Base Load Power Hub (BLPH)

Equipment Manufacturers Record Book – Complete
Hydrogen Vent KO Drum, TAG V-43001

Document Number: 1724000163-QC-DB-00013

Document Class: 2

04	15/07/2025	Accepted for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
03	12/05/2025	Accepted for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
02	07/03/2025	Issue for Review (IFR) after comments	M. Antolini	G. De Candia	E. Dall'Arche
01	25/02/2025	Issue for Review (IFR) after comments	M. Antolini	G. De Candia	E. Dall'Arche
00	20/12/2024	Issue for Review (IFR)	M. Antolini	G. De Candia	E. Dall'Arche
Rev.	Date	Description	Prepared	Reviewed	Approved

C.A.M.P.I. Srl
Ferrara - Italy

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

FORNITORE / SUPPLIER

C.A.M.P.I. Srl

DOSSIER TECNICO PED Vol. 1/1

PED TECHNICAL BOOK NR. **24003-MRB-01 rev.0**

PER / For: **HYDROGEN VENT KO DRUM**

ITEM: **V-43001**

NUMERO DI FABBRICA / SERIAL Nr. **24-003**

COMMESSA DEL FORNITORE /Supplier Job Number: **24003**

TIMBRO FORNITORE / Supplier Stamp: C.A.M.P.I. srl Partita IVA 01012380389 Via Diamantina, 15 I 44100 FERRARA

FORNITORE / Supplier Q.C. Signature: Antolini M.

PROJECT: HOLLANDE KUST NOORD WIND PARK
SITE: Netherlands

CLIENT: Rosetti Marino S.p.A.
P.O.: 1724000163 –**CLIENT JOB:** 123A90

CONTROLLATO IL / CHECKED ON _____

DA / BY

ISPETTORE / INSPECTOR:

TÜV Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:

The present book is composed by ___ sheets marked from _1_ to ___

Base Load Power Hub (BLPH)

Equipment Manufacturer Record Book (Final dossier) – Index
Hydrogen Vent KO Drum, TAG V-43001

Document Number: 1724000163-QC-LIS-00012

ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED

NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.

Sign	Date
ROSETTI MARINO S.p.A. Stefano Lloyd Quality Control Dept.	07/11/24

Document Class: 2

Rev.	Date	Description	Prepared	Reviewed	Approved
02	10/10/2024	Accepted for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
01	16/09/2024	Accepted for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
00	08/05/2024	Issue for Review (IFR)	M. Antolini	G. De Candia	E. Dall'Arche

C.A.M.P.I. Srl
Ferrara - Italy

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

Indice Sezioni /Section Index

C.A.M.P.I. Srl
Ferrara

Cliente / Purchaser: Rosetti Marino S.p.A.	Ordine N. / *Order No.:* 1724000163
Progetto / Project: HOLLANDE KUST NOORD WIND PARK – Netherlands	
Commessa CAMPI / *Mfr's Works No.:* 24003 Commessa Cliente / Client Job: 123A90	Disegno Nr. / *Drawing n°:* 24003-VE-10
Apparecchio / *Equipment:* HYDROGEN VENT KO DRUM	*Item / Mark:* V-43001
	N. Fabbrica / *Serial No.:* 24-003

Sez.	CERTIFICATION DOSSIER			Volume
1	**RELEASE CERTIFICATE**	1.1	*Manufacturer Declaration of Conformity*	**1 of 2**
		1.2	*Final Inspection Report + weight certificate*	**1 of 2**
2	**INSPECTION and TEST PLAN**			**1 of 2**
3	**MATERIALS**	3.1	*Material Identification Sketch*	**1 of 2**
		3.2	*Summary of Materials Certificate & Certificates*	**1 of 2**
		3.3	*Filler metal certificate*	**1 of 2**
4	**NDE OPERATOR'S QUALIFICATION**	4	*List of NDE Examiner & qualification*	**1 of 2**
5	**NDE EXAMINATION & TEST**	5.1	*Radiographic/UT examination reports and location*	**1 of 2**
		5.2	*Magnetic Particle / Liquid Penetrant examination reports*	**1 of 2**
		5.3	*Visual examination reports*	**1 of 2**
		5.4	*Dimensional examination report*	**1 of 2**
		5.5	*PWHT procedure and PWHT diagram check records*	**1 of 2**
6	**LEAK TESTING**	6.1	*Hydro test certificate & manometers + Water analysis certificate*	**1 of 2**
		6.2	*Pneumatic test certificate for reinf. PAD & manometers*	**1 of 2**
7	**PAINTING**	7	*Painting reports*	**1 of 2**
8	**NAMEPLATE**	8	*Name plate copy/photo*	**1 of 2**
9	**NON CONFORMITY**			**1 of 2**
Sez.	DESIGN DOSSIER			Volume
1A	**DRAWINGS & ENGINEERING**	1A.1	*Welding Book – WPQR-WPS–WPQ*	**2 of 2**
		1A.2	*Mechanical Calculation*	**2 of 2**
		1A.3	*Drawing*	**2 of 2**
		1A.4	*Risk analysis & Essential Safety Requirements check list*	**2 of 2**
		1A.5	*Instruction & Operating Manual*	**2 of 2**

Data 16-September-2024 Ferrara	**C.A.M.P.I. Srl** Ufficio Collaudi/Qualità Quality department C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date Signature	***Inspector Purchaser*** Ispettore Cliente	***Inspector*** / Ispettore

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 1

RELEASE CERTIFICATE

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 1.1

Manufacturer Declaration of Conformity

C.A.M.P.I. srl Ferrara (Italy)	CERTIFICATE OF CONFORMITY CERTIFICAT DE CONFORMITE HERSTELLERERKLÄRUNG CERTIFICATO DI CONFORMITA'

Plant / Installation / Anlage Client Job: 123A90A Project: Hollande Kust Noord Wind Park Site: Netherlands	Ordine / Order / Commande / Bestellung **1724000163** C.A.M.P.I. Job No. / No. / Nr. **24003** Supplement / Avenant / Nachtrag **/** Item No. / Repère / Positions-Nr. **V-43001** Numero di fabbrica / Serial No: **24-003**

Fabbricante / Manufacturer / Fabricant / Hersteller:
C.A.M.P.I. srl

Indirizzo / Address / Adresse / Anschrift:
Via Diamantina No. 15 – 44122 FERRARA (ITALY)

Ordine N° / Order No. / No. de com. / Komm.-Nr.:
Rosetti Marino S.p.A. n° 1724000163

Descrizione Apparecchiatura / Nomenclature of equipment / Nomenclature d'équipment / Benennung der Ausrüstung:
Hydrogen Vento K.O. Drum

Quantità / Quantity / Quantité / Anzahl : **1**

N° di fabbrica / Serial No. / No. de série / Fabrik-Nr.:
24-003

Anno di fabbricazione / Year of manufacture / Année de fabrication / Baujahr:
2024

Tipo / Type / Type / Typ :
Vertical

Disegno n° / Drawing No. / Plan No. / Zeichnungs-Nr.:
24003-VE-10 Rev.04

With regard to the construction and materials used, the quality of the equipment is in conformity with the latest technical specifications including the approved drawings and standard engineering practices as well as all with the conditions of the contract signed with Rosetti Marino S.p.A.

Au niveau de l'exécution et des matériaux utilisés, la qualité de l'équipement répond aux dernières spécifications techniques en vigueur, comprenant les plans approuvés, les réglementations reconnues propres à l'ingénierie ainsi que l'ensemble des conditions attachées au contrat passé avec l'entreprise Rosetti Marino S.p.A.

Die Qualität der Ausrüstung entspricht hinsichtlich der Ausführung und den verwendeten Werkstoffen den letztgültigen technischen Spezifikationen, einschließlich den genehmigten Zeichnungen und dem Stand der Technik, sowie allen Bedingungen des Vertrages mit der Firma Rosetti Marino S.p.A.

Per quanto riguarda la costruzione ed i materiali utilizzati, la qualità del componente è conforme alle più recenti specifiche tecniche, inclusi i disegni approvati, le pratiche di ingegneria standard e le condizioni del contratto firmato con ENI S.p.A.

FERRARA Luogo / Place Lieu / Ort	**04-October-2024** Data / Date Date / Datum	Firma / Signature Rechtsverbindliche Unterschrift	**C.A.M.P.I. srl** Partita IVA 01042580389 Via Diamantina, 15 I - 44122 FERRARA Timbro Fabbricante Manufacturer's stamp Cachet du fabricant Firmenstempel

C.A.M.P.I. Srl
Via Diamantina, 15 - 44122 Ferrara

Dichiarazione di Conformità UE n°24003-01 rev0
(ai sensi dell'Allegato IV della Direttiva Europea 2014/68/UE)

La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante

Descrizione dell'attrezzatura a pressione costruita:

A.

Oggetto della dichiarazione: V-43001 Hydrogen Vent K.O. Drum

Numero di fabbrica:	Nr. progetto o disegno	Famiglia	Tipo
24-003	Disegno 24003-VE-10 Rev.04	Serbatoio	Verticale

B.

CAMERA		Pressione massima di esercizio Barg	Temperatura minima e massima di esercizio (TS) °C	Stato fisico	Capacità / DN Litri
Nr	Descrizione				
1	Mantello / Shell	3,5	-29 / +80	Idrogeno (Hydrogen) / Acqua (Water) – 1/2 – Gas+Liquido (Liquid)	700 lt
2					
3					
4					

C. Procedura/e di valutazione di conformità utilizzata/e (rif. allegati II e III della 2014/68/UE): Categoria/Modulo: **IV / G**

D. Numero, nome ed indirizzo dell'Organismo Notificato incaricato della valutazione di conformità e dell'Organismo Notificato incaricato della eventuale sorveglianza del sistema di qualità:
TÜV Italia S.r.l. – Via Carducci,125 • 20099 Sesto San Giovanni (MI) – Organismo Notificato n° **0948**

E. Estremi dell'eventuale "Attestato di esame CE del Tipo" o della "Progettazione": **DA-PED-2024-722358671-0001**

F. Estremi dell'Attestato di Conformità rilasciato dall'Organismo Notificato incaricato della procedura di valutazione di cui al punto C:

G. L'oggetto della dichiarazione di cui sopra è conforme alla pertinente normativa di armonizzazione dell'unione: **Direttiva 2014/68/UE**

H. Norme armonizzate e non armonizzate applicate alla progettazione ed alla costruzione: ASME VIII Div.1 Ed.2023 / ASME IX / EN 15614-1 / ASME II parte A / ISO 9606-1 / ISO 14732 / EN10204:2004 / EN ISO 9712 / EN17636-1 / EN10675-1 / ISO 3452-1 / EN 23277 / ISO17637 / ISO5817

I. Eventuali altre Direttive europee applicate all'attrezzatura: /

Per quanto sopra esposto,

si dichiara

che l'attrezzatura a pressione descritta nei punti A e B e verificata in accordo ai punti C, E, F, G, H, soddisfa i requisiti essenziali di sicurezza previsti nell'allegato I della Direttiva 2014/68/UE e ad essa applicabili.
Si dichiara inoltre che l'attrezzatura è stata sottoposta con esito favorevole a prova di pressione idrostatica di 5 Bar per il mantello e che è stata marcata con i seguenti dati:

N.F.: 24-003 / ITEM: V-43001

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

Firmato a nome di

Ferrara, li 04-October-2024

Amministratore Delegato
Ing. Enrico Dall'Arche
Firma

DECLARATION OF CONFORMITY
(in accordance with Annex IV of European Directive 2014/68/UE)

Description of the manufactured pressure equipment:

A. Definition – Serial No. – Project code/ Drawing no. – Family – Type
B. Chamber–Max. operating pressure–Min. and max operating temperature–Medium–Capacity–No.–Description
C. Conformity assessment procedure(s) used – Module(s) - (ref. Annex II and III of Directive 2014/68/UE)
D. Number, name and address of the Notified Body designated for the assessment of conformity and of the Notified Body designated to supervise the Quality Control System:
E. Details of the "Certificate of CE Examination of the Type" or of the "Design"
F. Details of the Certificate of Conformity issued by the Notified Body designated for the conformity assessment procedure as per point C.
G. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation
H. Harmonized and non-harmonized Codes applied to design and construction
I. Other European Directives applied to the equipment

For all the above, it is hereby declared that the pressure equipment described at points A and B and verified in accordance with points C, E, F, G, H, comply with the essential Safety Requirements foreseen in Annex I of Directive 2014/68/UE and applicable to the such equipment.
It is hereby likewise stated that the equipment was subjected to hydraulic pressure test at bar pressure for Shell Side and bar for the Tube Side with favourable results and that it was marked CE with the following data:
Serial no.
Place and date – Signature of responsible designated by Manufacturer

****

DECLARATION DE CONFORMITE
(aux sens de l'Annexe IV de la Directive Européenne 2014/68/UE)

Description de l'appareil à pression construit :

A. Définition – N. de fabrique – N. de projet ou plan – Famille – Type
B. Enceinte – Max. pression de service –Température min. et max. de service – Fluide – Capacité – Numéro – Description
C. Procédure de vérification de conformité utilisée – Formulaire(s) - (réf. Annexe II et III de la Directive 2014/68/UE)
D. Numéro, nom et adresse de l'Organisme Notifié en charge de la vérification de conformité et de l'Organisme Notifié en charge de l'éventuelle surveillance du Système de Qualité:
E. Détails de l'éventuel "Certificat de l'Examen CE du Type" ou du "Dessin"
F. Détails du Certificat de Conformité émis par l'Organisme Notifié en charge pour la procédure de vérification de conformité, voir point C.
G. L'objet de la déclaration décrite ci-dessus est conforme à la législation pertinente de l'Union en matière d'harmonisation
H. Codes harmonisés et non-harmonisés appliqués au dessin et à la construction:
I. Autres éventuelles Directives appliquées à l'appareil

Vu les points ci-dessus, on déclare que l'appareil à pression décrit dans les points A et B et vérifié selon les points C, E, F, G, H, est conforme aux règles essentielles de Sûreté prévues dans l'Annexe I de la Directive 2014/68/UE et applicables à l'appareil même.
On déclare en outre que l'appareil a été soumis à l'épreuve hydraulique de pression à une pression de bar pour la Calandre et de pour les Tubes avec des résultats favorables et qu'il a été marqué CE avec les suivants donnés :
N. de fabrique – Lieu et date – Signature du Responsable désigné par le Constructeur

****

KONFORMITÄTSERKLÄRUNG
(Anwendung der Anlagen IV der EG Richtlinie 2014/68/UE)

Beschreibung des herstellte Druckbehälters:

A. Objektart – Fabrik Nr. – Zeichnungsplan Nr. – Familie – Typ
B. Raum – Max. Betriebsüberdruck – Min. und Max. Betriebstemperatur – Flüssigkeit – Inhalt – Beschreibung
C. Verwendeter Anweisung für die Konformitätsbeurteilung – Formblatt - (Anlagen II und III von der Direktive 2014/68/UE
D. Nummer, Name und Adresse der Benannter Stelle, beauftragt für die Konformitätsbeurteilung und der Benannter Stelle, beauftragt für die Überwachung der Qualitätskontrolle.
E. Hauptdaten der "EG Prüfzertifikat des Typs„ oder der "Zeichnung„.
F. Hauptdaten des Konformitätszertifikats ausgestellt von den Benannten Stelle, beauftragt für die Anweisung der Konformitätsbeurteilung (sehen Punkt C).
G. Der Gegenstand der oben beschriebenen Erklärung steht im Einklang mit den einschlägigen Harmonisierungsvorschriften der Union
H. Standardisierte und nicht-standardisierte Normen angewandte zum Planung und Ausführung:
I. Andere eventuelle EG Direktiven angewandte zum Objektart:

Für alles oben angeführt, hiermit wird erklärt, dass den Druckbehälter, den in Punkten A und B beschreibt wird und nach den Punkten C, E, F, G, H beurteilt wurde, übereinstimmt mit den essentiellen Sicherheitsbestimmungen der Anlage I der Richtlinie 2014/68/UE.
Hiermit wird auch erklärt, dass den Druckbehälter unter einer Druckprüfung mit bar mantelseite und bar rohrseite gestellt wurde, die verlief ohne Beanstandung, und dass es wurde wie folgt EG-gestempelt:
Fabrik Nr. – Ort und Datum – Unterschrift der Prüfer beauftragt von Herstell

C.A.M.P.I. srl Ferrara (Italy)	**ISPEZIONI FINALI** *Final inspection Certificate* ACC TO EN 10204:2005 2.1	Certificato No. F.I. 24003-01 *Certificate no.* FOGLIO 1 DI 1 *Sheet of*

CLIENTE: Rosetti Marino S.p.A. *Customer*	ORDINE N.: 1724000163 *Order no.*	COMMESSA N. / *Job no.* 24003 (Client Job 123A90)
SIGLA E SERVIZIO: Item and Service V-43001 Hydrogen Vento K.O. Drum	N.F./ *Serial number:* 24-003	DISEGNO N- *Drawing n.* 24003-VE-10 rev.04 (1724000163-MAC-DA-00004 rev.04)
C.A.M.P.I ref.: 24003-ITP-01 rev.2 (1724000163-QC-ITP-00002 rev.02) Step 7-1, 7-2 & 7-5		

Si certifica che l'apparecchiatura sopra citata è stata sottoposta ad esame:

- **Identificazione dell'apparecchiature, targa dati**
- **Limite di fornitura, completezza ed ispezione finale**
- **Controllo visivo finale**
- **Controllo imballaggio**
- **Controllo marcatura**

We certify that the above mentioned equipment has been tested:

- *Equipment identification, name plate*
- *Quantity check and Completeness check*
- *Final visual inspection*
- *Packing check*
- *Marking check*

Allegato / Attached:
-Packing List / Packing List No.PL24003.1

Signor *Mr*	**A. Cerato**	**Ispettore per** *Inspector for*	**Rosetti Marino S.p.A.**

RISULTATO DELL'ESAME *EXAMINATION RESULTS*
SODDISFACENTE / Satisfactory

DATA / *Date*	**C.A.M.P.I. Srl** **QC Dept.**	**Ispettore Rosetti**	**Inspector**
04-October-2024	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 4/10/24 Signature	Quality Control Dept. Cerato Alex per Rosetti Marino SpA 04.10.2024	

C.A.M.P.I. S.r.l.

PACKING LIST

Shipping address and references

Job N° **24003**
Customer ROSETTI MARINO S.p.A.
Purch. Order N° 1724000163 123A90A
Project 123A90A - Base load power hub platform
Invoice N°
Invoice Date

Document N° **PL24003.1**
Revision **0**
Date 27.09.2024
Prepared by Segato Daniele

PACKAGE N°	TYPE of PACKING	DIMENSIONS (cm) LxPxH			VOLUME (m^3)	WEIGHTS (Kg) GROSS	WEIGHTS (Kg) NET	ITEM N°	MATERIAL DESCRIPTION
01	SADDLES	348	96	132	4,41	820	780	V-43001	Hydrogen ko drum
02	CARTON BOX	41	41	16	0,03	4	3		Commissioning and 2 years spare parts

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☑ Reviewed ☐
Date 04/10/24
Signature

Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
04.10.2024

2	TOTAL	4,44	824	783

C.A.M.P.I. S.r.l.

PACKING LIST

Job: **24003**

Shipping address and references:

Customer: ROSETTI MARINO S.p.A.

Purch. Order N°: 1724000163 123A90A

Plant: 123A90A - Base load power hub platform

Document N°: **PL24003.1** Date: 27.09.2024

Revision: **0** Prepared by: Segato Daniele

Invoice N°:

Invoice Date:

PACKAGE N°	Type of Packing	Dimensions (cm) LxPxH			Volume (m^3)	Gross Weight (Kg)	Net Weight (Kg)
01	SADDLES	348	96	132	4,4	820	780

PACKING LIST POSITION	ITEM N°	Quantity	MATERIAL DESCRIPTION	Purch. Order POS.	Drawing N°
1	V-43001	1 pc	Hydrogen KO drum complete with blind flanges	10	24003-VE-10 (1724000163-MAC-DA-00004)

Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
08.10.2024

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☒ Reviewed ☐
Date 04/10/24
Signature

C.A.M.P.I. S.r.l.

PACKING LIST

Job: **24003**

Shipping address and references:

Customer: ROSETTI MARINO S.p.A.

Purch. Order N°: 1724000163 123A90A

Plant: 123A90A - Base load power hub platform

Document N°: **PL24003.1** Date: 27.09.2024

Revision: **0** Prepared by: Segato Daniele

Invoice N°:

Invoice Date:

PACKAGE N°	Type of Packing	Dimensions (cm) LxWxH			Volume (m^3)	Gross Weight (Kg)	Net Weight (Kg)
02	CARTON BOX	41	41	16	0,0	4	3

PACKING LIST POSITION	ITEM N°	Quantity	MATERIAL DESCRIPTION	Purch. Order POS.	Drawing N°
			2 YEARS SPARE PARTS	20	24003-VE-10 (1724000163-MAC-DA-00004)
2		8 pcs	Gasket 6" #150 graphite for inspection ports H1-H2		
3		4 pcs	Stud bolt ¾"UNCx120 with 2 nuts and 2 plan washers for inspection ports H1-H2		
			COMMISSIONING SPARE PARTS	30	24003-VE-10 (1724000163-MAC-DA-00004)
4		4 pcs	Gasket 6" #150 graphite for inspection ports H1-H2		
5		2 pcs	Stud bolt ¾"UNCx120 with 2 nuts and 2 plan washers for inspection ports H1-H2		

Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
04.10.2024

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☒ Reviewed ☐
Date 4/10/24
Signature

C.A.M.P.I. srl Ferrara (Italy)	VERBALE DI PESATURA *Weight Report* ACC TO EN 10204:2005 2.1	Certificato No. F.I. 24003-WEI-01 *Certificate no.* FOGLIO 1 DI 1 *Sheet of*

CLIENTE: Rosetti Marino S.p.A. *Customer*	ORDINE N.: 1724000163 *Order no.*	COMMESSA N. / *Job no.* 24003 (Client Job 123A90)
SIGLA E SERVIZIO: Item and Service V-43001 Hydrogen Vento K.O. Drum	N.F./ *Serial number:* 24-003	DISEGNO N- *Drawing n.* 24003-VE-10 rev.04 (1724000163-MAC-DA-00004 rev.04)
C.A.M.P.I ref.: 24003-ITP-01 rev.2 (1724000163-QC-ITP-00002 rev.02) Step 7-2		

Si certifica che l'apparecchiatura sopra citata è stata sottoposta ad esame:

- **Controllo del peso: risultato 671,5 Kg**

We certify that the above mentioned equipment has been tested:

- *Weight Check: result 671,5 Kg*

Signor *Mr*		**Ispettore per** *Inspector for*	

RISULTATO DELL'ESAME *EXAMINATION RESULTS*
SODDISFACENTE / Satisfactory

DATA / *Date* ***04-October-2024***	**C.A.M.P.I. Srl** **QC Dept.** C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 4/10/24 Signature	**Ispettore Rosetti**	**Inspector**

STROPS®
SOLLEVAMENTO & ANCORAGGIO

ATTESTAZIONE "CE" DI CONFORMITA' Nr 1502209 del 22/02/2023

DESCRIZIONE ARTICOLO

Ns articolo
OMEGA/TRIPLO/3500 DINAMOMETRO TRIPLA SCALA T.3,5

Quantita'
N 1

Lotto: numero e data

Matricola
100535465

Descrizione
DINAMOMETRO ELETTRONICO CON TRE SCALE DI LETTURA
PORTATA MAX : KG. 3.500
SENSIBILITA' : KG.2
PRECISIONE: +/- 0,03% SU FONDO SCALA
MATRICOLE GRILLI: 0952/0951

DIRETTIVA 2014/30 EU EMC EN 61000-6-2/2005 61000-6-4/2007
61326-1/2013 EN 55011/2009 DIRETTIVA 2014/35/EU EN 61010-1/2010
.

DICHIARAZIONE "CE" DI CONFORMITA': Si dichiara che l'articolo sopra descritto e' conforme alle direttive 2006/42/CE recepita con D.LGS. 17/2010

La persona autorizzata a costituire il Fascicolo Tecnico e'il Sig.P.Cerutti
.
San Mauro Torinese:22/02/2023

Strops s.r.l.
(P. Cerutti)

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date 04/10/24
Signature

ww.bielle.it licenza d'uso rilasciata a STROPS SRL

TÜV SÜD
Italia

Aggiungi valore.
Ispira fiducia.

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 081B
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

TÜV Italia srl · Viale Fulvio Testi, 280/6 · I-20126 MILANO
Organismo Notificato per la PED (2014/68/UE) n. 0948

Spett.le

C.A.M.P.I. S.r.l.
Via Diamantina, 15
44122 - FERRARA

Alla c.a. Egr. Sig. Antolini

Rif. Modulo	Nostro rif.	E-Mail	Data	Pagina
PPE-02-M023_r11 del 27/12/2021	Gilberto Bovi	gilberto.bovi@tuvsud.com	17/09/2024	1 di 3

Oggetto: *VERIFICA DEL DISEGNO – PROGETTO*

DA-PED-2024-722358671-0001
Ns. Commessa: 722358671

Esame ed approvazione del progetto dell'apparecchio in pressione denominato " Serbatoio acqua/idrogeno" S.N.24-003 relativo al disegno :

N. 24003-VE-10 Rev.4

Dati dell'apparecchio in pressione

Pressione di progetto.....:	3,5 bar
Temperatura di progetto..... :	-29/80°C
Sovraspessore di corrosione.....:	1 mm
Fluido contenuto.....:	Idrogeno/Acqua (Gas Gr.1/Liquido Gr.2)
Categoria PED..... :	IV
Modulo di certificazione PED..... :	G

Egregi Signori,

con riferimento al Vostro ordine abbiamo esaminato la documentazione di progetto per l'approvazione degli apparecchi in pressione secondo il **Modulo G** della direttiva sulle attrezzature a pressione 2014/68/UE (PED) :

- Disegno N. 24003-VE-10 Rev.4
- Analisi dei rischi
- Rapporto di calcolo in condizioni di progetto e prova idraulica
- Particular Material Appraisal

Le normative tecniche utilizzate sono:

- ASME Sezione VIII Div.1 ED.2023

come specificato nel Vostro ordine.

IL PROGETTO SI CONSIDERA APPROVATO.

Dal nostro esame vi comunichiamo le seguenti risultanze:

- Le norme armonizzate relative all'Art. 12 della PED non sono state applicate.
- Eventuali indicazioni su documenti esaminati andranno opportunamente rispettate.
- Tutti i materiali utilizzati devono soddisfare i requisiti minimi dell'Allegato I p.to 7.5 della PED (27 J di resilienza alla minima temperatura di esercizio, 14% di allungamento)
- Le procedure per le saldature, e la qualificazione del personale addetto alla saldatura in base al punto 3.1.2 . dell'allegato I e le qualifiche del personale per prove non distruttive in base al punto 3.1.3 dell'allegato I e in conformità con le indicazioni contenute nel Codice applicato devono essere verificate.
- Deviazioni, aggiunte o esclusioni dalla specifica tecnica sopracitata : la resistenza ai carichi localizzati sui bocchelli è stata verificata utilizzando il WRC Bulletin 537.
- Procedure e/o specifiche tecniche non standard utilizzate: nessuna
- E' stato eseguito un review della analisi dei pericoli e dei rischi.

Note addizionali:

1) *Non è stata esaminata la conformità del progetto ai requisiti previsti dalla PED - Annex I in materia di:*
   - *incendio di origine esterna;*
   - *sollecitazioni dovute a traffico, terremoti, neve e vento;*
   - *forze e momenti di reazione provocati da sostegni, collegamenti, tubazioni ecc.;*
   - *sollecitazioni termiche;*
   - *erosione, fatica, decomposizione dei fluidi instabili.*

Tale conformità deve comunque essere ottenuta, qualora applicabile, mediante vari mezzi (per alcuni dei requisiti suddetti potrebbe essere sufficiente un'adeguata installazione).

2) *L'iter per accedere alla certificazione finale (preparazione dei documenti, modalità delle prove ecc.) dovrà essere preventivamente concordato con il ns. personale ispettivo.*

3) *La costruzione ed i test (saldature, controlli distruttivi e non distruttivi, trattamenti termici dopo saldatura o dopo formatura qualora richiesti) devono essere realizzati in conformità alla direttiva 2014/68/UE e secondo le prescrizioni riportate nel codice di calcolo adottato.*

   La mappa delle saldature ed i trattamenti termici, qualora richiesti, dovranno essere approvati in sede di verifica del disegno/progetto.

   Le saldature (welding book), i controlli distruttivi e non distruttivi, i report dei trattamenti termici dopo saldatura o dopo formatura, qualora richiesti, dovranno essere verificati in sede di collaudo finale.

4) *Tutti i materiali, esclusi i materiali senza transizione duttile / fragile, devono essere provati, quando applicabile, in accordo ai valori di resilienza previsti dalla normativa (vedi osservazioni iniziali).*

5) *Tutti i fornitori/costruttori dei materiali certificati 3.1 devono soddisfare i requisiti previsti al punto 4.3 dell'Allegato I della PED. Accertare tali requisiti nella certificazione dei Vostri fornitori/costruttori.*

6) *Durante l'ispezione finale saranno verificati /presenziati/approvati, ove applicabile (modulo B,F,G):*

- *i controlli non distruttivi e le eventuali prove eseguite su talloni di produzione;*
- *le Particular Material Appraisal (PMA) dei materiali approvate in sede di verifica del disegno/progetto (presenti nel caso di utilizzo di materiali secondo norme non armonizzate);*
- *le Qualifiche di Procedimento di Saldatura (WPQR);*
- *le qualifiche dei saldatori;*
- *i certificati di qualifica del personale addetto ai controlli non distruttivi;*
- **copia delle dichiarazioni di conformità e dei manuali d' uso dei componenti installati;*
- *il manuale di uso e manutenzione e la dichiarazione di conformità dell'insieme (nella dichiarazione di conformità e nel manuale di uso e manutenzione la normativa tecnica utilizzata deve essere menzionata) ;*
- *i dati sulla targa conformi ai dati di progetto ed ai requisiti della Direttiva PED*

Una copia dei disegni sarà trattenuta per la nostra documentazione.

Tutte le informazioni richieste devono essere presentate durante l'ispezione finale e devono essere prodotte per la certificazione del processo.

I risultati di tale esame sono validi solo per i documenti allegati.

La riproduzione del presente rapporto, eccetto che per una copia completa, richiede la nostra esplicita approvazione scritta.

Cordiali saluti

TÜV Italia Srl Industrie Service 09 48 Notified Body

TÜV Italia S.r.l.

Organismo Notificato 0948

Nota: eventuali ricorsi ai risultati dell'esame riportati in questo documento possono essere presentati – in forma scritta o verbale – al nostro dipartimento.

C.A.M.P.I. srl
Ferrara (Italy)

SEZIONE / Section 2

INSPECTION & TEST PLAN

Base Load Power Hub (BLPH)

INSPECTION and TEST PLAN
Hydrogen Vent KO Drum, TAG V-43001

Document Number: 1724000163-QC-ITP-00002

ROSETTI MARINO	
1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED
NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.	
Sign	Date
ROSETTI MARINO S.p.A.	06/08/2024

Document Class: 2

02	27/06/2024	Accepted for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
01	23/04/2024	Accepted for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
00	06/03/2024	Issue for Review (IFR)	M. Antolini	G. De Candia	E. Dall'Arche
Rev.	Date	Description	Prepared	Reviewed	Approved

C.A.M.P.I. Srl
Ferrara - Italy

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

C.A.M.P.I. Srl Ferrara - Italy	Progetto/ *Project:* HOLLANDE KUST NOORD WIND PARK – Netherlands		
	Cliente / *Client* : ROSETTI MARINO S.p.A.		
	Commessa C.A.M.P.I. / C.A.M.P.I. *Job* 24003	Documento. n° / *Document n°* **24003-ITP-01**	Pag. di *Sh. 1 of 10*

Oggetto: *Subject:* HYDROGEN VENT TO K.O. DRUM S.N 24-003 / ITEM : V-43001
PED Category IV Modulo G

Ordine: *Purchase Order:* 1724000163

Comm. Cliente: *Client Job:* 123A90

Descrizione: *Description:* **INSPECTION and TEST PLAN**

FASE / STAGE	FASE DI FABBRICAZIONE E CONTROLLO Fabrication and control stage	Da pag /a pag Sh to sh
1	Controllo documentazione / Documents review	2÷3
2	Controllo prima dell'assemblaggio / Check before assembly	3÷4
3	Fabbricazione mantello e bocchelli prima del Trattamento Termico / Fabrication of shell and nozzle before PWHT	4÷7
4	Trattamento Termico / PWHT	7
5	Collaudi finali dopo trattamento termico / Final Test after PWHT	7÷9
6	Verniciatura / Painting	9
7	Ispezioni finali / Final Inspection	10
	Attachment-1 painting inspection activity / Allegato-1 attività di controllo sulla verniciatura	11

A = Approvazione docum. o specifica / Approval of document or specifications
R = Controllo della documentazione a cura dell'Ispettore / Documentation review by Inspector
SW = Ispezione a spot durante la fabbricazione / Random inspection during fabrication - Notification not requested
W = Verifica da parte dell'Ispettore - richiesta notifica 7 giorni prima / Witnessed by Inspector - Notification requested 7 calendar day in advance
H = Punto fermo - richiesta notifica 7 prima / Hold point - Notification requested 7 calendar day in advance
C = Controllo a cura del costruttore / Review by the constructor
M = Monitoraggio / Monitoring

Legend/Leggenda: EPC=CrossWind

RISERVATO AL CLIENTE:
Customer reserved:

PCQ di riferimento Cliente n°:
Ref. Client Inspection and Test Plan (IDS) No.:

Rev.	Data / *Date*	Redatto da *Prepared by*	*Approvazione Approval*	*Approvazione Approval*	Descrizione / *Description*
3					
2	27-June-2024	C.A.M.P.I. srl M. Antolini	E. Dall'Arche		Up-dated where indicated / Aggiornato dove indicato
1	23-April-2024	M. Antolini	E. Dall'Arche		Issue for Review / Emesso per Verifica
0	01-March-2024	M. Antolini	E. Dall'Arche		Issue for Review / Emesso per Verifica

Rev. 1 2 **3** 4 5 6

EXHIBIT 5-1

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 2 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
1	**Documents review / Controllo documentazione**											
1-1	Drawing check *Verifica disegno*	24003-VE-10 1724000163-MAC-DA-00004	ASME VIII div.1 Ed.2023	H		R		R		A		
1-2	Calculation check *Controllo Calcoli*	24003-MC-10 1724000163-MAC-CA-00003	ASME VIII div.1 Ed.2023	H		R		R		A		
1-3	Risk Analysis *Analisi dei rischi*	PED 2014/68/UE	PED 2014/68/UE	H		/		/		R		
1-4	Safety requirements *Requisiti di sicurezza*	PED 2014/68/UE	PED 2014/68/UE	H		/		/		R		
1-5	IOM Instruction Operating Manual *Istruzioni operative / Manuale*	PED 2014/68/UE	PED 2014/68/UE	H		/		/		R	09 48	
1-6	Welding Documents *Specifiche di saldatura (WPS+PQR)*	24003-WD-01 1724000163-WEL-LIS-00011	ASME IX Ed.2023	H		R		R		A		
1-7	Welding Operator Qualification Record *Qualifiche saldatori (WPQ)*	WL 24003-01	ASME IX Ed.2023	H		R		R		R		
1-8	List of NDE operator *Qualifiche operatori CND*	OL 24003-01 1724000163-NDT-LIS-00009	ISO9712 Level II, Min.	H		R		R		R		
1-9	NDE procedure review *Verifica procedure CND*	24003-NDE-01 1724000163-NDT-PRO-00008	ASME VIII div.1 Ed.2023	R		R		R		R		

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 3 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
1-10	Test pressure procedure review *Verifica procedure di collaudo*	IO-PT206AS ❶1724000163-QC-PRO-00010	ASME VIII div.1 Ed.2023 + PED	R		R		R		R		
1-11	PWHT procedure *Procedura per trattamento termico*	24003-PWHT-01	ASME VIII div.1 Ed.2023	R		R		R		R		
1-12	MTC for pressure components *Certificati materiali parti in pressione*	ASME II part.A/B	ASME II part.A/B + EN 10204 3.1 / Ceq. Max 0,35%	R	02/09/24	R		R		R		3.1
1-13	Filler metal certificate *Materiali d'apporto*	ASME II part.C	ASME II part.C + EN 10204 3.1 for chemical & 2.2 for mechanical	R	02/09/24	R		R		R		
1-14	Forming head procedure *Procedura di formatura fondi*	Manufacturer Std	ASME VIII div.1 Ed.2023	R		R ❶		R		/		
1-15	Hardness Test Procedure *Procedura di misurazione durezze*	24003-HRD-01	ASME VIII div.1 Ed.2023	R		R		R		/		
2	**Check before assembling / Controlli prima dell'assemblaggio**											
2-1	Incoming material check (test report, eg HIC Test as per 15156+❶MTC) *Verifica materiale al ricevimento (verbali di collaudo, es. HIC test secono 15156+❶Certificati materiali)*	Manufacturer procedure	ASME VIII div.1 Ed.2023	H	30/05/24	/		/		/		ARCELOR MITTAL N°223-12424
2-2	Identification and marking transfer *Identificazione e trasporto punzoni*	Manufacturer procedure	ASME VIII div.1 Ed.2023	H	02/09/24	R		R		R		

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 4 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
2-3	Check of formed heads (dimensional, thickness..) *Controllo fondi formati (dim., spessore..)*	Construction drawing	Construction dwg + ASME VIII Div.1 Ed.23 UG 81	H	12/07/24	R		R		R		SIFEA n° 2024-027
2-4	100% Visual check and PT/MT on knukcle areas (external side) / *Controllo visivo al 100% e PT/MT su area ginocchio (lato esterno)*	ASME V Ed.23 art.7 or 6 + Procedure 24003-NDE	ASME VIII div.1 Ed.23 app.6 or 8 + 24003-NDE	H	12/07/24	W		W		/		The test can be performed by head manufacturer VT 041/24 LP 076/24 MT 053/24
2-5	Production Weld Test Coupon (❶see step 5-1 for detail) *Saldatura Tallone/i di Produzione (❶vedi fase 5-1 per I dettagli)*	Tech. Spec. 123A90-DDL-MAC-SP-50026 par. 4.12	Tech. Spec. 123A90-DDL-MAC-SP-50026 par. 4.12	H		R		R		/		To be done during Shell welds / da fare durante saldatura mantello
3	**Shell and nozzle assembling and activity before PWHT / Montaggio mantello e bocchelli e attività prima del trattamento termico**											
3-1	Check of shell fit-up before welding *Controllo preparazione cianfrini mantello prima della saldatura*	WPS + Dwg ❶1724000163-MAC-DA-00004	WPS + Construction Drawing	H		/		/		/		
3-2	Shell thickness check *Controllo spessore mantello*	Construction dwg ❶1724000163-MAC-DA-00004	Dwg + ASME VIII Div.1 Ed.23 UG 81	H		R		R		R		
3-3 ❷	Longitudinal & Circumferential welds and Flange-pipe welds (Joint Category "C") with thk. ≥10mm 100% UT examination *UT al 100% su saldature Longitudinali e Circonferenziali e saldatura tubo-flangia bocchelli con spessore ≥10mm*	ASME V art.4 + Procedure ND104AS rev.4	ASME VIII div.1 Ed.23 app.12 + Pro. ND104AS rev.4	H	09/09/24	R	Quality Control Dept. Cerullo Alex per Rosetti Marino SpA 09.09.2024	W ❶		R		STRAP V.T. n° UT-150-01-24

Rev. 1 2 3 4 5 6

EXHIBIT 5-1

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 5 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
3-3A ❶	Weld repairs pre PWHT (if any) *Riparazioni saldature prima del Trattamento Termico (se esistenti)*	ASME V art.2 + Procedure 24003-NDE	ASME VIII div.1 Ed.2023 par.UW52/51 + 24003-NDE	H	09/09/24	R	Quality Control Dept Cerullo Alex per Rosetti Marino SpA 09/09/24	W		R	09 48 07/10/24	No REPAIR
3-4	Check of shell tracing before drilling *Controllo tracciatura prima della foratura*	Construction Dwg ❶1724000163-MAC-DA-00004	Construction Drawing	H		/		/		/		
3-5	Nozzle and accessories prefabrication assembling & welding *Assemblaggio e saldatura bocchelli e accessori*	WPS + Construction Dwg ❶1724000163-MAC-DA-00004	WPS + Construction Ddrawing	H		/		/		/		
3-6	Nozzle opening bevels check *Controllo cianfrini per connessioni*	WPS + Construction Dwg ❶1724000163-MAC-DA-00004	Appl. WPS + Construction Drawing	H		/		/		/		
3-7	Nozzle on shell assembling & welding *Assemblaggio e saldatura bocchelli su mantello*	WPS + Construction Dwg ❶1724000163-MAC-DA-00004	WPS + Construction Ddrawing	H		/		/		/		
3-8	Nozzle on heads assembling & welding *Assemblaggio e saldatura bocchelli su mantello*	WPS + Construction Dwg ❶1724000163-MAC-DA-00004	WPS + Construction Ddrawing	H		/		/		/		

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 6 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
3-9	Accessories fabrication and welding (lugs, support skirt,/legs, insulation supports etc) Fabbricazione e saldatura parti accessorie (golfari, supporti serbatoio, supporti coibentazione etc.)	WPS + Construction Dwg ❶1724000163-MAC-DA-00004	WPS + Construction Ddrawing	H		/		/		/		
3-10	Pneumatic test of reinforced PAD at 0,5 Barg (7,25psi), ❶report will be issued *Prova di tenuta piastre di rinforzo a 0,5 Barg (7,25psi), ❶con emissione report*	CAMPI IO-PT207 ❶1724000163-QC-PRO-00010	ASME V Ed.2023 Art.10	H	05/09/24	R		R		/		BT 24003-01
3-11	Internal visual & dimensional exam. and cleaning check before PWHT *Controllo visivo e dimensionale interno e pulizia prima di trattamento termico*	CAMPI Procedure ND105AS rev.3	ASME V Ed.2023 Art.9	H	09/09/24	W	Quality Control Dept. Cerullo Alex 09.09.2024	W	Per Rosetti Marino SpA Quality Control Dept. Cerullo Alex 09.09.2024	H		Throught inspection nozzle H1 & H2 VT 24003-01
3-12	100% MT on welds before PWHT 100% MT *su saldature prima del trattamento termico*	ASME V Ed.23 art.7 + Procedure 24003-NDE	ASME VIII div.1 Ed.23 app.6 + 24003-NDE	H	09/09/24	R		W ❶		R		MT 24003-01 PT 24003-01
3-13	External visual and dimensional check before PWHT (❶Dimesional verification, Orientation, Levelness, Projection of nozzles) *Controllo visivo e dimensionale prima del trattamento termico (❶Verifica dimensionale, Orientamento, Planarità, Proiezione dei bocchelli)*	Drawing + Procedure ND106AS rev.0	Drawing + ASME VIII div.1 Ed.2023 + CAMPI Std. CTD-004/09 rev.0	H	09/09/24	W		W		R		DC 24003-01

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 7 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
Note ❶	No weld repair are ammitted after PWHT *Nessuna riparazionedi saldatura è ammessa dopo il Trattamento Termico*											
4	**Post Weld Heat Treatment / Trattamento Termico**											
4-1	Application of thermocouple on equipment and calibration certificates review. Equipment positioning in the furnace *Applicazione delle termocoppie, posizionamento apparecchio e verifica certificati di calibrazione*	Procedure 24003-PWHT + sub-supplier standard	Procedure 24003-PWHT + sub-supplier standard	H		R		R		/		At sub-supplier site
4-2	PWHT on vessel and PTP *Trattamento termico su serbatoio e talloni*	ASME VIII div.1 Ed.2023+ Procedure 24003-PWHT	ASME VIII div.1 Ed.2023+ Procedure 24003-PWHT	H	16/09/24	R		R		/		Recorded chart review TRATER n° 2024-09138/24 TT del 16/09/24
4-3	Hardness test after PWHT *Prove di durezza dopo il TT*	24003-HRD-01	24003-HRD-01 Max 235HV / 225HB	H	16/09/24	R		R		/		Internal side where possible TRATER n° 2024-09139
5	**Final Inspection and test after PWHT / Ispezioni e collaudi finali dopo trattamento termico**											
5-1	Mechanical Test on Production Test Coupon (❶tensile test at room temperature and charpy testing at -29°C, test in ISO 17025 accredited laboratory) *Prove meccaniche su Tallone/i di Produzione (❶prova di rottura a temperature ambiente e resilienze a -29°C, prove in laboratorio accreditato ISO17025)*	ASTM + Tech. Spec. 123A90-DDL-MAC-SP-50026 par. 4.12	ASTM + Tech. Spec. 123A90-DDL-MAC-SP-50026 par. 4.12	H	16/10/24	R		R		R		SIDERTEST n° PM 23983/24

Rev. 1 2 3 4 5 6

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 8 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
5-2	Longitudinal & Circumferential welds 10% RT examination (100% for cross) *RT al 10% su saldature Longitudinali e Circonferenziali*	ASME V art.2 + Procedure 24003-NDE	ASME VIII div.1 Ed.2023 par.UW52/51 + 24003-NDE	H	17/09/24	R		R		R		ST-010 Rev.11 n° RT-150-001_24
5-3	100% MT on welds 100% MT *su saldature*	ASME V Ed.23 art.7 + Procedure 24003-NDE	ASME VIII div.1 Ed.23 app.6 + 24003-NDE	H	17/09/24	R		R		R		MT 24003-02
5-4	External final visual and dimensional check (❶Dimesional verification, Orientation, Levelness, Projection of nozzles) *Controllo visivo e dimensionale finale (❶Verifica dimensionale, Orientamento, Planarità, Proiezione dei bocchelli)*	Dwg ❶1724000163-MAC-DA-00004 + Procedure ND106AS rev.0	Drawing + ASME VIII div.1 Ed.2023 + CAMPI Std. CTD-004/09 rev.0	H	18/09/24	W		W		W	09 48 18/9/24	As-built to be provided VT 24003-02 DC24003-02
5-5	Check of material marking *Verifica punzonatura materiali*	Summary of MTC	ASME VIII div.1 Ed.20231	H	18/09/24	W		W		W	18/9/24 09 48	
5-6	Hydrostatic test with water chloride content <50ppm ❶at 5barg for 1h *Prova idrostatica con acqua con contenuto di cloruri <50ppm ❶a 5barg per 1ora*	CAMPI Proc. IO-PT206AS ❶1724000163-QC-PRO-00010	ASME VIII div.1 Ed.2023 UG 99 no leakage	H	18/09/24	W		W		H	18/9/24 09 48	HT 24003-01

Rev. 1 2 3 4 5 6

EXHIBIT 5-1

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 9 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
5-7	Drying after hydrostatic test and drying *Asciugatura dopo prova idrostatica*	Common practice	Common practice	H	20/09/24	/		/		/		
5-8	100% PT examination on all weld after hydrostatic test *100% controlli PT su tutte le saldature dopo prova idrostatica*	ASME V Ed.23 art. 6 + Procedure 24003-NDE	ASME VIII div.1 Ed.23 app. 8 + 24003-NDE	H	18/09/24	W		W		R		PT 24003-9
5-9	Nameplate check *Controllo targa*	Drawing	Drawing	H	04/10/24	W	04.10.24	W		H	09 48 07/10/24	
6	**Painting / Verniciatura**											
6-1	Surface pre-blast check *Controllo superficie prima della sabbiatura*	24003-PP 301 1724000163-MAT-PRO-00007	2400-PP 301 + Client spec. 123A90-DDL-MAT-SP-60006	H		R		R		/		
6-2	Surface post-blast check, cleanliness and anchor profile check *Controllo pulizia e rugosità superficie dopo sabbiatura*	24003-PP 301 1724000163-MAT-PRO-00007	2400-PP 301 + Client spec. 123A90-DDL-MAT-SP-60006	H		R		R		/		
6-3	Visual inspection of finished coating *Controllo visivo finale verniciatura*	24003-PP 301 1724000163-MAT-PRO-00007	2400-PP 301 + Client spec. 123A90-DDL-MAT-SP-60006	H	04/10/24	R	04.10.24	R		/		24003/01
6-4	Check of dry film thickness and color *Controllo spessore e colore*	24003-PP 301 1724000163-MAT-PRO-00007	2400-PP 301 + Client spec. 123A90-DDL-MAT-SP-60006	H	04/10/24	W	04.10.24	W		/		This test can be performed during the final visual inspection 24003/01

Rev. 1 2 3 4 5 6

Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
04.10.2024

C.A.M.P.I. SRL Ferrara	Piano di controllo qualità n°: Inspection ant Test Plan n°: 24003-ITP-01	Oggetto / Object: HYDROGEN VENT K.O. DRUM	Rev n° 2	Data/Date 27-June-2024	Pagina di Sheet 10 of 10
Cliente / Customer: ROSETTI MARINO S.p.A.	Ordine n°/ Order n°: 1724000163	Impianto / Plant: HOLLANDE KUST NOORD WIND PARK	Sigla / Item: V-43001		Matric./Serial n° 24-003
Commessa CAMPI: CAMPI Job ref.: 24003	Codice o specifiche di riferimento / Reference code or specification: ASME VIII div.1 Ed.2023 + PED 2014/68/UE		Disegno n° / Drawing n° 24003-VE-10		

Fase Step	Fase di fabbricazione e Controllo Fabrication and control stage	Docum. di rif. Reference documents	Criteri di accettabilità Acceptance criteria	Punti di presenza / Key of attendant								Certificato n° / Note Certificate n° / Notes
				CAMPI		ROSETTI		EPC		No.Bo		
				Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	Cod. Key	Date Date	
				Firma / Sign.		Firma / Sign.		Firma / Sign.		Firma / Sign.		
7	**Final inspection / Ispezioni finali**											
7-1	Final visual inspection and completeness check before packing (Loose materiali check) *Controllo visivo finale e completezza fornitura prima dell'imballo (controllo parti sciolte)*	Order + packing list	Order + packing list	H	04/10/24	W	04.10.24	W		/		F.I. 24003-01
7-2	Weight Control *Controllo peso*	Drawing	Drawing	H	04/10/24	W	04.10.24	W		/		
7-3	Review of PED Technical Book *Verifica fascicolo Tecnico PED*	PED 2014/68/EU	Data Book index	H	07/10/24	R		R		W		
7-4	Manufacturer declaration of conformity *Dichiarazione di conformità fabbricante*	PED 2014/68/EU	PED 2014/68/EU Cat.IV Mod. G	H	04/10/24	R		R		R		
7-5	Packing and marking check *Controllo imballo e marcatura*	Marking template + packing list	Marking template + packing list	H	04/10/24	W	04.10.24	W		/		F.I. 24003-01
7-6 ❶	Issue Final documentation *Emissione Documentazione finale*	1724000163-QC-LIS-00012	1724000163-QC-LIS-00012	H	04/10/24	R		R		/		
7-7 ❶	Issue Inspection Release Note *Verbale di rilascio dell'ispezione*	P.O.	P.O.	W		H		R		/		

See Attachment-1 for painting inspection activity / Vedi allegato-1 per attività di controllo sulla verniciatura

Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
04.10.2024

Rev. 1 2 3 4 5 6

EXHIBIT 5-1

Attachment-1 of document 24003-QCP-01 / Allegato-1 del documento 24003-QCP-01

List of the test during external painting activity / Elenco controlli da fare durante la verniciatura esterna

Test / Prova	Reference Rules / Norma di riferimento	Frequency / Estensione test	Acceptance / Accettabilità	Required / Richiesto
Environmental condition / Condizioni ambientali	Ambient (air) temperature	Two times per shift / Due volte per turno	10÷40°C	Yes / Si
	Steel temperature		Min 3°C above dew point / Almeno 3°C sopra il dew point	Yes / Si
	Relative humidity		Max 85% (Min.50% for zinc primer application)	Yes / Si
Mechanical defects / Difetti meccanici	ISO 8501-3	100% of all surfaces / 100% di tutta la superficie	Grade P2 / Grado P2	Yes / Si
Contaminants / Contaminanti	Visual Check / Controllo Visivo	100% of all surfaces / 100% di tutta la superficie	No grease, oil and contaminants shall be present / Assenza di grassi, olii e contaminanti	Yes / Si
Cleanliness / Pulizia	ISO 8501-1	100% visual of all surfaces / 100% visivo di tutta la superficie	Sa XX as per paint system (eg. SA 2½) / Sa XX in accordo al sistema di verniciatura (Es. Sa 2½)	Yes / Si
Residual dust / Polvere residua	ISO 8502-3	Spot check	Max rating 2	Yes / Si
Roughness (Rz) / Rugosità	ISO 8503-1	Each component or once per 10m² / Ogni componente o ogni 10m²	40÷85 µm (or as per data sheet) for Carbon Steel / per acciaio carbonio 25÷40 µm for Stainless Steel / per acciaio inossidabile	Yes / Si
Salt test / Controllo Sali	ISO 8502-6 and ISO 8502-9	One per Item or per day of production / Uno per Item o per giorno di produzione	Max conductivity corresponding to 20 mg/m² (20µS/cm) as Chloride / Massima conduttività corrispondente a 20 mg/m² (20µS/cm) per Cloruri	Yes / Si
Wet film thickness check / Controllo film bagnato	ISO 2808	Spot check / Controllo a Spot	According to PDS / In accord a data sheet prodotto	Yes / Si
Visual examination of coating (each layer) / Controllo visivo verniciatura (ogni strato)	Coating defects, such as contamination, pinholes, popping, sagging etc. / Difetti di rivestimento, come contaminazione, fori, bolle, striature, colature etc.	100% visual of all surfaces / 100% visivo di tutta la superficie	No defect / Nessun difetto	Yes / Si
MEK Test (ESI-Ethyl Silicate Inorganic Zinc only) – MEK test solo su zinco inorganico	ASTM D4752	Each component or once per 100m² / Ogni componente o ogni 100m²	Rating 4 to 5	N.A.
Dry Film Thickness chek / Controllo spessore a secco	ISO 19840 (Gauge correction factors as per Table 2) / ISO 19840 (Fattore di correzione spessimetrico secondo la Tabell 2)	ISO 19840	Level 4 - Arithmetic average of DFTs not less then specifice (NDFT) / Livello 4 - media aritmetica delle misure non inferiore al minimo spessore nominale richiesto	Yes / Si
			No single DFT less than 80% of NDFT / nessuna singola misura inferiore al 80% del minimo spessore nominale richiesto	
			Max DFT as per PDS / Spessore massimo accettato secondo scheda prodotto	
Holiday test for Epoxy Phenolic only / Holyday test su Epossifenoliche	ISO 29601	100% of all surfaces / 100% di tutta la superficie	Low-Voltage Wet Sponge Test for thickness ≤ 500µm - No Pinholes / Test con spugna bagnata a bassa tensione per spessori fino a 500µm – Nessuna porosità	N.A.
Adhesion Test (pull-off) N.A. for Silicone Aluminum	ISO 4624 with hydraulic devices only / con solo dispositivo idraulico	One per system, per day (or lot) of production / Uno per ogni sistema, per giorno (o lotto) di produzione	Min. 5 MPa, unless otherwise declared by Product Data Sheet / Minimo 5 MPa se non diversamente dichiarato dal produttore	Yes / Si
Adhesion Test (X cross test) N.A. for Silicone Aluminum	ISO 2409	One per system, per day (or lot) of production / Uno per ogni sistema, per giorno (o lotto) di produzione	Class 2 Max is Required	N.A.

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 3

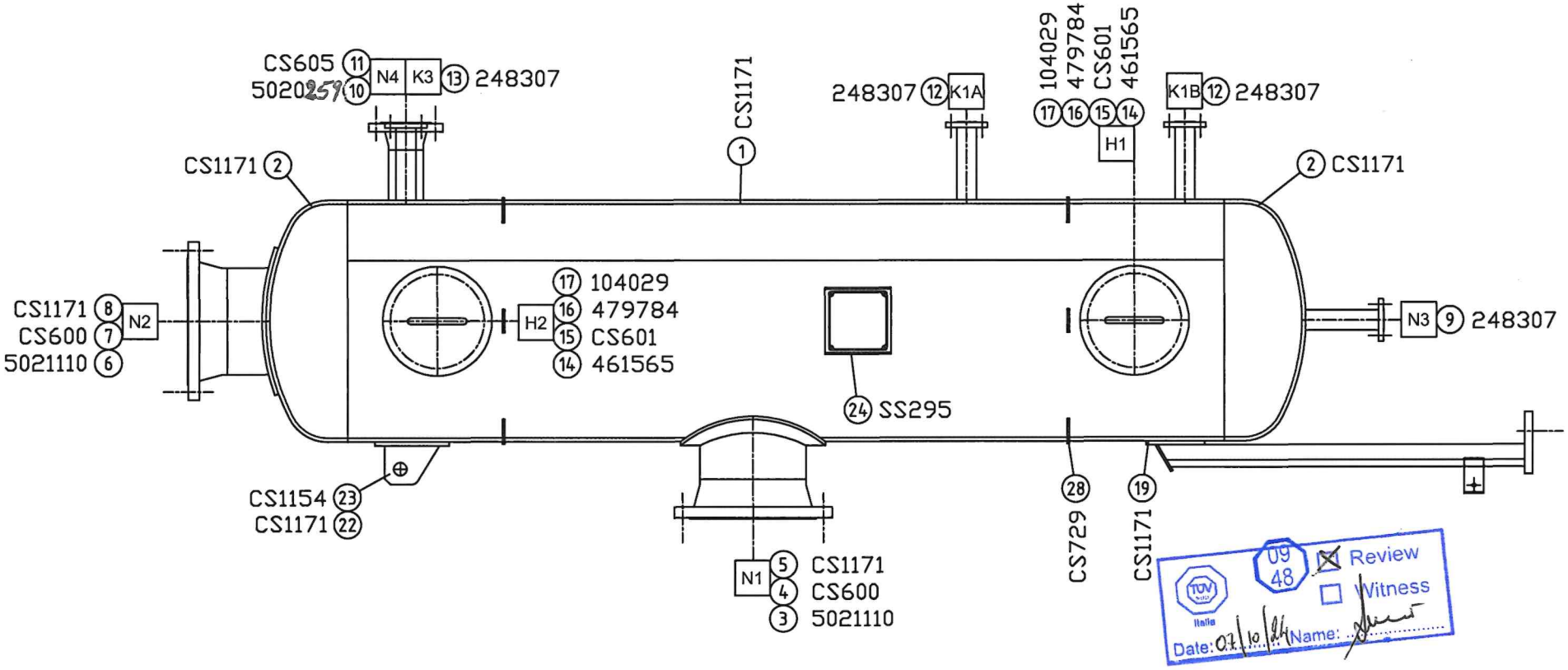
MATERIALS

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 3.1

Material Identification Sketch

C.A.M.P.I. Srl Ferrara (Italy)	**SCHEMA IDENTIFICAZIONE MATERIALI** ***Materials Identification Sketch***	Documento Nr: SK.Mat. 24003-001 *Document No:*

Cliente : ROSETTI MARINO S.p.A. *Client :*	Ordine : 1724000163 *Order :*	Apparecchio : HYDROGEN VENT KO DRUM *Equipment :*	
Commessa Nr : 24003 *Job No :*	Disegno Nr : 24003-VE-10 *Drawing No :*	Sigla : V-43001 *Item :*	Nr. Fabbrica : 24-003 *Serial No :*



Data : 29-August-2024 *Date :*	**C.A.M.P.I. Srl** Quality Control	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 29/8/24 Signature	Ispettore Cliente Inspector Purchaser	Ispettore Autorizzato Authorized Inspector

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 3.2

Summary of Material Certificate and Certificates

C.A.M.P.I. srl
Ferrara (Italy)

SUMMARY OF MATERIAL CERTIFICATES
Elenco dei Certificati Materiali

PURCHASER: ROSETTI MARINO S.p.A. Cliente	WORK JOB NUMBER: 24003 Commessa numero	DRAWING NUMBER: 24003-VE-10 Disegno numero
P.O. NUMBER: 1724000163 Ordine numero	ITEM: V-43001 Sigla	SERIAL NUMBER: 24-003 Numero di Fabbrica

DRAWING POSITION Posizione Disegno	DESCRIZIONE Description TYPE OF MATERIAL Tipo di materiale	THICKNESS Spessore SIZES Dimensioni	HEAT NUMBER Numero Colata TEST NUMBER Numero Prova	NAME OF SUPPLIER Nome del Fornitore	CERTIFICATE NO. Certificato n. TYPE Tipo	SH Pag.
VE-10 p. 1	Shell plate ASME SA 516 60 <=12.5	10 2500x1200	35773-CS1171 585474002	Arcelor Mittal	2023-124254 3.1	
p.2	Ellipsoidal head ASME SA 516 60 <=12.5	10 head id.600	35773-CS1171 585474002	Arcelor Mittal	2023-124254 3.1	
p.3	N1 Flange ASME SA 350 LF2	xs wn 10" 150	5021110	Ferrari Flange	2068 3.1	
p.4	N1 Pipe ASME SA 333 6	12,7 273 (10")	44480KN HC-CS600	Liberty Ostrava as	81240/22 3.1	
p.5	N1 Plate ASME SA 516 60 <=12.5	10 2500x1200	35773-CS1171 585474002	Arcelor Mittal	2023-124254 3.1	
p.6	N2 Flange ASME SA 350 LF2	xs wn 10" 150	5021110	Ferrari Flange	2068 3.1	
p.7	N2 Pipe ASME SA 333 6	12,7 273 (10")	44480KN HC-CS600	Liberty Ostrava as	81240/22 3.1	
p.8	N2 Plate ASME SA 516 60 <=12.5	10 2500x1200	35773-CS1171 585474002	Arcelor Mittal	2023-124254 3.1	
p.9	N3 Flange ASME SA 350 LF2	l=230 lwn 1" 150#	248307	Ferrari Flange	2068 3.1	
p.10	N4 Flange ASME SA 350 LF2	xs wn 3" 150#	5020259	Ferrari Flange	2068 3.1	
p.11	N4 Pipe ASME SA 333 6	7,62 88,9 (3")	55300YN HC-CS605	Liberty Ostrava as	82073/23 3.1	
p.12	K1A-K1B Flange ASME SA 350 LF2	l=230 lwn 1" 150#	248307	Ferrari Flange	2068 3.1	

SHEET: 1 Foglio OF: 3 di DATE: 29/08/2024 Data	MANUFACTURER Q.C C.Q. Costruttore C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 02/09/24 Signature	PURCHASER INSPECTOR Ispettore Cliente	AUTHORIZED INSPECTOR Ispettore Autorizzato TÜV Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:

C.A.M.P.I. srl
Ferrara (Italy)

SUMMARY OF MATERIAL CERTIFICATES
Elenco dei Certificati Materiali

PURCHASER: ROSETTI MARINO S.p.A. Cliente	WORK JOB NUMBER: 24003 Commessa numero	DRAWING NUMBER: 24003-VE-10 Disegno numero
P.O. NUMBER: 1724000163 Ordine numero	ITEM: V-43001 Sigla	SERIAL NUMBER: 24-003 Numero di Fabbrica

DRAWING POSITION Posizione Disegno	DESCRIZIONE Description TYPE OF MATERIAL Tipo di materiale	THICKNESS Spessore SIZES Dimensioni	HEAT NUMBER Numero Colata TEST NUMBER Numero Prova	NAME OF SUPPLIER Nome del Fornitore	CERTIFICATE NO. Certificato n. TYPE Tipo	SH Pag.
p.13	K3 Flange ASME SA 350 LF2	l=230 lwn 1" 150#	248307	Ferrari Flange	2068 3.1	
p.14	H1-H2 Flange ASME SA 350 LF2	xs wn 6" 150#	461565	Ferrari Flange	2068 3.1	
p.15	H1-H2 Pipe ASME SA 333 6	10,97 168,3 (6")	1213222 HC-CS601	Arcelor Mittal	B 23233/3 3.1	
p.16	H1-H2 Blind flange ASME SA 350 LF2	bl 6" 150# R	479784	Ferrari Flange	2068 3.1	
p.16b	H1-H2 stud bolt ASME SA 320 L7	l=120 stud ¾" 10	297448	Press Bolt	3167244 3.1	
p.16c	H1-H2 Hexagonal nut ASME SA194 Gr7	nut ¾" 10U	550096	Press Bolt	3167244 3.1	
p.17	H1-H2 Rod EURONORM S355J2-EN1002	round d.16	104029	Ferriere Bellicini	1900616 3.1	
p.19	Plate ASME SA 516 60 <=12.5	10 2500x1200	35773-CS1171 585474002	Arcelor Mittal	2023-124254 3.1	
p.22	Plate ASME SA 516 60 <=12.5	10 2500x1200	35773-CS1171 585474002	Arcelor Mittal	2023-124254 3.1	
p.23	Plate ASME SA 516 60 <=12.5	12 2500x1200	RSAA02 2202B-CS1154	Metinvest Trametal	603473 3.1	
p.24	Plate ASME SA 240 316L	5 1500x3000	0547016 HC-SS295	Acciai Spec.Terni	02252165 3.1	
p.28	Plate ASME SA 516 60 <=12.5	6 2000x	730 514113 2509041 CS729	Arcelor Mittal	730-149043 3.1	
p.B	Stud bolt ASME SA 320 L7	l=120 stud ¾" 10	297448	Press Bolt	3167244 3.1	

SHEET: 2 Foglio OF: 3 di DATE: 29/08/2024 Data	MANUFACTURER Q.C C.Q. Costruttore C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☑ Date: 2/09/24 Signature	PURCHASER INSPECTOR Ispettore Cliente	AUTHORIZED INSPECTOR Ispettore Autorizzato TÜV Hellas 09 48 ☑ Review ☐ Witness Date: 04/10/24 Name:

C.A.M.P.I. srl
Ferrara (Italy)

SUMMARY OF MATERIAL CERTIFICATES
Elenco dei Certificati Materiali

PURCHASER: ROSETTI MARINO S.p.A. Cliente	WORK JOB NUMBER: 24003 Commessa numero	DRAWING NUMBER: 24003-VE-10 Disegno numero
P.O. NUMBER: 1724000163 Ordine numero	ITEM: V-43001 Sigla	SERIAL NUMBER: 24-003 Numero di Fabbrica

DRAWING POSITION Posizione Disegno	DESCRIZIONE Description TYPE OF MATERIAL Tipo di materiale	THICKNESS Spessore SIZES Dimensioni	HEAT NUMBER Numero Colata TEST NUMBER Numero Prova	NAME OF SUPPLIER Nome del Fornitore	CERTIFICATE NO. Certificato n. TYPE Tipo	SH Pag.
p.C	Hexagonal nut ASME SA194 Gr7	nut ¾" 10U	550096	Press Bolt	3167244 3.1	

SHEET: 3 Foglio OF: 3 di DATE: 29/08/2024 Data	MANUFACTURER Q.C C.Q. Costruttore C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 02/09/24 Signature	PURCHASER INSPECTOR Ispettore Cliente	AUTHORIZED INSPECTOR Ispettore Autorizzato TÜV Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 001 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	

Industeel Belgium
Site : Rue de Châtelet 266 6030 Marchienne-au-Pont

ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022
ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022

Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

#010 - PRODUITS LIVRES - DELIVERED PRODUCTS - GELIEFERTEN GEGENSTÄNDE

Nuance - Grade - Werkstoff		Selon norme - According to - Entsprechend	
	A/SA 516 Grade 60/Grade 415		INDUSTEEL CARELSO HIC PREMIUM+
	A/SA 516 Grade 65/Grade 450		INDUSTEEL CARELSO HIC PREMIUM+
	A/SA 516 Grade 70/Grade 485		INDUSTEEL CARELSO HIC PREMIUM+

Epaisseur - Thickness - Dicke	Largeur - Width - Breite	Longueur - Length - Länge
10.00 mm	2,500 mm	12,000 mm

Spécification - Specification - Spezifikation

HEAT CODE CS 1171

According to ASME II Part.A Ed.2021
According to ASTM Ed.2017

VE - 10 p. 1 5 8 19 22

https://eservices.industeel.be

État thermique de livraison - Heat treatment state of delivery - Wärmebehandlung Lieferzustand

Normalisation (920 °C - 1 min/mm) - Normalization - Normalisierung

Procédé d'élaboration - Melting process - Erschmelzungsart

Electric-arc furnace - Vacuum degassed - Fully killed - Fine grain practice

Nbre Nbr Stz	N° produit Product Erzeugnis	N° de coulée Ladle nr. Schmelze nr.	N° de lot de contrôle Inspection lot nr. Prüflos nr.	Nbre Nbr Stz	N° produit Product Erzeugnis	N° de coulée Ladle nr. Schmelze nr.	N° de lot de contrôle Inspection lot nr. Prüflos nr.
01	585474002	35773	585474.1001 / 585474.5001				

Total - Total - Gesamtzahl 001

Z35 QUALITY GUARANTEE
TREATED FOR GLOBULIZATION OF INCLUSIONS
SSC resistance in PWHT condition guranteed
Grain size > 5 according to MC Quaid-EHN test

10.0 2500 6000
CARELSO HIC
585474-002 ns ddt
3193 del
29/05/2024
Vs.Rif.24003.02
DEL 20/05/24

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date 30/05/24
Signature

COPIA CONFORME ALL'ORIGINALE
Controllo Qualità
Siderurgica Leonessa s.r.l

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004
Inspection Certificate 3.2 / EN 10204:2004
Prüfbescheinigung 3.2 / EN 10204:2004

Inspection Number : AVS 2314517

Numéro de document Rev 00
Document number
Bescheinigungnummer
2023-124254

Page 002 / 013
Sheet
Seite

ArcelorMittal

Client - Purchaser - Besteller: SIDERURGICA LEONESSA S.R.L

Référence client - Purchase order - Kaufauftrag: 143-2023

Projet - Project - Projekt

Industeel Belgium
Site : Rue de Châtelet 266 6030 Marchienne-au-Pont

ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022
ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022

Produit - Product - Erzeugnis: Plate(s)

Commande / Poste - Internal order - Werksbestellung: 1114476 / 000010

Bordereau de livraison - Delivery note - Lieferungsdokument: 80432304

#020 - ANALYSE CHIMIQUE DE COULEE - HEAT CHEMICAL COMPOSITION - SCHMELZE CHEMISCHE ZUSAMMENSETZUNG

	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
	%	%	%	%	%	%	%	%	%
Min.		0.850			0.150				
35773	0.171	1.152	0.0064	0.0003	0.361	0.030	0.037	0.049	0.018
Max.	0.200	1.200	0.0080	0.0010	0.400	0.400	0.400	0.300	0.120
	Al	Nb	V	Ti	B	O tot	(01)	(02)	(03)
	%	%	%	%	%	%			
Min.	0.020								
35773	0.030	0.009	0.001	0.003	0.0002	0.0005	0.381	0.134	0.067
Max.		0.015	0.005	0.030	0.0005	0.0020	0.410	0.700	0.320

(01) Ceq = C+(Mn/6)+((Cu+Ni)/15)+((Cr+Mo+V)/5)
(02) F(104) = Cu+Ni+Cr+Mo
(03) F(143) = Cr+Mo

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS
INDUSTRY & FACILITIES
DOM 1326

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 003 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont		ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022	
Produit - Product - Erzeugnis		Plate(s)	
Commande / Poste - Internal order - Werksbestellung		1114476 / 000010	
Bordereau de livraison - Delivery note - Lieferungsdokument		80432304	

#072 ESSAIS MECANIQUES - MECHANICAL TESTS - MECHANISCHE PRÜFUNGEN

DURETE SUR COUPON - HARDNESS ON SAMPLE - HÄRTE AUF COUPON

NACE MR0175 / ISO 15156-2
NACE MR0175 / ISO 15156-2 - NACE MR0175 / ISO 15156-2

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac
585474.5001	002	T3/4	PSS	20	°C	

Test result HRC < 22

DURETE SUR COUPON - HARDNESS ON SAMPLE - HÄRTE AUF COUPON

NACE MR0103 / ISO 17945
NACE MR0103 / ISO 17945 - NACE MR0103 / ISO 17945

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac
585474.5001	002	T3/4	PSS	20	°C	

Test result HRC < 22

TRACTION A L' AMBIANTE - ROOM TEMPERATURE TENSILE TEST - ZUGVERSUCH BEI RT

Traction
Tensile test - Zugversuch

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac		Rp 0,2%	Rm	A Lo=200mm
							Uni	MPa	MPa	%
							Min	260	485	21
							Max		550	
585474.1001	001	T3/4	PST	20	°C			363	510	31

TRACTION A L' AMBIANTE - ROOM TEMPERATURE TENSILE TEST - ZUGVERSUCH BEI RT

Traction
Tensile test - Zugversuch

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac		Rp 0,2%	Rm	A Lo=200mm
							Uni	MPa	MPa	%
							Min	260	485	21
							Max		550	
585474.1001	002	T3/4	PST	20	°C			352	494	27

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm
KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac		Energ Ind	Energ Ind	Energ Ind	Energ Ave
							Uni	J	J	J	J
							Min	12	12	12	15
							Max				
585474.1001	001	T3/4	PSL	-51	°C			131	108	131	123

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 004 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	

Industeel Belgium
Site : Rue de Châtelet 266 6030 Marchienne-au-Pont

ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022
ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022

Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm								Energ Ind	Energ Ind	Energ Ind	Energ Ave								
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	J	J	J	J								
							Min	12	12	12	15								
							Max												
585474.1001	001	T3/4	PST	-51	°C			105	92	115	104								

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm								Energ Ind	Energ Ind	Energ Ind	Energ Ave								
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	J	J	J	J								
							Min	12	12	12	15								
							Max												
585474.1001	002	T3/4	PSL	-51	°C			123	107	99	109								

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm								Energ Ind	Energ Ind	Energ Ind	Energ Ave								
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	J	J	J	J								
							Min	12	12	12	15								
							Max												
585474.1001	002	T3/4	PST	-51	°C			97	101	75	91								

Loc	3/4	Trois-Quart - 3/4 Width - 3/4 Breite
Loc	T	Tête - Top - Kopf
Epr. Epaisseur	P	Peau - Rolled Surface - Walzfläche
Epr. Face	S	Supérieure - Upper face - obere
Epr. Sens	L	Long - Longitudinal - Längs
Epr. Sens	S	Standard - Standard - Standard
Epr. Sens	T	Travers - Transverse - Quer
Etat	001	PWHT - PWHT (From 425 °C at 222 °C/h to 610 °C - 60 min/* (min: 60 min) - Down to 425 °C at 280 °C/h - 1 Cycle) - PWHT
Etat	002	PWHT - PWHT (From 425 °C at 222 °C/h to 610 °C - 60 min/* (min: 60 min) - Down to 425 °C at 280 °C/h - 3 Cycles) - PWHT
Epr.Ep./Face/Sens	PSL	Peau - Rolled Surface - Walzfläche / Supérieure - Upper face - obere / Long - Longitudinal - Längs
Epr.Ep./Face/Sens	PSS	Peau - Rolled Surface - Walzfläche / Supérieure - Upper face - obere / Standard - Standard - Standard
Epr.Ep./Face/Sens	PST	Peau - Rolled Surface - Walzfläche / Supérieure - Upper face - obere / Travers - Transverse - Quer
T°	RT	Température ambiante - Room Temperature - Raumtemperatur

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS ... INDUSTRY & FACILITIES

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 005 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont		ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022	
Produit - Product - Erzeugnis		Plate(s)	
Commande / Poste - Internal order - Werksbestellung		1114476 / 000010	
Bordereau de livraison - Delivery note - Lieferungsdokument		80432304	

#082 ESSAIS TECHNOLOGIQUES - TECHNOLOGICAL TESTS - TECHNOLOGISCHE PRÜFUNGEN

MICROGRAPHIE - MICROGRAPHY - SCHLIFFBILD

BANDING TEST SELON ASTM E 1268
ASTM E1268 - ASTM E1268

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac
585474.5001	002	T3/4	SSS	20	°C	

Standard: ASTM E1268

Number of Fields: 5

N°	Location - Localisation - Lage	Picture - Image - Bild	Magnification - Grossissement - Vergrößerung
01	Top Surface	AN_0001114476_000010_585474001_001_0001	100X
02	1/4 thickness	AN_0001114476_000010_585474001_001_0002	100X
03	1/2 thickness	AN_0001114476_000010_585474001_001_0003	100X
04	3/4 thickness	AN_0001114476_000010_585474001_001_0004	100X
05	Bottom Surface	AN_0001114476_000010_585474001_001_0005	100X

	Nl (No/mm)	NL// (No/mm)	Al (NL / NL//)	Ohm 12 (N)	SB (mm)
X	40.93	40.27	1.02	0.01	0.02
S	8.88	13.19			
95% CI	11.02	16.37			
% RA	26.92	40.66			
N	40.66	40.66			

	Pl (No/mm)	Pl// (No/mm)	Al (Pl / Pl//)	Ohm 12 (P)
X	128.93	127.73	1.01	0.01
S	7.22	15.29		
95% CI	8.96	18.98		
% RA	6.95	14.86		
N	14.86	14.86		

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 006 / 013 Sheet Seite	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont	ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022		
Produit - Product - Erzeugnis	Plate(s)		
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010		
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304		

HIC - HIC - HIC

ESSAI HIC SELON NACE TM0284 HIC NACE TM0284 - HIC NACE TM0284								T° solution	Initial H2S	Final H2S	Initial T°	Final T°	Initial pH	Final pH	pH solution	Nbr cracks	Longest crack		
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	°C	ppm	ppm	°C	°C				Number	mm		
							Min	22	2300	2300	22	22	2.70		2.60				
							Max	28			28	28	3.30	4.00	2.80		5.00		
585474.5001	002	T3/4	SSL	20	°C			22	2750	2970	23	24	2.96	3.78	2.71	0	0.00		

Standard	NACE TM0284 ed.2016
Specimen surface preparation	320-grit polishing
Degreasing	Acetone + Check according to ASTM F21
Solution	A
Remark	at 1/2 width
Inert Gas Used	Azote

Size of Specimen - Dimensions de l'échantillon - Probengrösse					
Length - Longueur - Länge	Unit - Unité - Einheit	Width - Largeur - Breite	Unit - Unité - Einheit	Thickness - Epaisseur - Dicke	Unit - Unité - Einheit
100.00	mm	20.00	mm	10.00	mm
Total area - Surface de l'échantillon - Probenoberfläche			64.00	cm2	

Start of Test - Début de test - Testenbeginn	26/10/2023 11:16
End of Test - Fin de test - Testenende	30/10/2023 11:16
Test duration in h Durée du test - Testendauer	96.00

N°	Location - Localisation - Lage	Picture - Image - Bild	Magnification - Grossissement - Vergrößerung
01	Top Surface	AN_0001114476_000010_585474001_002_0001	1X
02	Bottom Surface	AN_0001114476_000010_585474001_002_0002	1X
03	Microstructure unetched	AN_0001114476_000010_585474001_002_0003	100X
04	Microstructure etched	AN_0001114476_000010_585474001_002_0004	100X

Blisters whose dimensions are < 1,0 mm are not taken into account

	1st specimen					2nd specimen					3rd specimen														
Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
Diameter in mm	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5										

	1st specimen				2nd specimen				3rd specimen			
	S1.1	S1.2	S1.3	S1 Aver.	S2.1	S2.2	S2.3	S2 Aver.	S3.1	S3.2	S3.3	S3 Aver.
CLR	0	0	0	0	0	0	0	0	0	0	0	0
CTR	0	0	0	0	0	0	0	0	0	0	0	0
CSR	0	0	0	0	0	0	0	0	0	0	0	0

	Aver.	Max requirements		
		Per sect	Per spec	Aver.
CLR	0		5.000	5.000
CTR	0.00		1.50	1.50
CSR	0.00		0.50	0.50

Loc	3/4	Trois-Quart - 3/4 Width - 3/4 Breite
Loc	T	Tête - Top - Kopf
Epr. Epaisseur	S	Standard - Standard - Standard
Epr. Face	S	Supérieure - Upper face - obere
Epr. Sens	L	Long - Longitudinal - Längs
Epr. Sens	S	Standard - Standard - Standard

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INDUSTRY & FACILITIES

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 007 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	

Industeel Belgium
Site : Rue de Châtelet 266 6030 Marchienne-au-Pont

ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022
ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022

Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

Etat	002	PWHT - PWHT (From 425 °C at 222 °C/h to 610 °C - 60 min/* (min: 60 min) - Down to 425 °C at 280 °C/h - 3 Cycles) - PWHT
Epr.Ep./Face/Sens	SSL	Standard - Standard - Standard / Supérieure - Upper face - obere / Long - Longitudinal - Längs
Epr.Ep./Face/Sens	SSS	Standard - Standard - Standard / Supérieure - Upper face - obere / Standard - Standard - Standard
T°	RT	Température ambiante - Room Temperature - Raumtemperatur

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 008 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	

Industeel Belgium
Site : Rue de Châtelet 266 6030 Marchienne-au-Pont

ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022
ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022

Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

#141 - CONTROLE US - ULTRASONIC EXAMINATION - ULTRACHALLPRÜFUNGSBESCHEINIGUNG

Norme applicable 1 - Applicable standard 1 - ASME SA 578 LEVEL C Paths 75mm rolling direction 100% edge controle on 50mm

Résultat du contrôle - Examination result - Prüfergebnis

Conforme aux spécifications précitées - Conforming to above specifications - Entspricht der vorgenannten vorschriften

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

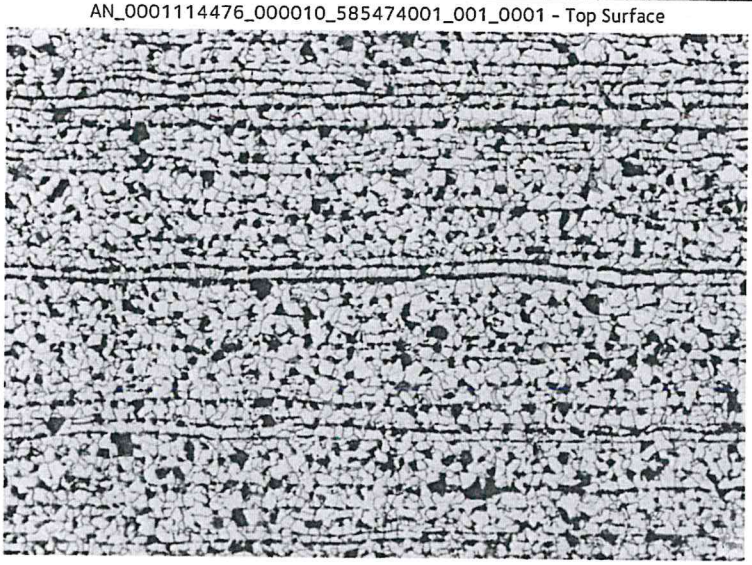
BUREAU VERITAS ANTWERP 1825 INDUSTRY & FACILITIES

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

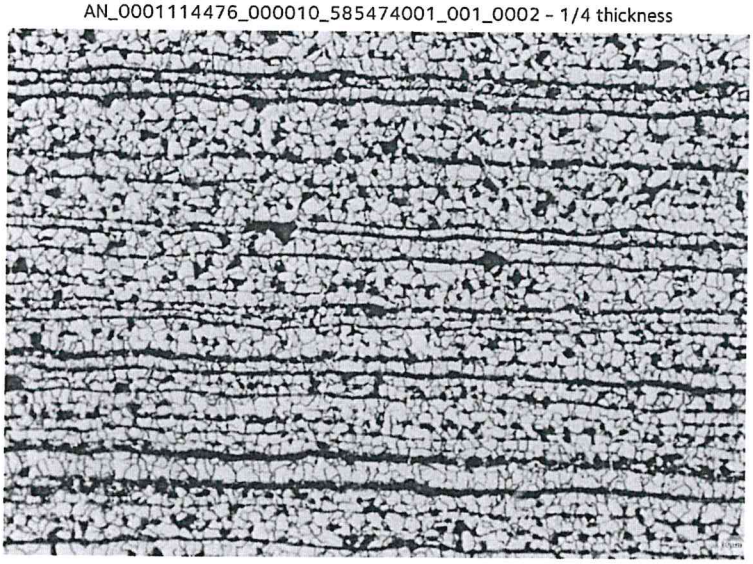
CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 009 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_001_0001
AN_0001114476_000010_585474001_001_0002

AN_0001114476_000010_585474001_001_0001 - Top Surface



AN_0001114476_000010_585474001_001_0002 - 1/4 thickness



BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

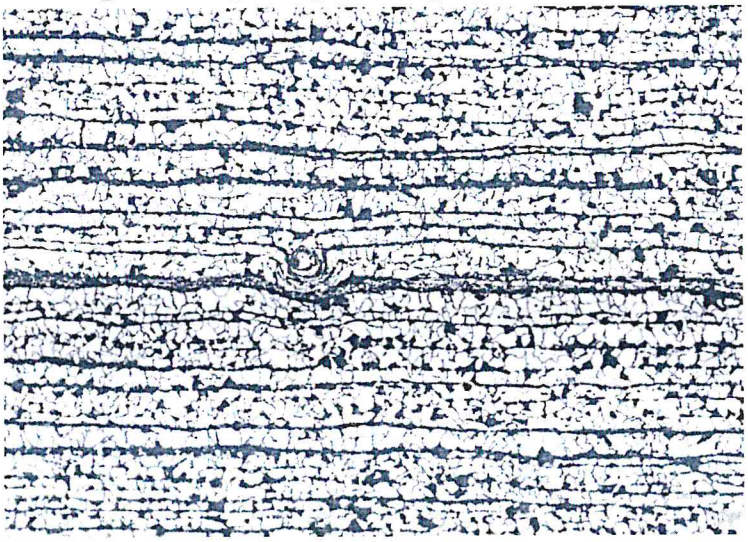
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

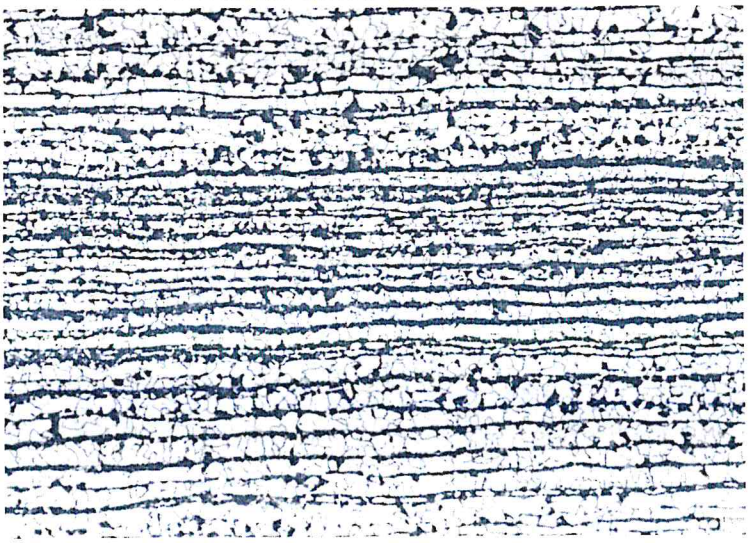
CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 010 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_001_0003
AN_0001114476_000010_585474001_001_0004

AN_0001114476_000010_585474001_001_0003 - 1/2 thickness



AN_0001114476_000010_585474001_001_0004 - 3/4 thickness



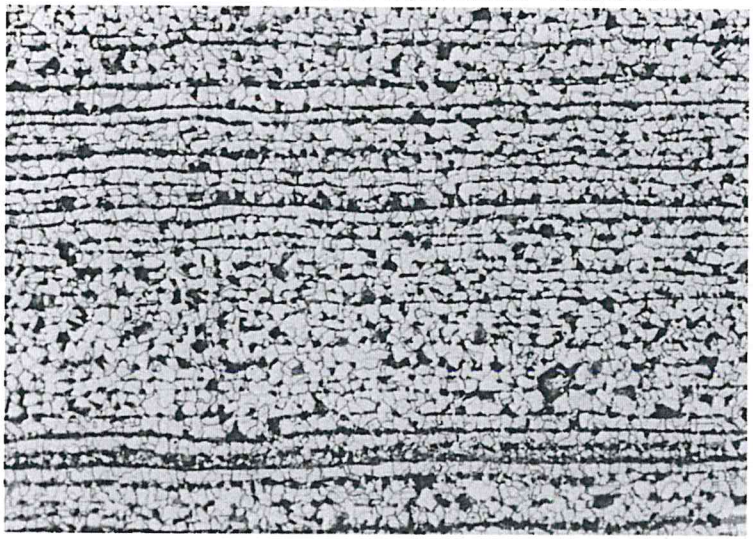
BUREAU VERITAS INDUSTRY & FACILITIES

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

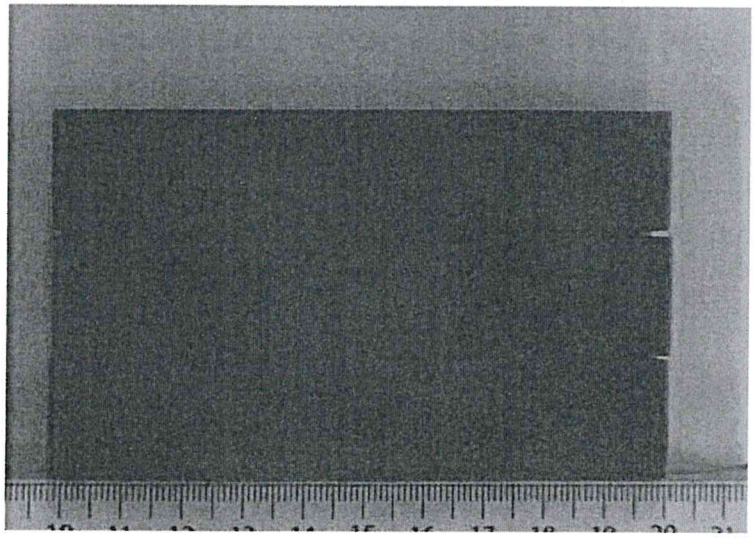
CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 011 / 013 Sheet Seite	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_001_0005
AN_0001114476_000010_585474001_002_0001

AN_0001114476_000010_585474001_001_0005 - Bottom Surface



AN_0001114476_000010_585474001_002_0001 - Top Surface



BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

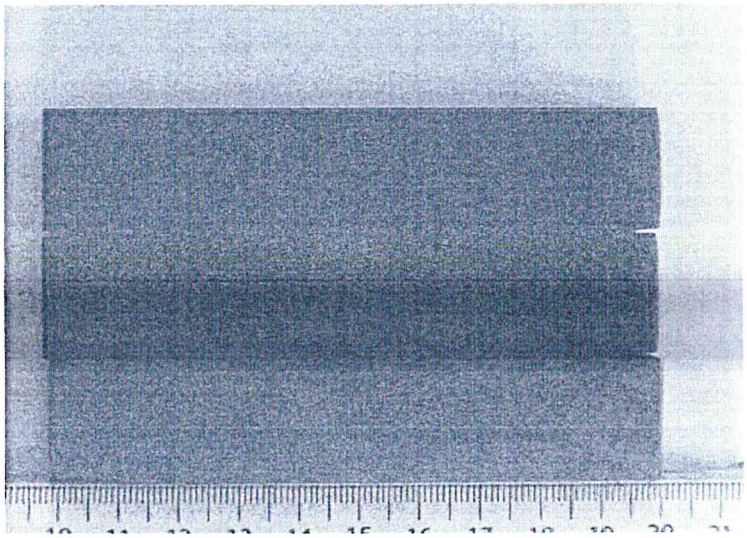
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 012 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_002_0002
AN_0001114476_000010_585474001_002_0003

AN_0001114476_000010_585474001_002_0002 - Bottom Surface



AN_0001114476_000010_585474001_002_0003 - Microstructure unetched

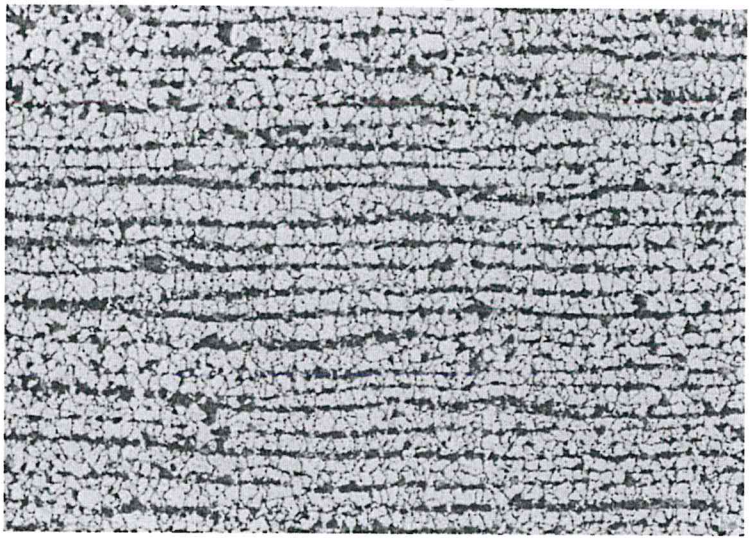
BUREAU VERITAS ANTWERP BELGIUM 1828 INDUSTRY & FACILITIES

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 013 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_002_0004

AN_0001114476_000010_585474001_002_0004 - Microstructure etched



BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

S.I.F.E.B.
Società Italiana Fondi Bombati e Affini

Rapporto di collaudo - Inspection certificate - Abnahmeprufzeügnis

In accordo - According-Nach: **UNI EN10204 3.1** **Mod. 8.5-03**

Numero Certificato: **170393** **del 26/06/2024**

Cliente: C.A.M.P.I. S.R.L.

Rif. Ordine: 24003.03 del 20/05/2024 **Rif. Commessa:** 24003

Item.	Q.ty:	Tipo Prodotto Product type	Normativa di Riferimento Code	Vs. riferimento Codice articolo / Disegno
1	2	FONDO PSEUDOELLITTICO 2:1	ASME VIII Div.1 Ed.'23 UG-32(c), UG-79, UG-81	FND

									SBORDATURA		
Diam. Max Max Diameter	Circ. Esterna Ext. Circle	Spessore Lamiera Plate's thk.	Spessore Min. Min thk.	Raggio bomb. Max Rad.	Raggio bord. Knuc. Rad.	Collarino Straight flange	Altezza Tot. Height	Foro Hole	Diametro Min. Min. Diameter	Raggio Sbord. Knuc. Rad.	Collarino Straight Flange
D.I. 600	1948	10	8	540	100	50	210				

Tipo Formatura Forming Type	Trattamento Termico Heat treatment type (1)	Diagramma nr. Heat treat. nr.
FORMATURA A FREDDO	NORMALIZING POST FORMING HEAT TREATMENT AT 910°C	37/2024

Ns.Matricola Our Serial Number	Qualità Materiale Material Quality	Colata Heat	Placca Plate	Produttore Lamiera Plate' s Producer	Certificato Nr. Certificate Nr.	Data Date
	SA516-60 HIC					
	SA516-60 HIC					

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

VE-10 p. (2) HEAD.

Società Italiana Fondi Bombati e Affini

Rapporto di collaudo - Inspection certificate - Abnahmeprufzeügnis

In accordo - According-Nach: UNI EN10204 3.1 Mod. 8.5-03

Controllo visivo e dimensionale dopo formatura: non si riscontrano difetti visivi. Le dimensioni sono entro le tolleranze e i processi di formatura sono conformi al codice applicato, alle specifiche e ordine del cliente.
Visual and dimensional test check after forming: no visual defects has been found. Dimensions are under tollerances and forming processes are according to code apply, client's specifications and purchase order.

Issued in agreement with TÜV SÜD Industrie Service GmbH. QS approved acc. to PED, Annex I, Para. 4.3 by Notified Body 0036, (Certification no. DGR-0036-QS-W 182/2003/MUC-001).

S.I.F.E.A. S.r.l.	Authorized Inspector	Client's Inspector	SIFEA 's Stamp
S.I.F.E.A. S.r.l. Via L. Da Vinci, 3 35020 Legnaro PD			SIFEA

Formatura in accordo alle procedure S.I.F.E.A. S.r.l. "QA.PR.FONDI" e "IO7.5-02 rev.2".
(1): se il trattamento termico non è stato eseguito, sarà a cura del cliente eseguire il trattamento termico in conformità alla normativa e specifiche applicate.
(1): if heat treatment is not be executed, it will be performed by client in according to code and project's procedure.
(1): ref. AD2000HP7/2 P.to 2.5 = wall thickness < 8 mm, h1 < 40 mm, Temperature -10°C to 120°C.

26003 HEAD D.I. 600

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 001 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	

Industeel Belgium
Site : Rue de Châtelet 266 6030 Marchienne-au-Pont

ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022
ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022

Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

#010 - PRODUITS LIVRES - DELIVERED PRODUCTS - GELIEFERTEN GEGENSTÄNDE

Nuance - Grade - Werkstoff	A/SA 516 Grade 60/Grade 415 ←	Selon norme - According to - Entsprechend	INDUSTEEL CARELSO HIC PREMIUM+
	A/SA 516 Grade 65/Grade 450		INDUSTEEL CARELSO HIC PREMIUM+
	A/SA 516 Grade 70/Grade 485		INDUSTEEL CARELSO HIC PREMIUM+

Epaisseur - Thickness - Dicke	10.00 mm	Largeur - Width - Breite	2,500 mm	Longueur - Length - Länge	12,000 mm

Spécification - Specification - Spezifikation

HEAT CODE ES1171

According to ASME II Part.A Ed.2021
According to ASTM Ed.2017

VE-10p. (2)

https://eservices.industeel.be

Etat thermique de livraison - Heat treatment state of delivery - Wärmebehandlung Lieferzustand

Normalisation (920 °C - 1 min/mm) - Normalization - Normalisierung

Procédé d'élaboration - Melting process - Erschmelzungsart

Electric-arc furnace - Vacuum degassed - Fully killed - Fine grain practice

Nbre Nbr Stz	N° produit Product Erzeugnis	N° de coulée Ladle nr. Schmelze nr.	N° de lot de contrôle Inspection lot nr. Prüflos nr.	Nbre Nbr Stz	N° produit Product Erzeugnis	N° de coulée Ladle nr. Schmelze nr.	N° de lot de contrôle Inspection lot nr. Prüflos nr.
01	585474002	35773	585474.1001 / 585474.5001				

Total - Total - Gesamtzahl 001

Z35 QUALITY GUARANTEE
TREATED FOR GLOBULIZATION OF INCLUSIONS
SSC resistance in PWHT condition guranteed
Grain size > 5 according to MC Quaid-EHN test

10.0 2500 6000
CARELSO HIC
585474-002 ns ddt
3193 del
29/05/2024
Vs.Rif.24003.02
DEL 20/05/24

COPIA CONFORME ALL'ORIGINALE
Controllo Qualità
Siderurgica Leonessa s.r.l

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

(2)

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 002 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont		ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022	
Produit - Product - Erzeugnis		Plate(s)	
Commande / Poste - Internal order - Werksbestellung		1114476 / 000010	
Bordereau de livraison - Delivery note - Lieferungsdokument		80432304	

#020 - ANALYSE CHIMIQUE DE COULEE - HEAT CHEMICAL COMPOSITION - SCHMELZE CHEMISCHE ZUSAMMENSETZUNG

	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
	%	%	%	%	%	%	%	%	%
Min.		0.850			0.150				
35773	0.171	1.152	0.0064	0.0003	0.361	0.030	0.037	0.049	0.018
Max.	0.200	1.200	0.0080	0.0010	0.400	0.400	0.400	0.300	0.120
	Al	Nb	V	Ti	B	O tot	(01)	(02)	(03)
	%	%	%	%	%	%			
Min.	0.020								
35773	0.030	0.009	0.001	0.003	0.0002	0.0005	0.381	0.134	0.067
Max.		0.015	0.005	0.030	0.0005	0.0020	0.410	0.700	0.320

(01)	Ceq = C+(Mn/6)+((Cu+Ni)/15)+((Cr+Mo+V)/5)
(02)	F(104) = Cu+Ni+Cr+Mo
(03)	F(143) = Cr+Mo

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP PARIS 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 003 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont	ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022
Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

#072 ESSAIS MECANIQUES - MECHANICAL TESTS - MECHANISCHE PRÜFUNGEN

DURETE SUR COUPON - HARDNESS ON SAMPLE - HÄRTE AUF COUPON

NACE MR0175 / ISO 15156-2
NACE MR0175 / ISO 15156-2 - NACE MR0175 / ISO 15156-2

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac
585474.5001	002	T3/4	PSS	20	°C	

Test result: HRC < 22

DURETE SUR COUPON - HARDNESS ON SAMPLE - HÄRTE AUF COUPON

NACE MR0103 / ISO 17945
NACE MR0103 / ISO 17945 - NACE MR0103 / ISO 17945

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac
585474.5001	002	T3/4	PSS	20	°C	

Test result: HRC < 22

TRACTION A L' AMBIANTE - ROOM TEMPERATURE TENSILE TEST - ZUGVERSUCH BEI RT

Traction
Tensile test - Zugversuch

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac		Rp 0,2%	Rm	A Lo=200mm
							Uni	MPa	MPa	%
							Min	260	485	21
							Max		550	
585474.1001	001	T3/4	PST	20	°C			363	510	31

TRACTION A L' AMBIANTE - ROOM TEMPERATURE TENSILE TEST - ZUGVERSUCH BEI RT

Traction
Tensile test - Zugversuch

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac		Rp 0,2%	Rm	A Lo=200mm
							Uni	MPa	MPa	%
							Min	260	485	21
							Max		550	
585474.1001	002	T3/4	PST	20	°C			352	494	27

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm
KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac		Energ Ind	Energ Ind	Energ Ind	Energ Ave
							Uni	J	J	J	J
							Min	12	12	12	15
							Max				
585474.1001	001	T3/4	PSL	-51	°C			131	108	131	123

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 004 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont		ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022	
Produit - Product - Erzeugnis		Plate(s)	
Commande / Poste - Internal order - Werksbestellung		1114476 / 000010	
Bordereau de livraison - Delivery note - Lieferungsdokument		80432304	

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm								Energ Ind	Energ Ind	Energ Ind	Energ Ave								
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	J	J	J	J								
							Min	12	12	12	15								
							Max												
585474.1001	001	T3/4	PST	-51	°C			105	92	115	104								

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm								Energ Ind	Energ Ind	Energ Ind	Energ Ave								
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	J	J	J	J								
							Min	12	12	12	15								
							Max												
585474.1001	002	T3/4	PSL	-51	°C			123	107	99	109								

RESILIENCE - TOUGHNESS - KERBSCHLAGZÄHIGKEIT

KCV ASTM 10X7.5mm KCV ASTM 10X7.5mm - KCV ASTM 10X7.5mm								Energ Ind	Energ Ind	Energ Ind	Energ Ave								
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	J	J	J	J								
							Min	12	12	12	15								
							Max												
585474.1001	002	T3/4	PST	-51	°C			97	101	75	91								

Loc	3/4	Trois-Quart - 3/4 Width - 3/4 Breite
Loc	T	Tête - Top - Kopf
Epr. Epaisseur	P	Peau - Rolled Surface - Walzfläche
Epr. Face	S	Supérieure - Upper face - obere
Epr. Sens	L	Long - Longitudinal - Längs
Epr. Sens	S	Standard - Standard - Standard
Epr. Sens	T	Travers - Transverse - Quer
Etat	001	PWHT - PWHT (From 425 °C at 222 °C/h to 610 °C - 60 min/° (min: 60 min) - Down to 425 °C at 280 °C/h - 1 Cycle) - PWHT
Etat	002	PWHT - PWHT (From 425 °C at 222 °C/h to 610 °C - 60 min/° (min: 60 min) - Down to 425 °C at 280 °C/h - 3 Cycles) - PWHT
Epr.Ep./Face/Sens	PSL	Peau - Rolled Surface - Walzfläche / Supérieure - Upper face - obere / Long - Longitudinal - Längs
Epr.Ep./Face/Sens	PSS	Peau - Rolled Surface - Walzfläche / Supérieure - Upper face - obere / Standard - Standard - Standard
Epr.Ep./Face/Sens	PST	Peau - Rolled Surface - Walzfläche / Supérieure - Upper face - obere / Travers - Transverse - Quer
T°	RT	Température ambiante - Room Temperature - Raumtemperatur

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP Paris 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 005 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont		ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022	
Produit - Product - Erzeugnis		Plate(s)	
Commande / Poste - Internal order - Werksbestellung		1114476 / 000010	
Bordereau de livraison - Delivery note - Lieferungsdokument		80432304	

#082 ESSAIS TECHNOLOGIQUES - TECHNOLOGICAL TESTS - TECHNOLOGISCHE PRÜFUNGEN

MICROGRAPHIE - MICROGRAPHY - SCHLIFFBILD

BANDING TEST SELON ASTM E 1268
ASTM E1268 - ASTM E1268

N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac
585474.5001	002	T3/4	SSS	20	°C	

Standard: ASTM E1268

Number of Fields: 5

N°	Location - Localisation - Lage	Picture - Image - Bild	Magnification - Grossissement - Vergrößerung
01	Top Surface	AN_0001114476_000010_585474001_001_0001	100X
02	1/4 thickness	AN_0001114476_000010_585474001_001_0002	100X
03	1/2 thickness	AN_0001114476_000010_585474001_001_0003	100X
04	3/4 thickness	AN_0001114476_000010_585474001_001_0004	100X
05	Bottom Surface	AN_0001114476_000010_585474001_001_0005	100X

	NI (No/mm)	NL// (No/mm)	AI (NL / NL//)	Ohm 12 (N)	SB (mm)
X	40.93	40.27	1.02	0.01	0.02
S	8.88	13.19			
95% CI	11.02	16.37			
% RA	26.92	40.66			
N	40.66	40.66			

	PI (No/mm)	PI// (No/mm)	AI (PI / PI//)	Ohm 12 (P)
X	128.93	127.73	1.01	0.01
S	7.22	15.29		
95% CI	8.96	18.98		
% RA	6.95	14.86		
N	14.86	14.86		

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 006 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont		ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022	
Produit - Product - Erzeugnis		Plate(s)	
Commande / Poste - Internal order - Werksbestellung		1114476 / 000010	
Bordereau de livraison - Delivery note - Lieferungsdokument		80432304	

HIC - HIC - HIC

ESSAI HIC SELON NACE TM0284 HIC NACE TM0284 - HIC NACE TM0284								T° solution	Initial H2S	Final H2S	Initial T°	Final T°	Initial pH	Final pH	pH solution	Nbr cracks	Longest crack		
N° lot QM	Etat	Loc	Epr.	T°	Uni	Mac	Uni	°C	ppm	ppm	°C	°C				Number	mm		
							Min	22	2300	2300	22	22	2.70		2.60				
							Max	28			28	28	3.30	4.00	2.80		5.00		
585474.5001	002	T3/4	SSL	20	°C			22	2750	2970	23	24	2.96	3.78	2.71	0	0.00		

Standard	NACE TM0284 ed.2016
Specimen surface preparation	320-grit polishing
Degreasing	Acetone + Check according to ASTM F21
Solution	A
Remark	at 1/2 width
Inert Gas Used	Azote

Size of Specimen - Dimensions de l'échantillon - Probengrösse					
Length - Longueur - Länge	Unit - Unité - Einheit	Width - Largeur - Breite	Unit - Unité - Einheit	Thickness - Epaisseur - Dicke	Unit - Unité - Einheit
100.00	mm	20.00	mm	10.00	mm
Total area - Surface de l'échantillon - Probenoberfläche			64.00	cm2	

Start of Test - Début de test - Testenbeginn	26/10/2023 11:16
End of Test - Fin de test - Testenende	30/10/2023 11:16
Test duration in h Durée du test - Testendauer	96.00

N°	Location - Localisation - Lage	Picture - Image - Bild	Magnification - Grossissement - Vergrößerung
01	Top Surface	AN_0001114476_000010_585474001_002_0001	1X
02	Bottom Surface	AN_0001114476_000010_585474001_002_0002	1X
03	Microstructure unetched	AN_0001114476_000010_585474001_002_0003	100X
04	Microstructure etched	AN_0001114476_000010_585474001_002_0004	100X

Blisters whose dimensions are < 1,0 mm are not taken into account

	1st specimen					2nd specimen					3rd specimen														
Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
Diameter in mm	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5										

	1st specimen				2nd specimen				3rd specimen			
	S1.1	S1.2	S1.3	S1 Aver.	S2.1	S2.2	S2.3	S2 Aver.	S3.1	S3.2	S3.3	S3 Aver.
CLR	0	0	0	0	0	0	0	0	0	0	0	0
CTR	0	0	0	0	0	0	0	0	0	0	0	0
CSR	0	0	0	0	0	0	0	0	0	0	0	0

	Aver.	Max requirements		
		Per sect	Per spec	Aver.
CLR	0		5.000	5.000
CTR	0.00		1.50	1.50
CSR	0.00		0.50	0.50

Loc	3/4	Trois-Quart - 3/4 Width - 3/4 Breite
Loc	T	Tête - Top - Kopf
Epr. Epaisseur	S	Standard - Standard - Standard
Epr. Face	S	Supérieure - Upper face - obere
Epr. Sens	L	Long - Longitudinal - Längs
Epr. Sens	S	Standard - Standard - Standard

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP DEPUIS 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 007 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	
Industeel Belgium Site : Rue de Châtelet 266 6030 Marchienne-au-Pont	ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022 ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022
Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

Etat	002	PWHT - PWHT (From 425 °C at 222 °C/h to 610 °C - 60 min/* (min: 60 min) - Down to 425 °C at 280 °C/h - 3 Cycles) - PWHT
Epr.Ep./Face/Sens	SSL	Standard - Standard - Standard / Supérieure - Upper face - obere / Long - Longitudinal - Längs
Epr.Ep./Face/Sens	SSS	Standard - Standard - Standard / Supérieure - Upper face - obere / Standard - Standard - Standard
T°	RT	Température ambiante - Room Temperature - Raumtemperatur

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 008 Sheet / Seite 013	ArcelorMittal

Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L
Référence client - Purchase order - Kaufauftrag	143-2023
Projet - Project - Projekt	

Industeel Belgium
Site : Rue de Châtelet 266 6030 Marchienne-au-Pont

ISO 9001 (Cert C602171, Valid 02/06/2026) + MAQ REV 01 du 25/04/2022
ISO 9001 (Cert C602171, Valid 02/06/2026) + QAM REV 01 of 25/04/2022

Produit - Product - Erzeugnis	Plate(s)
Commande / Poste - Internal order - Werksbestellung	1114476 / 000010
Bordereau de livraison - Delivery note - Lieferungsdokument	80432304

#141 - CONTROLE US - ULTRASONIC EXAMINATION - ULTRACHALLPRÜFUNGSBESCHEINIGUNG

Norme applicable 1 - Applicable standard 1 -	ASME SA 578 LEVEL C Paths 75mm rolling direction 100% edge controle on 50mm
Résultat du contrôle - Examination result - Prüfergebnis	

Conforme aux spécifications précitées - Conforming to above specifications - Entspricht der vorgenannten vorschriften

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande.
We hereby certify that the above mentioned products are complying with the order requirements.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungvorschriften entsprechen.

BUREAU VERITAS INSPECTORS AT ANTWERP Paris 1828 INDUSTRY & FACILITIES

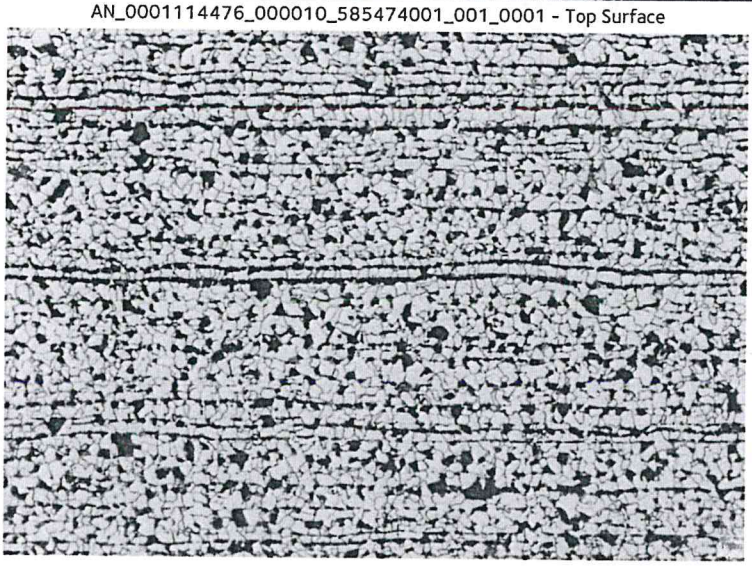
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

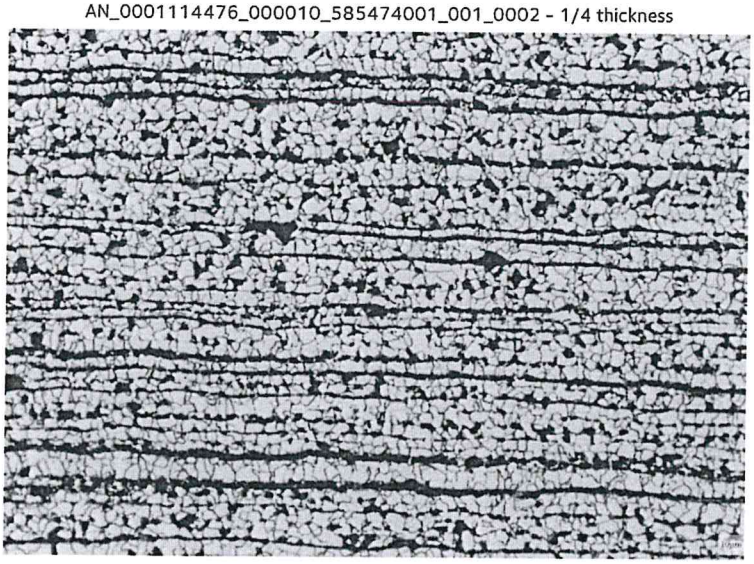
CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 009 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_001_0001
AN_0001114476_000010_585474001_001_0002

AN_0001114476_000010_585474001_001_0001 - Top Surface



AN_0001114476_000010_585474001_001_0002 - 1/4 thickness



BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

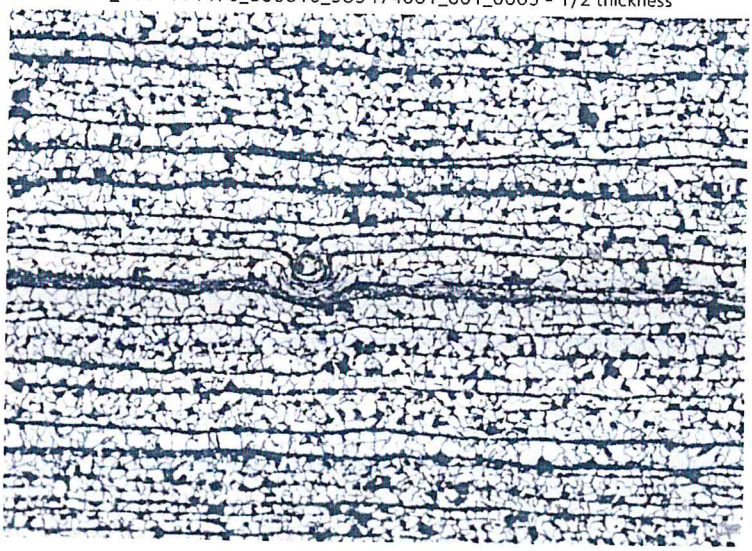
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

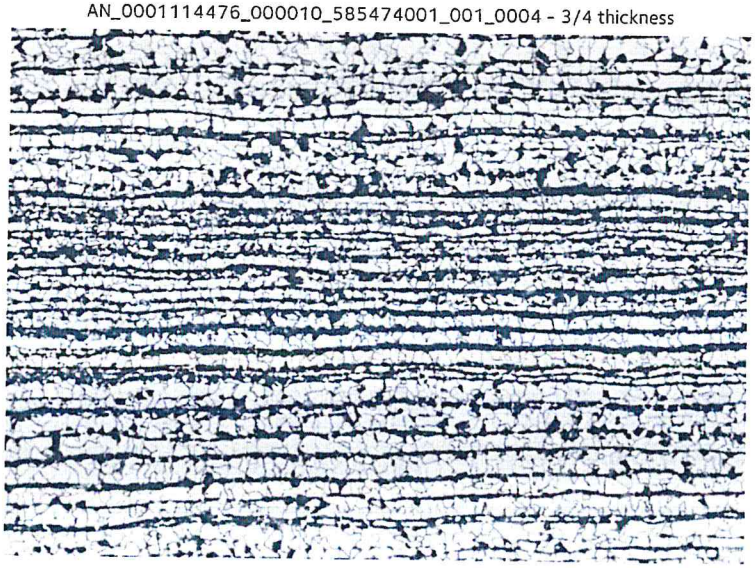
CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 010 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_001_0003
AN_0001114476_000010_585474001_001_0004

AN_0001114476_000010_585474001_001_0003 - 1/2 thickness



AN_0001114476_000010_585474001_001_0004 - 3/4 thickness



BUREAU VERITAS INSPECTORS AT ANTWERP since 1828 INDUSTRY & FACILITIES

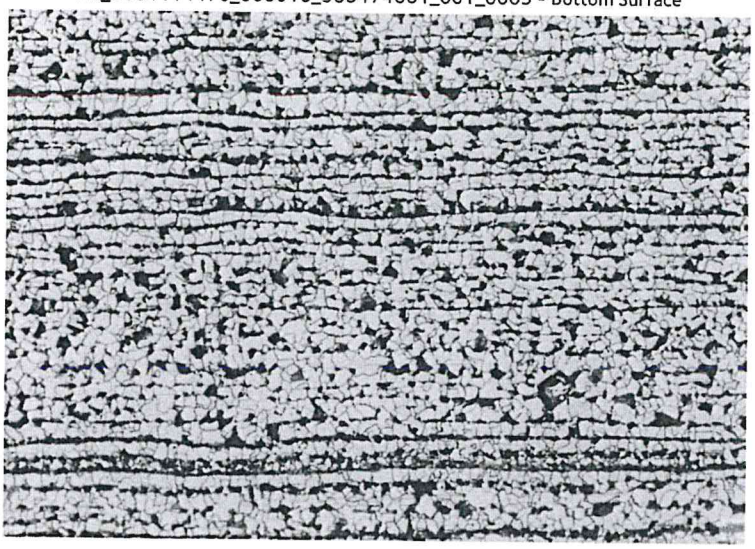
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

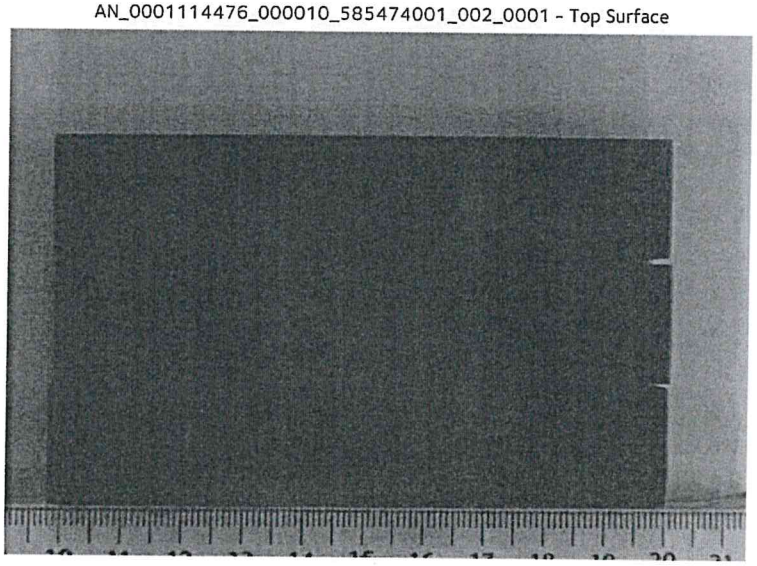
CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 011 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_001_0005
AN_0001114476_000010_585474001_002_0001

AN_0001114476_000010_585474001_001_0005 - Bottom Surface



AN_0001114476_000010_585474001_002_0001 - Top Surface



BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

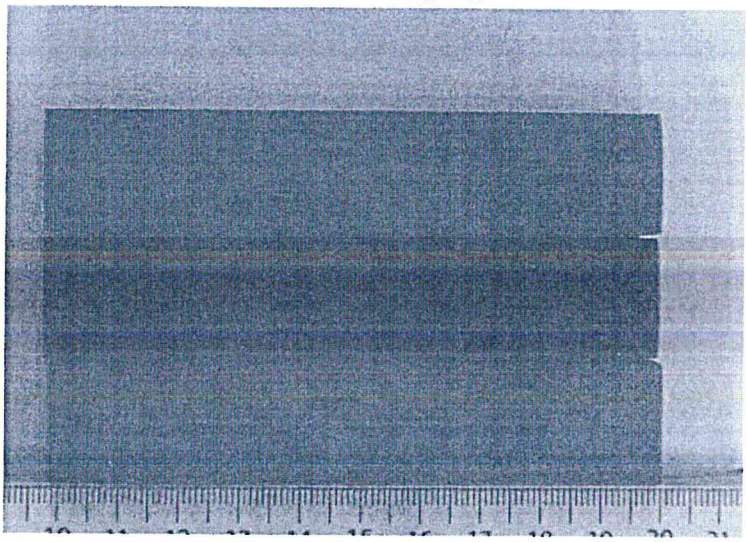
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 012 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_002_0002
AN_0001114476_000010_585474001_002_0003

AN_0001114476_000010_585474001_002_0002 - Bottom Surface



AN_0001114476_000010_585474001_002_0003 - Microstructure unetched

BUREAU VERITAS INSPECTORS AT ANTWERP depuis 1828 INDUSTRY & FACILITIES

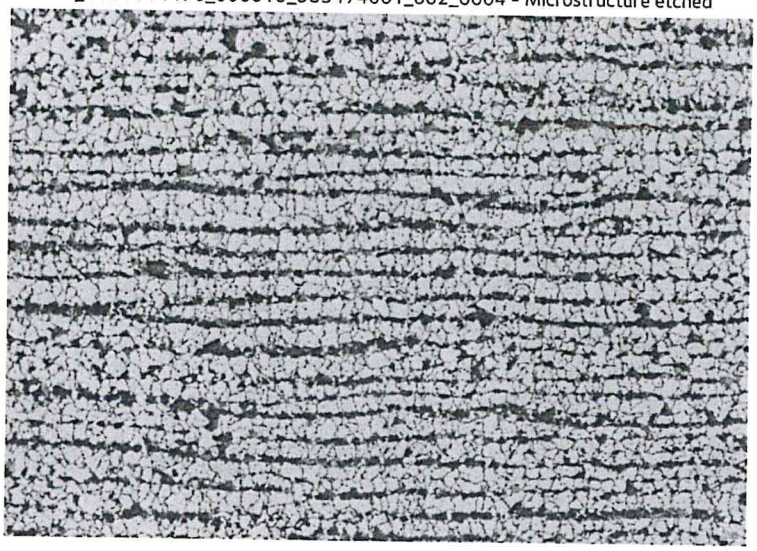
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

CERTIFICAT DE RECEPTION 3.2 / EN 10204:2004 Inspection Certificate 3.2 / EN 10204:2004 Prüfbescheinigung 3.2 / EN 10204:2004 Inspection Number : AVS 2314517	Numéro de document Rev 00 Document number Bescheinigungnummer 2023-124254	Page 013 Sheet / Seite 013	ArcelorMittal
Client - Purchaser - Besteller	SIDERURGICA LEONESSA S.R.L		
Référence client - Purchase order - Kaufauftrag	143-2023		
Projet - Project - Projekt			

ANNEXES - APPENDIX - ANLAGEN 585474001 AN_0001114476_000010_585474001_002_0004

AN_0001114476_000010_585474001_002_0004 - Microstructure etched



BUREAU VERITAS INSPECTORS AT ANTWERP paris 1828 INDUSTRY & FACILITIES

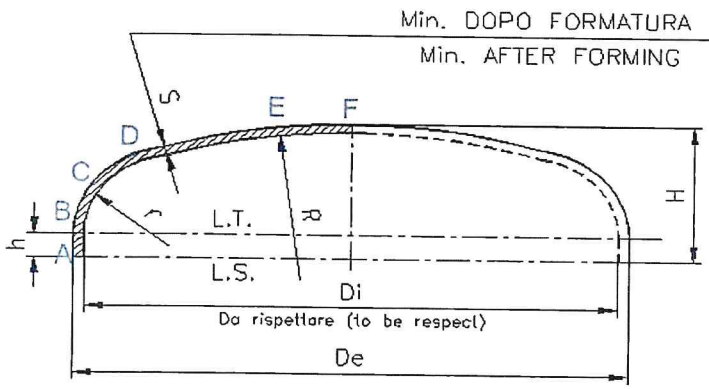
INSPECTOR'S STAMP

TONINO D'ANGELO
06/11/2023
Gestionnaire Commande
Mill inspector
Werksbeauftragte

S.I.F.E.A.	**Inspection of heads** *Rapporto di collaudo fondi*	*Date* :	12.07.2024
		Sheet - Foglio :	1 di 1
		Report - Rapporto :	2024-027
		Rev. :	0

Client : Cliente :	C.A.M.P.I. S.R.L.	*Purch.order.* : Ordine:	24003.03/A	*Item* : Articolo	FND
Object : Oggetto :	2:1 Ellipsoidal head	*Job* : Comm :	24003	*Serial no.* : NF :	F1 + F2
Drawing : Disegno :	-	*SIFEA's Job:* Commessa:	170393CL/1/1	*Code* : Codice :	ASME

Description / Descrizione



Construction Data (mm)

Dati costruttivi (mm)

S_{min} = 8 R = 540

H = 210 r = 100

h = 50 CRF = 1948

D_i = 600 D_e = -

Plate thk. / Sp. Lam. = 10 mm

SN	A	B	C	D	E	F	Height	h	Circumference	Ø (min / max)
F1	11,0	10,4	9,8	10,5	10,0	9,8	*210*	*50*	*1945*	*598 ÷ 597*
F2	10,7	9,9	9,1	10,3	10,0	10,8	213	50	1946	598 ÷ 598

Note / Remarks:

Material / Materiale	*No. of plate or test*	*Heat* / Colata	*Thk* / Sp.
SA516-60 HIC	-	-	**10,0**

(v) = E' stato considerato il valore minimo. (~) Valore medio.

Conclusions / **Considerazioni finali**

We hereby certify that inspections and tests forecasted, were carried out, are according to codes and SIFEA's forming procedure applied, with positive results.
Certifichiamo che l'esame, previsto, è stato eseguito alle prescrizioni e alle tolleranze di fabbricazione S.I.F.E.A., nonchè dalle raccomandazioni imposte dal contratto d'appalto, soddisfano i requisiti delle specifiche approvate ed applicate ed ha avuto esito soddisfacente.

Verified and approved	Executed Nicola Fierro	Data/Date 12/07/2024	Ispettore/Inspector

S.I.F.E.A.
Società Italiana Fondi Bombati e Affini

Via L. Da Vinci,3 35020
Legnaro - Padova - Italy
Tel. ++ 39 049 8830188
Fax ++ 39 049 641247

Web site: www.sifea.it
e-mail: info@sifea.it

Trattamento Termico n. 37/2024
Heat treatment nr.

del 17/06/2024
of

Cliente: / Costumer:

Il materiale sottoposto al trattamento termico è descritto nella distinta allegata:
Products treated are described in the attached list.

Descrizione del trattamento termico:
Heat treatment details:

Temperatura di Ingresso: ambiente
Load temperature: room temperature

Velocità salita: 150°C/h max da 300°C
Heating rate:

Permanenza: 60 minuti
Holding time:

Temperatura di trattamento: 910°C ±10°C
Treatment temperature:

Raffreddamento: aria calma
Cooling rate:

Termocoppie tipo Chromel-Allumen: (K)
Chromel-Alumen Thermocpouples (k)

Registratore Eurotherm Chessel Mod. 4102
Eurotherm Chessel recorder Mod. 4102

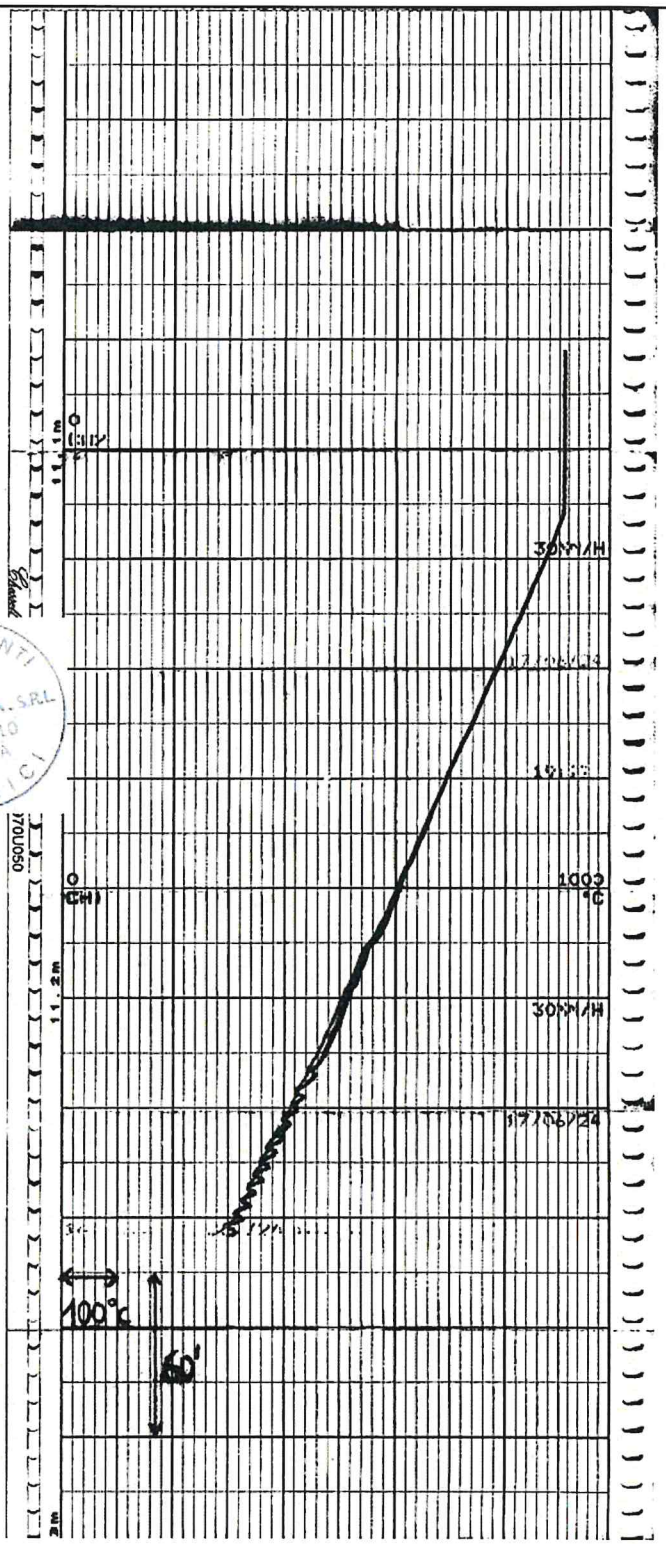
Velocità carta 30 mm/h
Paper Speed 30 mm/h

Scala Carta 0° C - 1000°C
Paper scale 0° C - 1000°C

Diagramma ridotto 24%
Diagram reduced to 24%

TRATTAMENTI S.I.F.E.A. S.R.L. CONTROLLO QUALITÀ TERMICI

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date
Signature



S.I.F.E.A.
Società Italiana Fondi Bombati e Affini

Via L. Da Vinci,3 35020
Legnaro - Padova - Italy
Tel. ++ 39 049 8830188
Fax ++ 39 049 641247

Web site: www.sifea.it
e-mail: info@sifea.it

NumeroDocumento: Document number:	Cliente: Client:	Trattamento Termico n. Heat treatment number	Data Trattamento Execution date
170393	C.A.M.P.I. S.R.L.	37/2024	17/06/2024

Q.ta: Q.ty:	Categoria Articolo: Product tipe:	Dimensioni: Dimensions:	Qualità Materiale: Material quality:	Welding test coupon nr:	Plate test coupon nr:
2	FONDO PSEUDOELLITTICO 2:1	DIAMETRO INTERNO=600 SPESSORE PARTENZA=10	SA516-60 HIC		1

Matricola SN:	Matricola cliente Customer SN:	Colata Heat:	Placca Plate:
170393CL/1/1/001			
170393CL/1/1/002			

Emesso da:
Issue by:

S.I.F.E.A. S.r.l.

Marco Rosso

Controllato da:
Checked by:

S.I.F.E.A. S.r.l.

Marco Rosso

VETORIX
INDUSTRY NDI

CERTIFICATO DI ISPEZIONE VISIVA – VISUAL EXAMINATION REPORT
NR. 011/24

Data: *Date:*	12 Luglio 2024	Sigla: *Item:*	170393CL/1/1	Nr. Fabbrica: *Serial Nr.:*	/
Cliente: *Customer:*	S.I.F.E.A. S.r.l. – Legnaro (PD)	Ordine: *Order:*	/	Disegno: *Drawing:*	/
Impianto: *Plant:*	/	Commessa: *Shop order:*	C.A.M.P.I. S.R.L.	Proc. saldat.: *Welding process:*	/
Oggetto: *Object:*	N. 2 FONDO PSEUDOELLITTICI Øe 620mm			Estens. test: *Test Extension:*	100%

Materiale: *Material:*	Spessore (mm): *Thickness (mm):*	Particolare: *Component:*	Condizioni superficiali: *Surface conditions:*	Stadio lavorazione: *Working step:*
SA516-60 HIC	10	/	Rasata	Finito

Specifica di riferimento: *Specific Reference:*	UNI EN ISO 17637	**Classe di accettabilità:** *Acceptance criteria:*	UNI EN ISO 5817 Liv. C

TECNICA E PROCEDURA DI CONTROLLO - *TEST METHOD AND PROCEDURE*

PREPARAZIONE DELLA SUPERFICIE *SURFACE PRE-CLEANING*	☐ Preparazione di tipo meccanico: *Mechanical pre-cleaning:*	☑ Preparazione di tipo chimico: *Chemical pre-cleaning:* Solnet	Altro: *Altro:*	
ESTENSIONE DEL CONTROLLO *EXTENSION OF EXAMINATION*	☑ Totale 100% *Full coverage* ☐ Locale *Localized*	☐ Cianfrini *Bevels* ☑ Saldatura finita *End stage*	Note: *Note:*	Altro: *Altro:*
METODO VISIVO *VISUAL EXAMINATION METHOD*	☑ Metodo diretto *Direct visual examination*	☐ Metodo remoto *Remote visual examination*		
	☐ Preliminare *Preliminary* ☑ Finale *Final*	☐ In esercizio *On working*	Note: *Note:*	
APPARECCHIATURA E REGISTRAZIONE DATI *INSTRUMENT AND STORAGE MEDIA SYSTEM*	Strumento di controllo *Testing equipment*			
	☐ Fibre ottiche: *Optical Fiber:*	☐ Lenti *Lens*	☑ Weld Gauge *Weld Gauge*	
	☐ Disegno *Drawing*	☐ CD/Floppy Disk/DVD *CD/Floppy Disk/DVD*	☑ Fotografia *Photo*	
ISPEZIONE *INSPECTION*	☑ Luce naturale *Natural light*	☐ Luce bianca *White light*		
	Illuminamento *Luminance:* 1215 lux	Ingrandimenti *Magnitudo:* X		

IDENTIFICAZIONE *IDENTIFICATION*	DISCONTINUITA' *DISCONTINUITY*	LARGHEZZA *WIDTH* (mm)	LUNGHEZZA *LENGHT* (mm)	NOTE *NOTES*	ESITO * *RESULT* *
N. 2 FONDI PSEUDOELLITTICI Øe 620mm	/	/	/	/	C

* :**C** = Conforme - *Acceptable* - **NC** = Non Conforme - *Unacceptable* **NA** = Non applicabile – *Not Applicable*

Prepared by: NDI TECHNICIAN	*Approved by: SUPERVISOR*	*QUALITY CONTROL*
LIMENA Luca	LIMENA Luca III Liv. VT EN ISO 9712	
Luogo: MARCON - VE	Report issue date: 16/07/2024	

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV
ISO 9001 • AS/EN/JISQ 9100

© Vetorix Engineering S.r.l The information in this document is Confidential and property of Vetorix Engineering S.r.l. and S.I.F.E.A. S.r.l. Cannot be copied or communicated to a third party, or used, for any purpose other than that for which it is supplied without the express written consent of Vetorix Engineering S.r.l

VETORIX
INDUSTRY NDT

CERTIFICATO DI CONTROLLO MAGNETOSCOPICO - MAGNETIC PARTICLES EXAMINATION REPORT
NR. 053/24

Data: *Date:*	12 Luglio 2024	Sigla: *Item:*	170393CL/1/1	Nr. Fabbrica: *Serial Nr.:*	/
Cliente: *Customer:*	S.I.F.E.A. S.r.l. – Legnaro (PD)	Ordine: *Order:*	/	Disegno: *Drawing:*	/
Impianto: *Plant:*	/	Commessa: *Shop order:*	C.A.M.P.I. S.R.L.	Proc. saldat.: *Welding process:*	/
Oggetto: *Object:*	N. 2 FONDO PSEUDOELLITTICI Øe 620mm			Estens. test: *Test Extension:*	100%

Materiale: *Material:*	Spessore (mm): *Thickness (mm):*	Particolare: *Component:*	Condizioni superficiali: *Surface conditions:*	Stadio lavorazione: *Working step:*
SA516-60 HIC	10	Raccordo + collarino	Liscia	Dopo formatura

Specifica di riferimento: *Specific reference:* ASME V art. 7 | **Classe di accettabilità:** *Acceptance criteria:* ASME VIII DIV. 1 app.6

TECNICA E PROCEDURA DI CONTROLLO - *TEST METHOD AND PROCEDURE*

PREPARAZIONE DELLA SUPERFICIE *SURFACE PRE-CLEANING*

☐ Preparazione di tipo meccanico: *Mechanical pre-cleaning:*

☑ Preparazione di tipo chimico: *Chemical pre-cleaning:* Solnet

Temperatura d' esame (°C): *Test temperature (°C):* 23° C

MAGNETIZZAZIONE *MAGNETIZATION*

Strumento di controllo: *Testing equipment:* Giogo Elettromagnetico H12 s/n 22.12-19

☐ Puntali *Probes* ☑ Giogo *Yoke* ☐ Bancale magnetoscopico *Stationary MT inspection unit* ☐ Altro: *Other:*

Sistema di magnetizzazione *Magnetization system*: ☑ Magnetico *Magnetic* ☐ Elettrico *Electric* ☐ Combinato *Combined*

Direzione della magnetizzazione *Direction of magnetization*: ☑ Longitudinale *Longitudinal* ☐ Circolare *Circular*

Campo magnet. tangenziale: *Tangential field check:* 4.5 KA/m ☑ CA *AC* ☐ CC *DC* Distanza: *Spacing:* 160 mm

METODO DI CONTROLLO *EXAMINATION METHOD*

☑ Metodo continuo *Continuous method* ☐ Metodo residuo *Residual method*

RIVELATORE *DEVELOPER*

Denominazione commerciale: *Trade mark:* FLUXO 3

☐ Secco *Dry* Sospens. liquida: *Wet* ☐ Acqua *Water* ☑ Petrolio *Petrol*

☑ Contrasto di colore *Color contrast* ☐ Fluorescente *Fluorescent* Colore rivelat.: *Developer color:* Nero Lacca di contrasto: *Paint contrast:* FLUXO 4

Smagnetizzazione: *Demagnetization:* ☐ Eseguita *Executed* ☐ Non necessaria *Not necessary* Magn.mo residuo *Residual magnetism:* / A/m

VERIF. CAMPO MAGNETICO *MAGNETIC FIELD CHECK*

☑ Sonda ASME *ASME Probe* ☐ Sonda Hall *Hall Probe* ☐ Sonda Berthold *Berthold Probe*

☑ Prova di sollevamento *Lifting test:* 5.7 Kg Blocco soll. nr. *Sample block no.:* V82

ISPEZIONE *INSPECTION*

☑ Luce naturale *Natural light* ☐ Luce bianca *White light* ☐ Luce UV *UV light*

Illuminamento *Luminance:* 1190 lux Irraggiamento *Irradiance:* / µW/cm²

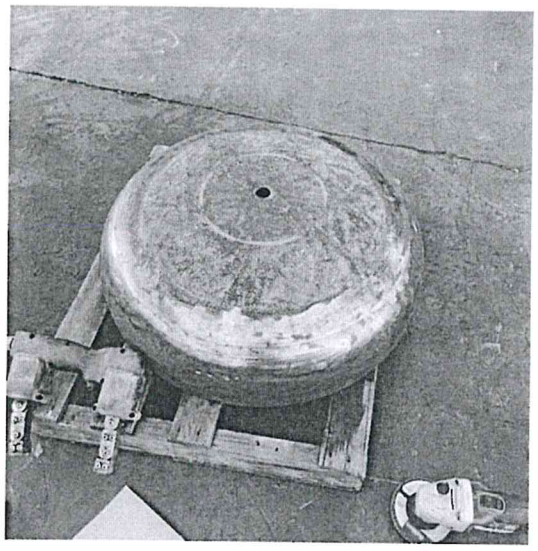
COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV

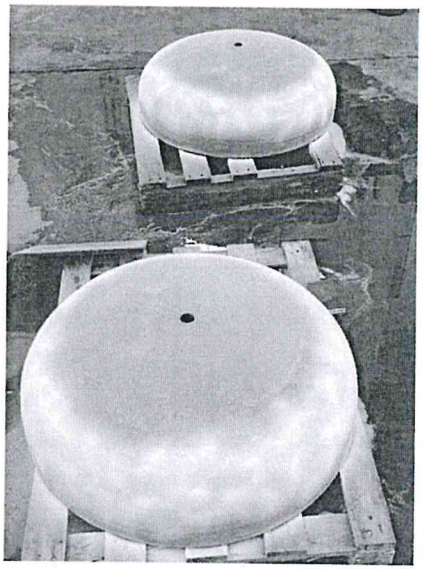
© Vetorix Engineering S.r.l The information in this document is Confidential and property of Vetorix Engineering S.r.l. and S.I.F.E.A. S.r.l. Cannot be copied or communicated to a third party, or used, for any purpose other than that for which it is supplied without the express written consent of Vetorix Engineering S.r.l

VETORIX
INDUSTRY NDI

CERTIFICATO DI CONTROLLO MAGNETOSCOPICO - MAGNETIC PARTICLES EXAMINATION REPORT
NR. 053/24

DOCUMENTAZIONE FOTOGRAFICA





IDENTIFICAZIONE *IDENTIFICATION*	DISCONTINUITA' *DISCONTINUITY*	LARGHEZZA *WIDTH* (mm)	LUNGHEZZA *LENGHT* (mm)	NOTE *NOTES*	ESITO * *RESULT* *
N. 2 FONDO PSEUDOELLITTICI Øe 620mm	/	/	/	Raccordo + collarino	**C**

l = Lunghezza - *Length* **w** = Larghezza – *Width*
* : **C** = Conforme - *Acceptable* - **NC** = Non Conforme - *Unacceptable* – **NA** = Non Applicabile – *Not Applicable*

Prepared by: NDI TECHNICIAN	*Approved by: SUPERVISOR*	*QUALITY CONTROL*
LUCIANO LIMENA	LUCA LIMENA III Liv. MT – SNT-TC-1A	
Luogo: MARCON - VE	Report issue date: 16/07/2024	

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV
ISO 9001 • AS/EN/JISQ 9100

© Vetorix Engineering S.r.l The information in this document is Confidential and property of Vetorix Engineering S.r.l. and S.I.F.E.A. S.r.l. Cannot be copied or communicated to a third party, or used, for any purpose other than that for which it is supplied without the express written consent of Vetorix Engineering S.r.l

VETORIX
INDUSTRY NDT

CERTIFICATO DI CONTROLLO CON LIQUIDI PENETRANTI – LIQUID PENETRANT EXAMINATION REPORT
NR. 076/24

Data: *Date:*	12 Luglio 2024	Sigla: *Item:*	170393CL/1/1	Nr. Fabbrica: *Serial Nr.:*	/
Cliente: *Customer:*	S.I.F.E.A. S.r.l. – Legnaro (PD)	Ordine: *Order:*	/	Disegno: *Drawing:*	/
Impianto: *Plant:*	/	Commessa *Shop order:*	C.A.M.P.I. S.R.L.	Proc. saldat.: *Welding process:*	/
Oggetto: *Object:*	N. 2 FONDO PSEUDOELLITTICI Øe 620mm			Estens. test: *Test Extension:*	100%

Materiale: *Material:*	Spessore (mm): *Thickness (mm):*	Particolare: *Component:*	Condizioni superficiali: *Surface conditions:*	Stadio lavorazione: *Working step:*
SA516-60 HIC	10	Raccordo + collarino	Liscia	Dopo formatura

Specifica di riferimento: *Specific Reference:*	Proc. Vetorix doc. PT 02 Rev. 2 ASME V Art. 6 SE 165 App.5 UW51	**Classe di accettabilità:** *Acceptance criteria:*	ASME VIII Div. 1 App. 8

TECNICA E PROCEDURA DI CONTROLLO - *TEST METHOD AND PROCEDURE*

PREPARAZIONE DELLA SUPERFICIE *SURFACE PRE-CLEANING*

☐ Tipo meccanico: *Mechanical pre-cleaning:*	☑ Tipo chimico: *Chemical pre-cleaning:*	Temperatura d'esame: *Test temperature (°C):*	Tempo asciug. remover: *Drying time of remover:*
	Solnet	23°	10 min. *minutes*

PENETRANTE *PENETRANT*

Denominazione commerciale: *Trade mark:*	FLUXO P 125		
☑ Contrasto di colore *Color contrast*	☐ Fluorescente *Fluorescent*		
Applicazione del penetrante *Penetrant application*	☑ A spruzzo *Spray gun*	☐ Ad immersione *By immersion*	
Tempo di penetrazione *Penetration time:*	10 minuti *minutes*		

EMULSIONANTE *EMULSIFIER*

Denominazione commerciale: *Trade mark:*	/	Emulsionante: *Emulsifier type:*	/
Applicazione emulsionante: *Emulsifier application:*	/	Tempo di emulsionatura: *Emulsification time:*	/ minuti *minutes*

RIMOZIONE DEL PENETRANTE *PENETRANT REMOVAL*

☑ Manuale con acqua *Water manual*	☐ A spruzzo *Spray gun*	☐ Manuale con solvente *Manual with solvent*

ASCIUGATURA *DRYING*

☐ Aria compressa *Dry air compressed*	☑ Aria libera *Dry free air*	☐ Aria calda *Hot air*	☑ Con stracci *Rags*
Tempo di asciugatura *Time drying:*	10 minuti *minutes*		

RIVELATORE *DEVELOPER*

Denominazione commerciale: *Trade mark:*	FLUXO R 175	Tipo rivelatore: *Developer type:*	Not watery solution
Applicazione rivelatore: *Developer application:*	Spray	Tempo sviluppo: *Development time:*	10 minuti *minutes*
Tempo massimo di lettura *Inspection time:*	60 minuti *minutes*		

ISPEZIONE *INSPECTION*

☑ Luce naturale *Natural light*	☐ Luce bianca *White light*	☐ Luce UV *UV light*
Illuminamento *Luminance:*	1190 lux	Irraggiamento *Irradiance:* / µW/cm²

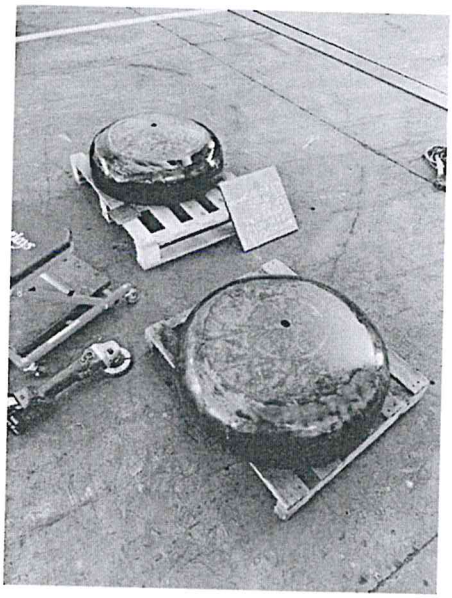
COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV

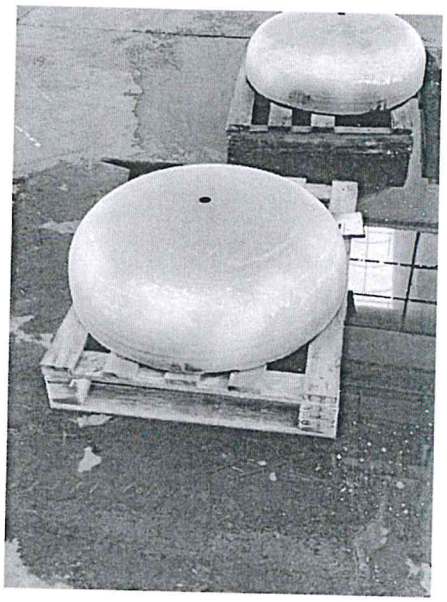
© Vetorix Engineering S.r.l The information in this document is Confidential and property of Vetorix Engineering S.r.l. and S.I.F.E.A. S.r.l. Cannot be copied or communicated to a third party, or used, for any purpose other than that for which it is supplied without the express written consent of Vetorix Engineering S.r.l

VETORIX
INDUSTRY NDI

CERTIFICATO DI CONTROLLO CON LIQUIDI PENETRANTI – LIQUID PENETRANT EXAMINATION REPORT
NR. 076/24

DOCUMENTAZIONE FOTOGRAFICA





IDENTIFICAZIONE *IDENTIFICATION*	DISCONTINUITA' *DISCONTINUITY*	LARGHEZZA *WIDTH* (mm)	LUNGHEZZA *LENGHT* (mm)	NOTE *NOTES*	ESITO * *RESULT* *
N. 2 FONDO PSEUDOELLITTICI Øe 620mm	/	/	/	Raccordo + collarino	**C**

* : **C** = Conforme - *Acceptable* - **NC** = Non Conforme - *Unacceptable* – **NA** = Non Applicabile – *Not Applicable*

Prepared by: NDI TECHNICIAN	*Approved by: SUPERVISOR*	*QUALITY CONTROL*
LIMENA LUCIANO	LIMENA LUCA III Liv. PT SNT-TC-1A	
Luogo: MARCON - VE	Report issue date: 16/07/2024	

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV
ISO 9001 • AS/EN/JISQ 9100

© Vetorix Engineering S.r.l The information in this document is Confidential and property of Vetorix Engineering S.r.l. and S.I.F.E.A. S.r.l. Cannot be copied or communicated to a third party, or used, for any purpose other than that for which it is supplied without the express written consent of Vetorix Engineering S.r.l

NDT OPERATOR QUALIFICATION CERTIFICATE

No. **22TO00648PN1**

Validity renewal of certificate n° 18VE00012PO1

Operator	**LIMENA LUCA**		
Born in	**MESTRE (VE)**	on	**08/07/1979**
Employed by	**VETORIX ENGINEERING SRL UNIPERSONALE**		
Located in	**Marcon (VE)**		

declared by his company to be in possession of the requirements requested by the Recommended Practice SNT-TC-1A Ed. 2016 and V.WRPR01 REV.04 DEL 16.08.2021 successfully passed on 13/01/2023 the portion of examination required by the relevant written practice and by the a.m. rules for NDT technicians of level

III (Third)

for the methods:

MT	**MAGNETIC PARTICLE**
PT	**DYE PENETRANT**
VT	**VISUAL**
UT	**ULTRASONIC**
RT	**RADIOGRAPHIC**

This certificate is valid from	**13 December 2022**	to	**13 December 2027**
Issued at	**GENOVA**	on	**13 January 2023**

VETORIX ENGINEERING s.r.l. UNIPERSONALE
Via dell'Artigianato, 12
30020 MARCON (VE)
P.IVA e C.F.: 03706450272

CERTIFYING AUTHORITY

Filippo Lago

(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

ROSSI MASSIMILIANO

NDT LEVEL III ASNT
Certificate n. 201394

This certificate consist of 1 pages

SIDERTEST
mechanical chemical non destructive tests
Head Office: Strada della Barianella, 1/B - 29015 Castel San Giovanni(PC) ITALY
U.O. Plant B: Viale dell Industria, 25 - 29015 Castel San Giovanni(PC) ITALY
Tel. +39 0523 881900 Fax. +39 0523 842903 sidertest@sidertest.it www.sidertest.it

Verifica di Autenticità/ Authenticity Verification

RAPPORTO DI PROVA/ TEST REPORT

PM 23984 / 24

Rif. Lab SIM (FCP) : **7726 / 24 (A / A)**

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0864 L

Cliente/ Customer **C.A.M.P.I. Srl Via Diamantina, 15 44122 Ferrara FE**

Ordine/ Order **24003.15**

Commessa/ Job **24003**

Campione fornito da cliente/ Sample supplied by customer :Parte del prodotto finito/ part of finished product

Descrizione/ Description	Qta/ Qty	Posizione/ Item	Prova Nr./ Test Nr.	Colata/ Heat	Materiale/ Material
PLATE W.T. 10 mm	1		170393CL/1/1		**ASME SA 516-23 Gr. 60**

Osservazioni/ Observations **Normalizzato da SIFEA a910°C**

PROVA DI TRAZIONE A TEMPERATURA AMBIENTE/ Tensile test at room temperature [Decision rule: Qn]

ID Prova/ ID Specimen	Metodo di prova/ Test method	Specifica/ Specification	Dimensioni/ Dimension *Wth Ø / Width ØPipe* mm	Lo (mm)	Posizione di prelievo/ Test position	Temp./ Temp. °C	Snervamento/ Yield strength MPa		Rottura/ Tensile strength Rm MPa		Allungamento/ Elongation after fracture *A (%)*		Strizione/ Area Reduction *Z (%)*	S/R/ Ratio Yield strength / Tensile strength	Data esecuzione/ Date of Testing
130632	ASTM A370 – 24 §6÷14, § A1.3, § A2.2 and § A3.2	**JOB 24003**	10,95 12,52	50,00	B T FT	23,0	(≥220) Rp0,2%	**369**			(415÷550)	**524**	(≥25)	**35,1**			07/10/2024

Esito/ Conclusion: Conforme a 'Specifica'/ Compliant with 'Specification'

PROVA DI RESILIENZA/ Notched-bar impact test [Decision rule: Qn]

ID Prova/ ID Specimen	Metodo di prova/ Test method	Specifica/ Specification	Dimensioni/ Dimension mm *Size Width Lenght*	Posizione di prelievo/ Test position	Tipo/ Type	Temp./ Temp. °C	Energia Nominale/ Nominal Energy 750 #Fondoscala/ Full Scale										Data esecuzione/ Date of Testing
							Energia Assorbita/ Absorbed energy J Valore singolo/ Single Value			Media/ Average	Area di taglio/ Shear area % Valore singolo/ Single Value		Average	Espansione laterale/ Lateral expansion mm Valore singolo/ Single Value		Media/ Average	
130633	ASTM A370 – 24 § 20÷29	**JOB 24003**	7,5 x 10 x 55	B T UP -1,5	KV8	-46	(≥20,5)	**113,0**	**105,3**	**114,8**	(≥25,5)	**111,0**					04/10/2024

Thermal conditioning with Cryostat and ethyl alcohol(time: min 5 minutes)

Esito/ Conclusion: Conforme a 'Specifica'/ Compliant with 'Specification'

HEAD PLATE

I risultati presenti in questo rapporto di prova si riferiscono al solo campione così come ricevuto dal Cliente, che esegue il campionamento, salvo in caso di trattamenti termici effettuati dal Laboratorio. I campi in blu sono forniti dal cliente. La conformità ai documenti in "Specifica" riguarda solamente le prove presenti in questo rapporto di prova. Il simbolo * antecedente a "ID_Prova" indica una prova non accreditata da ACCREDIA. Dichiarazioni false, fittizie o fraudolente e modifiche del presente rapporto di prova costituiscono reato punibile secondo le norme penali vigenti. Il rapporto di prova non può essere riprodotto parzialmente, salvo nostra approvazione scritta. Il Laboratorio non è responsabile dei dati forniti dal cliente che possono influenzare la validità dei risultati./ This test report refers only to the examined sample as received from the Customer, except in case of heat treatments carried out by the Laboratory. Clients are in charge of sampling. Blue fields are supplied by the Client.Compliance with documents in "Specification" refers only to the tests described on this test report.The * symbol before "ID_Prova" indicates that the test is not accredited by ACCREDIA. Any false statement or modification of this test report is a violation of law and the Laboratory may take legal action.This test report cannot be partially reproduced without our written approval. Laboratory is not responsible for information supplied by the customer which can affect the validity of the result.

Data Ingresso Materiale/ Date of Material Arrival **01/10/2024**

Data Rapporto di prova/ Test Report Date **08/10/2024**

Responsabile di Reparto o sostituto/ Department Manager or Deputy

Morresi Davide

firmato elettronicamente/electronically signed

Responsabile Laboratorio o Sostituto/ Laboratory Manager or Deputy

Amani Paolo

Ispettori/ Inspector

Cliente/ Customer

C.A.M.P. S.r.l. Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

DECISION RULE:
- Ql → Qualitative
- Qs → Semi-quantitative
- Qn → Quantitative (Implicit Uncertainty)
- Qi → Quantitative (Non Implicit Uncertainty) - the uncertainty is reported in the test report and is used for conformity assessment. The result can be COMPLIANT or NOT COMPLIANT

Test Position Legend: [B]-Specimen in Base Material; [FT]-full thickness; [T]-trasv.; [UP -1,5]-external sup. (1,5 mm)

SIDERTEST
mechanical chemical non destructive tests
Head Office: Strada della Barianella, 1/B - 29015 Castel San Giovanni(PC) ITALY
U.O. Plant B: Viale dell Industria, 25 - 29015 Castel San Giovanni(PC) ITALY
Tel. +39 0523 881900 Fax. +39 0523 842903 sidertest@sidertest.it www.sidertest.it

Verifica di Autenticità/ Authenticity Verification

RAPPORTO DI PROVA/ TEST REPORT

DUR 23984 / 24

Rif. Lab SIM (FCP) : **7726 / 24 (A / A)**

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
LAB N° 0864 L

Cliente/ Customer **C.A.M.P.I. Srl Via Diamantina, 15 44122 Ferrara FE**

Ordine/ Order **24003.15**

Commessa/ Job **24003**

Campione fornito da cliente/ Sample supplied by customer :Parte del prodotto finito/ part of finished product

Descrizione/ Description	Qta/ Qty	Posizione/ Item	Prova Nr./ Test Nr.	Colata/ Heat	Materiale/ Material
PLATE W.T. 10 mm	1		170393CL/1/1		**ASME SA 516-23 Gr. 60**

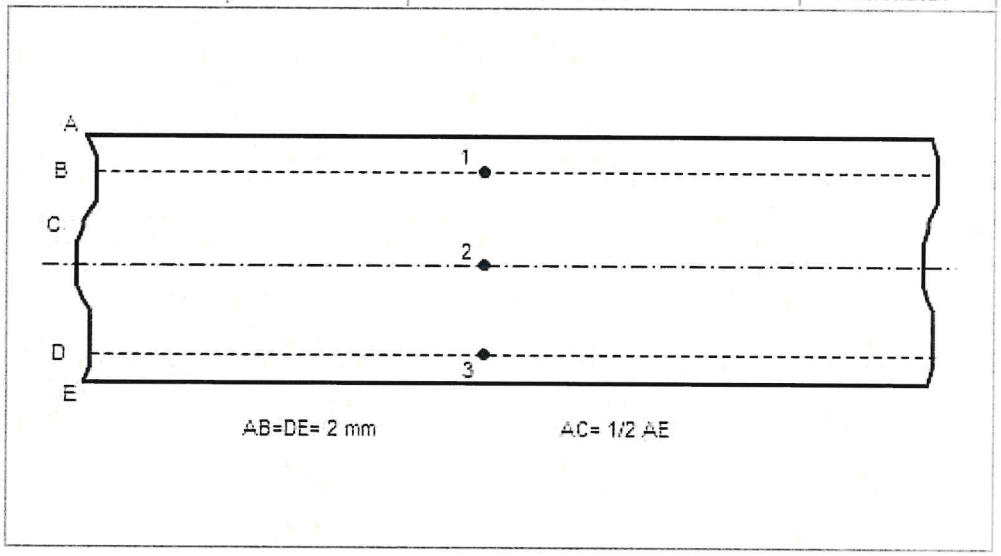
Osservazioni/ Observations **Normalizzato da SIFEA a910°C**

PROVA DI DUREZZA HV10 - HV30 - HV5/ HV10 - HV30 - HV5 hardness test [Decision rule: Qn]

ID Prova/ ID Specimen	Metodo di prova/ Test method	Specifica/ Specification	Posizione di prelievo/ Test position	Temp./ Temp.	Durezza/ Hardness	Data esecuzione/ Date of Testing
130635	ASTM E92 – 23 (only Vickers)	**JOB 24003**	B T	20 °C	HV10	08/10/2024

(B1) - Base Material **MAX 235**

HV10	1	**155**	2	**154**	3	**154**



Position	*Average*	
(B1) - Base Material	154	HV10

Esito/ Conclusion: **Conforme a 'Specifica'/ Compliant with 'Specification'**

HEAD PLATE

I risultati presenti in questo rapporto di prova si riferiscono al solo campione così come ricevuto dal Cliente, che esegue il campionamento, salvo in caso di trattamenti termici effettuati dal Laboratorio. I campi in blu sono forniti dal cliente. La conformità ai documenti in "Specifica" riguarda solamente le prove presenti in questo rapporto di prova. Il simbolo * antecedente a "ID_Prova" indica una prova non accreditata da ACCREDIA. Dichiarazioni false, fittizie o fraudolente e modifiche del presente rapporto di prova costituiscono reato punibile secondo le norme penali vigenti. Il rapporto di prova non può essere riprodotto parzialmente, salvo nostra approvazione scritta. Il Laboratorio non è responsabile dei dati forniti dal cliente che possono influenzare la validità dei risultati./ This test report refers only to the examined sample as received from the Customer, except in case of heat treatments carried out by the Laboratory. Clients are in charge of sampling. Blue fields are supplied by the Client.Compliance with documents in "Specification" refers only to the tests described on this test report.The * symbol before "ID_Prova" indicates that the test is not accredited by ACCREDIA. Any false statement or modification of this test report is a violation of law and the Laboratory may take legal action.This test report cannot be partially reproduced without our written approval. Laboratory is not responsible for information supplied by the customer which can affect the validity of the result.

Data Ingresso Materiale/ Date of Material Arrival **01/10/2024**

Data Rapporto di prova/ Test Report Date **08/10/2024**

Responsabile di Reparto o sostituto/ Department Manager or Deputy
Morresi Davide
firmato elettronicamente/electronically signed

Responsabile Laboratorio o Sostituto/ Laboratory Manager or Deputy
Amani Paolo

Ispettori/ Inspector

Cliente/ Customer
C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

DECISION RULE:
- Ql → Qualitative
- Qs → Semi-quantitative
- Qn → Quantitative (Implicit Uncertainty)
- Qi → Quantitative (Non Implicit Uncertainty) - the uncertainty is reported in the test report and is used for conformity assessment.

The result can be COMPLIANT or NOT COMPLIANT

Test Position Legend: [B]-Specimen in Base Material; [SZ]-along the thickness; [T]-trasv.

VE-10p. 3 6 9 10 12 13 14 16

FERRARI

Via Achille Grandi n. 29 (Zona Bassette) 48123 Ravenna - ITALIA
P.IVA 01134740396 Tel. 0544/508311 - Fax 0544 451601
CF e Iscr.Reg.Impr. 01134740396
Cod.ident. CEE IT 01134740396 M. RA 003417 - R.E.A. RA 122802
CAP. SOC. Euro 46.800,00 www.ferrari-ra.it info@ferrari-ra.it

(A04) **MATERIAL TEST CERTIFICATE**

- [ ] UNI/EN 10204:2004 2.2 - EN 10168:2004
- [X] UNI/EN 10204:2004 3.1 - EN 10168:2004
- [ ] UNI/EN 10204:2004 3.2 - EN 10168:2004

Azienda con sistema di gestione certificato da IGQ secondo UNI EN ISO 9001
IGQ system quality certified company according to UNI EN ISO 9001

LAB01 Rev.5

(A03) Cert.N°: 2.068 Rev.:
Page: 1 of 1
(Z02) Date: 15/05/2024
Ddt N°: AB1 / 1.545

(A06) CUSTOMER / CONSIGNEE:	C.A.M.P.I. S.R.L.	(A08) Job N°:	1.292
(A07) PURCHASE ORDER:	24003.01	(B02) Steel Designation:	A/SA350M LF2 Cl1

Item	(B08) Qty	(A09/B01 - B09 - B11) Description Material - Product	(B07) Heat No.	Supplier
10	2,00	1-FLG WN 150 RF 10" XS SA350 LF2 Cl1	.5021110	11049-ACC VENETE
15	4,00	2-FLG LWN 150 RF 1" Id=25,4 L=230 SA350 LF2 Cl1	.248307	12246-ACC. VENETE
20	1,00	3-FLG WN 150 RF 3" XS SA350 LF2 Cl1	.5020259	11031-ACC.VENETE
25	2,00	4-FLG WN 150 RF 6" XS SA350 LF2 Cl1	.461565	11031-ABS
30	2,00	5-FLG BL 150 RF 6" SA350 LF2 Cl1	.479784	11031-BERTOLI SAFAU

CHEMICAL ANALYSIS % (C71 - C92)

(B07) Heat N.	C Mn	Si Cr	Ni Mo	Cu Ca	P S	V Nb	V+Nb Fe	As Sn	Sb Al	Ti W	O_2 H_2	N_2 B	Ceq Ceq(SF)	Co Nb+Ta	Cr+Mo Cr+Mo+N	V+Nb+Ti Cr+Ni+Cu+Mo	J fact. X fact.	(C01)
.248307	0,164 1,020	0,185 0,119	0,112 0,023	0,138	0,0070 0,0030	0,0040 0,0020	0,0060	0,0030 0,0080	0,0300	0,0150	0,0001	0,0107 0,0002	0,38 0,33	0,0020	0,142 0,153	0,0210 0,392	181 0	L
.461565	0,185 1,240	0,200 0,090	0,080 0,020	0,120 0,0012	0,0100 0,0020	0,0050 0,0020	0,0070	0,0030 0,0050	0,0010 0,0270	0,0019	0,0010 0,0001	0,0068 0,0001	0,43 0,39	0,0070 0,0020	0,110 0,117	0,0089 0,310	216 13	L
.479784	0,188 1,180	0,190 0,080	0,040 0,010	0,070 0,0011	0,0080 0,0030	0,0050 0,0020	0,0070	0,0030 0,0050	0,0010 0,0210	0,0024	0,0007 0,0001	0,0067 0,0001	0,41 0,38	0,0060 0,0020	0,090 0,097	0,0094 0,200	178 11	L
.5020259	0,175 1,110	0,210 0,113	0,110 0,027	0,161	0,0107 0,0028	0,0035 0,0035	0,0070	0,0048 0,0089	0,0263	0,0010	0,0002	0,0055	0,41 0,36	0,0035	0,139 0,145	0,0080 0,411	259 15	L
.5021110	0,170 1,122	0,236 0,067	0,074 0,013	0,160	0,0089 0,0022	0,0247 0,0132	0,0379	0,0038	0,0279			0,0092	0,39 0,36	0,0132	0,080 0,089	0,0379 0,314	121 9	L

MECHANICAL TESTS (C01 - C69)

(B07) Heat N.	(C01) Location	(C02) Direction	(C10) Shape mm	(C03) Temp C°	(C11) Yield Stress N/mm²	(C12) Tensile Strength N/mm²	(C13) Elongation on 2" %	(C14) Reduction of Area %	(C30) Test Method	(C31) Hardness		(C01) Location	(C02) Direction	Impact Test (J) (C49)10x10 mm. (C42) Obtained			(C43)Mean	(C03) Temp C°	(B05) Heat Treatment
.248307	T/2	L	8,75x35	20	350,0	491,3	41,0	70,0	HB	155	157	T/2	T	98	102	99	100	-46	N
.461565	T/2	Q	12,5x50	20	339,2	514,3	39,0	68,3	HB	146	150	T/2	L	74	99	127	100	-46	N
.479784				20	316,0	502,0	33,4	75,4	HB	140	141	T/2	T	42	37	44	41	-50	N
.5020259	T/2	T	12,5x50	20	324,5	500,3	33,2	71,3	HB	144	147	T/2	T	135	118	113	122	-50	N
.5021110	T/2	T	12,5x50	20	310,0	555,0	34,7	68,2	HB	153	156	T/2	T	105	114	134	118	-46	N

(B05)	N=Normalized	T=Normalized And Tempered	A=Annealed	Q=Quenched And Tempered	S=Solution Treat & Quench
(C01) Location:	F=Full thk.	S=Surface	T/4=1/4 thk.	T/2=1/2 thk.	L=Ladle Analysis P=Product Analysis
(C02) Direction:	T=Transvers	L=Longitudinal	R=Radial	Q=Tangential	

NOTE:
- Material Fully Killed & fine grain
- Material according to ASTM A350/A350M-23
  Material according to ASME II Part.A SA-350/SA-350M Ed.2023
- Material normalized at 920°C
- Material in compliance with specification and order
  Where not indicate content of V & Nb less than 0,001%
- For more than one forging shipped per heat, hardness test is performed on two different forgings
- Material fully killed and fine grain
- Material according to NACE MR01-75/ISO 15156

(Z03) Inspection Representative	(Z05) Inspection Authority	(Z06) Customer
FERRARI s.r.l. Eugenio Berlini		

This document has been prepared electronically and is valid without signature

3

CISQ is a member of

IQNET

The International Certification Network

www.iqnet-certification.com

IGQ

CERTIFICATO
CERTIFICATE

IGQ 9807

Si certifica che il sistema di gestione qualità di:
We hereby certify that the quality management system operated by:

Ferrari Srl

Via Achille Grandi, 29

48100 Ravenna RA - IT

è conforme alla norma:
is in compliance with the standard:

UNI EN ISO 9001:2015

per le seguenti attività:
for the following activities:

IAF: 17

Produzione e commercializzazione di flange in acciai al carbonio, legati, per basse temperature, inossidabili, e leghe di nichel; commercializzazione di valvole, raccordi e tiranti per tubazioni, sistemi di sollevamento e di produzione e utilizzo aria compressa; service del settore aria compressa

Manufacture of flanges in carbon, alloy, low temperature, stainless steel and nickel alloys; commercial distribution of valves, fittings and stud bolts for piping, compressed air lifting systems, compressed air production equipment; servicing of compressed air equipment

prima emissione: *first issued on:*	**1998-03-10**
emissione corrente: *last issued on:*	**2024-06-30**
data di scadenza: *valid until:*	**2027-06-30**

Data ultima revisione: / *Last revision date*: **2024-06-30**

Il Direttore
Roberto Pieroncini

IGQ - Via Giosuè Carducci 125/A - 20099 Sesto San Giovanni (MI) - Italy
www.igq.it - info@igq.it

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17021-1
MANAGEMENT SYSTEMS CERTIFICATION BODY

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT
IAF

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
MS N° 0001
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

CISQ
www.cisq.com
CISQ è la Federazione Italiana di Organismi di Certificazione dei sistemi di gestione aziendale. CISQ is the Italian Federation of management system Certification Bodies.

IGQ

ISTITUTO ITALIANO DI
GARANZIA DELLA QUALITÀ

ATTESTAZIONE

Declaration

RILASCIATO A:
ISSUED TO:

Ferrari Srl

Unità produttiva di Ravenna
Via Achille Grandi, 29 – 48100 RA

Con riferimento alla Direttiva 2014/68/UE (PED), allegato 1, punto 4.3, comma 3, ed al paragrafo 4.2 della norma armonizzata EN 764-5, si dichiara che il Sistema di Gestione per la Qualità certificato IGQ 9807 include i processi relativi alla fornitura dei seguenti prodotti:

With reference to 2014/68/UE Directive, annex 1, point 4.3, comma 3, and to harmonized standard EN 764-5, clause 4.2, we attest that the Quality Management System certified IGQ 9807 includes the supply of the following products:

Tipo di prodotti *Type of products*	Specifica *Specification*	Materiale *Material*	Stato di fornitura *Delivery conditions*	Dimensione *Dimension*
Flange forgiate, stampate e laminate *Forged, pressed and rolled flanges*	Norme nazionali, europee ed internazionali *National, European and International Standards*	Acciai non legati *Non - alloy steels* Acciai legati *Alloy steels* Acciai inossidabili austenitici *Austenitic stainless steels*	Grezzo o lavorato meccanicamente *As worked or machine worked*	DN 10 ÷ DN 3000 3/8 ÷ 118 inches

prima emissione: **30-04-2003**
first issue on:
emissione corrente: **30-06-2024**
last issue on:
last issue on:
data di scadenza: **30-06-2027**
valid until:

Il Direttore
ing. Roberto Pieroncini

VE-10P-(4)(7)

HEAT CODE CS600

LIBERTY

A02 **Inspection certificate "3.1" (EN 10 204)**

A03 Document No.:**81240/22**

A07	Customer's Order (P.O.) No./Item No.: **OF210757**	A08	Manufacturer's Works Order No.: **59148/0/22**
A11	Supplier's Order No.: **3151018290**	A10	Advice - Note No.: **8150085356**
B08, B12/13	Quantity delivered: pcs / bdls: **14**; mtrs / feet: **120,899**; B13 Actual mass kgs / lbs: **9896**	A06	Customer / Consignee: **T.A.L. S.P.A. TUBI ACCIAIO LOMBARDA con socio unico VIA G.DI VITTORIO, 6-ZONA IND. 29017 FIORENZUOLA ARDA Italy**
B09-11	Dimensions: **273,0 X 12,70 mm (10" SCH60)**		
B02	Steel designation: **L360/X52 PSL1 Grade 6**		

B01,B03,B04 Product, conditions and terms of delivery:

Seamless steel tubes,
ASME B36.10M-18, ASTM A999/A999M-18, ASME SA999/SA999M-19,
API Spec.5L-46th edit.18 PSL1, EN ISO 3183/19, ASTM A333/A333M-18, ASME SA333/SA333M-21 – PED 2014/68/EU.
ASME II Part.D Table Y1-11a. ANSI/NACE MR0175/ISO 15156-15, ANSI/NACE MR0103/ISO 17945-15.
Normalized (min. 860-945°C). **TS02 Rev.6 for T.A.L.+ LO deviation**

A04, B06 Marking: Manufacturer's mark, mill inspector's stamp

LIBERTY OSTRAVA 1 2

C71-92 / B07 Heat (H) and product (P) chemical analyses (%) — C70 Steel made by basic oxygen process, fully killed, strand cast.

Heat No.:		C	MN	SI	P	S	CU	NI	CR	AI	MO	V	TI	NB	CEQ
44480KN	**H**	**0,16**	**1,27**	**0,197**	**0,014**	**0,009**	**0,09**	**0,09**	**0,04**	**0,028**	**0,011**	**0,044**	**0,002**	**<0,003**	**0,40**
	P	0,15	1,25	0,191	0,014	0,009	0,08	0,09	0,04	0,027	0,009	0,043	0,002	<0,001	0,39
	P	0,15	1,25	0,191	0,014	0,009	0,08	0,09	0,04	0,027	0,009	0,044	0,002	<0,001	0,39

Z99

B07 / C04 Test results: Heat No. C00 Specimen No. / Requirements:	MPa C11 Yield Point	MPa C12 Tensile Strength	% (2") C13 Elongation	C40-43 Impact test (KCV2)	HRB C30-32 Hardness
	L360/X52	**min. 360**	**min. 460**	**min. 27,0**	**A) L-10-40J / - 52°C**	**max. 99**
	Grade 6	**min. 240**	**min. 415**	**min. 30,0**	**B) INF: SHEAR AREA (%)**
	Longitudinal strip specimen 38,1 mm				Ø / min
44480KN	**399**	**543**	**43,1**	**A) 187**	**188 202 170**	**78 79**
	400	**550**	**42,5**	**B) 60**	**61 67 53**

Z99

D01	Visual and dimensional inspection with satisfactory results	X	D51	Hydrostatic test - min. test pressure MPa / sec.	20,5 / 5
C50	Flattening test - satisfactory	X	D02	The pipes tested on tightness by NDT in acc. to	
C51	Expanding test - satisfactory				
C52	Bending test - satisfactory				
C53	Ring expanding test - satisfactory		D03	Nondestructive Electromagnetic Testing	
C54	Ring tensile test - satisfactory				

The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, ISO 45001:2018.

QA System has been subjected to a specific assessment acc. to directive 2014/68/EU, annex I, point 4.3 and AD 2000-Mbl. W0 by TÜV NORD Systems GmbH & Co. KG. Welding process, personnel for welding and NDT are approved acc. to PED 2014/68/EU.

Elongation (A5) = min. 14% guaranteed (L0= 5.65 * $\sqrt{S0}$)

Residual magnetic field [mT] max.3 - satisfactory **MANUFACTURER OF BILLETS: LIBERTY OSTRAVA**

Mass activity value of the ionising radiation in the heat analysis does not exceed 100 Bq/kg.

22HRC=99HRBmax. **Grain size min. 7 acc. ASTM E112 is guaranteed.**

Guarantee of tensile properties acc.to ASME Sec.II Part.D Table Y1.

Z01 All pipes conform to the above mentioned standards and ordering requirements and agreements.

Z02 Date of issue **22.04.2022/lb**

Tel.:++420 595683644

A01 Liberty Ostrava a.s.
A05 QA Department
Vratimovská 689/117
719 00 Ostrava-Kunčice
Czech Republic

LIBERTY
Liberty Ostrava a.s.
Vratimovská 689/117, 719 00 Ostrava - Kunčice
QA - WORKS INSPECTOR
IDENTIFICATION No. 4

Bc. Petr Pastucha
Work's Inspector
Z02 Validation

E.1. 2574/16/15/P

Approved by MBRONZINI on 02/05/22

TAL SPA - THIS DOCUMENT IS REPRODUCED BY A COMPUTERIZED SYSTEM AND IS CONFORM TO THE ORIGINAL

(4)

C.A.M.P.I. S.R.L. P.O. 23031.07-23032.05 NQ TAL JOB N°324000054 OUR DDT N°202400497 OF 25/01/24
N° 1 MT 11,62 HEAT 55300YN DIMENSIONS 88,9 x 7,62

VE-10 p. (11)

HEAT CODE ES 605

A02 **Inspection certificate "3.1" (EN 10 204)**

LIBERTY

A03 Document No.: **82073/23**

A07	Customer's Order (P.O.) No./Item No.: **OF230361**	A08	Manufacturer's Works Order No.: **49133/0/23**
A11	Supplier's Order No.: **3151030628**	A10	Advice - Note No.: **8151004617**
B08, B12/13	Quantity delivered: pcs / bdls: **116**; mtrs / feet: **1345,350**; B13 Actual mass kgs / lbs: **20633**	A06	Customer / Consignee: **T.A.L. S.P.A. TUBI ACCIAIO LOMBARDA con socio unico VIA G.DI VITTORIO, 6-ZONA IND. 29017 FIORENZUOLA ARDA Italy**
B09-11	Dimensions: **88,9 X 7,62 mm (3" SCH80)**		
B02	Steel designation: **L360/X52 PSL1 Grade 6**		

B01,B03, B04 Product, conditions and terms of delivery:

Seamless steel tubes,
ASME B36.10M-22, ASTM A999/A999M-18, ASME SA999/SA999M-21,
API Spec.5L-46th edit.18 PSL1, EN ISO 3183/19, ASTM A333/A333M-18, ASME SA333/SA333M-21 – PED 2014/68/EU.
ASME II Part.D Table Y1-11a. ANSI/NACE MR0175/ISO 15156-15, ANSI/NACE MR0103/ISO 17945-15.
Normalized (min. 860°C). **TS02 Rev.6 for T.A.L.+ LO deviation**

A04,B06 Marking: Manufacturer's mark, mill inspector's stamp

LIBERTY OSTRAVA (1) (2)

C71-92 / B07 Heat (H) and product (P) chemical analyses (%) — C70 Steel made by basic oxygen process, fully killed, strand cast.

Heat No.:		C	MN	SI	P	S	CU	NI	CR	AL	MO	V	TI	NB	CEQ
55300YN	H	**0,15**	**1,24**	**0,217**	**0,016**	**0,002**	**0,13**	**0,09**	**0,04**	**0,029**	**0,011**	**0,043**	**0,003**	**<0,003**	**0,39**
	P	0,16	1,23	0,217	0,017	0,002	0,13	0,09	0,04	0,027	0,011	0,043	0,003	<0,001	0,39
	P	0,15	1,23	0,218	0,017	0,002	0,13	0,09	0,04	0,027	0,012	0,043	0,003	<0,001	0,39

Z99 ☐

B07 C04 Test results: Heat No. C00 Specimen No.	MPa C11 Yield Point	MPa C12 Tensile Strength	% (2") C13 Elongation	C40-43 Impact test	HRB C30-32 Hardness
Requirements: **L360/X52 Grade 6**	**min. 360 min. 240**	**min. 460 min. 415**	**min. 21,0 min. 29,0**	**A) L-5-20J / - 53°C B) INF: SHEAR AREA (%)**	**max. 99**
	Longitudinal strip specimen 19,0 mm			Ø / min	
55300YN	**382**	**520**	**29,3**	**A) 77** **66 80 84**	**82 81**
	384	**523**	**32,2**	**B) 94** **83 100 100**	
	380	**521**	**33,5**		
	390	**523**	**32,9**		
	381	**516**	**32,6**		
	384	**522**	**31,5**		

Z99 ☐

D01	Visual and dimensional inspection with satisfactory results	X	D51	Hydrostatic test - min. test pressure MPa / sec.	20,5 / 5
C50	Flattening test - satisfactory	X	D02	The pipes tested on tightness by NDT in acc. to	
C51	Expanding test - satisfactory				
C52	Bending test - satisfactory				
C53	Ring expanding test - satisfactory		D03	Nondestructive Electromagnetic Testing	
C54	Ring tensile test - satisfactory			**eddy - current** acc. to ASTM E309 – **satisfactory**	X

The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2018, ISO 45001:2018.

QA System has been subjected to a specific assessment acc. to directive 2014/68/EU, annex I, point 4.3 and AD 2000-Mbl. W0 by TÜV NORD Systems GmbH & Co. KG. Welding process, personnel for welding and NDT are approved acc. to PED 2014/68/EU.

Elongation (A5) = min. 14% guaranteed (L0= 5.65 * $\sqrt{S\,0}$)

Z99 X

continues on page 2/2

Z01 All pipes conform to the above mentioned standards and ordering requirements and agreements.

Z02 Date of issue **03.07.2023/lb**

Tel.:++420 595683644

A01 Liberty Ostrava a.s.
A05 QA Department
Vratimovská 689/117
719 00 Ostrava-Kunčice
Czech Republic

LIBERTY
Liberty Ostrava a.s.
Vratimovská 689/117, 719 00 Ostrava - Kunčice
QA - WORKS INSPECTOR
IDENTIFICATION No. 4

Bc. Petr Pastucha
Work's Inspector
Z02 Validation

58

E.z. 2574/16/15/P

Approved by QUALITY2 on 05/07/23

TAL SPA - THIS DOCUMENT IS REPRODUCED BY A COMPUTERIZED SYSTEM AND IS CONFORM TO THE ORIGINAL

(5)

LIBERTY

A02 **Inspection certificate "3.1" (EN 10 204)**

A03 Document No: **82073/23**

Residual magnetic field [mT] max.3 - satisfactory **MANUFACTURER OF BILLETS: LIBERTY OSTRAVA**
Mass activity value of the ionising radiation in the heat analysis does not exceed 100 Bq/kg.
22HRC=99HRBmax. **Grain size min. 7 acc. ASTM E112 is guaranteed.**
Guarantee of tensile properties acc.to ASME Sec.II Part.D Table Y1.

C71-92 Heat (H) and product (P) chemical analyses (%)

B07 Heat No.	C	MN	SI	P	S	CU	NI	CR	AI	MO	V	TI	NB	CEQ

B07 Test results: Heat No.	C00 Specimen No.	MPa C11 Yield Point	MPa C12 Tensile Strength	% C13 Elongation	C40-43 Impact Test		C30-32 Hardness

Z02 Date of issue **03.07.2023/lb**

Tel.:++420 595683644

A01 Liberty Ostrava a.s.
A05 QA Department
Vratimovská 689/117
719 00 Ostrava-Kunčice
Czech Republic

LIBERTY

Liberty Ostrava a.s.
Vratimovská 689/117, 719 00 Ostrava - Kunčice
QA - WORKS INSPECTOR
IDENTIFICATION No. 4

Bc. Petr Pastucha
Work's Inspector
Z02 Validation

E.z. 2574/16/15/P

Approved by QUALITY2 on 05/07/23

TAL SPA - THIS DOCUMENT IS REPRODUCED BY A COMPUTERIZED SYSTEM AND IS CONFORM TO THE ORIGINAL

Manufacturer: ArcelorMittal Tubular Products Roman S.A. STEFAN CEL MARE STR, BL 15, SC. A, PARTER I ROMAN, NEAMT ROMANIA	**MILL TEST CERTIFICATE** according to EN 10204/3.1/2004 -	Page 1/4 B 23233/3 22.10.2021	ArcelorMittal

Buyer: T.A.L. S.P.A.con socio unico VIA G. DI VITTORIO, 6, ZONA IND., 29017 FIORENZUOLA D'ARDA (PIACENZA) ITALY	SEAMLESS STEEL LINE PIPES	Total weight: 5.116 tons - lbs	Total Length: 120.21 meters - feets	Pieces 11	Bundles 3

Buyer's reference: PO NO. : OF210356	**Standard:** API 5L ED.46-2018-PSL1; ASME SA 333/SA 333M-2019; ASTM A 333/A 333M-2018; EN 10216-3-2014; TS 02 Rev 06/13.01.2021 with deviation as per Technical Offer no.7/26.08.2021; ASME B16.25-2017; ASME II part DTable Y1; ANSI/NACE MR0103/ISO17945-2015; NACE MR0175/ISO 15156-1&2-2015;
Contract 50005083	Dimensions: 168.30 x 10.97 mm - / Schedule: XS/80 / Length: 10.00 - 11.80 m - / - -

Item	Item Client
2	-

Hydro Test:	Bar	PSI	MPa	Time(sec)
	205	-	20.5	5

Steel Grade: L360/X52/6/P355NL1TC1 -

Chemical Analysis(%)

Heat	Bulletin No.	Product Req.		C	Mn	Si	S	P	Cr	Ni	Cu	Al	Mo	V	Nb	Ti	B	N
			Max	0.18	1.30	0.35	0.008	0.020	0.20	0.40	0.30	0.060	0.08	0.080	0.020	0.040	0.0010	0.0200
			Min	-	-	0.15	-	-	-	-	-	0.020	-	0.060	-	-	-	-
1213222		Heat analysis		0.14	1.25	0.22	0.003	0.009	0.07	0.10	0.20	0.028	0.01	0.069	0.002	0.001	0.0002	0.0070
1213222	21-1075	Product analysis		0.14	1.25	0.22	0.002	0.008	0.07	0.10	0.16	0.035	0.01	0.069	0.003	0.002	0.0003	0.0053
1213222	21-1075	Product analysis		0.14	1.24	0.22	0.001	0.008	0.07	0.10	0.16	0.034	0.01	0.068	0.003	0.002	0.0003	0.0055

Chemical Analysis(%)

Heat	Bulletin No.	Product Req.		Al / N	Nb + V	Nb + Ti + V	Cr + Mo + Cu + Nb + V + Ti	CE_IIW	Cr + Mo + Cu
			Max	-	0.100	0.120	0.600	0.42	0.45
			Min	2.00	-	-	-	-	-
1213222		Heat analysis		4.00	0.071	0.072	0.354	0.40	0.28
1213222	21-1075	Product analysis		6.60	0.072	0.074	0.314	0.40	0.24
1213222	21-1075	Product analysis		6.18	0.071	0.073	0.313	0.39	0.24

CEpcm = C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B CE_S = C+Mn/6 CE_{IIW} = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

Quality Control Representative

TAL SPA - THIS DOCUMENT IS REPRODUCED BY A COMPUTERIZED SYSTEM AND IS CONFORM TO THE ORIGINAL

1724000163-QC-DB-00013 rev02 page81/528

Approved by QUALITY2 on 03/11/21

Manufacturer:
ArcelorMittal Tubular Products Roman S.A.
STEFAN CEL MARE STR, BL 15, SC. A, PARTER I
ROMAN, NEAMT ROMANIA

MILL TEST CERTIFICATE
according to EN 10204/3.1/2004
-

Page 2/4
B 23233/3
22.10.2021

ArcelorMittal

Buyer: T.A.L. S.P.A.con socio unico
VIA G. DI VITTORIO, 6, ZONA IND., 29017
FIORENZUOLA D'ARDA (PIACENZA)
ITALY

SEAMLESS STEEL LINE PIPES

Total weight:	Total Length:	Pieces	Bundles
5.116 tons - lbs	120.21 meters - feets	11	3

Standard: API 5L ED.46-2018-PSL1; ASME SA 333/SA 333M-2019; ASTM A 333/A 333M-2018; EN 10216-3-2014; TS 02 Rev 06/13.01.2021 with deviation as per Technical Offer no.7/26.08.2021; ASME B16.25-2017; ASME II part DTable Y1; ANSI/NACE MR0103/ISO17945-2015; NACE MR0175/ISO 15156-1&2-2015;

Buyer's reference: PO NO. : OF210356

Contract 50005083

Dimensions: 168.30 x 10.97 mm
-

Schedule: XS/80

Length: 10.00 - 11.80 m
-

-
-

Item	Item Client
2	-

Hydro Test:

Bar	PSI	MPa	Time(sec)
205	-	20.5	5

Steel Grade: L360/X52/6/P355NL1TC1
-

Tensile Test

Heat	Orientation	Length		Width/Diameter		Thickness		Section		Mechanical test Bulletin No.	YS MPa	YS (PSI:1000)	UTS MPa	UTS (PSI:1000)	E %	YS/UTS max: -
		mm	inch	mm	inch	mm	inch	mm²	inch²							
1213222	Longitudinal Flat	50.8	-	40.00	-	12.10	-	484.0	-	21-3166	414.00	-	527.00	-	40.10	0.79
1213222	Longitudinal Flat	50.8	-	40.00	-	11.80	-	472.0	-	21-3166	410.00	-	525.00	-	39.20	0.78
1213222	Longitudinal Flat	-	-	20.00	-	11.70	-	234.0	-	21-2418	412.00	-	521.80	-	36.60	0.79

Impact Test

Heat	Impact Test Bulletin No.	Orientation	Size (mm)	Temp. (°C)	Req.KV (min. J)	KV values (J)			Req.Avr. (min. J)	Avr. fracture energy (J)	KCU min:-J/cm² T:°C			Shear Area min. %			Lateral Expansion min. mm		
1213222	21-3883	Longitudinal	10x7.5x55	-52	20.0	156	167	148	30.0	157	-	-	-	95	95	95	1.39	1.50	1.32

Hardness Test

Heat	Hardness Test Bulletin No.	HB max.-	HV 10 max.-	HV 10 max.-					HRC max.22
				OD	Midwall	ID	End A	End B	
1213222	21-2629	-	-	-	-	-	-	-	<20
1213222	21-2629	-	-	-	-	-	-	-	<20

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

Quality Control Representative

TAL SPA - THIS DOCUMENT IS REPRODUCED BY A COMPUTERIZED SYSTEM AND IS CONFORM TO THE ORIGINAL

1724000163-QC-DB-00013 rev02 page82/528

Approved by QUALITY2 on 03/11/21

Manufacturer:
ArcelorMittal Tubular Products Roman S.A.
STEFAN CEL MARE STR, BL 15, SC. A, PARTER I
ROMAN, NEAMT ROMANIA

MILL TEST CERTIFICATE
according to EN 10204/3.1/2004
-

Page 3/4
B 23233/3
22.10.2021

ArcelorMittal

Buyer: T.A.L. S.P.A.con socio unico

VIA G. DI VITTORIO, 6, ZONA IND., 29017
FIORENZUOLA D'ARDA (PIACENZA)
ITALY

SEAMLESS STEEL LINE PIPES

Total weight:	Total Length:	Pieces	Bundles
5.116 tons - lbs	120.21 meters - feets	11	3

Standard: API 5L ED.46-2018-PSL1; ASME SA 333/SA 333M-2019; ASTM A 333/A 333M-2018; EN 10216-3-2014; TS 02 Rev 06/13.01.2021 with deviation as per Technical Offer no.7/26.08.2021; ASME B16.25-2017; ASME II part DTable Y1; ANSI/NACE MR0103/ISO17945-2015; NACE MR0175/ISO 15156-1&2-2015;

Buyer's reference: PO NO. : OF210356

Contract 50005083

Dimensions: 168.30 x 10.97 mm
-

Schedule: XS/80

Length: 10.00 - 11.80 m
-

-
-

Item	Item Client
2	-

Hydro Test:

Bar	PSI	MPa	Time(sec)
205	-	20.5	5

Steel Grade: L360/X52/6/P355NL1TC1
-

Yield Strength Test

Heat	Yield Strength Bulletin No.	T °C	YS (MPa)	YS (PSI):1000
1213222	21-828	450	267.10	-

Technological/Microstructure Test

Heat	Flattening Test Bulletin No.	Flattening Test
1213222	21-4433	OK
1213222	21-4433	OK

Heat	Microstructure Bulletin No.	Inclusion level max. "z"	Size grain ferritic min. "z"
1213222	21-829	0	10

Heat

Heat	Pieces	Length (m)	Weight (kg)
1213222	11	120.21	5116

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

Quality Control Representative

TAL SPA - THIS DOCUMENT IS REPRODUCED BY A COMPUTERIZED SYSTEM AND IS CONFORM TO THE ORIGINAL

1724000163-QC-DB-00013 rev02 page83/528

Approved by QUALITY2 on 03/11/21

Manufacturer: ArcelorMittal Tubular Products Roman S.A. STEFAN CEL MARE STR, BL 15, SC. A, PARTER I ROMAN, NEAMT ROMANIA	**MILL TEST CERTIFICATE** **according to EN 10204/3.1/2004** -					Page 4/4 **B 23233/3** **22.10.2021**	ArcelorMittal	
Buyer: T.A.L. S.P.A.con socio unico VIA G. DI VITTORIO, 6, ZONA IND., 29017 FIORENZUOLA D'ARDA (PIACENZA) ITALY	SEAMLESS STEEL LINE PIPES					Total weight: 5.116 tons - lbs	Total Length: 120.21 meters - feets	Pieces: 11 Bundles: 3
Buyer's reference: PO NO. : OF210356 **Contract 50005083**	**Standard:** API 5L ED.46-2018-PSL1; ASME SA 333/SA 333M-2019; ASTM A 333/A 333M-2018; EN 10216-3-2014; TS 02 Rev 06/13.01.2021 with deviation as per Technical Offer no.7/26.08.2021; ASME B16.25-2017; ASME II part DTable Y1; ANSI/NACE MR0103/ISO17945-2015; NACE MR0175/ISO 15156-1&2-2015;							
	Dimensions: 168.30 x 10.97 mm -		Schedule: XS/80			Length: 10.00 - 11.80 m -	-	

Item	Item Client
2	-

Hydro Test:	Bar	PSI	MPa	Time(sec)
	205	-	20.5	5

Steel Grade: L360/X52/6/P355NL1TC1
-

Remarks PIPES IN COMPLIANCE WITH PED: 2014-68-EU/15.05.2014, ANNEX 1, SECTION 4.3. & 7.5
"Issued in agreement with TÜV SÜD Industrie Service GmbH (07.2008)"
"QS approved acc. to PED, Annex I, Para. 4.3 by Notified Body 0036"
"(Certification no. DGR-0036-QS-W 361/2008/MUC)"
Manufacturing process – hot rolling.
Hot finished, steel is fully killed and vacuum degassing, produced by electric furnace, source G300706.
Visual inspection and dimensional check without objection.
Heat treatment: normalizing at temperature: 890-940°C, time soaking 3 min.
Residual magnetism check less than 30 Gauss-satisfactory.
Hydrostatic test hold for 5 sec. no leakage noticed.
The products was manufactured, sampled, tested, marked and inspected in accordance with the Standards, the supplementary requirements, and any other requirements designated in the purchase order, and has been found to meet such requirements.

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

Quality Control Representative

TAL SPA - THIS DOCUMENT IS REPRODUCED BY A COMPUTERIZED SYSTEM AND IS CONFORM TO THE ORIGINAL

Approved by QUALITY2 on 03/11/21

VE-10p. 16B 16C B C

PRESSBOLT

Pressbolt s.r.l. con unico socio
Partita Iva 03231770136
Via dell'Artigianato, 12 - 22078 - Turate (CO)
Tel. +39 02 96.97.98.50 - Fax +39 02 96.97.98.29
email qualita@pressbolt.com

Messrs. C.A.M.P.I. S.r.l.
VIA DIAMANTINA, 15
44100 - FERRARA(FE)

Inspection Certificate EN 10204:2004 3.1

Number	Rev.	Date
3167244	0	16 July 2024

Client Reference Order		Reference Order	
Number	24003.04 of 31 May 2024	Number	3403267
Reference			
Item	1	Item	10
Job		Shipping ref.	3411482 of 16 July 2024

Standard
ASTM A320(M)-22 / ASME SA320(M) BPVC-IIA-2021 - L7

Item Description	Heat Treatment
STUDBOLT ASME B16.5 A/SA 320 L7 3/4"-10 UNCX0120	QUENCHED AND TEMPERED Min 593 °C

Heat	Quantity	Lot	Job PB
297448	30	P1681928	0001223293

Chemical Analysis "%"

	C	Mn	Si	P	S	Cr	Mo	
Required	0.38 - 0.48	0.75 - 1	0.15 - 0.35	max 0.035	max 0.04	0.8 - 1.1	0.15 - 0.25	
Actual	0.4	0.81	0.26	0.01	0.004	1.008	0.2	

Tensile Test

	Rm "Mpa"	Rp02 "Mpa"	A "%"	Z "%"
Required	min 860	min 725	min 16	min 50
Actual	976	766	21.6	57.7

	Hardness "HB"	Impact Test -101 C "J"
Required	max 321 HB	min 20J min med 27J
Actual	293;293;293	45;44;41

Mechanical tests are longitudinal performed at t/2 or t/4 as a function of specimen dimension

Macroetch Examination	Positive	Visual and dimensional Test	Positive

The material was manufactured, tested and checked in accordance with the specifications and additional requirements of the Purchase Order or the Agreement
No weld repair has been performed on the material

Davide Feggi
Laboratory manager

Pressbolt s.r.l. con unico socio - Certificate N 000003167244 Rev. 000 of 16 July 2024 - Page 1/3

7

Pressbolt s.r.l. con unico socio
Partita Iva 03231770136
Via dell'Artigianato, 12 - 22078 - Turate (CO)
Tel. +39 02 96.97.98.50 - Fax +39 02 96.97.98.29
email qualita@pressbolt.com

Messrs. C.A.M.P.I. S.r.l.
VIA DIAMANTINA, 15
44100 - FERRARA(FE)

Inspection Certificate EN 10204:2004 3.1

Number	Rev.	Date
3167244	0	16 July 2024

Client Reference Order		Reference Order	
Number	24003.04 of 31 May 2024	Number	3403267
Reference			
Item	2	Item	20
Job		Shipping ref.	3411482 of 16 July 2024

Standard	
ASTM A194(M)-22 / ASME SA194(M) BPVC-IIA-2021	
Item Description	Heat Treatment
HEAVY HEX NUT H=d ASME B18.2.2. Tab 10 A/SA 194 7 3/4"-10 UNC	QUENCHED AND TEMPERED 595 C

Heat	Quantity	Lot	Job PB
550096	60	P1646773	0001223294

Chemical Analysis "%"

	C	Mn	Si	P	S	Cr	Mo	
Required	0.38 - 0.48	0.75 - 1.0	0.15 - 0.35	max 0.035	max 0.04	0.80 - 1.1	0.15 - 0.25	
Actual	0.420	0.750	0.210	0.014	0.009	0.980	0.200	

	Proof Load	Hardness "HB"	HB after H.T. 24h
Required	Positive	248 - 327	Min 201
Actual	Positive	282;288;286	277;282;279

Mechanical tests are longitudinal performed at t/2 or t/4 as a function of specimen dimension

Macroetch Examination	Positive	Visual and dimensional Test	Positive

The material was manufactured, tested and checked in accordance with the specifications and additional requirements of the Purchase Order or the Agreement
No weld repair has been performed on the material

Davide Feggi
Laboratory manager

Pressbolt s.r.l. con unico socio - Certificate N 0000003167244 Rev. 000 of 16 July 2024 - Page 2/3

Pressbolt s.r.l. con unico socio
Partita Iva 03231770136
Via dell'Artigianato, 12 - 22078 - Turate (CO)
Tel. +39 02 96.97.98.50 - Fax +39 02 96.97.98.29
email qualita@pressbolt.com

Messrs. C.A.M.P.I. S.r.l.
VIA DIAMANTINA, 15
44100 - FERRARA(FE)

Inspection Certificate EN 10204:2004 3.1

Number	Rev.	Date
3167244	0	16 July 2024

Client Reference Order		Reference Order	
Number	24003.04 of 31 May 2024	Number	3403267
Reference			
Item	3	Item	30
Job		Shipping ref.	3411482 of 16 July 2024

Standard	
ASTM F436(M)-19	
Item Description	Heat Treatment
WASHER ASTM F436 T2 CIRC ASTM F436 TYPE 1 3/4"	Carburized and hardened

Heat	Quantity	Lot	Job PB
B28886	60	P1546037	0001223295

Chemical Analysis '%'

	P	S
Required	max 0.045 %	max 0.055 %
Actual	0.014	0.001

	Hardness "HRC"
Required	min 30 HRC
Actual	39;41;41

Mechanical tests are longitudinal performed at t/2 or t/4 as a function of specimen dimension

Visual and dimensional Test	Positive

Type 1

The material was manufactured, tested and checked in accordance with the specifications and additional requirements of the Purchase Order or the Agreement
No weld repair has been performed on the material

Davide Feggi
Laboratory manager

Pressbolt s.r.l. con unico socio - Certificate N 0000003167244 Rev. 000 of 16 July 2024 - Page 3/3

(8)

ROUND d. 16

FERRIERE BELLICINI s.r.l.

Stabilimento: Via Cav. Andrea Bellicini, 2/4
25040 Berzo Inferiore (Brescia)
Tel. +39 0364 301024 - Fax +39 0364 306398
E-mail info@ferrierebellicini.it

CERTIFICATO DI COLLAUDO (EN 10204 3,1)

Numero di certificato 1900616
Data di registrazione 05/04/2019

VE - 10P.

(14)

ANALISI CHIMICA																			
Nr. Colata	Diametro	Tipo	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	N (ppm)	Ceq	Sezione mmq	Snervam. N/mmq	Resist. N/mmq	Allung.% A5%	Resilienza - 20° C KV J	KV J	KV J
~~86979~~	~~12Q~~	~~S 355 J2 + AR~~	~~0,17~~	~~0,94~~	~~0,23~~	~~0,023~~	~~0,004~~	~~0,21~~	~~0,16~~	~~0,26~~	~~0,032~~	~~82~~	~~0,41~~	~~141,15~~	~~356~~	~~544~~	~~32,0~~	~~45~~	~~OK~~	~~OK~~
104029	16	S 355 J2 + AR	0,17	1,08	0,22	0,024	0,006	0,22	0,17	0,38	0,036	106	0,44	202,55	363	556	33,0	80	83	78
~~104028~~	~~40X8~~	~~S 355 J2 + AR~~	~~0,17~~	~~1,05~~	~~0,21~~	~~0,024~~	~~0,012~~	~~0,20~~	~~0,16~~	~~0,36~~	~~0,035~~	~~104~~	~~0,43~~	~~321,78~~	~~367~~	~~564~~	~~29,0~~	~~30~~	~~32~~	~~29~~

Copia conforme all'originale
Cliente: C.A.M.P.I. SRL
Vs.ordine: n.21023.14 del 20/01/2022.
Ref.: ....
Ns.ordine: n.190 del 01/02/2022.
Quantità: n.10 barre.
Ravenna, 01 febbraio 2022
PROSIDER SRL.

Allegato alla bolla 19000650 del 05/04/19.

Certifichiamo che il prodotto sopra elencato è conforme alla prescrizione dell'ordine in rispetto della norma: EN 10025-1-2, 10058 - 10060: 2005

S. G. Q.

Materiale fornito in barre di Qualità: S 355 J2 + AR

I semiprodotti utilizzati sono esenti da radioattività, come garantito dalle acciaierie di provenienza

Resp. CQ: Lorenzo Silli

FERRIERE BELLICINI S.r.l.

VIA CAV. ANDREA BELLICINI, 2/4
25040 BERZO INFERIORE (BS)
ITALY

Declaration of Performance – Dichiarazione di Prestazione – n. 1

1 Codice di identificazione unico del prodotto – tipo

Unique identification code of the product – type S 355 J2+AR

2 Identificazione lotto: In base alle informazioni contenute sull'etichetta (posizionata su ogni singolo pacco)

Type number: according to information contained in the label (positioned on each package)

- SIZE PIATTI: 10X3 – 10X4 – 10X5 – 10X6 – 12X3 – 12X4 – 12X5 – 12X6 – 12X8 – 14X3 – 14X4 – 14X5 – 14X6 – 14X8 – 15X3 15X4 – 15X5 – 15X6 - 15X8 – 15 X 10 – 16X3 – 16X4 – 16X5 – 16X6 – 16X8 – 16X10 – 18X3 – 18X4 – 18X5 – 18X8 – 20X3 – 20X4 20X5 – 20X6 – 20X8 – 20X10 – 20X12 – 25X3 – 25X4 – 25X5 – 25X6 – 25X8 – 25X10 – 25X12 – 30X3 – 30X4 – 30X5 – 30X6 30X8 – 30X10 – 30X12 – 35X3 – 35X4 – 35X5 – 35X6 – 35X8 – 35X10 – 35X12 – 40X3 – 40X4 – 40X5 – 40X6 – 40X8 – 40X10 40X12 – 40X15 – 45X4 – 45X5 – 45X6 – 45X8 – 45X10 – 50X3 – 50X4 – 50X5 – 50X6 – 50X8 – 50X10
- SIZE QUADRI: 6 – 8 – 10 – 12 – 14 – 15 – 16 – 18 – 20
- SIZE TONDI: 6 – 8 – 10 – 12 – 14 – 15 – 16- 18 – 20 – 22

→ tipo e dimensione /type and dimension QUALITY: S 355 J2+AR

CE 0398

3 Uso o usi previsti del prodotto da costruzione, conformemente alla norma

Intended use or uses of the construction product, in accordance with EN 10025-2:2004

Strutture metalliche o in composito metallico e strutture in calcestruzzo

Metal structures or in composite metal and concrete structures

4 Nome e indirizzo del fabbricante

Name and contact address of the manufacturer Ferriere Bellicini Srl – Via Cav. Andrea Bellicini 2/4 – 25040 Berzo Inferiore (BS)

5 Sistema di valutazione e verifica della costanza della prestazione

System of assessment and verification of constancy of performance 2+

6 Norma armonizzata

Harmonised standard EN 10025-1:2004

7 Ente di certificazione

Notified body Apave Italia Cpm Srl – Via Artigiani, 63 – 25040 Bienno (BS)
Ha effettuato una ispezione iniziale dello stabilimento e del controllo di produzione in fabbrica,
Esegue la sorveglianza periodica in conformità al sistema 2+ e ha rilasciato il certificate di
conformità del controllo della produzione in fabbrica N. 0398/CPD/MP/08.001/02
has performed an initial inspection of the manufacturing plant and of the factory production
control, continuously surveys under system 2+ and issued the certificate of conformity of the
factory production control N. 0398/CPD/MP/08.001/02

8 Prestazione dichiarata – Declared performance

	Tipo/Type	in conformità/according to
Tolleranza sulle dimensioni e tolleranza di forma Tolerances on dimensions and shape tolerances	Tondo/Round Quadro/Square Piano/Flat	EN 10060 EN 10059 EN 10058

Elongation	
Tensile strenght	
Yiels strength	:S 355 J2+AR - EN 10025-2
Impact strength	
Weldability	
Durability: No performance detennined.	
Reulated substance: No performance determined	

9 La prestazione del prodotto di cui ai punti 1 e 2 è conforme alla prestazione dichiarata al punto 8

Si rilascia la presente dichiarazione di prestazione sotto responsabilità esclusiva del fabbricante di cui al punto 4

The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8

This issue the declaration of performance under the sole responsibility of the manufacturer identified in point 4

A02

CERTIFICATO DI CONTROLLO 3.1 / INSPECTION CERTIFICATE 3.1 - EN 10204:2004

A04/A05

METINVEST
METINVEST TRAMETAL SPA

A01

Società per azioni con socio unico soggetta a direzione e coordinamento di Metinvest B.V
Registered office: Via XII Ottobre 1, 5° piano - 16121 Genova, Italy
Phone +39 010 5762911 - Fax +39 010 5762990
Works: Via E. Fermi, 44 - 33058 San Giorgio di Nogaro UD, Italy
Phone +39 0431 629989 - Fax +39 0431 629985
Cap. Soc. Euro 300.120.000,00 i.v.
C.F., P.IVA e Iscr. Reg. Imp. GE 05956630965 - REA 437720/GE
http://trametal.metinvestholding.com

(A) PROCESSO DI ELABORAZIONE / STEELMAKING PROCESS: E = ELECTRIC ; BO = BASIC OXYGEN
(B) STATO DI FORNITURA / DELIVERY CONDITION: AR = GREZZO DI LAMINAZIONE / AS ROLLED ;
N' = LAMINAZIONE A TEMPERATURA CONTROLLATA / NORMALIZING ROLLING ;
N = NORMALIZZATO / NORMALIZED at 910°C, 1,5 min/mm ; ARIA CALMA / STILL AIR;
R = RICOTTO / ANNEALED;
N+R = NORMALIZZATO + RINVENUTO / NORMALIZED + TEMPERED
(C) TRATTAMENTO TERMICO DEL CAMPIONE / HEAT TREATMENT OF SAMPLE:
N = 910°C, 1,5 min/mm ; ARIA CALMA / STILL AIR
R = 650°C, 1,5 min/mm ; ARIA CALMA / STILL AIR
(D) Ceq_1 = C + Mn/6 ; Ceq_2 = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 ;
Pcm = C + Si/30 + (Mn + Cu + Cr)/20 + NI/60 + Mo/15 + V/10 + B*5
(1) POSIZIONE / LOCATION: 1 = TESTA / TOP ; 2 = PIEDE / BOTTOM
(2) POSIZIONE / LOCATION: C = CUORE / 1/2 THICKNESS ; P = PELLE / SURFACE ; D = 1/4 SPESSORE / THICKNESS
(3) DIREZIONE / DIRECTION: L = LONGITUDINALE / LONGITUDINAL ; T = TRASVERSALE / TRANSVERSE
(4) FORMA DEL PROVINO / SHAPE OF TEST PIECE: P = PRISMATICO / PRISMATIC ; C = CILINDRICO / CYLINDRICAL
(5) ESITO PROVA DI PIEGA / RESULT: OK = COMPLYING ; NO = NOT COMPLYING

A06 Cliente / Customer

S.I.A.T. SPA SOC. ITAL.

Via dei Cavallari 37
15077 PREDOSA 15077 IT
AL ITALIA

A03 N° Certificato / Certificate no.: 603473

Z02 Data / Date: 07/02/2024

A08 N° Ordine Trametal / Works order: 32306326

A07 N° Ordine cliente / Customer's order: 497

DDT: BOL 32401909

del / date: 06/02/2024

Pratica / File no.:

del / date:

B06 Marcatura di prodotto / Marking of the product

LAMIERA/ORDINE/N° INFORNAMENTO/DIMENSIONI/QUALITÀ/MARCHIO DEL PRODUTTORE
PLATE/ORDER/INTERNAL N°/DIMENSIONS/STEEL GRADE/MANUFACTURER'S MARK

B01/B02/B03

Prodotto / Product: Lamiere / Hot rolled plates

Qualità / Steel grade: SA516GR60MT/LTV

Normativa / Specification: ASME

VE-10p.(23)

B07 ITEM	B07 LAMIERA PLATE	B07 N° INFORN. INTERNAL NUMBER	B09/B11 DIMENSIONI DIMENSIONS [mm]	B12 MASSA TEORICA [t] THEORICAL WEIGHT	B07 LOTTO BATCH NO.	C70 STEELMAKING PROCESS	B04 STATO FORNITURA LAMIERA (B) DELIVERY CONDITION PROCESSO ELAB. (A)	C00 CAMPIONE SAMPLE	B05 TRATT. CAMPIONE (C) HEAT TREATMENT	C00 CAMPIONE PWHT SAMPLE	B05 PWHT TEMPERATURA INIZIO °C BEGINNING TEMPERATURE	VELOCITA' RISCALDO C/h HEATING RATE	TEMPERATURA TRATTAMENTO °C TEMPERATURE TREATMENT	HOLDING TIME PERMANENZA Min	COOLING RATE VELOCITA' RAFFREDDAMENTO °C/h	TEMPERATURA FINE °C END TEMPERATURE	N° CICLI / CYCLES	C00 CAMPIONE Q+T SAMPLE	B05 Q+T TEMPERATURE (Q) °C	HOLDING TIME PERMANENZA (Q) Min	COOLING RAFFREDDAMENTO	TEMPERATURA (T) °C	HOLDING TIME PERMANENZA (T) Min	COOLING RAFFREDDAMENTO
3	KSAA761704B	1923646	8.00X2500X12000	1,88	785294	BO	N	GA686																	
4	XSAA030201B	1923728	10.00X2500X12000	2,36	785280	BO	N	GA683																	
4	XSAA030201C	1923728	10.00X2500X12000	2,36	785280	BO	N	GA683																	
6	LSAA151702A	1923833	12.00X2500X12000	2,83	785300	BO	N	GA687																	
6	LSAA151702B	1923833	12.00X2500X12000	2,83	785300	BO	N	GA687																	
6	RSAA022202A	1923852	12.00X2500X12000	2,83	785303	BO	N	GA689																	
6	RSAA022202B	1923852	12.00X2500X12000	2,83	785303	BO	N	GA689	CS	1154															

C71/C92 COMPOSIZIONE CHIMICA DI COLATA / HEAT CHEMICAL ANALYSIS

B07 COLATA HEAT	C71 C %	C72 Mn %	C73 Si %	C74 P %	C75 S %	C76 Cu %	C77 Ni %	C78 Cr %	C79 Mo %	C80 Al %	C81 V %	C82 Nb %	C83 Ti %	C84 Sn %	C85 Ca %	C86 N %	C87 B %	C88 H %	C89 Ceq1 % (D)	C90 Ceq2 % (D)	C91 Pcm % (D)
Ordine Min 3																					
Ordine Max 3	0,15	1,10																			
Ordine Min 4																					
Ordine Max 4	0,15	1,10																			
Ordine Min 6																					
Ordine Max 6	0,15	1,10																			
SA51660LTV Min 0.00 - 12.50		0,60	0,15																		
SA51660LTV Max 0.00 - 12.50	0,21	0,90	0,40	0,025	0,025																
KSAA76	0,11	0,88	0,19	0,016	0,003	0,010	0,010	0,010	<0.005	0,032	0,001	0,002	0,001	<0.005	0,0000	0,0050	0,0002	0,0000	0,26	0,26	0,16
LSAA15	0,13	1,06	0,27	0,014	0,002	0,010	0,010	0,010	<0.005	0,034	0,001	0,001	0,003	<0.005	0,0000	0,0054	0,0003	0,0000	0,31	0,31	0,19
RSAA02	0,15	1,04	0,23	0,018	0,005	0,010	0,010	0,010	<0.005	0,030	0,001	0,001	0,002	<0.005	0,0000	0,0064	0,0005	0,0003	0,32	0,33	0,21
XSAA03	0,11	0,89	0,20	0,012	0,001	0,030	0,020	0,060	0,010	0,024	0,002	0,003	0,004	<0.005	0,0000	0,0033	0,0005	0,0002	0,26	0,28	0,17

			PROVA DI TRAZIONE TENSILE TEST									PROVA DI RESILIENZA IMPACT TEST - CHARPY V-NOTCH TEST						PROVA DI PIEGA BEND TEST				PROVA DI DUREZZA HARDNESS TEST				PROVA DI STRIZIONE Z% TEST	
C00		C01	C01	C02	C03	C11	C12		C13	C14	C10	C41	C02	C03	C01	C42	C43	C02	C51	C52	C50	C01	C30	C31	C32	C53	C54
CAMPIONE SAMPLE	SPESSORE LAMIERA PLATE THICKNESS	POSIZIONE (1) LOCATION	POSIZIONE (2) LOCATION	DIREZIONE (3) ORIENTATION	TEMPERATURA [°C] TEST TEMPERATURE	ReH [Mpa] YIELD STRENGTH	Rm [Mpa] TENSILE STRENGTH	ReH/Rm	A8" ELONGATION	Rp 0.2 [Mpa] PROOF/YIELD STRENGTH	FORMA PROVINO (4) SHAPE OF TEST PIECE	LARGHEZZA [mm] WIDTH	DIREZIONE (3) ORIENTATION	TEMPERATURA [°C] TEST TEMPERATURE	POSIZIONE (2) LOCATION	SINGOLI VALORI [J] INDIVIDUAL VALUES	MEDIA [J] MEAN VALUE	DIREZIONE (3) ORIENTATION	MANDREL MANDRINO [mm]	ANGOLO [°] ANGLE	ESITO (5) RESULT	POSIZIONE (2) LOCATION	METODO TEST METHOD	SINGOLI VALORI INDIVIDUAL VALUES	MEDIA MEAN VALUE	Z% SINGOLI VALORI Z% INDIVIDUAL VALUES	Z% VALORE MEDIO Z% MEAN VALUE
ORDINE Min 3													L	-51			18										
ORDINE Min 4													L	-51			18										
ORDINE Min 6													L	-51			18										
SA51660LTV Min 0.00 - 20.00					20		415		21,0	220																	
SA51660LTV Max 0.00 - 20.00					20		550																				
SA51660LTV Min 0.00 - 25.00													L	-51			18										
GA683	10,00	2	P	T	20		430		40,3	310	P	7,50	L	-51	P	187 152 172	170						HB	130 134 126	130		
GA683	10,00	2	P	T	300					200	C	7,50	T	-50	P	68 97 82	82										
GA683	10,00	2										7,50	T	-20	P	138 117 146	134										
GA686	8,00	2	P	T	20		424		42,5	318	P	7,50	L	-51	P	146 150 176	157						HB	128 132 124	128		
GA686	8,00	2	P	T	300					213	C	7,50	T	-50	P	72 64 92	76										
GA686	8,00	2										7,50	T	-20	P	128 155 148	144										
GA687	12,00	2	P	T	20		447		39,6	312	P	10,00	L	-51	P	189 149 176	171						HB	135 139 131	135		
GA687	12,00	2	P	T	300					210	C	10,00	T	-50	P	81 73 85	80										
GA687	12,00	2										10,00	T	-20	P	161 124 133	139										
GA689	12,00	2	P	T	20		465		40,6	340	P	10,00	L	-51	P	192 175 215	194						HB	141 145 137	141		
GA689	12,00	2	P	T	300					225	C	10,00	T	-50	P	69 101 80	83										
GA689	12,00	2										10,00	T	-20	P	135 150 169	151										

C10

ASME SA-370 FIG. 3 AND FIG. 10 / 11 - SAMPLE TAKEN AFTER PLATE HEAT TREATMENT

D02-D50 CONTROLLO ULTRASONORO / ULTRASONIC EXAMINATION

D02	D03	D04	D05	D06	D07
APPARECCHIATURA EQUIPMENT	N° SERIE SERIAL NO	CONDIZIONI SUPERFICIALI SURFACE CONDITIONS	ACCOPPIANTE COUPLANT	MODALITÀ OPERATIVE PROCEDURE	TARATURA CALIBRATION
GILARDONI RDG2000	RDG2000-053188003	GREZZO DI LAMINAZIONE AS ROLLED	ACQUA WATER	IN ACCORDO ALLA SPECIFICA ACCORDING TO SPECIFICATION	IN ACCORDO ALLA SPECIFICA ACCORDING TO SPECIFICATION

B07 LAMIERA PLATE	D08 SONDE PROBE	D09 DIAMETRO DIAMETER MM	D10 FREQUENZA FREQUENCE MHZ	D11 ANGOLO Angle °	D12 NORMA DI RIFERIMENTO STANDARD SPECIFICATION	D13 CLASSE DI ACCETTABILITÀ ACCEPTANCE SPECIFICATIONS	D14 ESITO RESULT	D15 INDICAZIONI INDICATIONS	D16 RETICOLO RETICLE	D17 BORDI EDGES
XSAA030201B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
XSAA030201C		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
KSAA761704B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
LSAA151702A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
LSAA151702B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
RSAA022202A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
RSAA022202B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50

D18	D19	D20
NOTE REMARKS	ENTE ISPETTIVO INSPECTOR	FIRMA SIGNATURE
		METINVEST TRAMETAL S.p.a. F. Andrian III Liv. EN ISO 9712

Z01

ITEM		TOLLERANZA DI SPESSORE TOLERANCE ON THICKNESS	TOLLERANZE DI LARGHEZZA TOLERANCE ON WIDTH	TOLLERANZE DI LUNGHEZZA TOLERANCE ON LENGTH	CONDIZIONI SUPERFICIALI SURFACE FINISH	PLANARITÀ FLATNESS
3		EN 10029 CL.B	-0+100 MM	-0+200 MM	EN 10163/2 CL B2	EN 10029 CL. N
4		EN 10029 CL.B	-0+100 MM	-0+200 MM	EN 10163/2 CL B2	EN 10029 CL. N
6		EN 10029 CL.B	-0+100 MM	-0+200 MM	EN 10163/2 CL B2	EN 10029 CL. N

CERTIFICHIAMO che le lamiere elencate sono conformi alla prescrizione dell'ordine, che i controlli della marcatura, dell'aspetto superficiale e dimensionale hanno dato esito positivo.
WE CERTIFY that the above mentioned plates are consistent with the order prescriptions: marking, inspection and measurement without objection.
DICHIARIAMO CHE LE LAMIERE SONO STATE CONTROLLATE IN ACCORDO ALLA NORMATIVA VIGENTE E CHE LE RADIAZIONI IONIZZANTI NON ECCEDONO IL VALORE DEL FONDO NATURALE.
WE DECLARE THAT THE PLATES WERE CONTROLLED ACCORDING TO STANDARD AND RADIATION DO NOT EXCEED THE NATURAL RADIATION.

Z06

FULLY KILLED FINE GRAIN STEEL

HARDNESS IN ACC. TO NACE MR 0175 / ISO15156

HARDNESS IN ACC. TO NACE MR 0103

STEEL VACUUM DEGASSED

Z07	Z03 ENTE COLLAUDO / INSPECTION BODY	Z02
PRODUCED FROM CONTINOUS CAST SLAB AND HAVE A MINIMUN REDUCTION RATIO OF 3 TO 1. ACCORDING TO ASME II PART A ED. 2021. FULLY KILLED, FINE GRAIN STEEL. Value of Mn maximun in derogation permitted up to 1.50% Issued in agreement with TÜV SÜD Industrie Service GmbH. QS approved acc. to PED, Annex I, Para. 4.3 by Notified Body 0036 (Certification no. DGR-0036-QS-W 084/2003/MUC-002).	TIMBRO DELL'ISPETTORE STAMP OF THE INSPECTION REPRESENTATIVE	METINVEST TRAMETAL S.p.a/ F. Andrian CQ Manager

VE - 10 P. (23)

GIOVANNI RIZZU

LIV.II ASNT TC-1A N.07DG00387PO2 - CERTIFICATO DI ABILITAZIONE RILASCIATO DAL RINA (REGISTRO ITALIANO NAVALE) A GENOVA IN DATA 27/04/2007
LIV.2 UNI EN 473 E ISO 9712 N.22T000227PN1/RC - CERTIFICATO DI ABILITAZIONE RILASCIATO DAL RINA (REGISTRO ITALIANO NAVALE) A GENOVA IN DATA 24/04/2022

RAPPORTO CONTROLLO ULTRASUONI

ULTRASONIC TEST REPORT

CERTIFICATO N. 39-2

CLIENTE/CUSTOMER:	LOCALITA'/PLACE:	OGGETTO/DESCRIPTION:
S.I.A.T. S.P.A.	Predosa (AL)	CONTROLLO UT SU LAMIERE

DATA/DATE: 29/02/2024

STRUMENTO/INSTRUMENT: GILARDONI MG 15

Scostamento Linearità:		Taratura fondo scala:		Taratura sensibilità:
Linearity:		Time base range calibration:		Sensivity calibration:
Vert. +/-0,5	Orizz. +/ 0,5	Onde long.	Onde trasv	Foro/Hole
		1|25- 50	=	
Vertical	Orizzontal	Long Wawes	Trasv Wawes	ECO DI RIFERIMENTO

SONDE/ Probes: GILARDONI

Onde Long. Tipo DD 25	Onde Trasv. Tipo: =	Angolo emissione: =	Metodo di controllo
Long Wawes Type	Trasv. Wawes Type	Angle of reflection	Scanning method
Freq.: 2mhz	Freq.: =	Soglia/Dampin 0	Manuale con carrello 100%

MEZZO DI ACCOPPIAMENTO: Coupling	ACQUA/Water
AMPLIFICAZIONE DI ESPLORAZIONE: Scanning amplitude	52 DB
AMPLIFICAZIONE DI VALUTAZIONE: Evaluation amplidue	46 DB
ALTEZZA ECO DI TARATURA: Calibration pulse height	100% I ECO
NORME DI CONTROLLO: Scanning specifications	EN 10160
NORME DI ACCETTABILITA': Acceptance standards specifications	SA 578 lev.B + S1

NOTE: Remarks	QUALITA' Quality	DIMENSIONE Dimensions	COLATA Heat	PLACCA
	ASME SA516.60	MM.70X2500X6000	1SAC620	1SAC620504A
	ASME SA516.70	MM.55X3000X6000	473665	07603-1
	ASME SA516.60	MM.18X3000X12000	SSAA730	SSAA730405A
	ASME SA516.60	MM.13X3000X12000	CSAA290	CSAA290201B
	ASME SA516.60	MM.12X2500X12000	RSAA022	RSAA022202B
	P265GH	MM12X2500X12000	RSAA041	RSAA041202A
	ASME SA516.70	MM.80X2500X6000	465176	18004.1
	ASME SA516.70	MM.60X3000X6000	495458	538142.1
	P355GH	MM.25X2500X8000	LNAA430	LNAA430804A
	P355GH	MM.12X2500X12000	KTAB642	KTAB642802A

ESITO/RESULT: CONFORME A NORMA E CLASSE RICHIESTA

L'OPERATORE:
(The Operator
GIOVANNI RIZZU
LIV.II ASNT - TC-1A
CERT.N.07DG00387PO2
LIV. 2 UNI EN 473 - ISO 9712
CERT.N.22T000227PN1/RC

CERTIFICATO DI QUALIFICA DI OPERATORE PER CND

N. **22TO00227PN1/RC**

Rinnovo di validità del certificato n° 17MI00559PO1

Operatore	**RIZZU GIOVANNI ANTONIO**		
Nato a	**SASSARI (SS)**	il	**01/09/1965**
Impiegato presso	**S.I.A.T. SPA**		
Con sede in	**Predosa (AL)**		

SI CERTIFICA che, a seguito degli esami sostenuti, l'operatore addetto alle prove non distruttive è qualificato al LIVELLO 2 , in conformità alla norma ISO 9712:2012,

nel metodo:

ULTRASONORO

per il/i settore/i:

Prodotti lavorati

Il presente certificato è valido dal	**24 Aprile 2022**	fino al	**24 Aprile 2027**
Rilasciato a	**GENOVA**	il	**22 Luglio 2022**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

Operatore

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

Questo certificato è composto di 1 pagina

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N° 066 C

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

(5)

4445

Acciai Speciali Terni S.p.A.
Viale B. Brin, 218 - 05100 Terni - Italia
AZIENDA CON SISTEMA DI GESTIONE CERTIFICATO SECONDO ISO 9001

CERTIFICATO DI COLLAUDO INSPECTION CERTIFICATE
CERTIFICATE DE RECEPTION ABNAHMEPRÜFZEUGNIS B*

EN 10204/3.1 1/1

AVV. DI SPEDIZ. N°: 0180645964 ORDINE CLIENTE N°: 2342
SHIPPING NOTICE N° CUSTOMER ORDER N°
AVIS D'EXPEDITION N° COMMANDE DU CLIENT N°
VERSANDANZEIGE Nr BESTELLUNG Nr

ORDINE INTERNO N°: 8X230719 CERTIFICATO N°: 02252165 CARICO N°: 0010083304
INTERNAL ORDER N° CERTIFICATE N°
COMMANDE INT. N°
WERKS Nr

CLIENTE: ECOR S.P.A. A SOCIO UNICO
CUSTOMER: VIA VENETO 10
CLIENT: SCHIO
BESTELLER: 36015 - VI - Italia

DESTINATARIO: ECOR S.P.A. A SOCIO UNICO
SHIP.TO PARTY: VIA VENETO 10
CLIENT LIVRÉ: SCHIO
WARENEMPFÄNGER: 36015 - VI - Italia

PRODOTTO: STAINLESS STEEL PLATES FROM COIL
PRODUCT
PRODUIT
PRUFGEGENSTAND

N° ROTOLO COIL N° N° BOBINE BAND Nr.	N° COLATA HEAT N° N° COULEE SCHMELZE Nr.	COMPOSIZIONE CHIMICA / CHEMICAL COMPOSITION / COMPOSITION CHIMIQUE/ CHEMISCHE ZUSAMMENSETZUNG													
		% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Mo	% N	% Ti	CU %	%	%	%
162321	0547016	0,014	0,840	0,360	0,035	0,001	17,10	11,000	2,060	0,044		0,420			

SPECIFICA, SPECIFICATION, ANFORDERUNGEN:	TIPO D'ACCIAIO, STEEL TYPE, TYPE D'ACIER, MARKENBEZEICHNUNG:
EN 10088-2	1.4404/1.4401
EN 10088-4	1.4404/1.4401
ASTM A240 ASME SA240	316L/316
AST	316L

TRATT. TERMICO - RICOTTURA DI SOLUBILIZZ. 1050°C ARIA - ACQUANEBULIZZATA - ACQUA
HEAT TRATMENT - ANNEALING: AIR - WATER SPRAY - WATER COOLING
TRAITEMENT - THERMIQUE - HYPERTREMPE: AIR - EAU ATOMISEE - EAU
WARMEBEHANDLUNG - ABSCHRECKEN. °C/LUFT - SPRÜHWASSER - WASSER

PROCESSO DI ELABORAZIONE: E + AOD + CC
STEELMAKING PROCESS
PROCEDE D'ELABORATION
ERSCHMELZUNGSART

IL MATERIALE E RESISTENTE ALLA CORROSIONE INTERGRANULARE SECONDO:
THE MATERIAL IS RESISTANT TO INTERCRYSTALLINE CORROSION IN ACCORDANCE WITH:
LE MATERIEL EST RESISTANT A LA CORROSION INTERGRANULAIR SELON:
DAS MATERIAL IST BESTÄNDIG GEGEN INTERKRISTALLINE KORROSION GEMÄSS:

EN ISO 3651-2
ASTM A262 E

RISULTATI DELLE PROVE / TEST RESULTS / RESULTATS DES ESSAIS /ERGEBNIS DER PRÜFUNGEN (1 N / m m² = 1 M Pa)

N° COLLO PACKAGE N° N° COLIS KISTEN Nr.	N° ROTOLO COIL N° N° BOBINE BAND Nr.	DIMENSIONI DIMENSIONS ABMESSUNGEN mm	N° PEZZI PIECES N° N° PIECES STUCKZAHL	FINITURA FINISH FINITION AUSFÜHRG	PESO WEIGHT POIDS GEWICHT Kg.	PRELIEVO (1)	SENSO (2)	TRAZIONE / TENSILE / TRACTION / ZUGVERSUCH ACCORDING TO EN 6892-1						DUREZZA HARDNESS DURETE HARTE		PIEGA BEND PLIAGE FALTVERSUCH	GRANO GRAIN KORN (size)		
								Rp 0.2%	Rp 1%	Rm	A %								
								N/mm²	N/mm²	N/mm²	Lo = 2"	Lo = 80	Lo = A5	HRB					
CARATTERISTICHE RICHIESTE - REQUIRED CHARACTERISTICS -CHARACTERISTIQUES REQUISES - ANFORDERUNGEN								≥ 240	≥ 270	530-680	≥ 40	≥	≥ 40	≤ 95	≤				
C0640166	162321	5.00X1500.0X3000	8	2B-2B	1.415	T	T	273	308	551	67,1		65,9	78,0					
C0640166						C	T	304	342	562	67,1		65,9	82,0					
C0640169	162321	5.00X1500.0X3000	8	2B-2B	1.410	T	T	273	308	551	67,1		65,9	78,0					
C0640169						C	T	304	342	562	67,1		65,9	82,0					
C0640170	162321	5.00X1500.0X3000	8	2B-2B	1.410	T	T	273	308	551	67,1		65,9	78,0					
C0640170						C	T	304	342	562	67,1		65,9	82,0					
C0640172	162321	5.00X1500.0X3000	8	2B-2B	1.410	T	T	273	308	551	67,1		65,9	78,0					
C0640172						C	T	304	342	562	67,1		65,9	82,0					
C0640173	162321	5.00X1500.0X3000	8	2B-2B	1.410	T	T	273	308	551	67,1		65,9	78,0					
C0640173						C	T	304	342	562	67,1		65,9	82,0					

Certificato emesso automaticamente
COMPLIES WITH ED 2000/53/EC
MATERIAL IDENTIFICATION CHECK, SURFACE QUALITY AND DIMENSIONS = OK

* 0 0 0 0 3 2 0 6 1 5 *
Codice: 0000320615
Articolo: -04L2B1500X3000X050
Colata: 0547016

1) Sampling - Location - Ort
T = Testa - Top - Tête - Kopf
C = Coda - Bottom - Pied - Fuss

2) Sens - Direction - Richtung
T = Trasversale - Transverse - Traverse - Quer
L = Longitudinale - Longitudinal - Long - Längs

CE
2592
13
2592-CPR-0038
Declaration of Performance:
0010
0009

Subjected to the control system by the Notified Body n°2592
Qoncert - Siradone Farnese 39G 29121 Piacenza (Italy)
System of assessment 2+

Certifichiamo che i prodotti sopra elencati sono conformi alle prescrizioni dell'ordine.
We certify that products listed above comply with order requirements.
Nous certifions que les produits ci-dessus énumérés sont conformes aux prescriptions de la commande.
Wir bestaetigen, dass die Lieferung den Vereinbarungen der Bestellannahme entspricht.

TIMBRO DEL PRODUTTORE: Acciai Speciali Terni S.p.A.
PRODUCER TRADE MARK:
MARQUE DU PRODUCTEUR:
ZEICHEN DES LIEFERWERKS:

TIMBRO DEL RESPONSABILE INCARICATO:
INSPECTOR STAMP:
MARQUE DU RESPONSABLE CHARGE
STEMPEL DES WERKSSACHVERSTÄNDIGEN

Acciai Speciali Terni S.p.A.
FIRMA DEL RESPONSABILE INCARICATO
INSPECTOR SIGNATURE
SIGNATURE DU RESPONSABLE CHARGE UNTERSCHRIFT
DES WERKSSACHVERSTÄNDIGEN

TERNI IL 30.11.2023 Responsabile del Laboratorio S. Contadini

VE - 10 P. (24)

83033/05+ 83038-04

HEAT CODE SS295

INSPECTION CERTIFICATE / NF EN 10204-3.1/DIN 50049-3.1.B/ISO 10474

A02 — B.E. 730/ 149043 - 1 — A09/A03

ArcelorMittal

ARCELORMITTAL MEDITERRANEE
Site de FOS
13776 - FOS SUR MER CEDEX
FRANCE
T:+33(0)44247-3314 F:+33(0)44247-3231
E: un.scu@arcelormittal.com
A01

Sigle du producteur / Trade mark: Fos sur Mer — A04

T Re=220 MINI MPA Rm=415 -550 MPA A%(50)=25 MINI
KV T - 51dgC 14 J MINI/IND 18 J MINI/MOY
(5) B03

(5) Etat de livraison / Delivery condition:
E : Recuit Emaillage / Enamelling Annealing
BL : Brut de laminage / As rolled
LN : Laminage normalisant / Normalising forming
A : Revenu / Tempered
TE : Trempé à l'eau / Water quenching
LTC : Laminé temp. contrôlée / Thermo-controled forming
TM : Laminage thermomécanique / Thermo-mechanical forming
N : Normalisé / Normalised
D : Détensionné / Stress relieved
G : Adouci par recuit / Soft annealed
(1)

Organisme et/ou service de contrôle Inspection	Client et/ou destinataire / Purchaser and/or consignee	N° Commande Courtier/Client / Broker/purchaser's order N°	N° Commande Usine / Works order N°	Nuances et spécifications techniques / Quality and specifications	Etat de livraison / Delivery condition
RECEPTION USINE A05	A06	15-188 A07	FH51008005 7FN35 A08	SA516G60-SA20/S5 ASME SA516M-13 HOT ROLLED COIL, AS ROLLED B01 B02	LTC : LN (1) B04 Traitement de référence / Test condition: BL,N (1) B05

Identification du produit / Product identification			Nombre pièces / Quantity of pieces	Dimensions (mm)			Masse / Weight (kg)		Traction / Tensile test											Résilience / Notch thoughtness										
Repère pièce / Plate number	Coulée / Heat	Poste / Item		Epaisseur / Thickness	Largeur / Width	Longueur / Length	(7)	Emp Loc (2)	S (3)	Pos. Z(4)	Type / Form	Ref. (1)	Temp.	Re02	Rm	A%				Emp Loc (2)	Ref. (1)	Type / Form	S (3)	Temp.	Pos. Z(4)	Valeurs individuelles / Individual values			Moyenne / Average
B07	B07	A07	B08	B09	B10	B11	B13	C01	C02	C06	C10		C03	C11	C12	C13	C14,C29		C60,C69	C0		C40	C0	C08	C62	<-	-C42-	-->	C43
2509041	730 514113	002	1	6,000	2000,00		25235	1	T	P	PRISM	BL	20	355	497	32,3				1	N	KV	T	-51	P	71	68	75	71

CAMPO SEL
ORDINE Mo 14.08 Rev. 1
Pcs. 1

COPIA CONFORME ALL'ORIGINALE
ROLLA, TRAVERSO & STORACE

NS. N. MATRICOLA
E3496

AC:C =0,210 MAXI MN=0,850-1,200 P =0,035 MAXI S =0,035 MAXI SI=0,150-0,400 AL=0,020 MINI CU=0,400 MAXI NI=0,400 MAXI CR=0,300 MAXI NB=0,020 MAXI V =0,030 MAXI
TI=0,030 MAXI B =,0010 MAXI MO=0,120 MAXI CBN13=CU+NI+CR+MO =1,00 MAXI CBN23=CR+MO =0,320 MAXI CBN02=SI+2,5P =0,325 MAXI
AP:SI=0,130-0,450 CU=0,430 MAXI NI=0,430 MAXI CR=0,340 MAXI NB=0,030 MAXI V =0,040 MAXI TI=0,040 MAXI MO=0,130 MAXI

Meth.(6) of steel making	Repère Pièce / Plate number	N° Coulée / Heat number		Analyse sur produit / Check analysis C%	Mn%	P%	S%	Si%	AL%	B %	CR%	CU%	MO%	N %	NB%	NI%	TI%	V %					CBN13	CBN23	CBN02		
C70	B07	B07		C71	C72	C73	C74	C75	C76	C77	C78	C79	C80	C81	C82	C83	C84	C85	C86	C87	C88	C89	C90	C91	C92	C96	C97
O/Y CC		730 514113		0,153	1,172	0,019	0,003	0,182	0,034	0,0002	0,021	0,012	0,002	0,003	0,001	0,013	0,018	0,002					0,05	0,023	0,230		
O/Y CC	2509041	730 514113	*	0,152	1,154	0,019	0,003	0,182	0,027	0,000	0,020	0,011	0,000	0,003	0,001	0,012	0,017	0,002									

(2) Emplacement/Location: 1:Tête / Top; 2:Pied / Bottom; 3:1/2 longueur / Length

(3) Orientation/Direction: L:Long / Longitudinal; T:Travers / Traverse; 3:30° / LML; 4:45° / LML; 6:60° / LML

(4) Position/épaisseur: 1:ép.réd10mm-full size; 5:ép.réd5mm- 1/2 size; 6:ép.réd6,7mm-2/3 size; 7:ép.réd7,5mm-3/4 size; C:Coeur(1/2 épaisseur)

(6) Mode élab-Meth Coulée: T: Thomas M: Martin E: Electrique / Electric O/Y: Oxygène pur / Basic Oxygen CC: Coulée Continue /

(7) Masse et nb pieces à titre indicatif. Mass and quantity of pieces as a rough guide

Nous certifions que la fourniture citée a été fabriquée conformément aux spécifications techniques du contrat et que, toutes opérations de contrôle et essais effectués, elle répond sous tous ses aspects aux spécifications particulières ainsi qu'aux normes en vigueur s'y rapportant
We certify hereby that the above mentioned products areconsistent with the order prescriptions

Contrôle de marquage, d'aspect et de dimensions : satisfaisants
Marking, inspection and measurement : without objection

C50 D01 Z02

Date 10/10/15.
Agent / Name F. SIXDENIERS

HEAT ODE CS729 & CS730.

1724000163-QC-DB-00013 rev02 page95/528

PARTICULAR MATERIAL APPRAISAL

C.A.M.P.I.
Ferrara -Italy

PMA Ref. No. 24003-01	**Rev. 0**
Pressure Equipment Manufacturer: C.A.M.P.I. srl	
Address : Via Diamantina, 15 – 44122 Ferrara (Italy)	

Material specification including date: **ASTM A 516**	**Grade:** **60**	**Delivery condition:** **Normalized**	**Product:** **Hot/Cold Rolled**
Material Group (Per CR ISO 15608:2000) **1.1**	**Similar EN material:**		
Application / Description of pressure equipment: **Hydrogen Vent KO Drum**			
References of the component **Item V-43001**	**Position** **Vertical**	**Fluid type** **Hydrogen-1 / Water-2**	
PED Risk Category **IV**	**Drawing of the component** **24003-VE-10 rev.04**		
Applicable Design Code: **ASME VIII Div.1 Ed.2023**	**Dimension / thickness range:** **up to 13mm**		
Maximum allowable temperature: **80°C**	**Minimum allowable temperature:** **-29°C**		

Essential Safety Requirements of Materials for pressure bearing parts (in finished pressure equipments)

Property	Requirement	Ref. Specification	Details of Compliance * (to be verified on material certification)
Appropriate properties (Annex I - 4.1(a)) (Assured by material manufacturer)	Proof strength/Yield strength (at appropriate temperature) UTS / Creep data	A/SA 516	*TS at -29°C=415MPa* *TS at +80°C=414MPa* *YS at -29°C=220MPa* *YS at +80°C=201MPa* *+ material certificate*
Sufficiently ductile (Annex I - 4.1(a)) (Annex I - 7.5)	e.g. for steel: A_{min} 14%	A/SA 516	*Quote minimum elongation specified in material specification,* *$A_{min\ in\ 8\ in.}$ 21%* *$A_{min\ in\ 2\ in.}$ 25%*
Sufficiently tough (Annex I - 4.1(a), Annex I - 7.5)	e.g. for steel; KV_{min} 27J at 20 °C or lowest operating temperature.	A/SA 516	*Quote impact strength and coincident minimum temperature specified in the material certificate ~~or exempted by the design code~~*
Not significantly affected by ageing (Annex I § 4.1 (c))	Appropriate selection. Suitable composition	A/SA 516	*a) Select materials that are not liable to (strain) ageing* *b) confirm plastic deformation not sufficient to cause strain aging.*
Sufficiently chemically resistant to the fluid contained, considering the scheduled lifetime of the equipment (Annex 1 § 4.1 (b))		Data sheet	*The fluids indicated on this PMA are not considered as significantly corrosive for carbon steel on technical literature when the design of vessels or plant is performed acc. to the sound engineering practice. This fact is also demonstrated by many years of use on pressure vessels.*
Selected in order to avoid undesirable effects when put together with other materials (needs to have electrochemical compatibility (Annex 1 § 4.1 (c))		/	*The electrochemical compatibility is analysed case by case. If there are end user specific requirements , the connection between two different type of material will be done with use of insulating material.*

Suitable for intended processing (Annex 1 § 4.1 (d))	e.g. welding, forming, etc	ASME IX + PED requirements	*All the welding activities are performed acc. to approved procedures.*
Material Marking Traceability (Annex 1 § 3.1.5)		ASME II part A + C.A.M.P.I. internal procedure	*Method of traceability to the certification supplied by the material manufacturer.*
Type of material Certificate (Annex 1 § 4.3)	Cat III & IV - Certificate of Specific Product Control.	EN 10204:2005	*Certification according to EN 10204:2004 Inspection Certificate "type 3.1 or "type 3.2"*
Material Manufacturer Approval (Annex 1 § 4.3)	Quality System of Material manufacturer is certified ISO 9001 by EU Competent Body	ISO 9001	*All material manufacturers must have a quality system certified acc. to ISO 9001 by EU "competent body"*
Test programme	e.g. ref to EN 10045-1, EN 10002, EN ISO 3651-2, etc . Specification has to be compatible with PED and results comparable with PED ESR.	/	*Not Applicable*
Results of test programme		/	*Not Applicable*

- *Contents of this column are provided for guidance to the responses required, other solutions may be equally valid.*

Additional Requirements:

The named material specification may be used for the construction of pressure equipment intended for use within the stated limits and subject to the following restrictions:

Restrictions:

TÜV Italia Quality Certification Service 09 48 Notified Body

17/09/2024

With reference to toughness test it must be carried out because the requirements of PED have priority over non harmonized standard (ASME)

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

Signed:

(Pressure Equipment Manufacturer)

Date: 01 August 2024

Confirmed:

Notified Body (Cats III & IV only)

Date:

TÜV Italia ☒ Review ☐ Witness Date: 07/10/24 Name: ....

19024-01 sh.2

PARTICULAR MATERIAL APPRAISAL

C.A.M.P.I.
Ferrara -Italy

PMA Ref. No. 24003-02	**Rev. 0**
Pressure Equipment Manufacturer: C.A.M.P.I. srl	
Address : Via Diamantina, 15 – 44122 Ferrara (Italy)	

Material specification including date: **ASTM A 350**	**Grade:** **LF2**	**Delivery condition:** **Normalized**	**Product:** **Forged**
Material Group (Per CR ISO 15608:2000) **11.1**	**Similar EN material:**		
Application / Description of pressure equipment: **Hydrogen Vent KO Drum**			
References of the component **Item V-43001**	**Position** **Vertical**	**Fluid type** **Hydrogen-1 / Water-2**	
PED Risk Category **IV**	**Drawing of the component** **24003-VE-10 rev.04**		
Applicable Design Code: **ASME VIII Div.1 Ed.2023**	**Dimension / thickness range:** **up to 20mm**		
Maximum allowable temperature: **80°C**	**Minimum allowable temperature:** **-29°C**		

Essential Safety Requirements of Materials for pressure bearing parts (in finished pressure equipments)

Property	Requirement	Ref. Specification	Details of Compliance * (to be verified on material certification)
Appropriate properties (Annex I - 4.1(a)) (Assured by material manufacturer)	Proof strength/Yield strength (at appropriate temperature) UTS / Creep data	A/SA 350	*TS at -29°C=485MPa* *TS at +80°C=483MPa* *YS at -29°C=250MPa* *YS at +80°C=227MPa* *+ material certificate*
Sufficiently ductile (Annex I - 4.1(a)) (Annex I - 7.5)	e.g. for steel: A_{min} 14%	A/SA 350	*Quote minimum elongation specified in material specification,* $A_{min\ long\ base}$ *30 %* $A_{min\ long\ STD\ 2in}$ *22 %*
Sufficiently tough (Annex I - 4.1(a), Annex I - 7.5)	e.g. for steel; KV_{min} 27J at 20 °C or lowest operating temperature.	A/SA 350	*Quote impact strength and coincident minimum temperature specified in the material certificate ~~or exempted by the design code~~*
Not significantly affected by ageing (Annex I § 4.1 (c))	Appropriate selection. Suitable composition	A/SA 350	*a) Select materials that are not liable to (strain) ageing* *b) confirm plastic deformation not sufficient to cause strain aging.*
Sufficiently chemically resistant to the fluid contained, considering the scheduled lifetime of the equipment (Annex 1 § 4.1 (b))		Data sheet	*The fluids indicated on this PMA are not considered as significantly corrosive for carbon steel on technical literature when the design of vessels or plant is performed acc. to the sound engineering practice. This fact is also demonstrated by many years of use on pressure vessels.*
Selected in order to avoid undesirable effects when put together with other materials (needs to have electrochemical compatibility (Annex 1 § 4.1 (c))		/	*The electrochemical compatibility is analysed case by case. If there are end user specific requirements , the connection between two different type of material will be done with use of insulating material.*

Suitable for intended processing (Annex 1 § 4.1 (d))	e.g. welding, forming, etc	ASME IX + PED requirements	*All the welding activities are performed acc. to approved procedures.*
Material Marking Traceability (Annex 1 § 3.1.5)		ASME II part A + C.A.M.P.I. internal procedure	*Method of traceability to the certification supplied by the material manufacturer.*
Type of material Certificate (Annex 1 § 4.3)	Cat III & IV - Certificate of Specific Product Control.	EN 10204:2005	*Certification according to EN 10204:2004 Inspection Certificate "type 3.1 or "type 3.2"*
Material Manufacturer Approval (Annex 1 § 4.3)	Quality System of Material manufacturer is certified ISO 9001 by EU Competent Body	ISO 9001	*All material manufacturers must have a quality system certified acc. to ISO 9001 by EU "competent body"*
Test programme	e.g. ref to EN 10045-1, EN 10002, EN ISO 3651-2, etc . Specification has to be compatible with PED and results comparable with PED ESR.	/	*Not Applicable*
Results of test programme		/	*Not Applicable*

- *Contents of this column are provided for guidance to the responses required, other solutions may be equally valid.*

Additional Requirements:

The named material specification may be used for the construction of pressure equipment intended for use within the stated limits and subject to the following restrictions:

TÜV Italia Srl Industry Service 09 48 Notified Body

17/09/2024

Restrictions:

With reference to toughness test it must be carriied out because the PED requirements have priority on non harmonized code (ASME)

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

Signed:

(Pressure Equipment Manufacturer)

Date: 01 August 2024

Confirmed:

Notified Body (Cats III & IV only)

Date:

TÜV Italia Review ☒ Witness ☐ Date: 07/10/24 Name:

PARTICULAR MATERIAL APPRAISAL

C.A.M.P.I.
Ferrara -Italy

PMA Ref. No. 24003-03	**Rev. 0**
Pressure Equipment Manufacturer: C.A.M.P.I. srl	
Address : Via Diamantina, 15 – 44122 Ferrara (Italy)	

Material specification including date: **ASTM A 333**	**Grade:** **6**	**Delivery condition:** **Normalized**	**Product:** **Seamless**
Material Group (Per CR ISO 15608:2000) **11.1**	**Similar EN material:**		
Application / Description of pressure equipment: **Hydrogen Vent KO Drum**			
References of the component **Item V-43001**	**Position** **Vertical**	**Fluid type** **Hydrogen-1 / Water-2**	
PED Risk Category **IV**	**Drawing of the component** **24003-VE-10 rev.04**		
Applicable Design Code: **ASME VIII Div.1 Ed.2023**	**Dimension / thickness range:** **up to 13mm**		
Maximum allowable temperature: **80°C**	**Minimum allowable temperature:** **-29°C**		

Essential Safety Requirements of Materials for pressure bearing parts (in finished pressure equipments)

Property	Requirement	Ref. Specification	Details of Compliance * (to be verified on material certification)
Appropriate properties (Annex I - 4.1(a)) (Assured by material manufacturer)	Proof strength/Yield strength (at appropriate temperature) UTS / Creep data	A/SA 333	*TS at -29°C=415MPa* *TS at +80°C=414MPa* *YS at -29°C=240MPa* *YS at +80°C=220MPa* *+ material certificate*
Sufficiently ductile (Annex I - 4.1(a)) (Annex I - 7.5)	e.g. for steel: A_{min} 14%	A/SA 333	*Quote minimum elongation specified in material specification,* $A_{min\ longitudinal}$ *30%* $A_{min\ transverse}$ *16%*
Sufficiently tough (Annex I - 4.1(a), Annex I - 7.5)	e.g. for steel; KV_{min} 27J at 20 °C or lowest operating temperature.	A/SA 333	*Quote impact strength and coincident minimum temperature specified in the material certificate ~~or exempted by the design code~~*
Not significantly affected by ageing (Annex I § 4.1 (c))	Appropriate selection. Suitable composition	A/SA 333	*a) Select materials that are not liable to (strain) ageing* *b) confirm plastic deformation not sufficient to cause strain aging.*
Sufficiently chemically resistant to the fluid contained, considering the scheduled lifetime of the equipment (Annex 1 § 4.1 (b))		Data sheet	*The fluids indicated on this PMA are not considered as significantly corrosive for carbon steel on technical literature when the design of vessels or plant is performed acc. to the sound engineering practice. This fact is also demonstrated by many years of use on pressure vessels.*
Selected in order to avoid undesirable effects when put together with other materials (needs to have electrochemical compatibility (Annex 1 § 4.1 (c))		/	*The electrochemical compatibility is analysed case by case. If there are end user specific requirements , the connection between two different type of material will be done with use of insulating material.*

Suitable for intended processing (Annex 1 § 4.1 (d))	e.g. welding, forming, etc	ASME IX + PED requirements	*All the welding activities are performed acc. to approved procedures.*
Material Marking Traceability (Annex 1 § 3.1.5)		ASME II part A + C.A.M.P.I. internal procedure	*Method of traceability to the certification supplied by the material manufacturer.*
Type of material Certificate (Annex 1 § 4.3)	Cat III & IV - Certificate of Specific Product Control.	EN 10204:2005	*Certification according to EN 10204:2004 Inspection Certificate "type 3.1 or "type 3.2"*
Material Manufacturer Approval (Annex 1 § 4.3)	Quality System of Material manufacturer is certified ISO 9001 by EU Competent Body	ISO 9001	*All material manufacturers must have a quality system certified acc. to ISO 9001 by EU "competent body"*
Test programme	e.g. ref to EN 10045-1, EN 10002, EN ISO 3651-2, etc . Specification has to be compatible with PED and results comparable with PED ESR.	/	*Not Applicable*
Results of test programme		/	*Not Applicable*

- *Contents of this column are provided for guidance to the responses required, other solutions may be equally valid.*

Additional Requirements:

The named material specification may be used for the construction of pressure equipment intended for use within the stated limits and subject to the following restrictions:

Restrictions:

TÜV Italia Group Marine Service 09 48 Notified Body

17/09/2024

With reference to toughness test it must be carriied out because the PED requirements have priority on non harmonized code (ASME)

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

Signed:

(Pressure Equipment Manufacturer)

Date: 01 August 2024

Confirmed:

Notified Body (Cats III & IV only)

Date:

TÜV Italia ☒ Review ☐ Witness Date: 04/10/24 Name:

PARTICULAR MATERIAL APPRAISAL

C.A.M.P.I.
Ferrara -Italy

PMA Ref. No. 24003-04	**Rev. 0**
Pressure Equipment Manufacturer: C.A.M.P.I. srl	
Address : Via Diamantina, 15 – 44122 Ferrara (Italy)	

Material specification including date: **ASTM A 320**	**Grade:** **L7**	**Delivery condition:** **Quenched and tempered**	**Product:** **Hot-wrought bar**
Material Group (Per CR ISO 15608:2000) **11.1**	**Similar EN material:**		
Application / Description of pressure equipment: **Hydrogen Vent KO Drum**			
References of the component **Item V-43001**	**Position** **Vertical**	**Fluid type** **Hydrogen-1 / Water-2**	
PED Risk Category **IV**	**Drawing of the component** **24003-VE-10 rev.04**		
Applicable Design Code: **ASME VIII Div.1 Ed.2023**	**Dimension / thickness range:** **up to 64mm**		
Maximum allowable temperature: **80°C**	**Minimum allowable temperature:** **-29°C**		

Essential Safety Requirements of Materials for pressure bearing parts (in finished pressure equipments)

Property	Requirement	Ref. Specification	Details of Compliance * (to be verified on material certification)
Appropriate properties (Annex I - 4.1(a)) (Assured by material manufacturer)	Proof strength/Yield strength (at appropriate temperature) UTS / Creep data	A/SA 320	*TS at -29°C=860MPa* *TS at +80°C=862MPa* *YS at -29°C=725MPa* *YS at +80°C=671MPa* *+ material certificate*
Sufficiently ductile (Annex I - 4.1(a)) (Annex I - 7.5)	e.g. for steel: A_{min} 14%	A/SA 320	*Quote minimum elongation specified in material specification,* *$A_{min\ long\ STD\ 2in}$ 16 %*
Sufficiently tough (Annex I - 4.1(a), Annex I - 7.5)	e.g. for steel; KV_{min} 27J at 20 °C or lowest operating temperature.	A/SA 320	*Quote impact strength and coincident minimum temperature specified in the material certificate ~~or exempted by the design code~~*
Not significantly affected by ageing (Annex I § 4.1 (c))	Appropriate selection. Suitable composition	A/SA 320	*a) Select materials that are not liable to (strain) ageing* *b) confirm plastic deformation not sufficient to cause strain aging.*
Sufficiently chemically resistant to the fluid contained, considering the scheduled lifetime of the equipment (Annex 1 § 4.1 (b))		Data sheet	*The fluids indicated on this PMA are not considered as significantly corrosive for carbon steel on technical literature when the design of vessels or plant is performed acc. to the sound engineering practice. This fact is also demonstrated by many years of use on pressure vessels.*
Selected in order to avoid undesirable effects when put together with other materials (needs to have electrochemical compatibility (Annex 1 § 4.1 (c))		/	*The electrochemical compatibility is analysed case by case. If there are end user specific requirements , the connection between two different type of material will be done with use of insulating material.*

Suitable for intended processing (Annex 1 § 4.1 (d))	e.g. welding, forming, etc	ASME IX + PED requirements	*N.A.*
Material Marking Traceability (Annex 1 § 3.1.5)		ASME II part A + C.A.M.P.I. internal procedure	*Method of traceability to the certification supplied by the material manufacturer.*
Type of material Certificate (Annex 1 § 4.3)	Cat III & IV - Certificate of Specific Product Control.	EN 10204:2005	*Certification according to EN 10204:2004 Inspection Certificate "type 3.1 or "type 3.2"*
Material Manufacturer Approval (Annex 1 § 4.3)	Quality System of Material manufacturer is certified ISO 9001 by EU Competent Body	ISO 9001	*All material manufacturers must have a quality system certified acc. to ISO 9001 by EU "competent body"*
Test programme	e.g. ref to EN 10045-1, EN 10002, EN ISO 3651-2, etc . Specification has to be compatible with PED and results comparable with PED ESR.	/	*Not Applicable*
Results of test programme		/	*Not Applicable*

- *Contents of this column are provided for guidance to the responses required, other solutions may be equally valid.*

Additional Requirements:

The named material specification may be used for the construction of pressure equipment intended for use within the stated limits and subject to the following restrictions:

TÜV Italia Industrie Service 09 48 Notified Body

17/09/2024

Restrictions:

With reference to toughness test it must be carriied out because the PED requirements have priority on non harmonized code (ASME)

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

Signed:

(Pressure Equipment Manufacturer)

Date: 01 August 2024

Confirmed:

Notified Body (Cats III & IV only)

Date:

TÜV Italia

☒ Review
☐ Witness

Date: 07/10/24 Name: ...

PARTICULAR MATERIAL APPRAISAL

C.A.M.P.I.
Ferrara -Italy

PMA Ref. No. 24003-05	**Rev. 0**
Pressure Equipment Manufacturer: C.A.M.P.I. srl	
Address : Via Diamantina, 15 – 44122 Ferrara (Italy)	

Material specification including date: **ASTM A 194**	**Grade:** **7**	**Delivery condition:** **Quenched and tempered**	**Product:** **Hot-wrought bar**
Material Group (Per CR ISO 15608:2000) **11.1**	**Similar EN material:**		
Application / Description of pressure equipment: **Hydrogen Vent KO Drum**			
References of the component **Item V-43001**	**Position** **Vertical**	**Fluid type** **Hydrogen-1 / Water-2**	
PED Risk Category **IV**	**Drawing of the component** **24003-VE-10 rev.04**		
Applicable Design Code: **ASME VIII Div.1 Ed.2023**	**Dimension / thickness range:** **up to 64mm**		
Maximum allowable temperature: **80°C**	**Minimum allowable temperature:** **-29°C**		

Essential Safety Requirements of Materials for pressure bearing parts (in finished pressure equipments)

Property	Requirement	Ref. Specification	Details of Compliance * (to be verified on material certification)
Appropriate properties (Annex I - 4.1(a)) (Assured by material manufacturer)	Proof strength/Yield strength (at appropriate temperature) UTS / Creep data	A/SA 194	*Proof Load =69300 lbf + material certificate*
Sufficiently ductile (Annex I - 4.1(a)) (Annex I - 7.5)	e.g. for steel: A_{min} 14%	A/SA 194	*N.A.*
Sufficiently tough (Annex I - 4.1(a), Annex I - 7.5)	e.g. for steel; KV_{min} 27J at 20 °C or lowest operating temperature.	A/SA 194	*Quote impact strength and coincident minimum temperature specified in the material certificate ~~or exempted by the design code~~*
Not significantly affected by ageing (Annex I § 4.1 (c))	Appropriate selection. Suitable composition	A/SA 194	*a) Select materials that are not liable to (strain) ageing b) confirm plastic deformation not sufficient to cause strain aging.*
Sufficiently chemically resistant to the fluid contained, considering the scheduled lifetime of the equipment (Annex 1 § 4.1 (b))		Data sheet	*The fluids indicated on this PMA are not considered as significantly corrosive for carbon steel on technical literature when the design of vessels or plant is performed acc. to the sound engineering practice. This fact is also demonstrated by many years of use on pressure vessels.*
Selected in order to avoid undesirable effects when put together with other materials (needs to have electrochemical compatibility (Annex 1 § 4.1 (c))		/	*The electrochemical compatibility is analysed case by case. If there are end user specific requirements , the connection between two different type of material will be done with use of insulating material.*

Suitable for intended processing (Annex 1 § 4.1 (d))	e.g. welding, forming, etc	ASME IX + PED requirements	*N.A.*
Material Marking Traceability (Annex 1 § 3.1.5)		ASME II part A + C.A.M.P.I. internal procedure	*Method of traceability to the certification supplied by the material manufacturer.*
Type of material Certificate (Annex 1 § 4.3)	Cat III & IV - Certificate of Specific Product Control.	EN 10204:2005	*Certification according to EN 10204:2004 Inspection Certificate "type 3.1 or "type 3.2"*
Material Manufacturer Approval (Annex 1 § 4.3)	Quality System of Material manufacturer is certified ISO 9001 by EU Competent Body	ISO 9001	*All material manufacturers must have a quality system certified acc. to ISO 9001 by EU "competent body"*
Test programme	e.g. ref to EN 10045-1, EN 10002, EN ISO 3651-2, etc . Specification has to be compatible with PED and results comparable with PED ESR.	/	*Not Applicable*
Results of test programme		/	*Not Applicable*

- *Contents of this column are provided for guidance to the responses required, other solutions may be equally valid.*

Additional Requirements:

The named material specification may be used for the construction of pressure equipment intended for use within the stated limits and subject to the following restrictions:

TÜV Italia Srl Notified Body 09 48

17/09/2024

Restrictions:

With reference to toughness test it must be carriied out because the PED requirements have priority on non harmonized code (ASME)

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

Signed:

(Pressure Equipment Manufacturer)

Date: 01 August 2024

Confirmed:

Notified Body (Cats III & IV only)

Date:

TÜV Italia ☒ Review ☐ Witness Date: 07/10/24 Name:

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 3.3

Filler Metal Certificate

C.A.M.P.I. Ferrara-Italy	LISTA MATERIALI D'APPORTO **Filler Metal List**	Commessa / *Job* 24003

ITEM n°: V - 43001		**N° di Fabbrica:** 24-003	
TRADE NAME Marca	**DESCRIBTION** Descrizione	**HEAT/LOT N°** Colata/lotto n°	**CERTIFICATE N°** Certificato Nr:
LINCOLN	GTAW WIRE Carborod Nil – 2,4mm	B102854T24	01304582
LINCOLN	ELECTRODES TENAX 35S- 3,2mm	M1MS213404	01680995
LINCOLN	ELECTRODES TENAX 35S- 4mm	M1MS235501	02155916
BOHLER	GMAW WIRE Diamondspark 54MC - 1,2mm	1120912	1120912
LINCOLN	SAW WIRE L50M – 3,2mm	F1SW210912	02203599
LINCOLN	FLUX P230	F1FX230127	02203598

C.A.M.P. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date
Signature

TÜV Italia
09 48 ☒ Review ☐ Witness
Date: 07/10/24 Name:

QC sign
Firma QC

Date
Data 09-September-2024

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	TIG
Product	Carborod Ni1
Size(s) mm	2.4X1000XTUB05
Item No.	W000283394
Lot/Batch	B102854T24
Class	AWS A5.28 ER80S-Ni1 EN ISO 636-A W 46 6 W3Ni1

Customer Ref	17/21
Our Reference	815341935
Quantity	25.0 KG
Customer	MOLESINI

VIA VENEZUELA 8
Portomaggiore 44015
Italia

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	V	Al
0.088	0.67	1.09	0.005	0.013	0.03	0.87	0.01	0.12	<0.01	0.002

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	Rp0.2 MPa	Rm MPa	A5 %
AW	20	520	610	26

Impact testing

Cond.	Temp. °C	KV J	Temp. °C	KV J
AW	20	160	-60	65

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Via Fratelli Canepa 8
16010 Serra Riccò
Italy

Printed By: Giuseppe Lavezzari
Function: Warehouse
Date: 19/FEB/2021

Cert. No. 01304582
ZEU_LOWALLOY , 1

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	Electrode
Product	TENAX 35S
Size(s) mm	3.20X450XVPMD
Item No.	W000287343
Lot/Batch	M1MS213404
Class	AWS A5.1 E7018-1 H4 EN-ISO 2560-A E 42 5 B 3 2 H5

Customer Ref	38/22
Our Reference	817000459
Quantity	100.8 KG
Customer	C.A.M.P.I. S.R.L.

VIA DIAMANTINA, 15
FERRARA 44122
Italia

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Nb	Cu	V
0.040	0.49	1.38	0.017	0.008	0.03	0.02	<0.01	0.01	0.02	0.02

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	RpO.2 MPa	Rm MPa	A5 %
AW	20	490	541	30

Impact testing

Cond.	Temp. °C	KV J
AW	-50	148

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Loc. Casalmenini 3
37010 Rivoli Veronese
Italy

DUCTIL S.A.

Printed By	Christian Grigoli	Cert. No. 01680995
Function	Warehouse Operator	ZEU_CMN . 1
Date	17/MAR/2022	

METRODE 4000163-QC-DB-00013 [illegible]

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	**Electrode**
Product	**TENAX 35S**
Size(s) mm	**4.00X450XVPMD**
Item No.	**W000287344**
Lot/Batch	**M1MS235501**
Class	**AWS A5.1 E7018-1 H4** **EN-ISO 2560-A E 42 5 B 3 2 H5**

Customer Ref	**96/23**
Our Reference	**819295277**
Quantity	**87.0 KG**
Customer	**MOLESINI C/O CAMPI SRL**

VIA DIAMANTINA, 15
FERRARA 44122
Italia

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Nb	Cu	V
0.064	**0.47**	**1.44**	**0.015**	**0.006**	**0.04**	**0.02**	**<0.01**	**<0.01**	**0.03**	**0.02**

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	Rp0.2 MPa	Rm MPa	A5 %
AW	**20**	**490**	**541**	**30**

Impact testing

Cond.	Temp. °C	KV J
AW	**-50**	**148**

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company	Issued By	Printed		Cert. No.
Lincoln Electric Italia srl	C.Dascalu	By	Emil Cristian Pavel	**02155916**
Loc. Casalmenini 3		Function	Warehouse operator	ZEU_CMN , 1
37010 Rivoli Veronese	Position: QES Manager	Date	19/SEP/2023	
Italy				

voestalpine Böhler Welding Italia S.r.l.

Certificato di prova 3.1
Inspection certificate 3.1

secondo / as per : EN 10204
No. : No. : 2024-2014610056-10-1120912-014
Rev. 0 Page / Page : 1 / 1

C.A.M.P.I. SRL

VIA DIAMANTINA 15
44122 FERRARA
Italia

Ordine N°	PO no.	n.23029.31	del / of	23.05.2024
Ordine N°	Order no.	1014273371		
Bolla di consegna/Pos./Splitt.	Delivery note/pos./split	2014610056/000000/000010	del / of	27.05.2024

Oggetto test	Product	filo animato / Tubular cored electrode	
Denominazione commerciale	Trade name	**diamondspark 54 MC**	250021
Classificazione norma	Standard designation	EN ISO 17632-A: T46 6 M M21 1 H5/T42 5 M C1 1 H5	44445 CU04190F
		AWS A5.18 / SFA-5.18: E70C-6M-H4	0140

Dimensione	Dimension	1,2 mm
Colata	Serial no.	1120912
Quantità fornita	Quantity	896,0 KG

Composizione chimica in % del deposito **Chemical composition in % of the weld metal**

C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu	Al	Nb			
0,07	0,78	1,34	0,005	0,009	0,02	< 0,01	0,02	< 0,01	0,10	< 0,1	< 0,01			

proprietà meccaniche **Mechanical properties** **EN 10204 - 2.2**

Prova di trazione Tensile test

T	ReL / Rp 0,2 MPa	Rp 1,0 MPa	Rm MPa	A (Lo = 5d) %	Z %	WBH PWHT	Note Remarks
20°C	≥ 460		550 - 660	≥ 20			

Prova di resilienza Impact test

T	Energia di impatto Impact energy KV / J	Medio Average KV / J	Espansione lat. Lateral expansion mm	Frattura cristalliina Shear fracture %	WBH PWHT	Note Remarks
-60°C	≥ 47					

Questo certificate è stato emesso con sistema automatizzato e non richiede firma
This certificate was issued by DP-equipment and does not require signature.

Centro / Town: Milano
Data / Date: 28.05.2024

Q.A. representative / Authorized representative
Faraone

voestalpine
ONE STEP AHEAD.

23-20.1o

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	SAW
Product	L50M (LNS133U) (LS-3)
Size(s) mm	2,4
Item No.	FL50M-24-25VCI
Lot/Batch	F1SW210912
Class	AWS A5.17/A5.17M : EH12K ISO 14171-A : S3Si

Customer Ref	VS ORDINE EMAIL
Our Reference	819523149
Quantity	300.0 KG
Customer	MOLESINI C/O CAMPI SRL

VIA DIAMANTINA, 15
FERRARA 44122
Italia

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	V	Al	Co	N
0.110	0.29	1.76	0.007	0.005	0.02	0.01	<0.01	0.01	<0.01	<0.01	0.004	0.003

Mechanical tests, all weld metal

Remarks

Rivestimento di rame aggiuntivo : 0,12% max

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company	Issued By	Printed		Cert. No.
Lincoln Electric Italia srl **Loc. Casalmenini 3** **37010 Rivoli Veronese** **Italy**	F.Wera Manager Quality	By Function Date	Christian Grigoli Warehouse Operator 10/NOV/2023	**02203599** ZEU CMN . 1

OERLIKON SAF-FRO METRODE WELDING CONSUMABLES SPECIAL ALLOYS

Inspection Certificate 3.1

5302a.1a

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	FLUX
Product	P230
Item No.	FXP230-25SRB
Lot/Batch	F1FX230127
Wire Class	FL61-4-25VCI L61 VCI 4.0X25 STEIN
	ISO 14174 : S A AB 1 67 AC H5*
	ISO14171-A S 38 4 AB S2Si
	AWS A5.17 F7A4-EM12K

Customer Ref	VS ORDINE EMAIL
Our Reference	819523149
Quantity	300.0 KG
Customer	MOLESINI C/O CAMPI SRL

VIA DIAMANTINA, 15
FERRARA 44122
Italia

Flux Composition (%) According to EN10204 3.1

Al2O3	SiO2	TiO2	ZrO2	K2O	Na2O	MnO	CaO	MgO	CaF2	FeO
17.8	23.2	2.3	0.2	0.90	2.10	5.6	4.8	19.9	21.6	1.50

Al2O3+CaO+MgO
42.60

Sieve analysis (%) According to EN10204 3.1

>2,0mm	>1,7mm	>0,85mm	>0,425mm	>0,25mm	<0,25mm
2.10	7.00	55.40	33.70	1.80	0.10

Diffusible hydrogen According to EN10204 2.2
HDM as Manufactured
5.0 ml/100g

Chemical analysis (%) Batch: F1SW14O272 L61 VCI 4.0X25 STEIN BASKET SP According to EN10204 3.1

C	Si	Mn	P	S
0.12	0.23	1.02	0.010	0.010

Chemical analysis (%) / Weld Metal According to EN10204 2.2

C	Si	Mn	P	S	Cr	Ni	Mo
0.07	0.33	1.30	0.016	0.013	0.03	0.02	<0.01

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	ReH MPa	Rm MPa	A4 %	Z %
AW	20	436	519	31	76

Impact testing

Temp. °C	C1a J	C1b J	C1c J	KV J
-40	109	100	128	112

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Loc. Casalmenini 3
37010 Rivoli Veronese
Italy

F.Wera
Manager Quality

Printed By: Christian Grigoli
Function: Warehouse Operator
Date: 10/NOV/2023

Cert. No.
02203598
ZEU_FLUX_1

OERLIKON SAF-FRO METRODE WELDING CONSUMABLES SPECIAL ALLOYS

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 4

NDE OPERATOR'S QUALIFICATION

List of NDE Examiner & qualification

Base Load Power Hub (BLPH)

NDE Operators List and Qualification

Document Number: 1724000163-NDT-LIS-00009

Document Class: 2

ROSETTI MARINO	
1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED
NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.	
Sign	Date
Comandini Massimo Level III NDT EN - ISO9712 WI CSWIP 3.1	17-10-2024

Rev.	Date	Description	Prepared	Reviewed	Approved
02	04/09/2024	Approved for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
01	19/06/2024	Approved for Construction (AFC)	M. Antolini	G. De Candia	E. Dall'Arche
00	08/05/2024	Issue for Review (IFR)	M. Antolini	G. De Candia	E. Dall'Arche

C.A.M.P.I. Srl

Ferrara - Italy

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

TITOLO DEL DOCUMENTO / DOCUMENT TITLE:

ELENCO GENERALE CERTIFICATI QUALIFICA OPERATORI AI CONTROLLI NON DISTRUTTIVI

GENERAL LIST OF NDE EXAMINER

STATO DELLE REVISIONI DEL DOCUMENTO

Rev.	Date	Issued	Verified	Approved	Scope
1	04/09/2024	Bellinatti	Antolini M.	Polidori	Per Uso / For use
0	08/05/2024	Bellinatti	Antolini M.	Polidori	Per Uso / For use

ELENCO OPERATORI CND QUALIFICATI –ISO 9712
NDE qualified personnel list-ISO 9712

Operatore *Personnel*	Tipo di esame *Type of examination*	Livello *Level*	Data di qualificazione *Qualification data*	Data di scadenza Expiration date	Certificato di abilitazione operatore NDE *Certificate of NDE training and examination*	Ente Terzo Riconosciuto
Segato Andrea	VT	II	09/03/2023	08/03/2028	IND-23-00800-R	Bureau Veritas
Segato Andrea	MT	II	21/11/2022	20/11/2027	IND-22-02831-R	Bureau Veritas
Segato Andrea	PT	II	21/11/2022	20/11/2027	IND-22-02832-R	Bureau Veritas
Antolini Michele	RT	II	21/11/2023	20/11/2028	IND-23-03626-C	Bureau Veritas
Antolini Michele	MT	II	16/11/2023	26/08/2028	IND-23-03627-C	Bureau Veritas
Antolini Michele	PT	II	21/11/2023	20/11/2028	IND-23-03628-C	Bureau Veritas
Antolini Michele	VT	II	25/01/2024	24/01/2029	IND-23-03629-C	Bureau Veritas
Cattabriga Stefano	VT	II	09/03/2023	08/03/2028	IND-23-00793-R	Bureau Veritas
Cattabriga Stefano	MT	II	09/03/2023	08/03/2028	IND-23-00787-R	Bureau Veritas
Cattabriga Stefano	PT	II	09/03/2023	08/03/2028	IND-23-00788-R	Bureau Veritas
Bruschi Marco	RT	II	27/06/2022	24/11/2026	n°CPND.PND22/ 178-01.22.178-21	Apave
Bruschi Marco	UT	II	27/06/2022	24/11/2026	n°CPND.PND22/ 178-01.22.178-22	Apave
Diego Zanibellato	RT	II	25/05/2021	24/05/2026	D00192-RT	TEC Eurolab
David Felici	UT	II	25/05/2021	24/05/2026	E-00943-UT-2-TO	TEC Eurolab

TÜV Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:



PRS N° 076C

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore
NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-00800-R

Si certifica la qualifica in Prove Non Distruttive al Livello 2
It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*
Andrea Segato (ID # 1106)

Nato a / *born in*: Rovigo (RO) Italy

Il / *on*: 14 Dec 1985

Per il metodo / *For the method*
Visual Testing (VT)

Per i settori / *For the sectors*
Pre- and in-service testing which includes manufacturing

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2012 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND
This certificate is issued according to UNI EN ISO 9712:2012 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Data ultima revisione / *Date last revision*: ----------

Emesso / *Issued*: 9 Mar 2023

Valido dal / *Valid from*: 9 Mar 2023

Scadenza / *Expiry date*: 8 Mar 2028

Firma titolare del certificato
Signature of certificate holder

Responsabile Tecnico di Schema
NDT Scheme Chief
Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



BUREAU VERITAS 1828

BUREAU VERITAS

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
PRS N° 076C
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC mutual Recognition Agreements

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore
NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-22-02831-R

Si certifica la qualifica in Prove Non Distruttive al Livello 2
It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato/*Certificate holder*
Andrea Segato (ID # 1106)

Nato a/*born in*: Rovigo (RO) Italy

Il/*on*: 14 Dec 1985

Per il metodo / *for the method:*
Magnetic Testing (MT)

APPROVAZIONE PER ESECUZIONE DI PROVE NON DISTRUTTIVE secondo l'Allegato I paragrafo 3.1.3 della direttiva attrezzature a pressione 2014/68/UE PED (CEN/TR 15589 Route A)
APPROVAL FOR EXECUTION OF NON-DESTRUCTIVE TESTING as per Annex I paragraph 3.1.3 of pressure equipment directive 2014/68/UE PED (CEN/TR 15589 Route A)

Per i settori /*for the sectors*:
Pre- and in-service testing which includes manufacturing

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2012 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND
This certificate is issued according to UNI EN ISO 9712:2012 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Data ultima revisione / *Date last revision*: ----------

Emesso / *issued*: 21 Nov 2022

Scadenza / *Expiry date*: 20 Nov 2027

Firma titolare del certificato
Signature of certificate holder

Responsabile Tecnico di Schema
NDT Scheme Chief
Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



BUREAU VERITAS 1828

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRS N° 076C

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore
NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-22-02832-R

Si certifica la qualifica in Prove Non Distruttive al Livello 2
It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato/*Certificate holder*
Andrea Segato (ID # 1106)

Nato a/*born in*: Rovigo (RO) Italy

Il/*on*: 14 Dec 1985

Per il metodo / *for the method:*
Penetrant Testing (PT)

APPROVAZIONE PER ESECUZIONE DI PROVE NON DISTRUTTIVE secondo l'Allegato I paragrafo 3.1.3 della direttiva attrezzature a pressione 2014/68/UE PED (CEN/TR 15589 Route A)
APPROVAL FOR EXECUTION OF NON-DESTRUCTIVE TESTING as per Annex I paragraph 3.1.3 of pressure equipment directive 2014/68/UE PED (CEN/TR 15589 Route A)

Per i settori /*for the sectors*:
Pre- and in-service testing which includes manufacturing

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2012 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND
This certificate is issued according to UNI EN ISO 9712:2012 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Data ultima revisione / *Date last revision*: ----------

Emesso / *issued*: 21 Nov 2022

Scadenza / *Expiry date*: 20 Nov 2027

Firma titolare del certificato
Signature of certificate holder

Responsabile Tecnico di Schema
NDT Scheme Chief
Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



PRS N°0076

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore

NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-03626-C

Si certifica la qualifica in Prove Non Distruttive al Livello 2

It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*

Michele Antolini (ID # 2546)

Nato a / *born in*: Codigoro (FE) Italy

Il / *on*: 31 Aug 1971

Per il metodo-tecnica / F*or the method-tecnique:*

Radiographic Testing / Film interpretation (RT/F-I)

APPROVAZIONE PER ESECUZIONE DI PROVE NON DISTRUTTIVE secondo l'Allegato I paragrafo 3.1.3 della direttiva attrezzature a pressione 2014/68/UE PED (CEN/TR 15589 Route A)

APPROVAL FOR EXECUTION OF NON-DESTRUCTIVE TESTING as per Annex I paragraph 3.1.3 of pressure equipment directive 2014/68/UE PED (CEN/TR 15589 Route A)

Per i settori / F*or the sectors*:

Pre- and in-service testing which includes manufacturing (s)

(composed by product sector c-f-w-t-wp-m)

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2022 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND

This certificate is issued according to UNI EN ISO 9712:2022 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Emesso / *Issued:* 16 Nov 2023

Valido dal / *Validity start date*: 21 Nov 2023

Data ultima revisione / *Date last revision:* ----------

Scadenza / *Expiry date*: 20 Nov 2028

Responsabile Tecnico di Schema

NDT Scheme Chief

Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



BUREAU VERITAS

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N°0076

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore

NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-03627-C

Si certifica la qualifica in Prove Non Distruttive al Livello 2

It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*

Michele Antolini (ID # 2546)

Nato a / *born in*: Codigoro (FE) Italy

Il / *on*: 31 Aug 1971

Per il metodo-tecnica / F*or the method-tecnique:*

Magnetic Testing (MT)

APPROVAZIONE PER ESECUZIONE DI PROVE NON DISTRUTTIVE secondo l'Allegato I paragrafo 3.1.3 della direttiva attrezzature a pressione 2014/68/UE PED (CEN/TR 15589 Route A)

APPROVAL FOR EXECUTION OF NON-DESTRUCTIVE TESTING as per Annex I paragraph 3.1.3 of pressure equipment directive 2014/68/UE PED (CEN/TR 15589 Route A)

Per i settori / F*or the sectors*:

Pre- and in-service testing which includes manufacturing (s)

(composed by product sector c-f-w-t-wp-m)

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2022 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND

This certificate is issued according to UNI EN ISO 9712:2022 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Emesso / *Issued:* 16 Nov 2023

Valido dal / *Validity start date*: 16 Nov 2023

Data ultima revisione / *Date last revision:* ----------

Scadenza / *Expiry date*: 26 Aug 2028

Responsabile Tecnico di Schema

NDT Scheme Chief

Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



PRS N°0076

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore

NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-03628-C

Si certifica la qualifica in Prove Non Distruttive al Livello 2

It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*

Michele Antolini (ID # 2546)

Nato a / *born in*: Codigoro (FE) Italy

Il / *on*: 31 Aug 1971

Per il metodo-tecnica / F*or the method-tecnique:*

Penetrant Testing (PT)

APPROVAZIONE PER ESECUZIONE DI PROVE NON DISTRUTTIVE secondo l'Allegato I paragrafo 3.1.3 della direttiva attrezzature a pressione 2014/68/UE PED (CEN/TR 15589 Route A)

APPROVAL FOR EXECUTION OF NON-DESTRUCTIVE TESTING as per Annex I paragraph 3.1.3 of pressure equipment directive 2014/68/UE PED (CEN/TR 15589 Route A)

Per i settori / F*or the sectors*:

Pre- and in-service testing which includes manufacturing (s)

(composed by product sector c-f-w-t-wp-m)

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2022 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND

This certificate is issued according to UNI EN ISO 9712:2022 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Emesso / *Issued:* 16 Nov 2023

Valido dal / *Validity start date*: 21 Nov 2023

Data ultima revisione / *Date last revision:* ----------

Scadenza / *Expiry date*: 20 Nov 2028

Responsabile Tecnico di Schema

NDT Scheme Chief

Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



BUREAU VERITAS

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N°0076

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore

NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-03629-C

Si certifica la qualifica in Prove Non Distruttive al Livello 2

It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*

Michele Antolini (ID # 2546)

Nato a / *born in*: Codigoro (FE) Italy

Il / *on*: 31 Aug 1971

Per il metodo-tecnica / *For the method-tecnique:*

Visual Testing (VT)

Per i settori / *For the sectors*:

Pre- and in-service testing which includes manufacturing (s)

(composed by product sector c-f-w-t-wp-m)

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2022 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND

This certificate is issued according to UNI EN ISO 9712:2022 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Emesso / *Issued:* 16 Nov 2023

Valido dal / *Validity start date*: 25 Jan 2024

Data ultima revisione / *Date last revision:* ----------

Scadenza / *Expiry date*: 24 Jan 2029

Responsabile Tecnico di Schema

NDT Scheme Chief

Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



BUREAU VERITAS

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
PRS N° 076C

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore
NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-00793-R

Si certifica la qualifica in Prove Non Distruttive al Livello 2
It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*
Stefano Cattabriga (ID # 1664)

Nato a / *born in*: Bondeno (FE) Italy

Il / *on*: 11 Oct 1984

Per il metodo / *For the method*
Visual Testing (VT)

Per i settori / *For the sectors*
Pre- and in-service testing which includes manufacturing

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2012 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND
This certificate is issued according to UNI EN ISO 9712:2012 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Data ultima revisione / *Date last revision*: ----------

Emesso / *Issued*: 9 Mar 2023

Valido dal / *Valid from*: 9 Mar 2023

Scadenza / *Expiry date*: 8 Mar 2028

Firma titolare del certificato
Signature of certificate holder

Responsabile Tecnico di Schema
NDT Scheme Chief
Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



BUREAU VERITAS 1828

BUREAU VERITAS

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
PRS N° 076C
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC mutual Recognition Agreements

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore
NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-00787-R

Si certifica la qualifica in Prove Non Distruttive al Livello 2
It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*
Stefano Cattabriga (ID # 1664)

Nato a / *born in*: Bondeno (FE) Italy — Il / *on*: 11 Oct 1984

Per il metodo / *For the method*
Magnetic Testing (MT)

APPROVAZIONE PER ESECUZIONE DI PROVE NON DISTRUTTIVE secondo l'Allegato I paragrafo 3.1.3 della direttiva attrezzature a pressione 2014/68/UE PED (CEN/TR 15589 Route A)
APPROVAL FOR EXECUTION OF NON-DESTRUCTIVE TESTING as per Annex I paragraph 3.1.3 of pressure equipment directive 2014/68/UE PED (CEN/TR 15589 Route A)

Per i settori / *For the sectors*
Pre- and in-service testing which includes manufacturing

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2012 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND
This certificate is issued according to UNI EN ISO 9712:2012 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Data ultima revisione / *Date last revision*: ---------- — Emesso / *Issued*: 9 Mar 2023

Valido dal / *Valid from*: 9 Mar 2023 — Scadenza / *Expiry date*: 8 Mar 2028

Firma titolare del certificato
Signature of certificate holder

Responsabile Tecnico di Schema
NDT Scheme Chief
Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano



BUREAU VERITAS

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
PRS N° 076C

PROVE NON DISTRUTTIVE: Certificato di Qualifica Operatore
NON-DESTRUCTIVE TESTING: Operator Qualification Certificate

N° IND-23-00788-R

Si certifica la qualifica in Prove Non Distruttive al Livello 2
It certifies the qualification for Non-Destructive Testing at the level 2

Titolare del certificato / *Certificate holder*
Stefano Cattabriga (ID # 1664)

Nato a / *born in*: Bondeno (FE) Italy — Il / *on*: 11 Oct 1984

Per il metodo / *For the method*
Penetrant Testing (PT)

APPROVAZIONE PER ESECUZIONE DI PROVE NON DISTRUTTIVE secondo l'Allegato I paragrafo 3.1.3 della direttiva attrezzature a pressione 2014/68/UE PED (CEN/TR 15589 Route A)
APPROVAL FOR EXECUTION OF NON-DESTRUCTIVE TESTING as per Annex I paragraph 3.1.3 of pressure equipment directive 2014/68/UE PED (CEN/TR 15589 Route A)

Per i settori / *For the sectors*
Pre- and in-service testing which includes manufacturing

Il presente certificato viene rilasciato in conformità alla Norma UNI EN ISO 9712:2012 e Regolamento Bureau Veritas IT-IND-REG-01_NDT.IND
This certificate is issued according to UNI EN ISO 9712:2012 and Bureau Veritas Rule IT-IND-REG-01_NDT.IND

Data ultima revisione / *Date last revision*: ---------- Emesso / *Issued*: 9 Mar 2023

Valido dal / *Valid from*: 9 Mar 2023 Scadenza / *Expiry date*: 8 Mar 2028

Firma titolare del certificato
Signature of certificate holder

Responsabile Tecnico di Schema
NDT Scheme Chief
Luca Rossi

to check the certificate: https://bvchecker.revo.network

© BUREAU VERITAS ITALIA S.p.A. Viale Monza, 347, 20126 Milano

Apave Italia Cpm Srl - Notified Body 0398
Via Artigiani, 63 - 25040 BIENNO (BS)
Tel. +39.0364.300.342 - Fax +39.0364.300.354

PRS n. 079 C
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

CERTIFICATE No / *CERTIFICATO N°*

CPND.PND22/178-01.22.178-21

LEVEL 2 CERTIFICATE
CERTIFICATO DI LIVELLO 2

Certification of qualification by examination as Non Destructive Test Operator
Certificazione della qualificazione per esami come operatore in Prove Non Distruttive

Mr. / Sig.

BRUSCHI MARCO

born in *nato a*	FERRARA
on *il*	21/05/1991
for the method *per il metodo*	RT - RADIOGRAFIA
for the industrial sectors / product sectors *per i settori industriali / settori di prodotto*	1, 2, 3, 4

Legend / *Legenda*

Industrial sectors / *Settori Industriali*

(1) FPM Manufacturing of metal products (c, f, w, t, wp)
Fabbricazione di prodotti metallici (c, f, w, t, wp)

(2) FEM Manufacturing (pre-service) and in work / maintenance (in-service) of equipment, plant and metal structures (c, f, w, t, wp and other product sectors)
Fabbricazione (pre-servizio) ed esercizio / manutenzione (in servizio) di attrezzature, impianti e strutture metalliche (c, f, w, t, wp ed altri settori di prodotto)

(3) FMS Manufacturing (pre-service) and operating / maintenance (in-service) of equipment, wagons, plant and railways structures (c, f, w, t, wp and other product sectors)
Fabbricazione (preservizio) ed esercizio / manutenzione (in servizio) di attrezzature, carri, impianti e strutture ferroviarie (c, f, w, t, wp ed altri settori di prodotto)

(4) FDE Manufacturing (pre-service) and operating / maintenance / changes (in-service) of pressure equipment, assemblies, safety devices (fixed and transportable) – Directive 2014/68/EU PED and 2010/35/EU T-PED (c, f, w, t, wp and other product sectors)
Fabbricazione (preservizio) ed esercizio / manutenzione / modifica (in servizio) di attrezzature, insiemi, dispositivi di sicurezza a pressione (fissi e trasportabili) – Direttiva 2014/68/UE PED e 2010/35/UE T-PED (c, f, w, t, wp ed altri settori di prodotto)

(5) ASZ Aerospace (c, f, w, t, wp and other product sectors)
Aerospaziale (c, f, w, t, wp, altri settori di prodotto)

(6) CPA Civil and artistic heritage (only for TT method)
Civile e patrimonio artistico (solo per il metodo TT)

(7) ECO Ecology (only for TT method)
Ecologia (solo per il metodo TT)

Product sectors / *Settori di prodotto*

(c) castings (ferrous and non-ferrous materials)
getti (di materiale ferroso e non ferroso)

(f) forgings (all types of forgings: ferrous and non-ferrous materials)
fucinati (tutti i tipi di fucinati: materiali ferrosi e non ferrosi)

(w) welds (all types of welds, including soldering, for ferrous and non-ferrous materials)
prodotti saldati (tutti i tipi di prodotti saldati, compresa la brasatura, per i materiali ferrosi e non ferrosi)

(t) tubes and pipes (seamless, welded, ferrous and non-ferrous materials, including flat products for the manufacturing of welded pipes)
tubi e condotte (senza saldatura, saldati, materiali ferrosi e non ferrosi, inclusi i prodotti piatti per la fabbricazione di tubi saldati)

(wp) wrought products except forgings (e.g. plates, bar, rods)
prodotti lavorati fatta eccezione per i fucinati (ad es. piastre, barre, vergelle)

(p) composite materials
materiali compositi

This certificate is:
Questo certificato è:

- [ ] New certification - *Nuova certificazione*
- [X] Renewal (after 5 years from certification or recertification) - *Rinnovo (dopo 5 anni dalla certificazione o ricertificazione)*
- [ ] Recertification (after 5 years from renewal) - *Ricertificazione (dopo 5 anni dal rinnovo)*
- [ ] In accordance to clause 3.1.3 Directive 2014/68/UE - *In accordo al punto 3.1.3 Direttiva 2014/68/UE*

START OF QUALIFICATION *DATA INIZIO VALIDITA'*	27/06/2022
QUALIFICATION VALIDITY UNTIL *VALIDITA' DELLA QUALIFICA FINO A*	24/11/2026

ISSUE DATE *EMESSO IN DATA*	27/06/2022
LEGAL REPRESENTATIVE *RAPPRESENTANTE LEGALE*	U. STRADA

Apave Italia Cpm Srl apave 25040 BIENNO (BS)

Il presente certificato viene rilasciato in conformità alle prescrizioni della Norma UNI EN ISO 9712:2012 e in accordo al Regolamento di Certificazione di APAVE ITALIA CPM (Reg. PRS PND)

Apave Italia Cpm Srl - Notified Body 0398
Via Artigiani, 63 - 25040 BIENNO (BS)
Tel. +39.0364.300.342 - Fax +39.0364.300.354

PRS n. 079 C
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

CERTIFICATE No / *CERTIFICATO N°*

CPND.PND22/178-01.22.178-22

LEVEL 3 CERTIFICATE
CERTIFICATO DI LIVELLO 3

Certification of qualification by examination as Non Destructive Test Operator
Certificazione della qualificazione per esami come operatore in Prove Non Distruttive

Mr. / Sig.

BRUSCHI MARCO

born in *nato a*	FERRARA
on *il*	21/05/1991
for the method *per il metodo*	UT - ULTRASUONI
for the industrial sectors / product sectors *per i settori industriali / settori di prodotto*	1, 2, 3, 4

Legend / *Legenda*

Industrial sectors / *Settori Industriali*

(1) FPM Manufacturing of metal products (c, f, w, t, wp)
Fabbricazione di prodotti metallici (c, f, w, t, wp)

(2) FEM Manufacturing (pre-service) and in work / maintenance (in-service) of equipment, plant and metal structures (c, f, w, t, wp and other product sectors)
Fabbricazione (pre-servizio) ed esercizio / manutenzione (in servizio) di attrezzature, impianti e strutture metalliche (c, f, w, t, wp ed altri settori di prodotto)

(3) FMS Manufacturing (pre-service) and operating / maintenance (in-service) of equipment, wagons, plant and railways structures (c, f, w, t, wp and other product sectors)
Fabbricazione (preservizio) ed esercizio / manutenzione (in servizio) di attrezzature, carri, impianti e strutture ferroviarie (c, f, w, t, wp ed altri settori di prodotto)

(4) FDE Manufacturing (pre-service) and operating / maintenance / changes (in-service) of pressure equipment, assemblies, safety devices (fixed and transportable) – Directive 2014/68/EU PED and 2010/35/EU T-PED (c, f, w, t, wp and other product sectors)
Fabbricazione (preservizio) ed esercizio / manutenzione / modifica (in servizio) di attrezzature, insiemi, dispositivi di sicurezza a pressione (fissi e trasportabili) – Direttiva 2014/68/UE PED e 2010/35/UE T-PED (c, f, w, t, wp ed altri settori di prodotto)

(5) ASZ Aerospace (c, f, w, t, wp and other product sectors)
Aerospaziale (c, f, w, t, wp, altri settori di prodotto)

(6) CPA Civil and artistic heritage (only for TT method)
Civile e patrimonio artistico (solo per il metodo TT)

(7) ECO Ecology (only for TT method)
Ecologia (solo per il metodo TT)

Product sectors / *Settori di prodotto*

(c) castings (ferrous and non-ferrous materials)
getti (di materiale ferroso e non ferroso)

(f) forgings (all types of forgings: ferrous and non-ferrous materials)
fucinati (tutti i tipi di fucinati: materiali ferrosi e non ferrosi)

(w) welds (all types of welds, including soldering, for ferrous and non-ferrous materials)
prodotti saldati (tutti i tipi di prodotti saldati, compresa la brasatura, per i materiali ferrosi e non ferrosi)

(t) tubes and pipes (seamless, welded, ferrous and non-ferrous materials, including flat products for the manufacturing of welded pipes)
tubi e condotte (senza saldatura, saldati, materiali ferrosi e non ferrosi, inclusi i prodotti piatti per la fabbricazione di tubi saldati)

(wp) wrought products except forgings (e.g. plates, bar, rods)
prodotti lavorati fatta eccezione per i fucinati (ad es. piastre, barre, vergelle)

(p) composite materials
materiali compositi

This certificate is:
Questo certificato è:

- [ ] New certification - *Nuova certificazione*
- [X] Renewal (after 5 years from certification or recertification) - *Rinnovo (dopo 5 anni dalla certificazione o ricertificazione)*
- [ ] Recertification (after 5 years from renewal) - *Ricertificazione (dopo 5 anni dal rinnovo)*
- [ ] In accordance to clause 3.1.3 Directive 2014/68/UE - *In accordo al punto 3.1.3 Direttiva 2014/68/UE*

START OF QUALIFICATION *DATA INIZIO VALIDITA'*	27/06/2022
QUALIFICATION VALIDITY UNTIL *VALIDITA' DELLA QUALIFICA FINO A*	24/11/2026

ISSUE DATE *EMESSO IN DATA*	27/06/2022
LEGAL REPRESENTATIVE *RAPPRESENTANTE LEGALE*	U. STRADA

Apave Italia Cpm S.r.l. 25040 BIENNO (BS)

Il presente certificato viene rilasciato in conformità alle prescrizioni della Norma UNI EN ISO 9712:2012 e in accordo al Regolamento di Certificazione di APAVE ITALIA CPM (Reg. PRS PND)

TEC·Eurolab
CERTIFICATION BODY

CERTIFICATO N° **D-00192-RT**
CERTIFICATE N° ***D-00192-RT***

DIEGO ZANIBELLATO

Nato a / born in NOALE il / on the 16-03-1983

Metodo / Test Method Radiografico
Livello / Level 2

Per i settori / for the sector:

- di prodotto (Plurisettoriale)
- industriale (Prova pre-servizio e in servizio di attrezzature, impianti e strutture)

E' certificato in conformità alla normativa:
Is certified according to the standard:

UNI EN ISO 9712:2012

Data di emissione / Issued on the : **25-05-2021**
Data di scadenza / Expiration date : **24-05-2026**

Firma della persona certificata
Signature of the certified person

Il direttore della Certificazione
Certification Manager
Alberto Montagnani
Alberto Montagnani

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N°0069 C
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

Il certificato non include l'autorizzazione ad operare da parte del datore di lavoro
This certificate does not include the authorization to operate by the employer

TEC Eurolab S.r.L ■ Viale Europa, 40 ■ 41011 Campogalliano (MO), Italia ■ Tel. +39 059 527175 ■ Fax +39 059 527173
P. IVA e C.F. 02452430368 ■ REA Modena 304470 ■ Cap. Soc. 98.800,00 i.v. ■ info@tec-eurolab.com ■ www.tec-eurolab.com

TEC·Eurolab
CERTIFICATION BODY

CERTIFICATO N° E-00943-UT-2 TO
CERTIFICATE N° E-00943-UT-2 TO

DAVID FELICI

Nato a / *born in* FERRARA (FE) il / *on the* 28/01/1997

Metodo / *Test Method:* **UT**
Livello / *Level*: **2**

Per i settori / for the sectors:

x di prodotto: **plurisettoriale**
x industriale: **prova pre-servizio e in servizio di attrezzature, impianti e strutture**
x applicazione particolare: **TOFD**

E' certificato in conformità alla normativa:
Is certified according to the standard:

UNI EN ISO 9712:2012

Data di emissione / *Issued on the:* **25/05/2021**
Data di scadenza / *Expiration date:* **24/05/2026**

Firma della persona certificata
Signature of the certified person

Il Direttore della Certificazione
Certification Manager
Alberto Montagnani

Alberto Montagnani

Il certificato non include l'autorizzazione ad operare da parte del datore di lavoro
This certificate does not include the authorization to operate by the employer

TEC Eurolab S.r.l. ■ Viale Europa, 40 ■ 41011 Campogalliano (MO), Italia ■ Tel. +39 059 527775 ■ Fax +39 059 527773
P. IVA e C.F. 02452540368 ■ REA Modena 304470 ■ Cap. Soc. 98.800,00 € i.v. ■ info@tec-eurolab.com ■ www.tec-eurolab.com

C.A.M.P.I. srl
Ferrara (Italy)

SEZIONE / Section 5

NDE EXAMINATION & TEST

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 5.1

Radiographic/UT examination reports and location

PND-RT-A_1

RAPPORTO DI ESAME RADIOGRAFICO
Radiographic test report

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

STUDIO V.M. S.r.l. **Via F. L. Ferrari, 24/C, 44122 (Fe)**	**Report No.** **RT-150-001_24** **Rev. 0**	**Data ispezione** / Insp. Date **Data report** / Report date	17/09/2024 17/09/2024
Committente / Customer	**# Commessa N°** / Job No.	**# Oggetto** / Subject	
C.a.m.p.i. S.r.l. Via Diamantina, 15 , 44122 Ferrara	Campi 24003	Hidrogen Vent KO Drum item V-43001 S.No.24-003	
# Cliente finale / User	**# Ordine N°** / Order No.	**# Disegno N°** / Drawing No.	**# Materiale** / Material
Rosetti Marino	1724000163	24003-VE-10	NOZZLE :SA-350LF2/SA-333Gr.6 SHELL : SA 516 Gr.60
Metodo di prova / Standard	**Accettabilità** / Acceptance levels		**Procedura int.** / Internal procedure
Asme V Ed 2023	Asme VIII div.1 Ed 2023 UW51		ND101AS Rev.7
Luogo ispezione / Site inspection	Via Diamantina, 15 , 44122 Ferrara		

Informazioni sulla parte controllata / Information about the inspected part

Controllo eseguito / Test carried out	**Stato della superficie** / Surface condition	**Temperatura pezzo** / Piece temperature (°C)
Dopo il TT / After PWHT	Come saldato / As welded	25

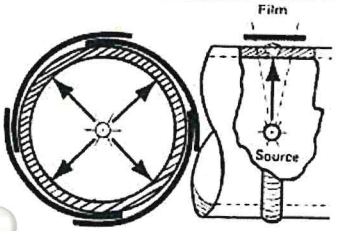
Tipo di controllo / Control type

Apparecchiatura / Equipment	**Tipo di sorgente** / Source type	**Energia** / Energy
-	Raggi Gamma Ir192 / Gamma ray Ir 192	25 Ci
Intensità / Intensity (mAh)	**Macchia focale** / Focal spot (mm)	**Penetrametro** / I.Q.I. Type
-	2 x 1.32	ASTM 1A
Pellicola marca - tipo / Film type	**Film** / Film	**Sviluppo** / Processing
Agfa D4	Singolo / Single	**Automatico 28 Ciclo 8** / Automatic 28 Cycle 8
Distanza fuoco pezzo / Focal distance (mm)	**Distanza pezzo-film** / Distance film to object (mm)	**Penombra geometrica** / Geometric unsharpness
see list	see list	**Conforme** / Comforming

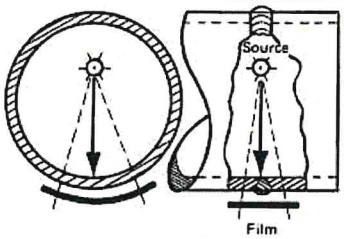
Schermi / Screen

Anteriore - tipo e spessore Front - tipe and Thk. (mm)	**Posteriore - tipo e spessore** Back - tipe and Thk. (mm)	**Intermedio - tipo e spessore** **Intermediate - tipe and Thk. (mm)**
Pb 0,05 mm	Pb 0,1 mm	-

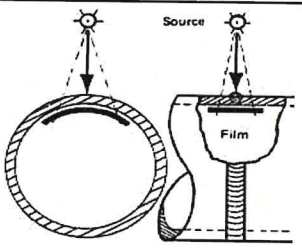
Tecnica radiografica / Radiographic technique



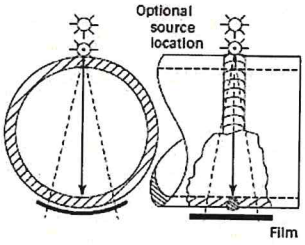
Tipo A- Type A



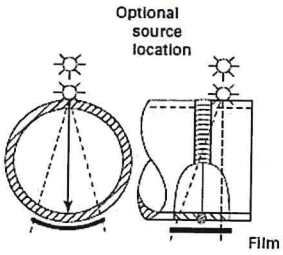
Tipo B- Type B



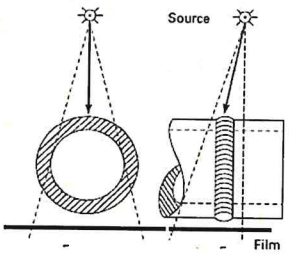
Tipo C- Type C



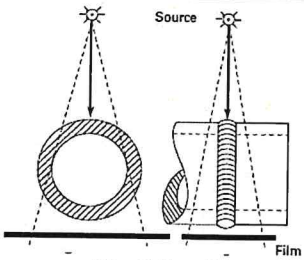
Tipo D - Type D



Tipo E-Type E



Tipo F - Type F



Tipo G-Type G

Operatore CND / NDE Operator	**Approvato da** / Approved by	**Controllo qualità** / Q.C. Supervisor	**Ispettore** / Inspector
D.Zanibellato II Level SNT-TC1-A	M.Bruschi		

STUDIO V.M. srl 2° LIVELLO C.N.D. D. Zanibellato

STUDIO V.M. srl M. Bruschi Resp. Laboratorio

C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☑ Date 17/9/24 Signature

TÜV Nord 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:

I risultati del presente Rapporto sono riferiti solo agli oggetti in esame cosi come ricevuti e non sono in nessun caso estendibili ad altri. Ogni riproduzione parziale o semplice citazione deve essere autorizzata dallo Studio V.M. Si garantisce la rispondenza alle procedure adottate. La fine del rapporto di prova è indicata dal numero di pagine riportate in basso. (#)= dati forniti dal cliente, per i quali il laboratorio non si assume responsabilità.
The results of this Report refer only to the objects under examination and can not in any case be extended to others, any partial reproduction or simple quotation must be authorized by Studio V.M. We guarantee the full compliance whit the procedures adopted. The end of the test report is indicated by the number of pages shown in bottom. (#) = data provided by the customer, for which the laboratory assumes no responsibility.

PND-RT-A_1

STUDIO V.M. S.r.l.
Via F. L. Ferrari, 24/C, 44122 (Fe)

RAPPORTO DI ESAME RADIOGRAFICO
Radiographic test report

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Report No.		**Data ispezione** / Insp. Date	17/09/2024
RT-150-001_24	**Rev. 0**	**Data report** / Report date	17/09/2024

Committente / Customer	**# Commessa N°** / Job No.	**# Oggetto** / Subject
C.a.m.p.i. S.r.l. Via Diamantina, 15 , 44122 Ferrara	Campi 24003	Hidrogen Vent KO Drum item V-43001 S.No.24-003

# Cliente finale / User	**# Ordine N°** / Order No.	**# Disegno N°** / Drawing No.	**# Materiale** / Material
Rosetti Marino	1724000163	24003-VE-10	NOZZLE :SA-350LF2/SA-333Gr.6 SHELL : SA 516 Gr.60

Pos	Disegno Drawing	Saldatura n° Weld No.	Tecnica Tecnique	Lato IQI side IQI	Diametro Diameter (mm)	Lunghezza Length (mm)	Spessore Thickness (mm)	Tratto Line	Densità Density	Difetto Defect	Giudizio Judgment	IQI
1	24003-VE-10	L1	D	Film side	620	2300	10	1-2	2.3 ÷ 4	-	1	-
2	"	C1	"	"	"	-	"	1-2	2.3 ÷ 4	-	1	-
3	"	"	"	"	"	-	"	3-4	2.3 ÷ 4	-	1	-
4	"	C2	"	"	"	-	"	1-2	2.3 ÷ 4	-	1	-
5	"	"	"	"	"	-	"	3-4	2.3 ÷ 4	F	1	-
6	"	N1	"	"	273	-	12.7	1-2	2.3 ÷ 4	-	1	-
7	"	N2	"	"	"	-	"	1-2	2.3 ÷ 4	-	1	-
8	"	H1	"	"	168.3	-	10.97	1-2	2.3 ÷ 4	-	1	-
9	"	H2	"	"	"	-	"	1-2	2.3 ÷ 4	-	1	-
10	"	N4	"	"	88.9	-	7.62	1-2	2.3 ÷ 4	-	1	-

Abbreviazioni delle difettologie / Abbreviation for difectology

A	**Inclusioni gassose**/Gas cavities	**Fi**	**Incisione interna** / internal undercut
Aa	**Soffiature tondeggianti**/Porosities	**Fb**	**Maglia irregolare** / Irregular profile
Ab	**Soffiature vermicolari**/ Worm holes	**G**	**Eccesso di penetrazione** / Excees of penetration
B	**Inclusioni di scoria** / Slag inclusions	**Ga**	**Sgocciolamento** / Drip
Ba	**Scorie allineate** / Aligned slag inclusion	**H**	**Insellamento al vertice** /Root concavity
Bb	**Difetto di puntatura** / Tack weld difect	**L**	**Cratere di ritiro** / Withdrawal crater
Bc	**Stop Start**	**M**	**Inclusione di tungsteno** / Tungsten inclusion
C	**Cricche** / Cracks	**N**	**Ossido** / Oxides
Cl	**Cricche longitudinali** / Longitudinal cracks	**O**	**Slivellamento** / Misalignment
Ct	**Cricche trasversali** /Transversal cracks	**P**	**Solcatura di mola** / Grinding grooving
D	**Mancanza di fusione** / Lack of fusion	**R**	**Difetti del materiale base** / Base material defects
E	**Mancata penetrazione** / Lack of penetration	**DF**	**Difetto film** / Film defected
F	**Incisioni** / Undercuts	**-**	-

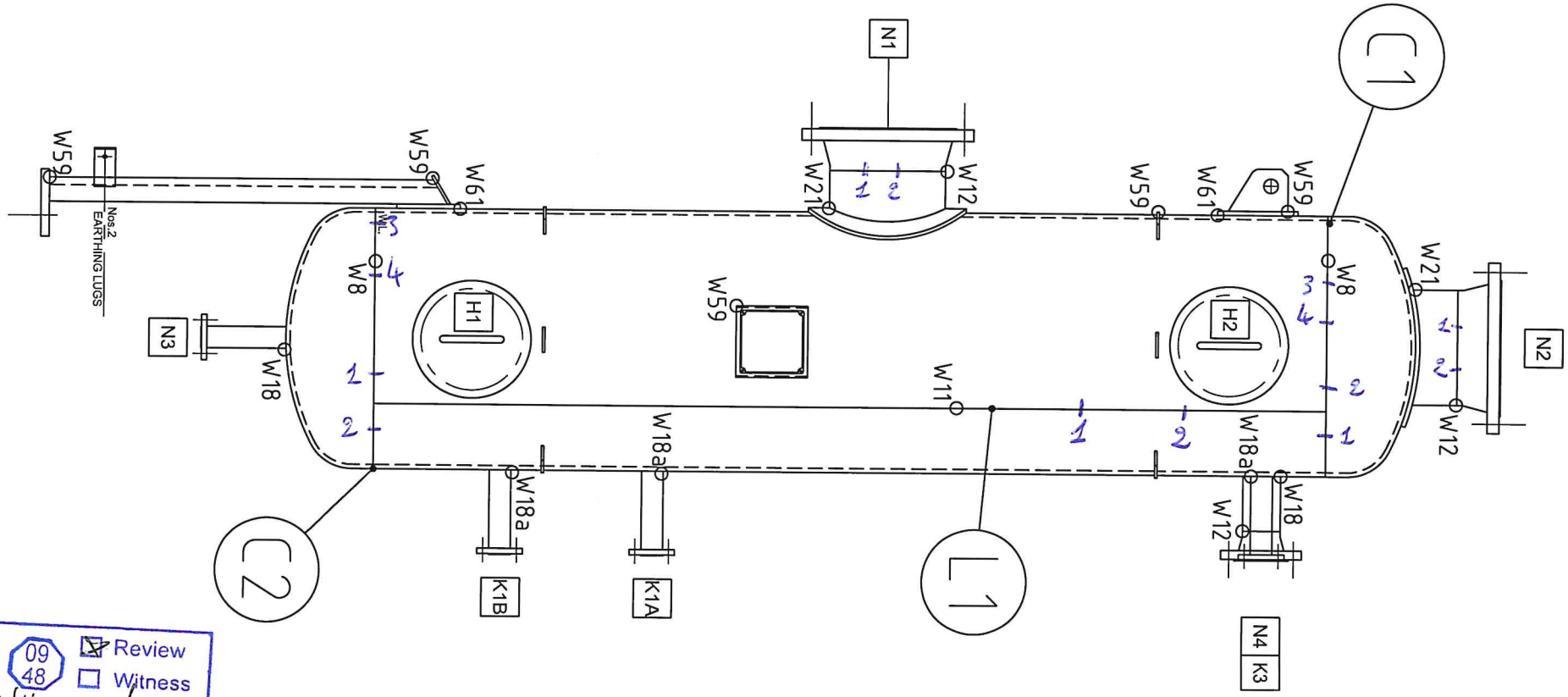
Giudizio/Judgment

1	**Accettabile** / Acceptable	**2**	**Non accettabile** / Non acceptable	**3**	Ripetere film / film to be repeated
				4	Conferma difetto / Defect confirmation

TÜV Italia 09 48 ☒ Review ☐ Witness
Date: 07/10/24 Name:

C.A.M.P.I. Srl Ferrara (Italy)	**SCHEMA IDENTIFICAZIONE SALDATURE** ***Welds Identification Sketch***	Documento Nr: 24003-WD-01 fg1_2 *Document No:*

Cliente : Rossetti Marino *Client :*	Ordine : 1724000163 *Order :*	Apparecchio : Hydrogen Vent K.o. Drum *Equipment :*	
Commessa Nr : 24003 *Job No :*	Disegno Nr : 24003-VE-10 *Drawing No :*	Sigla : V-43001 *Item :*	Nr. Fabbrica : 24-003 *Serial No :*



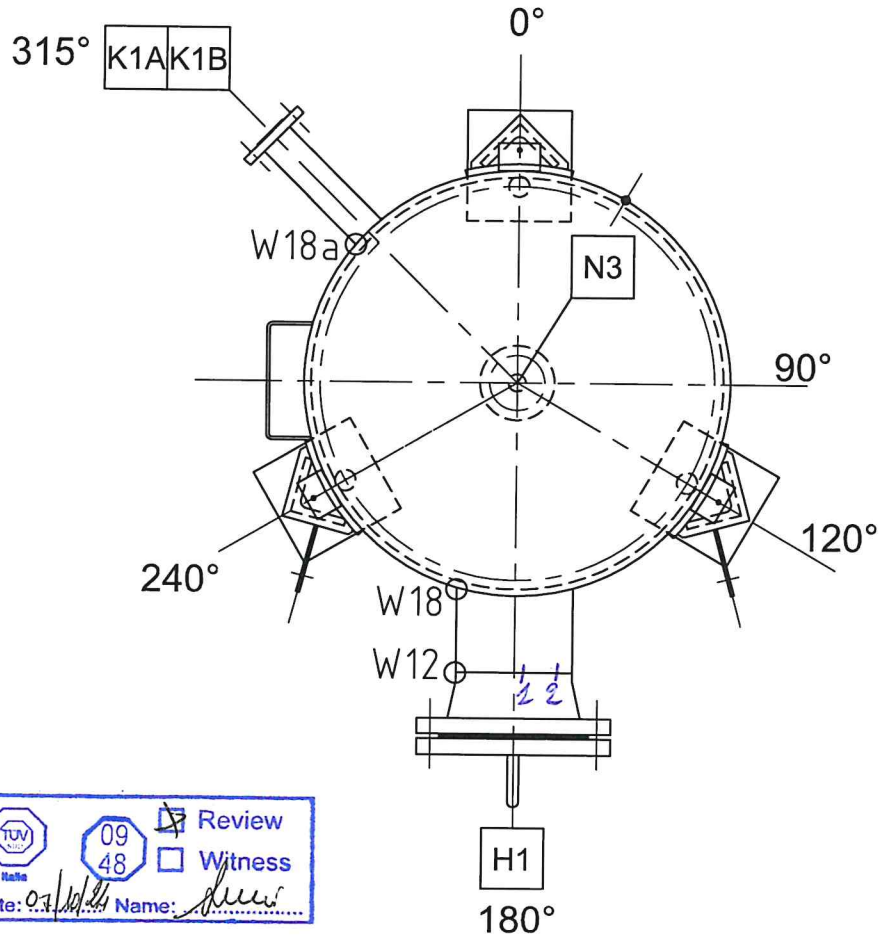
TÜV SÜD Italia 09 48 ☑ Review ☐ Witness
Date: 07/10/24 Name:

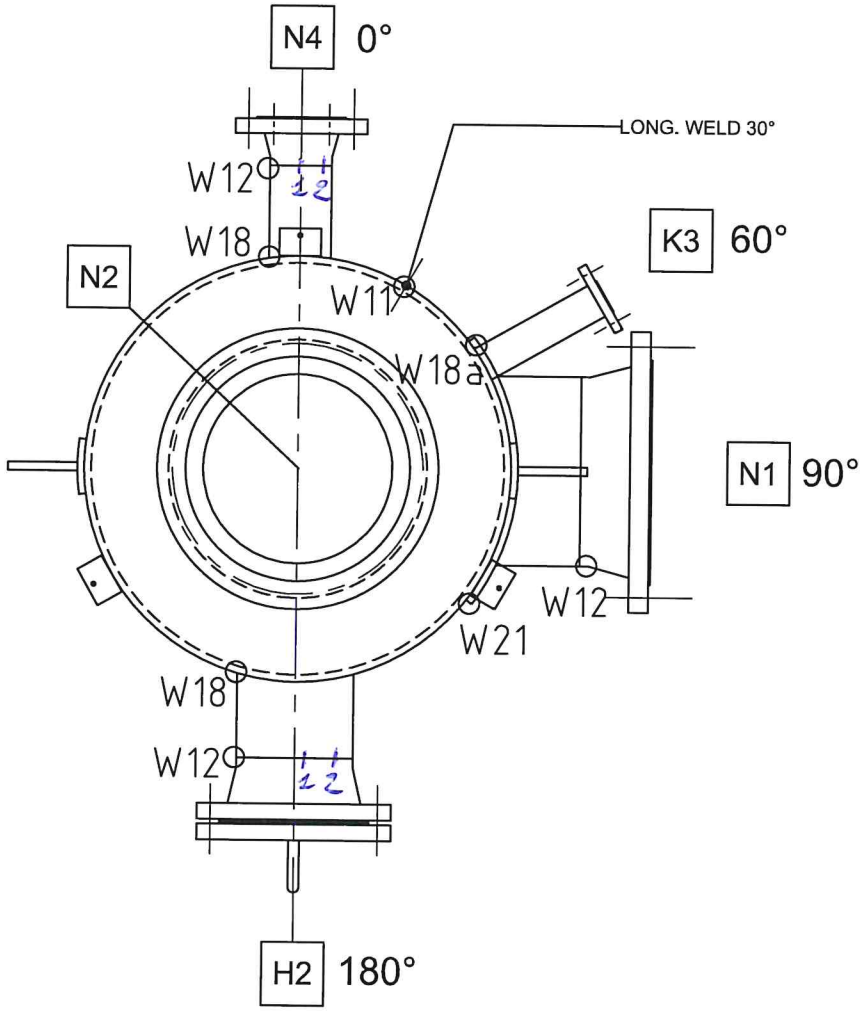
C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date 7/6/24
Signature

Data : 08-May-2024 *Date :*	**C.A.M.P.I. Srl** Quality Control	Ispettore Cliente Inspector Purchaser	Ispettore Autorizzato Authorized Inspector

C.A.M.P.I. Srl Ferrara (Italy)	**SCHEMA IDENTIFICAZIONE SALDATURE** ***Welds Identification Sketch***	Documento Nr: 24003-WD-01 fg2_2 *Document No:*

Cliente : Rossetti Marino *Client :*	Ordine : 1724000163 *Order :*	Apparecchio : Hydrogen Vent K.o. Drum *Equipment :*	
Commessa Nr : 24003 *Job No :*	Disegno Nr : 24003-VE-10 *Drawing No :*	Sigla : V-43001 *Item :*	Nr. Fabbrica : 24-003 *Serial No :*





Review ☑ Witness ☐
Date: 07/10/24 Name:

Data : 08-May-2024 *Date :*	**C.A.M.P.I. Srl** Quality Control	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☑ Date 17/09/24 Signature	Ispettore Cliente Inspector Purchaser	Ispettore Autorizzato Authorized Inspector

PND-UT-A_2

RAPPORTO DI ESAME ULTRASONORO MANUALE
Manual ultrasonic test report

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

STUDIO V.M. S.r.l. **Via F. L. Ferrari, 24/C, 44124 (Fe)**	**Rapporto n° /** Report No. UT-150-001_24 Rev. 0	**Data ispezione /** Insp. Date **Data report /** Report date	09/09/2024 09/09/2024

Committente / Customer	**# Commessa N° /** Job No.	**# Oggetto /** Subject	
CAMPI S.r.l. Via Diamantina, 15 , 44122 Ferrara	Campi 24003 VM 150/23	Hidrogen Vent KO Drum item V-43001 S.No.24-003	
# Cliente finale / User	**# Ordine N° /** Order No.	**# Disegno N° /** Drawing No.	**# Materiale /** Material
ROSETTI MARINO	1724000163	24003-VE-10	NOZZLE :SA-350LF2/SA-333Gr.6 SHELL : SA 516 Gr.60
Luogo ispezione / Site inspection		Via Diamantina, 15 , 44122 Ferrara	

Informazioni sulla parte controllata / Information about the inspected part

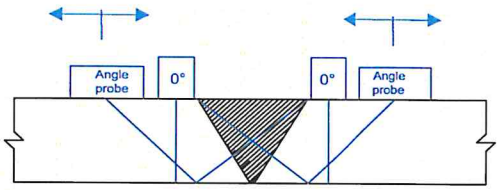
Diametro / Diameter (mm)	**Lunghezza /** Length (mm)	**Spessore /** Thickness (mm)
-	-	10-12,7
Controllo eseguito / Test carried out	**Stato della superficie /** Surface condition	**Temperatura pezzo /** Piece temperature (°C)
Prima del TT / Before PWHT	Come fornito / As supplied	15
Metodo di prova / Standard	**Accettabilità /** Acceptance levels	**Procedura - Specifica /** Procedure
ASME V Art.4 Ed. 2023	ASME VIII div.1 Ed.2023	ND 104 AS REV.3

Tipo di controllo / Control type

Costruttore - Apparecchio - N° di serie Manufacturer - Equipment - Serial No .	KK - USM 35 - 1080A
Tecnica di controllo / Control technique	Riflessione / Reflection
Liquido di accoppiamento / Couplant	Methilcellulosa / Methilcellulose
Blocco di taratura / Calibration block	V2
Blocco di riferimento / Reference block	Cal-b-3 - ISO - 10 mm
Sensibilità di taratura / Sensivity setting	SDH 1,25 - Notch 1 mm
Campo / Range	100 mm
Sensibilità / Damping	150 Ohm
Cavo -Lunghezza / Cable - Lenght	Coaxial Φ 2.6 mm - 1,5Mt

Schizzo della scansione / Scanning sketch

FWT_1



Trasduttori / Transducers

Produttore / Manufacturer	**Tipo /** Type	**Frequenza /** Frequency (MHz)	**Sezione /** Section (mm)	**Angolo /** Angle (°)	**Guadagno di riferimento /** Gain reference (dB)	**Onde /** Waves
GE	GE - MB4S	4	Φ 10	0	48	Longitudinal
GE	GE - MWB-4	4	8*9	60-70	47-50	Shear
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Ubicazione difetti / Findings

Posizione / Position	**Distanza /** Distance (from "0")	**Profondità /** Depth (mm)	**Altezza /** Height (mm)	**Lunghezza /** Length (mm)	**Amplificazione /** Amplitude (%dac)	**Giudizio /** Judgment
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	-	-	-	-	-	-

Note dell'operatore / Operator remarks

WELDS CHECKED: L1-C1-C2-N1W12-N2W12-H1W12-H2W12

TÜV Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:

Esito del controllo / Inspection result — Conforme alla specifica / Conforming to specification

Operatore CND / NDE Operator	**Approvato da /** Approved by	**Controllo qualità /** Q.C. Supervisor	**Ispettore /** Inspector
D.Felici Level 2 ISO 9712	M.Bruschi Level 3 ISO 9712		
STUDIO V.M. srl 2° LIVELLO C.N.D. D. Felici	STUDIO V.M. srl M. Bruschi Liv. 3 ISO 9712	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 9/9/24 Signature	Quality Control Dept. Cerato Alex per Rosetti Marino SpA 09 09 2024

I risultati del presente Rapporto sono riferiti solo agli oggetti in esame così come ricevuti e non sono in nessun caso estendibili ad altri. Ogni riproduzione parziale o semplice citazione deve essere autorizzata dallo Studio V.M. Si garantisce la rispondenza alle procedure adottate. La fine del rapporto di prova è indicata dal numero di pagine riportate in basso. (#)= dati forniti dal cliente, per i quali il laboratorio non si assume responsabilità.
The results of this Report refer only to the objects under examination and can not in any case be extended to others, any partial reproduction or simple quotation must be authorized by Studio V.M. We guarantee the full compliance whit the procedures adopted. The end of the test report is indicated by the number of pages shown in bottom. (#) = data provided by the customer, for which the laboratory assumes no responsibility.

CERTIFICATO N° / CERTIFICATE N° : E202463 Rev.0

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

CERTIFICATO DI CALIBRAZIONE
IN ACCORDO CON UNI EN 12668-1 GRUPPO2

CERTIFICATE OF CALIBRATION
IN AGREEMENT WITH UNI EN 12668-1 GROUP 2

DATA CALIBRAZIONE / CALIBRATION DATE : 07/05/2024
SCADENZA IL / DUE DATE : 06/05/2025
APPARECCHIATURA MOD. / EQUIPMENT : USM 35X DAC
COSTRUTTORE / PRODUCER : Krautkramer
NUMERO DI SERIE / SERIAL NUMBER : 1080a
VER. SOFTWARE : 01.10.30
CLIENTE / CUSTOMER : Studio V.M. S.r.l.
CODICE CLIENTE / CUSTOMER CODE : -

La catena di riferibilità ha inizio dal campione di prima linea/ All equipments used for calibration have a certification traceability through first line standard.

Strumento	Costruttore	Modello	Serial	Certificato	Data Taratura	Data Scadenza
OSCILLOSCOPIO	ROHDE & SCHWARZ HAMEG	HMO 2022	19607998	LAT 019 49497	30/01/2023	29/01/2025
ATTENUATORE	TELONIC INSTRUMENT	TG 975	5884B	LAT 019 49498	30/01/2023	29/01/2025
ATTENUATORE	ALAN	50DV10.9BNC	140229	LAT 019 49491	29/01/2023	28/01/2025
ALIMENTATORE DC	ISO-TECH	IPS 2303	225B058G2	LAT 019 49492	29/01/2023	28/01/2025
GENERATORE DI FUNZIONI	AGILENT	33250A	MY40029808	LAT 019 49496	30/01/2023	29/01/2025
TERMOIGROMETRO	AMPROBE	TH-1	14040057	LAT 123 18-SU-0186	16/05/2023	15/05/2025

Il rapporto è emesso in conformità alla UNI ISO 10012:2004. I risultati di misura riportati nel presente rapporto sono stati ottenuti applicando le istruzioni operative emesse da IMG ULTRASUONI in conformità al SGQ ex UNI EN ISO 9001, dove sono specificati gli strumenti che garantiscono la catena di riferibilità e i rispettivi certificati di taratura in corso di validità. Essi si riferiscono esclusivamente all'oggetto in taratura e sono validi nel momento e nelle condizioni di taratura.

The report is issued in compliance with the UNI ISO 10012: 2004. The reported measurements herein were obtained according to operating instructions issued by IMG ULTRASUONI in compliance with SGQ ex UNI EN ISO 9001, which specifies the tools that ensure the traceability chain and their calibration certificates validity. They refer only to the equipment being calibrated and are valid

Condizioni ambientali di prova / enviromental conditions:

Temperatura / temperature: 26,5 -0/+3°C Umidità relativa / relative humidity 42,4 ± 5%

RAPPORTO DI VERIFICA / REPORT OF VERIFICATION	
Apparecchio Nuovo / New equipment	
Apparecchio Riparato e Ricalibrato / Repaired equipment and recalibrated	
Apparecchio fuori calibratura Ricalibrato / equipment out of calibration recalibrated	
Lo strumento non ha subito manutenzioni, regolazioni e/o messe a punto ne prima ne dopo la taratura (AS FOUND = AS LEFT) The instrument was not subjected to maintenance, adjustments and / or set up either before or after calibration (AS FOUND = AS LEFT)	X

L'accuratezza dello strumento sopra indicato è stata verificata in conformità alle specifiche fornite dal costruttore / The instrument described above has been tested and the calibration accuracy verified to meet the original manufacturer's specification

I risultati espressi nel presente documento sono stati dichiarati in riferimento alle specifiche del costruttore dello strumento / The results espresse in this document have been stated in reference to the specifications of the manufacturer of the instrument.

Le incertezze di misura dichiarate in questo documento,associate alle letture effettuate, sono espresse come due volte lo scarto tipo corrispondente,nel caso di distribuzione normale, ad un livello di confidenza di circa 95%

The measurement uncertainties declared in this document, associated to the readings effected, are expressed as twice the corresponding standard deviation, in case of normal distribution, at a confidence level of about 95%.

In base ai risultati ottenuti seguendo l'istruzione operativa IO 11.01D Rev.00 riferita al Manuale Qualità si dichiara che le prestazioni dello strumento sotto esame soddisfano i requisiti di funzionamento dichiarati nella norma UNI EN 12668-1:2010 Verifiche annuali del Gruppo 2

Based on the results obtained by following the operating instructions IO 11.01D Rev.00 referring to the Quality Manual states that the performance of the instrument under test meets the requirements stated in the standard operating UNI EN 12668-1:2010 annual checks Group 2

TecnicoEsecutore
Examiner

Silvio Andreotti

Cert. 2° livello UNI EN ISO 9712 metodo UT

Ente Collaudo
Emitted By

IMG ULTRASUONI SRL
VERIFICATO
da CQA

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

STATO FISICO ED ASPETTO ESTERNO – physical state and external aspects	**Punto** - point
	9.2
Tipo di controllo - Type of control	**Esito** - Result
Condizioni esterne dello strumento - external conditions of instrument	**OK**
Stato del display – display state	**OK**
Stato delle Connessioni – connection state	**OK**
Stato del caricabatteria – charger state	**OK**
Accessori - accessories	**OK**

STABILITA' – stability	**Punto** - point
	9.3
Stabilità dopo il preriscaldamento – Stability after warm up	**9.3.2**

Impostazioni Settings	**Filtro** Filter	3-8 MHz	**Impedenza** Damping	50 Ω	**Guadagno** Gain	38,7 dB

Tempo trascorso Elapsed time **(minuti)**	**Val. iniziale** Start value **(%) f.s.**	**Val. rilevato** Detected value **(%) f.s.**	**Scostamento** Deviation **(%) f.s.**	**Val.iniziale** Start value **(%) f.s.**	**Val.Rilevato** Detected Value **(%) f.s.**	**Scostamento** Deviation **(%) f.s.**
0,0	80	80,0	0,0%	50	50,00	0,00%
10,0		80,0	0,0%		50,00	0,00%
20,0		80,0	0,0%		50,00	0,00%
30,0		80,0	0,0%		50,00	0,00%
40,0		80,0	0,0%		50,00	0,00%

Incertezza delle misure – Uncertainty of the result:		
	0,2 % f.s.	0,1 % f.s.

Errore max ammesso per l'ampiezza (MPE):	±2% f.s.	**Esito** (result)	OK
Errore max ammesso per base dei tempi (MPE):	±1% f.s.	**Esito** (result)	OK

STABILITA' – stability	**Punto** - point
	9.3
Vibrazioni del display – display jitter	**9.3.3**

Ampiezza – amplitude

Impostazioni Settings	**Filtro** Filter	3-8 MHz	**Impedenza** Damping	50 Ω	**Guadagno** Gain	38,8 dB

Valore di riferimento ref. Value **(%) f.s.**	**Valore minimo rilevato** minimum detected value **(%) f.s.**	**Valore massimo rilevato** maximum detected value **(%) f.s.**	**Scostamento** deviation **(%) f.s.**
80	80,0	81,0	1,0%

Incertezza delle misure – uncertainty of the result: 0,2 % f.s.

Base dei tempi – time base

50	50,00	50,00	0,00%

Incertezza delle misure – uncertainty of the result: 0,1 % f.s.

Errore max ammesso per l'ampiezza (MPE):	±2% f.s.	**Esito** - result	OK
Errore max ammesso per base dei tempi (MPE):	±1% f.s.	**Esito** - result	OK

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

CERTIFICATO N° / CERTIFICATE N° : E202463 Rev.0

STABILITA' – stability	**Punto** - point
	9.3
Stabilità alle variazioni di tensione – stability against voltage variations	**9.3.4**

Impostazioni Settings	**Filtro** Filter	3-8 MHz	**Impedenza** Damping	50 Ω	**Guadagno** Gain	38,3 dB

Tensione alimentazione Supply Voltage **(V)**	**Ampiezza - amplitude**				**Base dei tempi – time base**			
	Ampiezza alla tensione di rif. Amplitude at the ref.voltage **(%) f.s.**	**Valore minimo rilevato** Minimum value detected **(%) f.s.**	**Valore massimo rilevato** Maximum value detected **(%) f.s.**	**Scostamento** Deviation **(%) f.s.**	**Valore alla tensione di rif.** Value at the ref.voltage **(%) f.s.**	**Valore minimo rilevato** Minimum value detected **(%) f.s.**	**Valore massimo rilevato** Maximum value detected **(%) f.s.**	**Scostamento** Deviation **(%) f.s.**
14,5	80	80,0	81,0	1,0%	50	50,00	50,00	0,00%
15,0		80,0	81,0	1,0%		50,00	50,00	0,00%
15,5		80,0	81,0	1,0%		50,00	50,00	0,00%
16,0		80,0	81,0	1,0%		50,00	50,00	0,00%
16,5		80,0	81,0	1,0%		50,00	50,00	0,00%

Incertezza delle misure – Uncertainty of the result:					
		0,2 % f.s.		0,1 % f.s.	

Errore max ammesso per l'ampiezza (MPE):	±2% f.s.	**Esito** (result)	OK
Errore max ammesso per base dei tempi (MPE):	±1% f.s.	**Esito** (result)	OK

CERTIFICATO N° / CERTIFICATE N° : E202463 Rev.0

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

PARAMETRI TRASMETTITORE D'IMPULSI – Transmitter pulse parameters | **Punto** - point **9.4**

Forma d'onda impulso: TRIANGOLARE – Pulse type: SPIKE

Impostazioni strumento Instrument settings:				**Valori nominali di Rif.** Nominal values		**Parametri rilevati** – detected parameters					
Frequenza impulso PRF (Hz)	**MOD** **FRI**	**Impedenza** Damping (Ω)	**Tensione impulso** Pulse Voltage (V)	**Tensione impulso dichiarata** Declared Pulse Voltage (V)	**Larghezza impulso dichiarata** Declared Pulse width ns	**Tensione impulso Rilevata min.** Detected pulse voltage min. (V)	**Tensione impulso Rilevata max** Detected pulse voltage max (V)	**Larghezza impulso Rilevata min.** Detected pulse width min. (ns)	**Larghezza impulso Rilevata max.** Detected pulse widthmax. (ns)	**Tempo di salita rilevato (ns)** Detected rise time	**Riverbero** Reverberation (%)
15	-	50	100	100	35	106,0	108,0	33,5	34,5	12,1	0,0
150	-	50	100	100	35	106,0	108,0	33,5	34,5	12,1	0,0
250	-	50	100	100	35	106,0	108,0	33,5	34,5	11,9	0,0
1000	-	50	100	100	35	106,0	108,0	33,5	34,5	11,8	0,0
2500	-	50	100	100	35	106,0	108,0	34,0	35,0	12,0	0,0
5000	-	50	100	100	35	106,0	108,0	34,0	35,0	12,0	0,0
Incertezza delle misure – Uncertainty of the result:											
						0,1V	0,1 V	0,1 ns	0,1 ns	0,1 ns	0,1%

Scostamento massimo per la tensione d'impulso – pulse voltage max deviation:	± 10%	**Esito** (result)	-
Tempo massimo di salita fronte impulso – max pulse rise time :	50 ns	**Esito** (result)	-
Scostamento massimo per la larghezza d'impulso – pulse width max deviation:	± 10%	**Esito** (result)	-
Massimo riverbero dell'impulso – max pulse reverberation :	4%	**Esito** (result)	-

PARAMETRI TRASMETTITORE D'IMPULSI – Transmitter pulse parameters | **Punto** - point **9.4**

Forma d'onda impulso: TRIANGOLARE – Pulse type: SPIKE

Impostazioni strumento Instrument settings:				**Valori nominali di Rif.** Nominal values		**Parametri rilevati** – detected parameters					
Frequenza impulso PRF (Hz)	**MOD** **FRI**	**Impedenza** Damping (Ω)	**Tensione impulso** Pulse Voltage (V)	**Tensione impulso dichiarata** Declared Pulse Voltage (V)	**Larghezza impulso dichiarata** Declared Pulse width ns	**Tensione impulso Rilevata min.** Detected pulse voltage min. (V)	**Tensione impulso Rilevata max** Detected pulse voltage max (V)	**Larghezza impulso Rilevata min.** Detected pulse width min. (ns)	**Larghezza impulso Rilevata max.** Detected pulse widthmax. (ns)	**Tempo di salita rilevato (ns)** Detected rise time	**Riverbero** Reverberation (%)
15	-	50	450	350	25	380,0	384,0	23,0	23,5	12,8	0,0
150	-	50	450	350	25	380,0	384,0	23,0	23,5	12,9	0,0
250	-	50	450	350	25	380,0	384,0	23,0	23,5	12,8	0,0
1000	-	50	450	350	25	380,0	384,0	23,0	23,5	12,9	0,0
2500	-	50	450	350	25	380,0	384,0	23,0	23,5	12,8	0,0
5000	-	50	450	350	25	380,0	384,0	23,0	23,5	13,1	0,0
Incertezza delle misure – Uncertainty of the result:											
						0,1V	0,1 V	0,1 ns	0,1 ns	0,1 ns	0,1%

Scostamento massimo per la tensione d'impulso – pulse voltage max deviation:	± 10%	**Esito** (result)	-
Tempo massimo di salita fronte impulso – max pulse rise time :	50 ns	**Esito** (result)	-
Scostamento massimo per la larghezza d'impulso – pulse width max deviation:	± 10%	**Esito** (result)	-
Massimo riverbero dell'impulso – max pulse reverberation :	4%	**Esito** (result)	-

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

CERTIFICATO N° / CERTIFICATE N° : E202463 Rev.0

PARAMETRI TRASMETTITORE D'IMPULSI – Transmitter pulse parameters | **Punto** - point **9.4**

Forma d'onda impulso: ONDA QUADRA UNIDIREZIONALE – Pulse type: SQUARE WAWE UNIDIRECTIONAL

Impostazioni strumento Instrument settings:				**Valori nominali di Rif.** Nominal values		**Parametri rilevati** – detected parameters					
Frequenza impulso PRF (Hz)	**Impedenza** Damping (Ω)	**Tensione impulso** Pulse Voltage (V)	**Larghezza impulso** Pulse width ns (MHz)	**Tensione impulso dichiarata** Declared Pulse Voltage (V)	**Larghezza impulso dichiarata** Declared Pulse width ns	**Tensione impulso Rilevata min.** Detected pulse voltage min. (V)	**Tensione impulso Rilevata max** Detected pulse voltage max (V)	**Larghezza impulso Rilevata min.** Detected pulse width min. (ns)	**Larghezza impulso Rilevata max.** Detected pulse widthmax. (ns)	**Tempo di salita rilevato** Detected rise time (ns)	**Riverbero** Reverberation (%)
15	50	100	50	100	50	106,0	108,0	50,5	51,5	11,2	0,0
15	50	100	100	100	100	106,0	108,0	101,5	102,5	9,5	0,0
15	50	100	120	100	120	106,0	108,0	121,5	122,0	9,9	0,0
15	50	100	200	100	200	106,0	108,0	201,5	202,5	10,0	0,0
15	50	100	250	100	250	106,0	108,0	251,5	252,5	11,1	0,0
15	50	100	500	100	500	106,0	108,0	501,0	502,0	25,0	0,0
15	50	100	1000	100	1000	106,0	108,0	1000,0	1000,0	25,0	0,0
15	50	100	2000	100	2000	106,0	108,0	1990,0	2000,0	25,0	0,0
Incertezza delle misure – Uncertainty of the result:											
						0,1V	0,1 V	0,1 ns	0,1 ns	0,1 ns	0,1%

Scostamento massimo per la tensione d'impulso – pulse voltage max deviation:	± 10%	**Esito** (result)	**OK**
Tempo massimo di salita fronte impulso – max pulse rise time :	50 ns	**Esito** (result)	**OK**
Scostamento massimo per la larghezza d'impulso – pulse width max deviation:	± 10%	**Esito** (result)	**OK**
Massimo riverbero dell'impulso – max pulse reverberation :	4%	**Esito** (result)	**OK**

PARAMETRI TRASMETTITORE D'IMPULSI – Transmitter pulse parameters | **Punto** - point **9.4**

Forma d'onda impulso: ONDA QUADRA UNIDIREZIONALE – Pulse type: SQUARE WAWE UNIDIRECTIONAL

Impostazioni strumento Instrument settings:				**Valori nominali di Rif.** Nominal values		**Parametri rilevati** – detected parameters					
Frequenza impulso PRF (Hz)	**Impedenza** Damping (Ω)	**Tensione impulso** Pulse Voltage (V)	**Larghezza impulso** Pulse width ns (MHz)	**Tensione impulso dichiarata** Declared Pulse Voltage (V)	**Larghezza impulso dichiarata** Declared Pulse width ns	**Tensione impulso Rilevata min.** Detected pulse voltage min. (V)	**Tensione impulso Rilevata max** Detected pulse voltage max (V)	**Larghezza impulso Rilevata min.** Detected pulse width min. (ns)	**Larghezza impulso Rilevata max.** Detected pulse widthmax. (ns)	**Tempo di salita rilevato** Detected rise time (ns)	**Riverbero** Reverberation (%)
5000	50	100	50	100	50	106,0	108,0	51,0	51,5	11,9	0,0
5000	50	100	100	100	100	106,0	108,0	101,5	102,5	9,8	0,0
5000	50	100	120	100	120	106,0	108,0	121,5	122,5	9,7	0,0
5000	50	100	200	100	200	106,0	108,0	201,5	202,5	10,8	0,0
5000	50	100	250	100	250	106,0	108,0	251,5	252,5	14,1	0,0
5000	50	100	500	100	500	106,0	108,0	501,0	502,0	25,0	0,0
5000	50	100	1000	100	1000	106,0	108,0	1000,0	1000,0	25,0	0,0
5000	50	100	2000	100	2000	104,0	105,5	1999,0	2000,0	1,6	0,0
Incertezza delle misure – Uncertainty of the result:											
						0,1V	0,1 V	0,1 ns	0,1 ns	0,1 ns	0,1%

Scostamento massimo per la tensione d'impulso – pulse voltage max deviation:	± 10%	**Esito** (result)	**OK**
Tempo massimo di salita fronte impulso – max pulse rise time :	50 ns	**Esito** (result)	**OK**
Scostamento massimo per la larghezza d'impulso – pulse width max deviation:	± 10%	**Esito** (result)	**OK**
Massimo riverbero dell'impulso – max pulse reverberation :	4%	**Esito** (result)	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

CERTIFICATO N° / CERTIFICATE N° : E202463 Rev.0

PARAMETRI TRASMETTITORE D'IMPULSI – Transmitter pulse parameters	**Punto** - point **9.4**

Forma d'onda impulso: ONDA QUADRA UNIDIREZIONALE – Pulse type: SQUARE WAWE UNIDIRECTIONAL

Impostazioni strumento Instrument settings:				**Valori nominali di Rif.** Nominal values		**Parametri rilevati** – detected parameters					
Frequenza impulso PRF (Hz)	**Impedenza** Damping (Ω)	**Tensione impulso** Pulse Voltage (V)	**Larghezza impulso** Pulse width ns (MHz)	**Tensione impulso dichiarata** Declared Pulse Voltage (V)	**Larghezza impulso dichiarata** Declared Pulse width ns	**Tensione impulso Rilevata min.** Detected pulse voltage min. (V)	**Tensione impulso Rilevata max** Detected pulse voltage max (V)	**Larghezza impulso Rilevata min.** Detected pulse width min. (ns)	**Larghezza impulso Rilevata max.** Detected pulse widthmax. (ns)	**Tempo di salita rilevato** Detected rise time (ns)	**Riverbero** Reverberation (%)
15	50	450	50	400	45	424,0	428,0	44,0	44,5	14,3	0,0
15	50	450	100	400	100	424,0	428,0	96,0	97,0	13,3	0,0
15	50	450	120	400	120	424,0	428,0	116,0	116,5	13,5	0,0
15	50	450	200	400	200	424,0	428,0	196,0	196,5	13,8	0,0
15	50	450	250	400	250	424,0	428,0	246,0	246,5	16,0	0,0
15	50	450	500	400	500	420,0	424,0	495,0	496,0	25,0	0,0
15	50	450	1000	400	1000	420,0	424,0	994,0	995,0	25,0	0,0
15	50	450	2000	400	2000	420,0	424,0	1990,0	1990,0	25,0	0,0
Incertezza delle misure – Uncertainty of the result:											
						0,1V	0,1 V	0,1 ns	0,1 ns	0,1 ns	0,1%

Scostamento massimo per la tensione d'impulso – pulse voltage max deviation:	± 10%	**Esito** (result)	**OK**
Tempo massimo di salita fronte impulso – max pulse rise time :	50 ns	**Esito** (result)	**OK**
Scostamento massimo per la larghezza d'impulso – pulse width max deviation:	± 10%	**Esito** (result)	**OK**
Massimo riverbero dell'impulso – max pulse reverberation :	4%	**Esito** (result)	**OK**

PARAMETRI TRASMETTITORE D'IMPULSI – Transmitter pulse parameters	**Punto** - point **9.4**

Forma d'onda impulso: ONDA QUADRA UNIDIREZIONALE – Pulse type: SQUARE WAWE UNIDIRECTIONAL

Impostazioni strumento Instrument settings:				**Valori nominali di Rif.** Nominal values		**Parametri rilevati** – detected parameters					
Frequenza impulso PRF (Hz)	**Impedenza** Damping (Ω)	**Tensione impulso** Pulse Voltage (V)	**Larghezza impulso** Pulse width ns (MHz)	**Tensione impulso dichiarata** Declared Pulse Voltage (V)	**Larghezza impulso dichiarata** Declared Pulse width ns	**Tensione impulso Rilevata min.** Detected pulse voltage min. (V)	**Tensione impulso Rilevata max** Detected pulse voltage max (V)	**Larghezza impulso Rilevata min.** Detected pulse width min. (ns)	**Larghezza impulso Rilevata max.** Detected pulse widthmax. (ns)	**Tempo di salita rilevato** Detected rise time (ns)	**Riverbero** Reverberation (%)
5000	50	450	50	400	45	424,0	428,0	44,5	45,0	14,1	0,0
5000	50	450	100	400	100	420,0	424,0	96,5	97,5	13,7	0,0
4200	50	450	120	400	120	416,0	420,0	115,0	115,5	14,3	0,0
2500	50	450	200	400	200	416,0	420,0	195,5	196,5	14,9	0,0
1000	50	450	250	400	250	416,0	420,0	245,5	246,5	16,9	0,0
500	50	450	500	400	500	416,0	420,0	495,0	496,0	25,0	0,0
250	50	450	1000	400	1000	416,0	420,0	994,0	995,0	25,0	0,0
250	50	450	2000	400	2000	416,0	420,0	1990,0	1990,0	25,0	0,0
Incertezza delle misure – Uncertainty of the result:											
						0,1V	0,1 V	0,1 ns	0,1 ns	0,1 ns	0,1%

Scostamento massimo per la tensione d'impulso – pulse voltage max deviation:	± 10%	**Esito** (result)	**OK**
Tempo massimo di salita fronte impulso – max pulse rise time :	50 ns	**Esito** (result)	**OK**
Scostamento massimo per la larghezza d'impulso – pulse width max deviation:	± 10%	**Esito** (result)	**OK**
Massimo riverbero dell'impulso – max pulse reverberation :	4%	**Esito** (result)	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

RICEVITORE – Receiver	**Punto - point**
	9.5
Risposta in frequenza dell'amplificatore – Amplifier frequency response	**9.5.2**

Filtro Filter **(MHz)**	**Guadagno** Gain **(dB)**	**Massima frequenza** Max frequency **(MHz)**	**Frequenza inferiore -3dB** Lower frequency **(MHz)**	**Frequenza superiore +3dB** Upper frequency **(MHz)**	**Frequenza centrale** Central frequency **(MHz)**		**Banda passante** Bandwidth **(MHz)**	**Esito** Result
0,1-0,5	31,5	0,283	0,141	0,440	0,25		0,30	**OK**
0,2-0,8	30,5	0,540	0,255	0,867	0,47		0,61	**OK**
0,4-1,6	31,6	0,917	0,456	1,670	0,87		1,21	**OK**
1,4-3	32,1	2,270	1,428	3,547	2,25		2,12	**OK**
3-8	31,9	4,747	2,947	7,837	4,81		4,89	**OK**
7-15	32,2	11,037	6,267	16,245	10,09		9,98	**OK**
9-21	34,1	16,445	9,145	22,045	14,20		12,90	**OK**
WIDE	31,4	9,545	1,545	20,485	5,63		18,94	**OK**

Incertezza delle misure – Uncertainty of the result:							
	0,1 dB	0,01 MHz	0,01 MHz	0,01 MHz	0,01 MHz	0,01 MHz	

Impostazioni Settings	**PRF** PRF	**Rettificaz.** Rect.	**Impedenza** Damping
	35 Hz	**Onda Piena**	**50 Ω**

Scostamento max per la frequenza centrale – central frequency max deviation :	± 5%	**Esito** (result)	**OK**
Scostamento max per la banda passante – bandwidth max deviation :	± 10%	**Esito** (result)	**OK**

RICEVITORE – Receiver	**Punto - point**
	9.5
Rumore d'ingresso equivalente – eq. Input noise	**9.5.3**

Filtro Filter **(MHz)**	**segnale d'ingresso** Input signal **(Vpp)**	**Rumore Max noise max (%)**	**Valore di attenuazione Attenuator value (dB)**	**Rumore d'ingresso eq.** Equivalent input noise **(Vpp)**	**Rumore quad. banda pass.** Noise per root bandwidth **(V/√Hz)**
0,1-0,5	1	10	95	1,778E-05	3,252E-08
0,2-0,8	1	15	93	2,239E-05	2,862E-08
0,4-1,6	1	20	90	3,162E-05	2,870E-08
1,4-3	1	25	87	4,467E-05	3,069E-08
3-8	1	35	84	6,310E-05	2,853E-08
7-15	1	50	81	8,913E-05	2,821E-08
9-21	1	60	78	1,259E-04	3,505E-08
WIDE	1	85	78	1,259E-04	2,893E-08
			1 dB	**1x10E-9**	**1x10E-9**

Scostamento max rumore quadr. banda passante Noise per root bandwidth max deviation :	nin <80x10E-9 V/√Hz	**Esito** (result)	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

RICEVITORE – Receiver							**Punto** - point 9.5
ACCURATEZZA DELL'ATTENUATORE CALIBRATO Accuracy of calibrated attenuator							9.5.4
Valore impost. Apparecchio Setting value	**Valore rilevato attenuatore** Detected value (dB)	**Scostamento** Deviation (dB)	**Esito** Result	**Valore impost. Apparecchio** Setting value	**Valore rilevato attenuatore** Detected value (dB)	**Scostamento** Deviation (dB)	**Esito** Result
Da 0 a 1dB	1,00	0,00	OK	Da55 a 56dB	55,60	0,10	OK
Da 1 a 2dB	2,00	0,00	OK	Da56 a 57dB	56,60	0,00	OK
Da 2 a 3dB	3,00	0,00	OK	Da57 a 58dB	57,50	-0,10	OK
Da 3 a 4dB	3,90	-0,10	OK	Da58 a 59dB	58,40	-0,10	OK
Da 4 a 5dB	4,90	0,00	OK	Da59 a 60dB	59,40	0,00	OK
Da 5 a 6dB	5,90	0,00	OK	Da60 a 61dB	60,40	0,00	OK
Da 6 a 7dB	6,90	0,00	OK	Da61 a 62dB	61,50	0,10	OK
Da 7 a 8dB	7,90	0,00	OK	Da62 a 63dB	62,50	0,00	OK
Da 8 a 9dB	8,90	0,00	OK	Da63 a 64dB	63,40	-0,10	OK
Da 9 a 10dB	9,80	-0,10	OK	Da64 a 65dB	64,30	-0,10	OK
Da10 a 11dB	10,80	0,00	OK	Da65 a 66dB	65,30	0,00	OK
Da11 a 12dB	11,90	0,10	OK	Da66 a 67dB	66,30	0,00	OK
Da12 a 13dB	13,00	0,10	OK	Da67 a 68dB	67,30	0,00	OK
Da13 a 14dB	13,90	-0,10	OK	Da68 a 69dB	68,30	0,00	OK
Da14 a 15dB	14,80	-0,10	OK	Da69 a 70dB	69,30	0,00	OK
Da15 a 16dB	15,80	0,00	OK	Da70 a 71dB	70,30	0,00	OK
Da16 a 17dB	16,80	0,00	OK	Da71 a 72dB	71,30	0,00	OK
Da17 a 18dB	17,90	0,10	OK	Da72 a 73dB	72,30	0,00	OK
Da18 a 19dB	19,00	0,10	OK	Da73 a 74dB	73,30	0,00	OK
Da19 a 20dB	20,00	0,00	OK	Da74 a 75dB	74,30	0,00	OK
Da20 a 21dB	21,00	0,00	OK	Da75 a 76dB	75,30	0,00	OK
Da21 a 22dB	21,90	-0,10	OK	Da76 a 77dB	76,30	0,00	OK
Da22 a 23dB	22,80	-0,10	OK	Da77 a 78dB	77,30	0,00	OK
Da23 a 24dB	23,80	0,00	OK	Da78 a 79dB	78,30	0,00	OK
Da24 a 25dB	24,80	0,00	OK	Da79 a 80dB	79,30	0,00	OK
Da25 a 26dB	25,90	0,10	OK	Da80 a 81dB	80,30	0,00	OK
Da26 a 27dB	26,90	0,00	OK	Da81 a 82dB	81,30	0,00	OK
Da27 a 28dB	27,80	-0,10	OK	Da82 a 83dB	82,30	0,00	OK
Da28 a 29dB	28,70	-0,10	OK	Da83 a 84dB	83,30	0,00	OK
Da29 a 30dB	29,70	0,00	OK	Da84 a 85dB	84,30	0,00	OK
Da30 a 31dB	30,80	0,10	OK	Da85 a 86dB	85,30	0,00	OK
Da31 a 32dB	31,90	0,10	OK	Da86 a 87dB	86,30	0,00	OK
Da32 a 33dB	32,90	0,00	OK	Da87 a 88dB	87,30	0,00	OK
Da33 a 34dB	33,80	-0,10	OK	Da88 a 89dB	88,30	0,00	OK
Da34 a 35dB	34,70	-0,10	OK	Da89 a 90dB	89,30	0,00	OK
Da35 a 36dB	35,70	0,00	OK	Da90 a 91dB	90,30	0,00	OK
Da36 a 37dB	36,60	-0,10	OK	Da91 a 92dB	91,30	0,00	OK
Da37 a 38dB	37,60	0,00	OK	Da92 a 93dB	92,30	0,00	OK
Da38 a 39dB	38,60	0,00	OK	Da93 a 94dB	93,30	0,00	OK
Da39 a 40dB	39,50	-0,10	OK	Da94 a 95dB	94,30	0,00	OK
Da40 a 41dB	40,40	-0,10	OK	Da95 a 96dB	95,30	0,00	OK
Da41 a 42dB	41,30	-0,10	OK	Da96 a 97dB	96,30	0,00	OK
Da42 a 43dB	42,40	0,10	OK	Da97 a 98dB	97,30	0,00	OK
Da43 a 44dB	43,50	0,10	OK	Da98 a 99dB	98,30	0,00	OK
Da44 a 45dB	44,50	0,00	OK	Da99 a 100dB	99,30	0,00	OK
Da45 a 46dB	45,50	0,00	OK	Da100 a 101dB	100,30	0,00	OK
Da46 a 47dB	46,40	-0,10	OK	Da101 a 102dB	101,30	0,00	OK
Da47 a 48dB	47,40	0,00	OK	Da102 a 103dB	102,30	0,00	OK
Da48 a 49dB	48,50	0,10	OK	Da103 a 104dB	103,30	0,00	OK
Da49 a 50dB	49,60	0,10	OK	Da104 a 105dB	*	*	*
Da50 a 51dB	50,60	0,00	OK	Da105 a 106dB	*	*	*
Da51 a 52dB	51,50	-0,10	OK	Da106 a 107dB	*	*	*
Da52 a 53dB	52,50	0,00	OK	Da107 a 108dB	*	*	*
Da53 a 54dB	53,50	0,00	OK	Da108 a 109dB	*	*	*
Da54 a 55dB	54,50	0,00	OK	Da109 a 110dB	*	*	*

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

RICEVITORE – Receiver	**Punto - point**
	9.5
ACCURATEZZA DELL'ATTENUATORE CALIBRATO Accuracy of calibrated attenuator	**9.5.4**

Incertezza delle misure – Uncertainty of the result:

	0,1 dB	0,1 dB	

IMPOSTAZIONI STRUMENTO - Instrument Setting

Filtro - Filter	3-8 MHz
Soppressione - Reject	0%
Impedenza - Damping	50 Ω
DAC	OFF

Scostamento max per l'attenuazione fine per intervalli consecutivi di 20 dB Fine attenuation max deviation	**± 1dB**	**Esito** (result)	**OK**
Scostamento max per l'attenuazione grossolana per intervalli consecutivi di 60 dB Coarse attenuation max deviation	**± 2dB**	**Esito** (result)	**OK**

* causa innalzamento dello zero traccia con rumore elettrico elevato scala non utilizzabile

Filtro - Filter (MHz)	**Frequenza Centrale** central frequency (MHz)	**Massimo scostamento rilevato** Max deviation detected (dB)
0,1-0,5	0,25	-0,1
0,2-0,8	0,47	-0,1
0,4-1,6	0,87	-0,1
1,4-3	2,25	-0,1
3-8	4,81	-0,1
7-15	10,09	-0,1
9-21	14,20	-0,1
WIDE	5,63	-0,1

Incertezza delle misure – Uncertainty of the result:

	<0,01 MHz	<0,1 dB

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

RICEVITORE – Receiver	**Punto** - point
	9.5
LINEARITA VERTICALE DEL DISPLAY – Linearity of vertical display	**9.5.5**
Rettificazione ad ONDA PIENA – FULL WAWE retification	

Attenuazione Attenuation **(dB)**	**Ampiezza schermo** Display amplitude **(%) f.s.**	**Valore rilevato** Detected value **(%) f.s.**	**Scostamento** Deviation **(%) f.s.**	**Ampiezza accettabile (%) f.s.**	**Esito** result
1	90	90,0	0,0	88 a 92	**OK**
2	80	80,0	0,0	riferimento	**OK**
4	64	62,9	1,1	62 a 66	**OK**
6	50	50,0	0,0	48 a 52	**OK**
8	40	39,4	0,6	38 a 42	**OK**
12	25	24,5	0,5	23 a 27	**OK**
14	20	19,0	1,0	18 a 22	**OK**
20	10	8,4	1,6	8 a 12	**OK**
26	5	3,7	1,3	3 a 7	**OK**

Incertezza delle misure – Uncertainty of the result:		
	0,2% f.s.	

IMPOSTAZIONI STRUMENTO - Instrument Setting	
Filtro - Filter	3-8 MHz
Soppressione - Reject	0%
Impedenza - Danping	50 Ω
DAC	OFF

Filtro - Filter (MHz)	**Frequenza Centrale** central frequency (MHz)	**Massimo scostamento rilevato** Max deviation detected (% f.s.)
0,1-0,5	0,25	1,6
0,2-0,8	0,47	1,6
0,4-1,6	0,87	1,6
1,4-3	2,25	1,6
3-8	4,81	1,6
7-15	10,09	1,6
9-21	14,20	1,6
WIDE	5,63	1,6

Incertezza delle misure – Uncertainty of the result:		
	0,01 MHz	0,2% f.s.

Scostamento max per la lincarità verticale Vertical linearity max deviation	**± 2 % f.s.**	**Esito** result	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

RICEVITORE – Receiver	**Punto** - point
	9.5
LINEARITA VERTICALE DEL DISPLAY – Linearity of vertical display	**9.5.5**
Rettificazione ad MEZZ'ONDA POSITIVA – POSITIVE HALF WAWE retification	

Attenuazione Attenuation **(dB)**	**Ampiezza schermo** Display amplitude **(%) f.s.**	**Valore rilevato** Detected value **(%) f.s.**	**Scostamento** Deviation **(%) f.s.**	**Ampiezza accettabile (%) f.s.**	**Esito** result
1	90	90,0	0,0	88 a 92	**OK**
2	80	80,0	0,0	riferimento	**OK**
4	64	63,3	0,7	62 a 66	**OK**
6	50	50,0	0,0	48 a 52	**OK**
8	40	39,4	0,6	38 a 42	**OK**
12	25	24,1	0,9	23 a 27	**OK**
14	20	19,0	1,0	18 a 22	**OK**
20	10	8,4	1,6	8 a 12	**OK**
26	5	3,3	1,7	3 a 7	**OK**

Incertezza delle misure – Uncertainty of the result:		
	0,2% f.s.	

IMPOSTAZIONI STRUMENTO - Instrument Setting	
Filtro - Filter	3-8 MHz
Soppressione - Reject	0%
Impedenza - Danping	50 Ω
DAC	OFF

Filtro - Filter (MHz)	**Frequenza Centrale** central frequency (MHz)	**Massimo scostamento rilevato** Max deviation detected (% f.s.)
0,1-0,5	0,25	1,7
0,2-0,8	0,47	1,7
0,4-1,6	0,87	1,7
1,4-3	2,25	1,7
3-8	4,81	1,7
7-15	10,09	1,7
9-21	14,20	1,7
WIDE	5,63	1,7

Incertezza delle misure – Uncertainty of the result:		
	0,01 MHz	0,2% f.s.

Scostamento max per la linearità verticale Vertical linearity max deviation	**± 2 % f.s.**	**Esito** result	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

RICEVITORE – Receiver	**Punto** - point
	9.5
LINEARITA VERTICALE DEL DISPLAY – Linearity of vertical display	**9.5.5**
Rettificazione ad MEZZ'ONDA NEGATIVA – NEGATIVE HALF WAWE retification	

Attenuazione Attenuation **(dB)**	**Ampiezza schermo** Display amplitude **(%) f.s.**	**Valore rilevato** Detected value **(%) f.s.**	**Scostamento** Deviation **(%) f.s.**	**Ampiezza accettabile** **(%) f.s.**	**Esito** result
1	90	90,0	0,0	88 a 92	**OK**
2	80	80,0	0,0	riferimento	**OK**
4	64	63,3	0,7	62 a 66	**OK**
6	50	50,0	0,0	48 a 52	**OK**
8	40	39,4	0,6	38 a 42	**OK**
12	25	24,5	0,5	23 a 27	**OK**
14	20	19,0	1,0	18 a 22	**OK**
20	10	8,8	1,2	8 a 12	**OK**
26	5	3,3	1,7	3 a 7	**OK**

Incertezza delle misure – Uncertainty of the result:		
	0,2% f.s.	

IMPOSTAZIONI STRUMENTO - Instrument Setting	
Filtro - Filter	3-8 MHz
Soppressione - Reject	0%
Impedenza - Danping	50 Ω
DAC	OFF

Filtro - Filter (MHz)	**Frequenza Centrale** central frequency (MHz)	**Massimo scostamento rilevato** Max deviation detected (% f.s.)
0,1-0,5	0,25	1,7
0,2-0,8	0,47	1,7
0,4-1,6	0,87	1,7
1,4-3	2,25	1,7
3-8	4,81	1,7
7-15	10,09	1,7
9-21	14,20	1,7
WIDE	5,63	1,7

Incertezza delle misure – Uncertainty of the result:		
	0,01 MHz	0,2% f.s.

Scostamento max per la linearità verticale Vertical linearity max deviation	**± 2 % f.s.**	**Esito** result	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

LINEARITA BASE DEI TEMPI – Linearity of vertical display			**Punto** - point **9.6**
CAMPO DI MISURA 100mm – Range 100mm			
N° IMPULSI Pulse n°	**Posizione reticolo attesa** Expected graticule position **(%) f.s.**	**Posizione reticolo rilevata** Detected graticule position **(%) f.s.**	**Esito** result
1	0	0,01	**OK**
2	10	10,01	**OK**
3	20	20,01	**OK**
4	30	30,01	**OK**
5	40	40,01	**OK**
6	50	50,02	**OK**
7	60	60,01	**OK**
8	70	70,02	**OK**
9	80	80,03	**OK**
10	90	90,02	**OK**
11	100	100,03	**OK**
Incertezza delle misure – Uncertainty of the result:			
		0,01% f.s.	
IMPOSTAZIONI STRUMENTO - Instrument Setting			
Filtro - Filter	3-8 MHz		
Soppressione - Reject	0%		
Impedenza - Danping	50 Ω		
DAC	OFF		
Scostamento max per la linearità della base dei tempi Time base max deviation	**± 1 % f.s.**	**Esito** result	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

LINEARITA BASE DEI TEMPI – Linearity of Time-Base for digital ultrasonic instruments				**Punto** - point **8.8**
CAMPO DI MISURA **5 us** - Range **5 us**				**8.8.2**
Valore impostato Setting value **(%) f.s.**	**Valore impostato** Setting value **(us)**	**Valore rilevato** Detected value **(us)**	**Scostamento** Deviation **(%) f.s.**	**Esito** Result
0	0,00	0,00	0,20%	**OK**
5	0,25	0,25	-0,10%	**OK**
10	0,50	0,50	-0,10%	**OK**
15	0,75	0,75	-0,10%	**OK**
20	1,00	1,00	-0,10%	**OK**
25	1,25	1,25	-0,10%	**OK**
30	1,50	1,50	-0,10%	**OK**
35	1,75	1,75	-0,10%	**OK**
40	2,00	2,00	-0,10%	**OK**
45	2,25	2,25	-0,10%	**OK**
50	2,50	2,50	-0,10%	**OK**
55	2,75	2,75	-0,10%	**OK**
60	3,00	3,00	-0,10%	**OK**
65	3,25	3,25	-0,10%	**OK**
70	3,50	3,50	-0,10%	**OK**
75	3,75	3,75	-0,10%	**OK**
80	4,00	4,00	-0,10%	**OK**
85	4,25	4,25	-0,10%	**OK**
90	4,50	4,50	-0,10%	**OK**
95	4,75	4,75	-0,10%	**OK**
100	5,00	5,00	-0,10%	**OK**

Incertezza delle misure – Uncertainty of the result:			
	0,01uS		

IMPOSTAZIONI STRUMENTO - Instrument Setting	
Filtro - Filter	3-8 MHz
Soppressione - Reject	0%
Impedenza - Danping	50 Ω
DAC	OFF

Scostamento max per la linearità della base dei tempi Time base max deviation	**± 0,5 % f.s.**	**Esito** result	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

CERTIFICATO N° / CERTIFICATE N° : E202463 Rev.0

LINEARITA BASE DEI TEMPI – Linearity of Time-Base for digital ultrasonic instruments	**Punto** - point **8.8**
CAMPO DI MISURA 1000 us - Range **1000 us**	**8.8.2**

Valore impostato Setting value **(%) f.s.**	**Valore impostato** Setting value **(us)**	**Valore rilevato** Detected value **(us)**	**Scostamento** Deviation **(%) f.s.**	**Esito** Result
0	0	0,01	0,00%	**OK**
5	50	50,01	0,00%	**OK**
10	100	100,00	0,00%	**OK**
15	150	150,00	0,00%	**OK**
20	200	200,00	0,00%	**OK**
25	250	249,99	0,00%	**OK**
30	300	299,99	0,00%	**OK**
35	350	349,99	0,00%	**OK**
40	400	399,99	0,00%	**OK**
45	450	449,99	0,00%	**OK**
50	500	500,00	0,00%	**OK**
55	550	549,99	0,00%	**OK**
60	600	599,99	0,00%	**OK**
65	650	649,98	0,00%	**OK**
70	700	699,98	0,00%	**OK**
75	750	749,97	0,00%	**OK**
80	800	799,98	0,00%	**OK**
85	850	849,99	0,00%	**OK**
90	900	899,98	0,00%	**OK**
95	950	949,99	0,00%	**OK**
100	1000	999,98	0,00%	**OK**

Incertezza delle misure – Uncertainty of the result:			
	0,01uS		

IMPOSTAZIONI STRUMENTO - Instrument Setting	
Filtro - Filter	3-8 MHz
Soppressione - Reject	0%
Impedenza - Danping	50 Ω
DAC	OFF

Scostamento max per la linearità della base dei tempi Time base max deviation	**± 0,5 % f.s.**	**Esito** result	**OK**

IMG ULTRASUONI SRL
Via agli archi, 8/C
23826 Mandello del Lario (LC)
e_mail img@img-us.com
http://www.img-us.com

Tel. (+39) 0341.733.723
Fax.(+39) 0341.720.004
Cod. fiscale e VAT/P. Iva: IT 03037940131
Registro delle Imprese n. 03037940131
R.E.A. LC 305319 Capitale sociale E 50.000,00 i.v.

CERTIFICATO N° / CERTIFICATE N° : E202463 Rev.0

LINEARITA BASE DEI TEMPI – Linearity of Time-Base for digital ultrasonic instruments	**Punto** - point **8.8**
CAMPO DI MISURA 5000 us - Range **5000 us**	**8.8.2**

Valore impostato Setting value **(%) f.s.**	**Valore impostato** Setting value **(us)**	**Valore rilevato** Detected value **(us)**	**Scostamento** Deviation **(%) f.s.**	**Esito** Result
0	0	0,01	0,00%	**OK**
5	250	250,00	0,00%	**OK**
10	500	499,99	0,00%	**OK**
15	750	749,98	0,00%	**OK**
20	1000	999,98	0,00%	**OK**
25	1250	1249,97	0,00%	**OK**
30	1500	1499,98	0,00%	**OK**
35	1750	1749,97	0,00%	**OK**
40	2000	1999,96	0,00%	**OK**
45	2250	2249,96	0,00%	**OK**
50	2500	2499,95	0,00%	**OK**
55	2750	2749,95	0,00%	**OK**
60	3000	2999,95	0,00%	**OK**
65	3250	3249,94	0,00%	**OK**
70	3500	3499,94	0,00%	**OK**
75	3750	3749,94	0,00%	**OK**
80	4000	3999,93	0,00%	**OK**
85	4250	4249,93	0,00%	**OK**
90	4500	4499,92	0,00%	**OK**
95	4750	4749,92	0,00%	**OK**
100	5000	4999,91	0,00%	**OK**

Incertezza delle misure – Uncertainty of the result:			
	0,01uS		

IMPOSTAZIONI STRUMENTO - Instrument Setting	
Filtro - Filter	3-8 MHz
Soppressione - Reject	0%
Impedenza - Danping	50 Ω
DAC	OFF

Scostamento max per la linearità della base dei tempi Time base max deviation	**± 0,5 % f.s.**	**Esito** result	**OK**

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 5.2

Magnetic Particle / Liquid Penetrant examination report

C.A.M.P.I. srl Ferrara (Italy)	CERTIFICATO DI CONTROLLO CON LIQUIDI PENETRANTI *LIQUID PENETRANT EXAMINATION REPORT*	PT No. 24003-02 Foglio / Sheet 1 of 1

CLIENTE: *Purchaser:* **Rosetti Marino** ORDINE: *Purchase Order No.:* **1724000163** APPARECCHIO: **Hydrogen Vent K.O Drum** Sigla: *Type of vessel:* Item **V-43001**	**COLLAUDO** *Inspection Authority*	**COMMESSA** / Job No. 24003 (Client Ref. 123A90) **N.F.** / Item Serial No. **24-003**

PARTE ESAMINATA / *Examined part*: PT effettuato sul 100% delle saldature dopo la prova idrostatica / *PT performed on 100% of welds after hydrotest*				
STADIO DI LAVORAZIONE *Working Step*	O *AFTER FORMING* O *AFTER MACHINING*	O *AFTER GRINDING* • *AFTER WELDING*	O *AFTER PWHT* • *AFTER HYDR.*	
CONDIZIONI SUPERFICIALI *Test Surface Status*	■COME SALD. *As welded*	□ MOLATO *Ground*	□LAV. DI MACCHINA *Machined*	
SPEC. DI CONTROLLO / *Examination procedure* 1724000163-NDT-PRO-00008 rev.01 CAMPI IO ND102AS r.5 / ASME Sect.V Art.6 Ed. 2023		**CRITERI ACCETT.** / *Acceptance criteria* 1724000163-NDT-PRO-00008 rev.01 C.A.M.P.I. ND102AS rev5 / ASME Sect VIII Div.1 App.8 Ed. 2023		

COMBINAZIONE LIQUIDI PENETRANTI / *Liquid Penetrant Grouping*

	■ LAVABILE CON ACQUA *Water washable*		□ LAVAB. CON SOLVENTE *Solvent removable*		□ POST-EMULSIFICABILE *Post-emulsified*	
	■ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*
PULITORE *Cleaner*	VELNET Batch 23/008					
PENETRANTE *Penetrant*	RED W/W Batch 22/293					
EMULSIFICATORE *Emulsified*	/					
RIMOZIONE PENETRANTE *Penetrant Remover*	/					
RIVELATORE *Developer*	ROTRIVEL U Batch 22/421					
MARCA *Trade-mark*	CGM					
MEZZO DI ILLUMINAZIONE *Lighting Equipment*	■ NATURALE *Natural*	■ ARTIFICIALE *Artificial*				
LUXOMETRO S.N. *Luxmeter S.N.*	900710		DATA CALIBR. *Calibrat. Date*	04/10/2023	Lux value: >1200 lux	

PROCEDURA DI CONTROLLO / *Examination procedure*			**Refer doc. / Note**
PULITURA CON *Cleaning by*	*BRUSHING & VELNET*		Inspection Test Plan N° 1724000163-QC-ITP-00002 rev.02 Step 5-8 Ambient Temperature 19÷19,5°C Lighting value - Lux level >1200 lx
APPLICAZIONE PENETRANTE CON *Penetrant application by*	SPRAY		
TEMPO MINIMO DI PENETRAZIONE Penetrant minimum time	15 MINUTI Minutes		
APPLICAZIONE EMULSIFICATORE CON *Emulsifier application by*	/		
RIMOZIONE PENETRANTE CON *Penetrant removal by*	ACQUA *WATER*		
APPLICAZIONE RIVELATORE *Developer application*	SPRAY		
ESSICCAZIONE CON *Drying process by*	NATURAL		
TEMPO MINIMO DI SVILUPPO *Developing minimum time*	15	MINUTI *Minutes*	
TEMPO MASSIMO DI LETTURA *Checking maximum time*	60	MINUTI *Minutes*	
ANALISI ACCETTAZIONE LIQUIDI *Liquid acceptance testing*	VEDI CERTIFICATO CGM *SEE CGM CERTIFICATE*		

RISULTATI DELL'ESAME *Examination Result* ■ *NO REPORTABLE INDICATIONS ACCEPTABLE* □ *SEE ATTACHED SHEETS* □ *NOT ACCEPTABLE*

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*
18-September-2024	**LIVELLO** *Level* □ 1 ■ 2 □ 3 C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed □ Reviewed □ Date 18/9/24 Signature C.A.M.P.I. S.R.L. MICHELE ANTOLINI 2 LEVEL PT TC 1A ENTE ISO 9712	TÜV Italia 09 48 ☒ Review ☐ Witness Date: 02/10/24 Name:

EXHIBIT 8-2

C.A.M.P.I. srl Ferrara (Italy)	CERTIFICATO DI CONTROLLO CON PARTICELLE MAGNETICHE *MAGNETIC PARTICLE EXAMINATION REPORT*	MT No. 24003-02
		Foglio / Sheet 1 of 1

CLIENTE / *Purchaser:* **Rosetti Matino** ORDINE / *Purchase Order No.:* **1724000163** APPARECCHIO *Type of vessel:* **Hydrogen Vent K.O. Drum** Sigla / *Item*: **V-43001**	**COMMESSA** / Job No. 24003 (Client Ref. 123A90) **N.F.** / Item Serial No. 24-003

PARTE ESAMINATA / *Examined part*:
MT effettuato sul 100% delle saldature dopo il Trattamento Termico / *MT performed on 100% of welds after PWHT*

STADIO DI LAVORAZIONE *Working Step*	O *AFTER FORMING*	• *AFTER GRINDING*	• *AFTER PWHT*
	O AFTER MACHINING	• *AFTER WELDING*	O *AFTER HYDR.*
CONDIZIONI SUPERFICIALI *Test Surface Status*	■ COME SALDATO *As welded*	■ MOLATO *Ground*	☐ LAV. DI MACCHINA *Machined*

SPEC. DI CONTROLLO / *Examination procedure* 1724000163-NDT-PRO-00008 rev.01 IO ND109AS rev.3 / ASME Sect. V Art. 7 Ed.2023	**CRITERI ACCETT.** *Acceptance criteria* 1724000163-NDT-PRO-00008 rev.01 ASME Sect VIII Div.1 App.6 Ed.2023 / ISO 23278 liv.2X

METODO DI MAGNETIZZAZIONE / *Magnetizing Method*

☐ **PUNTALI** / *Prods*	■ **GIOGO** / *Yoke*	☐ **BOBINA** / *Coil*	METODO DI CONTROLLO *Examination Method*
CORRENTE *Current*	CORRENTE C.A. *Current*	CORRENTE *Current*	
INTENSITA' *Intensity*		AMPERSPIRE *Ampere-turns*	
FLUSSO MAGNETICO *Magnetic flux*	FLUSSO MAGNETICO *Magnetic Flux*	FLUSSO MAGNETICO *Magnetic Flux*	■ METODO CONTINUO *Continuous Method*
DISTANZA mm *Spacing*	DISTANZA 160 mm *Spacing*	DISTANZA mm *Spacing*	
APPARATO *Equip.*	APPARATO **H235** *Equip.* **s.n. 53.23518** - *UNION Test*	DIAMETRO mm *Diameter*	☐ METODO RESIDUO *Residual Method*
	■ VER. FORZA DI SOLL. *Lifting power check*	APPARATO *Equipment*	

MEZZO DI CONTROLLO / *Examination medium*

☐ **SECCO** *Dry*	■ **UMIDO** *Wet*	☐ **FLUORESCENTE** *Fluorescent*
POLVERE/*Powder*	POLVERE/*Powder*	POLVERE/*Powder*
☐ ROSSA / *Red*	☐ ROSSA / *Red*	☐ MAGNAGLO
☐ GRIGIA / Grey	■ NERA / *Black*	☐
☐ NERA / *Black*	☐	INTENSITA' LUMINOSA *Black light intensity* (μ W/cm² x 1000)
☐	**IN SOLUZ. DI** *In solution of*	**SOSPENSIONE IN** *Suspension in*
	■ PETROLIO / *Petroleum*	☐ PETROLIO / *Petroleum*
	☐ ACQUA / *Water*	☐ ACQUA / *Water*

MARCA/Trade name:CGM VECOPLAST Batch 23_256 & KEROSENOIL LK35 Batch 23_410

PULITURA CON *Cleaning by*	■ SPAZZOLATURA *Brushing*	☐ SOLVENTE *Solvent*	
SMAGNETIZZAZIONE *Demagnetization*	/		
MAGNETISMO RESIDUO *Residual magnetism*	/		
PROVA EFFICACIA CAMPO MAGNETICO: SI / YES *Testing by magnetic particle field indicator*			

Refer doc. / Note

Inspection Test Plan N°
1724000163-QC-ITP-00002 rev.02 Step 5-3
Ambient Temperature 21,7°C

Carbon steel material thk. 6÷12,7mm

Lighting value - Lux level >1200 lx

RISULTATI DELL'ESAME *Examination Result* ■ *NO REPORTABLE INDICATIONS ACCEPTABLE* ☐ *SEE ATTACHED SHEETS* ☐ *NOT ACCEPTABLE*

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*
17-September-2024	**LIVELLO** *Level* ☐ **1** ■ **2** ☐ **3**	TÜV Italia 09 48 ☒ Review ☐ Witness Date: 17/10/24 Name:

C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 17/9/24 Signature

C.A.M.P.I. SRL MICHELE ANTOLINI 2 LEVEL ENT TC 1A EN473/ISO 9712

C.A.M.P.I. srl Ferrara (Italy)	CERTIFICATO DI CONTROLLO CON PARTICELLE MAGNETICHE *MAGNETIC PARTICLE EXAMINATION REPORT*	MT No. 24003-01 Foglio / Sheet 1 of 1

CLIENTE / *Purchaser:* **Rosetti Matino** ORDINE / *Purchase Order No.:* **1724000163** APPARECCHIO *Type of vessel:* **Hydrogen Vent K.O. Drum** Sigla / *Item*: **V-43001**	**COMMESSA** / Job No. 24003 (Client Ref. 123A90) **N.F.** / Item Serial No. 24-003

PARTE ESAMINATA / *Examined part*:
MT effettuato sul 100% delle saldature prima del Trattamento Termico / *MT performed on 100% of welds before PWHT*

STADIO DI LAVORAZIONE *Working Step*	O *AFTER FORMING*	• *AFTER GRINDING*	O *AFTER PWHT*	
	O AFTER MACHINING	• *AFTER WELDING*	O *AFTER HYDR.*	
CONDIZIONI SUPERFICIALI *Test Surface Status*	■ COME SALDATO *As welded*	■ MOLATO *Ground*	☐ LAV. DI MACCHINA *Machined*	

SPEC. DI CONTROLLO / *Examination procedure*	**CRITERI ACCETT.** *Acceptance criteria*
1724000163-NDT-PRO-00008 rev.01 IO ND109AS rev.3 / ASME Sect. V Art. 7 Ed.2023	1724000163-NDT-PRO-00008 rev.01 ASME Sect VIII Div.1 App.6 Ed.2023 / ISO 23278 liv.2X

METODO DI MAGNETIZZAZIONE / *Magnetizing Method*

☐ **PUNTALI** / *Prods*	■ **GIOGO** / *Yoke*	☐ **BOBINA** / *Coil*	METODO DI CONTROLLO *Examination Method*
CORRENTE *Current*	CORRENTE C.A. *Current*	CORRENTE *Current*	
INTENSITA' *Intensity*		AMPERSPIRE *Ampere-turns*	
FLUSSO MAGNETICO *Magnetic flux*	FLUSSO MAGNETICO *Magnetic Flux*	FLUSSO MAGNETICO *Magnetic Flux*	■ METODO CONTINUO *Continuous Method*
DISTANZA mm *Spacing*	DISTANZA 160 mm *Spacing*	DISTANZA mm *Spacing*	
APPARATO *Equip.*	APPARATO **H235** *Equip.* **s.n. 53.23518** - *UNION Test*	DIAMETRO mm *Diameter*	☐ METODO RESIDUO *Residual Method*
	■ VER. FORZA DI SOLL. *Lifting power check*	APPARATO *Equipment*	

MEZZO DI CONTROLLO / *Examination medium*

☐ **SECCO** *Dry*	■ **UMIDO** *Wet*	☐ **FLUORESCENTE** *Fluorescent*
POLVERE/*Powder*	POLVERE/*Powder*	POLVERE/*Powder*
☐ ROSSA / *Red*	☐ ROSSA / *Red*	☐ MAGNAGLO
☐ GRIGIA / Grey	■ NERA / *Black*	☐
☐ NERA / *Black*	☐	INTENSITA' LUMINOSA *Black light intensity* (μ W/cm^2 x 1000)
☐	**IN SOLUZ. DI** *In solution of*	**SOSPENSIONE IN** *Suspension in*
	■ PETROLIO / *Petroleum*	☐ PETROLIO / *Petroleum*
	☐ ACQUA / *Water*	☐ ACQUA / *Water*

MARCA/Trade name:CGM VECOPLAST Batch 23_256 & KEROSENOIL LK35 Batch 23_410

PULITURA CON *Cleaning by*	■ SPAZZOLATURA *Brushing*	☐ SOLVENTE *Solvent*	
SMAGNETIZZAZIONE *Demagnetization*	/		
MAGNETISMO RESIDUO *Residual magnetism*	/		
PROVA EFFICACIA CAMPO MAGNETICO: SI / YES *Testing by magnetic particle field indicator*			

Refer doc. / Note

Inspection Test Plan N°
1724000163-QC-ITP-00002 rev.02 Step 3-12
Ambient Temperature 20,8°C

Carbon steel material thk. 6÷12,7mm

Lighting value - Lux level >1200 lx

RISULTATI DELL'ESAME *Examination Result* ■ *NO REPORTABLE INDICATIONS ACCEPTABLE* ☐ *SEE ATTACHED SHEETS* ☐ *NOT ACCEPTABLE*

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*
09-September-2024	**LIVELLO** *Level* ☐ 1 ■ 2 ☐ 3 C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☐ Date 09/09/24 Signature C.A.M.P.I. SRL STEFANO CATTABRIGA 2 LEVEL ENT TC 1A ISO 9712 TÜV Italia 09 48 Date: 07/10/24	Quality Control Dept. Cerato Alex per Rosetti Marino SpA ☒ Review 09 2024 ☐ Witness

Yoke

unionTest
MARPOSS

CERTIFICATO DI COLLAUDO N° 40-21

GIOGO ELETTROMAGNETICO H235

Dati Tecnici Giogo

Giogo elettromagnetico mod.:	H235
Matricola Giogo:	53.235-18
Dimensioni giogo in mm escluso cavo di alimentazione:	235L x 195H x 55P
Dimensioni sez. trasversale poli:	22 x 23mm
Duty cycle:	50%
Peso:	2,650Kg. (cavo di alimentazione escluso)
Costruttore:	Union Test NDT S.r.l.

Campioni primari utilizzati per taratura e collaudo gioghi elettromagnetici in AC

Strumento	Matricola/ Cod. interno		Certificato N°	Scadenza
Peso campione mod. HR45 4,50Kg. taratura giogo in AC	PC14-19	MC38	112-19 in data 27.03.19	27.03.24
Misuratore campo magnetico Hirst GM07 per giogo in AC con sonda trasversale	GM07-3467 PT12787	MC23 MC24	1859/20 in data 05.06.20	05.06.22

Strumento	Matricola/ Cod. interno		Conformità
Sonda Asme Ottagonale Ferrochem verifica rilevabilità indicazioni trasversali e inclinate	FC-41070	/	Asme V art.7, ASTM E-709 ASTM E-1444
Penetrametro TP4 K2840	T9425	/	Rolls-Royce PLC RPS 700

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date 09/09/24
Signature

Procedura di taratura e collaudo Giogo Elettromagnetico H235 in AC

Tutte le prove vengono eseguite tenendo le espansioni polari del giogo elettromagnetico H235 alla loro distanza nominale di 160mm. (interasse).

Per verificare la forza di sollevamento del Giogo elettromagnetico alimentato in AC (corrente alternata) viene utilizzato peso campione mod. HR45 da 4,50Kg. nominali conforme a Norma UNI EN ISO 9934-3, ASME V art.7, ASTM E1444/E1444M-16.

Il peso campione viene posizionato su un banco di appoggio amagnetico, piano e stabile.

Vengono rimossi dai piedi di appoggio del giogo elettromagnetico tracce di polvere con uno straccio pulito.

Le espansioni polari del giogo elettromagnetico vengono allineate alla loro distanza nominale perfettamente parallele e successivamente il giogo elettromagnetico viene posizionato sul peso campione in modo che sia perfettamente stabile e la superficie di contatto dei piedi di appoggio sia la maggiore possibile.

Tempo di sollevamento: 10 secondi. La prova viene eseguita 3 volte.

Successivamente con misuratore di campo magnetico Hirst GM07 completo di sonda trasversale viene misurata l'intensità di campo magnetico tangenziale centralmente tra le espansioni polari.

Durata prova: 10 secondi. La prova viene eseguita 2 volte.

Il giogo viene poi posizionato su penetrametro campione TP4 K2840. In posizione centrale viene inserita una sonda Asme ottagonale per verificare la rilevabilità di indicazione trasversale e inclinate a 45°.

Durante la magnetizzazione la sonda viene irrorata di liquido magnetico nero.

Tempo di magnetizzazione: 10 secondi

Tempo di irrorazione magnetico nero spray: 4 secondi

Al termine della prova sulla superficie in rame della sonda Asme, devono essere perfettamente visibili indicazione trasversale e inclinate a 45°.

La prova viene poi ripetuta con giogo su penetrametro TP4 K2840, senza sonda Asme ottagonale, in modo da verificare la profondità di penetrazione campo magnetico longitudinale.

Durante la magnetizzazione il penetrametro TP4 K2840 viene irrorato di liquido magnetico nero.

Tempo di magnetizzazione: 10 secondi

Tempo di irrorazione magnetico nero spray: 4 secondi

Al termine della prova sulla superficie del penetrametro deve essere perfettamente visibile indicazione trasversale 1° foro profondità di penetrazione 1,5mm.

Dati di taratura e collaudo Giogo Elettromagnetico H235 in AC verifica forza di sollevamento peso campione 4,50Kg., misura intensità campo magnetico tangenziale, verifica prestazioni con blocco campione Penetrametro TP4 e Sonda Asme ottagonale.

Alimentazione Giogo in AC:	230Vac
Potenza Giogo in AC:	150VA
Forza di sollevamento alla distanza nominale poli (interasse):	160mm.
Durata di sollevamento Giogo in AC:	10 secondi
Misura campo magnetico tangenziale, con giogo posizionato su peso campione, alla distanza poli (interasse):	160mm.
Intensità campo magnetico tangenziale minimo consentito centralmente tra i poli:	2K.Amp./mt.
Durata prova:	10 secondi
Giogo posizionato su penetrametro TP4 K2840 verifica rilevabilità indicazione trasversale e inclinate a 45° sonda Asme posizionata su penetrametro TP4 K2840, centralmente tra le espansioni polari giogo.	
Distanza nominale poli giogo (interasse):	160mm.
Durata prova:	10 secondi
Giogo posizionato su penetrametro TP4 K2840 verifica rilevabilità indicazione trasversale 1° foro penetrametro TP4, profondità rilevazione 1,5mm.	
Distanza nominale poli giogo (interasse):	160mm.
Durata prova:	10 secondi

Note: La prova di sollevamento è stata effettuata 3 volte.
La misura intensità campo magnetico è stata effettuata 2 volte.
Verifica rilevabilità 1° foro penetrametro TP4 e indicazione trasversale e inclinate sonda Asme è stata effettuata 1 volta.

ACCETTABILITA'

Forza di sollevamento giogo elettromagnetico in AC: ≥ 4,50Kg. Tempo di impulso ON: ≥ 5sec.
(Normative ASME V art. 7; ASTM E-1444/E1444M-16; UNI EN ISO 9934-3)
Intensità campo magnetico tangenziale centralmente tra i poli alla distanza consigliata:
≥ 2K.Amp./mt. (Normativa UNI EN ISO 9934-3)

Esito taratura e collaudo

Verifica funzionamento Giogo H235 Alimentazione 230Vac
Esito: Funzionante

Forza di sollevamento Giogo H235 in AC peso campione 4,50Kg.
Esito: Positivo Conforme Normative: UNI EN ISO 9934-3
ASME V art. 7
ASTM E1444/E1444M-16

Verifica intensità campo magnetico tangenziale centralmente tra i poli, alla loro distanza nominale di 160mm (interasse): 2K.Amp./mt.
Esito: Positivo Conforme Normativa: UNI EN ISO 9943-3

Verifica rilevabilità indicazioni trasversale e inclinate a 45° sonda Asme, rivelatore utilizzato magnetico nero Supramor 4 Black spray
Esito: Positivo Conforme Normative: ASME V art.7
ASTM E1444/E1444M-16

Verifica rilevabilità indicazione trasversale 1° foro Penetrametro TP4 funzionamento Giogo in AC rilevatore utilizzato magnetico nero Supramor 4 black Spray
Esito: Positivo

Condizioni ambientali di collaudo
Temperatura ambiente 23°C. ± 1°C. Umidità 50% U.R. ± 10% U.R.

Il fabbricante:	Union Test NDT S.r.l.
Indirizzo:	Via Alberto Martini, 23 20092 - Cinisello Balsamo (MI)
Luogo di collaudo:	Laboratorio Union Test NDT S.r.l.
Data:	22.09.2021

Responsabile: Casoni Paolo

Firma del Responsabile:

UnionTest NDT s.r.l.
Via Alberto Martini, 23
20092 Cinisello Balsamo (MI)
Cod.Fisc. P.IVA 08855620962
www.uniontest-ndt.com

C.A.M.P.I. srl **Ferrara (Italy)**	**CERTIFICATO DI CONTROLLO CON LIQUIDI PENETRANTI** *LIQUID PENETRANT EXAMINATION REPORT*	**PT No.** 24003-01 Foglio / Sheet 1 of 1

CLIENTE: *Purchaser:* **Rosetti Marino** ORDINE: *Purchase Order No.:* **1724000163** APPARECCHIO: **Hydrogen Vent K.O Drum** Sigla: *Type of vessel:* Item **V-43001**	**COLLAUDO** *Inspection Authority*	**COMMESSA** / Job No. 24003 (Client Ref. 123A90) **N.F.** / Item Serial No. **24-003**

PARTE ESAMINATA / *Examined part*:
PT effettuato sul 100% delle saldature interne prima del T.T. / *PT performed on 100% of internal welds before PWHT*

STADIO DI LAVORAZIONE *Working Step*	O *AFTER FORMING* O *AFTER MACHINING*	O *AFTER GRINDING* • *AFTER WELDING*	O *AFTER PWHT* O *AFTER HYDR.*	
CONDIZIONI SUPERFICIALI *Test Surface Status*	■COME SALD. *As welded*	□ MOLATO *Ground*	□LAV. DI MACCHINA *Machined*	

SPEC. DI CONTROLLO / *Examination procedure*	**CRITERI ACCETT.** / *Acceptance criteria*
1724000163-NDT-PRO-00008 rev.01 CAMPI IO ND102AS r.5 / ASME Sect.V Art.6 Ed. 2023	1724000163-NDT-PRO-00008 rev.01 C.A.M.P.I. ND102AS rev5 / ASME Sect VIII Div.1 App.8 Ed. 2023

COMBINAZIONE LIQUIDI PENETRANTI / *Liquid Penetrant Grouping*

	■ LAVABILE CON ACQUA *Water washable*		□ LAVAB. CON SOLVENTE *Solvent removable*		□ POST-EMULSIFICABILE *Post-emulsified*	
	■ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*
PULITORE *Cleaner*	VELNET Batch 23/008					
PENETRANTE *Penetrant*	RED W/W Batch 22/293					
EMULSIFICATORE *Emulsified*	/					
RIMOZIONE PENETRANTE *Penetrant Remover*	/					
RIVELATORE *Developer*	ROTRIVEL U Batch 22/421					
MARCA *Trade-mark*	CGM					
MEZZO DI ILLUMINAZIONE *Lighting Equipment*	■ NATURALE *Natural*	■ ARTIFICIALE *Artificial*				
LUXOMETRO S.N. *Luxmeter S.N.*	900710		DATA CALIBR. *Calibrat. Date*	04/10/2023	Lux value: >1200 lux	

PROCEDURA DI CONTROLLO / *Examination procedure*			**Refer doc. / Note**
PULITURA CON *Cleaning by*	*BRUSHING & VELNET*		
APPLICAZIONE PENETRANTE CON *Penetrant application by*	SPRAY		
TEMPO MINIMO DI PENETRAZIONE *Penetrant minimum time*	15 MINUTI Mi nutes		Inspection Test Plan N° 1724000163-QC-ITP-00002 rev.02 Step 3-12
APPLICAZIONE EMULSIFICATORE CON *Emulsifier application by*	/		Ambient Temperature 20,5÷21°C
RIMOZIONE PENETRANTE CON *Penetrant removal by*	ACQUA *WATER*		Lighting value - Lux level >1200 lx
APPLICAZIONE RIVELATORE *Developer application*	SPRAY		
ESSICCAZIONE CON *Drying process by*	NATURAL		
TEMPO MINIMO DI SVILUPPO *Developing minimum time*	15	MINUTI *Minutes*	
TEMPO MASSIMO DI LETTURA *Checking maximum time*	60	MINUTI *Minutes*	
ANALISI ACCETTAZIONE LIQUIDI *Liquid acceptance testing*	VEDI CERTIFICATO CGM *SEE CGM CERTIFICATE*		

RISULTATI DELL'ESAME *Examination Result* ■ *NO REPORTABLE INDICATIONS ACCEPTABLE* □ *SEE ATTACHED SHEETS* □ *NOT ACCEPTABLE*

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*
06-September-2024	**LIVELLO** *Level* □ 1 ■ 2 □ 3 C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 06/09/24 Signature C.A.M.P.I. SRL STEFANO CATTABRIGA 2 LEVEL SNT TC 1A ISO 9712 TÜV Italia 09 48 Date: 07/10/24 Name:	Quality Control Dept. Cerato Alex per Rosetti Marino SpA ☒ Review 09/09/2024 ☐ Witness

EXHIBIT 8-2

Via S. Silvestro, 92
21100 Varese
Tel + 39 0332 213045
212639 - 220185
Fax +39 0332 822553
www.assicontrol.com
e-mail: info@assicontrol.com
C.F. e P.I. 02436670125

STRUMENTI & SERVIZI
per il sistema qualità

Nr. 86990/A/0001/UK/IT
Sistema di Gestione Qualità Assicontrol
certificato secondo la norma ISO 9001:2015

Laboratorio Metrologico

CERTIFICATO DI TARATURA

N° 9748/23

Destinatario: **C.A.M.P.I. S.r.l. – Ferrara (FE)**

Oggetto della taratura: **Luxmetro**

Metodo: verifica per comparazione con campioni e/o strumenti primari

Utilizzo: misura di intensità luminosa

Modello: **LM-20** Matricola: **900710**

Sensore: fotoelemento Matricola: /

Filtro: correzione colore

Costruttore: Pantec

Procedura utilizzata per la verifica: CP020

Procedura di verifica
La procedura utilizzata per effettuare la verifica prevede l'impiego di strumenti e/o campioni primari certificati da centri Accredia o equivalenti riconosciuti a livello internazionale (ove disponibili).
Le verifiche vengono effettuate per confronto diretto o indiretto tra lo strumento/campione in taratura e lo strumento/campione di riferimento primario con l'utilizzo delle attrezzature di supporto.
Si predispone l'oggetto della verifica e gli strumenti/campioni di confronto pronti ad effettuare misurazioni lasciandoli per circa due ore nella camera di prova a temperatura ed umidità controllate. Si effettuano una serie di misure significative annotandole sulla scheda tecnica interna. Si calcola la media aritmetica degli scostamenti rilevati. Si verifica poi la ripetibilità di lettura. Si determina quindi l'incertezza di misura derivante dagli scostamenti rilevati, dalla ripetibilità di lettura, dall'incertezza degli strumenti e/o campioni utilizzati per la prova, da deriva termica, rumore, ove applicabili. Si determina poi l'esito della verifica o la conformità alla normativa di riferimento, se previsti. Alla fine della compilazione della scheda tecnica interna, può essere redatto il documento di verifica. Si appone infine sullo strumento/campione l'etichetta di avvenuta certificazione.

ACCEPTED / ACCETTATO
C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date 20/10/23
Signature

VALIDITA' 12 MESI
SCADENZA / EXPIRY DATE
03-OCTOBER-2024

Data: 04-10-23

Intervallo di verifica: 12 mesi

Esecuzione attività c/o Assicontrol S.r.l.

Il responsabile di laboratorio: C. Alborghetti firma _____

ASSICONTROL CENTRO TARATURE ISO 9001

La riproduzione del presente documento è ammessa in copia conforme integrale. La riproduzione parziale è consentita soltanto a seguito di autorizzazione scritta del Centro di emissione del documento

Verifica di **Luxmetro** modello: **LM-20** tipo: digitale matricola: **900710**

portata: 0 – 20.000 lux precisione: ± 4% lett. ± 0,5% f.s.(scale 200-2.000)
± 7% lett. ± 1% f.s. (scala 20.000)

scale (risoluzione) (lux): 200 (0,1) 2.000 (1) 20.000 (10)

Sensore tipo: fotoelemento al Selenio matricola: /

Normativa di riferimento: DIN 5032 parte 7

Procedura: CP020
Metodo di verifica: per confronto indiretto con primario di riferimento

La catena di riferibilità ha inizio con i seguenti campioni primari:
Luxmetro Delta Ohm HD2302.0 matricola 08008497 con sensore matricola 08010545 munito di certificato Accredia n°23000926

Strumentazione ausiliaria:
- generatore luce bianca e uv matricola 45
- variatore Delta Core matricola 45V
- sistema di movimentazione Elektra Pride matricola 831GH56FFT

Risultati della verifica

Punto	valore nominale (lux)	valore letto (lux)	scostamento dal valore nominale (lux)	scostamento dal valore nominale (%)	incertezza delle misure (<± lux)
1	156,39	150,0	-6,39	-4,09	5,62
2	529,8	500	-29,8	-5,62	26,22
3	1589,2	1500	-89,2	-5,61	78,50
4	5311	5000	-311	-5,86	273,68
5	15968	15000	-968	-6,06	851,84
	Scostamento medio dal valore nominale:			5,45 (%)	

Note: il valore letto è il valore medio di 5 rilevazioni.

Considerazioni: /

Le incertezze di misura dichiarate in questo documento, associate alle letture effettuate, sono espresse come due volte lo scarto tipo corrispondente, nel caso di distribuzione normale, ad un livello di confidenza di circa 95%.

Le misure sono state effettuate nelle seguenti condizioni ambientali:
Temperatura: 23°C ± 1°C
Umidità: 50% u.r. ± 10% u.r.

Data delle prove: 04-10-23 Tecnico di laboratorio

ASSICONTROL Divisione ASSISTENZA e TARATURE

La riproduzione del presente documento è ammessa in copia conforme integrale. La riproduzione parziale è consentita soltanto a seguito di autorizzazione scritta del Centro di emissione del documento.

C.A.M.P.I. srl
Ferrara (Italy)

SEZIONE / Section 5.3

Visual Examination reports

C.A.M.P.I. srl Ferrara (Italy)	CERTIFICATO DI CONTROLLO VISIVO SALDATURE E PULIZIA *Visual and cleanliness Inspection Certificate* *Welded joints*	Certificato N. VT 24003-02 *Certificate no.* FOGLIO 1 DI 1 *Sheet of*

CLIENTE / *Customer*: Rosetti Marino	ORDINE N. / *Order no.* 1724000163	COMMESSA N. / *Job no.* 24003 (Client Ref. 123A90)
SIGLA E SERVIZIO: *Item and Service* V-43001 Hydrogen Vent KO Drum	N.F. / *Serial number:* 24-003	DISEGNO N- *Drawing n.* 1724000163-MAC-DA-00004 rev.04 (24003-VE-10 rev.04)
ITP No.: 1724000163-QC-ITP-00002 rev.02 step 5-4	PROCEDURA N. / *Procedure no.* C.A.M.P.I. ND 105AS rev.3 - ASME VIII Div.1 Ed.2023– ASME V Art. 9 Ed.2023	
DESCRIZIONE: *Description* External final visual examination and cleaning check after completion of welding and after PWHT		TIPO DI MATERIALE: *Type of material* SA-516 Gr.60N / SA-333 Gr.6 / SA-350 LF2
SPECIF. APPLICAB. / *Appl. Specifications:* 1724000163-NDT-PRO-00008 rev.01 ASME VIII Div.1 Ed.2023 / ASME V Art. 9	Criteri Accettabilità / *Acceptance criteria:* 1724000163-NDT-PRO-00008 rev.01 ND105AS rev.3 / ASME VIII Div.1 Ed.2023 / ISO 5817 Liv.B	

Designazione delle imperfezioni *Imperfections designation*	**Accettabilita'** *Acceptable*	**Note** Note
1)-Incompleto riempimento di cianfrini. Incomplete fill-up of weld groove.	**Non Accettabile** *Unaccettable*	*None*
2)-Cricche, mancanza di fusione e penetrazione superficiale. Crack, lack of fusion or penetration.	**Non Accettabile** Unaccettable	*None*
3)-Incisioni marginali con profondità superiore a quella prevista dal Codice applicabile. Undercuts having depth greater than allowable values permitted by referencing Code section.	**ASME VIII Div 1** **UW 35** **ND 105AS**	*Conform*
4)-Rinforzo di saldatura superiore a quanto previsto dal Codice applicabile. Weld reinforcement greater than allowable values permitted by referencing Code section	**ASME VIII Div 1** **UW 35** **ND 105AS**	*Conform*
5)-Spigoli acuti o situazioni geometriche che possono interferire con la successiva esecuzione di esami non distruttivi. Sharp corners and weld profile that could interfere with radiographic examination or other N.D.E. methods.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*Conform*
6)-Scarsa raccordatura tra le passate, sovrapposizioni, brusche variazioni di sezione ed intagli. Coarse ripples, grooves, overlaps, abrupt ridges and valleys.	**Non Accettabile** Unaccettable	*None*
7)-Scorie di saldatura aderente, spruzzi e inneschi d'arco. Slag, spatters and arc spots.	**Non Accettabile** Unaccettable	*None*
8)-Controllo pulizia secondo / Cleanliness check	No dirt and dust	*Conform*

Si certifica che il saggio sopra citato è stato sottoposto ad esame visivo delle saldature (100%) alla presenza di:

We certify that the piece has been visual examined and witnessed by:

Signor *Mr*	**E. Albarelli**	**Ispettore per** *Inspector for*	**TUV**

RISULTATO DELL'ESAME VISIVO
VISUAL EXAMINATION RESULTS
SATISFACTORY

DATA / *Date* ***18-September-2024***	**C.A.M.P.I. Srl** **QC Dept.** C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 18/09/24 Signature	**Inspector**	**No. Bo.** TÜV SÜD Italia 09 48 ☐ Review ☒ Witness Date: 18/9/24 Name:

C.A.M.P.I. srl Ferrara (Italy)	**CERTIFICATO DI CONTROLLO VISIVO SALDATURE E PULIZIA** *Visual and cleanliness Inspection Certificate Welded joints*	Certificato N. VT 24003-01 *Certificate no.* FOGLIO 1 DI 1 *Sheet of*

CLIENTE / *Customer:* Rosetti Marino	ORDINE N. / *Order no.* 1724000163	COMMESSA N. / *Job no.* 24003 (Client Ref. 123A90)
SIGLA E SERVIZIO: *Item and Service* V-43001 Hydrogen Vent KO Drum	N.F. / *Serial number:* 24-003	DISEGNO N- *Drawing n.* 1724000163-MAC-DA-00004 rev.4
ITP No.: 1724000163-QC-ITP-00002 rev.02 step 3-11	PROCEDURA N. / *Procedure no.* C.A.M.P.I. ND 105AS rev.3 - ASME VIII Div.1 Ed.2023– ASME V Art. 9 Ed.2023	
DESCRIZIONE: *Description* Internal visual examination and cleaning check after completion of welding		TIPO DI MATERIALE: *Type of material* SA-516 Gr.60N / SA-333 Gr.6 / SA-350 LF2
SPECIF. APPLICAB. / *Appl. Specifications:* 1724000163-NDT-PRO-00008 rev.01 ASME VIII Div.1 Ed.2023 / ASME V Art. 9	Criteri Accettabilità / *Acceptance criteria:* 1724000163-NDT-PRO-00008 rev.01 ND105AS rev.3 / ASME VIII Div.1 Ed.2023 / ISO 5817 Liv.B	

Designazione delle imperfezioni *Imperfections designation*	**Accettabilita'** *Acceptable*	**Note** Note
1)-Incompleto riempimento di cianfrini. Incomplete fill-up of weld groove.	**Non Accettabile** *Unaccettable*	*None*
2)-Cricche, mancanza di fusione e penetrazione superficiale. Crack, lack of fusion or penetration.	**Non Accettabile** Unaccettable	*None*
3)-Incisioni marginali con profondità superiore a quella prevista dal Codice applicabile. Undercuts having depth greater than allowable values permitted by referencing Code section.	**ASME VIII Div 1** **UW 35** **ND 105AS**	*Conform*
4)-Rinforzo di saldatura superiore a quanto previsto dal Codice applicabile. Weld reinforcement greater than allowable values permitted by referencing Code section	**ASME VIII Div 1** **UW 35** **ND 105AS**	*Conform*
5)-Spigoli acuti o situazioni geometriche che possono interferire con la successiva esecuzione di esami non distruttivi. Sharp corners and weld profile that could interfere with radiographic examination or other N.D.E. methods.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*Conform*
6)-Scarsa raccordatura tra le passate, sovrapposizioni, brusche variazioni di sezione ed intagli. Coarse ripples, grooves, overlaps, abrupt ridges and valleys.	**Non Accettabile** Unaccettable	*None*
7)-Scorie di saldatura aderente, spruzzi e inneschi d'arco. Slag, spatters and arc spots.	**Non Accettabile** Unaccettable	*None*
8)-Controllo pulizia secondo / Cleanliness check	**No dirt and dust**	*Conform*

Si certifica che il saggio sopra citato è stato sottoposto ad esame visivo delle saldature (100%) alla presenza di:
We certify that the piece has been visual examined and witnessed by:

Signor *Mr*	**A. Cerato**	**Ispettore per** *Inspector for*	**Rosetti Marino**

RISULTATO DELL'ESAME VISIVO *VISUAL EXAMINATION RESULTS*
SATISFACTORY

DATA / *Date* ***09-September-2024***	**C.A.M.P.I. Srl** **QC Dept.** C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 9/9/24 Signature	**Inspector** Quality Control Dept. Cerato Alex per Rosetti Marino SpA 09 09 2024	**A.I.** 09 48 ☐ Review ☒ Witness Date 09.09.2024 Name:

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 5.4

Dimensional Examination report

C.A.M.P.I. srl Ferrara (Italy)	**CERTIFICATO DI CONTROLLO DIMENSIONALE FINALE** ***Final Dimensional Check Report***	CERTIFICATO N. DC24003-02 *Report no.* FOGLIO DI *Sheet* *1 of 1*

CLIENTE / *Customer*: Rosetti Marino	ORDINE N. / *Order no.* 1724000163	COMMESSA N. / *Job no.* 24003 (Client Ref. 123A90)
SIGLA E SERVIZIO: *Item and Service* V-43001 Hydrogen Vent K.O. Drum	N.F. / *Serial number:* 24-003	DISEGNO N- *Drawing n.* 1724000163-MAC-DA-00004 rev.04 (24003-VE-10 rev.04)
ITP No.: 1724000163-QC-ITP-00002 rev.02 step 3-13	PROCEDURA N. / *Procedure no.:* C.A.M.P.I. ND106 rev.0 - ASME VIII Div.1 Ed. 2023 UG96	
COMPONENTE CONTROLLATO / *Item to be tested:* SHELL, HEAD & NOZZLE DESCRIZIONE / *Description:* Final dimensional check after PWHT		
SPECIF. APPLICAB. / Appl. Specifications: Drawing + ND106 + IO-GP412	CRITERI ACCETTABILITA'/*Acceptance criteria* Drawing + ASME VIII Div.1 Ed.2023 + STD CAMPI CTD-004_09 rev.0	

Tipo di strumento *Instrument*	No. Identificazione *Identification No:*	No. Certificato *Certificate No:*	Data Taratura *Calibration date*	Data scadenza *Expery date*
Multimetro *Multimeter*	MT 04-1	M559	07-06-2024	07-06-2025
Bindella *Metrical Strapr*	B01	M561	07-06-2024	07-06-2025
Calibro ventesimale *Ventesimal caliber*	SM011	C293	07-06-2024	07-06-2025
Livella goniometrica *Goniometric level*	Controllo effettuato prima del test con livella a bolla d'aria Instruments checked with spirit level before dimensional test			
Controllo effettuato da *Test performed by*	Antolini M. / Fioratti P.			

Test Performed:
-Visual
-Dimensional
-Nozzle NPS, location and rating
-Check of flatness of flange connection

See AS-Built Drawing - Vedi disegno As-Built

ESITO DEL CONTROLLO: *Result of test*	CONFORME *Conforming* ■	NON CONFORME *Not conforming* ☐

NOTE: TUTTE LE DIMENSIONI RISCONTRATE SONO IN TOLLERANZA
Notes: ALL THE DIMENSIONS ARE IN TOLERANCE

OPERATOR / *Operatore*	C.Q. COSTRUTTORE *Manufacturer Q.C.*	ISPETTORE CLIENTE Client Inspector	ISPETTORE / Inspector
	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 18/09/24 Signature		TÜV Italia 09 48 ☐ Review ☒ Witness Date: 18/9/24 Name:
DATA/Date 18-Sept.-2024	DATA/Date 18-Sept.-2024	DATA/Date	DATA/Date

MOD. ND106/1 Rev. 0 1 2 3 4 5

C.A.M.P.I. srl Ferrara (Italy)	CERTIFICATO DI CONTROLLO DIMENSIONALE FINALE *Final Dimensional Check Report*	CERTIFICATO N. DC24003-01 *Report no.* FOGLIO DI *Sheet* 1 of 1

CLIENTE / *Customer*: Rosetti Marino	ORDINE N. / *Order no.* 1724000163	COMMESSA N. / *Job no.* 24003 (Client Ref. 123A90)
SIGLA E SERVIZIO: *Item and Service* V-43001 Hydrogen Vent KO Drum	N.F. / *Serial number:* 24-003	DISEGNO N- *Drawing n.* 1724000163-MAC-DA-00004 rev.04 (24003-VE-10 rev.04)
ITP No.: 1724000163-QC-ITP-00002 rev.02 step 3-13	PROCEDURA N. / *Procedure no.:* C.A.M.P.I. ND106 rev.0 - ASME VIII Div.1 Ed. 2023 UG96	
COMPONENTE CONTROLLATO / *Item to be tested:* SHELL, HEAD & NOZZLE DESCRIZIONE / *Description:* Final dimensional check before PWHT		
SPECIF. APPLICAB. / Appl. Specifications: Drawing + ND106 + IO-GP412	CRITERI ACCETTABILITA'/*Acceptance criteria* Drawing + ASME VIII Div.1 Ed.2023 + STD CAMPI CTD-004_09 rev.0	

Tipo di strumento *Instrument*	No. Identificazione *Identification No:*	No. Certificato *Certificate No:*	Data Taratura *Calibration date*	Data scadenza *Expery date*
Multimetro *Multimeter*	MT 04-1	M559	07-06-2024	07-06-2025
Bindella *Metrical Strapr*	B01	M561	07-06-2024	07-06-2025
Calibro ventesimale *Ventesimal caliber*	SM011	C293	07-06-2024	07-06-2025
Livella goniometrica *Goniometric level*	Controllo effettuato prima del test con livella a bolla d'aria Instruments checked with spirit level before dimensional test			
Controllo effettuato da *Test performed by*	Antolini M. / Fioratti P.			

Test Performed:
-Visual
-Dimensional
-Nozzle NPS, location and rating
-Check of flatness of flange connection

NOTE: the leg support of the vessel will be welded to the relevant PAD after the RT examination post PWHT

See AS-Built Drawing - Vedi disegno As-Built

ESITO DEL CONTROLLO: *Result of test* — CONFORME *Conforming* ■ — NON CONFORME *Not conforming* ☐

NOTE: TUTTE LE DIMENSIONI RISCONTRATE SONO IN TOLLERANZA
Notes: ALL THE DIMENSIONS ARE IN TOLERANCE

OPERATOR / *Operatore*	C.Q. COSTRUTTORE *Manufacturer Q.C.*	ISPETTORE CLIENTE Client Inspector	ISPETTORE / Inspector
	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 9/9/24 Signature	Quality Control Dept. Cerato Alex per Rosetti Marino SpA	☒ Review ☐ Witness Date: 09/09/24 Name:
DATA/Date 09-Sept.-2024	DATA/Date 09-Sept.-2024	DATA/Date 09 09 2024	DATA/Date

MOD. ND106/1 Rev. 0 1 2 3 4 5

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 5.5

PWHT procedure and PWHT diagram check records

TRATER TRATTAMENTI TERMICI INDUSTRIALI

Trattamento termico N° 2024091308K Del 13/09/2024
Heat treatment N° Of

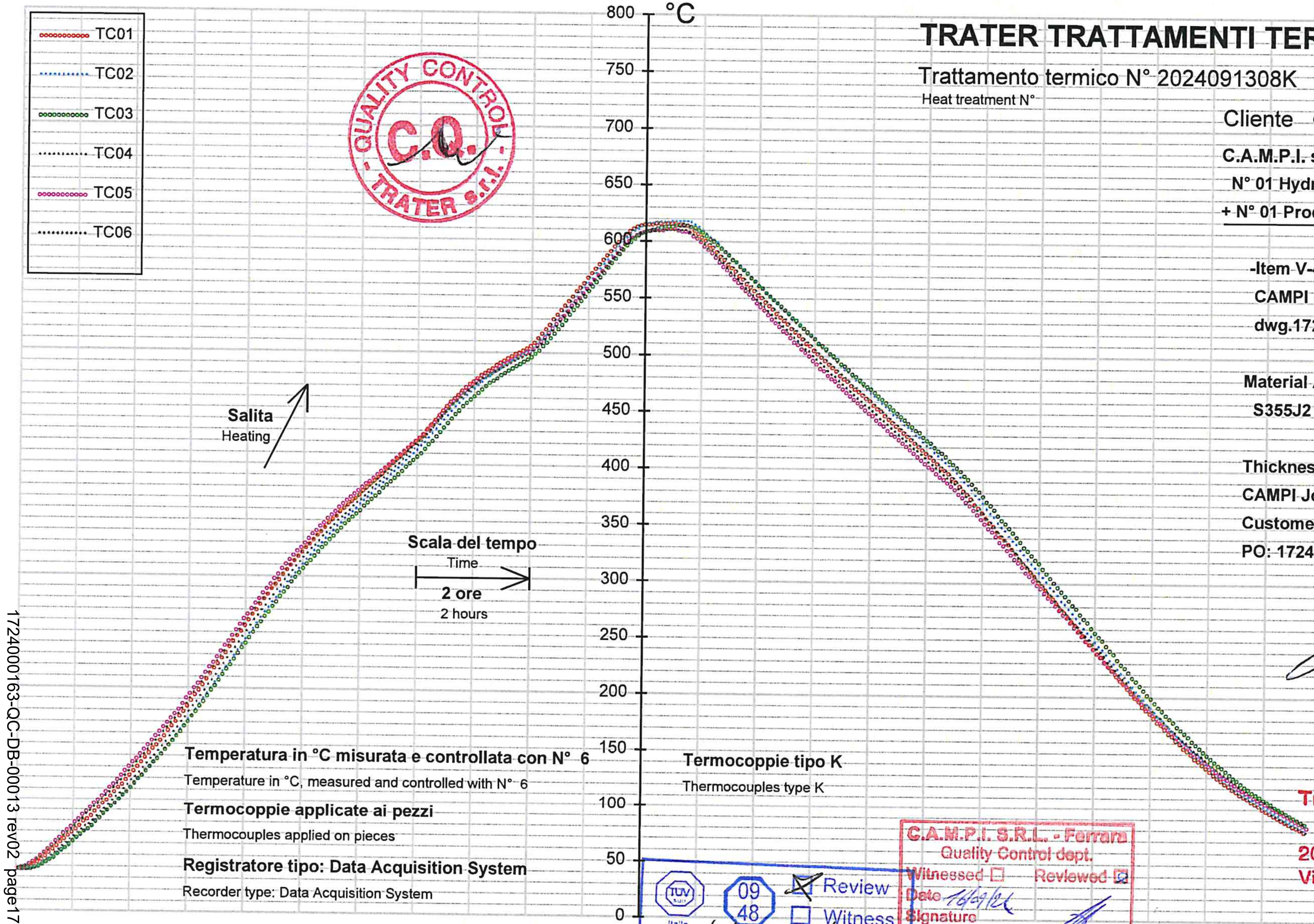
Cliente Customer: C.A.M.P.I. s.r.l.

Oggetto Object:
N° 01 Hydrogen vent KO drum
+ N° 01 Production test plate

-Item V-43001 SN.24-003
CAMPI dwg. 24003-VE-10
dwg.1724000163-MAC-DA-00004 Rev.2 -

Material ASME SA320 Gr.L7 / SA-194 Gr.7
S355J2 / SA516 Gr.70 / SA-350 LF2 Cl.1

Thickness: 8 ÷ 10 mm
CAMPI Job 24003(123A90)
Customer: CROSSWIND
PO: 1724000163



Temperatura in °C misurata e controllata con N° 6
Temperature in °C, measured and controlled with N° 6

Termocoppie applicate ai pezzi
Thermocouples applied on pieces

Registratore tipo: Data Acquisition System
Recorder type: Data Acquisition System

Termocoppie tipo K
Thermocouples type K

QUALITY CONTROL C.Q. - TRATER s.r.l.

TRUE COPY TO ORIGINAL
TRATER s.r.l.

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date 14/09/24
Signature

TÜV Italia 09 48
☒ Review
☐ Witness
Date: 07/10/24 Name:

Trattamenti Termici Industriali
TRATER s.r.l.
20834 NOVA MILANESE (MB)
Via S. Pellico, 69 ☎ 0362/40817

Il responsabile tecnico

Cliente *C.A.M.P.I. s.r.l.* Customer	**Comm. TRATER** 2024091009 - 2024091215 TRATER'S job	**Pagina** *1 / 4* Page

Rapporto di esecuzione n° TT0416092024 **Del** 16/09/2024
Report n° date

HEAT TREATMENT REPORT

Tipo di trattamento PWHT
Heat treatment type

Metodo di trattamento In Oven
Method of heat treatment

Componenti e materiale N° -1- Hydrogen vent KO drum
Items and materials N° -1- Production test plate

-Item V-43001 SN.24-003
CAMPI dwg. 24003-VE-10
dwg.1724000163-MAC-DA-00004 Rev.2 -

Material ASME SA320 Gr.L7 / SA-194 Gr.7
S355J2 / SA516 Gr.70 / SA-350 LF2 Cl.1

Thickness: 8 ÷ 10 mm
CAMPI Job 24003(123A90)
Customer: CROSSWIND
PO: 1724000163

Riferimenti a specifiche Proc.24003-HT415AS Rev.0
Codes and standard

TRUE COPY TO ORIGINAL
TRATER s.r.l.

Data - date *16/09/2024* *TRATER il Responsabile* Trattamenti Termici Industriali TRATER S.r.l. Via S. Pellico, 69 ☎ 0362/40817	**Data** - date *16/09/2024* TRATER Controllo Qualità QUALITY CONTROL C.Q. TRATER s.r.l.	**Data** - date C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 16/9/24 Signature	**Data** - date **ENTE** TÜV SÜD Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:	**Data** - date **ENTE**

Cliente *C.A.M.P.I. s.r.l.* Customer	Comm. TRATER 2024091009 - 2024091215 TRATER'S job	Pagina *2 / 4* Page

Rapporto di esecuzione n° TT0416092024 **Del** 16/09/2024
Report n° date

Diagramma di trattamento n° **2024091308K** **Data del trattamento** 13/09/2024
Diagram chart n° Date of heat treatment

Forno N° F02 **Tipo** Tunnel **Combustibile** Natural Gas
Oven n° Type Fuel

CICLO TERMICO PRESCRITTO
SPECIFIED THERMAL CYCLE

Temperatura di immissione Loading temperature	*Ambient*
Gradiente di riscaldamento Heating rate	*< 80°C/h*
Temperatura di permanenza Soaking temperature	*610°C ± 10°C*
Tempo di permanenza minimo Minimum soaking time	*1 Hour*
Modalità di raffreddamento Cooling type	*Controlled in oven*
Gradiente di raffreddamento Cooling rate	*< 80°C/h*
Temperatura di estrazione Unloading temperature	*< 150°C*
Temperatura di fine registrazione End recording temperature	*< 150°C*

CICLO TERMICO RILEVATO DAL DIAGRAMMA
THERMAL CYCLE READ ON TIME/TEMPERATURE CHART

Temperatura di immissione Entry temperature in the oven	*Ambient*
Gradiente medio di riscaldamento Medium heating rate	*55°C/h*
Max differenza di temp. in riscaldam. Max difference of temperature during heating	*25°C*
Range di temperatura di permanenza Range of soaking temperature	*600°C ÷ 618°C*
Tempo di permanenza nel range prescritto Soaking time in the specified range	*72 minutes*
Gradiente medio di raffreddamento Medium cooling rate	*51°C/h*
Max differenza di temp. in raffredd. Max difference of temperature during cooling	*23°C*
Temperatura di fine registrazione End recording temperature	*86°C*

Registratore/i:
Recorder/s:

Registratore N° Recorder ID	*53*
Tipo Type	*Digital*
Marca Manifacturer	*Keithley*
Certificato/i di calibrazione n° Calibration certificate n°	*R-53-24-5-LT*

Termocoppie: / Thermocouples:

Termocoppie N° Thermocouples n° *6* **Tipo** *K* Type

Classe di precisione Class of accuracy *ASTM E 230 Special*

N° / SN / ID	Certificato/i di collaudo n° Verification certificate n°
24-070	24-070-BT-LT

Application of thermocouples according to TRATER proc. 09-TT-03 rev.15

DISPOSIZIONE TERMOCOPPIE
LOCATION THERMOCOUPLES

Vedi allegato - See sketch

Si certifica che il trattamento termico risulta in accordo con la specifica summenzionata.
We certify that the heat treatment is in according to the named specification.

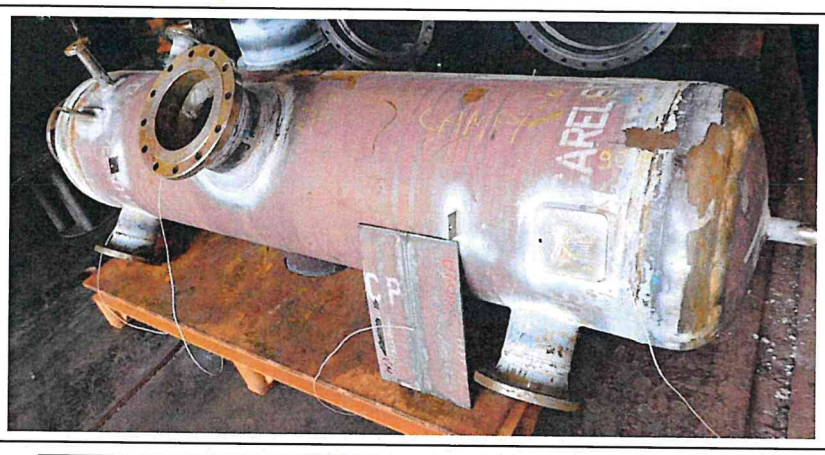
TRUE COPY TO ORIGINAL
TRATER s.r.l.

Data - date *16/09/2024*	Data - date *16/09/2024*	Data - date	Data - date	Data - date
TRATER il Responsabile	TRATER Controllo Qualità		ENTE	ENTE
Trattamenti Termici Industriali TRATER s.r.l. Via S. Pellico, 69 ☎ 0362/40817	QUALITY CONTROL C.Q. TRATER s.r.l.	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 16/09/24 Signature	TÜV SÜD Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:	

Cliente Customer	C.A.M.P.I. S.r.l.	**Comm. TRATER** TRATER'S Job nr.	2024091009-2024091215	**Pagina** Page	3/4
Rapporto di esecuzione nr. Report nr.		TT 0416092024		**Del** Date	16/09/2024

DISPOSIZIONE DEI MANUFATTI IN FORNO

Supporting method of the items in the oven



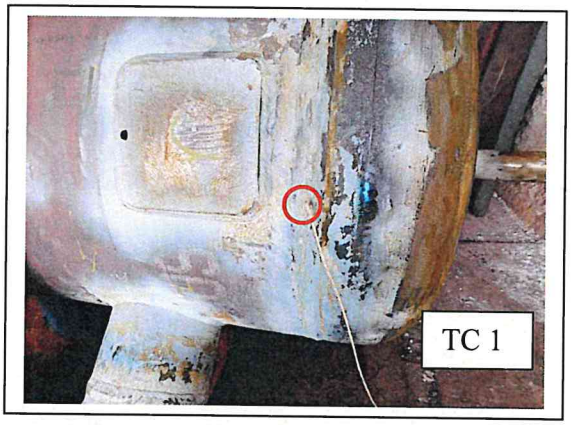


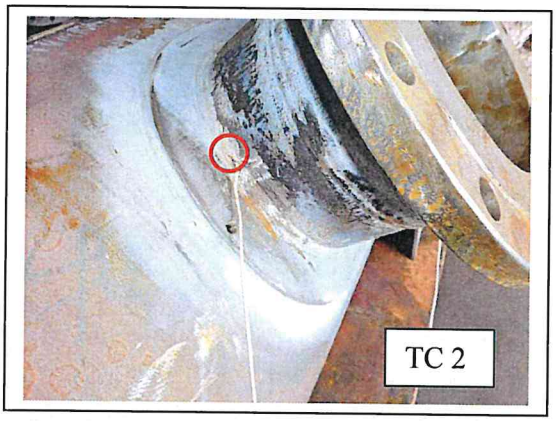
TRUE COPY TO ORIGINAL
TRATER s.r.l.

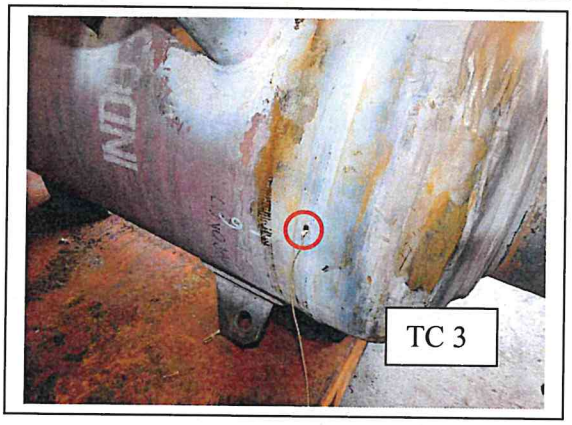
Data date	Data date	Data date	Data date	Data date
16/09/2024	16/09/2024			
Trater - il Responsabile	Trater - Controllo.Qualità.			
Trattamenti Termici Industriali TRATER S.r.l. Via S. Pellico, 69 ☎ 0362/40817	QUALITY CONTROL C.Q. TRATER s.r.l.	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 16/09/24 Signature	TÜV SÜD Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:	

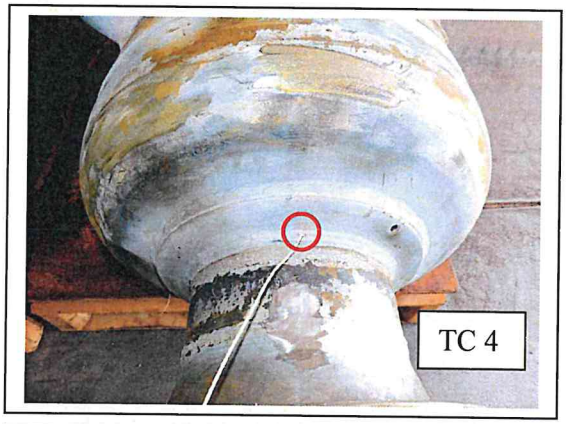
Cliente Customer	**C.A.M.P.I. S.r.l.**	**Comm. TRATER** TRATER'S Job nr.	**2024091009-2024091215**	**Pagina** Page	4/4
Rapporto di esecuzione nr. Report nr.		**TT 0416092024**		**Del** Date	16/09/2024

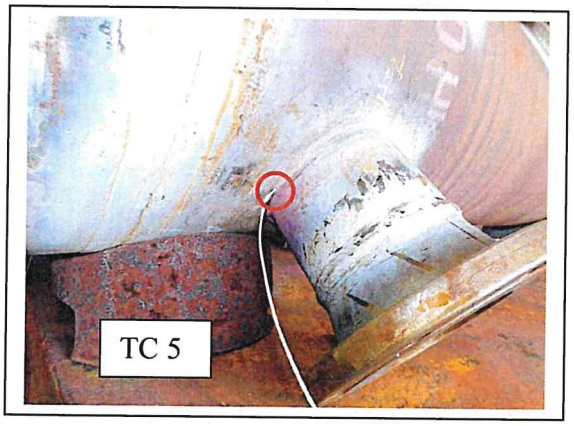
DISPOSIZIONE DELLE TERMOCOPPIE
Location of the thermocouples

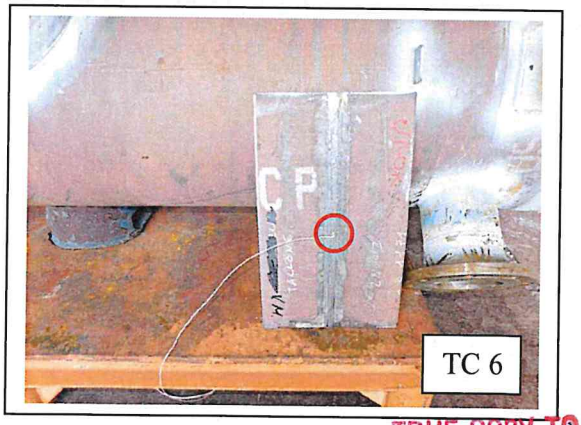












Data date 16/09/2024	Data date 16/09/2024	Data date	Data date	Data date
Trater - il Responsabile Trattamenti Termici Industriali TRATER s.r.l. Via S. Pellico, 69 ☎ 0362/40817	*Trater - Controllo Qualità.* QUALITY CONTROL C.Q. TRATER s.r.l.	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☑ Date 16/9/24 Signature	TÜV SÜD Italia 09 48 ☒ Review ☐ Witness Date: 17/09/24 Name:	

TRUE COPY TO ORIGINAL TRATER s.r.l.

TRATER S.r.l. Tel 0362 40817 e-mail ufftec@trater.it

TRA TER - LabTer Laboratorio di Termometria interno - Internal Department of thermometry

CERTIFICATO DI TARATURA N°

Calibration certificate n°

R-53-24- 5-LT del 04/09/2024

of

Oggetto : Collaudo termometrico periodico, bimestrale
Object Periodical thermometric testing, bimonthly

Eseguito su On	REGISTRATORE DIGITALE *DIGITAL RECORDER*
Numero Seriale **Serial Number**	**53**
Costruttore **Manifacturer**	**KEITHLEY**
Modello **Model**	**2701 Ethernet Multimeter**
Matricola Register	4058058
Tipo Type	Ethernet
Ingresso Input	V-Re-J-K-N-T-E-R-S-B
Numero massimo canali Max number of pins	72
Classe di accuratezza Class of accuracy	0,2°C
Sensibilità Sensibility	0,001°C
Scala di registrazione Range of themperature	0° - 1200°C.
Tempo standard di acquisizione Standard acquisition time	1 minuto 1 minute
Ampiezza scala Excursion scale	Display

TRUE COPY TO ORIGINAL
TRATER s.r.l.

Esito della taratura per confronto - Result of calibration by comparison

In accordo alla procedura TRATER n° 11-TT-02 ultima revisione,
con l'utilizzo del calibratore primario Eurotron EasyCal Tc+ matr.2702D F 35 0162 A

certificato di calibrazione n° Irving 80 LAT 238 1145CT-24 l'oggetto del collaudo risulta

In accordance with the procedure TRATER No. 11-TT-02 last revision., using the primary calibrator Eurotron Easycal Tc + matr.2702D F 35 0162 A

calibration certificate n° Irving 80 LAT 238 1145CT-24 the object of testing is

Conforme Conforming [X]

Non conforme Non-compliant [ ]

alla classe di accuratezza dichiarata dal costruttore dell'apparecchio, **0,2°C**
the accuracy class declared by the manufacturer of the appliance,

e idoneo all'utilizzo in impianto quale strumento per il controllo e la misura della temperatura.
and suitable for use in the plant as a tool for controlling and measuring temperature.

Scadenza del collaudo **4 novembre 2024**
Date out calibration

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date 16/09/24
Signature

Il Responsabile di laboratorio
Grassi Stefano
TRATER S.r.l. LABORATORIO TERMOMETRIA

TRATER - LabTer Laboratorio di Termometria interno - *Internal Department of thermometry*

CERTIFICATO DI COLLAUDO AL RICEVIMENTO E IDENTIFICAZIONE TRATER

Trater testing and identification certificate of thermometric devices

n° 24-070 -BT- LT
n°

del 25 Marzo **2024**
of *25 March* *2024*

In accordo alla ns. procedura n° **11-TT-01** **ultima revisione** **si certifica che:**
according to our procedure n ° ***11-TT-01*** ***last revision*** **we hereby certify that:**

La matassa numero **24-070**
The reel number

Tipo K Modello Trater -BT- lunghezza 520 metri Fornitore TERMICS
Type Trater's model length meters Supplier

ricavate da un lotto di filo da 1.575 metri totali, denominato N° 2424
achieved from a batch of wire from *total meters,* *named N°*

da cui, in base alla norma AMS2750E, è stato ricavato il seguente campione, sottoposto a taratura, secondo procedure ACCREDIA.

from which, in accordance with standard AMS2750E, the following sample was achieved and subjected to calibration, according to ACCREDIA procedure.

numero progressivo	certificato ACCREDIA LAT n°	del
serial number	*ACCREDIA LAT certificate n °*	*of*
2424	241 0639A24	19/3/2024

rientrando nella classe **ASTM E230 Special tollerance** **è conforme all'utilizzo**
resulting in accordance with the class ***is compliant for use***

in impianto quale strumento per il controllo e la misura della temperatura.
in plants as a tools for the control and measurement of temperature.

Scadenza del collaudo **esaurimento matassa** max 1 anno
Expiration date ***exhaustion of reel*** max 1 year

La validità della taratura è conforme alla scadenza temporale indicata nelle norme di riferimento applicabili alle commesse in esecuzione.

The validity of the calibration complies with the time limit indicated in the reference standards applicable to the job in progress.

Allegati: certificato n° 241 0639A24
Attachments: *certificate n°*

TRUE COPY TO ORIGINAL TRATER s.r.l.

Il Responsabile di Laboratorio

Grassi Stefano

LABTER

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date 11/03/24
Signature

Metrologie Srl

Via S.Predengo, 27/29
Loc. S.Abramo
26022 Castelverde (CR)
Tel.+39 0372807529
Fax +39 0372027800
info@metrologie.it
www.metrologie.it

Centro di Taratura LAT N° 241
Calibration Centre
Laboratorio Accreditato di Taratura
Accredited Calibration Laboratory

LAT N° 241

CERTIFICATO DI TARATURA LAT 241 0639A24
Certificate of Calibration

- data di emissione *date of issue*	2024-03-19
- cliente *customer*	Trater Trattamenti Termici Industriali Milano Srl Viale Piave, 28 - 20129 Milano (MI)
- destinatario *receiver*	Trater Trattamenti Termici Industriali Milano Srl Viale Piave, 28 - 20129 Milano (MI)

Il presente certificato di taratura è emesso in base all'accreditamento LAT N° 241 rilasciato in accordo ai decreti attuativi della legge n. 273/1991 che ha istituito il Sistema Nazionale di Taratura (SNT). ACCREDIA attesta le capacità di misura e di taratura, le competenze metrologiche del Centro e la riferibilità delle tarature eseguite ai campioni nazionali e internazionali delle unità di misura del Sistema Internazionale delle Unità (SI).
Questo certificato non può essere riprodotto in modo parziale, salvo espressa autorizzazione scritta da parte del Centro.

This certificate of calibration is issued in compliance with the accreditation LAT N° 241 granted according to decrees connected with Italian law No. 273/1991 which has established the National Calibration System. ACCREDIA attests the calibration and measurement capability, the metrological competence of the Centre and the traceability of calibration results to the national and international standards of the International System of Units (SI).
This certificate may not be partially reproduced, except with the prior written permission of the issuing Centre.

Si riferisce a
Referring to

- oggetto *-item*	Termocoppia
- costruttore *manufacturer*	Termics - I
- modello *model*	Tipo "K" 006891
- matricola *serial number*	Lotto Trater N°2424 (*)
- data di ricevimento oggetto *date of receipt of item*	2024-03-07
- data delle misure *date of measurements*	2024-03-15 al 2024-03-18
- registro di laboratorio *laboratory reference*	0639-24

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure di taratura citate alla pagina seguente, dove sono specificati anche i campioni o gli strumenti che garantiscono la catena di riferibilità del Centro e i rispettivi certificati di taratura in corso di validità. Essi si riferiscono esclusivamente all'oggetto in taratura e sono validi nel momento e nelle condizioni di taratura, salvo diversamente specificato.

The measurement results reported in this Certificate were obtained following the calibration procedures given in the following page, where the reference standards or instruments are indicated which guarantee the traceability chain of the laboratory, and the related calibration certificates in the course of validity are indicated as well. They relate only to the calibrated item and they are valid for the time and conditions of calibration, unless otherwise specified.

Le incertezze di misura dichiarate in questo documento sono state determinate conformemente alla Guida ISO/IEC 98 e al documento EA-4/02. Solitamente sono espresse come incertezza estesa ottenuta moltiplicando l'incertezza tipo per il fattore di copertura k corrispondente ad un livello di fiducia di circa il 95 %. Normalmente tale fattore k vale 2.

The measurement uncertainties stated in this document have been determined according to the ISO/IEC Guide 98 and to EA-4/02. Usually, they have been estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor k corresponding to a confidence level of about 95%. Normally, this factor k is 2.

Direzione tecnica
(Approving Officer)
Stefano Lucchini

(*) Dato fornito dal cliente
(*) Data provided by the customer

TRUE COPY TO ORIGINAL
TRATER s.r.l.

TRATER S.r.l. LABTER LABORATORIO TERMOMETRIA

Gusti Stefano

Metrologie Srl

Via S.Predengo, 27/29
Loc. S.Abramo
26022 Castelverde (CR)
Tel.+39 0372807529
Fax +39 0372027800
info@metrologie.it
www.metrologie.it

Centro di Taratura LAT N° 241
Calibration Centre
Laboratorio Accreditato di Taratura
Accredited Calibration Laboratory

LAT N° 241

CERTIFICATO DI TARATURA LAT 241 0639A24
Certificate of Calibration

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure N.
The measurement results reported in this Certificate were obtained following procedures No.

P04T rev.06; P09T rev.02

La catena di riferibilità ha inizio dai campioni di riferimento N.
Traceability chain starts from the reference standards No.

PNM00, PTC02, PTR01

muniti di certificati validi di taratura rispettivamente N.
with their certificates of calibration No.

23-0419-01, 2023030003/1/PM03, LMK0723P811 - emessi da I.N.RI.M., UKAS N°0478, LMK LK-002

La taratura della termocoppia viene eseguita secondo il seguente procedimento:
The calibration of the thermocouple is performed according to the following method:

Le letture di f.e.m. vengono eseguite con il giunto di riferimento a 0 °C in una miscela di ghiaccio di acqua deionizzata satura d'aria.
E.m.f. readings are carried out with the reference junction at 0 °C in reference bath, of a mixture of ice and distilled water, saturated with air.

da 150°C a 250°C	In bagno termostatico ad olio, per confronto con termometro a resistenza campione, immersione / In oil stirred bath, for comparison with sample resistance thermometer, immersion 280 mm
a 400°C	In bagno termostatico a sali fusi per confronto con termometro campione a resistenza di platino, immersione / In salt stirred bath, for comparison with sample resistance thermometer, immersion 400 mm
da 560°C a 660°C	In forno termostatico verticale con blocco equalizzatore, per confronto con termocoppia campione, immersione / In vertical furnace with equalization block, for comparison with sample thermocouple, immersion 435 mm

Le misure sono state effettuate nelle seguenti condizioni ambientali:
Environmental conditions of the calibration

-Termocoppia in taratura

Thermocouple in calibration

Temperatura (*temperature*): 24°C ± 4,0°C

-Strumentazione campione di misura segnali elettrici

Instrumentation for measuring electrical signals

Temperatura *(temperature)*: 23 °C ± 2,0°C
Umidita' relativa *(relative humidity)*: 50 %U.R. ± 20%U.R.
Alimentazione *(power supply)*: 230 V ± 5% /50 Hz ± 6%

Dichiarazione di conformità:

Declaration of conformity:

Si dichiara che tutti i valori della colonna "differenza (t_{spe}-t_{rif})" della tabella riepilogativa dei risultati di pagina 3, giacciono entro i valori di tolleranza "Special " indicati nella tabella 1 di pagina 4, della norma ASTM E230-17.

We declare that all values of the column 'difference (t_{spe}-t_{rif})' of the summary table results of page 3, lie on within the tolerance values 'Special' in Table 1 on page 4, ASTM E230-17

La regola decisionale applicata per la valutazione della conformità dei risultati alla norma, è la seguente:

The decision rule applied to evaluate the conformity of the results to the standard, is as follows:

Un risultato di misura viene accettato come conforme quando esso cade entro l'intervallo di tolleranza, altrimenti detta zona di specifica, indicato nella norma. Il tal caso l'incertezza estesa associata al risultato di misura soddisfa il criterio U≤T/2,5.

A measurement result is accepted as compliant when it lies within the tolerance interval (specification interval), indicated in the standard. In this case the expanded uncertainty associated with the measurement result satisfies U≤T/2,5

Legenda *Legend* :
T: Intervallo di tolleranza *Tollerance interval*
U: Incertezza estesa *Expanded uncertainty*

TRUE COPY TO ORIGINAL
TRATER s.r.l.
TRATER S.R.L. LABTER
Grassi Stefano

Metrologie Srl

Via S.Predengo, 27/29
Loc. S.Abramo
26022 Castelverde (CR)
Tel.+39 0372807529
Fax +39 0372027800
info@metrologie.it
www.metrologie.it

Centro di Taratura LAT N° 241
Calibration Centre
Laboratorio Accreditato di Taratura
Accredited Calibration Laboratory

LAT N° 241

CERTIFICATO DI TARATURA LAT 241 0639A24
Certificate of Calibration

RISULTATI DELLA TARATURA
Calibration results

Oggetto: Termocoppia
Item
Modello: Tipo "K" 006891
Model
Matricola: Lotto Trater N°2424 (*)
Serial number

N°	Temperatura di riferimento /°C	f.e.m. sperimentale /mV	f.e.m di riferimento (1) IEC 60584-1 ed 3.0 /mV	Differenza ($f.e.m._{spe}$-$f.e.m._{rif}$) /mV	Differenza (t_{spe}-t_{rif}) /°C	Incertezza estesa /°C
1	149,81	6,1210	6,1305	-0,0095	-0,24	0,42
2	249,64	10,1169	10,1387	-0,0218	-0,54	0,52
3	399,44	16,3560	16,3734	-0,0174	-0,41	0,81
4	562,9	23,313	23,326	-0,013	-0,3	1,5
5	602,7	25,009	25,019	-0,010	-0,2	1,5
6	661,9	27,519	27,528	-0,009	-0,2	1,6
N°	*Reference temperature /°C*	*Sperimental e.m.f /mV*	*Reference e.m.f IEC60584 /mV*	*Difference ($e.m.f._{spe}$-$e.m.f._{rif}$) /mV*	*Difference (t_{spe}-t_{rif}) /°C*	*Expanded uncertainty /°C*

NOTE (*Notes*):
(1) La f.e.m di riferimento è calcolata a partire dalla temperatura di riferimento, utilizzando la specifica funzione della norma indicata in tabella.
(1) The reference f.e.m is calculated from the reference temperature, using the specific function of the standard indicated in the table.

Stato di utilizzo della termocoppia *(Usage status of the thermocouple)*: Nuova, prima taratura (*) *(New, first calibration)*

Trattamenti preliminari e sequenza di esecuzione delle misure *(Preliminary treatments and measurement execution order)*:
La termocoppia è nuova, prima taratura, Il limite superiore del campo di taratura è maggiore di 500°C, quindi la taratura è stata eseguita per valori di temperatura crescenti. Per la valutazione del contributo di stabilità della termocoppia in taratura, si esegue un punto a 560°C, e lo si ripete al decrescere della temperatura dopo l'esecuzione del punto alla temperatura più elevata. Lo scostamento sperimentale tra i due punti di taratura ripetuti, è stato di: 0,1 °C

The thermocouple is new, first calibration, the upper limit of the calibration range is greater than 500 °C, then the calibration has been performed for increasing temperature values. For the evaluation of the contribution to stability of the thermocouple, has been executed a point at 560 °C, and it is repeated with decreasing temperature after execution of the point at the highest temperature. The experimental deviation between the two repeated calibration points was: 0,1 °C

Inomogeneità lungo i fili della termocoppia *(Inhomogeneity of the thermocouple wires)*:
espressa richiesta del cliente intestatario del certificato, non è stata eseguita la misura per la sua valutazione. Per cui, come raccomandato nella linea guida per la calibrazione di termocoppie EURAMET cg-8 Version 3.1 (02/2020), viene stimata pari al 0,1% del valore di temperatura misurato.

At the express request of the client, the measurement for its evaluation has not been performed. Therefore, as recommended in the EURAMET cg-8 calibration guideline Version 3.1 (02/2020), it is estimated to be 0,1% of the measured temperature.

Collegamenti *(Connections)*:
La termocoppia è della tipologia a fili integrali
The thermocouple is of a type of integral wires

Legenda *Legend* :
$f.e.m_{spe}$: f.e.m sperimentale *Experimental f.e.m*
$f.e.m_{rif}$: f.e.m di riferimento. *Reference e.m.f.*
t_{spe}: Temperatura calcolata a partire dalla f.e.m sperimentale, utilizzando la specifica funzione della norma indicata in tabella. *Temperature calculated from the experimental e.m.f, using the specific function of the standard indicated in the table.*
t_{rif}: Temperatura di riferimento. *Reference temperature.*

(*) Dato fornito dal cliente
(*) Data provided by the customer

TRUE COPY TO ORIGINAL
TRATER s.r.l.

TRATER S.R.L. LABTER LABORATORIO TERMOMETRIA

Grassi Stefano

METROLOGIE

Laboratorio di Taratura – Formazione e Consulenza
Noleggio – Vendita Strumentazione

Metrologie S.r.l.
Via S. Predengo, 27/29
Località Costa S. Abramo
26022 Castelverde (CR)
Telefono 0372 807529
e-mail info@metrologie.it
sito www.metrologie.it

Castelverde, 25 marzo 2024

Spett.le
TRATER Srl
Via Silvio Pellico, 71
20834 Nova Milanese (MB)

Oggetto: Dichiarazione lotto di appartenenza
Subject: Declaration of belonging lot

Dichiariamo che la termocoppia tipo "K" mod. 006891 Sn. Lotto Trater N°2424, munita di certificato di taratura N° 0639A24 del 2024-03-19, è stata ricavata dal lotto di 1575 metri della matassa di cavo lotto N° ODV23-03670/10 composto da N°3 bobine lotto 24069, 24070, 24071.
We declare that the thermocouple type "K" mod. 006891 Sn. Lotto Trater N°2424 with calibration certificate N°0639A24 of 2024-03-19, was obtained from the 1575 meters coil of cable lot N° ODV23-03670/10 composed of N°3 coil lot number 24069, 24070, 24071.

Responsabile del laboratorio
(Head of the laboratory)

TRUE COPY TO ORIGINAL
TRATER s.r.l.

TRATER s.r.l. LABTER LABORATORIO TERMOMETRIA

Gnas Stefano

Cliente Customer	**C.A.M.P.I. s.r.l.**	**Comm. TRATER** TRATER'S Job n°	**2024091009**	**Pagina** Page	1/3
Rapporto di esecuzione n° Report n°	**CN0516092024/DU**			**Del** Date	16/09/2024

HARDNESS TEST CERTIFICATE

Riferimenti a specifiche Codes and standard: Proc. N°24003-HRD-01 Rev.0

Componenti e materiale
Items and materials

N° 01 Hydrogen vent KO drum

-Item V-43001 SN.24-003
CAMPI dwg. 24003-VE-10
dwg.1724000163-MAC-DA-00004 Rev.2 -

Material ASME SA320 Gr.L7 / SA-194 Gr.7
S355J2 / SA516 Gr.70 / SA-350 LF2 Cl.1

Thickness: 8 ÷ 10 mm
CAMPI Job 24003(123A90)
Customer: CROSSWIND
PO: 1724000163

TRUE COPY TO ORIGINAL
TRATER s.r.l.

Data date 16/09/2024	Data date 16/09/2024	Data date	Data date	Data date
Trater - il Responsabile Trattamenti Termici Industriali TRATER S.r.l. Via S. Pellico, 69 ☎ 0362/40817	Trater – Controllo Qualità QUALITY CONTROL C.Q. TRATER s.r.l.	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 16/9/24 Signature	TÜV Italia 09 48 ☒ Review ☐ Witness Date: 07/10/24 Name:	

Cliente Customer	**C.A.M.P.I. s.r.l.**	**Comm. TRATER** TRATER'S Job n°	**2024091009**	**Pagina** Page	2/3
Rapporto di esecuzione n° Report n°	**CN0516092024/DU**			**Del** Date	16/09/2024

Stato superficiale del pezzo/i
Surface status test

Grezzo Rough	☐	**Lavorato di macchina** Machined	☐	**Sabbiato** Abrasive blasted	☐
Sgrossato Roughshaped	☐	**Come saldato** As welded	X	**Trattato termicamente** Stress relieving	X
Molato Ground	X	**Finito** Machine-finished	☐	_____	☐

Metodo di preparazione della superficie Surface preparation method — **Lucidato Ra < 3 µm** Polished

Metodo di controllo
Test method

BRINNEL	X	HB		HB_{30}		HBW
VICKERS		HV_5		HV_{10}		
ROCKWELL		HRC				

Apparecchio utilizzato Apparatus: ERNST Handy Esatest mar.260

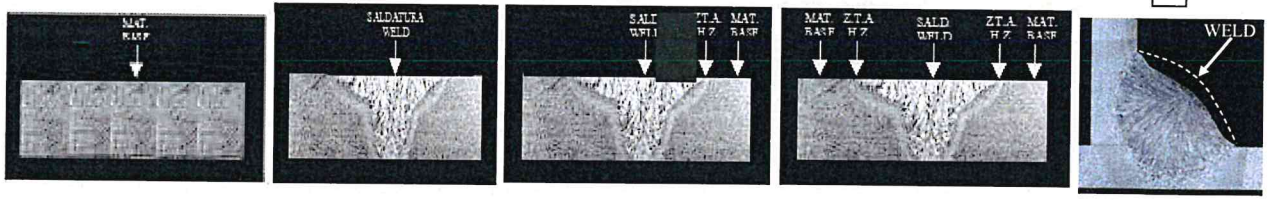
Certificato di calibrazione Calibration certificate: 150923/1ML

Data di esecuzione delle misure Date of measurements execution: **14-09-2024**

TRUE COPY TO ORIGINAL
TRATER s.r.l.

Posizioni di misura, sulla superficie esterna del pezzo
Measurement points on the external side of the item

☐ ☐ X X ☐

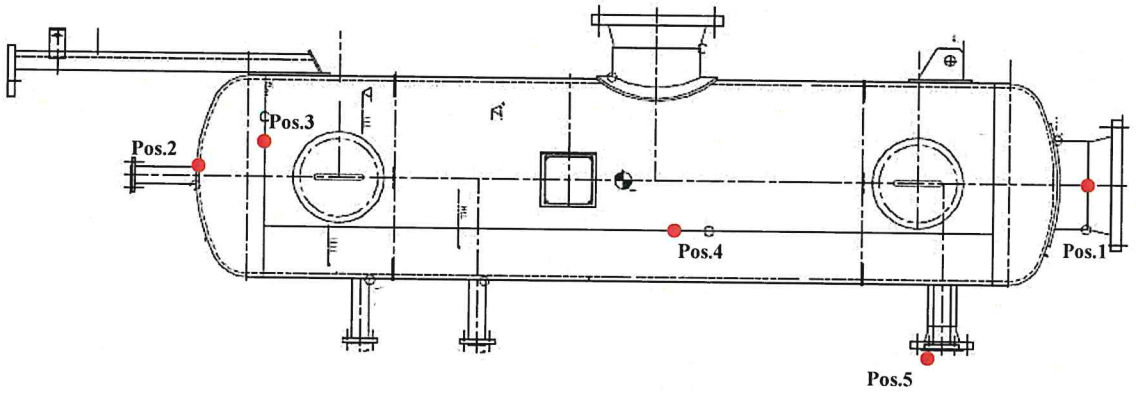


Data date	Data date	Data date	Data date	Data date
16/09/2024	16/09/2024			
Trater - il Responsabile	*Trater – Controllo Qualità*			
Trattamenti Termici Industriali TRATER s.r.l. Via S. Pellico, 69 ☎ 0362/40817	QUALITY CONTROL C.Q. TRATER s.r.l.	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 14/9/24 Signature	TÜV Italia 09 48 ☒ Review ☐ Witness Date: 08/10/24 Name:	

Cliente Customer	**C.A.M.P.I. s.r.l.**	**Comm. TRATER** TRATER'S Job n°	**2024091009**	**Pagina** Page	3/3
Rapporto di esecuzione n° Report n°	**CN0516092024/DU**			**Del** Date	16/09/2024

Valori di durezza rilevati dopo trattamento termico

Pos.	Saldatura	Z.T.A.	Materiale Base	Z.T.A.	Materiale Base
1	173 HB	**Lato tubo** 184 HB	**Lato tubo** 146 HB	**Flangia** 184 HB	**Lato flangia** 132 HB
2	158 HB	/	**Lato tubo** 129 HB	/	**Lato fondo** 144 HB
3	160 HB	**Lato fondo** 165 HB	**Lato fondo** 126 HB	**Lato virola** 173 HB	**Lato virola** 145 HB
4	156 HB	**Verso il bocchello** 177 HB	**Verso il bocchello** 147 HB	180 HB	148 HB
5	166 HB	/	**Lato tubo** 141 HB		**Lato virola** 147 HB



TRUE COPY TO ORIGINAL
TRATER s.r.l.

Data date	Data date	Data date	Data date	Data date
16/09/2024	16/09/2024			
Trater - il Responsabile Trattamenti Termici Industriali TRATER s.r.l. Via S. Pellico, 69 ☎ 0362/40817	*Trater – Controllo Qualità* QUALITY CONTROL C.Q. TRATER s.r.l.	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☐ Date 16/9/24 Signature	09 48 ☒ Review ☐ Witness Date: 02/10/24 Name:	

SIDERTEST
mechanical chemical non destructive tests
Head Office: Strada della Barianella, 1/B - 29015 Castel San Giovanni(PC) ITALY
U.O. Plant B: Viale dell Industria, 25 - 29015 Castel San Giovanni(PC) ITALY
Tel. +39 0523 881900 Fax. +39 0523 842903 sidertest@sidertest.it www.sidertest.it

Verifica di Autenticità/ Authenticity Verification

RAPPORTO DI PROVA/ TEST REPORT

PM 23983 / 24

Rif. Lab SIM (FCP) : **7726 / 24 (A / A)**

LAB N° 0864 L

Cliente/ Customer **C.A.M.P.I. Srl Via Diamantina, 15 44122 Ferrara FE**

Ordine/ Order **24003.15**

Commessa/ Job **24003**

Campione fornito da cliente/ Sample supplied by customer :Parte del prodotto finito/ part of finished product

Descrizione/ Description	Qta/ Qty	Posizione/ Item	Prova Nr./ Test Nr.	Colata/ Heat	Materiale/ Material
WELDED PLATE W.T. 10 mm	1		24003-PTP-01		**ASME SA 516-23 Gr. 60**

Osservazioni/ Observations **P.W.H.T. Trater a 610°C**

PROVA DI TRAZIONE A TEMPERATURA AMBIENTE/ Tensile test at room temperature [Decision rule: Qn]

ID Prova/ ID Specimen	Metodo di prova/ Test method	Specifica/ Specification	Dimensioni/ Dimension mm *Wth Ø / Width ØPipe*	Lo (mm)	Posizione di prelievo/ Test position	Temp./ Temp. °C	Snervamento/ Yield strength MPa		Rottura/ Tensile strength Rm MPa		Allungamento/ Elongation after fracture *A (%)*		Strizione/ Area Reduction *Z (%)*	S/R/ Ratio Yield strength / Tensile strength	Data esecuzione/ Date of Testing
130626	ASME BPVC.IX-2023 QW-150	**JOB 24003**	10,75 19,03	50,00	W T FT	23,0	(≥220) Rp0,2%	**379**	(415÷550)	**525**	(≥25)	**28,4**			07/10/2024

Note Tecniche/ Technical Notes: Broken out of weld.

Esito/ Conclusion: Conforme a 'Specifica'/ Compliant with 'Specification'

PROVA DI RESILIENZA/ Notched-bar impact test [Decision rule: Qn]

ID Prova/ ID Specimen	Metodo di prova/ Test method	Specifica/ Specification	Dimensioni/ Dimension mm *Size Width Lenght*	Posizione di prelievo/ Test position	Tipo/ Type	Temp./ Temp. °C	Energia Nominale/ Nominal Energy 750 #Fondoscala/ Full Scale — Energia Assorbita/ Absorbed energy J Valore singolo/ Single Value			Media/ Average	Area di taglio/ Shear area % Valore singolo/ Single Value	Average	Espansione laterale/ Lateral expansion mm Valore singolo/ Single Value	Media/ Average	Data esecuzione/ Date of Testing
130627	ASTM A370 – 24 § 20÷29	**JOB 24003**	7,5 x 10 x 55	B T UP -1,5	KV8	-46	(≥20,5)	**100,4**	**96,5**	**97,9**	(≥25,5) **98,3**				04/10/2024

Thermal conditioning with Cryostat and ethyl alcohol(time: min 5 minutes)

Esito/ Conclusion: Conforme a 'Specifica'/ Compliant with 'Specification'

130628	ASTM A370 – 24 § 20÷29	**JOB 24003**	7,5 x 10 x 55	H T UP -1,5	KV8	-46	(≥20,5)	**114,1**	**177,5**	**177,5**	(≥25,5) **156,4**				04/10/2024

Thermal conditioning with Cryostat and ethyl alcohol(time: min 5 minutes)

Esito/ Conclusion: Conforme a 'Specifica'/ Compliant with 'Specification'

130629	ASTM A370 – 24 § 20÷29	**JOB 24003**	7,5 x 10 x 55	W T UP -1,5	KV8	-46	(≥20,5)	**125,7**	**133,4**	**97,4**	(≥25,5) **118,8**				04/10/2024

Thermal conditioning with Cryostat and ethyl alcohol(time: min 5 minutes)

Esito/ Conclusion: Conforme a 'Specifica'/ Compliant with 'Specification'

Test Position Legend: [B]-Specimen in Base Material; [FT]-full thickness; [H]-Specimen in H.A.Z.; [T]-trasv.; [UP -1,5]-external sup. (1,5 mm); [W]-Specimen in W.M.

PRODUCTION TEST PLATE

I risultati presenti in questo rapporto di prova si riferiscono al solo campione così come ricevuto dal Cliente, che esegue il campionamento, salvo in caso di trattamenti termici effettuati dal Laboratorio. I campi in blu sono forniti dal cliente. La conformità ai documenti in "Specifica" riguarda solamente le prove presenti in questo rapporto di prova. Il simbolo * antecedente a "ID_Prova" indica una prova non accreditata da ACCREDIA. Dichiarazioni false, fittizie o fraudolente e modifiche del presente rapporto di prova costituiscono reato punibile secondo le norme penali vigenti. Il rapporto di prova non può essere riprodotto parzialmente, salvo nostra approvazione scritta. Il Laboratorio non è responsabile dei dati forniti dal cliente che possono influenzare la validità dei risultati./ This test report refers only to the examined sample as received from the Customer, except in case of heat treatments carried out by the Laboratory. Clients are in charge of sampling. Blue fields are supplied by the Client.Compliance with documents in "Specification" refers only to the tests described on this test report.The * symbol before "ID_Prova" indicates that the test is not accredited by ACCREDIA. Any false statement or modification of this test report is a violation of law and the Laboratory may take legal action.This test report cannot be partially reproduced without our written approval. Laboratory is not responsible for information supplied by the customer which can affect the validity of the result.

Data Ingresso Materiale/ Date of Material Arrival **01/10/2024**

Data Rapporto di prova/ Test Report Date **08/10/2024**

Responsabile di Reparto o sostituto/ Department Manager or Deputy

Morresi Davide

firmato elettronicamente/electronically signed

Responsabile Laboratorio o Sostituto/ Laboratory Manager or Deputy

Amani Paolo

Ispettori/ Inspector

Cliente/ Customer

Quality Control dept.
Witnessed ☐ Reviewed ☒
Date 10/10/24
Signature

DECISION RULE:
- Ql → Qualitative
- Qs → Semi-quantitative
- Qa → Quantitative (Implicit Uncertainty)
- Qi → Quantitative (Non Implicit Uncertainty) - the uncertainty is reported in the test report and is used for conformity assessment. The result can be COMPLIANT or NOT COMPLIANT

SIDERTEST
mechanical chemical non destructive tests
Head Office: Strada della Barianella, 1/B - 29015 Castel San Giovanni(PC) ITALY
U.O. Plant B: Viale dell Industria, 25 - 29015 Castel San Giovanni(PC) ITALY
Tel. +39 0523 881900 Fax. +39 0523 842903 sidertest@sidertest.it www.sidertest.it

Verifica di Autenticità/ Authenticity Verification

RAPPORTO DI PROVA/ TEST REPORT

MAC 23983 / 24

Rif. Lab SIM (FCP) : **7726 / 24 (A / A)**

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0864 L

Cliente/ Customer	Ordine/ Order	Commessa/ Job
C.A.M.P.I. Srl Via Diamantina, 15 44122 Ferrara FE	**24003.15**	**24003**

Campione fornito da cliente/ Sample supplied by customer :Parte del prodotto finito/ part of finished product

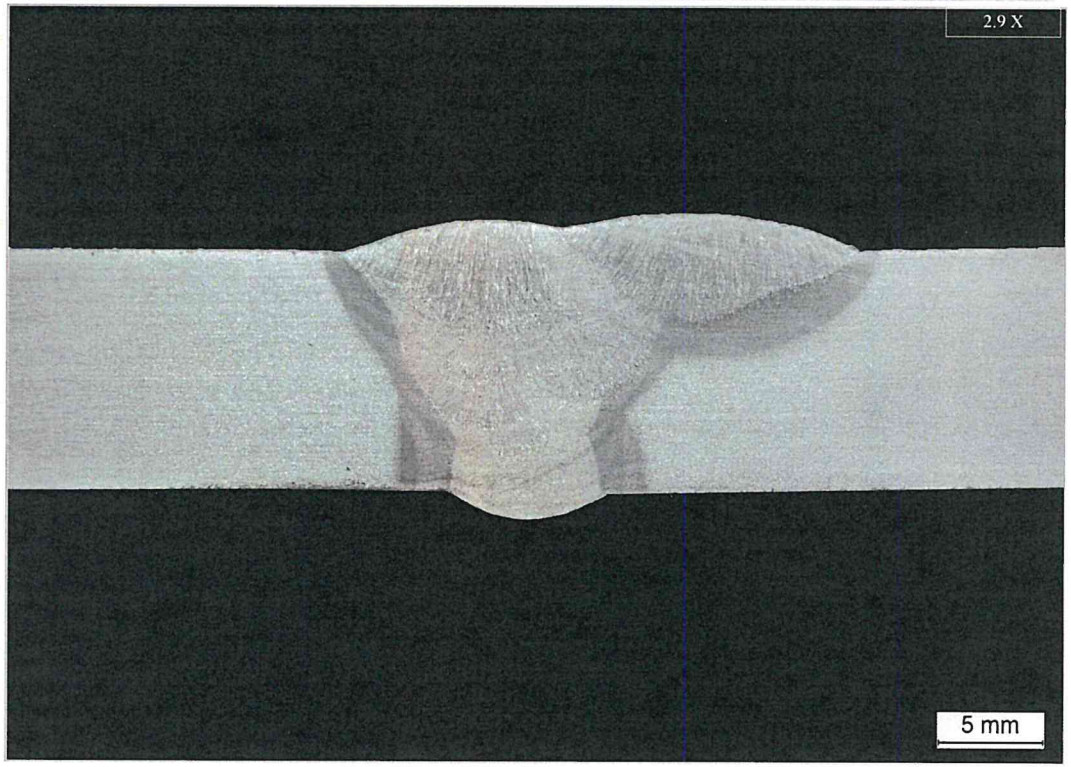
Descrizione/ Description	Qta/ Qty	Posizione/ Item	Prova Nr./ Test Nr.	Colata/ Heat	Materiale/ Material
WELDED PLATE W.T. 10 mm	**1**		**24003-PTP-01**		**ASME SA 516-23 Gr. 60**

Osservazioni/ Observations **P.W.H.T. Trater a 610°C**

ESAME MACROGRAFICO/ Macrographic examination [Decision rule: QI]

ID Prova/ ID Specimen	Metodo di prova/ Test method	Specifica/ Specification	Posizione di prelievo/ Test position	Data esecuzione/ Date of Testing
130630	ASTM E340 – 23	**JOB 24003**	BHW T FT	07/10/2024

Attacco/ Etching (Immersion)	Nital 5%
Superficie Fotografia a/ Surface Photography at	2.9 X
Superficie Esaminata a/ Surface Examined at	5 X



PRODUCTION TEST PLATE

Esito/ Conclusion: **Requisiti non specificati/ Unspecified requirements**

I risultati presenti in questo rapporto di prova si riferiscono al solo campione così come ricevuto dal Cliente, che esegue il campionamento, salvo in caso di trattamenti termici effettuati dal Laboratorio. I campi in blu sono forniti dal cliente. La conformità ai documenti in "Specifica" riguarda solamente le prove presenti in questo rapporto di prova. Il simbolo * antecedente a "ID_Prova" indica una prova non accreditata da ACCREDIA. Dichiarazioni false, fittizie o fraudolente e modifiche del presente rapporto di prova costituiscono reato punibile secondo le norme penali vigenti. Il rapporto di prova non può essere riprodotto parzialmente, salvo nostra approvazione scritta. Il Laboratorio non è responsabile dei dati forniti dal cliente che possono influenzare la validità dei risultati./ This test report refers only to the examined sample as received from the Customer, except in case of heat treatments carried out by the Laboratory. Clients are in charge of sampling. Blue fields are supplied by the Client.Compliance with documents in "Specification" refers only to the tests described on this test report.The * symbol before "ID_Prova" indicates that the test is not accredited by ACCREDIA. Any false statement or modification of this test report is a violation of law and the Laboratory may take legal action.This test report cannot be partially reproduced without our written approval. Laboratory is not responsible for information supplied by the customer which can affect the validity of the result.

Data Ingresso Materiale/ Date of Material Arrival	Responsabile di Reparto o sostituto/ Department Manager or Deputy	Responsabile Laboratorio o Sostituto/ Laboratory Manager or Deputy	Ispettori/ Inspector	Cliente/ Customer
01/10/2024				C.A.M.P.I. S.r.l. Quality Control dept. Witnessed ☐ Reviewed ☒ Date 7/11/24 Signature
Data Rapporto di prova/ Test Report Date: **08/10/2024**	*Antonielli Stefano*	*Amani Paolo*		
firmato elettronicamente/electronically signed				

DECISION RULE:
- QI → Qualitative
- Qs → Semi-quantitative
- Qn → Quantitative (Implicit Uncertainty)
- Qi → Quantitative (Non Implicit Uncertainty) - the uncertainty is reported in the test report and is used for conformity assessment. The result can be COMPLIANT or NOT COMPLIANT

Test Position Legend: [BHW]- Specimen including B.M., H.A.Z. and W.M.; [FT]-full thickness; [T]-trasv.

SIDERTEST
mechanical chemical non destructive tests
Head Office: Strada della Barianella, 1/B - 29015 Castel San Giovanni(PC) ITALY
U.O. Plant B: Viale dell Industria, 25 - 29015 Castel San Giovanni(PC) ITALY
Tel. +39 0523 881900 Fax. +39 0523 842903 sidertest@sidertest.it www.sidertest.it

Verifica di Autenticità/ Authenticity Verification

RAPPORTO DI PROVA/ TEST REPORT

DUR 23983 / 24

Rif. Lab SIM (FCP) : **7726 / 24 (A / A)**

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0864 L

Cliente/ Customer	Ordine/ Order	Commessa/ Job
C.A.M.P.I. Srl Via Diamantina, 15 44122 Ferrara FE	24003.15	24003

Campione fornito da cliente/ Sample supplied by customer :Parte del prodotto finito/ part of finished product

Descrizione/ Description	Qta/ Qty	Posizione/ Item	Prova Nr./ Test Nr.	Colata/ Heat	Materiale/ Material
WELDED PLATE W.T. 10 mm	1		24003-PTP-01		ASME SA 516-23 Gr. 60

Osservazioni/ Observations P.W.H.T. Trater a 610°C

PROVA DI DUREZZA HV10 - HV30 - HV5/ HV10 - HV30 - HV5 hardness test [Decision rule: Qn]

ID Prova/ ID Specimen	Metodo di prova/ Test method	Specifica/ Specification	Posizione di prelievo/ Test position	Temp./ Temp.	Durezza/ Hardness	Data esecuzione/ Date of Testing
130631	ASTM E92 – 23 (only Vickers)	JOB 24003	BHW T	20 °C	HV10	08/10/2024

(B1) - Base Material MAX 235

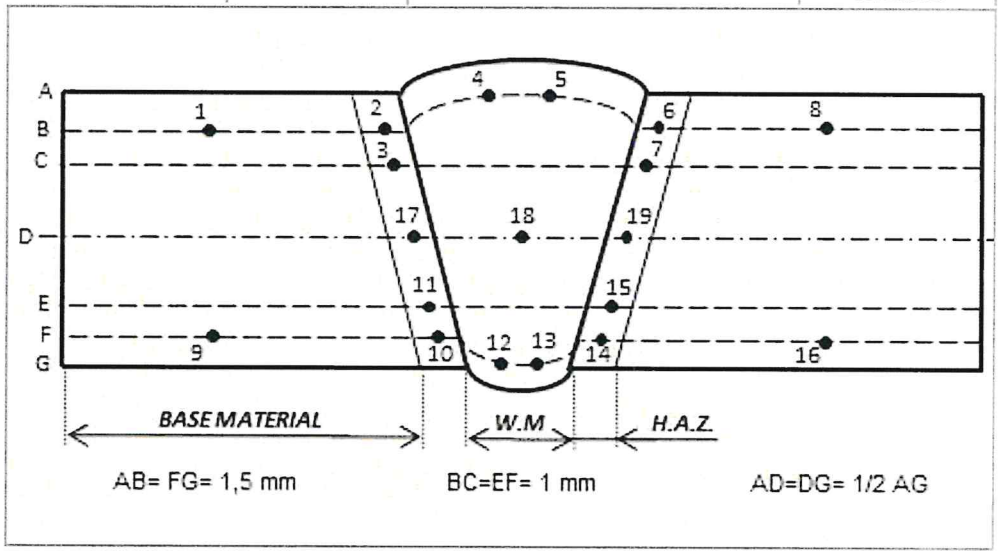
HV10	1	155	8	152	9	155	16	151

(B1_W) - Transition MAX 235

HV10	2	190	3	188	6	201	7	201	10	188	11	173
	14	173	15	167	17	165	19	150				

(W) - Weld MAX 235

HV10	4	182	5	187	12	154	13	153	18	157



Position	*Average*	
(W) - Weld	167	HV10
(B1_W) - Transition	180	HV10
(B1) - Base Material	153	HV10

Esito/ Conclusion: **Conforme a 'Specifica'/ Compliant with 'Specification'**

PRODUCTION TEST PLATE

I risultati presenti in questo rapporto di prova si riferiscono al solo campione così come ricevuto dal Cliente, che esegue il campionamento, salvo in caso di trattamenti termici effettuati dal Laboratorio. I campi in blu sono forniti dal cliente. La conformità ai documenti in "Specifica" riguarda solamente le prove presenti in questo rapporto di prova. Il simbolo * antecedente a "ID_Prova" indica una prova non accreditata da ACCREDIA. Dichiarazioni false, fittizie o fraudolente e modifiche del presente rapporto di prova costituiscono reato punibile secondo le norme penali vigenti. Il rapporto di prova non può essere riprodotto parzialmente, salvo nostra approvazione scritta. Il Laboratorio non è responsabile dei dati forniti dal cliente che possono influenzare la validità dei risultati./ This test report refers only to the examined sample as received from the Customer, except in case of heat treatments carried out by the Laboratory. Clients are in charge of sampling. Blue fields are supplied by the Client.Compliance with documents in "Specification" refers only to the tests described on this test report.The * symbol before "ID_Prova" indicates that the test is not accredited by ACCREDIA. Any false statement or modification of this test report is a violation of law and the Laboratory may take legal action.This test report cannot be partially reproduced without our written approval. Laboratory is not responsible for information supplied by the customer which can affect the validity of the result.

Data Ingresso Materiale/ Date of Material Arrival **01/10/2024**

Data Rapporto di prova/ Test Report Date **08/10/2024**

firmato elettronicamente/electronically signed

Responsabile di Reparto o sostituto/ Department Manager or Deputy: *Morresi Davide*

Responsabile Laboratorio o Sostituto/ Laboratory Manager or Deputy: *Amani Paolo*

Ispettori/ Inspector

Cliente/ Customer

C.A.M.P.I. S.r.l. Quality Control dept. Witnessed ☐ Reviewed ☒ Date 10/10/24 Signature

DECISION RULE:
- QI → Qualitative
- Qs → Semi-quantitative
- Qa → Quantitative (Implicit Uncertainty)
- Qt → Quantitative (Non Implicit Uncertainty) - the uncertainty is reported in the test report and it used for conformity assessment. The result can be COMPLIANT or NOT COMPLIANT

Test Position Legend: [BHW]-Specimen including B.M., H.A.Z. and W.M.; [SZ]-along the thickness; [T]-trasv.

C.A.M.P.I. srl
Ferrara (Italy)

SEZIONE / Section 6

LEAK TESTING

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 6.1

Hydro test certificate & manometers

+

Water analysis certificate

C.A.M.P.I. Ferrara -Italy	**RAPPORTO DI PROVA IDROSTATICA** *Hydrostatic pressure test report*	**Certificato n.** *Certificate no.* HT 24003-01
		Foglio / *Sheet 1/1*

CLIENTE / *Purchaser:* Rosetti Marino	ORDINE N. / *Order no.:* 1724000163
COMMESSA / *Job*: 24003 (Client Ref. 123A90)	DIS. N°- *Dwg n.:* 1724000163-MAC-DA-00004 rev.04 (24003-VE-10 rev.04)
APPARECCHIO / *Equipment:* K.O. DRUM	SIGLA / *Item No:* V-43001
N. FABBRICA / *Serial n°:* 24-003	ITP No.: 1724000163-QC-ITP-00002 rev.02 step 5-6

PARTI ESAMINATE- *Examined parts*

SHELL, HEAD & NOZZLE

CONDIZIONI RICHIESTE / *REQUIRED CONDITIONS*

PRESSIONE DI PROVA *Test pressure*	5 barg
VELOCITA' DI SALITA IN PRESSIONE *Pressure rising speed*	2,5bar/5'
DURATA DI MANTENIMENTO IN PRESSIONE *Pressure holding duration*	1 hour

CONDIZIONI DI PROVA / *TEST CONDITIONS*

FLUIDO UTILIZZATO *Utilized fluid*: ACQUA ■ *Potable Water Cl ≤50ppm* — OLIO □ *Oil* _____

Altri □ *Others* _____

TEMP. DI PARETE / TEMP. ACQUA *wall temperature / water temperature*	19,3°C
PRESSIONE *Pressure*	5 barg
VELOCITA' DI SALITA IN PRESSIONE *Pressure rising speed*	2,5bar/5'
DURATA DI MANTENIMENTO IN PRESSIONE *Pressure holding duration*	1 hour

Manometri per prova idrostatica / *Gauges for hydrostatic test*

Tipo di strumento *Instrument*	No. Identificazione *Identification No:*	No. Certificato *Certificate No:*	Data Taratura *Calibration date*	Data scadenza *Expiry date*
Manometro 0÷10 bar *Manometer*	9-16624	2579	03/01/2024	03/01/2025
Manometro 0÷10 bar *Manometer*	9-22328	2581	03/01/2024	03/01/2025
Controllo effettuato da *Test performed by*				

RISULTATI DELLA PROVA / *TEST RESULTS* - SATISFACTORY (no leak, no deformation)

Test performed according to Proc. 24003-IOPT 206AS r.1 (1724000163-QC-PRO-00010 r.01) / ASME VIII div.1 Ed.2023 UG-99

DATA / Date	**C.A.M.P.I. Srl** Ufficio Collaudi / QA Dpt	**Rosetti** Inspector	**Crosswind** Inspector	**No. Bo.** Inspector
18-September-2024	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 18/9/24 Signature			0048 ☐ Review ☒ Witness Date: 18/9/24 Name:

EXIBIT 5-2A

Rev. 0 1 2 3 4 5

Trescal

TRESCAL s.r.l.
Via dei Metalli, 1
25039 Travagliato (BS)
Tel. 030 6842501 - Fax 030 6842599
www.trescal.com - e-mail: it.info.bs@trescal.com

Centro di Taratura LAT 051
Calibration Centre
Laboratorio Accreditato di Taratura
Accredited Calibration Laboratory

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAT 051

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC

Signatory of EA, IAF and ILAC Mutual Recognition Agreements

CERTIFICATO DI TARATURA LAT 051 C12228EED0

Certificate of Calibration

- data di emissione *date of issue*	2022/06/03
- cliente *customer*	C.A.M.P.I. S.R.L. VIA DIAMANTINA, 15 44100 FERRARA (FE)
- destinatario *receiver*	C.A.M.P.I. S.R.L. VIA DIAMANTINA, 15 44100 FERRARA (FE)

Il presente certificato di taratura è emesso in base all'accreditamento LAT N° 051 rilasciato in accordo ai decreti attuativi della legge n. 273/1991 che ha istituito il Sistema Nazionale di Taratura (SNT). ACCREDIA attesta le capacità di misura e di taratura, le competenze metrologiche del Centro e la riferibilità delle tarature eseguite ai campioni nazionali e internazionali delle unità di misura del Sistema Internazionale delle Unità (SI).
Questo certificato non può essere riprodotto in modo parziale, salvo espressa autorizzazione scritta da parte del Centro.

This certificate of calibration is issued in compliance with the accreditation LAT N° 051 granted according to decrees connected with Italian law No. 273/1991 which has established the National Calibration System. ACCREDIA attests the calibration and measurement capability, the metrological competence of the Centre and the traceability of calibration results to the national and international standards of the International System of Units (SI).
This certificate may not be partially reproduced, except with the prior written permission of the issuing Centre.

Si riferisce a
referring to

- oggetto *item*	Manometro a quadrante
- costruttore *manufacturer*	Nuova Fima
- modello *model*	//
- matricola *serial number*	6-86053
- data ricev. oggetto *date of receipt of item*	2022/05/23
- data delle misure *date of measurements*	2022/06/03
- registro di laboratorio *laboratory reference*	GS2M

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date 09/06/22
Signature

ACCEPTED
VALIDITY 36 MONTHS
EXPIRY DATE 02-JUNE-2025

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure citate alla pagina seguente, dove sono specificati anche i campioni o gli strumenti che garantiscono la catena di riferibilità del Centro e i rispettivi certificati di taratura in corso di validità. Essi si riferiscono esclusivamente all'oggetto in taratura e sono validi nel momento e nelle condizioni di taratura, salvo diversamente specificato.
The measurement results reported in this Certificate were obtained following the procedures given in the following page, where the reference standards or instruments are indicated which guarantee the traceability chain of the laboratory, and the related calibration certificates in their course of validity are indicated as well. They relate only to the calibrated item and they are valid for the time and conditions of calibration, unless otherwise specified.

Le incertezze di misura dichiarate in questo documento sono state determinate conformemente alla Guida ISO/IEC 98 e al documento EA-4/02. Solitamente sono espresse come incertezza estesa ottenuta moltiplicando l'incertezza tipo per il fattore di copertura *k* corrispondente ad livello di fiducia di circa il 95%. Normalmente tale fattore *k* vale 2.
The measurement uncertainties stated in this document have been determined according to the ISO/IEC 98 and to EA-4/02. Usually, they have been estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor k corresponding to a confidence level of about 95%. Normally, this factor k is 2.

Direzione tecnica
(Approving Officer)
Trescal DIREZIONE TECNICA DI TARATURA
IL RESPONSABILE *(Dott. FULVIO FENOTTI)*

Trescal

TRESCAL s.r.l.
Via dei Metalli, 1
25039 Travagliato (BS)
Tel. 030 6842501 - Fax 030 6842599
www.trescal.com - e-mail: it.info.bs@trescal.com

Centro di Taratura LAT 051
Calibration Centre
Laboratorio Accreditato di Taratura
Accredited Calibration Laboratory

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAT 051

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC

Signatory of EA, IAF and ILAC Mutual Recognition Agreements

CERTIFICATO DI TARATURA LAT 051 C12228EED0

Certificate of Calibration

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure N.
The measurement results reported in this Certificate were obtained following procedures No.

MG/SIT/61 Rev. 04

La catena di riferibilità ha inizio dai campioni di riferimento N.
Traceability is through reference standards No.

J-194	Accoppiamento pistone-cilindro
47861	Set di masse campione
V-1335	Accoppiamento pistone-cilindro
TL-1351	Accoppiamento pistone-cilindro
48120	Set di masse campione
2331	Accoppiamento pistone-cilindro

muniti di certificati validi di taratura rispettivamente N.
validated by certificates of calibration No.

Certificato n.:	Emesso da	Data scad.
20-0511-01	I.N.Ri.M.	2023-09-10
LAT 051 CT-MA-0256-2022	Trescal S.r.l.	2028-06-01
19-0809-02	I.N.Ri.M.	2022-12-02
19-0809-01	I.N.Ri.M.	2022-12-02
LAT051 CT-MA-0845-2016	Trescal S.r.l.	2022-12-23
4220675	Fluke Calibration	2025-05-10

Condizioni ambientali
Environmental conditions

Temperatura: (20 ± 0,5) °C
Temperature

Umidità relativa: (50 ± 10) %UR
Relative Humidity

Pressione atmosferica: 100400 Pa
Atmospheric pressure

Luogo della taratura
Calibration site

Taratura eseguita presso il laboratorio permanente Trescal con sede a Travagliato (BS).
Calibration performed at Trescal permanent laboratory based in Travagliato (BS).

L'operatore
Consoli A.

Trescal CENTRO DI TARATURA
L'OPERATORE (*p. i. ANDREA CONSOLI*)

Trescal

TRESCAL s.r.l.
Via dei Metalli, 1
25039 Travagliato (BS)
Tel. 030 6842501 - Fax 030 6842599
www.trescal.com - e-mail: it.info.bs@trescal.com

Centro di Taratura LAT 051
Calibration Centre
Laboratorio Accreditato di Taratura
Accredited Calibration Laboratory

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAT 051

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC

Signatory of EA, IAF and ILAC Mutual Recognition Agreements

CERTIFICATO DI TARATURA LAT 051 C12228EED0

Certificate of Calibration

IMPOSTAZIONI

Campo di misura	0 / 10 bar	
Unità di formato	0.05	bar
Risoluzione	0.01	bar
Classe	0.25 0,025 BAR	

Fluido di taratura: Aria
Livello di riferimento: piano del raccordo di connessione
Posizione: verticale
Pressione relativa alla pressione atmosferica

RISULTATI SPERIMENTALI

Pressione di riferimento P_{rif}	Pressione indicata (pressione crescente) P_{up}	Pressione indicata (pressione decrescente) P_{down}	Ripetibilità n. 1	Ripetibilità n. 2	Ripetibilità della pressione indicata
/ bar	/ bar	/ bar	/ bar	/ bar	/ bar
0.00	0.00	0.00			
1.00	0.99	0.99			
3.00	2.99	2.99			
5.00	5.00	5.00	5.00	5.00	0.000
8.00	8.00	8.00			
10.00	10.02	10.02			

Pressione di riferimento P_{rif}	Errore di indicazione pressione crescente E_{up}	Errore di indicazione pressione decrescente E_{down}	Incertezza estesa U	Incertezza estesa nel caso in cui non si effettuano correzioni U'_{up}	Incertezza estesa nel caso in cui non si effettuano correzioni U'_{down}
/ bar	/ bar	/ bar	/ bar	/ bar	/ bar
0.00	0.0000	0.0000	0.0058	0.0058	0.0058
1.00	-0.0100	-0.0100	0.0058	0.0158	0.0158
3.00	-0.0100	-0.0100	0.0058	0.0158	0.0158
5.00	0.0000	0.0000	0.0058	0.0058	0.0058
8.00	0.0000	0.0000	0.0058	0.0058	0.0058
10.00	0.0200	0.0200	0.0058	0.0258	0.0258

NOTE

Il manometro è stato picchiettato ad ogni punto di misura

L'operatore
Consoli A.

Trescal CENTRO DI TARATURA
L'OPERATORE (*p. i. ANDREA CONSOLI*)

C.A.M.P.I. srl **Ferrara (Italy)**	**SCHEDA DI TARATURA MANOMETRI** *Manometer calibration report*

MANOMETRO *Pressure gauge*	A MOLLA	N° IDENT. *Id. number*	9-16624	SCALA *Scale*	0÷10 BAR
MODELLO e MARCA *Type and mark*	NUOVA FIMA	SERIE N° *Serial Nr*	/	CLASSE *Accuracy*	1%
MANOMETRO CAMPIONE *Master gauge*	NUOVA FIMA	N° IDENT. *Id. number*	6-86053	CLASSE *Accuracy*	0,25%

CALIBRAZIONE / *Calibration*

LETTURE / *Readings*			MASSIMO SCOSTAMENTO *Max deviation*	SCOSTAMENTO IN % FONDO SCALA *Deviation % Scale*
SUL MANOMETRO CAMPIONE *On master gauge*	SUL MANOMETRO IN CALIBRAZIONE *On gauge to be calibrated*			
	SALITA / *Up*	DISCESA / *Down*		
A	B	B	A-B	$\frac{A-B}{S} x100$
2,50	2,50		0	0
5,00	5,00		0	0
7,50	7,50		0	0
10,00	10,00		0	0
7,50		7,50	0	0
5,00		5,00	0	0
2,50		2,50	0	0
0		0	0	0

VALUTAZIONE E DISPOSIZIONI
Evaluation and dispositions

MANOMETRO CONFORME ALLA PROCEDURA IO PT203AS
Pressure gauge compliant to IO PT203AS procedure

TÜV Italia 09 48 ☒ Review ☐ Witness Date: 18/9/24 Name:

Tolleranza : 1% F.S.

Validità : 12 mesi

CALIBRAZIONE ESEGUITA DA *Calibration performed by*	VERIFICATO DA *Reviewed by*	N° CERTIFICATO *Certificate nr.*
CAMPI S.R.L. Ferrara Inspection Dept. Dato SA Signature		2579
IL / *On* 03/01/2024	IL / *On* 03/01/2024	

C.A.M.P.I. srl **Ferrara (Italy)**	**SCHEDA DI TARATURA MANOMETRI** *Manometer calibration report*

MANOMETRO *Pressure gauge*	A MOLLA	N° IDENT. *Id. number*	9-22328	SCALA *Scale*	0÷10 BAR
MODELLO e MARCA *Type and mark*	NUOVA FIMA	SERIE N° *Serial Nr*	/	CLASSE *Accuracy*	1%
MANOMETRO CAMPIONE *Master gauge*	NUOVA FIMA	N° IDENT. *Id. number*	6-86053	CLASSE *Accuracy*	0,25%

CALIBRAZIONE / *Calibration*

LETTURE / *Readings*			MASSIMO SCOSTAMENTO *Max deviation*	SCOSTAMENTO IN % FONDO SCALA *Deviation % Scale*
SUL MANOMETRO CAMPIONE *On master gauge*	SUL MANOMETRO IN CALIBRAZIONE *On gauge to be calibrated*			
	SALITA / *Up*	DISCESA / *Down*		
A	B	B	A-B	$\frac{A-B}{S} x100$
2,50	2,50		0	0
5,00	5,00		0	0
7,49	7,50		-0,01	-0,1
9,99	10,00		-0,01	-0,1
7,50		7,50	0	0
5,00		5,00	0	0
2,50		2,50	0	0
0		0	0	0

VALUTAZIONE E DISPOSIZIONI
Evaluation and dispositions

MANOMETRO CONFORME ALLA PROCEDURA IO PT203AS
Pressure gauge compliant to IO PT203AS procedure

TÜV Italia 09 48 ☒ Review ☐ Witness Date: 18/9/24 Name:

Tolleranza : 1% F.S.

Validità : 12 mesi

CALIBRAZIONE ESEGUITA DA *Calibration performed by*	VERIFICATO DA *Reviewed by*	N° CERTIFICATO *Certificate nr.*
C.A.M.P.I. S.R.L. Ferrara Inspection dept. Date Signature		2581
IL / *On* 03/01/2024	IL / *On* 03/01/2024	

Ferrara - Anno 2023 II semestre

Comune	Alcalinità da bicarbonati : mg/L (N.P.)	Alcalinità totale: mg/L (N.P.)	Ammonio mg/L (0,50)	Arsenico : µg/L (10)	Calcio mg/L (N.P.)	Cloro residuo libero mg/L:	Cloruro mg/L (250)	Concentrazioni idrogeno (pH) (= 6,5 e = 9,5)	Conduttività : µS/cm a 20°C (2500)	Durezza °F	Fluoruro mg/L (1,50)	Magnesio mg/L (N.P.)	Manganese : µg/L (50)	Nitrato (NO3-) mg/L: (50)	Nitrito (NO2) mg/L: (0,50)	Potassio mg/L (N.P.)	Residuo secco a 180° C mg/L	Sodio mg/L (200)	Solfato mg/L (250)
Argenta	177	145	< 0,02	1	52	0,1	31	7,9	455	18	< 0,10	12	< 5	7	< 0,02	3	289	20	35
Bondeno	278	228	< 0,02	< 1	77	0,1	25	7,4	589	27	< 0,10	17	< 5	2	< 0,02	3	378	21	42
Cento	257	211	< 0,02	< 1	69	0,1	27	7,5	511	24	< 0,10	15	< 5	3	< 0,02	3	367	20	39
Ferrara	183	151	< 0,02	1	56	0,2	29	7,6	437	20	< 0,10	13	< 5	6	< 0,02	3	286	21	37
Masi Torello	197	160	< 0,02	2	60	0,1	39	7,7	506	21	0,10	14	< 5	6	< 0,02	3	330	25	32
Poggio Renatico	380	312	< 0,02	< 1	116	0,05	30	7,4	740	39	< 0,10	25	< 5	6	< 0,02	2	520	28	79
Portomaggiore	183	149	< 0,02	1	54	0,2	31	7,8	462	19	< 0,10	12	< 5	6	< 0,02	3	298	21	34
Terre del Reno	178	146	< 0,02	< 1	55	0,2	29	7,7	463	19	< 0,10	12	< 5	6	< 0,02	3	298	19	36
Vigarano Mainarda	190	154	< 0,02	1	54	0,2	29	7,7	455	19	< 0,10	13	< 5	6	< 0,02	3	293	20	35
Voghiera	193	159	< 0,02	1	58	0,2	28	7,7	447	20	< 0,10	13	< 5	7	< 0,02	3	305	21	37

* Valori massimi consigliati

TÜV Italia 09 48 ☒ Review ☐ Witness Date: 18/9/24 Name:

C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date 18/9/24 Signature

** Valore consigliato (se impiegato)

Data 22/12/2023

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 6.2

Pneumatic test certificate for reinforcing PAD and manometers

C.A.M.P.I. Ferrara -Italy	RAPPORTO DI PROVA PNEUMATICA *Low pressure pneumatic test report*	Certificato n. *Certificate no.* BT 24003-01
		Foglio / Sheet 1/1

CLIENTE / *Purchaser:* Rosetti Marino	ORDINE N. / *Order no.:* 1724000163
COMMESSA / *Job*: 24003 (Client Job 123A90)	DIS. N°- *Dwg n.:* 1724000163-MAC-DA-00004 rev.04 (24003-VE-10 rev.04)
APPARECCHIO / *Equipment:* KO DRUM	SIGLA / *Item No:* V-43001
N. FABBRICA / *Serial n°:* 24-003	ITP No.: 1724000163-QC-ITP-00002 rev.02 step 3-10

OGGETTO DEL TEST / *SUBJECT OF TEST*

Componente provato:
Component tested: *Reinforcing pad for connection* N1-N2
Lato pressurizzato: interno
Pressurized side: *Internal*
Tipo di giunto:
Type of joint: *WELDED*
Finitura saldatura: /
Weld finishing: /
Trattamento termico post- saldatura: NO
Postwelded heat treatment: *None*

TECNICA/ *TECNIQUE*

Pulitura con:
Cleaning by:
Fluido usato per la prova: ARIA
Fluid used for test: Air
Pressione di prova: 0,5 Barg
Test pressure:
Periodo di immersione: /
Soaking time:
Temperatura metallo °C: 21,6
Metal temperature °C:
Illuminazione: NATURALE
Illumination: *Natural*
Manometro: N Matricola 9-49535 Fondo scala 1,6 Bar
Gauge: *No Number* *Range*

RISULTATI DELLA PROVA / *TEST RESULTS*
SODDISFACENTE - Satisfactory

NOTE / *REMARKS*
Test acc. to ASME V Ed.2023 Art.10 - Proc. IO-PT207 rev.0
Mezzo di rivelazione fughe: soluzione saponosa – Fluid leak detection: soap solution

DATA / Date	C.A.M.P.I. Srl Ufficio Collaudi / QA Dpt	Inspector	Inspector
06-September-2024	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 06/9/24 Signature		

C.A.M.P.I. srl **Ferrara (Italy)**	**SCHEDA DI TARATURA MANOMETRI** *Manometer calibration report*

MANOMETRO *Pressure gauge*	A MOLLA	N° IDENT. *Id. number*	9-49535	SCALA *Scale*	0÷1,6 BAR
MODELLO e MARCA *Type and mark*	NUOVA FIMA	SERIE N° *Serial Nr*	/	CLASSE *Accuracy*	1%
MANOMETRO CAMPIONE *Master gauge*	NUOVA FIMA	N° IDENT. *Id. number*	6-86050	CLASSE *Accuracy*	0,25%

CALIBRAZIONE / *Calibration*

LETTURE / *Readings*			MASSIMO SCOSTAMENTO *Max deviation*	SCOSTAMENTO IN % FONDO SCALA *Deviation % Scale*
SUL MANOMETRO CAMPIONE *On master gauge*	SUL MANOMETRO IN CALIBRAZIONE *On gauge to be calibrated*			
	SALITA / *Up*	DISCESA / *Down*		
A	B	B	A-B	$\frac{A-B}{S} x100$
0,40	0,40		0	0
0,80	0,80		0	0
1,20	1,20		0	0
1,60	1,60		0	0
1,20		1,20	0	0
0,80		0,80	0	0
0,40		0,40	0	0
0		0	0	0

VALUTAZIONE E DISPOSIZIONI
Evaluation and dispositions

MANOMETRO CONFORME ALLA PROCEDURA IO PT203AS

Pressure gauge compliant to IO PT203AS procedure

Tolleranza : 1% F.S.

Validità : 12 mesi

CALIBRAZIONE ESEGUITA DA *Calibration performed by*	VERIFICATO DA *Reviewed by*	N° CERTIFICATO *Certificate nr.*
C.A.M.P.I. S.R.L. - Ferrara Inspection dept. Date Signature	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☐ Reviewed ☒ Date Signature	2557
IL / *On* 03/01/2024	IL / *On* 03/01/2024	

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 7

PAINTING

METAL-SAB PIU' SRL	Verbale di Controllo Verniciatura	QA 7.5 ALL. 6 REV. 00 Pag. 1 di 1

CERTIFICATE N°24003/01

PROCEDURA APPLICATA / *Applied Procedure:* Painting Procedure 1724000163-MAT-PRO-00007 Rev. 00 del 10/05/2024 **PAINTING DATE:** Blasting: 23/09/2024 1° coat: 23/09/2024 2° coat: 24/09/2024 Final coat: 25/09/2024	**DESCRIZIONE**/*Description:* Base Load Power Hub (BLPH) Hydrogen Vent KO Drum ITEM V-43001 **N° DI Commessa** /*Job n°*: 24003 **N° PEZZI:** No. Of PCS: 1 **N° MATRICOLA** /*Serial No.:* 24-003

	Valori richiesti Requested values	Valori rilevato Results
- Visual check for defects as per ISO 8501-3, grade P2: OK - Contamination visual check: OK - Blotter test as per ASTM D4285: OK Sabbiatura esterna: (SSPC-SP 10) *External Sandblasting:* (ISO 8501-1) Date 23/09/2024 Start 08:00 Finish 09:30	**SA 2½** **Rz. 55÷85 µm**	**AVR= 85 µm** **Satisfactory**
Chlorides Contamination Test: (ISO 8502-6/9)	**20 mg/m²**	**15 mg/m²**
Cleanliness (ISO 8501-1):	**SA 2½**	**SA 2½**
Dust Level Test (ISO 8502-3):	**Max Rating 2**	**Rating 2**
Primer (Asciutto/Dry): **Barrier 80S – Jotun** Batch: "A" 3565748-1-*-1:2-3; Batch: "B" 3589589-1-*-1:2-1 Date: 23/09/2024 *Start:* 10:00; **T.** 22,5; **RH** 74,8; **Dp.** 17,8; **Ts.** 21,7; *Finish:*10:45; **T.** 23; **RH** 72,4; **Dp.** 17,8; **Ts.** 21,5;	**NDFT Thickness as per ISO 19840** **80 µm** **Visual check**	**AVR= 84 µm** **Minimum DFT value 71 µm** **Satisfactory**
MEK test (ASTM D4752), only for Etil Silicate Inorganic Zinc:	**N.A.**	**N.A.**
Intermedio/Intermediate Layer (Asciutto/Dry): **Penguard Exp – Jotun** Batch: "A" 3508483-1-*-1:3; Batch "B" 3563755-1-*-1:3 Date: 24/09/2024 *Start:* 10:30; **T.** 21,9; **RH** 72,7; **Dp.** 16,8; **Ts.** 20,2; *Finish:* 11:30; **T.** 24,8; **RH** 66; **Dp.** 18,02; **Ts.** 22,4;	**NDFT Thickness as per ISO 19840** **150 µm** **Visual check**	**AVR= 162 µm** **Minimum DFT value 144 µm** **Satisfactory**
Finale / Final Layer (Asciutto/Dry): **Hardtop XP RAL9002** Batch: "A" 3628209-1-*-1:2; Batch "B" 3613863-1-*-1:2 Date: 25/09/2024 *Start:* 14:30 **T.** 24,7; **RH** 61,5; **Dp.** 16,8; **Ts.** 25; *Finish:* 15:15 **T.** 25,2; **RH** 64; **Dp.** 17,9; **Ts.** 24,6;	**NDFT Thickness as per ISO 19840** **50 µm** **Visual check**	**AVR= 55 µm** **Minimum DFT value 47 µm** **Satisfactory**
Spessore Totale: *Total Thickness:*	**280 µm**	**AVR=301 µm**
Holiday Test as per ISO 29601 Low-Voltage Wet Sponge:	**N.A.**	**N.A.**
Thickness Gauge used: DeFelsko Positector 6000 S/n. "787489 - 278966"		

CONFORME/CONFORMING
SATISFACTORY
~~**NON CONFORME**/NOT CONFORMING~~

NOTE: Prova di adesione in accordo alla ISO 2409 (Cross-cut): Positivo Class 2
Prova di adesione in accord alla ISO 4624 (Pull-Off): See sheet attached

DATE:	METAL-SAB PIU'	C.A.M.P.I.	ISPETTORE	CLIENTE
27/09/2024	Metal-Sab Più S.r.l. BORDENO (FE)	C.A.M.P.I. Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 04/10/24 Signature	Quality Control Dept. Cerato Alex per Rosetti Marino SpA 04.10.2024	

Jotun Protects Property

Trieste, 23/09/2024

Certificate of Batch Analysis and Conformity

We hereby certify that the product(s) supplied detailed hereon have been inspected and tested according to the following standards*:

- Viscosity: ISO 2884 / ASTM D 562
- Density: ISO 2811
- Grindness: ISO 1524
- Application properties and SAG index: n/a
- Colour strength: DIN 53234
- Specular gloss: ISO 2813

* where applicable, according to the product's type

The test results were compliant with the provisions of the QC plan(s) and the product(s) fully comply with what is described in the Technical Data Sheets.

Customer:
METAL SAB PIU' SRL

Sales Part Description	Lot/Batch No	Production Date	Best Before Date
PENGUARD EXPRESS MIO GREY A16L	3508483-1-*-1:3	13/05/2024	13/05/2026
PENGUARD EXPRESS, COMP B 4L	3563755-1-*-1:3	12/07/2024	12/07/2026
BARRIER 80 S GREY A 7.5L	3565748-1-*-1:2-3	06/07/2024	06/07/2026
BARRIER 80 S, EU COMP B 1.25L	3589589-1-*-1:2-1	24/07/2024	24/07/2026
JOTUN ZINC 100, COMP B 2.6L	4521	29/02/2024	28/02/2028
JOTAFIX PU TC RAL 9010 16,22L	3588746-1-*-1:2	26/07/2024	25/07/2028
JOTAFIX PU TC, COMP B 2L	3583852-1-*-1:2	19/07/2024	18/07/2028
SOLVALITT ALU 5L	3571248-1-*-1:2	10/07/2024	10/07/2026
RESIST 78 COMP A 9L	3589633-1-*-1:2-1	26/07/2024	25/01/2025
HARDTOP XP RAL 9002 16,47L	3628209-1-*-1:2	04/09/2024	03/09/2028
HARDTOP XP RAL 9010 16,42L	3628209-1-*-1:2	04/09/2024	03/09/2028
JOTAMASTIC 90 black 14,74L	3551131-1-*-1:2	19/06/2024	18/06/2028
HARDTOP XP, COMP B 1.8L	3613863-1-*-1:2	19/08/2024	18/08/2028
JOTAMASTIC 90, STD COMP B 4.4L	3573330-1-*-1:2	09/07/2024	09/07/2026
0VCGRESVA	PENGUARD EXPRESS	13/05/2024	13/05/2026
0VACPBEVA	PENGUARD EXPRESS,	12/07/2024	12/07/2026
6BRGREHQA	BARRIER 80 S GREY A	06/07/2024	06/07/2026
6BRCASBMF	BARRIER 80 S, EU COI	24/07/2024	24/07/2026
0ADCASCRA	JOTUN ZINC 100, COI	29/02/2024	28/02/2028

Jotun Italia Srl
Soggetto all'attività di direzione e coordinamento da parte della Jotun AS - Norvegia
Via O. Petronio, 8
34015 Muggia (Trieste) ITALY
P.I. 00804150324 - C.F. 10163910150

Jotun Italia Srl
Via O. Petronio, 8
34015 – Muggia (TS)
Italy

Soggetta all'attività di direzione e coordinamento da parte della Jotun AS - Norvegia.

Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
04.10.2024

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date 04/10/24
Signature

04QPGAX20	JOTAFIX PU TC RAL 9(	26/07/2024	25/07/2028
04QCPBCVA	JOTAFIX PU TC, COMF	19/07/2024	18/07/2028
0JRCPAKVA	RESIST 78 COMP A	26/07/2024	25/01/2025
0HBALUFVA	SOLVALITT ALU	10/07/2024	10/07/2026
0UVPGAX20	HARDTOP XP RAL 90C	04/09/2024	03/09/2028
0UVPGAX20	HARDTOP XP RAL 901	04/09/2024	03/09/2028
0D5PGAX20	JOTAMASTIC 90 black	19/06/2024	18/06/2028
0UVCPBBTA	HARDTOP XP, COMP I	19/08/2024	18/08/2028
0UVCPBBTA	HARDTOP XP, COMP I	19/08/2024	18/08/2028
0D5CASEPA	JOTAMASTIC 90, STD	09/07/2024	09/07/2026

Jotun Italia Srl
Soggetta all'attività di direzione e coordinamento da parte della Jotun AS - Norvegia
Via O. Petronio, 8
34015 Muggia (Trieste) ITALY
P.I. 00804150324 - C.F. 10163910150

Jotun Italia Srl
Via O. Petronio, 8
34015 – Muggia (TS)
Italy

Soggetta all'attività di direzione e coordinamento da parte della Jotun AS - Norvegia.

METAL-SAB PIU' S.R.L. **ADHESION TEST CERTIFICATE** **REPORT N. 001/2024**

CUSTOMER: CAMPI S.R.L.
PROJECT: Base Load Power Hub (BLPH)

DESCRIPTION: Hydrogen Vent KO Drum ITEM V-43001

PAINTING CYCLE: 1724000163-MAT-PRO-00007 Rev. 00 del 10/05/2024

PULL-OFF TEST FOR ADHESION - ISO 4624 **DATE** 21/10/2024

N.	Support	Paint thickness (µm)	F (N)	D (mm)	X (Mpa)	Y (Mpa)	Type of Failure
1	Carbon steel	282	2575	20	8,2	5	C/D 50% -Y/Z 50%
2	Carbon steel	286	3203	20	10,2	5	C/D 50% -Y/Z 50%
3	Carbon steel	284	3077	20	9,8	5	Y/Z 50% - B/C 30% - A/B 20%
4	Carbon steel	294	2512	20	8	5	C/D 50% -Y/Z 50%
5	Carbon steel	302	2010	20	6,4	5	C/D 50% -Y/Z 50%

PULL-OFF TEST FOR ADHESION **DATE**

N.	Support	Paint thickness (µm)	F (N)	D (mm)	X (Mpa)	Y (Mpa)	Type of Failure

NATURE OF THE FRACTURE:

A: is cohesive failure of substrate
A/B: is adhesive failure between substrate and first coat
B: is cohesive failure of first coat
B/C: is adhesive failure between first and second coats
C: is cohesive failure of the second coat
C/D: is adhesive failure between the second coat and third coat
D: is cohesive failure of the third coat
D/E: is adhesive failure between the third coat and fourth coat
E: is cohesive failure of the fourth coat
-/Y: is adhesive failure between final coat and adhesive
Y: is cohesive failure of adhesive
Y/Z: is adhesive failure between adhesive and dolly

LEGEND:

F: Breaking force
D: Diameter of the dolly
X: Breaking strength measured (pull-off)
Y: Breaking strength minimum required

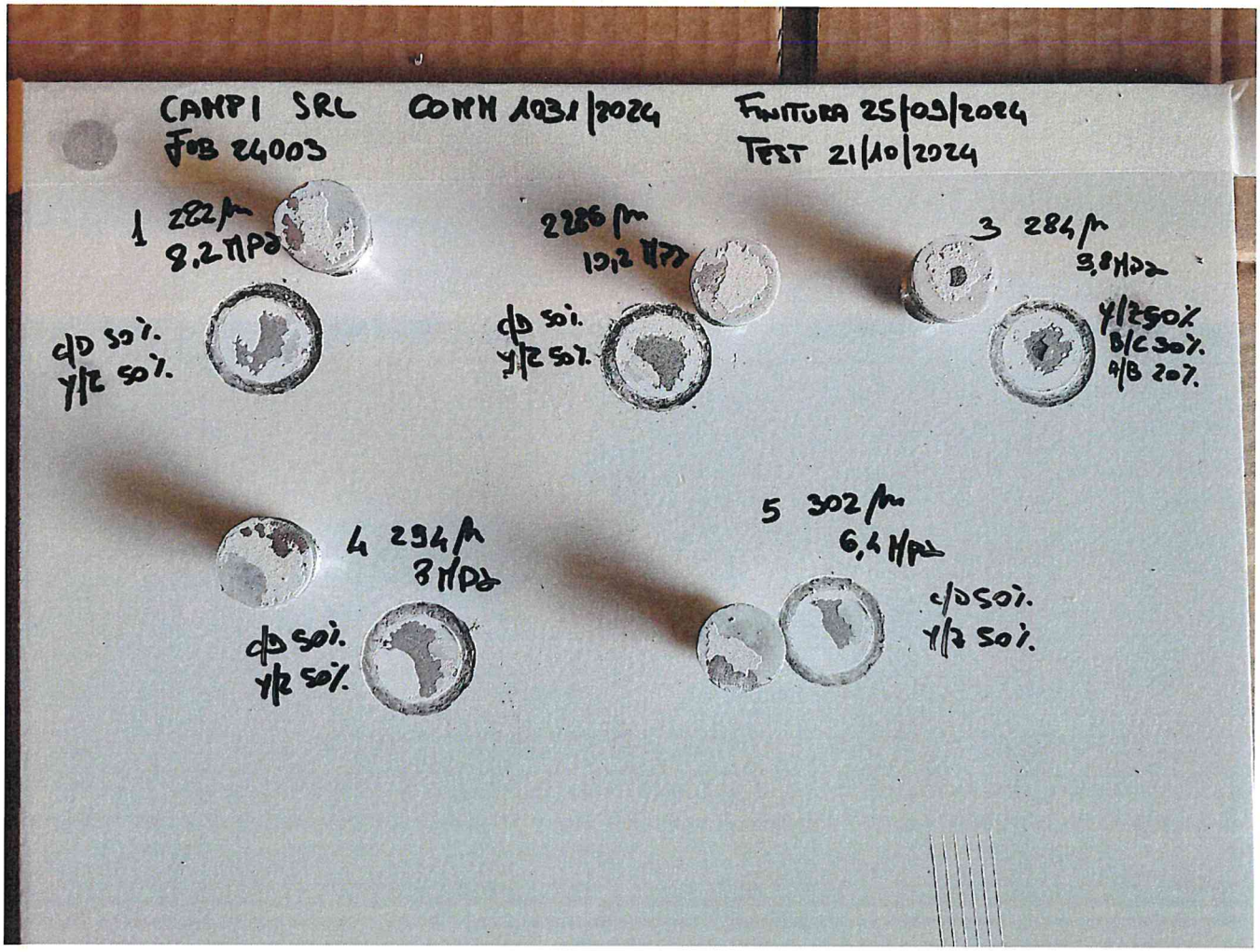
INSTRUMENTS:
Pull - Off Test Equipment: Elcometer 506 analogue adhesion tester working range 2-25MPa - S.N. TL12773
Adhesive: 2 part epoxy

The report test attached of paint certificate n. 24003/01 CAMPI S.R.L.

DATE	METAL-SAB PIU' A.Q.	INSPECTOR	CUSTOMER
21/10/2024	Metal-Sab Più S.r.l. BONDENO (FE)	S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 21/10/24 Signature	

METAL-SAB
Via Palladio, 28
44012 Bondeno - Ferrara

TEST ADESIONE PULL-OFF
Allegato report 24003/01



C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☐
Date 21/10/24
Signature

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 8

NAMEPLATE

C.A.M.P.I. S.r.l.

Via DIAMANTINA, 15 – FERRARA – ITALY

CE 0948

ITEM	V-43001
SERIAL NUMBER	24-003
TYPE	KO-DRUM
CONSTR. YEAR	2024
CODE	ASME VIII-1 / PED

TEST DATE 18/SEPT/2024

DESIGN TEMPERATURE	TS	-29/80 °C
DESIGN PRESSURE	PS	3.5 bar(g)
TEST PRESSURE	PT	5 bar(g)
CAPACITY		0.7 m^3
PED CATEGORY / MOD.		IV / G
FLUID CATEGORY		1
WEIGHT		780 kg

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☒ Reviewed ☐
Date 04/10/24
Signature

TÜV SÜD Italia 09 48 ☒ Review ☐ Witness
Date: 07/10/24 Name:

Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
04.10.24

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 9

NON CONFORMITY

ROSETTI MARINO	Base Load Power Hub (BLPH) Punch List Entry Form	CROSSWIND

Sub-system code:	Sub-system description:	Date: 04/10/2024

Category "A" → Items to be cleared before the issuance of the RFCC (Ready for Commissioning Certificate).

Category "B" → Items to be cleared before the issuance of the RFOC (Ready For Operations Certificate).

Category "C" → Items to be cleared before Sail Away.

Item N.	Check sheet ref.	Disc.	Tag Number	Raised By	Defect Description / Corrective Action	Attachments	Cat.	Action By	Duty Phase	Deadline date
1.	-		V-43001	A.Cerato	**NCR2024-Q-123A90-0007**		B	C.A.M.P.I.		11.10.24
2.	-									
3.	-									
4.	-									
5.	-									
6.										
7.										
8.										

Raised by
Contractor / Subcontractor: C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

Checked by
Contractor QA/QC: Quality Control Dept.
Cerato Alex
per Rosetti Marino SpA
04.10.2024

Accepted by
COMPANY: _____

P1/1

ROSETTI MARINO	NON CONFORMITY REPORT	NCR n° 2024-Q-123A90-0007 rev. 0

DESCRIPTION

Project: 123A90	**Client:** CROSSWIND C.V.	**Originator:** VENDOR	**Subcontractor name:** C.A.M.P.I. Srl

Process:	SUPPLY MANAGEMENT	**Procedure:**	1724000163-QC-PRO-00010: HYDROSTATIC TEST PROCEDURES AND PNEUMATIC TEST PROCEDURE (FAT PROCEDURE) 1724000163-MD-LIS-00001: SUPPLIER MASTER INDEX REGISTER (SMIR) 1724000163-QC-ITP-00002: INSPECTION AND TEST PLAN
Activity:	QC INSPECTIONS		
Short Title:	EXECUTION OF HYDROSTATIC TEST WITH TEST PROCEDURE AND ITP NOT APPROVED UNDER CODE 1		

Description:

On September 18, 2024, an "health check" was conducted at C.A.M.P.I. Srl, the supplier of the H2 KO Drum for the BLPH project. Concurrently, a notification for the execution of the final hydrostatic test following the PWHT (Post Weld Heat Treatment) was issued.

One of the key aspects of the health check was to review the activities leading up to the final hydrostatic test phase, including the verification of the approval status of the related documentation. During the review, it was found that almost all the documents under verification were marked with approval code 2 by Crosswind. It is important to note that although code 2 does not block activities, the high number of documents affected by this code, many of which had significant comments, were not addressed. No responses were provided, nor were the comments discussed.

As a result, the hydrostatic test was conducted, with the Notified Body (NO.BO.) present due to the PED (Pressure Equipment Directive) stamp, without having at least the procedure and the ITP (Inspection Test Plan) in approval code 1 (approved).

Please be informed that the test was nevertheless successful.

Noted by:	Degli Esposti Raffaele	**Role:**	PQM	**Date:**	18/09/2024
Accepted by:	Degli Esposti Raffaele	**Role:**		**Date:**	23/09/2024

MANAGEMENT

☐ **Use as is** ☐ **Rework** ☐ **Rejected**

Root-Cause Analysis

Classification: DOCUMENTATION NOT APPROVED

Notes:

REFER TO THE ATTACHED NOTES

Reaction Plan

Activities	Person in charge	Scheduled Closing Date	Actual Closing Date	Notes
Respond to comments received on documents and revise accordingly	SUPPLIER C.A.M.P.I.	27/09/2024		
Hold the HT report until comments are closed. Vessel is still accepted with reservation.	Degli Esposti Raffaele	07/10/2024		

Defined by:	Degli Esposti Raffaele	**Role:**	PQM	**Date:**	23/09/2024
Approved by:	Degli Esposti Raffaele	**Role:**	PQM	**Date:**	23/09/2024
Client's / AI Approval:		**Role:**		**Date:**	

COMPLETION

Checked by:	Degli Esposti Raffaele	**Role:**		**Date:**	

Effective Closing Date:

ROSETTI MARINO	NON CONFORMITY REPORT	NCR n° 2024-Q-123A90-0007 rev. 0

Client's / AI Approval:	Role:	Date:
Notes:		
Distribution:		

ROSETTI MARINO	NON CONFORMITY REPORT	NCR n° 2024-Q-123A90-0007 rev. 0

DESCRIPTION			
Project: 123A90	**Client:** CROSSWIND C.V.	**Originator:** VENDOR	**Subcontractor name:** C.A.M.P.I. Srl
Process: SUPPLY MANAGEMENT		**Procedure:** 1724000163-QC-PRO-00010: HYDROSTATIC TEST PROCEDURES AND PNEUMATIC TEST PROCEDURE (FAT PROCEDURE) 1724000163-MD-LIS-00001: SUPPLIER MASTER INDEX REGISTER (SMIR) 1724000163-QC-ITP-00002: INSPECTION AND TEST PLAN	
Activity: QC INSPECTIONS			
Short Title: EXECUTION OF HYDROSTATIC TEST WITH TEST PROCEDURE AND ITP NOT APPROVED UNDER CODE 1			

Root Cause Analysis:

The main causes that led to the non-conformity include:

1. **Inadequate Documentation Management**:
   - Critical documentation (hydrostatic test procedure, ITP, welding, and NDT procedures) was not adequately managed to ensure completion and approval within the required timeframes. This is due to ineffective monitoring of the document review process and a lack of clear tracking of approvals.
2. **Insufficient Communication Between Departments**:
   - The failure to discuss and resolve comments on documents suggests poor communication and collaboration within CAMPI organization. Comments on the documents were not addressed promptly, indicating a breakdown in communication management.
3. **Incomplete or Unfollowed Quality Control Procedures**:
   - There were no effective control mechanisms to verify the approval status of the documentation before proceeding with the hydrostatic test. This indicates potential gaps in the quality control procedures, where adequate checkpoints were not established to ensure document readiness.
4. **Pressure to Meet Delivery Deadlines**:
   - The decision to proceed with the test despite unapproved documentation may have been influenced by project delivery pressures and deadlines. The urgency to meet schedules overshadowed compliance with documentation processes.

Corrective Actions:

1. **Enhance Use of Rosetti Fusion Live Database**:
   - Leverage the existing Rosetti Fusion Live database more effectively to monitor and track the approval status of critical documents.
2. **Improve Internal Communication**:
   - Establish regular communication channels to ensure that comments on critical documents are discussed and resolved promptly.

DESCRIPTION			
Project: 123A90	**Client:** CROSSWIND C.V.	**Originator:** VENDOR	**Subcontractor name:** C.A.M.P.I. Srl
Process: SUPPLY MANAGEMENT		**Procedure:** 1724000163-QC-PRO-00010: HYDROSTATIC TEST PROCEDURES AND PNEUMATIC TEST PROCEDURE (FAT PROCEDURE) 1724000163-MD-LIS-00001: SUPPLIER MASTER INDEX REGISTER (SMIR) 1724000163-QC-ITP-00002: INSPECTION AND TEST PLAN	
Activity: QC INSPECTIONS			
Short Title: EXECUTION OF HYDROSTATIC TEST WITH TEST PROCEDURE AND ITP NOT APPROVED UNDER CODE 1			

3. **Implement Pre-Test Document Status Verification:**
    - Rosetti must conduct a thorough review of the approval status of all relevant documents before accepting any test notifications.
4. **Managing Project Timelines:**
    - While adjusting project deadlines can be challenging, it is crucial to try to balance schedule pressures with compliance and safety standards.

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 1A

DRAWINGS & ENGINEERING

C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 1A.1

Welding Book – WPQR-WPS–WPQ

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO
Document Title:	Welding Procedure Specification (WPS) and Qualification (PQR) Records, Welding Operator List and Welder Qualifications Records (WPQ) and Welding Map	Sheet 1 of 132 Date: 16/01/2025 Rev: 03

Base Load Power Hub (BLPH)

Welding Procedure Specification (WPS) and Qualification (PQR) Records, Welding Operator List and Welder Qualifications Records (WPQ) and Welding Map

Document Number: 1724000163-WEL-LIS-00011

Document Class: 2

ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED

NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.

Sign	Date
Davide Cenacchi	17/01/2025

03	16/01/2025	Accepted for Construction (AFC)	M. Antolini	C. Cervellati	M. Antolini
02	20/12/2024	Issue for Review (IFR)	M. Antolini	C. Cervellati	M. Antolini
01	04/09/2024	Issue for Review (IFR)	M. Antolini	C. Cervellati	M. Antolini
00	08/05/2024	Issue for Review (IFR)	M. Antolini	C. Cervellati	M. Antolini
Rev.	Date	Description	Prepared	Reviewed	Approved

C.A.M.P.I. Srl

Ferrara - Italy

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

C.A.M.P.I. Srl Ferrara - Italy	**PLANT:** HOLLANDE KUST NOORD WIND PARK – Netherlands	
	CLIENT: Rosetti Marino S.p.A. for Crosswind	
	P.O. No: 1724000163	
	Commessa / *Job:* 24003	**Documento. n° / *Document n°:*** 24003-WD-01

Oggetto: **Welding Book according to ASME IX - QUADERNO DI SALDATURA**
Subject

HYDROGEN VENT TO K.O. DRUM
SERIAL No: 24-003
ITEM No: V-43001
DRAWINGS No: 24003-VE-10 – GA Drawing

RISERVATO AL CLIENTE / A.I.
Customer reserved / A.I.

6			
5			
4			
3	16-January-2025	C.A.M.P.I. srl Partita IVA 01[illegible]80389 Via Dir[illegible]via, 15 I 44100 FERRARA Michele Antolini	Up dated as per comment's / Aggiornato come da commenti
2	20-December-2024	Michele Antolini	Up dated as per comment's / Aggiornato come da commenti
1	04-September-2024	Michele Antolini	Up dated as per comment's / Aggiornato come da commenti
0	08-May-2024	Michele Antolini	Issue for Review / Emesso per Verifica
Rev.	Data / *Date*	Approvazione / *Approval*	Descrizione / *Description*

C.A.M.P.I. Srl Ferrara - Italy	**Welding Document for HYDROGEN VENT TO K.O. DRUM SERIAL No: 24-003 ITEM No: V-43001**	**Doc. No:** 24003-WD-01 Rev. 3 On 16-Jannuary-2025

SUMMARY - RIEPILOGO

Section. Sezione	**Documents**	Pag./*Page* di/*of*
1	List of WPS & PQR / Riepilogo WPS & WPQR	
2	WKF & Weld Map / Mappa delle saldature	
3	WPS: Welding procedure specification / Specifiche di saldatura 24003-01 rev.1❶ 24003-02 rev.1❶ 24003-03 rev.0 24003-04 rev.0 24003-05 rev.0 24003-06 rev.0 24003-07 rev.0 24003-08 rev.0	
4	WPQR: Welding Procedure Qualification Record / Qualifiche Procedimenti di saldatura WPQR No: P415-AS WPQR No: P423-AS WPQR No: P425-AS	
5	Welder & welding operator qualification / qualifiche saldatori e operatori	
6	Repair procedure IO-GP410 rev.4	

SECTION 1

List of WPS & PQR / Riepilogo WPS & PQR

C.A.M.P.I. Srl Ferrara - Italy	**Welding Document** **for** **HYDROGEN VENT TO K.O. DRUM** **SERIAL No: 24-003** **ITEM No: V-43001**			**Doc. No:** 24003-WD-01 Rev. 3 On 16-Jannuary-2025
Joint detail Dettaglio saldatura	**WPS:** Welding procedure specification	❷WPS Range thk. / d. mm	**PQR:** Procedure Qualification Record Qualifiche Procedimenti di saldatura	PN with PN Gruppo con Gruppo
W8	24003-01	5÷12 / ≥150	P425-AS+P415-AS	**Group 1 to Group 1**
W11	24003-02	5÷12 / ≥150	P425-AS+P415-AS	**Group 1 to Group 1**
W12	24003-03	5÷25 / ≥60,3	P425-AS	**Group 1 to Group 1**
W18	24003-04	5÷25 / ≥60,3	P425-AS	**Group 1 to Group 1**
W18a	24003-05	5÷25,4 / ≥33,4	P423-AS	**Group 1 to Group 1**
W21	24003-06	5÷25 / ≥60,3	P425-AS	**Group 1 to Group 1**
W59	24003-07	5÷21 / ≥150	P425-AS	**Group 1 to Group 1**
W61	24003-08	5÷21 / ≥150	P425-AS	**Group 1 to Group 1**

❷ **Comment:** Please assign a unique progressive weld number without gaps

Reply: The number cannot be changed to progressive without gap because as for the CAMPI Quality System each welding detail number corresponds to a very specific type of coupling uniquely recognized both by the technical department and by the Production of the CAMPI company. Changing that number could be confusing

SECTION 2

WKF & Weld Map / Mappa delle saldature

C.A.M.P.I. Srl Ferrara - Italy	**PLANT:** HOLLANDE KUST NOORD WIND PARK – Netherlands	**WELDING KEY FORM N°** 24003-WD-01
	CLIENTE / *CUSTOMER*: Rosetti Marino S.p.A.	**COMMESSA N° / JOB N°** 24003
	ACQUIRENTE / *PURCHASER*: Crosswind	**P.O.No:** 1724000163

For Location of Welded Joints See Attached Sketch
Per le posizioni delle saldature vedere il disegno allegato

(1)= N°2 production test coupon (500mm X 300mm) shall be prepared and attached to the vessel during the longitudinal welds, base material of the same heat number of the shell shall be used
(1)= Devono essere preparati n°2 talloni di Produzione(500mm X 300mm) saranno attaccati al sebatoio durante la fase di saldatura della Longitudinale del mantello, il materiale deve essere della stessa colata della lamiera del mantello

❶ **(2)=** UT examination shall be performed before the PWHT on the Butt weld joint with thickness ≥10mm / Il controllo UT sarà effettuato sui giunti di testa con spessore ≥ a 10mm

This format shall be issued for each item - The Manufacturer shall show the required informations on the relevant areas - The WKF shall be approved or commented by AIA/CLIENT - In case of comments it shalle be revised by the Manufacturer and reissued for final approval.

Part.	Material with material	RT (%)	UT (%)	PT/MT (%)	KV (J)	MDMT °C	Hardness (HV)	P.W.H.T. (°C/H)	Note
W8	SA-516Gr.60/70N+ SA-516Gr.60/70N	10	❶100 **(2)**	❶100	/	-29	235 Max	Yes	
W11	SA-516Gr.60/70N+ SA-516Gr.60/70N	10	❶100 **(2)**	❶100	/	-29	235 Max	Yes	**PTC(1)**
W12	SA-333Gr.6+ SA-350LF2	10	❶100 **(2)**	❶100	/	-29	235 Max	Yes	
W18	SA-516Gr.60/70N+ SA-333Gr.6	/	/	100	/	-29	235 Max	Yes	≥ NPS2½
W18a	SA-516Gr.60/70N+ SA-350LF2	/	/	100	/	-29	235 Max	Yes	< NPS2½
W21	SA-516Gr.60/70N+ SA-333Gr.6	/	/	100	/	-29	235 Max	Yes	
W59	SA-516Gr.60/70N+ SA-516Gr.60/70N	/	/	100	/	-29	/	Yes	
W61	SA-516Gr.60/70N+ SA-516Gr.60/70N	/	/	100	/	-29	/	Yes	
❷ For the range on the WPS see Sheet 4									

APPLICABLE WPS-PQR

Part.	Jonts	WPS	PQR
W8	BUTT WELD	24003-01	P425-AS+P415-AS
W11	BUTT WELD	24003-02	P425-AS+P415-AS
W12	BUTT WELD	24003-03	P425-AS
W18	BUTT WELD	24003-04	P425-AS
W18a	BUTT WELD	24003-05	P423-AS
W21	BUTT WELD	24003-06	P425-AS
W59	FILLET WELD	24003-07	P425-AS
W61	FILLET WELD	24003-08	P425-AS

FORMING DATA

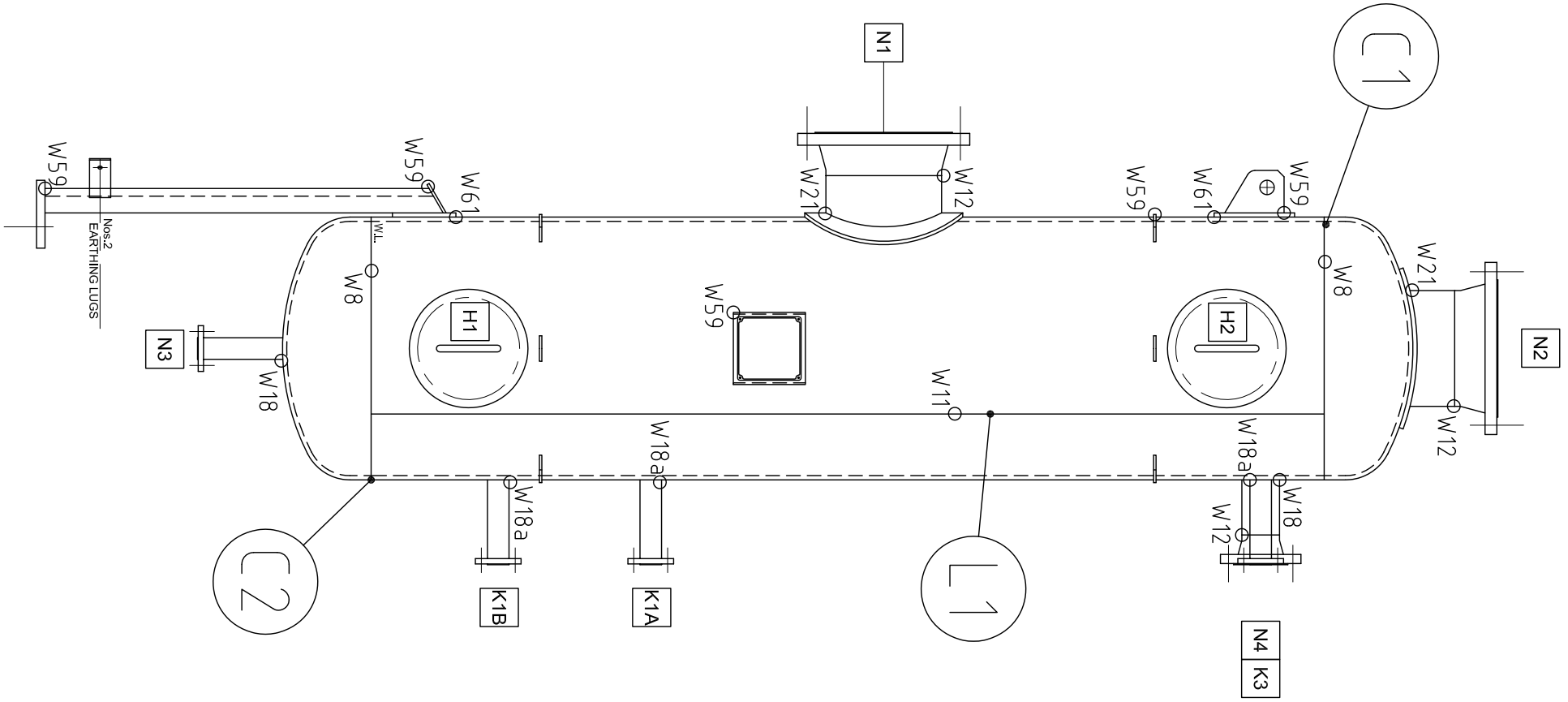
Descr.	Thk (1) A	Thk (1) F	% (2)	Type Hot	Type Cold	H.T. (3)	Coup (4)
Ellipsodail Head 2:1	10 mm	8 mm			X	N	X

1) A = Actual (thk. before forming) F = final (thk. after forming)
2) Fiber elongation (see ASME VIII div. I-UCS 85)
3) Heat treatment after forming shall be specified and shown as:
N = Normalizing; QT = Quenched and tempered
Nt = Normalized and tempered ; etc.
4) Acc. To ASMVE VIII div. I-UCS 85 coupons shall be subjected to simulated heat treatments including any intermediate and/or final heat treatment, if any.

ITEM: V-43001		2	Up dated	20-December-2024	
		1	Up dated	04-September-2024	
SN: 24-003	N° DWG: 24003-VE-10	0	For Review	08-May-2024	
		Rev	Description	Date	Appr.

C.A.M.P.I. Srl Ferrara (Italy)	**SCHEMA IDENTIFICAZIONE SALDATURE** ***Welds Identification Sketch***	Documento Nr: 24003-WD-01 fg1_2 *Document No:*

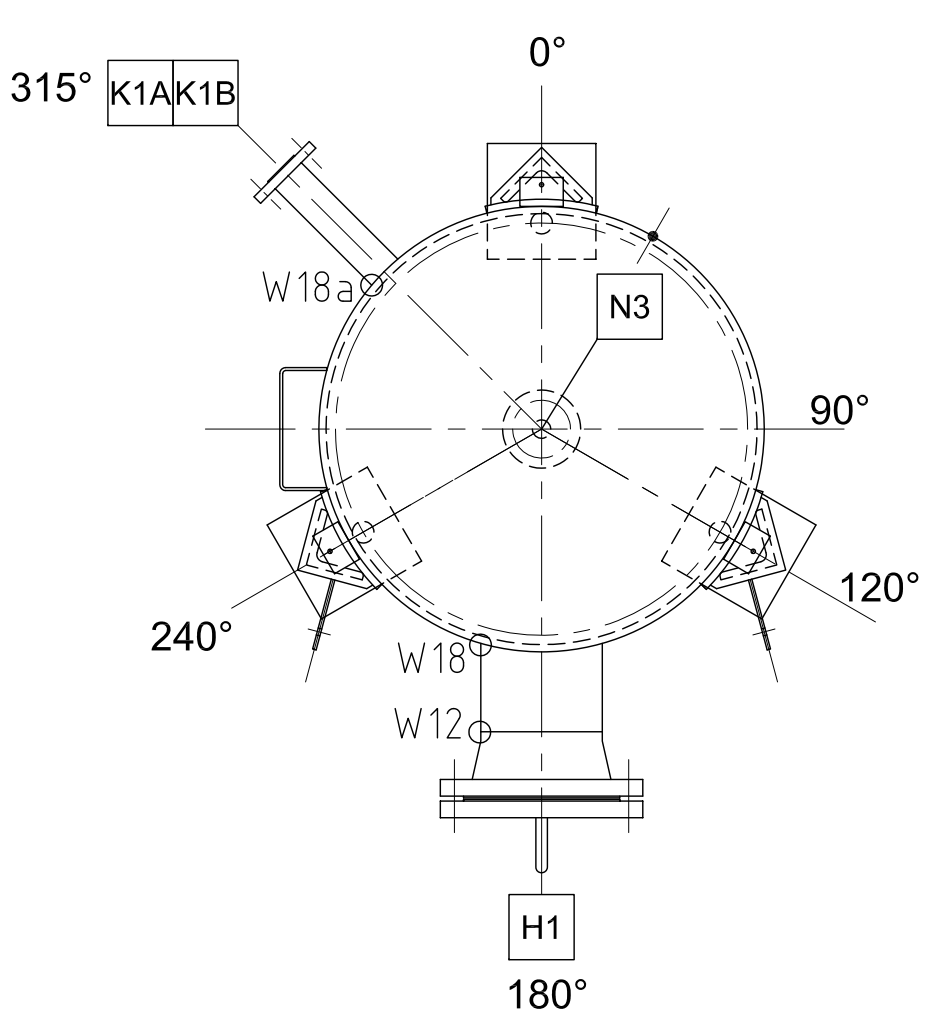
Cliente : Rossetti Marino *Client :*	Ordine : 1724000163 *Order :*	Apparecchio : Hydrogen Vent K.o. Drum *Equipment :*	
Commessa Nr : 24003 *Job No :*	Disegno Nr : 24003-VE-10 *Drawing No :*	Sigla : V-43001 *Item :*	Nr. Fabbrica : 24-003 *Serial No :*

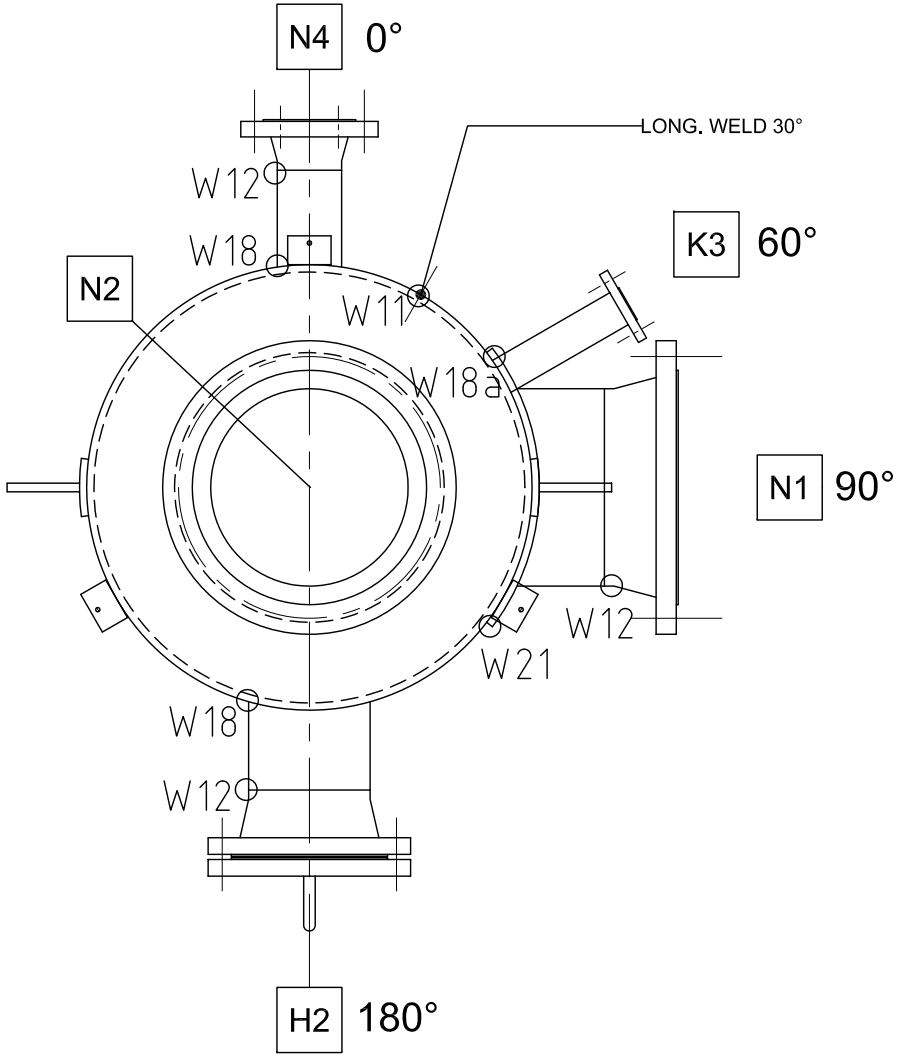


Data : 08-May-2024 *Date :*	**C.A.M.P.I. Srl** Quality Control	Ispettore Cliente Inspector Purchaser	Ispettore Autorizzato Authorized Inspector

C.A.M.P.I. Srl Ferrara (Italy)	**SCHEMA IDENTIFICAZIONE SALDATURE** ***Welds Identification Sketch***	Documento Nr: 24003-WD-01 fg2_2 *Document No:*

Cliente : Rossetti Marino *Client :*	Ordine : 1724000163 *Order :*	Apparecchio : Hydrogen Vent K.o. Drum *Equipment :*	
Commessa Nr : 24003 *Job No :*	Disegno Nr : 24003-VE-10 *Drawing No :*	Sigla : V-43001 *Item :*	Nr. Fabbrica : 24-003 *Serial No :*





Data : 08-May-2024 *Date :*	**C.A.M.P.I. Srl** Quality Control	Ispettore Cliente Inspector Purchaser	Ispettore Autorizzato Authorized Inspector

SECTION 3

WPS: Welding procedure specification
Specifiche di saldatura

C.A.M.P.I. srl **Ferrara (Italy)**	**WELDING PROCEDURE SPECIFICATION (WPS)** **(QW 482)**	**WPS-N.** 24003-01_ **Rev.** 1 **Date:** 04/09/2024 **Supp. PQR N.** P425-AS & P415-AS

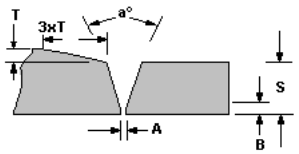
Welding Process(es) a) GTAW b) GMAW c) SAW
Type(s) a) Manual b) Semiautomatic c) Machine
Joints (QW-402)

Joint design BW: V groove weld butt joint (see sketch)
Backing GTAW (No) GMAW (Yes) SAW (Yes)
Backing material (Type) WELD METAL

- Metal — Non fusing metal
- Non metallic — Other

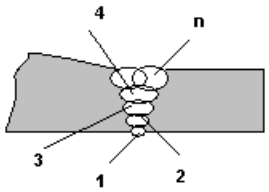
Base metal (QW-403)
P-No. _1_ Gr. No. _1/2_ to P-No. _1_ Gr. No. _1/2_
Spec. type & grade SA-516 Gr.60/70N
to spec. type & grade SA-516 Gr.60/70N
Chem. anal. & mech. prop.
to Chem. Anal. & Mech. Prop.
Thickness range
Base metal (mm): Groove: 5÷12mm Fillet: All
Pipe dia.: Groove: >150mm Fillet: All
Other:

Joint Design
Disegno giunto
W8



A:3÷5mm - **B:**1,5±1mm
a°:60±5 - **S:**8/10mm

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.36	5.17
AWS No. (Class)	ER80S-Ni1	E71T15-M21A6-CS1-H4	EH12K
F-No.	6	6	6
A-No.	10	1	1
Size of filler metal (mm)	2,4 mm	1,2 mm	2,4
F.M. Trade Name	Carborod Ni1	Diamondspark 54 MC	L50M
Manufacturer	Lincoln	Boehler	Lincoln
Max Weld Metal Thk. Thickness Groove:	2 mm	2 mm	Max 6 mm
Fillet:	All	All	/
Flux Trade Name	/	/	P230
Manufacturer	/	/	Lincoln
Electr.-Flux (Class)	/	/	F48P5-EH12K

Other **a):** QW404.23: Solid wire – QW 404.22: No – QW404.14: With Filler Metal

GAS (QW-408)	Percent Composition			
	Gas(es)	Mixture	Flow rate	
Plasma				l/min
Shielding (a)	Ar	99,997%	9÷11	l/min
Shielding (b)	Ar+CO_2	92%+8%	14÷16	l/min
Trailing				l/min
Backing	NO	N.A.	N.A.	l/min

Other:

POSITIONS (QW-405)	
Position(s) of groove or fillet	All
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	15°C
Interpass Temp.	300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	60 minutes
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	a)-b)-c) DC
Polarity:	a) SP / b)-c) RP
Mode of Metal Transfer for GMAW:	Pulsed
Tungsten Electrode Type & Size	SFA 5.12 EWLa-2
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	11/16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	/
Frequency	/
Contact Tube to Work Distance GMAW 15÷20mm SAW 25÷28mm	
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	Single

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
a):QW410.64 N.A. and QW410.11:No ; **b):** QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal		Current		Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other Max HEAT IMPUT (KJ/mm)
		AWS Class or Trade Name	Size/Dia (mm)	Type & polarity	Amp. Range ±10%			
1	GTAW	ER80S-Ni1	2,4	DC-SP	146	9,1	78	1,02
2	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87
3	SAW	L50M	2,4	DC-RP	340	26,8	600	0,911
4-n	SAW	L50M	2,4	DC-RP	340	26,8	600	0,911
❶ 1'	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87

❶ where accessible, a back side weld with GMAW process / dove accessibile ripresa a rovescio con GMAW

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 01[illegible]80389 Via Diamantina, 15 44100 FERRARA	

C.A.M.P.I. srl Ferrara (Italy)	WELDING PROCEDURE SPECIFICATION (WPS) (QW 482)	WPS-N. 24003-02_ Rev. 1 Date: 04/09/2024 Supp. PQR N. P425-AS & P415-AS

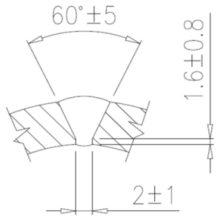
Welding Process(es) a) GTAW b) GMAW c) SAW
Type(s) a) Manual b) Semiautomatic c) Machine
Joints (QW-402)

Joint design BW: V groove weld butt joint (see sketch)
Backing GTAW (No) GMAW (Yes) SAW (Yes)
Backing material (Type) WELD METAL

- Metal — Non fusing metal
- Non metallic — Other

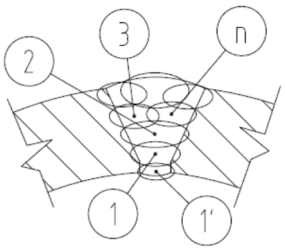
Base metal (QW-403)
P-No. _1_ Gr. No. _1/2_ to P-No. _1_ Gr. No. _1/2_
Spec. type & grade SA-516 Gr.60/70N
to spec. type & grade SA-516 Gr.60/70N
Chem. anal. & mech. prop.
to Chem. Anal. & Mech. Prop.
Thickness range
Base metal (mm): Groove: 5÷12mm Fillet: All
Pipe dia.: Groove: >150mm Fillet: All
Other:

Joint Design
Disegno giunto
W11



A:3÷5mm - **B:**1,5±1mm
a°:60±5 - **S:**10mm

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.36	5.17
AWS No. (Class)	ER80S-Ni1	E71T15-M21A6-CS1-H4	EH12K
F-No.	6	6	6
A-No.	10	1	1
Size of filler metal (mm)	2,4 mm	1,2 mm	2,4
F.M. Trade Name	Carborod Ni1	Diamondspark 54 MC	L50M
Manufacturer	Lincoln	Boehler	Lincoln
Max Weld Metal Thk. Thickness Groove:	2 mm	2 mm	Max 6 mm
Fillet:	All	All	/
Flux Trade Name	/	/	P230
Manufacturer	/	/	Lincoln
Electr.-Flux (Class)	/	/	F48P5-EH12K

Other **a):** QW404.23: Solid wire – QW 404.22: No – QW404.14: With Filler Metal

GAS (QW-408)	Percent Composition			
	Gas(es)	Mixture	Flow rate	
Plasma				l/min
Shielding (a)	Ar	99,997%	9÷11	l/min
Shielding (b)	Ar+CO_2	92%+8%	14÷16	l/min
Trailing				l/min
Backing	NO	N.A.	N.A.	l/min

Other:

POSITIONS (QW-405)	
Position(s) of groove or fillet	All
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	15°C
Interpass Temp.	300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	60 minutes
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	a)-b)-c) DC
Polarity:	a) SP / b)-c) RP
Mode of Metal Transfer for GMAW:	Pulsed
Tungsten Electrode Type & Size	SFA 5.12 EWLa-2
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	11/16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	/
Frequency	/
Contact Tube to Work Distance GMAW 15÷20mm SAW 25÷28mm	
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	Single

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
a):QW410.64 N.A. and QW410.11:No ; **b):** QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal AWS Class or Trade Name	Filler metal Size/Dia (mm)	Current Type & polarity	Current Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other Max HEAT IMPUT (KJ/mm)
1	GTAW	ER80S-Ni1	2,4	DC-SP	146	9,1	78	1,02
2	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87
3	SAW	L50M	2,4	DC-RP	340	26,8	600	0,911
4-n	SAW	L50M	2,4	DC-RP	340	26,8	600	0,911
❶ 1'	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

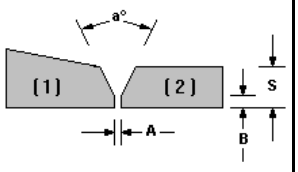
Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA [illegible] Via Dir[illegible], 15 I 44100 FERRARA	

C.A.M.P.I. srl **Ferrara (Italy)**	**WELDING PROCEDURE SPECIFICATION (WPS)** **(QW 482)**	**WPS-N.** 24003-03 **Rev.** 0 **Date:** 08/05/2024 **Supp. PQR N.** P425-AS

Welding Process(es) a) GTAW b) GMAW c) _____
Type(s) a) Manual b) Semiautomatic c) _____
Joints (QW-402)
Joint design BW: V groove weld butt joint (see sketch)
Backing GTAW (No) GMAW (Yes)
Backing material (Type) WELD METAL
- Metal Non fusing metal _____
- Non metallic Other _____

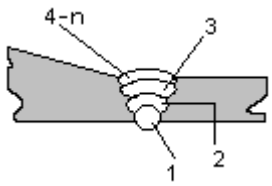
Base metal (QW-403)
P-No. _1_ Gr. No. _2_ to P-No. _1_ Gr. No. _1_
Spec. type & grade SA-350 LF2
to spec. type & grade SA-333 Gr.6
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm): Groove: 5÷25mm Fillet: All
Pipe dia.: Groove: >60,3mm Fillet: All
Other:

Joint Design
Disegno giunto
W12



A:3±1mm – **B:**1,5±1mm
a°:75±2,5 -
S:7,62÷12,7mm

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.36	
AWS No. (Class)	ER80S-Ni1	E71T15-M21A6-CS1-H4	
F-No.	6	6	
A-No.	10	1	
Size of filler metal (mm)	2,4 mm	1,2 mm	
F.M. Trade Name	Carborod Ni1	Diamondspark 54 MC	
Manufacturer	Lincoln	Boehler	
Max Weld Metal Thk. Thickness Groove:	2 mm	Max 11 mm	
Fillet:	All	All	
Flux Trade Name	/	/	
Manufacturer	/	/	
Electr.-Flux (Class)	/	/	

Other **a):** QW404.23: Solid wire – QW 404.22: No – QW404.14: With Filler Metal

GAS (QW-408)		Percent Composition			
		Gas(es)	Mixture	Flow rate	
Plasma					l/min
Shielding	(a)	Ar	99,997%	9÷11	l/min
Shielding	(b)	Ar+CO_2	92%+8%	14÷16	l/min
Trailing					l/min
Backing		NO	N.A.	N.A.	l/min

Other:

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	DC
Polarity:	a) SP / b) RP
Mode of Metal Transfer for GMAW:	Pulsed
Tungsten Electrode Type & Size	SFA 5.12 EWLa-2
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	11/16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	/
Frequency	/
Contact Tube to Work Distance GMAW	15÷20mm
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	Single

POSITIONS (QW-405)
Position(s) of groove or fillet All
Welding Progression: /
Other:

PREHEAT (QW-406)
Preheat Temp. 15°C
Interpass Temp. 300°C
Preheat maintenance

POSTWELD HEAT TREATMENT (QW-407)
Temp. Range 610±10°C
Time Range 60 minutes
Heat rate: Max 80°C/h – above 300°C
Cool rate: Max 80°C/h– above 300°C and cooled in still air

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
a):QW410.64 N.A. and QW410.11:No ; **b):** QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal AWS Class or Trade Name	Filler metal Size/Dia (mm)	Current Type & polarity	Current Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other Max HEAT IMPUT (KJ/mm)
1	GTAW	ER80S-Ni1	2,4	DC-SP	146	9,1	78	1,02
2	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87
3	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91
4-n	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

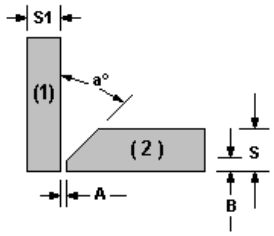
Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 00[illegible]80389 Via Diamantina, 15 [illegible] FERRARA	

C.A.M.P.I. srl **Ferrara (Italy)**	**WELDING PROCEDURE SPECIFICATION (WPS)** **(QW 482)**	**WPS-N.** 24003-04_ **Rev.** 0 **Date:** 08/05/2024 **Supp. PQR N.** P425-AS

Welding Process(es) a) GTAW b) GMAW c) _____
Type(s) a) Manual b) Semiautomatic c) _____
Joints (QW-402)
Joint design BW: V groove weld butt joint (see sketch)
Backing GTAW (No) GMAW (Yes)
Backing material (Type) WELD METAL
- Metal Non fusing metal _____
- Non metallic Other _____

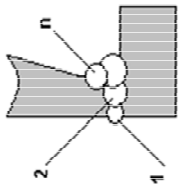
Base metal (QW-403)
P-No. _1_ Gr. No. _1/2_ to P-No. _1_ Gr. No. _1/2_
Spec. type & grade SA-350 LF2/SA-333 Gr.6
to spec. type & grade SA-516 Gr.60/70N
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm): Groove: 5÷25mm Fillet: All
Pipe dia.: Groove: >60,3mm Fillet: All
Other:

Joint Design
Disegno giunto
W18



A:2÷5mm – **B:**2±1mm
a°:45°±5 - **S:**8÷10 mm
S1:7,62÷12,7mm

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.36	
AWS No. (Class)	ER80S-Ni1	E71T15-M21A6-CS1-H4	
F-No.	6	6	
A-No.	10	1	
Size of filler metal (mm)	2,4 mm	1,2 mm	
F.M. Trade Name	Carborod Ni1	Diamondspark 54 MC	
Manufacturer	Lincoln	Boehler	
Max Weld Metal Thk. Thickness Groove:	2 mm	Mas 11 mm	
Fillet:	All	All	
Flux Trade Name	/	/	
Manufacturer	/	/	
Electr.-Flux (Class)	/	/	

Other **a):** QW404.23: Solid wire – QW 404.22: No – QW404.14: With Filler Metal

GAS (QW-408)		Percent Composition			
		Gas(es)	Mixture	Flow rate	
Plasma					l/min
Shielding	(a)	Ar	99,997%	9÷11	l/min
Shielding	(b)	Ar+CO_2	92%+8%	14÷16	l/min
Trailing					l/min
Backing		NO	N.A.	N.A.	l/min

Other:

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	DC
Polarity:	a) SP / b) RP
Mode of Metal Transfer for GMAW:	Pulsed
Tungsten Electrode Type & Size	SFA 5.12 EWLa-2
Electrode wire feed speed range	/

POSITIONS (QW-405)	
Position(s) of groove or fillet	All
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	15°C
Interpass Temp.	300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	60 minutes
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	11/16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	/
Frequency	/
Contact Tube to Work Distance GMAW	15÷20mm
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	Single

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
a):QW410.64 N.A. and QW410.11:No ; **b):** QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal AWS Class or Trade Name	Filler metal Size/Dia (mm)	Current Type & polarity	Current Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other Max HEAT IMPUT (KJ/mm)
1	GTAW	ER80S-Ni1	2,4	DC-SP	146	9,1	78	1,02
2	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87
3	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91
4-n	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91

1' - If accessible, a back side weld with GMAW process is admitted / se accessibile la ripresa a rovescio con metodo GMAW è ammessa

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 01[illegible]80389 Via Dis[illegible]ia, 15 [illegible] FERRARA	

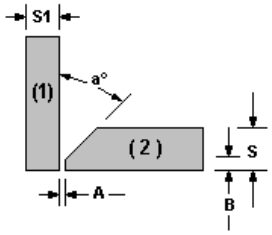
C.A.M.P.I. srl **Ferrara (Italy)**	**WELDING PROCEDURE SPECIFICATION (WPS)** **(QW 482)**	**WPS-N.** 24003-05 **Rev.** 0 **Date:** 08/05/2024 **Supp. PQR N.** P423-AS

Welding Process(es) a) GTAW b) SMAW c) _____
Type(s) a) Manual b) Manual c) _____
Joints (QW-402)

Joint design BW: V groove weld butt joint (see sketch)
Backing SMAW (Yes) ____GTAW_ (No) _____
Backing material (Type) _____WELD METAL _____
- Metal Non fusing metal _____
- Non metallic Other _____

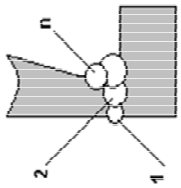
Base metal (QW-403)
P-No. _1_ Gr.No. _2_ to P-No. _1_ Gr. No. _1/2_
Spec. type & grade _____SA-350 LF2
to spec. type & grade _____SA-516 Gr.60/70N
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm/inches):Groove 5÷25,4mm_ Fillet ___All___
Pipe dia.: Groove : ≥33,4 Fillet _All___
Other:

Joint Design
Disegno giunto
W18a



A:3÷5mm – **B:**2±1mm
a°:45°±5 - **S:**8÷10 mm
S1:12,7mm

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.1	
AWS No. (Class)	ER80S-Ni1	E7018-1 H4	
F-No.	6	4	
A-No.	10	1	
Size of filler metal	2,4 mm	3,2/4,0 mm	
F.M. Trade Name	Carborod Ni1	TENAX 35S	
Manufacturer	Lincoln	Lincoln	
Weld Metal Thickness Thickness Groove:	2 mm	Max 16 mm	
Fillet:	All	All	
Flux Trade Name	/		
Manufacturer	/		
Electr.-Flux (Class)	/		

Other **a):**QW404.23: Solid wire – QW 404.22: No –QW404.14:With Filler Metal

GAS (QW-408)	Gas(es)	Mixture	Flow rate	
		Percent Composition		
Plasma				l/min
Shielding (a)	Ar	99,997%	13÷15	l/min
Shielding (b)				l/min
Trailing				l/min
Backing	NO	N.A.	N.A.	l/min
Other:				

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	DC
Polarity:	RP
Mode of Metal Transfer for GMAW:	/
Tungsten Electrode Type & Size	SFA 5.12 EWTh-2
Electrode wire feed speed range	/

POSITIONS (QW-405)	
Position(s) of groove or fillet	Flat (1G)
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	>15°C
Interpass Temp.	Max 300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	60 minutes
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	
Frequency	
Contact Tube to Work Distance	/
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	N.A.

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements

a):QW410.64 N.A. and QW410.11:No – **b):** QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal AWS Class or Trade Name	Filler metal Size/Dia (mm)	Current Type & polarity	Current Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other HEAT IMPUT KJ/mm
1	GTAW	ER80S-Ni1	2,4	DC-SP	146	14,2	73	1,71
2	SMAW	E7018-1 H4	3,2	DC-RP	118	22,5	123	1,3
3-n	SMAW	E7018-1 H4	3,2	DC-RP	120	22,5	125	1,32
4-n	SMAW	E7018-1 H4	4,0	DC-RP	160	24,5	90	2,61

1' - If accessible, a back side weld with SMAW process is admitted / se accessibile la ripresa a rovescio con metodo SMAW è ammessa

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

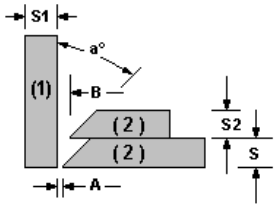
Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 01[illegible]80389 Via Dir[illegible]ria, 15 [44100 FERRARA	

C.A.M.P.I. srl **Ferrara (Italy)**	**WELDING PROCEDURE SPECIFICATION (WPS)** **(QW 482)**	**WPS-N.** 24003-06 **Rev.** 0 **Date:** 08/05/2024 **Supp. PQR N.** P425-AS

Welding Process(es) a) GTAW b) GMAW c) _____
Type(s) a) Manual b) Semiautomatic c) _____
Joints (QW-402)
Joint design BW: V groove weld butt joint (see sketch)
Backing GTAW (No) GMAW (Yes)
Backing material (Type) WELD METAL
- Metal Non fusing metal _____
- Non metallic Other _____

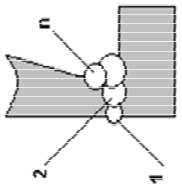
Base metal (QW-403)
P-No. 1 Gr. No. 1 to P-No. 1 Gr. No. 1/2
Spec. type & grade SA-333 Gr.6
to spec. type & grade SA-516 Gr.60/70N
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm): Groove: 5÷25mm Fillet: All
Pipe dia.: Groove: >60,3mm Fillet: All
Other:

Joint Design
Disegno giunto
W21



A:3÷5mm - **B:**8±3mm
a°:45±5 – **S/S2:**8÷10mm
S1:12,7mm

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.36	
AWS No. (Class)	ER80S-Ni1	E71T15-M21A6-CS1-H4	
F-No.	6	6	
A-No.	10	1	
Size of filler metal (mm)	2,4 mm	1,2 mm	
F.M. Trade Name	Carborod Ni1	Diamondspark 54 MC	
Manufacturer	Lincoln	Boehler	
Max Weld Metal Thk. Thickness Groove:	2 mm	Mas 11 mm	
Fillet:	All	All	
Flux Trade Name	/	/	
Manufacturer	/	/	
Electr.-Flux (Class)	/	/	

Other **a):** QW404.23: Solid wire – QW 404.22: No – QW404.14: With Filler Metal

GAS (QW-408)		Percent Composition			
		Gas(es)	Mixture	Flow rate	
Plasma					l/min
Shielding	(a)	Ar	99,997%	9÷11	l/min
Shielding	(b)	Ar+CO_2	92%+8%	14÷16	l/min
Trailing					l/min
Backing		NO	N.A.	N.A.	l/min

Other:

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	DC
Polarity:	a) SP / b) RP
Mode of Metal Transfer for GMAW:	Pulsed
Tungsten Electrode Type & Size	SFA 5.12 EWLa-2
Electrode wire feed speed range	/

POSITIONS (QW-405)	
Position(s) of groove or fillet	All
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	15°C
Interpass Temp.	300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	60 minutes
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	11/16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	/
Frequency	/
Contact Tube to Work Distance GMAW	15÷20mm
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	Single

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
a):QW410.64 N.A. and QW410.11:No ; **b):** QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal AWS Class or Trade Name	Filler metal Size/Dia (mm)	Current Type & polarity	Current Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other Max HEAT IMPUT (KJ/mm)
1	GTAW	ER80S-Ni1	2,4	DC-SP	146	9,1	78	1,02
2	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87
3	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91
4-n	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91

1' - If accessible, a back side weld with GMAW process is admitted / se accessibile la ripresa a rovescio con metodo GMAW è ammessa

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 01[illegible]80389 Via Dis[illegible]ia, 15 [illegible] FERRARA	

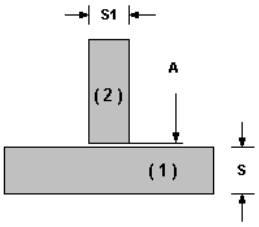
C.A.M.P.I. srl Ferrara (Italy)	WELDING PROCEDURE SPECIFICATION (WPS) (QW 482)	WPS-N. 24003-07_ Rev. 0 Date: 08/05/2024 Supp. PQR N. P425-AS

Welding Process(es) a) GMAW b) _____ c) _____
Type(s) a) Semiautomatic b) _____ c) _____
Joints (QW-402)

Joint design FW: fillet weld (see sketch)
Backing GMAW (Yes) _____ (No) _____
Backing material (Type) BASE METAL
- Metal Non fusing metal _____
- Non metallic Other _____

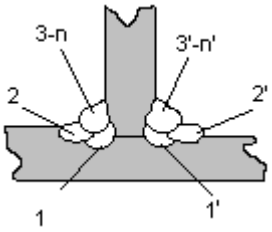
Base metal (QW-403)
P-No. _1_ Gr.No. _1/2_ to P-No. _1_ Gr. No. _1/2_
Spec. type & grade SA-516 Gr.60/70N
to spec. type & grade SA-516 Gr.60/70N
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm/inches):Groove 5÷21mm_ Fillet All
Pipe dia.: Groove :>150mm Fillet _All
Other:

Joint Design
Disegno giunto
W59



S:8÷10mm - **S1:**5÷20mm
A: 0÷1mm

Welding Sequences
sequenze saldatura



All fillet welds (if no different indication on the drawing) shall be continuous type with **a (tc)** 0,7 of the thinner of the plate welded together
TUTTE LE SALDATURE DOVRANNO ESSERE CONTINUE CON UN ALTEZZA DI GOLA **a (tc)** DI 0,7 DELLO SPESSORE PIU' PICCOLO DA SALDARE, SE NON DIVERSAMENTE INDICATO SUL DISEGNO

FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.36		
AWS No. (Class)	E70T15-M21A8-CS1-H4		
F-No.	6		
A-No.	1		
Size of filler metal	1,2 mm		
F.M. Trade Name	Diamondspark 54 MC		
Manufacturer	Boehler		
Weld Metal Thickness Thickness Groove:	/		
Fillet:	All		
Flux Trade Name	/		
Manufacturer	/		
Electr.-Flux (Class)	/		

Other: **a):**QW 404.23 Metal cored , QW 404.24 : NO - QW 404.27 : NO

GAS (QW-408)	Gas(es)	Mixture	Flow rate	
		Percent Composition		
Plasma				l/min
Shielding (a)	$Ar+CO_2$	92%+8%	13÷15	l/min
Shielding (b)				l/min
Trailing				l/min
Backing	NO	N.A.	N.A.	l/min

Other:

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	DC
Polarity:	RP
Mode of Metal Transfer for GMAW:	PULSED ARC
Tungsten Electrode Type & Size	/
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12-14mm
Method of Back Gouging	/
Oscillation: Amplitude	
Frequency	
Contact Tube to Work Distance	15÷20mm
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	N.A.

POSITIONS (QW-405)	
Position(s) of groove or fillet	Flat (1G)
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	>15°C
Interpass Temp.	Max 300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	60 minutes
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
Other: QW 410.64 : N.A.

Weld pass(es) or layers	Welding process(es)	Filler metal AWS Class or Trade Name	Filler metal Size/Dia (mm)	Current Type & polarity	Current Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other HEAT IMPUT KJ/mm
1-1'	GMAW	Diamondspark 54 MC	1,2	DC-RP	140	19,5	195	0,84
2-2'	GMAW	Diamondspark 54 MC	1,2	DC-RP	200	21,5	205	1,258
3/3'-n/n'	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 01[illegible]80389 Via D[illegible]nia, 15 I 44100 FERRARA	

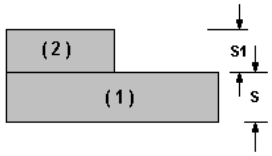
C.A.M.P.I. srl **Ferrara (Italy)**	**WELDING PROCEDURE SPECIFICATION (WPS)** **(QW 482)**	**WPS-N.** 24003-08 **Rev.** 0 **Date:** 08/05/2024 **Supp. PQR N.** P425-AS

Welding Process(es) a) GMAW b) _____ c) _____
Type(s) a) Semiautomatic b) _____ c) _____
Joints (QW-402)

Joint design FW: fillet weld (see sketch)
Backing GMAW (Yes) _____ (No) _____
Backing material (Type) BASE METAL
- Metal — Non fusing metal _____
- Non metallic — Other _____

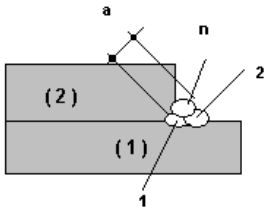
Base metal (QW-403)
P-No. _1_ Gr.No. _1/2_ to P-No. _1_ Gr. No. _1/2_
Spec. type & grade SA-516 Gr.60/70N
to spec. type & grade SA-516 Gr.60/70N
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm/inches): Groove 5÷21mm Fillet All
Pipe dia.: Groove :>150mm Fillet All
Other:

Joint Design
Disegno giunto
W61



S:5÷10mm - **S1:**5÷10mm

Welding Sequences
sequenze saldatura



All fillet welds (if no different indication on the drawing) shall be continuous type with **a (tc)** 0,7 of the thinner of the plate welded together
TUTTE LE SALDATURE DOVRANNO ESSERE CONTINUE CON UN ALTEZZA DI GOLA **a (tc)** DI 0,7 DELLO SPESSORE PIU' PICCOLO DA SALDARE, SE NON DIVERSAMENTE INDICATO SUL DISEGNO

FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.36		
AWS No. (Class)	E70T15-M21A8-CS1-H4		
F-No.	6		
A-No.	1		
Size of filler metal	1,2 mm		
F.M. Trade Name	Diamondspark 54 MC		
Manufacturer	Boehler		
Weld Metal Thickness Thickness Groove:	/		
Fillet:	All		
Flux Trade Name	/		
Manufacturer	/		
Electr.-Flux (Class)	/		

Other: **a):**QW 404.23 Metal cored , QW 404.24 : NO - QW 404.27 : NO

GAS (QW-408)	Percent Composition			
	Gas(es)	Mixture	Flow rate	
Plasma				l/min
Shielding (a)	Ar+CO_2	92%+8%	13÷15	l/min
Shielding (b)				l/min
Trailing				l/min
Backing	NO	N.A.	N.A.	l/min

Other:

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	DC
Polarity:	RP
Mode of Metal Transfer for GMAW:	PULSED ARC
Tungsten Electrode Type & Size	/
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12-14mm
Method of Back Gouging	/
Oscillation: Amplitude	
Frequency	
Contact Tube to Work Distance	15÷20mm
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	N.A.

POSITIONS (QW-405)	
Position(s) of groove or fillet	Flat (1G)
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	>15°C
Interpass Temp.	Max 300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	60 minutes
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
Other: QW 410.64 : N.A.

Weld pass(es) or layers	Welding process(es)	Filler metal		Current		Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other HEAT IMPUT KJ/mm
		AWS Class or Trade Name	Size/Dia (mm)	Type & polarity	Amp. Range ±10%			
1	GMAW	Diamondspark 54 MC	1,2	DC-RP	140	19,5	195	0,84
2	GMAW	Diamondspark 54 MC	1,2	DC-RP	200	21,5	205	1,258
3-n'	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 01[illegible]80389 Via Dir[illegible], 15 [44100 FERRARA	

SECTION 4

PQR: Procedure Qualification Record
Qualifiche Procedimenti di saldatura

-PQR P415-AS + Approval QP-AT-ITA-24-00164-rev.0
-PQR P423-AS + Approval QP-AT-ITA-24-00165-rev.0
-PQR P425-AS + Approval QP-AT-ITA-24-00166-rev.0

ISP N°0006

PERMANENT JOINING PROCEDURE APPROVAL CERTIFICATE

CERTIFICATO DI APPROVAZIONE DELLE GIUNZIONI PERMANENTI

N° QP-AP-ITA-24-00164-rev.0

MANUFACTURER FABBRICANTE	**C.A.M.P.I. rsl – Ferrara Italy**		
PJPQR IN APPROVAL N° NO DELLA QUALIFICA IN APPROVAZIONE	**PQR No. P415-AS Rev. 0**		
REFERENCE STANDARD OF PQR IN APPROVAL NORMA DI RIFERIMENTO QUALIFICA IN APPROVAZIONE	**ASME Sect. IX**		
THIRD PART RECOGNIZED OR BODY TERZA PARTE RICONOSCIUTA O ORGANISMO	**Bureau Veritas Italia**		
TEST IN PQR EQUIVALENT TO TEST AS PER HARMONIZED STANDARD TEST EFFETTUATI IN PQR SONO EQUIVALENTI COME PER NORMA ARMONIZZATA	**Yes** / Si **No** / No	☒ ☐	(Supplementary test required)
SUPPLEMENTED BY RIFERIMENTO DI EVENTUALI PROVE COMPLEMETARI	**N.A.**		
COMPLEMENTARY TEST(S) PERFORMED IN PRESENCE OF PROVE COMPLEMENTARI REALIZZATE IN PRESENZA DI	**N.A.**		

BUREAU VERITAS ITALIA S.P.A. NOTIFIED BODY NR 1370

BUREAU VERITAS ITALIA S.P.A. ORGANISMO NOTIFICATO N°1370

OFFICE LOCATION / AGENZIA DI :	**MILAN - ITALY**

CERTIFIES THAT THE PERMANENT JOINING PROCEDURE QUALIFICATION RECORD, POSSIBLY COMPLETED BY SUPPLEMENTARY TESTS, COMPLIES WITH THE ESSENTIAL SAFETY REQUIREMENTS STATED BY 2014/68/UE DIRECTIVE - APPENDIX 1- § 3.1.2.

CERTIFICA CHE LA QUALIFICA DI ASSEMBLAGGIO PERMANENTE, COMPLETATO DA EVENTUALI PROVE COMPLEMENTARI, SODDISFA LE ESIGENZE ESSENZIALI DI SICUREZZA DELLA DIRETTIVA 2014/68/UE DIRECTIVE - ALLEGATO1 - § 3.1.2.

Observations : **All tests are equivalent to the requirements of harmonized standard EN ISO 15614-1**
OSSERVAZIONI :

NAME / **Nome**	DATE/ **Data**	VISA / **Firma**	STAMP / **Timbro**
Gabriele Fracassi	**16/09/2024**	Gabriele Fracassi	BUREAU VERITAS ITALIA Notified Body no. 1370

OTHER IDENTIFICATION (AS NECESSARY) : **IT FILE 23.SF.702806 4.138 Chrono No. P16344/24/GF/gf** PAGE 1/1
ALTRE IDENTIFICAZIONI (SE NECESSARIE)

Attachment : Approved document & Supplementary test certificate (if required)
ALLEGATO : DOCUMENTO APPROVATO & CERTIFICATO PROVE SUPPLEMENTARI (SE RICHIESTO)

C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P415-AS**	**Rev.** 0 **Date:** April 20,2021

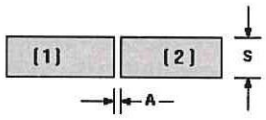
Company Name: C.A.M.P.I. S.r.l. Via Diamantina,15 - 44122 Ferrara, ITALY

WPS No.: P415-01AS

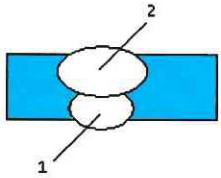
Welding Process(es): SAW (Submerged Arc Welding)

Types (Manual, Automatic, Machine): Machine

JOINTS (QW-402)



A: 2±1mm - **S:**6mm



Groove Design of Test Coupon
(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used)

BASE METALS (QW-403)
Material Spec. **(1):** SA516 **(2):** SA516
Type or Grade Gr. 60 to Gr 70
P. No. 1 Gr. 1 to P. No. 1 Gr. 2
Thickness of Test Coupon 6 mm
Diameter of Test Coupon Plate

POSTWELD HEAT TREATMENT (QW-407)
Temperature: 610±10°C
Time: 1hr/in minimum 60min.

Other: Heat and Cool rate 80°C/h above 300°C

Performed N°1 & N°3 cycles of simulated PWHT

FILLER METALS (QW-404)	SAW	
Weld Metal Analysis A-No.	1	
Size of Filler Metal (mm)	2,4	
Filler Metal F-No.	6	
SFA Specification	5.17	
AWS Classification	EH12K	
Deposited weld metal (mm)	6	
Flux Type	Neutral flux	
Flux Trade name	P230 LINCOLN	
Filler Metal Product Form	Solid wire	
Supplemental filler metal	NO	
Alloy elements	NO	
Filler Material trade name	L50M	
Manufacturer	LINCOLN	
QW-404.35 Flux/wire class.	F48P5-EH12K	

Others: QW-410.10: None ; QW-404.36 Recrushed slag: NO

GAS (QW-408) **Percent composition**

	Gas(es)	Mixture %	Flow rate
Shelding (1)	/	/	/
Shelding (2)	/	/	/
Trailing	None		
Backing	None		

ELECTRICAL CHARACTERISTICS (QW-409)

Current : DC	Polarity: RP	Travel Speed (mm/1')
1) Amps: 340	Volts: 26,8	600
2) Amps: 440	Volts: 29,5	600
3) Amps:	Volts:	
4) Amps:	Volts:	

Heat Input (KJ/mm): 1):0,911; 2):1,405

Others: Transfer mode: /

POSITION (QW-405)
Position of Groove 1G
Weld Progression (Uphill, Downhill) /
Other

PREHEAT (QW-406)
Preheat Temp. >15°C
Interpass Temp. Max 300°C
Other

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 20 APR. 2021

TECHNIQUE (QW-410)
String or wave bead: STRING
Oscillation: NO Frequency: N.A.
Multi pass or single pass (per side) MULTI
Single or multiple electrodes: SINGLE
Contact tube to work distance : 25÷28 mm
Orifice or Gas cap size: /
Use of Thermal process: N.A.

C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P415-AS**	**Rev.** 0 **Date:** April 20,2021

Tensile Test (QW-150) with 1PWHT

Specimen No. QW 462.1(a)	Width mm	Thickness mm	Area mm^2	Ultimate Total Load N.	Tensile Strenght Rm (MPa)	Type of Failure & Location
415-1-t1	18,74	5,80	108,69	/	487	BM SA516 Gr.60
415-1-t2	18,66	5,81	109,58	/	480	BM SA516 Gr.60

Guided Bend Tests (QW-160) with 1PWHT

Type and Figure no.	Result
1-Face bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163
2-Face bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163
3-Root bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163
4-Root bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163

Toughness Tests (QW-170) with 1PWHT size 2,5mm

Specimen No.	Notch Location	Notch Type	Test. Temp.	Impact values-J.		Lateral Exp.		Drop Weight	
				Single	Average	% Shear	Mils.mm	Break	No.break
5-1	BM Gr.60	KV	-52°C	24	25,7				
5-2	BM Gr.60	KV	-52°C	25					
5-3	BM Gr.60	KV	-52°C	28					
3-1	HAZ	KV	-52°C	24	24,7				
3-2	HAZ	KV	-52°C	25					
3-3	HAZ	KV	-52°C	25					
1-1	WM	KV	-52°C	22	20,7				
1-2	WM	KV	-52°C	20					
1-3	WM	KV	-52°C	20					
2-1	HAZ	KV	-52°C	24	24				
2-2	HAZ	KV	-52°C	24					
2-3	HAZ	KV	-52°C	24					
4-1	BM Gr.70	KV	-52°C	20	23				
4-2	BM Gr.70	KV	-52°C	24					
4-3	BM Gr.70	KV	-52°C	25					

Fillet Weld Test (QW-180)

Result – Satisfactory: Yes ____/_____ No ____/___ Penetration into Parent Metal: Yes __/__ No __/__

Macro – Results

Other Tests

1) **Hardness test**: HV10 – Max 210 : SATISFACTORY Max 192HV
2) **Macrographic examination**: SATISFACTORY
3) **Deposit Analysis**: On weld metal – See certificate Studio VM Ferrara
4) **X Ray** according to ASME Sect. IX QW 191 & QW-302.2: SATISFACTORY
   See certificate RT 2021-02 on 24-March-2021
5) **Magnetic particle examination**: SATISFACTORY – see cert. MT 415-01AS on 23-March-2021
6) **Visual examination** According to ASME Sect. IX QW 194 & QW-302.4: SATISFACTORY
   See cert. VT 415-01AS on 23-March-2021

Tests conducted by: C.A.M.P.I. / Studio V.M. Laboratory Test No LAB-035-001_21 on 19-April-2021



C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P415-AS**	**Rev.** 0 **Date:** April 20,2021

Tensile Test (QW-150) with 3PWHT

Specimen No. QW 462.1(a)	Width mm	Thickness mm	Area mm^2	Ultimate Total Load N.	Tensile Strenght Rm (MPa)	Type of Failure & Location
415-3-t1	18,82	5,91	111,23	/	464	BM SA516 Gr.60
415-3-t2	18,75	5,75	107,81	/	479	BM SA516 Gr.60

Guided Bend Tests (QW-160) with 3PWHT

Type and Figure no.	Result
5-Face bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163
6-Face bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163
7-Root bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163
8-Root bend QW462.3(a)	No imperfections – Acceptable criteria acc. to QW-163

Toughness Tests (QW-170) with 3PWHT size 2,5mm

Specimen No.	Notch Location	Notch Type	Test. Temp.	Impact values-J.		Lateral Exp.		Drop Weight	
				Single	Average	% Shear	Mils.mm	Break	No.break
10-1	BM Gr.60	KV	-52°C	24					
10-2	BM Gr.60	KV	-52°C	24	22,7				
10-3	BM Gr.60	KV	-52°C	20					
8-1	HAZ	KV	-52°C	22					
8-2	HAZ	KV	-52°C	28	23				
8-3	HAZ	KV	-52°C	19					
6-1	WM	KV	-52°C	23					
6-2	WM	KV	-52°C	25	22,3				
6-3	WM	KV	-52°C	19					
7-1	HAZ	KV	-52°C	28					
7-2	HAZ	KV	-52°C	30	29,3				
7-3	HAZ	KV	-52°C	30					
9-1	BM Gr.70	KV	-52°C	26					
9-2	BM Gr.70	KV	-52°C	28	26,7				
9-3	BM Gr.70	KV	-52°C	26					

Fillet Weld Test (QW-180)

Result – Satisfactory: Yes ____/_____ No ____/___ Penetration into Parent Metal: Yes __/__ No __/__
Macro – Results

Other Tests

1) **Hardness test**: HV10 – Max 210 : SATISFACTORY Max 198HV
2) **Macrographic examination**: SATISFACTORY
3) **Deposit Analysis**: On weld metal – See certificate Studio VM Ferrara
4) **X Ray** according to ASME Sect. IX QW 191 & QW-302.2: SATISFACTORY
   See certificate RT 2021-02 on 24-March-2021
5) **Magnetic particle examination**: SATISFACTORY – see cert. MT 415-01AS on 23-March-2021
6) **Visual examination** According to ASME Sect. IX QW 194 & QW-302.4: SATISFACTORY
   See cert. VT 415-01AS on 23-March-2021

Welder's Name: Perelli Cristian Clock No.: 85 Stamp No.: 8

Tests conducted by: C.A.M.P.I. / Studio V.M. Laboratory Test No LAB-035-001_21 on 19-April-2021

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX Ed.2019 of the ASME Boiler and Pressure Vessel Code.

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 20 APR. 2021

Test Supervised by _____

Signed _____

Date 20-April-2021

Manufacturer C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I-44122 FERRARA

By _____

Exhibit 7-2 Rev. 0 | 1 | 2 | 3 | 4 | 5

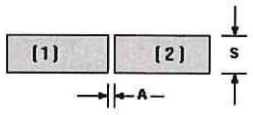
C.A.M.P.I. srl Ferrara (Italy)	WELDING PROCEDURE SPECIFICATION (WPS) (QW 482)	WPS-N. P415-01AS Rev. 0 Date: 23/03/2021 Supp. PQR N. P415-AS

Welding Process(es) a) SAW b) c)
Type(s) a) Machine b) c)
Joints (QW-402)

Joint design BW: V groove weld butt joint (see sketch)
Backing SAW (Yes) (No)
Backing material (Type) BASE METAL
- Metal — Non fusing metal
- Non metallic — Other

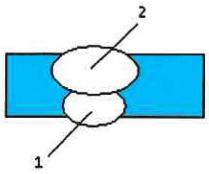
Base metal (QW-403)
P-No. 1 Gr.No. 1 to P-No. 1 Gr. No. 2
Spec. type & grade SA-516 Gr.60
to spec. type & grade SA-516 Gr.70
Chem. anal. & mech. prop.
to Chem. Anal. & Mech. Prop.
Thickness range
Base metal (mm/inches): Groove 6mm Fillet All
Pipe dia.: Groove :>2"7/8 Fillet All
Other:

Joint Design
Disegno giunto



A: 2±1mm - **S:**6mm

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.17		
AWS No. (Class)	EH12K		
F-No.	6		
A-No.	1		
Size of filler metal	2,4		
F.M. Trade Name	L50M		
Manufacturer	Lincoln		
Weld Metal Thickness Thickness Groove:	6mm		
Fillet:	/		
Flux Trade Name	P230		
Manufacturer	Lincoln		
Electr.-Flux (Class)	F48P5-EH12K		

Other:

GAS (QW-408)	Percent Composition			
	Gas(es)	Mixture	Flow rate	
Plasma	/	/	/	l/min
Shielding (a)	/	/	/	l/min
Shielding (b)	/	/	/	l/min
Trailing	/	/	/	l/min
Backing	/	/	/	l/min

Other:

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	DC
Polarity:	RP
Mode of Metal Transfer for GMAW:	/
Tungsten Electrode Type & Size	/
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING
Orifice or Gas Cup Size	/
Initial & Interpass Cleaning	GRINDING
Stick out:	/
Method of Back Gouging	GRINDING
Oscillation: Amplitude	
Frequency	
Contact Tube to Work Distance	25÷28mm
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	SINGLE

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
Other:

POSITIONS (QW-405)	
Position(s) of groove or fillet	Flat (1G)
Welding Progression:	/
Other:	

PREHEAT (QW-406)	
Preheat Temp.	>15°C
Interpass Temp.	Max 300°C
Preheat maintenance	

POSTWELD HEAT TREATMENT (QW-407)	
Temp. Range	610±10°C
Time Range	1hr/inch minimum 60min.
Heat rate: Max 80°C/h – above 300°C	
Cool rate: Max 80°C/h– above 300°C and cooled in still air	

Weld pass(es) or layers	Welding process(es)	Filler metal: AWS Class or Trade Name	Filler metal: Size/Dia (mm)	Current: Type & polarity	Current: Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other HEAT INPUT KJ/mm
1	SAW	FL50M	2,4	DC-RP	340	26,8	600	0,911
grinding and PT Examination before back gouging / molatura prima della ripresa a rovescio + LP								
2	SAW	FL50M	2,4	DC-RP	440	29,5	600	1,405

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Terza parte *TP Inspector*
	C.A.M.P.I. srl Partita IVA [illegible] Via Dal Pozzo, 15 I 44100 FERRARA	BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 23 MAR. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **1 di 10**	
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**	
#Colata / Heat **1TAH340803B** **810493 A302**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA516 Gr.70** **SA516 Gr.60**	**Stato** / Status **Heat treated**

M-Lab Rev2

Sommario / Summary

1) PROVA DI TRAZIONE TRASVERSALE/ Transversal tensile test 2
2) PROVA DI PIEGA / Bending test 3
3) PROVA DI RESILIENZA / Charpy impact test 4
4) PROVA DI DUREZZA VICKERS / Vickers hardness test 5
5) PROVA DI DUREZZA VICKERS / Vickers hardness test 6
6) ESAME MACROGRAFICO / Macrographic examination 7
7) ANALISI CHIMICA / Chemical analysis* 8
8) TRATTAMENTO TERMICO / Heat treatment * 9

I risultati del presente Rapporto sono riferiti solo agli oggetti in esame e non sono in nessun caso estendibili ad altri.
Ogni riproduzione parziale deve essere autorizzata dallo Studio V.M.
Il laboratorio garantisce la correttezza delle procedure adottate, il campionamento eseguito dal Cliente e non oggetto di accreditamento.
I campioni testati sono archiviati per 30gg.
(#)= dati forniti dal cliente, per i quali il laboratorio non si assume responsabilità.
(*)= prova non accreditata da Accredia

The results of this Report refer only to the objects under examination and can not in any case be extended to others.
Any partial reproduction must be authorized by Studio V.M.
The laboratory guarantees the correctness of the procedures adopted, the sampling is by Client and not subject to accreditation
The tested samples have been stored for 30 day.
(#) = data provided by the customer, for which the laboratory assumes no responsibility.
(*) = test not accredited by Accredia

Responsabile di prova Test responsible	**Responsabile di laboratorio** Laboratory manager	**Controllo qualità del cliente** Q.C. Client Supervisor	**Ispettore di 3^ parte** 3rd party Inspector
STUDIO V.M. srl M. Provasi Resp. Prove Meccaniche	STUDIO V.M. srl M. Bruschi Resp. Laboratorio		ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 19 APR. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **2 di 10**
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
1TAH340803B	**-**	**SA516 Gr.70**	
810493 A302	**-**	**SA516 Gr.60**	**Heat treated**

M-Lab Rev2

1) PROVA DI TRAZIONE TRASVERSALE/ Transversal tensile test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**WAW 600 D Lab-01**
Estensimetro digitale / Digital extensimeter	**-**
Metodo di prova / Standard	**ASME IX-19 QW-150**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Tipo di provetta / Test specimen	**Flat**

N.	**Dimensioni** Dimension (mm)	**Sezione** Section So (mm)	**Lunghezza utile** Rupture length Lo (mm)	**Lunghezza finale** Final length Lf (mm)	**Loc. rottura** Failure pos (see note)	**Carico di rottura** Tensile strength Rm (MPa)	**Carico di snervamento** Yield strength ReH (MPa)	**Allungamento** Elongation A %	Z %
1	18.74*5.80	108.69	-	-	BM **SA516 Gr.60**	487	321	-	-
2	18.86*5.81	109.58	-	-	BM **SA516 Gr.60**	480	327	-	-
3	18.82*5.91	111.23	-	-	BM **SA516 Gr.60**	464	310	-	-
4	18.75*5.75	107.81	-	-	BM **SA516 Gr.60**	479	310	-	-
Valore richiesto dal cliente Required value by client						-	-	-	-

N°1-2 performed after 1 cycle of PWHT
N°3-4 performed after 3 cycle of PWHT

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

Note / note :
BM = metallo base / base metal **WM = saldatura** / weld metal **HAZ = zona termicamente alterata** / heat affected zone

Prova di trazione eseguita il / Tensile test performed on **19/04/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **3 di 10**
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
1TAH340803B	**-**	**SA516 Gr.70**	
810493 A302	**-**	**SA516 Gr.60**	**Heat treated**

M-Lab Rev2

2) PROVA DI PIEGA / Bending test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**WAW 600 D Lab-01**
Metodo di prova / Standard	**ASTM E190-14, ASME IX-19 QW-160**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Tipo di piega / Bend type	**Face / Root**

No.	**Dimensioni** Dimensions (mm)	**Tipo di Piega** Bend type (see note)	**Diametro del mandrino** Diameter of spindle (mm)	**Distanza rulli** Rollers distance (mm)	**Angolo°** Bend angle°	**Risultato** Result
1	38*6	Face bend	24	39	180	No defect founds
2	38*6	Face bend	24	39	180	No defect founds
3	38*6	Root bend	24	39	180	No defect founds
4	38*6	Root bend	24	39	180	No defect founds
5	38*6	Face bend	24	39	180	No defect founds
6	38*6	Face bend	24	39	180	No defect founds
7	38*6	Root bend	24	39	180	No defect founds
8	38*6	Root bend	24	39	180	No defect founds

N°1-4 performed after 1 cycle of PWHT
N°5-8 performed after 3 cycle of PWHT

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

Note / note :
Face = Piega dritta / face bend **Root = Piega al rovescio** / root bend **Side = Piega laterale** / side bend

Prova di piega eseguita il / Bending test performed on **19/04/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **4 di 10**
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
1TAH340803B	**-**	**SA516 Gr.70**	
810493 A302	**-**	**SA516 Gr.60**	**Heat treated**

M-Lab Rev2

3) PROVA DI RESILIENZA / Charpy impact test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**JBS 500J - KV8 Lab-01**
Metodo di prova / Standard	**ASME IX-19 QW-170**
Specifica del cliente / Client specification	**ASTM SA516 Gr.70**
Temperatura di prova / Test temperature	**-52°C**
Tipo di intaglio / Notch type	**V-NOTCH**

No.	Dimensioni Dimensions (mm)	Posizione Position	Valore Value (J)	Valore medio Average (J)	Shear fracture (%)	Lateral expansion (mm)
1-1	**2.5*10*55**	WZ 1 cycle PWHT	22	20.7	-	-
1-2	**2.5*10*55**		20		-	-
1-3	**2.5*10*55**		20		-	-
2-1	**2.5*10*55**	HAZ SA516 Gr.70 1 cycle PWHT	24	24.0	-	-
2-2	**2.5*10*55**		24		-	-
2-3	**2.5*10*55**		24		-	-
3-1	**2.5*10*55**	HAZ SA516 Gr.60 1 cycle PWHT	24	24.7	-	-
3-2	**2.5*10*55**		25		-	-
3-3	**2.5*10*55**		25		-	-
4-1	**2.5*10*55**	B.M. SA516 Gr.70 1 cycle PWHT	20	23.0	-	-
4-2	**2.5*10*55**		24		-	-
4-3	**2.5*10*55**		25		-	-
5-1	**2.5*10*55**	B.M. SA516 Gr.60 1 cycle PWHT	24	25.7	-	-
5-2	**2.5*10*55**		25		-	-
5-3	**2.5*10*55**		28		-	-
6-1	**2.5*10*55**	WZ 3 cycle PWHT	23	22.3	-	-
6-2	**2.5*10*55**		25		-	-
6-3	**2.5*10*55**		19		-	-
7-1	**2.5*10*55**	HAZ SA516 Gr.70 3 cycle PWHT	28	29.3	-	-
7-2	**2.5*10*55**		30		-	-
7-3	**2.5*10*55**		30		-	-
8-1	**2.5*10*55**	HAZ SA516 Gr.60 3 cycle PWHT	22	23.0	-	-
8-2	**2.5*10*55**		28		-	-
8-3	**2.5*10*55**		19		-	-
9-1	**2.5*10*55**	B.M. SA516 Gr.70 3 cycle PWHT	26	26.7	-	-
9-2	**2.5*10*55**		28		-	-
9-3	**2.5*10*55**		26		-	-
10-1	**2.5*10*55**	B.M. SA516 Gr.60 3 cycle PWHT	24	22.7	-	-
10-2	**2.5*10*55**		24		-	-
10-3	**2.5*10*55**		20		-	-
Valore richiesto dalla distinta Required value cutt-off sheet			**>34** **For specimen 10*10**	**>34** **For specimen 10*10**	-	-

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 19 APR. 2021

Note / note :
BM = metallo base / base metal **WM = saldatura** / weld metal **HAZ = zona termicamente alterata** / heat affected zone

Prova di resilienza eseguita il / Charpy impact test performed on **19/04/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **5 di 10**
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**

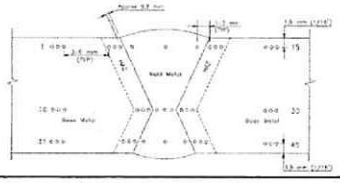
#Colata / Heat	#Cert. No.	#Mat. dichiarato / Steel dec.	Stato / Status
1TAH340803B	-	SA516 Gr.70	
810493 A302	-	SA516 Gr.60	Heat treated

M-Lab Rev2

4) *PROVA DI DUREZZA VICKERS / Vickers hardness test*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**HVS 30Z – Lab 04**
Metodo di prova / Standard	**ASTM E92-16**
Specifica del cliente / Client specification	**-**
Temperatura del controllo / Test temperature	**22°C**
Modalità di prova / Testing parameters	**In section - After 1 cycle PWHT**
Valore richiesto / Required value	**210 HV10 max**

No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10
1	B.M. SA516 Gr.60	140	16	B.M. SA516 Gr.60	136	31	B.M. SA516 Gr.60	137
2	B.M. SA516 Gr.60	145	17	B.M. SA516 Gr.60	139	32	B.M. SA516 Gr.60	138
3	B.M. SA516 Gr.60	145	18	B.M. SA516 Gr.60	137	33	B.M. SA516 Gr.60	136
4	H.A.Z.	137	19	H.A.Z.	144	34	H.A.Z.	146
5	H.A.Z.	142	20	H.A.Z.	142	35	H.A.Z.	142
6	H.A.Z.	154	21	H.A.Z.	149	36	H.A.Z.	152
7	W.Z.	165	22	W.Z.	167	37	W.Z.	167
8	W.Z.	170	23	W.Z.	171	38	W.Z.	173
9	W.Z.	185	24	W.Z.	175	39	W.Z.	182
10	H.A.Z.	187	25	H.A.Z.	192	40	H.A.Z.	172
11	H.A.Z.	165	26	H.A.Z.	185	41	H.A.Z.	155
12	H.A.Z.	156	27	H.A.Z.	162	42	H.A.Z.	150
13	B.M. SA516 Gr.70	155	28	B.M. SA516 Gr.70	153	43	B.M. SA516 Gr.70	151
14	B.M. SA516 Gr.70	155	29	B.M. SA516 Gr.70	145	44	B.M. SA516 Gr.70	154
15	B.M. SA516 Gr.70	157	30	B.M. SA516 Gr.70	149	45	B.M. SA516 Gr.70	155



BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

Note / note :
B.M. = **metallo base** / base metal **W.M.** = **saldatura** / weld metal **H.A.Z.** = **zona termicamente alterata** / heat affected zone

Prove di durezza eseguite il / Hardness test performed on **19/04/2021**

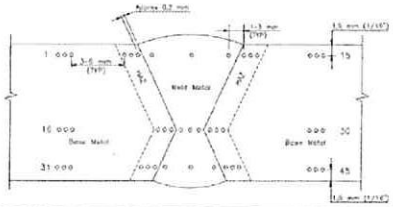
STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **6 di 10**	
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**	
#Colata / Heat **1TAH340803B** **810493 A302**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA516 Gr.70** **SA516 Gr.60**	**Stato** / Status **Heat treated**

M-Lab Rev2

5) *PROVA DI DUREZZA VICKERS / Vickers hardness test*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**HVS 30Z – Lab 04**
Metodo di prova / Standard	**ASTM E92-16**
Specifica del cliente / Client specification	**-**
Temperatura del controllo / Test temperature	**22°C**
Modalità di prova / Testing parameters	**In section - After 3 cycle PWHT**
Valore richiesto / Required value	**210 HV10 max**

No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10
1	B.M. SA516 Gr.70	154	16	B.M. SA516 Gr.70	149	31	B.M. SA516 Gr.70	149
2	B.M. SA516 Gr.70	151	17	B.M. SA516 Gr.70	152	32	B.M. SA516 Gr.70	152
3	B.M. SA516 Gr.70	150	18	B.M. SA516 Gr.70	153	33	B.M. SA516 Gr.70	152
4	H.A.Z.	150	19	H.A.Z.	147	34	H.A.Z.	154
5	H.A.Z.	153	20	H.A.Z.	160	35	H.A.Z.	163
6	H.A.Z.	198	21	H.A.Z.	173	36	H.A.Z.	174
7	W.Z.	180	22	W.Z.	166	37	W.Z.	178
8	W.Z.	181	23	W.Z.	167	38	W.Z.	177
9	W.Z.	171	24	W.Z.	169	39	W.Z.	178
10	H.A.Z.	167	25	H.A.Z.	146	40	H.A.Z.	166
11	H.A.Z.	145	26	H.A.Z.	142	41	H.A.Z.	151
12	H.A.Z.	137	27	H.A.Z.	133	42	H.A.Z.	145
13	B.M. SA516 Gr.60	129	28	B.M. SA516 Gr.60	133	43	B.M. SA516 Gr.60	144
14	B.M. SA516 Gr.60	124	29	B.M. SA516 Gr.60	136	44	B.M. SA516 Gr.60	138
15	B.M. SA516 Gr.60	126	30	B.M. SA516 Gr.60	139	45	B.M. SA516 Gr.60	140



BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

Note / note :
B.M. = metallo base / base metal **W.M. = saldatura** / weld metal **H.A.Z. = zona termicamente alterata** / heat affected zone

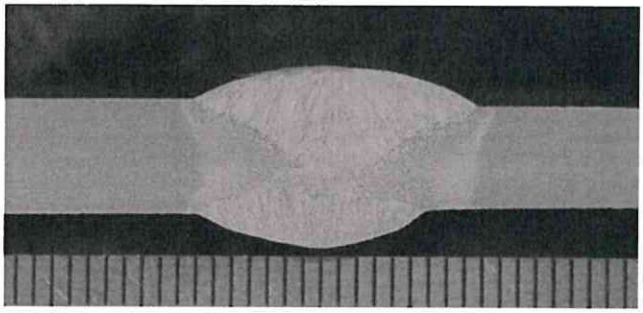
Prove di durezza eseguite il / Hardness test performed on **19/04/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **7 di 10**	
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**	
#Colata / Heat **1TAH340803B** **810493 A302**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA516 Gr.70** **SA516 Gr.60**	**Stato** / Status **Heat treated**

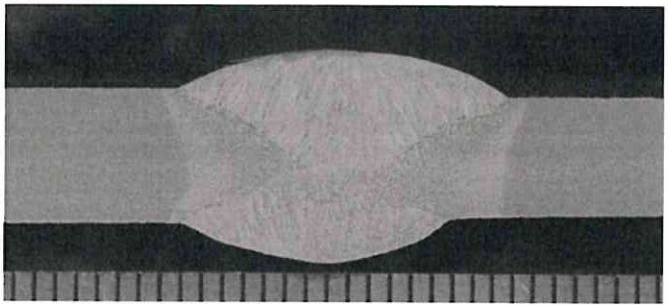
M-Lab Rev2

6) *ESAME MACROGRAFICO / Macrographic examination*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**MACRO INFINITY - Lab 07**
Metodo di prova / Standard	**ASME IX-19 QW184**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Modalità di prova / Test modality	**In section**
Reattivo / Eatching	**Nital 10%**
Ingrandimento / Magnification	**3.5X**



After 1 Cycle PWHT



After 3 Cycle PWHT

Esame macrografico eseguito il / Macrographic examination performed on **19/04/2021**

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**		**Foglio N°** / Sheet No. **8 di 10**
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**			**Data ricevimento 31/03/2021** **Data report 19/04/2021**
#Colata / Heat **1TAH340803B** **810493 A302**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA516 Gr.70** **SA516 Gr.60**	**Stato** / Status **Heat treated**

M-Lab Rev2

*7) ANALISI CHIMICA / Chemical analysis**

Apparecchiatura e codice V.M. / Equipment and V.M. code	**AMETEK SPEKTROMAXX**
Metodo di prova / Standard	**PO13**
Specifica del cliente / Client specification	**ASME IX-19 QW440 Table QW442**
Modalità di prova / Test modality	**Weld Metal**

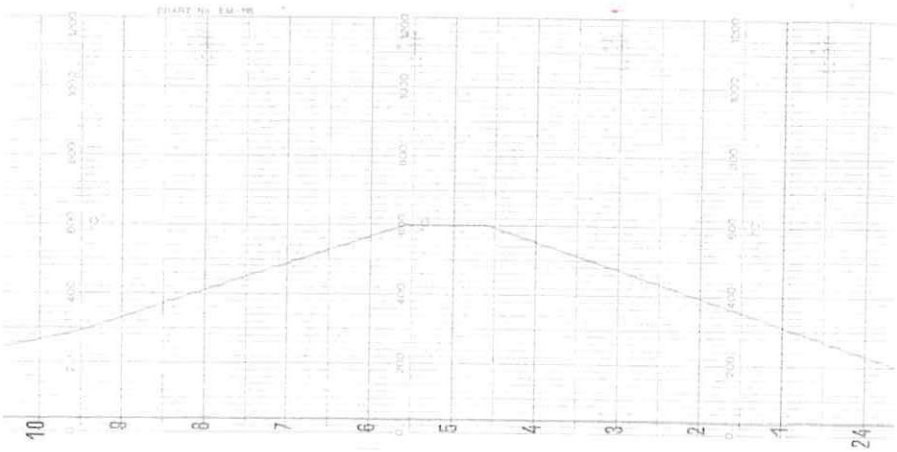
No.	C %	Cr %	Mo %	Ni %	Mn %	Si %	-
1	0.131	0.032	0.007	0.025	1.36	0.701	-



Analisi chimica eseguita il /Chemical analysisperformed on **19/04/2021**

8) *TRATTAMENTO TERMICO / Heat treatment* *

Apparecchiatura e codice V.M. / Equipment and V.M. code	**SICORTHERM ETTS/50**
Registratore / Recorder	**CHINO KL4106 Serial n° R1131C006**
Specifica del cliente / Client specification	**X3 Cycle**
Temperatura massima /Temperature	**610 °C**
Tempo di mantenimento / Holding time	**1h**
Gradiente di salita - discesa / Heating - cooling rate	**80°C/h**



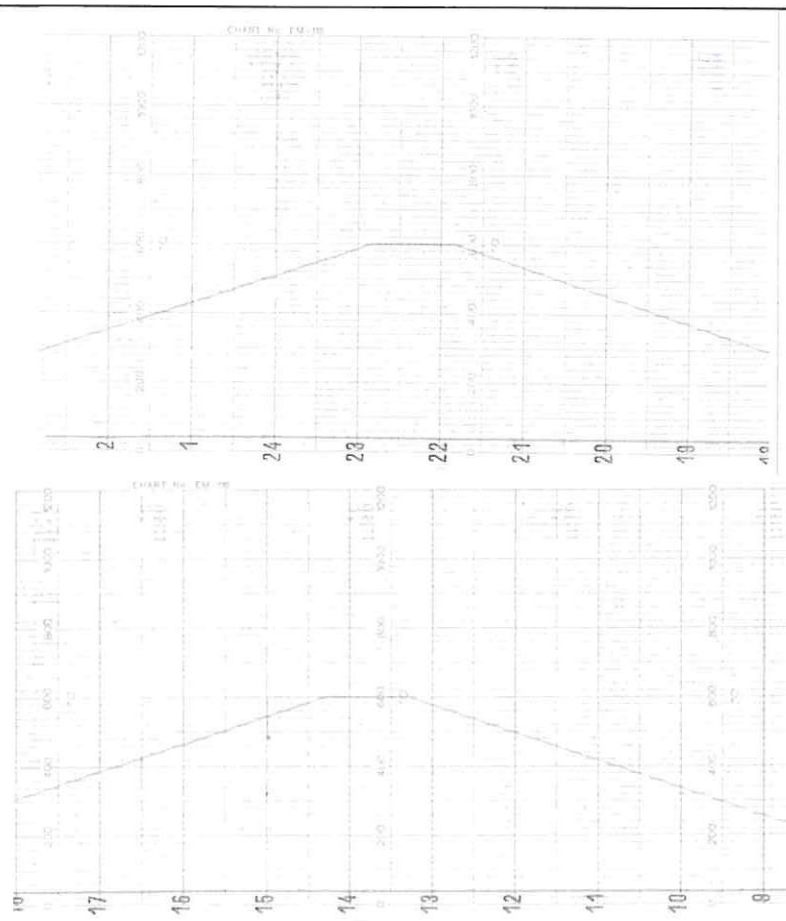
BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-01_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P415**	**Foglio N°** / Sheet No. **10 di 10**
Oggetto / Subject **PQR P415 SAW Plate Thk.6mm Welder: Perelli Cristian** **Wire L50M 2.4mm Heat: F1SW200786 Flux P230 Heat: F1FX210033**		**Data ricevimento 31/03/2021** **Data report 19/04/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
1TAH340803B	**-**	**SA516 Gr.70**	
810493 A302	**-**	**SA516 Gr.60**	**Heat treated**

M-Lab Rev2



BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

Trattamento termico eseguito il / Heat treated performed on **05/04/2021**

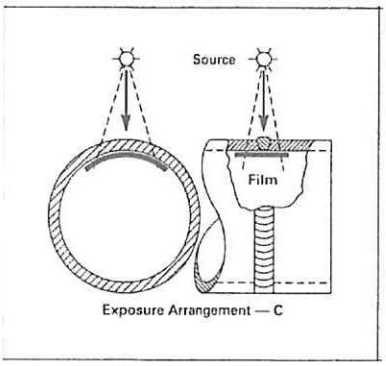
C.A.M.P.I. srl Ferrara (Italy)	CONTROLLO RADIOGRAFICO RADIOGRAPHIC EXAMINATION REPORT	RT No. 2021-02 Foglio / Sheet 1 of 2

APPARECCHIO- Equipment: Test plates P415 / P416 / P417 / P418 / P419 / P420 / P426 / P427 & P431 *Talloni di saldatura* P415 / P416 / P417 / P418 / P419 / P420 / P426 / P427 & P431	COLLAUDO *Inspection Authority*	COMMESSA / Job No. / N.F. / Item Serial No. /

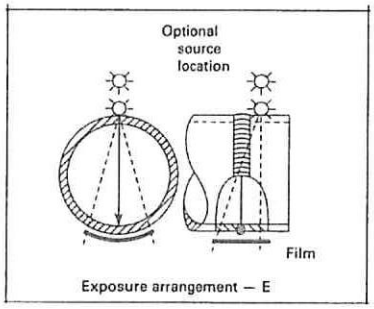
STADIO DI LAVORAZIONE : Dopo saldatura *Fabrication step : After welding*	CONDIZIONI SUPERFICIALI : come saldato *Test surface status : As welded*	
SPECIFICA DI CONTROLLO *Testing procedure:* C.A.M.P.I. IO ND101AS rev.6 / ASME Sect. V Ed.19 Art. 2	*CLASSE ACCETTABILITA' / Acceptance standard* C.A.M.P.I. IO ND101AS rev.6 / ASME VIII Div.1 Ed.19 - UW51 & App.4 / ASME IX Ed.19 QW191.1	ESTENSIONE *Extension* : 100%

TECNICA RADIOGRAFICA *Radiographic method*			1	2	3
SALDATURA *Weldjoint*	MATERIALE BASE TIPO *Base material type*		SA516Gr70	SA516Gr70 / SA312Tp304L / SA387Gr.11	SA516Gr70
	SPESSORE (nom.) mm *Thickness (nom.)*		6	10÷15	25
	RINFORZO mm *Weld reinforcement thk*		1,0+1,5	1,0+1,5	1,0+1,5
	TIPO DI SALDATURA *Welding type*		Butt Weld	Butt Weld	Butt Weld
PELLICOLA *Film*	MARCA – TIPO *Trade mark – type*		AGFA Structurix D5	AGFA Structurix D5	AGFA Structurix D5
	DOPPIA *Double film*		NO	NO	NO
	SINGOLA *Single film*		YES	YES	YES
	FORMATO *Size*		10x48	10x48	10x48
PENETRAMETRO *Penetrameter*	TIPO *Type*	ASME	ASTM 1B	ASTM 1B	ASTM 1B
		EN	-	-	-
	POSIZIONE *Location*	LATO SORG. *Source side*	■	■	■
		LATO FILM *Film side*	□	□	□
SCHERMI *Screens*	ANTERIORE *Front*	TIPO *Type*	Pb	Pb	Pb
		SPESSORE *Thickness*	0,05mm	0,05mm	0,05mm
	POSTERIORE *Back*	TIPO *Type*	Pb	Pb	Pb
		SPESSORE *Thickness*	0,10mm	0,10mm	0,10mm
SORGENTE *Source*	TIPO *Type*		Gilardoni 300/6	Gilardoni 300/6	Gilardoni 300/6
	ENERGIA *Energy*		170KV	220÷235KV	290KV
	INTENSITA' *Intensity*		3 mA	3 mA	3 mA
	F: MACCHIA FOCALE mm *F: Focal spot*		1,5X1,5	1.5X1.5	1.5X1.5
PARETI ATTRAV. *Radiation through*	Singola *Single wall*	Direzionale *Single*	■	■	■
		Panoramica *Multiple*	□	□	□
	Doppia	*Double wall*	□	□	□
D:Distance from source of radiation to weld or object being radiographed : mm *Distanza Fuoco- pezzo*			700	700	40
d:distance from surce side of weld or object being radiographated to the film : mm *Distanza pezzo- pellicola*			8	12÷17	27
TEMPO DI ESPOSIZIONE / DOSE *Exposure / Dose*			90"	90"	90"
DENSITA' PELLICOLA *Film density*			1,9 to 3,4	1,8 to 3,7	2,1 to 3,6
SENSIBILITA' RADIOGR. MINIMA *Penetrameter min. sensitivity*			2%	2%	2%

TECNICA RADIOGRAFICA 1-2-3
Radiographic method



TECNICA RADIOGRAFICA
Radiographic method



Ug : Geometric Unsharpness:
Penombra geometrica
Ug=Fd/D
D and d shall be determined at the approximate center of the area of interest.
For material thk <50mm
Ug max 0.51mm
- Result : OK

NUMERO TOTALE FILM: **9**
Number of films

DATA / *Date*	CAMPI	ISPETTORI / *Inspectors*	CLIENTE / *Purchaser*
24-March-2021	LIVELLO *Level* □ 1 ■ 2 □ 3		

C.A.M.P.I. SRL
MICHELE ANTOLINI
2 LEVEL ENT TC 1A
EN473/ISO 9712

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date 24/3/21
Signature

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

C.A.M.P.I. srl Ferrara (Italy)	**CONTROLLO RADIOGRAFICO** **RADIOGRAPHIC EXAMINATION REPORT**	**RT No. 2021-02** Foglio / Sheet 2 of 2

N. saldatura *Weld no.*	Tratto *Section*	Diametro *Diameter*	Spessore *Thickness*	Tecnica radiografica *Radiographic method*	Difetto *Defect*	Giudizio *Evaluation*	Giudizio cliente *Customer evaluation*
P415-W1	1-2	/	6	1		A	
P416-W1	1-2	/	12	2		A	
P417-W1	1-2	/	25	3		A	
P418-W1	1-2	/	6	1		A	
P419-W1	1-2	/	12	2		A	
P420-W1	1-2	/	25	3		A	
P426-W1	1-2	/	10	2		A	
P427-W1	1-2	/	10	2		A	
P431-W1	1-2	/	15	2		A	

CLASSIFICAZIONE DIFETTI
Defects classification

100 - C Cricca / *Crack*
104 – CC Cricca di cratere / *Crater crack*
2011 - P Porosità isolate / *Gas pore*
2012 - PD Porosità distribuita uniformemente / *Uniformly distribuited porosity*
2013 – PP Nido di porosità/ *Clustered porosity*
2014 – PA Porosità alleneate / *Linear porosity*
2015 – IG Inclusioni di gas allungata / *Elonged cavity*
2016 – T Tarlo / *Worm hole*
202 – CA Cavità di ritiro / *Shrinkage cavity*
2024 –K Cavità di cratere / *Crater pipe*
301 – IS Inclusioni di scoria / *Slag inclusion*
302 – IF Inclusioni di flusso / *Flux inclusions*
303 – IO Inclusione di ossido / *Oxide inclusion*
3041 – IW Inclusione di tungsteno / *Tungsten inclusion*
401 - MF Mancanza di fusione / *Lack of fusion*
402 - MP Mancanza di penetrazione / *Lack of penetraion*

5011 – IMC Incisioni marginali continue / *Continuos undercut*
5012 – IMI Incisioni marginali intermittenza / *Intermittent undercut*
5013 – IMS Incisioni di radice / *Shrinkage groove*
504 – EP Eccesso di penetrazione / *Excess penetration*
5041- SG Sgoccilamento / *Local excessive penetration*
507 – SL Slivellamento / *Linear misalignment*
509 – SL Avvallamento / *Sagging*
511 – IN Insellamento / *Incompletely filled grove*
514 – SI Superfice irregolare / *Inter-run undercut*
515 – CR Concavità di radice / *Root concavity*
517 – RD Ripresa difettosa / *Poor restart*
601 – CD Colpo d'arco /*Arc strike stray arc*
602 – SP Spruzzi / *Spatter*
606 – EM Eccesso di molatura / *Underflusching*
BM Difetto materiale base /*Base material defect*
DF Difetto film / *Film defect*

A = ACCETTABILE (*acceptable*)
R = DA RIPARARE (*to repair*)
RRX= RIPETERE FILM (*Film repeat*)
A1 – A2 – A3 =
accettabile dopo 1^, 2^ e 3^ riparazione
(*acceptable after 1st, 2nd and 3rd repair*)

NOTES:

Date of exposure from 23-March-2021

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors* /	**CLIENTE** / *Purchaser*
24-March-2021	**LIVELLO** *Level* ☐ 1 ■ 2 ☐ 3 C.A.M.P.I. SRL MICHELE ANTOLINI 2 LEVEL UT TC 1A EN473/ISO 9712	ITALY WITNESSED NOTED REVIEWED SURVEYOR G.FRACASSI DATE 19 APR. 2021	

C.A.M.P.I. srl Ferrara (Italy)	**CERTIFICATO DI CONTROLLO VISIVO SALDATURE** *Visual Inspection Certificate Welded joints*	Certificato N. VT 415-01AS *Certificate no.* FOGLIO 1 DI 1 *Sheet of*

CLIENTE: / *Customer*	ORDINE N.: / *Order no.*	COMMESSA N.: 21004 *Job no.*
SIGLA - *Item :* / *SERVIZIO- Service :* *Test Plate Qualification*	NUM. FABBRICA: / *Serial number*	DISEGNO N.: / *Drawing n*
QCP N.: / FASE N.: / *QCP no. Stage no.*	PROCEDURA N. C.A.M.P.I. ND 105AS rev.2 *Procedure no.*	
COMPONENTE SOTTOPOSTO AL CONTROLLO *Component subject to test* DESCRIZIONE: Test Plate Qualification P415-AS 6mm Thk. *Description*		TIPO DI MATERIALE: *Type of material* SA516 Gr.70
SPECIF. APPLICAB. / *Appl. Specifications.* ASME Sect. IX Ed.2019 QW-194 / QW-302.4 ASME V Ed.2019 Art.9	CRITERI ACCETTABILITA' / *Acceptance criteria:* C.A.M.P.I. ND 105AS rev.2 / ASME Sect. IX Ed.2019 QW-194 / QW-302.4	

Designazione delle imperfezioni *Imperfections designation*	**Accettabilita'** *Acceptable*	**Note** Note
1)-Incompleto riempimento di cianfrini. Incomplete fill-up of weldgroove.	**Non Accettabile** *Unaccettable*	*None*
2)-Cricche, mancanza di fusione e penetrazione superficiale. Crack, lack of fusion or penetration.	**Non Accettabile** Unaccettable	*None*
3)-Incisioni marginali con profondità superiore a quella prevista dal Codice applicabile. Undercuts having depth greater than allowable values permitted by referencing Code section.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
4)-Rinforzo di saldatura superiore a quanto previsto dal Codice applicabile. Weld reinforcement greater than allowable values permitted by referencing Code section	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
5)-Spigoli acuti o situazioni geometriche che possono interferire con la successiva esecuzione di esami non distruttivi. Sharp corners and weld profile that could interfere with radiographic examination or other N.D.E. methods.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
6)-Scarsa raccordatura tra le passate, sovrapposizioni, brusche variazioni di sezione ed intagli. Coarse ripples, grooves, overlaps, abrupt ridges and valleys.	**Non Accettabile** Unaccettable	*None*
7)-Scorie di saldatura aderente, spruzzi e inneschi d'arco. Slag, spatters and arc spots.	**Non Accettabile** Unaccettable	*None*

Si certifica che il saggio sopra citato è stato sottoposto ad esame visivo delle saldature (100%) alla presenza di:

We certify that the piece has been visual examined and witnessed by:

Signor *Mr*		**Ispettore per** *Inspector for*	

RISULTATO DELL'ESAME VISIVO
VISUAL EXAMINATION RESULTS
SODDISFACENTE / Satisfactory

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 19 APR. 2021

DATA / *Date* ***23-March-2021***	**C.A.M.P.I. Srl** **QC Dept.** C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☑ Reviewed ☐ Date 23/3/21 Signature	Foglio 1 di 1 *Sheet of* N. ----------

C.A.M.P.I. srl **Ferrara (Italy)**	**CERTIFICATO DI CONTROLLO CON LIQUIDI PENETRANTI** *LIQUID PENETRANT EXAMINATION REPORT*	**PT No.** P415-01AS Foglio / Sheet 1 of 1

CLIENTE: *Purchaser:* / ORDINE: *Purchase Order No.:* / APPARECCHIO: **Test plate coupon** Sigla: **P415** *Type of vessel :* *Item:*	**COLLAUDO** *Inspection Authority*	**COMMESSA** / Job No. / **N.F.** / Item Serial No. /

PARTE ESAMINATA : controllo effettuato su tallone di saldatura spessore 6mm *Examined part* *Test performed on test plate 6mm thickness*			
STADIO DI LAVORAZIONE *Working Step*	O *AFTER FORMING* O *AFTER MACHINING*	O *AFTER GRINDING* • *AFTER WELDING*	O *AFTER PWHT* O *AFTER HYDR.*
CONDIZIONI SUPERFICIALI *Test Surface Status*	■ COME SALD. *As welded*	□ MOLATO *Ground*	□ LAV. DI MACCHINA *Machined*
SPEC. DI CONTROLLO / *Examination procedure* C.A.M.P.I. IO ND102AS rev.4 / ASME Sect.V Art. 6 Ed 2019 & ASME IX Ed.2019 QW195		**CRITERI ACCETT.** *Acceptance criteria* C.A.M.P.I. IO ND102AS rev.4 / ASME Sect VIII Div.1 App.8 Ed. 2019 & ASME IX Ed.2019 QW195.2	

COMBINAZIONE LIQUIDI PENETRANTI / *Liquid Penetrant Grouping*

	■ LAVABILE CON ACQUA *Water washable*		□ LAVAB. CON SOLVENTE *Solvent removable*		□ POST-EMULSIFICABILE *Post-emulsified*	
	■ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*
PULITORE *Cleaner*	VELNET Batch 19/0526					
PENETRANTE *Penetrant*	RED W/W Batch 20/0074					
EMULSIFICATORE *Emulsified*	/					
RIMOZIONE PENETRANTE *Penetrant Remover*	/					
RIVELATORE *Developer*	ROTRIVEL U Batch 20/0146					
MARCA *Trade-mark*	CGM					
MEZZO DI ILLUMINAZIONE *Lighting Equipment*	■ NATURALE *Natural*	□ ARTIFICIALE *Artificial*				
LUXOMETRO S.N. *Luxmeter S.N.*	900710		DATA CALIBR. *Calibrat. Date*	02/10/2020	Lux value: 1200 lux	

PROCEDURA DI CONTROLLO / *Examination procedure*			**Refer doc. / Note**
PULITURA CON *Cleaning by*	*BRUSHING & VELNET*		WPS 415-01AS WELDING OPERATOR: PERELLI CRISTIAN STAMP No 8 MATERIALS: SA516 Gr.70 Ambient Temperature 16,4°C
APPLICAZIONE PENETRANTE CON *Penetrant application by*	SPRAY		
TEMPO MINIMO DI PENETRAZIONE *Penetrant minimum time*	15	MINUTI *Minutes*	
APPLICAZIONE EMULSIFICATORE CON *Emulsifier application by*	/		
RIMOZIONE PENETRANTE CON *Penetrant removal by*	ACQUA *WATER*		
APPLICAZIONE RIVELATORE *Developer application*	SPRAY		
ESSICCAZIONE CON *Drying process by*	NATURAL		
TEMPO MINIMO DI SVILUPPO *Developing minimum time*	10	MINUTI *Minutes*	
TEMPO MASSIMO DI LETTURA *Checking maximum time*	30	MINUTI *Minutes*	
ANALISI ACCETTAZIONE LIQUIDI *Liquid acceptance testing*	VEDI CERTIFICATO CGM *SEE CGM CERTIFICATE*		

RISULTATI DELL'ESAME *Examination Result* ■ *NO REPORTABLE INDICATIONS ACCEPTABLE* □ *SEE ATTACHED SHEETS* □ *NOT ACCEPTABLE*

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*
23-March-2021	**LIVELLO** *Level* □ 1 ■ 2 □ 3 C.A.M.P.I. SRL MICHELE ANTOLINI 2 LEVEL SNT TC 1A EN473/ISO 9712 C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 23/03/21 Signature	ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 19 APR. 2021

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	**SAW Wire**
Product	**L50M (LNS133U) (LS-3)**
Size(s) mm	**2,4**
Item No.	**FL50M-24-25VCI**
Lot/Batch	**F1SW200786**
Class	**AWS A5.17/A5.17M : EH12K** **ISO 14171-A : S3Si**

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	V	Al	Co	N
0.100	**0.30**	**1.75**	**0.007**	**0.004**	**0.03**	**0.02**	**<0.01**	**0.01**	**<0.01**	**<0.01**	**0.004**	**0.004**

Mechanical tests, all weld metal

Remarks

Additional copper coating : 0,12% max

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Via Fratelli Canepa 8
16010 Serra Riccò
Italy

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date

Printed By **Silvana Martinetto**
Function **Customer Service Center**
Date **01/MAR/2021**

Cert. No. **01349384**
ZEU_CMN , 1

OERLIKON SAF-FRO METRODE WELDING CONSUMABLES SPECIAL ALLOYS

Inspection Certificate 3.1

Product Line	**Flux**
Product	**P230**
Item No.	**FXP230-25SRB**
Lot/Batch	**F1FX210033**
Wire	**FL61-4-25VCI L61 4.00X25 STEIN BASKET +**
Class	**ISO 14174 : S A AB 1 67 AC H5***
	ISO14171-A S 38 4 AB S2Si
	AWS A5.17 F7A4-EM12K

LINCOLN ELECTRIC
THE WELDING EXPERTS

Flux Composition (%) According to EN10204 3.1

Al2O3	SiO2	TiO2	ZrO2	K2O	Na2O	MnO	CaO	MgO	CaF2
18.0	**21.0**	**2.0**	**0.2**	**1.30**	**1.90**	**5.3**	**5.8**	**17.9**	**25.2**

Al2O3+CaO+MgO
41.80

Sieve analysis (%) According to EN10204 3.1

>1,7mm	>0,85mm	>0,425mm	>0,25mm	<0,25mm
0.80	**53.80**	**34.20**	**10.30**	**0.90**

Chemical analysis (%) Batch: F1SW14O272 L61 4.00X25 STEIN BASKET + VCI 25KG According to EN10204 3.1

C	Si	Mn	P	S
0.12	**0.23**	**1.02**	**0.010**	**0.010**

Chemical analysis (%) / Weld Metal According to EN10204 2.2

C	Si	Mn	P	S	Cr	Ni	Mo
0.07	**0.33**	**1.30**	**0.016**	**0.013**	**0.03**	**0.02**	**<0.01**

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	ReH MPa	Rm MPa	Z %
AW	**20**	**436**	**519**	**76**

Impact testing

Temp. °C	C1a J	C1b J	C1c J	KV J
-40	**109**	**100**	**128**	**112**

Remarks

* Nearest classification

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Loc. Casalmenini 3
37010 Rivoli Veronese
Italy

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date
Signature

Printed By	Silvana Martinetto	Cert. No. **01385208**
Function	Customer Service Center	ZEU_FLUX . 1
Date	04/MARCH/2021	

OERLIKON SAF-FRO METRODE WELDING CONSUMABLES SPECIAL ALLOYS

Tipo 13

CERTIFICATO DI CONTROLLO 3.1 / INSPECTION CERTIFICATE 3.1 - EN 10204:2004

A04/A05

METINVEST
METINVEST TRAMETAL SPA

A01
Società per azioni con socio unico soggetta a direzione e coordinamento di Metinvest B.V
Registered office: Via XII Ottobre, 3 - 16121 Genova, Italy
Phone +39 010 5762911 - Fax +39 010 5762990
Works: Via E. Fermi, 44 - 33058 San Giorgio di Nogaro UD, Italy
Phone +39 0431 629989 - Fax +39 0431 629985
Cap. Soc. Euro 300.120.000,00 i.v.
C.F., P.IVA e Iscr. Reg. Imp. GE 05956630965 - REA 437720/GE
http://trametal.metinvestholding.com

(A) PROCESSO DI ELABORAZIONE / STEELMAKING PROCESS: E = ELECTRIC ; BO = BASIC OXYGEN
(B) STATO DI FORNITURA / DELIVERY CONDITION: AR = GREZZO DI LAMINAZIONE / AS ROLLED ;
N° = LAMINAZIONE A TEMPERATURA CONTROLLATA / NORMALIZING ROLLING ;
N = NORMALIZZATO / NORMALIZED at 910°C, 1,5 min/mm ; ARIA CALMA / STILL AIR;
R = RICOTTO / ANNEALED;
N+R = NORMALIZZATO + RINVENUTO / NORMALIZED + TEMPERED
(C) TRATTAMENTO TERMICO DEL CAMPIONE / HEAT TREATMENT OF SAMPLE:
N = 910°C, 1,5 min/mm ; ARIA CALMA / STILL AIR
R = 650°C, 1,5 min/mm ; ARIA CALMA / STILL AIR
(D) Ceq_1 = C + Mn/6 ; Ceq_2 = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 ;
Pcm = C + Si/30 + (Mn + Cu + Cr)/20 + Ni/60 + Mo/15 + V/10 + B*5
(1) POSIZIONE / LOCATION: 1 = TESTA / TOP ; 2 = PIEDE / BOTTOM
(2) POSIZIONE / LOCATION: C = CUORE / 1/2 THICKNESS ; P = PELLE / SURFACE ; D = 1/4 SPESSORE / THICKNESS
(3) DIREZIONE / DIRECTION: L = LONGITUDINALE / LONGITUDINAL ; T = TRASVERSALE / TRANSVERSE
(4) FORMA DEL PROVINO / SHAPE OF TEST PIECE: P = PRISMATICO / PRISMATIC ; C = CILINDRICO / CYLINDRICAL
(5) ESITO PROVA DI PIEGA / RESULT: OK = COMPLYING ; NO = NOT COMPLYING

A06 Cliente / Customer

S.I.A.T. SPA SOC. ITAL.

Via dei Cavallari 37
15077 PREDOSA 15077 IT
AL ITALIA

A03 N° Certificato / Certificate no.	A02 Data / Date
464682	27/05/2019
A08 N° Ordine Trametal / Works order	**A07 N° Ordine cliente / Customer's order**
31901110	36
DDT	del / date
BOL 31909374	24/05/2019
Pratica / File no.	
del / date	

E06 Marcatura di prodotto / Marking of the product
LAMIERA/ORDINE/N° INFORNAMENTO/DIMENSIONI/QUALITÀ/MARCHIO DEL PRODUTTORE
PLATE/ORDER/INTERNAL N°/DIMENSIONS/STEEL GRADE/MANUFACTURER'S MARK

B01/B02/B03

Prodotto / Product	Lamiere / Hot rolled plates
Qualità / Steel grade	SA516GR70MT/LTV
Normativa / Specification	ASME

B07 ITEM	B07 LAMIERA PLATE	B07 N° INFORN. INTERNAL NUMBER	B09/B11 DIMENSIONI [mm] DIMENSIONS	B12 MASSA TEORICA [t] THEORICAL WEIGHT	B07 LOTTO BATCH NO.	C70 PROCESSO ELAB. (A) STEELMAKING PROCESS	B04 STATO FORNITURA LAMIERA (B) DELIVERY CONDITION	C00 CAMPIONE SAMPLE	B05 TRATT. CAMPIONE (C) HEAT TREATMENT	C00 CAMPIONE PWHT SAMPLE	B05 PWHT TEMPERATURA INIZIO °C BEGINNING TEMPERATURE	VELOCITA' RISCALDO C/h HEATING RATE	TEMPERATURA TRATTAMENTO °C TEMPERATURE TREATMENT	HOLDING TIME PERMANENZA Min	VELOCITA' RAFFREDDAMENTO °C/h COOLING RATE	TEMPERATURA FINE °C END TEMPERATURE	N° CICLI / CYCLES	C00 CAMPIONE Q+T SAMPLE	B05 Q+T TEMPERATURA (Q) °C TEMPERATURE	HOLDING TIME (Q) Min PERMANENZA COOLING	RAFFREDDAMENTO	TEMPERATURA (T) °C TEMPERATURE	HOLDING TIME (T) Min PERMANENZA COOLING	RAFFREDDAMENTO
1	1TAH340801A	1537929	6.00X2500X12000	1,41	606142	BO	N	GE933																	
1	1TAH340801B	1537929	6.00X2500X12000	1,41	606142	BO	N	GE933																	
1	1TAH340802A	1537934	6.00X2500X12000	1,41	606143	BO	N	GE934																	
1	1TAH340802B	1537934	6.00X2500X12000	1,41	606143	BO	N	GE934																	
1	1TAH340803A	1537933	6.00X2500X12000	1,41	606144	BO	N	GE935																	
1	1TAH340803B	1537933	6.00X2500X12000	1,41	606144	BO	N	GE935		HEAT CODE CS898															
1	1TAH340804A	1537930	6.00X2500X12000	1,41	606145	BO	N	GE936																	
1	1TAH340804B	1537930	6.00X2500X12000	1,41	606145	BO	N	GE936																	
1	1TAH340805A	1537936	6.00X2500X12000	1,41	606146	BO	N	GE937																	
1	1TAH340805B	1537936	6.00X2500X12000	1,41	606146	BO	N	GE937																	
1	1TAH340806A	1537931	6.00X2500X12000	1,41	606147	BO	N	GE938																	
1	1TAH340806B	1537931	6.00X2500X12000	1,41	606147	BO	N	GE938																	
1	1TAH340807A	1537937	6.00X2500X12000	1,41	606148	BO	N	GE939																	
1	1TAH340807B	1537937	6.00X2500X12000	1,41	606148	BO	N	GE939																	

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. PUGLIASSI DATE

C71/C92 COMPOSIZIONE CHIMICA DI COLATA / HEAT CHEMICAL ANALYSIS

B07	C71	C72	C73	C74	C75	C76	C77	C78	C79	C80	C81	C82	C83	C84	C85	C86	C87	C88	C89	C90	C91
COLATA HEAT	C %	Mn %	Si %	P %	S %	Cu %	Ni %	Cr %	Mo %	Al %	V %	Nb %	Ti %	Sn %	Ca %	N %	B %	H %	Ceq1 % (D)	Ceq2 % (D)	Pcm % (D)
Ordine Min 1																					
Ordine Max 1	0,18				0,006						0,030	0,040								0,43	
SA51670LTV Min 0.00 - 12.50		0,85	0,15																		
SA51670LTV Max 0.00 - 12.50	0,27	1,20	0,40	0,035	0,035																
1TAH34	0,15	1,44	0,19	0,011	0,002	0,030	0,030	0,030	<0.005	0,036	<0.005	<0.010	<0.005	<0.005	0,0000	0,0070	<0.0005	0,0002	0,39	0,40	0,23

			PROVA DI TRAZIONE TENSILE TEST										PROVA DI RESILIENZA IMPACT TEST - CHARPY V-NOTCH TEST						PROVA DI PIEGA BEND TEST				PROVA DI DUREZZA HARDNESS TEST				PROVA DI STRIZIONE Z% TEST	
C00		C01	C01	C02	C03	C11	C12		C13	C14	C10	C41	C02	C03	C01	C42	C43	C02	C51	C52	C50	C01	C30	C31	C32	C53	C54
CAMPIONE SAMPLE	SPESSORE LAMIERA PLATE THICKNESS	POSIZIONE (1) LOCATION	POSIZIONE (2) LOCATION	DIREZIONE (3) ORIENTATION	TEMPERATURA [°C] TEST TEMPERATURE	YIELD STRENGTH ReH [Mpa]	Rm [Mpa] TENSILE STRENGTH	ReH/Rm	A8" ELONGATION	Rp 0.2 [Mpa] PROOF/YIELD STRENGTH	FORMA PROVINO (4) SHAPE OF TEST PIECE	LARGHEZZA [mm] WIDTH	DIREZIONE (3) ORIENTATION	TEMPERATURA [°C] TEST TEMPERATURE	POSIZIONE (2) LOCATION	SINGOLI VALORI [J] INDIVIDUAL VALUES	MEDIA [J] MEAN VALUE	DIREZIONE (3) ORIENTATION	MANDRINO [mm] MANDREL	ANGOLO [°] ANGLE	ESITO (5) RESULT	POSIZIONE (2) LOCATION	METODO TEST METHOD	SINGOLI VALORI INDIVIDUAL VALUES	MEDIA MEAN VALUE	Z% SINGOLI VALORI Z% INDIVIDUAL VALUES	Z% VALORE MEDIO Z% MEAN VALUE
ORDINE Min 1													L	-46		16	20										
SA51670LTV Min 0.00 - 20.00					20		485		17,0	260																	
SA51670LTV Max 0.00 - 20.00					20		620																				
SA51670LTV Min 0.00 - 25.00													L	-46			20										
GE933	6,00	2	P	T	20		514		31,5	388	P	5,00	T	-50	P	84 69 60	71						HB	160 156 155	157		
GE933	6,00	2	P	T	300					289	C	5,00	L	-46	P	115 121 123	120										
GE933	6,00	2										5,00	T	-20	P	108 121 103	111										
GE934	6,00	2	P	T	20		511		32,3	390	P	5,00	T	-50	P	77 72 65	71						HB	155 153 158	155		
GE934	6,00	2										5,00	L	-46	P	131 131 145	136										
GE934	6,00	2										5,00	T	-20	P	110 112 115	112										
GE935	6,00	2	P	T	20		515		33,2	385	P	5,00	T	-50	P	79 70 67	72						HB	150 150 159	153		
GE935	6,00	2										5,00	L	-46	P	118 107 116	114										
GE935	6,00	2										5,00	T	-20	P	98 93 90	94										
GE936	6,00	2	P	T	20		522		30,3	382	P	5,00	T	-50	P	56 56 57	56						HB	149 153 162	154		
GE936	6,00	2										5,00	L	-46	P	113 111 124	116										
GE936	6,00	2										5,00	T	-20	P	89 97 89	92										
GE937	6,00	2	P	T	20		511		34,6	383	P	5,00	T	-50	P	63 77 70	70						HB	145 149 158	151		
GE937	6,00	2										5,00	L	-46	P	120 128 121	123										
GE937	6,00	2										5,00	T	-20	P	80 88 94	87										
GE938	6,00	2	P	T	20		512		31,2	399	P	5,00	T	-50	P	71 75 73	73						HB	161 150 159	156		
GE938	6,00	2										5,00	L	-46	P	113 116 124	118										
GE938	6,00	2										5,00	T	-20	P	122 108 109	113										
GE939	6,00	2	P	T	20		511		29,2	382	P	5,00	T	-50	P	74 67 71	71						HB	156 149 158	155		
GE939	6,00	2										5,00	L	-46	P	119 111 132	121										
GE939	6,00	2										5,00	T	-20	P	106 94 98	99										

C10
ASME SA-370 FIG. 3 AND FIG. 10 / 11 - SAMPLE TAKEN AFTER PLATE HEAT TREATMENT



D02-D50 CONTROLLO ULTRASONORO / ULTRASONIC EXAMINATION

D02	D03	D04	D05	D06	D07
APPARECCHIATURA EQUIPMENT	N° SERIE SERIAL NO	CONDIZIONI SUPERFICIALI SURFACE CONDITIONS	ACCOPPIANTE COUPLANT	MODALITÀ OPERATIVE PROCEDURE	TARATURA CALIBRATION
GILARDONI RDG450	RDG450-450-140185TC	GREZZO DI LAMINAZIONE AS ROLLED	ACQUA WATER	IN ACCORDO ALLA SPECIFICA ACCORDING TO SPECIFICATION	IN ACCORDO ALLA SPECIFICA ACCORDING TO SPECIFICATION

B07 LAMIERA PLATE	D08 SONDE PROBE	D09 DIAMETRO DIAMETER MM	D10 FREQUENZA FREQUENCE MHZ	D11 ANGOLO Angle °	D12 NORMA DI RIFERIMENTO STANDARD SPECIFICATION	D13 CLASSE DI ACCETTABILITÀ ACCEPTANCE SPECIFICATIONS	D14 ESITO RESULT	D15 INDICAZIONI INDICATIONS	D16 RETICOLO RETICLE	D17 BORDI EDGES
1TAH340801A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340801B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340802A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340802B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340803A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340803B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340804A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340804B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340805A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340805B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340806A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340806B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340807A		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50
1TAH340807B		mm 20	5 MHz	0	ASME-SA578/A		OK	NO INDICATIONS FOUND	mm 225x225	50

D18 NOTE REMARKS	D19 ENTE ISPETTIVO INSPECTOR	D20 FIRMA SIGNATURE
		METINVEST TRAMETAL S.p.a. F. Andrian III Liv. EN ISO 9712

Z01

ITEM		TOLLERANZA DI SPESSORE TOLERANCE ON THICKNESS	TOLLERANZE DI LARGHEZZA TOLERANCE ON WIDTH	TOLLERANZE DI LUNGHEZZA TOLERANCE ON LENGTH	CONDIZIONI SUPERFICIALI SURFACE FINISH	PLANARITÀ FLATNESS
1		EN 10029 CL.B	-0+100 MM	-0+200 MM	EN 10163/2 CL B2	EN 10029 CL. N

CERTIFICHIAMO che le lamiere elencate sono conformi alla prescrizione dell'ordine, che i controlli della marcatura, dell'aspetto superficiale e dimensionale hanno dato esito positivo.
WE CERTIFY that the above mentioned plates are consistent with the order prescriptions: marking, inspection and measurement without objection.
DICHIARIAMO CHE LE LAMIERE SONO STATE CONTROLLATE IN ACCORDO ALLA NORMATIVA VIGENTE E CHE LE RADIAZIONI IONIZZANTI NON ECCEDONO IL VALORE DEL FONDO NATURALE.
WE DECLARE THAT THE PLATES WERE CONTROLLED ACCORDING TO STANDARD AND RADIATION DO NOT EXCEED THE NATURAL RADIATION.

Z06

FULLY KILLED FINE GRAIN STEEL

HARDNESS IN ACC. TO NACE MR 0175 / ISO15156

HARDNESS IN ACC. TO NACE MR 0103

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASS
DATE

Z07	Z03 ENTE COLLAUDO / INSPECTION BODY	Z02
PRODUCED FROM CONTINOUS CAST SLAB AND HAVE A MINIMUN REDUCTION RATIO OF 3 TO 1. ACCORDING TO ASME II PART A ED. 2017. FULLY KILLED, FINE GRAIN STEEL. Value of Mn maximun in derogation permitted up to 1.50% Plates acc. to PED 2014/68/EU	TIMBRO DELL'ISPETTORE STAMP OF THE INSPECTION REPRESENTATIVE	METINVEST TRAMETAL S.p.a. F. Andrian CQ Manager

GIOVANNI RIZZU

LIV.II ASNT TC-1A N.07DG00387PO2 - CERTIFICATO DI ABILITAZIONE RILASCIATO DAL RINA (REGISTRO ITALIANO NAVALE) A GENOVA IN DATA 27/04/2007

LIV.2 UNI EN 473 E ISO 9712 N.17MI00559P01 - CERTIFICATO DI ABILITAZIONE RILASCIATO DAL RINA (REGISTRO ITALIANO NAVALE) A GENOVA IN DATA 24/04/2017

RAPPORTO CONTROLLO ULTRASUONI

ULTRASONIC TEST REPORT

CERTIFICATO N.111-1

CLIENTE/CUSTOMER:	LOCALITA'/PLACE:	OGGETTO/DESCRIPTION:
S.I.A.T. S.P.A.	Predosa (AL)	CONTROLLO UT SU LAMIERE

DATA/DATE:03/09/2019

STRUMENTO/INSTRUMENT: GILARDONI MG 15

Scostamento Linearità:		Taratura fondo scala:		Taratura sensibilità:
Linearity:		Time base range calibration:		Sensivity calibration:
Vert. +/-0,5	Orizz. +/ 0,5	Onde long. 1 | 200	Onde trasv =	Foro/Hole
Vertical	Orizzontal	Long Wawes	Trasv Wawes	Eco di riferimento

SONDE/ Probes: GILARDONI

Onde Long. Tipo Dd 25	Onde Trasv. Tipo: =	Angolo emissione: =	Metodo di controllo
Long Wawes Type	Trasv. Wawes Type	Angle of reflection	Scanning method
Freq.: 2mhz	Freq.: =	Soglia/Damping: 0	Manuale con carrello 100%

MEZZO DI ACCOPPIAMENTO: Coupling	ACQUA/Water
AMPLIFICAZIONE DI ESPLORAZIONE: Scanning amplitude	54 DB
AMPLIFICAZIONE DI VALUTAZIONE: Evaluation amplidue	46 DB
ALTEZZA ECO DI TARATURA: Calibration pulse height	100% I ECO
NORME DI CONTROLLO: Scanning specifications	SA 578
NORME DI ACCETTABILITA': Acceptance standards specifications	SA 578 LEV. B + S1

NOTE: Remarks	QUALITA' Quality	DIMENSIONE Dimensions	COLATA Heat	PLACCA Plates
	SA 516.70	mm.19X3000X9000	ITAM52	ITAM520104A
	SA 516.70	mm.22X2500X10000	INAI50	INAI500403A
	SA 516.70	mm.20X2500X10000	INAI34	INAI340801A
	SA 516.70	mm.8X2500X12000	ITAL40	ITAL401004A
	SA 516.70	mm.6X2500X12000	ITAH34	ITAH340803B

ESITO: CONFORME A NORMA E CLASSE RICHIESTA

RESULT: IN CONFORMITY WITH THE NORM AND THE CLASS REQUESTED- NO RECORDABLE INDICATIONS FOUND

(The Operator
GIOVANNI RIZZU
LIV.II ASNT - TC-1A
CERT.N.07DG00387PO2
LIV. 2 UNI EN 473 - ISO 9712
CERT.N.17MI00559P01

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSO
DATE

NLMK CLABECQ
Rue de Clabecq 101
1460 ITTRE (BELGIQUE)

RECEPTION 3.1 selon EN 10204 (2004) - A2[illegible]5 selon ASME II Part A Ed.2013

N° 7020

N° PAGE 3/3
BLATT NR
PAGE No

PLAQUES-BLECHE-PLATES

SIGLE PRODUCTEUR
HERSTELLERZEICHEN
TRADE MARK
NQ

Selon Spec. 10042013-60

(E.L) : Etat de Livraison - (L)ieferzustand - (S.D) State of Delivery
N : Normalise

Poinçon organisme et / ou service de contrôle
Stempel des Abnahmebeauftragten
Stamp of the Inspection representative

CLIENT / DESTINATAIRE - BESTELLER / EMPFANGER - CUSTOMER / CONSIGNEE

S.I.A.T. S.P.A.
SOCIETA'ITALIANA ACCIAI E TUBI
Via XII Ottobre 12
I-B7 GENOVA GE

N° COMMANDE COURTIER/CLIENT - MAKLER/KUNDENBESTELLNUMMER
BROKER/PURCHASER'S ORDER NUMBER

1.176 du 15.07.13

N°Commande usine
Werks Nr.
Works order No

9097

NUANCE ET SPECIFICATIONS TECHNIQUES / PRÜF-UND WERKSTOFFGRUNDLAGEN / QUALITY AND SPECIFICATIONS

GRADE 60
ASME SA516 Ed.2013

IDENTIFICATION DU PRODUIT ERZEUGNIS BENENNUNG – PRODUCT ID			N° Pst	Nbre de Plaques	DIMENSIONS – ABMESSUNGEN – DIMENSIONS			Masse Théorique	(E.L)	TRACTION – ZUGVERSUCH – TENSILE TEST					RESILIENCE – KERBSCHLAGZAHIGKEIT – IMPACT TEST						Dureté		Norm.	Durée		
No Référence	No Coulée	Brame			Epaisseur	Largeur	Longueur			Place	Sens	RP0,2	Rm	A%(1)			Temp		Valeurs Individuelles			Moy		Durée			
Referenz. Nr	Schmelze Nr	Bramme	Post Nr	Stückzahl	Dicke	Breite	Lange	Theoretische Masse	(L)	(2)	Der						°C	T.S.L	Einzelwerte			Mitw		Härte		Glühen	Dauer		
Reference No	Heat No	Slab	Item Nr	Nbr of pieces	Thickness	Width	Length	Theoretical Mass	(S.D)		(3)	YS0,2	Ts	E%(1)					Individual Values			Avrg		Hardness		Norm.	Duration		
					(mm)	(mm)	(mm)	(Kg)				(MPa)	(MPa)						(Joules)									
9031	810493	A3	1	4	6.00	2000	12000	4520	N	1	T	316	428	25.2+			-51	NL6	140	132	130	134		128		939	8		
									N								-50	VT6	62	64	60	62							
9032	810493	A4	1	3	6.00	2000	12000	3390	N	1	T	313	423	23.7+			-51	NL6	142	138	138	139		126		962	14		
									N								-50	VT6	70	68	62	67							
9033	810493	F3	1	3	6.00	2000	12000	3390	N	1	T	315	428	24.4+			-51	NL6	132	136	133	134		128		960	12		
									N								-50	VT6	82	80	80	81							
				10				11300																					
				29				58731																					

A302
A303
A304

(5)	N° COULEE SCHMELZE Nr HEAT No	ANALYSE COULEE - SCHMELZEANALYSE - HEAT ANALYSIS (*) = ANALYSE PRODUIT - STUCKANALYSE - PRODUCT ANALYSIS															V+Nb +Ti%	Cr+Ni+ Mo+Cu%	Cr+Cu +Mo%
		Mn %	P%	S%	C%	Si%	Al%	Cu%	Nb%	Ni%	Cr%	V%	Mo%	Ti%	N2%				
@ CC	810493	1.090	0.014	0.003	0.097	0.158	0.037	0.020	0.002	0.009	0.018	0.003	0.001	0.002	0.0034		0.007	0.048	0.039

(1) (*) Lo = 5,65 VS mm – (#) Lo = 50 mm – (+) Lo = 200 mm

Controle de surface selon EN 10163-2, CL. B (S.-CL.2)
Acier totalement calme, a grains fins

N° article client – Artikel Nr des Kunden – Customer article No

BUREAU VERITAS
WITNESSED - NOTED REVIEWED
SURVEYOR
DATE
ITALY
G. FRACASSI

Contrôle de marquage d'aspect et de dimensions : Satisfaisants
Kennzeichnung, Besichtigung und Ausmessung : Ohne Beanstandung
Marking, inspection and measurement : Without objection

P275 NL2 /NH/P265GH SA516-60 MT LTV
EN 10029/2010 CL.C

ITTRE le 11/09/13
FAIENZA Savino
Editeur certificat

(3) Type : V : ISO V ; U : ISO U ; N : ASTM Charpy V
Sens : L : Long – Langs – Length T : Travers – Quer – Transverse
Localisation : 1 : Peau – Oberflache – Rolled surface
2 : 1/2 Epaisseur – 1/2 Dicke – 1/2 Thickness
4 : 1/4 Epaisseur – 1/4 Dicke – 1/4 Thickness
5 : 5*10 mm 7 : 7.5*10 mm 8 : 8.7*10 mm

(2) Location – Probelage 1 : Tete – Kopf – Top
2 : Milieu – Mitte – Middle
3 : Pied – Fuss – Bottom
Impact test machines max. energy
SN 10045 : 460J
ASTM/ASME A/SA 370: 358J

(5) # : Oxygène sur – Sauerstoff – Oxygen + : EAF
CC : Coulée continue – Kontinuierliches Giessen
Continuous casting

Nous certifions que les produits énumérés ci-dessus sont conformes aux prescriptions de la commande.
Wir bestätigen hiermit, dass die obengenannten Erzeugnisse den Bestellungsvorschriften entsprechen.
We certify hereby that the above mentioned products are consistent with the order prescriptions.

ISP N°0006

PERMANENT JOINING PROCEDURE APPROVAL CERTIFICATE

CERTIFICATO DI APPROVAZIONE DELLE GIUNZIONI PERMANENTI

N° QP-AP-ITA-24-00165-rev.0

MANUFACTURER FABBRICANTE	**C.A.M.P.I. rsl – Ferrara Italy**		
PJPQR IN APPROVAL N° NO DELLA QUALIFICA IN APPROVAZIONE	**PQR No. P423-AS Rev. 0**		
REFERENCE STANDARD OF PQR IN APPROVAL NORMA DI RIFERIMENTO QUALIFICA IN APPROVAZIONE	**ASME Sect. IX**		
THIRD PART RECOGNIZED OR BODY TERZA PARTE RICONOSCIUTA O ORGANISMO	**Bureau Veritas Italia**		
TEST IN PQR EQUIVALENT TO TEST AS PER HARMONIZED STANDARD TEST EFFETTUATI IN PQR SONO EQUIVALENTI COME PER NORMA ARMONIZZATA	**Yes** / Si **No** / No	☒ ☐	(Supplementary test required)
SUPPLEMENTED BY RIFERIMENTO DI EVENTUALI PROVE COMPLEMETARI	**N.A.**		
COMPLEMENTARY TEST(S) PERFORMED IN PRESENCE OF PROVE COMPLEMENTARI REALIZZATE IN PRESENZA DI	**N.A.**		

BUREAU VERITAS ITALIA S.P.A. NOTIFIED BODY NR 1370

BUREAU VERITAS ITALIA S.P.A. ORGANISMO NOTIFICATO N°1370

OFFICE LOCATION / AGENZIA DI :	**MILAN - ITALY**

CERTIFIES THAT THE PERMANENT JOINING PROCEDURE QUALIFICATION RECORD, POSSIBLY COMPLETED BY SUPPLEMENTARY TESTS, COMPLIES WITH THE ESSENTIAL SAFETY REQUIREMENTS STATED BY 2014/68/UE DIRECTIVE - APPENDIX 1- § 3.1.2.

CERTIFICA CHE LA QUALIFICA DI ASSEMBLAGGIO PERMANENTE, COMPLETATO DA EVENTUALI PROVE COMPLEMENTARI, SODDISFA LE ESIGENZE ESSENZIALI DI SICUREZZA DELLA DIRETTIVA 2014/68/UE DIRECTIVE - ALLEGATO1 - § 3.1.2.

Observations : **All tests are equivalent to the requirements of harmonized standard EN ISO 15614-1**
OSSERVAZIONI :

NAME / **Nome**	DATE/ **Data**	VISA / **Firma**	STAMP / **Timbro**
Gabriele Fracassi	**16/09/2024**		

OTHER IDENTIFICATION (AS NECESSARY) : **IT FILE 23.SF.702806 4.138 Chrono No. P16345/24/GF/gf** PAGE 1/1
ALTRE IDENTIFICAZIONI (SE NECESSARIE)

Attachment : Approved document & Supplementary test certificate (if required)
ALLEGATO : DOCUMENTO APPROVATO & CERTIFICATO PROVE SUPPLEMENTARI (SE RICHIESTO)

C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P423-AS**	**Rev.** 0 **Date:** May 18,2021

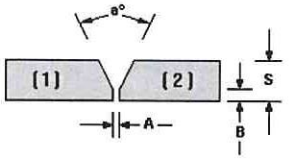
Company Name C.A.M.P.I. S.r.l. Via Diamantina,15 - 44122 Ferrara, ITALY

WPS No. P423-01AS

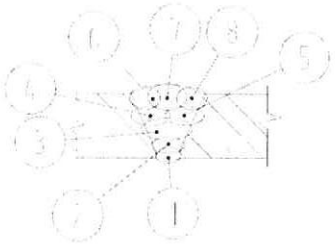
Welding Process(es) GTAW + SMAW

Types (Manual, Automatic, Machine) Manual

JOINTS (QW-402)



A:3÷5mm - **B:**1,5±1mm **a°:**75±2,5 - **S:**12,7mm
Dia. 8"



Groove Design of Test Coupon
(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used)

BASE METALS (QW-403)
Material Spec. **(1):** SA333 **(2):** SA106
Type or Grade Gr.6 to Gr.C
P. No. 1 Gr. 1 to P. No. 1 Gr. 2
Thickness of Test Coupon: 12,7 mm
Diameter of Test Coupon: 8" (219,1mm)

POSTWELD HEAT TREATMENT (QW-407)
Temperature: 610±10°C
Time: 1hr/in minimum 60min.

Other: Heat and Cool rate 80°C/h above 300°C

Performed N°1 & N°3 cycles of simulated PWHT

FILLER METALS (QW-404)	(1)GTAW	(2)SMAW
Weld Metal Analysis A-No.	10	1
Size of Filler Metal (mm)	2,4	3,2/4,0
Filler Metal F-No.	6	4
SFA Specification	5.28	5.1
AWS Classification	ER80S-Ni1	E7018-1 H4
Deposited weld metal (mm)	2	11
Flux Type	/	/
Flux Trade name	/	/
Filler Metal Product Form	Solid wire	/
Supplemental filler metal	NO	NO
Alloy elements	NO	NO
Filler Material trade name	Carborod Ni1	Tenax 35S
Manufacturer	LINCOLN	LINCOLN
QW-404.35 Flux/wire class.	/	/

Others: QW404.23: Solid wire – QW 404.22: No –QW404.14:With Filler Metal

GAS (QW-408) Percent composition

	Gas(es)	Mixture %	Flow rate
Shelding (1)	Ar	99,999	14 l/min
Shelding (2)	/	/	/
Trailing	None		
Backing	None		

ELECTRICAL CHARACTERISTICS (QW-409)

Current : DC	Polarity: (1)SP (2) RP	Travel Speed (mm/1')
1) Amps: 146	Volts: 14,2	73
2-3) Amps: 118	Volts: 22,5	123
4-5) Amps: 160	Volts: 24,5	90
6÷8) Amps: 160	Volts: 24,5	90

Heat Input (KJ/mm): 1):1,71; 2÷3):1,3; 4÷8):2,61

Others: Transfer mode: /

POSITION (QW-405)
Position of Groove 1G
Weld Progression (Uphill, Downhill) /
Other

PREHEAT (QW-406)
Preheat Temp. >15°C
Interpass Temp. Max 300°C
Other

TECHNIQUE (QW-410)
String or wave bead: STRING
Oscillation: NO Frequency: N.A.
Multi pass or single pass (per side) MULTI
Single or multiple electrodes: SINGLE
Contact tube to work distance : /
Orifice or Gas cap size: 16mm
Use of Thermal process: N.A.

C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P423-AS**	**Rev.** 0 **Date:** May 18,2021

Tensile Test (QW-150) with 1PWHT

Specimen No. QW 462.1(a)	Width mm	Thickness mm	Area mm^2	Ultimate Total Load N.	Tensile Strenght Rm (MPa)	Type of Failure & Location
423-1-t1	18,92	13,23	250,31	/	444	BM SA333 Gr.6
423-1-t2	19,02	12,55	238,7	/	457	BM SA333 Gr.6

Guided Bend Tests (QW-160) with 1PWHT

Type and Figure no.	Result
1-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
2-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
3-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
4-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163

Toughness Tests (QW-170) with 1PWHT size 10mm

Specimen No.	Notch Location	Notch Type	Test. Temp.	Impact values-J.		Lateral Exp.		Drop Weight	
				Single	Average	% Shear	Mils.mm	Break	No.break
4-1	BM Gr.6	KV	-52°C	60	66,3				
4-2	BM Gr.6	KV	-52°C	68					
4-3	BM Gr.6	KV	-52°C	71					
2-1	HAZ	KV	-52°C	66	64				
2-2	HAZ	KV	-52°C	65					
2-3	HAZ	KV	-52°C	61					
1-1	WM	KV	-52°C	60	64,3				
1-2	WM	KV	-52°C	65					
1-3	WM	KV	-52°C	68					
3-1	HAZ	KV	-52°C	64	66,3				
3-2	HAZ	KV	-52°C	66					
3-3	HAZ	KV	-52°C	69					
5-1	BM Gr.C	KV	-52°C	70	69,3				
5-2	BM Gr.C	KV	-52°C	65					
5-3	BM Gr.C	KV	-52°C	73					

Fillet Weld Test (QW-180)

Result – Satisfactory: Yes ____/_____ No ____/___ Penetration into Parent Metal: Yes __/__ No __/__

Macro – Results

Other Tests

1) **Hardness test**: HV10 – Max 210 : SATISFACTORY Max 185HV
2) **Macrographic examination**: SATISFACTORY
3) **Deposit Analysis**: On weld metal – See certificate Studio VM Ferrara
4) **X Ray** according to ASME Sect. IX QW 191 & QW-302.2: SATISFACTORY
   See certificate RT 2021-01 on 09-March-2021
5) **Liquid Penetrant examination**: SATISFACTORY – see cert. PT 423-01AS on 05-March-2021
6) **Visual examination** According to ASME Sect. IX QW 194 & QW-302.4: SATISFACTORY
   See cert. VT 423-01AS on 05-March-2021

Tests conducted by: C.A.M.P.I. / Studio V.M. Laboratory Test No LAB-035-009_21 on 18-May-2021

C.A.M.P.I. srl Ferrara (Italy)	PROCEDURE QUALIFICATION RECORD (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon PQR No. P423-AS	Rev. 0 Date: May 18,2021

Tensile Test (QW-150) with 3PWHT

Specimen No. QW 462.1(a)	Width mm	Thickness mm	Area mm^2	Ultimate Total Load N.	Tensile Strenght Rm (MPa)	Type of Failure & Location
426-3-t1	19,0	13,01	247,19	/	450	BM SA333 Gr.6
426-3-t2	18,97	12,78	242,43	/	453	BM SA333 Gr.6

Guided Bend Tests (QW-160) with 3PWHT

Type and Figure no.	Result
5-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
6-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
7-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
8-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163

Toughness Tests (QW-170) with 3PWHT size 10mm

Specimen No.	Notch Location	Notch Type	Test. Temp.	Impact values-J.		Lateral Exp.		Drop Weight	
				Single	Average	% Shear	Mils.mm	Break	No.break
9-1	BM Gr.6	KV	-52°C	84	82				
9-2	BM Gr.6	KV	-52°C	80					
9-3	BM Gr.6	KV	-52°C	82					
7-1	HAZ	KV	-52°C	76	71,3				
7-2	HAZ	KV	-52°C	70					
7-3	HAZ	KV	-52°C	68					
6-1	WM	KV	-52°C	78	74				
6-2	WM	KV	-52°C	74					
6-3	WM	KV	-52°C	70					
8-1	HAZ	KV	-52°C	65	67,3				
8-2	HAZ	KV	-52°C	66					
8-3	HAZ	KV	-52°C	71					
10-1	BM Gr.C	KV	-52°C	78	78,3				
10-2	BM Gr.C	KV	-52°C	80					
10-3	BM Gr.C	KV	-52°C	76					

Fillet Weld Test (QW-180)

Result – Satisfactory: Yes ____/_____ No ____/___ Penetration into Parent Metal: Yes __/__ No __/__
Macro – Results

Other Tests

1) **Hardness test**: HV10 – Max 210 : SATISFACTORY Max 177HV
2) **Macrographic examination**: SATISFACTORY
3) **Deposit Analysis**: On weld metal – See certificate Studio VM Ferrara
4) **X Ray** according to ASME Sect. IX QW 191 & QW-302.2: SATISFACTORY
   See certificate RT 2021-01 on 09-March-2021
5) **Liquid Penetrant examination**: SATISFACTORY – see cert. PT 423-01AS on 05-March-2021
6) **Visual examination** According to ASME Sect. IX QW 194 & QW-302.4: SATISFACTORY
   See cert. VT 423-01AS on 05-March-2021

Welder's Name: Perelli Cristian Clock No.: 85 Stamp No.: 8

Tests conducted by: C.A.M.P.I. / Studio V.M. Laboratory Test No LAB-035-009_21 on 18-May-2021

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX Ed.2019 of the ASME Boiler and Pressure Vessel Code.

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021

Test Supervised by _____

Signed _____

Date 18-May-2021

Manufacturer C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA

By _____
QUALITY CONTROL
QC

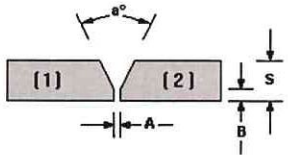
C.A.M.P.I. srl Ferrara (Italy)	WELDING PROCEDURE SPECIFICATION (WPS) (QW 482)	WPS-N. P423-01AS Rev. 0 Date: 04/03/2021 Supp. PQR N. P423-AS

Welding Process(es) a) GTAW b) SMAW c) _____
Type(s) a) Manual b) Manual c) _____
Joints (QW-402)

Joint design BW: V groove weld butt joint (see sketch)
Backing SMAW (Yes) GTAW (No) _____
Backing material (Type) WELD METAL
- Metal — Non fusing metal _____
- Non metallic — Other _____

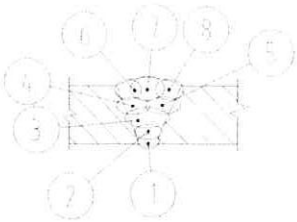
Base metal (QW-403)
P-No. 1 Gr.No. 1 to P-No. 1 Gr. No. 2
Spec. type & grade SA333 Gr.6
to spec. type & grade SA106 Gr.C
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm/inches): Groove 12,7mm Fillet All
Pipe dia.: Groove : 8" Fillet: All
Other:

Joint Design
Disegno giunto



A:3÷5mm - **B**:1,5±1mm
a°:75±2,5 - **S**:12,7mm
Dia. 8"

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.1	
AWS No. (Class)	ER80S-Ni1	E7018-1 H4	
F-No.	6	4	
A-No.	10	1	
Size of filler metal	2,4 mm	3,2/4,0 mm	
F.M. Trade Name	Carborod Ni1	TENAX 35S	
Manufacturer	Lincoln	Lincoln	
Weld Metal Thickness Thickness Groove:	2 mm	Max 11 mm	
Fillet:	All	All	
Flux Trade Name	/		
Manufacturer	/		
Electr.-Flux (Class)	/		

Other **a)**:QW404.23: Solid wire – QW 404.22: No –QW404.14:With Filler Metal

GAS (QW-408)	Gas(es)	Mixture	Flow rate	
Plasma				l/min
Shielding (a)	Ar	99,99%	14	l/min
Shielding (b)				l/min
Trailing				l/min
Backing	NO	N.A.	N.A.	l/min
Other:				

Percent Composition

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	a)-b) DC
Polarity:	a)SP b)RP
Mode of Metal Transfer for GMAW:	/
Tungsten Electrode Type & Size	SFA 5.12 EWLa-2
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	
Frequency	
Contact Tube to Work Distance	/
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	N.A.

POSITIONS (QW-405)
Position(s) of groove or fillet: Flat (1G)
Welding Progression: /
Other:

PREHEAT (QW-406)
Preheat Temp. >15°C
Interpass Temp. Max 300°C
Preheat maintenance

POSTWELD HEAT TREATMENT (QW-407)
Temp. Range 610±10°C
Time Range 60 minutes
Heat rate: Max 80°C/h – above 300°C
Cool rate: Max 80°C/h– above 300°C and cooled in still air

Other
Peening no permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
a):QW410.64 N.A. and QW410.11:No – **b)**: QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal AWS Class or Trade Name	Filler metal Size/Dia (mm)	Current Type & polarity	Current Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other HEAT IMPUT KJ/mm
1	GTAW	ER80S-Ni1	2,4	DC-SP	146	14,2	73	1,71
2-3	SMAW	E7018-1 H4	3,2	DC-RP	118	22,5	123	1,3
4-5	SMAW	E7018-1 H4	3,2	DC-RP	160	24,5	90	2,61
6÷8	SMAW	E7018-1 H4	4,0	DC-RP	160	24,5	90	2,61

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 0[illegible] Via Dalla Ragione, 15 I 44100 FERRARA	WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 04 MAR. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**	**Foglio N°** / Sheet No. **1 di 10**	
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

Sommario / Summary

1) PROVA DI TRAZIONE TRASVERSALE/ Transversal tensile test 2
2) PROVA DI PIEGA / Bending test 3
3) PROVA DI RESILIENZA / Charpy impact test 4
4) PROVA DI DUREZZA VICKERS / Vickers hardness test 5
5) PROVA DI DUREZZA VICKERS / Vickers hardness test 6
6) ESAME MACROGRAFICO / Macrographic examination 7
7) ANALISI CHIMICA / Chemical analysis* 8
8) TRATTAMENTO TERMICO / Heat treatment * 9

I risultati del presente Rapporto sono riferiti solo agli oggetti in esame e non sono in nessun caso estendibili ad altri.
Ogni riproduzione parziale deve essere autorizzata dallo Studio V.M.
Il laboratorio garantisce la correttezza delle procedure adottate, il campionamento eseguito dal Cliente e non oggetto di accreditamento.
I campioni testati sono archiviati per 30gg.
(#)= dati forniti dal cliente, per i quali il laboratorio non si assume responsabilità.
(*)= prova non accreditata da Accredia

The results of this Report refer only to the objects under examination and can not in any case be extended to others.
Any partial reproduction must be authorized by Studio V.M.
The laboratory guarantees the correctness of the procedures adopted, the sampling is by Client and not subject to accreditation
The tested samples have been stored for 30 day.
(#) = data provided by the customer, for which the laboratory assumes no responsibility.
(*) = test not accredited by Accredia

Responsabile di prova Test responsible	Responsabile di laboratorio Laboratory manager	Controllo qualità del cliente Q.C. Client Supervisor	Ispettore di 3^ parte 3rd party Inspector
STUDIO V.M. srl M. Provasi Resp. Prove Meccaniche	STUDIO V.M. srl M. Bruschi Resp. Laboratorio		BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**	**Foglio N°** / Sheet No. **2 di 10**
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
901679	**-**	**SA333 Gr.6**	
81463	**-**	**SA106 Gr.C**	**Heat treated**

M-Lab Rev2

1) PROVA DI TRAZIONE TRASVERSALE/ Transversal tensile test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**WAW 600 D Lab-01**
Estensimetro digitale / Digital extensimeter	**-**
Metodo di prova / Standard	**ASME IX-19 QW-150**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Tipo di provetta / Test specimen	**Flat**

N.	**Dimensioni** Dimension (mm)	**Sezione** Section So (mm)	**Lunghezza utile** Rupture length Lo (mm)	**Lunghezza finale** Final length Lf (mm)	**Loc. rottura** Failure pos (see note)	**Carico di rottura** Tensile strength Rm (MPa)	**Carico di snervamento** Yield strength ReH (MPa)	**Allungamento** Elongation A %	**Z %**
1	18.92*13.23	250.31	-	-	BM **SA333 Gr.6**	444	332	-	-
2	19.02*12.55	238.70	-	-	BM **SA333 Gr.6**	457	308	-	-
3	19.00*13.01	247.19	-	-	BM **SA333 Gr.6**	450	338	-	-
4	18.97*12.78	242.43	-	-	BM **SA333 Gr.6**	453	327	-	-
Valore richiesto dal cliente Required value by client						-	-	-	-

N°1-2 performed after 1 cycle of PWHT
N°3-4 performed after 3 cycle of PWHT

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Note / note :
BM = metallo base / base metal **WM = saldatura** / weld metal **HAZ = zona termicamente alterata** / heat affected zone

Prova di trazione eseguita il / Tensile test performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**	**Foglio N°** / Sheet No. **3 di 10**	
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

2) PROVA DI PIEGA / Bending test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**WAW 600 D Lab-01**
Metodo di prova / Standard	**ASTM E190-14, ASME IX-19 QW-160**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Tipo di piega / Bend type	**Side**

No.	Dimensioni Dimensions (mm)	Tipo di Piega Bend type (see note)	Diametro del mandrino Diameter of spindle (mm)	Distanza rulli Rollers distance (mm)	Angolo° Bend angle°	Risultato Result
1	10*12.7	Side bend	40	63	180	No defect founds
2	10*12.7	Side bend	40	63	180	No defect founds
3	10*12.7	Side bend	40	63	180	No defect founds
4	10*12.7	Side bend	40	63	180	No defect founds
5	10*12.7	Side bend	40	63	180	No defect founds
6	10*12.7	Side bend	40	63	180	No defect founds
7	10*12.7	Side bend	40	63	180	No defect founds
8	10*12.7	Side bend	40	63	180	No defect founds

N°1-4 performed after 1 cycle of PWHT
N°5-8 performed after 3 cycle of PWHT

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Note / note :
Face = Piega dritta / face bend **Root = Piega al rovescio** / root bend **Side = Piega laterale** / side bend

Prova di piega eseguita il / Bending test performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**	**Foglio N°** / Sheet No. **4 di 10**
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
901679	**-**	**SA333 Gr.6**	
81463	**-**	**SA106 Gr.C**	**Heat treated**

M-Lab Rev2

3) *PROVA DI RESILIENZA / Charpy impact test*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**JBS 500J - KV8 Lab-01**
Metodo di prova / Standard	**ASME IX-19 QW-170**
Specifica del cliente / Client specification	**ASTM SA516 Gr.70**
Temperatura di prova / Test temperature	**-52°C**
Tipo di intaglio / Notch type	**V-NOTCH**

No.	Dimensioni Dimensions (mm)	Posizione Position	Valore Value (J)	Valore medio Average (J)	Shear fracture (%)	Lateral expansion (mm)
1-1	10*10*55	WZ 1 cycle PWHT	60	64.3	-	-
1-2	10*10*55		65		-	-
1-3	10*10*55		68		-	-
2-1	10*10*55	HAZ SA333 Gr.6 1 cycle PWHT	66	64.0	-	-
2-2	10*10*55		65		-	-
2-3	10*10*55		61		-	-
3-1	10*10*55	HAZ SA106 Gr.C 1 cycle PWHT	64	66.3	-	-
3-2	10*10*55		66		-	-
3-3	10*10*55		69		-	-
4-1	10*10*55	B.M. SA333 Gr.6 1 cycle PWHT	60	66.3	-	-
4-2	10*10*55		68		-	-
4-3	10*10*55		71		-	-
5-1	10*10*55	B.M. SA106 Gr.C 1 cycle PWHT	70	69.3	-	-
5-2	10*10*55		65		-	-
5-3	10*10*55		73		-	-
6-1	10*10*55	WZ 3 cycle PWHT	78	74.0	-	-
6-2	10*10*55		74		-	-
6-3	10*10*55		70		-	-
7-1	10*10*55	HAZ SA333 Gr.6 3 cycle PWHT	76	71.3	-	-
7-2	10*10*55		70		-	-
7-3	10*10*55		68		-	-
8-1	10*10*55	HAZ SA106 Gr.C 3 cycle PWHT	65	67.3	-	-
8-2	10*10*55		66		-	-
8-3	10*10*55		71		-	-
9-1	10*10*55	B.M. SA333 Gr.6 3 cycle PWHT	84	82.0	-	-
9-2	10*10*55		80		-	-
9-3	10*10*55		82		-	-
10-1	10*10*55	B.M. SA106 Gr.C 3 cycle PWHT	78	78.3	-	-
10-2	10*10*55		80		-	-
10-3	10*10*55		76		-	-
Valore richiesto dalla distinta Required value cutt-off sheet			**>34** **For specimen 10*10**	**>34** **For specimen 10*10**	-	-

Note / note :
BM = metallo base / base metal **WM = saldatura** / weld metal **HAZ = zona termicamente alterata** / heat affected zone

Prova di resilienza eseguita il / Charpy impact test performed on **18/05/2021**

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021

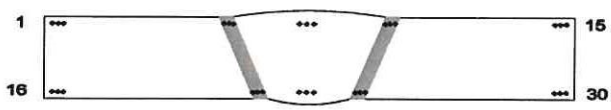
STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**	**Foglio N°** / Sheet No. **5 di 10**	
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

4) PROVA DI DUREZZA VICKERS / Vickers hardness test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**HVS 30Z – Lab 04**
Metodo di prova / Standard	**ASTM E92-16**
Specifica del cliente / Client specification	**-**
Temperatura del controllo / Test temperature	**22°C**
Modalità di prova / Testing parameters	**In section - After 1 cycle PWHT**
Valore richiesto / Required value	**210 HV10 max**

No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10
1	B.M. SA333 Gr.6	130	16	B.M. SA333 Gr.6	135	-	-	-
2	B.M. SA333 Gr.6	135	17	B.M. SA333 Gr.6	132	-	-	-
3	B.M. SA333 Gr.6	133	18	B.M. SA333 Gr.6	137	-	-	-
4	H.A.Z.	142	19	H.A.Z.	150	-	-	-
5	H.A.Z.	148	20	H.A.Z.	162	-	-	-
6	H.A.Z.	165	21	H.A.Z.	174	-	-	-
7	W.Z.	181	22	W.Z.	184	-	-	-
8	W.Z.	180	23	W.Z.	185	-	-	-
9	W.Z.	178	24	W.Z.	180	-	-	-
10	H.A.Z.	175	25	H.A.Z.	177	-	-	-
11	H.A.Z.	159	26	H.A.Z.	164	-	-	-
12	H.A.Z.	148	27	H.A.Z.	152	-	-	-
13	B.M. SA106 Gr.C	137	28	B.M. SA106 Gr.C	140	-	-	-
14	B.M. SA106 Gr.C	135	29	B.M. SA106 Gr.C	139	-	-	-
15	B.M. SA106 Gr.C	140	30	B.M. SA106 Gr.C	137	-	-	-



BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Note / note :
B.M. = **metallo base** / base metal **W.M.** = **saldatura** / weld metal **H.A.Z.** = **zona termicamente alterata** / heat affected zone

Prove di durezza eseguite il / Hardness test performed on **18/05/2021**

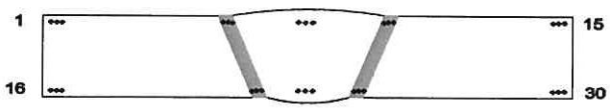
STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**		**Foglio N°** / Sheet No. **6 di 10**
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**			**Data ricevimento 31/03/2021** **Data report 18/05/2021**
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

5) *PROVA DI DUREZZA VICKERS / Vickers hardness test*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**HVS 30Z – Lab 04**
Metodo di prova / Standard	**ASTM E92-16**
Specifica del cliente / Client specification	**-**
Temperatura del controllo / Test temperature	**22°C**
Modalità di prova / Testing parameters	**In section - After 3 cycle PWHT**
Valore richiesto / Required value	**210 HV10 max**

No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10
1	B.M. SA333 Gr.6	136	16	B.M. SA333 Gr.6	132	-	-	-
2	B.M. SA333 Gr.6	132	17	B.M. SA333 Gr.6	132	-	-	-
3	B.M. SA333 Gr.6	135	18	B.M. SA333 Gr.6	136	-	-	-
4	H.A.Z.	147	19	H.A.Z.	145	-	-	-
5	H.A.Z.	152	20	H.A.Z.	156	-	-	-
6	H.A.Z.	170	21	H.A.Z.	172	-	-	-
7	W.Z.	175	22	W.Z.	176	-	-	-
8	W.Z.	170	23	W.Z.	177	-	-	-
9	W.Z.	176	24	W.Z.	173	-	-	-
10	H.A.Z.	174	25	H.A.Z.	175	-	-	-
11	H.A.Z.	161	26	H.A.Z.	162	-	-	-
12	H.A.Z.	150	27	H.A.Z.	156	-	-	-
13	B.M. SA106 Gr.C	139	28	B.M. SA106 Gr.C	140	-	-	-
14	B.M. SA106 Gr.C	137	29	B.M. SA106 Gr.C	137	-	-	-
15	B.M. SA106 Gr.C	135	30	B.M. SA106 Gr.C	135	-	-	-



BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG 2021

Note / note :
B.M. = metallo base / base metal **W.M. = saldatura** / weld metal **H.A.Z. = zona termicamente alterata** / heat affected zone

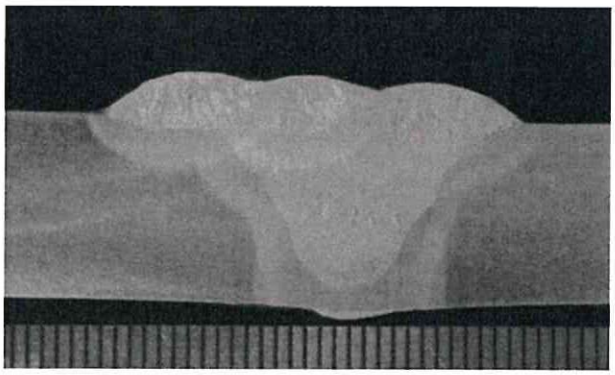
Prove di durezza eseguite il / Hardness test performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**		**Foglio N°** / Sheet No. **7 di 10**
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**			**Data ricevimento 31/03/2021** **Data report 18/05/2021**
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

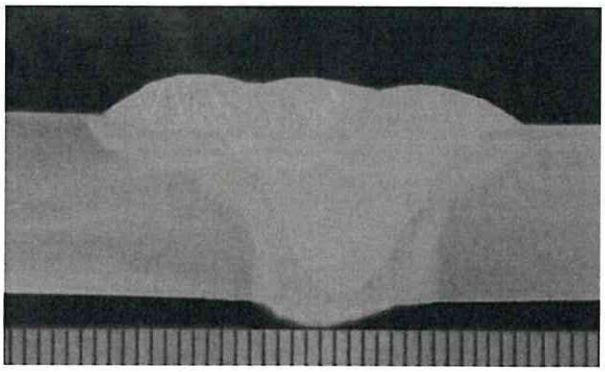
M-Lab Rev2

6) *ESAME MACROGRAFICO / Macrographic examination*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**MACRO INFINITY - Lab 07**
Metodo di prova / Standard	**ASME IX-19 QW184**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Modalità di prova / Test modality	**In section**
Reattivo / Eatching	**Nital 10%**
Ingrandimento / Magnification	**3.5X**



After 1 Cycle PWHT



After 3 Cycle PWHT

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSO
DATE 18 MAG. 2021

Esame macrografico eseguito il / Macrographic examination performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**	**Foglio N°** / Sheet No. **8 di 10**	
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

*7) ANALISI CHIMICA / Chemical analysis**

Apparecchiatura e codice V.M. / Equipment and V.M. code	**AMETEK SPEKTROMAXX**
Metodo di prova / Standard	**PO13**
Specifica del cliente / Client specification	**ASME IX-19 QW440 Table QW442**
Modalità di prova / Test modality	**Weld Metal**

No.	C %	Cr %	Mo %	Ni %	Mn %	Si %	-
1	0.138	0.062	0.008	0.260	1.30	0.576	-

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Analisi chimica eseguita il /Chemical analysisperformed on **18/05/2021**

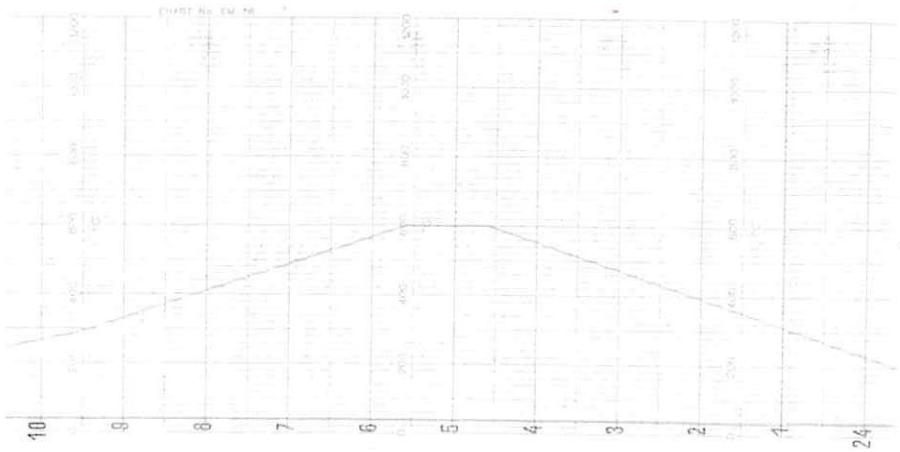
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**	**Foglio N°** / Sheet No. **9 di 10**
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
901679	**-**	**SA333 Gr.6**	
81463	**-**	**SA106 Gr.C**	**Heat treated**

M-Lab Rev2

*8) TRATTAMENTO TERMICO / Heat treatment **

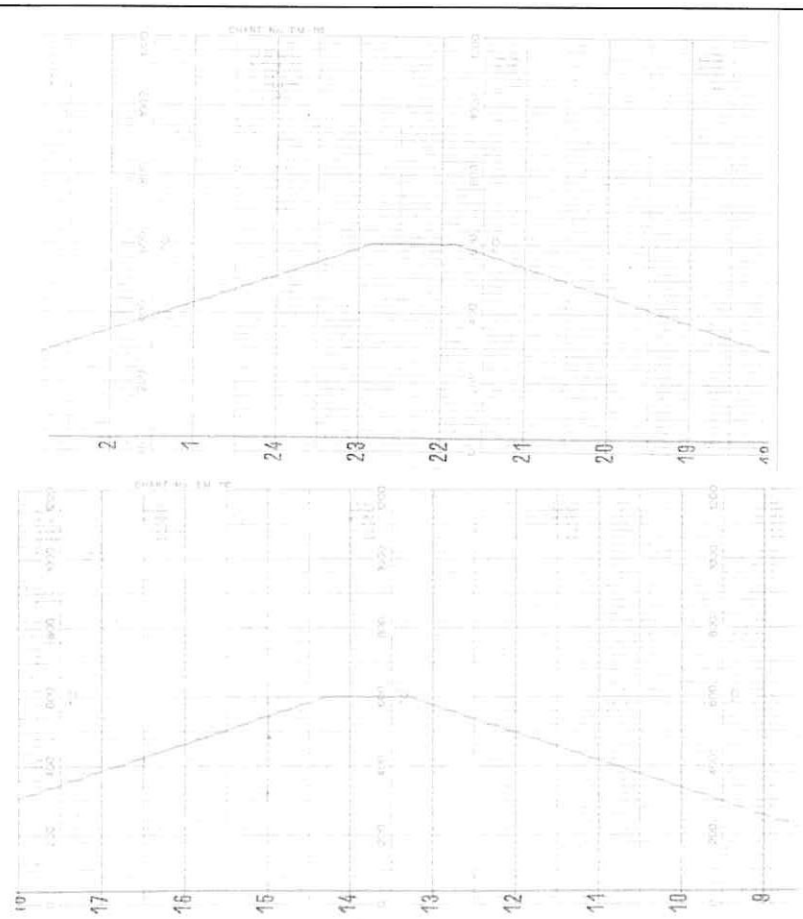
Apparecchiatura e codice V.M. / Equipment and V.M. code	**SICORTHERM ETTS/50**
Registratore / Recorder	**CHINO KL4106 Serial n° R1131C006**
Specifica del cliente / Client specification	**X3 Cycle**
Temperatura massima /Temperature	**610 °C**
Tempo di mantenimento / Holding time	**1h**
Gradiente di salita - discesa / Heating - cooling rate	**80°C/h**



BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-09_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P423**		**Foglio N°** / Sheet No. **10 di 10**
Oggetto / Subject **PQR P423 GTAW+SMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Electrode Tenax 35S Heat: M1MS21209+M1MS212140**			**Data ricevimento 31/03/2021** **Data report 18/05/2021**
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2



BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Trattamento termico eseguito il / Heat treated performed on **05/04/2021**

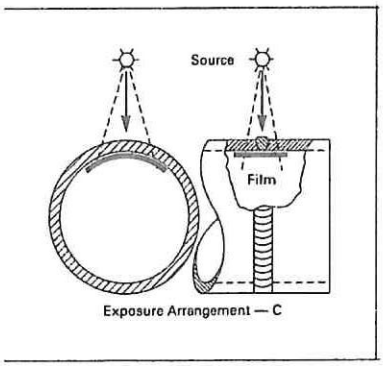
C.A.M.P.I. srl Ferrara (Italy)	CONTROLLO RADIOGRAFICO RADIOGRAPHIC EXAMINATION REPORT	RT No. 2021-01 Foglio / Sheet 1 of 2

APPARECCHIO- Equipment: Test plates **P421 / P422 / P423 / P424 & P425** *Talloni di saldatura **P421 / P422 / P423 / P424 & P425***	**COLLAUDO** *Inspection Authority*	**COMMESSA** / Job No. / **N.F.** / Item Serial No. /

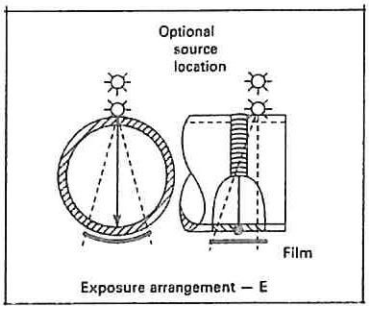
STADIO DI LAVORAZIONE : Dopo saldatura *Fabrication step : After welding*	CONDIZIONI SUPERFICIALI : come saldato *Test surface status : As welded*	
SPECIFICA DI CONTROLLO *Testing procedure:* C.A.M.P.I. IO ND101AS rev.6 / ASME Sect. V Ed.19 Art. 2	*CLASSE ACCETTABILITA' / Acceptance standard* C.A.M.P.I. IO ND101AS rev.6 / ASME VIII Div.1 Ed.19 - UW51 & App.4 / ASME IX Ed.19 QW191.1	ESTENSIONE *Extension* : 100%

TECNICA RADIOGRAFICA *Radiographic method*			1	2		3
SALDATURA *Weldjoint*	MATERIALE BASE TIPO *Base material type*		SA333Gr.6 / SA106Gr.C	SA333Gr.6 / SA106Gr.C		SA333Gr.6 / SA106Gr.C
	SPESSORE (nom.) mm *Thickness (nom.)*		8"x12,7	3"x7,62	1"½ x 7,14	½"x3,73
	RINFORZO mm *Weld reinforcement thk*		1,0+1,5	1,0+1,5		1,0+1,5
	TIPO DI SALDATURA *Welding type*		Butt Weld	Butt Weld		Butt Weld
PELLICOLA *Film*	MARCA – TIPO *Trade mark – type*		AGFA Structurix D7	AGFA Structurix D7		AGFA Structurix D7
	DOPPIA *Double film*		NO	NO		NO
	SINGOLA *Single film*		YES	YES		YES
	FORMATO *Size*		10x24	10x16 / 10x24		10x16
PENETRAMETRO *Penetrameter*	TIPO *Type*	ASME	ASTM 1B	ASTM 1A		ASTM 1A
		EN	-	-		-
	POSIZIONE *Location*	LATO SORG. *Source side*	□	□		□
		LATO FILM *Film side*	■	■		■
SCHERMI *Screens*	ANTERIORE *Front*	TIPO *Type*	Pb	Pb		Pb
		SPESSORE *Thickness*	0,05mm	0,05mm		0,05mm
	POSTERIORE *Back*	TIPO *Type*	Pb	Pb		Pb
		SPESSORE *Thickness*	0,10mm	0,10mm		0,10mm
SORGENTE *Source*	TIPO *Type*		Ir192	Ir192		Ir192
	ENERGIA *Energy*		15 Ci	15 Ci		15 Ci
	INTENSITA' *Intensity*		/	/		/
	F: MACCHIA FOCALE mm *F: Focal spot*		2x1,32	2x1,32		2x1,32
PARETI ATTRAV. *Radiation through*	Singola *Single wall*	Direzionale *Single*	□	□		□
		Panoramica *Multiple*	□	□		□
	Doppia	*Double wall*	■	■		■
D:Distance from source of radiation to weld or object being radiographed : mm *Distanza Fuoco- pezzo*			220	90	50	40
d:distance from surce side of weld or object being radiographated to the film : mm *Distanza pezzo- pellicola*			2	2	2	2
TEMPO DI ESPOSIZIONE / DOSE *Exposure / Dose*			6'	4'	2'	5"
DENSITA' PELLICOLA *Film density*			2,3 to 3,1	2,2 to 3,5		2,4 to 3,3
SENSIBILITA' RADIOGR. MINIMA *Penetrameter min. sensitivity*			2%	2%		2%

TECNICA RADIOGRAFICA
Radiographic method



TECNICA RADIOGRAFICA 1-2-3
Radiographic method



Ug : Geometric Unsharpness:
Penombra geometrica
Ug=Fd/D
D and d shall be determined at the approximate center of the area of interest.
For material thk <50mm
Ug max 0.51mm
- Result : OK

NUMERO TOTALE FILM: **37**
Number of films

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*	**CLIENTE** / *Purchaser*
09-March-2021	**LIVELLO** *Level* □ 1 ■ 2 □ 3		

C.A.M.P.I. SRL MICHELE ANTOLINI 2 LEVEL UT TC 1A EN473 ISO 9712

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date 09/03/21
Signature

EUROPEAN INSPECTION SERVICES ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSO
DATE 18 MAG. 2021

C.A.M.P.I. srl Ferrara (Italy)	CONTROLLO RADIOGRAFICO RADIOGRAPHIC EXAMINATION REPORT	RT No. 2021-01 Foglio / Sheet 2 of 2

N. saldatura *Weld no.*	Tratto *Section*	Diametro *Diameter*	Spessore *Thickness*	Tecnica radiografica *Radiographic method*	Difetto *Defect*	Giudizio *Evaluation*	Giudizio cliente *Customer evaluation*
P421 W1	1	21,3	3,73	3		A	
P421 W1	2	21,3	3,73	3		A	
P421 W2	1	21,3	3,73	3		A	
P421 W2	2	21,3	3,73	3		A	
P421 W3	1	21,3	3,73	3		A	
P421 W3	2	21,3	3,73	3		A	
P421 W4	1	21,3	3,73	3		A	
P421 W4	2	21,3	3,73	3		A	
P421 W5	1	21,3	3,73	3		A	
P421 W5	2	21,3	3,73	3		A	
P421 W6	1	21,3	3,73	3		A	
P421 W6	2	21,3	3,73	3		A	
P422 W1	1	48,3	7,14	2		A	
P422 W1	2	48,3	7,14	2		A	
P422 W1	3	48,3	7,14	2		A	
P422 W2	1	48,3	7,14	2		A	
P422 W2	2	48,3	7,14	2		A	
P422 W2	3	48,3	7,14	2		A	
P422 W3	1	48,3	7,14	2		A	
P422 W3	2	48,3	7,14	2		A	
P422 W3	3	48,3	7,14	2		A	
P423 W1	1-2	219,1	12,7	1		A	
P423 W1	2-3	219,1	12,7	1		A	
P423 W1	3-4	219,1	12,7	1		A	
P423 W1	4-1	219,1	12,7	1		A	
P424 W1	1-2	88,9	7,62	2		A	
P424 W1	2-3	88,9	7,62	2		A	
P424 W1	3-4	88,9	7,62	2		A	
P424 W1	4-1	88,9	7,62	2		A	
P424 W2	1-2	88,9	7,62	2		A	
P424 W2	2-3	88,9	7,62	2		A	
P424 W2	3-4	88,9	7,62	2		A	
P424 W2	4-1	88,9	7,62	2		A	
P425 W1	1-2	219,1	12,7	1		A	
P425 W1	2-3	219,1	12,7	1		A	
P425 W1	3-4	219,1	12,7	1		A	
P425 W1	4-1	219,1	12,7	1		A	

CLASSIFICAZIONE DIFETTI
Defects classification

100 - C Cricca / *Crack*
104 – CC Cricca di cratere / *Crater crack*
2011 - P Porosità isolate / *Gas pore*
2012 - PD Porosità distribuita uniformemente / *Uniformly distribuited porosity*
2013 – PP Nido di porosità/ *Clustered porosity*
2014 – PA Porosità alleneate / *Linear porosity*
2015 – IG Inclusioni di gas allungata / *Elonged cavity*
2016 – T Tarlo / *Worm hole*
202 – CA Cavità di ritiro / *Shrinkage cavity*
2024 –K Cavità di cratere / *Crater pipe*
301 – IS Inclusioni di scoria / *Slag inclusion*
302 – IF Inclusioni di flusso / *Flux inclusions*
303 – IO Inclusione di ossido / *Oxide inclusion*
3041 – IW Inclusione di tungsteno / *Tungsten inclusion*
401 - MF Mancanza di fusione / *Lack of fusion*
402 - MP Mancanza di penetrazione / *Lack of penetraion*

5011 – IMC Incisioni marginali continue / *Continuos undercut*
5012 – IMI Incisioni marginali intermittenza / *Intermittent undercut*
5013 – IMS Incisioni di radice / *Shrinkage groove*
504 – EP Eccesso di penetrazione / *Excess penetration*
5041- SG Sgoccilamento / *Local excessive penetration*
507 – SL Slivellamento / *Linear misalignment*
509 – SL Avvallamento / *Sagging*
511 – IN Insellamento / *Incompletely filled grove*
514 – SI Superfice irregolare / *Inter-run undercut*
515 – CR Concavità di radice / *Root concavity*
517 – RD Ripresa difettosa / *Poor restart*
601 – CD Colpo d'arco /*Arc strike stray arc*
602 – SP Spruzzi / *Spatter*
606 – EM Eccesso di molatura / *Underflusching*
BM Difetto materiale base /*Base material defect*
DF Difetto film / *Film defect*

A = ACCETTABILE (*acceptable)*
R = DA RIPARARE (*to repair*)
RRX= RIPETERE FILM *(Film repeat)*
A1 – A2 – A3 =
accettabile dopo 1^, 2^ e 3^ riparazione
(*acceptable after 1st, 2nd and 3rd repair*)

NOTES:

Date of exposure from 08-March-2021

DATA / *Date*	CAMPI	ISPETTORI / *Inspectors*	CLIENTE / *Purchaser*
09-March-2021	**LIVELLO** *Level* ☐ 1 ■ 2 ☐ 3 C.A.M.P.I. SRL MICHELE ANTOLINI 2 LEVEL INT TC 1A EN 473 ISO 9712	ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021	

C.A.M.P.I. srl Ferrara (Italy)	**CERTIFICATO DI CONTROLLO VISIVO SALDATURE** *Visual Inspection Certificate Welded joints*	Certificato N. VT 423-01AS *Certificate no.* FOGLIO 1 DI 1 *Sheet of*

CLIENTE: / *Customer*	ORDINE N.: / *Order no.*	COMMESSA N.: 21004 *Job no.*
SIGLA - *Item :* / *SERVIZIO- Service :* *Test Plate Qualification*	NUM. FABBRICA: / *Serial number*	DISEGNO N.: / *Drawing n*
QCP N.: / FASE N.: / *QCP no. Stage no.*	PROCEDURA N. C.A.M.P.I. ND 105AS rev.2 *Procedure no.*	
COMPONENTE SOTTOPOSTO AL CONTROLLO *Component subject to test* DESCRIZIONE: Test Pipe Qualification P423-AS d.8" x 12,7mm Thk. *Description*		TIPO DI MATERIALE: *Type of material* SA333 Gr.6 / SA106 Gr.C
SPECIF. APPLICAB. / *Appl. Specifications.* ASME Sect. IX Ed.2019 QW-194 / QW-302.4 ASME V Ed.2019 Art.9	CRITERI ACCETTABILITA' / *Acceptance criteria:* C.A.M.P.I. ND 105AS rev.2 / ASME Sect. IX Ed.2019 QW-194 / QW-302.4	

Designazione delle imperfezioni *Imperfections designation*	**Accettabilita'** *Acceptable*	**Note** Note
1)-Incompleto riempimento di cianfrini. Incomplete fill-up of weldgroove.	**Non Accettabile** *Unaccettable*	*None*
2)-Cricche, mancanza di fusione e penetrazione superficiale. Crack, lack of fusion or penetration.	**Non Accettabile** Unaccettable	*None*
3)-Incisioni marginali con profondità superiore a quella prevista dal Codice applicabile. Undercuts having depth greater than allowable values permitted by referencing Code section.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
4)-Rinforzo di saldatura superiore a quanto previsto dal Codice applicabile. Weld reinforcement greater than allowable values permitted by referencing Code section	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
5)-Spigoli acuti o situazioni geometriche che possono interferire con la successiva esecuzione di esami non distruttivi. Sharp corners and weld profile that could interfere with radiographic examination or other N.D.E. methods.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
6)-Scarsa raccordatura tra le passate, sovrapposizioni, brusche variazioni di sezione ed intagli. Coarse ripples, grooves, overlaps, abrupt ridges and valleys.	**Non Accettabile** Unaccettable	*None*
7)-Scorie di saldatura aderente, spruzzi e inneschi d'arco. Slag, spatters and arc spots.	**Non Accettabile** Unaccettable	*None*

Si certifica che il saggio sopra citato è stato sottoposto ad esame visivo delle saldature (100%) alla presenza di:

We certify that the piece has been visual examined and witnessed by:

Signor *Mr*		**Ispettore per** *Inspector for*	

RISULTATO DELL'ESAME VISIVO
VISUAL EXAMINATION RESULTS
SODDISFACENTE / Satisfactory

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

DATA / *Date* ***05-March-2021***	C.A.M.P.I. Srl Ferrara QC Dept. Witnessed ☒ Reviewed ☐ Date 05/03/21 Signature	Foglio 1 di 1 *Sheet of* N. ----------

C.A.M.P.I. srl Ferrara (Italy)	**CERTIFICATO DI CONTROLLO CON LIQUIDI PENETRANTI** *LIQUID PENETRANT EXAMINATION REPORT*	**PT No.** P423-01AS Foglio / Sheet 1 of 1

CLIENTE: *Purchaser:* / ORDINE: *Purchase Order No.:* / APPARECCHIO: **Test pipe coupon** Sigla: **P423** *Type of vessel :* *Item:*	**COLLAUDO** *Inspection Authority*	**COMMESSA** / Job No. / **N.F.** / Item Serial No. /

PARTE ESAMINATA : controllo effettuato su tallone di saldatura diametro 8" e spessore 12,7mm *Examined part* *Test performed on test plate diameter 8" and 12,7mm thickness*				
STADIO DI LAVORAZIONE *Working Step*	O *AFTER FORMING* O *AFTER MACHINING*	O *AFTER GRINDING* • *AFTER WELDING*	O *AFTER PWHT* O *AFTER HYDR.*	
CONDIZIONI SUPERFICIALI *Test Surface Status*	■ COME SALD. *As welded*	□ MOLATO *Ground*	□ LAV. DI MACCHINA *Machined*	
SPEC. DI CONTROLLO / *Examination procedure* C.A.M.P.I. IO ND102AS rev.4 / ASME Sect.V Art. 6 Ed 2019 & ASME IX Ed.2019 QW195		**CRITERI ACCETT.** *Acceptance criteria* C.A.M.P.I. IO ND102AS rev.4 / ASME Sect VIII Div.1 App.8 Ed. 2019 & ASME IX Ed.2019 QW195.2		

COMBINAZIONE LIQUIDI PENETRANTI / *Liquid Penetrant Grouping*

	■ LAVABILE CON ACQUA *Water washable*		□ LAVAB. CON SOLVENTE *Solvent removable*		□ POST-EMULSIFICABILE *Post-emulsified*	
	■ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*
PULITORE *Cleaner*	VELNET Batch 19/0526					
PENETRANTE *Penetrant*	RED W/W Batch 20/0074					
EMULSIFICATORE *Emulsified*	/					
RIMOZIONE PENETRANTE *Penetrant Remover*	/					
RIVELATORE *Developer*	ROTRIVEL U Batch 20/0146					
MARCA *Trade-mark*	CGM					
MEZZO DI ILLUMINAZIONE *Lighting Equipment*	■ NATURALE *Natural*	□ ARTIFICIALE *Artificial*				
LUXOMETRO S.N. *Luxmeter S.N.*	900710		DATA CALIBR. *Calibrat. Date*	02/10/2020	Lux value: 1200 lux	

PROCEDURA DI CONTROLLO / *Examination procedure*			**Refer doc. / Note**
PULITURA CON *Cleaning by*	*BRUSHING & VELNET*		WPS 421-01AS WELDER: PERELLI CRISTIAN STAMP No 8 MATERIALS: SA333 Gr.6 / SA106 Gr.C Ambient Temperature 15,8°C
APPLICAZIONE PENETRANTE CON *Penetrant application by*	SPRAY		
TEMPO MINIMO DI PENETRAZIONE *Penetrant minimum time*	15	MINUTI *Minutes*	
APPLICAZIONE EMULSIFICATORE CON *Emulsifier application by*	/		
RIMOZIONE PENETRANTE CON *Penetrant removal by*	ACQUA *WATER*		
APPLICAZIONE RIVELATORE *Developer application*	SPRAY		
ESSICCAZIONE CON *Drying process by*	NATURAL		
TEMPO MINIMO DI SVILUPPO *Developing minimum time*	10	MINUTI *Minutes*	
TEMPO MASSIMO DI LETTURA *Checking maximum time*	30	MINUTI *Minutes*	
ANALISI ACCETTAZIONE LIQUIDI *Liquid acceptance testing*	VEDI CERTIFICATO CGM *SEE CGM CERTIFICATE*		

RISULTATI DELL'ESAME *Examination Result* ■ *NO REPORTABLE INDICATIONS ACCEPTABLE* □ *SEE ATTACHED SHEETS* □ *NOT ACCEPTABLE*

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*
05-March-2021	**LIVELLO** *Level* □ 1 ■ 2 □ 3 C.A.M.P.I. SRL MICHELE ANTOLINI 2 LEVEL ENDT TC 1A EN473/ISO 9712 C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☑ Reviewed ☐ Date 05/03/21 Signature	BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	TIG
Product	Carborod Ni1
Size(s) mm	2.4X1000XTUB05
Item No.	W000283394
Lot/Batch	B102854T24
Class	AWS A5.28 ER80S-Ni1 EN ISO 636-A W 46 6 W3Ni1

Customer Ref	17/21
Our Reference	815341935
Quantity	25.0 KG
Customer	MOLESINI

VIA VENEZUELA 8
Portomaggiore 44015
Italia

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	V	Al
0.088	0.67	1.09	0.005	0.013	0.03	0.87	0.01	0.12	<0.01	0.002

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	Rp0.2 MPa	Rm MPa	A5 %
AW	20	520	610	26

Impact testing

Cond.	Temp. °C	KV J	Temp. °C	KV J
AW	20	160	-60	65

BUREAU VERITAS
ITALY
WITNESSED - NOTED - REVIEWED
SURVEYOR G. FRACASSI
DATE

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Via Fratelli Canepa 8
16010 Serra Riccò
Italy

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date
Signature

Printed By Giuseppe Lavezzari
Function Warehouse
Date 19/FEB/2021

Cert. No. 01304582
ZEU_LOWALLOY , 1

METRODE

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	Electrode
Product	TENAX 35S
Size(s) mm	3.2mm
Item No.	W000380291
Lot/Batch	M1MS212209
Class	AWS A5.1 E7018-1 H4 EN-ISO 2560-A E 42 5 B 3 2 H5

Customer Ref	47/21
Our Reference	815606479
Quantity	174.0 KG
Customer	MOLESINI

VIA VENEZUELA 8
Portomaggiore 44015
Italia

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Nb	Cu	V
0.047	0.42	1.39	0.015	0.006	0.05	0.02	<0.01	0.01	0.04	0.02

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	Rp0.2 MPa	Rm MPa	A5 %
AW	20	490	541	30

Impact testing

Cond.	Temp. °C	KV J
AW	-50	148

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Via Fratelli Canepa 8
16010 Serra Riccò
Italy

DUCTIL S.A.
C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

Printed By	Christian Grigoli	Cert. No. 01362941
Function	Warehouse Operator	ZEU_CMN , 1
Date	16/APR/2021	

METRODE

SPECIAL ALLO

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	**Electrodes**
Product	**TENAX 35S**
Size(s) mm	**4.00X0450XCBOX**
Item No.	**W000380293**
Lot/Batch	**M1MS212140**
Class	**AWS A5.1 E7018-1 H4** **EN-ISO 2560-A E 42 5 B 3 2 H5**

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Nb	Cu	V
0.067	**0.42**	**1.34**	**0.008**	**0.007**	**0.03**	**0.03**	**<0.01**	**0.01**	**0.03**	**0.02**

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	Rp0.2 MPa	Rm MPa	A5 %
AW	**20**	**490**	**541**	**30**

Impact testing

Cond.	Temp. °C	KV J
AW	**-50**	**148**

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Loc. Casalmenini 3
37010 Rivoli Veronese
Italy

DUCTIL S.A.

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

Printed By	**Silvana Martinetto**	Cert. No. **01385200**
Function	**Customer Service Center**	ZEU_CMN . 1
Date	**03/MARCH/2021**	

OERLIKON SAF-FRO METRODE WELDING CONSUMABLES SPECIAL ALLOYS

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero: **01-20-05894** | Page / Pagina: **1 / 9**

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**	Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED** **NORMALIZZATI**	Product Type / Tipo di prodotto: **See note nr.1** **Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISI** **GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2** **Vedi nota nr.2**		Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333** **ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25** **SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T.** **ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80** .	Length / Lunghezza: **32.808 ft ÷ 38.714 ft** **10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** **1202'05" ft** **52033,4 lb** **366.5 mt** **23602 kg**	Nominal Weight / Peso nominale: **43.44 lb/ft** **64.65 Kg/m**

DELIVERY NOTES / AVVISI DI SPEDIZIONE

Delivery Notes / Avvisi di spedizione	Delivery Notes / Avvisi di spedizione
Job Number: 0031264534 / 000030 Shipping note: 0101975269 - 18/06/2020 Address: VIALE LIDICE, 40	Town: 10095 GRUGLIASCO, Country: Italy

TENSILE TEST / PROVA DI TRAZIONE

Heat N° / Colata N°	Sample N° / Prova N°	Lot N° / Lotto N°	Specimen condition / Condizioni della provetta: Ls	Sc	Type / Tipo	Ori	Specimen dimensions / Dimensioni della provetta: Size / Dimensioni	Area / Area	Test temp / Temp. di prova	Y.S. OffSet 0.2% Min: 240.00 Max: --	Y.S. EUL 0.5% Min: 240.00 Max: --	U.T.S. Req. Min: 415.00 Max: --	Y.S./U.T.S Req. Max. 0.85	Elongation / Allungamento: Lo	Min.	Min.	Obt.
							mm	mm2	°C	MPa	MPa	MPa		cal.	mm	%	%
901679	Q8778/C	5	B	N	Ss	L	37.89 x 12.83	488.90	+20	309.00	307.00	444.00	0.70	2"	50.0	30.0%	46.5%
901679	Q8779	5	B	N	Ss	L	37.92 x 12.99	495.40	+20	308.00	303.00	445.00	0.69	2"	50.0	30.0%	46.5%
901679	Q8780/C	5	B	N	Ss	L	37.86 x 12.88	490.40	+20	320.00	318.00	446.00	0.72	2"	50.0	30.0%	46.5%

B: Body / Corpo
L: Longitudinal / Longitudinale
Lo: Initial length / Lunghezza iniziale
Ls: Location of sample / Ubicazione provetta
Max: Maximum / Massimo
Min: Minimum / Minimo
N: Normalized / Normalizzato
Obt: Obtained / Ottenuto
Ori: Orientation / Orientamento
Req. Max: Required maximum / Massimo richiesto
Req: Required / Richiesto
Sc: Specimen condition / Condizioni Provetta
Ss: Strip specimen / Retlangolare
U.T.S: Ultimate Tensile Strength / Rottura
Y.S: Yield Strength / Snervamento

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original on taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

BUREAU VERITAS ITALY WITNESSED NOTIFIED SURVEYOR DATE

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer: C.A.M.P.I. SRL | Kg 324
Heat No.: 901679 | Mt. 4,99
P.O. No.: PO: 20023.15-20024.14 | Cta's job: LC0000327 | Pz No.: 1
Item: 6 | Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	2 / 9
Date / Data: June 18, 2020	

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3627 fax

Customer / Cliente: COMMERCIALE TUBI ACCIAIO SPA	Customer's Order Item / Rifer. Ordine Cliente - I: AB00060/OA0000063	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: 1240573/001
Manufacture Process / Processo di fabbricazione: NORMALIZED / NORMALIZZATI	Product Type / Tipo di prodotto: See note nr.1 / Vedi nota nr.1		Surface / Superficie: BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH / GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE
Standard or Specification / Norme o specifica: See note nr.2 / Vedi nota nr.2		Steel Grade / Grado dell'Acciaio: STEEL GR 6 ASTM A 333 AND ASME SA 333 / ACC. GR 6 ASTM A 333 E ASME SA 333	Ends / Estremità: BEVELLED AS PER ASME B 16.25 / SMUSSATI SECONDO ASME B 16.25
Dimensions / Dimensioni: ø 8.625" O.D. x .500" W.T. / ø 219.10mm O.D. x 12.70mm W.T.	Schedule / Schedula: 80 .	Length / Lunghezza: 32.808 ft ÷ 38.714 ft / 10000 mm ÷ 11800 mm	Quantity / Quantità: 32Pcs/Pz; 1202'05" ft 52033,4 lb; 366.5 mt 23602 kg	Nominal Weight / Peso nominale: 43.44 lb/ft / 64.65 Kg/m

CHEMICAL COMPOSITION / COMPOSIZIONE CHIMICA

				Composition % / Composizione %																
				x 100									x 1000						x 10000		
				C	Mn	Si	Ni	Cr	Mo	Cu	Ce LF	F1	P	S	Al	Ti	Nb	V	N	B	Ca
			H Max	18	130	30	40	40	12	40	42	60	25	10	40	20	20	50	120	5	60
			Min	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heat N° / Colata N°	Sample N° / Prova N°	Lot N° / Lotto N°	P Max	18	130	30	40	40	12	40	42	60	25	10	40	20	20	50	120	5	60
			Min	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
901679			H	9	104	21	17	16	7	15	33	38.8	14	4	27	2	1	5	75	1	15
901679	Q8778/C	5	P	9	105	21	17	16	7	15	33	38.9	14	4	27	2	1	6	85	1	15
901679	Q8779	5	P	9	104	20	17	16	7	15	33	38.8	14	3	27	2	1	5	75	1	15

Ce LF: C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
F1: (Nb+V +Ti+Cr+Cu+Mo)

H: Heat / Colata
Max: Maximum / Massimo
Min: Minimum / Minimo
P: Product / Prodotto

THROUGH WALL HARDNESS / DUREZZA ATTRAVERSO LO SPESSORE

Required values / Valori richiesti			Individuals / Individuali			Average / Media			Hardness type / Tipo de dureza: brinell; Minimum martensite / martensite minima: (%): –				Formula applied / Formula Applicata							
			Min: –	Max: 200.0	Var: –	Min: –	Max: –	Var: –												
Heat N° / Colata N°	Sample N° / Prova N°	Lot N° / Lotto N°	Specimen condition						Quad.	Scale / Scala	OD				ID					
			Ls		Sc						1	2	Dist. (mm)	Avg.	1	2	Dist. (mm)	Avg.		
901679	Q8778/C	5	B		N				1	HBW	133.0	132.0	- 2.00	132.5	135.0	132.0	2	133.5		

Avg: Average / Media
B: Body / Corpo
ID: Internal Diameter / Diametro interno
Ls: Location of sample / Ubicazione provetta
N: Normalized / Normalizzato
OD: Outside Diameter / Diametro esterno
Var: Variation / Variazione

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

This document is reproduced by a computerized system and is conform to the original

CTA Group
Customer : C.A.M.P.I. SRL
P.O. No.: PO: 20023.15-20024.14
Heat No.: 901679
Cta's job: LC0000327
Kg 324
Mt 4,99
Pz No.: 1
Item: 6
Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero: **01-20-05894** | Page / Pagina: **3 / 9**

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3027 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**	Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED** **NORMALIZZATI**	Product Type / Tipo di prodotto: **See note nr.1** **Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH** **GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2** **Vedi nota nr.2**		Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333** **ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25** **SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T.** **ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80** .	Length / Lunghezza: **32.808 ft ÷ 38.714 ft** **10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** **1202'05" ft 52033,4 lb** **366.5 mt 23602 kg**	Nominal Weight / Peso nominale: **43.44 lb/ft** **64.65 Kg/m**

THROUGH WALL HARDNESS / DUREZZA ATTRAVERSO LO SPESSORE

Dist: Distance from outer diameter / Distanza dal diametro esterno
Max: Maximum / Massimo
Min: Minimum / Minimo
Quad: Quadrant / Quadrante
Sc: Specimen condition / Condizioni Provetta

IMPACT TEST / PROVA DI RESILIENZA

Type/Tipo: KCV | Orientation/Direzione: L | Unit / Unità: JOULE
Position/Posizione: | Temp: - 50 | Unit/Unità: °C | Ind.Min.Req: 32 | Req.Min.Avg: 41

Heat N° / Colata N°	Sample N° / Prova N°	Zone / Zona	Lot N° / Lotto N°	Ls	Sc	Size / Dimensioni mm	Results / Risultato 1	2	3	Avg.
901679	Q8778/C	outside	5	B	N	10 x 10.00	384.0	328.0	355.0	356.0

Avg: Average / Media
B: Body / Corpo
Ind. Min. Req: Individual Minimum Required / Minimo singolo richiesto
L: Longitudinal / Longitudinale
Ls: Location of sample / Ubicazione provetta
N: Normalized / Normalizzato
Req. Min. Avg: Required minimum average / Minima media richiesta
Sc: Specimen condition / Condizioni Provetta
Temp: Temperature / Temperatura

Type/Tipo: KCV | Orientation/Direzione: T | Unit / Unità: JOULE
Position/Posizione: | Temp: - 50 | Unit/Unità: °C | Ind.Min.Req: 21 | Req.Min.Avg: 27

Heat N° / Colata N°	Sample N° / Prova N°	Zone / Zona	Lot N° / Lotto N°	Ls	Sc	Size / Dimensioni mm	Results / Risultato 1	2	3	Avg.
901679	Q8778/C	outside	5	B	N	10 x 10.00	372.0	370.0	371.0	371.0

Avg: Average / Media
B: Body / Corpo
Ind. Min. Req: Individual Minimum Required / Minimo singolo richiesto
Ls: Location of sample / Ubicazione provetta
N: Normalized / Normalizzato
Req. Min. Avg: Required minimum average / Minima media richiesta
Sc: Specimen condition / Condizioni Provetta
T: Transversal / Trasversale
Temp: Temperature / Temperatura

This certificate is issued by a compulerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group
This document is reproduced by a computerized system and is conform to the original
Customer: C.A.M.P.I. SRL
Kg 324
Heat No.: 901679
Mt 4,99
P.O. No.: PO: 20023.15-20024.14
Cta's job: LC0000327
Pz No.: 1
Item: 6
Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero: **01-20-05894** | Page / Pagina: **4 / 9**

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) - Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**	Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED / NORMALIZZATI**	Product Type / Tipo di prodotto: **See note nr.1 / Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH / GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2 / Vedi nota nr.2**		Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 / ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25 / SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. / ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80**	Length / Lunghezza: **32.808 ft ÷ 38.714 ft / 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** — **1202'05" ft** — **52033,4 lb** / **366.5 mt** — **23602 kg**	Nominal Weight / Peso nominale: **43.44 lb/ft / 64.65 Kg/m**

FLATTENING TEST / PROVA DI SCHIACCIAMENTO

Standard / Norma:

Heat N° / Colata N°	Lot N° / Lotto N°	Sample N° / Prova N°	Zone / Zona	Sc	Test Frequency / Frequenza prova	Result / Esito
901679	5	Q8775	E1	N	5% of the lot	Good /Buono
901679	5	Q8776/C	E1	N	5% of the lot	Good /Buono

Standard / Norma:

Heat N° / Colata N°	Lot N° / Lotto N°	Sample N° / Prova N°	Zone / Zona	Sc	Test Frequency / Frequenza prova	Result / Esito
901679	5	Q8777	E1	N	5% of the lot	Good /Buono

E1 / E2: Ends of Sampling / Estremità della provetta — N: Normalized / Normalizzato — Sc: Specimen condition / Condizioni Provetta

BUREAU VERITAS ITALY WITNESSED / TESTED / REVIEWED SURVEYOR DATE G. PUCCASS.

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer : C.A.M.P.I. SRL		Kg 324			Pz No.: 1
P.O. No.: PO: 20023.15-20024.14	Heat No.: 901679	Mt 4,99	Cta's job: LC0000327	Date: 17/02/2021	Item: 6

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	5 / 9

Date / Data: June 18, 2020

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: COMMERCIALE TUBI ACCIAIO SPA	Customer's Order Item / Rifer. Ordine Cliente - I	Customer's Reference / Posizione Cliente:	Manufacturer's Works Order N° / Conferma-Posizione:
	AB00060/OA0000063	.	1240573/001

Manufacture Process / Processo di fabbricazione:	Product Type / Tipo di prodotto:	Surface / Superficie:
NORMALIZED NORMALIZZATI	See note nr.1 Vedi nota nr.1	BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE

Standard or Specification / Norme o specifica:	Steel Grade / Grado dell'Acciaio:	Ends / Estremità:
See note nr.2 Vedi nota nr.2	STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333	BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25

Dimensions / Dimensioni:	Schedule / Schedula:	Length / Lunghezza:	Quantity / Quantità: 32Pcs/Pz		Nominal Weight / Peso nominale:
ø 8.625" O.D. x .500" W.T.	80	32.808 ft ÷ 38.714 ft	1202'05" ft	52033,4 lb	43.44 lb/ft
ø 219.10mm O.D. x 12.70mm W.T.	.	10000 mm ÷ 11800 mm	366,5 mt	23602 kg	64.65 Kg/m

HYDROSTATIC TEST / PROVA IDRAULICA

Pressure / Pressione		Time / Tempo	Results / Risultato
Unit / Unità.	Value / Valore	Seconds / Secondi	
MPa	17	5	Satisfactory / Soddisfacente

SUPPLEMENTARY INFORMATION / INFORMAZIONI SUPPLEMENTARI

STANDARD EDITIONS
EDIZIONI NORME

Standard:ASTM A 333/333M Year:2018	Norma:ASTM A 333/333M Anno:2018
Standard:ASME SA333M Year:2019	Norma:ASME SA333M Anno:2019
Standard:NACE MR0175/ISO 15156 Year:2015	Norma:NACE MR0175/ISO 15156 Anno:2015
Standard:NACE MR0103/ISO 17945 Year:2015	Norma:NACE MR0103/ISO 17945 Anno:2015

PRODUCT DESCRIPTION NOTES
NOTE DI DESCRIZIONE DEL PRODOTTO

Note 1 is the full description of the 'Product type' SEAMLESS HOT FINISHED TUBES FOR LOW TEMPERATURE SERVICES (WITH SUPPLEMENTARY REQUIREMENTS)	La nota 1 è la descrizione completa del 'Tipo prodotto' TUBI S.S. DI QUALITA' FINITI A CALDO PER IMPIEGHI A BASSE TEMPERATURE (CON RICHIESTE SUPPLEMENTARI)
Note 2 is the full description of the 'Standard or specification' NORM ASTM A 333 M/ASME SA333M, MPD-02-PS-GS R.0, NACE MR0175/ISO 15156, MR0103, TEMPL. CTA-MPD-6 REV.1.4	La nota 2 è la descrizione completa delle 'Norme o specifiche' NORMA ASTM A 333 M/ASME SA333M, MPD-02-PS-GS R.0, NACE MR0175/ISO 15156, MR0103, TEMPL. CTA-MPD-6 REV.1.4

WITNESSED NOTED INSPECTION SURVEYOR DATE

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer :	Kg	324
C.A.M.P.I. SRL	Heat No.:	901679
P.O. No.:	Cta's job:	LC0000327
PO: 20023.15-20024.14	Mt	4,99
	Date:	17/02/2021
	Item:	6
	Pz No.:	1

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	6 / 9

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**			Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED NORMALIZZATI**		Product Type / Tipo di prodotto: **See note nr.1 Vedi nota nr.1**			Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2 Vedi nota nr.2**			Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333**		Ends / Estremità: **BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80**	Length / Lunghezza: **32.808 ft ÷ 38.714 ft 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** **1202'05" ft** **52033,4 lb** **366,5 mt** **23602 kg**		Nominal Weight / Peso nominale: **43.44 lb/ft 64.65 Kg/m**

SUPPLEMENTARY INFORMATION / INFORMAZIONI SUPPLEMENTARI

Supplementary Information / Informazioni supplementari	
La Societe' DALMINE garantit que tous les produits, objet du Certificat susdit, respectent en leur totalite' les Specifications de l'Article 15 de l'Arrete Ministeriel du 24 mars 1978 modifiè: C max 0.25% P max 0.05% S max 0.05% Rm (N/mm2) max 700 A(Lo=5.65VSo) min 16% long Rm (A-2) min 10500 E max 0.9 A(Lo=5.65VSo) min 14% trans RA min 10500	La Societe' DALMINE garantit que tous les produits, objet du Certificat susdit, respectent en leur totalite' les Specifications de l'Article 15 de l'Arrete Ministeriel du 24 mars 1978 modifiè: C max 0.25% P max 0.05% S max 0.05% Rm (N/mm2) max 700 A(Lo=5.65VSo) min 16% long Rm (A-2) min 10500 E max 0.9 A(Lo=5.65VSo) min 14% trans RA min 10500

Supplementary Information / Informazioni supplementari	
Country of melt ITALY Continuous casting and Fully killed	Paese di colaggio acciaio ITALIA Colaggio continuo ed acciaio di tipo calmato

Supplementary Information / Informazioni supplementari	
DALMINE OPERATES A QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER NR. LRC 110950/QMS/U/EN/001,AND IT HAS UNDERGONE A SPECIFIC ASSESSMENT SUPPORTING THE REQUIREMENTS OF ANNEX 1 SECT 4.3 OF "PRESSURE EQUIPMENT DIRECTIVE (PED) 2014/68/EU". INSPECTION CERTIFICATE ISSUED IN AGREEMENT WITH T.U.V SUD INDUSTRIE SERVICE GmbH.QMS APPROVED ACCORDING TO ANNEX I PAR.4.3 OF PRESSURE EQUIPMENT DIRECTIVE 2014/68/EU BY NOTIFIED BODY 0036. CERTIFICATION no. DGR-0036-QS-W 200/2003/MUC. MATERIAL ACCORDING TO ASME II PART. D TAB. Y1 AFTER INSPECTION OPERATION, THE MATERIAL HAS NOT A RESIDUAL MAGNETISM	DALMINE OPERA CON UN QUALITY MANAGEMENT SYSTEM CERTIFICATO DAL LLOYD'S REGISTER NR. LRC 110950/QMS/U/EN/001 CHE SUPPORTA I REQUISITI DELL' ANNEX 1 SECT. 4.3 DEL "PRESSURE EQUIPMENT DIRECTIVE (PED) 2014/68/EU" ISPEZIONE. CERTIFICATO RILASCIATO IN ACCORDO CON TUV SUD INDUSTRIE SERVICE GmbH QMS, APPROVATO SECONDO L'ALLEGATO I PAR.4.3 DELLA DIRETTIVA APPARECCHIATURE DI PRESSIONE 2014/68 / UE PER L'ORGANISMO NOTIFICATO 0036.CERTIFICAZIONE n. DGR-0036-QS-W 200/2003 / MUC MATERIALE IN ACCORDO ALLA SPEC. ASME II PART. D TAB. Y1 DOPO LE OPERAZIONI DI CONTROLLO, IL MATERIALE NON PRESENTA UN MAGNETISMO RESIDUO SUPERIORE A 20 GAUSS

WITNESSED - NOTED - REVIEWED
SURVEYOR
DATE
BUREAU VERITAS
ITALY

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumandosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer : C.A.M.P.I. SRL

P.O. No.: PO: 20023.15-20024.14

Heat No.: 901679

Cla's job: LC0000327

Item: 6

Kg 324

Mt 4,99

Pz No.: 1

Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero: **01-20-05894** | Page / Pagina: **7 / 9**

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3027 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**		Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .
Manufacture Process / Processo di fabbricazione: **NORMALIZED NORMALIZZATI**		Product Type / Tipo di prodotto: **See note nr.1 Vedi nota nr.1**	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Standard or Specification / Norme o specifica: **See note nr.2 Vedi nota nr.2**		Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333**	Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80**	Length / Lunghezza: **32.808 ft ÷ 38.714 ft 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** **1202'05" ft** **52033,4 lb** **366.5 mt** **23602 kg**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25** Nominal Weight / Peso nominale: **43.44 lb/ft 64.65 Kg/m**

SUPPLEMENTARY INFORMATION / INFORMAZIONI SUPPLEMENTARI

Supplementary Information
Informazioni supplementari

GREATER THAN 20 GAUSS
HARDNESS HRC 22 MAX, ACCORDING TO NACE MR0175/ISO 15156
HARDNESS HBW 200 MAX, ACCORDING TO NACE MR0103/ISO 17945
ALL PIPES HAVE BEEN TESTED BY ELECTROMAGNETIC TEST
(LONG/TRANSV INT/EXT NOTCH 10%) ACCORDING TO SPEC.
E 570, WITH SATISFACTORY RESULT
ALL PIPES HAVE BEEN NORMALIZED AT 920°C FOR 13 MINS. AND COOLED IN
STILL AIR
EMI FULL LENGTH
MATERIAL ACCORDING TO ASME B 36.10
STEEL IS CALCIUM TREATED FOR MICROINCLUSION SHAPE CONTROL
SEAMLESS HOT FINISHED PIPES
VISUAL AND DIMENSIONAL CONTROL HAS BEEN CARRIED OUT WITH SATISFACTORY RESULT
STEEL IS FULLY KILLED AND PRODUCED BY ELECTRIC FURNACE TO A FINE GRAIN PRACTICE
THE PRODUCT SUPPLIED IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE ORDER.
MANUFACTURED BY TENARIS DALMINE
NO WELD REPAIR, MERCURY AND RADIATION FREE
AS PER STANDARD, PIPES CAN BE REPAIRED; MANUFACTURER SHOULD DECIDE TO GRIND THE SURFACE OF THE PIPES WHEN, DURING FINAL VISUAL INSPECTION, SOME IMPERFECTIONS ARE DETECTED. THE RESULTED SURFACE AREAS, AFTER GRINDING, HAS DIFFERENT COLORATION COMPARED WITH USUAL ONE AS MANUFACTURED. THE RESIDUAL WALL THICKNESS AFTER GRINDING HAS BEEN CHECKED RESULTING IN TOLERANCE WITH STANDARD.
Tenaris IT identification number for MTC: 58[9w5r4

DUREZZA HRC 22 MAX, IN ACCORDO ALLA SPEC. NACE MR0175/ISO 15156
DUREZZA HBW 200 MAX, IN ACCORDO ALLA SPEC. NACE MR0103/ISO 17945
I TUBI SONO STATI SOTTOPOSTI AL CONTROLLO ELETTROMAGNETICO
(LONG/TRASV INT/EST TARATURA 10%) IN ACCORDO
ALLA SPEC. E 570 CON ESITO SODDISFACENTE
I TUBI SONO STATI NORMALIZZATI A 920°C PER 13 MIN. E RAFFREDDATI IN
ARIA CALMA
EMI SU TUTTA LA LUNGHEZZA
MATERIALE IN ACCORDO ALLA ASME B 36.10
ACCIAIO TRITATO AL CALCIO PER CONTROLLO MICROINCLUSIONI
.
TUBI SENZA SALDATURA FINITI A CALDO
IL CONTROLLO VISIVO E DIMENSIONALE HA DATO ESITO SODDISFACENTE
L'ACCIAIO E' DI TIPO CALMATO, A GRANO FINE, PRODOTTO AL FORNO ELETTRICO
IL MATERIALE FORNITO E' IN ACCORDO AI REQUISITI DELL'ORDINE.
FABBRICATO DA TENARIS DALMINE
NON RIPARATO MEDIANTE SALDATURA, ESENTE DA MERCURIO E RADIAZIONI
COME DA PROCEDURA STANDARD, I TUBI POSSONO ESSERE RIPARATI; IL COSTRUTTORE DOVREBBE PROCEDERE ALLA RETTIFICA DELLA LORO SUPERFICIE QUANDO DURANTE L'ISPEZIONE VISIVA FINALE VENGONO RILEVATE DELLE IMPERFEZIONI. DOPO LA RETTIFICA, LE AREE SUPERFICIALI INTERESSATE PRESENTANO UNA COLORAZIONE DIVERSA RISPETTO A QUELLA ORIGINALE. LO SPESSORE RESIDUO DELLE PARETI RIENTRA NELLA SOGLIA DI TOLLERANZA.
Numero Identificativo Tenaris IT per MTC: 58[9w5r4

BUREAU VERITAS ITALY WITNESSED / NOTED REMARKS: SURVEYOR DATE

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norme di legge.

CTA Group
This document is reproduced by a computerized system and is conform to the original
Customer : C.A.M.P.I. SRL
Kg 324
Heat No.: 901679
Mt 4,99
P.O. No.: PO: 20023.15-20024.14
Cta's job: LC0000327
Pz No.: 1
Item: 6
Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	8 / 9

Date / Data: June 18, 2020

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: COMMERCIALE TUBI ACCIAIO SPA	Customer's Order Item / Rifer. Ordine Cliente - I	Customer's Reference / Posizione Cliente:	Manufacturer's Works Order N° / Conferma-Posizione:
	AB00060/OA0000063	.	1240573/001

Manufacture Process / Processo di fabbricazione:	Product Type / Tipo di prodotto:	Surface / Superficie:
NORMALIZED NORMALIZZATI	See note nr.1 Vedi nota nr.1	BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE

Standard or Specification / Norme o specifica:	Steel Grade / Grado dell'Acciaio:	Ends / Estremità:
See note nr.2 Vedi nota nr.2	STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333	BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25

Dimensions / Dimensioni:	Schedule / Schedula:	Length / Lunghezza:	Quantity / Quantità: 32Pcs/Pz		Nominal Weight / Peso nominale:
ø 8.625" O.D. x .500" W.T.	80	32.808 ft ÷ 38.714 ft	1202'05" ft	52033,4 lb	43.44 lb/ft
ø 219.10mm O.D. x 12.70mm W.T.		10000 mm ÷ 11800 mm	366.5 mt	23602 kg	64.65 Kg/m

MARKING / MARCATURA

Marking
Marcatura

STENCILING
_T ASTM/ASME A/SA 333M 6 HOT FINISHED SEAMLESS 219,1 x 12,70 SCH. 80 LT-50C
HEAT: _COLATA MT _MT KG _KG NR. _NR

LEGEND
_T = TENARIS Logo
_COLATA = Heat Number
_MT = Pipe/Tube Length in meters
_KG = Pipe/Tube Weight in kilograms
_NR = Pipe/Tube identifier

PUNCHING
HEAT: _COLATA

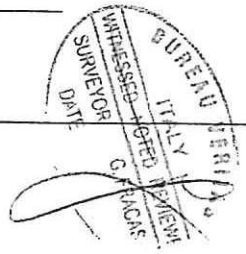
LEGEND
_COLATA = Heat Number

VERNICIATURA
_T ASTM/ASME A/SA 333M 6 HOT FINISHED SEAMLESS 219,1 x 12,70 SCH. 80 LT-50C
HEAT: _COLATA MT _MT KG _KG NR. _NR

LEGENDA
_T = Logo TENARIS
_COLATA = Numero di colata
_MT = Lunghezza del tubo in metri
_KG = Peso del tubo in chilogrammi
_NR = Identificativo numerico del tubo

PUNZONATURA
HEAT: _COLATA

LEGENDA
_COLATA = Numero di colata



This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer : C.A.M.P.I. SRL

Kg 324 | Pz No.: 1

Heat No.: 901679 | Mt 4,99

P.O. No.: PO: 20023.15-20024.14 | Cta's job: LC0000327

Item: 6 | Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	9 / 9

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti di Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**		Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED NORMALIZZATI**		Product Type / Tipo di prodotto: **See note nr.1 Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2 Vedi nota nr.2**			Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80**	Length / Lunghezza: **32.808 ft ÷ 38.714 ft 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** 1202'05" ft 52033,4 lb 366.5 mt 23602 kg	Nominal Weight / Peso nominale: **43.44 lb/ft 64.65 Kg/m**

This is to certify that the product described here has been manufactured, sampled, tested, and inspected in accordance w purchaser order requirements. This certificate is not a declaration of origin nor may it be used as a declaration of origin.

Si certifica che il prodotto descritto è stato prodotto, provato, testato e controllato in conformità ai requisiti dell'ordine del cliente. Questo certificato non è una dichiarazione d'origine e non può essere usato come tale.

	CUSTOMER THIRD PARTY	TENARIS QUALITY DEPARTMENT SIGNATURE	
	INSPECTION COMPANY COMPAGNIA D'ISPEZIONE	QUALITY CERTIFICATION DEPT. UFFICIO CERTIFICAZIONE QUALITA' SIGOLI Gianluca	CHIEF OF QUALITY CERTIFICATION DEPT. RESPONSABILE DELL'UFFICIO CERTIFICAZIONE QUALITA' FERRARI Donigio

BUREAU VERITAS ITALY WITNESSED / NOTED PRESENCE SURVEYOR DATE G.FRUCASC

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer: C.A.M.P.I. SRL	Heat No.: 901679	Kg 324	Mt 4,99	Pz No.: 1
P.O. No.: PO: 20023.15-20024.14	Cta's job: LC0000327			Date: 17/02/2021
	Item: 6			

ISP N°0006

PERMANENT JOINING PROCEDURE APPROVAL CERTIFICATE

CERTIFICATO DI APPROVAZIONE DELLE GIUNZIONI PERMANENTI

N° QP-AP-ITA-24-00166-rev.0

MANUFACTURER FABBRICANTE	**C.A.M.P.I. rsl – Ferrara Italy**		
PJPQR IN APPROVAL N° NO DELLA QUALIFICA IN APPROVAZIONE	**PQR No. P425-AS Rev. 0**		
REFERENCE STANDARD OF PQR IN APPROVAL NORMA DI RIFERIMENTO QUALIFICA IN APPROVAZIONE	**ASME Sect. IX**		
THIRD PART RECOGNIZED OR BODY TERZA PARTE RICONOSCIUTA O ORGANISMO	**Bureau Veritas Italia**		
TEST IN PQR EQUIVALENT TO TEST AS PER HARMONIZED STANDARD TEST EFFETTUATI IN PQR SONO EQUIVALENTI COME PER NORMA ARMONIZZATA	**Yes** / Si **No** / No	☒ ☐	(Supplementary test required)
SUPPLEMENTED BY RIFERIMENTO DI EVENTUALI PROVE COMPLEMETARI	**N.A.**		
COMPLEMENTARY TEST(S) PERFORMED IN PRESENCE OF PROVE COMPLEMENTARI REALIZZATE IN PRESENZA DI	**N.A.**		

BUREAU VERITAS ITALIA S.P.A. NOTIFIED BODY NR 1370

BUREAU VERITAS ITALIA S.P.A. ORGANISMO NOTIFICATO N°1370

OFFICE LOCATION / AGENZIA DI :	**MILAN - ITALY**

CERTIFIES THAT THE PERMANENT JOINING PROCEDURE QUALIFICATION RECORD, POSSIBLY COMPLETED BY SUPPLEMENTARY TESTS, COMPLIES WITH THE ESSENTIAL SAFETY REQUIREMENTS STATED BY 2014/68/UE DIRECTIVE - APPENDIX 1- § 3.1.2.

CERTIFICA CHE LA QUALIFICA DI ASSEMBLAGGIO PERMANENTE, COMPLETATO DA EVENTUALI PROVE COMPLEMENTARI, SODDISFA LE ESIGENZE ESSENZIALI DI SICUREZZA DELLA DIRETTIVA 2014/68/UE DIRECTIVE - ALLEGATO1 - § 3.1.2.

Observations : **All tests are equivalent to the requirements of harmonized standard EN ISO 15614-1**
OSSERVAZIONI :

NAME / **Nome**	DATE/ **Data**	VISA / **Firma**	STAMP / **Timbro**
Gabriele Fracassi	**16/09/2024**		

OTHER IDENTIFICATION (AS NECESSARY) : **IT FILE 23.SF.702806 4.138 Chrono No. P16346/24/GF/gf**
ALTRE IDENTIFICAZIONI (SE NECESSARIE)

Attachment : Approved document & Supplementary test certificate (if required)
ALLEGATO : DOCUMENTO APPROVATO & CERTIFICATO PROVE SUPPLEMENTARI (SE RICHIESTO)

C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P425-AS**	**Rev.** 0 **Date:** May 18,2021

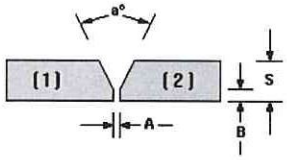
Company Name: C.A.M.P.I. S.r.l. Via Diamantina,15 - 44122 Ferrara, ITALY

WPS No.: P425-01AS

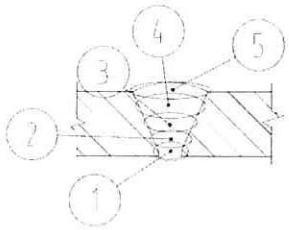
Welding Process(es): GTAW + GMAW

Types (Manual, Automatic, Machine): Manual + Semiautomatic

JOINTS (QW-402)



A:3÷5mm - **B:**1,5±1mm **a°:**75±2,5 - **S:**12,7mm
Dia. 8"



Groove Design of Test Coupon
(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used)

BASE METALS (QW-403)
Material Spec. **(1):** SA333 **(2):** SA106
Type or Grade Gr.6 to Gr.C
P. No. 1 Gr. 1 to P. No. 1 Gr. 2
Thickness of Test Coupon: 12,7 mm
Diameter of Test Coupon: 8" (219,1mm)

POSTWELD HEAT TREATMENT (QW-407)
Temperature: 610±10°C
Time: 1hr/in minimum 60min.

Other: Heat and Cool rate 80°C/h above 300°C

Performed N°1 & N°3 cycles of simulated PWHT

FILLER METALS (QW-404)	(1)GTAW	(2)GMAW
Weld Metal Analysis A-No.	10	1
Size of Filler Metal (mm)	2,4	1,2
Filler Metal F-No.	6	6
SFA Specification	5.28	5.36
AWS Classification	ER80S-Ni1	E71T15-M21A6-CS1-H4
Deposited weld metal (mm)	2,0	10,7
Flux Type	/	/
Flux Trade name	/	/
Filler Metal Product Form	Solid wire	Metal Cored
Supplemental filler metal	NO	NO
Alloy elements	NO	NO
Filler Material trade name	Carborod Ni1	Diamondspark 54 MC
Manufacturer	LINCOLN	Böhler
QW-404.35 Flux/wire class.	/	/

Others: QW404.23: Solid wire – QW 404.22: No –QW404.14:With Filler Metal

GAS (QW-408) **Percent composition**

	Gas(es)	Mixture %	Flow rate
Shelding (1)	Ar	99,999	10 l/min
Shelding (2)	Ar+CO_2	92+8	15 l/min
Trailing	None		
Backing	None		

ELECTRICAL CHARACTERISTICS (QW-409)

Current : DC	Polarity: (1)SP (2) RP	Travel Speed (mm/1')
1) Amps: 146	Volts: 9,1	78
2-3) Amps: 220	Volts: 22,5	340
4-5) Amps: 230	Volts: 22,5	340

Heat Input (KJ/mm): 1):1,02; 2÷3):0,87; 4÷5):0,91

Others: Transfer mode: Pulsed Arc

POSITION (QW-405)
Position of Groove 1G
Weld Progression (Uphill, Downhill) /
Other

PREHEAT (QW-406)
Preheat Temp. >15°C
Interpass Temp. Max 300°C
Other

TECHNIQUE (QW-410)
String or wave bead: STRING
Oscillation: NO Frequency: N.A.
Multi pass or single pass (per side) MULTI
Single or multiple electrodes: SINGLE
Contact tube to work distance : GMAW 15÷20 mm
Orifice or Gas cap size: 16mm
Use of Thermal process: N.A.

C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P425-AS**	**Rev.** 0 **Date:** May 18,2021

Tensile Test (QW-150) with 1PWHT

Specimen No. QW 462.1(a)	Width mm	Thickness mm	Area mm^2	Ultimate Total Load N.	Tensile Strenght Rm (MPa)	Type of Failure & Location
425-1-t1	18,96	12,72	241,17	/	453	BM SA333 Gr.6
425-1-t2	18,90	12,75	240,97	/	460	BM SA333 Gr.6

Guided Bend Tests (QW-160) with 1PWHT

Type and Figure no.	Result
1-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
2-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
3-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
4-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163

Toughness Tests (QW-170) with 1PWHT size 5mm

Specimen No.	Notch Location	Notch Type	Test. Temp.	Impact values-J.		Lateral Exp.		Drop Weight	
				Single	Average	% Shear	Mils.mm	Break	No.break
4-1	BM Gr.6	KV	-52°C	41					
4-2	BM Gr.6	KV	-52°C	40	40,3				
4-3	BM Gr.6	KV	-52°C	40					
2-1	HAZ	KV	-52°C	30					
2-2	HAZ	KV	-52°C	28	28,7				
2-3	HAZ	KV	-52°C	28					
1-1	WM	KV	-52°C	32					
1-2	WM	KV	-52°C	34	33,7				
1-3	WM	KV	-52°C	35					
3-1	HAZ	KV	-52°C	26					
3-2	HAZ	KV	-52°C	27	26,7				
3-3	HAZ	KV	-52°C	27					
5-1	BM Gr.C	KV	-52°C	45					
5-2	BM Gr.C	KV	-52°C	44	44,7				
5-3	BM Gr.C	KV	-52°C	45					

Fillet Weld Test (QW-180)

Result – Satisfactory: Yes ____/_____ No ____/___ Penetration into Parent Metal: Yes __/__ No __/__

Macro – Results

Other Tests

1) **Hardness test**: HV10 – Max 210 : SATISFACTORY Max 193HV
2) **Macrographic examination**: SATISFACTORY
3) **Deposit Analysis**: On weld metal – See certificate Studio VM Ferrara
4) **X Ray** according to ASME Sect. IX QW 191 & QW-302.2: SATISFACTORY
   See certificate RT 2021-01 on 09-March-2021
5) **Liquid Penetrant examination**: SATISFACTORY – see cert. PT 425-01AS on 05-March-2021
6) **Visual examination** According to ASME Sect. IX QW 194 & QW-302.4: SATISFACTORY
   See cert. VT 425-01AS on 05-March-2021

Tests conducted by: C.A.M.P.I. / Studio V.M. Laboratory Test No LAB-035-011_21 on 18-May-2021

C.A.M.P.I. srl Ferrara (Italy)	**PROCEDURE QUALIFICATION RECORD** (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to weld Test Coupon **PQR No. P425-AS**	**Rev.** 0 **Date:** May 18,2021

Tensile Test (QW-150) with 3PWHT

Specimen No. QW 462.1(a)	Width mm	Thickness mm	Area mm^2	Ultimate Total Load N.	Tensile Strenght Rm (MPa)	Type of Failure & Location
425-3-t1	18,87	12,73	240,21	/	502	BM SA333 Gr.6
425-3-t2	19,03	12,74	242,44	/	501	BM SA333 Gr.6

Guided Bend Tests (QW-160) with 3PWHT

Type and Figure no.	Result
5-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
6-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
7-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163
8-Transverse Side bend QW462.2	No imperfections – Acceptable criteria acc. to QW-163

Toughness Tests (QW-170) with 3PWHT size 5mm

Specimen No.	Notch Location	Notch Type	Test. Temp.	Impact values-J.		Lateral Exp.		Drop Weight	
				Single	Average	% Shear	Mils.mm	Break	No.break
9-1	BM Gr.6	KV	-52°C	44					
9-2	BM Gr.6	KV	-52°C	45	45,3				
9-3	BM Gr.6	KV	-52°C	47					
7-1	HAZ	KV	-52°C	30					
7-2	HAZ	KV	-52°C	33	32,7				
7-3	HAZ	KV	-52°C	35					
6-1	WM	KV	-52°C	38					
6-2	WM	KV	-52°C	32	35,3				
6-3	WM	KV	-52°C	36					
8-1	HAZ	KV	-52°C	37					
8-2	HAZ	KV	-52°C	37	35				
8-3	HAZ	KV	-52°C	31					
10-1	BM Gr.C	KV	-52°C	45					
10-2	BM Gr.C	KV	-52°C	48	47,7				
10-3	BM Gr.C	KV	-52°C	50					

Fillet Weld Test (QW-180)

Result – Satisfactory: Yes ____/_____ No ____/___ Penetration into Parent Metal: Yes __/__ No __/__
Macro – Results

Other Tests

1) **Hardness test**: HV10 – Max 210 : SATISFACTORY Max 184HV
2) **Macrographic examination**: SATISFACTORY
3) **Deposit Analysis**: On weld metal – See certificate Studio VM Ferrara
4) **X Ray** according to ASME Sect. IX QW 191 & QW-302.2: SATISFACTORY
   See certificate RT 2021-01 on 09-March-2021
5) **Liquid Penetrant examination**: SATISFACTORY – see cert. PT 425-01AS on 05-March-2021
6) **Visual examination** According to ASME Sect. IX QW 194 & QW-302.4: SATISFACTORY
   See cert. VT 425-01AS on 05-March-2021

Welder's Name: Perelli Cristian Clock No.: 85 Stamp No.: 8

Tests conducted by: C.A.M.P.I. / Studio V.M. Laboratory Test No LAB-035-011_21 on 18-May-2021

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX Ed.2019 of the ASME Boiler and Pressure Vessel Code.

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021

Test Supervised by

Signed

Date 18-May-2021

Manufacturer C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I-44122 FERRARA

By QUALITY CONTROL QC

Exhibit 7-2 Rev. 0 | 1 | 2 | 3 | 4 | 5

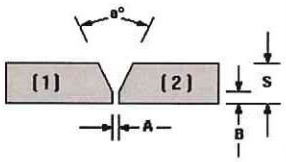
C.A.M.P.I. srl Ferrara (Italy)	WELDING PROCEDURE SPECIFICATION (WPS) (QW 482)	WPS-N. P425-01AS Rev. 0 Date: 03/03/2021 Supp. PQR N. P425-AS

Welding Process(es) a) GTAW b) GMAW c) _____
Type(s) a) Manual b) Semiautomatic c) _____
Joints (QW-402)

Joint design BW: V groove weld butt joint (see sketch)
Backing GMAW (Yes) GTAW (No) _____
Backing material (Type) WELD METAL
- Metal — Non fusing metal _____
- Non metallic — Other _____

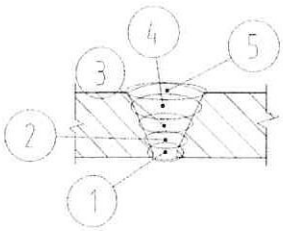
Base metal (QW-403)
P-No. 1 Gr.No. 1 to P-No. 1 Gr. No. 2
Spec. type & grade SA333 Gr.6
to spec. type & grade SA106 Gr.C
Chem. anal. & mech. prop. _____
to Chem. Anal. & Mech. Prop. _____
Thickness range
Base metal (mm/inches): Groove 12,7mm Fillet All
Pipe dia.: Groove : 8" Fillet: All
Other:

Joint Design
Disegno giunto



A:3÷5mm - **B**:1,5±1mm
a°:75±2,5 - **S**:12,7mm
Dia. 8"

Welding Sequences
sequenze saldatura



FILLER METALS (QW-404)	a)	b)	c)
Spec. No. (SFA)	5.28	5.36	
AWS No. (Class)	ER80S-Ni1	E71T15-M21A6-CS1-H4	
F-No.	6	6	
A-No.	10	1	
Size of filler metal	2,4 mm	1,2 mm	
F.M. Trade Name	Carborod Ni1	Diamondspark 54 MC	
Manufacturer	Lincoln	Boehler	
Weld Metal Thickness Thickness Groove:	2,0 mm	10,7mm	
Fillet:	All	All	
Flux Trade Name	/	/	
Manufacturer	/	/	
Electr.-Flux (Class)	/	/	

Other **a)**:QW404.23: Solid wire – QW 404.22: No –QW404.14:With Filler Metal

GAS (QW-408)	Percent Composition			
	Gas(es)	Mixture	Flow rate	
Plasma				l/min
Shielding (a)	Ar	99,999%	10	l/min
Shielding (c)	Ar+CO_2	92%+8%	15	l/min
Trailing				l/min
Backing	NO	N.A.	N.A.	l/min

Other:

ELECTRICAL CHARACTERISTICS (QW-409)	
Current:	a)-b) DC
Polarity:	a)SP b)RP
Mode of Metal Transfer for GMAW:	PULSED
Tungsten Electrode Type & Size	SFA 5.12 EWTh-2
Electrode wire feed speed range	/

TECHNIQUE (QW-410)	
String or Weave Bead	STRING & WEAVE
Orifice or Gas Cup Size	16 mm
Initial & Interpass Cleaning	GRINDING
Stick out:	12÷14mm
Method of Back Gouging	/
Oscillation: Amplitude	
Frequency	
Contact Tube to Work Distance: GMAW 15÷20mm	
Multipass or Single Pass (per side)	MULTI
Single or Multiple Electrodes	N.A.

POSITIONS (QW-405)
Position(s) of groove or fillet: Flat (1G)
Welding Progression: /
Other:

PREHEAT (QW-406)
Preheat Temp. >15°C
Interpass Temp. Max 300°C
Preheat maintenance

POSTWELD HEAT TREATMENT (QW-407)
Temp. Range 610±10°C
Time Range 60 minutes
Heat rate: Max 80°C/h – above 300°C
Cool rate: Max 80°C/h– above 300°C and cooled in still air

Other
Peening not permitted
■ t Pass < 1/2" □ Sup. powder □ Alloy elements
a):QW410.64 N.A. and QW410.11:No – **b)**: QW410.64 No

Weld pass(es) or layers	Welding process(es)	Filler metal: AWS Class or Trade Name	Filler metal: Size/Dia (mm)	Current: Type & polarity	Current: Amp. Range ±10%	Volt Range ±10%	Travel Speed Range (mm/min) ±10%	Other HEAT IMPUT KJ/mm
1	GTAW	ER80S-Ni1	2,0	DC-SP	146	9,1	78	1,02
2-3	GMAW	Diamondspark 54 MC	1,2	DC-RP	220	22,5	340	0,87
4÷5	GMAW	Diamondspark 54 MC	1,2	DC-RP	230	22,5	340	0,91

Impiegare saldatori con qualifica / *Qualified welders or welding operator:* ASME IX

Preparato da / *Prepared by*	Accettato per la qualifica *Accepted as ready for qualification*	Approvato da Ispettore Autorizzato *Approved by Authorized Inspector*
	C.A.M.P.I. srl Partita IVA 01[illegible]0389 Via Della [illegible] 15 I 44100 FERRARA	BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 03 MAR. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**		**Foglio N°** / Sheet No. **1 di 10**
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**			**Data ricevimento 31/03/2021** **Data report 18/05/2021**
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

Sommario / Summary

1) PROVA DI TRAZIONE TRASVERSALE/ Transversal tensile test 2
2) PROVA DI PIEGA / Bending test 3
3) PROVA DI RESILIENZA / Charpy impact test 4
4) PROVA DI DUREZZA VICKERS / Vickers hardness test 5
5) PROVA DI DUREZZA VICKERS / Vickers hardness test 6
6) ESAME MACROGRAFICO / Macrographic examination 7
7) ANALISI CHIMICA / Chemical analysis* 8
8) TRATTAMENTO TERMICO / Heat treatment * 9

I risultati del presente Rapporto sono riferiti solo agli oggetti in esame e non sono in nessun caso estendibili ad altri.
Ogni riproduzione parziale deve essere autorizzata dallo Studio V.M.
Il laboratorio garantisce la correttezza delle procedure adottate, il campionamento eseguito dal Cliente e non oggetto di accreditamento.
I campioni testati sono archiviati per 30gg.
(#)= dati forniti dal cliente, per i quali il laboratorio non si assume responsabilità.
(*)= prova non accreditata da Accredia

The results of this Report refer only to the objects under examination and can not in any case be extended to others.
Any partial reproduction must be authorized by Studio V.M.
The laboratory guarantees the correctness of the procedures adopted, the sampling is by Client and not subject to accreditation
The tested samples have been stored for 30 day.
(#) = data provided by the customer, for which the laboratory assumes no responsibility.
(*) = test not accredited by Accredia

Responsabile di prova Test responsible	**Responsabile di laboratorio** Laboratory manager	**Controllo qualità del cliente** Q.C. Client Supervisor	**Ispettore di 3^ parte** 3rd party Inspector
STUDIO V.M. srl M. Provasi Resp. Prove Meccaniche	STUDIO V.M. srl M. Bruschi Resp. Laboratorio		BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**	**Foglio N°** / Sheet No. **2 di 10**
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
901679	**-**	**SA333 Gr.6**	
81463	**-**	**SA106 Gr.C**	**Heat treated**

M-Lab Rev2

1) PROVA DI TRAZIONE TRASVERSALE/ Transversal tensile test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**WAW 600 D Lab-01**
Estensimetro digitale / Digital extensimeter	**-**
Metodo di prova / Standard	**ASME IX-19 QW-150**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Tipo di provetta / Test specimen	**Flat**

N.	**Dimensioni** Dimension (mm)	**Sezione** Section So (mm)	**Lunghezza utile** Rupture length Lo (mm)	**Lunghezza finale** Final length Lf (mm)	**Loc. rottura** Failure pos (see note)	**Carico di rottura** Tensile strength Rm (MPa)	**Carico di snervamento** Yield strength ReH (MPa)	**Allungamento** Elongation A %	**Z %**
1	18.96*12.72	241.17	-	-	BM **SA333 Gr.6**	453	313	-	-
2	18.90*12.75	240.97	-	-	BM **SA333 Gr.6**	460	318	-	-
3	18.87*12.73	240.21	-	-	BM **SA333 Gr.6**	502	336	-	-
4	19.03*12.74	242.44	-	-	BM **SA333 Gr.6**	501	340	-	-
Valore richiesto dal cliente Required value by client						-	-	-	-

N°1-2 performed after 1 cycle of PWHT
N°3-4 performed after 3 cycle of PWHT

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G.FRACASSO
DATE 18 MAG. 2021

Note / note :
BM = metallo base / base metal **WM = saldatura** / weld metal **HAZ = zona termicamente alterata** / heat affected zone

Prova di trazione eseguita il / Tensile test performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**	**Foglio N°** / Sheet No. **3 di 10**
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
901679	**-**	**SA333 Gr.6**	
81463	**-**	**SA106 Gr.C**	**Heat treated**

M-Lab Rev2

2) PROVA DI PIEGA / Bending test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**WAW 600 D Lab-01**
Metodo di prova / Standard	**ASTM E190-14, ASME IX-19 QW-160**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Tipo di piega / Bend type	**Side**

No.	Dimensioni Dimensions (mm)	Tipo di Piega Bend type (see note)	Diametro del mandrino Diameter of spindle (mm)	Distanza rulli Rollers distance (mm)	Angolo° Bend angle°	Risultato Result
1	10*12.7	Side bend	40	63	180	No defect founds
2	10*12.7	Side bend	40	63	180	No defect founds
3	10*12.7	Side bend	40	63	180	No defect founds
4	10*12.7	Side bend	40	63	180	No defect founds
5	10*12.7	Side bend	40	63	180	No defect founds
6	10*12.7	Side bend	40	63	180	No defect founds
7	10*12.7	Side bend	40	63	180	No defect founds
8	10*12.7	Side bend	40	63	180	No defect founds

N°1-4 performed after 1 cycle of PWHT
N°5-8 performed after 3 cycle of PWHT

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Note / note :
Face = Piega dritta / face bend **Root = Piega al rovescio** / root bend **Side = Piega laterale** / side bend

Prova di piega eseguita il / Bending test performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**	**Foglio N°** / Sheet No. **4 di 10**	
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

3) *PROVA DI RESILIENZA / Charpy impact test*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**JBS 500J - KV8 Lab-01**
Metodo di prova / Standard	**ASME IX-19 QW-170**
Specifica del cliente / Client specification	**ASTM SA516 Gr.70**
Temperatura di prova / Test temperature	**-52°C**
Tipo di intaglio / Notch type	**V-NOTCH**

No.	Dimensioni Dimensions (mm)	Posizione Position	Valore Value (J)	Valore medio Average (J)	Shear fracture (%)	Lateral expansion (mm)
1-1	**10*10*55**	WZ 1 cycle PWHT	32	33.7	-	-
1-2	**5*10*55**		34		-	-
1-3	**5*10*55**		35		-	-
2-1	**5*10*55**	HAZ SA333 Gr.6 1 cycle PWHT	30	28.7	-	-
2-2	**5*10*55**		28		-	-
2-3	**5*10*55**		28		-	-
3-1	**5*10*55**	HAZ SA106 Gr.C 1 cycle PWHT	26	26.7	-	-
3-2	**5*10*55**		27		-	-
3-3	**5*10*55**		27		-	-
4-1	**5*10*55**	B.M. SA333 Gr.6 1 cycle PWHT	41	40.3	-	-
4-2	**5*10*55**		40		-	-
4-3	**5*10*55**		40		-	-
5-1	**5*10*55**	B.M. SA106 Gr.C 1 cycle PWHT	45	44.7	-	-
5-2	**5*10*55**		44		-	-
5-3	**5*10*55**		45		-	-
6-1	**5*10*55**	WZ 3 cycle PWHT	38	35.3	-	-
6-2	**5*10*55**		32		-	-
6-3	**5*10*55**		36		-	-
7-1	**5*10*55**	HAZ SA333 Gr.6 3 cycle PWHT	30	32.7	-	-
7-2	**5*10*55**		33		-	-
7-3	**5*10*55**		35		-	-
8-1	**5*10*55**	HAZ SA106 Gr.C 3 cycle PWHT	37	35.0	-	-
8-2	**5*10*55**		37		-	-
8-3	**5*10*55**		31		-	-
9-1	**5*10*55**	B.M. SA333 Gr.6 3 cycle PWHT	44	45.3	-	-
9-2	**5*10*55**		45		-	-
9-3	**5*10*55**		47		-	-
10-1	**5*10*55**	B.M. SA106 Gr.C 3 cycle PWHT	45	47.7	-	-
10-2	**5*10*55**		48		-	-
10-3	**5*10*55**		50		-	-
Valore richiesto dalla distinta Required value cutt-off sheet			**>34** **For specimen 10*10**	**>34** **For specimen 10*10**	-	-

Note / note :
BM = metallo base / base metal **WM = saldatura** / weld metal **HAZ = zona termicamente alterata** / heat affected zone

Prova di resilienza eseguita il / Charpy impact test performed on **18/05/2021**

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G.FRACASSI
DATE 18 MAG. 2021

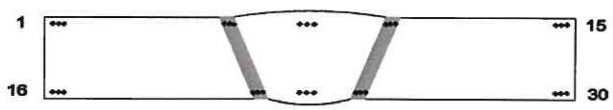
STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**	**Foglio N°** / Sheet No. **5 di 10**	
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

4) *PROVA DI DUREZZA VICKERS / Vickers hardness test*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**HVS 30Z – Lab 04**
Metodo di prova / Standard	**ASTM E92-16**
Specifica del cliente / Client specification	**-**
Temperatura del controllo / Test temperature	**22°C**
Modalità di prova / Testing parameters	**In section - After 1 cycle PWHT**
Valore richiesto / Required value	**210 HV10 max**

No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10
1	B.M. SA333 Gr.6	135	16	B.M. SA333 Gr.6	141	-	-	-
2	B.M. SA333 Gr.6	133	17	B.M. SA333 Gr.6	138	-	-	-
3	B.M. SA333 Gr.6	131	18	B.M. SA333 Gr.6	140	-	-	-
4	H.A.Z.	154	19	H.A.Z.	157	-	-	-
5	H.A.Z.	179	20	H.A.Z.	169	-	-	-
6	H.A.Z.	182	21	H.A.Z.	180	-	-	-
7	W.Z.	188	22	W.Z.	191	-	-	-
8	W.Z.	186	23	W.Z.	193	-	-	-
9	W.Z.	190	24	W.Z.	187	-	-	-
10	H.A.Z.	185	25	H.A.Z.	180	-	-	-
11	H.A.Z.	174	26	H.A.Z.	180	-	-	-
12	H.A.Z.	170	27	H.A.Z.	164	-	-	-
13	B.M. SA106 Gr.C	140	28	B.M. SA106 Gr.C	145	-	-	-
14	B.M. SA106 Gr.C	143	29	B.M. SA106 Gr.C	143	-	-	-
15	B.M. SA106 Gr.C	139	30	B.M. SA106 Gr.C	137	-	-	-



BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Note / note :
B.M. = **metallo base** / base metal **W.M.** = **saldatura** / weld metal **H.A.Z.** = **zona termicamente alterata** / heat affected zone

Prove di durezza eseguite il / Hardness test performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L

Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**	**Foglio N°** / Sheet No. **6 di 10**
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**

#Colata / Heat	**#Cert. No.**	**#Mat. dichiarato** / Steel dec.	**Stato** / Status
901679	**-**	**SA333 Gr.6**	
81463	**-**	**SA106 Gr.C**	**Heat treated**

M-Lab Rev2

5) PROVA DI DUREZZA VICKERS / Vickers hardness test

Apparecchiatura e codice V.M. / Equipment and V.M. code	**HVS 30Z – Lab 04**
Metodo di prova / Standard	**ASTM E92-16**
Specifica del cliente / Client specification	**-**
Temperatura del controllo / Test temperature	**22°C**
Modalità di prova / Testing parameters	**In section - After 3 cycle PWHT**
Valore richiesto / Required value	**210 HV10 max**

No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10	No.	Posizione Position	Valore Rilevato Measured value HV10
1	B.M. SA333 Gr.6	129	16	B.M. SA333 Gr.6	134	-	-	-
2	B.M. SA333 Gr.6	130	17	B.M. SA333 Gr.6	130	-	-	-
3	B.M. SA333 Gr.6	133	18	B.M. SA333 Gr.6	129	-	-	-
4	H.A.Z.	136	19	H.A.Z.	140	-	-	-
5	H.A.Z.	143	20	H.A.Z.	152	-	-	-
6	H.A.Z.	159	21	H.A.Z.	160	-	-	-
7	W.Z.	179	22	W.Z.	182	-	-	-
8	W.Z.	178	23	W.Z.	180	-	-	-
9	W.Z.	181	24	W.Z.	178	-	-	-
10	H.A.Z.	176	25	H.A.Z.	184	-	-	-
11	H.A.Z.	171	26	H.A.Z.	170	-	-	-
12	H.A.Z.	153	27	H.A.Z.	154	-	-	-
13	B.M. SA106 Gr.C	130	28	B.M. SA106 Gr.C	130	-	-	-
14	B.M. SA106 Gr.C	134	29	B.M. SA106 Gr.C	135	-	-	-
15	B.M. SA106 Gr.C	132	30	B.M. SA106 Gr.C	135	-	-	-



BUREAU VERITAS ITALY WITNESSED NOTED REVIEWER SURVEYOR G. FRACASSI DATE 18 MAG. 2021

Note / note :
B.M. = metallo base / base metal **W.M. = saldatura** / weld metal **H.A.Z. = zona termicamente alterata** / heat affected zone

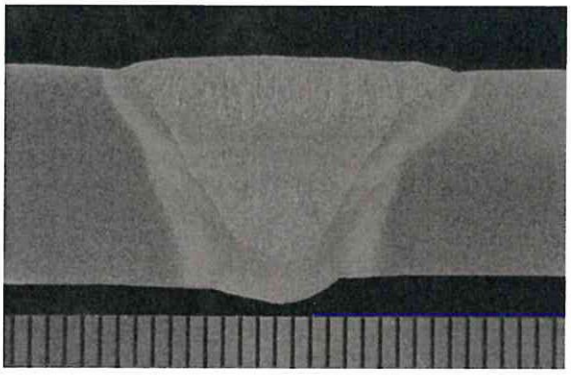
Prove di durezza eseguite il / Hardness test performed on **18/05/2021**

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**	**Foglio N°** / Sheet No. **7 di 10**	
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

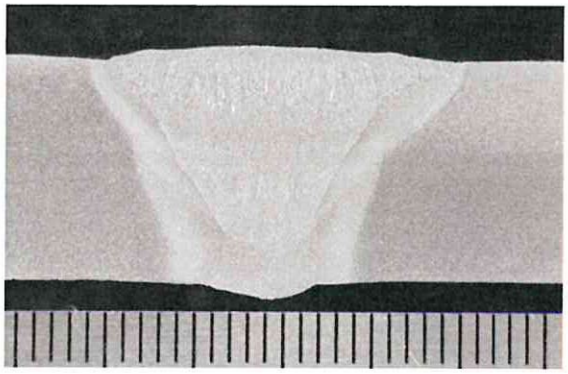
M-Lab Rev2

6) *ESAME MACROGRAFICO / Macrographic examination*

Apparecchiatura e codice V.M. / Equipment and V.M. code	**MACRO INFINITY - Lab 07**
Metodo di prova / Standard	**ASME IX-19 QW184**
Specifica del cliente / Client specification	**-**
Temperatura di prova / Test temperature	**22°C**
Modalità di prova / Test modality	**In section**
Reattivo / Eatching	**Nital 10%**
Ingrandimento / Magnification	**3.5X**



After 1 Cycle PWHT



After 3 Cycle PWHT

Esame macrografico eseguito il / Macrographic examination performed on **18/05/2021**

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**	**Foglio N°** / Sheet No. **8 di 10**	
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**		**Data ricevimento 31/03/2021** **Data report 18/05/2021**	
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2

*7) ANALISI CHIMICA / Chemical analysis**

Apparecchiatura e codice V.M. / Equipment and V.M. code	**AMETEK SPEKTROMAXX**
Metodo di prova / Standard	**PO13**
Specifica del cliente / Client specification	**ASME IX-19 QW440 Table QW442**
Modalità di prova / Test modality	**Weld Metal**

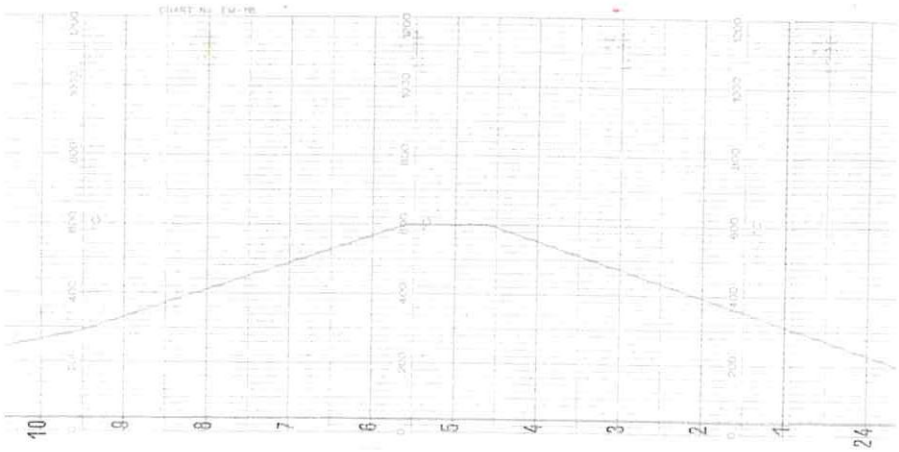
No.	C %	Cr %	Mo %	Ni %	Mn %	Si %	-
1	0.133	0.062	0.007	0.259	1.30	0.572	-

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Analisi chimica eseguita il /Chemical analysisperformed on **18/05/2021**

8) *TRATTAMENTO TERMICO / Heat treatment* *

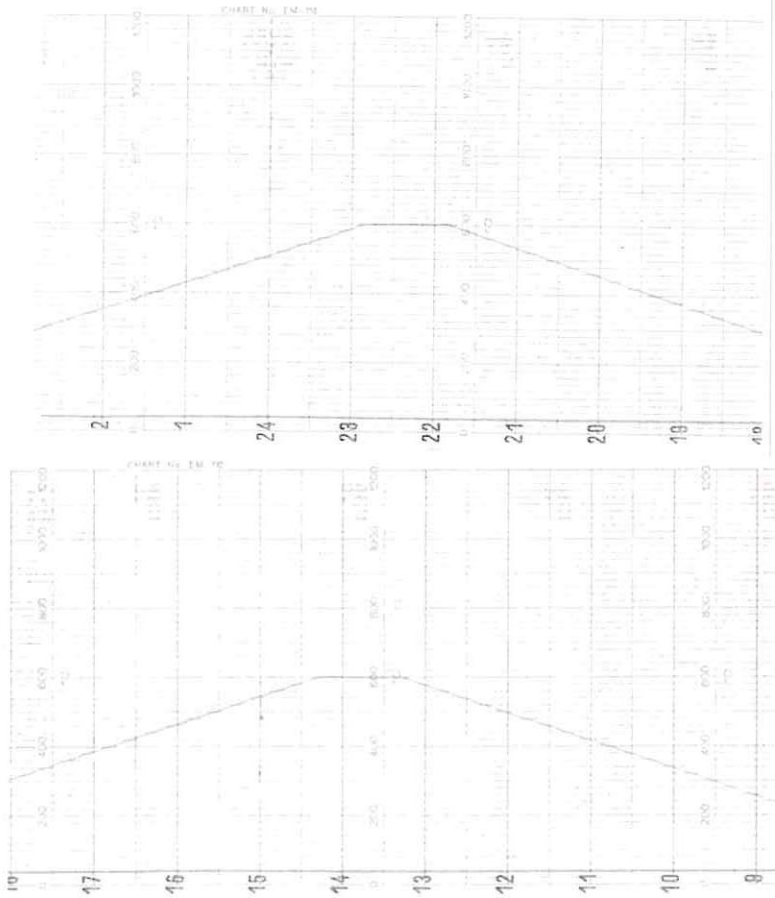
Apparecchiatura e codice V.M. / Equipment and V.M. code	**SICORTHERM ETTS/50**
Registratore / Recorder	**CHINO KL4106 Serial n° R1131C006**
Specifica del cliente / Client specification	**X3 Cycle**
Temperatura massima /Temperature	**610 °C**
Tempo di mantenimento / Holding time	**1h**
Gradiente di salita - discesa / Heating - cooling rate	**80°C/h**



BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

STUDIO V.M. S.r.l. Ferrara Via F. L. Ferrari 24/C 44124	**RAPPORTO DI PROVA** TEST REPORT **Report No. Lab-035-011_21 Rev. 0**	ilac-MRA ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO LAB N° 1630 L	
Committente / Customer **C.A.M.P.I. S.r.l.** Via Diamantina, 15, 44123 Ferrara (Fe)	**Codice campione** / Sample code **P425**		**Foglio N°** / Sheet No. **10 di 10**
Oggetto / Subject **PQR P425 GTAW+GMAW Pipe Ø8" Thk.12.7mm Welder: Perelli Cristian** **Rod Carborod Ni1 Heat: B102854T24 Wire Diamondspark Heat: 926712**			**Data ricevimento 31/03/2021** **Data report 18/05/2021**
#Colata / Heat **901679** **81463**	**#Cert. No.** **-** **-**	**#Mat. dichiarato** / Steel dec. **SA333 Gr.6** **SA106 Gr.C**	**Stato** / Status **Heat treated**

M-Lab Rev2



BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

Trattamento termico eseguito il / Heat treated performed on **05/04/2021**

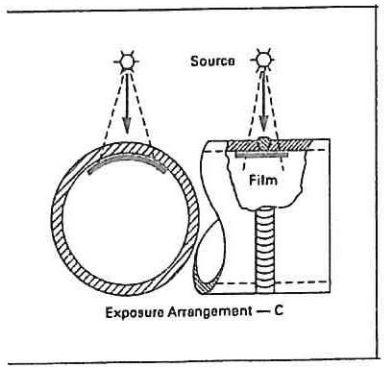
C.A.M.P.I. srl Ferrara (Italy)	CONTROLLO RADIOGRAFICO RADIOGRAPHIC EXAMINATION REPORT	RT No. 2021-01 Foglio / Sheet 1 of 2

APPARECCHIO- Equipment: Test plates **P421 / P422 / P423 / P424 & P425** *Talloni di saldatura **P421 / P422 / P423 / P424 & P425***	**COLLAUDO** *Inspection Authority*	**COMMESSA** / Job No. / **N.F.** / Item Serial No. /

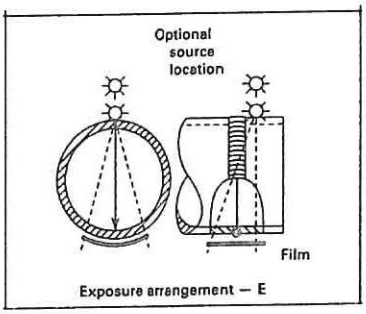
STADIO DI LAVORAZIONE : Dopo saldatura *Fabrication step : After welding*	CONDIZIONI SUPERFICIALI : come saldato *Test surface status : As welded*	
SPECIFICA DI CONTROLLO *Testing procedure:* C.A.M.P.I. IO ND101AS rev.6 / ASME Sect. V Ed.19 Art. 2	*CLASSE ACCETTABILITA' / Acceptance standard* C.A.M.P.I. IO ND101AS rev.6 / ASME VIII Div.1 Ed.19 - UW51 & App.4 / ASME IX Ed.19 QW191.1	ESTENSIONE *Extension* : 100%

TECNICA RADIOGRAFICA *Radiographic method*			1	2		3
SALDATURA *Weldjoint*	MATERIALE BASE TIPO *Base material type*		SA333Gr.6 / SA106Gr.C	SA333Gr.6 / SA106Gr.C		SA333Gr.6 / SA106Gr.C
	SPESSORE (nom.) mm *Thickness (nom.)*		8"x12,7	3"x7,62	1"½ x 7,14	½"x3,73
	RINFORZO mm *Weld reinforcement thk*		1,0+1,5	1,0+1,5		1,0+1,5
	TIPO DI SALDATURA *Welding type*		Butt Weld	Butt Weld		Butt Weld
PELLICOLA *Film*	MARCA – TIPO *Trade mark – type*		AGFA Structurix D7	AGFA Structurix D7		AGFA Structurix D7
	DOPPIA *Double film*		NO	NO		NO
	SINGOLA *Single film*		YES	YES		YES
	FORMATO *Size*		10x24	10x16 / 10x24		10x16
PENETRAMETRO *Penetrameter*	TIPO *Type*	ASME	ASTM 1B	ASTM 1A		ASTM 1A
		EN	-	-		-
	POSIZIONE *Location*	LATO SORG. *Source side*	□	□		□
		LATO FILM *Film side*	■	■		■
SCHERMI *Screens*	ANTERIORE *Front*	TIPO *Type*	Pb	Pb		Pb
		SPESSORE *Thickness*	0,05mm	0,05mm		0,05mm
	POSTERIORE *Back*	TIPO *Type*	Pb	Pb		Pb
		SPESSORE *Thickness*	0,10mm	0,10mm		0,10mm
SORGENTE *Source*	TIPO *Type*		Ir192	Ir192		Ir192
	ENERGIA *Energy*		15 Ci	15 Ci		15 Ci
	INTENSITA' *Intensity*		/	/		/
	F: MACCHIA FOCALE mm *F: Focal spot*		2x1,32	2x1,32		2x1,32
PARETI ATTRAV. *Radiation through*	Singola *Single wall*	Direzionale *Single*	□	□		□
		Panoramica *Multiple*	□	□		□
	Doppia	*Double wall*	■	■		■
D:Distance from source of radiation to weld or object being radiographed : mm *Distanza Fuoco- pezzo*			220	90	50	40
d:distance from surce side of weld or object being radiographated to the film : mm *Distanza pezzo- pellicola*			2	2	2	2
TEMPO DI ESPOSIZIONE / DOSE *Exposure / Dose*			6'	4'	2'	5''
DENSITA' PELLICOLA *Film density*			2,3 to 3,1	2,2 to 3,5		2,4 to 3,3
SENSIBILITA' RADIOGR. MINIMA *Penetrameter min. sensitivity*			2%	2%		2%

TECNICA RADIOGRAFICA
Radiographic method



TECNICA RADIOGRAFICA 1-2-3
Radiographic method



Ug : Geometric Unsharpness:
Penombra geometrica
Ug=Fd/D
D and d shall be determined at the approximate center of the area of interest.
For material thk <50mm
Ug max 0.51mm
- Result : OK

NUMERO TOTALE FILM: **37**
Number of films

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*	**CLIENTE** / *Purchaser*
09-March-2021	**LIVELLO** *Level* □ 1 ■ 2 □ 3	C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed □ Reviewed ☒ Data 09/03/21 Signature	BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 10 MAG. 2021

C.A.M.P.I. S.R.L.
MICHELE ANTOLINI
2 LEVEL TC 1A
EN473/ISO 9712

C.A.M.P.I. srl Ferrara (Italy)	CONTROLLO RADIOGRAFICO RADIOGRAPHIC EXAMINATION REPORT	RT No. 2021-01 Foglio / Sheet 2 of 2

N. saldatura *Weld no.*	Tratto *Section*	Diametro *Diameter*	Spessore *Thickness*	Tecnica radiografica *Radiographic method*	Difetto *Defect*	Giudizio *Evaluation*	Giudizio cliente *Customer evaluation*
P421 W1	1	21,3	3,73	3		A	
P421 W1	2	21,3	3,73	3		A	
P421 W2	1	21,3	3,73	3		A	
P421 W2	2	21,3	3,73	3		A	
P421 W3	1	21,3	3,73	3		A	
P421 W3	2	21,3	3,73	3		A	
P421 W4	1	21,3	3,73	3		A	
P421 W4	2	21,3	3,73	3		A	
P421 W5	1	21,3	3,73	3		A	
P421 W5	2	21,3	3,73	3		A	
P421 W6	1	21,3	3,73	3		A	
P421 W6	2	21,3	3,73	3		A	
P422 W1	1	48,3	7,14	2		A	
P422 W1	2	48,3	7,14	2		A	
P422 W1	3	48,3	7,14	2		A	
P422 W2	1	48,3	7,14	2		A	
P422 W2	2	48,3	7,14	2		A	
P422 W2	3	48,3	7,14	2		A	
P422 W3	1	48,3	7,14	2		A	
P422 W3	2	48,3	7,14	2		A	
P422 W3	3	48,3	7,14	2		A	
P423 W1	1-2	219,1	12,7	1		A	
P423 W1	2-3	219,1	12,7	1		A	
P423 W1	3-4	219,1	12,7	1		A	
P423 W1	4-1	219,1	12,7	1		A	
P424 W1	1-2	88,9	7,62	2		A	
P424 W1	2-3	88,9	7,62	2		A	
P424 W1	3-4	88,9	7,62	2		A	
P424 W1	4-1	88,9	7,62	2		A	
P424 W2	1-2	88,9	7,62	2		A	
P424 W2	2-3	88,9	7,62	2		A	
P424 W2	3-4	88,9	7,62	2		A	
P424 W2	4-1	88,9	7,62	2		A	
P425 W1	1-2	219,1	12,7	1		A	
P425 W1	2-3	219,1	12,7	1		A	
P425 W1	3-4	219,1	12,7	1		A	
P425 W1	4-1	219,1	12,7	1		A	

CLASSIFICAZIONE DIFETTI
Defects classification

100 - C Cricca / *Crack*
104 – CC Cricca di cratere / *Crater crack*
2011 - P Porosità isolate / *Gas pore*
2012 - PD Porosità distribuita uniformemente / *Uniformly distribuited porosity*
2013 – PP Nido di porosità/ *Clustered porosity*
2014 – PA Porosità alleneate / *Linear porosity*
2015 – IG Inclusioni di gas allungata / *Elonged cavity*
2016 – T Tarlo / *Worm hole*
202 – CA Cavità di ritiro / *Shrinkage cavity*
2024 –K Cavità di cratere / *Crater pipe*
301 – IS Inclusioni di scoria / *Slag inclusion*
302 – IF Inclusioni di flusso / *Flux inclusions*
303 – IO Inclusione di ossido / *Oxide inclusion*
3041 – IW Inclusione di tungsteno / *Tungsten inclusion*
401 - MF Mancanza di fusione / *Lack of fusion*
402 - MP Mancanza di penetrazione / *Lack of penetraion*

5011 – IMC Incisioni marginali continue / *Continuos undercut*
5012 – IMI Incisioni marginali intermittenza / *Intermittent undercut*
5013 – IMS Incisioni di radice / *Shrinkage groove*
504 – EP Eccesso di penetrazione / *Excess penetration*
5041- SG Sgoccilamento / *Local excessive penetration*
507 – SL Slivellamento / *Linear misalignment*
509 – SL Avvallamento / *Sagging*
511 – IN Insellamento / *Incompletely filled grove*
514 – SI Superfice irregolare / *Inter-run undercut*
515 – CR Concavità di radice / *Root concavity*
517 – RD Ripresa difettosa / *Poor restart*
601 – CD Colpo d'arco /*Arc strike stray arc*
602 – SP Spruzzi / *Spatter*
606 – EM Eccesso di molatura / *Underflusching*
BM Difetto materiale base /*Base material defect*
DF Difetto film / *Film defect*

A = ACCETTABILE (*acceptable)*
R = DA RIPARARE (*to repair*)
RRX= RIPETERE FILM *(Film repeat)*
A1 – A2 – A3 =
accettabile dopo 1^, 2^ e 3^ riparazione
(*acceptable after 1st, 2nd and 3rd repair*)

NOTES:

Date of exposure from 08-March-2021

DATA / *Date*	CAMPI	ISPETTORI / *Inspectors*	CLIENTE / *Purchaser*
09-March-2021	LIVELLO *Level* ☐ 1 ■ 2 ☐ 3 C.A.M.P.I. SRL MICHELE ANTOLINI 2 LEVEL ~~ENT~~ NT TC 1A EN ~~473~~ ISO 9712	ITALY WITNESSED ~~NOTED~~ REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021	

C.A.M.P.I. srl Ferrara (Italy)	**CERTIFICATO DI CONTROLLO VISIVO SALDATURE** *Visual Inspection Certificate Welded joints*	Certificato N. VT 425-01AS *Certificate no.* FOGLIO 1 DI 1 *Sheet of*

CLIENTE: / *Customer*	ORDINE N.: / *Order no.*	COMMESSA N.: 21004 *Job no.*
SIGLA - *Item :* / *SERVIZIO- Service :* *Test Plate Qualification*	NUM. FABBRICA: / *Serial number*	DISEGNO N.: / *Drawing n*
QCP N.: / FASE N.: / *QCP no.* *Stage no.*	PROCEDURA N. C.A.M.P.I. ND 105AS rev.2 *Procedure no.*	
COMPONENTE SOTTOPOSTO AL CONTROLLO *Component subject to test* DESCRIZIONE: Test Pipe Qualification P425-AS d.8" x 12,7mm Thk. *Description*		TIPO DI MATERIALE: *Type of material* SA333 Gr.6 / SA106 Gr.C
SPECIF. APPLICAB. / *Appl. Specifications.* ASME Sect. IX Ed.2019 QW-194 / QW-302.4 ASME V Ed.2019 Art.9	CRITERI ACCETTABILITA' / *Acceptance criteria:* C.A.M.P.I. ND 105AS rev.2 / ASME Sect. IX Ed.2019 QW-194 / QW-302.4	

Designazione delle imperfezioni *Imperfections designation*	**Accettabilita'** *Acceptable*	**Note** Note
1)-Incompleto riempimento di cianfrini. Incomplete fill-up of weldgroove.	**Non Accettabile** *Unaccettable*	*None*
2)-Cricche, mancanza di fusione e penetrazione superficiale. Crack, lack of fusion or penetration.	**Non Accettabile** Unaccettable	*None*
3)-Incisioni marginali con profondità superiore a quella prevista dal Codice applicabile. Undercuts having depth greater than allowable values permitted by referencing Code section.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
4)-Rinforzo di saldatura superiore a quanto previsto dal Codice applicabile. Weld reinforcement greater than allowable values permitted by referencing Code section	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
5)-Spigoli acuti o situazioni geometriche che possono interferire con la successiva esecuzione di esami non distruttivi. Sharp corners and weld profile that could interfere with radiographic examination or other N.D.E. methods.	**ASME VIII Div 1** **UW 35** **ND 101AS**	*None*
6)-Scarsa raccordatura tra le passate, sovrapposizioni, brusche variazioni di sezione ed intagli. Coarse ripples, grooves, overlaps, abrupt ridges and valleys.	**Non Accettabile** Unaccettable	*None*
7)-Scorie di saldatura aderente, spruzzi e inneschi d'arco. Slag, spatters and arc spots.	**Non Accettabile** Unaccettable	*None*

Si certifica che il saggio sopra citato è stato sottoposto ad esame visivo delle saldature (100%) alla presenza di:

We certify that the piece has been visual examined and witnessed by:

Signor *Mr*		**Ispettore per** *Inspector for*	

RISULTATO DELL'ESAME VISIVO
VISUAL EXAMINATION RESULTS
SODDISFACENTE / Satisfactory

BUREAU VERITAS ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE 18 MAG. 2021

DATA / *Date* ***05-March-2021***	**C.A.M.P.I. Srl** **QC Dept.** C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☑ Reviewed ☐ Date 05/03/21 Signature	Foglio 1 di 1 *Sheet of* N. ----------

C.A.M.P.I. srl Ferrara (Italy)	**CERTIFICATO DI CONTROLLO CON LIQUIDI PENETRANTI** *LIQUID PENETRANT EXAMINATION REPORT*	**PT No.** P425-01AS Foglio / Sheet 1 of 1

CLIENTE: *Purchaser:* / ORDINE: *Purchase Order No.:* / APPARECCHIO: **Test pipe coupon** Sigla: **P425** *Type of vessel :* *Item:*	**COLLAUDO** *Inspection Authority*	**COMMESSA** / Job No. / **N.F.** / Item Serial No. /

PARTE ESAMINATA : controllo effettuato su tallone di saldatura diametro 8" e spessore 12,7mm *Examined part* *Test performed on test plate diameter 8" and 12,7mm thickness*				
STADIO DI LAVORAZIONE *Working Step*	O *AFTER FORMING* O *AFTER MACHINING*	O *AFTER GRINDING* • *AFTER WELDING*	O *AFTER PWHT* O *AFTER HYDR.*	
CONDIZIONI SUPERFICIALI *Test Surface Status*	■ COME SALD. *As welded*	□ MOLATO *Ground*	□ LAV. DI MACCHINA *Machined*	
SPEC. DI CONTROLLO / *Examination procedure* C.A.M.P.I. IO ND102AS rev.4 / ASME Sect.V Art. 6 Ed 2019 & ASME IX Ed.2019 QW195		**CRITERI ACCETT.** *Acceptance criteria* C.A.M.P.I. IO ND102AS rev.4 / ASME Sect VIII Div.1 App.8 Ed. 2019 & ASME IX Ed.2019 QW195.2		

COMBINAZIONE LIQUIDI PENETRANTI / *Liquid Penetrant Grouping*

	■ LAVABILE CON ACQUA *Water washable*		□ LAVAB. CON SOLVENTE *Solvent removable*		□ POST-EMULSIFICABILE *Post-emulsified*	
	■ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*	□ VISIBILE *Visible*	□ FLUOR. *Fluorescent*
PULITORE *Cleaner*	VELNET Batch 19/0526					
PENETRANTE *Penetrant*	RED W/W Batch 20/0074					
EMULSIFICATORE *Emulsified*	/					
RIMOZIONE PENETRANTE *Penetrant Remover*	/					
RIVELATORE *Developer*	ROTRIVEL U Batch 20/0146					
MARCA *Trade-mark*	CGM					
MEZZO DI ILLUMINAZIONE *Lighting Equipment*	■ NATURALE *Natural*	□ ARTIFICIALE *Artificial*				
LUXOMETRO S.N. *Luxmeter S.N.*	900710		DATA CALIBR. *Calibrat. Date*	02/10/2020	Lux value: 1200 lux	

PROCEDURA DI CONTROLLO / *Examination procedure*			**Refer doc. / Note**
PULITURA CON *Cleaning by*	*BRUSHING & VELNET*		WPS 425-01AS WELDER: PERELLI CRISTIAN STAMP No 8 MATERIALS: SA333 Gr.6 / SA106 Gr.C Ambient Temperature 15,8°C
APPLICAZIONE PENETRANTE CON *Penetrant application by*	SPRAY		
TEMPO MINIMO DI PENETRAZIONE *Penetrant minimum time*	15	MINUTI *Minutes*	
APPLICAZIONE EMULSIFICATORE CON *Emulsifier application by*	/		
RIMOZIONE PENETRANTE CON *Penetrant removal by*	ACQUA *WATER*		
APPLICAZIONE RIVELATORE *Developer application*	SPRAY		
ESSICCAZIONE CON *Drying process by*	NATURAL		
TEMPO MINIMO DI SVILUPPO *Developing minimum time*	10	MINUTI *Minutes*	
TEMPO MASSIMO DI LETTURA *Checking maximum time*	30	MINUTI *Minutes*	
ANALISI ACCETTAZIONE LIQUIDI *Liquid acceptance testing*	VEDI CERTIFICATO CGM *SEE CGM CERTIFICATE*		

RISULTATI DELL'ESAME *Examination Result* ■ *NO REPORTABLE INDICATIONS ACCEPTABLE* □ *SEE ATTACHED SHEETS* □ *NOT ACCEPTABLE*

DATA / *Date*	**CAMPI**	**ISPETTORI** / *Inspectors*
05-March-2021	**LIVELLO** *Level* □ 1 ■ 2 □ 3 C.A.M.P.I. SRL MICHELE SARTOLINI 2 LEVEL SNT TC 1A EN473/ISO 9712 C.A.M.P.I. S.R.L. - Ferrara Quality Control dept. Witnessed ☒ Reviewed ☐ Date 05/03/21 Signature	BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR G. FRACASSI DATE 18 MAG. 2021

Inspection Certificate 3.1

LINCOLN ELECTRIC
THE WELDING EXPERTS

Product Line	TIG
Product	Carborod Ni1
Size(s) mm	2.4X1000XTUB05
Item No.	W000283394
Lot/Batch	B102854T24
Class	AWS A5.28 ER80S-Ni1 EN ISO 636-A W 46 6 W3Ni1

Customer Ref	17/21
Our Reference	815341935
Quantity	25.0 KG
Customer	MOLESINI

VIA VENEZUELA 8
Portomaggiore 44015
Italia

Chemical analysis (%) According to EN10204 3.1

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	V	Al
0.088	0.67	1.09	0.005	0.013	0.03	0.87	0.01	0.12	<0.01	0.002

Mechanical tests, all weld metal According to EN10204 2.2

Tensile testing

Cond.	Temp. °C	Rp0.2 MPa	Rm MPa	A5 %
AW	20	520	610	26

Impact testing

Cond.	Temp. °C	KV J	Temp. °C	KV J
AW	20	160	-60	65

BUREAU VERITAS
ITALY
WITNESSED - NOTED - REVIEWED
SURVEYOR G. FRACASSI
DATE

Remarks

The product identified above has been manufactured, tested and supplied in compliance with a certified ISO 9001 Quality Assurance Programme.

Company
Lincoln Electric Italia srl
Via Fratelli Canepa 8
16010 Serra Riccò
Italy

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☑
Date
Signature

Printed By	Giuseppe Lavezzari	Cert. No. 01304582
Function	Warehouse	ZEU_LOWALLOY , 1
Date	19/FEB/2021	

METRODE

voestalpine Böhler Welding Italia S.r.l.

voestalpine Böhler Welding Italia S.r.l.

Via Palizzi, 90
I – 20157 MILANO MI
Tel. +39 02 39017.1
Fax +39 02 39017244

www.voestalpine.com/welding

Certificato di prova 3.1
Inspection certificate 3.1

secondo / as per : EN 10204
No. : No. : 2021-2014565923-10-926712-014
Rev. 0 Page / Page : 1 / 1

METALUTENSILI SRL

VIA DEL COMMERCIO 25
44123 FERRARA
Italia

Ordine N°	PO no.	0000501032/Laura Tenani	del / of	04.03.2021
Ordine N°	Order no.	1014241789		
Bolla di consegna/Pos./Splitt.	Delivery note/pos./splitt	2014565923/000000/000010	del / of	04.03.2021

Oggetto test	Product	filo animato / Tubular cored electrode
Denominazione commerciale	Trade name	**diamondspark 54 MC**
Classificazione norma	Standard designation	EN ISO 17632-A: T46 6 M M21 1 H5/T42 5 M C1 1 H5
		AWS A5.36/SFA-5.36: E71T15-M21A8-CS1-H4
		AWS A5.36/SFA-5.36: E71T15-C1A6-CS1-H4
AWS A5.18 / SFA-5.18: E70C-6M-H4		

281645
44445
CU04190F
0140

Dimensione	Dimension	1,2 mm
Colata	Serial no.	926712
Quantità fornita	Quantity	1600,0 KG

Composizione chimica in % del deposito **Chemical composition in % of the weld metal**

C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu	Al	Nb			
0,08	0,68	1,23	0,006	0,012	0,02	< 0,01	0,02	< 0,01	0,08	< 0,1	< 0,01			

proprietà meccaniche **Mechanical properties** **EN 10204 - 2.2**

Prova di trazione Tensile test

T	ReL / Rp 0,2 MPa	Rp 1,0 MPa	Rm MPa	A (Lo = 5d) %	Z %	WBH PWHT	Note Remarks
20°C	≥ 460		550 - 660	≥ 20			

Prova di resilienza Impact test

T	Energia di impatto Impact energy KV / J	Medio Average KV / J	Espansione lat. Lateral expansion mm	Frattura cristalliina Shear fracture %	WBH PWHT	Note Remarks
-60°C	≥ 47					

Questo certificate é stato emesso con sistema automatizzato e non richiede firma
This certificate was issued by DP-equipment and does not require signature.

Centro / Town: Milano
Data / Date: 05.03.2021

Q.A. representative / Authorized representative
Zuin

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

BUREAU VERITAS
ITALY
WITNESSED NOTED REVIEWED
SURVEYOR G. FRACASSI
DATE

voestalpine
ONE STEP AHEAD.

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Number / Numero:	Page / Pagina:
01-20-05894	1 / 9

Date / Data: June 18, 2020

Customer / Cliente: COMMERCIALE TUBI ACCIAIO SPA	Customer's Order Item / Rifer. Ordine Cliente - I: AB00060/OA0000063	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: 1240573/001
Manufacture Process / Processo di fabbricazione: NORMALIZED / NORMALIZZATI	Product Type / Tipo di prodotto: See note nr.1 / Vedi nota nr.1		Surface / Superficie: BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH / GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE
Standard or Specification / Norme o specifica: See note nr.2 / Vedi nota nr.2		Steel Grade / Grado dell'Acciaio: STEEL GR 6 ASTM A 333 AND ASME SA 333 / ACC. GR 6 ASTM A 333 E ASME SA 333	Ends / Estremità: BEVELLED AS PER ASME B 16.25 / SMUSSATI SECONDO ASME B 16.25
Dimensions / Dimensioni: ø 8.625" O.D. x .500" W.T. / ø 219.10mm O.D. x 12.70mm W.T.	Schedule / Schedula: 80	Length / Lunghezza: 32.808 ft ÷ 38.714 ft / 10000 mm ÷ 11800 mm	Quantity / Quantità: 32Pcs/Pz; 1202'05" ft 52033,4 lb; 366.5 mt 23602 kg	Nominal Weight / Peso nominale: 43.44 lb/ft / 64.65 Kg/m

DELIVERY NOTES / AVVISI DI SPEDIZIONE

Delivery Notes / Avvisi di spedizione	
Job Number:	0031264534 / 000030
Shipping note:	0101975269 - 18/06/2020
Address:	VIALE LIDICE, 40

Delivery Notes / Avvisi di spedizione	
Town:	10095 GRUGLIASCO,
Country:	Italy

TENSILE TEST / PROVA DI TRAZIONE

Heat N° / Colata N°	Sample N° / Prova N°	Lot N° / Lotto N°	Specimen condition / Condizioni della provetta: Ls	Sc	Type / Tipo	Ori	Specimen dimensions / Dimensioni della provetta: Size / Dimensioni	Area / Area	Test temp / Temp. di prova	Y.S. OffSet 0.2% Min: 240.00 Max: --	Y.S. EUL 0.5% Min: 240.00 Max: --	U.T.S. Req. Min: 415.00 Max: --	Y.S./U.T.S Req. Max. 0.85	Elongation / Allungamento: Lo	Min.	Min.	Obt.
							mm	mm2	°C	MPa	MPa	MPa		cal.	mm	%	%
901679	Q8778/C	5	B	N	Ss	L	37.89 x 12.83	488.90	+20	309.00	307.00	444.00	0.70	2"	50.0	30.0%	46.5%
901679	Q8779	5	B	N	Ss	L	37.92 x 12.99	495.40	+20	308.00	303.00	445.00	0.69	2"	50.0	30.0%	46.5%
901679	Q8780/C	5	B	N	Ss	L	37.86 x 12.88	490.40	+20	320.00	318.00	446.00	0.72	2"	50.0	30.0%	46.5%

B: Body / Corpo
L: Longitudinal / Longitudinale
Lo: Initial length / Lunghezza iniziale
Ls: Location of sample / Ubicazione provetta
Max: Maximum / Massimo
Min: Minimum / Minimo
N: Normalized / Normalizzato
Obt: Obtained / Ottenuto
Ori: Orientation / Orientamento
Req. Max: Required maximum / Massimo richiesto
Req: Required / Richiesto
Sc: Specimen condition / Condizioni Provetta
Ss: Strip specimen / Rettangolare
U.T.S: Ultimate Tensile Strength / Rottura
Y.S: Yield Strength / Snervamento

WITNESSED / REVIEWED
BUREAU VERITAS ITALY
SURVEYOR
DATE

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

C.A.M.P.I. S.R.L. - Ferrara
Quality Control dept.
Witnessed ☐ Reviewed ☒
Date
Signature

CTA Group
This document is reproduced by a computerized system and is conform to the original
Customer : C.A.M.P.I. SRL
Kg 324
Heat No.: 901679
Mt 4,99
P.O. No.: PO: 20023.15-20024.14
Cia's job: LC0000327
Pz No.: 1
Item: 6
Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero: **01-20-05894** | Page / Pagina: **2 / 9**

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel.
+39 035 560 3827 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**	Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED / NORMALIZZATI**	Product Type / Tipo di prodotto: **See note nr.1 / Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH / GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2 / Vedi nota nr.2**		Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 / ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25 / SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. / ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80** / .	Length / Lunghezza: **32.808 ft ÷ 38.714 ft / 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** — **1202'05" ft** — **52033,4 lb** / **366.5 mt** — **23602 kg**	Nominal Weight / Peso nominale: **43.44 lb/ft / 64.65 Kg/m**

CHEMICAL COMPOSITION / COMPOSIZIONE CHIMICA

				Composition % / Composizione %																
				X 100									X 1000						X 10000		
				C	Mn	Si	Ni	Cr	Mo	Cu	Ce LF	F1	P	S	Al	Ti	Nb	V	N	B	Ca
			H Max	18	130	30	40	40	12	40	42	60	25	10	40	20	20	50	120	5	60
			Min	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heat N°	Sample N°	Lot N°	P Max	18	130	30	40	40	12	40	42	60	25	10	40	20	20	50	120	5	60
Colata N°	Prova N°	Lotto N°	Min	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
901679			H	9	104	21	17	16	7	15	33	38.8	14	4	27	2	1	5	75	1	15
901679	Q8778/C	5	P	9	105	21	17	16	7	15	33	38.9	14	4	27	2	1	6	85	1	15
901679	Q8779	5	P	9	104	20	17	16	7	15	33	38.8	14	3	27	2	1	5	75	1	15

Ce LF: C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15 — H: Heat / Colata — Min: Minimum / Minimo
F1: (Nb+V +Ti+Cr+Cu+Mo) — Max: Maximum / Massimo — P: Product / Prodotto

THROUGH WALL HARDNESS / DUREZZA ATTRAVERSO LO SPESSORE

Required values / Valori richiesti			Individuals / Individuali			Average / Media			Hardness type / Tipo de dureza: brinell		Formula applied / Formula Applicata								
			Min: --	Max: 200.0	Var: --	Min: --	Max: --	Var: --	Minimum martensite / martensite minima: (%): --										
Heat N°	Sample N°	Lot N°	Specimen condition			Quad.	Scale		OD				ID						
Colata N°	Prova N°	Lotto N°	Ls	Sc			Scala		1	2	Dist. (mm)	Avg.	1	2	Dist. (mm)	Avg.			
901679	Q8778/C	5	B	N		1	HBW		133.0	132.0	- 2.00	132.5	135.0	132.0	2	133.5			

Avg: Average / Media — ID: Internal Diameter / Diametro interno — N: Normalized / Normalizzato — Var: Variation / Variazione
B: Body / Corpo — Ls: Location of sample / Ubicazione provetta — OD: Outside Diameter / Diametro esterno

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group
This document is reproduced by a computerized system and is conform to the original
Customer : C.A.M.P.I. SRL
Kg 324
Mt 4,99
Pz No.: 1
P.O. No.: PO: 20023.15-20024.14
Heat No.: 901679
Cta's job: LC0000327
Date: 17/02/2021
Item: 6

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	3 / 9

Date / Data: June 18, 2020

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: COMMERCIALE TUBI ACCIAIO SPA	Customer's Order Item / Rifer. Ordine Cliente - I: AB00060/OA0000063	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: 1240573/001
Manufacture Process / Processo di fabbricazione: NORMALIZED / NORMALIZZATI	Product Type / Tipo di prodotto: See note nr.1 / Vedi nota nr.1		Surface / Superficie: BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH / GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE
Standard or Specification / Norme o specifica: See note nr.2 / Vedi nota nr.2		Steel Grade / Grado dell'Acciaio: STEEL GR 6 ASTM A 333 AND ASME SA 333 / ACC. GR 6 ASTM A 333 E ASME SA 333	Ends / Estremità: BEVELLED AS PER ASME B 16.25 / SMUSSATI SECONDO ASME B 16.25
Dimensions / Dimensioni: ø 8.625" O.D. x .500" W.T. / ø 219.10mm O.D. x 12.70mm W.T.	Schedule / Schedula: 80 .	Length / Lunghezza: 32.808 ft ÷ 38.714 ft / 10000 mm ÷ 11800 mm	Quantity / Quantità: 32Pcs/Pz; 1202'05" ft 52033,4 lb; 366.5 mt 23602 kg	Nominal Weight / Peso nominale: 43.44 lb/ft / 64.65 Kg/m

THROUGH WALL HARDNESS / DUREZZA ATTRAVERSO LO SPESSORE

Dist: Distance from outer diameter / Distanza dal diametro esterno
Max: Maximum / Massimo
Min: Minimum / Minimo
Quad: Quadrant / Quadrante
Sc: Specimen condition / Condizioni Provetta

IMPACT TEST / PROVA DI RESILIENZA

Type/Tipo: KCV | Orientation/Direzione: L | Unit / Unità: JOULE
Position/Posizione: | Temp: - 50 | Unit/Unità: °C | Ind.Min.Req: 32 | Req.Min.Avg: 41

Heat N° / Colata N°	Sample N° / Prova N°	Zone / Zona	Lot N° / Lotto N°	Ls	Sc	Size / Dimensioni mm	Results / Risultato 1	2	3	Avg.
901679	Q8778/C	outside	5	B	N	10 x 10.00	384.0	328.0	355.0	356.0

Avg: Average / Media
B: Body / Corpo
Ind. Min. Req: Individual Minimum Required / Minimo singolo richiesto
L: Longitudinal / Longitudinale
Ls: Location of sample / Ubicazione provetta
N: Normalized / Normalizzato
Req. Min. Avg: Required minimum average / Minima media richiesta
Sc: Specimen condition / Condizioni Provetta
Temp: Temperature / Temperatura

Type/Tipo: KCV | Orientation/Direzione: T | Unit / Unità: JOULE
Position/Posizione: | Temp: - 50 | Unit/Unità: °C | Ind.Min.Req: 21 | Req.Min.Avg: 27

Heat N° / Colata N°	Sample N° / Prova N°	Zone / Zona	Lot N° / Lotto N°	Ls	Sc	Size / Dimensioni mm	Results / Risultato 1	2	3	Avg.
901679	Q8778/C	outside	5	B	N	10 x 10.00	372.0	370.0	371.0	371.0

Avg: Average / Media
B: Body / Corpo
Ind. Min. Req: Individual Minimum Required / Minimo singolo richiesto
Ls: Location of sample / Ubicazione provetta
N: Normalized / Normalizzato
Req. Min. Avg: Required minimum average / Minima media richiesta
Sc: Specimen condition / Condizioni Provetta
T: Transversal / Trasversale
Temp: Temperature / Temperatura

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group
This document is reproduced by a computerized system and is conform to the original

Customer: C.A.M.P.I. SRL	Heat No.: 901679	Kg 324	Pz No.: 1
P.O. No.: PO: 20023.15-20024.14	Cia's job: LC0000327	Mt 4,99	Date: 17/02/2021
			Item: 6

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	4 / 9

Date / Data: June 18, 2020

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) - Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: COMMERCIALE TUBI ACCIAIO SPA	Customer's Order Item / Rifer. Ordine Cliente - I: AB00060/OA0000063	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: 1240573/001
Manufacture Process / Processo di fabbricazione: NORMALIZED / NORMALIZZATI	Product Type / Tipo di prodotto: See note nr.1 / Vedi nota nr.1		Surface / Superficie: BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH / GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE
Standard or Specification / Norme o specifica: See note nr.2 / Vedi nota nr.2		Steel Grade / Grado dell'Acciaio: STEEL GR 6 ASTM A 333 AND ASME SA 333 / ACC. GR 6 ASTM A 333 E ASME SA 333	Ends / Estremità: BEVELLED AS PER ASME B 16.25 / SMUSSATI SECONDO ASME B 16.25
Dimensions / Dimensioni: ø 8.625" O.D. x .500" W.T. / ø 219.10mm O.D. x 12.70mm W.T.	Schedule / Schedula: 80	Length / Lunghezza: 32.808 ft ÷ 38.714 ft / 10000 mm ÷ 11800 mm	Quantity / Quantità: 32Pcs/Pz; 1202'05" ft 52033,4 lb; 366.5 mt 23602 kg	Nominal Weight / Peso nominale: 43.44 lb/ft / 64.65 Kg/m

FLATTENING TEST / PROVA DI SCHIACCIAMENTO

Standard / Norma:

Heat N° / Colata N°	Lot N° / Lotto N°	Sample N° / Prova N°	Zone / Zona	Sc	Test Frequency / Frequenza prova	Result / Esito
901679	5	Q8775	E1	N	5% of the lot	Good /Buono
901679	5	Q8776/C	E1	N	5% of the lot	Good /Buono

Standard / Norma:

Heat N° / Colata N°	Lot N° / Lotto N°	Sample N° / Prova N°	Zone / Zona	Sc	Test Frequency / Frequenza prova	Result / Esito
901679	5	Q8777	E1	N	5% of the lot	Good /Buono

E1 / E2: Ends of Sampling / Estremità della provetta — N: Normalized / Normalizzato — Sc: Specimen condition / Condizioni Provetta

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR DATE G.F.C./CASS.

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer: C.A.M.P.I. SRL		Kg 324	Pz No.: 1
P.O. No.: PO: 20023.15-20024.14	Heat No.: 901679	Mt 4,99	
	Cta's job: LC0000327	Date: 17/02/2021	
	Item: 6		

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	5 / 9

Date / Data: June 18, 2020

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: COMMERCIALE TUBI ACCIAIO SPA		Customer's Order Item / Rifer. Ordine Cliente - Il: AB00060/OA0000063	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: 1240573/001
Manufacture Process / Processo di fabbricazione: NORMALIZED NORMALIZZATI		Product Type / Tipo di prodotto: See note nr.1 Vedi nota nr.1		Surface / Superficie: BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE
Standard or Specification / Norme o specifica: See note nr.2 Vedi nota nr.2			Steel Grade / Grado dell'Acciaio: STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333	Ends / Estremità: BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25
Dimensions / Dimensioni: ø 8.625" O.D. x .500" W.T. ø 219.10mm O.D. x 12.70mm W.T.	Schedule / Schedula: 80	Length / Lunghezza: 32.808 ft ÷ 38.714 ft 10000 mm ÷ 11800 mm	Quantity / Quantità: 32Pcs/Pz 1202'05" ft 52033,4 lb 366.5 mt 23602 kg	Nominal Weight / Peso nominale: 43.44 lb/ft 64.65 Kg/m

HYDROSTATIC TEST / PROVA IDRAULICA

Pressure / Pressione		Time / Tempo	Results / Risultato
Unit / Unità.	Value / Valore	Seconds / Secondi	
MPa	17	5	Satisfactory / Soddisfacente

SUPPLEMENTARY INFORMATION / INFORMAZIONI SUPPLEMENTARI

STANDARD EDITIONS EDIZIONI NORME	
Standard:ASTM A 333/333M Year:2018	Norma:ASTM A 333/333M Anno:2018
Standard:ASME SA333M Year:2019	Norma:ASME SA333M Anno:2019
Standard:NACE MR0175/ISO 15156 Year:2015	Norma:NACE MR0175/ISO 15156 Anno:2015
Standard:NACE MR0103/ISO 17945 Year:2015	Norma:NACE MR0103/ISO 17945 Anno:2015

PRODUCT DESCRIPTION NOTES NOTE DI DESCRIZIONE DEL PRODOTTO	
Note 1 is the full description of the 'Product type' SEAMLESS HOT FINISHED TUBES FOR LOW TEMPERATURE SERVICES (WITH SUPPLEMENTARY REQUIREMENTS)	La nota 1 è la descrizione completa del 'Tipo prodotto' TUBI S.S. DI QUALITA' FINITI A CALDO PER IMPIEGHI A BASSE TEMPERATURE (CON RICHIESTE SUPPLEMENTARI)
Note 2 is the full description of the 'Standard or specification' NORM ASTM A 333 M/ASME SA333M, MPD-02-PS-GS R.0, NACE MR0175/ISO 15156, MR0103, TEMPL. CTA-MPD-6 REV.1.4	La nota 2 è la descrizione completa delle 'Norme o specifiche' NORMA ASTM A 333 M/ASME SA333M, MPD-02-PS-GS R.0, NACE MR0175/ISO 15156, MR0103, TEMPL. CTA-MPD-6 REV.1.4

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green-colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

WITNESSED INSPECTION SURVEYOR DATE ITALY

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer : C.A.M.P.I. SRL		Kg 324		Pz No.: 1	
P.O. No.: PO: 20023.15-20024.14	Heat No.: 901679	Mt 4,99			
	Cta's job: LC0000327	Date: 17/02/2021			
	Item: 6				

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero: **01-20-05894** | Page / Pagina: **6 / 9**

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3937 fax

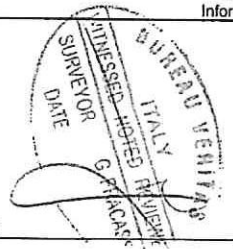
Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**		Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED NORMALIZZATI**		Product Type / Tipo di prodotto: **See note nr.1 Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2 Vedi nota nr.2**			Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80** .	Length / Lunghezza: **32,808 ft ÷ 38.714 ft 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** 1202'05" ft 52033,4 lb 366,5 mt 23602 kg	Nominal Weight / Peso nominale: **43.44 lb/ft 64.65 Kg/m**

SUPPLEMENTARY INFORMATION / INFORMAZIONI SUPPLEMENTARI

Supplementary Information	Informazioni supplementari
La Societe' DALMINE garantit que tous les produits, objet du Certificat susdit, respectent en leur totalite' les Specifications de l'Article 15 de l'Arrete Ministeriel du 24 mars 1978 modifiè: C max 0.25% P max 0.05% S max 0.05% Rm (N/mm2) max 700 A(Lo=5.65VSo) min 16% long Rm (A-2) min 10500 E max 0.9 A(Lo=5.65VSo) min 14% trans RA min 10500	La Societe' DALMINE garantit que tous les produits, objet du Certificat susdit, respectent en leur totalite' les Specifications de l'Article 15 de l'Arrete Ministeriel du 24 mars 1978 modifiè: C max 0.25% P max 0.05% S max 0.05% Rm (N/mm2) max 700 A(Lo=5.65VSo) min 16% long Rm (A-2) min 10500 E max 0.9 A(Lo=5.65VSo) min 14% trans RA min 10500

Supplementary Information	Informazioni supplementari
Country of melt ITALY Continuous casting and Fully killed	Paese di colaggio acciaio ITALIA Colaggio continuo ed acciaio di tipo calmato

Supplementary Information	Informazioni supplementari
DALMINE OPERATES A QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER NR. LRC 110950/QMS/U/EN/001,AND IT HAS UNDERGONE A SPECIFIC ASSESSMENT SUPPORTING THE REQUIREMENTS OF ANNEX 1 SECT 4.3 OF "PRESSURE EQUIPMENT DIRECTIVE (PED) 2014/68/EU". INSPECTION CERTIFICATE ISSUED IN AGREEMENT WITH T.U.V SUD INDUSTRIE SERVICE GmbH.QMS APPROVED ACCORDING TO ANNEX I PAR.4.3 OF PRESSURE EQUIPMENT DIRECTIVE 2014/68/EU BY NOTIFIED BODY 0036. CERTIFICATION no. DGR-0036-QS-W 200/2003/MUC. MATERIAL ACCORDING TO ASME II PART. D TAB. Y1 AFTER INSPECTION OPERATION, THE MATERIAL HAS NOT A RESIDUAL MAGNETISM	DALMINE OPERA CON UN QUALITY MANAGEMENT SYSTEM CERTIFICATO DAL LLOYD'S REGISTER NR. LRC 110950/QMS/U/EN/001 CHE SUPPORTA I REQUISITI DELL' ANNEX 1 SECT. 4.3 DEL "PRESSURE EQUIPMENT DIRECTIVE (PED) 2014/68/EU" ISPEZIONE. CERTIFICATO RILASCIATO IN ACCORDO CON TUV SUD INDUSTRIE SERVICE GmbH QMS, APPROVATO SECONDO L'ALLEGATO I PAR.4.3 DELLA DIRETTIVA APPARECCHIATURE DI PRESSIONE 2014/68 / UE PER L'ORGANISMO NOTIFICATO 0036.CERTIFICAZIONE n. DGR-0036-QS-W 200/2003 / MUC MATERIALE IN ACCORDO ALLA SPEC. ASME II PART. D TAB. Y1 DOPO LE OPERAZIONI DI CONTROLLO, IL MATERIALE NON PRESENTA UN MAGNETISMO RESIDUO SUPERIORE A 20 GAUSS



This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer : C.A.M.P.I. SRL

P.O. No.: PO: 20023.15-20024.14

Heat No.: 901679

Cta's job: LC0000327

Kg 324

Mt 4,99

Pz No.: 1

Item: 6

Date: 17/02/2021

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero: **01-20-05894** | Page / Pagina: **7 / 9**

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**		Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED NORMALIZZATI**		Product Type / Tipo di prodotto: **See note nr.1 Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2 Vedi nota nr.2**			Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schedula: **80 .**	Length / Lunghezza: **32.808 ft ÷ 38.714 ft 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** 1202'05" ft 52033,4 lb 366.5 mt 23602 kg	Nominal Weight / Peso nominale: **43.44 lb/ft 64.65 Kg/m**

SUPPLEMENTARY INFORMATION / INFORMAZIONI SUPPLEMENTARI

Supplementary Information	Informazioni supplementari
GREATER THAN 20 GAUSS	DUREZZA HRC 22 MAX, IN ACCORDO ALLA SPEC. NACE MR0175/ISO 15156
HARDNESS HRC 22 MAX, ACCORDING TO NACE MR0175/ISO 15156	DUREZZA HBW 200 MAX, IN ACCORDO ALLA SPEC. NACE MR0103/ISO 17945
HARDNESS HBW 200 MAX, ACCORDING TO NACE MR0103/ISO 17945	I TUBI SONO STATI SOTTOPOSTI AL CONTROLLO ELETTROMAGNETICO
ALL PIPES HAVE BEEN TESTED BY ELECTROMAGNETIC TEST	(LONG/TRASV INT/EST TARATURA 10%) IN ACCORDO
(LONG/TRANSV INT/EXT NOTCH 10%) ACCORDING TO SPEC.	ALLA SPEC. E 570 CON ESITO SODDISFACENTE
E 570, WITH SATISFACTORY RESULT	I TUBI SONO STATI NORMALIZZATI A 920°C PER 13 MIN. E RAFFREDDATI IN
ALL PIPES HAVE BEEN NORMALIZED AT 920°C FOR 13 MINS. AND COOLED IN	ARIA CALMA
STILL AIR	EMI SU TUTTA LA LUNGHEZZA
EMI FULL LENGTH	MATERIALE IN ACCORDO ALLA ASME B 36.10
MATERIAL ACCORDING TO ASME B 36.10	ACCIAIO TRTTATO AL CALCIO PER CONTROLLO MICROINCLUSIONI
STEEL IS CALCIUM TREATED FOR MICROINCLUSION SHAPE CONTROL	.
SEAMLESS HOT FINISHED PIPES	TUBI SENZA SALDATURA FINITI A CALDO
VISUAL AND DIMENSIONAL CONTROL HAS BEEN CARRIED OUT WITH SATISFACTORY RESULT	IL CONTROLLO VISIVO E DIMENSIONALE HA DATO ESITO SODDISFACENTE
STEEL IS FULLY KILLED AND PRODUCED BY ELECTRIC FURNACE TO A FINE GRAIN PRACTICE	L'ACCIAIO E' DI TIPO CALMATO, A GRANO FINE, PRODOTTO AL FORNO ELETTRICO
THE PRODUCT SUPPLIED IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE ORDER.	IL MATERIALE FORNITO E' IN ACCORDO AI REQUISITI DELL'ORDINE.
MANUFACTURED BY TENARIS DALMINE	FABBRICATO DA TENARIS DALMINE
NO WELD REPAIR, MERCURY AND RADIATION FREE	NON RIPARATO MEDIANTE SALDATURA, ESENTE DA MERCURIO E RADIAZIONI
AS PER STANDARD, PIPES CAN BE REPAIRED; MANUFACTURER SHOULD DECIDE TO GRIND THE	COME DA PROCEDURA STANDARD, I TUBI POSSONO ESSERE RIPARATI; IL COSTRUTTORE DOVREBBE
SURFACE OF THE PIPES WHEN, DURING FINAL VISUAL INSPECTION, SOME IMPERFECTIONS	PROCEDERE ALLA RETTIFICA DELLA LORO SUPERFICIE QUANDO DURANTE L'ISPEZIONE VISIVA
ARE DETECTED. THE RESULTED SURFACE AREAS, AFTER GRINDING, HAS DIFFERENT	FINALE VENGONO RILEVATE DELLE IMPERFEZIONI. DOPO LA RETTIFICA, LE AREE SUPERFICIALI
COLORATION COMPARED WITH USUAL ONE AS MANUFACTURED. THE RESIDUAL WALL THICKNESS	INTERESSATE PRESENTANO UNA COLORAZIONE DIVERSA RISPETTO A QUELLA ORIGINALE. LO
AFTER GRINDING HAS BEEN CHECKED RESULTING IN TOLERANCE WITH STANDARD.	SPESSORE RESIDUO DELLE PARETI RIENTRA NELLA SOGLIA DI TOLLERANZA.
Tenaris IT identification number for MTC: 58[9w5r4	Numero Identificativo Tenaris IT per MTC: 58[9w5r4

BUREAU VERITAS ITALY WITNESSED NOTED REVIEWED SURVEYOR DATE

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer : C.A.M.P.I. SRL

P.O. No.: PO: 20023.15-20024.14

Heat No.: 901679

Cta's job: LC0000327

Item: 6

Kg 324

Mt 4,99

Date: 17/02/2021

Pz No.: 1

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	8 / 9

Date / Data: June 18, 2020

Dalmine S.p.A. - Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) - Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente:	Customer's Order Item / Rifer. Ordine Cliente - I	Customer's Reference / Posizione Cliente:	Manufacturer's Works Order N° / Conferma-Posizione:
COMMERCIALE TUBI ACCIAIO SPA	AB00060/OA0000063	.	1240573/001

Manufacture Process / Processo di fabbricazione:	Product Type / Tipo di prodotto:	Surface / Superficie:
NORMALIZED NORMALIZZATI	See note nr.1 Vedi nota nr.1	BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE

Standard or Specification / Norme o specifica:	Steel Grade / Grado dell'Acciaio:	Ends / Estremità:
See note nr.2 Vedi nota nr.2	STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333	BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25

Dimensions / Dimensioni:	Schedule / Schedula:	Length / Lunghezza:	Quantity / Quantità: 32Pcs/Pz		Nominal Weight / Peso nominale:
ø 8.625" O.D. x .500" W.T.	80	32.808 ft ÷ 38.714 ft	1202'05" ft	52033,4 lb	43.44 lb/ft
ø 219.10mm O.D. x 12.70mm W.T.	.	10000 mm ÷ 11800 mm	366.5 mt	23602 kg	64.65 Kg/m

MARKING / MARCATURA

Marking
Marcatura

STENCILING
_T ASTM/ASME A/SA 333M 6 HOT FINISHED SEAMLESS 219,1 x 12,70 SCH. 80 LT-50C
HEAT: _COLATA MT _MT KG _KG NR. _NR

LEGEND
_T = TENARIS Logo
_COLATA = Heat Number
_MT = Pipe/Tube Length in meters
_KG = Pipe/Tube Weight in kilograms
_NR = Pipe/Tube identifier

PUNCHING
HEAT: _COLATA

LEGEND
_COLATA = Heat Number

VERNICIATURA
_T ASTM/ASME A/SA 333M 6 HOT FINISHED SEAMLESS 219,1 x 12,70 SCH. 80 LT-50C
HEAT: _COLATA MT _MT KG _KG NR. _NR

LEGENDA
_T = Logo TENARIS
_COLATA = Numero di colata
_MT = Lunghezza del tubo in metri
_KG = Peso del tubo in chilogrammi
_NR = Identificativo numerico del tubo

PUNZONATURA
HEAT: _COLATA

LEGENDA
_COLATA = Numero di colata

BUREAU VERITAS ITALY WITNESSED NOTIFIED REVIEW SURVEYOR DATE G. FACAS

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non. Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer:	Kg	324
C.A.M.P.I. SRL	Heat No.:	901679
P.O. No.:	Cta's job:	LC0000327
PO: 20023.15-20024.14	Date:	17/02/2021
Item: 6	Pz No.:	1
	Mt	4,99

Tenaris

INSPECTION CERTIFICATE
CERTIFICATO DI COLLAUDO
(UNI EN 10204 3.1 / ISO 10474 3.1)

Number / Numero:	Page / Pagina:
01-20-05894	9 / 9

Date / Data: **June 18, 2020**

Dalmine S.p.A. – Dalmine plant
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) – Italy
+39 035 560 111 tel
+39 035 560 3827 fax

Customer / Cliente: **COMMERCIALE TUBI ACCIAIO SPA**		Customer's Order Item / Rifer. Ordine Cliente - I: **AB00060/OA0000063**	Customer's Reference / Posizione Cliente: .	Manufacturer's Works Order N° / Conferma-Posizione: **1240573/001**
Manufacture Process / Processo di fabbricazione: **NORMALIZED NORMALIZZATI**		Product Type / Tipo di prodotto: **See note nr.1 Vedi nota nr.1**		Surface / Superficie: **BARE INSIDE, EXTERNALLY PROTECTED BY VARNISH GREZZI INTERNAMENTE, OLEATI ESTERNAMENTE**
Standard or Specification / Norme o specifica: **See note nr.2 Vedi nota nr.2**			Steel Grade / Grado dell'Acciaio: **STEEL GR 6 ASTM A 333 AND ASME SA 333 ACC. GR 6 ASTM A 333 E ASME SA 333**	Ends / Estremità: **BEVELLED AS PER ASME B 16.25 SMUSSATI SECONDO ASME B 16.25**
Dimensions / Dimensioni: **ø 8.625" O.D. x .500" W.T. ø 219.10mm O.D. x 12.70mm W.T.**	Schedule / Schecula: **80**	Length / Lunghezza: **32.808 ft ÷ 38.714 ft 10000 mm ÷ 11800 mm**	Quantity / Quantità: **32Pcs/Pz** **1202'05" ft** **52033,4 lb** **366.5 mt** **23602 kg**	Nominal Weight / Peso nominale: **43.44 lb/ft 64.65 Kg/m**

This is to certify that the product described here has been manufactured, sampled, tested, and inspected in accordance w purchaser order requirements. This certificate is not a declaration of origin nor may it be used as a declaration of origin.

Si certifica che il prodotto descritto è stato prodotto, provato, testato e controllato in conformità ai requisiti dell'ordine del cliente. Questo certificato non è una dichiarazione d'origine e non può essere usato come tale.

CUSTOMER THIRD PARTY	TENARIS QUALITY DEPARTMENT SIGNATURE	
INSPECTION COMPANY COMPAGNIA D'ISPEZIONE	QUALITY CERTIFICATION DEPT. UFFICIO CERTIFICAZIONE QUALITA' SIGOLI Gianluca	CHIEF OF QUALITY CERTIFICATION DEPT. RESPONSABILE DELL'UFFICIO CERTIFICAZIONE QUALITA' FERRARI Donigio

BUREAU VERITAS ITALY WITNESSED / NOTED REVIEWED SURVEYOR DATE G.FRUCASO

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Questo certificato è emesso da un sistema computerizzato ed è valido con firma elettronica. Il certificato originale riporta il marchio "Tenaris" in colore verde. Il possessore dell'originale, qualora rilasci copia, deve attestarne a suo nome la conformità all'originale, assumendosi ogni responsabilità per usi illeciti o non Qualunque alterazione e/o falsificazione sarà perseguita a norma di legge.

CTA Group

This document is reproduced by a computerized system and is conform to the original

Customer : C.A.M.P.I. SRL

Kg	Mt	Pz No.:
324	4,99	1

Heat No.:	Cta's job:	Date:
901679	LC0000327	17/02/2021

P.O. No.:	Item:
PO: 20023.15-20024.14	6

SECTION 5

Welders and welder operator qualification
Qualifiche saldatori e operatori

C.A.M.P.I. srl **Ferrara (Italy)**	**LIST OF QUALIFIED WELDERS AND WELDING OPERATORS, according to ASME IX** **Doc. WL24003-01 rev.2** ***Elenco saldatori ed operatori di saldatura qualificati, in accordo alle ASME IX***

Nome Saldatore *Welder's name*	**N. stampo** *Stamp no.*	**Processo** *Process*	*Mater.* *Material*	**Position** *Posizione*	*Certificate n°*	*Code* *Codice*			
BREVIGLIERI MICHELE	5	GTAW+SMAW	C.S	6G	05-02	ASME IX			
BREVIGLIERI MICHELE	5	GTAW+SMAW	C.S	6G	05-03	ASME IX			
BREVIGLIERI MICHELE	5	GTAW+SMAW	C.S	6G	05-04	ASME IX			
BREVIGLIERI MICHELE	5	SAW	C.S	1G	05-05	ASME IX			
BREVIGLIERI MICHELE	5	GMAW	C.S	2G	05-11	ASME IX			
BREVIGLIERI MICHELE	5	GMAW	C.S	3G	05-12	ASME IX			
BREVIGLIERI MICHELE	5	GTAW+GMAW	C.S	1G	14-074	ASME IX			
BREVIGLIERI MICHELE	5	121	CS	PA	QOS-ITA-23-00023	14732			
BREVIGLIERI MICHELE	5	141+138/135	CS	PA	QS-ITA-23-00435	9606-1			
BREVIGLIERI MICHELE	5	141+111	CS	H-L045	QS-ITA-24-03241	9606-1			
BREVIGLIERI MICHELE	5	138/135	CS	PA/PB	QS-ITA-24-03244	9606-1			

Project: BASE LOAD POWER HUB - Netherland - **Client:** Rostti Marino S.p.A.- **P.O.:** 1724000163 –**ITEM:** V-43001 **S.N.:** 24-003

Exhibit 7-4

Rev. 0 | | 2 | 3 | 4 | 5

C.A.M.P.I. srl Ferrara (Italy)	**TEST DI QUALIFICA SALDATORI** *welder performance qualification (WPQ)* (QW-301, Section IX, ASME Boiler and Pressure Vessel Code) **CERTIFICATE No. 05.02**

Welder's Name: Breviglieri Michele Clock number: Stamp no.: 5
Welding process(es) used GTAW + SMAW Type MANUAL
Identification of WPS followed by welder during welding of test coupon 78-04
Base material(s) welded SA 106 Gr B Thickness 10,97 mm
Filler metal specification (SFA) Class (QW-404) GTAW 5.28 – SMAW 5.1

Manual or Semiautomatic Variables for each Process (QW-350)	**Actual values**	**Range qualified**
Backing (metal, weld metal, welded from both sides, flux, etc.) (QW-402)	No	GTAW: yes or not SMAW: yes
Material specification - ASME P-No. 1 Gr 1 to ASME P-No. 1 Gr 1 (QW-403)	PN 1 – PN 1	PN 1 TO PN 11
( ) Plate (X) Pipe (enter diameter, if pipe) (QW-403)	NPS 6"	OD.2" 7/8 and over
Base material thickness Groove (mm) (QW 452.1)	10,97	< 21,94 mm
Fillet (mm)	_____	ALL
Filler metal (QW 404)		
- 1st process / 1st layer Fn° 6 SFA 5,28 AWS	ER80SG	Fn° 6
- 2nd process / 2nd layer Fn° 4 SFA 5,1 AWS	E7018.1	Fn° 1-2-3-4
Filler metal product form [solid/cored/flux-cored – GTAW/PAW (QW-404)]	SOLID	SOLID
With or without filler metal (QW404.14)	With	With
Consumbale insert for GTAW or PAW (QW-404)	NO	NO
Weld deposit thickness for each welding process (QW-404)	GTAW 2-SMAW 8,97	< 4 mm - < 17,94
Position (QW 405)	6G	ALL
Progression (uphill/downhill) (QW-405)	uphill	uphill
Torch gas type (QW 408)	ARGON 99,99%	Inert gas
Backing gas for GTAW, PAW or GMAW; fuel gas for OFW (QW-408)	NO	YES OR NOT
Electrical characteristics (QW 409):		
- GTAW welding current type / polarity	DC-SP	DC-SP
Transfer mode (GMAW) (QW-409)	/	/

Guided Bend Test Results

Guided Bend Tests Type < > QW-462.2 (Side) Results < > QW 462.3(A) (Trans. R&F) Type < > QW-462.3(b) (Long, R&F) Results

Visual examination results (QW-302.4): SATISFACTORY
Radiographic test results (QW-304 and QW-305): SATISFACTORY
(For alternative qualification of groove welds by radiography)
Fillet Weld – Fracture test _____ Length and percent of defects _____ in.
Macro test fusion _____ Fillet leg size _____ in. x _____ in. Concavity/convexity _____ in.
Welding test conducted by C.A.M.P.I. Srl
Mechanical tests conducted by _____ Laboratory test no. _____
We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

Organization _____ QUALITY CONTROL QC

Date: 31/01/2005 By _____

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I 44100 FERRARA

C.A.M.P.I. srl **Ferrara (Italy)**	**TEST DI QUALIFICA SALDATORI** *welder performance qualification (WPQ)* (QW-301, Section IX, ASME Boiler and Pressure Vessel Code) **CERTIFICATE No. 05.03**

Welder's Name: Breviglieri Michele Clock number: Stamp no.: 5
Welding process(es) used GTAW + SMAW Type MANUAL
Identification of WPS followed by welder during welding of test coupon 79-04A
Base material(s) welded SA 106 Gr B Thickness 3,73 mm
Filler metal specification (SFA) Class (QW-404) GTAW 5.28 – SMAW 5.1

Manual or Semiautomatic Variables for each Process (QW-350)	**Actual values**	**Range qualified**
Backing (metal, weld metal, welded from both sides, flux, etc.) (QW-402)	No	GTAW: yes or not SMAW: yes
Material specification - ASME P-No. 1 Gr 1 to ASME P-No. 1 Gr 1 (QW-403)	PN 1 – PN 1	PN 1 TO PN 11
⟨ ⟩ Plate ⟨X⟩ Pipe (enter diameter, if pipe) (QW-403)	NPS 1/2"	NPS≥ 1/2"OD 21.3
Base material thickness Groove (mm) (QW 452.1)	3,73	1,58 ÷ 7,46
Fillet (mm)	_____	ALL
Filler metal (QW 404)		
- 1st process / 1st layer Fn° 6 SFA 5,28 AWS	ER80SG	Fn° 6
- 2nd process / 2nd layer Fn° 4 SFA 5,1 AWS	E7018.1	Fn° 1-2-3-4
Filler metal product form [solid/cored/flux-cored – GTAW/PAW (QW-404)]	SOLID	SOLID
With or without filler metal (QW404.14)	With	With
Consumbale insert for GTAW or PAW (QW-404)	NO	NO
Weld deposit thickness for each welding process (QW-404)	GTAW 2-SMAW 2	< 4 mm - < 4 mm
Position (QW 405)	6G	ALL
Progression (uphill/downhill) (QW-405)	uphill	uphill
Torch gas type (QW 408)	ARGON 99,99%	Inert gas
Backing gas for GTAW, PAW or GMAW; fuel gas for OFW (QW-408)	NO	YES OR NOT
Electrical characteristics (QW 409):		
- GTAW welding current type / polarity	DC-SP	DC-SP
Transfer mode (GMAW) (QW-409)	/	/

Guided Bend Test Results

Guided Bend Tests Type < > QW-462.2 (Side) Results < > QW 462.3(A) (Trans. R&F) Type < > QW-462.3(b) (Long, R&F) Results

Visual examination results (QW-302.4): SATISFACTORY
Radiographic test results (QW-304 and QW-305): SATISFACTORY – SEE RT REPORT N. 981
(For alternative qualification of groove welds by radiography)
Fillet Weld – Fracture test _____ Length and percent of defects _____ in.
Macro test fusion _____ Fillet leg size _____ in. x _____ in. Concavity/convexity _____ in.
Welding test conducted by C.A.M.P.I. Srl
Mechanical tests conducted by _____ Laboratory test no. _____
We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

Organization _____
QUALITY CONTROL QC
Date: 31/01/2005 By _____

C.A.M.P.I. srl
Partita [illegible]580389
Via Diamantina, 15
I 44100 FERRARA

C.A.M.P.I. srl **Ferrara (Italy)**	**TEST DI QUALIFICA SALDATORI** *welder performance qualification (WPQ)* (QW-301, Section IX, ASME Boiler and Pressure Vessel Code) **CERTIFICATE No. 05.04**

Welder's Name: Breviglieri Michele Clock number: Stamp no.: 5
Welding process(es) used GTAW + SMAW Type MANUAL
Identification of WPS followed by welder during welding of test coupon 79-05
Base material(s) welded SA 106 Gr B Thickness 5,54 mm
Filler metal specification (SFA) Class (QW-404) GTAW 5.28 – SMAW 5.1

Manual or Semiautomatic Variables for each Process (QW-350)	**Actual values**	**Range qualified**
Backing (metal, weld metal, welded from both sides, flux, etc.) (QW-402)	No	GTAW: yes or not SMAW: yes
Material specification - ASME P-No. 1 Gr 1 to ASME P-No. 1 Gr 1 (QW-403)	PN 1 – PN 1	PN 1 TO PN 11
( ) Plate (X) Pipe (enter diameter, if pipe) (QW-403)	NPS 2"	OD 1" and over
Base material thickness Groove (mm) (QW 452.1)	5,54	< 11,08
Fillet (mm)	_____	ALL
Filler metal (QW 404)		
- 1st process / 1st layer Fn° 6 SFA 5,28 AWS	ER80SG	Fn° 6
- 2nd process / 2nd layer Fn° 4 SFA 5,1 AWS	E7018.1	Fn° 1-2-3-4
Filler metal product form [solid/cored/flux-cored – GTAW/PAW (QW-404)]	SOLID	SOLID
With or without filler metal (QW404.14)	With	With
Consumbale insert for GTAW or PAW (QW-404)	NO	NO
Weld deposit thickness for each welding process (QW-404)	GTAW 2-SMAW 3,54	< 4 mm - < 7,08
Position (QW 405)	6G	ALL
Progression (uphill/downhill) (QW-405)	uphill	uphill
Torch gas type (QW 408)	ARGON 99,99%	Inert gas
Backing gas for GTAW, PAW or GMAW; fuel gas for OFW (QW-408)	NO	YES OR NOT
Electrical characteristics (QW 409):		
- GTAW welding current type / polarity	DC-SP	DC-SP
Transfer mode (GMAW) (QW-409)	/	/

Guided Bend Test Results

Guided Bend Tests Type < > QW-462.2 (Side) Results < > QW 462.3(A) (Trans. R&F) Type < > QW-462.3(b) (Long, R&F) Results

Visual examination results (QW-302.4): SATISFACTORY
Radiographic test results (QW-304 and QW-305): SATISFACTORY – SEE RT REPORT N. 953
(For alternative qualification of groove welds by radiography)
Fillet Weld – Fracture test _____ Length and percent of defects _____ in.
Macro test fusion _____ Fillet leg size _____ in. x _____ in. Concavity/convexity _____ in.
Welding test conducted by C.A.M.P.I. Srl
Mechanical tests conducted by _____ Laboratory test no. _____
We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

Organization _____

Date: 31/01/2005 By _____

QUALITY CONTROL

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
44100 FERRARA

C.A.M.P.I. srl **Ferrara (Italy)**	***WELDING OPERATOR PERFORMANCE QUALIFICATION (WOPQ)*** (QW-301, Section IX, ASME Boiler and Pressure Vessel Code) **CERTIFICATE No.05.05**

Welding operator's Name BREVIGLIERI MICHELE Identification no . STAMP No 5

Test Description

Identification of WPS followed 260.01.A Test coupon ■ Production weld □

Specification of base metal(s) welded : SA 516Gr70 Thickness 14 mm

Base metal P or S-Number 1 to P or S-Number 1 Position (2G, 6G, 3F, etc.) 1G

Plate ■ Pipe □ (enter diameter if pipe or tube): /

Filler metal (SFA) specification 5.17 Filler metal or electrode classification F7A4EM12

Testing Conditions and Qualification Limits When Using Automatic Welding Equipment

Welding Variables (QW-361.1)	Actual values	Range qualified
Type of welding (Automatic)		
Welding process		
Filler metal (EBW or LBW)		
Type of laser for LBW (CO_2 to YAG, etc.)		
Continuous drive or inertia welding (FW)		
Vacuum or out of vacuum (EBW)		

Testing Conditions and Qualification Limits When Using Machine Welding Equipment

Welding Variables (QW-361.2)	Actual values	Range qualified
Type of welding (machine)	ESAB LAE 1250-A6 SFD1 / SGD1	All other similar machine
Welding process	SAW (Machine)	SAW (Machine)
Direct or remote visual control	Direct	Direct
Automatic arc voltage control (GTAW)	/	/
Automatic joint tracking	/	/
Position qualified (2G, 6G, 3F, etc.)	1G Rotated	1G-F
Consumable inserts (GTAW or PAW)	/	/
Backing (metal, weld metal, etc.)	Weld metal	With backing
Single or multiple passes per side	Mulipass	Mulipass / Single pass

RESULTS

Visual Examination of Completed Weld (QW-302.4) Satisfactory

□ Bend test; □ Transverse root and face [QW-462.3(a)]; □ Longitudinal root and face [QW-462.3(b)]; ■ Side (QW-462.2)

□ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; □ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];

□ Macro test for fusion [QW-462.5(b)]; □ Macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result
Side (QW-462.2)	No imperfections	Side (QW-462.2)	No imperfections		
Side (QW-462.2)	No imperfections	Side (QW-462.2)	No imperfections		

Alternative radiographic examination results (QW-191) X Ray 100% see certificate No:RT 1482 on MARCH.01,2011

Fillet Weld – Fracture test (QW-180) _____ Length and percent of defects _____

Macro examination (QW-184) / Fillet size (in.) ___ x ___ Concavity/convexity (in.) ___

Other tests _____

Film or specimen evaluated by Nicolli Tonino Company C.A.M.P.I. S.r.l.

Mechanical tests conducted by / Laboratory test no. _____

Welding supervised by C.A.M.P.I. S.r.l

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME BOILER AND PRESSURE VESSEL CODE

Organization C.A.M.P.I. srl

Partita IVA 01042580389
Via Diamantina, 15
I 44100 FERRARA

Date MARCH.01.2011 By _____

QUALITY CONTROL
QC

C.A.M.P.I. srl **Ferrara (Italy)**	**TEST DI QUALIFICA SALDATORI** ***WELDER PERFORMANCE QUALIFICATION (WPQ)*** (QW-301, Section IX, ASME Boiler and Pressure Vessel Code) **CERTIFICATE No.05.11**

Welder's Name BREVIGLIERI MICHELE Identification no . STAMP No 5

Test Description

Identification of WPS followed 364.01-2G Test coupon ■ Production weld □

Specification of base metal(s) welded :SA 516Gr70 Thickness 10 mm

Testing Conditions and Qualification Limits

Welding Variables (QW-350)	**Actual values**	**Range qualified**
Welding process(es)	GMAW	GMAW and FCAW
Type (ie;manual,semi-automatic)used	Semiautomatic	Semiautomatic
Backing (metal,weld metal,double-welded,etc.)	Welded from both side	With backing
■ Plate □ Pipe (enter diameter if pipe or tube)	Plate	Plate and pipe >2"7/8 in.(73mm)
Base metal P-or S-Number to P or S-Number	PN 1Gr2	PN1 to PN 15F,PN 34,41to49
Filler metal or electrode specification(s) (SFA)(info.only)	5.18	/
Filler metal or electrode classification(s) (info.only)	E71T-1MJH4	/
Filler metal F Number(s)	6	All FN6 filler metal
Consumable insert (GTAW or PAW)	/	/
Filler type (solid/metal or flux cored/powder)(GTAW or PAW)	/	/
Deposit thickness for each		/
Process 1 GMAW 3 layers minimum ■ Yes □ No	10 mm	20 mm max
Process 2 ____ 3 layers minimum □ Yes □ No	/	/
Position qualified (2G,6G,3F, etc.)	2G	Flat and Horizontal
Vertical progression (uphill or downhill)	/	/
Type of fuel gas (OFW)	/	/
Inert gas backing (GTAW,PAW,GMAW)	without	With or without
Transfer mode (sprey/globular or pulse to short circuit-GMAW)	Spray	Spray/Pulse/Globular
GTAW current type/polarity (AC,DCEP,DCEN)	DC/RP	DC/RP

RESULTS

Visual Examination of Completed Weld (QW-302.4) Satisfactory

□ Bend test; □ Transverse root and face [QW-462.3(a)]; □ Longitudinal root and face [QW-462.3(b)]; □ Side (QW-462.2)
□ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; □ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];
□ Macro test for fusion [QW-462.5(b)]; □ Macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result

Alternative radiographic examination results (QW-191) X Ray 100% satisfactory see certificate No:RT 05-364-01 ON June.13,2013

Fillet Weld – Fracture test (QW-180) _____ Length and percent of defects _____

Macro examination (QW-184) / Fillet size (in.) ___ x _____ Concavity/convexity (in.) ___

Other tests _____

Film or specimen evaluated by Nicolli Tonino Company C.A.M.P.I. S.r.l.

Mechanical tests conducted by / Laboratory test no. _____

Welding supervised by C.A.M.P.I. S.r.l

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME BOILER AND PRESSURE VESSEL CODE

Organization C.A.M.P.I. srl Partita IVA 01042560389 Via Diamantina, 15 I-44100 FERRARA

Date June.13,2013 By _____

QUALITY CONTROL QC

Exhibit 7-3A Rev. 1 2 3 4 5 6

C.A.M.P.I. srl Ferrara (Italy)	TEST DI QUALIFICA SALDATORI *WELDER PERFORMANCE QUALIFICATION (WPQ)* (QW-301, Section IX, ASME Boiler and Pressure Vessel Code) **CERTIFICATE No.05.12**

Welder's Name BREVIGLIERI MICHELE Identification no . STAMP No 5

Test Description

Identification of WPS followed 364.01-3G Test coupon ■ Production weld □

Specification of base metal(s) welded :SA 516Gr70 Thickness 10 mm

Testing Conditions and Qualification Limits

Welding Variables (QW-350)	**Actual values**	**Range qualified**
Welding process(es)	GMAW	GMAW and FCAW
Type (ie;manual,semi-automatic)used	Semiautomatic	Semiautomatic
Backing (metal,weld metal,double-welded,etc.)	Welded from both side	With backing
■ Plate □ Pipe (enter diameter if pipe or tube)	Plate	Plate and pipe >2"7/8 in.(73mm)
Base metal P-or S-Number to P or S-Number	PN 1Gr2	PN1 to PN 15F,PN 34,41to49
Filler metal or electrode specification(s) (SFA)(info.only)	5.18	/
Filler metal or electrode classification(s) (info.only)	E71T-1MJH4	/
Filler metal F Number(s)	6	All FN6 filler metal
Consumable insert (GTAW or PAW)	/	/
Filler type (solid/metal or flux cored/powder)(GTAW or PAW)	/	/
Deposit thickness for each		/
Process 1 GMAW 3 layers minimum ■ Yes □ No	10 mm	20 mm max
Process 2 ____ 3 layers minimum □ Yes □ No	/	/
Position qualified (2G,6G,3F, etc.)	3G	F/V(pl. & p. over 24in – F(p. ≤24in) –F,H,V,(Fillet)
Vertical progression (uphill or downhill)	Uphill	uphill
Type of fuel gas (OFW)	/	/
Inert gas backing (GTAW,PAW,GMAW)	without	With or without
Transfer mode (sprey/globular or pulse to short circuit-GMAW)	Spray	Spray/Pulse/Globular
GTAW current type/polarity (AC,DCEP,DCEN)	DC/RP	DC/RP

RESULTS

Visual Examination of Completed Weld (QW-302.4) Satisfactory

□ Bend test; □ Transverse root and face [QW-462.3(a)]; □ Longitudinal root and face [QW-462.3(b)]; □ Side (QW-462.2)
□ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; □ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];
□ Macro test for fusion [QW-462.5(b)]; □ Macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result

Alternative radiographic examination results (QW-191) X Ray 100% satisfactory see certificate No:RT 05-364-01 ON June.13,2013

Fillet Weld – Fracture test (QW-180) ____ Length and percent of defects ____

Macro examination (QW-184) / Fillet size (in.) ___ x ____ Concavity/convexity (in.) ___

Other tests ____

Film or specimen evaluated by Nicolli Tonino Company C.A.M.P.I. S.r.l.

Mechanical tests conducted by / Laboratory test no. ____

Welding supervised by C.A.M.P.I. S.r.l

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME BOILER AND PRESSURE VESSEL CODE

Organization ____

Date June.13,2013

By ____

C.A.M.P.I. srl
Partita IVA 01042560389
Via Diamantina, 15
44100 FERRARA

QUALITY CONTROL
QC

Exhibit 7-3A Rev. 1 2 3 4 5 6

SGS

WELDER PERFORMANCE QUALIFICATION (WPQ)

(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

WPQ 14-074

Company Name	**C.A.M.P.I. Srl** - Via Diamantina, 15 - 44122 Ferrara - ITALY				
Welder's name	**BREVIGLIERI MICHELE**	Clock number	--	Stamp No.	5
Identification of WPS followed by welder during welding of test coupon	P386-AS	Rev.	0	Date	13/11/2014

Welding process (es) used	a) GTAW	b) FCAW	c)		
Type (s)	a) Manual	b) Semiautomatic	c)		
Base material (s) welded	ASTM A106 Gr.B	Thickness (mm)	Ø 48,3 x 10,16 mm		

Manual or Semiautomatic Variables for Each Process (QW-350)	Actual Values	Range Qualified
Backing (metal,weld metal,welded from both sides,etc.) (QW-402)	a) Without backing b) With backing	a) With and Without backing b) With backing
ASME P-No. 1 Gr. 1 to ASME P-No.1 Gr. 1 (QW-403)	P-No 1 to P-No 1	P-No 1 through P-No 15F, P-No 34, P-No 41 through P-No 49, and unassigned metals of similar chemical composition of these metals
( ) Plate (X) Pipe (enter O.D., if pipe) (QW-403) (mm)	48,3	Plates and pipes 25,0 mm O.D. and over
Filler metal or electrode specification (s) (SFA) (info only)	a) 5.18 - b) 5.36	
Filler metal or electrode classification (s) (info only)	a) ER 70S-6 b) E70T15-M21A8-CS1-H4	
Filler metal F-No. (QW-404)	a) 6 - b) 6	a) All F-No.6 b) All F-No.6
Filler metal product form (solid/cored/flux-cored GTAW / PAW (QW-404)	Solid rod	Solid and metal cored rods
Consumable insert for GTAW or PAW (QW-404)	without	without
Weld deposit thickness for each welding process (QW-404) (mm)		
Process 1: 3 layers minimum ( ) yes (X) no	1,16	up to 2,32 mm
Process 2: 3 layers minimum ( ) yes (X) no	9,0	up to 18,0 mm
Welding position (1G,5G,etc.) (QW-405)	1G	F
Vertical progression (uphill/downhill) (QW-405)	N.A.	N.A.
Backing gas for GTAW, PAW or GMAW (QW-408)	with	with and without
Type of fuel gas for OFW (QW-408)	N.A.	N.A.
GMAW transfer mode (QW-409)	Pulsed Arc	Globular, Spray and Pulsed Arc
GTAW welding current type/polarity (QW-409) (AC, DCEP, DCEN)	DCEN	DCEN

Guided Bend Test Results

Guided Bend Tests Type	( ) QW-462.2 (Side) Results	(X) QW-462.3 (a) (Trans. R&F) Type	( ) QW-462.3 (b) (Long. R&F) Results
		2 at 180°: SATISFACTORY	

Visual examination results (QW-302.4)	SATISFACTORY	
Radiographic test results (QW-304 and QW-305)	SATISFACTORY	(For alternative qualification of groove welds by radiography)
Other tests --		

Fillet Weld – Fracture test	--			Length and percent of defects	--		mm
Macro test fusion	--	Fillet leg size	-- mm x -- mm		Concavity/convexity	--	mm
Welding test conducted by:	C.A.M.P.I. Srl - Via Diamantina, 15 - 44122 Ferrara - ITALY						
Mechanical test conducted by:	Sider Test Srl - Castel San Giovanni - PC (ITALY)			Laboratory test No. VT 171-14 - RT 2956/14 – PM 26728/14			

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code BPV (2013).

Date : 02.12.2014

Test supervised by

SGS Italia S.p.A.

C.A.M.P.I. srl
Partita IVA 01042580389
Via Diamantina, 15
I - 44122 FERRARA
(Stamp and signature)

C.A.M.P.I. srl **Ferrara (Italy)**	**WELDER'S LOG - 2024** ***Registrazione attività saldatore***	Welder/operator name - *Nome saldatore/operat.* BREVIGLIERI MICHELE Clock no./*Cartellino* 47 *Stamp / Punzone* 5

Process(es) *Processo/i*	Qualification *Qualifica n°*	Material(s) Materiale/i P. n. to P. n.		MONTHLY ACTIVITY REGISTRATION *Registrazione attività mensile* January *Gennaio*	February *Febbraio*	March *Marzo*	April *Aprile*	May *Maggio*	June *Giugno*	July *Luglio*	August *Agosto*	September *Settembre*	October *Ottobre*	November *Novembre*	December *Dicembre*
GTAW	05.02	1	1	**REF JOB:** 23-31		QUALITY CONTROL QC		**REF JOB:** 23-31 23-20		QUALITY CONTROL QC		**REF JOB:** 23-29 24-16		QUALITY CONTROL QC	
	05.03	8	8												
	05.04	1	1												
	05.06	34	34												
	05.07	34	34												
	05.10	34	34												
	05.15	1	1												
	14-073	8	8												
	14-074	1	1												
SMAW	05.02	1	1	**REF JOB:** 23-31		QUALITY CONTROL QC		**REF JOB:** 23-31 23-20		QUALITY CONTROL QC		**REF JOB:** 23-29 24-16		QUALITY CONTROL QC	
	05.03	8	8												
	05.04	1	1												
	05.09	1	1												
	05.15	1	1												
SAW	05.05	1	1	**REF JOB:** 23-31		QUALITY CONTROL QC		**REF JOB:** 23-29		QUALITY CONTROL QC		**REF JOB:** 23-29/24-16		QUALITY CONTROL QC	

C.A.M.P.I. srl Ferrara (Italy)	**WELDER'S LOG - 2024** ***Registrazione attività saldatore***	Welder/operator name - *Nome saldatore/operat.* BREVIGLIERI MICHELE Clock no./*Cartellino* 47 *Stamp / Punzone* 5

FCAW / GMAW/ GMAWS	05.01	1	1	**REF JOB:** E3031 E3035 QUALITY CONTROL QC	**REF JOB:** E3020 QUALITY CONTROL QC	**REF JOB:** E3029 E4016 QUALITY CONTROL QC
	05.08 X)	34	34			
	05.09	1	1			
	05.10 X)	34	34			
	05.11	1	1			
	05.12	1	1			
	14-073	8	8			
	14-074	1	1			

REMARKS / *Note:* **1):** The Shop Foreman keeps the QCM informed of the monthly activity of each qualified welder / *Il capo officina informa il QCM dell'attività mensile di ogni saldatore qualificato*

2): X): Welder has not welded with a specific process during a period of six (6) months or more, his qualification for that process shall expire. / *Il saldatore che non ha effettuato saldature con lo specifico procedimento per un periodo superiore a 6 mesi , questa qualifica dovrà essere eliminata*

Welding Engineer *Responsabile saldatura*												
Date / *Data*				30/04/24				29/08/24				18/12/24

EXHIBIT 7-5 Rev. 3

C.A.M.P.I. srl **Ferrara (Italy)**	**WELDER'S LOG - 2023** ***Registrazione attività saldatore***	Welder/operator name - *Nome saldatore/operat.* BREVIGLIERI MICHELE Clock no./*Cartellino* 47 *Stamp / Punzone* 5

Process(es) *Processo/i*	Qualification *Qualifica n°*	Material(s) Materiale/i P. n. to P. n.		MONTHLY ACTIVITY REGISTRATION *Registrazione attività mensile* January *Gennaio*	February *Febbraio*	March *Marzo*	April *Aprile*	May *Maggio*	June *Giugno*	July *Luglio*	August *Agosto*	September *Settembre*	October *Ottobre*	November *Novembre*	December *Dicembre*
GTAW	05.02	1	1	**REF JOB:** 23012 23021 QUALITY CONTROL QC				**REF JOB:** 17029 23028 23021 QUALITY CONTROL QC				**REF JOB:** 23026 23030 QUALITY CONTROL QC			
	05.03	8	8												
	05.04	1	1												
	05.06	34	34												
	05.07	34	34												
	05.10	34	34												
	05.15	1	1												
	14-073	8	8												
	14-074	1	1												
SMAW	05.02	1	1	**REF JOB:** 23012 23021 QUALITY CONTROL QC				**REF JOB:** 17029 23028 23021 QUALITY CONTROL QC				**REF JOB:** 23026 23030 QUALITY CONTROL QC			
	05.03	8	8												
	05.04	1	1												
	05.09	1	1												
	05.15	1	1												
SAW	05.05	1	1	**REF JOB:** 23012/23021 QUALITY CONTROL QC				**REF JOB:** 23003/23028/23021 QUALITY CONTROL QC				**REF JOB:** 23026/23030 QUALITY CONTROL QC			

C.A.M.P.I. srl Ferrara (Italy)	**WELDER'S LOG - 2023** ***Registrazione attività saldatore***	Welder/operator name - *Nome saldatore/operat.* BREVIGLIERI MICHELE Clock no./*Cartellino* 47 *Stamp / Punzone* 5

FCAW / GMAW/ GMAWS	05.01	1	1	**REF JOB:** 22412 23021 QUALITY CONTROL QC	**REF JOB:** 22023 22428 QUALITY CONTROL QC	**REF JOB:** 23030 23021 QUALITY CONTROL QC
	05.08 X)	34	34			
	05.09	1	1			
	05.10 X)	34	34			
	05.11	1	1			
	05.12	1	1			
	14-073	8	8			
	14-074	1	1			

REMARKS / *Note:* **1):** The Shop Foreman keeps the QCM informed of the monthly activity of each qualified welder / *Il capo officina informa il QCM dell'attività mensile di ogni saldatore qualificato*

2): X): Welder has not welded with a specific process during a period of six (6) months or more, his qualification for that process shall expire. / *Il saldatore che non ha effettuato saldature con lo specifico procedimento per un periodo superiore a 6 mesi , questa qualifica dovrà essere eliminata*

Welding Engineer *Responsabile saldatura*												
Date / *Data*				20/04/23				31/08/23				22/12/23

EXHIBIT 7-5 Rev. 3

C.A.M.P.I. srl **Ferrara (Italy)**	**WELDER'S LOG - 2022** ***Registrazione attività saldatore***	Welder/operator name - *Nome saldatore/operat.* BREVIGLIERI MICHELE Clock no./*Cartellino* 47 *Stamp / Punzone* 5

Process(es) *Processo/i*	Qualification *Qualifica n°*	Material(s) Materiale/i		MONTHLY ACTIVITY REGISTRATION *Registrazione attività mensile*											
		P. n. to	P. n.	January *Gennaio*	February *Febbraio*	March *Marzo*	April *Aprile*	May *Maggio*	June *Giugno*	July *Luglio*	August *Agosto*	September *Settembre*	October *Ottobre*	November *Novembre*	December *Dicembre*
GTAW +05.15	05.02	1	1	**REF JOB:** 21004 21013 QUALITY CONTROL QC				**REF JOB:** 21004 21013 21020 QUALITY CONTROL QC				**REF JOB:** 22010 22012 QUALITY CONTROL QC			
	05.03	8	8												
	05.04	1	1												
	05.06	34	34												
	05.07	34	34												
	05.10	34	34												
	14-073	8	8												
	14-074	1	1												
SMAW +05.15	05.02	1	1	**REF JOB:** 21004 QUALITY CONTROL QC				**REF JOB:** 21020 21013 QUALITY CONTROL QC				**REF JOB:** 22010 22012 QUALITY CONTROL QC			
	05.03	8	8												
	05.04	1	1												
	05.09	1	1												
SAW	05.05	1	1	**REF JOB:** 21004 21013 QUALITY CONTROL QC				**REF JOB:** 21013 QUALITY CONTROL QC				**REF JOB:** 22010 22012 QUALITY CONTROL QC			

C.A.M.P.I. srl Ferrara (Italy)	**WELDER'S LOG - 2022** ***Registrazione attività saldatore***	Welder/operator name - *Nome saldatore/operat.* BREVIGLIERI MICHELE Clock no./*Cartellino* 47 *Stamp / Punzone* 5

FCAW / GMAW/ GMAWS	05.01	1	1	**REF JOB:** QUALITY CONTROL QC 21027	**REF JOB:** QUALITY CONTROL QC 21020 21023	**REF JOB:** QUALITY CONTROL QC 22010 22012
	05.08 X)	34	34			
	05.09	1	1			
	05.10 X)	34	34			
	05.11	1	1			
	05.12	1	1			
	14-073	8	8			
	14-074	1	1			

REMARKS / *Note:* **1):** The Shop Foreman keeps the QCM informed of the monthly activity of each qualified welder / *Il capo officina informa il QCM dell'attività mensile di ogni saldatore qualificato*

2): X):Welder has not welded with a specific process during a period of six (6) months or more, his qualification for that process shall expire. / *Il saldatore che non ha effettuato saldatore con lo specifico procedimento per un periodo superiore a 6 mesi , questa qualifica dovrà essere eliminata*

Welding Engineer *Responsabile saldatura*												
Date / *Data*				27/04/22				30/8/22				23/12/22

EXHIBIT 7-5 Rev. 3

BUREAU VERITAS

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 009B
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC mutual Recognition Agreements

Area : ITALY
Region :
Certificato No. : QOS-ITA-23-00023-rev.0
Certificate No. :
Rif. Interno : 22.SF.4931880.138
Internal No. : P13007/23/PM/pm
Notified Body Yes

1. CERTIFICATO DI QUALIFICA DELL'OPERATORE IN ACCORDO CON UNI EN ISO 14732:2013

(APPROVAL TEST CERTIFICATE FOR WELDING OPERATOR IN ACCORDANCE WITH UNI EN ISO 14732:2013)

1a Riconduzione del certificato N° *(Renewal of certificate N°):*

2. N° riferimento WPS *(WPS reference No):* **WPS 397-01A** Rev. **0**

3. Nome e Cognome del Saldatore *(Welder's name):* **Michele Breviglieri**
4. Data e luogo di nascita *(Date and Place of birth):* **09/12/1977 - Ferrara - FE - ITALY**
4a. Identificazione *(Identification):* **5** 4.b. Met. di identif. *(Ident. Method):* **STAMP**
5. Datore di lavoro *(Manufacturer):* **C.a.m.p.i. S.r.l. - Via Diamantina 15, 44123 Ferrara (FE)**
6. Conoscenze tecniche / *Job Knowledge* : Accettabile *(Acceptable)* ☐ Non verificato *(Not tested)* ☑

7. Variabili *(Variables)*	48. Dettagli della prova pratica *(Test piece details)*	49. Campo di validità della qualifica *(Range of qualification)*
8. Procedimento(i) saldatura *(Welding process (es))*	121	121
9. Impianto di saldatura *(Welding unit)*	Esab	Same equipment
10. Attrezzatura di saldatura *(Welding equipment)*	MPM4X4 LAE 1250	
11. *Variabili per saldatura meccanizzata (Details for mechanized welding)*		
12. Controllo visivo diretto o indiretto *(Visual control direct or remote)*		
13. Controllo aut. della lunghezza d'arco *(Automatic arc lenght control)*		
14. Controllo Automatico del giunto *(Automatic Joint tracking)*		
15. Posizione di saldatura *(Welding position)*		
16. Passata singola / multi passata *(Single run/ multi run)*		
17. Materiale di supporto *(Material backing)*		
18. Inserto Consumabile *(Consumable insert)*		
19. *Variabili per saldatura automatica (Details for automatic welding)*		
20. Tastatore *(Joint sensor)*	Without	With or without
21. Sensore di controllo dell'arco *(Arc sensor control)*	Without	With or without
22. Passata singola o multi passata *(Single run or multi run)*	Multi	Single and multi
23. Tipo dell'impianto di saldatura *(Type of welding unit)*	Esab MPM4X4 LAE 1250	Same equipment

24. Metodo di qualificazione / The qualification is based on :

25. (4.1a) WPQR in accordo con le parti rilevanti della EN ISO 15614 /Welding procedure test in accordance with the relevant part of EN ISO 15614 ☐
26. (4.1b) Prove di saldatura di pre-produzione o produzione in accordo con EN ISO 15613 / Pre or production welding test in accordance with EN ISO 15613 ☐
27. (4.1c) Prove di saldatura in accordo con le parti rilevanti della EN ISO 9606 / Test piece in accordance with the relevant part of EN ISO 9606 ☐
28. (4.1d) Campionatura di produzione o saggio di produzione / Production test or production test sample ☑

29. Tipo di prova *(Type of test)*	30. Effettuato ed accettabile *(Performed and acceptable)*	31. Non verificato *(Not verified)*
33. Esame visivo *(Visual test)*	☑	☐
34. Radiografia *(Radiographic Examination)*	☑	☐
35. Ultrasuoni *(Ultrasonic Examination)*	☐	☑
36. Frattura *(Fracture test)*	☐	☑
37. Prova di piega *(Bend test)*	☐	☑
38. Macrografia *(Macrographic examination)*	☐	☑
39. Magnetoscopico *(Magn.part. examination)*	☐	☑
40. Altre prove *(Other tests)*	☐	☑

32. Prolungamento della qualifica da parte del datore di lavoro o del supervisore per i successivi 6 mesi
(Prolongation for approval by employer/supervisor for the following 6 months)

41. Data *(Date)*	42. Firma *(Signature)*	43. Posizione *(Position)*
30/05/23		WELDING COORDINATOR
30/11/23		" "
29/05/24		" "

Correlazione fra i parametri ed il risultato finale / ***Correlation between parameter deviations and welding results*** ☐
Messa a punto dei parametri in accordo alla WPS / ***Control parameters setting at the welding unit according to WPS*** ☑
Prova di funzionalità dell'impianto in accordo alla WPS / ***Test the operational items of the welding unit according to WPS*** ☐
Individuazione malfunzionamenti influenzanti la saldatura / ***Welding unit malfunction report influencing the weld*** ☐

45. Nome dell'ispettore *(Examiner name)*	Paolo Milzoni
46. Data inizio validità *(Start of qualification) :*	30/11/2022
47. Validità della qualificazione: fino a (data): *(Welding performance qualification valid until)*	29/11/2028

42. Firma *(Signature)* Approver	41. Data *(Date)*	Timbro *(Stamp)*
	09/01/2023	

BUREAU VERITAS ITALIA Notified Body no. 1370

v1.0.188

BUREAU VERITAS

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 0098
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC mutual Recognition Agreements

Area : **ITALY**
Region :
Certificato No. : **QS-ITA-23-00435-rev.0**
Certificate No. :
Rif. Interno : **22.SF.4931880.138**
Internal No. : **P13006/23/PM/pm**
Notified Body **Yes**

1. CERTIFICATO DI QUALIFICA SALDATORE IN ACCORDO A UNI EN ISO 9606-1:2017

(WELDER QUALIFICATION TEST CERTIFICATE IN ACCORDANCE WITH UNI EN ISO 9606-1:2017)

1a Riconduzione del certificato N° *(Renewal of certificate N°):*

2. DESIGNAZIONE(I): **A) ISO 9606-1, 141, T, BW, FM1, S, s2, D88.9, PA, ss nb**
B) ISO 9606-1, 138, T, BW, FM1, M, s13.24, D88.9, PA, ss mb

3. N° riferimento WPS *(WPS reference No):* **WPS 353-01A** Rev. **0**

4. Nome e Cognome del Saldatore *(Welder's name):* **Michele Breviglieri**
5. Data e luogo di nascita *(Date and Place of birth):* **09/12/1977 - Ferrara - FE - ITALY**
4a. Identificazione *(Identification):* **5** 5a. Met. di identif. *(Ident. Method):* **STAMP**
6. Datore di lavoro *(Manufacturer):* **C.a.m.p.i. S.r.l. - Via Diamantina 15, 44123 Ferrara (FE)**
7. Saggio d'angolo supplementare *(Supplementary fillet weld test):* Si *(Yes)* ☐ No *(No)* ☑
8. Conoscenze tecniche / *Job Knowledge*: Accettabile *(Acceptable)* ☐ Non verificato *(Not tested)* ☑

9. Variabili *(Variables)*	42. Dettagli della prova pratica *(Test piece details)*	43. Campo di validità della qualifica *(Range of qualification)*
10. Procedimento(i) saldatura *(Welding process (es))*	A) 141 B) 138	A) 141, 142, 143 and 145 B) 138, 135
11. Modalità di trasferimento *(Transfer mode)*	B) S	B) G, S, P
12. Lamiera o tubo *(Plate or pipe)*	T	T, P
13. Tipo di saldatura *(Type of weld)*	BW	BW, BC >= 60°
14. Particolari di saldatura *(Weld details)*	A) ss nb B) ss mb	A) ss gb, ss nb, ss mb, bs, ss fb B) ss mb, bs
15. Multistrato o strato singolo *(Multilayer -singlelayer)*		
16. Gruppo *(Parent material group(s))*	1	1 to 11 (1 without FM)
17. Gruppo del Metallo d'apporto *(Filler material group(s))*	A) FM1 B) FM1	A) FM1, FM2 B) FM1, FM2
18. Tipo del Metallo(i) d'apporto *(Filler material types)*	A) S B) M	A) S, M, nm B) S, M
19. Tipo di gas *(Shielding gas)* EN ISO 14175	A) I1 B) M21	A) Appropriated shielding gas protection B) Appropriated shielding gas protection
20. Materiali ausiliari *(Auxiliaries)*		
21. Tipo di corrente e polarità *(Type of current and polarity)*	A) DC EN B) DC EN	
22. Dimensioni *(Dimensions) :*		
23. Spessore(i) materiale *(Material thickness)*	15,24	
24. Spessore *(Deposited thickness metal A)*	A) 2,00	A) 2 to 4
25. Spessore *(Deposited thickness metal B)*	B) 13,24	B) >= 3
26. Ø esterno tubo *(Outside pipe Ø)*	88,90	>= 44,45
27. Posizione saldatura *(Welding position)*	PA	P BW: FLAT P FW: T BW: FLAT T FW: Branch:FLAT

28. Tipo di prova *(Type of test)*	29. Effettuato ed accettabile *(Performed and acceptable)*	30. Non verificato *(Not verified)*
32. Esame visivo *(Visual test)*	☑	☐
33. Radiografia *(Radiographic Examination)*	☑	☐
34. Ultrasuoni *(Ultrasonic Examination)*	☐	☑
35. Frattura *(Fracture test)*	☐	☑
36. Prova di piega *(Bend test)*	☑	☐
37. Macrografia *(Macrographic examination)*	☐	☑
38. Prove complement. FW sup. *(Addit.tests)*	☐	☑

31. Prolungamento della qualifica da parte del datore di lavoro o del supervisore per i successivi 6 mesi
(Prolongation for approval by employer/supervisor for the following 6 months)

44. Data *(Date)*	45. Firma *(Signature)*	46. Posizione *(Position)*
30/05/23		WELDER GRADUATER
30/11/23		4 1
29/05/24		4 4

39. Nome dell'ispettore *(Examiner name)*	Paolo Milzoni
40. Data inizio validità *(Start of qualification) :*	30/11/2022
41. Validità della qualificazione: fino a (data): *(Welding performance qualification valid until)*	29/11/2025

45. Firma *(Signature) Approver*	44. Data *(Date)*	46. Timbro *(Stamp)*
	09/01/2023	BUREAU VERITAS ITALIA Notified Body no. 1370

v1.2.215

BUREAU VERITAS

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N°0076

Area : ITALY
Region :
Certificato No. : QS-ITA-24-03241-rev.0
Certificate No. :
Rif. Interno : 23.SF.7028064.138
Internal No. : P16167/24/GF/gf
Notified Body Yes

1. CERTIFICATO DI QUALIFICA SALDATORE IN ACCORDO A UNI EN ISO 9606-1:2017

(WELDER QUALIFICATION TEST CERTIFICATE IN ACCORDANCE WITH UNI EN ISO 9606-1:2017)

1a Riconduzione del certificato N° *(Renewal of certificate N°):*

2. DESIGNAZIONE(I): **A) ISO 9606-1, 141, T, BW, FM1, S, s2, D60.3, H-L045, ss nb**
B) ISO 9606-1, 111, T, BW, FM1, B, s6.74, D60.3, H-L045, ss mb

3. N° riferimento WPS *(WPS reference No):* **383-01A** Rev. **0**

4. Nome e Cognome del Saldatore *(Welder's name):* **Michele Breviglieri**
5. Data e luogo di nascita *(Date and Place of birth):* **09/12/1977 - Ferrara - FE - ITALY**
4a. Identificazione *(Identification):* **S5** 5a. Met. di identif. *(Ident. Method):* **STAMP**
6. Datore di lavoro *(Manufacturer):* **C.A.M.P.I. Srl - Via Diamantina 15 - FERRARA - ITALY**

7. Saggio d'angolo supplementare *(Supplementary fillet weld test)*: Si *(Yes)* ☐ No *(No)* ☑
8. Conoscenze tecniche / *Job Knowledge*: Accettabile *(Acceptable)* ☐ Non verificato *(Not tested)* ☑

9. Variabili *(Variables)*	42. Dettagli della prova pratica *(Test piece details)*	43. Campo di validità della qualifica *(Range of qualification)*
10. Procedimento(i) saldatura *(Welding process (es))*	A) 141 B) 111	A) 141, 142, 143 and 145 B) 111
11. Modalità di trasferimento *(Transfer mode)*		
12. Lamiera o tubo *(Plate or pipe)*	T	T, P
13. Tipo di saldatura *(Type of weld)*	BW	BW, BC >= 60°
14. Particolari di saldatura *(Weld details)*	A) ss nb B) ss mb	A) ss gb, ss nb, ss mb, bs, ss fb B) ss mb, bs
15. Multistrato o strato singolo *(Multilayer –singlelayer)*		
16. Gruppo *(Parent material group(s))*	11	1 to 11 (11 without FM)
17. Gruppo del Metallo d'apporto *(Filler material group(s))*	A) FM1 B) FM1	A) FM1, FM2 B) FM1, FM2
18. Tipo del Metallo(i) d'apporto *(Filler material types)*	A) S B) B	A) S, M, nm B) A, RA, RB, RC, RR, R, B
19. Tipo di gas *(Shielding gas)* EN ISO 14175	A) I1	A) Appropriated shielding gas protection
20. Materiali ausiliari *(Auxiliaries)*	A) NO B) NO	
21. Tipo di corrente e polarità *(Type of current and polarity)*	A) DC EN B) DC EP	
22. Dimensioni *(Dimensions) :*		
23. Spessore(i) materiale *(Material thickness)*	8,74	
24. Spessore *(Deposited thickness metal A)*	A) 2,00	A) 2 to 4
25. Spessore *(Deposited thickness metal B)*	B) 6,74	B) 3 to 13,48
26. Ø esterno tubo *(Outside pipe Ø)*	60,30	>= 30,15
27. Posizione saldatura *(Welding position)*	H-L045	P BW: ALL, EXCEPT VERTICAL DOWN P FW: T BW: ALL, EXCEPT VERTICAL DOWN T FW: Branch:ALL, EXCEPT VERTICAL DOWN

28. Tipo di prova *(Type of test)*	29. Effettuato ed accettabile *(Performed and acceptable)*	30. Non verificato *(Not verified)*
32. Esame visivo *(Visual test)*	☑	☐
33. Radiografia *(Radiographic Examination)*	☑	☐
34. Ultrasuoni *(Ultrasonic Examination)*	☐	☑
35. Frattura *(Fracture test)*	☐	☑
36. Prova di piega *(Bend test)*	☐	☑
37. Macrografia *(Macrographic examination)*	☐	☑
38. Prove complement. FW sup. *(Addit.tests)*	☐	☑

31. Prolungamento della qualifica da parte del datore di lavoro o del supervisore per i successivi 6 mesi
(Prolongation for approval by employer/supervisor for the following 6 months)

44. Data *(Date)*	45. Firma *(Signature)*	46. Posizione *(Position)*
03/04/2024		WELDING COORDINATOR
04/10/2024		" "

39. Nome dell'ispettore *(Examiner name)*	Gabriele Fracassi
40. Data inizio validità *(Start of qualification) :*	06/10/2023
41. Validità della qualificazione: fino a (data): *(Welding performance qualification valid until)*	05/10/2026

45. Firma *(Signature)* Approver	44. Data *(Date)*	46. Timbro *(Stamp)*
	29/04/2024	BUREAU VERITAS ITALIA Notified Body no. 1370

v1.2.215

BUREAU VERITAS

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N°0076

Area : ITALY
Region :
Certificato No. : QS-ITA-24-03244-rev.0
Certificate No. :
Rif. Interno : 23.SF.7028064.138
Internal No. : P16170/24/GF/gf
Notified Body Yes

1. CERTIFICATO DI QUALIFICA SALDATORE IN ACCORDO A UNI EN ISO 9606-1:2017

(WELDER QUALIFICATION TEST CERTIFICATE IN ACCORDANCE WITH UNI EN ISO 9606-1:2017)

1a Riconduzione del certificato N° *(Renewal of certificate N°):*

2. DESIGNAZIONE(I): **A) ISO 9606-1, 138, P, FW, FM1, M, t13, PB, ml**

3. N° riferimento WPS *(WPS reference No):* **398-01A** Rev. **0**

4. Nome e Cognome del Saldatore *(Welder's name):* **Michele Breviglieri**
5. Data e luogo di nascita *(Date and Place of birth):* **09/12/1977 - Ferrara - FE - ITALY**
4a. Identificazione *(Identification):* **S5** 5a. Met. di identif. *(Ident. Method):* **STAMP**
6. Datore di lavoro *(Manufacturer):* **C.A.M.P.I. Srl - Via Diamantina 15 - FERRARA - ITALY**

7. Saggio d'angolo supplementare *(Supplementary fillet weld test)*: Si *(Yes)* ☐ No *(No)* ☑
8. Conoscenze tecniche / *Job Knowledge*: Accettabile *(Acceptable)* ☐ Non verificato *(Not tested)* ☑

9. Variabili *(Variables)*	42. Dettagli della prova pratica *(Test piece details)*	43. Campo di validità della qualifica *(Range of qualification)*
10. Procedimento(i) saldatura *(Welding process (es))*	A) 138	A) 138, 135
11. Modalità di trasferimento *(Transfer mode)*	A) P	A) G, S, P
12. Lamiera o tubo *(Plate or pipe)*	P	T, P
13. Tipo di saldatura *(Type of weld)*	FW	FW
14. Particolari di saldatura *(Weld details)*		
15. Multistrato o strato singolo *(Multilayer -singlelayer)*	ml	ml, sl
16. Gruppo *(Parent material group(s))*	11	1 to 11
17. Gruppo del Metallo d'apporto *(Filler material group(s))*	A) FM1	A) FM1, FM2
18. Tipo del Metallo(i) d'apporto *(Filler material types)*	A) M	A) S, M
19. Tipo di gas *(Shielding gas)* EN ISO 14175	A) M20	A) Appropriated shielding gas protection
20. Materiali ausiliari *(Auxiliaries)*	A) NO	
21. Tipo di corrente e polarità *(Type of current and polarity)*	A) DC EP	
22. Dimensioni *(Dimensions) :*		
23. Spessore(i) materiale *(Material thickness)*	13,00	>= 3
24. Spessore *(Deposited thickness metal A)*		
25. Spessore *(Deposited thickness metal B)*		
26. Ø esterno tubo *(Outside pipe Ø)*		>=75 rotating pos, >=500 fixed pos
27. Posizione saldatura *(Welding position)*	PB	P BW: P FW: FLAT, HORIZONTAL(ONLY PB) T BW: T FW: FLAT, HORIZONTAL(ONLY PB) Branch:

28. Tipo di prova *(Type of test)*	29. Effettuato ed accettabile *(Performed and acceptable)*	30. Non verificato *(Not verified)*
32. Esame visivo *(Visual test)*	☑	☐
33. Radiografia *(Radiographic Examination)*	☐	☑
34. Ultrasuoni *(Ultrasonic Examination)*	☐	☑
35. Frattura *(Fracture test)*	☐	☑
36. Prova di piega *(Bend test)*	☐	☑
37. Macrografia *(Macrographic examination)*	☑	☐
38. Prove complement. FW sup. *(Addit.tests)*	☐	☑

31. Prolungamento della qualifica da parte del datore di lavoro o del supervisore per i successivi 6 mesi
(Prolongation for approval by employer/supervisor for the following 6 months)

44. Data *(Date)*	45. Firma *(Signature)*	46. Posizione *(Position)*
03/04/2024		WELDING COORDINATOR
04/10/2024		" "

39. Nome dell'ispettore *(Examiner name)*	Gabriele Fracassi
40. Data inizio validità *(Start of qualification) :*	06/10/2023
41. Validità della qualificazione: fino a (data): *(Welding performance qualification valid until)*	05/10/2026

45. Firma *(Signature)* Approver	44. Data *(Date)*	46. Timbro *(Stamp)*
	29/04/2024	

BUREAU VERITAS ITALIA Notified Body no. 1370

v1.2.215

SECTION 6

Repair Procedure
Procedura di Riparazione

DOCUMENT TITLE:

PROCEDURE FOR REPAIRS OF WELDS AND BASE MATERIAL

RISERVATO AL CLIENTE:
Customer reserved:

STATUS OF DOCUMENT REVISIONS

Rev.	Date	Prepared by AQ	Verified by DPRO	Approved By CS	Description of modification
4	05/11/14				Traceability of repairs
3	18/08/98				General modification
2	16/07/97				Modification of point 4.0
1	18/06/97				Modification of point 4.0 and addition of 5.0
0	05/05/97				First issue

It is not allowed to make copies of the present document without previous authorization

INDEX

PAGE

1.0 SCOPE 3
2.0 RESPONSABILITY 3
3.0 REPAIR OF BASE MATERIAL 3
4.0 REPAIR OF WELDS 4
5.0 DEFINITION OF MAJOR AND MINOR DEFECTS 5

It is not allowed to make copies of the present document without previous authorization

4 1.0 SCOPE

Scope of the present operative instruction is to describe repairing methods for welds and base material, indicating the operations to be performed and those to be avoided; to document the activity carried out after repairs on welded joints.

4 REFERENCES TO CODE

- UNI EN ISO 3834-1 Ed. Nov. 2006 : Quality criteria for fusion welding of metallic materials – Criteria for the choice of appropriate level of quality requirements
- UNI EN ISO 3834-2 Ed. Nov. 2006 : Quality criteria for fusion welding of metallic materials – Extended quality requirements
- UNI EN ISO 3834-5 Ed. Nov. 2006 : Quality criteria for fusion welding of metallic materials – Documents to be complied in order to declare the conformity to quality requirements as per parts 2,3,4 of ISO 3834

4 2.0 RESPONSIBILITY

The person responsible for the repairs is Welding Coordinator (CS) with the support of Welder / Operator involved.

The responsibility for the execution of repairs, by grinding, is of the Shop Foreman.

Quality Control/ Welding Coordinator is responsible for the respect of the procedure, for the evaluation of the repair result and for the documentation of the activity carried out after repair of welded joints.

3.0 REPAIR OF BASE MATERIAL

3.1 SUPERFICIAL REPAIRS

Repairs of the plate surface shall be carried out only through removal of the defect by grinding wheel; the grinded surface shall be uniform and well-connected to the near one. After repair the surface shall be visually examined and the thickness shall be checked as it cannot be lower than the required minimum.

At point 5.0 major and minor defects are defined.

Major defects shall be treated as per point 4.0.

It is not allowed to make copies of the present document without previous authorization

3.2 REPAIR OF EDGES

Repairs of edges to correct profile deflections or engravings due to performed works are allowed both by grinding as well as by welding.

Repairs by welding are allowed provided that they are small and carried out by qualified welders using approved procedures and weld materials.

The repaired area shall be visually checked and examined with penetrant liquids.

4.0 REPAIR OF WELDS

The procedure for repairs of welds that is here described is applicable to every type of welding (SMAW – SAW – GTAW – GMAW④ or their combination) every time that the visual examination or the CND examination detects unacceptable defects. The defects shall be removed by grinding, the area shall be cleaned of all residues, smoothed and well-connected to the near one, in order to make the following welding operation easier.

The removal by carbon electrode (arc air) is not allowed.

The removal of the defect shall be checked by magnetoscopic examination or penetrant liquid examination.

SMAW, GTAW or GMAW technique (the most suitable one among these) shall be used to carry out the repair.

The preheating temperature, the performing technique and the weld materials shall be according to the WPS for joints to be repaired.

All welding repairs shall be carried out according to qualified welding procedures and only by qualified welders.

④ The traceability of repairs has to be guaranteed all the time. To this purpose, a map or construction drawing shall be prepared, showing the points of repairs. The responsible for the check will write a new report after repair, attesting the positive result and mentioning the WPS used for the repair.

④The Welding Coordinator / Quality Control Manager will keep the documentation by including it in the final book of the equipment.

Major and minor defects of welds and base material are defined at point 5.0.

It is not allowed to make copies of the present document without previous authorization

All major defects shall be treated according to written procedures approved by the person in charge of quality control and they shall include detailed sketches or well-defined proportions of the discontinuities.
This documentation shall be included in the final dossier of the equipment.
After fulfilment of repair welding, the surface and its edges shall be grounded to make them uniform and well-connected to the near one. The completed repair will be checked with the same technique used for the original welding.
Welding repairs shall be carried out before heat treatment (if any).

In case of dispute between Italian and English text, the Italian one prevails.

5.0 DEFINITION OF MAJOR AND MINOR DEFECTS

MAJOR DEFECTS

BASE METAL	WELD METAL
Crack	Crack, except crater cracks
Repair cavity greater than 6450 square mm (10 square inches)	Repair cavity greater than 6450 square mm (10 square inches)
Repair cavity deeper than 50% of thickness or 13 mm (1/2 inch), whichever is less	Repair cavity deeper than 50% of thickness or 13 mm (1/2 inch), whichever is less
Weld deposit to correct manufacturing mistakes	Lack of fusion and/or penetration

It is not allowed to make copies of the present document without previous authorization

MAJOR DEFECTS

BASE METAL

Deep or base metal thickness edge defects greater than 25 mm (1 inch) whichever is less

Edge defects greater than 20% of edge length

* All weld deposits or buttering shall be 100% RT or UT examined.

MINOR DEFECTS

Repair cavities or edge defects smaller than the above, excluding cracks

Porosity or slag inclusions
Undercut
Crater cracks

It is not allowed to make copies of the present document without previous authorization

C.A.M.P.I. srl
Ferrara (Italy)

SEZIONE / Section 1A.2

Mechanical Calculation

ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED

NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.

Sign	Date
	05-07-2024

Base Load Power Hub (BLPH)

MECHANICAL CALCULATION

Document Number: 1724000163-MAC-CA-00003

Document Class: 2

Rev.	Date	Description	Prepared	Reviewed	Approved
03	03/07/2024	Acceptance for Construction (AFC)	Cattani	Dondi	Dall'Arche
02	19/06/2024	Issue for Review (IFR)	Cervellati	Dondi	Dall'Arche
01	22/03/2024	Issue for Review (IFR)	Cervellati	Dondi	Dall'Arche
00	29/02/2024	Issue for Review (IFR)	Cervellati	Dondi	Dall'Arche

C.A.M.P.I. S.r.l. Ferrara Italy

TÜV Italia Srl Industrie Service 09 48 Notified Body

17/09/2024

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

File:1724000163-MAC-CA-00003_REV03

STABILITY CHECK OF THE EQUIPMENT
WITH CODE ASME VIII DIV.I ED 2023 + 2014/68/EU

ITEM IDENTIFICATION DATA

ITEM CODE	HYDROGEN VENT KO DRUM
WORK NUMBER	24-003
DRAWING N°	24003-VE-10

MATERIALS:

SHELL	SA-516 Gr.60N
HEAD	SA-516 Gr.60N
FLANGES NOZZLES	SA-350 LF2 Cl.1
PIPE NOZZLES	SA-333 Gr.6
STUD BOLTS	SA-320 Gr.L7
NUT	SA-194 Gr.4

DESIGN DATA

	Shell Side
DESIGN PRESSURE, bar(g)	3.5
HYDROSTATIC PRESSURE, bar(g)	5.0
DESIGN TEMPERATURE, °C	-29/+80
CORROSION THICKNESS, mm	1.0
JOINTS EFFICIENCY	0.85

-

Vessel Loading Requirements
ASME Section VIII, Div.1 (UG-22)

Shop Order No. 24003

ASME Section VIII Div. 1 **Edition 2023**

APPLIES YES	APPLIES NO	ITEM V-4301
■	☐	INTERNAL PRESSURE
☐	■	EXTERNAL PRESSURE
■	☐	WEIGHT OF THE EQUIPMENT
■	☐	WEIGHT OF NORMAL CONTENTS UNDER OPERATING CONDITIONS (STATIC HEAD)
■	☐	WEIGHT OF NORMAL CONTENTS UNDER TEST CONDITIONS (STATIC HEAD)
■	☐	SUPERIMPOSED STATIC REACTIONS FROM WEIGHT OF ATTACHED EQUIPMENT
☐	■	THE ATTACHMENTS OF INTERNALS (APP. D)
■	☐	THE ATTACHMENTS OF VESSEL SUPPORTS (SKIRT, LEGS, SADDLES ETC.) (APP. G)
■	☐	THE ATTACHMENTS OF LIFTING LUGS
☐	■	CYCLIC AND DYNAMIC REACTIONS DUE TO PRESSURE
☐	■	CYCLIC AND DYNAMIC REACTIONS DUE TO THERMAL VARIATIONS
☐	■	CYCLIC AND DYNAMIC REACTIONS DUE TO EQUIPMENT MOUNTED ON THE EXCH.
☐	■	CYCLIC AND DYNAMIC REACTIONS DUE TO MECHANICAL LOADINGS
■	☐	WIND REACTIONS
☐	■	SNOW REACTIONS
☐	■	SEISMIC REACTIONS
☐	■	IMPACT REACTIONS SUCH AS THOSE DUE TO FLUID SHOCK
☐	■	TEMPERATURE GRADIENTS
☐	■	DIFFERENTIAL THERMAL EXPANSION
☐	■	ABNORMAL PRESSURES, SUCH AS THOSE CAUSED BY DEFLAGRATION
■	☐	TEST PRESSURE AND COINCIDENT STATIC HEAD ACTING DURING THE TEST

verified and approved by E. Dall'Arche date 29-Feb.-2024

Table of Contents

Vessel Design Summary: 5
Nozzle Summary: 7
Nozzle Schedule: 8
Bill of Material: 9
MDMT Summary: 10
Input Echo: 12
Internal Pressure Calculations: 18
Element: BOTTOM HEAD 19
Element: MAIN SHELL 22
Element: TOP HEAD 24
Pressure Test Results: Shop Test 27
Element and Detail Weights: 29
Nozzle Flange MAWP: 32
Natural Frequency Calculation: 34
Wind Load Calculation: 35
Wind/Earthquake Shear, Bending: 39
Wind/Earthquake Deflection: 40
Longitudinal Stress Constants: 42
Longitudinal Allowable Stresses: 43
Longitudinal Stresses due to: 44
Stress due to Combined Loads: 46
Center of Gravity Calculation: 50
Lifting Lug Calcs: LIFTING LUG 52
Leg Check, (Operating Case): 60
Leg Check, (Filled w/Water): 63
Nozzle Calcs.: N3-LIQUID OUTLE 66
Nozzle Calcs.: N1- GAS INLET 69
Nozzle Calcs.: H1-INSPECTION P 80
Nozzle Calcs.: K1B-LT FOR ALAR 85
Nozzle Calcs.: H2-INSPECTION P 88
Nozzle Calcs.: N4-VENT 93
Nozzle Calcs.: K1A-LT FOR ALAR 96
Nozzle Calcs.: K3-PT 99
Nozzle Calcs.: N2-GAS OUTLET 102
Foundation/Support Summary: 112
PED Results: 113

Vessel Design Summary:

ASME Code, Section VIII Division 1, 2023

```
Diameter Spec : 600.000 mm. ID
Vessel Design Length, Tangent to Tangent          2350.00  mm.

Distance of Bottom Tangent above Grade               0.00  mm.
Specified Datum Line Distance                        0.00  mm.

Internal Design Temperature                            80  °C
Internal Design Pressure                            3.500  bar(g)

External Design Temperature                            80  °C

Maximum Allowable Working Pressure                     18  bar(g)
Shop Test Pressure                                  5.005  bar(g)

Required Minimum Design Metal Temperature           -29.0  °C
Warmest Computed Minimum Design Metal Temperature   -46.0  °C

Wind Design Code                                  EN-2010
Earthquake Design Code                         No Seismic
```

Materials of Construction:

Component Type	Material	Class	Thickness	UNS #	Normalized	Impact Tested
Shell	SA-516 60	...	...	K02100	Yes	No
Head	SA-516 60	...	...	K02100	Yes	No
Nozzle	SA-350 LF2	1	...	K03011	No	Yes
Nozzle	SA-333 6	...	...	K03006	No	Yes
Re-Pad	SA-516 70	...	...	K02700	No	No
Re-Pad	SA-516 60	...	...	K02100	No	No
Nozzle Flg	SA-350 LF2	1	...	K03011	No	Yes
Leg Baseplate	SA-516 70	...	...	K02700	No	No
Leg Bolting	SA-307 B	...	...		No	No

Normalized is determined based on the UCS-66 material curve selection and Figure UCS-66.
Impact Tested is based on material selection and material data properties.

Element Pressures and MAWP (bar(g) & mm.):

Element Description or Type	Design Pressure + Stat. head	Ext. Press.	Element M.A.W.P	Total Corrosion Allowance	Str. Flg. Gov.	In Creep Range
BOTTOM HEAD	3.588	0.00	23.000	1.0000	No	No
MAIN SHELL	3.568	0.00	29.000	1.0000	N/A	No
TOP HEAD	3.500	0.00	23.000	1.0000	No	No

```
Liquid Level: 900.00 mm.  Dens.: 0.001 kg./cm^3    Sp. Gr.: 1.000
```

Element Types and Properties:

Element Type	"To" Elev mm.	Element Length mm.	Nominal Thickness mm.	Finished Thickness mm.	Reqd Thk Internal mm.	Reqd Thk External mm.	Long Eff	Circ Eff
Ellipse	50.0	50.0	10.0	8.0	2.5	...	0.85	0.85
Cylinder	2300.0	2250.0	10.0	10.0	2.5	...	0.85	0.85
Ellipse	2350.0	50.0	10.0	8.0	2.5	...	0.85	0.85

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Nozzle Calculation Summary (bar(g) & mm.):

Description	MAWP	Ext	MAPNC	UG-45	[tr]	Weld Path	Areas or Stresses
N3-LIQUID OUTLE	23	...	...	OK	4.42	OK	No Calc[*]
N1- GAS INLET	28	...	...	OK	5.73	OK	Passed
H1-INSPECTION P	22	...	...	...		OK	Passed
K1B-LT FOR ALAR	29	...	...	OK	4.42	OK	No Calc[*]
H2-INSPECTION P	22	...	...	...		OK	Passed
N4-VENT	29	...	...	OK	5.73	OK	No Calc[*]
K1A-LT FOR ALAR	29	...	...	OK	4.42	OK	No Calc[*]
K3-PT	29	...	...	OK	4.42	OK	No Calc[*]
N2-GAS OUTLET	23	...	...	OK	5.66	OK	Passed

Nozzle MAWP Summary:

Minimum MAWP Nozzles	:	22 Nozzle : H2-INSPECTION P
Minimum MAWP Shells/Flanges	:	18 bar(g)
Computed Vessel M.A.W.P.	:	18 bar(g)

[*] - This was a small opening and the areas were not computed or
the MAWP of this connection could not be computed because
the longitudinal bending stress was greater than the hoop stress.

Multiple output lines for the same nozzle indicates required Code calculations in both the longitudinal and circumferential planes of reinforcement where applicable.

Check the Spatial Relationship between the Nozzles:

From Node	Nozzle Description	Y Coordinate mm.	Layout Angle deg	Dia. Limit mm.
10	N3-LIQUID OUTLET	0.000	0.000	64.800
20	N1- GAS INLET	1260.000	90.000	505.650
20	H1-INSPECTION PO	280.000	180.000	302.145
20	K1B-LT FOR ALARM	350.000	315.000	68.800
20	H2-INSPECTION PO	2070.000	180.000	302.145
20	N4-VENT	2150.000	0.000	155.130
20	K1A-LT FOR ALARM	810.000	315.000	68.800
20	K3-PT	2150.000	60.000	68.800
30	N2-GAS OUTLET	0.000	0.000	505.650

The nozzle spacing is computed by the following:

$= \sqrt{ll^2 + lc^2}$ where

ll - Arc length along the inside vessel surface in the long. direction.
lc - Arc length along the inside vessel surface in the circ. direction

If any interferences/violations are found, they will be noted below.

No interference violations have been detected!

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Nozzle Schedule:

Description	Nominal or Actual Size	Schd or FVC Type	Flg Type	Nozzle O/Dia in	Wall Thk mm	Reinforcing Pad Diameter	Pad Thk mm	Cut Length mm	Flg Class
N3-LIQUID OUTLET	1.000 in	Actual	LWN	2.000	12.700	...	...	158.59	150
K1B-LT FOR ALARM	1.000 in	Actual	LWN	2.000	12.700	...	...	161.08	150
K1A-LT FOR ALARM	1.000 in	Actual	LWN	2.000	12.700	...	...	161.08	150
K3-PT	1.000 in	Actual	LWN	2.000	12.700	...	...	161.08	150
N4-VENT	3.000 in	XS	WNF	3.500	7.620	...	...	163.31	150
H1-INSPECTION PO	6.000 in	XS	WNF	6.625	10.973	...	...	172.04	150
H2-INSPECTION PO	6.000 in	XS	WNF	6.625	10.973	...	...	172.04	150
N1- GAS INLET	10.000 in	XS	WNF	10.750	12.700	373.05	10.00	192.87	150
N2-GAS OUTLET	10.000 in	XS	WNF	10.750	12.700	373.05	10.00	175.33	150

General Notes for the above table:

The cut length is the outside projection + inside projection + drop + in-plane shell thickness. This value does not include weld gaps, nor does it account for shrinkage.

In the case of oblique nozzles, the outside diameter must be increased. The re-pad width around the nozzle is calculated as follows:
Width of Pad = (Pad Outside Dia. (per above) - Nozzle Outside Dia.)/2

For hub nozzles, the thickness and diameter shown are those of the smaller and thinner section.

Nozzle Material and Weld Fillet Leg Size Details (mm.):

Description	Material	Shl Grve Weld	Noz Shl/Pad Weld	Pad OD Weld	Pad Grve Weld	Inside Weld
N3-LIQUID O	SA-350 LF2	8.000	10.000	...	...	...
K1B-LT FOR	SA-350 LF2	10.000	9.000	...	...	...
K1A-LT FOR	SA-350 LF2	10.000	9.000	...	...	...
K3-PT	SA-350 LF2	10.000	9.000	...	...	...
N4-VENT	SA-333 6	10.000	9.000	...	...	...
H1-INSPECTI	SA-333 6	10.000	9.000	...	...	...
H2-INSPECTI	SA-333 6	10.000	9.000	...	...	...
N1- GAS INL	SA-333 6	10.000	9.000	8.000	10.000	...
N2-GAS OUTL	SA-333 6	8.000	9.000	8.000	10.000	...

Note: The Outside projections below do not include the flange thickness.

Nozzle Miscellaneous Data:

Description	Elev/Distance From Datum mm.	Layout Angle deg	Proj Outside mm.	Proj Inside mm.	Installed in Component
N3-LIQUID OUTLET	...	0.0	150.00	0.00	BOTTOM HEAD
K1B-LT FOR ALARM	350.000	315.0	150.00	0.00	MAIN SHELL
K1A-LT FOR ALARM	810.000	315.0	150.00	0.00	MAIN SHELL
K3-PT	2150.000	60.0	150.00	0.00	MAIN SHELL
N4-VENT	2150.000	0.0	150.00	0.00	MAIN SHELL
H1-INSPECTION PO	280.000	180.0	150.00	0.00	MAIN SHELL
H2-INSPECTION PO	2070.000	180.0	150.00	0.00	MAIN SHELL
N1- GAS INLET	1260.000	90.0	150.00	0.00	MAIN SHELL
N2-GAS OUTLET	...	0.0	150.00	0.00	TOP HEAD

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Bill of Materials:

QTY	DESCRIPTION	MATERIAL
2	ELLIPTICAL HEAD: 2.0 X 1, 10.0mm. THK X 600.0mm. ID X 50.0mm.	SA-516 60
1	CYLINDER: 10.0mm. THK X 600.0mm. ID X 2250.0mm.	SA-516 60
3	LEGS, SHAPE: L80X80X10 960.0mm	...
3	BASEPLATES: 160.0mm X 150.0mm X 20.0mm	SA-516 70
3	BASEPLATE BOLTS: 24.0mm	SA-307 B
3	LEG RE-PADS: 150.000mm X 150.000mm X 10.000mm	SA-516 60
2	LIFTING LUGS:	SA-516 70
2	LIFTING LUG PADS: 80.0mm X 190.0mm X 10.0mm THK	
2	CLASS 150 GR 1.1, 6.0" BLIND FLANGE(S)	SA-350 LF2
1	NAMEPLATE	...

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Minimum Design Metal Temperature Results Summary (°C):

Description	Notes	Curve	Basic MDMT	Reduced MDMT	UG-20(f) MDMT	Thickness ratio	Gov Thk mm.	E*	PWHT reqd
BOTTOM HEAD	[10]	D	-48	-48	-29	0.669	8.000	0.85	No
BOTTOM HEAD	[7]	D	-48	-48	-29	0.527	10.000	0.85	No
MAIN SHELL	[8]	D	-48	-48	-29	0.527	10.000	0.85	No
TOP HEAD	[10]	D	-48	-48	-29	0.666	8.000	0.85	No
TOP HEAD	[7]	D	-48	-48	-29	0.525	10.000	0.85	No
N3-LIQUID OUTL	[1]	D	-48	-48	-29	0.603	8.000	1.00	No
Nozzle Flg	[5]	!	-46	-46					
N1- GAS INLET	[1]	B	-46	-46		0.526	10.000	1.00	No
Nozzle Flg	[5]	!	-46	-49					
H1-INSPECTION	[1]	D	-46	-104		0.151	9.601	1.00	No
Nozzle Flg	[5]	!	-46	-49					
K1B-LT FOR ALA	[1]	D	-48	-48	-29	0.526	10.000	1.00	No
Nozzle Flg	[5]	!	-46	-46					
H2-INSPECTION	[1]	D	-46	-104		0.151	9.601	1.00	No
Nozzle Flg	[5]	!	-46	-49					
N4-VENT	[1]	D	-46	-104		0.121	6.668	1.00	No
Nozzle Flg	[5]	!	-46	-49					
K1A-LT FOR ALA	[1]	D	-48	-48	-29	0.526	10.000	1.00	No
Nozzle Flg	[5]	!	-46	-46					
K3-PT	[1]	D	-48	-48	-29	0.526	10.000	1.00	No
Nozzle Flg	[5]	!	-46	-46					
N2-GAS OUTLET	[1]	C	-46	-46		0.666	10.000	1.00	No
Nozzle Flg	[5]	!	-46	-49					
Nozl. Bolting	[22]		-48			1.000	63.500	1.00	No
Warmest MDMT:			-46	-46					

Required Minimum Design Metal Temperature -29.0 °C
Warmest Computed Minimum Design Metal Temperature -46.0 °C

Notes:
[!] - This was an impact tested material.
[1] - Governing Nozzle Weld.
[4] - ASME Flange MDMT Calcs; Thickness ratio per UCS-66(b)(1)(-c).
[5] - ASME Flange MDMT Calcs; Thickness ratio per UCS-66(b)(1)(-b).
[6] - MDMT Calculations at the Shell/Head Joint.
[7] - MDMT Calculations for the Straight Flange.
[8] - Cylinder/Cone/Flange Junction MDMT.
[9] - Calculations in the Spherical Portion of the Head.
[10] - Calculations in the Knuckle Portion of the Head.
[11] - Calculated (Body Flange) Flange MDMT.
[12] - Calculated Flat Head MDMT per UCS-66.3
[13] - Tubesheet MDMT, shell side, if applicable
[14] - Tubesheet MDMT, tube side, if applicable
[15] - Nozzle Material
[16] - Shell or Head Material
[17] - Impact Testing required
[18] - Impact Testing not required, see UCS-66(b)(3)
[20] - Cylinder/Cone Junction MDMT based on Longitudinal Stress considerations
[21] - Body Flange Bolting Material
[22] - Nozzle Flange Bolting Material
[23] - Stiffening Ring to Shell Weld
[24] - Saddle to Shell Weld

UG-84(b)(2) was not considered.
UCS-66(g) was not considered.
UCS-66(i) was not considered.

Notes:
Impact test temps were not entered in and not considered in the analysis.
UCS-66(i) applies to impact tested materials not by specification and
UCS-66(g) applies to materials impact tested per UG-84.1 General Note (c).
The Basic MDMT includes the (30F) PWHT credit if applicable.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Units used in this Analysis (bar(g)_UniCode):

Name	System Unit	Constant	User Unit
Length	Feet	304.8000	mm.
Force	Pounds	0.4536	kgf
Mass	Pounds	0.4536	kg.
Area	sq. inches	6.4516	cm^2
Moment	ft. lbs.	0.1383	Kg-m.
Stress	lbs./sq.in.	0.0069	N./mm^2
Temperature	Degrees F	0.5556	°C
Pressure	psig	0.0689	bar(g)
Elast. Modulus	lbs./sq.in.	6.8946	kPa.
Pipe Density	lbs./cu.in.	0.0277	kg./cm^3
Ins. Density	lbs./cu.ft.	0.1600E-04	kg./cm^3
Fluid Density	lbs./cu.ft.	0.1600E-04	kg./cm^3
Wind Speed	miles/hr	1.6093	km/hr
Tray Weight	lbs./sq.ft.	0.0005	kgs/cm^2
Inertia	in.^4	41.6231	cm^4
G Load	G's	1.0000	g's
Wind Load	lbs./sq.ft.	4.8825	kgs/m^2
Elevation	Feet	304.8000	mm.
Volume	in.^3	16.3900	cm³
Diameter	inches	25.4000	mm.
Thickness	inches	25.4000	mm.

PV Elite Vessel Analysis Program: Input Data

Design Internal Pressure (for Hydrotest)	3.4998	bar(g)
Design Internal Temperature	80.0	°C
Projection of Nozzle from Vessel Top	0	mm.
Projection of Nozzle from Vessel Bottom	0	mm.
Minimum Design Metal Temperature	-29.0	°C
Type of Construction	Welded	
Special Service	None	
Degree of Radiography	RT-3	
Use Higher Longitudinal Stresses (Flag)	Y	
Select t for Internal Pressure (Flag)	N	
Select t for External Pressure (Flag)	N	
Select t for Axial Stress (Flag)	N	
Select Location for Stiff. Rings (Flag)	N	
Consider Vortex Shedding	N	

Shop Pressure Test:

Type of Pressure Test	PED and UG-99(b)
Pressure Test Position	Vertical
Test Performed in Corroded Condition	No

Load Case 1	NP+EW+WI+FW+BW
Load Case 2	NP+EW+EE+FS+BS
Load Case 3	NP+OW+WI+FW+BW
Load Case 4	NP+OW+EQ+FS+BS
Load Case 5	NP+HW+HI
Load Case 6	NP+HW+HE
Load Case 7	IP+OW+WI+FW+BW
Load Case 8	IP+OW+EQ+FS+BS
Load Case 9	EP+OW+WI+FW+BW
Load Case 10	EP+OW+EQ+FS+BS
Load Case 11	HP+HW+HI
Load Case 12	HP+HW+HE
Load Case 13	IP+WE+EW

Load Case 14	IP+WF+CW	
Load Case 15	IP+VO+OW	
Load Case 16	IP+VE+EW	
Load Case 17	NP+VO+OW	
Load Case 18	FS+BS+IP+OW	
Load Case 19	FS+BS+EP+OW	
Load Case 20	BL+IP+OW	
Wind Design Code	EN 1991-1-4:2005+A1:2010	
Fundamental Wind Velocity [Vb,0]	162	km/hr
Direction Factor [Cdir]	1.0	
Seasonal Factor [CSeason]	1.0	
Force Coefficient [Cf]	0.69999999	
Terrain Category	0 - Sea or Costal Area	
Air Density	1.25	kg/m³
Orography Factor	1.0	
Check Vortex Shedding per Section 22.10	No	
Use Procedure 2 Annex C to compute CsCd	No	
User input CsCd, Operating Case	1.0	
User input CsCd, Empty Case	0.0	
User input CsCd, Test Case	0.0	
Damping Factor, deltaS, [Operating]	0.0400	
Damping Factor, deltaS, [Empty]	0.0120	
Damping Factor, deltaS, [Filled]	0.0400	
Seismic Design Code	No Seismic	
M.A.W.P. + Static Head to Element Bottom	Y	
Consider MAP New and Cold in Noz. Design	N	
Consider External Loads for Nozzle Des.	Y	
Use ASME VIII-1 Appendix 1-9	N	
Perform Blast Load Analysis	No	
Material Database Year	Current w/Addenda or Code Year	

Configuration Directives:

g0 is taken as min(g0, attached shell thk)	Yes
Do not use Nozzle MDMT Interpretation VIII-1 01-37	No
Use Table G instead of exact equation for "A"	Yes
Shell Head Joints are Tapered	Yes
Compute "K" in corroded condition	Yes
Use Code Case 2286	No
Use the MAWP to compute the MDMT	Yes
For thickness ratios <= 0.35, MDMT will be -155F (-104C)	Yes
For PWHT & P1 Materials the MDMT can be < -55F (-48C)	No
Using Metric Material Databases, ASME II D	No
Calculate B31.3 type stress for Nozzles with Loads	Yes
Reduce the MDMT due to lower membrane stress	Yes
Consider Longitudinal Stress in MDMT Calculations	Yes

Complete Listing of Vessel Elements and Details:

Element#	1/3	
Element From Node	10	
Element To Node	20	
Element Type	Elliptical	
Description	BOTTOM HEAD	
Distance "FROM" to "TO"	50	mm.
Inside Diameter	600	mm.

Element Thickness	8	mm.
Internal Corrosion Allowance	1	mm.
Nominal Thickness	10	mm.
External Corrosion Allowance	0	mm.
Design Internal Pressure	3.4998	bar(g)
Design Temperature Internal Pressure	80	°C
Design External Pressure	0	bar(g)
Design Temperature External Pressure	80	°C
Effective Diameter Multiplier	1.2	
Material Name	SA-516 60 [Normalized]	
Allowable Stress, Ambient	117.9	N./mm^2
Allowable Stress, Operating	117.9	N./mm^2
Allowable Stress, Hydrotest	198.58	N./mm^2
Material Density	0.00775	kg./cm^3
P Number Thickness	31.801	mm.
Yield Stress, Operating	204.67	N./mm^2
UCS-66 Chart Curve Designation	D	
External Pressure Chart Name	CS-2	
UNS Number	K02100	
Product Form	Plate	
Efficiency, Longitudinal Seam	0.85	
Efficiency, Circumferential Seam	0.85	
Elliptical Head Factor	2.0	
Weld is pre-Heated	No	
Element From Node	10	
Detail Type	Liquid	
Detail ID	Liquid: 10	
Dist. from "FROM" Node / Offset dist	-150	mm.
Height/Length of Liquid	200	mm.
Liquid Density	0.0009984	kg./cm^3
Element From Node	10	
Detail Type	Nozzle	
Detail ID	N3-LIQUID OUTLET	
Dist. from "FROM" Node / Offset dist	0	mm.
Nozzle Diameter	1	in.
Nozzle Schedule	None	
Nozzle Class	150	
Layout Angle	0.0	
Blind Flange (Y/N)	N	
Weight of Nozzle (Used if > 0)	3.3388	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-350 LF2 [Impact Tested]	

Element#	2/3	
Element From Node	20	
Element To Node	30	
Element Type	Cylinder	
Description	MAIN SHELL	
Distance "FROM" to "TO"	2250	mm.
Inside Diameter	600	mm.
Element Thickness	10	mm.
Internal Corrosion Allowance	1	mm.
Nominal Thickness	10	mm.
External Corrosion Allowance	0	mm.
Design Internal Pressure	3.4998	bar(g)
Design Temperature Internal Pressure	80	°C
Design External Pressure	0	bar(g)
Design Temperature External Pressure	80	°C
Effective Diameter Multiplier	1.2	

Material Name	SA-516 60 [Normalized]	
Efficiency, Longitudinal Seam	0.85	
Efficiency, Circumferential Seam	0.85	
Weld is pre-Heated	No	
Element From Node	20	
Detail Type	Liquid	
Detail ID	Liquid: 20	
Dist. from "FROM" Node / Offset dist	0	mm.
Height/Length of Liquid	700	mm.
Liquid Density	0.0009984	kg./cm^3
Element From Node	20	
Detail Type	Nozzle	
Detail ID	N1- GAS INLET	
Dist. from "FROM" Node / Offset dist	1210	mm.
Nozzle Diameter	10	in.
Nozzle Schedule	XS	
Nozzle Class	150	
Layout Angle	90.0	
Blind Flange (Y/N)	N	
Weight of Nozzle (Used if > 0)	58.941	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-333 6 [Impact Tested]	
Element From Node	20	
Detail Type	Nozzle	
Detail ID	H1-INSPECTION PO	
Dist. from "FROM" Node / Offset dist	230	mm.
Nozzle Diameter	6	in.
Nozzle Schedule	XS	
Nozzle Class	150	
Layout Angle	180.0	
Blind Flange (Y/N)	Y	
Weight of Nozzle (Used if > 0)	49.648	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-333 6 [Impact Tested]	
Element From Node	20	
Detail Type	Nozzle	
Detail ID	K1B-LT FOR ALARM	
Dist. from "FROM" Node / Offset dist	300	mm.
Nozzle Diameter	1	in.
Nozzle Schedule	None	
Nozzle Class	150	
Layout Angle	315.0	
Blind Flange (Y/N)	N	
Weight of Nozzle (Used if > 0)	3.3388	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-350 LF2 [Impact Tested]	
Element From Node	20	
Detail Type	Nozzle	
Detail ID	H2-INSPECTION PO	
Dist. from "FROM" Node / Offset dist	2020	mm.
Nozzle Diameter	6	in.
Nozzle Schedule	XS	
Nozzle Class	150	
Layout Angle	180.0	
Blind Flange (Y/N)	Y	
Weight of Nozzle (Used if > 0)	49.648	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-333 6 [Impact Tested]	

Element From Node	20	
Detail Type	Nozzle	
Detail ID	N4-VENT	
Dist. from "FROM" Node / Offset dist	2100	mm.
Nozzle Diameter	3	in.
Nozzle Schedule	XS	
Nozzle Class	150	
Layout Angle	0.0	
Blind Flange (Y/N)	N	
Weight of Nozzle (Used if > 0)	9.6115	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-333 6 [Impact Tested]	

Element From Node	20	
Detail Type	Nozzle	
Detail ID	K1A-LT FOR ALARM	
Dist. from "FROM" Node / Offset dist	760	mm.
Nozzle Diameter	1	in.
Nozzle Schedule	None	
Nozzle Class	150	
Layout Angle	315.0	
Blind Flange (Y/N)	N	
Weight of Nozzle (Used if > 0)	3.3388	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-350 LF2 [Impact Tested]	

Element From Node	20	
Detail Type	Nozzle	
Detail ID	K3-PT	
Dist. from "FROM" Node / Offset dist	2100	mm.
Nozzle Diameter	1	in.
Nozzle Schedule	None	
Nozzle Class	150	
Layout Angle	60.0	
Blind Flange (Y/N)	N	
Weight of Nozzle (Used if > 0)	3.3388	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-350 LF2 [Impact Tested]	

Element From Node	20	
Detail Type	Leg	
Detail ID	LEGS	
Dist. from "FROM" Node / Offset dist	170	mm.
Diameter at Leg Centerline	685.07	mm.
Leg Orientation	3	
Number of Legs	3	
Section Identifier	L80X80X10	
Length of Legs	960	mm.

Element#	3/3	
Element From Node	30	
Element To Node	40	
Element Type	Elliptical	
Description	TOP HEAD	
Distance "FROM" to "TO"	50	mm.
Inside Diameter	600	mm.
Element Thickness	8	mm.
Internal Corrosion Allowance	1	mm.
Nominal Thickness	10	mm.
External Corrosion Allowance	0	mm.

Design Internal Pressure	3.4998	bar(g)
Design Temperature Internal Pressure	80	°C
Design External Pressure	0	bar(g)
Design Temperature External Pressure	80	°C
Effective Diameter Multiplier	1.2	
Material Name	SA-516 60 [Normalized]	
Efficiency, Longitudinal Seam	0.85	
Efficiency, Circumferential Seam	0.85	
Elliptical Head Factor	2.0	
Weld is pre-Heated	No	
Element From Node	30	
Detail Type	Nozzle	
Detail ID	N2-GAS OUTLET	
Dist. from "FROM" Node / Offset dist	0	mm.
Nozzle Diameter	10	in.
Nozzle Schedule	XS	
Nozzle Class	150	
Layout Angle	0.0	
Blind Flange (Y/N)	N	
Weight of Nozzle (Used if > 0)	58.799	kgf
Grade of Attached Flange	GR 1.1	
Nozzle Matl	SA-333 6 [Impact Tested]	

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Internal Pressure Results Summary:

Element Thickness, Pressure, Diameter and Allowable Stress :

From	To	Int. Press + Liq. Hd bar(g)	Nominal Thickness mm.	Total Corr Allowance mm.	Element Diameter mm.	Allowable Stress(SE) N./mm^2	Element#
BOTTOM HEAD		3.588	10	1	600	100.22	1
MAIN SHELL		3.5684	10	1	600	100.22	2
TOP HEAD		3.4998	10	1	600	100.22	3

Element Required Thickness and MAWP :

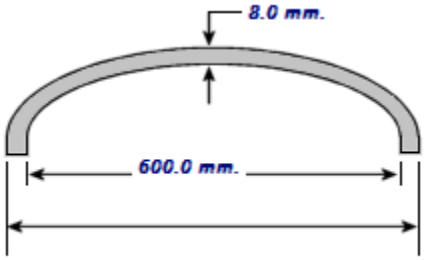
From	To	Design Pressure bar(g)	M.A.W.P. Corroded bar(g)	M.A.P. New & Cold bar(g)	Minimum Thickness mm.	Required Thickness mm.	Element#
BOTTOM HEAD		3.4998	23.2658	26.6525	8	2.5	1
MAIN SHELL		3.4998	29.3674	32.7494	10	2.5	2
TOP HEAD		3.4998	23.354	26.6525	8	2.5	3
Minimum			18	20			

Elements Suitable for Design Internal Pressure.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Internal Pressure Calculation Results:

ASME Code, Section VIII Division 1, 2023



Internal Pressure Results for: BOTTOM HEAD

Elliptical Head Design Information:			
Design Pressure P	3.588 bar(g)	Int. Design Temperature	80 °C
Material	SA-516 60	Ext. Design Temperature	80 °C
Length	50.000 mm.	External Pressure Chart	CS-2
		UNS Number	K02100
Int. Corr. All. c	1.0000 mm.	Allowable Stress (ope) S	117.9 N./mm^2
Ext. Corr. All. ce	0.0000 mm.	Allowable Stress (amb) Sa	117.9 N./mm^2
Inside Diameter Di	600.000 mm.	Actual Stress	18.1 N./mm^2
Spec. Min. Thk t or e	8.0000 mm.	Spec. Nominal Thk.	10.000 mm.
Surface Area	5140.7 cm^2	SG of Contents	1.000
Element Volume	42419.1 cm³	Weight of Contents	42.4 kgf
Empty Weight	41.9 kgf	Operating Weight	84.3 kgf
		Comp. All. Ope. Stress	133.1 N./mm^2
		Aspect Ratio	2.00

Radiography Information:			
Spot Radiography per UW-11(b) Type 1		Seamless	
Circ. Joint Efficiency	85 %	Long. Joint Efficiency E	85 %

Tolerance for Formed Heads per UG-81(a):
Head inner surface maximum deviation outside the specified shape, 1.25% of D: 7.500 mm.
Head inner surface maximum deviation inside the specified shape, 0.625% of D: 3.750 mm.

Required Thickness due to Internal Pressure [tr]:
= (P*D*Kcor)/(2*S*E-0.2*P) Appendix 1-4(c)
= (3.588*602.0*0.996)/(2*117.9*0.85-0.2*3.588)
= 1.0733 + 1.0000 = 2.0733 mm.

Note: The thickness required was less than the Code Minimum, therefore the Code Minimum value of 1.5000 mm. per UG-16 will be used.

Max. Allowable Working Pressure at given Thickness, corroded [MAWP]:
Less Operating Hydrostatic Head Pressure of 0.088 bar(g)
= (2*S*E*t)/(Kcor*D+0.2*t) per Appendix 1-4 (c)
= (2*117.9*0.85*7.0)/(0.996*602.0+0.2*7.0)
= 23 - 0.1 = 23 bar(g)

Maximum Allowable Pressure, New and Cold [MAPNC]:
= (2*S*E*t)/(K*D+0.2*t) per Appendix 1-4 (c)
= (2*117.9*0.85*8.0)/(1.0*600.0+0.2*8.0)
= 27 bar(g)

Actual stress at given pressure and thickness, corroded [Sact]:
= (P*(Kcor*D+0.2*t))/(2*E*t)
= (3.588*(0.996*602.0+0.2*7.0))/(2*0.85*7.0)
= 18.114 N./mm^2

Straight Flange Required Thickness:
= (P*R)/(S*E-0.6*P) + c per UG-27 (c)(1)
= (3.588*301.0)/(117.9*0.85-0.6*3.588)+1.0
= 2.080 mm.

Straight Flange Maximum Allowable Working Pressure:
Less Operating Hydrostatic Head Pressure of 0.074 bar(g)
= (S*E*t)/(R+0.6*t) per UG-27 (c)(1)
= (117.9 * 0.85 * 9.0)/(301.0 + 0.6 * 9.0)
= 29 - 0.1 = 29 bar(g)

Factor K, corroded condition [Kcor]:
= (2 + (Inside Diameter/(2 * Inside Head Depth))^2)/6
= (2 + (602.0/(2 * 151.0))^2)/6
= 0.995592

Percent Elong. per UCS-79, VIII-1-01-57 (75*tnom/Rf)*(1-Rf/Ro) 7.009 %
Note: Please Check Requirements of UCS-79 as Elongation is > 5%.

MDMT Calculations in the Knuckle Portion:

Govrn. thk, tg = 8.0, tr = 5.509, c = 1.0 mm., E✱ = 0.85
Thickness Ratio = tr * E✱/(tg - c) = 0.669, Temp. Reduction = 18 °C

Min Metal Temp. w/o impact per UCS-66, Curve D	-48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit	-48 °C

MDMT Calculations in the Head Straight Flange:

Govrn. thk, tg = 10.0, tr = 5.585, c = 1.0 mm., E✱ = 0.85
Thickness Ratio = tr * E✱/(tg - c) = 0.527, Temp. Reduction = 29 °C

Min Metal Temp. w/o impact per UCS-66, Curve D	-48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit	-48 °C

MDMT Design Information:

MDMT Curve	D	Press. at MDMT	18.388 bar(g)
UCS-66(b) red.	No	Min. Des. Mtl. Temp.	-29 °C
Governing Thk.	10.000 mm.	Basic MDMT	-48 °C
Stress/Thk. Ratio	0.527	Temperature Difference	0 °C
UCS-66(c) red.	Yes	Computed Min. Temp.	-48 °C
		MDMT per UG-20(f)	-29 °C
		Joint Efficiency E*	85 %

Note: Temperature values displayed above are for the location with the highest basic MDMT

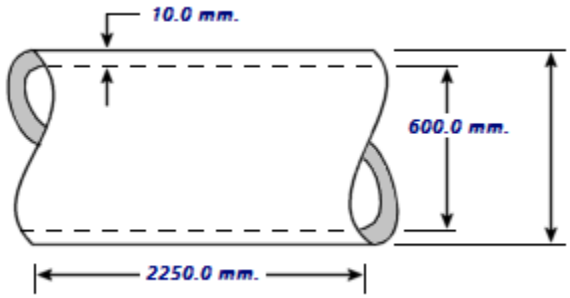
Tolerance for Formed Heads per UG-81(a):

```
Head inner surface maximum deviation outside the specified shape,  1.25% of D: 7.500 mm.
Head inner surface maximum deviation inside the specified shape,  0.625% of D: 3.750 mm.
```

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Internal Pressure Calculation Results:

ASME Code, Section VIII Division 1, 2023



Internal Pressure Results for: MAIN SHELL

Cylindrical Shell Design Information:			
Design Pressure P	3.568 bar(g)	Int. Design Temperature	80 °C
Material	SA-516 60	Ext. Design Temperature	80 °C
Length	2250.000 mm.	External Pressure Chart	CS-2
		UNS Number	K02100
Int. Corr. All. c	1.0000 mm.	Allowable Stress (ope) S	117.9 N./mm^2
Ext. Corr. All. ce	0.0000 mm.	Allowable Stress (amb) Sa	117.9 N./mm^2
Inside Diameter Di	600.000 mm.	Actual Stress	14.3 N./mm^2
Spec. Min. Thk t or e	10.0000 mm.	Spec. Nominal Thk.	10.000 mm.
Surface Area	43825.2 cm^2	SG of Contents	1.000
Element Volume	636286.6 cm³	Weight of Contents	197.8 kgf
Empty Weight	334.2 kgf	Operating Weight	532.0 kgf
		Comp. All. Ope. Stress	138.1 N./mm^2

Radiography Information:			
Full Radiography per UW-11(a) Type 1		Full Radiography per UW-11(a) Type 1	
Circ. Joint Efficiency	85 %	Long. Joint Efficiency E	85 %

Required Thickness due to Internal Pressure [tr]:
= (P*R)/(S*E-0.6*P) per UG-27 (c)(1)
= (3.568*301.0)/(117.9*0.85-0.6*3.568)
= 1.0741 + 1.0000 = 2.0741 mm.

Note: The thickness required was less than the Code Minimum, therefore the Code Minimum value of 1.5000 mm. per UG-16 will be used.

Max. Allowable Working Pressure at given Thickness, corroded [MAWP]:
Less Operating Hydrostatic Head Pressure of 0.069 bar(g)
= (S*E*t)/(R+0.6*t) per UG-27 (c)(1)
= (117.9*0.85*9.0)/(301.0+0.6*9.0)
= 29 - 0.1 = 29 bar(g)

Maximum Allowable Pressure, New and Cold [MAPNC]:
= (S*E*t)/(R+0.6*t) per UG-27 (c)(1)
= (117.9*0.85*10.0)/(300.0+0.6*10.0)
= 33 bar(g)

Actual stress at given pressure and thickness, corroded [Sact]:

```
= (P*(R+0.6*t))/(E*t)
= (3.568*(301.0+0.6*9.0))/(0.85*9.0)
= 14.293 N./mm^2
```

% Elongation per Table UG-79-1 (50*tnom/Rf*(1-Rf/Ro)) 1.639 %

Minimum Design Metal Temperature Results:

Govrn. thk, tg = 10.0, tr = 5.579, c = 1.0 mm., E✱ = 0.85
Thickness Ratio = tr * E✱/(tg - c) = 0.527, Temp. Reduction = 29 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve D            -48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit       -48 °C
```

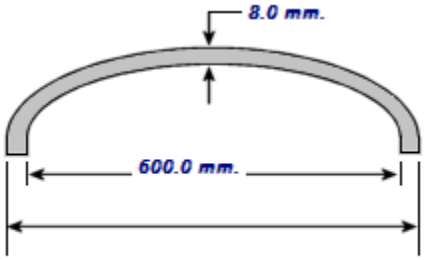
MDMT Design Information:

MDMT Curve	D	Press. at MDMT	18.369 bar(g)
UCS-66(b) red.	No	Min. Des. Mtl. Temp.	-29 °C
Governing Thk.	10.000 mm.	Basic MDMT	-48 °C
Stress/Thk. Ratio	0.527	Temperature Difference	0 °C
UCS-66(c) red.	Yes	Computed Min. Temp.	-48 °C
		MDMT per UG-20(f)	-29 °C
		Joint Efficiency E*	85 %

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Internal Pressure Calculation Results:

ASME Code, Section VIII Division 1, 2023



Internal Pressure Results for: TOP HEAD

Elliptical Head Design Information:			
Design Pressure P	3.500 bar(g)	Int. Design Temperature	80 °C
Material	SA-516 60	Ext. Design Temperature	80 °C
Length	50.000 mm.	External Pressure Chart	CS-2
		UNS Number	K02100
Int. Corr. All. c	1.0000 mm.	Allowable Stress (ope) S	117.9 N./mm^2
Ext. Corr. All. ce	0.0000 mm.	Allowable Stress (amb) Sa	117.9 N./mm^2
Inside Diameter Di	600.000 mm.	Actual Stress	17.7 N./mm^2
Spec. Min. Thk t or e	8.0000 mm.	Spec. Nominal Thk.	10.000 mm.
Surface Area	5140.7 cm^2	SG of Contents	0.000
Element Volume	42419.1 cm³	Weight of Contents	0.0 kgf
Empty Weight	41.9 kgf	Operating Weight	41.9 kgf
		Comp. All. Ope. Stress	133.1 N./mm^2
		Aspect Ratio	2.00

Radiography Information:			
Spot Radiography per UW-11(b) Type 1		Seamless	
Circ. Joint Efficiency	85 %	Long. Joint Efficiency E	85 %

Tolerance for Formed Heads per UG-81(a):
Head inner surface maximum deviation outside the specified shape, 1.25% of D: 7.500 mm.
Head inner surface maximum deviation inside the specified shape, 0.625% of D: 3.750 mm.

Required Thickness due to Internal Pressure [tr]:
= (P*D*Kcor)/(2*S*E-0.2*P) Appendix 1-4(c)
= (3.5*602.0*0.996)/(2*117.9*0.85-0.2*3.5)
= 1.0469 + 1.0000 = 2.0469 mm.

Note: The thickness required was less than the Code Minimum, therefore the Code Minimum value of 1.5000 mm. per UG-16 will be used.

Max. Allowable Working Pressure at given Thickness, corroded [MAWP]:
= (2*S*E*t)/(Kcor*D+0.2*t) per Appendix 1-4 (c)
= (2*117.9*0.85*7.0)/(0.996*602.0+0.2*7.0)
= 23 bar(g)

Maximum Allowable Pressure, New and Cold [MAPNC]:
= (2*S*E*t)/(K*D+0.2*t) per Appendix 1-4 (c)
= (2*117.9*0.85*8.0)/(1.0*600.0+0.2*8.0)
= 27 bar(g)

Actual stress at given pressure and thickness, corroded [Sact]:
= (P*(Kcor*D+0.2*t))/(2*E*t)
= (3.5*(0.996*602.0+0.2*7.0))/(2*0.85*7.0)
= 17.669 N./mm^2

Straight Flange Required Thickness:
= (P*R)/(S*E-0.6*P) + c per UG-27 (c)(1)
= (3.5*301.0)/(117.9*0.85-0.6*3.5)+1.0
= 2.053 mm.

Straight Flange Maximum Allowable Working Pressure:
= (S*E*t)/(R+0.6*t) per UG-27 (c)(1)
= (117.9 * 0.85 * 9.0)/(301.0 + 0.6 * 9.0)
= 29 bar(g)

Factor K, corroded condition [Kcor]:
= (2 + (Inside Diameter/(2 * Inside Head Depth))^2)/6
= (2 + (602.0/(2 * 151.0))^2)/6
= 0.995592

Percent Elong. per UCS-79, VIII-1-01-57 (75*tnom/Rf)*(1-Rf/Ro) 7.009 %
Note: Please Check Requirements of UCS-79 as Elongation is > 5%.

MDMT Calculations in the Knuckle Portion:

Govrn. thk, tg = 8.0, tr = 5.482, c = 1.0 mm., E✱ = 0.85
Thickness Ratio = tr * E✱/(tg - c) = 0.666, Temp. Reduction = 19 °C

Min Metal Temp. w/o impact per UCS-66, Curve D	-48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit	-48 °C

MDMT Calculations in the Head Straight Flange:

Govrn. thk, tg = 10.0, tr = 5.557, c = 1.0 mm., E✱ = 0.85
Thickness Ratio = tr * E✱/(tg - c) = 0.525, Temp. Reduction = 29 °C

Min Metal Temp. w/o impact per UCS-66, Curve D	-48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit	-48 °C

MDMT Design Information:

MDMT Curve	D	Press. at MDMT	18.300 bar(g)
UCS-66(b) red.	No	Min. Des. Mtl. Temp.	-29 °C
Governing Thk.	10.000 mm.	Basic MDMT	-48 °C
Stress/Thk. Ratio	0.525	Temperature Difference	0 °C
UCS-66(c) red.	Yes	Computed Min. Temp.	-48 °C
		MDMT per UG-20(f)	-29 °C
		Joint Efficiency E*	85 %

Note: Temperature values displayed above are for the location with the highest basic MDMT

Tolerance for Formed Heads per UG-81(a):

```
Head inner surface maximum deviation outside the specified shape,  1.25% of D: 7.500 mm.
Head inner surface maximum deviation inside the specified shape,  0.625% of D: 3.750 mm.
```

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Hydrostatic Test Pressure Results:

UG99(b)	= 1.30 * M.A.W.P. * Sa/S	23.790 bar(g)
UG99b(b)(35)	= 1.30 * Design Pres * Sa/S	4.550 bar(g)
UG99(c)	= 1.30 * M.A.P. - Head(Hyd)	25.480 bar(g)
UG100	= 1.10 * M.A.W.P. * Sa/S	20.130 bar(g)
PED	= max(1.43*DP, 1.25*DP*ratio)	5.005 bar(g)
PED&UG99(b)(35)	= max(1.43*DP, 1.3*DP*ratio)	5.005 bar(g)
App 27-4	= M.A.W.P.	18.300 bar(g)

Pressure per the PED and UG-99(b)(35):
= max(1.43 * Design Pressure, 1.3 * Design Pressure * Stress ratio)
= max(1.43 * 3.5, 1.3 * 3.5 * 1.0)
= max(5.005, 4.55)
= 5.005 bar(g)

Vertical Test performed per: PED & UG-99(b)(35)

Please note that Nozzle, Shell, Head, Flange, etc MAWPs are all considered when determining the hydrotest pressure for those test types that are based on the MAWP of the vessel.

Stresses on Elements due to Test Pressure (N./mm^2 & bar(g)):

From To	Stress	Allowable	Ratio	Pressure
BOTTOM HEAD	23.3	198.6	0.117	5.26
MAIN SHELL	18.9	198.6	0.095	5.24
TOP HEAD	22.2	198.6	0.112	5.02

Stress ratios for Nozzle and Pad Materials (N./mm^2):

Description	Pad/Nozzle	Ambient	Operating	Ratio
N3-LIQUID OUTLET	Nozzle	137.90	137.90	1.000
N1- GAS INLET	Nozzle	117.90	117.90	1.000
N1- GAS INLET	Pad	137.90	137.90	1.000
H1-INSPECTION PO	Nozzle	117.90	117.90	1.000
K1B-LT FOR ALARM	Nozzle	137.90	137.90	1.000
H2-INSPECTION PO	Nozzle	117.90	117.90	1.000
N4-VENT	Nozzle	117.90	117.90	1.000
K1A-LT FOR ALARM	Nozzle	137.90	137.90	1.000
K3-PT	Nozzle	137.90	137.90	1.000
N2-GAS OUTLET	Nozzle	117.90	117.90	1.000
N2-GAS OUTLET	Pad	117.90	117.90	1.000
Minimum				1.000

Stress ratios for Pressurized Vessel Elements (N./mm^2):

Description	Ambient	Operating	Ratio
BOTTOM HEAD	117.90	117.90	1.000
MAIN SHELL	117.90	117.90	1.000
TOP HEAD	117.90	117.90	1.000
Minimum			1.000

Hoop Stress in Nozzle Wall during Pressure Test (N./mm^2):

Description	Ambient	Operating	Ratio
N3-LIQUID OUTLET	0.84	223.40	0.004
N1- GAS INLET	6.09	217.19	0.028
H1-INSPECTION PO	4.37	217.19	0.020
K1B-LT FOR ALARM	0.83	223.40	0.004
H2-INSPECTION PO	4.22	217.19	0.019
N4-VENT	3.16	217.19	0.015
K1A-LT FOR ALARM	0.83	223.40	0.004
K3-PT	0.81	223.40	0.004
N2-GAS OUTLET	5.97	217.19	0.027

Elements Suitable for Test Pressure.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Element and Detail Weights:

From	To	Element Metal Wgt. kg.	Element ID Volume cm³	Corroded Metal Wgt. kg.	Corroded ID Volume cm³	Extra due Misc % kg.
10	20	41.941	42419.1	37.7469	42797.3	4.1941
20	30	334.172	636287	301.247	640536	33.4172
30	40	41.941	42419.1	37.7469	42797.3	4.1941
Total		418	721124.75	376	726130.12	41

Weight of Details:

From	Type	Weight of Detail kg.	X Offset, Dtl. Cent. mm.	Y Offset, Dtl. Cent. mm.	Z Offset Dtl. Cent. mm.	Description
10	Liqd	42.3932	...	-75	...	Liquid: 10
10	Nozl	3.67268	...	-271.006	...	N3-LIQUID OUTLET
20	Liqd	197.835	...	350	...	Liquid: 20
20	Nozl	64.8352	-375.006	1210	...	N1- GAS INLET
20	Nozl	54.6131	...	230	375.006	H1-INSPECTION PO
20	Nozl	3.67268	265.169	300	-265.169	K1B-LT FOR ALARM
20	Nozl	54.6131	...	2020	375.006	H2-INSPECTION PO
20	Nozl	10.5727	...	2100	-375.006	N4-VENT
20	Nozl	3.67268	265.169	760	-265.169	K1A-LT FOR ALARM
20	Nozl	3.67268	-324.765	2100	-187.503	K3-PT
20	Legs	49.4842	...	-310	...	LEGS
30	Nozl	64.6793	...	271.006	...	N2-GAS OUTLET

Total Weight of Each Detail Type:

Liquid	240.2
Nozzles	264.0
Legs	49.5
Sum of the Detail Weights	553.7 kg.

Weight Summation Results: (kg.)

	Fabricated	Shop Test	Shipping	Erected	Empty	Operating
Main Elements	459.9	459.9	459.9	459.9	459.9	459.9
Nozzles	264.0	264.0	264.0	264.0	264.0	264.0
Legs	49.5	49.5	49.5	49.5	49.5	49.5
Ope. Liquid	...	...	...	...	...	240.2
Test Liquid	...	720.7	...	...	...	...
Totals	773.3	1494.0	773.3	773.3	773.3	1013.6

Miscellaneous Weight Percent: 10.0 %

Note that the above value for the miscellaneous weight percent has been applied to the shells/heads/flange/tubesheets/tubes etc. in the weight calculations for metallic components.

Weight Summary:

Fabricated Wt.	- Bare Weight without Removable Internals	773.3 kg.
Shop Test Wt.	- Fabricated Weight + Water (Full)	1494.0 kg.
Shipping Wt.	- Fab. Weight + removable Intls.+ Shipping App.	773.3 kg.
Erected Wt.	- Fab. Wt + or - loose items (trays,platforms etc.)	773.3 kg.
Ope. Wt. no Liq	- Fab. Weight + Internals. + Details + Weights	773.3 kg.
Operating Wt.	- Empty Weight + Operating Liq. Uncorroded	1013.6 kg.
Field Test Wt.	- Empty Weight + Water (Full)	1494.0 kg.

Weights used in Vortex Shedding Calculations:

Mass of the Upper 1/3 of the Vertical Vessel (operating)	283.1 kg.
Mass of the Upper 1/3 of the Vertical Vessel (filled w/water)	430.7 kg.
Mass of the Upper 1/3 of the Vertical Vessel (empty)	299.5 kg.

Surface Areas of Elements:

From	To	Outside Surface Area cm^2	Inside Surface Area cm^2
10	20	5140.73	4844.82
20	30	43825.2	42411.5
30	40	5140.73	4844.82
Total		54106.7	52101.2 cm^2
Total		58.2	56.1 ft²

Element and Detail Weights:

From	To	Total Ele. Empty Wgt. kg.	Total. Ele. Oper. Wgt. kg.	Total. Ele. Hydro. Wgt. kg.	Total Dtl. Offset Mom. Kg-m.	Oper. Wgt. No Liquid kg.
10	20	49.8078	92.201	92.201	...	49.8078
20	Legs	42.556	57.5035	90.6016	34.36	42.556
Legs	30	520.685	703.572	1108.54	...	520.685
30	40	110.814	110.814	153.208	...	110.814

Cumulative Vessel Weight

From	To	Cumulative Ope Wgt. No Liquid kg.	Cumulative Oper. Wgt. kg.	Cumulative Hydro. Wgt. kg.
10	20	...	...	...
20	Legs	-49.8078	-92.201	-92.201
Legs	30	631.499	814.387	1261.75
30	40	110.814	110.814	153.208

The cumulative operating weights no liquid in the column above are the cumulative operating weights minus the operating liquid weight minus any weights absent in the empty condition.

Cumulative Vessel Moment

From	To	Cumulative Empty Mom. Kg-m.	Cumulative Oper. Mom. Kg-m.	Cumulative Hydro. Mom. Kg-m.
10	20	...	...	...
20	Legs	34.36	34.36	34.36
Legs	30	...	...	...
30	40	...	...	...

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Nozzle Flange MAWP Results: (bar(g) & °C)

Nozzle Description	Flange Rating Ope.	Flange Rating Ambient	Design Temp	Class	Grade/ Group	Equiv. Press	Max Pressure UG-44(b)	Max Pressure 50%	Max Pressure DNV
N3-LIQUID OUTL	18.30	19.60	80	150	GR 1.1	...	...	...	...
N1- GAS INLET	18.30	19.60	80	150	GR 1.1	19.790	18.300	18.300	7.66
H1-INSPECTION	18.30	19.60	80	150	GR 1.1	...	...	...	...
K1B-LT FOR ALA	18.30	19.60	80	150	GR 1.1	...	...	...	...
H2-INSPECTION	18.30	19.60	80	150	GR 1.1	...	...	...	...
N4-VENT	18.30	19.60	80	150	GR 1.1	...	...	...	...
K1A-LT FOR ALA	18.30	19.60	80	150	GR 1.1	...	...	...	...
K3-PT	18.30	19.60	80	150	GR 1.1	...	...	...	...
N2-GAS OUTLET	18.30	19.60	80	150	GR 1.1	19.790	18.300	18.300	7.66
Min Rating	18.300	19.600, [for Core Elements]				...		...	...

Selected Method for Derating ASME B16.5 Flange MAWP: ASME UG-44(b)

The UG-44(b) Method is based on the paper PVP 2013-97814. PV Elite uses the maximum loads from each load category to determine ME and FE. In many cases, the computed maximum allowable pressure will be greater than the flange rating. In these cases, the minimum of the rating from the table and the UG-44(b) method will be used. SA-193 B8 Cl. 2 bolts or ones with higher allowable stresses at the specified bolt size shall be used.

The axial force FE must put the nozzle in tension (-P for 107/297; +Fr for PD 5500 AnnexG) to be considered.

Nozzle Description	Gasket Dimension G mm.	Fm Value	Resolved Moment ME Kg-m.	Axial Force FE kgf	MAWP PD bar(g)	Maximum Pressure Pmax bar(g)	Pass Fail
N1- GAS INLET	302.387	1.20	1003	1224	18.300	18.300	Pass
N2-GAS OUTLET	302.387	1.20	1003	1224	18.300	18.300	Pass

Evaluating Flange on Nozzle [N1- GAS INLET]:
```
= 16*ME + 4*FE*G <= pi*G^3[((PR - PD) + FM * PR)]
= 16(1003)+4*abs(1224)302.387 < pi*302.387^3[(18.300-18.300)+1.200*18.300]
= 0.17531+05 <= 0.19453+05  Check Passes
```

Maximum Pressure for Flange on Nozzle N1- GAS INLET [Pmax]:
```
= min( PR, FM * PR + PR - (16*ME + 4*FE * G) / ( pi * G^3 ))
= min( 18.300, 1.200 * 18.300 + 18.300 - 17530.7/(pi * 302.387^3)
= min( 18.300, 20.470 )
= 18.300 bar(g)
```

Evaluating Flange on Nozzle [N2-GAS OUTLET]:
```
= 16*ME + 4*FE*G <= pi*G^3[((PR - PD) + FM * PR)]
= 16(1003)+4*abs(1224)302.387 < pi*302.387^3[(18.300-18.300)+1.200*18.300]
= 0.17531+05 <= 0.19453+05  Check Passes
```

Maximum Pressure for Flange on Nozzle N2-GAS OUTLET [Pmax]:
```
= min( PR, FM * PR + PR - (16*ME + 4*FE * G) / ( pi * G^3 ))
= min( 18.300, 1.200 * 18.300 + 18.300 - 17530.7/(pi * 302.387^3)
= min( 18.300, 20.470 )
= 18.300 bar(g)
```

Pressure Ratings are per ASME B16.5 2017 Metric Edition

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Natural Frequency [fn]:
```
  = 1 / ( 2 * pi * sqrt( wyy /( 386 * |( wy )| )))
  = 1/( 2 * pi * sqrt( 64.344/( 386 * |( 414.835 )| ))) Imperial units
  = 7.940 Hz.
```

where:
```
 wy = SumOf( weight * deflection )
 wyy = SumOf( weight * deflection^2 )
```

The Natural Frequencies for the vessel have been computed iteratively by solving a system of matrices. These matrices describe the mass and the stiffness of the vessel. This is the generalized eigenvalue/ eigenvector problem and is referenced in some mathematical texts.

The Natural Frequency for the Vessel (Empty.) is 21.3243 Hz.

Natural Frequency [fn]:
```
  = 1 / ( 2 * pi * sqrt( wyy /( 386 * |( wy )| )))
  = 1/( 2 * pi * sqrt( 144.418/( 386 * |( 699.431 )| ))) Imperial units
  = 6.881 Hz.
```

where:
```
 wy = SumOf( weight * deflection )
 wyy = SumOf( weight * deflection^2 )
```

The Natural Frequency for the Vessel (Ope...) is 19.0713 Hz.

Natural Frequency [fn]:
```
  = 1 / ( 2 * pi * sqrt( wyy /( 386 * |( wy )| )))
  = 1/( 2 * pi * sqrt( 512.448/( 386 * |( 1657.306 )| ))) Imperial units
  = 5.623 Hz.
```

where:
```
 wy = SumOf( weight * deflection )
 wyy = SumOf( weight * deflection^2 )
```

The Natural Frequency for the Vessel (Filled) is 15.5408 Hz.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Wind Load Calculation Results:

Wind Load results per EN 1991-1-4:2005+A1:2010

Input Data:

Wind Design Code	EN 1991-1-4:2005+A1:2010	
Fundamental Wind Velocity [Vb,0]	162	km/hr
Direction Factor [Cdir]	1.0	
Seasonal Factor [CSeason]	1.0	
Force Coefficient [Cf]	0.69999999	
Terrain Category	0 - Sea or Costal Area	
Air Density	1.25	kg/m³
Orography Factor	1.0	
Check Vortex Shedding per Section 22.10	No	
Use Procedure 2 Annex C to compute CsCd	No	
User input CsCd, Operating Case	1.0	
User input CsCd, Empty Case	0.0	
User input CsCd, Test Case	0.0	
Damping Factor, deltaS, [Operating]	0.0400	
Damping Factor, deltaS, [Empty]	0.0120	
Damping Factor, deltaS, [Filled]	0.0400	

The vessel must be skirt supported at the base to include the effects of vortex shedding per EN 13445 Section 22.10.

Analysis Results:

Note: The Wind Load Results below are in Metric Units.

Category 2 Basic Wind Velocity [Vb]:
= Cdir * CSeason * Vb,0
= 1.0 * 1.0 * 45.001
= 45.001 m/s

Terrain Factor dependant on Roughness Length [kr]:
$= 0.19(Zo / Z0,ii)^{0.07}$
$= 0.19(0.003/0.05)^{0.07}$
= 0.156

Sample Calculation for the first Element:

Determine the Roughness factor as a function of Elevation [Cr(z)]:
= kr * ln(z / zo)
= 0.156 * ln(1.0/0.003)
= 0.906

Mean Velocity at Height z [Vm(z)]:
= cr(z) * Co(z) * Vb
= 0.906 * 1.0 * 45.001
= 40.791 m/s

Turbulence Intensity at Height z [Iv(z)]:
= 1 / (Co(z) * ln(z / zo))
= 1/(1.0 * ln(1.0/0.003))
= 0.172

Peak Velocity Pressure at Height z [qp(z)]:

$= [1 + 7 * Iv(z)] * 1/2 * rho * Vm(z)^2$

$= [1 + 7 * 0.172] * 1/2 * 1.25 * 40.791^2$

$= 2293.027\ N/m^2$

Note: The turbulence factor ki(z) is taken to be 1.

EN 1991, Calculation of the Gust Response Factor CsCd:

Natural Frequency	n operating	19.07133	hz
Natural Frequency	n empty	21.32426	hz
Natural Frequency	n filled	15.54081	hz
Average Outer Diameter	b	0.61983	meters
Maximum Height	h	2.50800	meters
Zmin	zmin	1.00000	meters
z0	z0	0.00300	meters
Air Density	rho	1.25000	kg/m^3
alpha	alpha	0.37954	
L(z) at height 0.6 * h, B.1	L(0.6h)	46.89674	
Structural Damping	deltaS	0.02000	
Surface Roughness	k	0.02000	mm
Effective Slenderness Table 7.16, 15	h/b	4.04627	
Effective Slenderness Table 7.16, 50	0.7 * h/b	2.83239	
Effective Slenderness, final	lambda	4.04627	
Solidity ratio	phi	1.00000	
End Effect Factor Fig. 7.36	psi lambda	0.73978	
Factor, see Figure 7.28 Note 2	v; v(ze)	64.73548	
Reynold's Number, eqn. 7.19	Re	2674998	
Force Coefficient, see 7.28	Cf,0	1.05390	

Parameters for the Empty Case:

Non dimensional frequency from B.2	fl(zs)	22.42646	
One sided variance spectrum from B.2	Sl(zs)	0.01769	
Parameter from B.7	etah	5.51701	
Parameter from B.8	etab	1.36348	
Aerodynamic admittance value	Rh	0.16483	
Aerodynamic admittance value	Rb	1.36348	
Mass per Unit Length	mue	308.99487	kg/m
Aerodynamic Damping	deltaA	0.00204	
Final Value (deltaA + deltaS)	delta	0.02204	
Resonance Response Factor	R²	0.31475	
Background Factor Factor	B²	0.85950	
Up Crossing Frequency	nu	11.04017	Hz
Peak Factor	kp	4.33790	
Size Factor, see 6.2	cs	0.96167	
Dynamic Factor, see 6.3	cd	1.22737	
Final Value, see 6.3.1	CsCd	1.18033	

Parameters for the Test Case:

Non dimensional frequency from B.2	fl(zs)	16.34407	
One sided variance spectrum from B.2	Sl(zs)	0.02179	
Parameter from B.7	etah	4.02071	
Parameter from B.8	etab	0.99368	
Aerodynamic admittance value	Rh	0.21779	
Aerodynamic admittance value	Rb	0.99368	
Mass per Unit Length	mue	596.94812	kg/m
Aerodynamic Damping	deltaA	0.00145	
Final Value (deltaA + deltaS)	delta	0.02145	
Resonance Response Factor	R²	0.62162	
Background Factor Factor	B²	0.85950	
Up Crossing Frequency	nu	10.06796	Hz

```
Peak Factor                                                    kp      4.31662
Size Factor, see 6.2                                           cs      0.96167
Dynamic Factor, see 6.3                                        cd      1.31369
Final Value, see 6.3.1                                       CsCd      1.26334
```

Force on the First Element at Height z, Operating [Fw(z)]:
```
  = qp(z) * CsCd * Aref * Cf
  = 47.891 * 1.0 * 1.385 * 0.7
  = 206.562 Newtons
```

Wind Vibration Calculations

This evaluation is based on work by Kanti Mahajan and Ed Zorilla

Nomenclature

```
 Cf  - Correction factor for natural frequency
  D  - Average outer insulated diameter of vessel, mm.
 Df  - Damping Factor < 0.75 Unstable,  > 0.95 Stable
 Dr  - Average outer insulated of top half of vessel, mm.
  f  - Natural frequency of vibration (Hertz)
 f1  - Natural frequency of bare vessel based on a unit value of (D/L²)(10⁴)
  L  - Total height of structure mm.
 Lc  - Total length of conical section(s) of vessel, mm.
 tb  - Uncorroded plate thickness at bottom of vessel, mm.
 V30 - Design Wind Speed provided by user, km/hr
 Vc  - Critical wind velocity, km/hr
 Vw  - Maximum wind speed at top of structure, km/hr
 W   - Total corroded weight of structure, kgf
 Ws  - Cor. vessel weight excl. weight of parts which do not effect stiff. kgf
  Z  - Maximum amplitude of vibration at top of vessel, mm.
 Dl  - Logarithmic decrement ( taken as 0.03 for Welded Structures )
 Vp  - Vib. Chance, <= 0.320E-06 (High); 0.320E-06 < 0.400E-06 (Probable)
 P30 - wind pressure 30 feet above the base
```

Check other Conditions and Basic Assumptions:
```
 :: Total Cone Length / Total Length < 0.5
 :: 0.0/2350.0 = 0.0

 :: [ D / L² ] * 10⁴ < 8 (English Units, ft.)
 :: [ 2.03/7.71² ] * 10⁴ = 342.099 [Geometry Violation]
```

Compute the vibration possibility. If Vp > 0.400E-06 no chance. [Vp]:
```
  = W / ( L * Dr²)
  = 968/( 2350.0 * 619.83² )
  = 0.10723E-05
```

Since Vp is > 0.400E-06 no further vibration analysis is required !

The Natural Frequency for the Vessel (Ope...) is 19.0713 Hz.

Wind Load Calculation:

From	To	Wind Height mm.	Wind Diameter mm.	Wind Area cm^2	Wind Pressure kgs/m^2	Element Wind Load kgf
10	20	117.382	739.2	1286.89	233.828	21.0632
20	30	1325	744	16740	250.539	293.572
30	40	2540.62	739.2	1286.89	291.109	26.2231

The Natural Frequency for the Vessel (Empty.) is 21.3243 Hz.

Wind Load Calculation:

From	To	Wind Height mm.	Wind Diameter mm.	Wind Area cm^2	Wind Pressure kgs/m^2	Element Wind Load kgf
10	20	117.382	739.2	1286.89	233.828	24.8616
20	30	1325	744	16740	250.539	346.512
30	40	2540.62	739.2	1286.89	291.109	30.9519

The Natural Frequency for the Vessel (Filled) is 15.5408 Hz.

Wind Load Calculation:

From	To	Wind Height mm.	Wind Diameter mm.	Wind Area cm^2	Wind Pressure kgs/m^2	Element Wind Load kgf
10	20	117.382	739.2	1286.89	233.828	26.6101
20	30	1325	744	16740	250.539	370.883
30	40	2540.62	739.2	1286.89	291.109	33.1288

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

The following table is for the Filled Case.

Cumulative Wind Shear and Bending Moment

From	To	Distance to Support mm.	Cumulative Wind Shear kgf	Wind Bending Kg-m.
10	20	260.618	...	...
20	Legs	85	26.6101	2.41141
Legs	30	1040	402.6	419.176
30	40	2170.62	33.1288	3.00213

The following table is for the Empty Case.

Wind/Earthquake Shear, Bending:

From	To	Distance to Support mm.	Cumulative Wind Shear kgf	Earthquake Shear kgf	Wind Bending Kg-m.	Earthquake Bending Kg-m.
10	20	260.618	...	...	...	...
20	Legs	85	24.8616	...	2.25295	...
Legs	30	1040	376.145	...	391.632	...
30	40	2170.62	30.9519	...	2.80486	...

The following table is for the Operating Case.

Wind/Earthquake Shear, Bending:

From	To	Distance to Support mm.	Cumulative Wind Shear kgf	Earthquake Shear kgf	Wind Bending Kg-m.	Earthquake Bending Kg-m.
10	20	260.618	...	...	...	...
20	Legs	85	21.0632	...	1.90875	...
Legs	30	1040	318.677	...	331.799	...
30	40	2170.62	26.2231	...	2.37633	...

Note:
The Wind Shears/Moments and the Earthquake Shears/Moments calculated
and printed in the Wind/Earthquake Shear and Bending report have
been factored by the input Scalar/Load reductions factors of;
Wind: 1.000; Earthquake: 1.000.

Note:
Review the Vessel Design Summary for the cumulative shear force
and bending moment on the support.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Wind Deflection Calculations:

The following table is for Wind Deflection; Filled(test) Case.

Note: Test Case Deflections were computed using un-corr. section properties.

Wind Load Deflection:

From	To	Cumulative Shear kgf	Centroid Deflection mm.	Elem. End Deflection mm.	Elem. Ang. Rotation
10	20	...	0.5451	0.5451	0.00085084
20	Legs	6.65253	0.54513	0.54519	0.00085186
Legs	30	100.65	0.54871	0.55444	0.00085656
30	40	8.28219	0.55458	0.55472	0.00085656

Allowable deflection at the Tower Top (Hyd)(6.000"/100ft. Criteria)
Allowable deflection : 11.750 Actual deflection : 0.555 mm.

The following table is for Wind Deflection; Empty Case.

Wind Load Deflection:

From	To	Cumulative Shear kgf	Centroid Deflection mm.	Elem. End Deflection mm.	Elem. Ang. Rotation
10	20	...	2.03711	2.03711	0.0031793
20	Legs	24.8616	2.0372	2.03747	0.0031836
Legs	30	376.145	2.05201	2.07567	0.0032029
30	40	30.9519	2.07626	2.07685	0.0032029

Allowable deflection at the Tower Top (Emp)(6.000"/100ft. Criteria)
Allowable deflection : 11.750 Actual deflection : 2.077 mm.

The following table is for Wind Deflection; Operating Case.

Wind Load Deflection:

From	To	Cumulative Shear kgf	Centroid Deflection mm.	Elem. End Deflection mm.	Elem. Ang. Rotation
10	20	...	1.72588	1.72588	0.0026935
20	Legs	21.0632	1.72596	1.72619	0.0026972
Legs	30	318.677	1.73866	1.75894	0.0027138
30	40	26.2231	1.75945	1.75996	0.0027138

Critical Wind Velocity for Tower Vibration:

From	To	1st Crit. Wind Speed km/hr	2nd Crit. Wind Speed km/hr
10	20	253.072	1581.7
20	30	254.715	1591.97
30	40	253.072	1581.7

Allowable deflection at the Tower Top (Ope)(6.000"/100ft. Criteria)
Allowable deflection : 11.750 Actual deflection : 1.760 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Longitudinal Stress Constants:

From	To	Metal Area New cm^2	Metal Area Corroded cm^2	Section Modulus New mm.³	Section Modulus Corroded mm.³
10	20	152.807	133.926	2292900	2016116
20	30	191.637	172.756	2876101	2601103
30	40	152.807	133.926	2292900	2016116

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Longitudinal Allowable Stresses:

From	To	Tensile N./mm^2	Hydrotest Tensile N./mm^2	Compressive N./mm^2	Hydrotest Compressive N./mm^2
10	20	120.263	202.547	-133.109	-135.92
20	Legs	120.263	202.547	-138.07	-139.941
Legs	30	120.263	202.547	-138.07	-139.941
30	40	120.263	202.547	-133.109	-135.92

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Longitudinal Stress Report

Longitudinal Operating and Empty Stresses are computed in the corroded condition. Stresses due to loads in the hydrostatic test cases have been computed in the new and cold condition.

Longitudinal Pressure Stresses due to:

From	To	Longitudinal Stress Internal Pressure N./mm^2	Longitudinal Stress External Pressure N./mm^2	Longitudinal Stress Hydrotest Pressure N./mm^2
10	20	7.455	...	9.28427
20	30	5.78278	...	7.4074
30	40	7.455	...	9.28427

Longitudinal Stresses due to Weight Loads for these Conditions:

From	To	Wght. Str. Empty N./mm^2	Wght. Str. Operating N./mm^2	Wght. Str. Hydrotest N./mm^2	Wght. Str. Emp. Mom. N./mm^2	Wght. Str. Opr. Mom. N./mm^2
10	20	...	...	...	...	...
20	Legs	0.028274	0.05234	0.047183	0.12954	0.12954
Legs	30	-0.35848	-0.35	-0.32316	...	...
30	40	-0.081145	-0.081145	-0.071118	...	...

Longitudinal Stresses due to Weight Loads and Bending for these Conditions:

From	To	Wght. Str. Hyd. Mom. N./mm^2	Bend. Str. Oper. Wind N./mm^2	Bend. Str. Oper. Equ. N./mm^2	Bend. Str. Hyd. Wind N./mm^2	Bend. Str. Hyd. Equ. N./mm^2
10	20	...	...	...	...	...
20	Legs	0.11716	0.0071963	...	0.0020555	...
Legs	30	...	1.25094	...	0.35732	...
30	40	...	0.011559	...	0.00321	...

Longitudinal Stresses due to these Conditions:

From	To	Vortex Shedding Operating Case N./mm^2	Vortex Shedding Empty Case N./mm^2	Vortex Shedding Test Case N./mm^2	Earthquake Empty Case N./mm^2
10	20	...	...	...	...
20	Legs	...	...	...	...
Legs	30	...	...	...	...
30	40	...	...	...	...

Longitudinal Stresses due to Applied Axial Forces:

From	To	Longitudinal Stress Y Forces Wind N./mm^2	Longitudinal Stress Y Forces Seismic N./mm^2
10	20	...	...
20	Legs	...	...
Legs	30	...	...
30	40	...	...

Longitudinal Stresses due to User Forces and Moments:

From	To	Wind For/Mom Corroded N./mm^2	Earthquake For/Mom Corroded N./mm^2	Wind For/Mom No Corrosion N./mm^2	Earthquake For/Mom No Corrosion N./mm^2
10	20	...	...	...	...
20	Legs	...	...	...	...
Legs	30	...	...	...	...
30	40	...	...	...	...

Bending Stresses due to Blast Load:

From	To	Bending Stress N./mm^2
10	20	...
20	Legs	...
Legs	30	...
30	40	...

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Stress Combination Load Cases for Vertical Vessels:

Load Case Definition Key

```
IP = Longitudinal Stress due to Internal  Pressure
EP = Longitudinal Stress due to External  Pressure
HP = Longitudinal Stress due to Hydrotest Pressure
NP = No Pressure
EW = Longitudinal Stress due to Weight (No Liquid)
OW = Longitudinal Stress due to Weight (Operating)
HW = Longitudinal Stress due to Weight (Hydrotest)
WI = Bending Stress due to Wind Moment (Operating)
EQ = Bending Stress due to Earthquake Moment (Operating)
EE = Bending Stress due to Earthquake Moment (Empty)
HI = Bending Stress due to Wind Moment (Hydrotest)
HE = Bending Stress due to Earthquake Moment (Hydrotest)
WE = Bending Stress due to Wind Moment (Empty) (no CA)
WF = Bending Stress due to Wind Moment (Filled) (no CA)
CW = Longitudinal Stress due to Weight (Empty) (no CA)
VO = Bending Stress due to Vortex Shedding Loads ( Ope )
VE = Bending Stress due to Vortex Shedding Loads ( Emp )
VF = Bending Stress due to Vortex Shedding Loads ( Test No CA. )
FW = Axial Stress due to Vertical Forces for the Wind Case
FS = Axial Stress due to Vertical Forces for the Seismic Case
BW = Bending Stress due to Lat. Forces for the Wind Case, Corroded
BS = Bending Stress due to Lat. Forces for the Seismic Case, Corroded
BN = Bending Stress due to Lat. Forces for the Wind Case, UnCorroded
BU = Bending Stress due to Lat. Forces for the Seismic Case, UnCorroded
BL = Bending Stress due to Blast Loads, Corroded
```

General Notes:

Case types HI and HE are in the Un-Corroded condition.

Case types WE, WF, and CW are in the Un-Corroded condition.

A blank stress and stress ratio indicates that the corresponding stress comprising those components that did not contribute to that type of stress.

An asterisk (*) in the final column denotes overstress.

Analysis of Load Case 1 : NP+EW+WI+FW+BW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.17	120.26	-0.11	138.07	0.0014	0.0008
20	0.89	120.26	-1.61	138.07	0.0074	0.0117
30		120.26	-0.09	133.11		0.0007

Analysis of Load Case 2 : NP+EW+EE+FS+BS

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.16	120.26	-0.10	138.07	0.0013	0.0007
20		120.26	-0.36	138.07		0.0026
30		120.26	-0.08	133.11		0.0006

Analysis of Load Case 3 : NP+OW+WI+FW+BW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio

10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.19	120.26	-0.08	138.07	0.0016	0.0006
20	0.90	120.26	-1.60	138.07	0.0075	0.0116
30		120.26	-0.09	133.11		0.0007

Analysis of Load Case 4 : NP+OW+EQ+FS+BS

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.18	120.26	-0.08	138.07	0.0015	0.0006
20		120.26	-0.35	138.07		0.0025
30		120.26	-0.08	133.11		0.0006

Analysis of Load Case 5 : NP+HW+HI

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	202.55	0.00	135.92	0.0000	0.0000
20	0.17	202.55	-0.07	139.94	0.0008	0.0005
20	0.03	202.55	-0.68	139.94	0.0002	0.0049
30		202.55	-0.07	135.92		0.0005

Analysis of Load Case 6 : NP+HW+HE

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	202.55	0.00	135.92	0.0000	0.0000
20	0.16	202.55	-0.07	139.94	0.0008	0.0005
20		202.55	-0.32	139.94		0.0023
30		202.55	-0.07	135.92		0.0005

Analysis of Load Case 7 : IP+OW+WI+FW+BW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.97	120.26		138.07	0.0497	
20	6.68	120.26		138.07	0.0556	
30	7.39	120.26		133.11	0.0614	

Analysis of Load Case 8 : IP+OW+EQ+FS+BS

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.96	120.26		138.07	0.0496	
20	5.43	120.26		138.07	0.0452	
30	7.37	120.26		133.11	0.0613	

Analysis of Load Case 9 : EP+OW+WI+FW+BW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.19	120.26	-0.08	138.07	0.0016	0.0006
20	0.90	120.26	-1.60	138.07	0.0075	0.0116
30		120.26	-0.09	133.11		0.0007

Analysis of Load Case 10 : EP+OW+EQ+FS+BS

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio

10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.18	120.26	-0.08	138.07	0.0015	0.0006
20		120.26	-0.35	138.07		0.0025
30		120.26	-0.08	133.11		0.0006

Analysis of Load Case 11 : HP+HW+HI

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	9.28	202.55		135.92	0.0458	
20	7.57	202.55		139.94	0.0374	
20	7.44	202.55		139.94	0.0367	
30	9.22	202.55		135.92	0.0455	

Analysis of Load Case 12 : HP+HW+HE

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	9.28	202.55		135.92	0.0458	
20	7.57	202.55		139.94	0.0374	
20	7.08	202.55		139.94	0.0350	
30	9.21	202.55		135.92	0.0455	

Analysis of Load Case 13 : IP+WE+EW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.95	120.26		138.07	0.0495	
20	6.76	120.26		138.07	0.0562	
30	7.39	120.26		133.11	0.0614	

Analysis of Load Case 14 : IP+WF+CW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.84	120.26		138.07	0.0485	
20	6.90	120.26		138.07	0.0573	
30	7.40	120.26		133.11	0.0615	

Analysis of Load Case 15 : IP+VO+OW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.96	120.26		138.07	0.0496	
20	5.43	120.26		138.07	0.0452	
30	7.37	120.26		133.11	0.0613	

Analysis of Load Case 16 : IP+VE+EW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.94	120.26		138.07	0.0494	
20	5.42	120.26		138.07	0.0451	
30	7.37	120.26		133.11	0.0613	

Analysis of Load Case 17 : NP+VO+OW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.18	120.26	-0.08	138.07	0.0015	0.0006
20		120.26	-0.35	138.07		0.0025
30		120.26	-0.08	133.11		0.0006

Analysis of Load Case 18 : FS+BS+IP+OW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.96	120.26		138.07	0.0496	
20	5.43	120.26		138.07	0.0452	
30	7.37	120.26		133.11	0.0613	

Analysis of Load Case 19 : FS+BS+EP+OW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	0.00	120.26	0.00	133.11	0.0000	0.0000
20	0.18	120.26	-0.08	138.07	0.0015	0.0006
20		120.26	-0.35	138.07		0.0025
30		120.26	-0.08	133.11		0.0006

Analysis of Load Case 20 : BL+IP+OW

From Node	Tensile Stress	All. Tens. Stress	Comp. Stress	All. Comp. Stress	Tens. Ratio	Comp. Ratio
10	7.46	120.26		133.11	0.0620	
20	5.96	120.26		138.07	0.0496	
20	5.43	120.26		138.07	0.0452	
30	7.37	120.26		133.11	0.0613	

Absolute Maximum of the all of the Stress Ratio's 0.0620

Governing Element: BOTTOM HEAD
Governing Load Case 7 : IP+OW+WI+FW+BW

Element Description	Long Pressure Stress	Weight + Axial Load Stress	Eccentric Moment Stress	Wind or Earthquake Stress	Combined Stress	Which Side
BOTTOM HEAD	7.5	...	...	...	7.5	+ Tens
BOTTOM HEAD	7.5	...	...	...	...	- Comp
MAIN SHELL	5.8	0.1	0.1	...	6.0	+ Tens
MAIN SHELL	5.8	0.1	-0.1	-0.0	...	- Comp
MAIN SHELL	5.8	-0.3	...	1.3	6.7	+ Tens
MAIN SHELL	5.8	-0.3	...	-1.3	...	- Comp
TOP HEAD	7.5	-0.1	...	...	7.4	+ Tens
TOP HEAD	7.5	-0.1	...	-0.0	...	- Comp

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Shop/Field Installation Options :

Note : The CG is computed from the first Element From Node

```
Center of Gravity of the Liquid                          316.176 mm.
Center of Gravity of the Nozzles                        1553.826 mm.
Center of Gravity of the Legs                           -260.000 mm.

Center of Gravity of Bare Shell New and Cold            1175.000 mm.
Center of Gravity of Bare Shell Corroded                1175.000 mm.

Vessel CG in the Operating Condition                     991.852 mm.
Vessel CG in the Fabricated (Shop/Empty) Condition      1212.502 mm.
Vessel CG in the Test Condition                         1194.412 mm.
```

Rigging Analysis Results:

- Lifting weight based on the user selected calculated empty weight

```
Total Effective Length of Vessel for this analysis       2350.00 mm.
Total vessel weight (No Liquid)                Twt        773.35 kgf
Impact weight multiplication factor            Imp          2.00
Design lifting weight,  DWT = Imp * Twt                  1546.69 kgf
Elevation of the Tailing Lug (bottom)                       0.00 mm.
Elevation of the Lifting Lug (top   )                    2065.00 mm.
Design Reaction force at the tailing lug                  638.53 kgf
Design Reaction force at the lifting lug                  908.17 kgf

CG distance during field lifting operation               1212.50 mm.
CG distance from tailing lug                             1212.50 mm.
CG distance from the nearer lifting lug/trunnion          852.50 mm.

Compressive Allowable Increase Factor                       1.00
```

Critical Values: (N./mm^2, mm.)

	Max Stress	Elevation	Allowables	
Bending	0.66	1850.00	116.62	(UG-23)
Shear	0.35	1850.00	82.53	(0.7*S)

The compressive bending allowable stress is the minimum of the tensile allowable and the compressive allowable times the specified compressive allowable increase factor.

Forces and Moments at selected elevations (not all analysis points shown):

Distance mm.	Bending Moment Kg-m.	Bending Stress N./mm^2	Shear Force kgf	Shear Stress N./mm^2
0.00	0.0	0.0	498.4	0.3
500.00	26.9	0.1	551.3	0.3
1400.00	119.5	0.4	633.6	0.3
2300.00	89.2	0.4	122.4	0.1

Unity Check (Actual Stress / Allowable Stress):

Maximum Unity Check is 0.0057 at elevation 1850.0002 mm. - Must be <=1

Note: The rigging analysis is performed using a uniformly distributed load.

--- Plot data successfully generated ...----

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Lifting Lug Calculations:

Input Values:

Lifting Lug Material		SA-516 70	
Lifting Lug Yield Stress	Yield	262.01	N./mm^2
Total Height of Lifting Lug	w	140.0000	mm.
Thickness of Lifting Lug	t	12.0000	mm.
Diameter of Hole in Lifting Lug	dh	32.0000	mm.
Radius of Semi-Circular Arc of Lifting Lug	r	40.0000	mm.
Height of Lug from bottom to Center of Hole	h	100.0000	mm.
Offset from Vessel OD to Center of Hole	off	68.0000	mm.
Lug Fillet Weld Size	tw	8.0000	mm.
Length of weld along side of Lifting Lug	wl	140.0000	mm.
Length of Weld along Bottom of Lifting Lug	wb	12.0000	mm.
Thickness of Collar (if any)	tc	0.0000	mm.
Diameter of Collar (if any)	dc	0.0000	mm.
Impact Factor	Impfac	2.00	
Sling Angle from Horizontal		90.0	deg
Number of Lugs in Group		2	
Reinforcing Pad Circumferential Width	wpb	80.00	mm.
Reinforcing Pad Longitudinal Length	wpl	190.00	mm.
Reinforcing Pad Thickness	thkp	10.00	mm.
Reinforcing Pad Fillet Weld Size	tfp	8.00	mm.

Lifting Lug Orientation to Vessel: Perpendicular
Lift Orientation : From Horizontal to Vertical

Lifting Lug and Weld Stresses at various Angles: N./mm^2

	Weld Stresses			Lug Stresses		Maximum
Angle	Primary	Secondary	Allowable	Combined	Allowable	Ratio
0	29.9	...	104.8	90.1	172.9	0.521
5	30.8	...	104.8	91.5	172.9	0.529
10	31.4	...	104.8	92.2	172.9	0.533
15	31.8	...	104.8	92.2	172.9	0.533
20	32.0	...	104.8	91.4	172.9	0.528
25	32.0	...	104.8	89.9	172.9	0.520
30	31.8	...	104.8	87.7	172.9	0.507
35	31.4	...	104.8	84.8	172.9	0.491
40	30.7	...	104.8	81.3	172.9	0.470
45	29.9	...	104.8	77.1	172.9	0.446
50	28.8	...	104.8	72.3	172.9	0.418
55	27.6	...	104.8	66.9	172.9	0.387
60	26.2	...	104.8	60.9	172.9	0.352
65	24.6	...	104.8	54.4	172.9	0.315
70	23.0	...	104.8	47.4	172.9	0.274
75	21.2	...	104.8	39.9	172.9	0.231
80	19.4	...	104.8	31.8	172.9	0.185
85	17.6	...	104.8	23.1	172.9	0.168
90	16.2	...	104.8	13.2	172.9	0.155

Computed Results:

Total vessel weight (No Liquid)	773.35 kgf
Design Reaction force at the tailing lug	638.53 kgf
Design Reaction force at the lifting lug	908.17 kgf
Worst Case Lift Angle for Primary Weld Stresses	22 deg
Tangential Force at this Angle	442.6 kgf
Axial Force at this Angle	178.8 kgf
Worst Case Lift Angle for Secondary Weld Stresses	0 deg
Tangential Force at this Angle	454.1 kgf
Axial Force at this Angle	0.0 kgf
Worst Case Lift Angle for Lug Stresses	12 deg
Tangential Force at this Angle	456.6 kgf
Axial Force at this Angle	97.0 kgf

Converting the weld leg dimension (tw) to the weld throat dimension.

Weld Group Inertia Calculations:

Weld Group Inertia about the Circumferential Axis	Ilc	330.701 cm^4
Weld Group Centroid distance in the Long. Direction	Yll	75.656 mm.
Dist. of Weld Group Centroid from Lug bottom	Yll_b	70.000 mm.
Weld Group Inertia about the Longitudinal Axis	Ill	12.927 cm^4
Weld Group Centroid Distance in the Circ. Direction	Ylc	11.656 mm.

Note: The Impact Factor is applied to the Forces acting on the Lug.

Primary Shear Stress in the Welds due to Shear Loads [Ssll]:
= sqrt(Fax^2 + Ft^2 + Fn^2)/((2 * (wl + wb)) * tw)
= sqrt(179^2+443^2+0^2)/((2*(140.0+12.0))*5.656)
= 2.72 N./mm^2

Shear Stress in the Welds due to Bending Loads [Sblf]:
= (Fn(h-Yll_b))Yll/Ilc + (Fax * off * Yll/Ilc) + (Ft * off * Ylc/Ill)
= (0(100.0-70.0))75.656/330.701 +
(179 * 68.0 * 75.656/330.701) +
(443 * 68.0 * 11.656/12.927)
= 29.34 N./mm^2

Total Shear Stress for Combined Loads [St]:
= Ssll + Sblf
= 2.723 + 29.34
= 32.06 N./mm^2

Allowable Shear Stress for Combined Loads [Sta]:
= 0.4 * Yield * Occfac (AISC Shear Allowable)
= 0.4 * 262 * 1.0
= 104.80 N./mm^2

Shear Stress in Lug above Hole [Shs]:
= sqrt(Pl^2 + Fax^2) / Sha
= sqrt(773^2 + 179^2)/5.76
= 13.51 N./mm^2

Allowable Shear Stress in Lug above Hole [Sas]:
= 0.4 * Yield * Occfac
= 0.4 * 262 * 1.0
= 104.80 N./mm^2

Pin Hole Bearing Width [Pbw]:
= Lug Thickness + 2 * Collar Thickness
= 12.0 + 2 * 0.0
= 12.000 mm.

Pin Hole Bearing Stress [Pbs]:
= sqrt(Pl^2 + $Faxial^2$) / (Pbw * dh)
= sqrt(773^2 + 179^2)/(12.0 * 32.0)
= 20.27 N./mm^2

Allowable Bearing Stress [Pba]:
= min(0.75 * Yield * Occfac, 0.9 * Yield) AISC Bearing All.
= min(0.75 * 262 * 1.0, 235.8)
= 196.51 N./mm^2

Bending Stress at the Base of the Lug [Fbs]:
= Ft * off/(w * t^2/6) + Fax * off/(w^2 * t/6)
= 457 * 68.0/(140.0 * 12.0^2/6) +
97 * 68.0/(140.0^2 * 12.0/6)
= 90.88 N./mm^2

Tensile Stress at the Base of the Lug [Fa]:
= Fn / (w * t)
= 0/(140.0 * 12.0)
= 0.00 N./mm^2

Total Combined Stress at the Base of the Lug:
= Fbs + Fa
= 90.9 + 0.0
= 90.88 N./mm^2

Lug Allowable Stress for Bending and Tension:
= min(0.66 * Yield * Occfac, 0.75 * Yield)
= min(0.66 * 262 * 1.0, 196.5)
= 172.93 N./mm^2

Required Shackle Pin Diameter [Spd]:
= sqrt((2(Fn^2 + Fax^2)$^{0.5}$/(pi * Sta)))
= sqrt(2(773^2 + 179^2)$^{0.5}$/(pi * 105))
= 6.8763 mm.

WRC 107/537 Stress Analysis for the Lifting Lug to Shell Junction in the new and Cold Condition (no corrosion applied).

Note: The full lug load is applied in both the circumferential and longitudinal directions simultaneously.

The ratio Beta1/Beta2 for rectangular attachments was outside the range of values in tables 7 & 8 and was set to be an acceptable (maximum or minimum) value. This generally results in one dimension being altered so that the aspect ratio does not exceed 4 to 1.

Attachment dimensions (C11P, C22P etc.) may be modified accounting for attachment welds where applicable.

Input Echo, WRC107/537 Item 1, Description: Lift Lug

Diameter Basis for Vessel	Vbasis	ID	
Cylindrical or Spherical Vessel	Cylsph	Cylindrical	
Internal Corrosion Allowance	Cas	0.0000	mm.
Vessel Diameter	Dv	600.000	mm.
Vessel Thickness	Tv	10.000	mm.

Note: Lifting lug calculations are performed at ambient temperature conditions.

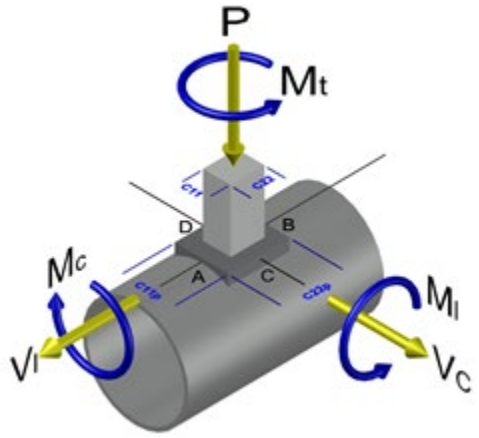
Attachment Type	Type	Rectangular	
Parameter C11	C11	12.00	mm.
Parameter C22	C22	48.00	mm.
Thickness of Reinforcing Pad	Tpad	10.000	mm.
Pad Parameter C11P	C11p	96.000	mm.
Pad Parameter C22P	C22p	198.000	mm.
Design Internal Pressure	Dp	0.000	bar(g)
Include Pressure Thrust		No	

External Forces and Moments in WRC 107/537 Convention:

Radial Load	(SUS)	P	0.0	kgf
Longitudinal Shear	(SUS)	Vl	773.3	kgf
Circumferential Shear	(SUS)	Vc	773.3	kgf
Circumferential Moment	(SUS)	Mc	52.6	Kg-m.
Longitudinal Moment	(SUS)	Ml	0.0	Kg-m.
Torsional Moment	(SUS)	Mt	0.0	Kg-m.

Use Interactive Control		No
WRC107 Version	Version	March 1979
Include Pressure Stress Indices per Div. 2		No
Compute Pressure Stress per WRC-368		No
Local Loads applied at end of Nozzle/Attachment		No

WRC Bulletin 537 provides equations for the dimensionless curves found in bulletin 107. As noted in the foreword to bulletin 537, "537 is equivalent to WRC 107". Where 107 is printed in the results below, "537" can be interchanged with "107".



WRC 107/537 has dimensional limitations that can be found in the bulletin's Foreword and which can also be inferred by review of the non-dimensional curve limits.

WRC 107 Stress Calculation for SUStained loads:

Radial Load	P	0.0	kgf
Circumferential Shear	VC	773.3	kgf
Longitudinal Shear	VL	773.3	kgf
Circumferential Moment	MC	52.6	Kg-m.
Longitudinal Moment	ML	0.0	Kg-m.
Torsional Moment	MT	0.0	Kg-m.

Dimensionless Parameters used : Gamma = 15.50

Dimensionless Loads for Cylindrical Shells at Attachment Junction:

Curves read for 1979	Beta	Figure	Value	Location
N(PHI) / (P/Rm)	0.057	4C	3.119	(A,B)
N(PHI) / (P/Rm)	0.057	3C	3.089	(C,D)
M(PHI) / (P)	0.034	2C1	0.233	(A,B)
M(PHI) / (P)	0.034	1C	0.265	(C,D)
N(PHI) / (MC/(Rm**2 * Beta))	0.031	3A	0.038	(A,B,C,D)
M(PHI) / (MC/(Rm * Beta))	0.040	1A	0.105	(A,B,C,D)
N(PHI) / (ML/(Rm**2 * Beta))	0.049	3B	0.450	(A,B,C,D)
M(PHI) / (ML/(Rm * Beta))	0.044	1B	0.064	(A,B,C,D)
N(x) / (P/Rm)	0.046	3C	3.136	(A,B)
N(x) / (P/Rm)	0.046	4C	3.146	(C,D)
M(x) / (P)	0.048	1C1	0.239	(A,B)
M(x) / (P)	0.048	2C	0.200	(C,D)
N(x) / (MC/(Rm**2 * Beta))	0.031	4A	0.063	(A,B,C,D)
M(x) / (MC/(Rm * Beta))	0.056	2A	0.064	(A,B,C,D)
N(x) / (ML/(Rm**2 * Beta))	0.049	4B	0.110	(A,B,C,D)
M(x) / (ML/(Rm * Beta))	0.060	2B	0.100	(A,B,C,D)

Stress Concentration Factors: Kn = 1.00, Kb = 1.00

Stresses in the Vessel at the Attachment Junction (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Memb. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Bend. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Memb. MC	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	0.1
Circ. Memb. MC	0.0	0.0	0.0	0.0	-65.1	65.1	65.1	-65.1
Circ. Memb. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Bend. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot. Circ. Str.	0.0	0.0	0.0	0.0	-65.2	65.0	65.2	-65.0
Long. Memb. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Bend. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Memb. MC	0.0	0.0	0.0	0.0	-0.3	-0.3	0.3	0.3
Long. Bend. MC	0.0	0.0	0.0	0.0	-28.1	28.1	28.1	-28.1
Long. Memb. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Bend. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot. Long. Str.	0.0	0.0	0.0	0.0	-28.4	27.8	28.4	-27.8
Shear VC	15.8	15.8	-15.8	-15.8	0.0	0.0	0.0	0.0
Shear VL	0.0	0.0	0.0	0.0	-4.0	-4.0	4.0	4.0
Shear MT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot. Shear	15.8	15.8	-15.8	-15.8	-4.0	-4.0	4.0	4.0
Str. Int.	31.6	31.6	31.6	31.6	65.6	65.4	65.6	65.4

Dimensionless Parameters used : Gamma = 30.50

Dimensionless Loads for Cylindrical Shells at Pad Edge:

Curves read for 1979	Beta	Figure	Value	Location
N(PHI) / (P/Rm)	0.301	4C	3.637	(A,B)
N(PHI) / (P/Rm)	0.301	3C	1.929	(C,D)
M(PHI) / (P)	0.207	2C1	0.040	(A,B)
M(PHI) / (P)	0.207	1C	0.070	(C,D)
N(PHI) / (MC/(Rm**2 * Beta))	0.200	3A	1.232	(A,B,C,D)
M(PHI) / (MC/(Rm * Beta))	0.220	1A	0.079	(A,B,C,D)
N(PHI) / (ML/(Rm**2 * Beta))	0.255	3B	2.872	(A,B,C,D)
M(PHI) / (ML/(Rm * Beta))	0.237	1B	0.023	(A,B,C,D)
N(x) / (P/Rm)	0.257	3C	2.313	(A,B)
N(x) / (P/Rm)	0.257	4C	3.945	(C,D)
M(x) / (P)	0.265	1C1	0.053	(A,B)
M(x) / (P)	0.265	2C !	0.031	(C,D)
N(x) / (MC/(Rm**2 * Beta))	0.200	4A	2.184	(A,B,C,D)
M(x) / (MC/(Rm * Beta))	0.273	2A	0.032	(A,B,C,D)
N(x) / (ML/(Rm**2 * Beta))	0.255	4B	1.249	(A,B,C,D)
M(x) / (ML/(Rm * Beta))	0.284	2B	0.030	(A,B,C,D)

Note - The ! mark next to the figure name denotes curve value exceeded.

Stress Concentration Factors: Kn = 1.00, Kb = 1.00

Stresses in the Vessel at the Edge of Reinforcing Pad (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Memb. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Bend. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Memb. MC	0.0	0.0	0.0	0.0	-2.0	-2.0	2.0	2.0
Circ. Memb. MC	0.0	0.0	0.0	0.0	-36.6	36.6	36.6	-36.6
Circ. Memb. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Bend. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot. Circ. Str.	0.0	0.0	0.0	0.0	-38.6	34.6	38.6	-34.6
Long. Memb. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Bend. P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Memb. MC	0.0	0.0	0.0	0.0	-4.4	-4.4	4.4	4.4
Long. Bend. MC	0.0	0.0	0.0	0.0	-12.0	12.0	12.0	-12.0
Long. Memb. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Bend. ML	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot. Long. Str.	0.0	0.0	0.0	0.0	-16.4	7.6	16.4	-7.6
Shear VC	4.0	4.0	-4.0	-4.0	0.0	0.0	0.0	0.0
Shear VL	0.0	0.0	0.0	0.0	-1.9	-1.9	1.9	1.9
Shear MT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot. Shear	4.0	4.0	-4.0	-4.0	-1.9	-1.9	1.9	1.9
Str. Int.	7.9	7.9	7.9	7.9	38.8	34.8	38.8	34.8

WRC 107/537 Stress Summations:

Vessel Stress Summation at Attachment Junction (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Pl (SUS)	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	0.1
Circ. Q (SUS)	0.0	0.0	0.0	0.0	-65.1	65.1	65.1	-65.1
Long. Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Pl (SUS)	0.0	0.0	0.0	0.0	-0.3	-0.3	0.3	0.3
Long. Q (SUS)	0.0	0.0	0.0	0.0	-28.1	28.1	28.1	-28.1
Shear Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pl (SUS)	15.8	15.8	-15.8	-15.8	-4.0	-4.0	4.0	4.0
Shear Q (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pm+Pl (SUS)	31.6	31.6	31.6	31.6	7.9	7.9	7.9	7.9
Pm+Pl+Q (Total)	31.6	31.6	31.6	31.6	65.6	65.4	65.6	65.4

Vessel Stress Summation Comparison (N./mm^2):

Type of Stress Int.	Max. S.I.	S.I. Allowable	Result
Pm (SUS)	0.00	117.90	Passed
Pm+Pl (SUS)	31.60	176.86	Passed
Pm+Pl+Q (TOTAL)	65.61	353.71	Passed

The Pm+Pl+Q allowable above was based on the rules of ASME VIII-2 Part 4, 4.1.6.3 (a)&(b) or per ASME VIII-2, 5.5.6.1(1)&(2) Part 5 as applicable.

The Pm+Pl+Q allowable was based on a temperature range cycling from ambient to design temperature.

WRC 107/537 Stress Summations:

Vessel Stress Summation at Reinforcing Pad Edge (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Pl (SUS)	0.0	0.0	0.0	0.0	-2.0	-2.0	2.0	2.0
Circ. Q (SUS)	0.0	0.0	0.0	0.0	-36.6	36.6	36.6	-36.6
Long. Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Pl (SUS)	0.0	0.0	0.0	0.0	-4.4	-4.4	4.4	4.4
Long. Q (SUS)	0.0	0.0	0.0	0.0	-12.0	12.0	12.0	-12.0
Shear Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pl (SUS)	4.0	4.0	-4.0	-4.0	-1.9	-1.9	1.9	1.9
Shear Q (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pm+Pl (SUS)	7.9	7.9	7.9	7.9	5.5	5.5	5.5	5.5

Pm+Pl+Q (Total)	7.9	7.9	7.9	7.9	38.8	34.8	38.8	34.8

Vessel Stress Summation Comparison (N./mm^2):

Type of Stress Int.	Max. S.I.	S.I. Allowable	Result
Pm (SUS)	0.00	117.90	Passed
Pm+Pl (SUS)	7.90	176.86	Passed
Pm+Pl+Q (TOTAL)	38.81	353.71	Passed

The Pm+Pl+Q allowable above was based on the rules of ASME VIII-2 Part 4, 4.1.6.3 (a)&(b) or per ASME VIII-2, 5.5.6.1(1)&(2) Part 5 as applicable.

The Pm+Pl+Q allowable was based on a temperature range cycling from ambient to design temperature.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

RESULTS FOR LEGS : Operating Case Description: LEGS

Legs attached to: MAIN SHELL

Section Properties : Single Angle L80X80X10

European Structural Steel Data

Overall Leg Length		960.000	mm.
Effective Leg Length	Leglen	940.000	mm.
Distance Leg Up Side of Vessel		170.000	mm.
Number of Legs	Nleg	3	
Cross Sectional Area for L80X80X10	Aleg	15.100	cm^2
Section Inertia (strong axis)		87.500	cm^4
Section Inertia (weak axis)		87.500	cm^4
Section Modulus (strong axis)		15400.062	mm.³
Section Modulus (weak axis)		15400.062	mm.³
Radius of Gyration (strong axis)		24.100	mm.
Radius of Gyration (weak axis)		24.100	mm.

Leg Orientation - Diagonal

Overturning Moment at top of Legs		331.8	Kg-m.
Total Weight Load at top of Legs	W	968.6	kgf
Total Shear force at top of Legs		340.9	kgf
Additional force in Leg due to Bracing	Fadd	0.0	kgf
Occasional Load Factor	Occfac	1.333	
Effective Leg End Condition Factor	k	1.000	

Note: The Legs are Not Cross Braced

The Leg Shear Force includes Wind, Seismic, and Applied Load Effects.

Pad Width along Circumference	C11P	150.000	mm.
Pad Length along Vessel Axis	C22P	150.000	mm.
Pad Thickness	Tpad	10.000	mm.

Maximum Shear at top of one Leg [Vleg]:
= (max(Wind, Seismic, Blast) + applied forces)(Imax / Itot)
= (340.9)(141.2/214.72)
= 224.22 kgf

Axial Compression, Leg furthest from the Neutral Axis [Sma]:
= W/Nleg + (Mleg/(Nlegm*Rn))/Aleg
= 9498/3 + (3253577/(1 * 342.536))/1509.997
= 8.39 N./mm^2

Axial Compression, Leg closest to the Neutral Axis [Sva]:
= (W / Nleg) / Aleg
= (969/3)/15.1
= 2.10 N./mm^2

Computing Principal Axis and Inertias for Angle:

Leg lengths and thickness:	80.000	80.000	10.0000
Distance to geometric centroid:	23.400	23.400	
Arm about YY:	18.400	21.600	
Arm about ZZ:	16.600	18.400	
Leg areas:	8.0000	7.0000	
Geometric inertia components YY:	27.751	61.242	
Geometric inertia components ZZ:	64.711	24.282	
Geometric inertias Iy & Iz:	88.993	88.993	

```
Product of inertia:              0.52256E+06
Mohrs Radius:                     31.888
Average Inertia:                  88.993

QFACT =   1.0000        FBZ         =  0.23431
Principal Axis Inertias (Z&W)       =   36.738      141.25
Angle to Principal Axis             =   45.000
Distances to extreme fibers CW & CZ =   56.568      23.476
FOB from Eq 5-5                     =   2.0722
Bending allowables Fby & Fbz        =  0.23431     0.23431

Shear Center Coordinates Wo & Zo:   25.095      0.0000
```

Values for Elastic Flexural-Torsional Buckling Stress:

```
E,    G,      J,   R0²:    29500.      11346.     0.12093      2.8032
AREA, LENGTH, Kw,  Kz:     2.3405      37.008      1.0000      1.0000
H,    Few,    Fez, Fej:   0.65177      308.23      80.168      209.13
Fe computed from C4-1:     154.77

Initial (Kl/r)max, & (Kl/r)equiv    =   60.264      43.373
Final (Kl/r)max, & Cc               =   60.264      106.34
Fa based on Eq 4-1                  =  0.16053
```

Leg Bending and Axial Stresses vs. Allowables: (N./mm^2)

```
                            Actual   Allowable
------------------------------------------------
Weak Axis Bending    :         93.40      312.34
Strong Axis Bending  :         58.53      312.34
Axial Compression    :          8.39      213.99

UNITY CHECKS ARE: H1-1     0.000
                  H1-2     0.000
                  H1-3     0.526
```

AISC Unity Check : 0.526, should be <= to 1 for Code compliance, [Passed]

Bolting Size Requirement for Leg Baseplates :

```
Baseplate Material                                  SA-516 70
Baseplate Allowable Stress                   SBA     137.90 N./mm^2
Baseplate Length                               B   160.0000 mm.
Baseplate Width                                D   150.0000 mm.
Baseplate Thickness                         BTHK    20.0000 mm.
Leg Dimension Along Baseplate Length           d    79.9998 mm.
Leg Dimension Along Baseplate Width            b    79.9998 mm.
Bolt Circle Diameter                         BCD   570.0000 mm.
Bolt Material                                      SA-307 B
Bolt Allowable Tensile Stress               STBA      48.26 N./mm^2
Bolt Allowable Shear Stress               SBShear     28.96 N./mm^2
Anchor Bolt Nominal Diameter                 BOD    24.0000 mm.
Number of Anchor Bolts in Tension per Leg     NB          1
Total Number of Anchors Bolt per Leg         NBT          1
Bolt Corrosion Allowance                     bca     0.0000 mm.
Ultimate 28-day Concrete Strength         FCPRIME     20.685 N./mm^2
```

Leg Baseplate and Bolting Analysis, including Moments

Shear Stress in a Single Bolt [taub]:

```
  = Shear Force/( Bolt Area * Number of Bolts )
  = 340.9/( 3.127 * 3 )
  = 3.6 N./mm^2.  Must be less than 29.0 N./mm^2.
```

Plate thickness required (5/8"; 16mm) per D. Moss

Since there is only 1 bolt, the standard computation for this geometry is not possible. A reasonable bolt size should be selected. Per Megyesy, use a 1 inch (25.4 mm) bolt.

Computing the required bolt area based on a standard method not including the baseplate's interaction with the foundation.

Calculation of Load per Bolt, Wind Empty [W,wind]:
```
= (( 4 * Moment/BCD ) - Weight )/Num Bolts
= (( 4 * 332/570.0) - 773 )/3
= 518.340 kgf
```

Calculation of Load per Bolt, Seismic Operating [W,seismic]:
```
= (( 4 * Moment/BCD ) - Weight )/Num Bolts
= (( 4 * 0/570.0) - 1014 )/3
= -337.859 kgf
```

Calculation of Maximum Load per Bolt [Wmax]:
```
= max( W,wind, W,seismic )
= max( 518.3, -337.86 )
= 518.340 kgf
```

Area Available in a Single Bolt, corroded [Ab]:
```
= 3.127 cm^2
```

Required Area of a single Bolt, Simplified Method:
```
= Wmax / Bolt Allowable Stress
= 518.34/45161.199
= 1.053 cm^2
```

Note: The Wind case empty condition governs.

Review notes about nozzle loadings and supports in the Warnings report.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

RESULTS FOR LEGS : HydroTest Case Description: LEGS

Legs attached to: MAIN SHELL

Section Properties : Single Angle L80X80X10

European Structural Steel Data

Overall Leg Length		960.000	mm.
Effective Leg Length	Leglen	940.000	mm.
Distance Leg Up Side of Vessel		170.000	mm.
Number of Legs	Nleg	3	
Cross Sectional Area for L80X80X10	Aleg	15.100	cm^2
Section Inertia (strong axis)		87.500	cm^4
Section Inertia (weak axis)		87.500	cm^4
Section Modulus (strong axis)		15400.062	mm.³
Section Modulus (weak axis)		15400.062	mm.³
Radius of Gyration (strong axis)		24.100	mm.
Radius of Gyration (weak axis)		24.100	mm.

Leg Orientation - Diagonal

Overturning Moment at top of Legs		82.9	Kg-m.
Total Weight Load at top of Legs	W	1449.0	kgf
Total Shear force at top of Legs		85.2	kgf
Additional force in Leg due to Bracing	Fadd	0.0	kgf
Occasional Load Factor	Occfac	1.333	
Effective Leg End Condition Factor	k	1.000	

Note: The Legs are Not Cross Braced

The Leg Shear Force includes Wind, Seismic, and Applied Load Effects.

Pad Width along Circumference	C11P	150.000	mm.
Pad Length along Vessel Axis	C22P	150.000	mm.
Pad Thickness	Tpad	10.000	mm.

Maximum Shear at top of one Leg [Vleg]:
```
= ( max( Wind, Seismic, Blast ) + applied forces )( Imax / Itot )
= ( 85.2 )( 141.2/214.72 )
= 56.06 kgf
```

Axial Compression, Leg furthest from the Neutral Axis [Sma]:
```
= W/Nleg + (Mleg/(Nlegm*Rn))/Aleg
= 14210/3 + (813394/( 1 * 342.536 ))/1509.997
= 4.71 N./mm^2
```

Axial Compression, Leg closest to the Neutral Axis [Sva]:
```
= ( W / Nleg ) / Aleg
= ( 1449/3 )/15.1
= 3.14 N./mm^2
```

Computing Principal Axis and Inertias for Angle:

Leg lengths and thickness:	80.000	80.000	10.0000
Distance to geometric centroid:	23.400	23.400	
Arm about YY:	18.400	21.600	
Arm about ZZ:	16.600	18.400	
Leg areas:	8.0000	7.0000	
Geometric inertia components YY:	27.751	61.242	
Geometric inertia components ZZ:	64.711	24.282	
Geometric inertias Iy & Iz:	88.993	88.993	

```
Product of inertia:              0.52256E+06
Mohrs Radius:                     31.888
Average Inertia:                  88.993

QFACT =   1.0000        FBZ         =  0.23431
Principal Axis Inertias (Z&W)       =   36.738      141.25
Angle to Principal Axis             =   45.000
Distances to extreme fibers CW & CZ =   56.568      23.476
FOB from Eq 5-5                     =   2.0722
Bending allowables Fby & Fbz        =  0.23431     0.23431

Shear Center Coordinates Wo & Zo:   25.095      0.0000
```

Values for Elastic Flexural-Torsional Buckling Stress:

```
E,    G,      J,   R0²:    29500.      11346.     0.12093      2.8032
AREA, LENGTH, Kw,  Kz:     2.3405      37.008      1.0000      1.0000
H,    Few,    Fez, Fej:   0.65177      308.23      80.168      209.13
Fe computed from C4-1:     154.77

Initial (Kl/r)max, & (Kl/r)equiv    =   60.264      43.373
Final (Kl/r)max, & Cc               =   60.264      106.34
Fa based on Eq 4-1                  =  0.16053
```

Leg Bending and Axial Stresses vs. Allowables: (N./mm^2)

```
                            Actual   Allowable
-----------------------------------------------
Weak Axis Bending    :         23.35      312.34
Strong Axis Bending  :         14.63      312.34
Axial Compression    :          4.71      213.99

UNITY CHECKS ARE: H1-1     0.000
                  H1-2     0.000
                  H1-3     0.144
```

AISC Unity Check : 0.144, should be <= to 1 for Code compliance, [Passed]

Bolting Size Requirement for Leg Baseplates :

```
Baseplate Material                                  SA-516 70
Baseplate Allowable Stress                   SBA     137.90 N./mm^2
Baseplate Length                               B   160.0000 mm.
Baseplate Width                                D   150.0000 mm.
Baseplate Thickness                         BTHK    20.0000 mm.
Leg Dimension Along Baseplate Length           d    79.9998 mm.
Leg Dimension Along Baseplate Width            b    79.9998 mm.
Bolt Circle Diameter                         BCD   570.0000 mm.
Bolt Material                                      SA-307 B
Bolt Allowable Tensile Stress               STBA      48.26 N./mm^2
Bolt Allowable Shear Stress               SBShear     28.96 N./mm^2
Anchor Bolt Nominal Diameter                 BOD    24.0000 mm.
Number of Anchor Bolts in Tension per Leg     NB          1
Total Number of Anchors Bolt per Leg         NBT          1
Bolt Corrosion Allowance                     bca     0.0000 mm.
Ultimate 28-day Concrete Strength         FCPRIME     20.685 N./mm^2
```

Leg Baseplate and Bolting Analysis, including Moments

Shear Stress in a Single Bolt [taub]:

```
  = Shear Force/( Bolt Area * Number of Bolts )
  = 340.9/( 3.127 * 3 )
  = 3.6 N./mm^2.  Must be less than 29.0 N./mm^2.
```

Plate thickness required (5/8"; 16mm) per D. Moss

Since there is only 1 bolt, the standard computation for this geometry is not possible. A reasonable bolt size should be selected. Per Megyesy, use a 1 inch (25.4 mm) bolt.

Review notes about nozzle loadings and supports in the Warnings report.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

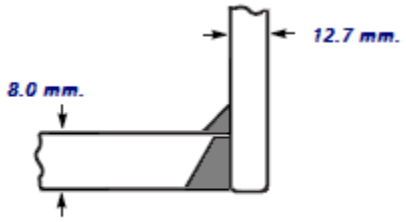
Input, Nozzle Desc: N3-LIQUID OUTLET From: 10

Pressure for Reinforcement Calculations	P	18.388	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Elliptical Head	D	600.00	mm.
Aspect Ratio of Elliptical Head	Ar	2.00	
Head Finished (Minimum) Thickness	t	8.0000	mm.
Head Internal Corrosion Allowance	c	1.0000	mm.
Head External Corrosion Allowance	co	0.0000	mm.
Distance from Head Centerline	L1	0.0000	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-350 LF2	
Material UNS Number		K03011	
Material Specification/Type		Forgings	
Allowable Stress at Temperature	Sn	137.90	N./mm^2
Allowable Stress At Ambient	Sna	137.90	N./mm^2
Diameter Basis (for tr calc only)		Inside	
Layout Angle		0.00	deg
Diameter		1.0000	in.
Size and Thickness Basis		Actual	
Actual Thickness	tn	12.7000	mm.
Flange Material [Normalized]		SA-350 LF2	
Flange Type		Long Weld Neck	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	10.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	8.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: N3-LIQUID OUTLET

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Inside Diameter Used in Calculation            1.000  in.
Actual Thickness Used in Calculation                  0.500  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Elliptical Head, tr [Int. Press]
```
  = P*D*K1/(2*Sv*E-0.2*P) per Appendix 1-4(c)
  = 18.39*602.0*0.8972/(2*117.9*1.0-0.2*18.39)
  = 4.2184 mm.
```

Reqd thk per App. 1 of Nozzle Wall, trn [Int. Press]
```
  = R( exp([P/(Sn*E)] - 1 ) per Appendix 1-2 (a)(1)
  = 13.7(exp([18.39/(137.9*1.0]-1)
  = 0.1839 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl    64.8000  mm.
Parallel to Vessel Wall                          Rn+tn+t    32.4000  mm.
Normal to Vessel Wall (Thickness Limit), no pad   Tlnp    17.5000  mm.
```

Taking a UG-36(c)(3)(a) exemption for nozzle: N3-LIQUID OUTLE.
This calculation is valid for nozzles that meet all the requirements of paragraph UG-36. Please check the Code carefully, especially for nozzles that are not isolated or do not meet Code spacing requirements. To force the computation of areas for small nozzles go to Tools->Configuration and check the box to force the UG-37 small nozzle area calculation.

UG-45 Minimum Nozzle Neck Thickness Requirement: [Int. Press.]
```
Wall Thickness for Internal/External pressures      ta = 1.1839 mm.
Wall Thickness per UG16(b),                      tr16b = 2.5000 mm.
Wall Thickness, shell/head, internal pressure     trb1 = 5.6812 mm.
Wall Thickness                  tb1 = max(trb1, tr16b) = 5.6812 mm.
Wall Thickness                  tb2 = max(trb2, tr16b) = 2.5000 mm.
Wall Thickness per table UG-45                    tb3 = 4.4200 mm.
```

Determine Nozzle Thickness candidate [tb]:
```
  = min[ tb3, max( tb1,tb2) ]
  = min[ 4.42, max( 5.6812, 2.5 ) ]
  = 4.4200 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:
```
  = max( ta, tb )
  = max( 1.1839, 4.42 )
  = 4.4200 mm.
```

Available Nozzle Neck Thickness = 12.7000 mm. -> OK

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 8.0, tr = 4.218, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.603, Temp. Reduction = 22 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve D          -48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit     -48 °C

Gov. MDMT of the nozzle to shell joint welded assembly :   -48 °C
```

Weld Size Calculations, Description: N3-LIQUID OUTLE

```
 Intermediate Calc. for nozzle/shell Welds   Tmin      9.0000  mm.
```

Results Per UW-16.1:

```
                       Required Thickness    Actual Thickness
 Nozzle Weld          6.0000 = Min per Code 7.0700 = 0.7 * Wo mm.
```

Skipping the nozzle attachment weld strength calculations. Per UW-15(b)(2) the nozzles exempted by UG-36(c)(3)(a) (small nozzles) do not require a weld strength check.

The Drop for this Nozzle is : 0.5907 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 158.5907 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

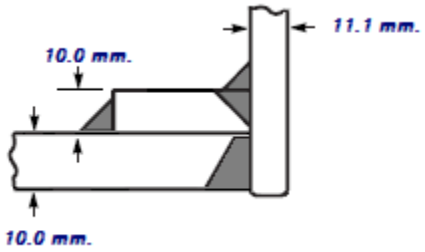
Input, Nozzle Desc: N1- GAS INLET From: 20

Pressure for Reinforcement Calculations	P	18.369	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Cylindrical Shell	D	600.00	mm.
Shell Finished (Minimum) Thickness	t	10.0000	mm.
Shell Internal Corrosion Allowance	c	1.0000	mm.
Shell External Corrosion Allowance	co	0.0000	mm.
Distance from Bottom/Left Tangent		1260.00	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-333 6	
Material UNS Number		K03006	
Material Specification/Type		Smls. & wld. pipe	
Allowable Stress at Temperature	Sn	117.90	N./mm^2
Allowable Stress At Ambient	Sna	117.90	N./mm^2
Diameter Basis (for tr calc only)		Outside	
Layout Angle		90.00	deg
Diameter		10.0000	in.
Size and Thickness Basis		Minimum	
Nominal Thickness		XS	
Flange Material		SA-350 LF2	
Flange Type		Weld Neck Flange	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	10.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
Pad Material		SA-516 70	
Pad Allowable Stress at Temperature	Sp	137.90	N./mm^2
Pad Allowable Stress At Ambient	Spa	137.90	N./mm^2
Diameter of Pad along vessel surface	Dp	373.0500	mm.
Thickness of Pad	te	10.0000	mm.
Weld leg size between Pad and Shell	Wp	8.0000	mm.
Groove weld depth between Pad and Nozzle	Wgpn	10.0000	mm.
Reinforcing Pad Width		50.0000	mm.
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: N1- GAS INLET

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Outside Diameter Used in Calculation          10.750  in.
Actual Thickness Used in Calculation                  0.438  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Cylindrical Shell, tr [Int. Press]
```
= P*R/(Sv*E-0.6*P) per UG-27 (c)(1)
= 18.37*301.0/(118*1.0-0.6*18.37)
= 4.7339 mm.
```

Reqd thk per UG-37(a) of Nozzle Wall, trn [Int. Press]
```
= P*Ro/(Sn*E+0.4*P) per Appendix 1-1 (a)(1)
= 18.37*136.525/(118*1.0+0.4*18.37)
= 2.1139 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl   505.6500  mm.
Parallel to Vessel Wall, opening length              d   252.8250  mm.
Normal to Vessel Wall (Thickness Limit), pad side Tlwp    22.5000  mm.
```

Weld Strength Reduction Factor [fr1]:
```
= min( 1, Sn/Sv )
= min( 1, 117.9/117.9 )
= 1.000
```

Weld Strength Reduction Factor [fr2]:
```
= min( 1, Sn/Sv )
= min( 1, 117.9/117.9 )
= 1.000
```

Weld Strength Reduction Factor [fr4]:
```
= min( 1, Sp/Sv )
= min( 1, 137.9/117.9 )
= 1.000
```

Weld Strength Reduction Factor [fr3]:
```
= min( fr2, fr4 )
= min( 1., 1.0 )
= 1.000
```

Results of Nozzle Reinforcement Area Calculations: (cm^2)

AREA AVAILABLE, A1 to A5		MAWP	External	Mapnc
Area Required	Ar	11.968	NA	NA
Area in Shell	A1	10.786	NA	NA
Area in Nozzle Wall	A2	3.599	NA	NA
Area in Inward Nozzle	A3	0.000	NA	NA

```
 Area in Welds    A41+A42+A43 |     1.450|        NA|        NA|
 Area in Element           A5 |    10.000|        NA|        NA|
 ------------------------------------------------------------
 TOTAL AREA AVAILABLE    Atot |    25.835|        NA|        NA|
```

The MAWP Case Governs the Analysis.

```
 Nozzle Angle Used in Area Calculations                90.00  degs.
```

The area available without a pad is Sufficient.
The area available with the given pad is Sufficient.

Area Required [A]:

```
  = ( d * tr*F + 2 * tn * tr*F * (1-fr1) ) UG-37(c)
  = (252.825*4.7339*1.0+2*10.1125*4.7339*1.0*(1-1.))
  = 11.968 cm^2
```

Reinforcement Areas per Figure UG-37.1

Area Available in Shell [A1]:

```
  = d( E1*t - F*tr ) - 2 * tn( E1*t - F*tr ) * ( 1 - fr1 )
  = 252.825( 1.0 * 9.0 - 1.0 * 4.734 ) - 2 * 10.112
    ( 1.0 * 9.0 - 1.0 * 4.7339 ) * ( 1 - 1. )
  = 10.786 cm^2
```

Area Available in Nozzle Wall Projecting Outward [A2]:

```
  = ( 2 * Tlwp ) * ( tn - trn ) * fr2
  = ( 2 * 22.5 ) * ( 10.11 - 2.11 ) * 1.
  = 3.599 cm^2
```

Area Available in Welds [A41 + A42 + A43]:

```
  = Wo² * fr3 + (Wi-can/0.707)² * fr2 + Wp² * fr4
  = 9.0² * 1. + (0.0)² * 1. + 8.0² * 1.0
  = 1.450 cm^2
```

Area Available in Element [A5]:

```
  = (min(Dp,DL)-(Nozzle OD))*(min(tp,Tlwp,te)) * fr4
  = ( 373.05 - 273.05 ) * 10.0 * 1.0
  = 10.000 cm^2
```

UG-45 Minimum Nozzle Neck Thickness Requirement: [Int. Press.]

```
 Wall Thickness for Internal/External pressures      ta = 3.1139 mm.
 Wall Thickness per UG16(b),                      tr16b = 2.5000 mm.
 Wall Thickness, shell/head, internal pressure     trb1 = 5.7339 mm.
 Wall Thickness                 tb1 = max(trb1, tr16b) = 5.7339 mm.
 Wall Thickness                 tb2 = max(trb2, tr16b) = 2.5000 mm.
 Wall Thickness per table UG-45                   tb3 = 9.1026 mm.
```

Determine Nozzle Thickness candidate [tb]:

```
  = min[ tb3, max( tb1,tb2) ]
  = min[ 9.103, max( 5.7339, 2.5 ) ]
  = 5.7339 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:

```
  = max( ta, tb )
  = max( 3.1139, 5.7339 )
  = 5.7339 mm.
```

Available Nozzle Neck Thickness = 11.1125 mm. -> OK

Stresses on Nozzle due to External and Pressure Loads per the ASME B31.3 Piping Code, (see 319.4.4 and 302.3.5):

```
 ---------------------------------------------------
 Sustained  :     28.2,  Allowable :    117.9 N./mm^2  Passed
```

```
Expansion  :      0.0,  Allowable :    266.6 N./mm^2  Passed
Occasional :     11.0,  Allowable :    156.8 N./mm^2  Passed
Shear      :     11.6,  Allowable :     82.5 N./mm^2  Passed
```

The number of cycles on this nozzle was assumed to be 7000 or less for the determination of the expansion stress allowable.

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle Neck to Flange Weld (Impact tested) :

Note:
This Material was specified as being an Impact Tested (Low Temperature) Material.

```
Impact Test Temperature provided per Specification         -46 °C

Calculated Minimum Design Metal Temperature               -104 °C
```

Nozzle Neck to Pad Weld for the Nozzle (Impact tested) :

Note:
This Material was specified as being an Impact Tested (Low Temperature) Material.

```
Impact Test Temperature provided per Specification         -46 °C
```

Nozzle Neck to Pad Weld for Reinforcement pad, Curve: B

Govrn. thk, tg = 10.0, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.526, Temp. Reduction = 29 °C
Attachment governing, Attachment stress = Shell stress per Code

```
Min Metal Temp. w/o impact per UCS-66, Curve B             -29 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit        -46 °C
Min Metal Temp. at Required thickness (UCS 66.1)           -48 °C
```

Shell to Pad Weld Junction at Pad OD, min(Curve:B, Curve:D)

Govrn. thk, tg = 10.0, tr = 4.734, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.526, Temp. Reduction = 29 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve B             -29 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit        -46 °C
Min Metal Temp. at Required thickness (UCS 66.1)           -48 °C
```

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 10.0, tr = 4.734, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.526, Temp. Reduction = 29 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve D             -48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit        -48 °C

Gov. MDMT of the Nozzle                                :   -46 °C
Gov. MDMT of the Reinforcement Pad                     :   -48 °C
Gov. MDMT of the nozzle to shell joint welded assembly :   -46 °C
```

Flange MDMT including Temperature reduction per UCS-66.1:

```
MDMT of ASME B16.5/47 flange per Matl. Specification       -46 °C
Flange MDMT with Temp reduction per UCS-66(i)(2)           -49 °C
```

Where the Stress Reduction Ratio per UCS-66(i)(2) is :
```
Design Pressure/Ambient Rating = 18.37/19.60 = 0.937
```

Weld Size Calculations, Description: N1- GAS INLET

```
Intermediate Calc. for nozzle/shell Welds   Tmin     10.0000  mm.
Intermediate Calc. for pad/shell Welds   TminPad      9.0000  mm.
```

Results Per UW-16.1:

```
                      Required Thickness    Actual Thickness
Nozzle Weld          6.0000 = Min per Code 6.3630 = 0.7 * Wo mm.
Pad Weld             4.5000 = 0.5*TminPad  5.6560 = 0.7 * Wp mm.
```

Weld Strength and Weld Loads per UG-41.1, Sketch (a) or (b)

Weld Load [W]:

```
  = max( 0, (A-A1+2*tn*fr1*(E1*t-tr))Sv)
  = max( 0, (11.9684 - 10.7858 + 2 * 10.1125 * 1. *
    (1.0 * 9.0 - 4.7339 ) )118)
  = 2459.15 kgf
```

Note: F is always set to 1.0 throughout the calculation.

Weld Load [W1]:

```
  = (A2+A5+A4-(Wi-Can/.707)²*fr2)*Sv
  = ( 3.5994 + 10.0 + 1.45 - 0.0 * 1. ) * 118
  = 18093.42 kgf
```

Weld Load [W2]:

```
  = (A2 + A3 + A4 + (2 * tn * t * fr1)) * Sv
  = ( 3.5994 + 0.0 + 0.81 + ( 1.8202 ) ) * 118
  = 7489.67 kgf
```

Weld Load [W3]:

```
  = (A2+A3+A4+A5+(2*tn*t*fr1))*S
  = ( 3.5994 + 0.0 + 1.45 + 10.0 + ( 1.8202 ) ) * 118
  = 20281.85 kgf
```

Strength of Connection Elements for Failure Path Analysis

Shear, Outward Nozzle Weld [Sonw]:

```
  = (pi/2) * Dlo * Wo * 0.49 * Snw
  = ( 3.1416/2.0 ) * 273.05 * 9.0 * 0.49 * 118
  = 22741. kgf
```

Shear, Pad Element Weld [Spew]:

```
  = (pi/2) * DP * WP * 0.49 * SEW
  = ( 3.1416/2.0 ) * 373.05 * 8.0 * 0.49 * 118
  = 27617. kgf
```

Shear, Nozzle Wall [Snw]:

```
  = (pi *( Dlr + Dlo )/4 ) * ( Thk - Can ) * 0.7 * Sn
  = (3.1416 * 131.4687) * ( 11.1125 - 1.0 ) * 0.7 * 118
  = 35150. kgf
```

Tension, Pad Groove Weld [Tpgw]:

```
  = ( pi/2) * Dlo * Wgpn * 0.74 * Seg
  =  (3.1416/2 ) * 273.05 * 10.0 * 0.74 * 138
  = 44630. kgf
```

Tension, Shell Groove Weld [Tngw]:

```
  = (pi/2) * Dlo * ( T - cas ) * 0.74 * Sng
  = ( 3.1416/2.0 ) * 273.05 * ( 10.0 - 1.0 ) * 0.74 * 118
  = 34343. kgf
```

See UG-41 and UW-15 for clarification of allowable stresses.

Strength of Failure Paths:

Failure Path [Path 1-1]:
= (SPEW + SNW) = (27617 + 35150) = 62767 kgf

Failure Path [Path 2-2]:
= (Sonw + Tpgw + Tngw + Sinw)
= (22741 + 44630 + 34343 + 0) = 101714 kgf

Failure Path [Path 3-3]:
= (Spew + Tngw + Sinw)
= (27617 + 34343 + 0) = 61960 kgf

Summary of Failure Path Calculations:

```
Path 1-1 = 62767   kgf, must exceed W = 2459 kgf     or W1 = 18093 kgf
Path 2-2 = 101713  kgf, must exceed W = 2459 kgf     or W2 = 7489 kgf
Path 3-3 = 61960   kgf, must exceed W = 2459 kgf     or W3 = 20281 kgf
```

Maximum Allowable Pressure for this Nozzle at this Location:

```
Converged Maximum Allowable Pressure in the Operating case: 28 bar(g)
```

The Drop for this Nozzle is : 32.8654 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 192.8654 mm.

Input Echo, WRC107/537 Item 1, Description: N1- GAS INLET :

Diameter Basis for Vessel	Vbasis	ID	
Cylindrical or Spherical Vessel	Cylsph	Cylindrical	
Internal Corrosion Allowance	Cas	1.0000	mm.
Vessel Diameter	Dv	600.000	mm.
Vessel Thickness	Tv	10.000	mm.
Design Temperature	T1	80.0	C
Vessel Material		SA-516 60	
Vessel UNS Number		K02100	
Vessel Cold S.I. Allowable	Smc	117.90	N./mm^2
Vessel Hot S.I. Allowable	Smh	117.90	N./mm^2

See ASME VIII Div. 1, UG-23(e), for determination of the SPS allowable.

Attachment Type	Type	Round	
Diameter Basis for Nozzle	Nbasis	OD	
Corrosion Allowance for Nozzle	Can	1.0000	mm.
Nozzle Diameter	Dn	273.050	mm.
Nozzle Thickness	Tn	11.113	mm.
Nozzle Material		SA-333 6	
Nozzle UNS Number		K03006	
Nozzle Cold S.I. Allowable	SNmc	117.90	N./mm^2
Nozzle Hot S.I. Allowable	SNmh	117.90	N./mm^2
Thickness of Reinforcing Pad	Tpad	10.000	mm.
Diameter of Reinforcing Pad	Dpad	373.050	mm.
Design Internal Pressure	Dp	18.369	bar(g)
Include Pressure Thrust		No	

External Forces and Moments in WRC 107/537 Convention:

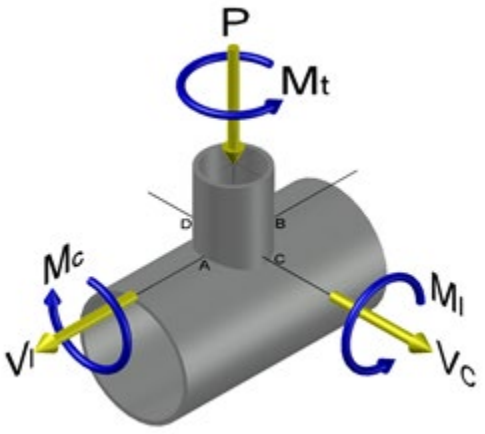
Radial Load	(SUS)	P	-1223.7	kgf
Longitudinal Shear	(SUS)	Vl	611.9	kgf

```
Circumferential Shear   (SUS)                Vc       917.8  kgf
Circumferential Moment  (SUS)                Mc       611.6  Kg-m.
Longitudinal Moment     (SUS)                Ml       795.1  Kg-m.
Torsional Moment        (SUS)                Mt       917.5  Kg-m.


Use Interactive Control                            No
WRC107 Version                          Version  March  1979

Include Pressure Stress Indices per Div. 2              No
Compute Pressure Stress per WRC-368                     No
Local Loads applied at end of Nozzle/Attachment         No
```

WRC Bulletin 537 provides equations for the dimensionless curves found in bulletin 107. As noted in the foreword to bulletin 537, "537 is equivalent to WRC 107". Where 107 is printed in the results below, "537" can be interchanged with "107".



WRC 107/537 has dimensional limitations that can be found in the bulletin's Foreword and which can also be inferred by review of the non-dimensional curve limits.

Stress Attenuation Diameter (for Insert Plates) per WRC 297:

```
  = NozzleOD + 2 * 1.65 * sqrt( Rmean( t - ca ) )
  = 273.05 + 2 * 1.65 * sqrt( 305.5 ( 10.0 - 1.0 ) )
  = 446.088 mm.
```

WRC 107 Stress Calculation for SUStained loads:

```
Radial Load                                  P      -1223.7  kgf
Circumferential Shear                       VC        917.8  kgf
Longitudinal Shear                          VL        611.9  kgf
Circumferential Moment                      MC        611.6  Kg-m.
Longitudinal Moment                         ML        795.1  Kg-m.
Torsional Moment                            MT        917.5  Kg-m.

Dimensionless Parameters used :   Gamma = 16.34
```

Dimensionless Loads for Cylindrical Shells at Attachment Junction:

```
-------------------------------------------------------------------
Curves read for 1979              Beta  Figure    Value   Location
-------------------------------------------------------------------
N(PHI) / ( P/Rm )                0.385   4C        2.048   (A,B)
N(PHI) / ( P/Rm )                0.385   3C        1.252   (C,D)
M(PHI) / ( P )                   0.385   2C1       0.023   (A,B)
M(PHI) / ( P )                   0.385   1C  !     0.056   (C,D)
N(PHI) / ( MC/(Rm**2 * Beta) )   0.385   3A        0.683   (A,B,C,D)
M(PHI) / ( MC/(Rm    * Beta) )   0.385   1A        0.074   (A,B,C,D)
N(PHI) / ( ML/(Rm**2 * Beta) )   0.385   3B        1.482   (A,B,C,D)
```

M(PHI) / (ML/(Rm * Beta))	0.385	1B	0.019	(A,B,C,D)
N(x) / (P/Rm)	0.385	3C	1.252	(A,B)
N(x) / (P/Rm)	0.385	4C	2.048	(C,D)
M(x) / (P)	0.385	1C1	0.044	(A,B)
M(x) / (P)	0.385	2C !	0.030	(C,D)
N(x) / (MC/(Rm**2 * Beta))	0.385	4A	1.596	(A,B,C,D)
M(x) / (MC/(Rm * Beta))	0.385	2A	0.034	(A,B,C,D)
N(x) / (ML/(Rm**2 * Beta))	0.385	4B	0.668	(A,B,C,D)
M(x) / (ML/(Rm * Beta))	0.385	2B	0.032	(A,B,C,D)

Note - The ! mark next to the figure name denotes curve value exceeded.

Stress Concentration Factors: Kn = 1.00, Kb = 1.00

Stresses in the Vessel at the Attachment Junction (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Memb. P	4.2	4.2	4.2	4.2	2.5	2.5	2.5	2.5
Circ. Bend. P	4.7	-4.7	4.7	-4.7	11.2	-11.2	11.2	-11.2
Circ. Memb. MC	0.0	0.0	0.0	0.0	-5.8	-5.8	5.8	5.8
Circ. Memb. MC	0.0	0.0	0.0	0.0	-61.7	61.7	61.7	-61.7
Circ. Memb. ML	-16.4	-16.4	16.4	16.4	0.0	0.0	0.0	0.0
Circ. Bend. ML	-20.1	20.1	20.1	-20.1	0.0	0.0	0.0	0.0
Tot. Circ. Str.	-27.7	3.2	45.4	-4.2	-53.8	47.3	81.2	-64.5
Long. Memb. P	2.5	2.5	2.5	2.5	4.2	4.2	4.2	4.2
Long. Bend. P	8.8	-8.8	8.8	-8.8	6.0	-6.0	6.0	-6.0
Long. Memb. MC	0.0	0.0	0.0	0.0	-13.6	-13.6	13.6	13.6
Long. Bend. MC	0.0	0.0	0.0	0.0	-28.8	28.8	28.8	-28.8
Long. Memb. ML	-7.4	-7.4	7.4	7.4	0.0	0.0	0.0	0.0
Long. Bend. ML	-35.0	35.0	35.0	-35.0	0.0	0.0	0.0	0.0
Tot. Long. Str.	-31.1	21.4	53.8	-33.9	-32.2	13.4	52.6	-17.1
Shear VC	1.1	1.1	-1.1	-1.1	0.0	0.0	0.0	0.0
Shear VL	0.0	0.0	0.0	0.0	-0.7	-0.7	0.7	0.7
Shear MT	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Tot. Shear	5.1	5.1	2.9	2.9	3.3	3.3	4.8	4.8
Str. Int.	34.8	22.8	54.7	34.2	54.3	47.6	82.0	65.0

WARNING: Ratio of Pad Radius/Rm (.611) is not between 0.01 and 0.571.

Dimensionless Parameters used : Gamma = 33.94

Dimensionless Loads for Cylindrical Shells at Pad Edge:

Curves read for 1979	Beta	Figure	Value	Location
N(PHI) / (P/Rm)	0.534	4C !	2.547	(A,B)
N(PHI) / (P/Rm)	0.534	3C !	0.971	(C,D)
M(PHI) / (P)	0.534	2C1 !	0.007	(A,B)
M(PHI) / (P)	0.534	1C !	0.061	(C,D)
N(PHI) / (MC/(Rm**2 * Beta))	0.534	3A !	0.813	(A,B,C,D)
M(PHI) / (MC/(Rm * Beta))	0.534	1A !	0.061	(A,B,C,D)

```
N(PHI) / ( ML/(Rm**2 * Beta) )   0.534   3B  !     1.334   (A,B,C,D)
M(PHI) / ( ML/(Rm    * Beta) )   0.534   1B  !     0.006   (A,B,C,D)

N(x)   / ( P/Rm )                0.534   3C  !     0.971   (A,B)
N(x)   / ( P/Rm )                0.534   4C  !     2.547   (C,D)
M(x)   / ( P )                   0.534   1C1 !     0.015   (A,B)
M(x)   / ( P )                   0.534   2C  !     0.031   (C,D)
N(x)   / ( MC/(Rm**2 * Beta) )   0.534   4A  !     3.242   (A,B,C,D)
M(x)   / ( MC/(Rm    * Beta) )   0.534   2A  !     0.025   (A,B,C,D)
N(x)   / ( ML/(Rm**2 * Beta) )   0.534   4B  !     0.814   (A,B,C,D)
M(x)   / ( ML/(Rm    * Beta) )   0.534   2B  !     0.010   (A,B,C,D)
```

Note - The ! mark next to the figure name denotes curve value exceeded.

Stress Concentration Factors: Kn = 1.00, Kb = 1.00

Stresses in the Vessel at the Edge of Reinforcing Pad (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Memb. P	11.1	11.1	11.1	11.1	4.2	4.2	4.2	4.2
Circ. Bend. P	5.8	-5.8	5.8	-5.8	54.2	-54.2	54.2	-54.2
Circ. Memb. MC	0.0	0.0	0.0	0.0	-10.9	-10.9	10.9	10.9
Circ. Memb. MC	0.0	0.0	0.0	0.0	-166.4	166.4	166.4	-166.4
Circ. Memb. ML	-23.2	-23.2	23.2	23.2	0.0	0.0	0.0	0.0
Circ. Bend. ML	-20.0	20.0	20.0	-20.0	0.0	0.0	0.0	0.0
Tot. Circ. Str.	-26.2	2.1	60.1	8.5	-118.8	105.6	235.8	-205.6
Long. Memb. P	4.2	4.2	4.2	4.2	11.1	11.1	11.1	11.1
Long. Bend. P	13.7	-13.7	13.7	-13.7	27.9	-27.9	27.9	-27.9
Long. Memb. MC	0.0	0.0	0.0	0.0	-43.3	-43.3	43.3	43.3
Long. Bend. MC	0.0	0.0	0.0	0.0	-68.4	68.4	68.4	-68.4
Long. Memb. ML	-14.1	-14.1	14.1	14.1	0.0	0.0	0.0	0.0
Long. Bend. ML	-36.1	36.1	36.1	-36.1	0.0	0.0	0.0	0.0
Tot. Long. Str.	-32.3	12.4	68.2	-31.4	-72.7	8.2	150.7	-41.8
Shear VC	1.7	1.7	-1.7	-1.7	0.0	0.0	0.0	0.0
Shear VL	0.0	0.0	0.0	0.0	-1.1	-1.1	1.1	1.1
Shear MT	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Tot. Shear	6.3	6.3	2.9	2.9	3.4	3.4	5.7	5.7
Str. Int.	36.2	16.3	69.1	40.4	119.1	105.7	236.2	205.8

WRC 107/537 Stress Summations:

Vessel Stress Summation at Attachment Junction (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Pm (SUS)	28.2	30.0	28.2	30.0	28.2	30.0	28.2	30.0
Circ. Pl (SUS)	-12.2	-12.2	20.6	20.6	-3.3	-3.3	8.4	8.4
Circ. Q (SUS)	-15.4	15.4	24.8	-24.8	-50.6	50.6	72.9	-72.9

Long. Pm (SUS)	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
Long. Pl (SUS)	-4.8	-4.8	9.9	9.9	-9.4	-9.4	17.7	17.7
Long. Q (SUS)	-26.3	26.3	43.8	-43.8	-22.8	22.8	34.8	-34.8
Shear Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pl (SUS)	1.1	1.1	-1.1	-1.1	-0.7	-0.7	0.7	0.7
Shear Q (SUS)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Pm (SUS)	28.2	30.0	28.2	30.0	28.2	30.0	28.2	30.0
Pm+Pl (SUS)	16.2	18.0	48.8	50.7	25.0	26.8	36.7	38.5
Pm+Pl+Q (Total)	20.3	39.7	74.8	46.0	26.9	77.6	110.0	35.2

Vessel Stress Summation Comparison (N./mm^2):

Type of Stress Int.	Max. S.I.	S.I. Allowable	Result
Pm (SUS)	30.05	117.90	Passed
Pm+Pl (SUS)	50.66	176.86	Passed
Pm+Pl+Q (TOTAL)	109.98	353.71	Passed

*Because only sustained loads were specified, the Pm+Pl+Q allowable was 3 * Smh.*

WRC 107/537 Stress Summations:

Vessel Stress Summation at Reinforcing Pad Edge (N./mm^2)

		Stress Intensity Values at							
Type of Stress	Load	Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Circ. Pm (SUS)		60.5	62.4	60.5	62.4	60.5	62.4	60.5	62.4
Circ. Pl (SUS)		-12.1	-12.1	34.3	34.3	-6.6	-6.6	15.1	15.1
Circ. Q (SUS)		-14.2	14.2	25.8	-25.8	-112.2	112.2	220.7	-220.7
Long. Pm (SUS)		30.3	30.3	30.3	30.3	30.3	30.3	30.3	30.3
Long. Pl (SUS)		-9.9	-9.9	18.4	18.4	-32.2	-32.2	54.4	54.4
Long. Q (SUS)		-22.4	22.4	49.8	-49.8	-40.5	40.5	96.3	-96.3
Shear Pm (SUS)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pl (SUS)		1.7	1.7	-1.7	-1.7	-1.1	-1.1	1.1	1.1
Shear Q (SUS)		4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Pm (SUS)		60.5	62.4	60.5	62.4	60.5	62.4	60.5	62.4
Pm+Pl (SUS)		48.6	50.4	94.9	96.7	55.9	57.7	84.9	84.9
Pm+Pl+Q (Total)		38.4	66.2	121.0	72.3	59.0	168.0	296.6	143.5

Vessel Stress Summation Comparison (N./mm^2):

Type of Stress Int.	Max. S.I.	S.I. Allowable	Result
Pm (SUS)	62.37	117.90	Passed
Pm+Pl (SUS)	96.73	176.86	Passed
Pm+Pl+Q (TOTAL)	296.60	353.71	Passed

*Because only sustained loads were specified, the Pm+Pl+Q allowable was 3 * Smh.*

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

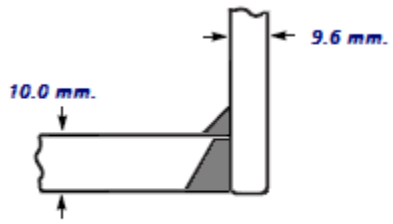
Input, Nozzle Desc: H1-INSPECTION PO From: 20

Pressure for Reinforcement Calculations	P	18.369	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Cylindrical Shell	D	600.00	mm.
Shell Finished (Minimum) Thickness	t	10.0000	mm.
Shell Internal Corrosion Allowance	c	1.0000	mm.
Shell External Corrosion Allowance	co	0.0000	mm.
Distance from Bottom/Left Tangent		280.00	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-333 6	
Material UNS Number		K03006	
Material Specification/Type		Smls. & wld. pipe	
Allowable Stress at Temperature	Sn	117.90	N./mm^2
Allowable Stress At Ambient	Sna	117.90	N./mm^2
Diameter Basis (for tr calc only)		Outside	
Layout Angle		180.00	deg
Diameter		6.0000	in.
Size and Thickness Basis		Minimum	
Nominal Thickness		XS	
Flange Material		SA-350 LF2	
Flange Type		Weld Neck Flange	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	10.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
This is a Manway or Access Opening.			
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: H1-INSPECTION PO

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Outside Diameter Used in Calculation            6.625  in.
Actual Thickness Used in Calculation                   0.378  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Cylindrical Shell, tr [Int. Press]
```
  = P*R/(Sv*E-0.6*P) per UG-27 (c)(1)
  = 18.37*301.0/(118*1.0-0.6*18.37)
  = 4.7339 mm.
```

Reqd thk per UG-37(a) of Nozzle Wall, trn [Int. Press]
```
  = P*Ro/(Sn*E+0.4*P) per Appendix 1-1 (a)(1)
  = 18.37*84.1375/(118*1.0+0.4*18.37)
  = 1.3028 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl   302.1452  mm.
Parallel to Vessel Wall, opening length              d   151.0726  mm.
Normal to Vessel Wall (Thickness Limit), no pad   Tlnp    21.5030  mm.
```

Weld Strength Reduction Factor [fr1]:
```
  = min( 1, Sn/Sv )
  = min( 1, 117.9/117.9 )
  = 1.000
```

Weld Strength Reduction Factor [fr2]:
```
  = min( 1, Sn/Sv )
  = min( 1, 117.9/117.9 )
  = 1.000
```

Weld Strength Reduction Factor [fr3]:
```
  = min( fr2, fr4 )
  = min( 1., 1.0 )
  = 1.000
```

Results of Nozzle Reinforcement Area Calculations: (cm^2)

AREA AVAILABLE, A1 to A5		MAWP	External	Mapnc
Area Required	Ar	7.152	NA	NA
Area in Shell	A1	6.445	NA	NA
Area in Nozzle Wall	A2	3.139	NA	NA
Area in Inward Nozzle	A3	0.000	NA	NA
Area in Welds	A41+A42+A43	0.810	NA	NA
Area in Element	A5	0.000	NA	NA
TOTAL AREA AVAILABLE	Atot	10.394	NA	NA

The MAWP Case Governs the Analysis.

```
Nozzle Angle Used in Area Calculations                90.00  degs.
```

The area available without a pad is Sufficient.

Area Required [A]:
```
  = ( d * tr*F + 2 * tn * tr*F * (1-fr1) ) UG-37(c)
  = (151.0726*4.7339*1.0+2*8.6012*4.7339*1.0*(1-1.))
  = 7.152 cm^2
```

Reinforcement Areas per Figure UG-37.1

Area Available in Shell [A1]:
```
  = d( E1*t - F*tr ) - 2 * tn( E1*t - F*tr ) * ( 1 - fr1 )
  = 151.073( 1.0 * 9.0 - 1.0 * 4.734 ) - 2 * 8.601
    ( 1.0 * 9.0 - 1.0 * 4.7339 ) * ( 1 - 1. )
  = 6.445 cm^2
```

Area Available in Nozzle Projecting Outward [A2]:
```
  = ( 2 * tlnp )( tn - trn )fr2
  = ( 2 * 21.5 )( 8.6 - 1.3 ) 1.
  = 3.139 cm^2
```

Area Available in Inward Weld + Outward Weld [A41 + A43]:
```
  = Wo² * fr2 + ( Wi-can/0.707 )² * fr2
  = 9.0² * 1. + ( 0.0 )² * 1.
  = 0.810 cm^2
```

UG-45 Minimum Nozzle Neck Thickness Requirement:
```
 Wall Thickness for Internal/External pressures      ta = 2.3028 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:
```
  = ta
  = 2.3028 mm.
```

Available Nozzle Neck Thickness = 9.6012 mm. -> OK

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle Neck to Flange Weld (Impact tested) :

Note:
This Material was specified as being an Impact Tested (Low Temperature) Material.

```
 Impact Test Temperature provided per Specification         -46 °C

 Calculated Minimum Design Metal Temperature               -104 °C
```

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 9.601, tr = 1.303, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.151, Temp. Reduction = 78 °C

```
 Min Metal Temp. w/o impact per UCS-66, Curve D             -48 °C
 Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit        -48 °C
 Min Metal Temp. at Required thickness (UCS 66.1)          -104 °C

 Gov. MDMT of the nozzle to shell joint welded assembly :  -104 °C
```

Flange MDMT including Temperature reduction per UCS-66.1:

```
 MDMT of ASME B16.5/47 flange per Matl. Specification       -46 °C
 Flange MDMT with Temp reduction per UCS-66(i)(2)           -49 °C
```

Where the Stress Reduction Ratio per UCS-66(i)(2) is :
```
 Design Pressure/Ambient Rating = 18.37/19.60 = 0.937
```

Weld Size Calculations, Description: H1-INSPECTION P

```
 Intermediate Calc. for nozzle/shell Welds   Tmin      8.6012  mm.
```

Results Per UW-16.1:

	Required Thickness	Actual Thickness
Nozzle Weld	6.0000 = Min per Code	6.3630 = 0.7 * Wo mm.

Weld Strength and Weld Loads per UG-41.1, Sketch (a) or (b)

Weld Load [W]:
```
= max( 0, (A-A1+2*tn*fr1*(E1*t-tr))Sv)
= max( 0, (7.1516 - 6.4449 + 2 * 8.6012 * 1. *
  (1.0 * 9.0 - 4.7339 ) )118)
= 1731.90 kgf
```

Note: F is always set to 1.0 throughout the calculation.

Weld Load [W1]:
```
= (A2+A5+A4-(Wi-Can/.707)²*fr2)*Sv
= ( 3.1388 + 0.0 + 0.81 - 0.0 * 1. ) * 118
= 4747.48 kgf
```

Weld Load [W2]:
```
= (A2 + A3 + A4 + (2 * tn * t * fr1)) * Sv
= ( 3.1388 + 0.0 + 0.81 + ( 1.5482 ) ) * 118
= 6608.85 kgf
```

Weld Load [W3]:
```
= (A2+A3+A4+A5+(2*tn*t*fr1))*S
= ( 3.1388 + 0.0 + 0.81 + 0.0 + ( 1.5482 ) ) * 118
= 6608.85 kgf
```

Strength of Connection Elements for Failure Path Analysis

Shear, Outward Nozzle Weld [Sonw]:
```
= (pi/2) * Dlo * Wo * 0.49 * Snw
= ( 3.1416/2.0 ) * 168.275 * 9.0 * 0.49 * 118
= 14015. kgf
```

Shear, Nozzle Wall [Snw]:
```
= (pi *( Dlr + Dlo )/4 ) * ( Thk - Can ) * 0.7 * Sn
= (3.1416 * 79.8369) * ( 9.6012 - 1.0 ) * 0.7 * 118
= 18156. kgf
```

Tension, Shell Groove Weld [Tngw]:
```
= (pi/2) * Dlo * ( T - cas ) * 0.74 * Sng
= ( 3.1416/2.0 ) * 168.275 * ( 10.0 - 1.0 ) * 0.74 * 118
= 21165. kgf
```

See UG-41 and UW-15 for clarification of allowable stresses.

Strength of Failure Paths:

Failure Path [Path 1-1]:
```
= ( SONW + SNW ) = ( 14015 + 18156 ) = 32170 kgf
```

Failure Path [Path 2-2]:
```
= ( Sonw + Tpgw + Tngw + Sinw )
= ( 14015 + 0 + 21165 + 0 ) = 35179 kgf
```

Failure Path [Path 3-3]:
```
= ( Sonw + Tngw + Sinw )
= ( 14015 + 21165 + 0 ) = 35179 kgf
```

Summary of Failure Path Calculations:

```
 Path 1-1 = 32170   kgf, must exceed W = 1731 kgf     or W1 = 4747 kgf
 Path 2-2 = 35179   kgf, must exceed W = 1731 kgf     or W2 = 6608 kgf
 Path 3-3 = 35179   kgf, must exceed W = 1731 kgf     or W3 = 6608 kgf
```

Maximum Allowable Pressure for this Nozzle at this Location:

```
 Converged Maximum Allowable Pressure in the Operating case: 22 bar(g)
```

The Drop for this Nozzle is : 12.0402 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 172.0401 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

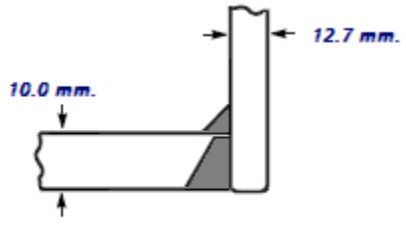
Input, Nozzle Desc: K1B-LT FOR ALARM From: 20

Pressure for Reinforcement Calculations	P	18.369	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Cylindrical Shell	D	600.00	mm.
Shell Finished (Minimum) Thickness	t	10.0000	mm.
Shell Internal Corrosion Allowance	c	1.0000	mm.
Shell External Corrosion Allowance	co	0.0000	mm.
Distance from Bottom/Left Tangent		350.00	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-350 LF2	
Material UNS Number		K03011	
Material Specification/Type		Forgings	
Allowable Stress at Temperature	Sn	137.90	N./mm^2
Allowable Stress At Ambient	Sna	137.90	N./mm^2
Diameter Basis (for tr calc only)		Inside	
Layout Angle		315.00	deg
Diameter		1.0000	in.
Size and Thickness Basis		Actual	
Actual Thickness	tn	12.7000	mm.
Flange Material [Normalized]		SA-350 LF2	
Flange Type		Long Weld Neck	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	10.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: K1B-LT FOR ALARM

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Inside Diameter Used in Calculation            1.000  in.
Actual Thickness Used in Calculation                  0.500  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Cylindrical Shell, tr [Int. Press]
```
  = P*R/(Sv*E-0.6*P) per UG-27 (c)(1)
  = 18.37*301.0/(118*1.0-0.6*18.37)
  = 4.7339 mm.
```

Reqd thk per App. 1 of Nozzle Wall, trn [Int. Press]
```
  = R( exp([P/(Sn*E)] - 1 ) per Appendix 1-2 (a)(1)
  = 13.7(exp([18.37/(137.9*1.0]-1)
  = 0.1837 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl    68.8000  mm.
Parallel to Vessel Wall                          Rn+tn+t    34.4000  mm.
Normal to Vessel Wall (Thickness Limit), no pad   Tlnp    22.5000  mm.
```

Taking a UG-36(c)(3)(a) exemption for nozzle: K1B-LT FOR ALAR.
This calculation is valid for nozzles that meet all the requirements of paragraph UG-36. Please check the Code carefully, especially for nozzles that are not isolated or do not meet Code spacing requirements. To force the computation of areas for small nozzles go to Tools->Configuration and check the box to force the UG-37 small nozzle area calculation.

UG-45 Minimum Nozzle Neck Thickness Requirement: [Int. Press.]
```
Wall Thickness for Internal/External pressures      ta = 1.1837 mm.
Wall Thickness per UG16(b),                      tr16b = 2.5000 mm.
Wall Thickness, shell/head, internal pressure     trb1 = 5.7339 mm.
Wall Thickness                  tb1 = max(trb1, tr16b) = 5.7339 mm.
Wall Thickness                  tb2 = max(trb2, tr16b) = 2.5000 mm.
Wall Thickness per table UG-45                    tb3 = 4.4200 mm.
```

Determine Nozzle Thickness candidate [tb]:
```
  = min[ tb3, max( tb1,tb2) ]
  = min[ 4.42, max( 5.7339, 2.5 ) ]
  = 4.4200 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:
```
  = max( ta, tb )
  = max( 1.1837, 4.42 )
  = 4.4200 mm.
```

Available Nozzle Neck Thickness = 12.7000 mm. -> OK

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 10.0, tr = 4.734, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.526, Temp. Reduction = 29 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve D          -48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit     -48 °C

Gov. MDMT of the nozzle to shell joint welded assembly :   -48 °C
```

Weld Size Calculations, Description: K1B-LT FOR ALAR

```
 Intermediate Calc. for nozzle/shell Welds   Tmin      9.0000  mm.
```

Results Per UW-16.1:

```
                       Required Thickness    Actual Thickness
 Nozzle Weld          6.0000 = Min per Code 6.3630 = 0.7 * Wo mm.
```

Skipping the nozzle attachment weld strength calculations. Per UW-15(b)(2) the nozzles exempted by UG-36(c)(3)(a) (small nozzles) do not require a weld strength check.

The Drop for this Nozzle is : 1.0772 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 161.0772 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

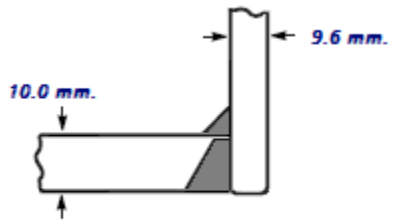
Input, Nozzle Desc: H2-INSPECTION PO From: 20

Pressure for Reinforcement Calculations	P	18.369	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Cylindrical Shell	D	600.00	mm.
Shell Finished (Minimum) Thickness	t	10.0000	mm.
Shell Internal Corrosion Allowance	c	1.0000	mm.
Shell External Corrosion Allowance	co	0.0000	mm.
Distance from Bottom/Left Tangent		2070.00	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-333 6	
Material UNS Number		K03006	
Material Specification/Type		Smls. & wld. pipe	
Allowable Stress at Temperature	Sn	117.90	N./mm^2
Allowable Stress At Ambient	Sna	117.90	N./mm^2
Diameter Basis (for tr calc only)		Outside	
Layout Angle		180.00	deg
Diameter		6.0000	in.
Size and Thickness Basis		Minimum	
Nominal Thickness		XS	
Flange Material		SA-350 LF2	
Flange Type		Weld Neck Flange	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	10.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
This is a Manway or Access Opening.			
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: H2-INSPECTION PO

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

Actual Outside Diameter Used in Calculation		6.625	in.
Actual Thickness Used in Calculation		0.378	in.

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Cylindrical Shell, tr [Int. Press]
= P*R/(Sv*E-0.6*P) per UG-27 (c)(1)
= 18.37*301.0/(118*1.0-0.6*18.37)
= 4.7339 mm.

Reqd thk per UG-37(a) of Nozzle Wall, trn [Int. Press]
= P*Ro/(Sn*E+0.4*P) per Appendix 1-1 (a)(1)
= 18.37*84.1375/(118*1.0+0.4*18.37)
= 1.3028 mm.

UG-40, Limits of Reinforcement: [Internal Pressure]

Parallel to Vessel Wall (Diameter Limit)	Dl	302.1452	mm.
Parallel to Vessel Wall, opening length	d	151.0726	mm.
Normal to Vessel Wall (Thickness Limit), no pad	Tlnp	21.5030	mm.

Weld Strength Reduction Factor [fr1]:
= min(1, Sn/Sv)
= min(1, 117.9/117.9)
= 1.000

Weld Strength Reduction Factor [fr2]:
= min(1, Sn/Sv)
= min(1, 117.9/117.9)
= 1.000

Weld Strength Reduction Factor [fr3]:
= min(fr2, fr4)
= min(1., 1.0)
= 1.000

Results of Nozzle Reinforcement Area Calculations: (cm^2)

AREA AVAILABLE, A1 to A5		MAWP	External	Mapnc
Area Required	Ar	7.152	NA	NA
Area in Shell	A1	6.445	NA	NA
Area in Nozzle Wall	A2	3.139	NA	NA
Area in Inward Nozzle	A3	0.000	NA	NA
Area in Welds	A41+A42+A43	0.810	NA	NA
Area in Element	A5	0.000	NA	NA
TOTAL AREA AVAILABLE	Atot	10.394	NA	NA

The MAWP Case Governs the Analysis.

Nozzle Angle Used in Area Calculations		90.00	degs.

The area available without a pad is Sufficient.

Area Required [A]:
= (d * tr*F + 2 * tn * tr*F * (1-fr1)) UG-37(c)
= (151.0726*4.7339*1.0+2*8.6012*4.7339*1.0*(1-1.))
= 7.152 cm^2

Reinforcement Areas per Figure UG-37.1

Area Available in Shell [A1]:
```
  = d( E1*t - F*tr ) - 2 * tn( E1*t - F*tr ) * ( 1 - fr1 )
  = 151.073( 1.0 * 9.0 - 1.0 * 4.734 ) - 2 * 8.601
    ( 1.0 * 9.0 - 1.0 * 4.7339 ) * ( 1 - 1. )
  = 6.445 cm^2
```

Area Available in Nozzle Projecting Outward [A2]:
```
  = ( 2 * tlnp )( tn - trn )fr2
  = ( 2 * 21.5 )( 8.6 - 1.3 ) 1.
  = 3.139 cm^2
```

Area Available in Inward Weld + Outward Weld [A41 + A43]:
```
  = Wo² * fr2 + ( Wi-can/0.707 )² * fr2
  = 9.0² * 1. + ( 0.0 )² * 1.
  = 0.810 cm^2
```

UG-45 Minimum Nozzle Neck Thickness Requirement:
```
 Wall Thickness for Internal/External pressures      ta = 2.3028 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:
```
  = ta
  = 2.3028 mm.
```

Available Nozzle Neck Thickness = 9.6012 mm. -> OK

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle Neck to Flange Weld (Impact tested) :

Note:
This Material was specified as being an Impact Tested (Low Temperature) Material.

```
 Impact Test Temperature provided per Specification         -46 °C

 Calculated Minimum Design Metal Temperature               -104 °C
```

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 9.601, tr = 1.303, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.151, Temp. Reduction = 78 °C

```
 Min Metal Temp. w/o impact per UCS-66, Curve D             -48 °C
 Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit        -48 °C
 Min Metal Temp. at Required thickness (UCS 66.1)          -104 °C

 Gov. MDMT of the nozzle to shell joint welded assembly :  -104 °C
```

Flange MDMT including Temperature reduction per UCS-66.1:

```
 MDMT of ASME B16.5/47 flange per Matl. Specification       -46 °C
 Flange MDMT with Temp reduction per UCS-66(i)(2)           -49 °C
```

Where the Stress Reduction Ratio per UCS-66(i)(2) is :
```
 Design Pressure/Ambient Rating = 18.37/19.60 = 0.937
```

Weld Size Calculations, Description: H2-INSPECTION P

```
 Intermediate Calc. for nozzle/shell Welds   Tmin      8.6012  mm.
```

Results Per UW-16.1:

	Required Thickness	Actual Thickness
Nozzle Weld	6.0000 = Min per Code	6.3630 = 0.7 * Wo mm.

Weld Strength and Weld Loads per UG-41.1, Sketch (a) or (b)

Weld Load [W]:
```
= max( 0, (A-A1+2*tn*fr1*(E1*t-tr))Sv)
= max( 0, (7.1516 - 6.4449 + 2 * 8.6012 * 1. *
  (1.0 * 9.0 - 4.7339 ) )118)
= 1731.90 kgf
```

Note: F is always set to 1.0 throughout the calculation.

Weld Load [W1]:
```
= (A2+A5+A4-(Wi-Can/.707)²*fr2)*Sv
= ( 3.1388 + 0.0 + 0.81 - 0.0 * 1. ) * 118
= 4747.48 kgf
```

Weld Load [W2]:
```
= (A2 + A3 + A4 + (2 * tn * t * fr1)) * Sv
= ( 3.1388 + 0.0 + 0.81 + ( 1.5482 ) ) * 118
= 6608.85 kgf
```

Weld Load [W3]:
```
= (A2+A3+A4+A5+(2*tn*t*fr1))*S
= ( 3.1388 + 0.0 + 0.81 + 0.0 + ( 1.5482 ) ) * 118
= 6608.85 kgf
```

Strength of Connection Elements for Failure Path Analysis

Shear, Outward Nozzle Weld [Sonw]:
```
= (pi/2) * Dlo * Wo * 0.49 * Snw
= ( 3.1416/2.0 ) * 168.275 * 9.0 * 0.49 * 118
= 14015. kgf
```

Shear, Nozzle Wall [Snw]:
```
= (pi *( Dlr + Dlo )/4 ) * ( Thk - Can ) * 0.7 * Sn
= (3.1416 * 79.8369) * ( 9.6012 - 1.0 ) * 0.7 * 118
= 18156. kgf
```

Tension, Shell Groove Weld [Tngw]:
```
= (pi/2) * Dlo * ( T - cas ) * 0.74 * Sng
= ( 3.1416/2.0 ) * 168.275 * ( 10.0 - 1.0 ) * 0.74 * 118
= 21165. kgf
```

See UG-41 and UW-15 for clarification of allowable stresses.

Strength of Failure Paths:

Failure Path [Path 1-1]:
```
= ( SONW + SNW ) = ( 14015 + 18156 ) = 32170 kgf
```

Failure Path [Path 2-2]:
```
= ( Sonw + Tpgw + Tngw + Sinw )
= ( 14015 + 0 + 21165 + 0 ) = 35179 kgf
```

Failure Path [Path 3-3]:
```
= ( Sonw + Tngw + Sinw )
= ( 14015 + 21165 + 0 ) = 35179 kgf
```

Summary of Failure Path Calculations:

```
 Path 1-1 = 32170   kgf, must exceed W = 1731 kgf     or W1 = 4747 kgf
 Path 2-2 = 35179   kgf, must exceed W = 1731 kgf     or W2 = 6608 kgf
 Path 3-3 = 35179   kgf, must exceed W = 1731 kgf     or W3 = 6608 kgf
```

Maximum Allowable Pressure for this Nozzle at this Location:

```
 Converged Maximum Allowable Pressure in the Operating case: 22 bar(g)
```

The Drop for this Nozzle is : 12.0402 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 172.0401 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

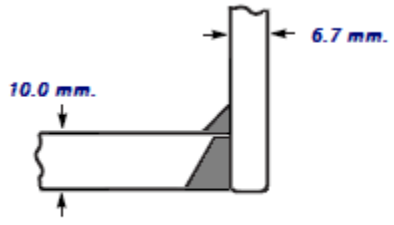
Input, Nozzle Desc: N4-VENT From: 20

Pressure for Reinforcement Calculations	P	18.369	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Cylindrical Shell	D	600.00	mm.
Shell Finished (Minimum) Thickness	t	10.0000	mm.
Shell Internal Corrosion Allowance	c	1.0000	mm.
Shell External Corrosion Allowance	co	0.0000	mm.
Distance from Bottom/Left Tangent		2150.00	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-333 6	
Material UNS Number		K03006	
Material Specification/Type		Smls. & wld. pipe	
Allowable Stress at Temperature	Sn	117.90	N./mm^2
Allowable Stress At Ambient	Sna	117.90	N./mm^2
Diameter Basis (for tr calc only)		Outside	
Layout Angle		0.00	deg
Diameter		3.0000	in.
Size and Thickness Basis		Minimum	
Nominal Thickness		XS	
Flange Material		SA-350 LF2	
Flange Type		Weld Neck Flange	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	10.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: N4-VENT

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Outside Diameter Used in Calculation            3.500  in.
Actual Thickness Used in Calculation                   0.263  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Cylindrical Shell, tr [Int. Press]
```
  = P*R/(Sv*E-0.6*P) per UG-27 (c)(1)
  = 18.37*301.0/(118*1.0-0.6*18.37)
  = 4.7339 mm.
```

Reqd thk per UG-37(a) of Nozzle Wall, trn [Int. Press]
```
  = P*Ro/(Sn*E+0.4*P) per Appendix 1-1 (a)(1)
  = 18.37*44.45/(118*1.0+0.4*18.37)
  = 0.6883 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl   155.1300  mm.
Parallel to Vessel Wall, opening length              d    77.5650  mm.
Normal to Vessel Wall (Thickness Limit), no pad   Tlnp    14.1688  mm.
```

Taking a UG-36(c)(3)(a) exemption for nozzle: N4-VENT.
This calculation is valid for nozzles that meet all the requirements of paragraph UG-36. Please check the Code carefully, especially for nozzles that are not isolated or do not meet Code spacing requirements. To force the computation of areas for small nozzles go to Tools->Configuration and check the box to force the UG-37 small nozzle area calculation.

UG-45 Minimum Nozzle Neck Thickness Requirement: [Int. Press.]
```
Wall Thickness for Internal/External pressures      ta = 1.6883 mm.
Wall Thickness per UG16(b),                      tr16b = 2.5000 mm.
Wall Thickness, shell/head, internal pressure     trb1 = 5.7339 mm.
Wall Thickness                 tb1 = max(trb1, tr16b) = 5.7339 mm.
Wall Thickness                 tb2 = max(trb2, tr16b) = 2.5000 mm.
Wall Thickness per table UG-45                   tb3 = 5.8000 mm.
```

Determine Nozzle Thickness candidate [tb]:
```
  = min[ tb3, max( tb1,tb2) ]
  = min[ 5.8, max( 5.7339, 2.5 ) ]
  = 5.7339 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:
```
  = max( ta, tb )
  = max( 1.6883, 5.7339 )
  = 5.7339 mm.
```

Available Nozzle Neck Thickness = 6.6675 mm. -> OK

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle Neck to Flange Weld (Impact tested) :

Note:
This Material was specified as being an Impact Tested (Low Temperature) Material.

```
Impact Test Temperature provided per Specification         -46 °C

Calculated Minimum Design Metal Temperature               -104 °C
```

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 6.668, tr = 0.688, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.121, Temp. Reduction = 78 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve D            -48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit       -48 °C
Min Metal Temp. at Required thickness (UCS 66.1)         -104 °C

Gov. MDMT of the nozzle to shell joint welded assembly :  -104 °C
```

Flange MDMT including Temperature reduction per UCS-66.1:

```
MDMT of ASME B16.5/47 flange per Matl. Specification      -46 °C
Flange MDMT with Temp reduction per UCS-66(i)(2)          -49 °C
```

Where the Stress Reduction Ratio per UCS-66(i)(2) is :
`Design Pressure/Ambient Rating = 18.37/19.60 = 0.937`

Weld Size Calculations, Description: N4-VENT

`Intermediate Calc. for nozzle/shell Welds  Tmin  5.6675  mm.`

Results Per UW-16.1:

	Required Thickness	Actual Thickness
Nozzle Weld	3.9673 = 0.7 * tmin.	6.3630 = 0.7 * Wo mm.

Skipping the nozzle attachment weld strength calculations. Per UW-15(b)(2) the nozzles exempted by UG-36(c)(3)(a) (small nozzles) do not require a weld strength check.

The Drop for this Nozzle is : 3.3113 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 163.3113 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

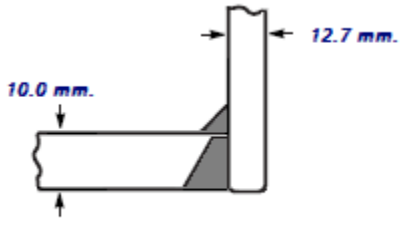
Input, Nozzle Desc: K1A-LT FOR ALARM From: 20

Pressure for Reinforcement Calculations	P	18.369	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Cylindrical Shell	D	600.00	mm.
Shell Finished (Minimum) Thickness	t	10.0000	mm.
Shell Internal Corrosion Allowance	c	1.0000	mm.
Shell External Corrosion Allowance	co	0.0000	mm.
Distance from Bottom/Left Tangent		810.00	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-350 LF2	
Material UNS Number		K03011	
Material Specification/Type		Forgings	
Allowable Stress at Temperature	Sn	137.90	N./mm^2
Allowable Stress At Ambient	Sna	137.90	N./mm^2
Diameter Basis (for tr calc only)		Inside	
Layout Angle		315.00	deg
Diameter		1.0000	in.
Size and Thickness Basis		Actual	
Actual Thickness	tn	12.7000	mm.
Flange Material [Normalized]		SA-350 LF2	
Flange Type		Long Weld Neck	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	10.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: K1A-LT FOR ALARM

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Inside Diameter Used in Calculation            1.000  in.
Actual Thickness Used in Calculation                  0.500  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Cylindrical Shell, tr [Int. Press]
```
  = P*R/(Sv*E-0.6*P) per UG-27 (c)(1)
  = 18.37*301.0/(118*1.0-0.6*18.37)
  = 4.7339 mm.
```

Reqd thk per App. 1 of Nozzle Wall, trn [Int. Press]
```
  = R( exp([P/(Sn*E)] - 1 ) per Appendix 1-2 (a)(1)
  = 13.7(exp([18.37/(137.9*1.0]-1)
  = 0.1837 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl    68.8000  mm.
Parallel to Vessel Wall                          Rn+tn+t    34.4000  mm.
Normal to Vessel Wall (Thickness Limit), no pad   Tlnp    22.5000  mm.
```

Taking a UG-36(c)(3)(a) exemption for nozzle: K1A-LT FOR ALAR.
This calculation is valid for nozzles that meet all the requirements of paragraph UG-36. Please check the Code carefully, especially for nozzles that are not isolated or do not meet Code spacing requirements. To force the computation of areas for small nozzles go to Tools->Configuration and check the box to force the UG-37 small nozzle area calculation.

UG-45 Minimum Nozzle Neck Thickness Requirement: [Int. Press.]
```
Wall Thickness for Internal/External pressures      ta = 1.1837 mm.
Wall Thickness per UG16(b),                      tr16b = 2.5000 mm.
Wall Thickness, shell/head, internal pressure     trb1 = 5.7339 mm.
Wall Thickness                  tb1 = max(trb1, tr16b) = 5.7339 mm.
Wall Thickness                  tb2 = max(trb2, tr16b) = 2.5000 mm.
Wall Thickness per table UG-45                    tb3 = 4.4200 mm.
```

Determine Nozzle Thickness candidate [tb]:
```
  = min[ tb3, max( tb1,tb2) ]
  = min[ 4.42, max( 5.7339, 2.5 ) ]
  = 4.4200 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:
```
  = max( ta, tb )
  = max( 1.1837, 4.42 )
  = 4.4200 mm.
```

Available Nozzle Neck Thickness = 12.7000 mm. -> OK

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 10.0, tr = 4.734, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.526, Temp. Reduction = 29 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve D          -48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit     -48 °C

Gov. MDMT of the nozzle to shell joint welded assembly :   -48 °C
```

Weld Size Calculations, Description: K1A-LT FOR ALAR

```
 Intermediate Calc. for nozzle/shell Welds   Tmin      9.0000  mm.
```

Results Per UW-16.1:

```
                       Required Thickness    Actual Thickness
 Nozzle Weld          6.0000 = Min per Code 6.3630 = 0.7 * Wo mm.
```

Skipping the nozzle attachment weld strength calculations. Per UW-15(b)(2) the nozzles exempted by UG-36(c)(3)(a) (small nozzles) do not require a weld strength check.

The Drop for this Nozzle is : 1.0772 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 161.0772 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

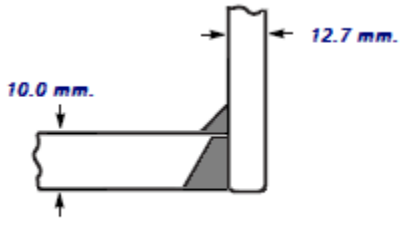
Input, Nozzle Desc: K3-PT From: 20

Pressure for Reinforcement Calculations	P	18.369	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Cylindrical Shell	D	600.00	mm.
Shell Finished (Minimum) Thickness	t	10.0000	mm.
Shell Internal Corrosion Allowance	c	1.0000	mm.
Shell External Corrosion Allowance	co	0.0000	mm.
Distance from Bottom/Left Tangent		2150.00	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-350 LF2	
Material UNS Number		K03011	
Material Specification/Type		Forgings	
Allowable Stress at Temperature	Sn	137.90	N./mm^2
Allowable Stress At Ambient	Sna	137.90	N./mm^2
Diameter Basis (for tr calc only)		Inside	
Layout Angle		60.00	deg
Diameter		1.0000	in.
Size and Thickness Basis		Actual	
Actual Thickness	tn	12.7000	mm.
Flange Material [Normalized]		SA-350 LF2	
Flange Type		Long Weld Neck	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	10.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: K3-PT

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Inside Diameter Used in Calculation            1.000  in.
Actual Thickness Used in Calculation                  0.500  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Cylindrical Shell, tr [Int. Press]
```
  = P*R/(Sv*E-0.6*P) per UG-27 (c)(1)
  = 18.37*301.0/(118*1.0-0.6*18.37)
  = 4.7339 mm.
```

Reqd thk per App. 1 of Nozzle Wall, trn [Int. Press]
```
  = R( exp([P/(Sn*E)] - 1 ) per Appendix 1-2 (a)(1)
  = 13.7(exp([18.37/(137.9*1.0]-1)
  = 0.1837 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl    68.8000  mm.
Parallel to Vessel Wall                          Rn+tn+t    34.4000  mm.
Normal to Vessel Wall (Thickness Limit), no pad   Tlnp    22.5000  mm.
```

Taking a UG-36(c)(3)(a) exemption for nozzle: K3-PT.
This calculation is valid for nozzles that meet all the requirements of paragraph UG-36. Please check the Code carefully, especially for nozzles that are not isolated or do not meet Code spacing requirements. To force the computation of areas for small nozzles go to Tools->Configuration and check the box to force the UG-37 small nozzle area calculation.

UG-45 Minimum Nozzle Neck Thickness Requirement: [Int. Press.]
```
Wall Thickness for Internal/External pressures      ta = 1.1837 mm.
Wall Thickness per UG16(b),                      tr16b = 2.5000 mm.
Wall Thickness, shell/head, internal pressure     trb1 = 5.7339 mm.
Wall Thickness                  tb1 = max(trb1, tr16b) = 5.7339 mm.
Wall Thickness                  tb2 = max(trb2, tr16b) = 2.5000 mm.
Wall Thickness per table UG-45                    tb3 = 4.4200 mm.
```

Determine Nozzle Thickness candidate [tb]:
```
  = min[ tb3, max( tb1,tb2) ]
  = min[ 4.42, max( 5.7339, 2.5 ) ]
  = 4.4200 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:
```
  = max( ta, tb )
  = max( 1.1837, 4.42 )
  = 4.4200 mm.
```

Available Nozzle Neck Thickness = 12.7000 mm. -> OK

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 10.0, tr = 4.734, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.526, Temp. Reduction = 29 °C

```
Min Metal Temp. w/o impact per UCS-66, Curve D          -48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit     -48 °C

Gov. MDMT of the nozzle to shell joint welded assembly :   -48 °C
```

Weld Size Calculations, Description: K3-PT

```
 Intermediate Calc. for nozzle/shell Welds   Tmin      9.0000  mm.
```

Results Per UW-16.1:

```
                       Required Thickness    Actual Thickness
 Nozzle Weld          6.0000 = Min per Code 6.3630 = 0.7 * Wo mm.
```

Skipping the nozzle attachment weld strength calculations. Per UW-15(b)(2) the nozzles exempted by UG-36(c)(3)(a) (small nozzles) do not require a weld strength check.

The Drop for this Nozzle is : 1.0772 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 161.0772 mm.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

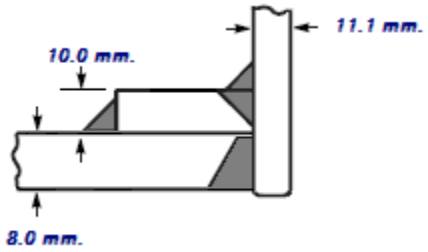
Input, Nozzle Desc: N2-GAS OUTLET From: 30

Pressure for Reinforcement Calculations	P	18.300	bar(g)
Temperature for Internal Pressure	Temp	80	°C
Parent Material [Normalized]		SA-516 60	
Parent Allowable Stress at Temperature	Sv	117.90	N./mm^2
Parent Allowable Stress At Ambient	Sva	117.90	N./mm^2
Inside Diameter of Elliptical Head	D	600.00	mm.
Aspect Ratio of Elliptical Head	Ar	2.00	
Head Finished (Minimum) Thickness	t	8.0000	mm.
Head Internal Corrosion Allowance	c	1.0000	mm.
Head External Corrosion Allowance	co	0.0000	mm.
Distance from Head Centerline	L1	0.0000	mm.
User Entered Minimum Design Metal Temperature		-29.00	°C

Type of Element Connected to the Parent : Nozzle

Material [Impact Tested]		SA-333 6	
Material UNS Number		K03006	
Material Specification/Type		Smls. & wld. pipe	
Allowable Stress at Temperature	Sn	117.90	N./mm^2
Allowable Stress At Ambient	Sna	117.90	N./mm^2
Diameter Basis (for tr calc only)		Outside	
Layout Angle		0.00	deg
Diameter		10.0000	in.
Size and Thickness Basis		Minimum	
Nominal Thickness		XS	
Flange Material		SA-350 LF2	
Flange Type		Weld Neck Flange	
Corrosion Allowance	can	1.0000	mm.
Joint Efficiency of Shell Seam at Nozzle	E1	1.00	
Joint Efficiency of Nozzle Neck	En	1.00	
Outside Projection	ho	150.0000	mm.
Weld leg size between Nozzle and Pad/Shell	Wo	9.0000	mm.
Groove weld depth between Nozzle and Vessel	Wgnv	8.0000	mm.
Inside Projection	h	0.0000	mm.
Weld leg size, Inside Element to Shell	Wi	0.0000	mm.
Pad Material		SA-516 60	
Pad Allowable Stress at Temperature	Sp	117.90	N./mm^2
Pad Allowable Stress At Ambient	Spa	117.90	N./mm^2
Diameter of Pad along vessel surface	Dp	373.0500	mm.
Thickness of Pad	te	10.0000	mm.
Weld leg size between Pad and Shell	Wp	8.0000	mm.
Groove weld depth between Pad and Nozzle	Wgpn	10.0000	mm.
Reinforcing Pad Width		50.0000	mm.
Flange Class		150	
Flange Grade		GR 1.1	

The Pressure Design option was MAWP + static head (bottom of element).



Reinforcement CALCULATION, Description: N2-GAS OUTLET

ASME Code, Section VIII, Div. 1, 2021, UG-37 to UG-45

```
Actual Outside Diameter Used in Calculation          10.750  in.
Actual Thickness Used in Calculation                  0.438  in.
```

Nozzle input data check completed without errors.

Reqd thk per UG-37(a) of Elliptical Head, tr [Int. Press]
```
  = P*D*K/(2*Sv*E-0.2*P) per Appendix 1-4(c)
  = 18.3*602.0*0.996/(2*117.9*1.0-0.2*18.3)
  = 4.6587 mm.
```

Reqd thk per UG-37(a) of Nozzle Wall, trn [Int. Press]
```
  = P*Ro/(Sn*E+0.4*P) per Appendix 1-1 (a)(1)
  = 18.3*136.525/(118*1.0+0.4*18.3)
  = 2.1061 mm.
```

UG-40, Limits of Reinforcement: [Internal Pressure]
```
Parallel to Vessel Wall (Diameter Limit)            Dl   505.6500  mm.
Parallel to Vessel Wall, opening length              d   252.8250  mm.
Normal to Vessel Wall (Thickness Limit), pad side Tlwp    17.5000  mm.
```

Weld Strength Reduction Factor [fr1]:
```
  = min( 1, Sn/Sv )
  = min( 1, 117.9/117.9 )
  = 1.000
```

Weld Strength Reduction Factor [fr2]:
```
  = min( 1, Sn/Sv )
  = min( 1, 117.9/117.9 )
  = 1.000
```

Weld Strength Reduction Factor [fr4]:
```
  = min( 1, Sp/Sv )
  = min( 1, 117.9/117.9 )
  = 1.000
```

Weld Strength Reduction Factor [fr3]:
```
  = min( fr2, fr4 )
  = min( 1., 1.0 )
  = 1.000
```

Results of Nozzle Reinforcement Area Calculations: (cm^2)

AREA AVAILABLE, A1 to A5		MAWP	External	Mapnc
Area Required	Ar	11.778	NA	NA
Area in Shell	A1	5.919	NA	NA
Area in Nozzle Wall	A2	2.802	NA	NA
Area in Inward Nozzle	A3	0.000	NA	NA

```
 Area in Welds    A41+A42+A43 |     1.427|        NA|        NA|
 Area in Element           A5 |    10.000|        NA|        NA|
 ------------------------------------------------------------
 TOTAL AREA AVAILABLE    Atot |    20.149|        NA|        NA|
```

The MAWP Case Governs the Analysis.

```
 Nozzle Angle Used in Area Calculations                90.00  degs.
```

The area available without a pad is Insufficient.
The area available with the given pad is Sufficient.

```
 SELECTION OF POSSIBLE REINFORCING PADS:   Diameter  Thickness
 Based on given Pad Thickness:            289.3445    10.0000  mm.
 Based on given Pad Diameter:             373.0500     1.6295  mm.
 Based on Shell or Nozzle Thickness:      293.4182     8.0000  mm.
```

Area Required [A]:

```
  = ( d * tr*F + 2 * tn * tr*F * (1-fr1) ) UG-37(c)
  = (252.825*4.6587*1.0+2*10.1125*4.6587*1.0*(1-1.))
  = 11.778 cm^2
```

Reinforcement Areas per Figure UG-37.1

Area Available in Shell [A1]:

```
  = d( E1*t - F*tr ) - 2 * tn( E1*t - F*tr ) * ( 1 - fr1 )
  = 252.825( 1.0 * 7.0 - 1.0 * 4.659 ) - 2 * 10.112
    ( 1.0 * 7.0 - 1.0 * 4.6587 ) * ( 1 - 1. )
  = 5.919 cm^2
```

Area Available in Nozzle Wall Projecting Outward [A2]:

```
  = ( 2 * Tlwp ) * ( tn - trn ) * fr2
  = ( 2 * 17.5 ) * ( 10.11 - 2.11 ) * 1.
  = 2.802 cm^2
```

Area Available in Welds [A41 + A42 + A43]:

```
  = (Wo² - Ar Lost)*Fr3+((Wi-can/0.707)² - Ar Lost)*fr2 + Wp²*fr4
  = ( 0.7875 ) * 1. + (0.0 ) * 1. + 8.0² * 1.0
  = 1.427 cm^2
```

Area Available in Element [A5]:

```
  = (min(Dp,DL)-(Nozzle OD))*(min(tp,Tlwp,te)) * fr4
  = ( 373.05 - 273.05 ) * 10.0 * 1.0
  = 10.000 cm^2
```

UG-45 Minimum Nozzle Neck Thickness Requirement: [Int. Press.]

```
 Wall Thickness for Internal/External pressures      ta = 3.1061 mm.
 Wall Thickness per UG16(b),                      tr16b = 2.5000 mm.
 Wall Thickness, shell/head, internal pressure     trb1 = 5.6587 mm.
 Wall Thickness                 tb1 = max(trb1, tr16b) = 5.6587 mm.
 Wall Thickness                 tb2 = max(trb2, tr16b) = 2.5000 mm.
 Wall Thickness per table UG-45                   tb3 = 9.1026 mm.
```

Determine Nozzle Thickness candidate [tb]:

```
  = min[ tb3, max( tb1,tb2) ]
  = min[ 9.103, max( 5.6587, 2.5 ) ]
  = 5.6587 mm.
```

Minimum Wall Thickness of Nozzle Necks [tUG-45]:

```
  = max( ta, tb )
  = max( 3.1061, 5.6587 )
  = 5.6587 mm.
```

Available Nozzle Neck Thickness = 11.1125 mm. -> OK

Stresses on Nozzle due to External and Pressure Loads per the ASME B31.3 Piping Code, (see 319.4.4 and 302.3.5):

Sustained :	28.1,	Allowable :	117.9 N./mm^2	Passed
Expansion :	0.0,	Allowable :	266.6 N./mm^2	Passed
Occasional :	11.0,	Allowable :	156.8 N./mm^2	Passed
Shear :	11.6,	Allowable :	82.5 N./mm^2	Passed

The number of cycles on this nozzle was assumed to be 7000 or less for the determination of the expansion stress allowable.

Nozzle Junction Minimum Design Metal Temperature (MDMT) Calculations:

Nozzle Neck to Flange Weld (Impact tested) :

Note:
This Material was specified as being an Impact Tested (Low Temperature) Material.

Impact Test Temperature provided per Specification	-46 °C
Calculated Minimum Design Metal Temperature	-104 °C

Nozzle Neck to Pad Weld for the Nozzle (Impact tested) :

Note:
This Material was specified as being an Impact Tested (Low Temperature) Material.

Impact Test Temperature provided per Specification	-46 °C

Nozzle Neck to Pad Weld for Reinforcement pad, Curve: C

Govrn. thk, tg = 10.0, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.666, Temp. Reduction = 19 °C
Attachment governing, Attachment stress = Shell stress per Code

Min Metal Temp. w/o impact per UCS-66, Curve C	-44 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit	-48 °C

Shell to Pad Weld Junction at Pad OD, min(Curve:C, Curve:D)

Govrn. thk, tg = 8.0, tr = 4.659, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.666, Temp. Reduction = 19 °C

Min Metal Temp. w/o impact per UCS-66, Curve C	-48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit	-48 °C

Nozzle-Shell/Head Weld (UCS-66(a)1(b)), Curve: D

Govrn. thk, tg = 8.0, tr = 4.659, c = 1.0 mm., E✱ = 1.0
Thickness Ratio = tr * E✱/(tg - c) = 0.666, Temp. Reduction = 19 °C

Min Metal Temp. w/o impact per UCS-66, Curve D		-48 °C
Min Metal Temp per UCS-66 and UCS-68(c),PWHT credit		-48 °C
Gov. MDMT of the Nozzle	:	-46 °C
Gov. MDMT of the Reinforcement Pad	:	-48 °C
Gov. MDMT of the nozzle to shell joint welded assembly	:	-46 °C

Flange MDMT including Temperature reduction per UCS-66.1:

MDMT of ASME B16.5/47 flange per Matl. Specification	-46 °C
Flange MDMT with Temp reduction per UCS-66(i)(2)	-49 °C

Where the Stress Reduction Ratio per UCS-66(i)(2) is :
Design Pressure/Ambient Rating = 18.30/19.60 = 0.934

Weld Size Calculations, Description: N2-GAS OUTLET

```
Intermediate Calc. for nozzle/shell Welds   Tmin     10.0000  mm.
Intermediate Calc. for pad/shell Welds   TminPad      9.0000  mm.
```

Results Per UW-16.1:

	Required Thickness	Actual Thickness
Nozzle Weld	6.0000 = Min per Code	6.3630 = 0.7 * Wo mm.
Pad Weld	4.5000 = 0.5*TminPad	5.6560 = 0.7 * Wp mm.

Weld Strength and Weld Loads per UG-41.1, Sketch (a) or (b)

Weld Load [W]:
= max(0, (A-A1+2*tn*fr1*(E1*t-tr))Sv)
= max(0, (11.7785 - 5.9193 + 2 * 10.1125 * 1. *
(1.0 * 7.0 - 4.6587))118)
= 7613.65 kgf

Note: F is always set to 1.0 throughout the calculation.

Weld Load [W1]:
= (A2+A5+A4-(Wi-Can/.707)²*fr2)*Sv
= (2.8022 + 10.0 + 1.4275 - 0.0 * 1.) * 118
= 17108.03 kgf

Weld Load [W2]:
= (A2 + A3 + A4 + (2 * tn * t * fr1)) * Sv
= (2.8022 + 0.0 + 0.81 + (1.4157)) * 118
= 6045.01 kgf

Weld Load [W3]:
= (A2+A3+A4+A5+(2*tn*t*fr1))*S
= (2.8022 + 0.0 + 1.4275 + 10.0 + (1.4157)) * 118
= 18810.14 kgf

Strength of Connection Elements for Failure Path Analysis

Shear, Outward Nozzle Weld [Sonw]:
= (pi/2) * Dlo * Wo * 0.49 * Snw
= (3.1416/2.0) * 273.05 * 9.0 * 0.49 * 118
= 22741. kgf

Shear, Pad Element Weld [Spew]:
= (pi/2) * DP * WP * 0.49 * SEW
= (3.1416/2.0) * 373.05 * 8.0 * 0.49 * 118
= 27617. kgf

Shear, Nozzle Wall [Snw]:
= (pi *(Dlr + Dlo)/4) * (Thk - Can) * 0.7 * Sn
= (3.1416 * 131.4687) * (11.1125 - 1.0) * 0.7 * 118
= 35150. kgf

Tension, Pad Groove Weld [Tpgw]:
= (pi/2) * Dlo * Wgpn * 0.74 * Seg
= (3.1416/2) * 273.05 * 10.0 * 0.74 * 118
= 38159. kgf

Tension, Shell Groove Weld [Tngw]:
```
= (pi/2) * Dlo * ( T - cas ) * 0.74 * Sng
= ( 3.1416/2.0 ) * 273.05 * ( 8.0 - 1.0 ) * 0.74 * 118
= 26711. kgf
```

See UG-41 and UW-15 for clarification of allowable stresses.

Strength of Failure Paths:

Failure Path [Path 1-1]:
```
= ( SPEW + SNW ) = ( 27617 + 35150 ) = 62767 kgf
```

Failure Path [Path 2-2]:
```
= ( Sonw + Tpgw + Tngw + Sinw )
= ( 22741 + 38159 + 26711 + 0 ) = 87611 kgf
```

Failure Path [Path 3-3]:
```
= ( Spew + Tngw + Sinw )
= ( 27617 + 26711 + 0 ) = 54328 kgf
```

Summary of Failure Path Calculations:
```
Path 1-1 = 62767   kgf, must exceed W = 7613 kgf     or W1 = 17108 kgf
Path 2-2 = 87610   kgf, must exceed W = 7613 kgf     or W2 = 6045 kgf
Path 3-3 = 54328   kgf, must exceed W = 7613 kgf     or W3 = 18810 kgf
```

Maximum Allowable Pressure for this Nozzle at this Location:
```
Converged Maximum Allowable Pressure in the Operating case: 23 bar(g)
```

Note: The MAWP of this junction was limited by the parent Shell/Head.

The Drop for this Nozzle is : 17.3311 mm.
The Cut Length for this Nozzle is, Drop + Ho + H + T : 175.3311 mm.

Input Echo, WRC107/537 Item 1, Description: N2-GAS OUTLET :

Diameter Basis for Vessel	Vbasis	ID	
Cylindrical or Spherical Vessel	Cylsph	Spherical	
Internal Corrosion Allowance	Cas	1.0000	mm.
Vessel Diameter	Dv	1080.000	mm.
Vessel Thickness	Tv	8.000	mm.
Design Temperature	T1	80.0	C
Vessel Material		SA-516 60	
Vessel UNS Number		K02100	
Vessel Cold S.I. Allowable	Smc	117.90	N./mm^2
Vessel Hot S.I. Allowable	Smh	117.90	N./mm^2

See ASME VIII Div. 1, UG-23(e), for determination of the SPS allowable.

Attachment Type	Type	Round	
WRC107 Attachment Classification	Holsol	Hollow	
Diameter Basis for Nozzle	Nbasis	OD	
Corrosion Allowance for Nozzle	Can	1.0000	mm.
Nozzle Diameter	Dn	273.050	mm.
Nozzle Thickness	Tn	11.113	mm.
Nozzle Material		SA-333 6	
Nozzle UNS Number		K03006	
Nozzle Cold S.I. Allowable	SNmc	117.90	N./mm^2
Nozzle Hot S.I. Allowable	SNmh	117.90	N./mm^2
Thickness of Reinforcing Pad	Tpad	10.000	mm.

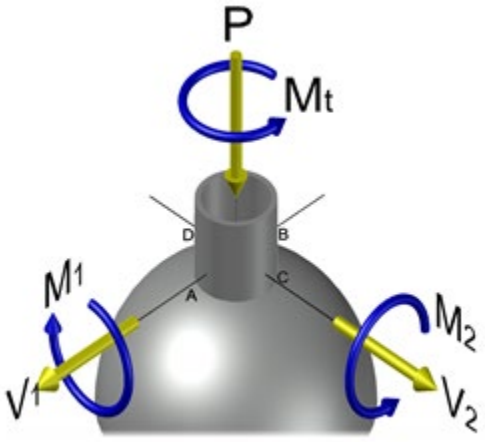
Diameter of Reinforcing Pad			Dpad	373.050	mm.
Design Internal Pressure			Dp	18.300	bar(g)
Include Pressure Thrust				No	

External Forces and Moments in WRC 107/537 Convention:

Radial Load	(SUS)		P	-1223.7	kgf
Longitudinal Shear	(SUS)	(Vl)	V1	611.9	kgf
Circumferential Shear	(SUS)	(Vc)	V2	917.8	kgf
Circumferential Moment	(SUS)	(Mc)	M1	611.6	Kg-m.
Longitudinal Moment	(SUS)	(Ml)	M2	795.1	Kg-m.
Torsional Moment	(SUS)		Mt	917.5	Kg-m.

Use Interactive Control		No
WRC107 Version	Version	March 1979
Include Pressure Stress Indices per Div. 2		No
Compute Pressure Stress per WRC-368		No
Local Loads applied at end of Nozzle/Attachment		No

WRC Bulletin 537 provides equations for the dimensionless curves found in bulletin 107. As noted in the foreword to bulletin 537, "537 is equivalent to WRC 107". Where 107 is printed in the results below, "537" can be interchanged with "107".



WRC 107/537 has dimensional limitations that can be found in the bulletin's Foreword and which can also be inferred by review of the non-dimensional curve limits.

Stress Attenuation Diameter (for Insert Plates) per WRC 297:

```
  = NozzleOD + 2 * 1.65 * sqrt( Rmean( t - ca ) )
  = 273.05 + 2 * 1.65 * sqrt( 544.5 ( 8.0 - 1.0 ) )
  = 476.783 mm.
```

WRC 107 Stress Calculation for SUStained loads:

Radial Load		P	-1223.7	kgf
Circumferential Shear	(VC)	V2	917.8	kgf
Longitudinal Shear	(VL)	V1	611.9	kgf
Circumferential Moment	(MC)	M1	611.6	Kg-m.
Longitudinal Moment	(ML)	M2	795.1	Kg-m.
Torsional Moment		MT	917.5	Kg-m.

Dimensionless Parameters: U = 1.41 TAU = 13.00 RHO = 1.68

Dimensionless Loads for Spherical Shells at Attachment Junction:

Curves read for 1979	Figure	Value	Location
N(x) * T / P	SP 2	0.02306	(A,B,C,D)
M(x) / P	SP 2	0.01962	(A,B,C,D)
N(x) * T * SQRT(Rm * T) / MC	SM 2	0.02660	(A,B,C,D)
M(x) * SQRT(Rm * T) / MC	SM 2	0.02500	(A,B,C,D)
N(x) * T * SQRT(Rm * T) / ML	SM 2	0.02660	(A,B,C,D)
M(x) * SQRT(Rm * T) / ML	SM 2	0.02500	(A,B,C,D)
N(y) * T / P	SP 2	0.08075	(A,B,C,D)
M(y) / P	SP 2	0.01053	(A,B,C,D)
N(y) * T * SQRT(Rm * T) / MC	SM 2	0.07949	(A,B,C,D)
M(y) * SQRT(Rm * T) / MC	SM 2	0.01578	(A,B,C,D)
N(y) * T * SQRT(Rm * T) / ML	SM 2	0.07949	(A,B,C,D)
M(y) * SQRT(Rm * T) / ML	SM 2	0.01578	(A,B,C,D)

Stress Concentration Factors: Kn = 1.00, Kb = 1.00

Stresses in the Vessel at the Attachment Junction (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Rad. Memb. P	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Rad. Bend. P	4.9	-4.9	4.9	-4.9	4.9	-4.9	4.9	-4.9
Rad. Memb. MC	0.0	0.0	0.0	0.0	-5.7	-5.7	5.7	5.7
Rad. Memb. MC	0.0	0.0	0.0	0.0	-32.2	32.2	32.2	-32.2
Rad. Memb. ML	-7.4	-7.4	7.4	7.4	0.0	0.0	0.0	0.0
Rad. Bend. ML	-41.9	41.9	41.9	-41.9	0.0	0.0	0.0	0.0
Tot. Rad. Str.	-43.4	30.5	55.1	-38.4	-32.1	22.6	43.8	-30.4
Tang. Memb. P	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Tang. Bend. P	2.6	-2.6	2.6	-2.6	2.6	-2.6	2.6	-2.6
Tang. Memb. MC	0.0	0.0	0.0	0.0	-17.1	-17.1	17.1	17.1
Tang. Bend. MC	0.0	0.0	0.0	0.0	-20.3	20.3	20.3	-20.3
Tang. Memb. ML	-22.2	-22.2	22.2	22.2	0.0	0.0	0.0	0.0
Tang. Bend. ML	-26.4	26.4	26.4	-26.4	0.0	0.0	0.0	0.0
Tot. Tang. Str.	-42.6	5.0	54.6	-3.5	-31.4	4.0	43.4	-2.5
Shear VC	1.2	1.2	-1.2	-1.2	0.0	0.0	0.0	0.0
Shear VL	0.0	0.0	0.0	0.0	-0.8	-0.8	0.8	0.8
Shear MT	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Tot. Shear	5.8	5.8	3.3	3.3	3.7	3.7	5.3	5.3
Str. Int.	48.8	31.7	58.2	38.7	35.5	23.3	48.9	31.4

Unitless Prm: U = 3.02 TAU = 0.00 (17.94) RHO = 0.00 (0.69)

Dimensionless Loads for Spherical Shells at Pad edge:

Curves read for 1979	Figure	Value	Location
N(x) * T / P	SR 2	0.02175	(A,B,C,D)
M(x) / P	SR 2	0.00990	(A,B,C,D)
N(x) * T * SQRT(Rm * T) / MC	SR 3	0.01691	(A,B,C,D)
M(x) * SQRT(Rm * T) / MC	SR 3	0.01053	(A,B,C,D)
N(x) * T * SQRT(Rm * T) / ML	SR 3	0.01691	(A,B,C,D)

```
M(x)     * SQRT(Rm * T ) / ML    SR 3    0.01053   (A,B,C,D)

N(y) * T / P                     SR 2    0.00650   (A,B,C,D)
M(y)     / P                     SR 2    0.00300   (A,B,C,D)
N(y) * T * SQRT(Rm * T ) / MC    SR 3    0.00507   (A,B,C,D)
M(y)     * SQRT(Rm * T ) / MC    SR 3    0.00317   (A,B,C,D)
N(y) * T * SQRT(Rm * T ) / ML    SR 3    0.00507   (A,B,C,D)
M(y)     * SQRT(Rm * T ) / ML    SR 3    0.00317   (A,B,C,D)
```

Stress Concentration Factors: Kn = 1.00, Kb = 1.00

Stresses in the Vessel at the Edge of Reinforcing Pad (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Rad. Memb. P	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Rad. Bend. P	14.5	-14.5	14.5	-14.5	14.5	-14.5	14.5	-14.5
Rad. Memb. MC	0.0	0.0	0.0	0.0	-33.5	-33.5	33.5	33.5
Rad. Memb. MC	0.0	0.0	0.0	0.0	-125.2	125.2	125.2	-125.2
Rad. Memb. ML	-43.6	-43.6	43.6	43.6	0.0	0.0	0.0	0.0
Rad. Bend. ML	-162.8	162.8	162.8	-162.8	0.0	0.0	0.0	0.0
Tot. Rad. Str.	-186.5	110.0	226.3	-128.4	-138.9	82.5	178.6	-100.9
Tang. Memb. P	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Tang. Bend. P	4.4	-4.4	4.4	-4.4	4.4	-4.4	4.4	-4.4
Tang. Memb. MC	0.0	0.0	0.0	0.0	-10.0	-10.0	10.0	10.0
Tang. Bend. MC	0.0	0.0	0.0	0.0	-37.8	37.8	37.8	-37.8
Tang. Memb. ML	-13.1	-13.1	13.1	13.1	0.0	0.0	0.0	0.0
Tang. Bend. ML	-49.1	49.1	49.1	-49.1	0.0	0.0	0.0	0.0
Tot. Tang. Str.	-56.2	33.2	68.2	-38.9	-41.8	24.9	53.8	-30.5
Shear VC	2.2	2.2	-2.2	-2.2	0.0	0.0	0.0	0.0
Shear VL	0.0	0.0	0.0	0.0	-1.5	-1.5	1.5	1.5
Shear MT	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Tot. Shear	8.1	8.1	3.7	3.7	4.4	4.4	7.3	7.3
Str. Int.	187.0	110.8	226.4	128.6	139.1	82.8	179.1	101.7

WRC 107/537 Stress Summations:

Vessel Stress Summation at Attachment Junction (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Rad. Pm (SUS)	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
Rad. Pl (SUS)	-6.5	-6.5	8.4	8.4	-4.8	-4.8	6.7	6.7
Rad. Q (SUS)	-37.0	37.0	46.8	-46.8	-27.3	27.3	37.1	-37.1
Long. Pm (SUS)	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
Long. Pl (SUS)	-18.8	-18.8	25.5	25.5	-13.7	-13.7	20.4	20.4
Long. Q (SUS)	-23.8	23.8	29.1	-29.1	-17.7	17.7	23.0	-23.0
Shear Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pl (SUS)	1.2	1.2	-1.2	-1.2	-0.8	-0.8	0.8	0.8

Shear Q (SUS)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Pm (SUS)	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
Pm+Pl (SUS)	22.8	22.8	54.8	54.8	24.5	24.5	49.6	49.6
Pm+Pl+Q (Total)	19.7	60.9	87.3	35.5	7.4	52.4	78.1	29.9

Vessel Stress Summation Comparison (N./mm^2):

Type of Stress Int.	Max. S.I.	S.I. Allowable	Result
Pm (SUS)	29.14	117.90	Passed
Pm+Pl (SUS)	54.77	176.86	Passed
Pm+Pl+Q (TOTAL)	87.30	353.71	Passed

*Because only sustained loads were specified, the Pm+Pl+Q allowable was 3 * Smh.*

WRC 107/537 Stress Summations:

Vessel Stress Summation at Reinforcing Pad Edge (N./mm^2)

Type of Stress Load	Stress Intensity Values at Au	Al	Bu	Bl	Cu	Cl	Du	Dl
Rad. Pm (SUS)	70.7	70.7	70.7	70.7	70.7	70.7	70.7	70.7
Rad. Pl (SUS)	-38.3	-38.3	48.9	48.9	-28.2	-28.2	38.9	38.9
Rad. Q (SUS)	-148.3	148.3	177.4	-177.4	-110.7	110.7	139.8	-139.8
Long. Pm (SUS)	70.7	70.7	70.7	70.7	70.7	70.7	70.7	70.7
Long. Pl (SUS)	-11.5	-11.5	14.7	14.7	-8.5	-8.5	11.6	11.6
Long. Q (SUS)	-44.7	44.7	53.5	-53.5	-33.4	33.4	42.2	-42.2
Shear Pm (SUS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pl (SUS)	2.2	2.2	-2.2	-2.2	-1.5	-1.5	1.5	1.5
Shear Q (SUS)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Pm (SUS)	70.7	70.7	70.7	70.7	70.7	70.7	70.7	70.7
Pm+Pl (SUS)	59.4	59.4	119.8	119.8	62.4	62.4	109.7	109.7
Pm+Pl+Q (Total)	131.4	181.6	297.1	89.9	97.5	153.5	249.8	71.9

Vessel Stress Summation Comparison (N./mm^2):

Type of Stress Int.	Max. S.I.	S.I. Allowable	Result
Pm (SUS)	70.73	117.90	Passed
Pm+Pl (SUS)	119.79	176.86	Passed
Pm+Pl+Q (TOTAL)	297.10	353.71	Passed

*Because only sustained loads were specified, the Pm+Pl+Q allowable was 3 * Smh.*

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Loads for Foundation/Support Design:

Total Wind Shear on top of all Legs	341.	kgf
Total Wind Moment at top of all Legs	332.	Kg-m.
Wind Load Case Test Moment on Support	83.	Kg-m.
Test Case Wind Shear on Support	85.	kgf
Max. Wind Shear on one Leg (top & bottom)	224.	kgf
Max. Wind Moment at base of one Leg	215.	Kg-m.
Max. Vertical Load (Wt. + Wind) on one Leg	1292.	kgf
Max. Vertical Load (Wt. + Eq.) on one Leg	323.	kgf

For the Pressure Test Case:

Max. Wind Shear on one Leg (top & bottom)	56.	kgf
Max. Wind Moment at base of one Leg	54.	Kg-m.
Max. Vertical Load (Wt. + Wind) on one Leg	740.	kgf
Max. Vertical Load (Wt. + Eq.) on one Leg	498.	kgf

The Wind and Seismic loads were not load factored in this analysis.

Wind and Earthquake moments include the effects of user defined forces and moments if any exist in the job and were specified to act (compute loads and stresses) during these cases. Also included are moment effects due to eccentric weights if any are present in the input.

Local Stress Analysis Results:

Description	Analysis Type	Max Stress Ratio	High Stress Location	Pass Fail
Lift Lug	WRC-107/537	0.185	n/a	Passed
N1- GAS INLET	WRC-107/537	0.839	n/a	Passed
N2-GAS OUTLET	WRC-107/537	0.840	n/a	Passed

Weights:

Fabricated	- Bare W/O Removable Internals	773.3	kg.
Shop Test	- Fabricated + Water (Full)	1494.0	kg.
Shipping	- Fab. + Rem. Intls.+ Shipping App.	773.3	kg.
Erected	- Fab. + Rem. Intls.+ Insul. (etc)	773.3	kg.
Empty	- Fab. + Intls. + Details + Wghts.	773.3	kg.
Operating	- Empty + Operating Liquid (No CA)	1013.6	kg.
Field Test	- Empty Weight + Water (Full)	1494.0	kg.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

Input Data:

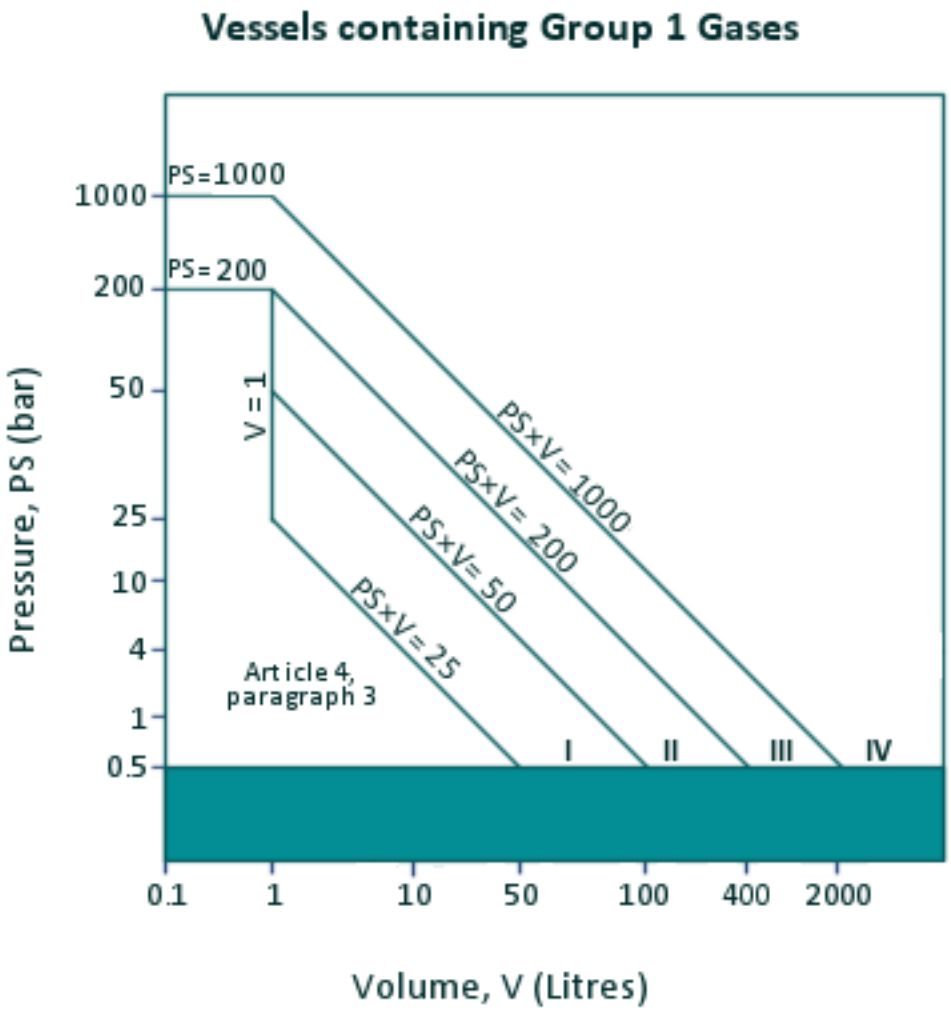
PED Version	PED 2014/68/EU
Maximum Allowable (Design) Pressure	3.500 bar(g)
Maximum Volume	721124.750 cm³
Equipment type per Article 4	1.1 Vessels
Fluid State	Gaseous
Fluid Group	1: Hazardous

Calculated Results:

Maximum Allowable Pressure	3.5 bar
Volume	721.0 litres
Pressure * Volume	2523.3 bar-litres
Category	4
Conformity Assessment Table	1

Modules B (production type) + D, B (production type) + F, G, H1

Exceptionally, vessels intended to contain an unstable gas and falling within categories I or II on the basis of table 1 must be classified in category III.



Pressure Equipment Directive

---

3. MODULE B: EU-TYPE EXAMINATION

3.1. EU-Type examination – production type

1. EU-type examination - production type is the part of a conformity assessment procedure in which a notified body examines the technical design of the pressure equipment and verifies and attests that the technical design of the pressure equipment meets the requirements of this Directive.

2. EU-type examination - production type shall consist of an assessment of the adequacy of the technical design of the pressure equipment through examination of the technical documentation and supporting evidence referred to in point 3, plus examination of a specimen, representative of the production envisaged, of the complete pressure equipment.

3. The manufacturer shall lodge an application for EU-type examination with a single notified body of his choice.

   The application shall include:

   - the name and address of the manufacturer and, if the application is lodged by the authorised representative, his name and address as well,
   - a written declaration that the same application has not been lodged with any other notified body,EN L 189/222 Official Journal of the European Union 27.6.2014
   - the technical documentation. The technical documentation shall make it possible to assess the conformity of the pressure equipment with the applicable requirements of this Directive and shall include an adequate analysis and assessment of the risk(s). The technical documentation shall specify the applicable requirements and cover, as far as relevant for the assessment, the design, manufacture and operation of the pressure equipment. The technical documentation shall contain, wherever applicable, at least the following elements:
   - a general description of the pressure equipment,
   - conceptual design and manufacturing drawings and diagrams of components, sub-assemblies, circuits, etc.,
   - descriptions and explanations necessary for the understanding of those drawings and diagrams and the operation of the pressure equipment,
   - a list of the harmonised standards the references of which have been published in the Official Journal of the European Union, applied in full or in part, and descriptions of the solutions adopted to meet the essential safety requirements of this Directive where those harmonised standards have not been applied. In the event of partly applied harmonised standards, the technical documentation shall specify the parts which have been applied,
   - results of design calculations made, examinations carried out, etc.,
   - test reports,
   - information concerning the tests provided for in manufacture,
   - information concerning the qualifications or approvals required under points 3.1.2 and 3.1.3 of Annex I,
   - the specimens representative of the production envisaged.

   The specimen may cover several versions of the pressure equipment provided that the differences between the versions do not affect the level of safety.

   The notified body may request further specimens if needed for carrying out the test programme;

   - the supporting evidence for the adequacy of the technical design solution. This supporting evidence shall mention any documents that have been used, in particular where the relevant harmonised standards have not been applied in full. The supporting evidence shall include, where necessary, the results of tests carried out by the appropriate laboratory of the manufacturer applying other relevant technical specifications, or by

another testing laboratory on his behalf and under his responsibility.

4. The notified body shall:

4.1. examine the technical documentation and supporting evidence to assess the adequacy of the technical design of the pressure equipment and the manufacturing procedures. In particular, the notified body shall:

- assess the materials where these are not in conformity with the relevant harmonised standards or with a European approval for pressure equipment materials, and check the certificate issued by the material manufacturer in accordance with point

4.3 of Annex I,

- approve the procedures for the permanent joining of pressure equipment parts, or check that they have been previously approved in accordance with point 3.1.2 of Annex I,EN 27.6.2014 Official Journal of the European Union L 189/223
- verify that the personnel undertaking the permanent joining of pressure equipment parts and the non-destructive tests are qualified or approved in accordance with points 3.1.2 or 3.1.3 of Annex I.

4.2. verify that the specimen(s) have been manufactured in conformity with the technical documentation and identify the elements which have been designed in accordance with the applicable provisions of the relevant harmonised standards as well as the elements which have been designed using other relevant technical specifications without applying the relevant provisions of those standards.

4.3. carry out appropriate examinations and necessary tests to check whether when the manufacturer has chosen to apply the solutions in the relevant harmonised standards, these have been applied correctly.

4.4. carry out appropriate examinations and necessary tests to check whether, where the solutions in the relevant harmonised standards have not been applied, the solutions adopted by the manufacturer applying other relevant technical specifications meet the corresponding essential safety requirements of this Directive.

4.5. agree with the manufacturer on a location where the examinations and tests will be carried out.

5. The notified body shall draw up an evaluation report that records the activities undertaken in accordance with point 4 and their outcomes. Without prejudice to its obligations vis-à-vis the notifying authority, the notified body shall release the content of that report, in full or in part, only with the agreement of the manufacturer.

6. Where the type meets the requirements of this Directive, the notified body shall issue an EU-type examination certificate – production type to the manufacturer. Without prejudice to point 7, the certificate shall be valid for 10 years and be renewable and shall contain the name and address of the manufacturer, the conclusions of the examination, the conditions (if any) for its validity and the necessary data for identification of the approved type.

A list of the relevant parts of the technical documentation shall be annexed to the certificate and a copy kept by the notified body.

The certificate and its annexes shall contain all relevant information to allow the conformity of manufactured pressure equipment with the examined type to be evaluated and to allow for in-service control.

Where the type does not satisfy the applicable requirements of this Directive, the notified body shall refuse to issue an EU-type examination certificate – production type and shall inform the applicant accordingly, giving detailed reasons for its refusal. Provision shall be made for an appeals procedure.

7. The notified body shall keep itself apprised of any changes in the generally acknowledged state of the art which indicate that the approved type may no longer comply with the applicable requirements of this Directive, and shall determine whether such changes require further investigation. If so, the notified body shall inform the manufacturer accordingly.

   The manufacturer shall inform the notified body that holds the technical documentation relating to the EU-type examination certificate – production type of all modifications to the approved type that may affect the conformity of the pressure equipment with the essential safety requirements of this Directive or the conditions for validity of the certificate. Such modifications shall require additional approval in the form of an addition to the original EU- type examination certificate – production type.

8. Each notified body shall inform its notifying authority concerning the EU-type examination certificates – production type and/or any additions thereto which it has issued or withdrawn, and shall, periodically or upon request, make available to its notifying authorities the list of certificates and/or any additions thereto refused, suspended or otherwise restricted.EN L 189/224 Official Journal of the European Union 27.6.2014.

   Each notified body shall inform the other notified bodies concerning the EU-type examination certificates – production type and/or any additions thereto which it has refused, withdrawn, suspended or otherwise restricted, and, upon request, concerning the certificates and/or additions thereto which it has issued.

   The Commission, the Member States and the other notified bodies may, on request, obtain a copy of the EU-type examination certificates – production type and/or additions thereto. On request, the Commission and the Member States may obtain a copy of the technical documentation and the results of the examinations carried out by the notified body. The notified body shall keep a copy of the EU-type examination certificate – production type, its annexes and additions, as well as the technical file including the documentation submitted by the manufacturer, until the expiry of the validity of the certificate.

9. The manufacturer shall keep a copy of the EU-type examination certificate – production type, its annexes and additions together with the technical documentation at the disposal of the national authorities for 10 years after the pressure equipment has been placed on the market.

10. The manufacturer’s authorised representative may lodge the application referred to in point 3 and fulfil the obligations set out in points 7 and 9, provided that they are specified in the mandate.

5. MODULE D: CONFORMITY TO TYPE BASED ON QUALITY ASSURANCE OF THE PRODUCTION PROCESS

1. Conformity to type based on quality assurance of the production process is that part of a conformity assessment procedure whereby the manufacturer fulfils the obligations laid down in points 2 and 5, and ensures and declares on his sole responsibility that the pressure equipment or assembly concerned is in conformity with the type described in the EU-type examination certificate and satisfies the requirements of this Directive that apply to it.

2. Manufacturing

   The manufacturer shall operate an approved quality system for production, final product inspection and testing of the pressure equipment concerned as specified in point 3 and shall be subject to surveillance as specified in point 4.EN L 189/228 Official Journal of the European Union 27.6.2014.

3. Quality system

3.1. The manufacturer shall lodge an application for assessment of his quality system

with the notified body of his choice for the pressure equipment concerned.

The application shall include:

- the name and address of the manufacturer and, if the application is lodged by the authorised representative, his name and address as well,
- a written declaration that the same application has not been lodged with any other notified body,
- all relevant information on the pressure equipment type envisaged,
- the documentation concerning the quality system,
- the technical documentation of the approved type and a copy of the EU-type examination certificate.

3.2. The quality system shall ensure that the pressure equipment is in conformity with the type described in the EU-type examination certificate and comply with the requirements of this Directive that apply to it.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic and orderly manner in the form of written policies, procedures and instructions. This quality system documentation shall permit a consistent interpretation of the quality programmes, plans, manuals and records.

It shall, in particular, contain an adequate description of:

- the quality objectives and the organisational structure, responsibilities and powers of the management with regard to the quality of the pressure equipment,
- the corresponding manufacturing, quality control and quality assurance techniques, processes and systematic actions that will be used, particularly the procedures used for the permanent joining of parts as approved in accordance with point 3.1.2 of Annex I,
- the examinations and tests that will be carried out before, during and after manufacture, and the frequency with which they will be carried out,
- the quality records, such as inspection reports and test data, calibration data, reports concerning the qualifications or approvals of the personnel concerned, particularly those of the personnel undertaking the permanent joining of parts and the non-destructive tests in accordance with points 3.1.2 and 3.1.3 of Annex I, etc., and
- the means of monitoring the achievement of the required quality and the effective operation of the quality system.

3.3. The notified body shall assess the quality system to determine whether it satisfies the requirements referred to in point 3.2.

It shall presume conformity with those requirements in respect of the elements of the quality system that comply with the corresponding specifications of the relevant harmonised standard.EN 27.6.2014 Official Journal of the European Union L 189/229

In addition to experience in quality management systems, the auditing team shall have at least one member with experience of evaluation in the relevant pressure equipment field and pressure equipment technology concerned, and knowledge of the applicable requirements of this Directive. The audit shall include an inspection visit to the manufacturer’s premises.

The auditing team shall review the technical documentation referred to in point 3.1, fifth indent, to verify the manufacturer’s ability to identify the relevant requirements of this Directive and to carry out the necessary examinations with a view to ensuring compliance of the product with those requirements.

The decision shall be notified to the manufacturer. The notification shall contain the conclusions of the audit and the reasoned assessment decision.

3.4. The manufacturer shall undertake to fulfil the obligations arising out of the quality system as approved and to maintain it so that it remains adequate and efficient.

3.5. The manufacturer shall keep the notified body that has approved the quality system informed of any intended change to the quality system.

The notified body shall evaluate the proposed changes and decide whether the modified quality system will continue to satisfy the requirements referred to in point 3.2 or whether a reassessment is necessary.

It shall notify the manufacturer of its decision. The notification shall contain the conclusions of the examination and the reasoned assessment decision.

4. Surveillance under the responsibility of the notified body

4.1. The purpose of surveillance is to make sure that the manufacturer duly fulfils the obligations arising out of the approved quality system.

4.2. The manufacturer shall, for assessment purposes, allow the notified body access to the manufacture, inspection, testing and storage sites and shall provide it with all necessary information, in particular:

- the quality system documentation,
- the quality records, such as inspection reports and test data, calibration data, qualification reports of the personnel concerned, etc.

4.3. The notified body shall carry out periodic audits to make sure that the manufacturer maintains and applies the quality system and provide the manufacturer with an audit report. The frequency of periodic audits shall be such that a full reassessment is carried out every three years.

4.4. In addition the notified body may pay unexpected visits to the manufacturer. The need for such additional visits, and the frequency thereof, will be determined on the basis of a visit control system operated by the notified body. In particular, the following factors shall be considered in the visit control system:

- the category of the pressure equipment,
- the results of previous surveillance visits,
- the need to follow up corrective actions,
- special conditions linked to the approval of the system, where applicable,
- significant changes in manufacturing organisation, policy or techniques.EN L 189/230 Official Journal of the European Union 27.6.2014

During such visits the notified body may, if necessary, carry out product tests or have them carried out in order to verify that the quality system is functioning correctly. The notified body shall provide the manufacturer with a visit report and, if tests have been carried out, with a test report.

5. CE marking and EU declaration of conformity

5.1. The manufacturer shall affix the CE marking and, under the responsibility of the notified body referred to in point 3.1, the latter’s identification number to each individual pressure equipment that is in conformity with the type described in the EU-type examination certificate and satisfies the applicable requirements of this Directive.

5.2. The manufacturer shall draw up a written EU declaration of conformity for each pressure equipment model and keep it at the disposal of the national authorities for 10 years after the pressure equipment has been placed on the market. The EU declaration of conformity shall identify the pressure equipment model for which it has been drawn up.

A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

6. The manufacturer shall, for a period ending 10 years after the pressure equipment has been placed on the market, keep at the disposal of the national authorities:

- the documentation referred to point 3.1,
- the change referred to in point 3.5, as approved,
- the decisions and reports of the notified body referred to in points 3.3, 3.5, 4.3 and 4.4.

7. Each notified body shall inform its notifying authorities of the quality system approvals issued or withdrawn, and shall, periodically or upon request, make available to its notifying authorities the list of quality system approvals refused, suspended or otherwise restricted.

   Each notified body shall inform the other notified bodies of the quality system approvals which it has refused, suspended, withdrawn or otherwise restricted, and, upon request, of quality system approvals which it has issued.

8. Authorised representative

   The manufacturer’s obligations set out in points 3.1, 3.5, 5 and 6 may be fulfilled by his authorised representative, on his behalf and under his responsibility, provided that they are specified in the mandate.

9. MODULE F: CONFORMITY TO TYPE BASED ON PRESSURE EQUIPMENT VERIFICATION

1. Conformity to type based on pressure equipment verification is the part of a conformity assessment procedure whereby the manufacturer fulfils the obligations laid down in points 2 and 5, and ensures and declares on his sole responsibility that the pressure equipment concerned, which has been subject to the provisions of point 3, is in conformity with the type described in the EU-type examination certificate and satisfies the requirements of this Directive which apply to it.

2. Manufacturing

   The manufacturer shall take all measures necessary so that the manufacturing process and its monitoring ensure conformity of the manufactured products with the approved type described in the EU-type examination certificate and with the requirements of this Directive which apply to them.

3. Verification

   A notified body chosen by the manufacturer shall carry out the appropriate examinations and tests in order to check the conformity of the pressure equipment with the approved type described in the EU-type examination certificate and with the appropriate requirements of this Directive.

   The examinations and tests to check the conformity of the pressure equipment with the appropriate requirements shall be carried out by examination and testing of every product as specified in point 4.

4. Verification of conformity by examination and testing of every item of pressure equipment

4.1. All pressure equipment shall be individually examined and appropriate tests set out in the relevant harmonised standard(s) or equivalent tests shall be carried out in order to verify conformity with the approved type and described in the EU-type examination certificate and with the appropriate requirements of this Directive. In the absence of such a harmonised standard, the notified body concerned shall decide on the appropriate tests to be carried out.

   In particular, the notified body shall:

   - verify that the personnel undertaking the permanent joining of parts and the non-destructive tests are qualified or approved in accordance with points 3.1.2 and 3.1.3

of Annex I,
- verify the certificate issued by the materials manufacturer in accordance with point 4.3 of Annex I,
- carry out or have carried out the final inspection and proof test referred to in point 3.2 of Annex I and examine the safety devices, if applicable.

4.2. The notified body shall issue a certificate of conformity in respect of the examinations and tests carried out, and shall affix its identification number or have it affixed under its responsibility to each approved item of pressure equipment.

The manufacturer shall keep the certificates of conformity available for inspection by the national authorities for 10 years after the pressure equipment has been placed on the market.

5. CE marking and EU declaration of conformity

5.1. The manufacturer shall affix the CE marking and, under the responsibility of the notified body referred to in point 3, the latter’s identification number to each individual item of pressure equipment that is in conformity with the approved type described in the EU-type examination certificate and satisfies the applicable requirements of this Directive.EN27.6.2014 Official Journal of the European Union L 189/241

5.2. The manufacturer shall draw up a written EU declaration of conformity for each pressure equipment model and keep it at the disposal of the national authorities, for 10 years after the pressure equipment has been placed on the market. The EU declaration of conformity shall identify the pressure equipment model for which it has been drawn up.

A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

If the notified body referred to in point 3 agrees and under its responsibility, the manufacturer may also affix the notified body’s identification number to the pressure equipment.

6. If the notified body agrees and under its responsibility, the manufacturer may affix the notified body’s identification number to the pressure equipment during the manufacturing process.

7. Authorised representative

The manufacturer’s obligations may be fulfilled by his authorised representative, on his behalf and under his responsibility, provided that they are specified in the mandate. An authorised representative may not fulfil the manufacturer’s obligations set out in point 2.

10. MODULE G: CONFORMITY BASED ON UNIT VERIFICATION

1. Conformity based on unit verification is the conformity assessment procedure whereby the manufacturer fulfils the obligations laid down in points 2, 3 and 5, and ensures and declares on his sole responsibility that the pressure equipment concerned, which has been subject to the provisions of point 4, is in conformity with the requirements of this Directive that apply to it.

2. Technical documentation

The manufacturer shall establish the technical documentation and make it available to the notified body referred to in point 4.

The documentation shall make it possible to assess the conformity of the pressure equipment with the relevant requirements and shall include an adequate analysis and assessment of the risk(s). The technical documentation shall specify the applicable

requirements and cover, as far as relevant for the assessment, the design, manufacture and operation of the pressure equipment.

The technical documentation shall, wherever applicable, contain at least the following elements:

- a general description of the pressure equipment,
- conceptual design and manufacturing drawings and diagrams of components, sub-assemblies, circuits, etc.,
- descriptions and explanations necessary for an understanding of those drawings and diagrams and the operation of the pressure equipment,
- a list of the harmonised standards the references of which have been published in the Official Journal of the European Union, applied in full or in part, and descriptions of the solutions adopted to meet the essential safety requirements of this Directive where those harmonised standards, have not been applied. In the event of partly applied harmonised standards, the technical documentation shall specify the parts which have been applied,
- results of design calculations made, examinations carried out, etc.,
- test reports,
- appropriate details relating to the approval of the manufacturing and test procedures and of the qualifications or approvals of the personnel concerned in accordance with points 3.1.2 and 3.1.3 of Annex I.EN L 189/242 Official Journal of the European Union 27.6.2014

The manufacturer shall keep the technical documentation at the disposal of the relevant national authorities for 10 years after the pressure equipment has been placed on the market.

3. Manufacturing

The manufacturer shall take all measures necessary so that the manufacturing process and its monitoring ensure conformity of the manufactured pressure equipment with the applicable requirements of this Directive.

4. Verification

A notified body chosen by the manufacturer shall carry out appropriate examinations and tests, set out in the relevant harmonised standard(s) and/or equivalent tests, to check the conformity of the pressure equipment with the applicable requirements of this Directive, or have them carried out. In the absence of such a harmonised standard the notified body concerned shall decide on the appropriate tests to be carried out applying other technical specifications.

In particular the notified body shall:

- examine the technical documentation with respect to the design and the manufacturing procedures,
- assess the materials used where these are not in conformity with the relevant harmonised standards or with a European approval for pressure equipment materials, and check the certificate issued by the material manufacturer in accordance with point 4.3 of Annex I,
- approve the procedures for the permanent joining of parts or check that they have been previously approved in accordance with point 3.1.2 of Annex I,
- verify the qualifications or approvals required under points 3.1.2 and 3.1.3 of Annex I,
- carry out the final inspection referred to in point 3.2.1 of Annex I, perform or have performed the proof test referred to in point 3.2.2 of Annex I, and examine the safety devices, if applicable.

The notified body shall issue a certificate of conformity in respect of the examinations and tests carried out and shall affix its identification number to the approved pressure equipment, or have it affixed under its responsibility. The manufacturer shall keep the certificates of conformity at the disposal of the national

authorities for 10 years after the pressure equipment has been placed on the market.

5. CE marking and EU declaration of conformity

5.1. The manufacturer shall affix the CE marking and, under the responsibility of the notified body referred to in point 4, the latter's identification number to each item of pressure equipment that satisfies the applicable requirements of this Directive.

5.2. The manufacturer shall draw up a written EU declaration of conformity and keep it at the disposal of the national authorities for 10 years after the pressure equipment has been placed on the market. The EU declaration of conformity shall identify the pressure equipment for which it has been drawn up.

A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

6. Authorised representative

The manufacturer's obligations set out in points 2 and 5 may be fulfilled by his authorised representative, on his behalf and under his responsibility, provided that they are specified in the mandate.EN 27.6.2014 Official Journal of the European Union L 189/243

12. MODULE H1: CONFORMITY BASED ON FULL QUALITY ASSURANCE PLUS DESIGN EXAMINATION

1. Conformity based on full quality assurance plus design examination and special surveillance of the final assessment is the conformity assessment procedure whereby the manufacturer fulfils the obligations laid down in points 2 and 6, and ensures and declares on his sole responsibility that the pressure equipment concerned satisfy the requirements of the Directive that apply to it.

2. Manufacturing

The manufacturer shall operate an approved quality system for design, manufacture and final product inspection and testing of the products concerned as specified in point 3 and shall be subject to surveillance as specified in point 5. The adequacy of the technical design of the pressure equipment shall have been examined in accordance with point 4.

3. Quality system

3.1. The manufacturer shall lodge an application for assessment of his quality system with the notified body of his choice, for the pressure equipment concerned.

The application shall include:

- the name and address of the manufacturer and, if the application is lodged by the authorised representative, his name and address as well,EN 27.6.2014 Official Journal of the European Union L 189/247
- the technical documentation for one model of each type of pressure equipment intended to be manufactured. The technical documentation shall, wherever applicable, contain at least the following elements:
- a general description of the pressure equipment,
- conceptual design and manufacturing drawings and diagrams of components, sub-assemblies, circuits, etc.,
- descriptions and explanations necessary for the understanding of those drawings and diagrams and the operation of the pressure equipment,
- a list of the harmonised standards the references of which have been published in the Official Journal of the European Union, applied in full or in part, and descriptions of the solutions adopted to meet the essential safety requirements of this Directive where those harmonised standards have not been applied. In the event of partly applied harmonised standards, the technical documentation shall specify the parts which have been applied,

- results of design calculations made, examinations carried out, etc.,
- test reports,
- the documentation concerning the quality system,
- a written declaration that the same application has not been lodged with any other notified body.

3.2. The quality system shall ensure compliance of the pressure equipment with the requirements of this Directive that apply to it.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic and orderly manner in the form of written policies, procedures and instructions. This quality system documentation shall permit a consistent interpretation of the quality programmes, plans, manuals and records.

It shall, in particular, contain an adequate description of:

- the quality objectives and the organisational structure, responsibilities and powers of the management with regard to design and product quality,
- the technical design specifications, including standards, that will be applied and, where relevant harmonised standards will not be applied in full, the means that will be used to ensure that the essential safety requirements of the Directive that apply to the pressure equipment will be met,
- the design control and design verification techniques, processes and systematic actions that will be used when designing the pressure equipment pertaining to the pressure equipment type covered, particularly with regard to materials in accordance with point 4 of Annex I,
- the corresponding manufacturing, quality control and quality assurance techniques, processes and systematic actions that will be used, particularly the procedures for the permanent joining of parts as approved in accordance with point 3.1.2 of Annex I,
- the examinations and tests that will be carried out before, during and after manufacture, and the frequency with which they will be carried out,EN L 189/248 Official Journal of the European Union 27.6.2014
- the quality records, such as inspection reports and test data, calibration data, reports concerning the qualifications or approvals of the personnel concerned, particularly those of the personnel undertaking the permanent joining of parts and the non-destructive tests in accordance with points 3.1.2 and 3.1.3 of Annex I, etc.,
- the means of monitoring the achievement of the required design and pressure equipment quality and the effective operation of the quality system.

3.3. The notified body shall assess the quality system to determine whether it satisfies the requirements referred to in point 3.2.

It shall presume conformity with those requirements in respect of the elements of the quality system that comply with the corresponding specifications of the relevant harmonised standard. In addition to experience in quality management systems, the auditing team shall have at least one member experienced as an assessor in the relevant pressure equipment field and pressure equipment technology concerned, and knowledge of the applicable requirements of this Directive. The audit shall include an assessment visit to the manufacturer’s premises.

The auditing team shall review the technical documentation referred to in point 3.1, second indent, to verify the manufacturer’s ability to identify the applicable requirements of this Directive and to carry out the necessary examinations with a view to ensuring compliance of the pressure equipment with those requirements.

The manufacturer or his authorised representative shall be notified of the decision.

The notification shall contain the conclusions of the audit and the reasoned assessment decision.

3.4. The manufacturer shall undertake to fulfil the obligations arising out of the quality system as approved and to maintain it so that it remains adequate and efficient.

3.5. The manufacturer shall keep the notified body that has approved the quality system informed of any intended change to the quality system.

The notified body shall evaluate any proposed changes and decide whether the modified quality system will continue to satisfy the requirements referred to in point 3.2 or whether a re-assessment is necessary.

It shall notify the manufacturer of its decision. The notification shall contain the conclusions of the examination and the reasoned assessment decision.

3.6. Each notified body shall inform its notifying authorities of quality system approvals issued or withdrawn, and shall, periodically or upon request, make available to its notifying authorities the list of quality system approvals refused, suspended or otherwise restricted.

Each notified body shall inform the other notified bodies of quality system approvals which it has refused, suspended or withdrawn, and, upon request, of quality system approvals which it has issued.

4. Design examination

4.1. The manufacturer shall lodge an application for examination of the design of each item of pressure equipment not covered by a previous design examination with the notified body referred to in point 3.1.

4.2. The application shall make it possible to understand the design, manufacture and operation of the pressure equipment, and to assess the conformity with the requirements of this Directive that apply to it. It shall include:

- the name and address of the manufacturer,EN 27.6.2014 Official Journal of the European Union L 189/249
- a written declaration that the same application has not been lodged with any other notified body,
- the technical documentation. The documentation shall make it possible to assess the conformity of the pressure equipment with the relevant requirements, and shall include an adequate analysis and assessment of the risk(s). The technical documentation shall specify the applicable requirements and cover, as far as relevant for the assessment, the design and operation of the pressure equipment. The technical documentation shall, wherever applicable, contain at least the following elements:
- a general description of the pressure equipment,
- conceptual design and manufacturing drawings and diagrams of components, sub-assemblies, circuits, etc.,
- descriptions and explanations necessary for the understanding of those drawings and diagrams and the operation of the pressure equipment,
- a list of the harmonised standards the references of which have been published in the Official Journal of the European Union, applied in full or in part, and descriptions of the solutions adopted to meet the essential safety requirements of this Directive, where those harmonised standards have not been applied. In the event of partly applied harmonised standards, the technical documentation shall specify the parts which have been applied,
- results of design calculations made, examinations carried out, etc., and
- test reports,
- the supporting evidence for the adequacy of the technical design. This supporting evidence shall mention any documents that have been used, in particular where the relevant harmonised standards have not been applied in full, and shall include, where necessary, the results of tests carried out by the appropriate laboratory of the manufacturer or by another testing laboratory on his behalf and under his responsibility.

4.3. The notified body shall examine the application, and where the design meets the requirements of this Directive that apply to the pressure equipment it shall issue an EU design examination certificate to the manufacturer. The certificate shall give the name and address of the manufacturer, the conclusions of the examination, the conditions (if

any) for its validity and the data necessary for identification of the approved design. The certificate may have one or more annexes attached.

The certificate and its annexes shall contain all relevant information to allow the conformity of manufactured products with the examined design to be evaluated, and to allow for in-service control, where applicable.

Where the design does not satisfy the applicable requirements of this Directive, the notified body shall refuse to issue a design examination certificate and shall inform the applicant accordingly, giving detailed reasons for its refusal.

4.4. The notified body shall keep itself apprised of any changes in the generally acknowledged state of the art which indicate that the approved design may no longer comply with the applicable requirements of this Directive, and shall determine whether such changes require further investigation. If so, the notified body shall inform the manufacturer accordingly.

The manufacturer shall keep the notified body that has issued the EU design examination certificate informed of any modification to the approved design that may affect the conformity with the essential safety requirements of this Directive or the conditions for validity of the certificate. Such modifications shall require additional approval - from the notified body that issued the EU design examination certificate - in the form of an addition to the original EU design examination certificate.EN L 189/250 Official Journal of the European Union 27.6.2014

4.5. Each notified body shall inform its notifying authorities of the EU design examination certificates and/or any additions thereto which it has issued or withdrawn, and shall, periodically or upon request, make available to its notifying authorities the list of certificates and/or any additions thereto refused, suspended or otherwise restricted.

Each notified body shall inform the other notified bodies of the EU design examination certificates and/or any additions thereto which it has refused, withdrawn, suspended or otherwise restricted, and, upon request, of the certificates and/or additions thereto which it has issued.

The Commission, the Member States and the other notified bodies may, on request, obtain a copy of the EU design examination certificates and/or additions thereto. On request, the Commission and the Member States may obtain a copy of the technical documentation and of the results of the examinations carried out by the notified body.

The notified body shall keep a copy of the EU design examination certificate, its annexes and additions, as well as the technical file including the documentation submitted by the manufacturer until the expiry of the validity of the certificate.

4.6. The manufacturer shall keep a copy of the EU design examination certificate, its annexes and additions together with the technical documentation at the disposal of the national authorities for 10 years after the pressure equipment has been placed on the market.

5. Surveillance under the responsibility of the notified body

5.1. The purpose of surveillance is to make sure that the manufacturer duly fulfils the obligations arising out of the approved quality system.

5.2. The manufacturer shall, for assessment purposes, allow the notified body access to the design, manufacture, inspection, testing and storage sites, and shall provide it with all necessary information, in particular:

- the quality system documentation,
- the quality records as provided for by the design part of the quality system, such as results of analyses, calculations, tests, etc.,
- the quality records as provided for by the manufacturing part of the quality

system, such as inspection reports and test data, calibration data, qualification reports on the personnel concerned, etc.

5.3. The notified body shall carry out periodic audits to make sure that the manufacturer maintains and applies the quality system and shall provide the manufacturer with an audit report. The frequency of periodic audits shall be such that a full reassessment is carried out every three years.

5.4. In addition, the notified body may pay unexpected visits to the manufacturer.

The need for such additional visits, and the frequency thereof, will be determined on the basis of a visit control system operated by the notified body. In particular, the following factors must be considered in the visit control system:

- the category of the equipment,
- the results of previous surveillance visits,
- the need to follow up corrective action(s),EN 27.6.2014 Official Journal of the European Union L 189/251
- special conditions linked to the approval of the system, where applicable,
- significant changes in manufacturing organisation, policy or techniques.

During such visits, the notified body may, if necessary, carry out product tests, or have them carried out, in order to check the proper functioning of the quality system. It shall provide the manufacturer with a visit report and, if tests have been carried out, with a test report.

5.5. Special surveillance of the final assessment

Final assessment as referred to in section 3.2 of Annex I is subject to increased surveillance in the form of unexpected visits by the notified body. In the course of such visits, the notified body shall conduct examinations on the pressure equipment.

It shall provide the manufacturer with a visit report and, if tests have been carried out, with a test report.

6. CE marking and EU declaration of conformity

6.1. The manufacturer shall affix the CE marking and, under the responsibility of the notified body referred to in point 3.1, the latter’s identification number to each individual item of pressure equipment that satisfies the applicable requirements of this Directive.

6.2. The manufacturer shall draw up a written EU declaration of conformity for each pressure equipment model and keep it at the disposal of the national authorities for 10 years after the pressure equipment has been placed on the market. The EU declaration of conformity shall identify the pressure equipment model for which it has been drawn up and shall mention the number of the design examination certificate.

A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

7. The manufacturer shall, for a period ending 10 years after the pressure equipment has been placed on the market, keep at the disposal of the national authorities:

- the documentation concerning the quality system referred to in point 3.1,
- the change referred to in point 3.5, as approved,
- the decisions and reports of the notified body referred to in points 3.5, 5.3 and 5.4.

8. Authorised representative

The manufacturer’s authorised representative may lodge the application referred to in points 4.1 and 4.2 and fulfil the obligations set out in points 3.1, 3.5, 4.4, 4.6, 6

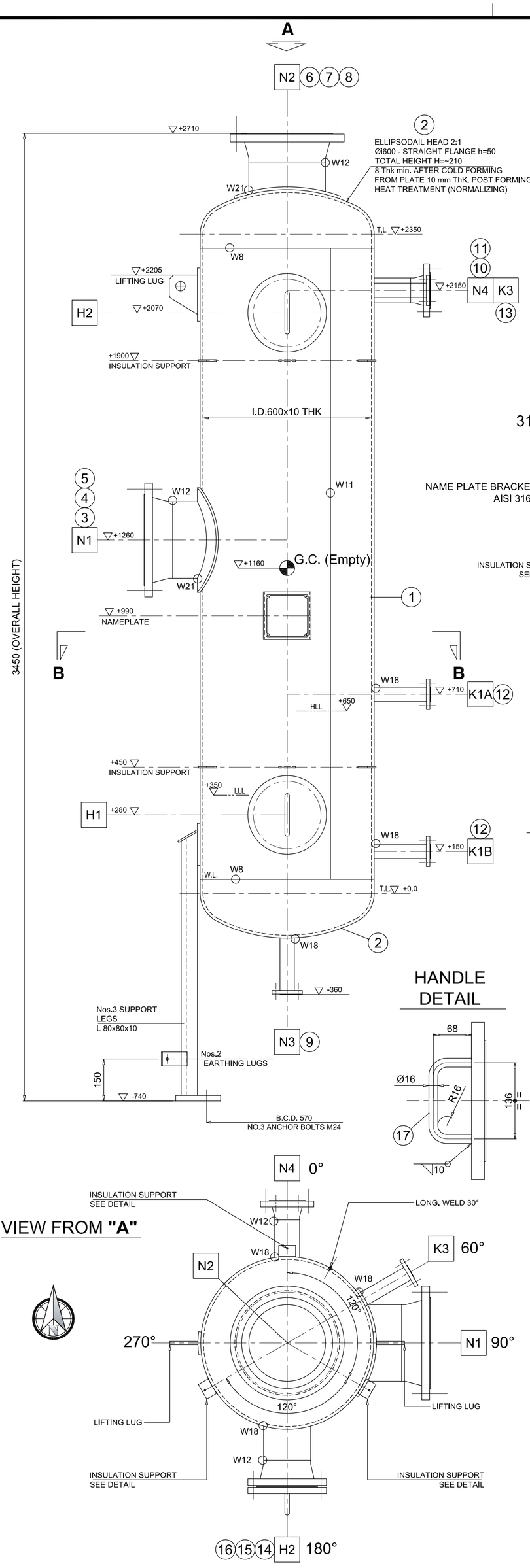
and 7, on his behalf and under his responsibility, provided that they are specified in the mandate.

PV Elite is a trademark of Hexagon AB, 2024, All rights reserved.

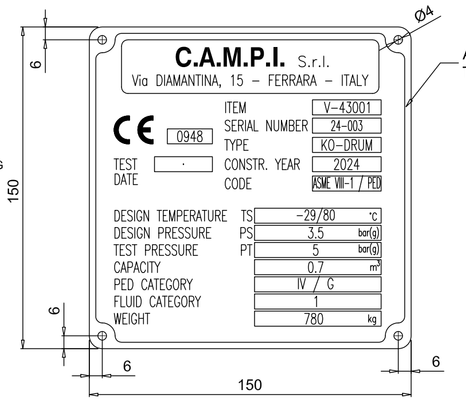
C.A.M.P.I. srl Ferrara (Italy)	SEZIONE / Section 1A.3

Drawings

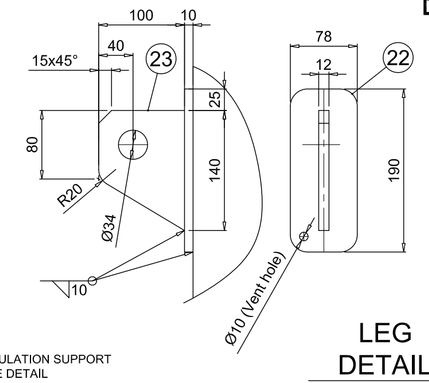
DRAWING NO. 1724000163-MAC-DA-00004 REV. 02



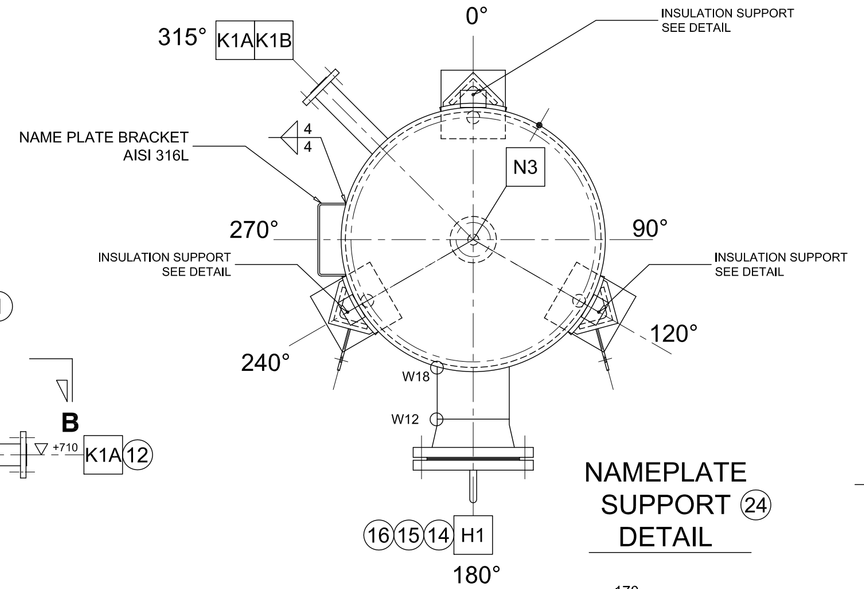
NAME PLATE 2014/68/EU (25)(26)



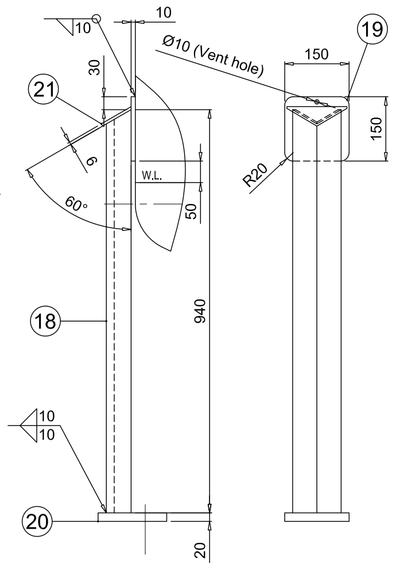
LUG DETAIL



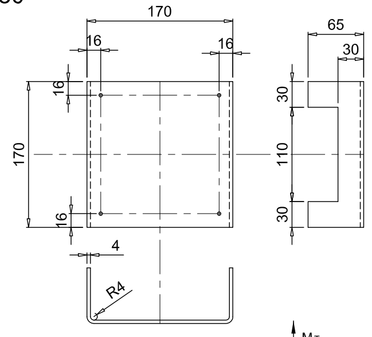
SECTION "B-B"



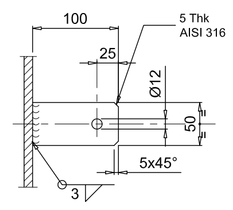
LEG DETAIL



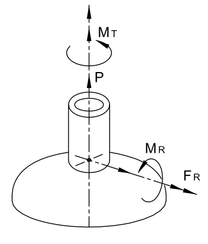
NAMEPLATE SUPPORT (24) DETAIL

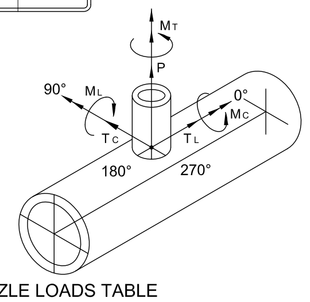


EARTHING LUG DETAIL (27)

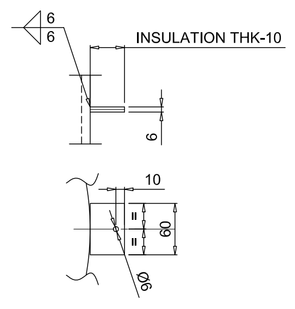


HANDLE DETAIL





INSULATION SUPPORT DETAIL



MAXIMUM ALLOWABLE NOZZLE LOADS TABLE

POSITION NOZZLES	NPS	P (N)	TL (N)	TC (N)	ML (N*m)	MC (N*m)	MT (N*m)
N1-N2	10	12000	6000	9000	7800	6000	9000

NOTE: NOZZLE FLANGE VERIFIED ACCORDING TO MANDATORY UG-44 TAKING INTO ACCOUNT THE EXTERNAL LOADS

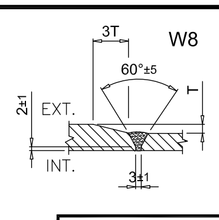
VIEW FROM "A"

POSITION NOZZLE	N° OF	ND (NPS)	SCHEDULE/ THICKNESS	ASME PRESS. CLASS	SERVICE	TYPE AND FACING / FLANGE	FLANGE FACE / FINISH	REINFORCING PLATE THK./WIDTH	PROJ. FROM CENTER LINE	NOTES
N1	1	10	XS/12.7	150#	GAS INLET	WN-RF	3.2 ÷ 6.3 µm Ra	10x50	510	
N2	1	10	XS/12.7	150#	GAS OUTLET	WN-RF	3.2 ÷ 6.3 µm Ra	10x50	SEE DWG	
N3	1	1	- /12.7	150#	LIQUID OUTLET	LWN-RF	3.2 ÷ 6.3 µm Ra	-	SEE DWG	
N4	1	3	XS /7.62	150#	VENT	WN-RF	3.2 ÷ 6.3 µm Ra	-	510	
K1A	1	1	- /12.7	150#	LT FOR ALARM	LWN-RF	3.2 ÷ 6.3 µm Ra	-	510	
K1B	1	1	- /12.7	150#	LT FOR ALARM	LWN-RF	3.2 ÷ 6.3 µm Ra	-	510	
K3	1	1	- /12.7	150#	PT	LWN-RF	3.2 ÷ 6.3 µm Ra	-	510	
H1	1	6	XS /10.97	150#	INSPECTION PORT	WN-RF + BF	3.2 ÷ 6.3 µm Ra	-	510	1)
H2	1	6	XS /10.97	150#	INSPECTION PORT	WN-RF + BF	3.2 ÷ 6.3 µm Ra	-	510	1)

LIST OF CONNECTIONS

NOZZLE NOTES

1) WITH BLIND FLANGE, GASKET, STUD BOLTS, NUTS, HANDLE



NOTE - tc min : The SMALLER of 6mm / 0.7xTmin

NUMBER	TITLE	REV.
123A90-DDL-MAC-SP-50026	TECHNICAL SPECIFICATION FOR CS HORIZONTAL PRESSURE VESSELS IN H2 SERVICE	01
123A90-DDL-MAC-DS-50028	TDS - HYDROGEN VENT KO DRUM - V-43001	00
123A90-DDL-MAT-SP-60006	COATING AND PAINTING SPECIFICATION	02
123A90-DDL-ST-SP-90017	STRUCTURAL DESIGN BASIS	02
123A90-DDL-ST-SP-90018	STRUCTURAL MATERIAL SPECIFICATION	01

REFERENCE DOCUMENTS

JOINT CATEGORY	RT	UT	PT/MT
A (SHELL LONGITUDINAL BUTT JOINT)	10% (100% for cross)	100%	-
B (SHELL CIRCUMFERENTIAL BUTT JOINT)	10% (100% for cross)	100%	-
C (NOZZLE-FLANGE BUTT JOINT)	10%	-	-
D (NOZZLE-SHELL/HEAD CORNER JOINT)	-	-	100%
LIFTING LUG AND LEGS	-	-	100%
WELD REPAIRS .	AS PER ORIGINAL WELD NDE		

WELDING EXAMINATIONS

DESCRIPTION	MATERIAL	CERT.	NOTES
GASKETS FOR NOZZLES	1/16" FLEXIBLE GRAPHITE W/304 S.S. INSERT	○	-
STUD BOLTS / NUTS (EXTERNAL)	SA-320 Gr.L7 / SA-194 Gr.7	◐	GALV. ACC. TO ASTM B633 FeZn12
SUPPORT LEGS / BASE PLATES	S355J2 / SA-516 Gr.70	◐	-
FLANGES NOZZLES AND BLIND	SA-350 LF2 CL1	◐	-
NOZZLE NECKS	SA-333 Gr.6	◐	-
REINFORCING PAD	SA-516 Gr.60N	◐	-
SHELL / HEADS	SA-516 Gr.60N	◐	-

MATERIAL LIST

MATERIALS CERTIFICATION	THICKNESSES TOLERANCE
● CERTIFICATE EN 10204 3.2	PLATES: - 0.2 mm
◐ CERTIFICATE EN 10204 3.1	PIPES: -12.5%
○ CERTIFICATE EN 10204 2.2	HEADS: -

DESIGN DATA

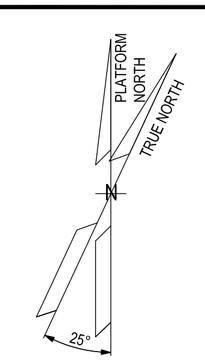
		SIDE	SHELL	NOTES
DESIGN CODES			ASME VIII Div.1 _ 2023 Ed.+2014/68/EU	
AUTHORIZED INSPECTION AGENCY			-	
ASME CERTIFICATION			NONE	
NATIONAL BOARD REGISTRATION			NONE	
PED CATEGORY			IV	
MODULE			G	
ATEX CLASSIFICATION			ZONE IIB T1+H2	
PRESSURE	DESIGN	bar (g)	3.5	
	OPERATING	bar (g)	ATM	
	HYDROTEST	bar (g)	5.0	
	M.A.W.P. (HOT AND CORRODED)	bar (g)	18 @ 80°C	
TEMPERATURE	DESIGN	°C	80	
	OPERATING	°C	25	
	MDMT	°C	-29 @ 18 bar (g)	18)
CORROSION ALLOWANCE		mm	1.0	
FLUID	TYPE		HYDROGEN / WATER	
	FLUID GROUP		1 / 2	
	PHYSICAL STATE		GAS / LIQUID	
	DENSITY	Kg/m³	0.085/1000	
	CAPACITY	m³	0.7	
JOINTS EFFICIENCY		SHELL	0.85	
		HEADS	0.85	
X-RAY TEST			SPOT	
POSTWELD HEAT TREATMENT AS PER UCS-56			YES (FOR PROCESS REQUIREMENT)	
OUT OF ROUND AS PER UG-80(a)		%	<1	
EXTREME FIBER ELONG SHELL AS PER UG-79-1		%	1.31 (NO Post forming heat treatment)	
EXTREME FIBER ELONG HEAD AS PER UG-79-1		%	7 (Post forming heat treatment see note 14)	
IMPACT TEST			SEE NOTE 18)	
INSPECTION OPENING AS PER UG-46(f)			SEE CONNECTION "H1" & "H2"	
SERVICE RESTRICTION AS PER UW-2			NONE	
INSULATION			YES / BY OTHERS	
FIREPROOFING			NONE	
SEISMIC ZONE FACTOR			NONE	
WIND DATA			1 Year Return, 3 sec. gust = 35 m/sec, 100 Year Return, 3 sec. gust = 45 m/sec	
INSTALLATION	VERTICAL		SUPPLY WEIGHT (MASS) 780	kg
LOCATION	OFFSHORE		OPERATING WEIGHT 1015	kg
			WEIGHT FULL OF WATER 1500	kg

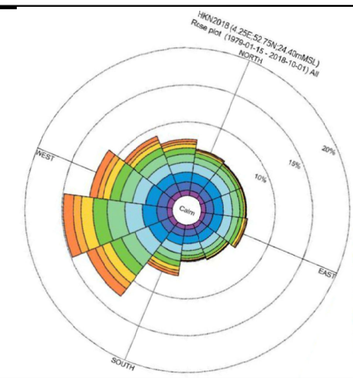
PAINTING (IN WORKSHOP)

EXTERNAL SURFACES:
- SANDBLASTING SA 2½ Std ISO 8501-1 (SSPC - SP10).
- COATING SYSTEM : N°1 OF NORSOK M-501
- TOP COAT COLOUR : WHITE RAL 9002

LOADS ON FOUNDATION

		ERECTION	TEST	OPERATING
VERTICAL LOAD	kN	7,6	14,7	9,9
SHEAR	kN	3,6	0,9	3,1
MOMENT	kN*m	3,8	0,95	3,2





NOTES

27) NO WELD REPAIR ARE ADMITTED AFTER PWHT

26) MECHANICAL TEST ON PRODUCTION TEST COUPON (TENSILE TEST AT ROOM TEMPERATURE AND CHARPY TESTING AT -29°C, TEST ISO 17025 IN ACCREDITATED LABORATORY)

25) FOR SHIPMENT ALL NOZZLES SHALL BE BLANKED OF (WITH METALLIC BLIND, BOLTS AND GASKETS)

24) FOR PRESERVATION AND PREPARATION FOR SHIPMENT DESSICANT BAG WILL BE USED

23) COMMISSIONING SPARE PARTS:
- 10% SPARE BOLTING FOR EACH SIZE, WITH A MINIMUM OF 2 BOLTS WITH 4 NUTS AND WASHERS
- TWO COMPLETE SETS OF NEW SPARE GASKETS OF THE SAME MATERIAL THAN GASKETS INSTALLED ON THE EQUIPMENT, FOR EACH SIZE.

22) SURFACE PREPARATION AND PAINTING AS PER C3 CORROSIVITY CATEGORY OF ISO 9223

21) MATERIALS SHALL BE CERTIFIED EN 10204 TYPE 3.1 FOR PRESSURE PARTS AND TYPE 2.2 FOR OTHER PARTS.

20) CS FABRICATION MATERIAL FOR PRESSURE VESSELS IN HYDROGEN SERVICE SHALL HAVE CE MAX. = 0.35%.

19) PHOSPHORUS MAXIMUM TO BE 0.015%

18) IMPACT TESTING SHALL BE AT -46°C FOR BASE METAL AND WELD METAL IN H2 SERVICE REGARDLESS OF MDMT

17) STEEL SHALL BE HIC RESISTANT TO ISO 15156-2

16) MAX HARDNESS IN BASE METAL SHALL BE 235 HV10

15) ALL CARBON STEEL MATERIALS SHALL BE SUPPLIED IN FULLY KILLED AND NORMALIZED CONDITIONS.

14) COLD FORMED CARBON STEEL HEADS SHALL BE NORMALIZED AFTER FORMING.

13) FLANGES SHALL BE THROUGH-BOLTED WITH STUD BOLTS, THREADED FULL-LENGTH WITH A REMOVABLE NUT ON EACH END. THE LENGTH OF THE STUD BOLTS SHALL BE SELECTED SUCH THAT AFTER ASSEMBLY THE LENGTH OF THE STUD PROTRUDING BEYOND THE NUT IS 3.5MM - 7.5MM.

12) WELDS ON REINFORCING PADS SHALL BE TESTED WITH BUBBLE (SOAP) SOLUTION AND COMPRESSED AIR AT A PRESSURE OF 0.5 TO 1 BAR (G), BEFORE PWHT AND HYDROSTATIC TESTING OF THE VESSEL.

11) REINFORCING PADS SHALL PREFERABLY BE OF ONE-PIECE CONSTRUCTION, IF THIS IS NOT POSSIBLE, THE WELDS IN SEGMENTED REINFORCING PADS SHALL BE ALIGNED IN THE DIRECTION OF THE VESSEL'S CIRCUMFERENCE.

10) REINFORCING PADS SHALL BE PROVIDED WITH ONE ½" NPT TELLTALE HOLE. TWO-PIECE REINFORCING PADS SHALL BE PROVIDED WITH TWO TELLTALE HOLES (ONE PER SEGMENT), AFTER TESTING, THE TELLTALE HOLE SHALL BE PLUGGED.

9) FABRICATION TEST COUPONS SHALL INCLUDE AS MINIMUM 1(ONE) TEST PIECE OF BASE MATERIAL BEFORE PWHT AND ANOTHER 1(ONE) OF MATERIAL WITH PWHT, TEST PLATES SHALL BE OF THE SAME HEAT OF THE SHELL MATERIAL USED IN THE CONSTRUCTION OF THE VESSEL AND SHALL BE HEAT TREATED WITH THE VESSEL IN THE SAME FURNACE WHEN APPLICABLE.

8) MACHINED SURFACES, FLANGE FACES, ETC., SHALL BE PROTECTED FROM OXIDATION DURING HEAT TREATMENT. NO WELDING, HAMMERING OR DEFORMATION IS PERMITTED AFTER PWHT.

7) THE MINIMUM DISTANCE BETWEEN THE EDGE OF THE NOZZLE WELDS OR REINFORCEMENT PLATE WELDS AND THE EDGE OF THE WELDED SEAM SHALL BE AS FOLLOWS:
- FOR A LONGITUDINAL WELD, THE GREATER OF 100 MM AND 2"t (WHERE t IS THE WALL THICKNESS);
- FOR CIRCUMFERENTIAL WELD, THE GREATER OF 50 MM AND 2"t.

6) NOZZLES PROJECTIONS REFERRED FROM EQUIPMENT CENTERLINE TO FLANGE CONTACT FACE. NOZZLE PROJECTIONS . FOR NOZZLE INSTALLED ON HEADS ARE REFERRED TO TANGENT LINE.

5) NOZZLES FLANGE STUD BOLTS HOLES STRADDLE C.L.

4) ALL THICKNESS SHOWN ON THIS DRAWING ARE MINIMUM AFTER FORMING AND MACHINING.

3) FLANGES ACCORDING TO ASME B16.5/2020 - , PIPES CARBON STEEL ACCORDING TO ASME B36.10/2022, PIPE FITTING ACCORDING TO ASME B16.9/2018 + B16.11/2021

2) CONSTRUCTION TOLERANCES AS PER ASME VIII DIV.1 ED.2023 PAR. UG-80 + UG-81. FOR ANGULAR AND LINEAR PARTS SEE C.A.M.P.I. SPEC. CTD-004/09 REV. 0

1) ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.

LEGEND

DESIGN EXAMINED
In accordance with ASME VIII Div.1 Ed.2023 annex (es) PED - Annex 1
Remarks of the attached letter are to be observed.
Milano, Date 17/09/2024
TÜV ITALIA S.R.L. - TÜV Süd Gruppe
Notified Body No. 0948

HOLDS

A) -
B) -
C) -
D) -

FERRARA C.A.M.P.I. ITALY
Via Diamantina, 15 - 44122 FERRARA - ITALY
Tel. (+39) 0532 770048-772292 e-mail: campi@campiswit

C.A.M.P.I. DWG No. 24003-VE-10
Manufacturer Serial No. 24-003

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
04	02/09/24	CATTANI	BENINI	DALL'ARCHE	ACCEPTED FOR CONSTRUCTION (AFC)
03	01/07/24	CATTANI	BENINI	DALL'ARCHE	ACCEPTED FOR CONSTRUCTION (AFC)
02	14/06/24	CERVELLATI	BENINI	DALL'ARCHE	ADDED INSULATION SUPPORT
01	22/03/24	CERVELLATI	BENINI	DALL'ARCHE	ISSUE FOR CLIENT REVIEW (ICR)
00	29/02/24	CERVELLATI	BENINI	DALL'ARCHE	ISSUE FOR CLIENT REVIEW (ICR)

CROSSWIND
ROSETTI MARINO

TITLE :
BASE LOAD POWER HUB (BLPH)
HYDROGEN VENT KO DRUM V-43001
GA DRAWING & FOUNDATION LOADING

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:10
DRAWN CERVELLATI | CHECKED BENINI | APPROVED DALL'ARCHE | DATE 28/02/24
A1 | DRAWING NO. 1724000163-MAC-DA-00004 | SHEET 1/3 | REV. 04

File Name : 1724000163-MAC-DA-00004

1724000163-QC-DB-00013 rev02 page480/528

MATERIAL LIST

Job	24003		
ROSETTI Ref	1724000163-MAC-DA-00004	Drawn	CERVELLATI 17/09/2024
Customer	ROSETTI MARINO		
Dwg Ref	24003-VE-10	Serial N°	24-003
Checked	BENINI	P.O. No.	
ITEM	G.A. DRAWING FOR 38-V-001	Q.ty	1
Date	22.03.2024		

ITEM .	REV	Q.TY	DESCRIPTION	DIMENSIONS		MATERIAL CODE DESIGNATION	APPLICABLE CODE	MATERIAL CERT.	OIS N°	NOTES
1	R2	1	SHELL PLATE	2250x1916	10 Thk	SA 516 Gr. 60N		EN10204 - 3.1		
2	R2	2	ELLIPSOIDAL HEAD 2:1	Øi600 h50 H210	8 Thk	SA 516 Gr. 60N		EN10204 - 3.1		Thk min AFTER COLD FORMING
3		1	FLANGE ASME W.N. R.F. Sch.XS	10"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		
4		1	PIPE	Ø273x12,7	~143	SA 333 Gr.6		EN10204 - 3.1		**N1**
5	R2	1	PLATE	Ø373/277	10 Thk	SA 516 Gr. 60N		EN10204 - 3.1		
6		1	FLANGE ASME W.N. R.F. Sch.XS	10"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		
7		1	PIPE	Ø273x12,7	~126	SA 333 Gr.6		EN10204 - 3.1		**N2**
8	R2	1	PLATE	Ø373/277	10 Thk	SA 516 Gr. 60N		EN10204 - 3.1		
9		1	FLANGE ASME L.W.N. R.F. L=STD	1"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		***N3***
10		1	FLANGE ASME W.N. R.F. Sch.XS	3"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		**N4**
11		1	PIPE	Ø88,9x7,62	~144	SA 333 Gr.6		EN10204 - 3.1		
12		2	FLANGE ASME L.W.N. R.F. L=STD	1"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		***K1A-K1B***
13		1	FLANGE ASME L.W.N. R.F. L=STD	1"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		***K3***
14		2	FLANGE ASME W.N. R.F. Sch.XS	6"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		
15		2	PIPE	Ø168,3x10,97	~133	SA 333 Gr.6		EN10204 - 3.1		
16		2	BLIND FLANGE ASME R.F.	6"	150#	SA 350 LF2 Cl.1		EN10204 - 3.1		
16a		2	GASKET	6"	150#	1/16" FLEXIBLE GRAPHITE W/304 S.S. INSERT		EN10204 - 2.2		***H1-H2***
16b		16	STUD BOLT	3/4"X120 10UNC-2A		SA 320 Gr. L7		EN10204 - 3.1		
16c		32	HEXAGONAL NUT	3/4" 10UNC-2B		SA 194 Gr. 4		EN10204 - 3.1		
16d		32	PLAIN WASHER	3/4"		F 436 Gr. 1				

MATERIAL LIST

Job 24003

ROSETTI Ref 1724000163-MAC-DA-00004

Drawn CERVELLATI

Customer ROSETTI MARINO

Dwg Ref 24003-VE-10

Serial N° 24-003

Checked BENINI

P.O. No.

ITEM G.A. DRAWING FOR 38-V-001

Q.ty 1

Date 22.03.2024

ITEM .	REV	Q.TY	DESCRIPTION	DIMENSIONS		MATERIAL CODE DESIGNATION	APPLICABLE CODE	MATERIAL CERT.	OIS N°	NOTES
17		2	ROD	Ø16	251	S355J2				
18	*R1*	3	L-SHAPE	80x80x10	940	S355J2				
19	***R2***	3	PLATE	150x150	10 Thk	SA 516 Gr. 60N		EN10204 - 3.1		
20	***R2***	3	PLATE	150x160	20 Thk	SA 516 Gr. 60N				
21		3	PLATE	140x80	6 Thk	C.S.				
22	***R2***	2	PLATE	78x190	10 Thk	SA 516 Gr. 60N		EN10204 - 3.1		
23	***R2***	2	PLATE	100x140	12 Thk	SA 516 Gr. 60N				
24		1	PLATE	170x286	4 Thk	AISI 316L				
25		1	NAME PLATE	150x150	2 Thk	AISI 316L				
26		4	RIVET	Ø3,5x11		AISI 316L				
27		2	PLATE	50x100	5 Thk	AISI 316				
28	***R2***	6	PLATE	60x40	6 Thk	SA 516 Gr. 60N		EN10204 - 3.1		
SPARE PARTS (Commissioning) - 2 SET OF GASKET (FOR EACH SIZE) + 10% OF BOLTS (FOR EACH SIZE) Min. 2 PCS.										
A		4	GASKET	6"	150#	1/16" FLEXIBLE GRAPHITE W/304 S.S. INSERT		EN10204 - 2.2		*Pos.16a*
B		2	STUD BOLT	3/4"X120 10UNC-2A		SA 320 Gr. L7		EN10204 - 3.1		*Pos.16b*
C		2	HEXAGONAL NUT	3/4" 10UNC-2B		SA 194 Gr. 4		EN10204 - 3.1		*Pos.16c*
D		2	PLAIN WASHER	3/4"		F 436 Gr. 1				*Pos.16d*
			NOTE >>>>> *- STUD BOLTS, NUTS AND WASHER SHALL BE GALVANIZED ACCORDING TO ASTM B633 FeZn12*							
		*	APPLICABLE CODE (for all materials certified 3.1) : ASME VIII							

C.A.M.P.I. srl
Ferrara (Italy)

SEZIONE / Section 1A.4

Risk Analysis & Essential Safety Requirements check list

TITOLO DEL DOCUMENTO / DOCUMENT DESCRIPTION:

ANALISI DEI RISCHI
Essential Safety Requirements

Apparecchio in pressione:	KO DRUM
Pressure Equipment:	
Numero di serie:	*24-003*
Serial Number:	
No App.:	V-43001
Item No:	
Disegno No:	*24003-VE-10*
Drawing No:	

RISERVATO AL CLIENTE
Client. reserved:

TÜV Italia Srl Industrie Service 09 48 Notified Body

17/09/2024

x review
Eventuali commenti sono riportati all'interno del documento

STATO DELLE REVISIONI DEL DOCUMENTO / Status of document revision

Rev Rev.	Data Date	Redatto da Prepared by	Verificato Verified by	Approvatore Approved by	Descrizione della modifica Descripiton of modification
0	17/09/24	Cattani	Antolini	Dall'Arche	STESURA ORIGINALE / Original issue

DESCRIZIONE APPARECCHIO A PRESSIONE
Pressure Equipment Description

Apparecchio *Equipment*	KO DRUM
Tipo Fluido *Fluid Type*	Hydrogen / Water
Stato fisico / *Phisycal State*	Gas / Fluido
Capacità apparecchio / *Capacity (m3)*	0.7
Pressione di progetto (PS) *Design Pressure (Kg/cm2 G)*	3.5
Temperature di progetto (TS) *Design Temperature (°C)*	80
Pressione di prova idraulica (PT) *Hydrotest Pressure(Kg/cm2 G)*	5.0
Sovraspessore di corrosione *Corrosion Allowance (mm)*	1
Categoria e modulo PED *PED Category - Module*	IV G

DESCRIZIONE APPARECCHIO A PRESSIONE
Description of Pressure Vessel

SISTEMA QUALITÀ
Quality Sistem

ANALISI DEI RISCHI
Risk Analisys

Con questo documento vengono valutati i rischi connessi con l'apparecchiatura su indicata, che possono insorgere durante il suo utilizzo, installazione o movimentazione, in accordo a quanto previsto dalla Direttiva Allegato 1 punto 1 e 2 e vengono altreSÌ/Yes indicate le prescrizioni a cui attenersi per evitare l'insorgere degli stessi.	This document evaluates the risks connected with the a/m vessel, which can arise during its use, installation or handling, in accordance to what foreseen by PED encl. 1 pos. 1 and 2 and the prescriptions that have to be followed in order to avoid their development.
La classificazione delle soluzioni adottate è la seguente: a) Soluzione per eliminare e/o ridurre il rischio; b) Applicazione delle opportune misure di protezione contro i rischi che non possono essere eliminati; c) Informazione degli utilizzatori circa i rischi residui	The classification of the adopted solutions is the following: a) solution to cancel and/or reduce the risk; b) employment of the proper protection measures against those risks that cannot be eliminated; c) information to the users about the remaining risks

PROGETTAZIONE		**DESIGN**	
RISCHIO	**Cedimento strutturale delle membrature**	RISK	**Structural yielding of equipment**
EFFETTO	Perdita della caratteristica di ermeticità della apparecchitura; cattivo funzionamento dell'impianto.	EFFECT	Loss of tightness of equipment; imperfect functioning of the vessel.
PERICOLO	Perdita di fluido, danni a persone e cose.	DANGER	Loss of fluid, damages to persons and things.
SOLUZIONE	La progettazione dell'apparecchio e la scelta dei materiali da impiegare è fatta in conformità alla normativa,. PED,nonché alla trattazione classica prevista dalla Scienza delle Costruzioni e dalla manualistica ingegneristica di comune utilizzo.	SOLUTION	The design of the vessel and the choice of the materials to employ are made in conformity to the regulations, PED,as well as to the usual literature foreseen by the Construction Science and by common engineering manuals.
PROTEZIONE PER IL RISCHIO RESIDUO	Al ricevimento i materiali vengono sottoposti alla procedura di accettazione che contempla anche la verifica dei documenti di certificazione del fabbricante.I livelli minimi di certificazione sono definiti dalla EN 10204.	PROTECTION AGAINST THE REMAINING RISKS	At receipt, materials are subjected to the acceptance procedure, which involves also the check of certificates submitted by the supplier. The minimum levels of certification are defined by EN 10204.
INFORMAZIONE DEL RISCHIO RESIDUO	Le istruzioni d'uso e manutenzione riportano le indicazioni sulle verifiche da effettuare in tale senso.	INFORMATION ABOUT THE REMAINING RISKS	The operating and maintenance instructions contain the indications about the checks to carry out in this respect.

RISCHIO	**Cedimento delle membrature causa fenomeni di corrosione interna**	RISK	**Yielding of equipment due to internal corrosion**
EFFETTO	Perdita della caratteristica di ermeticità dell' apparecchitura.	EFFECT	Loss of tightness of equipment.
PERICOLO	Perdita di fluido.	DANGER	Loss of fluid.
SOLUZIONE	Le proprietà dei materiali debbono essere stabili nel tempo di vita operativo. La progettazione delle membrature dell'apparecchio, tenendo conto della natura dei fluidi interessati e dei materiali utilizzati, prevede eventuali sovraspessori di corrosione per il lato mantello e per il lato tubi.	SOLUTION	The properties of materials shall be constant during the service life of the equipment. Its design foresees possible corrosion allowances for shell side and tubes side, considering the characteristics of the involved fluids and of the materials employed.
PROTEZIONE PER IL RISCHIO RESIDUO	Effettuare la verifica periodica dello stato delle membrature. Si utilizzano acciai al carbonio e/o inossidabili eventualmente con opportuni rivestimenti superficiali di vernice idonei a proteggere le superfici.	PROTECTION AGAINST THE REMAINING RISKS	To perform a regular inspection of the condition of the equipment. Carbon steel and/or stainless steel are used even with proper superficial painting coatings, which are suitable to protect the surfaces.
INFORMAZIONE DEL RISCHIO RESIDUO	Le istruzioni d'uso e manutenzione riportano le indicazioni sulle verifiche da effettuare in tale senso.	INFORMATION ABOUT THE REMAINING RISKS	The operating and maintenance instructions contain the indications about the checks to carry out in this respect.

ESERCIZIO		**OPERATION**	
RISCHIO	**Carichi addizionali – terremoto - vento**	RISK	**Additional loads – earthquake – wind**
EFFETTO	Deformazione, cedimento strutturale,	EFFECT	Deformation, structural yielding
PERICOLO	Esplosione o deformazione dell'apparecchio, fuoriuscita di fluido.	DANGER	Explosion or deformation of the vessel, leakage of fluid
SOLUZIONE	L'apparecchio è stato calcolato per i carichi esterni previsti dal DM 16/1/1996. Le fondazioni debbono essere idonee a sostenere il peso dell'apparecchio pieno d'acqua	SOLUTION	The vessel has been calculated for external loads as per DM 16/1/1996. Foundations must be suitable to support the weight of the vessel full of water.
PROTEZIONE PER IL RISCHIO RESIDUO	E' vietato gravare l'apparecchio con carichi estranei, è d'obbligo per l'installatore proteggere l'apparecchio da sollecitazioni esterne. E' compito dell'installatore verificare che l'apparecchio sia esente da pericolo di incendio.	PROTECTION AGAINST THE REMAINING RISKS	It is forbidden to weight the vessel with unrelated loads, the user must protect the vessel from external stresses. The user must verify that the vessel does not risk to catch fire.
INFORMAZIONE DEL RISCHIO RESIDUO	Nel fascicolo tecnico sono riportate le verifiche di stabilità ai carichi esterni.	INFORMATION ABOUT THE REMAINING RISKS	In the technical documentation, the stability inspections to external loads are reported.

COSTRUZIONE		CONSTRUCTION	
RISCHIO	**Cedimento delle giunzioni saldate**	RISK	**Yielding of welded connections**
EFFETTO	Deformazioni permanenti, perdita di ermeticità dell' apparecchitura.	EFFECT	Permanent deformations, loss of tightness of exchanger.
PERICOLO	Fuoriuscita di fluido.	DANGER	Loss of fluid.
SOLUZIONE	Le giunzioni saldate sono progettate e calcolate con le specifiche richieste in conformità alla PED. I procedimenti di saldatura sono qualificati secondo EN 288 e gli operatori di saldatura sono certificati secondo la EN 287. Tali documenti vengono riportati nel Fascicolo Tecnico.	SOLUTION	The welded connections are designed and calculated with the required specifications in conformity to the PED code. The welding procedures are qualified according to EN 288 and welding operators are certified according to EN 287. Such documents are in the Technical File.
PROTEZIONE PER IL RISCHIO RESIDUO	Le prove non distruttive vengono eseguite in percentuale sulle giunzioni permanenti e vengono indicate sui disegni costruttivi. I disegni riportano la classe di efficienza dei giunti; i documenti di saldatura sono inseriti nel fascicolo Tecnico.	PROTECTION AGAINST THE REMAINING RISKS	Non-destructive tests are performed in percentage on the permanent connections and are indicated on the construction drawings. Drawings show the efficiency class of the joints; the welding documents are in the Technical File.
INFORMAZIONE DEL RISCHIO RESIDUO	Le istruzioni d'uso e manutenzione riportano le indicazioni sulle verifiche da effettuare in tale senso.	INFORMATION ABOUT THE REMAINING RISKS	The operating and maintenance instructions contain the indications about the checks to carry out in this respect.
RISCHIO	**Cedimento delle membrature in fase di prova idraulica**	RISK	**Yielding of equipment during the hydraulic test**
EFFETTO	Deformazioni permanenti.	EFFECT	Permanent deformations.
PERICOLO	Perdita di fluido, danni a persone e a cose.	DANGER	Loss of fluid, damages to persons and things.
SOLUZIONE	La pressione di prova idraulica è definita in base alla norma di calcolo PED e alla Direttiva	SOLUTION	The hydraulic test pressure is defined basing on PED calculation code and on PED code.
PROTEZIONE PER IL RISCHIO RESIDUO	La pressione di prova idraulica viene indicata nei disegni. Sono utilizzate procedure ed istruzione per l'esecuzione del test; il personale addetto alla prova è addestrato e vengono utilizzati adeguati strumenti di misura, controllo e sicurezza.	PROTECTION AGAINST THE REMAINING RISKS	The hydraulic test pressure is indicated on the drawings. Procedures and instructions for the execution of test are employed; personnel who carry out the test is trained and proper measure, control and safety instruments are used.
INFORMAZIONE DEL RISCHIO RESIDUO	Le istruzioni d'uso e manutenzione riportano le indicazioni sulle verifiche da effettuare in tale senso	INFORMATION ABOUT THE REMAINING RISKS	The operating and maintenance instructions contain the indications about the checks to carry out in this respect.



Le norme EN 287 e 288 sono superate; le qualifiche di procedimento e dei saldatori dovranno essere eseguite in base alle norme attualmente in vigore (es. EN 15614, EN 9606)

TRASPORTO		TRANSPORT	
RISCHIO	**Instabilità per l'imballaggio ed il trasporto**	RISK	**Instability for packing and transport**
EFFETTO	Movimento incontrollato.	EFFECT	Uncontrolled movement.
PERICOLO	Schiacciamento a seguito di: Ribaltamento/ Scivolamento/ Caduta. Danneggiamento dell'unità.	DANGER	Deflection as a consequence of: rollover/ skidding/ fall. Damage of the equipment.
SOLUZIONE	Sono previsti controlli di corretto fissaggio dell'apparecchio sul mezzo di trasporto che impediscono movimenti relativi	SOLUTION	Checks of the correct positioning on transport vehicle are planned, to avoid movements on the means of transport.
PROTEZIONE PER IL RISCHIO RESIDUO	Gli apparecchi non debbono essere appoggiati a terra senza gli appositi sostegni.	PROTECTION AGAINST THE REMAINING RISKS	Vessels must not be put on the ground without the proper supports.
INFORMAZIONE DEL RISCHIO RESIDUO	Sono previste istruzioni per la movimentazione e l'imballaggio e disegni con indicazioni delle masse e dei punti di presa.	INFORMATION ABOUT THE REMAINING RISKS	Instructions for the handling and for packing and drawings showing masses and handling point will be provided
ESERCIZIO		OPERATION	
RISCHIO	**Superamento dei limiti di carico sui bocchelli**	RISK	**Overcoming of the loading limits on nozzles**
EFFETTO	Deformazioni permanenti, cedimenti strutturali, rotture.	EFFECT	Permanent deformations, structural yielding, break.
PERICOLO	Perdita di fluido.	DANGER	Loss of fluid
SOLUZIONE	In fase di progettazione vengono calcolati secondo la normativa di riferimento i valori limite dei carichi e dei momenti.	SOLUTION	During the design phase, the limit values of loads and moments are calculated according to the reference code
PROTEZIONE PER IL RISCHIO RESIDUO	I singoli bocchelli non debbono essere gravati di carichi e momenti maggiori di quelli indicati dal progettista come spinta massima sopportabile.	PROTECTION AGAINST THE REMAINING RISKS	The single nozzles must not be weighted with greater loads and moments than those indicated by the designer as maximum allowable thrust.
INFORMAZIONE DEL RISCHIO RESIDUO	I carichi ammissibili per i bocchelli vengono riportati nei calcoli meccanici inseriti nel fascicolo tecnico.	INFORMATION ABOUT THE REMAINING RISKS	The allowable loads for nozzles are indicated in the mechanical calculations in the technical documentation.

ESERCIZIO		OPERATION	
RISCHIO	**Sovrappressione oltre la massima pressione di esercizio**	RISK	**Overpressure beyond the maximum operating pressare**
EFFETTO	Esplosione, rottura dell'apparecchio, cricche, deformazioni permanenti delle membrature.	EFFECT	Explosion, break of vessel, cracks, permanent deformations of the equipment.
PERICOLO	Proiezione di parti metalliche, fuoriuscita di fluido, esplosione.	DANGER	Projections of metallic parts, leakage of fluid, explosion.
SOLUZIONE	L'apparecchiatura è costruita con opportuni margini di sicurezza imposti dalla PED e dalle norme di calcolo.	SOLUTION	The equipment is manufactured according to proper safety requirements established by PED and by the calculation codes.
PROTEZIONE PER IL RISCHIO RESIDUO	L'impianto di installazione deve essere dotato di opportuni accessori di sicurezza contro le sovrapressioni (a cura dell'installatore).	PROTECTION AGAINST THE REMAINING RISKS	The assembling equipment must be equipped with proper safety accessories against overpressures (at assembler's care).
INFORMAZIONE DEL RISCHIO RESIDUO	Nella apposita targa dati e sul disegno è riportata la massima pressione di esercizio.	INFORMATION ABOUT THE REMAINING RISKS	In the proper label about data and on the drawing the maximum operating pressure is indicated.
RISCHIO	**Surriscaldamento oltre la massima temperatura di funzionamento**	RISK	**Overheating beyond the maximum operating temperature**
EFFETTO	Sovrappressione interna. Diminuzione della resistenza dei materiali, riduzione dell'efficacia dell'eventuale rivestimento coibentante.	EFFECT	Internal overpressure. Decrease of the resistance of materials, reduction of the efficacy of the possible insulating coating.
PERICOLO	Esplosione o deformazione dell'apparecchio, fuoriuscita di fluido.	DANGER	Explosion or deformation of vessel, leakage of fluid.
SOLUZIONE	L'impianto deve essere dotato di idonei controlli contro il superamento della temperatura impostata.	SOLUTION	The vessel must have proper checks against the overcoming of the set temperature.
PROTEZIONE PER IL RISCHIO RESIDUO	L'utilizzatore deve installare ed utilizzare l'apparecchiatura a temperature inferiori a quella max ammissibile.	PROTECTION AGAINST THE REMAINING RISKS	The user must install and employ the vessel at lower temperatures than the max allowable one.
INFORMAZIONE DEL RISCHIO RESIDUO	In targhetta e nel disegno è riportata la massima temperatura di utilizzo.	INFORMATION ABOUT THE REMAINING RISKS	On the label and in the drawing the max operating temperature is indicated.

DESCRIZIONE GENERALE DEL PRODOTTO
General description of product

- Descrizione dell'attrezzatura - *Equipment Description*		HYDROGEN VENT KO DRUM
- Sigla / *Item*		V-43001
- Pressione di progetto PS (bar g) - *Design Pressure*		3.5
- Temperatura di progetto TS (°C) - *Design Temperature*		80
- Volume / *Capacity* (m3)		0.7
- Diametro / *Diameter* DN: (mm)		Øi600x10
Fluido *Fluid*	Nome / *Name:*	Hydrogen / Water
	Stato fisico / *Phisical State*	Gas / Liquid
	Densità / *Density Kg/m3:*	0.085 / 1000
- N° del disegno / *Drawing N°*:		1724000163-MAC-DA-00004 (24003-VE-10)
- Numero Fabbrica / *Serial Number*		24-003
Norme di progetto / *Design Codes*:		ASME Sect VIII Div 1_PED 2014/68/UE
Categoria/Modulo PED / *PED Category/Module*		IV G

TITOLO DEL DOCUMENTO / DOCUMENT DESCRIPTION:

CHECK LIST DEI REQUISITI ESSENZIALI DI SICUREZZA (ESR)

Essential Safety Requirements check list

Apparecchio in pressione:	KO DRUM
Pressure Equipment:	
Numero di serie:	*24-003*
Serial Number:	
No App.:	V-43001
Item No:	
Disegno No:	*1724000163-MAC-DA-00004*
Drawing No:	*(24003-VE-10)*

RISERVATO AL CLIENTE
Client. reserved:

STATO DELLE REVISIONI DEL DOCUMENTO / Status of document revision

Rev Rev.	Data Date	Redatto da Prepared by	Verificato Verified by	Approvatore Approved by	Descrizione della modifica Descripiton of modification
0	17/09/24	Cattani	Antolini	Dall'Arche	STESURA ORIGINALE / Original issue

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
1	**GENERALITA' / *GENERAL***		
1.1	Le attrezzature a pressione sono progettate, fabbricate e controllate e, ove occorra, dotate dei necessari accessori ed installate in modo da garantirne la sicurezza se messe in funzione in base alle istruzioni del fabbricante o in condizioni ragionevolmente prevedibili. *Equipment to be designed, manufactured, checked, equipped and installed to ensure safety if put in operation in accordance with manufacturer's instructions*	SÌ/YES	ASME Sect VIII Div 1- PED Procedure di Fabbricazione *Manufacture Procedures* Manuale Uso e Manutenzione Operating and maintenance Manual
1.2	Il fabbricante applica i principi fissati in appresso nell'ordine qui indicato: - eliminazione o riduzione dei rischi, nella misura in cui ciò sia ragionevolmente fattibile; - applicazione delle opportune misure di protezione contro i rischi che non possono essere eliminati; - informazione degli utilizzatori circa rischi residui, se del caso, e indicazione della necessità di opportune misure speciali di attenuazione dei rischi per l'installazione e/o l'utilizzazione. *Principles to be applied to:* *- eliminate or reduce hazards* *- apply protection measures against hazards* *- inform user of residual hazard, and indication of necessary special measures to reduce hazards for installation and use*	SÌ/YES	ASME Sect VIII Div 1- PED
1.3	Ove siano note o chiaramente prevedibili le possibilità di un uso scorretto, l'attrezzatura a pressione deve essere progettata in modo da eliminare pericoli derivanti da tale uso o, se ciò non fosse possibile, deve essere munita di un'avvertenza adeguata che ne sconsigli l'uso scorretto. *To be designed to prevent danger from foreseeable misuse* *- if not possible, warning to be given against misuse*	SÌ/YES	Manuale di uso e manutenzione *Operating and Maintenance Manual*
2	**PROGETTAZIONE / *DESIGN***		
2.1	Norme di carattere generale Le attrezzature a pressione sono progettate tenendo conto di tutti i fattori di sicurezza per tutta la durata di vita prevista. La progettazione include appropriati coefficienti di sicurezza. *Pressure equipments to be designed to ensure safety throughout intended life* *Design incorporates appropriate safety coefficients.*	SÌ/YES	ASME Sect VIII Div 1- PED
2.2	Progettazione ai fini di una resistenza adeguata / *To be designed for adequate strength*		

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
2.2.1	Le attrezzature a pressione devono essere progettate per carichi appropriati, ed in particolare: *To be designed for loadings appropriate to its intended use, in particular:*		
	a) Pressione interna - esterna / *in - out Pressure*	SÌ/YES	ASME Sect VIII Div 1- PED
	b) Temperatura ambiente e di esercizio / *ambient and operating temperature*	SÌ/YES	ASME Sect VIII Div 1- PED
	c) Pressione statica e massa della sostanza contenuta alle condizioni di esercizio e durante le prove. *Static pressure and mass of content at operating and test conditions*	SÌ/YES	ASME Sect VIII Div 1- PED
	d) Sollecitazioni dovute a movimentazione, vento, terremoti. / *Stresses due to handling, wind, earthquakes*	SÌ/YES	*See DWG 24003-VE-10*
	e) Forze di reazione e momenti di reazione risultanti da sostegni. attacchi. tubazioni di collegamento, ecc. *Reaction forces and moments resulting from supports, connections, connecting piping, etc*	SÌ/YES	WRC 107/537 ASME Sect VIII Div 1- PED
	f) Corrosione ed erosione, fatica, ecc. / *Corrosion and erosion, fatigue, etc.*	SÌ/YES	Disegni - Specifiche cliente *DWG and Client spec.*
	g) Decomposizione dei fluidi instabili. / *Unstable fluid decomposition* h) Possibili combinazioni dei carichi suddetti / *Possible combinations of a/m loads*	N.A. N.A.	

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
2.2.2	La progettazione, ai fini di una resistenza adeguata deve essere basata: - in generale, su un metodo di calcolo, integrato, se necessario, da un metodo di progettazione sperimentale *To be designed for adequate strength based on calculation method:* *- to be supplemented, if necessary, by experimental design method*	SÌ/YES	ASME Sect VIII Div 1- PED
2.2.3	Metodo di calcolo / *Calculation Method*		
a)	Limitazione delle sollecitazioni ammissibili delle attrezzature a pressione tenendo conto dei cedimenti ragionevolmente prevedibili in relazione alle condizioni di esercizio. Si applicano coefficienti di sicurezza opportuni. Uno dei seguenti metodi, od una loro combinazione, è applicato: - progettazione mediante formule. - progettazione mediante analisi. - progettazione mediante meccanica della rottura. *Allowable stresses to be limited with regard to foreseeable failure modes* *- safety factors to be applied* *Requirements to be met by applying one of the following methods* *- design by formula* *- design by analysis* *- design by fracture mechanics*	SÌ/YES	ASME Sect VIII Div 1- PED
b)	Al fine di determinare la resistenza dell'attrezzatura a pressione si deve fare uso di idonei calcoli di progetto. In particolare: *Design calculations effected to establish the resistance of equipment, in particular:* — le pressioni di calcolo non devono essere inferiori alle pressioni massime ammissibili e devono tenere conto della pressione statica e della pressione dinamica del fluido nonché della decomposizione dei fluidi instabili. *calculation pressure not to be lower than maximum allowable pressure, considering static head, dynamic fluid forces and decomposition of unstable fluids* — quando un recipiente é separato in scomparti distinti e singoli soggetti a pressione, la parete di divisione va progettata tenendo conto della pressione più elevata che si possa raggiungere in uno scomparto e della pressione minima possibile nello scomparto limitrofo; *in case of divided equipment into single pressure parts, dividing wall to be designed considering the highest pressure reachable by the part and the lowest pressure reachable by the part in close proximity;*	SÌ/YES	ASME Sect VIII Div 1- PED

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
b)	– le temperature di calcolo devono offrire idonei margini di sicurezza; *Calculation temperature to allow appropriate safety margins* – la progettazione deve tenere nel dovuto conto tutte le eventuali combinazioni di temperatura e di pressione *account to be taken of combinations of temperature and pressure* – le sollecitazioni massime e le concentrazioni delle sollecitazioni di punta devono essere mantenute entro limiti di sicurezza; *maximum stresses and peak stresses to be within safe limits* – nei calcoli per il contenimento dalla pressione si deve fare uso dei valori appropriati relativi alle proprietà dei materiali, basati su dati verificati tenendo conto di coefficienti di sicurezza adeguati. *in calculations for pressure limitation, appropriate values relating to material properties, based on documented data considering adequate safety coefficients, must be used* - limite di elasticità, 0.2% o 1% a seconda dei casi, alla temperatura di calcolo *./Elasticity limits, 0.2% or 1% according to the cases, to calculation temperature* - resistenza alla trazione / *tensile strength* - resistenza riferita al tempo, cioè resistenza allo scorrimento viscoso / *resistance to drift* - dati relativi alla fatica / *fatigue data* - modulo di Young (modulo di elasticità) / *Young module (elasticity)* - appropriato livello di deformazione plastica / *appropriate level of plastic deformation* - resistenza alla flessione dovuta agli urti (resilienza) / *impact strength* - resistenza alla frattura / *fracture strength* – idonei coefficienti di giunzione, da applicare alle caratteristiche dei materiali in funzione, ad esempio, dei tipo di prove non distruttive; delle proprietà dei materiali assemblati e delle condizioni di esercizio previste; *joint factors to be applied to materials to type of NDT and operating conditions* – la progettazione deve tenere opportunamente conto di tutti i meccanismi ragionevolmente prevedibili di deterioramento (per es. corrosione, scorrimento viscoso, fatica) *to take account of foreseeable degradation mechanisms (corrosion, drift, fatigue)*	SÌ/YES	ASME Sect VIII Div 1- PED

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
2.2.3 c)	La progettazione tiene conto dei rischi legati al trasporto e alla movimentazione, per garantire opportuna stabilità strutturale *Design to allow for adequate structural stability including transport and handling*	SÌ/YES	ASME Sect VIII Div 1- PED
2.2.4	Metodo sperimentale di progettazione / *Experimental Design Method* La progettazione dell'attrezzatura mediante metodo sperimentale è convalidata da un programma di prove da effettuare su un campione rappresentativo dell'attrezzatura o della famiglia di attrezzature. *Design to be validated by appropriate test program on representative samples of equipment or category of equipment* Il programma di prove comprende / *The test program to include:* a) una prova di resistenza alla pressione per verificare l'assenza di fuoriuscite significative e di deformazioni superiori al limite prefissato. *a pressure strength test to check equipment does not exhibit leaks or deformation exceeding determined threshold* b) in caso di rischio di scorrimento viscoso o di fatica prove appropriate stabilite in funzione delle condizioni di esercizio / *in case of drift risk or fatigue, appropriate tests established considering operating conditions* c) se necessario, prove complementari relative ad altri fattori ambientali specifici di cui al punto 2.2.1 quali corrosione, aggressioni esterne, ecc. *if necessary, extra tests relating to other ambient factors as per 2.2.1, such as corrosion, external aggressions, etc.*	N.A.	
2.3	Disposizioni a garanzia delle manovre e dell'esercizio in condizioni di sicurezza / *Provision to censure safe handling and operation* I sistemi di funzionamento delle attrezzature a pressione devono essere tali da escludere qualsiasi rischio ragionevolmente prevedibile derivante dal funzionamento. Se necessario, occorre prestare una particolare attenzione, a seconda del caso: *Methods specified for operation of equipment to preclude any foreseeable risk with attention being paid to:* – ai dispositivi di chiusura e di apertura / *closures and openings* – agli scarichi pericolosi delle valvole di sicurezza / *discharge of pressure relief blow-off* – ai dispositivi che impediscono l'accesso fisico in presenza di pressione o di vuoto / *access whilst pressure or vacuum exists* – alla temperatura superficiale, in considerazione dell'uso previsto / *surface temperature, taking account of intended use* – alla decomposizione dei fluidi instabili / *decomposition of unstable fluids* – dispositivi automatici o manuali che permettano all'utilizzatore di accertarsi facilmente che l'apertura non presenti alcun pericolo *Automatic or manual devices to allow the user to make sure the opening is not hazardous* – Se l'apertura può essere azionata rapidamente, un dispositivo che ne impedisca l'apertura fintantoché la pressione o la temperatura del fluido costituiscono un pericolo / *in case of rapid opening, a device preventing the opening until fluid pressure or temperature are unsafe*		

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
2.4	Mezzi di ispezione / *Means of examination* a) L'attrezzatura a pressione è progettata in modo che sia possibile effettuare tutte le ispezioni necessarie / *to be designed so that examinations can be carried out* b) Se necessario per garantire la sicurezza permanente, sono presenti mezzi per verificare le condizioni dell'attrezzatura a pressione al tuo interno, quali aperture di accesso che consentano l'accesso fisico all'interno dell'attrezzatura / *means of determining the internal conditions to be available (such as access doors)* c) Se necessario sono presenti altri mezzi che permettono di garantire lo stato di sicurezza dell'attrezzatura / *other means of ensuring safe conditions to be applied*	SÌ/YES	Disegni - *Drawings*
2.5	Mezzi di scarico e di sfiato / *Means of draining and Venting* Ove occorra, vanno previsti mezzi adeguati per lo scarico e lo sfiato delle attrezzature a pressione al fine di: *Means to be provided for draining and venting where necessary:* - evitare fenomeni dannosi come il colpo d'ariete, il cedimento strutturale sottovuoto, la corrosione e le reazioni chimiche incontrollate. Vanno tenute presenti tolte le fasi di funzionamento e di prova, in particolare le prove a pressione; *to avoid water hammer, vacuum collapse, corrosion and chemical reactions.* - consentire le operazioni di pulizia, ispezione e manutenzione in condizioni di assoluta sicurezza. *to permit cleaning, inspection and maintenance in safety*	SÌ/YES	Disegni - *Drawings*
2.6	Corrosione e altre aggressioni chimiche / *Corrosion and Other Chemical Attacks* E' previsto un maggiore spessore o una protezione adeguata contro la corrosione o altre aggressioni chimiche tenuto conto del tipo di utilizzo previsto e ragionevolmente prevedibile. *Adequate allowance or protection to be provided against corrosion or other chemical attack*	SÌ/YES	Disegni - *Drawings* Sovraspessore di corrosione *Corrosion allowance* 1 mm

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
2.7	Usura / *Wear* Ove sussista la possibilità di erosioni o di abrasioni di notevole entità, vanno prese misure adeguate per: - ridurre al minimo l'effetto aumentando lo spessore del materiale o con l'uso di incamiciature o di materiali di rivestimento - consentire la sostituzione delle parti maggiormente colpite; - attirare l'attenzione nelle istruzioni sulle misure necessarie per un uso in condizioni permanenti di sicurezza. *Adequate measures to be taken against effects of erosion or abrasion by:* - *reducing the effects by increasing material thicknesses or by lining* - *allow replacement of damaged parts* - *instructions warning on the necessary measures for a permanently safe use of the equipment*	SÌ/YES	Standard internazionali rispondenti a specifiche di progetto (ASTM, ANSI, EN, UNI, DIN, BS, ecc.) *International standards compliant to design specifications*
2.8	Insiemi / *Assemblies* Gli insiemi di attrezzature sono progettati in modo che: - gli elementi da assemblare siano adatti ed affidabili per l'applicazione prevista; / - tutti i componenti siano correttamente integrati e adeguatamente collegati. *Assemblies to be designed so that:* - *components to be assembled are suitable and reliable for their duty* - *components to be properly integrated and connected*	N.A.	
2.9	Disposizioni per il caricamento e lo scarico Sono state prese tutte le misure necessarie a garantire l'effettuazione in sicurezza delle fasi di caricamento e scaricamento, tenendo in particolare conto i seguenti rischi: *All necessary measures to be taken to ensure safe filling and discharging, with respect to hazards:* a) per il caricamento: - l'eccessivo riempimento o l'eccessiva pressurizzazione, con particolare riguardo al grado di riempimento e alla pressione di vapore alla temperatura di riferimento: - l'instabilitá delle attrezzature a pressione; *a) on filling:* - *by overfilling or over pressurization* - *instability of pressure equipments*	SI	

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
	b) per lo scarico: la fuoriuscita incontrollata dei fluido pressurizzato; *b) on discharging: uncontrolled leaks of pressurized fluid* c) per il caricamento e lo scarico: collegamento e scollegamento insicuri *c) on filling and discharging: insafe connection and disconnection*	SI	
2.10	Protezione contro il superamento dei limiti ammissibili dell'attrezzatura a pressione / *Protection against exceeding the allowable limits* Se è possibile che vengano superati i limiti ammissibili, l'attrezzatura a pressione è dotata o si provvede a che sia dotata di adeguati disposit. di protez., a meno che l'attrezz. sia destinata ad essere protetta da altri dispositivi di protez. Integrati. *If allowable limits can be exceeded, pressure equipment to be provided with suitable protection devices, or other protective devices integrated within an assembly.* I dispositivi di protezione e le relative combinazioni comprendono: / *Suitable devices or combination of devices to include* a) gli accessori di sicurezza di cui all'articolo 1, punto 2.1.3 *a) safety accessories as per art. 1 point 2.1.3* b) a seconda dei casi. adeguati dispositivi di controllo quali indicatori o allarmi che consentano di mantenere l'attrezzatura sotto pressione entro i limiti ammissibili in modo automatico o manuale / *b) according to cases, suitable control devices such as indicators, alarms, as to keep automatically or manually the equipment within allowable limits*	SI	A cura dell'installatore *At Installer's care*
2.11	Accessori di sicurezza / *Safety accessories*		
2.11.1	Gli accessori di sicurezza devono: - essere progettati e costruiti in modo da essere affidabili e adatti all'uso previsto e da tenere conto se del caso, delle esigenze in materia di manutenzione e di prova dei dispositivi stessi; - essere indipendenti da altre funzioni, a meno che la loro funzione di sicurezza possa essere intaccata dalle altre funzioni; - essere conformi ai principi di progettazione appropriati per ottenere una protezione adeguata ed affidabile. Detti principi comprendono segnatamente un sistema "fail-safe", un sistema a ridondanza, la diversità e un sistema di autocontrollo. *Safety accessories :* *to be designed and constructed to be reliable and suitable for intended duty, including maintenance and testing* - *to be independent or unaffected by other functions* - *to comply with design principles to obtain suitable and reliable protection. Said principles include a fail-safe system, a redundancy system, diversity and self-checking*		

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
2.11.2	*Dispositivi di limitazione della pressione / Pressure Limiting devices* Tali dispositivi sono progettati in modo che la pressione non superi in permanenza la pressione massima ammissibile PS, e possono comunque ammettere un picco di pressione di breve durata in base. *To be designed so that PS will not be exceeded except for short duration pressure surge of PS*	SI	A cura dell'installatore *At Installer's care*
2.11.3	*Dispositivi di controllo della temperatura / Temperature Monitorino Devices* Questi dispositivi hanno un tempo di risposta adeguato sotto il profilo della sicurezza e coerente con le funzioni di misurazione. *To have adequate response time on safety grounds*	SI	A cura dell'installatore *At Installer's care*
2.12	*Incendio all'esterno / External fire* In caso di pericolo di incendio all'esterno, sono state prese tutte le misure necessarie al fine di limitare i danni con particolare riguardo all'uso previsto dell'attrezzatura. *Equipment designed and, where appropriate, fitted with accessories to meet damage limitation requirements*	SI	A cura dell'installatore *At Installer's care*
3	FABBRICAZIONE / *MANUFACTURING*		
3.1	Procedure di fabbricazione / *Manufacturing Procedures* Il fabbricante applica le tecniche idonee e le procedure opportune, con particolare riguardo alle operazioni indicate di seguito. *Manufacturer to carry out competent execution of provisions set out at design stage and apply appropriate techniques and procedures*	SÌ/YES	
3.1.1	Preparazione dei componenti / *Preparation of component parts* Esistono procedure per la preparazione dei componenti, in particolare per : *There are procedures to be followed for the preparation for components parts such as:* - cianfrinatura / *bevelling* - piegatura / *bending* - calandratura / *roller leveling* - imbutitura / *drawing* - stampaggio / *forming* - altri / *others*	SÌ/YES	Le lavorazioni di finitura sono realizzate secondo specifiche di progetto. *Finishing activities are made according to design specification* Altre lavorazioni di formatura sono delegate a fornitura esterna. *Forming activities are executed by external company.*

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
3.1.2	*Giunzioni / Permanent Joining* Le giunzioni permanenti dei materiali e le zone adiacenti devono essere esente da difetti di superficie o interni tali da nuocere alla sicurezza delle attrezzature e da soddisfare le caratteristiche minime indicate per i materiali che devono essere collegati (a meno che altri valori delle caratteristiche corrispondenti siano stati specificamente presi in considerazione nei calcoli di progettazione). *Permanent joints and adjacent zones: to be free from surface or internal defects detrimental to safety properties to meet minimum specified for materials to be joined or taken into account in design calculations* - Le giunzioni permanenti sono qualificate */ permanent joining to be carried out by suitably qualified personnel according to suitable operating procedures* - Il personale che effettua le giunzioni permanenti è qualificato */ personnel and procedures to be approved by notified body or third party for Category II, III and IV equipment* L'approvazione delle procedure e del personale sono affidate per le attrezzature a pressione delle categorie II, III e IV ad: *To be carried out by suitably qualified personnel* - un organismo notificato / *Notified Body* - un'entità terza riconosciuta da uno Stato membro come previsto all'articolo 13. *Personnel to be approved by third party – recognized by EC member – for category III and IV, in acc. with art.13*	SÌ/YES	ASME Sect VIII Div 1- PED
3.1.3	*Prove non distruttive / Non destructive test* Il personale addetto alle prove non distruttive è adeguatamente qualificato. Per le attrezzature a pressione delle categorie III e IV, il personale è stato approvato da un'entità terza competente, riconosciuta da uno Stato membro, ai sensi dell'articolo 13. *To be carried out by suitably qualified personnel* *Personnel to be approved by third party – recognized by EC member – for category III and IV, in acc. with art.13*	SÌ/YES	ASME Sect VIII Div 1- PED
3.1.4	*Trattamento termico / Heat Treatment* Gli eventuali trattamenti termici sono adeguati ai materiali su cui vengono eseguiti e non ne pregiudicano le caratteristiche meccaniche. *If any, to be suitable for materials to be treated and preserve their mechanical characteristics.*	SÌ/YES	ASME Sect VIII Div 1- PED
3.1.5	*Rintracciabilità / Traceability* Devono essere stabilite e mantenute opportune procedure per identificare i materiali delle parti dell'attrezzatura che contribuiscono alla resistenza alla pressione con mezzi adeguati dal momento della ricezione, passando per la produzione, fino alla prova finale dell'attrezzatura a pressione costruita. *Materials making up component parts to be identified by suitable means from receipt, through production, up to final test*	SÌ/YES	

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
3.2	*Verifica finale / Final Assesment* Le attrezzature a pressione sono sottoposte alla verifica finale coSÌ/Yes composta: *Pressure equipment to be subjected to final assessment as below*	SÌ/YES	
3.2.1	*Esame finale / Final Inspection* Le attrezzature a pressione sono sottoposte ad un esame finale. Vengono effettuati i seguenti controlli: *To be carried out to:* - esame delle prove effettuate nel corso della fabbricazione e verifica del piano di controllo. *assess the tests carried out during manufacture and the quality control plan* - esame visivo effettuato all'interno ed all'esterno di tutte le parti dell'attrezzatura, eventualmente durante il processo di fabbricazione (ad esempio qualora l'attrezzatura non sia più ispezionabile all'atto dell'esame finale). *visual examination both internal and external, carried out on every part during manufacture*	SÌ/YES	
3.2.2	*Prova a pressione / Pressure Test* a) Viene eseguita una prova di pressione idraulica su tutte le attrezzature a pressione ad un valore stabilito in base alla Direttiva *To be carried out on all pressure equipments at a value established in accordance with Directive*	SÌ/YES	ASME Sect VIII Div 1- PED
	b) Nel caso di attrezzature a pressione in categoria I fabbricate in serie, detta prova è eseguita su base statistica. *Category I series produced equipment may be tested on a statistical basis*		
	c) Non viene eseguita la prova idraulica ma un'altra prova di contenimento della pressione preceduta da prove non distruttive o da altri metodi di efficacia equivalente. *Other tests may be carried out of equivalent validity where hydrostatic test is harmful or impractical*		
3.2.3	*Esame dei dispositivi di sicurezza / Inspection of safety Devices* Per gli insiemi, viene eseguito anche un esame degli accessori di sicurezza per verificare che siano pienamente rispettati i requisiti di cui al punto 2.10. *For assemblies, safety devices to be checked to confirm compliance with requirements as per point 2.10*	N.A.	
3.3	*Marcatura e/o etichettatura / Marking and / or Labelling* Oltre alla marcatura CE di cui all'articolo 15, sono fornite anche le informazioni indicate in appresso. *In addition to EC marking as per art. 15, all relevant information to be provided acc. to this section.*	Si	

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
3.3 a)	- nome e indirizzo o altre indicazioni distintive del fabbricante e se del caso del suo mandatario stabilito nella Comunità; - anno di fabbricazione; - identificazione dell'attrezzatura a pressione secondo la sua natura, tipo, serie o nr. identificazione partita, nr. di fabbricazione; - limiti essenziali massimi e minimi ammissibili. - *name and address or other information designing Manufacturer or his Agent in EC* - *manufacturing year* - *identification of pressure equipments according to kind, serial no., manufacturing no. etc.* - *essential allowable max. and min. limits*	SÌ/YES	Targa Dati - *Name Plate* Disegni - *Drawings*
3.3 b)	A seconda del tipo di attrezzatura a pressione, informazioni supplementari atte a garantire condizioni sicure di installazione, funzionamento o impiego e, ove occorra, di manutenzione ed ispezione periodica, quali: - dimensione nominale della tubazione DN, - pressione di prova PT applicata, espressa in bar, e data. - utilizzo previsto. - peso espressa in kg. - gruppo di prodotti. *Acc. to kind of equipment, additional information to ensure safety conditions of installation, operation and, where necessary, maintenance and periodical inspection:* - *nominal dimension of ND piping* - *PT test pressure applied, in bar, and date* - *foreseen employ* - *weight in kg* - *group of products*	SÌ/YES	Targa Dati – *Name Plate* Disegni - *Drawings*

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
3.3 c)	Sull'attrezzatura a pressione sono fissate avvertenze per attirare l'attenzione sugli impieghi non corretti. La marcatura CE e le informazioni richieste figurano sull'attrezzatura a pressione o su una targhetta saldamente fissata ad essa, ad eccezione dei seguenti casi: - se del caso, si può usare una opportuna documentazione per evitare la marcatura ripetuta di singoli elementi, come ad esempio componenti di tubazioni, destinati allo stesso insieme: ciò si applica alla marcatura CE e ad altre marcature ed etichette; - nel caso di attrezzature a pressione troppo piccole, ad esempio accessori, le informazioni di cui alla lettera b) possono essere riportate su un'etichetta apposta sull'attrezzatura in questione; - per indicare la massa contenibile e per le avvertenze di cui alla lettera c) si possono utilizzare etichette od altri mezzi adeguati, purché essi rimangano leggibili per tutto il periodo di vita previsto. *Warning to be fixed on pressure equipment, drawing attention to misuse which might occur* *EC marking and required information are fixed on equipment or on a nameplate , except for:* - *in case suitable documentation may be provided to avoid repeted marking of single parts, such as piping components, destined to same set: applicable to EC marking and other marking and labels* - *in case of too small equipments, such as accessories, information as per b) may be reported on apposite label* - *to indicate containable mass, and for warnings as per c), labels or other suitable means may be employed, provided that they be leasible during their whole life duration*	N.A.	
3.4	*Istruzioni operative / Operating Instruction*		
3.4 a)	L'attrezzatura a pressione è corredata di un foglio Illustrativo destinato all'utilizzatore contenente tutte le informazioni utili ai fini della sicurezza per quanto riguarda: - il montaggio compreso l'assemblaggio delle varie attrezzature a pressione; - la messa in servizio; - l'impiego; - la manutenzione e i controlli da parte dell'utilizzatore. *All relevant operating instructions to be provided for the user containing all safety information in accordance with this section* - *assembling of the various pressure equipments* - *starting-up* - *use* - *- maintenance and controls by user*	SÌ/YES	Manuali di uso e manutenzione *Operating And Maintenance Manual*

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
3.4 b)	Il foglio illustrativo riprende le informazioni presenti nel contrassegno dell'attrezzatura a pressione (punto 3.3) tranne l'identificazione della serie; - il foglio illustrativo è corredato (se necessario) della documentazione tecnica nonché dai disegni e dagli schemi necessari ad una piena comprensione di tali istruzioni. *The information sheet reports all information provided in the identification (point 3.3) except for series identification* - *the sheet if necessary is provided with all technical documentation, drawings and schemes illustrating and clarifying such information*	SÌ/YES	Manuali di uso e manutenzione *Operating And Maintenance Manual*
3.4 c)	- Ove occorra il foglio illustrativo deve inoltre richiamare l'attenzione sui pericoli di un uso scorretto. in base al punto 1.3, e sulle caratteristiche particolari della progettazione, in base al punto 2.2.3 - *If needed, the information sheet must warn on misuse, as per point 1.3 and on design peculiarities as per point 2.2.3*	SÌ/YES	Manuali di uso e manutenzione *Operating and Maintenance Manual*
4	**MATERIALI / *MATERIALS***		
4	I materiali utilizzati per la costruzione delle attrezzature a pressione sono adatti per tale applicazione durante tutta la durata di vita prevista, a meno che non si preveda una sostituzione. I materiali di saldatura e gli altri materiali di assemblaggio devono soddisfare in modo adeguato soltanto i corrispondenti requisiti dei punti 4.1, 4.2 lettera a) e 4.3, primo comma, sia singolarmente che dopo la messa in opera. *Materials for pressure equipments to be suitable during lifetime unless replacement is foreseen; welding consumables and other joining materials to fulfill requirements of 4.1, 4.2 a) and 4.3, first part, both singularly ad after start-up*	SI	Standard Internazionali rispondenti alle specifiche condizioni di progetto (EN, ASTM, ANSI, ecc.). *International standards compliant to design specifications* Specifiche cliente *Client Specification*

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
4.1	I materiali delle parti pressurizzate: - hanno caratteristiche adeguate a tutte le condizioni di prova e di esercizio ragionevolmente prevedibili - hanno duttilità e tenacità sufficienti; se del caso, le caratterist. di questi materiali dovranno rispettare i requisiti del punto 7.5 - la scelta dei materiali è fatta in modo da prevenire, se necessario, la rottura fragile - per i materiali fragili utilizzati per motivi specifici sono state previste idonee misure: - hanno una resistenza chimica sufficiente al fluido che sarà contenuto nell'attrezzatura a pressione - le proprietà chimico/ fisiche necessarie per la sicurezza non sono influenzate durante la vita prevista dell'attrezzatura: - non subiscono in modo rilevante l'influenza dell'usura; - sono adatti ai processi di trattamento previsti; - sono selezionati in modo da evitare effetti negativi rilevanti in caso di assemblaggio di materiali diversi. *Materials for pressurized parts to have :* - *appropriate properties for all operating and test conditions* - *to be sufficiently ductile and tough, the characteristrics of materials to compy with point 7.5* - *to be selscted in order to prevent brittle-type fracture* - *suitable measures provided for fragile materials used for specific reasons* - *to be chemically resistant to fluid contained* - *chemical and physical properties not to be significantly affected within scheduled lifetime of equipment* - *not to be significantly affected by aging* - *to be suitable for intended processing procedures* - *selected to avoid undesirable effects when different materials are joined*	SÌ/YES	Standard Internazionali rispondenti alle specifiche condizioni di progetto (ASTM, ANSI, EN, BS, UNI, ecc.). *International standards compliant to design specifications*
4.2 a)	Il fabbricante dell'attrezzatura a pressione ha definito adeguatamente i valori necessari per i calcoli di progettazione di cui al punto 2.2.3 nonché le caratteristiche essenziali dei materiali e della loro utilizzazione *Manufacturer to define values necessary for design calculations as per point 2.2.3 and essential characteristics of materials and their treatment*	SÌ/YES	

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
4.2 b)	Il fabbricante allega alla documentazione tecnica gli elementi che attestano il rispetto delle prescrizioni della direttiva riguardo ai materiali in una delle seguenti forme: - utilizzazione di materiali in accordo a norme armonizzate; - utilizzazione di materiali che hanno formato oggetto di un'approvazione europea di materiali per attrezzature a pressione - mediante una valutazione particolare dei materiali. *Manufacture to provide technical documentation relating to compliance with material specifications of directive in one of the following forms* - *by using materials which comply with harmonized standards* - *by using materials covered by an European approval* - *by a particular material appraisal*	SÌ/YES	Norme internazionali applicabili e rispondenti a specifici requisiti di progetto (ASTM, RACC. M, EN, ecc.). *International standards compliant to design specifications*
4.2 c)	Per le attrezzature a pressione delle categorie III e IV, la valutazione particolare di cui al terzo trattino della lettera b) é effettuata dall'Organismo Notificato/ Ispettorato degli Utilizzatori incaricato delle procedure di valutazione della conformità dell'attrezzatura a pressione. *For equipments in category III and IV, particular material appraisal as per last clause of 4.2 b) to be performed by notified body in charge of conformity assessment*	SÌ/YES	
4.3	Il fabbricante dell'attrezzatura si è accertato che il materiale impiegato sia conforme ai requisiti richiesti, e fornisce i documenti che ne attestano la conformità ad una determinata specifica. Per quanto riguarda le parti pressurizzate principali delle attrezzature delle categorie II, III, IV tali documenti devono essere costituiti da un certificato che prevede un controllo specifico sul prodotto. Allorché un fabbricante di materiali ha un sistema di garanzia di qualità appropriato certificato da un organismo competente stabilito nella comunità e che è stato oggetto di una valutazione specifica per i materiali, si presume che gli attestati da esso rilasciati assicurino la conformità ai corrispondenti requisiti del presente punto. *Material to take appropriate measures to ensure:* - *material used conforms to specification, and relevant documentation is provided by manufacturer affirming compliance with a specification* - *documentation for main pressure parts in categories II, III, IV to be a certificate of specific product control* - *certificates issued by material manufacturer who has appropriate quality assurance system to be presumed to certify conformity with requirements of this section*	SÌ/YES	

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
5	ATTREZZATURE A PRESSIONE ESPOSTE ALLA, FIAMMA O AD ALTRO TIPO DI RISCALDAMENTO, CHE PRESENTANO UN RISCHIO DI SURRISCALDAMENTO DI CUI ALL'ARTICOLO 3, PARAGRAFO 1 *FIRED OR OTHERWISE HEATED PRESSURE EQUIPMENT WITH RISK OF OVERHEATING*	SÌ/YES	ZONE IIB T1+H2
6	TUBAZIONI DESCRITTE ALL'ARTICOLO 3, PUNTO 1.3 *PIPING AS REFERRED TO ART. 3 SECTION 1.3*	N.A.	
7	REQUISITI PARTICOLARI ESPRESSI IN CIFRE, PER ATTREZZATURE A PRESSIONE SPECIFICHE *SPECIFIC QUANTITATIVE REQUIREMENTS FOR CERTAIN PRESSURE EQUIPMENT*	SÌ/YES	
7.1	Sollecitazioni ammissibili / *Permissibile Stress*		
7.1.2	A seconda del materiale impiegato, la sollecitazione generale ammissibile della membrana per carichi prevalentemente statici e per temperature situate fuori dal campo in cui i fenomeni di scorrimento viscoso sono significativi, non è superiore al più basso dei valori elencati in appresso: - per l'acciaio ferritico, compreso l'acciaio normalizzato (acciaio laminato normalizzato), ed esclusi gli acciai a grano fine e gli acciai che hanno subito un trattamento termico speciale, 2/3 di $R_{e/t}$ e 5/12 di $R_{m/20}$ - per l'acciaio austenitico: - se l'allungamento dopo la rottura é superiore al 30%, 2/3 di $R_{e/t}$ - in via alternativa e se l'allungamento dopo la rottura é superiore al 35%, 5/6 di $R_{e/t}$ e 1/3 di $R_{m/t}$ *According to the material used, permissible general membrane stresses, for predominantly static loads and for temperatures outside the creep range not to exceed the smaller of the following values:* - *Ferritic steels, including normalised steels, excluding fine grains steels and steels subjected to special heat treatment, 2/3 of $R_{e/t}$ and 5/12 of $R_{m/20}$* - *Austenitic steels:* - *If elongation after rupture exceeds 30% - 2/3 of Re/t* - *in alternative and if elongation after rupture exceeds 35% 5/6 of Re/t and 1/3 of Rm/t*	SÌ/YES	ASME Sect VIII Div 1- PED

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
7.2	Coefficienti di giunzione Per i giunti saldati il coefficiente di giunzione è al massimo pari al seguente valore: - per le attrezzature sottoposte a prove distruttive e N.D. per verificare l'inesistenza di difetti rilevanti: 1 - per le attrezzature sottoposte a prove non distruttive mediante sondaggio: 0,85 - per le attrezzature non sottoposte a prove non distruttive diverse da un'ispezione visiva: 0,7 Ove occorra, si devono prendere in considerazione anche il tipo di sollecitazione e le proprietà meccaniche e tecnologiche del giunto. ***Joint coefficients*** *For welded joints, the joint coefficient not to exceed the following values:* - *full non-destructive and destructive testing to verify inexistence of remarkable defects: 1* - *random non-destructive testing: 0.85* - *visula inspections only: 0.7* *if necessary, the type of stress and mechanical and technological properties of the joint to be taken into account.*	SÌ/YES	ASME Sect VIII Div 1- PED
7.3	Dispositivi di limitazione della pressione, specie per i recipienti a pressione Il picco temporaneo di pressione di cui al punto 2.11.2. è limitato al 10% della pressione massima ammissibile. *PRESSURE LIMITING DEVICES, particularly for pressure vessels* *The momentary pressure surge to be kept to 10% of maximum allowable pressure PS*	N.A.	
7.4	Pressione di prova idrostatica La pressione di prova idrostatica di cui al punto 3.2.2 è pari al più elevato dei due valori seguenti: - la pressione corrispondente al carico massimo che può sopportare l'attrezzatura in esercizio, tenuto conto della pressione massima ammissibile e della temperatura massima ammissibile, moltiplicata per il coefficiente 1,25 ovvero - la pressione massima ammissibile, moltiplicata per il coefficiente 1,43. ***Hydrostatic Test Pressure*** *For pressure vessels as per section 3.2.2, the hydrostatic test pressure to be equivalent to the values, whichever is the greater between:* - *maximum loading to which the pressure equipment may be subject to in service, taking into account its max. allowable pressure and its max. allowable temperature, multiplied by the coefficient 1.25 or* - *the maximum allowable pressure multiplied by the coefficient 1.43*	SÌ/YES	ASME Sect VIII Div 1- PED

Rif. PED All. I	Requisito essenziale di sicurezza / *Essential Safety Requirement*	Requisito SÌ/YES / N.A.	Norma EN § / Soluzione
7.5	Caratteristiche dei materiali Qualora non siano richiesti altri valori in base ad altri criteri da prendere in considerazione per essere conforme al punto 4.1, lettera a) un acciaio é considerato sufficientemente duttile se l'allungamento dopo la rottura, in una prova di trazione effettuata secondo un procedimento standard é pari almeno al 14 % e se l'energia di rottura a flessione per urto (resilienza), misurata in provetta ISO V é pari almeno a 27 J ad una temperatura al massimo pari a 20° C, ma non superiore alla temperatura minima di esercizio prevista. ***Material Characteristic*** *Unless other values are required in acc. with other criteria that must be taken into account, a steel is considered sufficiently ductile to satisfy 4.1 a) if, in a tensile test carried out by a standard procedure, its elongation after rupture is not less than 14% and its bending rupture energy measured on an ISO V test piece is not less than 27 J at a temperature not greater than 20°C but not higher than the lowest scheduled operating temperature*	SÌ/YES	

C.A.M.P.I. srl
Ferrara (Italy)

SEZIONE / Section 1A.5

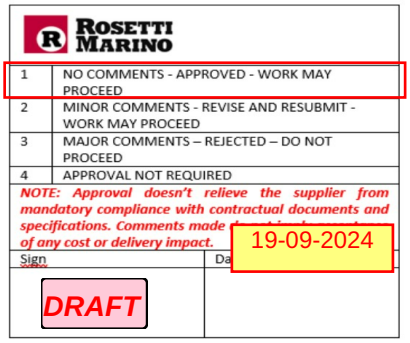
Instruction & Operating Manual

THE REPLY TO NOTE 1 OF CRS IS ADVISABLE TO ME MODIFIED AS FOLLOW:
CAMPI INDICATED THE DIAMETER OF INSTALLATION BOLTS IN GAD.
THE WAY TO FIX THE BOLTS, THE RELEVANT LENGTH, TYPE (BOLTS OR STUD BOLTS) TO THE DECK IS DECIDED BY CONTRACTOR

INSTALLATION AND OPERATING MAINTENANCE MANUAL (IOM)

HYDROGEN VENT KO DRUM V-43001

Document Number: 1724000163-MAC-MAN-00015



Document Class: 3

Rev.	Date	Description	Prepared	Reviewed	Approved
02	09/09/2024	Issue for Information (IFI)	M. CATTANI	S. DONDI	E. DALL'ARCHE
01	12/07/2024	Issue for Information (IFI)	M. CATTANI	S. DONDI	E. DALL'ARCHE
00	01/07/2024	Issue for Information (IFI)	M. CATTANI	S. DONDI	E. DALL'ARCHE

C.A.M.P.I. Srl
Ferrara - Italy

Revision / Change Log

Rev.	Description
00	Issue for Information (IFI)
01	Issue for Information (IFI)
02	Issue for Information (IFI)

HOLDS LIST

No.	Description
1	
2	
3	
4	

Table of contents

1 PROJECT / PROGETTO 5

2 DOCUMENT SCOPE / SCOPO DEL DOCUMENTO 6

2.1 REFERENCES / riferimenti 6

3 EQUIPMENT LIST / LISTA APPARECCHI 7

4 INSTALLATION / ERECTION 8

4.1 PACKING / UNPACKING & INSPECTION INSTRUCTION 8

4.2 shipping procedure / Procedura di imballaggio 9

4.3 STorage and preservation procedure / Procedura di stoccaggio e conservazione 9

4.4 handling procedure / Procedura di movimentazione 9

4.5 lifting - transportation design and procedure / Procedura e disegni di sollevamento - trasporto 9

4.6 installation procedure / Procedura di istallazione 9

4.7 bolt tightening procedure / Procedura serraggio 10

5 maintenance operation / manutenzione 16

5.1 Spare parts list / elenco ricambi 16

List of tables

Table 1 - Reference Documents.....6

1 PROJECT / PROGETTO

PROJECT / *PROGETTO* :	Hollandse Kust Noord (HKN)
CLIENT / *CLIENTE* :	Rosetti Marino
PURCHASE ORDER N° :	1724000163 123A90A
EQUIPMENT / *APPARECCHIO* :	HYDROGEN VENT KO DRUM
TAG / *SIGLA*:	V-43001
SUPPLIER / *FORNITORE* :	C.A.M.P.I. Srl
SUPPLIER JOB REF. / *COMMESSA DEL FORNITORE* :	24001

2 DOCUMENT SCOPE / SCOPO DEL DOCUMENTO

The purpose of the use and maintenance manual is to provide the customer and all personnel responsible for interacting with the TANK with all the information necessary for correct use and maintenance of the same in optimal conditions, with particular attention to ensuring that this occurs in the maximum possible way. safety conditions.

Lo scopo del manuale d'uso e manutenzione è di fornire al cliente e a tutto il personale, preposto ad interagire con il SERBATOIO, tutte le informazioni necessarie al corretto utilizzo ed al mantenimento in condizioni ottimali dello stesso, con particolare riguardo affinché ciò avvenga nelle massime condizioni di sicurezza.

2.1 REFERENCES / RIFERIMENTI

Doc. No.	Description
1724000163-MAC-DA-00004	GENERAL ARRANGEMENT DRAWINGS AND FOUNDATION LOADING DIAGRAM AND SUPPORT DETAILS (INCL NOZZLE LOADS) and INCLUDING NAMEPLATE DRAWINGS
1724000163-MAC-DS-00006	EQUIPMENT DATA SHEETS INCLUDING WEIGHT DATA SHEETS
1724000163-MAT-PRO-00007	PAINTING PROCEDURE (including surface preparation)
1724000163-COM-LIS-00014	SPARE PART INDEX REGISTER (COMMISSIONING, OPERATION)
1724000163-QC-PRO-00016	SHIPPING, PACKING, HANDLING AND STORAGE and PRESERVATIONS, PROCEDURES

Table 1 - Reference Documents

3 EQUIPMENT LIST / LISTA APPARECCHI

N.1 HYDROGEN VENT KO DRUM / SERBATOIO ACQUA – IDROGENO ①

4 INSTALLATION / ERECTION

4.1 PACKING / UNPACKING & INSPECTION INSTRUCTION

Text

The equipment is prepared for dispatch with the internal parts and the movable parts accurately fixed and protected against the possible impacts due to transport.

L'apparecchiatura è predisposta per la spedizione con le parti interne e le parti mobili fissate in modo accurato e protetta contro i possibili impatti dovuti al trasporto.

All nozzles and open connections are usually "blinded" and sealed, so to avoid the infiltration of foreign materials inside the pertinent chambers.

Tutti gli ugelli ei raccordi aperte sono solitamente " accecati " e sigillati in modo da evitare l'infiltrazione di materiali estranei all'interno delle camere pertinenti.

The unpacking activities must be carried out with the utmost attention, so to avoid possible damages to functional projecting parts (nozzles, brackets, etc..), as well as the seal surfaces performed with special finishing, and to internal movable parts.

Le attività di disimballaggio devono essere eseguite con la massima attenzione in modo da evitare eventuali danni alle parti funzionali sporgenti (ugelli, staffe, ecc..) , così come le superfici di tenuta eseguite con finitura speciale , e le parti interne mobili .

Once the supply has been unpacked, it must be checked for completeness by comparison with the packing list. Do not remove any identification labels from the individual parts because these part numbers are also used on the packing drawing.

Una volta disimballato si deve verificare la completezza rispetto al packing list. Non rimuovere le etichette di identificazione delle singole parti, perché questi codici sono utilizzati anche sul disegno di imballaggio.

Any parts missing or damaged have to be reported in writing immediately after the supply has been unpacked.

Le parti mancanti o danneggiate devono essere segnalate per iscritto immediatamente dopo che l'apparecchiatura è stata liberata dall'imballo.

4.2 SHIPPING PROCEDURE / PROCEDURA DI IMBALLAGGIO

The equipment is delivered (according to the constructive type and basing on the supply specifications and/or at manufacturer's discretion) in wooden box fixed to the loading device.

L' apparecchiatura è fornita (secondo la tipologia costruttiva, e basandosi sulle specifiche del costruttore) in cassa di legno fissata al dispositivo di carico.

No other projecting part (nozzle, connections, brackets, closing systems, mechanical parts, etc.) has to be used for this purpose, so to avoid any possible mechanical damages and/or breaks and/or falls.

Nessun'altra parte sporgente (ugelli, raccordi, staffe, sistemi di chiusura, parti meccaniche, ecc..) deve essere utilizzato per questo scopo, in modo da evitare eventuali danni e / o rotture meccaniche e / o cadute.

4.3 STORAGE AND PRESERVATION PROCEDURE / PROCEDURA DI STOCCAGGIO E CONSERVAZIONE

Keep the vessel in the same packing condition as delivery.

Mantenere l'apparecchio nelle medesime condizioni di imballo della consegna.

4.4 HANDLING PROCEDURE / PROCEDURA DI MOVIMENTAZIONE

The activities of loading and unloading must be carried out by means of apposite lifting lugs

Le attività di carico / scarico devono essere effettuate attraverso gli appositi golfari di sollevamento.

4.5 LIFTING - TRANSPORTATION DESIGN AND PROCEDURE / PROCEDURA E DISEGNI DI SOLLEVAMENTO - TRASPORTO

The equipment is provided with proper connections and lugs which allow the correct sling during the lifting activities and/or handling for a safe loading/unloading.

L'apparecchiatura è provvista di connessioni appropriate e di golfari di sollevamento che consentono la corretta imbragatura in sicurezza durante il sollevamento e spostamento nelle operazioni di carico / scarico.

4.6 INSTALLATION PROCEDURE / PROCEDURA DI ISTALLAZIONE

Check the dimensions of the foundations for the vessel as well as the height of the foundation platform as referred to the zero line.

Controllare le dimensioni delle basi e l'altezza della piattaforma di fondazione che è considerata la linea zero.

The zero line, or construction level +/-0 resp., must be marked by the site supervisor in a binding way.

La linea dello zero, o la costruzione di livello +/- 0 devono essere contrassegnati dal supervisore del sito in modo chiaro.

The connection lines must be connected without stress to the marked connection nozzles of the vessel. The maximum admissible forces and moments that may act on the connecting nozzles are indicated in the manufacturer general arrangement drawing.

Le linee di tubazione devono essere collegate con quelle marcate sull'apparecchio senza superare il carico di connessione. Le forze massime ammissibili e momenti che possono agire sui bocchelli di collegamento sono indicati disegno d'assieme fornito dal costruttore.

Check:

- correct alignment of pipes in order to avoid stress

- correct tightening of the bolts

Controllare:

- Corretto allineamento delle tubazioni per evitare lo stress

- Corretto serraggio dei bulloni

4.7 BOLT TIGHTENING PROCEDURE / PROCEDURA SERRAGGIO

Start the tightening procedure by lubricating the nuts and bolts (with GRAFITOL or equivalent). Then hand tighten till they are snug against the flanges. If an air wrench is used make sure the pressure is set to the minimum. When tightening always use the correct sequential bolt order for the flange.

Avviare la procedura di serraggio lubrificando i dadi e bulloni (con GRAFITOL o equivalente). Poi stringere a mano fino a che aderiscano alle flange. Se una chiave d'aria è utilizzato assicurarsi che la pressione sia impostato al minimo. Quando si stringe sempre utilizzare l'ordine sequenziale del bullone corretto per la flangia.

4 and 8 Bolt Flanges

- First round – 30% of final torque (flange sequential order)
- Second round- 60% of final torque (flange sequential order)
- Third round – 100% of final torque (flange sequential order)
- One final time - clockwise or counterclockwise sequentially around the flange.

4 e 8 bulloni per flangia

- *Primo turno - 30% della coppia finale (flangia ordine sequenziale)*
- *Seconda rotonde 60% della coppia finale (flangia ordine sequenziale)*
- *Terzo turno - 100% della coppia finale (flangia ordine sequenziale)*
- *Una volta definitivo - senso orario o antiorario in sequenza intorno alla flangia.*

12 Bolt Flanges and More

- First round – 20% of final torque (flange sequential order)
- Second round- 40% of final torque (flange sequential order)
- Third round – 80% of final torque (flange sequential order)
- Fourth round – 100% of final torque (sequential order)
- One final time - clockwise or counterclockwise sequentially around the flange.

12 o piu' bulloni per flangia

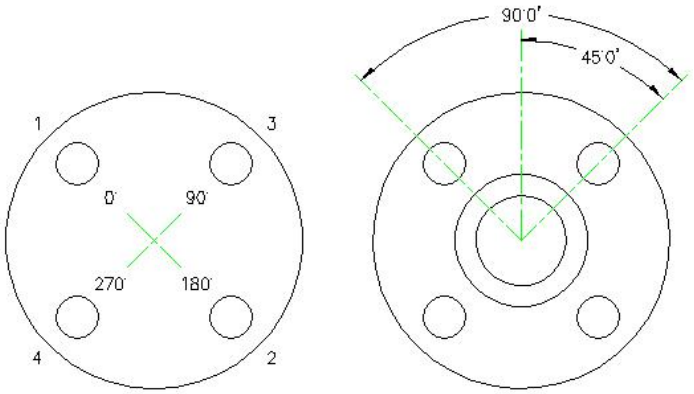
- *Primo turno - 20% della coppia finale (flangia ordine sequenziale)*
- *Seconda rotonde il 40% della coppia finale (flangia ordine sequenziale)*
- *Terzo turno - 80% della coppia finale (flangia ordine sequenziale)*
- *Quarto turno - 100% della coppia finale (ordine sequenziale)*
- *Una volta definitivo - senso orario o antiorario in sequenza intorno alla flangia.*

To avoid stresses in the flange, it's important to follow the exact tightening sequence

Per evitare tensioni nella flangia è importante seguire l'esatta sequenza:

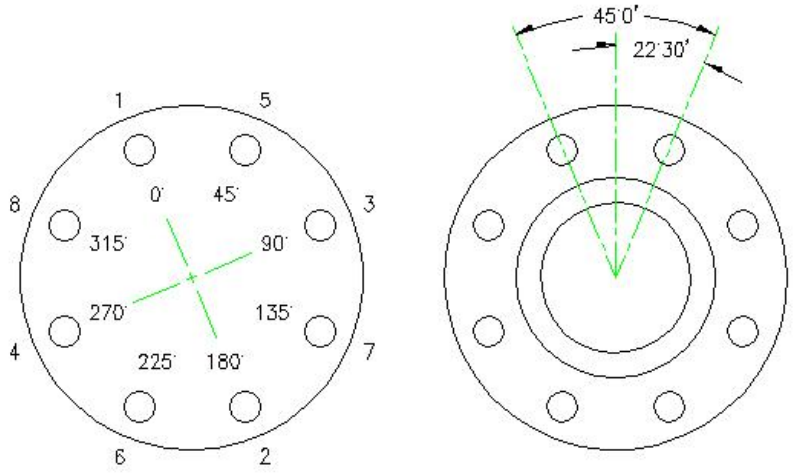
4 Bolt Tightening Sequence
4 bulloni sequenza di serraggio

- Sequential Order */ ordine sequenziale: 1-2, 3-4*
- Rotation Order */ ordine rotazionale: 1, 2, 3, 4*



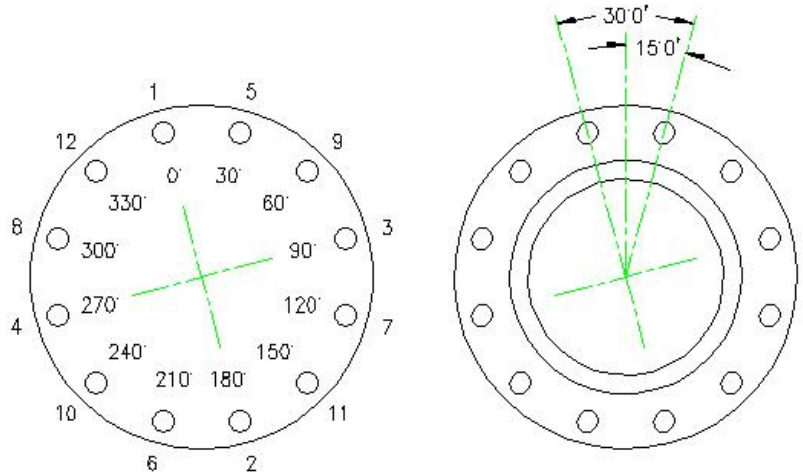
8 Bolt Tightening Sequence
8 bulloni sequenza di serraggio

- Sequential Order / ordine sequenziale: 1-2, 3-4, 5-6, 7-8
- Rotation Order / ordine rotazionale: 1, 5, 3, 7, 2, 6, 4, 8



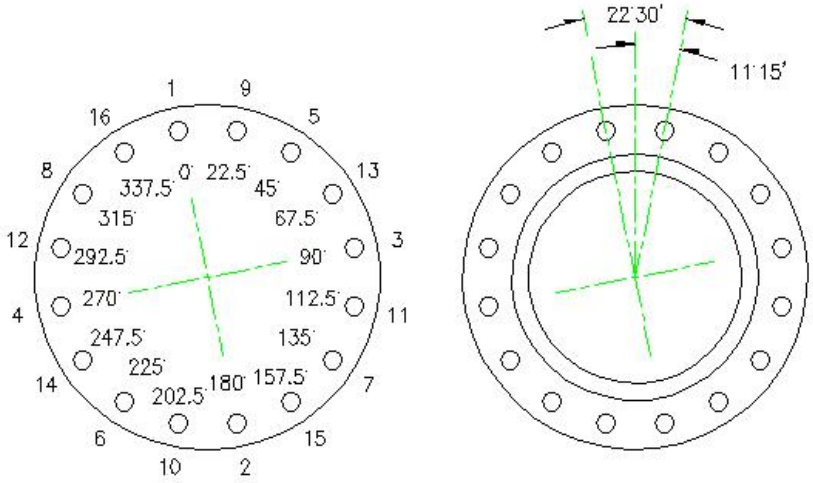
12 Bolt Tightening Sequence
12 bulloni sequenza di serraggio

- Sequential Order / ordine sequenziale: 1-2, 3-4, 5-6, 7-8, 9-10, 11-12
- Rotation Order / ordine rotazionale: 1, 5, 9, 3, 7, 11, 2, 6, 10, 4, 8, 12



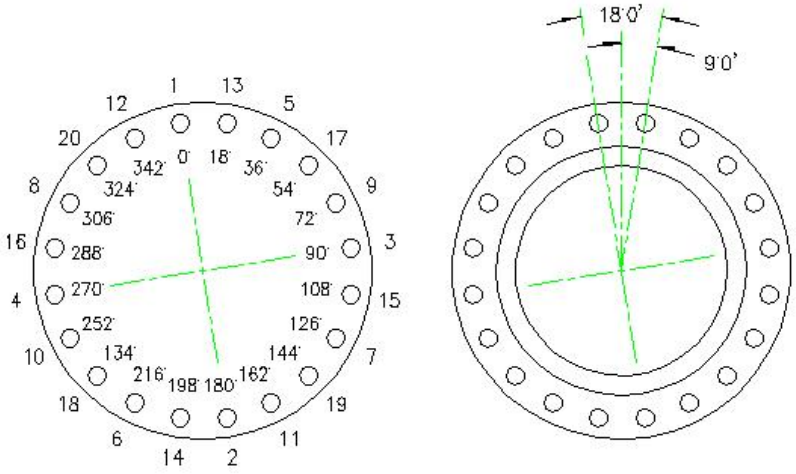
16 Bolt Tightening Sequence
16 bulloni sequenza di serraggio

- Sequential Order / ordine sequenziale: 1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
- Rotation Order / ordine rotazionale: 1, 9, 5, 13, 3, 11, 7, 15, 2, 10, 6, 14, 4, 12, 8, 16



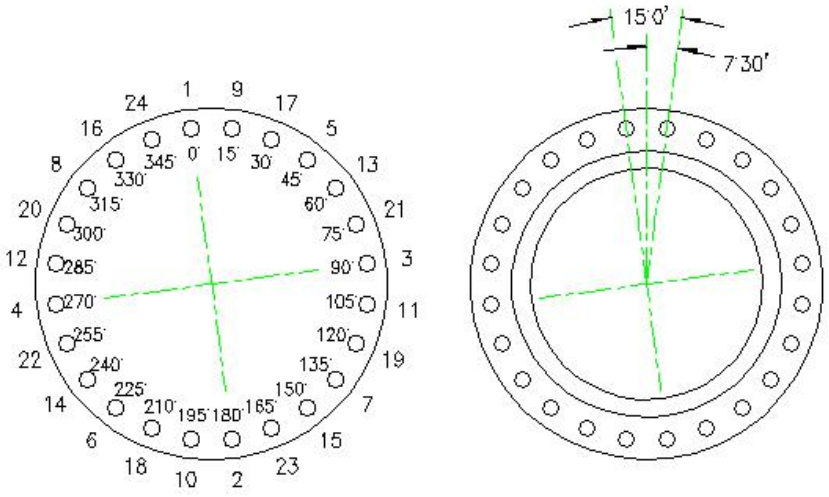
20 Bolt Tightening Sequence
20 bulloni sequenza di serraggio

- Sequential Order / ordine sequenziale: 1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20
- Rotation Order / ordine rotazionale: 1, 9, 5, 13, 3, 11, 7, 15, 2, 10, 6, 14, 4, 12, 8, 16



24 Bolt Tightening Sequence
24 bulloni sequenza di serraggio

- Sequential Order / ordine sequenziale: 1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 21-22, 23-24
- Rotation Order / ordine rotazionale: 1, 9, 17, 5, 13, 21, 3, 11, 19, 7, 15, 23, 2, 10, 18, 6, 14, 22, 20, 8, 16, 24



For the anchor bolts use the same tightening sequence used for flanges.

Per I bulloni di Fondazione utilizzare la stessa sequenza di serraggio.

For tensile load and tightening torque of carbon/stainless steel bolts use the following table:

Per I momenti e le forze da applicare durante il serraggio utilizzare la seguente tabella:

Bolt Size		Dry - lbs*ft (N*m)	Lubrificated - lbs*ft (N*m)
Carbon steel bolts			
M14	1/2"	75 (100)	40 (55)
M16	5/8"	150 (205)	80 (110)
M20	3/4"	285 (360)	145 (195)
M24	7/8"	430 (585)	230 (310)
M27	1"	635 (860)	345 (470)
M30	1" 1/8	935 (1270)	500 (680
M33	1" 1/4	1315 (1785)	700 (950)
M39	1" 1/2	2355 (3195)	1240 (1680)
Stainless steel bolts			
M14	1/2"	44 (60)	37 (50)
M16	5/8"	97 (132)	93 (126)
M20	3/4"	125 (170)	106 (144)
M24	7/8"	194 (263)	165 (223)
M27	1"	270 (366)	230 (312)
M30	1" 1/8	400 (542)	340 (461)
M33	1" 1/4	500 (678)	420 (570)
M39	1" 1/2	795 (1078)	675 (915)

Note: for SS bolts use antiseize fluid or similar
Nota: per bulloni inox utilizzare fluidi antigrippaggio

5 MAINTENANCE OPERATION / MANUTENZIONE

Check the tightening of the bolts and the integrity of the connection gaskets after putting in operation the vessel.

If there are some leakages due to vibrations or loads exceeding the loads recommended, tighten the bolts or replace the gaskets.

Repeat the checks periodically: 3 months suggested.

Controllare il serraggio dei bulloni e l'integrità delle guarnizioni di connessione dopo la messa in funzione del recipiente.

Se ci sono alcune perdite dovute a vibrazioni o carichi superiori ai carichi consigliati, stringere i bulloni o sostituire le guarnizioni.

Ripetere i controlli periodicamente: 3 mesi suggeriti.

Check the integrity of the welds on the vessel while on duty

Controllare l'integrità delle saldature sull'apparecchio mentre è in servizio

5.1 SPARE PARTS LIST / ELENCO RICAMBI

Please refer to SPARE PART INDEX REGISTER (COMMISSIONING, OPERATION) listed in 2.1 REFERENCES.

SI faccia riferimento a SPARE PART INDEX REGISTER (COMMISSIONING, OPERATION) elencato in 2.1 RIFERIMENTI