Base Load Power Hub (BLPH)

Weld procedure qualification records (WPQRs and PQRs) - Piping

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01	24/05/2024	Accepted for Construction (AFC)	D.CENACCHI	A.KHALIFA	M.BRUNELLI
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Revision / Change Log

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HOLDS LIST

No.	Description
1	
2	
3	
4	

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

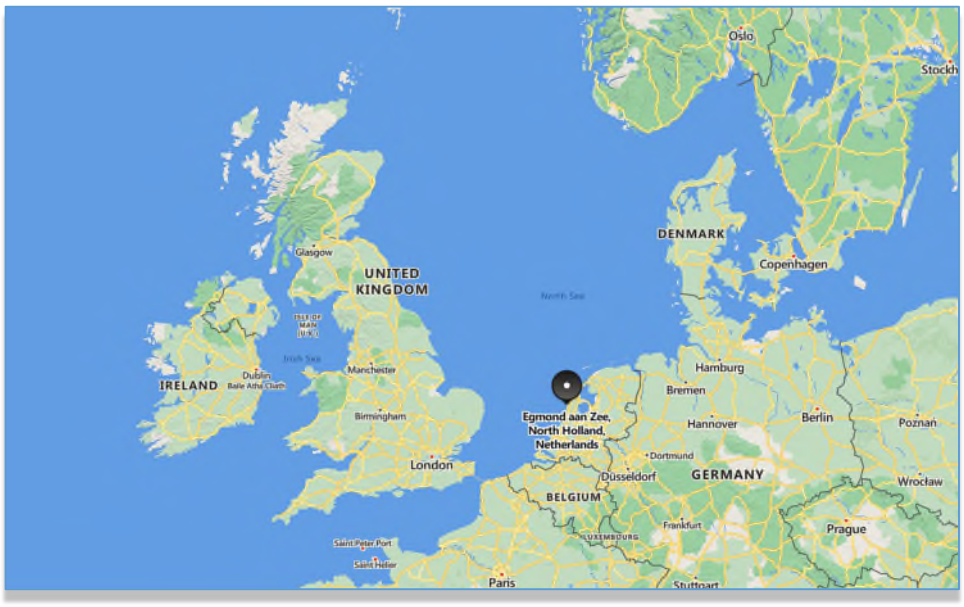


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

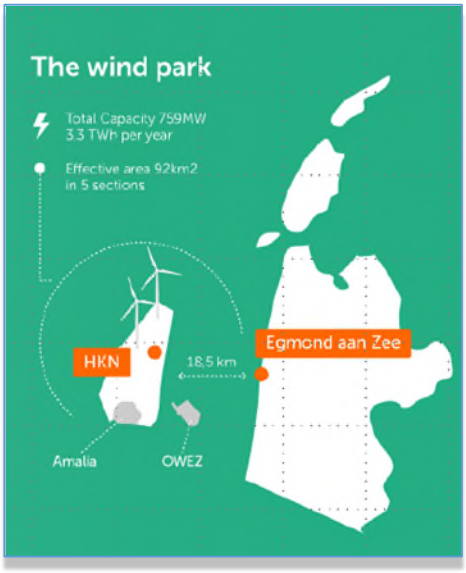


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

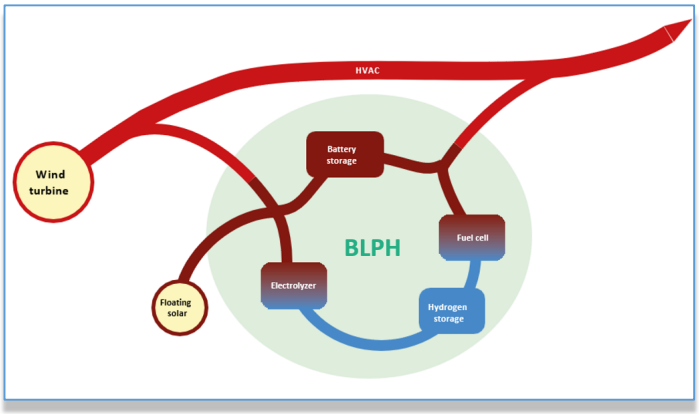


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

The scope of this procedure is to achieve all PQRs supporting WPSs to be used on pipework lines of Base Load Power Hub (BLPH).

3 REFERENCES

Doc. No.	Rev.	Date	Description - Title
K559-2254-PM-PLN-003	2	06/07/23	Basic Design Engineering Package
K559-2254-MT-REP-0001	1	03/03/2023	Material Selection Report
123A90-DDL-PP-SP-70029 TSS	02	08/01/2024	Piping Materials Narrative
123A90-DDL-PP-SP-70000	02	17/11/2023	Piping Material Classes
EN ISO 15614-1	Ed.2017	08/2017	Specification and qualification of welding procedures for metallic materials-Welding procedure test-Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys
123A90-DDL-PP-MTO-70062	01	14/03/2024	MTO - Piping Bulk
ASME B31.3			PROCESS PIPING

ASME B31.12	2019	20/12/2019	Hydrogen Piping and Pipelines
PED 2014/68/EU	2014		Pressure Equipment Directive

Table 1 - Reference Documents

4 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
CA	Certifying Authority
DP	Dye Penetrant
ITP	Inspection and Test Plan
MPI	Magnetic Particle Inspection
NDT	Non-Destructive Testing
QA	Quality Assurance
QC	Quality Control
RT	Radiographic Testing
UT	Ultrasonic Testing
WPQ	Welder Performance Qualification
WPQR (aka PQR)	Welding Procedure Qualification Record
WPS	Welding Procedure Specification
CJP	Complete Joint Penetration
PJP	Partial Joint Peneteration
FW	Fillet weld joint
WI	Welding Inspector
WS	Welding Supervisor
WT	Wall Thickness

Table 2 - Definitions and Abbreviations

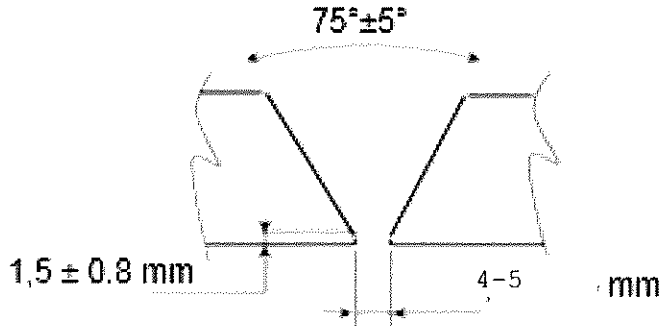
5 PQRS LIST

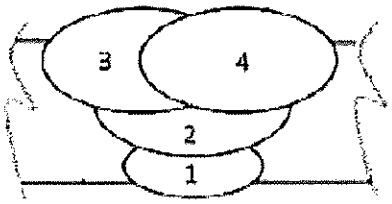
YEAR	#	WPQR	PARAMETERS	IVB
2018	01	01/18	PIPING	RINA
2018	02	02/18	PIPING	RINA
2003	03	03/03	PIPING	BUREAU VERITAS
2006	26	26/06	PIPING	RINA
2016	36	36/16	PIPING	RINA
2006	39	39/06	PIPING	RINA
2006	40	40/06	PIPING	RINA
2005	45	45/05	PIPING	RINA
2006	45	45/06	PIPING	RINA
2006	49	49/06	PIPING	RINA

6 PQRS ATTACHED

ROSETTI MARINO	PQR N°	01/18
PROCEDURE QUALIFICATION RECORD	Sheet: 1	Of: 2
	Prepared by: MDP	Date: 04/04/2018

MANUFACTURER	ROSETTI MARINO SPA		
WPS N°	*01/18 Rev. 2*	DATE:	*01/03/2018*
WELDING PROCESS(ES):	*GTAW*		
TYPES:	*MANUAL*		





BASE METAL		POSTWELD HEAT TREATMENT			
Material Specification:	*API 5L to API 5L*	*Temperature:*	/		
Type or grade:	*Gr. B to X60*	*Time:*	/		
P.Number. Group N.	*P-no. 1 Gr. Nr. 1 to P-no. 1 Gr. Nr. 2*	*Other*	/		
Thickness of Test Coupon:	*5,9 mm (machined from w. thk. 8,74 Gr. B, from 11,1 X60)*				
Diameter of Test Coupon:	*2" (60,3 mm)*				
Other:	*Heat No. 40238 (Gr. B) Heat No. 112855 (X60)*	*GAS*	*Percent composition*		
			Gas(es)	*(Mixture)*	*Flow rate*
FILLER METALS	*GTAW*	*Shielding*	*Ar*	*99,999*	*12 lt/1"*
SFA Specification	*A 5.18*	*Shielding*	*N.A.*	*N.A.*	*N.A.*
AWS Classification	*ER70S-3*	*Backing (*)*	*None*	*-*	*-*
Filler Metal F-No	*6*	*ELECTRICAL CHARACTERISTICS*			
Weld Metal Analysis A-No.	*1*	*Current*	*DC*		
Size of Filler Metal (mm)	*2,4*	*Polarity*	*SP*		
Deposited Weld Metal:	*5,9 mm*	*Amps.*	*87-116 A*	*Volts*	*11-14 V*
Filler metal make:	*ESAB OK TIGROD 12.60*	*Tungsten Electrode Size*	*2,4 mm*		
Other:	**Rod lot No. PVR47054102**	*Other:*	***Heat input: 0,64-0,98 kJ/mm***		

POSITION		TECHNIQUE	
Position of Groove	*5G*	*Travel speed*	*40-80 mm/min*
Weld progression (Uphill, Downhill)	*Uphill*	*String or Weave Bead*	*STRING (Max 10mm)*
Other	/	*Oscillation*	*N.A.*
		Multipass or single pass (per side)	*MULTIPASS*
		Single or multiple electrodes	*Single*

PREHEAT			
Preheat temperature:	*20° C*	*Other*	***Heat input calculation with coefficient 0,6 for GTAW***
Interpass temperature:	*250°C*		
Other	-		

ROSETTI MARINO	PQR N°	01/18
PROCEDURE QUALIFICATION RECORD	Sheet: 2	Of: 2
	Prepared by: MDP	Date: 04/04/2018

SPECIMEN No.	WIDTH (mm)	THICKNESS (mm)	AREA (mm^2)	Rp0,2% N/mm2	ULTIMATE UNIT STRESS N/mm2	TYPE OF FAILURE & LOCATION
Transverse 1,+20°C	*19.03*	*5.03*	*95.72*	*420.0*	*551.0*	*Ductile, broken out of weld (side API 5L Gr. B)*
Transverse 2,+20°C	*19.02*	*5.13*	*97.57*	*416.0*	*519.0*	*Ductile, broken out of weld (side API 5L Gr. B)*

TOUGHNESS TESTS

		NOTCH LOCATION	NOTCH TYPE	SPECIMEN SIZE (mm)	TEST TEMP. (°C)	IMPACT VALUES									DROP WEIGHT	
						JOULES				% SHEAR	MILS	LATERAL EXP.			BREAK	No. BREAK
						singles			Av.							
	h10-11	*WM*	*KV8*	*3,33x10*	*-57,1*	*55*	*44*	*52*	*50*	*-*	*-*	*1.69*	*1.47*	*1.79*	*-*	*-*
	h1-2	*FL side X60*	*KV8*	*3,33x10*	*-57,1*	*57*	*30*	*46*	*44*	*-*	*-*	*1.73*	*1.31*	*1.68*	*-*	*-*
	h10-11	*FL side Gr. B*	*KV8*	*3,33x10*	*-57,1*	*33*	*34*	*7*	*25*	*-*	*-*	*1.31*	*1.39*	*1.83*	*-*	*-*
	h1-2	*FL+2 side X60*	*KV8*	*3,33x10*	*-57,1*	*21*	*29*	*21*	*24*	*-*	*-*	*1.13*	*1.32*	*1.02*	*-*	*-*
	h10-11	*FL+2 side Gr. B*	*KV8*	*3,33x10*	*-57,1*	*58*	*61*	*53*	*57*	*-*	*-*	*1.71*	*1.75*	*1.70*	*-*	*-*

GUIDED BEND TEST

TYPE & FIGURE No.	RESULT
No. 2 transverse face bend test	*Satisfactory*
No. 2 transverse root bend test	*Satisfactory*

FILLET WELD

Result - Satisfactory	Yes. *N.A.*	No *N.A.*	Penetration into Parent Metal;	Yes *N.A.*	No. *N.A.*
Macro – Results	*N.A.*				

OTHER TESTS

Type of test	*VISUAL EXAMINATION:*	*Satisfactory, see report VDR 01/18*
	MT EXAMINATION	*Satisfactory, see report MT05-18047, 06-18047, 08-18047, 09-18047, 10-18047, 11-18047*
	MACROGRAPHIC EXAMINATION	*3 Sections, Satisfactory (h12, h3, h6)*
	RADIOGRAPHIC EXAMINATION	*Satisfactory, see report RT15-18047, 16-18047, 22-18047, 23-18047, 24-18047, 25-18047*
	Hardness HV 10	*Satisfactory ,see report RPR308-1E1R0A18 of 04th-04-2018 (max 197 HV10)*

Welder's Name	*Portas Maurizio (Coupon A, B, C, D, E, F)*	Clock No.		Stamp No.	*NC61*
Test conducted by	*Element Materials Technology Milan S.r.l.*	*Test Report No.*	*RPR308-1E1R0A18 of 04th-04-2018*		

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 ASME IX Ed. 2017, ASME B31.3:2016 & KE01-00-000-KD-V-SS-0018-000 Rev. C02

Date: *04th/04/2018*

Manufacturer: ROSETTI MARINO SpA
By: Welding Dept.
P. Cenacchi

RINA
F. Lago
RINA Services S.p.A.

RAPPORTO PROVA DI QUALIFICA DI PROCEDIMENTO DI SALDATURA/BRASATURA

N° PRATICA	N° SAGGIO	NORMA
2018 VE 319 PO	01/18	ASME IX Ed. 2017 & KE01-00-000-KD-V-SS-0018-000 Rev.C02

Società ROSETTI MARINO SPA Località RAVENNA

Processo GTAW Tipo MANUAL

Posizione Saldatore/ Brasatore ____ Spessore (mm) ____ Diametro (mm) ____

Stamp ____ WPS/BPS ____

Materiale base: Gruppo/i	Norma e designazione / tipo backing	*Materiale d'apporto o flusso:* Nome commerciale	Norma / designazione
Backing			

Gas al dritto:	*Gas al rovescio:*
Composizione ____ L/min ____ Ø ugello (mm) ____	Composizione ____ L/min ____

Ø Elettrodo Tungsteno (mm) e tipo ____ Temperatura preriscaldo (°C) ____

PWHT (temperatura, tempo e rampe) ____ Temperatura interpass max (°C) ____

Molatura fra le passate ____ Molatura al rovescio ____ Ripresa al rovescio ____

Passate	Processo	Materiale d'apporto Ø [mm]	Corrente [A]	Tensione [V]	Tipo corrente	Velocità [cm/min]

Preparazione giunto e sequenza saldatura
Per processi multipli indicare spessore depositato (mm/processo)

For all the information See As Run Parameters sheets attached

Esito esame visivo: ☒ Positivo ☐ Negativo

Prove di qualifica effettuate a: Ravenna (RA) Data 06-07/03/2018 Firma

Esito prove laboratorio: ☒ Positivo ☐ Negativo

Rapporti laboratorio allegati n° e data: Element *RPR308-1E1R0A18 of 04th-04-2018*

A seguito dell'esito positivo delle prove di laboratorio, si propone il rilascio del certificato di qualifica n° ROSETTI FORM PQR 01/18 Data 05/04/2018 Firma

Decisione DM– Con riferimento al documento RINA IS-CRT-SAL-01, si autorizza il rilascio dei certificati di qualifica Data ____ Firma DM ____

KCOI ROSETTI MARINO

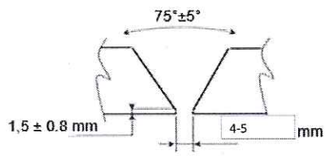
AS-RUN PARAMETER SHEET

pWPS 01/18	
PQR 01/18	
Coupon Nr. 01/18A	
Date:	Start 06-03-2018 Finish 06-03-2018 — Page: 1_ of _1

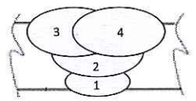
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,4	PVR47054102	ESAB OK TIGROD 12.60
Cap	2,4	PVR47054102	ESAB OK TIGROD 12.60

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	93	97	95	11	13	12,0	N.A.	N.A.	4,5	0,91	0,60	25	- Manual monitoring
NC61	2	GTAW	2	=	ER70S-3	2,4	DC-SP	100	110	105	12	14	13,0	N.A.	N.A.	6,5	0,76	0,60	100	Root pass deposit: 3 mm
NC61	3	GTAW	3	=	ER70S-3	2,4	DC-SP	100	110	105	12	14	13,0	N.A.	N.A.	7,5	0,66	0,60	250	
NC61	3	GTAW	4	=	ER70S-3	2,4	DC-SP	100	110	105	12	14	13,0	N.A.	N.A.	7,5	0,66	0,60	210	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D. Cenacchi	Signature:	Signature: RINA Services SpA D. Cinardi	Signature:
Date: 06/03/18	Date: 08/03/2018	Date: 06/03/2018	Date:

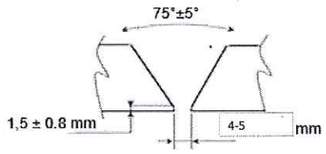
AS-RUN PARAMETER SHEET

pWPS 01/18			
PQR 01/18			
Coupon Nr. 01/18B			
Date:	Start 06-03-2018 Finish 06-03-2018	Page:	1_ of _1

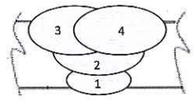
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,4		
Cap	2,4	PVR47054102	ESAB OK TIGROD 12.60

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	92	99	95,5	11	13	12,0	N.A.	N.A.	4,5	0,92	0,60	25	- Manual monitoring
NC61	2	GTAW	2	=	ER70S-3	2,4	DC-SP	104	114	109	12	14	13,0	N.A.	N.A.	6,5	0,78	0,60	120	Root pass deposit: 3 mm
NC61	3	GTAW	3	=	ER70S-3	2,4	DC-SP	103	112	107,5	12	14	13,0	N.A.	N.A.	7,5	0,67	0,60	250	
NC61	3	GTAW	4	=	ER70S-3	2,4	DC-SP	103	112	107,5	12	14	13,0	N.A.	N.A.	7,5	0,67	0,60	190	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name: Iacobini IIS	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D.Cenacchi	Signature: SERVICE S.r.l.	Signature: RINA Services SpA D. Cimarti	Signature:
Date: 06/03/18	Date: 08/03/2018	Date: 06/03/2018	Date:

KCOI ROSETTI MARINO

AS-RUN PARAMETER SHEET

pWPS 01/18

PQR 01/18

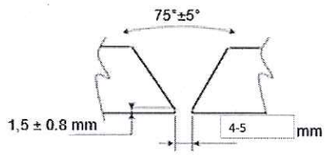
Coupon Nr. 01/18C

Date: Start 06-03-2018 Finish 06-03-2018 | Page: 1_ of _1

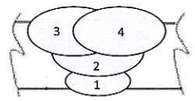
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,4		
Cap	2,4	PVR47054102	ESAB OK TIGROD 12.60

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	90	100	95	11	13	12,0	N.A.	N.A.	4,5	0,91	0,60	25	- Manual monitoring
NC61	2	GTAW	2	=	ER70S-3	2,4	DC-SP	100	110	105	12	14	13,0	N.A.	N.A.	6,5	0,76	0,60	100	Root pass deposit: 3 mm
NC61	3	GTAW	3	=	ER70S-3	2,4	DC-SP	104	113	108,5	12	14	13,0	N.A.	N.A.	7,5	0,68	0,60	250	
NC61	3	GTAW	4	=	ER70S-3	2,4	DC-SP	104	113	108,5	12	14	13,0	N.A.	N.A.	7,5	0,68	0,60	180	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept D. Cerlachi	Signature: IIS SERVICE S.r.l.	Signature: RINA Services SpA D. Cimarra	Signature:
Date: 06/03/18	Date: 08/03/2018	Date: 06/03/2018	Date:

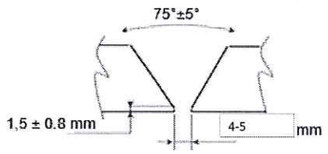
AS-RUN PARAMETER SHEET

pWPS 01/18	
PQR 01/18	
Coupon Nr. 01/18D	
Date:	Start 06-03-2018 Finish 06-03-2018
Page:	1_ of _1

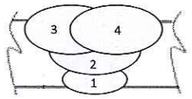
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,4		
Cap	2,4	PVR47054102	ESAB OK TIGROD 12.60

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	87	94	90,5	11	13	12,0	N.A.	N.A.	4,0	0,98	0,60	25	- Manual monitoring
NC61	2	GTAW	2	=	ER70S-3	2,4	DC-SP	102	115	108,5	12	14	13,0	N.A.	N.A.	6,0	0,85	0,60	105	Root pass deposit: 3 mm
NC61	3	GTAW	3	=	ER70S-3	2,4	DC-SP	105	114	109,5	12	14	13,0	N.A.	N.A.	7,0	0,73	0,60	250	
NC61	3	GTAW	4	=	ER70S-3	2,4	DC-SP	105	114	109,5	12	14	13,0	N.A.	N.A.	8,0	0,64	0,60	210	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept D. Cerracchi	Signature: ISTERI IIS SERVICE S.r.l.	Signature: RINA Services SpA D. Cimarelli	Signature:
Date: 26/03/18	Date: 08/03/2018	Date: 06/03/2018	Date:

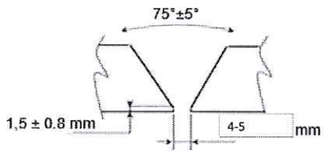
AS-RUN PARAMETER SHEET

pWPS 01/18	
PQR 01/18	
Coupon Nr. 01/18E	
Date: Start 06-03-2018 Finish 06-03-2018	Page: 1_ of _1

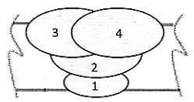
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,4		
Cap	2,4	PVR47054102	ESAB OK TIGROD 12.60

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	88	95	91,5	11	13	12,0	N.A.	N.A.	4,5	0,88	0,60	25	- Manual monitoring
NC61	2	GTAW	2	=	ER70S-3	2,4	DC-SP	101	109	105	12	14	13,0	N.A.	N.A.	5,5	0,89	0,60	95	Root pass deposit: 3 mm
NC61	3	GTAW	3	=	ER70S-3	2,4	DC-SP	103	116	109,5	12	14	13,0	N.A.	N.A.	7,5	0,68	0,60	250	
NC61	3	GTAW	4	=	ER70S-3	2,4	DC-SP	103	116	109,5	12	14	13,0	N.A.	N.A.	7,5	0,68	0,60	200	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D. Cernaschi	Signature:	Signature: RINA Services SpA D. Cimarelli	Signature:
Date: 06/03/18	Date: 08/03/2018	Date: 06/03/2018	Date:

KCOI ROSETTI MARINO

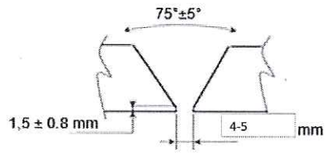
AS-RUN PARAMETER SHEET

pWPS 01/18	
PQR 01/18	
Coupon Nr. 01/18F	
Date:	Start 07-03-2018 Finish 07-03-2018
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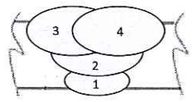
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,4		
Cap	2,4	PVR47054102	ESAB OK TIGROD 12.60

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	89	97	93	11	13	12,0	N.A.	N.A.	4,5	0,89	0,60	25	- Manual monitoring
NC61	2	GTAW	2	=	ER70S-3	2,4	DC-SP	103	110	106,5	12	14	13,0	N.A.	N.A.	5,5	0,91	0,60	105	Root pass deposit: 3 mm
NC61	3	GTAW	3	=	ER70S-3	2,4	DC-SP	105	114	109,5	12	14	13,0	N.A.	N.A.	7,5	0,68	0,60	250	
NC61	3	GTAW	4	=	ER70S-3	2,4	DC-SP	105	114	109,5	12	14	13,0	N.A.	N.A.	7,5	0,68	0,60	215	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name: Signature: ROSETTI MARINO SpA Welding Dept. D. Cenacchi Date: 07/03/18	Name: Iscelli Signature: IIS SERVICE S.r.l. Date: 08/03/2018	Name: Signature: RINA Services SpA D. Cimatti Date: 07/03/2018	Name: Signature: Date:

PQR attachments index:

Base material certificate (Pipe API 5L Gr. B)

Base material certificate (Pipe API 5L X60)

Shielding gas certificate

Consumables certificate

preliminary WPS

NDE certificate

Mechanical test report

Base material certificate (Pipe API 5L Gr. B)

COMMERCIALE TUBI ACCIAIO Viale Lidice 40-Grugliasco(TO)	Kg 234	Mt 21,05	Pz No.: 2
This document is reproduced by a computerized system and is conform to the original	Heat No.: 40238	Cta's job: VC0001608	Date: 15/07/2014
Customer : ROSETTI MARINO SPA	P.O. No.: PO: 1714002148 - 114A30B		Item: 30

COD QC – 3.1 – Ed. 2 REV 3/2013

TMK - ARTROM S.A.
Draganesti Street, No. 30, 230119, SLATINA, OLT, ROMANIA
Tel: +40-249-436862 (top management), 434640, 434641; Fax: +40-249-434330, 437288
E-mail: office.slatina@tmk-artrom.eu; www.tmk-artrom.eu
J 28/9/1991; VAT No: RO 1510210/1992;
Subscribed and Paid Share Capital: 291.587.538, 34 lei

MILL TEST CERTIFICATE / INSPECTION CERTIFICATE - EN 10204: 2004 / 3.1

No.: E5096 Date: 21.03.2014	Manufacturer's mark :	Customer Order No.: VS-0000007	PL: 11783

CUSTOMER : Commerciale Tubi Acciaio
Viale Lidice, 40; IT- 10095 Gruglissco (TORINO); VAT : IT 00505800011

Specifications: API 5L-13; ASTM A106-13; ASME SA106-10; ASTM A53-12; ASME SA53-10; ASME B16.25-07; ISO 3183: 12 ASME Section II part D, TAB.Y1; Spec. RAQ-01-PR-B REV. 0; PED 97/23/EC (Appendix 1, par. 4.3) + EN 10216-1: 02	**Dimensions: 60.3 x 8.74 x 10 000 to 11 800 mm Steel : Gr. B / L245/ X42 /L290 PSL1/ P265TR2**

Description: Hot rolled seamless steel pipes with bevelled ends; marking by painting at one end: TMK-ARTROM, standard, dimensions, steel grade, 11.11Kg/m, LENGTH(m), 2"SCH 160, 2970PSI/NDE, SMLS, heat no., LOT, mill inspector no. 5, technical control sign; marking one end: heat no.

Heat No.: 40238

Quantity	Pcs	Length m	Weight kg
	57	600.21	6692

C	Mn	S	P	Si	Ni	Cr	Mo	Cu	Al	Nb	Ti	N	V	B	Ca
0.19	1.08	0.004	0.011	0.26	0.10	0.06	0.02	0.21	0.028	0.002	0.001	0.009	0.003	.0005	0.002

Cr+Cu+Mo+Ni: 0.39 | V+Nb+Ti: 0.006 | Nb+V:0.005 | CEiiw=0.407

Product Chemical Analyse (%)

C	Mn	S	P	Si	Ni	Cr	Mo	Cu	Al	Nb	Ti	N	V	B	Ca
0.19	1.06	0.004	0.012	0.25	0.09	0.06	0.02	0.21	0.026	0.002	0.001	0.009	0.002	.0004	0.002
0.19	1.07	0.003	0.013	0.24	0.09	0.06	0.02	0.21	0.027	0.001	0.001	0.009	0.002	.0005	0.002

Mechanical Properties

TENSILE TEST (ASTM A370) – at room temperature- Test Specimen Strip–longitudinal	Rp0.2/Rt0.5 MPa	Rm MPa	Elongation %	Rp0.2/Rm
Dimension – Specimen (mm) 19.0 x 8.9	377/378	530	34.5	0.71
Section – Specimen (mm^2) 169.1				
Length - Specimen (Lo) (mm) 50.8				

Hydraulic test pressure (API5L/ASTM A530): 2970 PSI for 5 sec.: OK Heat treatment: normalised during hot rolling process, temperature between 880°C - 940°C and cooler in still air Bending test (ASTM A106 point 11): OK Test Eddy Current Acc. ASTM E309 & EN 10246-1 : OK	Charpy V–Notch (ASTM A370) KV / Longitudinal 7.5 x 10 [mm] 60 (57; 63; 59) [J] (-10° C)	Melting process: electric arc furnace, fully killed Fine grain Hardness BHN: OD: 158; 161 / ID: 158; 161 Hardness HRC acc to NACE MR01.75 NACE MR01.03

Hot yield at 343°C: 227MPa(strip longitudinal 5.2 x 8.8= 45.8 mm^2); Hot yield at 538°C: 178MPa(strip longitudinal 5.7 x 8.9= 50.7 mm^2)
Visual inspection and dimensional check : OK
" NO WELD REPAIR ON HEREBY CERTIFIED TUBES "
The manufacturer of pipes is certified in acc. with ISO 9001: 2008, 14001:2004 and ISO 18001:2007
THE PRODUCTS DELIVERED ARE CONTROLLED ON RADIOACTIVITY RESPECTIVELY ARE FREE FROM ADDITIONAL IONIC RADIATION AND MERCURY
The material "not contain intentional additions of elements such as lead, selenium, or sulphur to improve machinability"
Steel grade was treated with calcium for the shape control of micro inclusions.

QC & LABORATORIES CHIEF
Dipl. Eng. Silviu Barbulescu

MILL INSPECTOR
Eng. Constantin Lupu

La société T.M.K. ARTROM S.A. garantit que tous le produits, object cu Certificat susdit, respectent en leur Totalité les Specifications de l'article 15 de l'Arrete Ministériel du 24 Mars 1978 modifié.
Cmax 0.25%, Pmax 0.05%, Smax 0.05%,
Rm (N/mm2) max700, A(Lo=5.65√So) min.16% long, Rm(A-2)min 10500
E max0.9, A (Lo=5.65√So) min14%trans, RAmin 10500

The forgery of this certificate concludes to responsibility mentioned on Romanian Penal Code (art. 290-292).
THIS IS FOR CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED WITH THE ORDERED SPECIFICATION AND THAT INFORMATION IS CORRECT, THEY MEET THE SPECIFICATION'S REQUIREMENTS AND ARE RECORDS IN THE COMPANY DOCUMENTS.

Base material certificate (Pipe API 5L X60)

TUBOS REUNIDOS INDUSTRIAL, S.L.U
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)

EN 10204:2004 / 3.1

CERTIFICADO DE CALIDAD
MILL TEST CERTIFICATE

Nº 0000317548/1 Rev. 000

CLIENTE: CUSTOMER	TUBE DEVELOPMENTS LTD.	PEDIDO / PARTIDA: P.ORDER / ITEM	17319/11091
PRODUCTO: ARTICLE	TUBERÍA SIN SOLDADURA LAMINADA EN CALIENTE HOT FINISHED SEAMLESS TUBES	REF. FABRICA: WORK ORDER	300014748 000010
EXTREMOS: ENDS	BISELADOS BEVELLED ENDS	PROTECCIÓN SUPERF: EXT. COATING	LACA SECA EXTERIOR OD DRY LACQUERED
NORMA / GRADO: APL STANDARD AND GRADE	API5L 45TH ED. PSL2/ISO3183.07 / SPEC. DALE (04/07/2013) X60/X65Q L415/L450Q	PROCESO FUSION: MELTING PROCESS	HORNO ELECTRICO ACERO TOTALMENTE CALMADO ELECTRIC FURNACE // FULLY KILLED
ESPEC. ADICIONALES: ADITIONAL SPECS.	TD008 REV02 (09/07/2012) NACE MR0175.2002, (HRC <= 22). NACE MR0175/ISO 15156.PUB.2009	FAB. DE PALANQUILLA: BILLETS MANUFACTURE	COLADA CONTINUA CONTINUOUS CASTING
DIMENSIONES: DIMENSIONS	60,3 X 11,1 MM. X 10-11,8 M.		
MARCAS: MARKING	ESTAMPADO: DIE STAMPING		
	PINTADO: STENCILLED	TRI SPEC 5L 5L-0011 (SELLO API) ISO 3183 (MM/AA) 60,30 11,100 X60/X65Q L415/L450Q PSL2 SMLS (LONG. TUBO EN MTS) M HN (COLADA)	
	CODIGO COLOR: COLOUR CODE		
TRAT. TERMICO: HEAT TREATMENT	TEMPLADO Y REVENIDO / QUENCHED & TEMPERED. 905 °C 11 MIN 650 °C 59 MIN		

TUBE DEVELOPMENTS LIMITED
Q.A. DEPT
VERIFIED TRUE COPY OF ORIGINAL

Lista de Bultos / Packing List 133507

DESCRIPCION SUMINISTRO / DESCRIPTION OF DELIVERY (1)

ITEM FAB. T.R. ITEM	ITEM CLI. CLIENTS ITEM	LONG.INDIV (M) INDIVIDUAL LENGTH	COLADA CAST NR.	Nº TUBOS QUANTITY	LONG. TOTAL (M) LENGTH	PESO(KG) WEIGHT
000010		10,000 - 11,800	112855	72	810,000	10.933
TOTAL				72	810,000	10.933

P.O. 17130008007 112470B
ITEM 20

TUBOS REUNIDOS INDUSTRIAL GARANTIZA QUE TODAS LOS TUBOS CUBIERTOS POR ESTE CERTIFICADO CUMPLEN LOS REQUISITOS DEL PEDIDO Y CON LAS ESPECIFICACIONES ARRIBA MENCIONADAS.
TUBOS REUNIDOS INDUSTRIAL CERTIFY THAT ALL THE TUBES COVERED BY THIS CERTIFICATE COMPLY WITH ORDER REQUIREMENTS AND ABOVE MENTIONED SPECIFICATIONS.

AMURRIO 03.10.2013

TUBE DEVELOPMENTS
Q.A. DEPT
APPROVED
SIG
DATE 7.10.13
BSI REG No. RS00057

CONTROL DE CALIDAD DE TUBOS REUNIDOS INDUSTRIAL
TUBOS REUNIDOS INDUSTRIAL QUALITY CONTROL)
Alex Villarreyo
P.O.:

TUBOS REUNIDOS INDUSTRIAL, S.L.U
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)

EN 10204:2004 / 3.1

CERTIFICADO DE CALIDAD
MILL TEST CERTIFICATE

Nº 0000317548/1 Rev. 000

ENSAYOS NO DESTRUCTIVOS / NDT

ENSAYO / TEST	%CONTROL / TEST RATE(%)	REQUISITOS / REQUIREMENTS	RESULTADO / RESULT
VISUAL Y DIMENSIONAL/ VISUAL & DIMENSIONAL INSP.	100%		O.K.
P.HIDROSTATICA/ HYDROTEST	100%	3.000,0 PSI 5 SEC.	O.K.
CORRIENTES INDUCIDAS/ EDDY CURRENTS	100%	ASTM E 309.11, N12.5/HS 3.2 MM	O.K.
U.S. (LONGITUDINAL)/ ULTRASONIC TEST (LONG)	100%	ASTM E 213.04 5%W.T.NOTCH	O.K.
U.S.(LAMINAC.)/ ULTRASONIC TEST (LAMINATIONS)	100%	S.E.P. 1919	O.K.
P.MAGNETICAS (EXTREMOS)/ MAGNETIC PARTICLE INSP.(ENDS)	100%	ASTM E709.01	O.K.
INSP. POR PASO DE ANILLO/ RING GAUGE INSPECTION	100%	ACC. TO API 5L/ISO 3183	O.K.

TUBE DEVELOPMENTS LIMITED
Q.A. DEPT
VERIFIED TRUE COPY OF ORIGINAL

ANALISIS DE COLADA / CAST ANALYSYS

	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	V	Al	Ti	Nb	B	N	C.E.
MIN.																
MAX.	0,15	1,30	0,35	0,020	0,0030	0,400	0,400	0,02000	0,40000	0,00500	0,06000	0,04000	0,00500	0,00050	0,0120	0,42
112855	0,13	1,08	0,20	0,010	0,0025	0,075	0,088	0,02000	0,25560	0,00160	0,02860	0,00250	0,00080	0,00050	0,0016	0,35

ANALISIS DE PRODUCTO / PRODUCT ANALYSIS

	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	V	Al	Ti	Nb	B	N	C.E.
MIN.																
MAX.	0,15	1,30	0,35	0,020	0,0030	0,400	0,400	0,02000	0,40000	0,00500	0,06000	0,04000	0,00500	0,00050	0,0120	0,42
112855	0,13	1,08	0,21	0,009	0,0020	0,080	0,090	0,02000	0,25000	0,00200	0,02900	0,00200	0,00500	0,00010	0,0100	0,35
112855	0,13	1,08	0,21	0,009	0,0020	0,070	0,090	0,02000	0,25000	0,00200	0,02900	0,00200	0,00500	0,00010	0,0110	0,35

P.O. 4500460471 112470B
MTR120

AMURRIO 03.10.2013

TUBE DEVELOPMENTS
Q.A. DEPT
APPROVED
SIG
DATE 7.10.13
BSI REG No. RS00057

CONTROL DE CALIDAD DE TUBOS REUNIDOS INDUSTRIAL
TUBOS REUNIDOS INDUSTRIAL (QUALITY CONTROL)
Alex Villanueva
P.O.:

TUBOS REUNIDOS INDUSTRIAL, S.L.U
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)

EN 10204:2004 / 3.1

CERTIFICADO DE CALIDAD
MILL TEST CERTIFICATE

Nº 0000317548/1 Rev. 000

FORMULAS

	(01)	(02)
MIN.		
MAX.	0,150	0,250
112855	0,009	0,210
112855	0,009	0,210

(01) Nb + Ti + V
(02) Pcm: C +Si/30 + (Cr + Mn + Cu)/20 +Ni/60 + Mo/15 + V/10 + 5*B

ENSAYOS DE TRACCIÓN
TENSILE TEST

COLADA CAST	Nº	L/T (1)	T/P (2)	DIMENSION (mm)	L.ELAST. YIELD POINT (Mpa) (3)	R.TRACC. T.STRENGTH (Mpa)	ALARG. ELONG. (%) (4)	DUREZA HARDNESS (HRB)	E / R
					450	535			
					565	760		99	0,00
112855	0001	L	P	19,10 x 11,90	457	557	38	87	0,82
112855	0002	L	P	19,70 x 11,90	460	579	37	86	0,80

(1) : L = LONGITUDINAL // T = TRANSVERSAL
(2) : T = Full size tube // P = Strip specimen
(3) : yield point (0,5%)
(4) : Lo = 2" (50,8 mm)

ENSAYOS DE IMPACTO - CHARPY V
IMPACT TEST

COLADA CAST	L/T (1)	DIMENS (mm)		Tª (ºC)	RESILIENCIA IMPACT TEST (J)			AREA DUCTIL SHEAR AREA (%)		Exp. Lateral LATERAL EXP.
		10	10,00	-50	35			10		
					40					
112855	L	10	10,00	-50	322	318	348	90		1,40

(1) : L = LONGITUDINAL // T = TRANSVERSAL

ANEXOS / ANNEX

Magnetismo Remanente < 30 Gauss
Residual Magnetism < 30 Gauss

HEAT 112855
HARDNESS HRB (OUTSIDE SURFACE): 85/86/86/86
HARDNESS HRB (INSIDE SURFACE): 87/85/86/86

P.O. 1713004047 112470B
ITEM 20

TUBE DEVELOPMENTS LIMITED
Q.A. DEPT
VERIFIED AS BEING A TRUE COPY OF ORIGINAL

AMURRIO 03.10.2013

TUBE DEVELOPMENTS
Q.A. DEPT
APPROVED
SIG P.R.
DATE 7.10.13
BSI REG No. RS00057

CONTROL DE CALIDAD DE TUBOS REUNIDOS INDUSTRIAL
TUBOS REUNIDOS INDUSTRIAL (QUALITY CONTROL)
Alex Villanueva
P.O.:

ROSETTI MARINO

PQR 01/18

Shielding gas certificate

SCHEDA TECNICA N. 014

ARGON "50" Ar

Caratteristiche distintive bombola

Ogiva: Verde scuro RAL 6001
riportante il numero "50"
Corpo: Grigio RAL 7015



Informazioni sulle regolamentazioni

Classificazione CEE: N° 231-147-0
Classificazione UN: N° 1006
Classificazione CAS: N° 07440-37-1
Classificazione ADR-RID: 2; cod. 1A
n. pericolo 20
Etichettatura ADR: Etichetta 2.2



FRASI DI RISCHIO
RAS - in alta concentrazione può provocare asfissia

CONSIGLI DI PRUDENZA
S9 – Conservare il recipiente in luogo ben ventilato
S23 – Non respirare

Scheda di Sicurezza n. **005**
Scheda Tecnica n. 014 del 29.01.2004

TIPO GRADO	TITOLO IMPUREZZE	RECIPIENTI IMBALLO (lt)	RECIPIENTI QUANTITA' (m^3)	SETTORE DI APPLICAZIONE
50	≥ 99.9990%	Pacchi:		• Analisi acciai • Spettrometro • Quantovac • Saldature speciali • Miscele nucleari • Analisi secondo Abresch
		B 16/40	144	
		B 12/50	132	
		B 16/50	176	
5.0	O_2 ≤10 ppm H_2O ≤10 ppm N_2 ≤10 ppm	Bombole:		
La purezza del gas è garantita nella bombola fino alla pressione minima di 10 bar (g)		B50	11	
		B40	9	
		B14	3,1	
		B10	2,2	
		B5	1,1	
		Le quantità si intendono per bombole caricate a 200 bar (g)		

Gas compresso (liquefa **a –185,9°C** alla pressione di 1 bar (g)).
Non tossico, non infiammabile, incolore, inodore, insapore, inerte.
Peso molecolare (g/mol) : **40**
Punto di fusione : **- 189°C**
Temperatura critica: **- 122°C**
Solubilità in acqua (mg/l) : **61**
Non si autoaccende.
Può essere scaricato in atmosfera, evitare lo scarico in ambiente chiuso.
Densità relativa,gas (aria =1) : **1,38** (stratifica verso il basso).
Raccordo valvola: gruppo VIII – UNI 4412.

ROSETTI MARINO

PQR 01/18

Consumables certificate

CERTIFICATO DI COLLAUDO (3.1) - Analisi Chimica
ATTESTATO DI CONTROLLO (2.2) - Caratteristiche Meccaniche/
INSPECTION CERTIFICATE (3.1) - Chemical analysis
TEST REPORT (2.2) - Mechanical properties

Data/Date: 2017-12-21

Numero certificato/Cert no: EC24993815 rev. 0

Nostro ordine/Our order:	1823195	Vostro ordine/Your order:	1717002010-Z1AS
Nostro riferimento/Our ref:	Web user - Movex CMP020 ITB	Vostro riferimento/Your ref:	
Codice Cliente/Cust no:	ITB00060	Vostro numero fax/Your fax	
Data ordine Cliente/Your date:	20171213	Vostra e-mail/Your e-mail:	

Indirizzo di fatturazione/Invoice address	Destinatario del certificato/Cert receiver	Indirizzo di spedizione/Delivery address
ESAB SALDATURA SpA . VIA ROSA LUXEMBURG 49 20085 LOCATE DI TRIULZI (MI) 20085 ITALY Italy		ROSETTI MARINO SPA . VIA TRIESTE 230 48100 RAVENNA RA Italy

CONSEGNA/DELIVERY Numero di lotto/Lot no: PVR47054102 Quantità/Quantity: 20 KG

PRODOTTO/PRODUCT

Marchio/Brand:	ESAB
Descrizione/Desc:	OK Tigrod 12.60 2.4x1000mm 5kg
Codice/Item no:	**126024R150**

CLASSIFICAZIONE/CLASSIFICATIONS

EN ISO 636-A: W 38 3 W2Si
EN ISO 636-A: W2Si
SFA/AWS A5.18: ER70S-3

CARATTERISTICHE MECCANICHE/MECH PROPS

Valori tipici/Typical data: in accordo a/acc to EN 10204 - 2.2

Norma/Standard:	EN
Altro/Auxiliary:	I1
Condizione/Condition:	

TRAZIONE/TENSILE

ReL	Rm	A4-A5
420 MPa	515 MPa	26 %

RESILIENZA/IMPACT

Temp	-30 °C
KV	90 J

COMPOSIZIONE CHIMICA/ CHEMICAL COMPOSITION

Valori reali/Actual results: in accordo a/acc to EN 10204 - 3.1

Wire/strip

Altro/Auxiliary:

C		0.10%
Si		0.58%
Mn		1.03%
P		0.022%
S		0.024%
Cr		0.07%
Ni		0.03%
Mo		0.01%
Cu		0.09%
V	<	0.01%
Al		0%
Al	<	0.01%
Ti+Zr		0.01%

COMMENTI/COMMENTS

Materiale fornito in accordo al Sistema Qualità conforme alla norma EN ISO 9001.
Questo certificato è stampato elettronicamente ed è valido senza firma.
Per ogni chiarimento, rivolgersi a:

ESAB Saldatura Spa, Via Rosa Luxemburg 49, I-20085 Locate Triulzi (MI), +39 02 97968.1

Product supplied under a QA Programme fulfilling the EN ISO 9001 standard.
This certificate is produced electronically and is valid without signature.
Please refer any queries to: (see above)

Validazione - analisi chimica/Validation - Chemical Analysis		Validazione - altro/Validation - Others	
Josef Moravek	Quality Manager	Jose Abal Lopez	Product Manager

preliminary WPS

KCOI	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM PROCUREMENT, FABRICATION, LOAD-OUT AND TRANSPORTATION OF TOPSIDE FOR EP CLUSTER 4	PROPOSAL WPS FOR PQR QUALIFICATION

WPS CODE	ASME IX		WeldingSpc		KE01-00-000-KD-V-SS-0018-000-C02		
PQR ref.:	01/18 TBQ	WPS N°:	01/18	REV.:	2	Data /date	01/03/2018

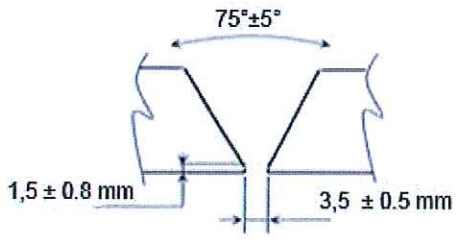
Procedimento di saldatura / Welding process: **GTAW** — Tipo / Type: **MANUAL**

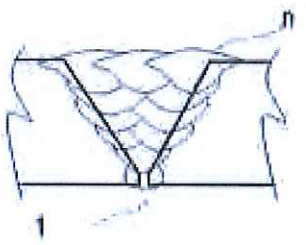
GIUNTO – JOINT (QW-402)

Tipo di giunto / Joint Design: **V** — Supporto / Backing: ☐ Si / Yes ☒ No

Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal. ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403)

Da / from P-N°: **1** — Group N°: **1** — A / to P-N°: **1** — Group N° **2**

A Tipo e grado / To type and grade: **API 5L Gr.B / API 5L X60**

- ► Materiale base / Base material: **5,9 mm (machined from 8,74) Range approved from 3 to 11,80 mm**
- ► Gamma diametri / Pipe dia. Range: **2"** **-**

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW		
Spec. N° (SFA)	A5.18		
AWS N° (CLASS)	ER70S-3		
F-N°	6		
A-N°	1		
Diametro mat. D'apporto / Size of filler metal	2,4		
Gamma spessori /Thick. Range	Up to 5,9mm		
Accoppiamento filo-flusso / Electrode-flux (CLASS)	NA		
Denom. Comm. Flusso / FLUX trade name	NA		
Inserto consumabile / Consumable insert	NA		
Altro / other	ROD: ESAB OK TIGROD 12.60		

POSIZIONI – POSITION (QW 405)

Joint: **CJP** — Posizione / position **5G** — Progressione / weld progression: **Uphill**

PRERISCALDO – PRE-HEAT (QW406)

Temp.preriscaldo minima / Min. pre-heat temp: **20 °C** — Max temp. Di interpass / Max interpass temp.: **250 °C** — Mantenimento interpass / Interpass maintenance: **N.A.** — Tempo di mantenimento prerisc. / Maintenance timing: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

N.A.

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port. / Flow rate
Protezione / Shielding:	Ar	99,998%	10-13 lt/min
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot. Al rovescio / Backing:	N.A.	N.A.	N.A.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW –409)

Corrente / Current: **DC** — Polarità / Polarity **SP**

Dia e tipo elettr. Tungsteno / Tungsten elctr. Size & type: **AWS 5.12 EWTh2 dia.2,4mm**

Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**

Velocità alimentazione filo / Electr. Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String 10mm** — Dimensione bocchello gas / Orifice of gas cup size: **3/8"** — Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura/Brushing**

Metodo di solcatura a rovescio / Method of back gouging: **N.A.** — Oscillazione / Oscillation: **N.A.** — Distanza tra zona di contatto e pezzo / Contact zone to work distance: **N.A.**

N°Passate / Passes nr.: **Multipla/Multiple** — Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single** — Martellatura / Peening: **N.A.**

Altro / Other: **K for TIG Heat Input is considered 0.6**

N° Passate Weld layers nr.	Processo Process	Materiale d'apporto Filler metal		Corrente Current		Voltaggio Volt	Vel. Avanzamento Travel speed (mm/min)	Apporto termico Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. Range			
1	GTAW	ER70S-3	2,4	SP	85-100	11-13	40-50	0,67-1,17
Hot pass	GTAW	ER70S-3	2,4	SP	100-120	12-14	50-70	0,62-1,21
Fill/Capping	GTAW	ER70S-3	2,4	SP	100-120	12-14	60-80	0,54-1,01

Approvato da / approved by:		
A.KHALIFA		

NDE certificate

ROSETTI MARINO	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 01-18 data: 06-03-2018

progetto project	EPC 4	cliente client	NCOC
ordine PO	/	commessa job	117A10
disegno dwg	/	ITP N°	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01
fase step	5.3.2		

SI CERTIFICA CHE :

gli item di seguito indicati sono stati sottoposti a controllo dimensionale ed accettati in accordo alla procedura / specifica sotto indicata ed ai criteri di accettabilita' in essa definiti.

WE CERTIFY THAT:

items below indicated have undergone a dimensional inspection and have been accepted according to the specific / procedure mentioned hereunder and to acceptance criteria defined in it.

oggetto – item

COUPON	STAMP	POS	THK	Ø	WPS	Date of examination
01/18 A	NC61	5G	5.9mm	2"	pWPS 01/18	06/03/2018
01/18 B	NC61	5G	5.9mm	2"	pWPS 01/18	06/03/2018
01/18 C	NC61	5G	5.9mm	2"	pWPS 01/18	06/03/2018
01/18 D	NC61	5G	5.9mm	2"	pWPS 01/18	06/03/2018
01/18 E	NC61	5G	5.9mm	2"	pWPS 01/18	06/03/2018
01/18 F	NC61	5G	5.9mm	2"	pWPS 01/18	06/03/2018

note - remarks

Acceptance criteria: ASME B31.3

Maximum distance of examination: 600 mm;

Viewing angle: ≥ 30° with the surface;

Light intensity: ≥ 1000 LUX

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

KE01-B7-000-8M-Q-PR-0008-000 Rev.A01

Operatore - Operator	Controllo Qualita' - Quality Control	Third party - Cliente - Client
CSWIP D.CENACCHI 305250 WI 3.1		RINA Services SpA D. Cenacchi

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 08/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 15	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KOCH MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. R01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 01-18 PQR 01-18A POS. 5G	/	2"	5,9	NC 61	0-1	/	A
					1-2	/	A
					2-0	A	A

Difetto *Defect*

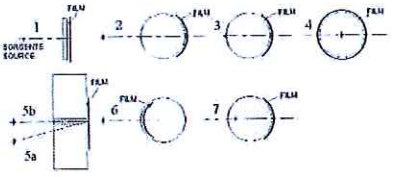
A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen Inclusion*
DF	Difetto film / *Film Defect*

Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03	**Schermi** *shield*	Pb 0,10 Pb 0,15	**Campo di densità** *Density range* 2÷4	**Pellicola** *Film type* KODAK C3
Tipo macchina Rγ Type machine Rγ Gammamat SE 75 matricola 916				

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75	**Tecnica Rx** *Rx Tecnique*	1 ☐	2 ☐	3 ☑	4 ☐	
					5 ☐	5b ☐	6 ☐	7 ☐	
Energia *Energy*	Ci 19	kV	mA						
Macchia focale *Focal spot*		3	mm						
Tempo d'esposizione *Exposure time*		Min	Sec 25						



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Stefano L... 3° Livello ...	ROSETTI MARINO SpA Welding Dept. D. Cenacchi 08/03/2018	Istituto Italiano della Saldatura Group IIS SERVICE S.r.l.	RINA SERVICES SpA D. ... 08/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 08/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 05	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOC MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. R01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 01-18	01-18 A	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA II° Livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO Welding Dept.	Istituto Italiano della Saldatura Group IIS SERVICE S.r.l.	RINA Services SpA 08/03/2018

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Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 08/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 16	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KCOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. R01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 01-18	/	2"	5,9	NC 61	0-1	DF	A
PQR 01-18B					1-2	/	A
POS. 5G					2-0	/	A

Difetto *Defect*

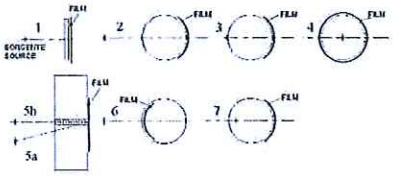
A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	**Schermi** *shield*	Pb 0,10 Pb 0,15	**Campo di densità** *Density range* 2÷4	**Pellicola** *Film type*	KODAK C3
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03					
Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916					

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75	**Tecnica Rx** *Rx Tecnique*	1 ☐	2 ☐	3 ☑	4 ☐
					5 ☐	5b ☐	6 ☐	7 ☐
Energia *Energy*	Ci 19	kV	mA					
Macchia focale *Focal spot*		3	mm					
Tempo d'esposizione *Exposure time*		Min	Sec 25					



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	**Dist. pezzo sorg. (D)** *Source piece distan*	**Dist. oggetto film (d)** *Film object distance*	**Penombra** *Unsharpness*		Visible Wire n° Requred Obtained	**Lastre n°** *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Stefano Zauli 3° Livello SNT-TC-1A / ISO 9712	ROSETTI MARINO SpA Welding Dept. D. Conacchi 08/03/2018	Istituto Italiano della Saldatura Group IIS SERVICE S.r.l. 08/03/18	RINA Services SpA D. Cinotti 08/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 08/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 06	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. R01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor

METODO / Method	☐ CONTINUO/Continuous	☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic	☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction		☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 01-18	01-18 B	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Insp.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO SpA Welding Dept.	IIS SERVICE S.r.l.	RINA Services SpA

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Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 22	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KCOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 01-18	/	2"	5,9	NC 61	0-1	/	A
PQR 01-18C					1-2	/	A
POS. 5G					2-0	/	A

Difetto *Defect*

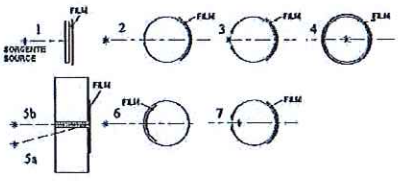
A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / *Worms*
B	Incl. di scoria o Allungata *Slag / Elongated Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / *Crack*
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03 **Tipo macchina Ry Type machine Ry** Gammamat SE 75 matricola 916	**Schermi** *shield*	Pb 0,10 Pb 0,15	**Campo di densità** *Density range* 2÷4	**Pellicola** *Film type* KODAK C3

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75	**Tecnica Rx** *Rx Tecnique*	1 ☐	2 ☐	3 ☑	4 ☐	
					5 ☐	5b ☐	6 ☐	7 ☐	
Energia *Energy*	Cl 19	kV	mA						
Macchia focale *Focal spot*		3	mm						
Tempo d'esposizione *Exposure time*		Min	Sec 25						



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Stefano Cantelli 3° Livello	ROSETTI MARINO SpA Welding Dept. D. Cenacchi	Istituto Italiano della Saldatura IIS SERVICE S.r.l.	RINA Services SpA D. Cenacchi 09/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 08	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOM MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 01-18	01-18 C	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO SpA Welding Dept. D. Cenacchi	Istituto Italiano della Saldatura IIS SERVICE S.r.l.	RINA Services S.p.A. D. Cenacchi 09/03/2018

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Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 23	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTIMARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KCOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 01-18 PQR 01-18D POS. 5G	/	2"	5,9	NC 61	0-1	DF	A
					1-2	DF	A
					2-0	DF	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen Inclusion*
DF	Difetto film / *Film Defect*

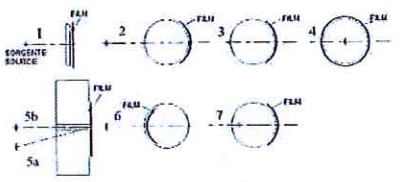
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	Schermi *shield*	Campo di densità *Density range*	Pellicola *Film type*
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03 Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916	Pb 0,10 Pb 0,15	2÷4	KODAK C3

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*	3	mm	
Tempo d'esposizione *Exposure time*	Min	Sec 25	

Tecnica Rx *Rx Tecnique*				
1 ☐	2 ☐	3 ☑	4 ☐	
5 ☐	5b ☐	6 ☐	7 ☐	



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Stefano Zauli 3° Livello SNT TC - 1A / ISO 9712	ROSETTI MARINO SpA Welding Dept. D. Cenacchi	Istituto Italiano della Saldatura Group IIS SERVICE S.r.l.	RINA Services SpA D. Cinotti 09/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 09	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint LOTTO/BACH		☑ NDT WBL5	☐ CGM VECOPLAST

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 01-18	01-18 D	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO SpA Welding Dept. D. Ceracchi	IIS SERVICE 09/03/2018	RINA Services SpA 09/03/2018

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Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 24	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KOC MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 01-18 PQR 01-18E POS. 5G	/	2"	5,9	NC 61	0-1	DF	A
					1-2	/	A
					2-0	/	A

Difetto *Defect*

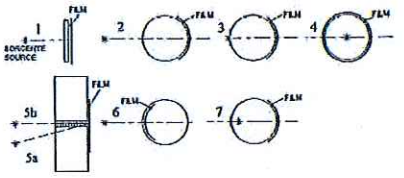
A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Incl. di scoria o Allungata *Slag / Elongated Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen Inclusion*
DF	Difetto film / *Film Defect*

Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03	**Schermi** *shield*	Pb 0,10 Pb 0,15	**Campo di densità** *Density range* 2÷4	**Pellicola** *Film type* KODAK C3
Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916				

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75	**Tecnica Rx** *Rx Tecnique*	1 ☐	2 ☐	3 ☑	4 ☐	**Penetrametro** *I.Q.I*	☐ ASTM ☑ EN
					5 ☐	5b ☐	6 ☐	7 ☐		☑ Lato film *film side* ☐ Lato sorgente *Source side*
Energia *Energy*	Ci 19	kV	mA						**Esposizione** *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Macchia focale *Focal spot*		3	mm						**Tecnica di sviluppo** *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*
Tempo d'esposizione *Exposure time*		Min	Sec 25							



Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Stefano Zaun 3° Livello SNT-TC - 1A / ISO 9712	ROSETTI MARINO SPA Welding Dept. D. Generoli	IIS SERVICE S.r.l.	RINA Services SpA D. Cinotti 09/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 10	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOM MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 01-18	01-18 E	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Insp.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO SpA Welding Dept D. Cenacchi	SERVICE PSC S.R.L.	RINA Services SpA D. Cenacchi 09/03/2018

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Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 25	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC ENI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 01-18 PQR 01-18F POS. 5G	/	2"	5,9	NC 61	0-1	DF	A
					1-2	/	A
					2-0	/	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

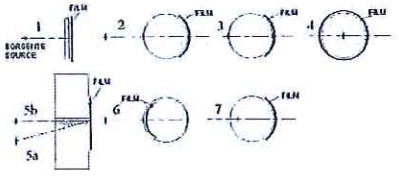
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	**Schermi** *shield*	Pb 0,10 Pb 0,15	**Campo di densità** *Density range* 2÷4	**Pellicola** *Film type* KODAK C3
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03 **Tipo macchina Ry Type machine Ry** Gammamat SE 75 matricola 916				

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*		3	mm
Tempo d'esposizione *Exposure time*		Min	Sec 25

Tecnica Rx *Rx Tecnique*	1 ☐	2 ☐	3 ☑	4 ☐
	5 ☐	5b ☐	6 ☐	7 ☐



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	**Dist. pezzo sorg. (D)** *Source piece distan*	**Dist. oggetto film (d)** *Film object distance*	**Penombra** *Unsharpness*		Visible Wire n° Requred Obtained	**Lastre n°** *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Stefano Zauli 3° Livello SNT-TC-1A / ISO 9712	ROSETTI MARINO SpA Welding Dept. D. Cenacchi	Società Italiana Saldatura Group IIS SERVICE S.r.l.	RINA Services S.p.A. 09/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 11	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOJ MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 01-18	01-18 F	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Rep.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO SpA Welding Dept. D. Conacelli	IIS SERVICE	RINA Services S.p.A. 09/03/2018

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Report NDT MT 03 Rev.1

ROSETTI MARINO

PQR 01/18

Mechanical test report

Element Materials Technology Milan S.r.l.
Via della Pierina 9/11
26013 Crema (CR)
Italy

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info.milan@element.com
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TEST REPORT

Client
Cod. 1737

ROSETTI MARINO S.P.A
VIA TRIESTE, 230
48100 RAVENNA (RA)
Italia

	Your ref. :	Document :	Ddt n. 000063	Date:	08/03/2018
	Our ref. :	Report :	RPR308-1E1R0A18	Date:	04/04/2018
		Job :	ADC308-1E1R0A18	Date:	09/03/2018

Remarks: PQR 01/18
DIAMETER : 2'' - WALL THICKNESS : 5.9mm
CLIENT : NCOC

Project: EPC4

Doc. reference: KE01-00-000-KD-V-SS-0018-000 Rev.C02 + ASME B31.3 / ASME IX ed.2017

Test standard: ASTM E340-15 - ANSI/NACE MR0175/ISO 15156-2:2015 - UNI EN ISO 6507-1:2006 - ASTM E190-14 - ASTM E23-16b - ASTM E8/E8M-16a

This Report (RPR) contains tests results on the following materials

Ref:	Identification	Material	Dn (mm)	Thk (mm)	Remarks
973A18	PQR 01/18	Side A : API 5L X60 Side B : API 5L Gr.B			

Report signatories and approval

☐ Third party	☐ Third party	☐ Third party	Client
☐ Witness	☐ Witness	☐ Witness	

Digitally signed by Cantoni Luca
Element Materials Technology Milan S.r.l.

Issue approved

ROSETTI MARINO SpA
Welding Dept.
D.Cenacchi

RINA Services SpA
☑W ☐R
D. Cimatti
06/04/2018

IIS SERVICE S.R.L.
dell'Istituto Italiano della Saldatura
Ispettore Incaricato
Matteo Carrubba
05 APR 2018

General conditions:
1. The Customer accepts general conditions and prices fixed by the laboratory to perform the tests.
2. Test results will be communicated only by means of test report except for different contractual agreement.
3. Tests sample will be destroyed 30 days after test except for different written Client request.
4. The spare will be destroyed 90 days after date of receipt for different written Client request.
5. The test results described in the following test report are referring only to the sample mentioned in it.
6. The date of material receivement is the same as the date of job opening. The date of testing is the same as the date of test report, except for different info.
7. The laboratory has examined the material sampled an supplied by the Client in compliance with standard request.
8. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.
9. Unless otherwise agreed, sales terms and conditions (MOD20-1E1R0) will be apply.

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element.com

TEST REPORT

Test	Page	Technician
Macrographic examination	Pag. 3..5	**Cristian Piloni**
Bend test	Pag. 6	**Luigi Vailati**
Hardness test	Pag. 7..9	**Cristian Piloni**
Charpy impact test	Pag. 10	**Nicolas Vailati**
Tensile test	Pag. 11..12	**Luigi Vailati**

ROSETTI MARINO SpA
Welding Dept.
D. Cenacchi

RINA Services SpA
☑W ☐R
D. Cimatti
04/04/2018

Technician signatories

Digitally signed by Cristian Piloni
Element Materials Technology Milan S.r.l.

Digitally signed by Luigi Vailati
Element Materials Technology Milan S.r.l.

Digitally signed by Nicolas Vailati
Element Materials Technology Milan S.r.l.

IIS SERVICE S.R.L.
dell'Istituto Italiano della Saldatura
Ispettore Incaricato
Matteo Carrubba
05 APR 2018

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info.milan@element.com
element.com

TEST REPORT

MACROGRAPHIC EXAMINATION

General Info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 MC 1
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h12
Test standard	ASTM E340-15

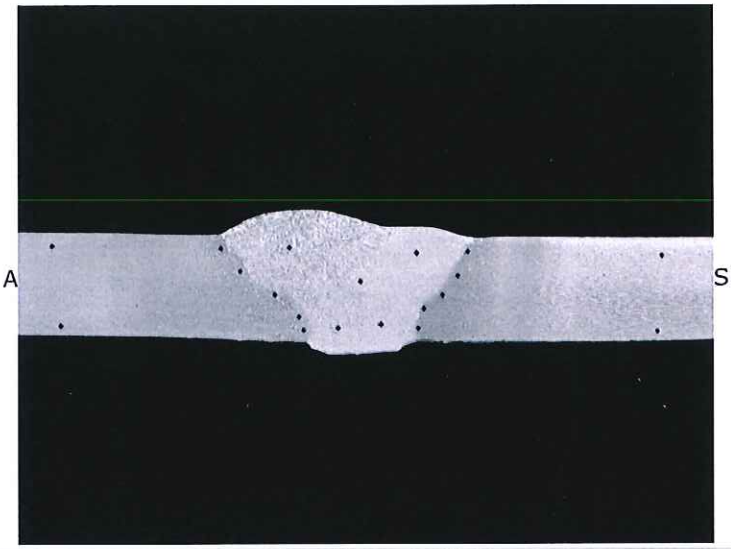
Equipments

(Inv.N°1961) PHOTOCAMERA

Test properties

Etching	Ammonium Persulfate

Side A



Side B

Magnification: ~2.5X

Result

Test specimen has been examined at low magnification (10x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

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Welding Dept.
D. Ceppacchi

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TEST REPORT

MACROGRAPHIC EXAMINATION

General info

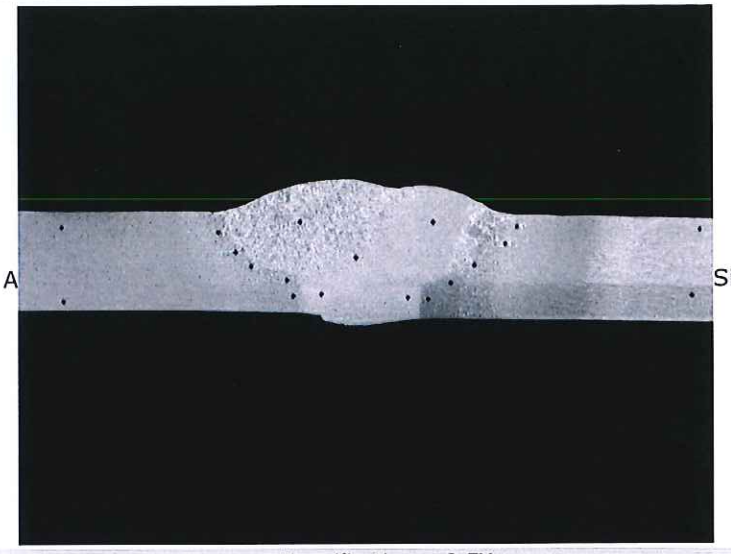
Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 MC 2
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h3
Test standard	ASTM E340-15

Equipments

(Inv.N°1961) PHOTOCAMERA

Test properties

Etching	Ammonium Persulfate

Side A  Side B

Magnification: ~2.5X

Result

Test specimen has been examined at low magnification (10x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

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TEST REPORT

MACROGRAPHIC EXAMINATION

General Info

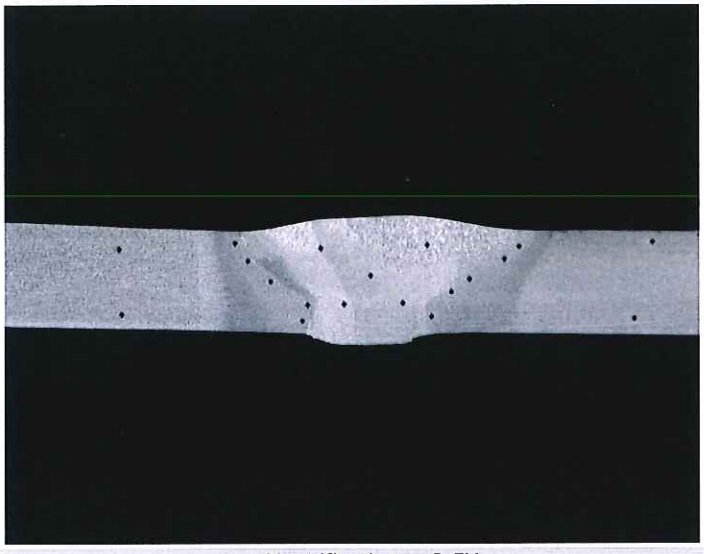
Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 MC 3
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h6
Test standard	ASTM E340-15

Equipments

(Inv.N°1961) PHOTOCAMERA

Test properties

Etching	Ammonium Persulfate



Magnification: ~2.5X

Result

Test specimen has been examined at low magnification (10x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

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TEST REPORT

BEND TEST

General info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Test standard	ASTM E190-14

Equipments

(Inv.N°1102) CALIPER - (Inv.N°1123) BEND MACHINE

Test parameters

Jig (mm)	25
Rollers distance (mm)	41
Angle (°)	180
Method	FORMER

Results

Ref.Lab.	T (°C)	Type	Position	Dimensions (mm)	L0 (mm)	Elongation (%)	Results
973 PI 1	20	TFBB (Transverse face bend)	T Face Bend h2	20.03 x 5.93			No defect
973 PI 2	20	TRBB (Transverse root bend)	T Root Bend h4	20.01 x 5.94			No defect
973 PI 3	20	TFBB (Transverse face bend)	T Face Bend h8	20.01 x 5.96			No defect
973 PI 4	20	TRBB (Transverse root bend)	T Root Bend h10	20.02 x 5.97			No defect

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TEST REPORT

HARDNESS TEST

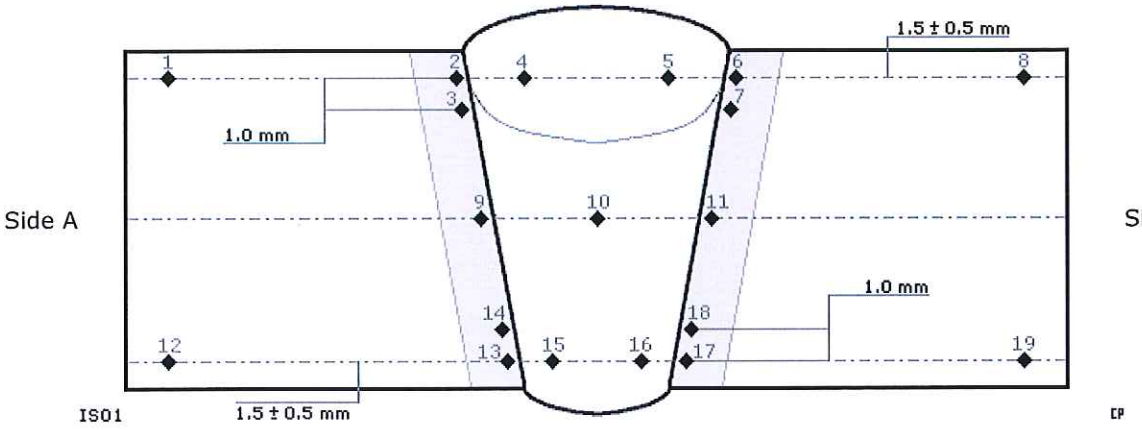
General info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 MC 1
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h12
Test standard	ANSI/NACE MR0175/ISO 15156-2:2015 + UNI EN ISO 6507-1:2006

Equipments

(Inv.N°9) HARDNESS TESTING MACHINE

Results



Cap		½ thk		Root	
N°	Value HV10	N°	Value HV10	N°	Value HV10
1	**179.0**	9	**187.0**	12	**155.0**
2	**174.0**	10	**181.0**	13	**185.0**
3	**169.0**	11	**174.0**	14	**187.0**
4	**158.0**			15	**146.0**
5	**155.0**			16	**144.0**
6	**159.0**			17	**152.0**
7	**179.0**			18	**160.0**
8	**167.0**			19	**153.0**

Min	144.0
Max	187.0

Required: : ≤248 HV10

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TEST REPORT

HARDNESS TEST

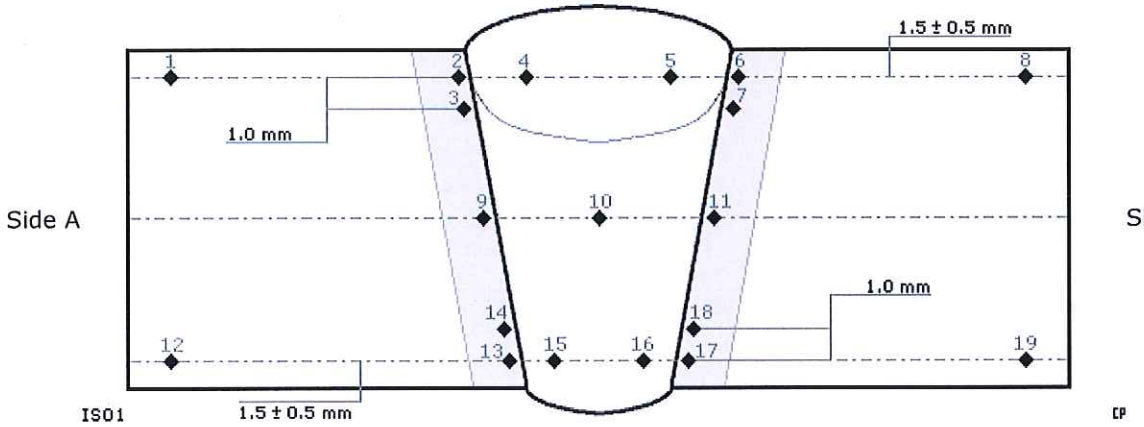
General info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 MC 2
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h3
Test standard	ANSI/NACE MR0175/ISO 15156-2:2015 + UNI EN ISO 6507-1:2006

Equipments

(Inv.N°9) HARDNESS TESTING MACHINE

Results



Cap

N°	Value HV10
1	**184.0**
2	**190.0**
3	**188.0**
4	**185.0**
5	**169.0**
6	**156.0**
7	**197.0**
8	**196.0**

½ thk

N°	Value HV10
9	**180.0**
10	**165.0**
11	**151.0**

Root

N°	Value HV10
12	**194.0**
13	**168.0**
14	**165.0**
15	**154.0**
16	**156.0**
17	**170.0**
18	**175.0**
19	**166.0**

Min	151.0
Max	197.0

Required: : ≤248 HV10

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TEST REPORT

HARDNESS TEST

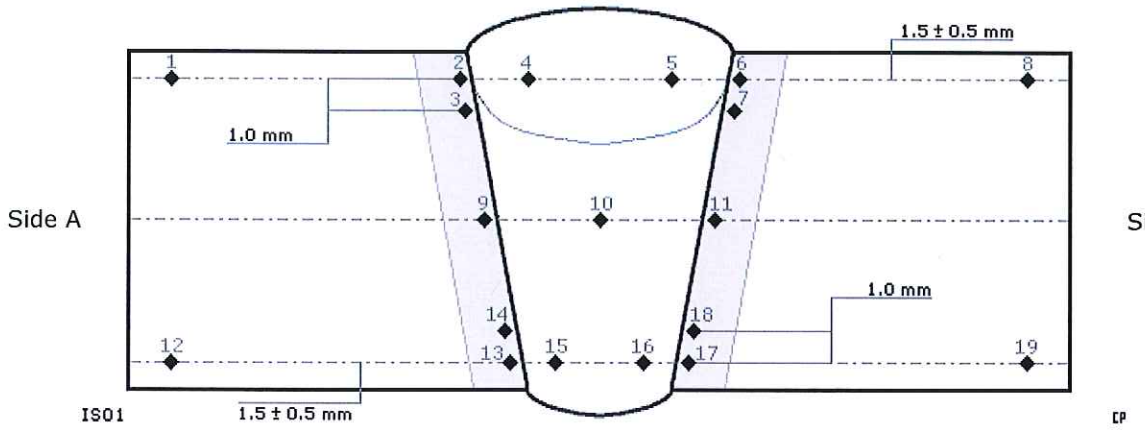
General Info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 MC 3
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h6
Test standard	ANSI/NACE MR0175/ISO 15156-2:2015 + UNI EN ISO 6507-1:2006

Equipments

(Inv.N°9) HARDNESS TESTING MACHINE

Results



Cap		½ thk		Root	
N°	Value HV10	N°	Value HV10	N°	Value HV10
1	**156.0**	9	**173.0**	12	**158.0**
2	**159.0**	10	**154.0**	13	**162.0**
3	**161.0**	11	**163.0**	14	**168.0**
4	**164.0**			15	**148.0**
5	**167.0**			16	**147.0**
6	**169.0**			17	**171.0**
7	**172.0**			18	**167.0**
8	**180.0**			19	**163.0**

Min	147.0
Max	180.0

Required: : ≤248 HV10

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TEST REPORT

CHARPY IMPACT TEST

General info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Test standard	ASTM E23-16b

Equipments

(Inv.N°1102) CALIPER - (Inv.N°1156) CHARPY IMPACT 450 - (Inv.N°1806) CRYOSTAT

Specimen informations

Notch: KV8

Test parameters

Nominal energy of test machine (J): 450

Results

Lab Id.	T (°C)	Position	Dimensions (mm)	A		B		C		Average	
				Value (J)	L.exp (mm)	Value (J)	L.exp (mm)	Value (J)	L.exp (mm)	Value (J)	L.exp (mm)
973 RE 1	-57.1	T WM h10-11	10.0 x 3.33	55	1.69	44	1.47	52	1.79	50	1.65
973 RE 2	-57.1	T FL (A) h1-2	10.0 x 3.33	57	1.73	30	1.31	46	1.68	44	1.57
973 RE 3	-57.1	T FL (B) h10-11	10.0 x 3.33	33	1.31	34	1.39	7	1.83	25	1.51
973 RE 4	-57.1	T FL (A)+2 h1-2	10.0 x 3.33	21	1.13	29	1.32	21	1.02	24	1.16
973 RE 5	-57.1	T FL (B)+2 h10-11	10.0 x 3.33	58	1.71	61	1.75	53	1.70	57	1.72

Note

Value required for API 5L X60 dimensions 10 x 10 : Minimum 16 J , Average 20 J ,
for dimensions 10 x 3,33 : Minimum 5 J , Average 7 J
Value required for API 5l Gr.B dimensions 10 x 10 : Minimum 14 J , Average 18 J ,
for dimensions 10 x 3,33 : Minimum 4 J , Average 5 J
Test temperature :
for full size specimen -46° ;
for subsize specimen reduced in compliance with ASME B31.3:2016 table 323.3.4

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TEST REPORT

TENSILE TEST

General info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 TR 1
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h12
Test standard	ASTM E8/E8M-16a

Equipments

(Inv.N°1102) CALIPER - (Inv.N°1153) UNIVERSAL MACHINE QUASAR 600 - (Inv.N°1161) EXTENSOMETER

Specimen informations

Type	Prismatic
Width (mm)	19.03
Thickness (mm)	5.03
Section (mm²)	95.72

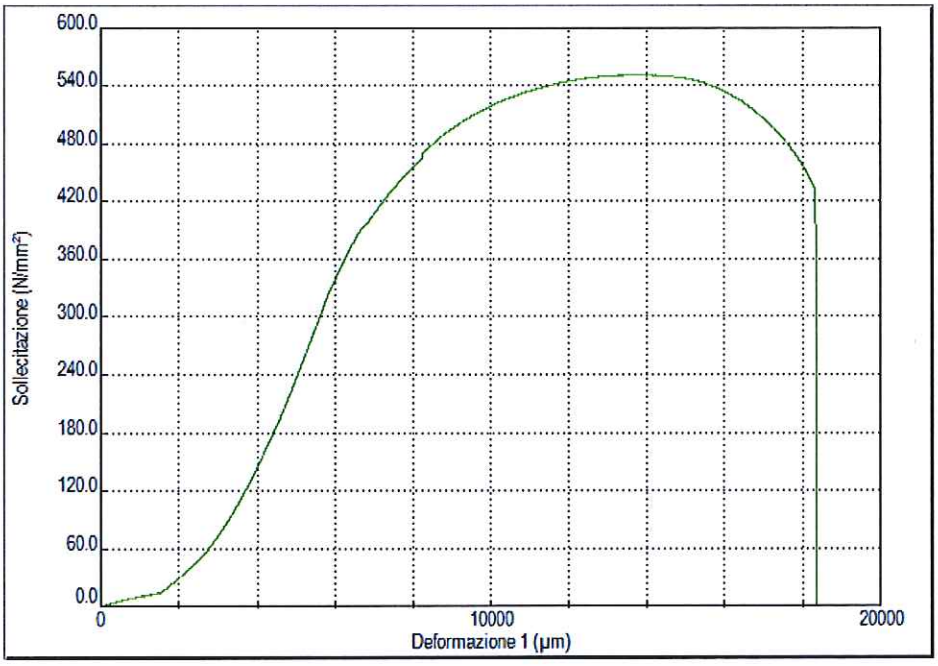
Test parameters

Temperature (°C)	20.0

Results		**Required**
Rp0.2% (N/mm²)	420.0	≥241
Rm (N/mm²)	551.0	≥413

Note

Broken out of weld (Side B)
Rp% determined by offset method - A% = determined after fracture - Values rounded to the nearest.
Speed of testing: method A - during yielding: 8 MPa/sec - after yielding: 0.25mm/mm/min



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TEST REPORT

TENSILE TEST

General Info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	973A18
Client reference	PQR 01/18
Identification of specimen (Lab)	973 TR 2
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h6
Test standard	ASTM E8/E8M-16a

Equipments

(Inv.N°1102) CALIPER - (Inv.N°1153) UNIVERSAL MACHINE QUASAR 600 - (Inv.N°1161) EXTENSOMETER

Specimen informations

Type	Prismatic
Width (mm)	19.02
Thickness (mm)	5.13
Section (mm²)	97.57

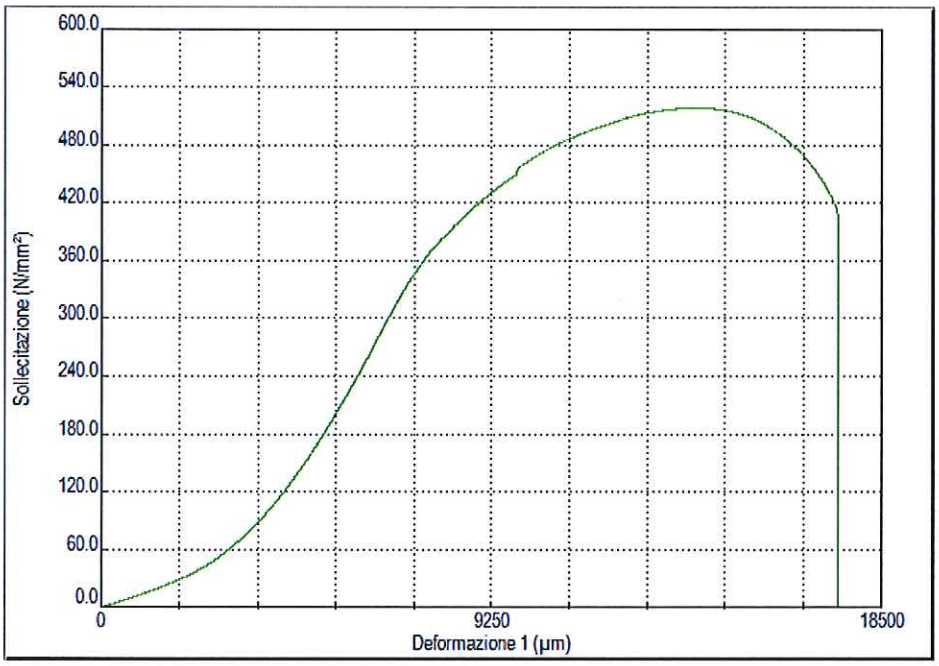
Test parameters

Temperature (°C)	20.0

Results		**Required**
Rp0.2% (N/mm²)	416.0	≥241
Rm (N/mm²)	519.0	≥413

Note

Broken out of weld (Side B)
Rp% determined by offset method - A% = determined after fracture - Values rounded to the nearest.
Speed of testing: method A - during yielding: 8 MPa/sec - after yielding: 0.25mm/mm/min



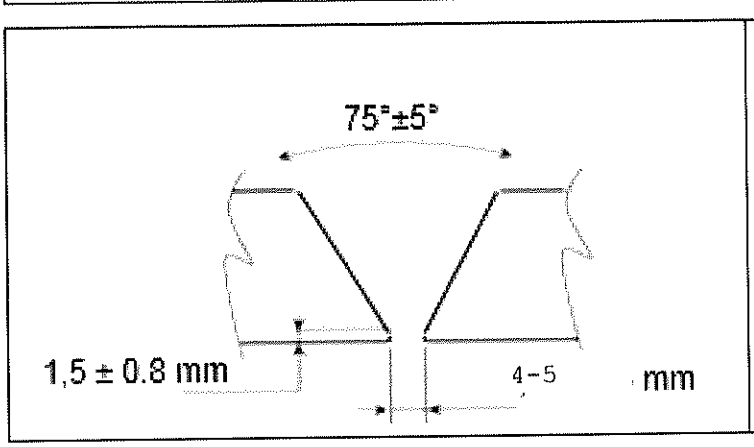
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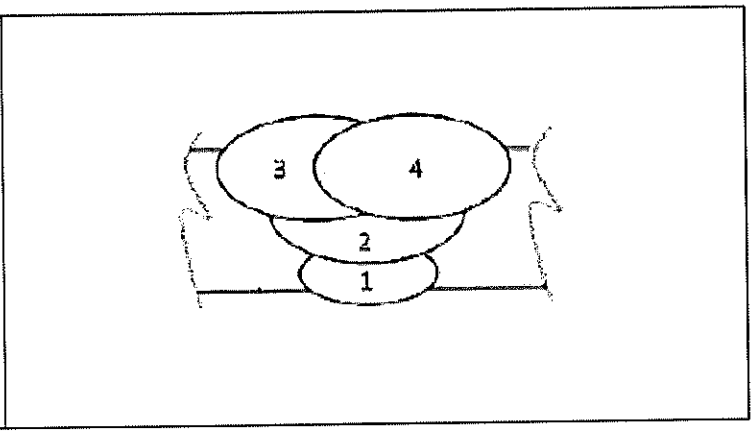
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ROSETTI MARINO	PQR N°	02/18 Rev. 1
PROCEDURE QUALIFICATION RECORD	Sheet: 1	Of: 2
	Prepared by: MDP	Date: 04/04/2018

MANUFACTURER	ROSETTI MARINO SPA		
WPS N°	*02/18 Rev. 2*	DATE:	*01/03/2018*
WELDING PROCESS(ES):	*GTAW – SMAW*		
TYPES:	*MANUAL*		





BASE METAL		
Material Specification:	*API 5L to API 5L*	
Type or grade:	*Gr. B to X60*	
P.Number. Group N.	*P-no. 1 Gr. Nr. 1 to P-no. 1 Gr. Nr. 2*	
Thickness of Test Coupon:	*5,9 mm (machined from w. thk. 8,74 Gr. B, from 11,1 X60)*	
Diameter of Test Coupon:	*2" (60,3 mm)*	
Other:	*Heat No. 40238 (Gr. B)* *Heat No. 112855 (X60)*	
FILLER METALS	*GTAW*	*SMAW*
SFA Specification	*A 5.18*	*A5.1*
AWS Classification	*ER70S-3*	*E7018-1H4R*
Filler Metal F-No	*6*	*4*
Weld Metal Analysis A-No.	*1*	*1*
Size of Filler Metal (mm)	*2,4*	*2,5*
Deposited Weld Metal:	*2,5 mm*	*3,4 mm*
Filler metal make:	*ESAB OK TIGROD 12.60 (GTAW);* *OERLIKON TENAX 35S DRY (SMAW)*	
Other:	**Rod lot No. PVR47054102** **Electrode lot No. 347161003 (ø 2,5 mm)**	

POSITION	
Position of Groove	*5G*
Weld progression (Uphill, Downhill)	*Uphill*
Other	*/*

PREHEAT	
Preheat temperature:	*20° C*
Interpass temperature:	*250°C*
Other	*-*

POSTWELD HEAT TREATMENT	
Temperature:	*/*
Time:	*/*
Other	*/*

GAS	Percent composition		
	Gas(es)	*(Mixture)*	*Flow rate*
Shielding	*Ar*	*99,999*	*12 lt/1"*
Shielding	*N.A.*	*N.A.*	*N.A.*
Backing (*)	*None*	*-*	*-*

ELECTRICAL CHARACTERISTICS			
Current	*DC*		
Polarity	*SP (GTAW) ; RP (SMAW)*		
Amps.	*88-99 A (GTAW);* *64-78 A (SMAW)*	*Volts*	*11-13 V (GTAW);* *21-23 V (SMAW)*
Tungsten Electrode Size	*2,4 mm*		
Other:	***Heat input:***	***0,82-1,03 kJ/mm (GTAW) ;*** ***0,77-0,90 kJ/mm (SMAW)***	

TECHNIQUE	
Travel speed	*40-50 mm/min (GTAW);* *65-95 mm/min (SMAW))*
String or Weave Bead	*STRING (Max 10mm – GTAW, Max. 8 mm SMAW)*
Oscillation	*N.A.*
Multipass or single pass (per side)	*Single (GTAW))* *MULTIPASS (SMAW)*
Single or multiple electrodes	*Single (each process)*
Other	***Heat input calculation with coefficient 0,6 for GTAW, 0,8 for SMAW***

ROSETTI MARINO	PQR N°	02/18 Rev. 1
PROCEDURE QUALIFICATION RECORD	Sheet: 2	Of: 2
	Prepared by: MDP	Date: 04/04/2018

SPECIMEN No.	WIDTH (mm)	THICKNESS (mm)	AREA (mm^2)	Rp0,2% N/mm2	ULTIMATE UNIT STRESS N/mm2	TYPE OF FAILURE & LOCATION
Transverse 1,+20°C	*19.01*	*5.11*	*97.14*	*384.0*	*541.0*	*Ductile, broken out of weld (side API 5L Gr. B)*
Transverse 2,+20°C	*19.02*	*5.02*	*95.48*	*377.0*	*508.0*	*Ductile, broken out of weld (side API 5L Gr. B)*

TOUGHNESS TESTS

		NOTCH LOCATION	NOTCH TYPE	SPECIMEN SIZE (mm)	TEST TEMP. (°C)	IMPACT VALUES									DROP WEIGHT	
						JOULES				% SHEAR	MILS	LATERAL EXP.			BREAK	No. BREAK
						singles			Av.							
	h10-11	*WM*	*KV8*	*3,33x10*	*-57,1*	*50*	*45*	*23*	*39*	*-*	*-*	*1.63*	*1.59*	*1.10*	*-*	*-*
	h1-2	*FL side X60*	*KV8*	*3,33x10*	*-57,1*	*37*	*48*	*43*	*43*	*-*	*-*	*1.31*	*1.44*	*1.31*	*-*	*-*
	h10-11	*FL side Gr. B*	*KV8*	*3,33x10*	*-57,1*	*28*	*43*	*61*	*44*	*-*	*-*	*1.27*	*1.40*	*1.73*	*-*	*-*
	h1-12	*FL+2 side X60*	*KV8*	*3,33x10*	*-57,1*	*28*	*54*	*31*	*38*	*-*	*-*	*1.25*	*1.38*	*1.33*	*-*	*-*
	h10-11	*FL+2 side Gr. B*	*KV8*	*3,33x10*	*-57,1*	*22*	*65*	*10*	*32*	*-*	*-*	*1.16*	*1.77*	*0.98*	*-*	*-*

GUIDED BEND TEST

TYPE & FIGURE No.	RESULT
No. 2 transverse face bend test	*Satisfactory*
No. 2 transverse root bend test	*Satisfactory*

FILLET WELD

Result - Satisfactory	Yes. *N.A.*	No *N.A.*	Penetration into Parent Metal;	Yes *N.A.* No. *N.A.*
Macro – Results	*N.A.*			

OTHER TESTS

Type of test	*VISUAL EXAMINATION:*	*Satisfactory, see report VDR 02/18*
	MT EXAMINATION	*Satisfactory, see report MT12-18047, 13-18047, 14-18047, 15-18047, 16-18047, 16-18047*
	MACROGRAPHIC EXAMINATION	*3 Sections, Satisfactory (h12, h3, h6)*
	RADIOGRAPHIC EXAMINATION	*Satisfactory, see report RT26-18047, 27-18047, 34-18047, 35-18047, 36-18047, 37-18047*
	Hardness HV 10	*Satisfactory ,see report RPR323-1E1R0A18 of 04th-042018 (max 195 HV10)*

Welder's Name	*Portas Maurizio (Coupon A, B, D, F) ; Serinelli Antonio (Coupon C); Greco Alessandro (Coupon E)*	*Clock No.*		*Stamp No.*	*NC61; AX83; NC535*
Test conducted by	*Element Materials Technology Milan S.r.l.*	*Test Report No. RPR323-1E1R0A18 of 04th-042018*			

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 ASME IX Ed. 2017, ASME B31.3:2016 & KE01-00-000-KD-V-SS-0018-000 Rev. C02

Date: *04th/04/2018*

Manufacturer:

By: ROSETTI MARINO SpA Welding Dept. D. Cenacchi

RINA F. Lago RINA Services S.p.A.

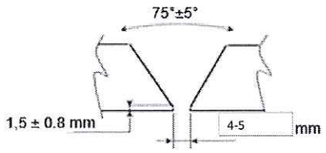
AS-RUN PARAMETER SHEET

pWPS 02/18			
PQR 02/18			
Coupon Nr. 02/18A			
Date:	Start 07-03-2018 Finish 07-03-2018	Page:	1_ of _1

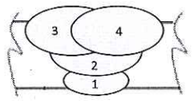
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW - SMAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,5	347161003	OERLIKON TENAX 35S DRY
Cap	2,5	347161003	OERLIKON TENAX 35S DRY

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:	No of Passes:	Multiple or Single Electrodes:
10 mm	STRING	MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required	Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA	NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	93	97	95	11	13	12,0	N.A.	N.A.	5,0	0,82	0,60	25	- Manual monitoring
NC61	2	SMAW	2	=	E7018-1H4R	2,5	DC-RP	66	72	69	21	23	22,0	N.A.	N.A.	8,5	0,86	0,80	100	Root pass deposit: 3 mm
NC61	3	SMAW	3	=	E7018-1H4R	2,5	DC-RP	67	78	72,5	21	23	22,0	N.A.	N.A.	8,5	0,90	0,80	250	
NC61	3	SMAW	4	=	E7018-1H4R	2,5	DC-RP	67	78	72,5	21	23	22,0	N.A.	N.A.	9,0	0,85	0,80	210	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name: Iscari IIS	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D. Cenacchi	Signature:	Signature: RINA Services SpA D. Cinatti	Signature:
Date: 07/03/18	Date: 08/03/2018	Date: 07/03/2018	Date:

KCOI ROSETTI MARINO

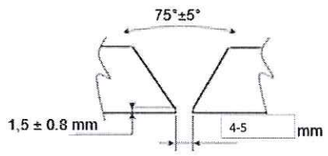
AS-RUN PARAMETER SHEET

pWPS 02/18	
PQR 02/18	
Coupon Nr. 02/18B	
Date:	Start 07-03-2018 Finish 07-03-2018
Page:	1_ of _1

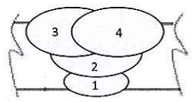
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW - SMAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,5	347161003	OERLIKON TENAX 35S DRY
Cap	2,5	347161003	OERLIKON TENAX 35S DRY

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	93	97	95	11	13	12,0	N.A.	N.A.	4,5	0,91	0,60	25	- Manual monitoring
NC61	2	SMAW	2	=	E7018-1H4R	2,5	DC-RP	65	72	68,5	21	23	22,0	N.A.	N.A.	6,5	0,83	0,60	100	Root pass deposit: 3 mm
NC61	3	SMAW	3	=	E7018-1H4R	2,5	DC-RP	70	75	72,5	21	23	22,0	N.A.	N.A.	7,5	0,77	0,60	250	
NC61	3	SMAW	4	=	E7018-1H4R	2,5	DC-RP	70	75	72,5	21	23	22,0	N.A.	N.A.	7,5	0,77	0,60	210	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D. Canacchi	Signature: ISTERIIS SERVICE S.r.l.	Signature: RINA Services SpA D. Cimarelli	Signature:
Date: 07/03/18	Date: 08/03/2018	Date: 07/03/2018	Date:

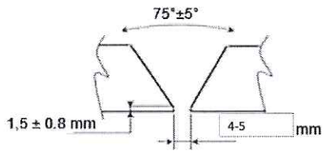
AS-RUN PARAMETER SHEET

pWPS 02/18	
PQR 02/18	
Coupon Nr. 02/18C	
Date:	Start 07-03-2018 Finish 07-03-2018 — Page: 1_ of _1

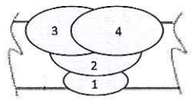
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Serinelli Antonio	Welder Id No(s):	AX83		
Welding Process(es):	GTAW - SMAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,5	347161003	OERLIKON TENAX 35S DRY
Cap	2,5	347161003	OERLIKON TENAX 35S DRY

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
AX83	1	GTAW	1	=	ER70S-3	2,4	DC-SP	92	99	95,5	11	13	12,0	N.A.	N.A.	4,0	1,03	0,60	25	- Manual monitoring
AX83	2	SMAW	2	=	E7018-1H4R	2,5	DC-RP	64	72	68	21	23	22,0	N.A.	N.A.	8,0	0,90	0,80	130	Root pass deposit: 3 mm
AX83	3	SMAW	3	=	E7018-1H4R	2,5	DC-RP	68	77	72,5	21	23	22,0	N.A.	N.A.	8,5	0,90	0,80	250	
AX83	3	SMAW	4	=	E7018-1H4R	2,5	DC-RP	68	77	72,5	21	23	22,0	N.A.	N.A.	9,0	0,85	0,80	200	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA D. Cenacchi	Signature: IGEC-TIIS SERVICE S.r.l.	Signature: RINA Services SpA D. Cenacchi	Signature:
Date: 07/03/18	Date: 08/03/18	Date: 07/03/2018	Date:

KCOI ROSETTI MARINO

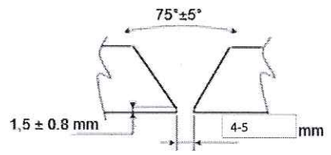
AS-RUN PARAMETER SHEET

pWPS 02/18	
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Coupon Nr. 02/18D	
Date:	Start 07-03-2018 Finish 07-03-2018
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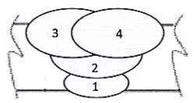
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW - SMAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,5	347161003	OERLIKON TENAX 35S DRY
Cap	2,5	347161003	OERLIKON TENAX 35S DRY

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:	No of Passes:	Multiple or Single Electrodes:
10 mm	STRING	MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required	Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA	NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL AWS Spec.	FILLER METAL Dia. mm	Electrode Polarity	Current Amperage Range Min	Current Amperage Range Max	Current Amperage Range Av.	Voltage Range Min	Voltage Range Max	Voltage Range Av.	Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	93	98	95,5	11	13	12,0	N.A.	N.A.	5,0	0,83	0,60	25	- Manual monitoring
NC61	2	SMAW	2	=	E7018-1H4R	2,5	DC-RP	67	74	70,5	21	23	22,0	N.A.	N.A.	8,5	0,88	0,80	100	Root pass deposit: 3 mm
NC61	3	SMAW	3	=	E7018-1H4R	2,5	DC-RP	68	76	72	21	23	22,0	N.A.	N.A.	8,5	0,89	0,80	250	
NC61	3	SMAW	4	=	E7018-1H4R	2,5	DC-RP	68	76	72	21	23	22,0	N.A.	N.A.	9,0	0,84	0,80	210	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name: ISCER	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D. Cenacchi	Signature: IIS SERVICE S.r.l.	Signature: RINA Services SpA D. Ciriatti	Signature:
Date: 07/02/18	Date: 08/03/2018	Date: 07/03/2018	Date:

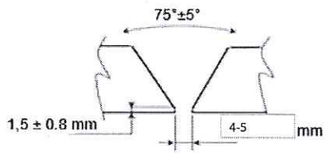
AS-RUN PARAMETER SHEET

pWPS 02/18			
PQR 02/18			
Coupon Nr. 02/18E			
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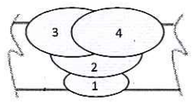
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Greco Alessandro	Welder Id No(s):	NC535		
Welding Process(es):	GTAW - SMAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,5	347161003	OERLIKON TENAX 35S DRY
Cap	2,5	347161003	OERLIKON TENAX 35S DRY

GAS:	
Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:		No of Passes:	Multiple or Single Electrodes:
10 mm	STRING		MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required		Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA		NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC535	1	GTAW	1	=	ER70S-3	2,4	DC-SP	88	94	91	11	13	12,0	N.A.	N.A.	4,5	0,87	0,60	25	- Manual monitoring
NC535	2	SMAW	2	=	E7018-1H4R	2,5	DC-RP	65	71	68	21	23	22,0	N.A.	N.A.	8,0	0,90	0,80	120	Root pass deposit: 3 mm
NC535	3	SMAW	3	=	E7018-1H4R	2,5	DC-RP	67	76	71,5	21	23	22,0	N.A.	N.A.	8,5	0,89	0,80	250	
NC535	3	SMAW	4	=	E7018-1H4R	2,5	DC-RP	68	76	72	21	23	22,0	N.A.	N.A.	9,0	0,84	0,80	210	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D. Ginacchi	Signature: ISCRI IIS SERVICE S.r.l.	Signature: RINA Services SpA D. Ginacchi	Signature:
Date: 07/03/18	Date: 08/03/18	Date: 07/03/2018	Date:

KCOI ROSETTI MARINO

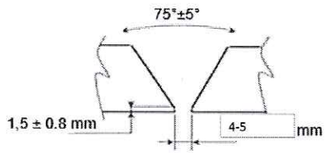
AS-RUN PARAMETER SHEET

pWPS 02/18	
PQR 02/18	
Coupon Nr. 02/18F	
Date:	Start 07-03-2018 Finish 07-03-2018
Page:	1_ of _1

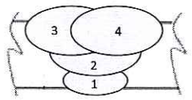
REFERENCE CODE AND PROJECT SPECIFICATIONS: **ASME IX + ASME B31.3 Chapter IX + KE01-00-000-KD-V-SS-0018-000 Rev. C02**

Welder Name(s):	Portas Maurizio	Welder Id No(s):	NC61		
Welding Process(es):	GTAW - SMAW	Type(s):	MANUAL		
Welding Position:	5G	Progression:	Uphill		
Base Materials:	API 5L Gr. B ; API 5L X60	Wall Thickness:	5,9 mm (machined from 8,74 mm, gr. B, from 11,1 mm X60)	Diameter:	2"
Heat No(s):	40238 (API 5L Gr. B) ; 112855 (API 5L X60)	Joint Type:	Single V butt weld		

WELD PREPARATION:



WELDING SEQUENCE / PASS LOCATION:



WELDING CONSUMABLES:

LAYER:	DIA:	BATCH NO:	SUPPLIER & TYPE:
Root	2,4	PVR47054102	ESAB OK TIGROD 12.60
Hot Pass	2,5	347161003	OERLIKON TENAX 35S DRY
Cap	2,5	347161003	OERLIKON TENAX 35S DRY

GAS:

Shielding Gas:	Argon for GTAW Process
Composition:	99,995%
Flow:	12 LPM
Gas Backing:	None
Flow:	-
Gas Size Nozzle:	10mm
Tungsten Type:	EW Th 2,SFA 5.12 2.4mm Dia
O2 Content of Back Purge:	-

Max Weld Bead Width:	String or Weave:	No of Passes:	Multiple or Single Electrodes:
10 mm	STRING	MULTIPLE	SINGLE

Preheat °C :	Preheat Method:	Max Interpass Temperature:	Check / Control Method:	Heat Treatment Required	Holding Temperature °C	Holding Time °c	Heating Rate °C	Cooling Rate °C
20	Propane torch	250°C	CONTACT DIGITAL THERMOMETHER	NA	NA	NA	NA	NA

WELDING PARAMETERS

Side No. (For 2 Welders)	Layer No.	Welding Process	Pass	Layer Thk. Mm	FILLER METAL		Electrode Polarity	Current Amperage Range			Voltage Range			Bead Length (mm)	Arc Time (Seconds)	Welding Speed Range (Cm/Min)	Heat Input Range (Kj/mm) Average	Arc Thermal Efficieny Factor As per EN 1011-1 (Kj/mm)	Interpass Temperature °C	REMARKS
					AWS Spec.	Dia. mm		Min	Max	Av.	Min	Max	Av.							
NC61	1	GTAW	1	=	ER70S-3	2,4	DC-SP	91	97	94	11	13	12,0	N.A.	N.A.	4,5	0,90	0,60	25	- Manual monitoring
NC61	2	SMAW	2	=	E7018-1H4R	2,5	DC-RP	66	74	70	21	23	22,0	N.A.	N.A.	8,5	0,87	0,80	120	Root pass deposit: 3 mm
NC61	3	SMAW	3	=	E7018-1H4R	2,5	DC-RP	69	78	73,5	21	23	22,0	N.A.	N.A.	8,5	0,91	0,80	250	
NC61	3	SMAW	4	=	E7018-1H4R	2,5	DC-RP	69	78	73,5	21	23	22,0	N.A.	N.A.	9,5	0,82	0,80	210	

SIGNED BY KCOI REPRESENTATIVE:	SIGNED BY CLIENT REPRESENTATIVE:	SIGNED BY KCOI THIRD PARTY REPRESENTATIVE:	SIGNED BY CLIENT THIRD PARTY REPRESENTATIVE:
Name:	Name:	Name:	Name:
Signature: ROSETTI MARINO SpA Welding Dept. D. Genocchi	Signature: IIS SERVICE Srl.	Signature: RINA Services SpA D. Cimarelli	Signature:
Date: 07/03/18	Date: 08/03/18	Date: 07/03/2018	Date:

PQR attachments index:

Base material certificate (Pipe API 5L Gr. B)

Base material certificate (Pipe API 5L X60)

Shielding gas certificate

Consumables certificate

preliminary WPS

NDE certificate

Mechanical test report

ROSETTI MARINO

PQR 02/18

Base material certificate (Pipe API 5L Gr. B)

COMMERCIALE TUBI ACCIAIO Viale Lidice 40-Grugliasco(TO)	Kg 234	Mt 21,05	Pz No.: 2
This document is reproduced by a computerized system and is conform to the original	Heat No.: 40238	Cta's job: VC0001608	Date: 15/07/2014
Customer : ROSETTI MARINO SPA	P.O. No.: PO: 1714002148 - 114A30B		Item: 30

COD QC – 3.1 – Ed. 2 REV 3/2013

TMK - ARTROM S.A.
Draganesti Street, No. 30, 230119, SLATINA, OLT, ROMANIA
Tel:+40-249-436862 (topmanagement), 434640, 434641; Fax:+40-249-434330, 437288
E-mail: office.slatina@tmk-artrom.eu; www.tmk-artrom.eu
J 28/9/1991; VAT No: RO 1510210/1992;
Subscribed and Paid Share Capital: 291.587.538, 34 lei

MILL TEST CERTIFICATE / INSPECTION CERTIFICATE - EN 10204: 2004 / 3.1

No.: E5096 Date: 21.03.2014	Manufacturer's mark :	Customer Order No.: VS-0000007	PL: 11783

CUSTOMER : Commerciale Tubi Acciaio
Viale Lidice, 40; IT- 10095 Grugliasco (TORINO); VAT : IT 00505800011

Specifications: API 5L-13; ASTM A106-13; ASME SA106-10; ASTM A53-12; ASME SA53-10; ASME B16.25-07; ISO 3183: 12 ASME Section II part D, TAB.Y1; Spec. RAQ-01-PR-B REV. 0; PED 97/23/EC (Appendix 1, par. 4.3) + EN 10216-1: 02	Dimensions: 60.3 x 8.74 x 10 000 to 11 800 mm Steel : Gr. B / L245/ X42 /L290 PSL1/ P265TR2

Description: Hot rolled seamless steel pipes with bevelled ends; marking by painting at one end: TMK-ARTROM, standard, dimensions, steel grade, 11.11Kg/m, LENGTH(m), 2"SCH 160, 2970PSI/NDE, SMLS, heat no., LOT, mill inspector no. 5, technical control sign; marking one end: heat no.

Heat No.: 40238

Quantity	Pcs	Length m	Weight kg
	57	600.21	6692

C	Mn	S	P	Si	Ni	Cr	Mo	Cu	Al	Nb	Ti	N	V	B	Ca
0.19	1.08	0.004	0.011	0.26	0.10	0.06	0.02	0.21	0.028	0.002	0.001	0.009	0.003	.0005	0.002

Cr+Cu+Mo+Ni: 0.39 | V+Nb+Ti: 0.006 | Nb+V:0.005 | CEnw=0.407

Product Chemical Analyse (%)

C	Mn	S	P	Si	Ni	Cr	Mo	Cu	Al	Nb	Ti	N	V	B	Ca
0.19	1.06	0.004	0.012	0.25	0.09	0.06	0.02	0.21	0.026	0.002	0.001	0.009	0.002	.0004	0.002
0.19	1.07	0.003	0.013	0.24	0.09	0.06	0.02	0.21	0.027	0.001	0.001	0.009	0.002	.0005	0.002

Mechanical Properties

TENSILE TEST (ASTM A370) – at room temperature- Test Specimen Strip–longitudinal	Rp0.2/Rt0.5 MPa	Rm MPa	Elongation %	Rp0.2/Rm
Dimension – Specimen (mm) 19.0 x 8.9	377/378	530	34.5	0.71
Section – Specimen (mm^2) 169.1				
Length - Specimen (Lo) (mm) 50.8				

Hydraulic test pressure (API5L/ASTM A530): 2970 PSI for 5 sec.: OK Heat treatment: normalised during hot rolling process, temperature between 880°C - 940°C and cooler in still air Bending test (ASTM A106 point 11): OK Test Eddy Current Acc. ASTM E309 & EN 10246-1 : OK	Charpy V–Notch (ASTM A370) KV / Longitudinal 7.5 x 10 [mm] 60 (57; 63; 59) [J] (-10^0 C)	Melting process: electric arc furnace, fully killed Fine grain Hardness BHN: OD: 158; 161 / ID: 158; 161 Hardness HRC acc to NACE MR01.75 NACE MR01.03

Hot yield at 343°C: 227MPa(strip longitudinal 5.2 x 8.8= 45.8 mm^2); Hot yield at 538°C: 178MPa(strip longitudinal 5.7 x 8.9= 50.7 mm^2)
Visual inspection and dimensional check : OK
" NO WELD REPAIR ON HEREBY CERTIFIED TUBES "
The manufacturer of pipes is certified in acc. with ISO 9001: 2008, 14001:2004 and ISO 18001:2007
THE PRODUCTS DELIVERED ARE CONTROLLED ON RADIOACTIVITY RESPECTIVELY ARE FREE FROM ADDITIONAL IONIC RADIATION AND MERCURY
The material "not contain intentional additions of elements such as lead, selenium, or sulphur to improve machinability"
Steel grade was treated with calcium for the shape control of micro inclusions.

QC & LABORATORIES CHIEF
Dipl. Eng. Silviu Barbulescu

MILL INSPECTOR
Eng. Constantin Lupu

La société T.M.K. ARTROM S.A. garantit que tous le produits, object cu Certificat susdit, respectent en leur Totalité les Specifications de l'article 15 de l'Arrete Ministériel du 24 Mars 1978 modifié.
Cmax 0.25%, Pmax 0.05%, Smax 0.05%,
Rm (N/mm2) max700, A(Lo=5.65√So) min.16% long, Rm(A-2)min 10500
E max0.9, A (Lo=5.65√So) min14%trans, RAmin 10500

The forgery of this certificate concludes to responsibility mentioned on Romanian Penal Code (art. 290-292).
THIS IS FOR CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED WITH THE ORDERED SPECIFICATION AND THAT INFORMATION IS CORRECT, THEY MEET THE SPECIFICATION'S REQUIREMENTS AND ARE RECORDS IN THE COMPANY DOCUMENTS.

Base material certificate (Pipe API 5L X60)

TUBOS REUNIDOS INDUSTRIAL, S.L.U
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)

EN 10204:2004 / 3.1

CERTIFICADO DE CALIDAD
MILL TEST CERTIFICATE

Nº 0000317548/1 Rev. 000

CLIENTE: CUSTOMER	TUBE DEVELOPMENTS LTD.	PEDIDO / PARTIDA: P.ORDER / ITEM	17319/11091
PRODUCTO: ARTICLE	TUBERÍA SIN SOLDADURA LAMINADA EN CALIENTE HOT FINISHED SEAMLESS TUBES	REF. FABRICA: WORK ORDER	300014748 000010
EXTREMOS: ENDS	BISELADOS BEVELLED ENDS	PROTECCIÓN SUPERF: EXT. COATING	LACA SECA EXTERIOR OD DRY LACQUERED
NORMA / GRADO: APL STANDARD AND GRADE	API5L 45TH ED. PSL2/ISO3183.07 / SPEC. DALE (04/07/2013) X60/X65Q L415/L450Q	PROCESO FUSION: MELTING PROCESS	HORNO ELECTRICO ACERO TOTALMENTE CALMADO ELECTRIC FURNACE // FULLY KILLED
ESPEC. ADICIONALES: ADITIONAL SPECS.	TD008 REV02 (09/07/2012) NACE MR0175.2002, (HRC <= 22). NACE MR0175/ISO 15156.PUB.2009	FAB. DE PALANQUILLA: BILLETS MANUFACTURE	COLADA CONTINUA CONTINUOUS CASTING
DIMENSIONES: DIMENSIONS	60,3 X 11,1 MM. X 10-11,8 M.		
MARCAS: MARKING	ESTAMPADO: DIE STAMPING		
	PINTADO: STENCILLED	TRI SPEC 5L 5L-0011 (SELLO API) ISO 3183 (MM/AA) 60,30 11,100 X60/X65Q L415/L450Q PSL2 SMLS (LONG. TUBO EN MTS) M HN (COLADA)	
	CODIGO COLOR: COLOUR CODE		
TRAT. TERMICO: HEAT TREATMENT	TEMPLADO Y REVENIDO / QUENCHED & TEMPERED. 905 °C 11 MIN 650 °C 59 MIN		

TUBE DEVELOPMENTS LIMITED
Q.A. DEPT
VERIFIED TRUE COPY OF ORIGINAL

Lista de Bultos / Packing List: 133507

DESCRIPCION SUMINISTRO / DESCRIPTION OF DELIVERY (1)

ITEM FAB. T.R. ITEM	ITEM CLI. CLIENTS ITEM	LONG.INDIV (M) INDIVIDUAL LENGTH	COLADA CAST NR.	Nº TUBOS QUANTITY	LONG. TOTAL (M) LENGTH	PESO(KG) WEIGHT
000010		10,000 - 11,800	112855	72	810,000	10.933
TOTAL				72	810,000	10.933

P.O. 17130006047 112470B
ITEM 20

TUBOS REUNIDOS INDUSTRIAL GARANTIZA QUE TODAS LOS TUBOS CUBIERTOS POR ESTE CERTIFICADO CUMPLEN LOS REQUISITOS DEL PEDIDO Y CON LAS ESPECIFICACIONES ARRIBA MENCIONADAS.
TUBOS REUNIDOS INDUSTRIAL CERTIFY THAT ALL THE TUBES COVERED BY THIS CERTIFICATE COMPLY WITH ORDER REQUIREMENTS AND ABOVE MENTIONED SPECIFICATIONS.

AMURRIO 03.10.2013

TUBE DEVELOPMENTS
Q.A. DEPT
APPROVED
SIG
DATE 7.10.13
BSI REG No. RS00057

CONTROL DE CALIDAD DE TUBOS REUNIDOS INDUSTRIAL
TUBOS REUNIDOS INDUSTRIAL QUALITY CONTROL)
Alex Villarreal
P.O.:

TUBOS REUNIDOS INDUSTRIAL, S.L.U
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)

EN 10204:2004 / 3.1

CERTIFICADO DE CALIDAD
MILL TEST CERTIFICATE

Nº 0000317548/1 Rev. 000

ENSAYOS NO DESTRUCTIVOS / N.D.T

ENSAYO / TEST	%CONTROL / TEST RATE(%)	REQUISITOS / REQUIREMENTS	RESULTADO / RESULT
VISUAL Y DIMENSIONAL/ VISUAL & DIMENSIONAL INSP.	100%		O.K.
P.HIDROSTATICA/ HYDROTEST	100%	3.000,0 PSI 5 SEC.	O.K.
CORRIENTES INDUCIDAS/ EDDY CURRENTS	100%	ASTM E 309.11, N12.5/HS 3.2 MM	O.K.
U.S. (LONGITUDINAL)/ ULTRASONIC TEST (LONG)	100%	ASTM E 213.04 5%W.T.NOTCH	O.K.
U.S.(LAMINAC.)/ ULTRASONIC TEST (LAMINATIONS)	100%	S.E.P. 1919	O.K.
P.MAGNETICAS (EXTREMOS)/ MAGNETIC PARTICLE INSP.(ENDS)	100%	ASTM E709.01	O.K.
INSP. POR PASO DE ANILLO/ RING GAUGE INSPECTION	100%	ACC. TO API 5L7/ISO 3183	O.K.

TUBE DEVELOPMENTS LIMITED
Q.A. DEPT
APPROVED
SIG
DATE
BSI REG No. RS00057

ANALISIS DE COLADA / CAST ANALYSYS

	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	V	Al	Ti	Nb	B	N	C.E.
MIN.																
MAX.	0,15	1,30	0,35	0,020	0,0030	0,400	0,400	0,02000	0,40000	0,00500	0,06000	0,04000	0,00500	0,00050	0,0120	0,42
112855	0,13	1,08	0,20	0,010	0,0025	0,075	0,088	0,02000	0,25560	0,00160	0,02860	0,00250	0,00080	0,00050	0,0016	0,35

ANALISIS DE PRODUCTO / PRODUCT ANALYSIS

	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	V	Al	Ti	Nb	B	N	C.E.
MIN.																
MAX.	0,15	1,30	0,35	0,020	0,0030	0,400	0,400	0,02000	0,40000	0,00500	0,06000	0,04000	0,00500	0,00050	0,0120	0,42
112855	0,13	1,08	0,21	0,009	0,0020	0,080	0,090	0,02000	0,25000	0,00200	0,02900	0,00200	0,00500	0,00010	0,0100	0,35
112855	0,13	1,08	0,21	0,009	0,0020	0,070	0,090	0,02000	0,25000	0,00200	0,02900	0,00200	0,00500	0,00010	0,0110	0,35

P.O. 4130046047 112470B
MEN20

AMURRIO 03.10.2013

CONTROL DE CALIDAD DE TUBOS REUNIDOS INDUSTRIAL
TUBOS REUNIDOS INDUSTRIAL (QUALITY CONTROL)
Alex Villanueva
P.O.:

TUBOS REUNIDOS INDUSTRIAL, S.L.U
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)

AENOR ER Empresa Registrada ER-0027/1997

IQNet CERTIFIED QUALITY SYSTEM

EN 10204:2004 / 3.1

CERTIFICADO DE CALIDAD
MILL TEST CERTIFICATE

Nº 0000317548/1 Rev. 000

FORMULAS

	(01)	(02)
MIN.		
MAX.	0,150	0,250
112855	0,009	0,210
112855	0,009	0,210

(01) Nb + Ti + V
(02) Pcm: C +Si/30 + (Cr + Mn + Cu)/20 +Ni/60 + Mo/15 + V/10 + 5*B

ENSAYOS DE TRACCIÓN
TENSILE TEST

COLADA CAST	Nº	L/T (1)	T/P (2)	DIMENSION (mm)	L.ELAST. YIELD POINT (Mpa) (3)	R.TRACC. T.STRENGTH (Mpa)	ALARG. ELONG. (%) (4)	DUREZA HARDNESS (HRB)	E / R
					450	535			
					565	760		99	0,00
112855	0001	L	P	19,10 x 11,90	457	557	38	87	0,82
112855	0002	L	P	19,70 x 11,90	460	579	37	86	0,80

(1) : L = LONGITUDINAL // T = TRANSVERSAL
(2) : T = Full size tube // P = Strip specimen
(3) : yield point (0,5%)
(4) : Lo = 2" (50,8 mm)

ENSAYOS DE IMPACTO - CHARPY V
IMPACT TEST

COLADA CAST	L/T (1)	DIMENS (mm)		Tª (ºC)	RESILIENCIA IMPACT TEST (J)		AREA DUCTIL SHEAR AREA (%)		Exp. Lateral LATERAL EXP.
		10	10,00	-50	35		10		
					40				
112855	L	10	10,00	-50	322	318	348	90	1,40

(1) : L = LONGITUDINAL // T = TRANSVERSAL

ANEXOS / ANNEX

Magnetismo Remanente < 30 Gauss
Residual Magnetism < 30 Gauss

P.O. 4500130047 112855
ITEM 20

HEAT 112855
HARDNESS HRB (OUTSIDE SURFACE): 85/86/86/86
HARDNESS HRB (INSIDE SURFACE): 87/85/86/86

TUBE DEVELOPMENTS LIMITED
Q.A. DEPT
VERIFIED AS A TRUE COPY OF ORIGINAL

AMURRIO 03.10.2013

TUBE DEVELOPMENTS
Q.A. DEPT
APPROVED
SIG P.L.
DATE 7.10.13
BSI REG No. RS00057

CONTROL DE CALIDAD DE TUBOS REUNIDOS INDUSTRIAL
TUBOS REUNIDOS INDUSTRIAL (QUALITY CONTROL)
Alex Villanueva
P.O.:

Shielding gas certificate

SCHEDA TECNICA N. 014

ARGON "50" Ar

Caratteristiche distintive bombola

Ogiva: Verde scuro RAL 6001
riportante il numero "50"
Corpo: Grigio RAL 7015



Informazioni sulle regolamentazioni

Classificazione CEE: N° 231-147-0
Classificazione UN: N° 1006
Classificazione CAS: N° 07440-37-1
Classificazione ADR-RID: 2; cod. 1A
n. pericolo 20
Etichettatura ADR: Etichetta 2.2



FRASI DI RISCHIO
RAS - in alta concentrazione può provocare asfissia

CONSIGLI DI PRUDENZA
S9 – Conservare il recipiente in luogo ben ventilato
S23 – Non respirare

Scheda di Sicurezza n. **005**
Scheda Tecnica n. 014 del 29.01.2004

TIPO GRADO	TITOLO IMPUREZZE	RECIPIENTI IMBALLO (lt)	RECIPIENTI QUANTITA' (m^3)	SETTORE DI APPLICAZIONE
50	≥ 99.9990%	Pacchi:		• Analisi acciai • Spettrometro • Quantovac • Saldature speciali • Miscele nucleari • Analisi secondo Abresch
		B 16/40	144	
		B 12/50	132	
		B 16/50	176	
5.0	O_2 ≤10 ppm H_2O ≤10 ppm N_2 ≤10 ppm	Bombole:		
La purezza del gas è garantita nella bombola fino alla pressione minima di 10 bar (g)		B50	11	
		B40	9	
		B14	3,1	
		B10	2,2	
		B5	1,1	

Le quantità si intendono per bombole caricate a 200 bar (g)

Gas compresso (liquefa **a –185,9°C** alla pressione di 1 bar (g)).
Non tossico, non infiammabile, incolore, inodore, insapore, inerte.
Peso molecolare (g/mol) : **40**
Punto di fusione : **- 189°C**
Temperatura critica: **- 122°C**
Solubilità in acqua (mg/l) : **61**
Non si autoaccende.
Può essere scaricato in atmosfera, evitare lo scarico in ambiente chiuso.
Densità relativa,gas (aria =1) : **1,38** (stratifica verso il basso).
Raccordo valvola: gruppo VIII – UNI 4412.

ROSETTI MARINO

PQR 02/18

Consumables certificate

CERTIFICATO DI COLLAUDO (3.1) - Analisi Chimica
ATTESTATO DI CONTROLLO (2.2) - Caratteristiche Meccaniche/
INSPECTION CERTIFICATE (3.1) - Chemical analysis
TEST REPORT (2.2) - Mechanical properties

Data/Date: 2017-12-21

Numero certificato/Cert no: EC24993815 rev. 0

Nostro ordine/Our order:	1823195	Vostro ordine/Your order:	1717002010-Z1AS
Nostro riferimento/Our ref:	Web user - Movex CMP020 ITB	Vostro riferimento/Your ref:	
Codice Cliente/Cust no:	ITB00060	Vostro numero fax/Your fax	
Data ordine Cliente/Your date:	20171213	Vostra e-mail/Your e-mail:	

Indirizzo di fatturazione/Invoice address	Destinatario del certificato/Cert receiver	Indirizzo di spedizione/Delivery address
ESAB SALDATURA SpA . VIA ROSA LUXEMBURG 49 20085 LOCATE DI TRIULZI (MI) 20085 ITALY Italy		ROSETTI MARINO SPA . VIA TRIESTE 230 48100 RAVENNA RA Italy

CONSEGNA/DELIVERY Numero di lotto/Lot no: PVR47054102 Quantità/Quantity: 20 KG

PRODOTTO/PRODUCT

Marchio/Brand:	ESAB
Descrizione/Desc:	OK Tigrod 12.60 2.4x1000mm 5kg
Codice/Item no:	**126024R150**

CLASSIFICAZIONE/CLASSIFICATIONS

EN ISO 636-A: W 38 3 W2Si
EN ISO 636-A: W2Si
SFA/AWS A5.18: ER70S-3

CARATTERISTICHE MECCANICHE/MECH PROPS

Valori tipici/Typical data: in accordo a/acc to EN 10204 - 2.2

Norma/Standard:	EN
Altro/Auxiliary:	I1
Condizione/Condition:	

TRAZIONE/TENSILE

ReL	Rm	A4-A5
420 MPa	515 MPa	26 %

RESILIENZA/IMPACT

Temp	-30 °C
KV	90 J

COMPOSIZIONE CHIMICA/ CHEMICAL COMPOSITION

Valori reali/Actual results: in accordo a/acc to EN 10204 - 3.1

Wire/strip

Altro/Auxiliary:

C		0.10%
Si		0.58%
Mn		1.03%
P		0.022%
S		0.024%
Cr		0.07%
Ni		0.03%
Mo		0.01%
Cu		0.09%
V	<	0.01%
Al		0%
Al	<	0.01%
Ti+Zr		0.01%

COMMENTI/COMMENTS

Materiale fornito in accordo al Sistema Qualità conforme alla norma EN ISO 9001.
Questo certificato è stampato elettronicamente ed è valido senza firma.
Per ogni chiarimento, rivolgersi a:

ESAB Saldatura Spa, Via Rosa Luxemburg 49, I-20085 Locate Triulzi (MI), +39 02 97968.1

Product supplied under a QA Programme fulfilling the EN ISO 9001 standard.
This certificate is produced electronically and is valid without signature.
Please refer any queries to: (see above)

Validazione - analisi chimica/Validation - Chemical Analysis		Validazione - altro/Validation - Others	
Josef Moravek	Quality Manager	Jose Abal Lopez	Product Manager

Air Liquide Welding France S.A.
25 Boulevard de la Paix
CS 30003 Cergy
95895 CERGY SAINT CHRISTOPHE
France
Telefono: +33 134213333
Fax: +33 134213130
Internet: www.airliquidewelding.com

Product Certificate

Cliente: / Customer:	Certificato N°: / Certificate No.:	Ordine N°: / Order No.:	Bolla N°: / Delivery Note:
ROSETTI MARINO VIA TRIESTE 230 48100 RAVENNA RA (RA) Italy	30138859	1718000178	
	Reference Number:	Quantità: / Quantity:	UM:
	W000380325	2160.00	PC
Designazione: / Trade Name:	TENAX 35S R 2.50X0300XVPMD		Lotto N°: / Batch No.: 347161003
Classificazione: / Classification:	AWS A5.1 E 7018 H4R EN ISO 2560-A: E 42 5 B 32 H5		
Gas: / Gas:	.		.

Si confermano le proprietà sotto riportate per i consumabili di saldatura da noi forniti
We confirm following properties for the welding filler metals delivered by us.

Analisi chimica del deposito / Chemical Analysis:
In accordo a / Certificate Type EN 10 204-3.1 WELD METAL

C	Mn	Si	P	S	Cr	Ni	Mo	Nb	V
0,069	1,283	0,431	0,013	0,003	0,032	0,026	0,004	0,0038	0,019
Cu									
0,034									

Proprietà meccaniche del deposito / Mechanical Properties:
In accordo a / Certificate Type EN 10 204-2.2 WELD METAL

Tensile Test according to EN ISO 6892-1					Impact Strength Test according to EN ISO 148--1		
Test Temp. °C	Snervamento Yield Strength ReH N/mm²	Trazione Tensile Strength N/mm²	Allungamento Elongation %	Z %	Test Temp. °C	Resilienza Impact Strength Joule(Charpy-V)	Trattamento Termico Heat Treatment
+20	503	580	37				AS WELDED

Daniel Toncelli
QC Manager - Due Carrare Plant
Data/ Date: 15/02/2018

ROSETTI MARINO

PQR 02/18

preliminary WPS

WPS CODE	ASME IX		WeldingSpc		KE01-00-000-KD-V-SS-0018-000-C02		
PQR ref.:	02/18 TBQ	WPS N°:	02/18	REV.:	2	Data /date	01/03/2018

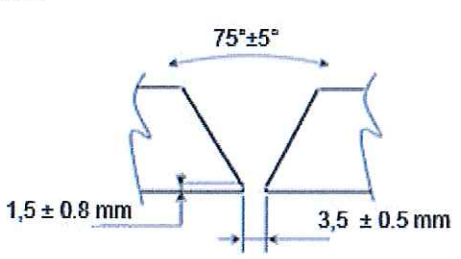
Procedimento di saldatura / Welding process: **GTAW + SMAW** — Tipo / Type: **MANUAL**

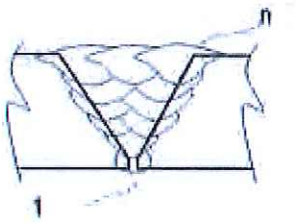
GIUNTO – JOINT (QW-402)

Tipo di giunto / Joint Design: **V** — Supporto / Backing: ☐ Si / Yes ☒ No

Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal. ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403)

Da / from P-N°: **1** — Group N°: **1** — A / to P-N°: **1** — Group N° **2**

A Tipo e grado / To type and grade: **API 5L Gr.B / API 5L X60**

- ► Materiale base / Base material: **5,9 mm (machined from 8,74) Range approved from 3 to 11,8 mm**
- ► Gamma diametri / Pipe dia. Range: **2"** -

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW	SMAW	
Spec. N° (SFA)	A5.18	A5.1	
AWS N° (CLASS)	ER70S-3	E7018-1H4R	
F-N°	6	4	
A-N°	1	1	
Diametro mat. D'apporto / Size of filler metal	2,4	2,5 – 3,2 - 4,0	
Gamma spessori /Thick. Range	Up to 4mm	Up to filling	
Accoppiamento filo-flusso / Electrode-flux (CLASS)	NA	NA	
Denom. Comm. Flusso / FLUX trade name	NA	NA	
Inserto consumabile / Consumable insert	NA	NA	
Altro / other	ROD: ESAB OK TIGROD 12.60	ELEC.: OERLIKON TENAX 35S DRY	

POSIZIONI – POSITION (QW 405)

Joint: **CJP** — Posizione / position **5G** — Progressione / weld progression: **Uphill**

PRERISCALDO – PRE-HEAT (QW406)

Temp.preriscaldo minima / Min. pre-heat temp: **20 °C** — Max temp. Di interpass / Max interpass temp.: **250 °C** — Mantenimento interpass / Interpass maintenance: **N.A.** — Tempo di mantenimento prerisc. / Maintenance timing: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

N.A.

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port. / Flow rate
Protezione / Shielding:	Ar	99,998%	10-13 lt/min
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot. Al rovescio / Backing:	N.A.	N.A.	N.A.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW –409)

Corrente / Current: **DC** — Polarità / Polarity **SP / RP**

Dia e tipo elettr. Tungsteno / Tungsten elctr. Size & type: **AWS 5.12 EWTh2 dia.2,4mm**

Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**

Velocità alimentazione filo / Electr. Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String (3x Ø elec.) 10mm for GTAW** — Dimensione bocchello gas / Orifice of gas cup size: **3/8"** — Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura/Brushing**

Metodo di solcatura a rovescio / Method of back gouging: **N.A.** — Oscillazione / Oscillation: **N.A.** — Distanza tra zona di contatto e pezzo / Contact zone to work distance: **N.A.**

N°Passate / Passes nr.: **Multipla/Multiple** — Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single** — Martellatura / Peening: **N.A.**

Altro / Other: **K for TIG Heat Input is considered 0.6 – for SMAW K considered for heat input is 0.8**

N° Passate / Weld layers nr.	Processo / Process	Materiale d'apporto / Filler metal		Corrente / Current		Voltaggio / Volt	Vel. Avanzamento / Travel speed (mm/min)	Apporto termico / Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. Range			
1	GTAW	ER70S-3	2,4	SP	85-100	11-13	40-50	0,67-1,17
Hot pass	SMAW	E7018-1H4R	2,5	RP	65-75	21-23	65-90	0,73-1,27
Fill/Capping	SMAW	E7018-1H4R	2,5	RP	65-80	21-23	75-95	0,69-1,18

Approvato da / approved by:		
A.KHALIFA		

ROSETTI MARINO

PQR 02/18

NDE certificate

ROSETTI MARINO	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 02-18 data: 07-03-2018

progetto project	EPC 4	cliente NCOC client	ordine / PO	commessa 117A10 job
disegno dwg	/	ITP N° KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	fase 5.3.2 step	

SI CERTIFICA CHE :

gli item di seguito indicati sono stati sottoposti a controllo dimensionale ed accettati in accordo alla procedura / specifica sotto indicata ed ai criteri di accettabilita' in essa definiti.

WE CERTIFY THAT:

items below indicated have undergone a dimensional inspection and have been accepted according to the specific / procedure mentioned hereunder and to acceptance criteria defined in it.

oggetto – item

COUPON	STAMP	POS	THK	Ø	WPS	Date of examination
02/18 A	NC61	5G	5.9mm	2"	pWPS 02/18	07/03/2018
02/18 B	NC61	5G	5.9mm	2"	pWPS 02/18	07/03/2018
02/18 C	AX83	5G	5.9mm	2"	pWPS 02/18	07/03/2018
02/18 D	NC61	5G	5.9mm	2"	pWPS 02/18	07/03/2018
02/18 E	NC535	5G	5.9mm	2"	pWPS 02/18	07/03/2018
02/18 F	NC61	5G	5.9mm	2"	pWPS 02/18	07/03/2018

note - remarks

Acceptance criteria: ASME B31.3

Maximum distance of examination: 600 mm;

Viewing angle: ≥ 30° with the surface;

Light intensity: ≥ 1000 LUX

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

KE01-B7-000-8M-Q-PR-0008-000 Rev.A01

Operatore - Operator	Controllo Qualita' - Quality Control	~~Cliente~~ ~~Client~~
CSWIP D.CENACCHI 305250 WI 3.1		RINA Services SpA D. Cenacchi

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 26	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KCOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 02-18 PQR 02-18A POS. 5G	/	2"	5,9	NC 61	0-1	/	A
					1-2	/	A
					2-0	DF	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / *Worms*
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen Inclusion*
DF	Difetto film / *Film Defect*

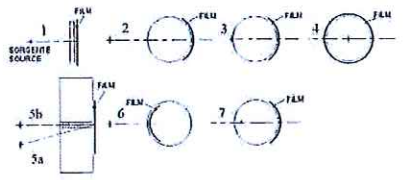
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	**Schermi** *shield*	Pb 0,10 Pb 0,15	**Campo di densità** *Density range* 2÷4	**Pellicola** *Film type* KODAK C3
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03				
Tipo macchina Ry *Type machine Ry* Gammamat SE 75 matricola 916				

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*	3	mm	
Tempo d'esposizione *Exposure time*	Min	Sec 25	

Tecnica Rx *Rx Tecnique*	1 ☐	2 ☐	3 ☑	4 ☐
	5 ☐	5b ☐	6 ☐	7 ☐



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	**Dist. pezzo sorg. (D)** *Source piece distan*	**Dist. oggetto film (d)** *Film object distance*	**Penombra** *Unsharpness*		Visible Wire n° Requred Obtained	**Lastre n°** *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Stefano Zauli 3° Livello SNT - TC - 1A / ISO 9712	ROSETTI MARINO SPA Welding Dept. D. Cenacchi	Iscer 09/03/	RINA Servi... D. C... 09/03/2018

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I risultati delle prove si riferiscono unicamente ai particolari esaminati – *Test results relate only to the items esamine*
Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 12	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 02-18	02-18 A	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Rep.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO SpA Welding Dept. D. Conacchi	IIS SERVICE S.r.l.	RINA Services SpA D. Conacchi 09/03/2018

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I risultati delle prove si riferiscono unicamente ai particolari esaminati – *Test results relate only to the items esamine*
Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 27	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KCA MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 02-18 PQR 02-18B POS. 5G	/	2"	5,9	NC 61	0-1	/	A
					1-2	/	A
					2-0	/	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

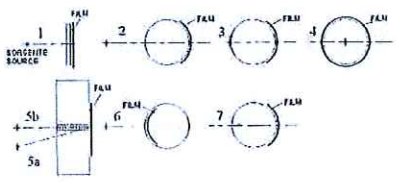
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	Schermi *shield*		Campo di densità *Density range*		Pellicola *Film type*	
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03	Pb 0,10 Pb 0,15		2÷4		KODAK	C3
Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916						

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*	3	mm	
Tempo d'esposizione *Exposure time*	Min	Sec 25	

Tecnica Rx *Rx Tecnique*				
1 ☐	2 ☐	3 ☑	4 ☐	
5 ☐	5b ☐	6 ☐	7 ☐	



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Rep.	ISPETTORE A.I. Inspection Agency
Stefano Zauli 3° Livello SNT-TC-1A / ISO 9712	ROSETTI MARINO SpA Welding Dept. D.Canacchi	IIS Service Saldatura Group 09/03/2018	RINA Services SpA 09/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 09/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 13	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KOM MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 02-18	02-18 B	2"	5,9	NC 61	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Representative	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello ISO 9712 / SNT-TC-1A	ROSETTI MARINO S.p.A. Welding Dept. D. Geneselli	IIS SERVICE 09/03/18	RINA Services SpA 09/03/2018

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I risultati delle prove si riferiscono unicamente ai particolari esaminati – *Test results relate only to the items examine*
Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 34	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KCGI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 02-18	/	2"	5,9	AX 106	0-1	/	A
PQR 02-18C					1-2	DF	A
POS. 5G					2-0	A	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Incl. di scoria o Allungata *Slag / Elongated Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen Inclusion*
DF	Difetto film / *Film Defect*

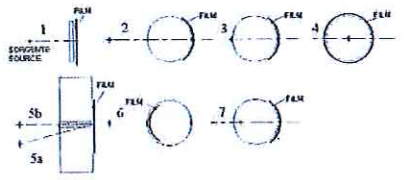
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	Schermi *shield*		Campo di densità *Density range*	Pellicola *Film type*
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03 Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916	Pb 0,10 Pb 0,15		2÷4	KODAK C3

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*	3	mm	
Tempo d'esposizione *Exposure time*	Min	Sec 25	

Tecnica Rx *Rx Tecnique*				
1 ☐	2 ☐	3 ☑	4 ☐	
5 ☐	5b ☐	6 ☐	7 ☐	



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Ing. Roberto Zauli 3° Livello ISO 9712	ROSETTI MARINO SPA Welding Dept. D. Ciavaccini	Istituto Italiano della Saldatura Group IIS SERVICE S.r.l.	RINA Services SpA D. Ciavatti 30/05/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 Info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 14	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KCOV MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint LOTTO/BACH		☑ NDT WBL5	☐ CGM VECOPLAST

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 02-18	02-18 C	2"	5,9	AX106	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr./a	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello	ROSETTI MARINO Welding Dept. D. Cenacchi	IIS SERVICE S.r.l.	RINA Services SpA D. C. Matti 10/03/2018

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Report NDT MT 03 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 35	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KCOI MCCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 02-18	/	2"	5,9	NC 47	0-1	/	A
PQR 02-18D					1-2	DF	A
POS. 5G					2-0	A	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature tondeggianti *Rounded blisters*
Ab	Tarli / *Worms*
B	Incl. di scoria o Allungata *Slag / Elongated Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

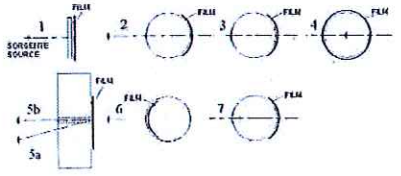
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	Schermi *shield*	Pb 0,10 Pb 0,15	Campo di densità *Density range* 2÷4	Pellicola *Film type* KODAK C3
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03 Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916				

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*	3	mm	
Tempo d'esposizione *Exposure time*	Min	Sec 25	

Tecnica Rx *Rx Tecnique*	1 ☐	2 ☐	3 ☑	4 ☐
	5 ☐	5b ☐	6 ☐	7 ☐



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Ing. Roberto Zauli 3° Livello ISO 9712	ROSETTI MARINO S.p.A. Welding Dept. D. Ceperani	IIS SERVICE S.r.l.	RINA Services SpA D. Citton 10/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 Info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 15	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KCOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint		☑ NDT WBL5	☐ CGM VECOPLAST
LOTTO/BACH			

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 02-18	02-18 D	2"	5,9	NC47	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello ISQ0618SNTV2ULK	ROSETTI MARINO S.p.A. Welding Dept. D. Cenacchi	IIS SERVICE S.r.l. 10/03/18	RINA Services SpA D. Cimutti 10/03/2018

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QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 36	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KOC MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 02-18	/	2"	5,9	AX 106	0-1	A	A
PQR 02-18E					1-2	/	A
POS. 5G					2-0	Ab	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Incl. di scoria o Allungata *Slag / Elongated Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

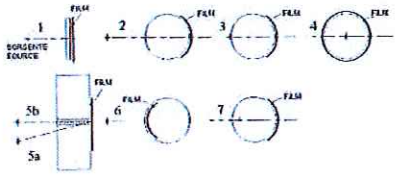
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	Schermi *shield*		Campo di densità *Density range*		Pellicola *Film type*	
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03 Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916	Pb 0,10 Pb 0,15		2÷4		KODAK	C3

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*	3	mm	
Tempo d'esposizione *Exposure time*	Min	Sec 25	

Tecnica Rx *Rx Tecnique*				
1 ☐	2 ☐	3 ☑	4 ☐	
5 ☐	5b ☐	6 ☐	7 ☐	



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Ing. Roberto Zauli 3° Livello ISO 9712	ROSETTI MARINO S.p.A. Welding Dept. D. Cenacchi	IIS SERVICE S.r.l. 10/03/2018	RINA Services SpA D. Cenacchi 10/03/2018

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 16	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KCOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint LOTTO/BACH		☑ NDT WBL5	☐ CGM VECOPLAST

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 02-18	02-18 E	2"	5,9	AX106	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Rep.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello SO 9712 ISNT-CQ-IA	ROSETTI MARINO Welding Dept. D. Cenacchi	ISCOM S.r.l. SERVICE 10/03/18	RINA Services S.p.A. D. Cimatti 10/03/2018

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QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 37	Ns. Rif./Our Ref. 18047

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
NCOC KOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
pWPS 02-18	/	2"	5,9	AX 106	0-1	/	A
PQR 02-18F					1-2	DF	A
POS. 5G					2-0	/	A

Difetto *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worms
B	Incl. di scoria o Allungata *Slag / Elongated Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

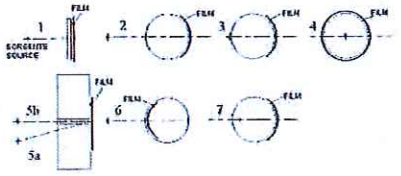
Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura procedure	Schermi *shield*	Pb 0,10 Pb 0,15	Campo di densità *Density range* 2÷4	Pellicola *Film type* KODAK C3
ASME IX KE01-B7-000-8M-Q-PR-0012-000 P03 Tipo macchina Ry Type machine Ry Gammamat SE 75 matricola 916				

Sorgente *Source*	☐ RX	☐ Ir 92	☑ Se 75
Energia *Energy*	Ci 19	kV	mA
Macchia focale *Focal spot*	3	mm	
Tempo d'esposizione *Exposure time*	Min	Sec 25	

Tecnica Rx *Rx Tecnique*				
1 ☐	2 ☐	3 ☑	4 ☐	
5 ☐	5b ☐	6 ☐	7 ☐	



Penetrametro *I.Q.I*	☐ ASTM ☑ EN
	☑ Lato film *film side* ☐ Lato sorgente *Source side*
Esposizione *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Tecnica di sviluppo *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*		Visible Wire n° Requred Obtained	Lastre n° *Films n°*
5,9+1,5 mm	54,1 mm	7,4 mm	≤0,51mm	0,41	W 13 F.S. W13 F.S.	3

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Ing. Roberto Zauli 3° Livello ISO 9712	ROSETTI MARINO Welding Dept. D.Cerlacchi	IIS SERVICE Srl	RINA Services SpA D. Ciriaci 28/03/2018

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Report NDT RT 05 Rev.I

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 10/03/2018	FOGLIO – Sheet 1
RAPPORTO D'ESAME MAGNETOSCOPICO ***MAGNETIC PARTICLE TEST***		MT N° : 17	Ns. Rif./Our Ref. 18047

CLIENTE – Client	ORDINE – Order	PROGETTO – Project	COMMESSA – Job	
ROSETTI MARINO	/	KASHAGAN FIELD DEVELOPMENT EXPERIMENTAL PROGRAM-EPC 4	117A10	
CLIENTE FINALE - Customer	OGGETTO - Object	DISEGNO – Drawing	P.F.C. – Q.C.P.	Fase - Step
NCOC KCOI MCC	PQR	/	KE01-B7-000-8M-Q-QP-0009-000 Rev. A01	5.3.2

CODICE / code	PROCEDURA/Procedure	ACCETTABILITA - Acceptance level
ASME V ART 7 Ed. 2015	MT KE01-B7-000-8M-Q-PR-0010-000 A01	ASME B31.3 Table 341.3.2

MATERIALE Material	TEMPERATURA DELLE SUPERFICI Surface temperature	INTENSITA' LUMINOSA / Light intensity	
		LUCE BIANCA	LUCE NERA
X60	INTERVALLO 5÷52°C	☑ > 1000 LUX	☐ 1000 µW/cm².

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO As welded	☑ SPAZZOLATO – Brushed	☐ LAVORATO DI MACCHINA – Machined
☐ MOLATO – Ground	☐ LAMINATO – Rolled	☐ GREZZO – Forged

TECNICA DI MAGNETIZZAZIONE / Magnetizzazion tecnics			
☐ PUNTALI/Prods	☑ GIOGO/Yoke	☐ SOLENOIDE/Solenoid	☐ CONDUTTORE CENTRALE/Central conduttor
METODO / Method	☐ CONTINUO/Continuous		☑ RESIDUO /Residual
TIPO/magnetization type	☐ MAGNETICO/magnetic		☑ELETTRICO/electric
DIREZIONE DEL CAMPO MAGNETICO/magnetic field direction			☑LONGITUDINALE/longitudinal

TIPO APPARECCHIO/Type of equipment	SILVER YOKE S.No. 03.230-16	DISTANZA PUNTALI/Pole spacing mm	180mm
TIPO DI CORRENTE/Type current	C.A	INTENSITÀ/Intesity (Amp)	4,5 kg

MEZZO DI ISPEZIONE / Examination medium		☑ UMIDO/Wet	☐ SECCO/Dry
PARTICELLE UTILIZZATE/Particle Type			
POLVERE NERA/Black powder	☑	FLUORESCENTE/Fluorescent	☐
MARCA TIPO/Mark Type	NDT BW2	MARCA TIPO/Mark Type	NDT FW1
LOTTO/BACH	7233s	LOTTO/BACH	U161125s
VERNICE DI CONTRASTO/Contrast Paint LOTTO/BACH		☑ NDT WBL5	☐ CGM VECOPLAST

SALDATURE CONTROLLATE / Welds Verified

Wps	PQR	Size	Thk	Welder	Pos
pWPS 02-18	02-18 F	2"	5,9	AX106	5G

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
RICCARDO NOCERA 2° Livello	ROSETTI MARINO SpA Welding Dept. D. Cenacchi	IIS SERVICE S.r.l.	RINA Services S.p.A. 10/03/2018

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Report NDT MT 03 Rev.1

ROSETTI MARINO

PQR 02/18

Mechanical test report

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TEST REPORT

Client
Cod. 1737

ROSETTI MARINO S.P.A
VIA TRIESTE, 230
48100 RAVENNA (RA)
Italia

Your ref. :	Document :	Ddt n. 1YPB180162	Date:	14/03/2018
Our ref. :	Report :	RPR323-1E1R0A18	Date:	04/04/2018
	Job :	ADC323-1E1R0A18	Date:	14/03/2018

Remarks: PQR 02/18
DIAMETER : 2" - WALL THICKNESS : 5.9mm
CLIENT : NCOC

Project: EPC4

Doc. reference: KE01-00-000-KD-V-SS-0018-000 Rev.C02 + ASME B31.3 / ASME IX ed.2017

Test standard: ASTM E340-15 - ANSI/NACE MR0175/ISO 15156-2:2015 - UNI EN ISO 6507-1:2006 - ASTM E190-14 - ASTM E23-16b - ASTM E8/E8M-16a

This Report (RPR) contains tests results on the following materials

Ref:	Identification	Material	Dn (mm)	Thk (mm)	Remarks
1055A18	PQR 02/18	Side A : API 5L X60 Side B : API 5L Gr.B			

Report signatories and approval

☐ Third party	☐ Third party	☐ Third party	Client
☐ Witness	☐ Witness	☐ Witness	

Digitally signed by Cantoni Luca
Element Materials Technology Milan S.r.l.

Issue approved

ROSETTI MARINO S.p.A
Welding Dept.
D. Cenacchi

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dell'Istituto Italiano della Saldatura
Ispettore Incaricato
Matteo Carrubba
05 APR 2018

RINA Services S.p.A
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D. Cimatti
04/04/2018

General conditions:
1. The Customer accepts general conditions and prices fixed by the laboratory to perform the tests.
2. Test results will be communicated only by means of test report except for different contractual agreement.
3. Tests sample will be destroyed 30 days after test except for different written Client request.
4. The spare will be destroyed 90 days after date of receipt for different written Client request.
5. The test results described in the following test report are referring only to the sample mentioned in it.
6. The date of material receivement is the same as the date of job opening. The date of testing is the same as the date of test report, except for different info.
7. The laboratory has examined the material sampled an supplied by the Client in compliance with standard request.
8. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.
9. Unless otherwise agreed, sales terms and conditions (MOD20-1E1R0) will be apply.

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TEST REPORT

Test	Page	Technician
Macrographic examination	Pag. 3..5	**Cristian Piloni**
Bend test	Pag. 6	**Luigi Vailati**
Hardness test	Pag. 7..9	**Cristian Piloni**
Charpy impact test	Pag. 10	**Nicolas Vailati**
Tensile test	Pag. 11..12	**Luigi Vailati**

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Matteo Carrubba
05 APR 2018

RINA Services SpA
W R
D. Cimatti
04/04/2018

Technician signatories

Digitally signed by Cristian Piloni
Element Materials Technology Milan S.r.l.

Digitally signed by Luigi Vailati
Element Materials Technology Milan S.r.l.

Digitally signed by Nicolas Vailati
Element Materials Technology Milan S.r.l.

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TEST REPORT

MACROGRAPHIC EXAMINATION

General Info

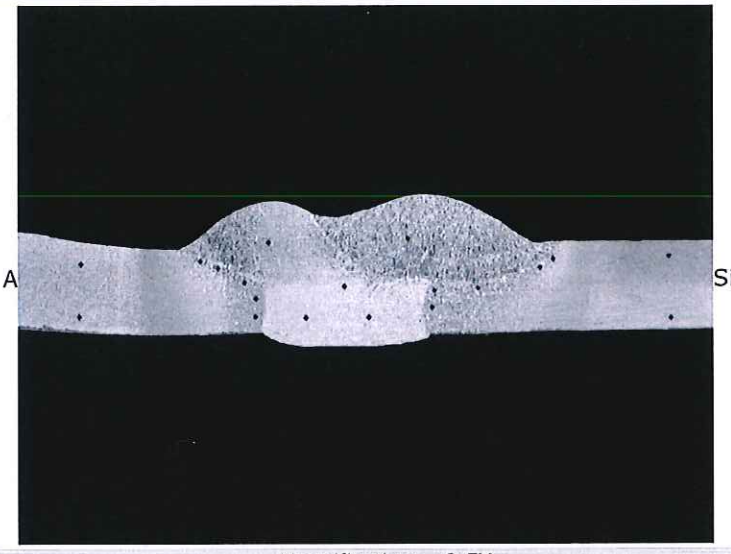
Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 MC 1
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h12
Test standard	ASTM E340-15

Equipments

(Inv.N°1961) PHOTOCAMERA

Test properties

Etching: Ammonium Persulfate

Side A  Side B

Magnification: ~2.5X

Result

Test specimen has been examined at low magnification (10x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

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TEST REPORT

MACROGRAPHIC EXAMINATION

General Info

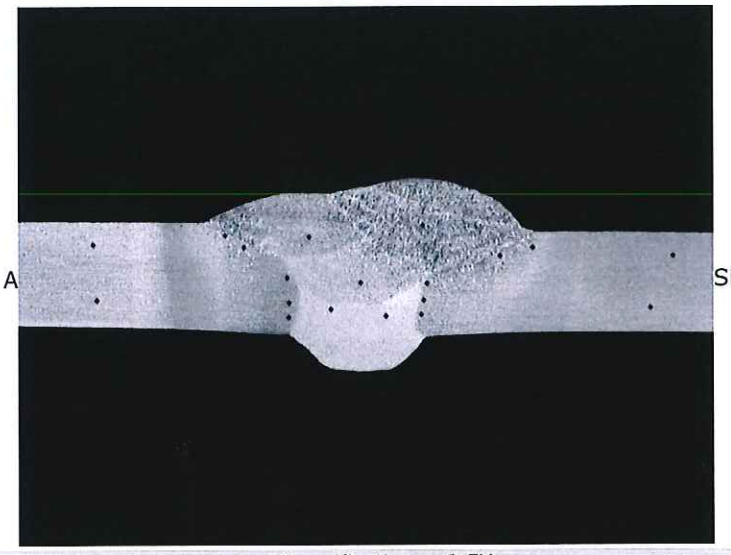
Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 MC 2
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h3
Test standard	ASTM E340-15

Equipments

(Inv.N°1961) PHOTOCAMERA

Test properties

Etching	Ammonium Persulfate

Side A  Side B

Magnification: ~2.5X

Result

Test specimen has been examined at low magnification (10x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

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TEST REPORT

MACROGRAPHIC EXAMINATION

General info

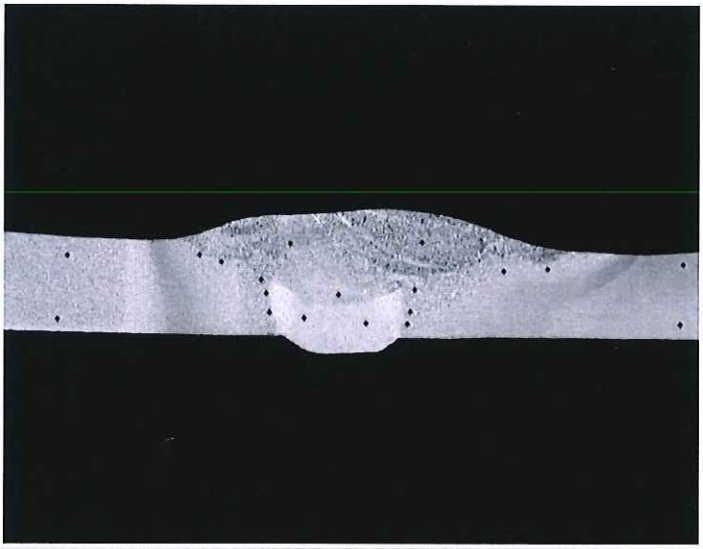
Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 MC 3
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h6
Test standard	ASTM E340-15

Equipments

(Inv.N°1961) PHOTOCAMERA

Test properties

Etching	Ammonium Persulfate



Magnification: ~2.5X

Result

Test specimen has been examined at low magnification (10x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

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TEST REPORT

BEND TEST

General info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Test standard	ASTM E190-14

Equipments

(Inv.N°1102) CALIPER - (Inv.N°1123) BEND MACHINE

Test parameters

Jig (mm)	25
Rollers distance (mm)	41
Angle (°)	180
Method	FORMER

Results

Ref.Lab.	T (°C)	Type	Position	Dimensions (mm)	L0 (mm)	Elongation (%)	Results
055 PI 1	20	TFBB (Transverse face bend)	T Face Bend h2	20.03 x 5.99			No defect
055 PI 2	20	TRBB (Transverse root bend)	T Root Bend h4	20.03 x 5.97			No defect
055 PI 3	20	TFBB (Transverse face bend)	T Face Bend h8	20.02 x 5.99			No defect
055 PI 4	20	TRBB (Transverse root bend)	T Root Bend h10	20.02 x 5.95			No defect

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TEST REPORT

HARDNESS TEST

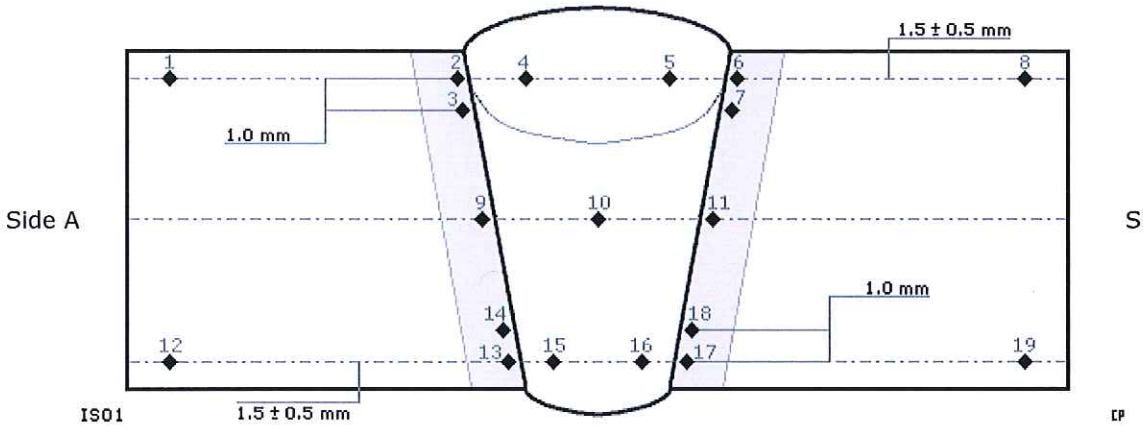
General Info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 MC 1
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h12
Test standard	ANSI/NACE MR0175/ISO 15156-2:2015 + UNI EN ISO 6507-1:2006

Equipments

(Inv.N°9) HARDNESS TESTING MACHINE

Results



Cap		½ thk		Root	
N°	Value HV10	N°	Value HV10	N°	Value HV10
1	**176.0**	9	**179.0**	12	**181.0**
2	**180.0**	10	**171.0**	13	**171.0**
3	**184.0**	11	**176.0**	14	**166.0**
4	**177.0**			15	**142.0**
5	**172.0**			16	**143.0**
6	**174.0**			17	**174.0**
7	**189.0**			18	**184.0**
8	**183.0**			19	**170.0**

Min	142.0
Max	189.0

Required: : ≤248 HV10

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TEST REPORT

HARDNESS TEST

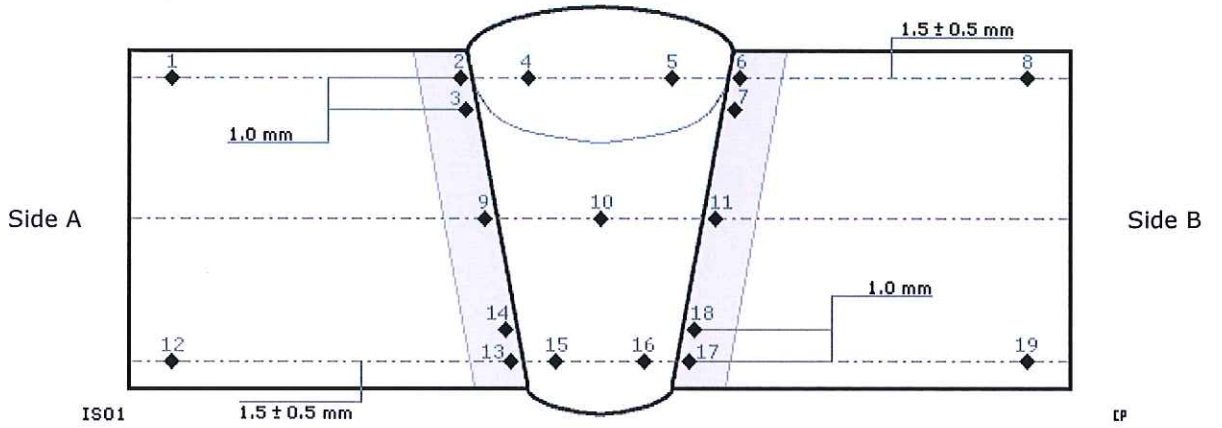
General Info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 MC 2
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h3
Test standard	ANSI/NACE MR0175/ISO 15156-2:2015 + UNI EN ISO 6507-1:2006

Equipments

(Inv.N°9) HARDNESS TESTING MACHINE

Results



Cap		½ thk		Root	
N°	Value HV10	N°	Value HV10	N°	Value HV10
1	**153.0**	9	**184.0**	12	**159.0**
2	**159.0**	10	**181.0**	13	**166.0**
3	**165.0**	11	**186.0**	14	**159.0**
4	**170.0**			15	**144.0**
5	**175.0**			16	**138.0**
6	**171.0**			17	**172.0**
7	**166.0**			18	**183.0**
8	**188.0**			19	**172.0**

Min	138.0
Max	188.0

Required: : ≤248 HV10

ROSETTI MARINO SpA
Welding Dept.
D. Cenacchi

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TEST REPORT

HARDNESS TEST

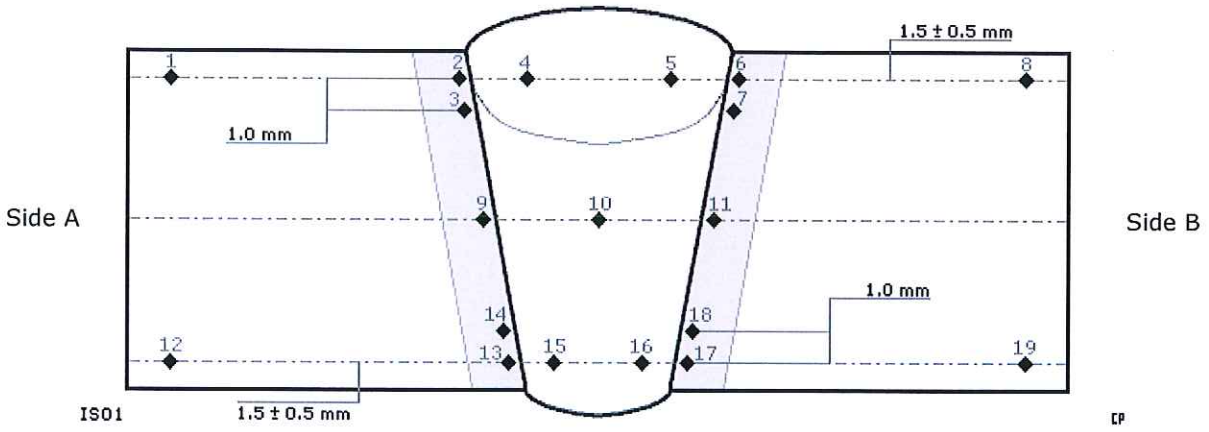
General Info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 MC 3
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h6
Test standard	ANSI/NACE MR0175/ISO 15156-2:2015 + UNI EN ISO 6507-1:2006

Equipments

(Inv.N°9) HARDNESS TESTING MACHINE

Results



Cap

N°	Value HV10
1	**155.0**
2	**167.0**
3	**173.0**
4	**176.0**
5	**179.0**
6	**163.0**
7	**160.0**
8	**195.0**

½ thk

N°	Value HV10
9	**168.0**
10	**172.0**
11	**175.0**

Root

N°	Value HV10
12	**154.0**
13	**158.0**
14	**151.0**
15	**144.0**
16	**159.0**
17	**176.0**
18	**180.0**
19	**175.0**

Min	144.0
Max	195.0

Required: : ≤248 HV10

ROSETTI MARINO SpA
Welding Dept.
D. Cenacchi

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TEST REPORT

CHARPY IMPACT TEST

General info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Test standard	ASTM E23-16b

Equipments

(Inv.N°1102) CALIPER - (Inv.N°1156) CHARPY IMPACT 450 - (Inv.N°1806) CRYOSTAT

Specimen informations

Notch: KV8

Test parameters

Nominal energy of test machine (J): 450

Results

Lab Id.	T (°C)	Position	Dimensions (mm)	A		B		C		Average	
				Value (J)	L.exp (mm)	Value (J)	L.exp (mm)	Value (J)	L.exp (mm)	Value (J)	L.exp (mm)
055 RE 1	-57.1	T WM h10-11	10.0 x 3.33	50	1.63	45	1.59	23	1.10	39	1.44
055 RE 2	-57.1	T FL (A) h1-2	10.0 x 3.33	37	1.31	48	1.44	43	1.31	43	1.35
055 RE 3	-57.1	T FL (B) h10-11	10.0 x 3.33	28	1.27	43	1.40	61	1.73	44	1.47
055 RE 4	-57.1	T FL (A)+2 h1-2	10.0 x 3.33	28	1.25	54	1.38	31	1.33	38	1.32
055 RE 5	-57.1	T FL (B)+2 h10-11	10.0 x 3.33	22	1.16	65	1.77	10	0.98	32	1.30

Note

Value required for API 5L X60 dimensions 10 x 10 : Minimum 16 J , Average 20 J
for dimensions 10 x 3,33 : Minimum 5 J , Average 7 J
Value required for API 5l Gr.B dimensions 10 x 10 : Minimum 14 J , Average 18 J ,
for dimensions 10 x 3,33 : Minimum 4 J , Average 5 J
Test temperature :
for full size specimen -46° ;
for subsize specimen reduced in compliance with ASME B31.3:2016 table 323.3.4

ROSETTI MARINO S.p.A.
Welding Dept.
D. Cimatti

RINA Services SpA
☒W ☐R
D. Cimatti
04/04/2018

IIS SERVICE S.R.L.
dell'Istituto Italiano della Saldatura
Ispettore Incaricato
Matteo Carrubba
05 APR 2018

Element Materials Technology Milan S.r.l.
Via della Pierina 9/11
26013 Crema (CR)
Italy
P: +39 0373 89721
F: +39 0373 897200
info.milan@element.com
element.com

TEST REPORT

TENSILE TEST

General Info

Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 TR 1
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h12
Test standard	ASTM E8/E8M-16a

Equipments

(Inv.N°1102) CALIPER - (Inv.N°1153) UNIVERSAL MACHINE QUASAR 600 - (Inv.N°1161) EXTENSOMETER

Specimen informations

Type	Prismatic
Width (mm)	19.01
Thickness (mm)	5.11
Section (mm²)	97.14

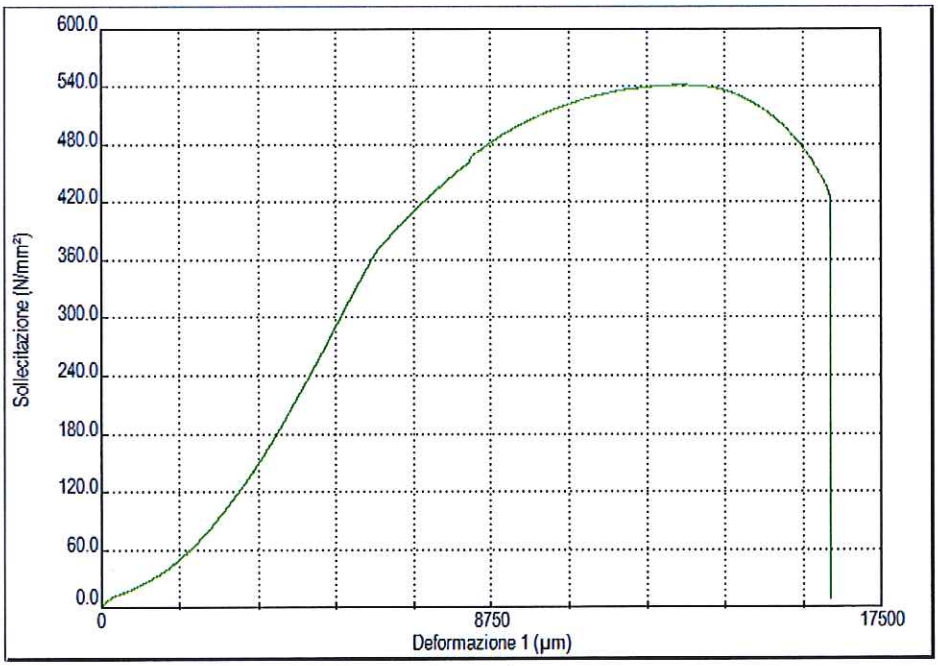
Test parameters

Temperature (°C)	20.0

Results		**Required**
Rp0.2% (N/mm²)	384.0	≥241
Rm (N/mm²)	541.0	≥413

Note

Broken out of weld (Side B)
Rp% determined by offset method - A% = determined after fracture - Values rounded to the nearest.
Speed of testing: method A - during yielding: 8 MPa/sec - after yielding: 0.25mm/mm/min



ROSETTI MARINO SpA
Welding Dept.
D. Donacchi

RINA Services SpA
☑W ☐R
D. Cimatti
04/04/2018

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element.com

TEST REPORT

TENSILE TEST

General Info	
Test start - Test finish	04/04/2018 - 04/04/2018
MIF reference (Lab)	1055A18
Client reference	PQR 02/18
Identification of specimen (Lab)	055 TR 2
Material	Side A : API 5L X60 Side B : API 5L Gr.B
Position	T WM Full thk h6
Test standard	ASTM E8/E8M-16a

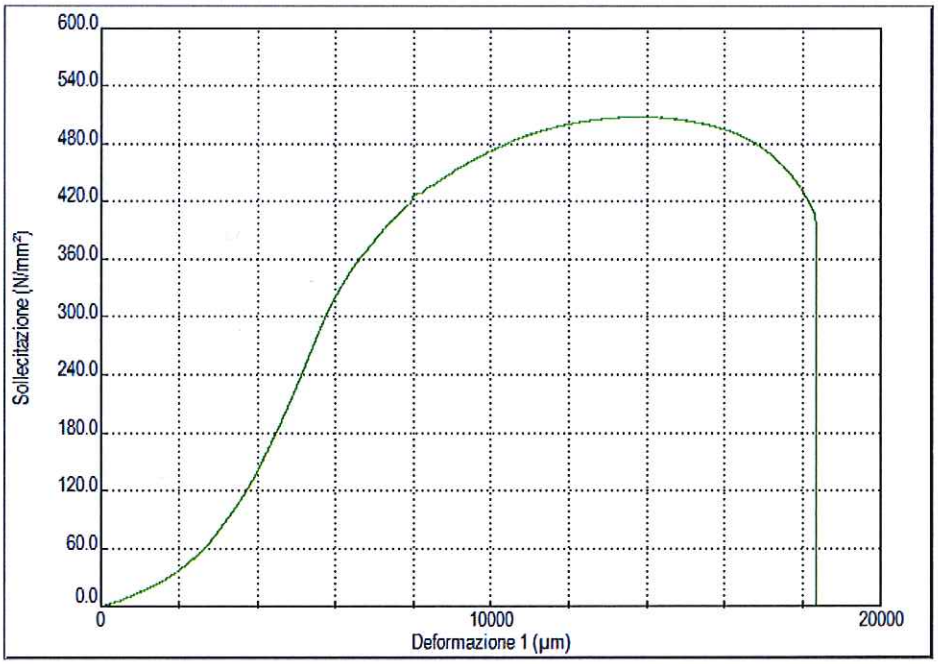
Equipments

(Inv.N°1102) CALIPER - (Inv.N°1153) UNIVERSAL MACHINE QUASAR 600 - (Inv.N°1161) EXTENSOMETER

Specimen informations		
Type	Prismatic	
Width (mm)	19.02	
Thickness (mm)	5.02	
Section (mm²)	95.48	
Test parameters		
Temperature (°C)	20.0	
Results		**Required**
Rp0.2% (N/mm²)	377.0	≥241
Rm (N/mm²)	508.0	≥413

Note

Broken out of weld (Side B)
Rp% determined by offset method - A% = determined after fracture - Values rounded to the nearest.
Speed of testing: method A - during yielding: 8 MPa/sec - after yielding: 0.25mm/mm/min



ROSETTI MARINO SpA
Welding Dept.
D. Cenacchi

RINA Services SpA
☒W ☐R
D. Cimatti
04/04/2018

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dell'Istituto Italiano della Saldatura
Ispettore Incaricato
Matteo Carrubba
05 APR 2018

ROSETTI MARINO SPA	Welding Procedure Approval Record form (WPAR) Certificato Approvazione Procedura di Saldatura	Sheet/Foglio 1/4

Welding Procedure Approval Certificate
Approvazione Procedura di Saldatura Certificato N. 03/03

Manufacturer's Welding / Procedure Reference No **Procedura di saldatura del costruttore. / N. di riferimento**	03/03 REV. 0				
Manufacturer / Costruttore	**ROSETTI MARINO S.p.A.**				
Address / Indirizzo	**VIA TRIESTE 230 - 48100 RAVENNA**				
Code, Testing Standard / Codice, Normativa	EN 288 – 3:1993/A1 May 1999				
Date of welding / Data esecuzione saggio	10.03.2003				
EXTENT OF APPROVAL / VALIDITA' DELL'APPROVAZIONE					
Welding process / Processo di saldatura	**a)** GTAW (141)	**b)** /	**c)** /		
Type(s) / Tipo	**a)** Manuale	**b)** /	**c)** /		
Joint type / Tipo di giunto	BW on plate and pipe: SS (mb, nb): BS (gg, mg); TW (ss, bs); FW (p, t)				
Parent metal(s) / Materiale di base	EM Gruppo 9 con gruppo 1				
Metal thickness / Spessore (mm)	3,0 ÷ 7,82 Throat ≥ 2,93 ÷ 5,86				
Outside diameter / Diametro esterno (mm)	30,15 ÷ 120,6				
Filler metal type / Tipo materiale d'apporto	DIN 8556:UPX2 CrNi 2412				
Shielding gas, flux / Gas di protezione, flusso	EN 439-I1 (ARGON 99,99%)				
Type of welding current / Corrente di saldatura	DC - EN	**Heat input / Apporto termico (kJ/mm)**	± 25% ogni passata		
Welding position / Posizione di saldatura	H-L045 Up				
Preheat / Preriscaldo (°C)	15	**Interpass temperature / Temp. di interpass (°C)**	200		
Post-Weld Heat Treatment and/or ageing / Trattamento Termico e/o Invecchiamento	N.A.				
Other information / Altre informazioni	NONE				
Welder's name / Nome del saldatore	Masacci Alberto (punzone n° 10)				
Welding test conducted by / Prove condotte da	Rosetti Marino S.p.A. – Ravenna				
Mechanical tes conducted by / Prove meccaniche condotte da	Control snc – Ravenna				
Laboratory report reference N. / Rapporto di prova N.	Report N° 193				

Test carried out in the presence of **Test condotti alla presenza di**	**BUREAU VERITAS**	**Test results are** **Risultato prove**	**Acceptable**

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 EN 288-3:1993/A1 May 1999

Si certifica che i dati riportati in questo rapporto sono corretti e che i saggi di saldatura sono preparati, saldati e testati in accordo con le richieste di EN 288-3:1993/A1 May 1999

Location / Luogo	**Date of issue / Data di emissione**	**Examiner or Examining Body / Esaminatore o Ente Certificante**
RAVENNA	**30-04-2003**	**BUREAU VERITAS**

ROSETTI MARINO S.p.A.

Name and signature / Nome e firma

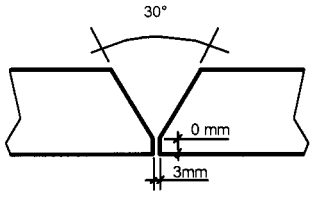
EWF S. SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

BUREAU VERITAS PADUA ITALY WITNESSED REVIEWED SURVEYOR MORASSI DATE 30 APR 2003

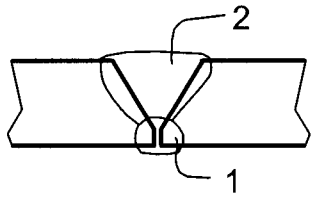
ROSETTI MARINO SPA	WELDING PROCEDURE APPROVAL RECORD QUALIFICA DI PROCEDIMENTO WPAR	WPAR N./PROC. N. 03/03	Sheet/Foglio 2/4

Manufacturer / Costruttore	ROSETTI MARINO S.p.A.					
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA			Examiner or Examining body / Ente certificante		
Procedure approval record (WPAR) N° / Qualifica di procedimento N.	03/03	Date/Data	10.03.03	Ref. N./N. Rif.	BUREAU VERITAS	
WPS No. / Procedure N.	03/03	Rev.	0	Date/Data	28.02.2003	
Welding Process(es) / Processo(i) di saldatura	a) GTAW (141)	b) /		c) /		
Types / Tipi (Man., Autom., Semi-autom.)	a) Manual / Manuale	b) /		c) /		
JOINTS / GIUNTI Joint type / Tipo di giunto	Butt weld single "V" groove					
BACKING / Sostegno	ARGON 99,99%					

EDGE PREPARATION / PREPARAZIONE GIUNTO



WELDING SEQUENCE - PASS LOCATION / POSIZIONAM. PASSATE



Run or layers / Passate o strati	Proc.	Filler metal / Materiale d'apporto Size / Dim (mm)		Amp.		Volt.		Travel Speed / Veloc. Sald.	Heat Input / Apporto Termico
		1E	2E	1E	2E	1E	2E	mm/min	kJ/mm
1	141	2.4	/	105	/	11	/	35	1,98
2	141	2.4	/	98	/	12	/	50	1,41

PARENT MATERIAL / MATERIALE DI BASE

Spec. Type & Grade / Specif. Tipo e Grado		ASTM/ASME A/SA 333		Gr. 6	
to Spec. Type & Grade / Specif. Tipo e Grado		ASTM A 312		TP 304 L	
Group No. / Gruppo	1	To / al	Group No. / Gruppo	9	
Thickness of test coupon / Spessore del saggio (mm)		3.91	to / con	3.91	
Diameter of test coupon / Diametro del saggio (mm)		60.3	to / con	60.3	
Other / Altro	Certificate Pietra 77063 heat 11590 Changwon Specialty Steel 20926-3053 heat A57892				

BUREAU VERITAS PADUA - ITALY WITNESSED REVIEWED SURVEYOR MORASSI DATE 30 APR 2003

FILLER METALS / MATERIALE D'APPORTO	a)	b)	c)
Specification No. DIN 8556	UP X2 CrNi 24 12		
En Class / Classificazione	/		
Size of filler metal / Dimensioni materiale d'apporto (mm)	2.4		
F.M. Trade name / Nome commerciale materiale d'apporto	SOUDOTIG 309L		
Manufacturer / Fabbricante	SOUDOMETAL		
Flux Trade name / Nome Commerciale Flusso	NA		
Manufacturer / Fabbricante	NA		
Deposited Weld Metal / Metallo depositato (mm)	3.91		
Other / Altro	Soudometal E110714 heat 3099		

EWF EUROPEAN WELDING FEDERATION S. SOLMI I.EWF.30416

ROSETTI MARINO SPA	WELDING PROCEDURE APPROVAL RECORD QUALIFICA DI PROCEDIMENTO WPAR	WPAR N./PROC. N. 03/03	Sheet/Foglio 3/4

ELECTRICAL CHARACTERISTICS / CARATTERISTICHE ELETTRICHE		
Current / Corrente		DC / CC
Polarity / Polarità		EN / PD
Ampere – Volt		See table page 2/4 / Vedi tabella pagina 2/4
Tungsten Electrode Type & Size / Tipo e Dimensioni Elettrodo W		UNI EN 26848 WT 20 Ø = 2,5 mm
Mode of Metal Transfer for GMAW / Modo di trasf. per MAG		N.A.
Other / Altro		None
TECHNIQUE / TECNICA		
Orifice or gas cup size / Diametro dell'ugello o ceramica		a) 3/8"
String or Weave Bead / Cordoni Stretti o Larghi		String/Stretti
Initial and interpass cleaning / Pulizia iniziale e tra le passate		Brushing end/or grinding - Molatura e/o spazzolatura
Method of back gouging / Metodo di solcatura		N.A.
Oscillation / Oscillazione:		
	Amplitude / Ampiezza	N.A.
	Frequency / Frequenza	N.A.
Distance contact tube-work piece / Distanza libera filo		/
Multiple, Single Pass (per Side) / Passata Singola o Mult. (per lato)		Multiple/Multipla
Single or Multiple Electrodes / Elettrodi Multipli o SIngoli		Singolo
Torche angle direction of welding / Angolo e direzione torcia		N.A.
Other / Altro		/
WELDING POSITIONS / POSIZIONI DI SALDATURA		
Position of groove or fillet/Posizione dello smusso o del cordone d'angolo		H L045
Welding Progression / Progressione di Saldatura		Up hill / Ascendente
Other / Altro		/
PREHEAT / PRERISCALDO		
Preheat Temperature / Temperatura di Preriscaldo (°C)		15
Interpass Temperature / Temperatura di Interpass (°C)		150
Other / Altro		/
POSTWELD HEAT TREATMENT / TRATTAMENTO TERMICO		
Temperature / Temperatura (°C)		/
Time / Tempo (h)		/
Other / Altro		/

GAS

	Percent Composition / Composizione %			
	Gas(es) / Gas	**(Mixture) / (Miscela)**	**Flow rate / Portata**	
Plasma	/	/	/	l/min
Shielding / Protezione	ARGON	99.99	10	l/min
Trailing /Aggiuntivo	/	/	/	l/min
Backing / Al rovescio	ARGON	99.99	4	l/min
Other / Altro	EN 439-I1	/	/	

EWF S. SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

BUREAU VERITAS PADOVA ITALY WITNESSED REVIEWED SURVEYOR MORASSI DATE 30 APR 2003

ROSETTI MARINO SPA	WELDING PROCEDURE APPROVAL RECORD QUALIFICA DI PROCEDIMENTO WPAR	WPAR N./PROC. N. 03/03	Sheet/Foglio 4/4

NON DESTRUCTIVE EXAMINATIONS / ESAMI NON DISTRUTTIVI

	Acceptable/Accettabile			Not performed / Non eseguito			Report No. / Rapporto N.
Visual examinations / Visivo		X					VRD 03/03
Penetrant test / Liquidi penetr.		X					CONTROL PT REPORT N° 03/03
Magnetic particle test / Magnet.							
Radiographic test / Radiografico		X					CONTROL RT REPORT N° 110
Ultrasonic test / Ultrasonoro							

TEST RESULT / RISULTATO DELLE PROVE

TENSILE TEST / PROVA DI TRAZIONE

Specimen type and No. / Provette tipo e N.	Re N/mm²	Rm N/mm²	A % on/su	Z %	Fracture Location Posizione Rottura	Remarks Note
Requirements / Richieste		≥ 415	/	/		
TRANSVERSE FACE		557			FAILURE OUT WELD	
TRANSVERSE FACE		556			FAILURE OUT WELD	
LONGITUDINAL T						

BEND TEST / PROVA DI PIEGAMENTO — Former diameter / Diametro Mandrino 15 mm

Type & N. / Tipo e N.	Bend angle / Angolo di piega	Elongation / Allungamento	Results / Risultati
N. 2 Root bend	180°	Not required	Satisfactory
N. 2 Root bend	180°	Not required	Satisfactory

IMPACT TEST / PROVA DI RESILIENZA — Requirements / Richieste Joule

Specimen Dimens. Dim. Provette (mm)	Notch Locations / Direction Posiz. Intaglio / Direzione	Notch Type / Tipo Intaglio	Test Temp. Temp. Prova (°C)	Impact value/average Valori/media (joule)	Remarks / Note
2,5x10x55	VWT 0/2	Kv	-56°C	26-30-28	
2,5x10x55	ZTA SIDE SA 333 Gr 6	Kv	-56°C	36-10-16	

FILLET WELD TEST / PROVA SALDATURA D'ANGOLO

Result – Satisfactory Risultato - Soddisfacente	Yes -	/	No -	/		Penetration into Parent Metal Penetrazione nel Materiale Base	Yes -	/	No -	/
Macro Results / Risultati Macro: -	/									

OTHER TESTS / ALTRE PROVE

Location of measurement (Sketch) (if required) / Posizione delle impronte (quando richieste)

Type of test / Tipo di prova	
Macro results	satisfactory

Examiner or Examining Body / Esaminatore o Ente Certificante

Date / Data
30-04-2003

BUREAU VERITAS

ROSETTI MARINO S.p.A. EWF S. SOLMI EWT 30418 EUROPEAN WELDING TECHNOLOGIST

Name and signature / Nome e firma

BUREAU VERITAS PADUA ITALY WITNESSED REVIEWED SURVEYOR MORASSI DATE 30 APR 2003

Control Snc	**LABORATORIO DI CONTROLLI E PROVE**	N° 193 Fg.1/2
Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	*CERTIFICATO PROVE MATERIALI* *TEST CERTIFICATE*	DATA / Date **30-apr-03**

COMMITTENTE / CUSTOMER **ROSETTI MARINO S.p.A.**

OBJECT **PQR 3/03 Mater.: 333 Gr.6 - 312 Tp 304**

NORME DI COLLAUDO / SPECIFICATIONS	**EN 288.3**	*ENTE COLLAUDO / INSPECTOR*	**BUREAU VERITAS**

PROVE MECCANICHE / MECHANICAL TESTS

CARATTERISTICHE RICHIESTE				*Snervamento*		*Massimo*		*Allung*	*Striz*	*Resilienza/Impact Test* Joule -56C°	
				Yeld stress	*Rs*	*Total Load*	*Rm*	*Elong.*	*Reduc.*		
				Fs(N)	*N/mmq*	*Fm(N)*	*N/mmq*	*%*	*%*	*Individual*	*Average*
REQUIREMENTS ---------->							>415			4	5
Pos. *Pos.*	*Prova Nr* *Test N°*	*Dimensioni* *Size mm*	*Area* *So* *mmq*	*L0* *mm*	*LU* *mm*	*RISULTATI / RESULT* *Fs*	*Rs*	*Fm*	*Rm*	*A%*			
TWT	1	13,0 x 3,7	48,1					26800	557		FOW	SIDE 333 Gr. 6	
TWT	2	13,0 x 3,5	45,5					25300	556		FOW	SIDE 333 Gr. 6	
FBB	n° 2	20 X 4	ANGLE: 120° - DIAMETER OF THE FORMER: 15mm								Acceptable		
RBB	n° 2	20 X 4	ANGLE: 120° - DIAMETER OF THE FORMER: 15mm								Acceptable		
VWT0/2		10 X 2,5										26 30 28	28
VHT2/2		10 X 2,5	SIDE 333 Gr. 6									36 10 16	21

CRITERI DI ACCETTABILITA'/REFERENCE STANDARD: EN 288.3

NORME DI RIFERIMENTO/REFERENCE STANDARD:

PROVA DI TRAZIONE TRASVERSALE/TRANSVERSE TENSILE TEST: UNI EN 895

PROVA DI TRAZIONE LONGITUDINALE/LONGITUDINAL TENSILE TEST: UNI EN 876

PROVA DI PIEGA /BEND TEST: UNI EN 910

PROVA DI RESILIENZA/IMPACT TEST: UNI EN 875

TWT=TRAZIONE TRASVERSALE SALDATURA/TRANSVERSE WELD TENSILE TEST

TWL=TRAZIONE LONG. SALDATURA / ALL WELD LONG. TENSILE

FOW=ROTTURA DUTTILE FUORI SALDATURA/ DUCTILE FAILURE OUT OF WELD

RBB=PIEGA TRASVERSALE AL ROVESCIO/TRANSVERSE ROOT BEND TEST

FBB= PIEGA TRASVERSALE AL DIRITTO/TRANSVERSE FACE BEND TEST

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile Controllo Qualità Quality Control Manager	BUREAU VERITAS PADUA, ITALY WITNESSED REVIEWED SURVEYOR MORASSI DATE 30 APR 2003

Control Snc
Sede Amministrativa - Laboratorio
Via Attilio Monti, 15 - 48100 Ravenna
Telefono - 0544 590597

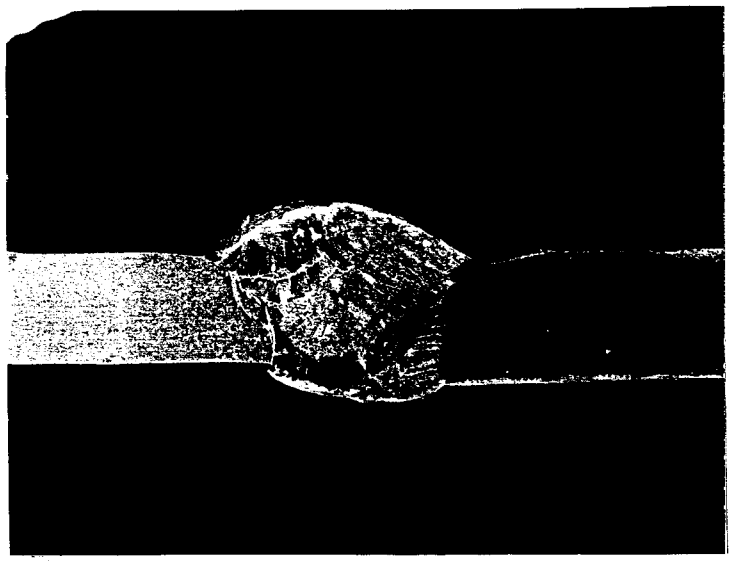
LABORATORIO DI CONTROLLI E PROVE

CERTIFICATO PROVE MATERIALI
TEST CERTIFICATE
MACRO EXAMINATION

N° 193 Fg. 2/2
DATA / Date
30-apr-03

COMMITTENTE
CUSTOMER **ROSETTI MARINO S.p.A.**

OGGETTO
OBJECT **PQR 3/03**



ROSETTI MARINO SPA
Ravenna Works

PROCEDURA DI SALDATURA (in accordo EN 288.3)
Welding Procedure Specification (according EN 288.3)

WPS N°:	03/03
PQR ref.:	03/03 to qualify
REV.:	0
Data /date	28.02.2003

Procedimento di saldatura / Welding process: **GTAW** + +
Tipo / Type: **MANUAL** + +

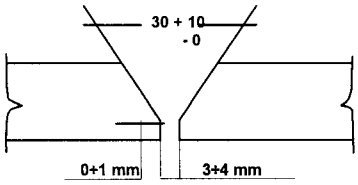
GIUNTO – JOINT

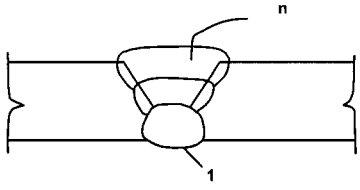
Tipo di giunto / Joint Design: **V**

Supporto / Backing: ☒ Si / Yes **Mat. d'apporto/Weld metal** ☒ No **Solo prima passata/Only for first pass**

Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal. ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other **Use SMAW or FCAW for tack welding**

Dettagli / Details: Groove preparation by machining





MATERIALE BASE – BASE MATERIAL

Da / from P-N°: / Group N°: **1** A / to P-N°: / Group N° **9**

Da Tipo e grado / From type and grade: **ASTM A333Gr.6**

A Tipo e grado / To type and grade: **ASTM A312Tp.304L**

Gamma spessori / Thickness range:
► Materiale base / Base material: Piena penetrazione / Groove **3,91 mm**
► Gamma diametri / Pipe dia. Range: Piena penetrazione / Groove **2"**

METALLO D'APPORTO – FILLER METAL (Procedures for filler metal management IL/MF-04, 05, 06)

	GTAW 141		
Spec. N° (SFA) DIN	**(5,9) 8556**		
AWS N° (CLASS) DIN	**(ER 309L) UP X2 CrNi 24 12**		
F-N°	**6**		
A-N°	**8**		
Diametro mat. d'apporto / Size of filler metal	**2,4**		
Metallo depositato / Deposit weld metal	**3,91**		
Gamma spessori /Thick. range	**3,91**		
Accoppiamento filo-flusso / Electrode-flux (CLASS)	**NA**		
Denom. Comm. flusso / FLUX trade name	**NA**		
Inserto consumabile / Consumable insert	**NA**		
Altro / other	**WIRE SOUDOTIG 309L**		

POSIZIONI – POSITION

Posizione del giunto / Joint position: **Cianfrino / groove**
Posizione / position **H-L0456G**
Progressione / weld progression: **UP HILL**

PRERISCALDO (misurazione con gessetti termoviranti o termometro) – PRE-HEAT (measuring with tempel sticks or thermometer)

Temp.preriscaldo minima / Min. pre-heat temp: **20°C**
Max temp. Di interpass / Max interpass temp.: **200**
Mantenimento interpass / Interpass maintenance: **N.A.**
Tempo di mantenimento interpass / Maintenance timing: **NA**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT

Riscaldamento / Heating rate: (°C/Hrs) **NA**
Temperatura di stasi / Holding temperature (°C) **NA**
Tempo di stasi / Holding time: **NA**
Velocità di raffreddamento / Cooling rate: (°C/Hrs) **NA**

GAS DI PROTEZIONE – GAS

	GAS	Miscela / Mixture	Port. / Flow rate
Protezione / Shielding:	**Ar**	**99,99**	**8-10 lt/1'**
Protezione al seguito / Trailing:	**N.A.**	**N.A.**	**N.A.**
Prot. Al rovescio / Backing:	**Ar**	**99,99**	**4 lt/1'**

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS

Corrente / Current: **DC** Polarità / Polarity **DP**
Dia e tipo elettr. Tungsteno / Tungsten electr. Size & type: **EN 26848WT20 ∅ 2,5 mm**
Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**
Velocità alimentazione filo / Electr. Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE

Passata / Bead: **Tirata/String**
Dimensione bocchello gas / Orifice of gas cup size: **3/8"**
Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura e Molatura/Brushing Grinding**
Metodo di solcatura a rovescio / Method of back gouging: **N.A.**
Oscillazione / Oscillation: **N.A.**
Sporgenza filo (distanza testa a pezzo) / Contact tube to work distance: **NA**
N°Passate / Passes nr.: **Multiple/Multiple**
Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single**
Martellatura / Peening: **N.A.**
Altro / Other: **NA**

N° Passate / Weld layers nr.	Processo / Process	Materiale d'apporto / Filler metal		Corrente / Current		Voltaggio / Volt range	Vel. avanzamento / Travel speed range (mm/min)	Apporto termico / Heat Input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. range			
1	GTAW	ER 309L	2,4	DC-DP	90-110	10-12	30-50	1,08÷2,64
2-n	GTAW	ER 309L	2,4	DC-DP	90-110	10-12	30-50	1,08÷2,64

Preparato da / prepared by: EMANUELE CERONI

Approvato da / approved by: STEFANO SOLMI

BUREAU VERITAS PADUA ITALY WITNESSED REVIEW SURVEYOR MORASSI DATE 28 FEB 2003

ROSETTI MARINO SPA

TABELLA DI SALDATURA
Welding Table

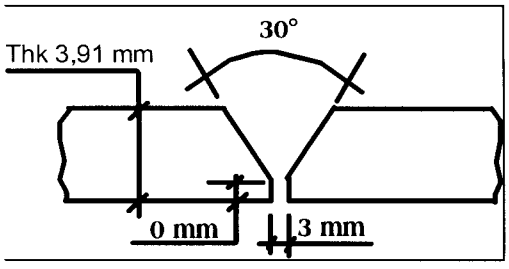
WPS N. **PQR 03-03 and 03A-03** | Posizione / Position **H-L045 (6G)**

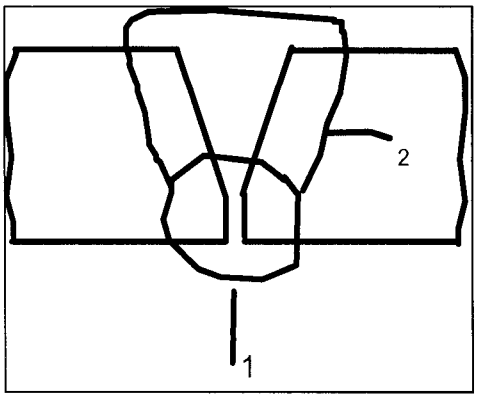
Tipo di saldatura / Welding Process	**GTAW (141)**
Filo / Wire	**SIDOTIG ER 309L HEAT 64502-001**
Flusso / Flux	
Cliente / Client	**AGIP-PETROLI SPA TARANTO**
Commessa / Job	**102D40**
Materiale base / Base material	**ASTM A333 Gr 6** / **A312 TP 304L HEAT A57892**
Saldatore/Operatore: Welder Name/Welding Operator	**MASACCI ALBERTO Sw 10**

	Gas / Gas (es)	Miscela / Mixture	Portata / Flow Rate
Protezione/Shielding	Ar	99,99%	10 lt/1'
Protezione/Shielding			
Aggiuntivo/Trailing			
Al rovescio/Backing	Ar	99,99%	4 lt/1'

Prerisc: / Preheat	**15°C**
Temp. max. di interpass:	**200°C**
Elettrodo / Electrode	**N.A.**
Ravenna,	10-mar-03
Officina Rosetti	**X**
Cantiere	
Corrente AC o DC / Current AC or DC	**DC**
Polarità / Polarity	**DP-SP**
Preparazione / Joint Design	See details

Pass. N. / Pass N.	Proced. / Process	Elettr. / Electr.	Ampere / Amps	Volts / Volts	Vel.mm/1' / Trav.Sp.	Altro / Other
1	141	2,4	105	11	35	1,98
2	141	2,4	98	12	50	1,41





EWF S. SOLMI I.EWT 30416 EUROPEAN WELDING FEDERATION

Note / Notes: **TUNGSTEN ELECTRODE TYPE AND SIZE: UNI EN 26848 WTA 20; ∅ 25 mm.**

BUREAU VERITAS PADUA ITALY WITNESSED REVIEWED SURVEYOR MORASSI DATE 18 MAR 2003

ROSETTI MARINO SPA	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 03/03 data: 10.03.2003

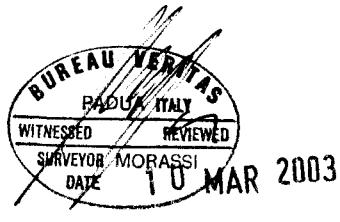
progetto COLONNE SNAM PROGETTI TARANTO project	cliente SNAM PROGETTI S.p.a. client	ordine / PO	commessa 102D40 job

disegno / dwg	ITP N° /	fase / step

oggetto – item

QUALIFICA PROCEDIMENTO PQR 03/03

SI CERTIFICA CHE LA SALDATURA DEL SAGGIO SOPRA CITATO E' STATA SOTTOPOSTA AD ESAME VISIVO AL 100%



note – remarks

Risultato dell'esame visivo : Accettato

risultato – result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

EN 970 Ed. ottobre 1997

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client

CONTROL snc
via Attilio Monti,15 48100 (RA)
tel. 0544 590597 - fax 590599

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - RADIOGRAFICO

NDE REPORT -RADIOGRAPHIC TEST

Data / Date **18/03/2003**

NDE-RT Report Nr **110**

foglio / sheet n° 1 of 1

COMMITTENTE / Customer	OGGETTO / Object	COMMESSA N° / Job No	ORDINE N° / Order No	PROGETTO / Project
ROSETTI MARINO SpA *(Ravenna - ITALIA)*	PQR	102D40	-	COLONNE AGIP TARANTO

LINEA N°/ Line No	DWG N° / DWG No	CODICE / PROCEDURA/In accordance with	ACCETTABILITA'/Acceptance levels
-	-	PRO-CND-AG-01 rev. 0	I.S.P.E.S.L. "Raccolta S"

ITP N° / ITP No	FASE ITP / Phase ITP		
-	-	● PRIMA ESECUZIONE/ First test	○ PRIMA DEL TT/ Before PWHT
		○ DOPO RIPARAZIONE/ After repair	○ DOPO IL TT/ After PWHT

TRACEABILITY		JOINT TYPE						
weld No - dwg - item	WPS	material	Φ	thickness	welder No	position film	defect	judgment
PQR 03/03 W1a			2"	3,91		0-1	Ex	A
						1-2		A
						2-0		A
PQR 03/03 W1A			"	"		0-1		A
						1-2	Aa	A
						2-0	Ex-Aa	A
PQR 03/03 W2			"	"		0-1	Aa	A
						1-2	Aa	A
						2-0		A
PQR 03/03 W2A			"	"		0-1	Be	A
						1-2	Ex-Aa	A
						2-0		A

NOTE / Remarks

CLASSIFICAZIONE DIFETTI

Classification defects ref. ISO 6520

(2011)	Aa	Soffiattura tondeggiante/Porosity < Φ 1mm
(2012)		Uniformly distributed porosity
(2013)		Localized porosity (Clustered)
(2014)		Linear porosity
(2017)		Surface pore
(2015)	Ab	Cavità allungata/Elongated cavity
(2016)	Ab	Tarli/Worm-hole
(300)		Inclusione solide/Solid inclusion
(301)	Ba	Inclusione di scoria/Slag inclusion
(3013)	Bb	Scoria d'orient. diverso/Of any shape in.
	Be	Difetto di ripresa/ 1st run irregular
(400)	C	Mancanza di fusione/Lack of fusion
(402)	D	Mancanza di penetrazione/Lack of penet.
(100)	E	Cricca o fessura/Crack
(101)	Ea	Cricca longitudinale/Longitudinal crack
(102)	Eb	Cricca trasversale/Transverse crack
(104)	Ec	Cricca di cratere/Crater crack
(502)		Sovrametallo in eccesso/Excess weld metal
(504)	Ex	Eccesso di penetrazione/Penetration excess.
(5041)		Sgocciolamento/Local protrusion
(5011)	F	Solco o incisione/Undercut
(514)	Fa	Irregolarità superficiale/Surface irregularity
(509)		Avvallamento/Sagging
(511)		Incom. riempimento/Incom. Filled groove
(515)	In	Insellamento/Root concavity
(517)		Ripresa difettosa/Poor restart
(2024)	K	Cavità di ritiro/Shrinkage cavity
(506)		Traboccamento/Overlap
(507)	Sl	Slivellamento/Misalignment
(3041)	W	Inclusione di tungsteno/Tungsten inclusion
(601)		Innesco d'arco/Arc strike

Giudizio / Judgment

NX-CF	To repeat to confirm defect
A	Accettabile/Acceptable
R	Riparare/To repair
NT	Tagliare/To cut
NX	Ripetere film/To repeat film
EX	Estendere il controllo/Extende test
DF	Difetto film/Film defect
TM	Taglio o modifica/Cut or modification

Pellicole (Nr) A-210	**Marca e tipo pellicola** T-231	**Indicatore Qualità Immagine** - Tipo T-233	
Films 12	Type film AGFA GEVAERT *Structurix D4*	Indicator Quality Image - Type DIN ■ ASTM □ altro/other □ *wire minimum visible* *11 0,32 mm*	
Unità X	**Pellicole per cassetta** (Nr)	**I.Q.I. - Posizione** T-233	**I.Q.I. - Sensibilità (%)**
Unit -	Films box 1	I.Q.I. - Location ■ Lato film/Film Side □ Lato sorgente/Source	I.Q.I. - Sensibility < 2
Sorgente γ T272.2	**Densità film**	**Schermi di rinforzo** (mm) T-232	**Penombra Ug** (mm) T-285
Source γ Iridio 192	Film density 2,5÷3,0	Intensifying screens Pb 0,10x0,15 Front-Back	Unsharpness geom. Ug < 0,5
Energia (keV)	**Sviluppo** T-231.2	**Tecnica radiografica** T-271.1	**Distanza sorgente-pellicola** (mm)
Energy 206÷612	Development ■ Automatic □ Manual	Radiographic techniques □ Panoramic □ Direct ■ Contact □ Ellipse	Distance Source-Film Φe
Macchia Focale (mm) T261.2	**Tempo di esposizione** (s)		**Distanza pezzo lato sorgente-pellicola** (mm)
Focal Spot 1,98*2,00	Exposure time 40/45		Distance Object (source side)-Film =Thk.

TECNICO II° livello CND - IMPRESA	CONTROLLO QUALITA'	ISPETTORE CLIENTE	ISPETTORE A.I.
Operator NDE-IR Level SNT-TC-1A EN473	O.C. Supervisor	Company Repr.	Inspection Agency
MASSIMO GUARDIGLI II° Level RT SNT-TC-1A RINA No 02DG00085PQ0001	ROSETTI MARINO S.p.A. Responsabile Controllo Qualità Quality Control Manager S. Solmi		
NDE Company - Date	Q.C. Supervisor - Date	Company Repr.- Date	I. A. - Date

file:110_ROSETTI_Ceroni

CONTROL S.N.C.
Via Attilio Monti 15 48100
RAVENNA

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - LIQUIDI PENETRANTI
NDT REPORT - DYE PENETRANT TEST

NDE-PT Report No

COMMITTENTE/Customer	**ORDINE N°**/Order No	**COMMESSA N°**/Job No	**PROGETTO**/Project
ROSETTI MARINO S.p.A.			
FILE NAME:	**LINEA N°**/ Line No	**OGGETTO** / Object	**DATA**/Date
		PQR 3 ; PQR 3A	

In accordance with specification and rule: EN 571.1

Stato della superficie / Surface Condition

COME SALDATO As Welded	■	SPAZZOLATO Brushed	■	LAV. DI MACCHINA Machined	☐	COME CALANDRATO As Bent	☐
MOLATO Ground	☐	COME LAMINATO As Rolled	☐	GREZZO As Forged	☐		☐

PRODOTTI UTILIZZATI / Products used	PROCEDURA DI ESECUZIONE / Execution of Procedure
PULITORE PRELIMINARE/ Cleaner **VELNET CGM**	**1** PULITURA PRELIMINARE / Preliminary Cleanign **SPRAY**
PENETRANTE / Penetrant **RED W - CGM**	**2** APPLICAZIONE PENETRANTE / Penetrant application **SPRAY**
PULITORE PENETRANTE/ Penetrant Remover **WATER**	**3** RIMOZIONE PENETRANTE / Removal penetrant ■ **WATER** ☐ ☐
RIVELATORE / Developer **WHITE W - CGM**	**4** ESSICAZIONE / Drying process **NATURAL**
NOTE / Remarks	**5** APPLICAZIONE RIVELATORE / Developer application **SPRAY**
	a (2) TEMPO PENETRAZIONE / Penetrating time (minuti / minutes) **15**
PULITORE POST-CONTROLLO / Cleaner after examination **Cloths and water**	**b** TEMPO DI LETTURA / Checking time (min.) (minuti / minutes) **5**
TEMPERATURA SUPERFICI / Surfaces temperature (°C) (standard range 16-52 °C) **ambient**	**c** ISPEZIONE VISIVA / Visual Inspection ☐ luce bianca min.1000 Lux ☐ luce U.V. min.1000 mW/cmq

NOTE / Remarks

Difetti / Discontinuities

a) Cricca a freddo / Crack	e) Cordone irregolare / Irreg. seam
b) Cricca da stress / Stress Crack	f) Incisione marginale / Undercutting
c) Difetto di ripresa / 1st run defect	g)
d) Porosità / Porosity	h)

Saldatura / Weld F spessore/thickness material/material

ROSETTI MARINO S.p.A.
Responsabile Controllo Qualità
Quality Control Manager
S. Solmi

RESULTS

NDE COMPANY - II° level NDE Operator	**CONFORME ALLA SPECIFICA (*)** conforming to specification	**NON CONFORME ALLA SPECIFICA (*)** not conforming to specification
MERCATALI ALESSIO II° liv. MT/PT CIC PND	■	☐

Q.C. Supervisor	**CUSTOMER INSPECTOR**
Date	Date

file:Pt nord

DALMINE DIV. TAD COM P.O. 02 AT 351 Pag. 1/2
JOB N. RS 095662 02 POS. 003 NR 28 MT 336,00 KG 1828,00 HEAT/COLATA N.11590

PIETRA
SOCIETÀ PER AZIONI
25125 BRESCIA - Via Orzinuovi, 2
telef.: 030 3540545 - fax: 030 3540204

CERTIFICATO DI COLLAUDO
Inspection certificate - Abnahmeprüfzeugnis - Certificat de Réception

EN 10204/3.1.B

N. 77063 FOGLIO 1 di 1
Sheet - Blatt - Page

DATA 27.09.01
Date - Datum - Date

CLIENTE EUROTUBE LIMITED
Customer - Kunde - Acheteur

ORDINE RP28451 DATA 20.06.01
Order - Bestellung - Commande

NS. COMMESSA 15373 DATA 26.06.01
Our order - Uns auftrags - Cde usine

DESCRIZIONE: TUBI S.S. Hot Rolled
Description - Seamless tubes
Beschreibung - Nahtlose stahlrohre
Description - Tubes sans soudure

STATO DI FORNITURA: X FINITI DI LAVORAZIONE A CALDO CON APPROPRIATA STRUTTURA
Condition of supply
Lieferzustand
Etat de fourniture
Hot-working finished with proper structure
Warmverarbeitet mit einwandfreiem Gefügezustand
Finis de travail a chaud avec convenable structure

NORME DI COLLAUDO ASTM/ASME A/SA 333/99-API5L/00 M
Tests standards - Abnahmenormen - Spécification du produit

TRATTAMENTO TERMICO 910 °C ___ MIN.
Heat treatment
Wärmebehandeln
Traitement thermique
Raffreddamento: aria
Cooling : air
Abkühlung : Luft
Refroidissement: air

PEZZI N. 258 (3084 M)
Quantity - Stückzahlmenge - Nombre

PESO KG. 17750
Weight - Gewicht - Masse

QUALITÀ ACCIAIO Gr.6-X 52 Fully killed
Quality of steel - Werkstoff - Nuance d'acier

DIMENSIONI 60,30 X 3,91 X lg. 12000 mm
Sizes - Abmessungen - Dimensions

VALORI RICHIESTI / PROVETTA (*)	Ro 0,2 SNERVAMENTO	R m ROTTURA	A 2" ALLUNGAMENTO	5,65√So	H RB DUREZZA	KV = 56 °C RESILIENZA (J)	Rm x A ≥ 10500	MANDRINATURA	ALLARGAMENTO	BORDATURA	SCHIACCIAMENTO
Requirements / Anforderungen / Valeurs	≥240	≥415	≥30,00								

RISULTATI OTTENUTI - Results - Ergebnisse - Resultats

N.	Sez. mm²	Lo mm	N / mm²	N / mm²	%		1'	2'	3'	
1	58,50	51	378	572	31	80	29J	32J	32J	G
2	58,65	51	380	572	30	80				G
3	58,65	51	380	577	30	81				G
4	58,65	51	380	572	30	80				G
5	58,50	51	375	568	31	79				G
6	58,65	51	380	572	30	80				G
7	58,50	51	376	571	31	79				G
8	58,50	51	376	565	31	79				G
9	58,65	51	380	577	30	81				G
10	58,65	51	380	576	30	81				G
11	58,50	51	377	571	31	79				G
12	58,65	51	380	577	30	81				G
13	58,50	51	375	567	31	79				G
14	58,65	51	380	572	30	80				G

AZIENDA CERTIFICATA UNI EN ISO 9002:94 IQD 9105

CERTIFIED IQNet QUALITY SYSTEM

RECEIVED 25 OCT 2001

Notes :
Heat 11590 Nr.150 Mt.1800 Kg.10310 Spec.1-8
Heat 11753 Nr.108 Mt.1296 Kg.7440 Spec.9-14
Heat 11590 Shear area = 60% Lateral expansion = 1,0 mm
Heat 11753 Shear area = 60% Lateral expansion = 1,2 mm

BUREAU VERITAS PADUA (IT) WITNESSED REVIEWED SURVEYOR MORASSI DATE 10 MAR 2003

(*) SENSO PROVINI : LONGITUDINALE
Specimen direction
Probenrichtung
Direction de l'éprouvette
Longitudinal
Längs
Longitudinale

X PROVA IDRAULICA ALLA PRESSIONE DI 3000 psi
Hydraulic test pressure - Wasserdruckversuch - Essai hydraulique

X CORRENTI INDOTTE SECONDO NORMA ASTM E 309
Eddy current according to - Zerstörungsfreie Prüfung - Courant de Foucaut

RISULTATI DELL'ISPEZIONE E CONTROLLO DIMENSIONALE : OK
Results of inspection and dimensional control
Besichtigung und Ausmessung
Resultat de l'inspection et contrôle dimensions

DIE ROHRE SIND DICHT UND HABEN FREIEN DURCHGANG

CERTIFICHIAMO CHE LA FORNITURA È CONFORME AGLI ACCORDI DELL'ORDINAZIONE
We here by certify that the material complies with the terms of the order
Es wird bestätigt daßdie Lieferung den Vereinbarungen bei der Bestellung entspricht
Nous certifions que la fourniture est conformeaux accords de la commande

COPY CONFORMING TO THE ORIGINAL

ANALISI CHIMICA PIETRA S.P.A.
Chemical analysis
Chemische analyse
Analyse chimiques

TIPO DI FUSIONE : ELECTRIC FURNACE
Cast type
Erschmelzungsart
Type de fusion

COLATA N. Heat - Schmelze Coulée	C %	Mn %	Si %	P %	S %	Cr %	Mo %	Ni %	Cu %	Sn %	V %	Al %	N %	Ceq. %	CERTIFICATO DI COLATA Heat Certificate - Vormaterialzeugnis Cert. d'origine
11590	0,133	1,250	0,192	0,012	0,008	0,108	0,042	0,180	0,226	0,015	0,000	0,027		0,406	GQ230701
CHECK	0,129	1,176	0,198	0,011	0,008	0,102	0,041	0,177	0,226	0,015	0,000	0,028			
11753	0,146	1,250	0,209	0,010	0,008	0,063	0,018	0,077	0,140	0,014	0,000	0,027		0,393	GQ060901
CHECK	0,142	1,256	0,194	0,009	0,008	0,063	0,017	0,073	0,139	0,013	0,000	0,027			

NOTE - Notes - Bemerkungen - Notes
G = GOOD
I TUBI HANNO SUBITO UN TRATTAMENTO COMPLETO DI DEMAGNETIZZAZIONE.
The tubes have been subjected to a complete demagnetization treatment.

MARCATURA marking - Kennzeichnung - Marquage

Il Collaudatore d'Officina
Internal authorized inspector
QUALITY CONTROL
(A. Zacchi)

Eurotube Limited

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ROSETTI M. S.p.A.
controllo qualità
quality control
F. Ragazzini

PIETRA S.p.A.

ENCLOSED TO CERTIFICATE NO. 77063 *DATE* 27/09/01

- ACCORDING TO TAD GROUP SPECIFICATION **TG 029 Rev.1**
- ACCORDING TO **ASME SECT. II PART A ED. 1998 Add. 2000**
- ACCORDING TO **NACE MR 01.75 REV. 2000**
- ACCORDING TO **ASTM A 333 ED. 2000 (VOL. 01.01)**
- ACCORDING TO **ASME SA 333 ED 1998 ADD. 2000**
- ACCORDING TO **API 5L ED. 2000**
- EDDY CURRENT TESTS ACCORDING TO **ASTM E 309**
- YELD/TENSILE STRENGHT RAZIO **0,85 MAX**
- **Nb** max 0,020% - **B** max 0,0005% - **Ti** max 0,02%
- **Nb + V + Ti + Cu + Mo + Cr 0,60% max**

ROSETTI MARINO S.p.A.
Conforme alla spec
According to the spec. REVIEW
Date
Date
11 GEN. 2003

DECLARATION

We hereby guarantee that the Yeld strength values of the above mentioned pipes are in accordance with ASME II part D table Y - 1 for Sec. VIII - " Application.

La société PIETRA S.p.A. garantit que les produits objet du présent certificat respectent en leur totalité les prescriptions de l'Article 15 de l'Arrete Ministériel du 24 Mars 1978 modifié:

C<=0,25%, P<=0,050%, S<=0,050%, R<=700 N/mm2, E<=0,9 x R, A% (Lo=5,65VSo) min. 16% en lon. R(A-2)>=10500, A% (Lo=5,65VSo) min. 14% en transv. RxA>=10500.

COPY CONFORMING TO THE ORIGINAL

PIETRA S.p.A.
QUALITY CONTROL
(A. Zacchi)

BUREAU VERITAS
PADUA ITALY
WITNESSED REVIEWED
SURVEYOR MORASSI
DATE
10 MAR 2003

Eurotube Limited

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Dalmine S.p.A.
Sede Legale, Direzione Generale,
Amministrativa e Commerciale
Piazza Caduti 6 Luglio 1944, 1 - 24044 Dalmine (BG)
Tel. + 39 035 560 111 - Fax + 39 035 560 4001

~~MILL TEST CERTIFICATE~~
~~INSPECTION CERTIFICATE~~

CHANGWON SPECIALTY STEEL

65 Shinchon-dong, Changwon, Kyongnam, Korea

MILL TEST CERTIFICATE

CUSTOMER: TAD METALS SPA

SUPPLIER: SAM SUN CORP.

PURCHASE ORDER NO.: TAD-020725.

REF.CD:715561-01

MANUFACTURE NO.: KPGEE03DB 060

CERT. NO.: 20926-3053

STEEL GRADE : TP304/304L

S I Z E : OD 2 NPS X WT SCH80S

ARTICLE : SEAMLESS AUSTENITIC STAINLESS STEEL PIPES

SPECIFICATION : ASTM A312

EDITION/ADDENDA : 99

STATE OF DELIVERY: SOLUTION TREATMENT
HOT FINISHED, PLAIN END

MELTING PROCESS: E.A.F.
V.O.D.
STRAND CASTING

Heat No.		Chemical Composition (wt.%)															Non-Metallic Inclusion Test
		C	Si	Mn	P	S	Ni	Cr	Mo	Cu							
Spec.	MIN.						8.000	18.000									
	MAX.	.035	.750	2.000	.0400	.0300	11.000	20.000									
A57892 L		.017	.356	1.674	.0310	.0010	9.182	18.108	.282	.406							
A57892 P		.015	.361	1.696	.0282	.0010	9.183	18.245	.282	.401							

Test No. (Lot No.)		Tensile Properties				Hardness		Impact Test			Decarburized Depth (mm)		Grain Size No.	Additional Tests
		Y.S.(KSI) 0.2%		T.S. (KSI)	EL. (%)	Body HRB					TOTAL	FERR.		
Spec.	MIN.	30.0		75.0	35.0									Flattening test: GOOD Hydrostatic test: GOOD (2500PSI)
	MAX.					90								
9000-1		35.0		84.0	53.0	78								
9000-2		36.0		84.0	52.0	79								

TAD METALS S.r.l.
COPIA CONFORME
ALL'ORIGINALE
Pos.: 6
Bolla: 67427

COPY CONFORMING
TO THE ORIGINAL

Lot No.	Bundle No.	Length (M)	Number of Qt.	Total Length(M)	Weight Kg	Case No.
2P12939000	2P129390001	6	29	174	1,319	290237
		TOTAL	29		1,319	

Additional Tests / Remarks

TOLERANCES: ASTM A530/530M-99. HARDNESS TEST: NACE MR-0175(00ED.)
TECH. CONDITION ACC. TO ASTM A312-99/ASME SA312-98ED.(00ADD.) TP304/304L
EQUIVALENT TO DIN WNR1.4301, 1.4306 & AFNOR Z6CN18-09, Z2CN18-10
INSPECTION CERTIFICATE DIN 50049 3.1B/EN 10204 3.1B

BUREAU VERITAS
PADUA ITALY
WITNESSED REVIEWED
SURVEYOR MORASSI
DATE 10 MAR 2003

ROSETTI MARINO S.p.A
Conforme alla spec.
According to the spec. REVIEW
C.F. Firma
C.F. Signature
Data
Date
27 GEN 2003

ORIGINAL

Our quality system is certified in accordance with ISO 9002 by kfq.

We here certify, that the material described above has been tested and complies with the terms of the order contract. P2.1 mat.6

Quality Technology Team Manager
DATE : SEP. 26, 2002

S.A. SOUDOMETAL N.V.
Bld. M. Herbettelaan 24
1070 Brussels (Belgium)
Tel.: 32 2 522 98 00 Fax: 32 2 520 08 07 Tlx: 23 361 Soudo B
TVA/BTW: BE 401.918.312

Message for FAX number : I3959343297
PLEASE USE OUR REF: CT_01384

FAX : I3959343297
ATTN : SIG. BORTOLACELLI

CERTIFICAT - TESTRAPPORT- TEST REPORT - WERKZEUGNIS - CERTIFICATO - CERTIFICADO

Cliente : E110714
Qualità : SOUDOR 309 L

SFA 5.9:ER 309 L
TALSUDO S.R.L.
Classificazione
DIN 8556:UP X2 CrNi 24 12

V/o Ordine : 501 DEL 050195

Dimensioni (mm)

N/o Rif : 105069
2,4

Prodotto : Filo per saldatura auto

N° Produzione(colata,lotto,ecc) 3099

1. Analisi chimica(%) metallo depositato * Valori rilevati

2. Proprieta meccaniche Valori tipici

N°	Rs0,2	Rm	A %	Z %	KV-J	Tratt.termico Durata(O)
3099	+20					

3. Varie Valori tipici Osservazioni

	Cont.Radio.	Sald.d'angolo	FN	Durezza HB	HRC	HRC(WH)
3099						

4. Composizione chimica del filo(%) Valori tipici

N°	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N
3099	0,015	1,6	0,41	0,013	0,015	23,33	13,51	0,08	0,082	0,078

BUREAU VERITAS PADUA, ITALY WITNESSED REVIEWED SURVEYOR MORASSI DATE 10 MAR 2003

Data :13/01/95

Noi certifichiamo che il prodotto sopradescritto risponde alle caratteristiche richieste della sua classific.(Ultima edizione)

T, I & QA Mgr

ROSETTI MARINO	Welding Procedure Approval Record (WPQR) Verbale di Qualifica di Procedura di Saldatura	No. 26/06	Sheet/Foglio 1/4

Manufacturer's Welding Procedure. Reference No Procedura di saldatura del costruttore. N. di riferimento	26/06 REV. 0			
Manufacturer / Costruttore	ROSETTI MARINO S.p.A.			
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA			
Code, Testing Standard / Codice, Normativa	EN 15614:2004 & MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4			
Date of welding / Data esecuzione saggio	25.07.2006			
EXTENT OF APPROVAL / VALIDITA' DELL'APPROVAZIONE				
Welding process / Processo di saldatura	a) 141 - GTAW	b) 111 - SMAW	c) /	
Type(s) / Tipo	a) Manual / Manuale	b) Manual / Manuale	c) /	
Joint type / Tipo di giunto	BW on pipe			
Parent Material Group & sub-Group	Group 8.1			
Parent material thickness / Spessore (mm)	11,07 mm 5,5÷22	Fillet weld (mm)	Unlimited throat, base metal thickness 5,5÷13,3	
Weld metal thickness/ spessore saldato	141 2 mm – 111 9,07 mm			
Single or Multi-pass / passata singola o multipla	MULTIPLE			
Outside diameter / Diametro esterno (mm)	60,3			
Filler material Designation / Classificazione materiale d'apporto	**141** :EN 12072 – W 19 12 3 L **111** :EN 1600 – E 12 12 3 L B 2 2			
Filler material Maker / Produttore materiale d'apporto	ESAB SALDATURA			
Filler material Size / Dimensioni materiale d'apporto	141 ∅ 2,4 mm 111 ∅ 3,2 mm			
Shielding gas, flux / Gas di protezione, flusso	I 1			
Backing gas, / Gas di supporto	I 1			
Type of welding current & polarity	DC – SP/RP	Heat input / Apporto termico (kJ/mm)	± 25% see sheet 2/4	
Welding position / Posizione di saldatura	PC			
Preheat / Preriscaldo (°C)	20	Interpass temperature / Temp. di interpass (°C)	150	
Post-Weld Heat Treatment and/or ageing / Trattamento Termico e/o Invecchiamento	N.A.			
Other information / Altre informazioni	NONE			
Welder's name / Nome del saldatore	**Bernabei Mirko** (punzone 6)			
Welding test conducted by / Prove condotte da	Rosetti Marino S.p.A. – Ravenna			
Mechanical tes conducted by / Prove meccaniche condotte da	Control – Ravenna			
Laboratory report reference N. / Rapporto di prova N.	Report N° 330 Dated 29-08-2006			
Test carried out in the presence of Test condotti alla presenza di	RINA S.p.A.	Test results are Risultato prove	Acceptable	

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 EN 15614:2004 +MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Si certifica che i dati riportati in questo rapporto sono corretti e che i saggi di saldatura sono preparati, saldati e testati in accordo con le richieste di EN 15614:2004 + OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Location / Luogo	Date of issue / Data di emissione	Examiner or Examining Body /
RAVENNA	08-09-2006	RINA S.p.A

ROSETTI MARINO S.p.A.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

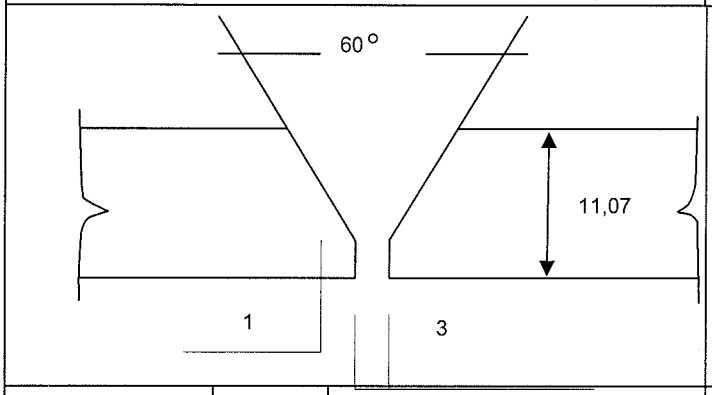
EWF
S. SOLMI
I EWT 30416
EUROPEAN WELDING TECHNOLOGIST

Name and signature / Nome e firma

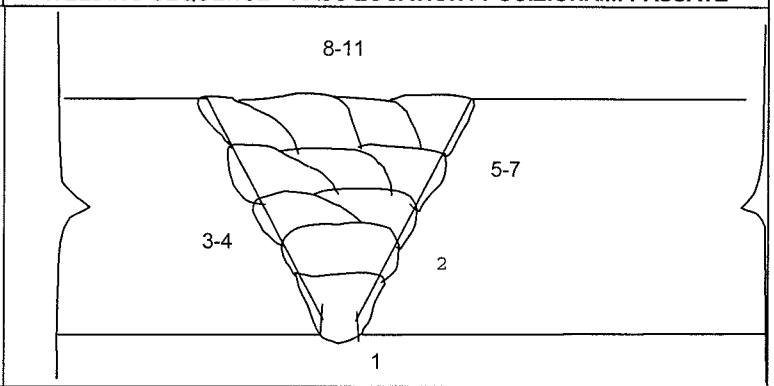
IL RESPONSABILE
(Ing. Cesare MURGIA)

Manufacturer / Costruttore	ROSETTI MARINO S.p.A.				
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA			Examiner or Examining body / Ente certificante	
Procedure approval record (WPAR) N° / Qualifica di procedimento N.	26/06	Date/Data	08-09-2006	Ref. N./N. Rif.	RINA S.p.A.
WPS No. / Procedure N.	26/06	Rev.	0	Date/Data	25-07-2006
Welding Process(es) / Processo(i) di saldatura	a) 111 - GTAW	b) 111 - SMAW	c) /		
Types / Tipi (Man., Autom., Semi-autom.)	a) Manual / Manuale	b) Manual / Manuale	c) /		
JOINTS / GIUNTI Joint type / Tipo di giunto	Butt weld "V" groove				
BACKING / Sostegno	WELD METAL GTAW				

EDGE PREPARATION / PREPARAZIONE GIUNTO



WELDING SEQUENCE - PASS LOCATION / POSIZIONAM. PASSATE



Run or layers / Passate o strati	Proc.	Filler metal / Materiale d'apporto Size / Dim (mm)		Amp.		Volt.		Travel Speed / Veloc. Sald.	Heat Input / Apporto Termico
		1E	2E	1E	2E	1E	2E	mm/min	kJ/mm
1	141	2.4		103		12		40	1.85
2	111	3,2		95		23		160	0.82
3	111	3,2		100		24		170	0.85
4	111	3,2		93		23		190	0. 68
5	111	3,2		92		23		180	0.71
6	111	3,2		93		23		190	0.68
7	111	3,2		90		23		190	0.68
8-11	111	3,2		90		23		180	0.69

PARENT MATERIAL / MATERIALE DI BASE

Spec. Type & Grade / Specif. Tipo e Grado		ASTM A312		Tp 316L	
to Spec. Type & Grade / Specif. Tipo e Grado		ASTM A312		Tp 316L	
Group No. / Gruppo	8.1	To / al	Group No. / Gruppo	8.1	
Thickness of test coupon / Spessore del saggio (mm)	11,07	to / con	11,07		
Diameter of test coupon / Diametro del saggio (mm)	60,3	to / con	60,3		
Other / Altro	Heat number 35698				

FILLER METALS / MATERIALE D'APPORTO	a) 141	b) 111	c)
Specification No. EN	EN 12072 (AWS 5.9)	EN 1600	
Class / Classificazione	W 19 12 3 L (ER 316L)	E 19 12 3 L B 2 2	
Size of filler metal / Dimensioni materiale d'apporto (mm)	2,4 (heat 444361)	3,2 (heat 5244091)	
F.M. Trade name / Nome commerciale materiale d'apporto	OK TIGROD 16.30	OK 63.35 (E316L-15)	
Manufacturer / Fabbricante	ESAB SALDATURA	ESAB SALDATURA	
Flux Trade name / Nome Commerciale Flusso	N.A.	N.A.	
Manufacturer / Fabbricante	N.A.	N.A.	
Deposited Weld Metal / Metallo depositato (mm)	2	9,07	
Other / Altro			

EWF EUROPEAN WELDING FEDERATION S. SOLMI I EWT 30416

ELECTRICAL CHARACTERISTICS / CARATTERISTICHE ELETTRICHE		
Current / Corrente		DC
Polarity / Polarità		141 : SP 111 : RP
Ampere – Volt		See table page 2/4 / Vedi tabella pagina 2/4
Tungsten Electrode Type & Size / Tipo e Dimensioni Elettrodo W		AWS 5.12 EWTh2
Mode of Metal Transfer for GMAW / Modo di trasf. per MAG		N.A.
Other / Altro		None
TECHNIQUE / TECNICA		
Orifice or gas cup size / Diametro dell'ugello o ceramica		8 mm
String or Weave Bead / Cordoni Stretti o Larghi		String/Stretti
Initial and interpass cleaning / Pulizia iniziale e tra le passate		Brushing and/or grinding - Molatura e/o spazzolatura
Method of back gouging / Metodo di solcatura		N.A.
Oscillation / Oscillazione:		
	Amplitude / Ampiezza	N.A.
	Frequency / Frequenza	N.A.
Distance contact tube-work piece / Distanza libera filo		/
Multiple, Single Pass (per Side) / Passata Singola o Mult. (per lato)		Multiple
Single or Multiple Electrodes / Elettrodi Multipli o SIngoli		Single
Torche angle direction of welding / Angolo e direzione torcia		N.A.
Other / Altro		/
WELDING POSITIONS / POSIZIONI DI SALDATURA		
Position of groove or fillet/Posizione dello smusso o del cordone d'angolo		PC
Other / Altro		/
PREHEAT / PRERISCALDO		
Preheat Temperature / Temperatura di Preriscaldo (°C)		20
Interpass Temperature / Temperatura di Interpass (°C)		150
Other / Altro		/
POSTWELD HEAT TREATMENT / TRATTAMENTO TERMICO		
Temperature / Temperatura (°C)		N.A.
Time / Tempo (h)		N.A.
Other / Altro		

GAS

	Percent Composition / Composizione %			
	Gas(es) / Gas	**(Mixture) / (Miscela)**	**Flow rate / Portata**	
Plasma	/	/	/	
Shielding / Protezione	I 1	99,99	12	
Trailing /Aggiuntivo	/	/	/	
Backing / Al rovescio	I 1	99,99	10	
Other / Altro	/	/	/	

EWF EUROPEAN WELDING FEDERATION S. SOLMI I EWT 30416

NON DESTRUCTIVE EXAMINATIONS / ESAMI NON DISTRUTTIVI

	Acceptable/Accettabile			Not performed / Non eseguito			Report No. / Rapporto N.
Visual examinations / Visivo		X					VDR 26/06
Penetrant test / Liquidi penetr.		X					PT Report 26/06
Magnetic particle test / Magnet.					X		
Radiographic test / Radiografico		X					RT Report 275
Ultrasonic test / Ultrasonoro					X		

TEST RESULT / RISULTATO DELLE PROVE

TENSILE TEST / PROVA DI TRAZIONE

Specimen type and No. / Provette tipo e N.	Re N/mm²	Rm N/mm²	A % on/su	Z %	Fracture Location Posizione Rottura	Remarks Note
Requirements / Richieste	/	≥ 485	/	/		
TRANSVERSE 1	/	607	/	/	Base material	
TRANSVERSE 2	/	618	/	/	Base material	

BEND TEST / PROVA DI PIEGAMENTO — Former diameter / Diametro Mandrino 40 mm

Type & N. / Tipo e N.	Bend angle / Angolo di piega	Elongation / Allungamento	Results / Risultati
N. 2 Transverse root bend	180°	Not required	Satisfactory
N. 2 Transverse face bend	180°	Not required	Satisfactory

IMPACT TEST / PROVA DI RESILIENZA — Requirements / Richieste Joule

Specimen Dimens. Dim. Provette (mm)	Notch Locations / Direction Posiz. Intaglio / Direzione	Notch Type / Tipo Intaglio	Test Temp. Temp. Prova (°C)	Impact value/average Valori/media (joule)		Remarks / Note
/						
/						
/						
/						

FILLET WELD TEST / PROVA SALDATURA D'ANGOLO

Result – Satisfactory Risultato - Soddisfacente	Yes -	/	No -	/		Penetration into Parent Metal Penetrazione nel Materiale Base	Yes -	/	No -	/
Macro Results / Risultati Macro: -	/									

OTHER TESTS / ALTRE PROVE

Location of measurement (Sketch) (if required) / Posizione delle impronte (quando richieste)

Type of test / Tipo di prova	
Macro results	Satisfactory-See CONTROL Certificate No. 330

Date / Data
08-09-2006

ROSETTI MARINO S.p.A.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

EWF
S. SOLMI
I EWT 30416
EUROPEAN WELDING TECHNOLOGIST

Examiner or Examining Body / Esaminatore o Ente Certificante
RINA S.p.A.

Name and signature / Nome e firma

IL RESPONSABILE
(Ing. Cesare MURGIA)

ROSETTI MARINO SPA
Ravenna Works

PROCEDURA DI SALDATURA (in accordo EN 15614/1+TS-12)
Welding Procedure Specification (according EN 15614/1+TS-12)

WPS N°:	26/06
PQR ref.:	26/06 to qualify
REV.:	0
Data /date	25-07-2006

Procedimento di saldatura / Welding process: **GTAW + SMAW** — Tipo / Type: **MANUAL + MANUAL**

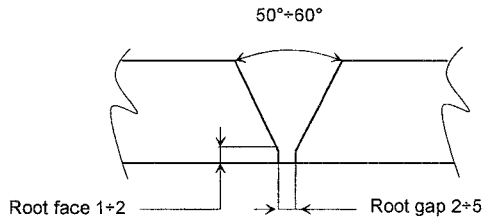
GIUNTO – JOINT (QW-402)

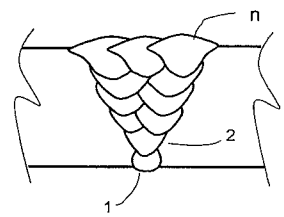
Tipo di giunto / Joint Design: **V**

Supporto / Backing: ☒ Si / Yes **Only for second and other passes** ☒ No **Only for first pass**

Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403)

Da / from P-N°: - Group N°: **(EN 15608) 8.1** — A / to P-N°: - Group N° **(EN 15608) 8.1**

Da Tipo e grado / From type and grade: **ASTM A312 Tp 316L**

A Tipo e grado / To type and grade: **ASTM A312 Tp 316L**

Gamma spessori / Thickness range:
- ► Materiale base / Base material: Piena penetrazione / Groove **11,07 mm (range 3 to 22,14)**
- ► Gamma diametri / Pipe dia Range: Piena penetrazione / Groove **2" (range 1" and over)**

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW 141	SMAW 111
Spec. N° (SFA)	5.9	5.4
AWS N° (CLASS)	ER 316L	E316L-15
F-N°	6	5
A-N°	8	8
Diametro mat. d'apporto / Size of filler metal	2,4	3,2 mm
Metallo depositato / Deposit weld metal		
Gamma spessori /Thick. range Piena penetrazione / Groov	2,0 mm	9,07 mm
Accoppiamento filo-flusso / Electrode-flux (CLASS)	N.A.	N.A.
Denom. Comm. flusso / FLUX trade name	N.A.	N.A.
Inserto consumabile / Consumable insert	N.A.	N.A.
Altro / other	WIRE: ESAB TIGROD 16.30	ELETTRODO: OK 63-35

POSIZIONI – POSITION (QW 405)

Posizione del giunto / Joint position: **Cianfrino / groove** — Posizione / position **PC (2G)** — Progressione / weld progression: **N.A.**

PRERISCALDO – PRE-HEAT (QW406)

Temp.preriscaldo minima / Min pre-heat temp: **20 °C** — Max temp. Di interpass / Max interpass temp.: **150°C** — Mantenimento posriscaldo / Postheat maintenance: **N.A.** — Tempo di mantenimento posriscaldo / Postheat time: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

Riscaldamento / Heating rate (°C/Hrs): **N.A.** — Temperatura di stasi / Holding temperature °C: **NA** — Tempo di stasi / Holding time (min): **NA** — Velocità di raffreddamento / Cooling rate (°C/Hrs): **N.A.**

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port / Flow rate
Protezione / Shielding:	Ar	99,99 %	10-12 lt/min.
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot Al rovescio / Backing:	Ar	99,99 %	10-12 lt/min.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW –409)

Corrente / Current: **DC** — Polarità / Polarity **SP/RP**

Dia e tipo elettr Tungsteno / Tungsten elctr Size & type: **AWS A 5.12 EWTh2 dia.2,4mm**

Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**

Velocità alimentazione filo / Electr. Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String** — Dimensione bocchello gas / Orifice of gas cup size: **3/8"** — Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura e Molatura/Brushing Grinding**

Metodo di solcatura a rovescio / Method of back gouging: **N.A.** — Oscillazione / Oscillation: **N.A.** — Distanza tra zona di contatto e pezzo / Contact zone to work distance: **N.A.**

N°Passate / Passes nr.: **Multipla/Multiple** — Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single** — Martellatura / Peening: **N.A.**

Altro / Other: **None**

N° Passate Weld layers nr.	Processo Process	Materiale d'apporto Filler metal		Corrente Current		Voltaggio Volt range	Vel. avanzamento Travel speed range (mm/min)	Apporto termico Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. range			
1	GTAW	ER 316L	2,4	DC/SP	90 - 110	11 - 12	40 - 60	1 – 1,9
2-n	SMAW	E316L-16	3,2	DC/RP	90 - 110	22 - 24	130 - 180	0,6 – 1,2

Preparato da / prepared by: ***A.Khalifa***

Approvato da / approved by: ***S.Solmi***

ROSETTI MARINO SPA

TABELLA DI SALDATURA
Welding Table

pWPS	26/06	Posizione / Position	2G

Tipo di saldatura / Welding Process	GTAW+SMAW
Filo / Wire	ESAB OK TIGROD 16.30 diam. 2,4 mm heat 444361
Filo / Wire	

PQR 26/06

Materiale base **ASTM A 312 Tp 316L**
Base material **PIPE 2" Thk. 11,07 Heat 35698**

	Gas / Gas (es)	Miscela / Mixture	Portata / Flow Rate
Protezione/Shielding	Ar	99,990%	12 L/min
Protezione/Shielding	N.A	N.A	N.A
Al rovescio/Backing	Ar	99,990%	10 L/min

Welder Name/Nome saldatore **Bernabei Mirko stamp 6**
Welder Name/Nome saldatore

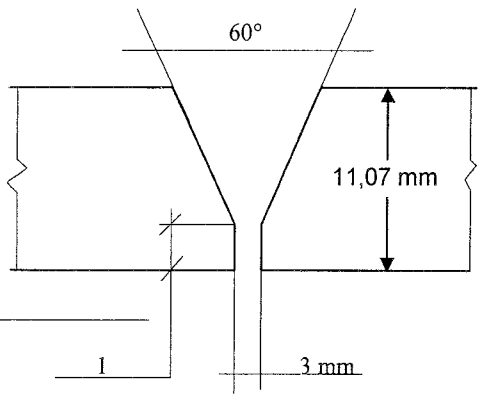
Prerisc: Preheat **20°C**
Temp. max. di interpass: **150°C**

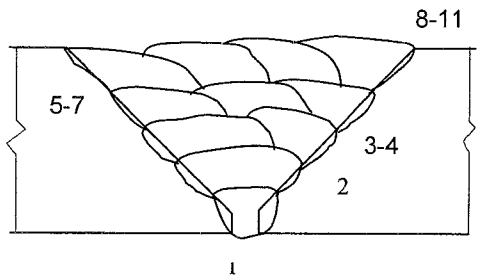
Elettrodo / Electrode **ESAB OK 63.35 Diam 3,2mm heat 5244091**
Ravenna **25/07/06**
Officina Rosetti **X**
Cantiere

Corrente / Current **DC**
Polarità / Polarity **GTAW DP** **SMAW RP**
Preparazione / Joint Design **V**

Pass. N. / Pass N.	Proced. / Process	Elettr. / Electr.	Ampere / Amps	Volts / Volts	Vel.mm/1' / Trav.Sp.	H.I. / KJ/mm
1	GTAW	2,4	103	12	40	1,85
2	SMAW	3,2	95	23	160	0,82
3	SMAW	3,2	100	24	170	0,85
4	SMAW	3,2	93	23	190	0,68
5	SMAW	3,2	92	23	180	0,71
6	SMAW	3,2	93	23	190	0,68
7	SMAW	3,2	93	23	190	0,68
8-11	SMAW	3,2	90	23	180	0,69

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Sonni





Note / Notes

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	***LABORATORIO DI CONTROLLI E PROVE***	
	CERTIFICATO PROVE MATERIALI *TEST CERTIFICATE*	**N. 330 Fg.1/2** DATA / Date **29-ago-2006**

COMMITTENTE / *CUSTOMER*: **ROSETTI MARINO S.p.A.**

OGGETTO / *OBJECT*	**Dimensione Provino mm.** Size Test mm :	**WPS N°**	**Materiale** Type Material
WPQR 26/2006	Diam.: **2"** Spess.: **11,1**	/	**A312 Tp 316L**

NORME DI COLLAUDO / *SPECIFICATIONS*: **UNI EN 15614-1:2004 + TS-12**

ENTE COLLAUDO / *INSPECTOR*: **RINA Spa**

PROVE MECCANICHE
MECHANICAL TESTS

CARATTERISTICHE RICHIESTE						*Snervamento* *Yeld stress* *Fs(N)*	*Rs* *N/mmq*	*Massimo* *Total Load* *Fm(N)*	*Rm* *N/mmq*		*Allung* *Elong.* *%*	*Resilienza/Impact Test* JOULE °C *Individual*	*Average*
REQUIREMENTS ----------->									**> 485**				
Pos. *Pos.*	*Prova Nr* *Test N°*	*Dimensioni* *Size mm*	*Area* *So* *mmq*	*L0* *mm*	*LU* *mm*	***RISULTATI / RESULT*** *Fs*	*Rs*	*Fm*	*Rm*		*A%*		
TRANSVERSE TENSILE TEST UNI EN 895													
TWT	1a	20,2 x 10,5	**212,1**					128800	**607**	**FOW**			
TWT	1b	20,2 x 10,5	**212,1**					131000	**618**	**FOW**			

BEND TEST UNI EN 910				
SBB	n° 4	x	N.A.	
RBB	n° 2	20 x 11	ANGLE: 180° DIAMETER OF THE FORMER 40 mm	**ACCEPTABLE**
FBB	n° 2	20 x 11	ANGLE: 180° DIAMETER OF THE FORMER 40 mm	**ACCEPTABLE**

VWT 0/2=ZONA FUSA/WELD MATERIAL

VHT 0/2=LINEA DI FUSIONE/FUSION LINE

VHT2/2=LINEA DI FUSIONE + 2mm /FUSION LINE + 2mm.

VHT5/2=LINEA DI FUSIONE + 5mm /FUSION LINE + 5mm

TWT=TRAZIONE TRASVERSALE SALDATURA/TRANSVERSE WELD TENSILE TEST

TWL=TRAZIONE LONG. SALDATURA / ALL WELD LONG. TENSILE

FOW=ROTTURA DUTTILE FUORI SALDATURA/ DUCTILE FAILURE OUT OF WELD

SBB=PIEGA LATERALE TRASVERSALE/TRANSVERSE SIDE BEND TEST

RBB=PIEGA TRASVERSALE AL ROVESCIO/TRANSVERSE ROOT BEND TEST

FBB= PIEGA TRASVERSALE AL DIRITTO/TRANSVERSE FACE BEND TEST

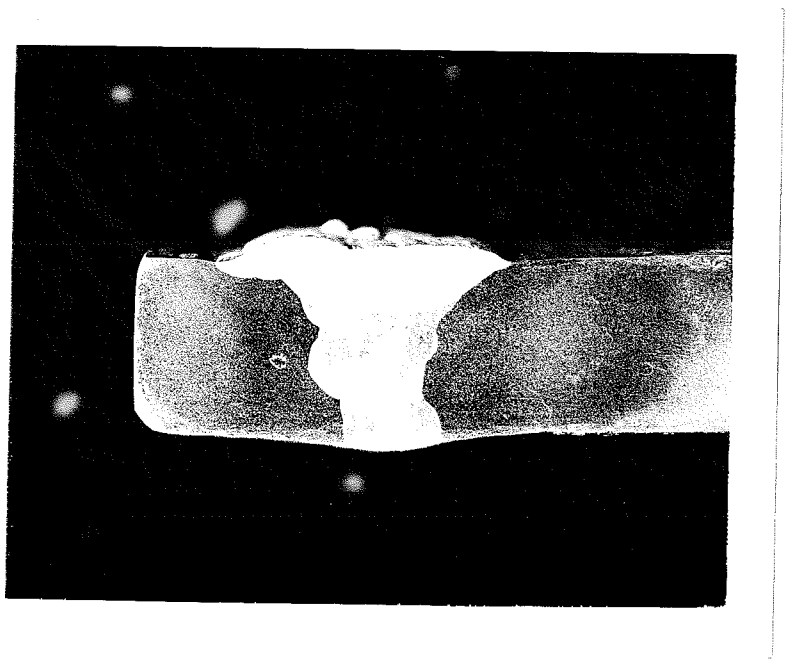
FIW=ROTTURA DUTTILE IN SALDATURA/ DUCTILE FAILURE IN WELD

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA S. Sabadino

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	*LABORATORIO DI CONTROLLI E PROVE*	
	CERTIFICATO PROVE MATERIALI *TEST CERTIFICATE* **MACRO EXAMINATION**	N. 330 Fg. 2/2 DATA / Date **29-ago-06**

COMMITTENTE *CUSTOMER*	**ROSETTI MARINO S.p.A.**			
OGGETTO *OBJECT*	**WPQR 26/2006**	Dimensione Provino/Size mm. Diam.: **2"** Spess.: **11,1**	Wps n° **/**	Materiale/Material **A312 Tp 316L**

MACRO EXAMINATION UNI EN 1321



MACROEXAMINATION:	**ACCEPTABLE**
VISUAL EXAMINATION	**ACCEPTABLE**
ETCH/ATTACCO :	**ACQUA REGIA**
MAGNIFICATION/INGRANDIMENTO:	**2 X**

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA S. Sabatino

ROSETTI MARINO	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 26-06 data: 25.07.2006

progetto / project	cliente / client	ordine / PO	commessa / job
disegno / dwg	ITP N° /	fase / step	

oggetto - item

Welding Procedure Qualification Record (WPQR) 26/06

Certificato di Qualifica di Procedimento di Saldatura (WPQR) 26/06

WE CERTIFY THAT THE SAMPLE ABOVE MENTIONED HAS BEEN SUBMITTED TO 100% VISUAL EXAMINATION IN AS WELDED STATUS IN ACCORDANCE WITH UNI EN 970:1997.

SI CERTIFICA CHE LA SALDATURA DEL SAGGIO SOPRA CITATO E' STATA SOTTOPOSTA AD ESAME VISIVO AL 100% ALLO STATO COME SALDATO IN ACCORDO ALLE UNI EN 970:1997.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

note - remarks

No visible defects have been detected.

Non sono stati rilevati difetti visibili.

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

UNI EN 970 : 1997

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client

CONTROL snc
via Attilio Monti,15 48100 (RA)
tel. 0544 590597 - fax 590599

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - RADIOGRAFICO

NDE REPORT -RADIOGRAPHIC TEST

Data / Date 07/09/2006
NDE-RT Report Nr 275
foglio / sheet n° 01 of 01

COMMITTENTE / Customer	OGGETTO / Object	COMMESSA N° / Job No	ORIDINE N°/Order n°	PROGETTO / Project
ROSETTI MARINO Spa	QUALIFICHE PROCEDIMENTO	106A10	-	-

LINEA N°/ Line No	DWG N° / DWG No	CODICE - PROCEDURA/In accordance with	ACCETTABILITA'/Acceptance levels
-	-	EN 15614 - 1	EN 25817 Classe B

ITP N° / ITP No	FASE ITP / Phase ITP		
-	-	● PRIMA ESECUZIONE/ First test	○ PRIMA DEL TT/ Before PWHT
		○ DOPO RIPARAZIONE/ After repair	○ DOPO IL TT/ After PWHT

TRACEABILITY		JOINT TYPE				RESULT		
weld No - dwg - item	Radiographic Tecniques	material	Φ	thickness	welder No	position film	defect	judgment
WPQR 24 - 06	contatto	A 333 Gr.6	4"	17,12mm	-	0-1		A
						1-2	Aa	A
						2-3		A
						3-4		A
						4-5		A
						5-0		A
WPQR 26 - 06	contatto	316 L	2"	11,07mm	-	0-1		A
						1-2		A
						2-3		A
						3-0		A
WPQR 25 - 06	contatto	A 333 Gr.6	3"	15,24mm	-	0-1		A
						1-2		A
						2-3		A
						3-4		A
						4-0	Aa	A
WPQR 27 - 06	diretta	UNS 31254	2"	2,77mm	-	A		A
						B		A
WPQR 40 - 06	diretta	316 L	2"	2,77mm	-	A		A
						B		A
WPQR 41 - 06	diretta	UNS 31254	2"	2,77mm	-	A		A
						B		A
WPQR 39 - 06	diretta	316 L	2"	2,77mm	-	A		A
						B		A
WPQR 42 - 06	diretta	S 355	PLATE	20mm	-	0-1	Aa-Bb	A
WPQR 43 - 06	diretta	S 355	PLATE	20mm	-	0-1	Ab	A

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer

NOTE / Remarks

CLASSIFICAZIONE DIFETTI
Classification defects ref. ISO 6520

(2011)	Aa	Soffiattura tondeggiante/Porosity < Φ 1mm
(2012)		Uniformly distributed porosity
(2013)		Localized porosity (Clustered)
(2014)		Linear porosity
(2017)		Surface pore
(2015)	Ab	Cavità allungata/Elongated cavity
(2016)	Ab	Tarli/Worm-hole
(300)		Inclusione solide/Solid inclusion
(301)	Ba	Inclusione di scoria/Slag inclusion
(3013)	Bb	Scoria d'orient. diverso/Of any shape in
	Be	Difetto di ripresa/ 1st run irregular
(400)	C	Mancanza di fusione/Lack of fusion
(402)	D	Mancanza di penetrazione/Lack of penet.
(100)	E	Cricca o fessura/Crack
(101)	Ea	Cricca longitudinale/Longitudinal crack
(102)	Eb	Cricca trasversale/Transverse crack
(104)	Ec	Cricca di cratere/Crater crack
(502)		Sovrametallo in eccesso/Excess weld metal
(504)	Ex	Eccesso di penetrazione/Penetration excess
(5041)		Sgocciolamento/Local protrusion
(5011)	F	Solco o incisione/Undercut
(514)	Fa	Irregolarità superficiale/Surface irregularity
(509)		Avvallamento/Sagging
(511)		Incom. riempimento/Incom. Filled groove
(515)	In	Insellamento/Root concavity
(517)		Ripresa difettosa/Poor restart
(2024)	K	Cavità di ritiro/Shrinkage cavity
(506)		Traboccamento/Overlap
(507)	Sl	Slivellamento/Misalignment
(3041)	W	Inclusione di tungsteno/Tungsten inclusion
(601)		Innesco d'arco/Arc strike

GIUDIZIO / Judgment

NX-CF	To repeat to confirm defect
A	Accettabile/Acceptable
R	Riparare/To repair
NT	Tagliare/To cut
NX	Ripetere film/To repeat film
EX	Estendere il controllo/Extende test
DF	Difetto film/Film defect
TM	Taglio o modifica/Cut or modification

RADIOGRAPHIC TECHNIQUE DETAILS

Films 25 — **Type film and Manufact.** — IQI type ASTM ☐ — 6-10 FE EN ■

Data di esposizione:31-07-2006 — **AGFA Structurix D7-D4**

Sorgente X - Unità X-Ray Unit **SEIFERT65**	**Pellicole per cassetta** (Nr) Films box **1**	**I.Q.I. - Posizione** I.Q.I. - Location ☐ Lato film/Film Side ■ Lato sorgente/Source	**Distanza sorgente-pellicola** (mm) Distance Source-Film **150(diretta) / Øe - 1Thk.**
Sorgente γ γ-Ray Activity **N.A.**		**Schermi di rinforzo** (mm) Intensifying screens Front-Back **Pb 0,10 x 0,10**	**Distanza pezzo lato sorgente-pellicola** (mm) Distance Object (source side)-Film **Weld Thk.**
Energia (keV) Energy **200KVolt/3mA**	**Sviluppo** Development ■ Automatic ☐ Manual	**Tecnica radiografica** Radiographic techniques ■ Single wall exp. ■ Double wall exp. ■ Single wall view ☐ Double wall view.	
Macchia Focale (mm) Focal Spot **3**			

TECNICO II° livello CND - IMPRESA	CONTROLLO QUALITA'	ISPETTORE CLIENTE	ISPETTORE A.I.
Operator NDT II° Level SNT-TC-1A / EN473	Q.C. Supervisor	Company Repr.	Inspection Agency
MERCATALI RICCARDO II° Liv. UT/PT/MT/RX CICPND			RINA S.Salvatino
NDE Company - Date	Q.C. Supervisor - Date	Company Repr.- Date	I. A. - Date

CONTROL S.N.C.
Via Attilio Monti 15 48100
RAVENNA

RAPPORTO CND - LIQUIDI PENETRANTI
NDT REPORT - DYE PENETRANT TEST

NDE-PT Report No

COMMITTENTE/Customer	**ORDINE N°**/Order No	**COMMESSA N°**/Job No	**PROGETTO**/Project
ROSETTI MARINO S.p.A.		**106A10**	
MATERIALE/Material	**LINEA N°**/ Line No	**OGGETTO** / Object	**DATA**/Date
AISI 316L		**WPQR 26/2006**	**7-set-06**

In accordance with specification and rule: **UNI EN 571.1 - UNI EN 1289**

Stato della superficie / Surface Condition

COME SALDATO As Welded	■	SPAZZOLATO Brushed	■	LAV. DI MACCHINA Machined	☐	COME CALANDRATO As Bent	☐
MOLATO Ground	☐	COME LAMINATO As Rolled	☐	GREZZO As Forged	☐		☐

PRODOTTI UTILIZZATI / Products used	PROCEDURA DI ESECUZIONE / Execution of Procedure
PULITORE PRELIMINARE/ Cleaner **VELNET CGM**	1 PULITURA PRELIMINARE / Preliminary Cleanign **SPRAY**
PENETRANTE / Penetrant **RED W - CGM**	2 APPLICAZIONE PENETRANTE / Penetrant application **SPRAY**
PULITORE PENETRANTE/ Penetrant Remover **WATER**	3 RIMOZIONE PENETRANTE / Removal penetrant ■ **WATER** ☐ ☐
RIVELATORE / Developer **WHITE W - CGM**	4 ESSICAZIONE / Drying process **NATURAL**
NOTE / Remarks	5 APPLICAZIONE RIVELATORE / Developer application **SPRAY**
	a (2) TEMPO PENETRAZIONE / Penetrating time (minuti / minutes) **15**
PULITORE POST-CONTROLLO / Cleaner after examination **Cloths and water**	**b** TEMPO DI LETTURA / Checking time (min.) (minuti / minutes) **5**
TEMPERATURA SUPERFICI / Surfaces temperature (°C) (standard range 16-52 °C) **ambient**	**c** ISPEZIONE VISIVA / Visual Inspection ☐ luce bianca min.1000 Lux ☐ luce U.V. min.1000 mW/cmq

NOTE / Remarks	Difetti / Discontinuities	
	a) Cricca a freddo / Crack	e) Cordone irregolare / Irreg. searm
	b) Cricca da stress / Stress Crack	f) Incisione marginale / Undercutting
	c) Difetto di ripresa / 1st run defect	g)
	d) Porosità / Porosity	h)

Saldatura / Weld	spessore/thickness	material/material	

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

RESULTS

NDE COMPANY - II° level NDE Operator	**CONFORME ALLA SPECIFICA (*)** conforming to specification	**NON CONFORME ALLA SPECIFICA (*)** not conforming to specification
MERCADALI ALESSIO II° liv. MT/PT CIC PND	■	☐
Q.C. Supervisor	**CUSTOMER INSPECTOR**	
Date	Date	

RINA
S. Sabatino

T.T.I. - Tubacex Tubos Inoxidables, S.A.

Registro Mercantil de Alava, Tomo 587, Folio 189, Hoja VI 2886 - N.I.F. A-01140227

TUBACEX

Printed on: 28.11.2005

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 375020 Page: 1 / 2 | Rev: 1

Date: 25.11.2005 | 28.11.2005

CUSTOMER :RACCORTUBI, S.R.L. PO :OS000144 S 1/7/05 OUR REFERENCE :J3956

STANDARD :ASTM-ASME A/SA312M-04 ED.04

ADDIT.SPECS :312S REV.0 AND NACE MR01.75-03

GRADE :TP316-316L

DIMENSIONS :60,33 X 11,07

MATERIAL :SEAMLESS STAINLESS STEEL TUBE
COLD ROLLED; PASSIVATED;
PLAIN ENDS SQUARE CUT;

110266

REVIEWED

----ITEM----- YOUR	TTI.	-HEAT- NR.	NO. OF PIECES	---WEIGHT-- KG	-TOTAL LENGTH-	--UNIT LENGTH--
	22	35556	18	1486	109,87	5,5 - 6,5 MT
	22	35698	18	1492	110,29	5,5 - 6,5 MT

RAW MATERIAL

MELTING PROCESS: ELECTRIC FURNACE + A.O.D FROM: ACERALAVA
PEELED BARS; MACROETCH TESTING: GOOD;

(1)	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	B	N
L	35556	0,014	1,34	0,490	0,031	0,0010	11,15	16,60	2,20	0,39	0,0011	0,0665
L	5698	0,022	1,49	0,470	0,031	0,0010	11,15	16,80	2,22	0,59	0,0013	0,0635
C	35556	0,016	1,33	0,490	0,030	0,0020	11,20	16,60	2,19	0,39	0,0009	0,0665
C	35698	0,021	1,47	0,460	0,028	0,0020	11,15	16,75	2,24	0,61	0,0002	0,0635

(1) L: LADLE; C: PRODUCT

HEAT TREATMENT

SOLUTION ANNEALED 1100 °C WATER QUENCHED

= TESTS = HEAT NR.	TEST NR.	TEMP.	-TENSION- MPA RM	RP 0,2	RP 1,0	% A	% Z	--I M P A C T T E S T S-- TEMP.	MINIMUM	AVERAGE	HARDNESS HRB
35556	510176	20	541,0	279,0	304,0	66,0					79 80
35698	510197	20	571,0	314,0	345,0	47,0					74 75

TECHNOLOGICALS

FLATTENING TEST: GOOD
FLARING TEST: GOOD
RING EXPANDING TEST: GOOD

METALLURGICAL TEST

INTERGRANULAR CORROSION: A-262"E", DIN 50914, NF A05-159 T1, ISO 3651-2: NO OBJECTIONS

NON DESTRUCTIVE TEST

100 % EDDY CURRENT TEST AT E.426 , GOOD
100 % HYDROSTATIC PRESSURE TESTED AT 175 BAR , DURING 6 SEC, GOOD
STEEL GRADE CHECKING ON EACH TUBE BY SPECTROMETRY (PMI)
DIMENSIONAL CHECKING ON EACH TUBE, SATISFACTORY
VISUAL INSPECTION ON EACH TUBE, SATISFACTORY

OTHER MATERIAL SPECIFICATIONS

DIN 17458 PK1 / NF A49117-85 1.4401-1.4404/Z6-Z2CND17.11/12

MARKS

TXA
TUBACEX 60,33 X 11,07 ASTM-ASME A-SA 312 TP316-316L - DIN 17458 PK1
1.4401-1.4404 NF A49-117 Z6CND17.11-Z2CND17.12 SMLS HEAT/..... NH
ET PMI

REMARKS

T.T.I GARANTIT QUE TOUS LES TUBES LIVRES SONT CONFORMES AUX SPEC.S DE L'ARTICLE 15
DE L'ARRETE MINISTERIEL DU 24 MARS 1978 MODIFIE

AENOR ER Empresa Registrada ER-0006/1991

IQNet

AENOR Gestión Ambiental GA COM-GU127

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above standards and specifications and satisfies the order's requirements.
This certificate is issued by a computerized system and it is valid without signature. On the original certificate the responsible's red coloured signature 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, assuming the responsibility for any unlawful or T.T.I.S.A. not allowed use.
Any forgery or falsification of this certificate shall legally prosecuted.

T.T.I.
Tubacex Tubos Inoxidables, S.A.
INGENIERIA DE CALIDAD
Jon Altuna Zubia

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n.: 1.000
Descr. : 60.33x11.07
Heat n°/Pcs. marking : 35698 Qtà/Qty:31,28
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N 160065

T.T.I. - Tubacex Tubos Inoxidables, S.A.

Registro Mercantil de Alava, Tomo 587, Folio 189, Hoja VI 2885 - N.I.F. A-01140227

TUBACEX

Printed on: 28.11.2005

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 375020 Page: 2 / 2 | Rev: 1

Date: 25.11.2005 | 28.11.2005

CUSTOMER :RACCORTUBI, S.R.L. PO :OS000144 S 1/7/05 OUR REFERENCE:J3956

STANDARD :ASTM-ASME A/SA312M-04 ED.04

ADDIT SPECS :312S REV.0 AND NACE MR01.75-03

GRADE :TP316-316L

DIMENSIONS :60,33 X 11,07

MATERIAL :SEAMLESS STAINLESS STEEL TUBE
COLD ROLLED; PASSIVATED;
PLAIN ENDS SQUARE CUT;

110266

C<=0,25%, P<=0,05%, S<=0,05%, R<800 N/MM2, E<=0,9 * R
A% (LO=5,65VSO) MIN, 16% EN LONG. R(A _2)>=10500
MATERIAL MANUFACTURER APPROVED WITH CERTIFICATE NR. 07/2001/MUC BY TÜV SÜDDEUTSCHLAND (NOTIFIED BODY 0036) TO ISSUE CERTIFICATES OF SPECIFIC PRODUCT CONTROL IN ACCORDANCE WITH PRESSURE EQUIPMENT DIRECTIVE 97/23/EC ANNEX 1 POINT 4.3.
MATERIAL CHARACTERISTICS COMPLY WITH POINT 7.5 OF ANNEX I TO PED BY HAVING AN ELONGATION AFTER RUPTURE AT TENSILE TEST NO LESS THAN 14 % AND A BENDING RUPTURE ENERGY AT IMPACT TEST NO LESS THAN 27 J AT 20°C.

ROSETTI MARINO
Conforme alla spec.
According to the spec. A312 TP316L rif. O.
TMUGF Firma / MTSMD Signature
Data / Date 04 LUG. 2006
☒ REVIEW
☐ WITNESS

AENOR ER Empresa Registrada ER-0065/1991

IQNet

AENOR GA Gestión Ambiental GGM-0021/1/1

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above standards and specifications and satisfies the order's requirements.
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Any forgery or falsification of this certificate shall legally prosecuted.

T.T.I.
Tubacex Tubos Inoxidables, S.A.
INGENIERIA DE CALIDAD
Jon Aburto Zubiaga

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n.: 1.000
Descr. : 60.33x11.07
Heat n°/Pcs. marking : 35698 Qtà/Qty:31,28
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N 160065

Inspection certificate(Certificato di collaudo) UNI EN 10204-3.1.B

ESAB ESAB Saldatura SpA

CERTIFICAZIONE
CERTIFICATION

No 375339

RINA QUACER ISO 9002 — IQNet — CISQ — ASME ACCREDITED MATERIAL ORGANIZATION — TÜV Rheinland MANUFACTURER CERTIFIED TO Vd TÜV 1153

Ns. rif./Our ref. Bolla 827384 Mag. A Del 06/11/1998

Vs. rif./Your ref. 821170 Del 26/10/1998 Vostro Ordine N°/Your Order No. Del

Cliente/Customer

ROSETTI MARINO SPA

VIA TRIESTE 230

48100 RAVENNA RA

Prodotto Marchio: ESAB
Inf.Suppl.

Pos. No.	Codice/Item No.	Descrizione/Description	Lotto/Lot	Colata/Heat
	163024R150	OK TIGROD 16.30 2.4 MM	--	444361

Analisi/Analysis

C	Mn	Si	S	P	Cr	Ni	Mo
0.01	1.56	0.40	0.010	0.019	18.39	12.28	2.60
Cu							
0.12							

Trazione/Tensile test.

	R_p 0,2 N/mm²	R_{eL} N/mm²	R_{eH} N/mm²	R_m N/mm²	A5 %
Metallo d'apporto All weld metal				552	36

Resilienza/Impact test.

	Temp. °C	Media/average J	J
Metallo d'apporto All weld metal			

Note/Remarks

Il prodotto è conforme alle norme / This welding consumable conforms to
1. SFA-AWS A 5.9 ER 316 L
2.
3.

ROSETTI MARINO S.p.A.
Conforme alla spec. A5.9 ER316L
According to the spec.
C.Q. Firma / Q.C.Signature
Data / Date 12-04-99

Località/Locality Mesero

Data/Date 11/03/1999

Direzione Tecnica

Certificazione - Certification

Certifichiamo che i sopraelencati materiali sono conformi ai requisiti dell'ordine e forniti in accordo col ns. Sistema di Qualità approvato secondo UNI EN ISO 9002 dal Rina, Certificato N. 57/93, e che i valori riportati sono stati verificati in accordo a quanto stabilito all'atto della vendita.

We hereby certify that the above stated products conform to the sales contract and are supplied in accordance with our Quality System approved to UNI EN ISO 9002 by Rina, Certificate N. 57/93, and that the goods, with indicated results have been tested according to the instructions in the sales contract.

20010 **MESERO** (MI)
Via Mattei, 24
Tel 02.97968.1

Amministrazione: Fax 02.9787865
Divisione materiali d'apporto: Fax 02.97289300
Divisione impianti: Fax 02.97289181
Assistenza tecnica impianti: Fax 02.9789140

Codice Fiscale/Partita Iva 00775990153
Capitale Sociale 6.600.000.000
Sede legale: Via V. Pisani, 16 Milano
Tribunale Milano 35367 - C.C.I.A.A. 236795

TEST REPORT

in accordance with EN 10204 - 2.2

Date: 2005-11-24

Certificate number: **EC20264807 rev. 0**

Our order:
Our reference:
Customer number: NA
Customer order date:

Your order:
Your reference:
Your fax number:
Your e-mail:

Invoice address
NA
ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA

Receiver of certificate

Delivery address
ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA

DELIVERY Lot number: 5244091 Quantity:

PRODUCT

Brand: ESAB
Description: OK 63.35 3.2 X 350 1/2 VP
Item number: **63353230G0**

CLASSIFICATIONS

EN 1600 E 19 12 3 L B 2 2
SFA/AWS A5.4 E316L-15
Werkstoffnummer 1.4430

CHEMICAL COMPOSITION

All weld metal
Auxiliary:

C	0.04%
Si	0.4%
Mn	1.6%
P	0.014%
S	0.006%
Cr	18.3%
Mo	2.7%
Ni	12.6%
Cu	0.12%
FN WRC-92	4

MECHANICAL PROPERTIES

Standard:
Auxiliary:
Condition:

TENSILE

Rp0.2	Rm	A4
430 MPa	560 MPa	40 %

IMPACT

Temp	KV
-120 °C	60 J

ROSETTI MARINO SpA
According to the spec.
A 5 4
Welding Dpt. Sign.
E 316L-15

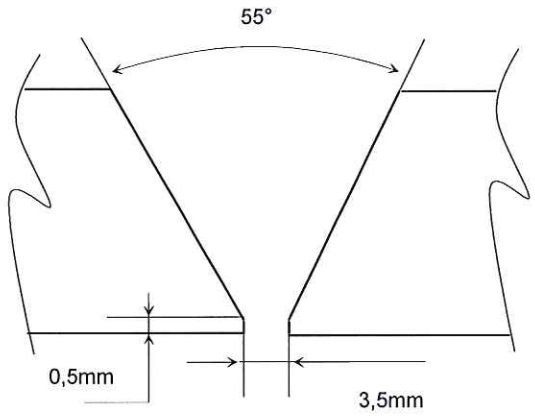
COMMENTS

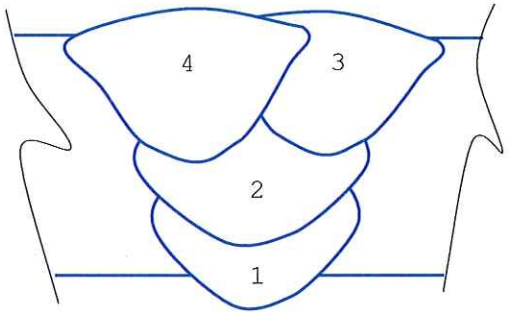
Product supplied under a QA Programme fulfilling the EN ISO 9000 standard.
This certificate is produced electronically and is valid without signature.
Please refer any queries to:
ESAB Saldatura Spa Via E.Mattei 24, I-20010 Mesero (MI), +39 02 979 68.1

Validation
Tapio Huhtala Product Manager

ROSETTI MARINO	PQR N°	36/16
PROCEDURE QUALIFICATION RECORD	Sheet: 1	Of: 2
	Prepared by: AK	Date: 06/09/2016

MANUFACTURER	ROSETTI MARINO SPA		
WPS N°	*36/16*	DATE:	*10/08/2016*
WELDING PROCESS(ES):	*GTAW*		
TYPES:	*MANUAL*		





BASE METAL		POSTWELD HEAT TREATMENT			
Material Specification:	*ASTM A790*	*Temperature:*	/		
Type or grade:	*UNS S32750 (SAF 2507)*	*Time:*	/		
P.Number. Group N.	*P-no. 10H - Gr.1*	*Other*	/		
Thickness of Test Coupon:	*4,55 mm*				
Diameter of Test Coupon:	*1" (33,4mm)*				
Other:	*Heat No. 28670* *Project material supplied NCOC*	*GAS*	*Percent composition*		
			Gas(es)	*(Mixture)*	*Flow rate*
FILLER METALS	*GTAW*	*Shielding*	*Ar*	*99,998*	*11 lt/1"*
SFA Specification	*A 5.9*	*Shielding*	*N.A.*	*N.A.*	*N.A.*
AWS Classification	*ER 2594*	*Backing*	*Ar*	*99,998*	*9 lt/1"*
Filler Metal F-No	*6*	*ELECTRICAL CHARACTERISTICS*			
Weld Metal Analysis A-No.	*Typical Cr25-Ni10-Mo4-N0,25*	*Current*	*DC*		
Size of Filler Metal (mm)	*2.0*	*Polarity*	*SP*		
Deposited Weld Metal:	*4,55 mm*	*Amps.*	*70-79 A*	*Volts*	*10 V± 1V*
Filler metal make:	*SANDVIK 25.10.4L*	*Tungsten Electrode Size*	*2,4 mm*		
Other:	Rod lot No. 16752	*Other:*	*Heat input: 1,35-1,50 KJ/mm*		

POSITION		TECHNIQUE	
Position of Groove	*6G*	*Travel speed*	*28-35 mm/min*
Weld progression (Uphill, Downhill)	*Uphill.*	*String or Weave Bead*	*STRING (Max 9mm)*
Other	/	*Oscillation*	*N.A.*
		Multipass or single pass (per side)	*MULTIPASS*
		Single or multiple electrodes	*Single*

PREHEAT			
Preheat temperature:	*20° C*	*Other*	*Heat input monitored with MAL III UNIT,* *Travel speed calculation manual (Manual welding process)* Max O_2 content 125PPM
Interpass temperature:	*110°C*		
Other			

IIW
A.KHALIFA
IWT 070154A
INTERNATIONAL WELDING TECHNOLOGIST

RINA Services SpA
D. Cimatti

ROSETTI MARINO	PQR N°	36/16
PROCEDURE QUALIFICATION RECORD	Sheet: 2	Of: 2
	Prepared by: AK	Date: 06/09/2016

TENSILE TEST

SPECIMEN No.	WIDTH (mm)	THICKNESS (mm)	AREA (mm^2)	ULTIMATE TOTAL LOAD N	ULTIMATE UNIT STRESS N/mm2	TYPE OF FAILURE & LOCATION
Transverse 1	*19,0*	*4,3*			*892*	*Ductile, broken in weld*
Transverse 2	*19,0*	*4,3*			*858*	*Ductile, broken in weld*

TOUGHNESS TESTS

		NOTCH LOCATION	NOTCH TYPE	SPECIMEN SIZE (mm)	TEST TEMP. (°C)	IMPACT VALUES									DROP WEIGHT	
						JOULES				% SHEAR	MILS	LATERAL EXP.			BREAK	No. BREAK
						singles			Av.							
	H3	*W*	*KV8*	*3,33x10*	*-48,7*	*43*	*54*	*44*	*47*	-	-	-	-	-	-	-
	H3	*FL*	*KV8*	*3,33x10*	*-48,7*	*47*	*52*	*50*	*50*	-	-	-	-	-	-	-
	H3	*FL+2*	*KV8*	*3,33x10*	*-48,7*	*60*	*69*	*57*	*62*	-	-	-	-	-	-	-
	H3	*FL+5*	*KV8*	*3,33x10*	*-48,7*	*59*	*46*	*55*	*53*	-	-	-	-	-	-	-
	H6	*W*	*KV8*	*3,33x10*	*-48,7*	*47*	*43*	*48*	*46*	-	-	-	-	-	-	-
	H6	*FL*	*KV8*	*3,33x10*	*-48,7*	*47*	*44*	*52*	*48*	-	-	-	-	-	-	-
	H6	*FL+2*	*KV8*	*3,33x10*	*-48,7*	*60*	*53*	*57*	*57*	-	-	-	-	-	-	-
	H6	*FL+5*	*KV8*	*3,33x10*	*-48,7*	*42*	*52*	*46*	*47*	-	-	-	-	-	-	-

GUIDED BEND TEST

TYPE & FIGURE No.	RESULT
No. 2 transverse face bend test	*Satisfactory*
No. 2 transverse root bend test	*Satisfactory*

FILLET WELD

Result - Satisfactory	Yes. *N.A.*	No *N.A.*	Penetration into Parent Metal;	Yes *N.A.* No. *N.A.*
Macro – Results	*N.A.*			

OTHER TESTS

Type of test	*VISUAL EXAMINATION:*	*Satisfactory*
	PT EXAMINATION	*Satisfactory,*
	MACROGRAPHIC EXAMINATION	*3 Sections, Satisfactory,*
	RADIOGRAPHIC EXAMINATION	*Satisfactory*
	Hardness HV 10	*Satisfactory ,see report 192061 of 6th-09-2016 (max 277HV10)*
	PITTING G48 TEST	*Satisfactory at 30°C, see report 192066 of 2nd-09-2016*
	Chemichal Analysis	*Satisfactory ,see report 192061 of 6th-09-2016*
	Micrographic examination	*Satisfactory ,see report 192061 of 6th-09-2016*
	Ferrite or Austenite content	*Satisfactory ,see report 192061 of 6th-09-2016*

Welder's Name	*FABBRI PIERLUIGI*	Clock No.		Stamp No.	*AX4*
Test conducted by	*EXOVA*		*Test Report No. 192061 of 6th-09-2016*		

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 ASME IX Ed. 2015 & KE01-B4-000-V-ST-0002-C01 & ASME B31.3:2012

Date: *6th/09/2016*

Manufacturer:

By:

RINA Services SpA D. Cimatti

IIW A.KHALIFA IWT 070154A INTERNATIONAL WELDING TECHNOLOGIST

ROSETTI MARINO

TABELLA DI SALDATURA
Welding sheet

WPS N.	36/16	Posizione Position	6G
Tipo di saldatura Welding Process	GTAW	Cliente Client	NCOC
Bacchetta Rod	SANDVIK 25.10.4L	Commessa Job	115A90 — EPC3 HU
Elettrodo Electrode	/	Materiale base Base material	PIPE SEAMLESS UNS S32750

	Gas Gas (es)	Miscela Mixture	Portata Flow Rate
Protezione/Shielding	AR	99,99%	11 Lt/1
Aggiuntivo/Trailing	N.A.	N.A.	N.A.
Al rovescio/Backing	AR	99,99%	9 Lt/1

Saldatore/Operatore: Welder Name/Welding Operator	FABBRI P. AX4
Prerisc: Preheat	20°C
Temp. Max. interpass:	110°C
Corrente AC o DC Current AC or DC	DC
Polarità Polarity	SP

PQR 036-16

Joint Design

	Pass. N. Pass N.	Proced. Process	Elettr. Electr.	Preheat plate °C	Interpass run °C	Ampere Amps A	Volts Volts V	Vel.mm/ Trav.Sp. mm/min	H.I. KJ/mm
WELD 1	1	GTAW	2,0	20	/	70	10	28	1,50
	2	GTAW	2,0	88	110	78	10	34	1,38
	3	GTAW	2,0	99	110	79	10	35	1,35
	4	GTAW	2,0	106	110	79	10	32	1,48

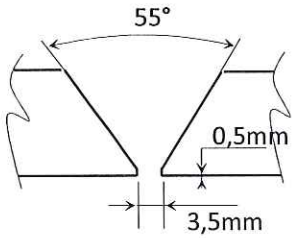
parent material Heat No. 28670, pipe 1"x4,55mm

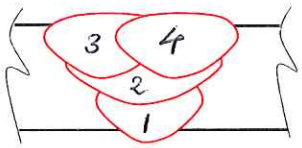
TIG LOT.16752

the parameters recorded are average values for each pass along the entire length,

max 120 ppm O2

Before welding





Date of weld:
10th Aug. 2016

CSWIP
A.K. KHALIFA
69505
WI 3.1

RINA Services SpA
D. Cimatti

TVC MINI ARC LOGGER III
SET NO: 440
SW REV: 3.1.7
DATE: 2016-08-10
TIME: 09:18:22
Project: KASHAGAN
Procedure: 36/16
Weld No: 2
Welder: FABBRI P
Position: 5G
Standard: ASME IX
Process: GTAW
K-Factor: 1.0
Polarity: SP
Tungsten Diameter: 2,4
Brand Name: SANDVIK
Consumable: ER2594
Shielding Gas: ARGON
Backing Gas: ARGON
Material: UNS S32750
Specification: asme ix
Size: 1"
Thickness: 4,55mm
Diameter: 33,4
RUN NO: 1
FILE: 09-18-22.txt

GAS LPM	TRAV CM/MIN	WIRE M/MIN	ARC VOLTS	ARC AMPS	TIME SECS
—	—	0.0	10.5	68	20.0
—	—	0.0	10.1	69	38.8
ARC TIME:			38.8s		
—	—	0.0	10.0	70	20.0
—	—	0.0	9.6	72	40.0
—	—	0.0	9.4	67	47.7
ARC TIME:			47.7s		
—	—	0.0	9.9	69	20.0
—	—	0.0	10.3	61	22.9
ARC TIME:			22.9s		
—	—	0.0	10.6	68	20.0
—	—	0.0	10.2	72	40.0
—	—	0.0	10.0	69	52.9
ARC TIME:			52.9s		
—	—	0.0	10.1	70	20.0
—	—	0.0	9.9	70	39.5
ARC TIME:			39.5s		
—	—	0.0	10.1	70	20.0
—	—	0.0	9.6	72	40.0
—	—	0.0	9.5	69	53.1
ARC TIME:			53.1s		
—	—	0.0	10.3	70	20.0
—	—	0.0	10.1	70	37.6
ARC TIME:			37.6s		
—	—	0.0	9.9	70	20.0
—	—	0.0	10.1	72	40.0
—	—	0.0	10.2	68	49.3
ARC TIME:			49.3s		
		Summary			
		*** Totals ***			
—	—	0.0	10.6	72 MAX	
—	—	0.0	10.0	70 AVG	
—	—	0.0	9.4	61 MIN	

Heat Input: 119.63 KJ/mm
Calc Energy: 239.2 KJ
Arc Time: 341.8 s
Weldlength: 2 mm
T'Speed(Calc): 0.0 CM/MIN
Wire Consumed: 0.0 MTRS
Finish Time: 09:34:48
Cycle Time(hh:mm:ss): 00:16:26
USB Memory Unused Ok

TVC MINI ARC LOGGER III
SET NO: 440
SW REV: 3.1.7
DATE: 2016-08-10
TIME: 09:45:14
Project: KASHAGAN
Procedure: 36/16
Weld No: 2
Welder: FABBRI P
Position: 5G
Standard: ASME IX
Process: GTAW
K-Factor: 1.0
Polarity: SP
Tungsten Diameter: 2,4
Brand Name: SANDVIK
Consumable: ER2594
Shielding Gas: ARGON
Backing Gas: ARGON
Material: UNS S32750
Specification: asme ix
Size: 1"
Thickness: 4,55mm
Diameter: 33,4
RUN NO: 2
FILE: 09-45-14.txt

GAS LPM	TRAV CM/MIN	WIRE M/MIN	ARC VOLTS	ARC AMPS	TIME SECS
—	—	0.0	10.9	79	20.0
—	—	0.0	10.3	78	35.3
ARC TIME:			35.3s		
—	—	0.0	10.3	79	20.0
—	—	0.0	10.2	81	40.0
—	—	0.0	10.3	79	54.9
ARC TIME:			54.9s		
—	—	0.0	10.9	78	20.0
—	—	0.0	10.3	78	33.4
ARC TIME:			33.4s		
—	—	0.0	10.5	80	20.0
—	—	0.0	10.6	78	35.2
ARC TIME:			35.2s		
—	—	0.0	10.0	79	20.0
—	—	0.0	9.9	77	29.1
ARC TIME:			29.1s		
—	—	0.0	9.9	56	3.4
ARC TIME:			3.4s		
		Summary			
		*** Totals ***			
—	—	0.0	10.9	81 MAX	
—	—	0.0	10.4	78 AVG	
—	—	0.0	9.9	56 MIN	

Heat Input: 77.59 KJ/mm
Calc Energy: 155.1 KJ
Arc Time: 191.3 s
Weldlength: 2 mm
T'Speed(Calc): 0.0 CM/MIN
Wire Consumed: 0.0 MTRS
Finish Time: 09:51:06
Cycle Time(hh:mm:ss): 00:05:52
USB Memory Unused Ok



RINA Services SpA
D. Cimarti

TVC MINI ARC LOGGER III
SET NO: 440
SW REV: 3.1.7
DATE: 2016-08-10
TIME: 09:51:47
Project: KASHAGAN
Procedure: 36/16
Weld No: 2
Welder: FABBRI P
Position: 5G
Standard: ASME IX
Process: GTAW
K-Factor: 1.0
Polarity: SP
Tungsten Diameter: 2,4
Brand Name: SANDVIK
Consumable: ER2594
Shielding Gas: ARGON
Backing Gas: ARGON
Material: UNS S32750
Specification: asme ix
Size: 1"
Thickness: 4,55mm
Diameter: 33,4
RUN NO: 3
FILE: 09-51-47.txt

GAS LPM	TRAV CM/MIN	WIRE M/MIN	ARC VOLTS	ARC AMPS	TIME SECS
—	—	0.0	11.1	78	20.0
—	—	0.0	10.4	78	34.2
ARC TIME:			34.2s		
—	—	0.0	10.3	79	20.0
—	—	0.0	10.1	82	40.0
—	—	0.0	10.5	82	60.0
—	—	0.0	10.8	72	64.0
ARC TIME:			64.0s		
—	—	0.0	10.5	79	20.0
—	—	0.0	10.2	79	37.3
ARC TIME:			37.3s		
—	—	0.0	10.2	79	20.0
—	—	0.0	10.1	81	40.0
—	—	0.0	10.4	78	53.3
ARC TIME:			53.3s		

Summary
*** Totals ***

—	—	0.0	11.1	82 MAX
—	—	0.0	10.4	79 AVG
—	—	0.0	10.1	72 MIN

Heat Input: 77.55 KJ/mm
Calc Energy: 155.1 KJ
Arc Time: 188.8 s
Weldlength: 2 mm
T'Speed(Calc): 0.0 CM/MIN
Wire Consumed: 0.0 MTRS
Finish Time: 10:17:20
Cycle Time(hh:mm:ss): 00:25:33
USB Memory Unused Ok

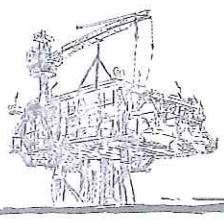
TVC MINI ARC LOGGER III
SET NO: 440
SW REV: 3.1.7
DATE: 2016-08-10
TIME: 10:33:07
Project: KASHAGAN
Procedure: 36/16
Weld No: 2
Welder: FABBRI P
Position: 5G
Standard: ASME IX
Process: GTAW
K-Factor: 1.0
Polarity: SP
Tungsten Diameter: 2,4
Brand Name: SANDVIK
Consumable: ER2594
Shielding Gas: ARGON
Backing Gas: ARGON
Material: UNS S32750
Specification: asme ix
Size: 1"
Thickness: 4,55mm
Diameter: 33,4
RUN NO: 4
FILE: 10-33-07.txt

GAS LPM	TRAV CM/MIN	WIRE M/MIN	ARC VOLTS	ARC AMPS	TIME SECS
—	—	0.0	10.4	78	20.0
—	—	0.0	10.1	79	37.4
ARC TIME:			37.4s		
—	—	0.0	10.2	78	20.0
—	—	0.0	10.2	81	40.0
—	—	0.0	10.2	81	60.0
—	—	0.0	10.3	78	72.1
ARC TIME:			72.1s		
—	—	0.0	10.8	79	20.0
—	—	0.0	10.3	78	30.3
ARC TIME:			30.3s		
—	—	0.0	10.5	80	20.0
—	—	0.0	10.4	82	40.0
—	—	0.0	10.5	80	58.6
ARC TIME:			58.6s		
—	—	0.0	10.0	70	7.3
ARC TIME:			7.3s		

Summary
*** Totals ***

—	—	0.0	10.8	82 MAX
—	—	0.0	10.3	79 AVG
—	—	0.0	10.0	70 MIN

Heat Input: 83.68 KJ/mm
Calc Energy: 167.3 KJ
Arc Time: 205.7 s
Weldlength: 2 mm
T'Speed(Calc): 0.0 CM/MIN
Wire Consumed: 0.0 MTRS
Finish Time: 10:39:36
Cycle Time(hh:mm:ss): 00:06:29
USB Memory Unused Ok



RINA Services SpA
D. Cimatti

F 000 121

SANDVIK

CERTIFICATE No. A/12-246214 Rev 00
Date 2012-04-24 Page 1/1

INSPECTION CERTIFICATE acc to
EN 10 204 3.1

ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA

INSPECTION STAMP
WQ

Customer References

	Customer order
VS ORD EMAIL 30/3/	2012-03-30

250-00991 ROSETTI W

Sandvik References

Order No.	Subs No.	ABSMT Dispatch note
274342	22387	41985/55
ABSMT No.	C.Code	
416-53164	45	

Material description
STAINLESS COLD DRAWN WIRE
TIG LENGTHS

Steel making process
Electric furnace

Steel/material Designations

Sandvik	AWS
25.10.4.L	ER2594

EN no
25 9 4 N L

ROSETTI MARINO S.p.A.
Welding Dpt.
A. Khalifa

Technical requirements
ASME SECT II PART C SFA 5.9,
EDITION 2010 ADDENDA 2011, AWS A5.9-06.
EN ISO 14 343

EXTENT OF DELIVERY

It	Product designation	Heat	Lot	Pieces	Kg
01	R25.10.4.L-2.00-1000	527243	16752	40	200.0
			Total	40	200.0

TEST RESULTS
Chemical composition (weight%)

Heat	C	Si	Mn	P	S	Cr	Ni	Mo
527243	0.013	0.40	0.40	0.015	0.0007	25.08	9.32	3.91
	W	Co	V	Ti	Cu	Nb	N	
527243	<0.01	0.088	0.075	<0.003	0.15	<0.01	0.24	

The delivered products comply with the specifications and requirements of the order.

The material is manufactured according to a Quality system, approved and registered to ISO 9001.

The certificate is produced with EDP and valid without signature.

RINA Services SpA
D. Cimatti

Quality assurance - Lotta Nylén/QA-manager Wire
MTC Service / Certificates

Wire Sandviken AB Reg No. 556779-3897 VAT No. SE663000-060901
SE-81181 SANDVIKEN SWEDEN www.smt.sandvik.com mtc_service.smt@sandvik.com

ROSETTI MARINO	VERBALE DI CONTROLLO VISIVO/DIMENSIONALE visual/dimensional inspection report	VDR N° 36-16 data: 11.08.2016
progetto project KASHAGAN EXPERIMENTAL PROGRAM - EPC3 HU	cliente client KCOI for NCOC	commessa job 115A90
disegno dwg /	ITP N° /	fase step /

oggetto - item

Welding Procedure Qualification Record (WPQR) 36/16

Certificato di Qualifica di Procedimento di Saldatura (WPQR) 36/16

WE CERTIFY THAT:

ITEMS INDICATED ABOVE HAVE UNDERGONE A VISUAL INSPECTION AND HAVE BEEN ACCEPTED ACCORDING TO THE SPECIFICATION / PROCEDURE MENTIONED AND TO ACCEPTANCE CRITERIA DEFINED IN IT

SI CERTIFICA CHE LA SALDATURA DEL SAGGIO SOPRA CITATO E' STATA SOTTOPOSTA AD ESAME VISIVO AL 100% ALLO STATO COME SALDATO IN ACCORDO ALLE SPECIFICHE E STANDARD CITATI.

note - remarks

No visible defects have been detected on 10 test welds 1"x4,55mm in S32750.

Non sono stati rilevati difetti visibili su 10 saldature 1"x4,55mm in S32750.

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

ASME IX:2015 + ASME B31.3:2012

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client
CSWIP A.K. KHALIFA 69505 WI 3.1		

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 08/09/2016	FOGLIO - Sheet 1
RAPPORTO D'ESAME LIQUIDI PENETRANTI ***NDT REPORT - DYE PENETRANT TEST***		PT N° : 15	Ns. Rif. 16148

COSTRUTTORE/Customer	ORDINE/Order	PROGETTO/Project	COMMESSA/Job	
ROSETTI MARINO S.P.A	/	/	115A90	
CLIENTE FINALE/Final client	OGGETTO/Object	DISEGNO/Dwg	P.F.C./Q.C.P.	FASE/Step
/	*WPS*	/	/	/

CODICE/Code	PROCEDURA/Procedure	ACCETTABILITA'/Acceptance level
ASME V ART 6 Ed. 2015	QT NDT PT 04	ASME B31.3-2014 para. 344.4.2 ASME BPVC.IX-2015 – QW-195.2

MATERIALE/Material	TEMP. SUPERFICI/ Surface temperature	INTENSITA' LUMINOSA/ Light intensity	
SEE TABLE BELOW	RANGE 5°÷52°	☑ LUCE BIANCA > 1000 Lux	☐ LUCE NERA 1000 µW/cm²

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO/As welded	☑ SPAZZOLATO - Brushed	☐ LAVORATO DI MACCHINA - Machined
☐ MOLATO - Ground	☐ LAMINATO - Rolled	☐ GREZZO - Forged

MATERIALI UTILIZZATI - Material Used	NDT	CGM
PULITORE PRELIMINARE/Cleaner	BC1	
PENETRANTE - Penetrant	K71B2P	
RIVELATORE/Developer	D112A	

ISTRUZIONE DI LAVORO/Works instruction		
Step 1 PULITURA PRELIMINARE/Preliminary Cleaning	BC1	
Step 2 APPLICAZIONE PENETRANT/ Penetrant application	SPRAY	
Step 2a TEMPO PENETRAZIONE/Dwel time (min)	10	
Step 3 RIMOZIONE PENETRANTE/Removal penetrant	ACQUA	
Step 4 ESSICAZIONE/Drying process	ARIA	
Step 5 INTERVALLO APP. RIVELATORE/time int. developer app.	Max 20 min	
Step 6 APPLICAZIONE RIVELATORE/Developer application	SPRAY	
Step 7 TEMPO DI LETTURA/Checking time	RANGE 10÷60	
Step 8 PULIZIA DOPO CONTROLLO/Cleaner after examination	☑ NO/No	☐ SI/Yes

SALDATURE CONTROLLATE / Welds Verified

SAGGIO	WPS	Ø	THK mm
A	36/16	33.4	4.55
B	36/16	33.4	4.55
C	36/16	33.4	4.55
D	36/16	33.4	4.55
E	36/16	33.4	4.55
F	36/16	33.4	4.55
G	36/16	33.4	4.55
H	36/16	33.4	4.55

Check-List			Acceptable value Limits
1	☐	relevant linear indications;	not acceptabe
2	☐	Relevant rounded indications greater than 5 mm	not acceptabe
3	☐	4 or more indications greater of 1,5 mm	not acceptabe if the indication is in a line separated by 1.5 mm or less edge to edge.

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Marco Ferrari II° Livello SNT - TC - 1A / ISO 9712	ROSETTI MARINO S.p.A. Welding Dpt. A. Khalifa		

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Report NDT PT 02 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud 48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 08/09/2016	FOGLIO - Sheet 1
RAPPORTO D'ESAME LIQUIDI PENETRANTI ***NDT REPORT - DYE PENETRANT TEST***		PT N° : 16	Ns. Rif. 16148

COSTRUTTORE/Customer	ORDINE/Order	PROGETTO/Project	COMMESSA/Job	
ROSETTI MARINO S.P.A	/	/	115A90	
CLIENTE FINALE/Final client	OGGETTO/Object	DISEGNO/Dwg	P.F.C./Q.C.P.	FASE/Step
/	*WPS*	/	/	/

CODICE/Code	PROCEDURA/Procedure	ACCETTABILITA'/Acceptance level
ASME V ART 6 Ed. 2015	QT NDT PT 04	ASME B31.3-2014 para. 344.4.2 ASME BPVC.IX-2015 – QW-195.2

MATERIALE/Material	TEMP. SUPERFICI/ Surface temperature	INTENSITA' LUMINOSA/ Light intensity	
SEE TABLE BELOW	RANGE 5°÷52°	☑ LUCE BIANCA > 1000 Lux	☐ LUCE NERA 1000 µW/cm²

STATO DELLA SUPERFICIE – Surface condition		
☑ COME SALDATO/As welded	☑ SPAZZOLATO - Brushed	☐ LAVORATO DI MACCHINA - Machined
☐ MOLATO - Ground	☐ LAMINATO - Rolled	☐ GREZZO - Forged

MATERIALI UTILIZZATI - Material Used	NDT	CGM
PULITORE PRELIMINARE/Cleaner	BC1	
PENETRANTE - Penetrant	K71B2P	
RIVELATORE/Developer	D112A	

ISTRUZIONE DI LAVORO/Works instruction		
Step 1 PULITURA PRELIMINARE/Preliminary Cleaning	BC1	
Step 2 APPLICAZIONE PENETRANT/ Penetrant application	SPRAY	
Step 2a TEMPO PENETRAZIONE/Dwel time (min)	10	
Step 3 RIMOZIONE PENETRANTE/Removal penetrant	ACQUA	
Step 4 ESSICAZIONE/Drying process	ARIA	
Step 5 INTERVALLO APP. RIVELATORE/time int. developer app.	Max 20 min	
Step 6 APPLICAZIONE RIVELATORE/Developer application	SPRAY	
Step 7 TEMPO DI LETTURA/Checking time	RANGE 10÷60	
Step 8 PULIZIA DOPO CONTROLLO/Cleaner after examination	☑ NO/No	☐ SI/Yes

SALDATURE CONTROLLATE / Welds Verified

SAGGIO	WPS	Ø	THK mm
I	36/16	33.4	4.55
L	36/16	33.4	4.55

Check-List			Acceptable value Limits
1	☐	relevant linear indications;	not acceptabe
2	☐	Relevant rounded indications greater than 5 mm	not acceptabe
3	☐	4 or more indications greater of 1,5 mm	not acceptabe if the indication is in a line separated by 1.5 mm or less edge to edge.

RISULTATI Result	CONFORME ALLA SPECIFICA According to specification ☑	NON CONFORME ALLA SPECIFICA Non According to specification ☐	
TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Marco Ferrari II° Livello SNT - TC - 1A / ISO 9712	ROSETTI MARINO S.p.A. Welding Dpt. A. Khalifa		

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QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 12/08/2016	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 07	Ns. Rif./Our Ref. 16148

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO S.P.A	/	/	115A90	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
/	WPS	/	/	/

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
WPS 36/16	SAGGIO G	1"	4.55	/	A	/	A
					B	/	A
					C	/	A
					D	/	A
WPS 36/16	SAGGIO H	1"	4.55	/	A	/	A
					B	/	A
					C	/	A
					D	/	A
WPS 36/16	SAGGIO I	1"	4.55	/	A	/	A
					B	A	NR
					C	/	A
					D	/	A
WPS 36/16	SAGGIO L	1"	4.55	/	A	/	A
					B	/	A
					C	/	A
					D	A	A

Difetto / *Defect*

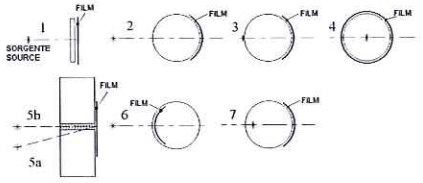
A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worns
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura *procedure*	ASME V ART. 2 Ed. 2015 / QT NDT RT 01 ASME IX	**Schermi** *Shields*	Pb 0,05 Pb 0,10
Campo di densità *Density range*	2÷4	**Pellicola** *Film type*	T200

Sorgente *Source*	☑ RX	☐ Ir 192	☐ Se 75	**Tecnica Rx** *Rx Tecnique*	1 ☐	2 ☐	3 ☐	4 ☐	**Penetrametro** *I.Q.I*	☑ ASTM ☐ EN
					5 ☐	5b ☑	6 ☐	7 ☐		☐ Lato film *film side* ☑ Lato sorgente *Source side*
Energia *Energy*	Ci	kV 215	mA 4.5						**Esposizione** *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Macchia focale *Focal spot*		3	mm						**Tecnica di sviluppo** *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*
Tempo d'esposizione *Exposure time*		Min	Sec 48							



Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*	Filo visibile n° Visible Wire n°	Lastre n° *Films n°*
4.55+1.5mm	666.6mm	33.4mm	≤0.51mm	5	16

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Marco Ferrari II° Livello SNT - TC - 1A / ISO 9712	ROSETTI MARINO S.p.A. Welding Dpt. A. Khalifa		RINA Services SpA D. Cimatti

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Report NDT RT 05 Rev.1

QUALITY TEST srl	Controlli non distruttivi Via F. Crispi n. 1 - Zona Bassette Sud48123 Ravenna Tel 0544 468472 info@qualitytestsrl.com	DATA – Date 12/08/2016	FOGLIO – Sheet 1
RAPPORTO D'ESAME RADIOGRAFICO *RADIOGRAPHIC TEST*		RT N° : 06	Ns. Rif./Our Ref. 16148

CLIENTE / Client	ORDINE / Order	PROGETTO / Project	COMMESSA / Job	
ROSETTI MARINO S.P.A	/	/	115A90	
CLIENTE FINALE /Customer	OGGETTO / Object	DISEGNO / Dwg	P.F.C. / Q.C.P.	Fase / Step
/	WPS	/	/	/

Schizzo *Sketch*	Saldatura *Weld*	Diametro *Diameter*	Spessore *Thikeness*	Punzone *Welder*	Posizione *Position*	Difetto *Defect*	Giudizio *Judgement*
WPS 36/16	SAGGIO A	1"	4.55	/	A	/	A
					B	Ab	NR
					C	/	A
					D	/	A
WPS 36/16	SAGGIO B	1"	4.55	/	A	/	A
					B	/	A
					C	/	A
					D	/	A
WPS 36/16	SAGGIO C	1"	4.55	/	A	/	A
					B	A	A
					C	/	A
					D	/	A
WPS 36/16	SAGGIO D	1"	4.55	/	A	/	A
					B	/	A
					C	/	A
					D	/	A
WPS 36/16	SAGGIO E	1"	4.55	/	A	/	A
					B	/	A
					C	/	A
					D	/	A
WPS 36/16	SAGGIO F	1"	4.55	/	A	/	A
					B	/	A
					C	DF	A
					D	/	A

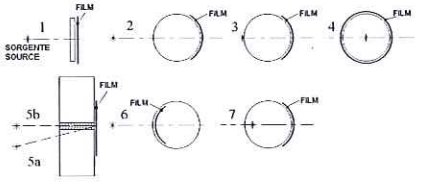
Difetto / *Defect*

A	Porosità / *Porosity*
Aa	Soffiature Tondeggianti *Rounded blisters*
Ab	Tarli / Worns
B	Inclusione di scoria *Slag Inclusion*
C	Mancanza di fusione *Lack of fusion*
D	Mancanza di penetraz. *Troughout penetration*
E	Cricca / Crack
Ex	Eccesso di penetrazione *Excessive penetration*
F	Incisione / *Undercut*
In	Insellamento *Root concavity*
Sl	Slivellamento *Misalignment*
W	Inclusioni di tungsteno *Tungsyen inclusion*
DF	Difetto film / *Film Defect*

Giudizio / *Judgement*

A	Accettabile / *Acceptable*
NR	Riparare / *Repair*
NX	Ripetere film/*Repeat film*
RX	Conferma difetto *Confirm the defect*

Procedura *procedure*	ASME V ART. 2 Ed. 2015 / QT NDT RT 01 ASME IX	**Schermi** *Shields*	Pb 0,05 Pb 0,10	**Campo di densità** *Density range*	2÷4
Pellicola *Film type*	T200				

Sorgente *Source*	☑ RX	☐ Ir 192	☐ Se 75	**Tecnica Rx** *Rx Tecnique*	1 ☐	2 ☐	3 ☐	4 ☐	**Penetrametro** *I.Q.I*	☑ ASTM ☐ EN
					5 ☐	5b ☑	6 ☐	7 ☐		☐ Lato film *film side* ☑ Lato sorgente *Source side*
Energia *Energy*	Ci	kV 215	mA 4.5						**Esposizione** *Esposition*	☑ Film singolo *Single film* ☐ Film doppio *Double film*
Macchia focale *Focal spot*		3	mm						**Tecnica di sviluppo** *Film processing*	☐ Manuale *manual* ☑ Automatico *Automatic*
Tempo d'esposizione *Exposure time*		Min	Sec 48							

Sp. Attraversato *Crossed thickness*	Dist. pezzo sorg. (D) *Source piece distan*	Dist. oggetto film (d) *Film object distance*	Penombra *Unsharpness*	Filo visibile n° Visible Wire n°	Lastre n° *Films n°*
4.55+1.5mm	666.6mm	33.4mm	≤0.51mm	5	24

TECNICO II° LIVELLO Level II° Technician	CONTROLLO QUALITA' Quality Control	ISPETTORE CLIENTE Company Repr.	ISPETTORE A.I. Inspection Agency
Marco Ferrari II° Livello SNT - TC - 1A / ISO 9712	ROSETTI MARINO S.p.A. Welding Dpt. K. Khalifa		RINA Services SpA D. Limatti

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Test report n° 192061 **Rev.0**
EN 10204, type : 3.2

Client
Cod. 1737

ROSETTI MARINO S.P.A
VIA TRIESTE, 230
48100 RAVENNA RA
Italy

Your ref.	Order n.	D.D.T. n.000207	data	16/08/2016
Our ref.	Report n.	**192061**	data	**06/09/2016**
	Job n.	61871	data	17/08/2016

Remarks PQR 36/16
Dimension : 1" (33.4mm) x 4.55mm
JOB : 115A90

Project NCOC EPC3 HU

Client Reference SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012

Test standard ASTM E8/E8M-15a - ASTM E190-14 - ASTM E23-16b - UNI EN ISO 6507-1:2006 - ASTM E562-11

This Report is made of n° 27 pages including this cover plus the following page:

Test	Pag.	Test	Pag.
Chemical Analysis	1	Impact test	1
Macrographic examination	3	Bend test	1
Micrographic examination	10	Ferrite or Austenite Content	6
Hardness test	3		
Tensile test at room temperature	1		

This Report (RPR) contains tests results on the following material:

Ref.	Identification	Material	DN / Thk [mm]	Remarks
142323	PQR 36/16	ASTM A790 UNS S32750		

Signed for and on behalf of — Customer — Inspector — Inspector

Exova s.r.l.
Luca Cantoni

ROSETTI MARINO S.P.A. Welding Dpt. A. Khalifa

RINA Services SpA G. Cortini

IIS Service S.r.l. Ispettore Incaricato (Massimo Fanciatichi) 06-09-16

General conditions:
1. The Customer accepts general conditions and prices fixed by the laboratory to perform the tests.
2. Test results will be communicated only by means of test report except for different contractual agreement.
3. Tests sample will be destroyed 30 days after test except for different written Client request.
4. The spare will be destroyed 90 days after date of receipt for different written Client request.
5. The test results described in the following test report are referring only to the sample mentioned in it.
6. The date of material receivement is the same as the date of job opening. The date of testing is the same as the date of test report, except for different info.
7. The laboratory has examined the material sampled an supplied by the Client in compliance with standard request.

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Test report n° 192061 Rev.0

Equipment n. 979/1412

CHEMICAL ANALYSIS

Q = OES method , W = Wet method , C = Combustion

Test Ref. Lab.	Client Ref.	Test Temp. °C	Posizione Positions	Elementi Elements	Valori Values	Unità di misura Unit	Note o richiesti Remarks or required	Norma di riferimento Application code / Standard	Rif. Ref.
323.AN1.01	36/16 h12	+20	WM 1.5mmRoot	C	0.013	%		#	Q
323.AN1.02	36/16 h12	+20	WM 1.5mmRoot	Si	0.40	%		#	Q
323.AN1.02	36/16 h12	+20	WM 1.5mmRoot	Mn	0.37	%		#	Q
323.AN1.03	36/16 h12	+20	WM 1.5mmRoot	Cr	25.6	%		#	Q
323.AN1.03	36/16 h12	+20	WM 1.5mmRoot	Ni	8.50	%		#	Q
323.AN1.04	36/16 h12	+20	WM 1.5mmRoot	Mo	3.78	%		#	Q
323.AN1.05	36/16 h12	+20	WM 1.5mmRoot	Cu	0.09	%		#	Q
323.AN1.06	36/16 h12	+20	WM 1.5mmRoot	W	0.01	%		#	Q
323.AN1.07	36/16 h12	+20	WM 1.5mmRoot	N	0.151	%		#	C

Standard ref. # SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator: SPE Costantino Amorielle Exova S.r.l.

Customer

Inspector: RINA Services S.p.A. G. Cortini

Inspector: IIS Service S.r.l. 06-09-16 Ispettore Inscricato (Massimo Panciatichi)

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Via della Pierina 9/11
26013 Crema (CR)
Italy

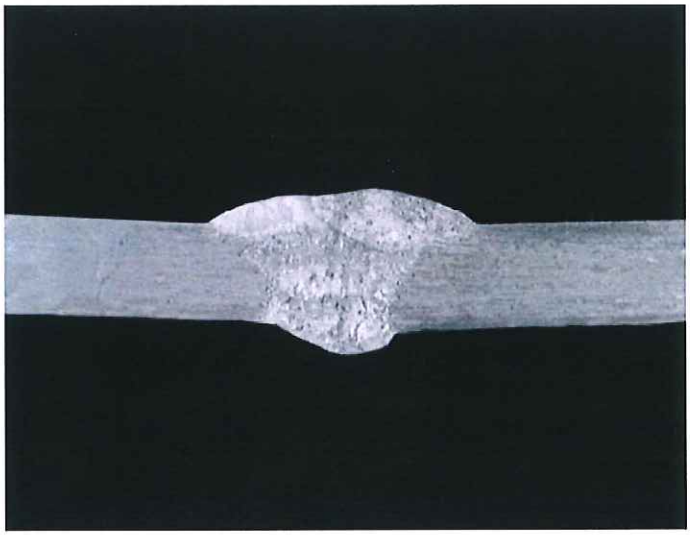
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W: www.exova.com

Test report n° 192061 Rev.0

Equipment n.	PHOTOGRAPHIC DOCUMENTATION	Pag. 1 of 3
1961		

Test Ref.	
Laboratory	Client
323.FO01.1	36/16

Etching : Oxalic Acid Solution **Magnification : x** 3



36/16 M1 h12

Comments Test specimen has been examined at low magnification (25x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Cristian Phoni Exova s.r.l.		RINA Services SpA G. Cortini	IIS Servico S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-07-16

This page is binded to references n. *192061 (job 61871)* *whose details are indicated on the cover*

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Italy

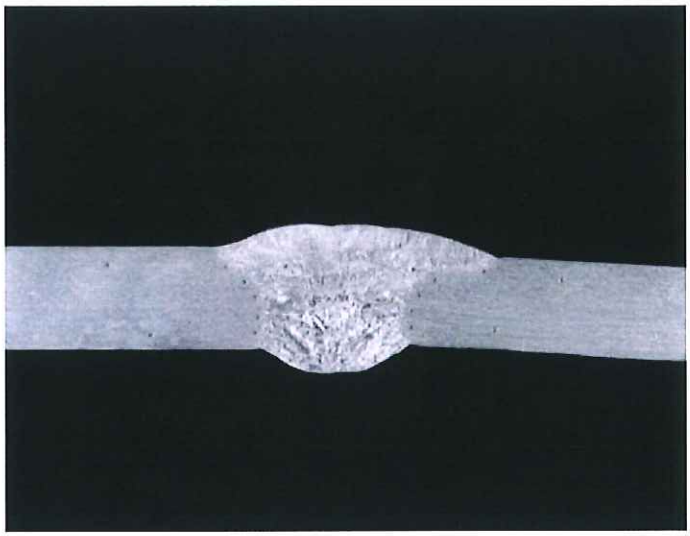
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W: www.exova.com

Test report n° 192061 Rev.0

Equipment n.	PHOTOGRAPHIC DOCUMENTATION	Pag. 2 of 3
1961		

Test Ref.	
Laboratory	Client
323.FO02.1	36/16

Etching : **Oxalic Acid Solution** **Magnification : x** **3**



36/16 **M2 h3**

Comments Test specimen has been examined at low magnification (25x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova S.r.l. SPE Cristian Pioni		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

This page is binded to references n. *192061 (job 61871)* *whose details are indicated on the cover*

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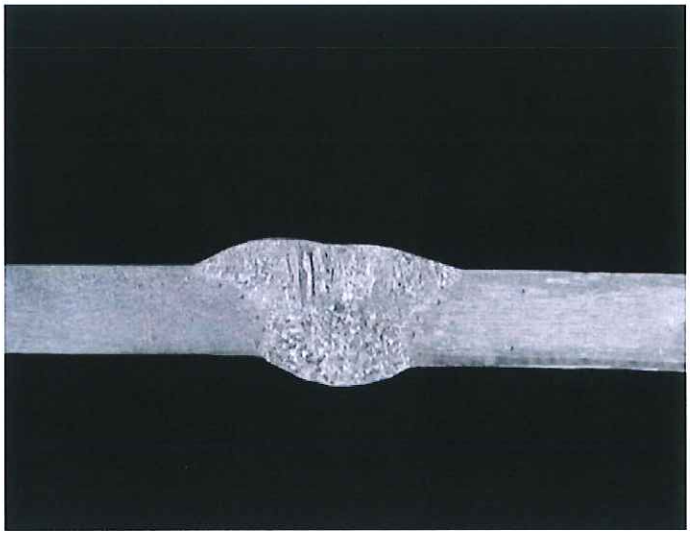
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E: info@exova.com
W: www.exova.com

Test report n° 192061 Rev.0

Equipment n.	PHOTOGRAPHIC DOCUMENTATION	Pag. 3 of 3
1961		

Test Ref.	
Laboratory	Client
323.FO03.1	36/16

Etching : Oxalic Acid Solution **Magnification : x** 3



36/16 M3 h6

Comments Test specimen has been examined at low magnification (25x) with and without etching.
The results of this exam, didn't show the presence of imperfections or defects in weld metal.

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Cristian Piloni EXOVA S.r.l.		RINA Services SpA G. Cortini	IIS Servico S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

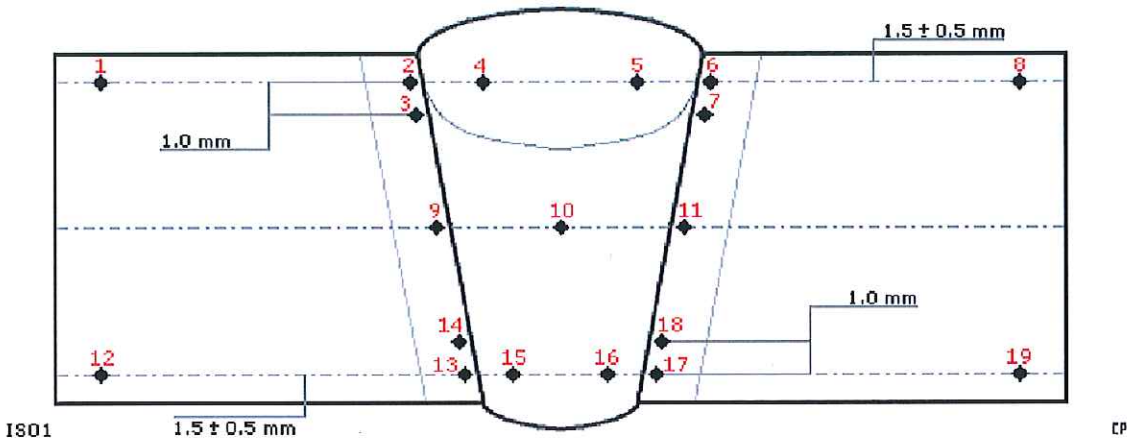
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Test report n° 192061 Rev.0

Equipment n.	HARDNESS TEST	Pag. 1 of 3
9	Internal procedure POI-07	



36/16
M1 h12

HV 10		-		-		-		-	
Point #	Value	Point #	Value	Point #	Value	Point #	Value	Point #	Value
#1	252	-	-	-	-	-	-	-	-
#2	246	-	-	-	-	-	-	-	-
#3	249	-	-	-	-	-	-	-	-
#4	236	-	-	-	-	-	-	-	-
#5	249	-	-	-	-	-	-	-	-
#6 Max	256	-	-	-	-	-	-	-	-
#7	254	-	-	-	-	-	-	-	-
#8	253	-	-	-	-	-	-	-	-
#9	246	-	-	-	-	-	-	-	-
#10	240	-	-	-	-	-	-	-	-
#11	247	-	-	-	-	-	-	-	-
#12 Max	256	-	-	-	-	-	-	-	-
#13	253	-	-	-	-	-	-	-	-
#14	255	-	-	-	-	-	-	-	-
#15	251	-	-	-	-	-	-	-	-
#16	240	-	-	-	-	-	-	-	-
#17	248	-	-	-	-	-	-	-	-
#18	249	-	-	-	-	-	-	-	-
#19	250	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 6507-1:2006

Remarks Required : 330 HV10 Max

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Cristian Piloni		RINA Services SpA G. Cortinia	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 05-09-16

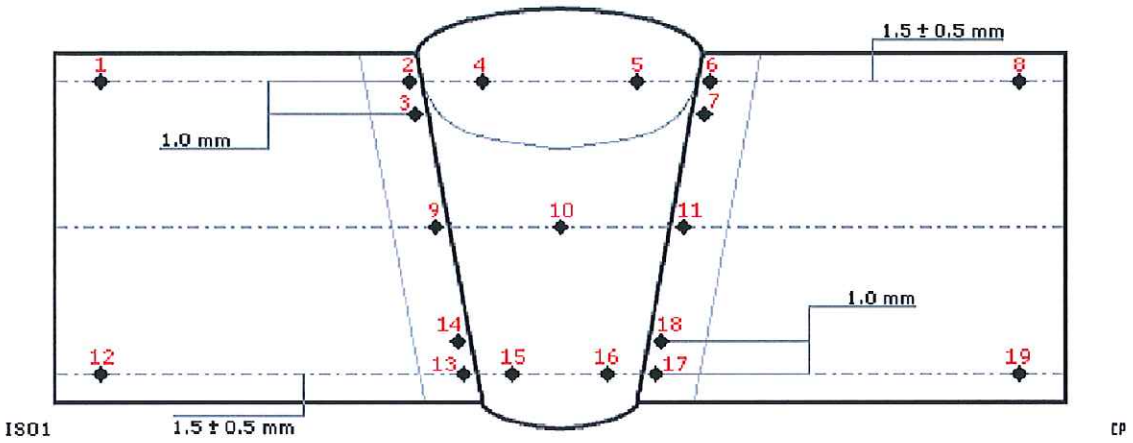
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Test report n° 192061 Rev.0

Equipment n.	HARDNESS TEST Internal procedure POI-07	Pag. 2 of 3
9		



36/16
M2 h3

HV 10		-		-		-		-	
Point #	**Value**	**Point #**	**Value**	**Point #**	**Value**	**Point #**	**Value**	**Point #**	**Value**
#1	268	-	-	-	-	-	-	-	-
#2	271	-	-	-	-	-	-	-	-
#3	254	-	-	-	-	-	-	-	-
#4	260	-	-	-	-	-	-	-	-
#5	255	-	-	-	-	-	-	-	-
#6	271	-	-	-	-	-	-	-	-
#7 Max	273	-	-	-	-	-	-	-	-
#8	264	-	-	-	-	-	-	-	-
#9	260	-	-	-	-	-	-	-	-
#10	249	-	-	-	-	-	-	-	-
#11	265	-	-	-	-	-	-	-	-
#12	271	-	-	-	-	-	-	-	-
#13	265	-	-	-	-	-	-	-	-
#14	269	-	-	-	-	-	-	-	-
#15	260	-	-	-	-	-	-	-	-
#16	258	-	-	-	-	-	-	-	-
#17	272	-	-	-	-	-	-	-	-
#18	270	-	-	-	-	-	-	-	-
#19	266	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 6507-1:2006

Remarks Required : 330 HV10 Max

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Cristian Pironi EXOVA S.r.l.		RINA Services SpA G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

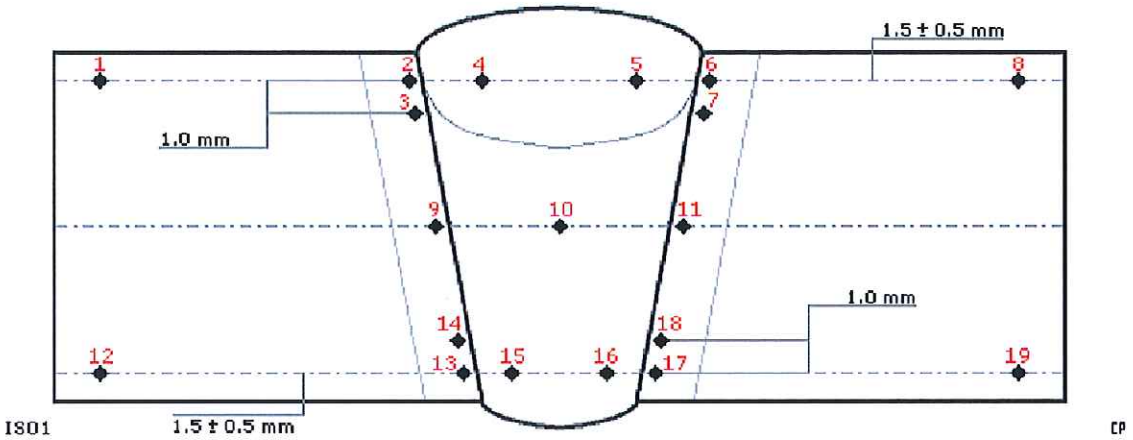
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Test report n° 192061 Rev.0

Equipment n.	HARDNESS TEST Internal procedure POI-07	Pag. 3 of 3
9		



36/16
M3 h6

HV 10		-		-		-		-	
Point #	**Value**	**Point #**	**Value**	**Point #**	**Value**	**Point #**	**Value**	**Point #**	**Value**
#1	252	-	-	-	-	-	-	-	-
#2	256	-	-	-	-	-	-	-	-
#3	267	-	-	-	-	-	-	-	-
#4	256	-	-	-	-	-	-	-	-
#5	262	-	-	-	-	-	-	-	-
#6	265	-	-	-	-	-	-	-	-
#7	264	-	-	-	-	-	-	-	-
#8 Max	277	-	-	-	-	-	-	-	-
#9	264	-	-	-	-	-	-	-	-
#10	251	-	-	-	-	-	-	-	-
#11	254	-	-	-	-	-	-	-	-
#12	264	-	-	-	-	-	-	-	-
#13	269	-	-	-	-	-	-	-	-
#14	263	-	-	-	-	-	-	-	-
#15	257	-	-	-	-	-	-	-	-
#16	257	-	-	-	-	-	-	-	-
#17	270	-	-	-	-	-	-	-	-
#18	263	-	-	-	-	-	-	-	-
#19	268	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 6507-1:2006

Remarks Required : 330 HV10 Max

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Cristian Pironi EXOVA S.r.l.		RINA Services SpA G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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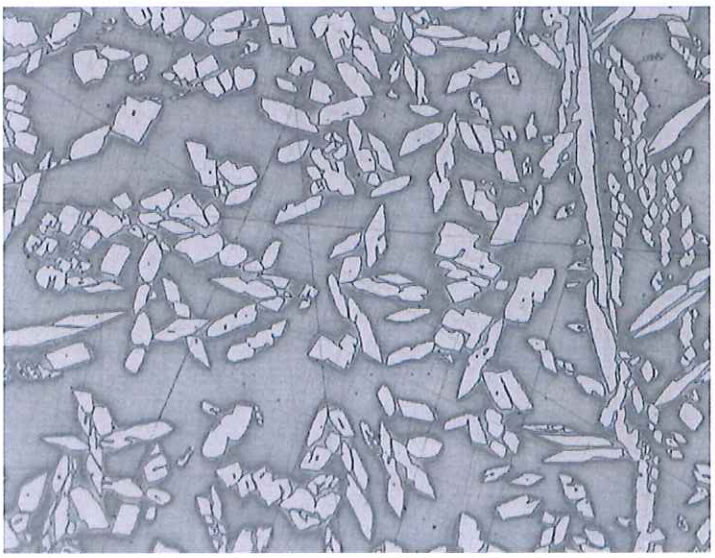
Test report n° 192061 Rev.0

Equipment n.	**MICROGRAPHIC EXAMINATION**	Pag. 1 of 10
781		

Test Ref.	
Laboratory	Client
323.GI01.1	36/16

Absence of deleterious phases

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **400**



36/16 **WM FILL h8**

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pleni		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi)

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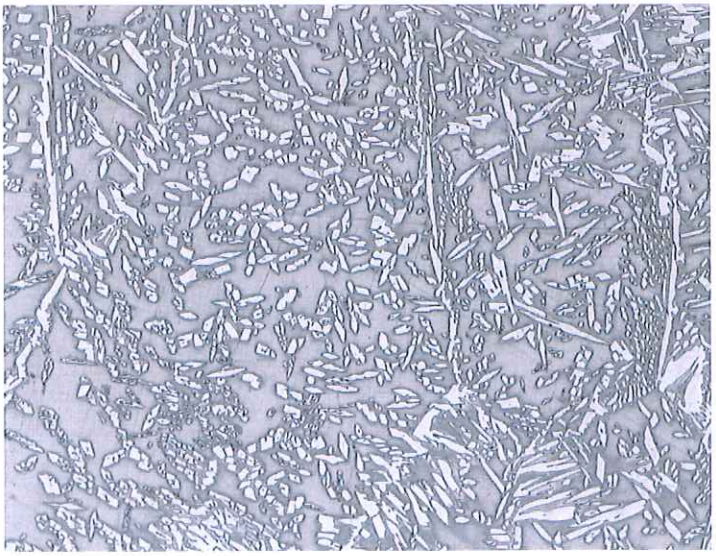
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Test report n° 192061 Rev.0

Equipment n.	**MICROGRAPHIC EXAMINATION**	
781		

Test Ref.	
Laboratory	Client
323.GI01.2	36/16

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **250**



36/16 **WM FILL h8**

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pieni		RINA Services SpA G. Cortini	IIS Servizi S.r.l. Ispettore Incaricato (Massimo Pancialichi)

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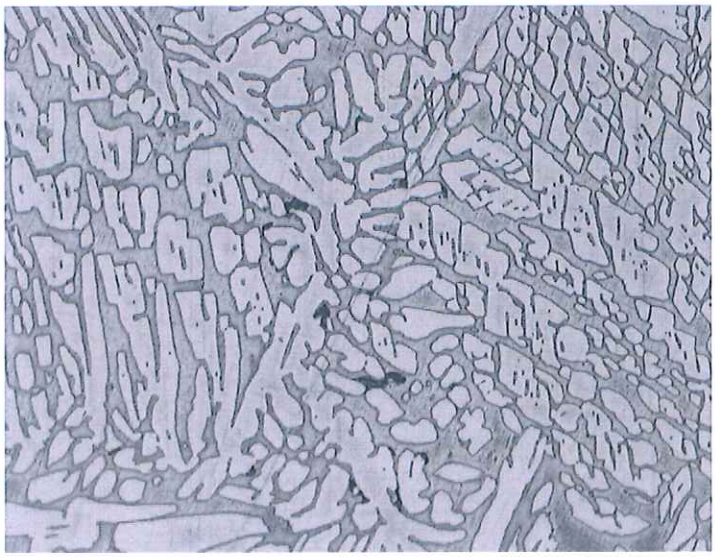
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Equipment n.	**MICROGRAPHIC EXAMINATION**	Pag. 3 of 10
781		

Test Ref.	
Laboratory	Client
323.GI01.4	36/16

Presence of sporadic deleterious phases do not exceed 1%

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **400**



36/16 **WM Root h8**

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pieni		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi)

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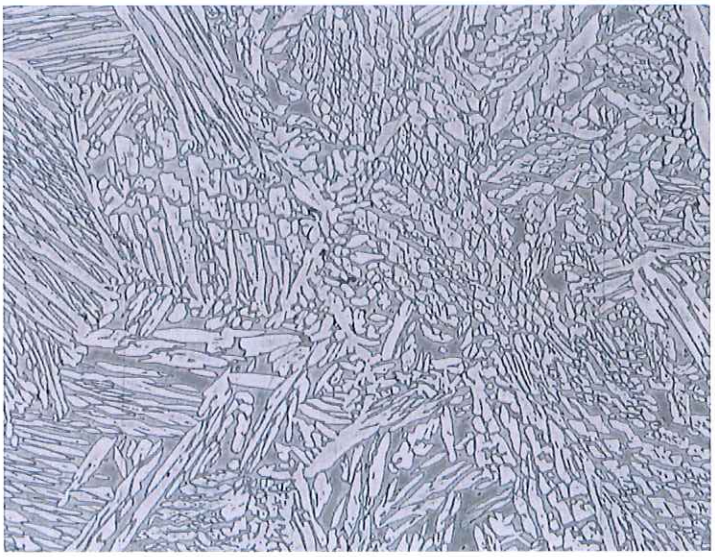
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Equipment n.	**MICROGRAPHIC EXAMINATION**	Pag. 4 of 10
781		

Test Ref.	
Laboratory	Client
323.GI01.5	36/16

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **250**



36/16 **WM Root h8**

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pieni		RINA Services SpA G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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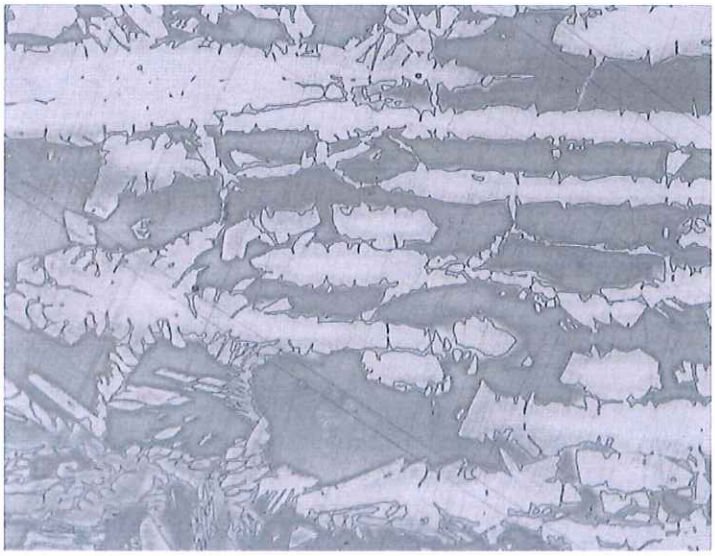
Test report n° 192061 Rev.0

Equipment n.	MICROGRAPHIC EXAMINATION	Pag. 5 of 10
781		

Test Ref.	
Laboratory	Client
323.GI01.7	36/16

Absence of deleterious phases

Etching : N.98-E407-07(Reapproved 2015)e1 **Magnification : x** 400



36/16 FL/HAZ FILL h8

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pleoni		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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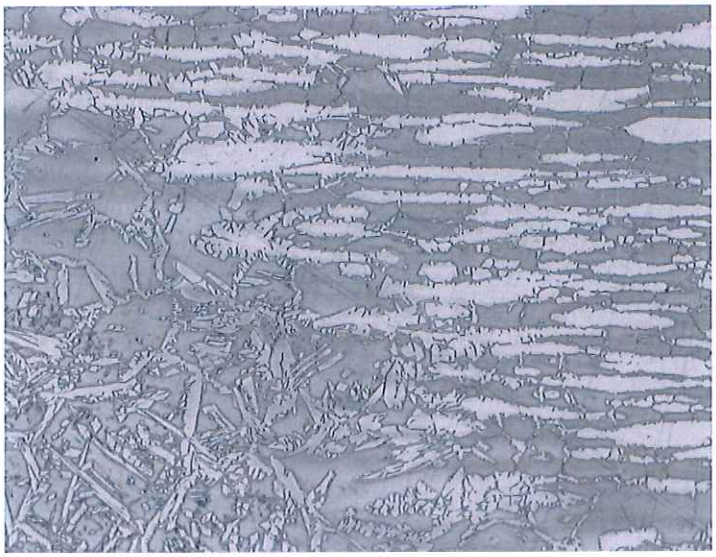
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Equipment n.	**MICROGRAPHIC EXAMINATION**	Pag. 6 of 10
781		

Test Ref.	
Laboratory	Client
323.GI01.8	36/16

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **250**



36/16 **FL/HAZ FILL h8**

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pieri		RINA Services SpA G. Cortini	IIS Servizi S.r.l. Ispettore Incaricato (Massimo Paciatichi) 06-09-16

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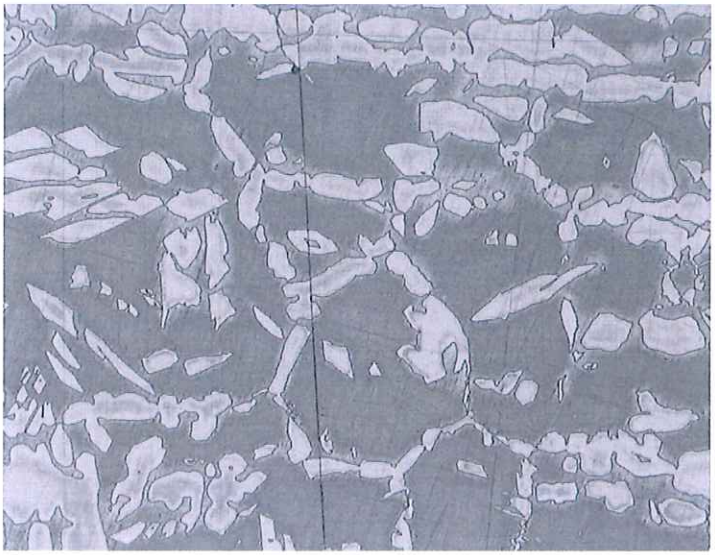
Test report n° 192061 Rev.0

Equipment n.	**MICROGRAPHIC EXAMINATION**	Pag. 7 of 10
781		

Test Ref.	
Laboratory	Client
323.GI1.10	36/16

Absence of deleterious phases

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **400**



36/16 **FL/HAZ Root h8**

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pleni		RINA Services SpA G. Cottini	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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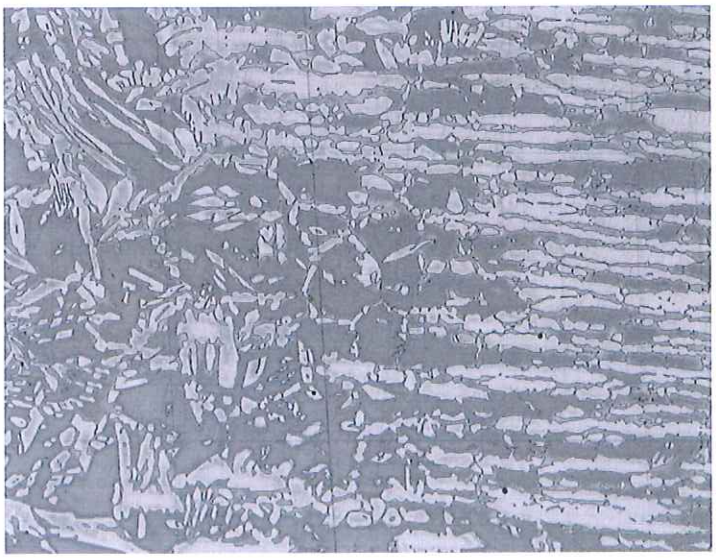
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Test report n° 192061 Rev.0

Equipment n.	MICROGRAPHIC EXAMINATION	Pag. 8 of 10
781		

Test Ref.	
Laboratory	Client
323.GI1.11	36/16

Etching : N.98-E407-07(Reapproved 2015)e1 **Magnification : x** 250



36/16 FL/HAZ Root h8

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pleoni		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi)

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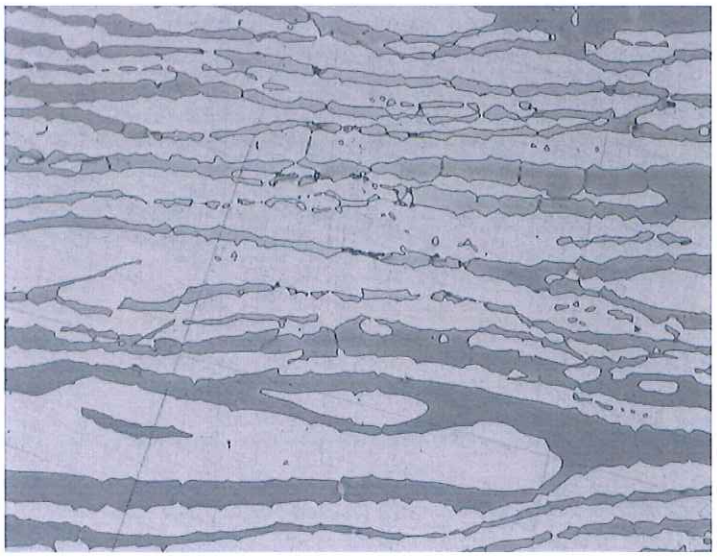
Test report n° 192061 Rev.0

Equipment n.	**MICROGRAPHIC EXAMINATION**	
781		

Test Ref.	
Laboratory	Client
323.GI1.13	36/16

Presence of sporadic deleterious phases do not exceed 1%, localized in BM root

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **400**



36/16 **BM (Full Thk) h8**

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pieri		RINA Services SpA G. Cortinici	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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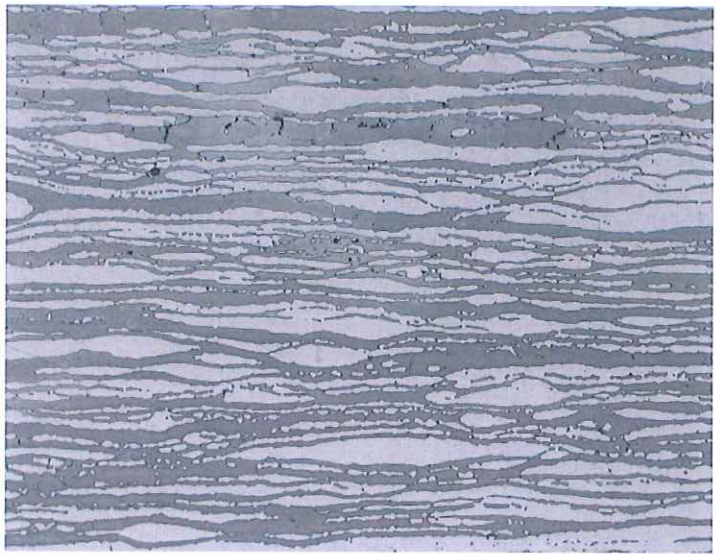
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Test report n° 192061 Rev.0

Equipment n.	**MICROGRAPHIC EXAMINATION**	
781		

Test Ref.	
Laboratory	Client
323.GI1.14	36/16

Etching : **N.98-E407-07(Reapproved 2015)e1** **Magnification : x** **250**



36/16

BM (Full Thk) h8

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - UNI EN ISO 17639:2013

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
Exova s.r.l. SPE Marco Pleni		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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Test report n° 192061 Rev.0

Equipment n. 1102-1153

TENSILE TEST

Internal procedure POI-01

Richiesti *Required*					>=550						>=800			
Test *Ref.* Lab.	Client	T *Test* °C	Posizione *Position*	Dimensioni *Dimensions* mm			Lo mm	Re N/mm²	Rp0.2% N/mm²	Rp0.5% N/mm²	Rt0.2% N/mm²	Rt0.35% N/mm²	Rt0.5% N/mm²	E	Rm N/mm²	A %	Z %	Rif. *Ref.*
323.TR1.01	36/16	+20	T Weld h12	19.00	x	4.30		-	570	-	-	-	-		892	-		#
323.TR1.02	36/16	+20	T Weld h6	19.00	x	4.30		-	568	-	-	-	-		858	-		#

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - ASTM E8/E8M-15a

Remarks X = Prismatic - # Broken in weld

Rp% determined by offset method - A% = determined after fracture - Values rounded to the nearest

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Luigi Vallati Exova S.r.l.		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

This page is binded to references n. *192061 (job 61871)* *whose details are indicated on the cover*

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Test report n° 192061 Rev.0

Equipment n.
§

IMPACT TEST

Internal procedure POI-02

Nominal machine energy : 450J

Test Ref. Lab.	Test Ref. Client	T Test °C	Posizione Position	Dimensioni Dimensions mm			Intaglio Notch	A Single Valore Value J	A Single Shear %	A Single Lateral E. mm	B Single Valore Value J	B Single Shear %	B Single Lateral E. mm	C Single Valore Value J	C Single Shear %	C Single Lateral E. mm	Media Average J	Rif. Ref.
Richiesti Required								14		0.381	14		0.381	14		0.381	17	
323.RE2.01	36/16	-48.7	WM h3	10	x	3.33	KV8	43		1.20	54		1.37	44		1.25	47	
323.RE2.02	36/16	-48.7	FL h3	10	x	3.33	KV8	47		1.57	52		1.65	50		1.42	50	
323.RE2.03	36/16	-48.7	FL+2 h3	10	x	3.33	KV8	60		0.67	69		1.73	57		1.67	62	
323.RE2.04	36/16	-48.7	FL+5 h3	10	x	3.33	KV8	59		1.32	46		1.62	55		1.61	53	
323.RE2.05	36/16	-48.7	WM h6	10	x	3.33	KV8	47		1.19	43		1.12	48		1.39	46	
323.RE2.06	36/16	-48.7	FL h6	10	x	3.33	KV8	47		1.49	44		1.47	52		1.35	48	
323.RE2.07	36/16	-48.7	FL+2 h6	10	x	3.33	KV8	60		1.58	53		1.68	57		1.92	57	
323.RE2.08	36/16	-48.7	FL+5 h6	10	x	3.33	KV8	42		1.18	52		1.40	46		1.34	47	

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - ASTM E23-16b

Remarks § 1102-1156-1509

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Luigi Vallati Exova S.r.l.		RINA Services SpA G. Cortini	IIS Service s.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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Test report n° 192061 Rev.0

Equipment n. 1102-1123

BEND TEST

Internal procedure POI-03

Test Ref. Lab.	Test Ref. Client	T Test °C	Tipo Type	Dimensioni Dimensions mm					Mandrino Jig mm	Distanza rulli Distance rollers mm	Angolo angle °	Lo Lo mm	Allungamento Elongation %	Esito Results	Note Remarks	Rif. Ref.
323.PI1.01	36/16	+20	Face Bend T			11.0	x	4.6	20	33	180			No Defect	h2	
323.PI1.02	36/16	+20	Root Bend T			11.0	x	4.6	20	33	180			No Defect	h4	
323.PI1.03	36/16	+20	Face Bend T			11.0	x	4.6	20	33	180			No Defect	h8	
323.PI1.04	36/16	+20	Root Bend T			11.0	x	4.6	20	33	180			No Defect	h10	

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - ASTM E190-14

Remarks Test Method "FORMER"

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Luigi Vailati Exova S.r.l.		RINA Services S.p.A. G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Penciatichi) 06-09-16

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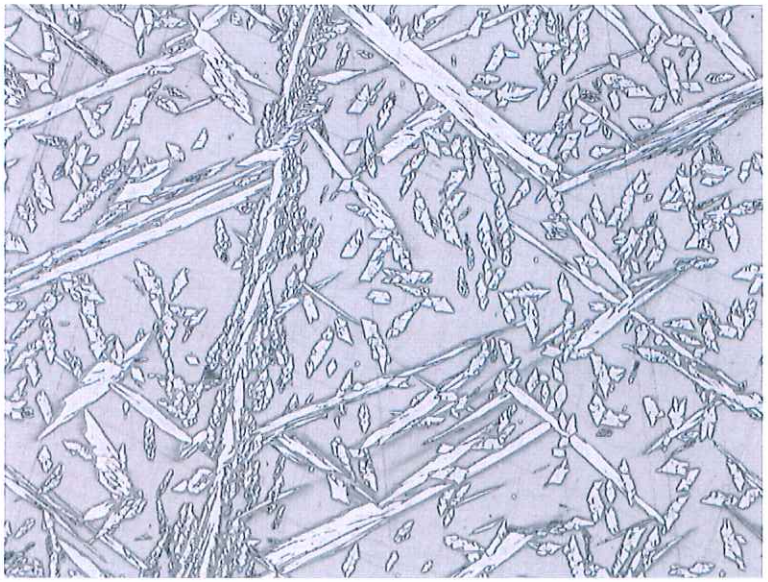
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Test report n° 192061 Rev.0

Ferrite contents

Test in accordance with:	Determination Ferrite content accordance with ASTM E562-11
Instruments:	Metallographic microscope Leitz DM 4000 (INV.781)
Sample:	JOB N° 61871 - MIF 142323 - PQR 36/16
Position:	WM 1mmCap h8
Number of sections:	1
Chosen of the fields:	Randomly
Polishing procedure and etching:	According to procedure POI 78 - Etching N. 220-E407-07e1
Magnification:	200
Grid Points and shape:	16- Square
Date test:	**01/09/2016**

n.	field	n.	field	n.	field	n.	field	n.	field
1	53.13	**11**	53.13	**21**	50.00				
2	50.00	**12**	46.88	**22**	53.13				
3	53.13	**13**	43.75	**23**	46.88				
4	53.13	**14**	50.00	**24**	50.00				
5	56.25	**15**	53.13	**25**	53.13				
6	46.88	**16**	56.25	**26**	56.25				
7	50.00	**17**	50.00	**27**	50.00				
8	53.13	**18**	53.13	**28**	53.13				
9	56.25	**19**	56.25	**29**	50.00				
10	56.25	**20**	53.13	**30**	53.13				



Detected	Obtained [%]	Required [%]
Volume fraction Vv [%]	**52.0**	**30÷65**
95% CI	**1.2**	**-**
RA [%]	**2.3%**	**-**

Note:

Operator	Customer	Inspector	Inspector
EXOVA S.r.l. SPE Marco Pieri		RINA Services SpA G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Penciatichi)

06-09-16

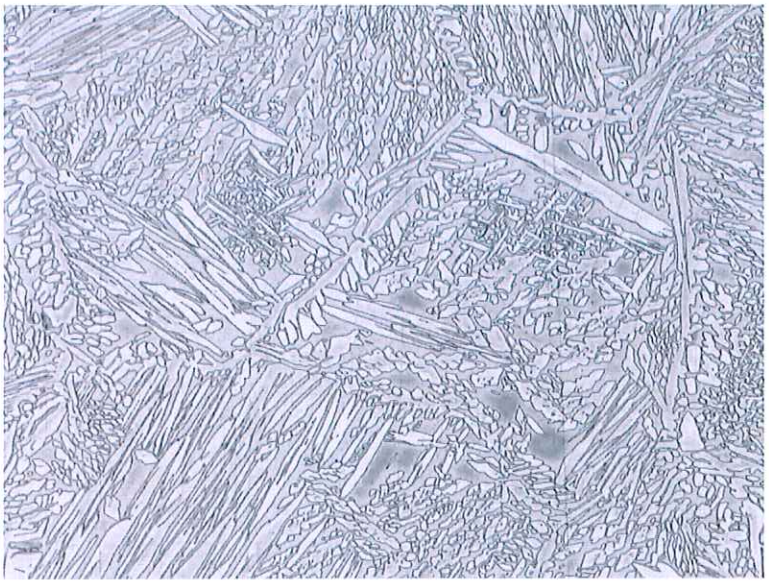
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Ferrite contents

Test in accordance with:	Determination Ferrite content accordance with ASTM E562-11
Instruments:	Metallographic microscope Leitz DM 4000 (INV.781)
Sample:	JOB N° 61871 - MIF 142323 - PQR 36/16
Position:	WM 1mmRoot h8
Number of sections:	1
Chosen of the fields:	Randomly
Polishing procedure and etching:	According to procedure POI 78 - Etching N. 220-E407-07e1
Magnification:	200
Grid Points and shape:	16- Square
Date test:	**01/09/2016**

n.	field	n.	field	n.	field	n.	field	n.	field
1	46.88	**11**	46.88	**21**	43.75				
2	50.00	**12**	46.88	**22**	50.00				
3	50.00	**13**	50.00	**23**	53.13				
4	46.88	**14**	53.13	**24**	43.75				
5	50.00	**15**	46.88	**25**	46.88				
6	53.13	**16**	46.88	**26**	46.88				
7	56.25	**17**	46.88	**27**	50.00				
8	50.00	**18**	46.88	**28**	53.13				
9	53.13	**19**	50.00	**29**	43.75				
10	43.75	**20**	53.13	**30**	43.75				



Detected	Obtained [%]	Required [%]
Volume fraction Vv [%]	**48.8**	**30÷65**
95% CI	**1.3**	-
RA [%]	**2.6%**	-

Note:

Operator	Customer	Inspector	Inspector
EXOVA S.r.l. SPE Marco Pieri		RINA Services SpA G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16

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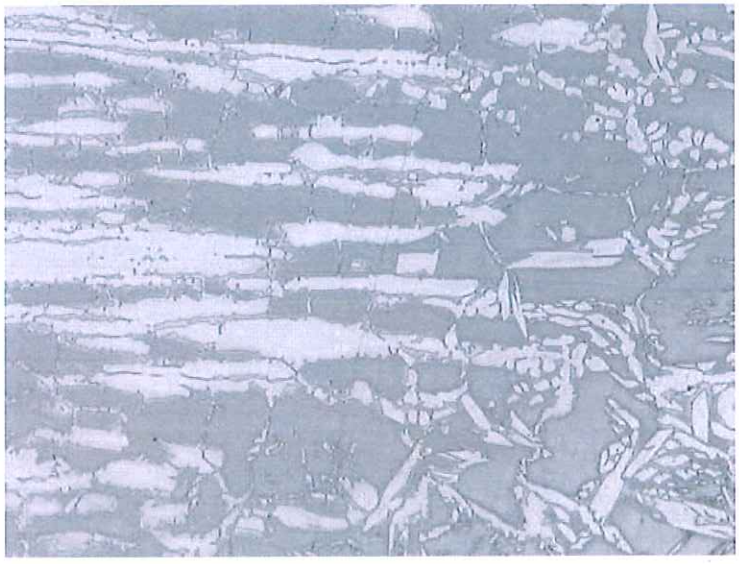
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Test report n° 192061 Rev.0

Ferrite contents

Test in accordance with:	Determination Ferrite content accordance with ASTM E562-11
Instruments:	Metallographic microscope Leitz DM 4000 (INV.781)
Sample:	JOB N° 61871 - MIF 142323 - PQR 36/16
Position:	HAZ 1mmCap h8
Number of sections:	1
Chosen of the fields:	Randomly
Polishing procedure and etching	According to procedure POI 78 - Etching N. 220-E407-07e1
Magnification:	200
Grid Points and shape:	16- Square
Date test:	**01/09/2016**

n.	field	n.	field	n.	field	n.	field	n.	field
1	56.25	**11**	53.13	**21**	50.00				
2	53.13	**12**	56.25	**22**	53.13				
3	53.13	**13**	50.00	**23**	56.25				
4	56.25	**14**	53.13	**24**	62.50				
5	50.00	**15**	56.25	**25**	56.25				
6	53.13	**16**	50.00	**26**	50.00				
7	56.25	**17**	53.13	**27**	53.13				
8	62.50	**18**	56.25	**28**	56.25				
9	56.25	**19**	53.13	**29**	50.00				
10	50.00	**20**	56.25	**30**	53.13				



Detected	Obtained [%]	Required [%]
Volume fraction Vv [%]	**54.2**	**30÷65**
95% CI	**1.2**	**-**
RA [%]	**2.3%**	**-**

Note:

Operator	Customer	Inspector	Inspector
EXOVA s.r.l.		RINA Services SpA G. Cartini	IIS Service s.r.l. Ispettore Incaricato (Massimo Perlatichi) 06-09-16

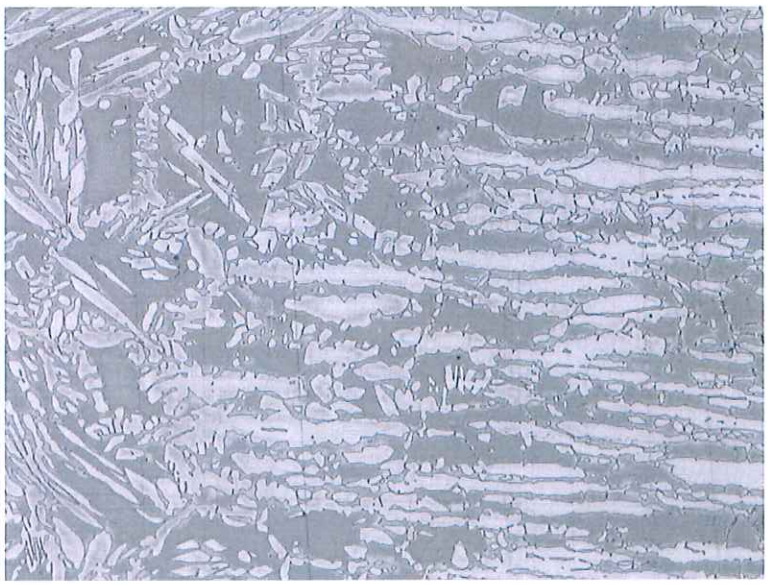
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Ferrite contents

Test in accordance with:	Determination Ferrite content accordance with ASTM E562-11
Instruments:	Metallographic microscope Leitz DM 4000 (INV.781)
Sample:	JOB N° 61871 - MIF 142323 - PQR 36/16
Position:	HAZ 1mmRoot h8
Number of sections:	1
Chosen of the fields:	Randomly
Polishing procedure and etching:	According to procedure POI 78 - Etching N. 220-E407-07e1
Magnification:	200
Grid Points and shape:	16- Square
Date test:	**01/09/2016**

n.	field	n.	field	n.	field	n.	field	n.	field
1	62.50	**11**	53.13	**21**	56.25				
2	56.25	**12**	56.25	**22**	50.00				
3	53.13	**13**	62.50	**23**	53.13				
4	50.00	**14**	62.50	**24**	56.25				
5	53.13	**15**	56.25	**25**	56.25				
6	56.25	**16**	50.00	**26**	59.38				
7	50.00	**17**	53.13	**27**	62.50				
8	53.13	**18**	53.13	**28**	56.25				
9	46.88	**19**	50.00	**29**	50.00				
10	50.00	**20**	53.13	**30**	53.13				



Detected	Obtained [%]	Required [%]
Volume fraction Vv [%]	**54.5**	**30÷65**
95% CI	**1.6**	-
RA [%]	**2.9%**	-

Note:

Operator	Customer	Inspector	Inspector
EXOVA s.r.l. SPE Marco Pieri		RINA Services spa G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi)

06-09-16

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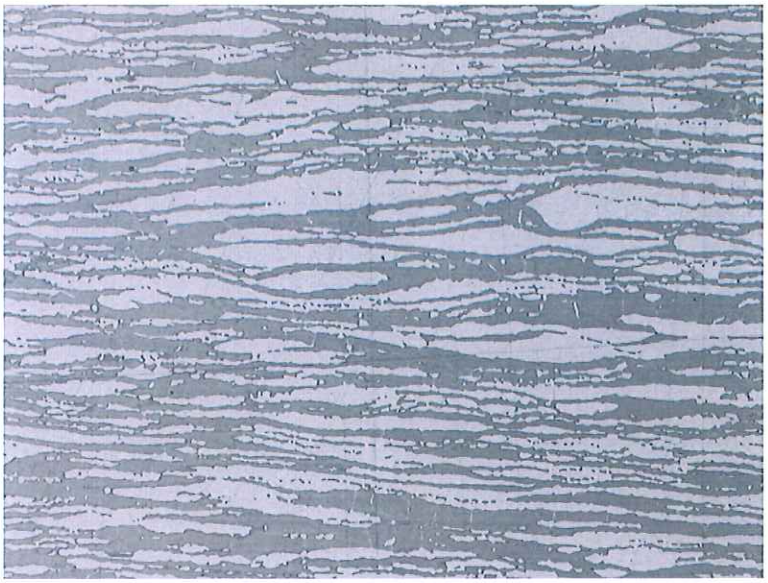
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Test report n° 192061 Rev.0

Ferrite contents

Test in accordance with:	Determination Ferrite content accordance with ASTM E562-11
Instruments:	Metallographic microscope Leitz DM 4000 (INV.781)
Sample:	JOB N° 61871 - MIF 142323 - PQR 36/16
Position:	BM 1mm Int.Surface h8
Number of sections:	1
Chosen of the fields:	Randomly
Polishing procedure and etching:	According to procedure POI 78 - Etching N. 220-E407-07e1
Magnification:	200
Grid Points and shape:	16- Square
Date test:	**01/09/2016**

n.	field	n.	field	n.	field	n.	field	n.	field
1	46.88	**11**	50.00	**21**	46.88				
2	50.00	**12**	53.13	**22**	46.88				
3	53.13	**13**	46.88	**23**	50.00				
4	50.00	**14**	50.00	**24**	53.13				
5	56.25	**15**	53.13	**25**	56.25				
6	53.13	**16**	56.25	**26**	50.00				
7	46.88	**17**	56.25	**27**	53.13				
8	50.00	**18**	50.00	**28**	50.00				
9	53.13	**19**	53.13	**29**	50.00				
10	56.25	**20**	53.13	**30**	46.88				



Detected	Obtained [%]	Required [%]
Volume fraction Vv [%]	**51.4**	**40÷60**
95% CI	**1.2**	**-**
RA [%]	**2.3%**	**-**

Note:

Operator	Customer	Inspector	Inspector
EXOVA S.r.l. SPE Marco Pieri		RINA Services SpA G. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Penciatichi)

06-09-16

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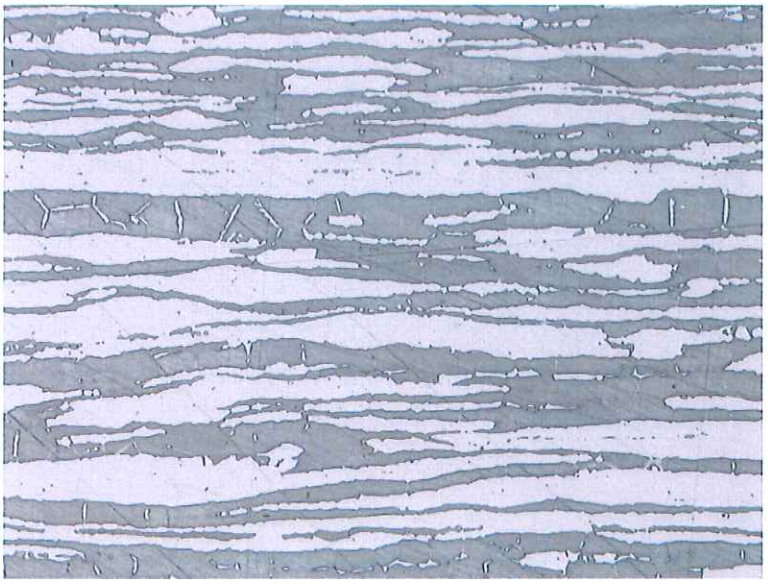
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Test report n° 192061 Rev.0

Ferrite contents

Test in accordance with:	Determination Ferrite content accordance with ASTM E562-11
Instruments:	Metallographic microscope Leitz DM 4000 (INV.781)
Sample:	JOB N° 61871 - MIF 142323 - PQR 36/16
Position:	BM 1mm Ext. Surface h8
Number of sections:	1
Chosen of the fields:	Randomly
Polishing procedure and etching:	According to procedure POI 78 - Etching N. 220-E407-07e1
Magnification:	200
Grid Points and shape:	16- Square
Date test:	**01/09/2016**

n.	field	n.	field	n.	field	n.	field	n.	field
1	56.25	**11**	50.00	**21**	50.00				
2	53.13	**12**	53.13	**22**	46.88				
3	50.00	**13**	46.88	**23**	50.00				
4	53.13	**14**	46.88	**24**	50.00				
5	46.88	**15**	53.13	**25**	53.13				
6	46.88	**16**	50.00	**26**	46.88				
7	50.00	**17**	53.13	**27**	46.88				
8	53.13	**18**	56.25	**28**	50.00				
9	56.25	**19**	50.00	**29**	53.13				
10	50.00	**20**	53.13	**30**	56.25				



Detected	Obtained [%]	Required [%]
Volume fraction Vv [%]	**51.0**	**40÷60**
95% CI	**1.2**	-
RA [%]	**2.3%**	-

Note:

Operator	Customer	Inspector	Inspector
EXOVA s.r.l. SPE Marco Pieri		RINA Services SpA S. Cortini	IIS Service S.r.l. Ispettore Incaricato (Massimo Ranciatichi) 06-09-16

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Test report n° 192066 **Rev.0**
EN 10204, type : 3.2

Client
Cod. 1737

ROSETTI MARINO S.P.A
VIA TRIESTE, 230
48100 RAVENNA RA
Italy

Your ref.	Order n.	D.D.T. n.000207	data	16/08/2016
Our ref.	Report n.	**192066**	data	**02/09/2016**
	Job n.	61871	data	17/08/2016

Remarks PQR 36/16
Dimension : 1" (33.4mm) x 4.55mm
JOB : 115A90

Project NCOC EPC3 HU

Client Reference SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012

Test standard ASTM G48-11(2015) Method A

This Report is made of n° 2 pages including this cover plus the following page:

Test	Pag.
Pitting test	1

This Report (RPR) contains tests results on the following material:

Ref.	Identification	Material	DN / Thk [mm]	Remarks
142328	PQR 36/16	ASTM A790 UNS S32750		

Lab Manager	Customer	Inspector	Inspector
Exova s.r.l. Luca Cantoni	ROSETTI MARINO S.p.A. Welding Dpt. A. Khalifa	IIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16	RINA Services SpA G. Cortini

General conditions:
1. The Customer accepts general conditions and prices fixed by the laboratory to perform the tests.
2. Test results will be communicated only by means of test report except for different contractual agreement.
3. Tests sample will be destroyed 30 days after test except for different written Client request.
4. The spare will be destroyed 90 days after date of receipt for different written Client request.
5. The test results described in the following test report are referring only to the sample mentioned in it.
6. The date of material receivement is the same as the date of job opening. The date of testing is the same as the date of test report, except for different info.
7. The laboratory has examined the material sampled an supplied by the Client in compliance with standard request.

This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory

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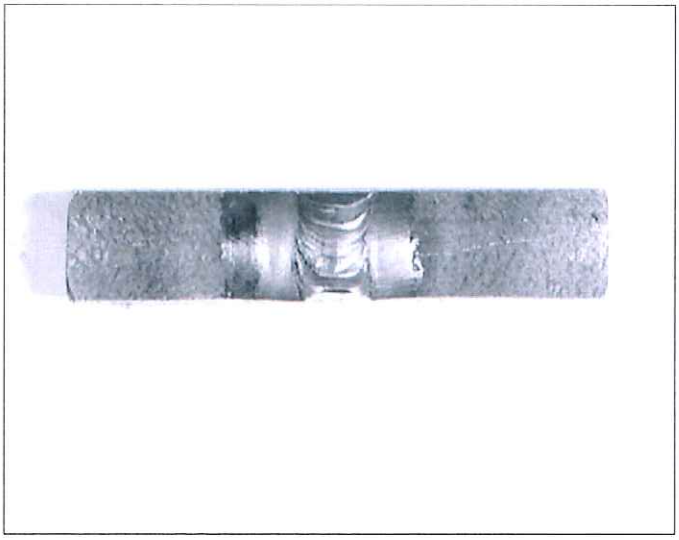
Test report n° 192066 Rev.0

Equipment n.	**PITTING CORROSION TEST**	Pag. 1 of 1
§		

Riferimento LAB *Test reference Lab*	**328.PT1.01**			Posizione *Location*	**T-WELD h12**
Riferimento Cliente *Test reference Customer*	**36/16**				
Dimensioni (mm) *Dimensions*	**51.00 x 9.96 x 4.55**			Sezione (cm²) *Section*	**15.71**
Soluzione *Solution*	**6%FeCl3**				
Procedura interna *Internal procedure*	**-**			Temp. test (°C) *Test Temperature*	**+30**
Decappaggio *Pickling*	**20% HNO3 + 5% HF at 60°C for 5 minute**				
Data inizio test *Start*	**01/09/2016**	Durata test (h) *Period (h)*	**24**	Data fine test *Finish*	**02/09/2016**
Peso iniziale (g) *Initial weight*	**19.1758**	Peso finale (g) *Final weight*	**19.1731**	Perdita peso (g) *Weight loss*	**0.0027**
Corrosione *Corrosion*	**1.72**	g/m²			
Esito della prova *Results*	**No visible pitting at 20x magnification**				



Prima del test
Before the test



Dopo il test
After the test

Note/Richiesti
Remarks/Required
4.0g/m² Max

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - ASTM G48-11(2015) Method A

Remarks § 665/1208/1615

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	A. Inspector	Inspector
EXOVA s.r.l. SPE Alessandro Fregoni	SEATTLE MARINO S.p.A. Welding Dpt. A. Khalifa	TIS Service S.r.l. Ispettore Incaricato (Massimo Panciatichi) 06-09-16	RINA Services SpA G. Cortini

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Equipment n.	**PHOTOGRAPHIC DOCUMENTATION**	Pag. 1 of 1
§		

Test Ref.	
Laboratory	Client
328.FO01.3	36/16

328.PT1.01

36/16



T-WELD h12

Standard ref. SPEC. KE01-B4-000-KD-V-ST-0002-000 + ASME IX Ed.2013 + ASME B31.3 Ed.2012 - ASTM G48-11(2015) Method A

Remarks

Test performed in Crema Laboratory Via della Pierina 9/11

Operator	Customer	Inspector	Inspector
SPE Alessandro Pregoni	ROSETTI MARINO S.p.A. Welding Dpt. A. Khalifa	RINA Services SpA D. Cimatti	

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ROSETTI MARINO	Welding Procedure Approval Record (WPQR) Verbale di Qualifica di Procedura di Saldatura	No. 39/06	Sheet/Foglio 1/4

Manufacturer's Welding Procedure. Reference No **Procedura di saldatura del costruttore. N. di riferimento**	**39/06** REV. **0**			
Manufacturer / Costruttore	**ROSETTI MARINO S.p.A.**			
Address / Indirizzo	**VIA TRIESTE 230 - 48100 RAVENNA**			
Code, Testing Standard / Codice, Normativa	EN 15614:2004 & MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4			
Date of welding / Data esecuzione saggio	30.08.2006			
EXTENT OF APPROVAL / VALIDITA' DELL'APPROVAZIONE				
Welding process / Processo di saldatura	**a)** 141 - GTAW	**b)**	**c)** /	
Type(s) / Tipo	**a)** Manual / Manuale	**b)**	**c)** /	
Joint type / Tipo di giunto	BW on pipe			
Parent Material Group & sub-Group	Group 8.1			
Parent material thickness / Spessore (mm)	2,77 mm 1,9÷5,54	**Fillet weld (mm)**	Unlimited throat, base metal thickness 1,9÷5,54	
Weld metal thickness/ spessore saldato	141 1,9÷5,54 mm			
Single or Multi-pass / passata singola o multipla	MULTIPLE			
Outside diameter / Diametro esterno (mm)	60,3			
Filler material Designation / **Classificazione materiale d'apporto**	**141** :EN 12072 S 19 12 3 L			
Filler material Maker / **Produttore materiale d'apporto**	ESAB SALDATURA			
Filler material Size / **Dimensioni materiale d'apporto**	141 ∅ 2,4 mm			
Shielding gas, flux / Gas di protezione, flusso	I 1			
Backing gas, / Gas di supporto	I 1			
Type of welding current & polarity	DC – SP	**Heat input / Apporto termico (kJ/mm)**	± 25% see sheet 2/4	
Welding position / Posizione di saldatura	PC			
Preheat / Preriscaldo (°C)	20	**Interpass temperature / Temp. di interpass (°C)**	150	
Post-Weld Heat Treatment and/or ageing / Trattamento Termico e/o Invecchiamento	N.A.			
Other information / Altre informazioni	NONE			
Welder's name / Nome del saldatore	**Masacci Alberto** (punzone 10)			
Welding test conducted by / Prove condotte da	Rosetti Marino S.p.A. – Ravenna			
Mechanical tes conducted by / Prove meccaniche condotte da	Control – Ravenna			
Laboratory report reference N. / Rapporto di prova N.	Report N° 364 Dated 15-09-2006			
Test carried out in the presence of **Test condotti alla presenza di**	**RINA INDUSTRY**	**Test results are** **Risultato prove**	**Acceptable**	

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 EN 15614:2004 +MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Si certifica che i dati riportati in questo rapporto sono corretti e che i saggi di saldatura sono preparati, saldati e testati in accordo con le richieste di EN 15614:2004 + OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Location / Luogo	**Date of issue / Data di emissione**	**Examiner or Examining Body /**
RAVENNA	**15-09-2006**	**RINA INDUSTRY**

ROSETTI MARINO S.p.A.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

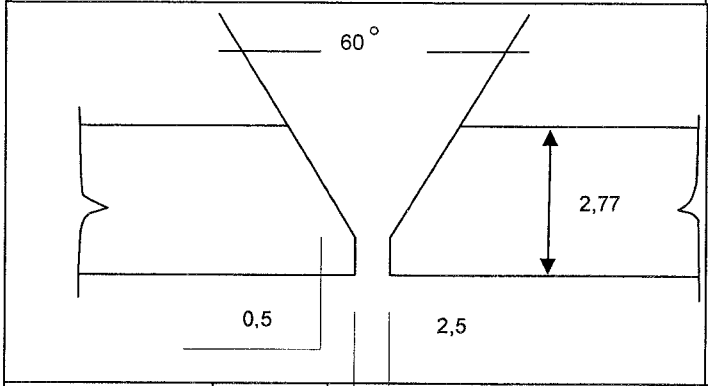
EWF
S. SOLMI
I EWT 30416
EUROPEAN WELDING TECHNOLOGIST

Name and signature / Nome e firma

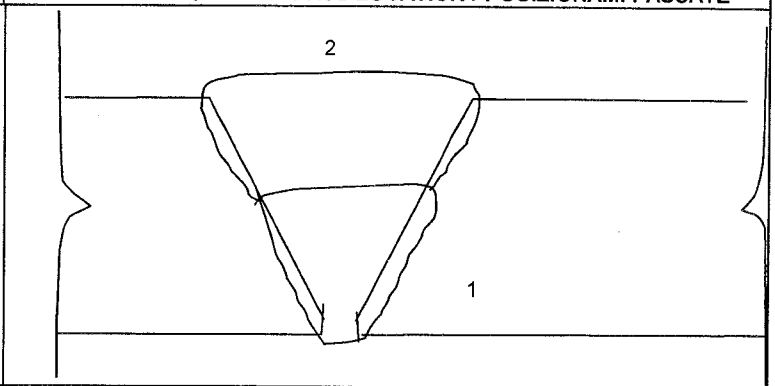
RINA
S. Sabatino

Manufacturer / Costruttore	ROSETTI MARINO S.p.A.						
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA				Examiner or Examining body / Ente certificante		
Procedure approval record (WPAR) N° / Qualifica di procedimento N.	39/06	Date/Data	15-09-2006		Ref. N./N. Rif.	RINA INDUSTRY	
WPS No. / Procedure N.	39/06		Rev.	0	Date/Data	30-08-2006	
Welding Process(es) / Processo(i) di saldatura	a) 141 - GTAW		b)		c) /		
Types / Tipi (Man., Autom., Semi-autom.)	a) Manual / Manuale		b)		c) /		
JOINTS / GIUNTI Joint type / Tipo di giunto	Butt weld "V" groove						
BACKING / Sostegno	WELD METAL GTAW (first pass)						

EDGE PREPARATION / PREPARAZIONE GIUNTO



WELDING SEQUENCE - PASS LOCATION / POSIZIONAM. PASSATE



Run or layers / Passate o strati	Proc.	Filler metal / Materiale d'apporto Size / Dim (mm)		Amp.		Volt.		Travel Speed / Veloc. Sald.	Heat Input / Apporto Termico
		1E	2E	1E	2E	1E	2E	mm/min	kJ/mm
1	141	2.4		88		10		50	1,06
2	141	2,4		85		10		60	0.85

PARENT MATERIAL / MATERIALE DI BASE				
Spec. Type & Grade / Specif. Tipo e Grado		ASTM A312	Tp 316L	
to Spec. Type & Grade / Specif. Tipo e Grado		ASTM A312	Tp 316L	
Group No. / Gruppo	8.1	To / al Group No. / Gruppo	8.1	
Thickness of test coupon / Spessore del saggio (mm)	2,77	to / con	2,77	
Diameter of test coupon / Diametro del saggio (mm)	60,3	to / con	60,3	
Other / Altro	Heat number 36602			

FILLER METALS / MATERIALE D'APPORTO	a) 141	b) 111	c)
Specification No. EN	12072 (AWS 5.9)		
Class / Classificazione	S 19 12 3 L (ER 316L)		
Size of filler metal / Dimensioni materiale d'apporto (mm)	2,4 (heat 444361)		
F.M. Trade name / Nome commerciale materiale d'apporto	OK TIGROD 16.30		
Manufacturer / Fabbricante	ESAB SALDATURA		
Flux Trade name / Nome Commerciale Flusso	N.A.		
Manufacturer / Fabbricante	N.A.		
Deposited Weld Metal / Metallo depositato (mm)	2,77		
Other / Altro			

EWF EUROPEAN WELDING FEDERATION S. SOLMI LEWT 304/6

RINA S. Sabatino

ELECTRICAL CHARACTERISTICS / CARATTERISTICHE ELETTRICHE		
Current / Corrente		DC
Polarity / Polarità		141 : SP
Ampere – Volt		See table page 2/4 / Vedi tabella pagina 2/4
Tungsten Electrode Type & Size / Tipo e Dimensioni Elettrodo W		AWS 5.12 EWTh2
Mode of Metal Transfer for GMAW / Modo di trasf. per MAG		N.A.
Other / Altro		None
TECHNIQUE / TECNICA		
Orifice or gas cup size / Diametro dell'ugello o ceramica		8 mm
String or Weave Bead / Cordoni Stretti o Larghi		String/Stretti
Initial and interpass cleaning / Pulizia iniziale e tra le passate		Brushing and/or grinding - Molatura e/o spazzolatura
Method of back gouging / Metodo di solcatura		N.A.
Oscillation / Oscillazione:		
	Amplitude / Ampiezza	N.A.
	Frequency / Frequenza	N.A.
Distance contact tube-work piece / Distanza libera filo		/
Multiple, Single Pass (per Side) / Passata Singola o Mult. (per lato)		Multiple
Single or Multiple Electrodes / Elettrodi Multipli o SIngoli		Single
Torche angle direction of welding / Angolo e direzione torcia		N.A.
Other / Altro		/
WELDING POSITIONS / POSIZIONI DI SALDATURA		
Position of groove or fillet/Posizione dello smusso o del cordone d'angolo		PC
Other / Altro		/
PREHEAT / PRERISCALDO		
Preheat Temperature / Temperatura di Preriscaldo (°C)		20
Interpass Temperature / Temperatura di Interpass (°C)		150
Other / Altro		/
POSTWELD HEAT TREATMENT / TRATTAMENTO TERMICO		
Temperature / Temperatura (°C)		N.A.
Time / Tempo (h)		N.A.
Other / Altro		

GAS

	Percent Composition / Composizione %		
	Gas(es) / Gas	(Mixture) / (Miscela)	Flow rate / Portata
Plasma	/	/	/
Shielding / Protezione	I 1	99,99	12
Trailing /Aggiuntivo	/	/	/
Backing / Al rovescio	I 1	99,99	13
Other / Altro	/	/	/

EWF EUROPEAN WELDING TECHNOLOGIST S. SOLMI I EWT 30418

RINA 1861

RINA
C. Saldatino
Provinciale

NON DESTRUCTIVE EXAMINATIONS / ESAMI NON DISTRUTTIVI							
	Acceptable/Accettabile			Not performed / Non eseguito			Report No. / Rapporto N.
Visual examinations / Visivo		X					VDR 39/06
Penetrant test / Liquidi penetr.		X					PT Report 39/06
Magnetic particle test / Magnet.					X		
Radiographic test / Radiografico		X					RT Report 275
Ultrasonic test / Ultrasonoro					X		

TEST RESULT / RISULTATO DELLE PROVE

TENSILE TEST / PROVA DI TRAZIONE

Specimen type and No. / Provette tipo e N.	Re N/mm²	Rm N/mm²	A % on/su	Z %	Fracture Location Posizione Rottura	Remarks Note
Requirements / Richieste	/	≥ 485	/	/		
TRANSVERSE 1	/	552	/	/	Weld metal	
TRANSVERSE 2	/	545	/	/	Weld metal	

BEND TEST / PROVA DI PIEGAMENTO — Former diameter / Diametro Mandrino 10 mm

Type & N. / Tipo e N.	Bend angle / Angolo di piega	Elongation / Allungamento	Results / Risultati
N. 2 Transverse root bend	180°	Not required	Satisfactory
N. 2 Transverse face bend	180°	Not required	Satisfactory

IMPACT TEST / PROVA DI RESILIENZA — Requirements / Richieste Joule

Specimen Dimens. Dim. Provette (mm)	Notch Locations / Direction Posiz. Intaglio / Direzione	Notch Type / Tipo Intaglio	Test Temp. Temp. Prova (°C)	Impact value/average Valori/media (joule)		Remarks / Note
/						
/						
/						
/						

FILLET WELD TEST / PROVA SALDATURA D'ANGOLO

Result – Satisfactory Risultato - Soddisfacente	Yes -	/	No -	/		Penetration into Parent Metal Penetrazione nel Materiale Base	Yes -	/	No -	/
Macro Results / Risultati Macro: -	/									

OTHER TESTS / ALTRE PROVE

Location of measurement (Sketch) (if required) / Posizione delle impronte (quando richieste)	
Type of test / Tipo di prova	
Macro results	Satisfactory-See CONTROL Certificate No. 364 dated 15-09-2006

Date / Data
15-09-2006

Examiner or Examining Body / Esaminatore o Ente Certificante
RINA INDUSTRY

ROSETTI MARINO S.p.A.

Name and signature / Nome e firma

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

EWF S. SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

RINA 1861

RINA S. Sabatino

Control Snc
Sede Amministrativa - Laboratorio
Via Attilio Monti, 15 - 48100 Ravenna
Telefono - 0544 590597

LABORATORIO DI CONTROLLI E PROVE

CERTIFICATO PROVE MATERIALI
TEST CERTIFICATE

N. 364 Fg.1/2
DATA / Date
15-set-2006

COMMITTENTE / *CUSTOMER*: **ROSETTI MARINO S.p.A.**

OGGETTO / *OBJECT*	Dimensione Provino mm. / Size Test mm. :	Commessa / Job	Materiale / Type Material
WPQR 39/2006	Diam.: **2"** Spess.: **2,77**	**106A10**	**A312 TP 316L**

NORME DI COLLAUDO / *SPECIFICATIONS*: **UNI EN 15614-1:2004 / TS-12**
ENTE COLLAUDO / *INSPECTOR*: **RINA S.p.A.**

PROVE MECCANICHE
MECHANICAL TESTS

CARATTERISTICHE RICHIESTE / *REQUIREMENTS*	*Snervamento* *Yeld stress* *Fs(N)*	*Rs* *N/mmq*	*Massimo* *Total Load* *Fm(N)*	*Rm* *N/mmq*		*Allung* *Elong* *%*	*Resilienza/Impact Test* **JOULE °C** *Individual*	*Average*
				> 485				

Pos. *Pos.*	*Prova Nr* *Test N°*	*Dimensioni* *Size mm*	*Area* *So mmq*	*L0 mm*	*LU mm*	*RISULTATI / RESULT* *Fs*	*Rs*	*Fm*	*Rm*		*A%*		
TRANSVERSE TENSILE TEST UNI EN 895													
TWT	1a	12,0 x 2,7	**32,4**					17900	**552**	**FIW**			
TWT	1b	12,5 x 2,7	**33,8**					18400	**545**	**FIW**			

BEND TEST UNI EN 910

SBB	n° 4	x	
RBB	n° 2	20 x 3	ANGLE: 180° DIAMETER OF THE FORMER 10 mm **ACCEPTABLE**
FBB	n° 2	20 x 3	ANGLE: 180° DIAMETER OF THE FORMER 10 mm **ACCEPTABLE**

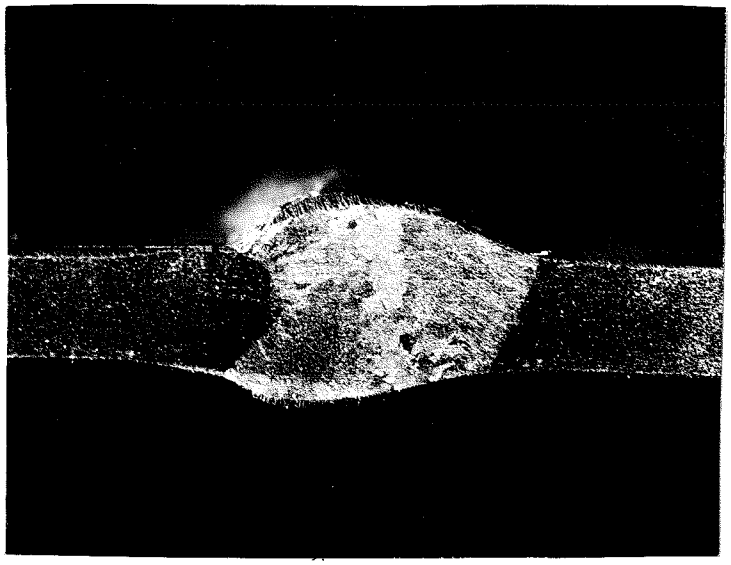
VWT 0/2=ZONA FUSA/WELD MATERIAL
VHT 0/2=LINEA DI FUSIONE/FUSION LINE
VHT2/2=LINEA DI FUSIONE + 2mm /FUSION LINE + 2mm
VHT5/2=LINEA DI FUSIONE + 5mm /FUSION LINE + 5mm
TWT=TRAZIONE TRASVERSALE SALDATURA/TRANSVERSE WELD TENSILE TEST
TWL=TRAZIONE LONG. SALDATURA / ALL WELD LONG. TENSILE
FOW=ROTTURA DUTTILE FUORI SALDATURA/ DUCTILE FAILURE OUT OF WELD
SBB=PIEGA LATERALE TRASVERSALE/TRANSVERSE SIDE BEND TEST
RBB=PIEGA TRASVERSALE AL ROVESCIO/TRANSVERSE ROOT BEND TEST
FBB= PIEGA TRASVERSALE AL DIRITTO/TRANSVERSE FACE BEND TEST
FIW=ROTTURA DUTTILE IN SALDATURA/ DUCTILE FAILURE IN WELD

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA S. Saltatino

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	*LABORATORIO DI CONTROLLI E PROVE*	
	CERTIFICATO PROVE MATERIALI *TEST CERTIFICATE* **MACRO EXAMINATION**	**N. 364** Fg. 2/2 DATA / Date **15-set-06**

COMMITTENTE *CUSTOMER*	**ROSETTI MARINO S.p.A.**		
OGGETTO *OBJECT* **WPQR 39/2006**	Dimensione Provino/Size mm. Diam.: **2"** Spess.: **2,8**	Commessa/Job **106A10**	Materiale/Material **A312 TP 316L**

MACRO EXAMINATION UNI EN 1321



MACROEXAMINATION:	**ACCEPTABLE**
VISUAL EXAMINATION	**ACCEPTABLE**
ETCH/ATTACCO :	**ACQUA REGIA**
MAGNIFICATION/INGRANDIMENTO:	**5 X**

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA S. Sabatino

ROSETTI MARINO SPA

TABELLA DI SALDATURA
Welding Table

pWPS	39/06	Posizione / Position	2G

Tipo di saldatura / Welding Process	GTAW

PQR 39/06

Filo / Wire	ESAB OK TIGROD 16.30 diam. 2,4 mm heat 444361
Filo / Wire	

Materiale base **ASTM A 312 Tp 316L**
Base material **PIPE 2" Thk. 2,77 Heat 36602**

	Gas / Gas (es)	Miscela / Mixture	Portata / Flow Rate
Protezione/Shielding	Ar	99,990%	12 L/min
Protezione/Shielding	N.A	N.A	N.A
Al rovescio/Backing	Ar	99,990%	13 L/min

Welder Name/Nome saldatore **Masacci Alberto stamp 10**
Welder Name/Nome saldatore

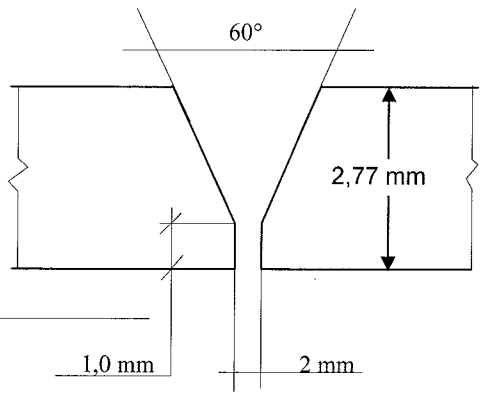
Prerisc: / Preheat **20°C**
Temp. max. di interpass: **150°C**

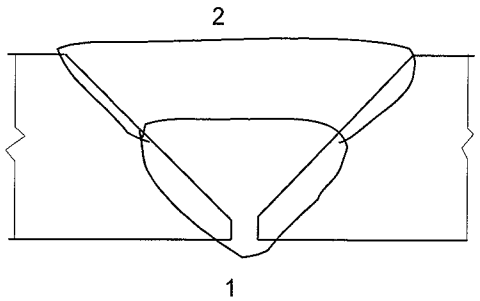
Elettrodo / Electrode
Ravenna **30/08/06**
Officina Rosetti **X**
Cantiere

Corrente / Current **DC**
Polarità / Polarity **GTAW DP**
Preparazione / Joint Design **V**

Pass. N. / Pass N.	Proced. / Process	Elettr. / Electr.	Ampere / Amps	Volts / Volts	Vel.mm/1' / Trav.Sp.	H.I. / KJ/mm
1	GTAW	2,4	88	10	50	1,06
2	GTAW	2,4	85	10	60	0,85

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Selmi





Note / Notes

ROSETTI MARINO SPA
Ravenna Works

PROCEDURA DI SALDATURA (in accordo EN 15614/1+TS-12)
Welding Procedure Specification (according EN 15614/1+TS-12)

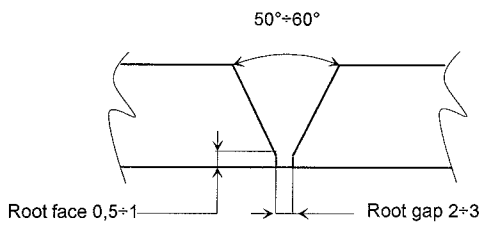
WPS N°:	39/06
PQR ref.:	39/06 to qualify
REV.:	0
Data /date	30-08-2006

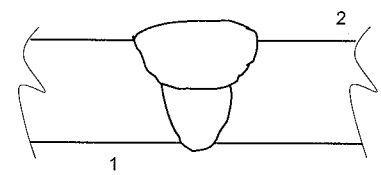
Procedimento di saldatura / Welding process: **GTAW** +
Tipo / Type: **MANUAL** +

GIUNTO – JOINT (QW-402)

Tipo di giunto / Joint Design: **V**
Supporto / Backing: ☒ Si / Yes **Only for second and other passes** ☒ No **Only for first pass**
Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403)

Da / from P-N°: **-** Group N°: **(EN 15608) 8.1**
A / to P-N°: **-** Group N° **(EN 15608) 8.1**

Da Tipo e grado / From type and grade: **ASTM A312 Tp 316L**
A Tipo e grado / To type and grade: **ASTM A312 Tp 316L**

Gamma spessori / Thickness range:
► Materiale base / Base material: Piena penetrazione / Groove **2,77 mm (range 1,9 to 5,54)**
► Gamma diametri / Pipe dia Range: Piena penetrazione / Groove **2" (range 1" and over)**

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW	
Spec. N° (SFA)	EN 12072 (5.9)	
AWS N° (CLASS)	W 19 12 3 L (ER 316L)	
F-N°	6	
A-N°	8	
Diametro mat. d'apporto / Size of filler metal	2,4	
Metallo depositato / Deposit weld metal		
Gamma spessori /Thick. range Piena penetrazione / Groov	2,77 mm	
Accoppiamento filo-flusso / Electrode-flux (CLASS)	N.A.	
Denom. Comm. flusso / FLUX trade name	N.A.	
Inserto consumabile / Consumable insert	N.A.	
Altro / other	WIRE: ESAB TIGROD 16.30	

POSIZIONI – POSITION (QW 405)

Posizione del giunto / Joint position: **Cianfrino / groove**
Posizione / position **PC (2G)**
Progressione / weld progression: **N.A.**

PRERISCALDO – PRE-HEAT (QW406)

Temp preriscaldo minima / Min pre-heat temp: **20 °C**
Max temp Di interpass / Max interpass temp: **150°C**
Mantenimento posriscaldo / Postheat maintenance: **N.A.**
Tempo di mantenimento posriscaldo / Postheat time: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

Riscaldamento / Heating rate (°C/Hrs): **N.A.**
Temperatura di stasi / Holding temperature °C: **NA**
Tempo di stasi / Holding time (min): **NA**
Velocità di raffreddamento / Cooling rate (°C/Hrs): **N.A.**

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port / Flow rate
Protezione / Shielding:	Ar	99,99 %	10-13 lt/min.
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot Al rovescio / Backing:	Ar	99,99 %	10-13 lt/min.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW -409)

Corrente / Current: **DC** Polarità / Polarity **SP**
Dia e tipo elettr. Tungsteno / Tungsten elctr Size & type: **AWS A 5.12 EWTh2 dia.2,4mm**
Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**
Velocità alimentazione filo / Electr Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String**
Dimensione bocchello gas / Orifice of gas cup size: **3/8"**
Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura e Molatura/Brushing Grinding**
Metodo di solcatura a rovescio / Method of back gouging: **N.A.**
Oscillazione / Oscillation: **N.A.**
Distanza tra zona di contatto e pezzo / Contact zone to work distance: **N.A.**
N°Passate / Passes nr.: **Multipla/Multiple**
Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single**
Martellatura / Peening: **N.A.**
Altro / Other: **Leave gas backing up to completion**

N° Passate Weld layers nr.	Processo Process	Materiale d'apporto Filler metal		Corrente Current		Voltaggio Volt range	Vel. avanzamento Travel speed range (mm/min)	Apporto termico Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. range			
1	GTAW	ER 316L	2,4	DC/SP	80 - 90	10 - 12	40 - 50	0,96 – 1,6
2	GTAW	ER 316L	2,4	DC/SP	80 - 90	10 - 12	50 - 60	0,8 – 1,29

Preparato da / prepared by: ***A.Khalifa***
Approvato da / approved by: ***S.Solmi***

CONTROL snc
via Attilio Monti,15 48100 (RA)
tel. 0544 590597 - fax 590599

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - RADIOGRAFICO

NDE REPORT -RADIOGRAPHIC TEST

Data / Date 07/09/2006
NDE-RT Report Nr 275
foglio / sheet n° 01 of 01

COMMITTENTE / Customer	OGGETTO / Object	COMMESSA N° / Job No	ORIDINE N°/Order n°	PROGETTO / Project
ROSETTI MARINO Spa	QUALIFICHE PROCEDIMENTO	106A10	-	-

LINEA N°/ Line No	DWG N° / DWG No	CODICE - PROCEDURA/In accordance with	ACCETTABILITA'/Acceptance levels
-	-	EN 15614 - 1	EN 25817 Classe B

ITP N° / ITP No	FASE ITP / Phase ITP		
-	-	● PRIMA ESECUZIONE/ First test	○ PRIMA DEL TT/ Before PWHT
		○ DOPO RIPARAZIONE / After repair	○ DOPO IL TT/ After PWHT

TRACEABILITY		JOINT TYPE				RESULT		
weld No - dwg - item	Radiographic Tecniques	material	Φ	thickness	welder No	position film	defect	judgment
WPQR 24 - 06	contatto	A 333 Gr.6	4"	17,12mm	-	0-1		A
						1-2	Aa	A
						2-3		A
						3-4		A
						4-5		A
						5-0		A
WPQR 26 - 06	contatto	316 L	2"	11,07mm	-	0-1		A
						1-2		A
						2-3		A
						3-0		A
WPQR 25 - 06	contatto	A 333 Gr.6	3"	15,24mm	-	0-1		A
						1-2		A
						2-3		A
						3-4		A
						4-0	Aa	A
WPQR 27 - 06	diretta	UNS 31254	2"	2,77mm	-	A		A
						B		A
WPQR 40 - 06	diretta	316 L	2"	2,77mm	-	A		A
						B		A
WPQR 41 - 06	diretta	UNS 31254	2"	2,77mm	-	A		A
						B		A
WPQR 39 - 06	diretta	316 L	2"	2,77mm	-	A		A
						B		A
WPQR 42 - 06	diretta	S 355	PLATE	20mm	-	0-1	Aa-Bb	A
WPQR 43 - 06	diretta	S 355	PLATE	20mm	-	0-1	Ab	A

NOTE / Remarks

CLASSIFICAZIONE DIFETTI
Classification defects ref. ISO 6520

(2011)	Aa	Soffiattura tondeggiante/Porosity < Φ 1mm
(2012)		Uniformly distributed porosity
(2013)		Localized porosity (Clustered)
(2014)		Linear porosity
(2017)		Surface pore
(2015)	Ab	Cavità allungata/Elongated cavity
(2016)	Ab	Tarli/Worm-hole
(300)		Inclusione solide/Solid inclusion
(301)	Ba	Inclusione di scoria/Slag inclusion
(3013)	Bb	Scoria d'orient. diverso/Of any shape in.
	Be	Difetto di ripresa/ 1st run irregular
(400)	C	Mancanza di fusione/Lack of fusion
(402)	D	Mancanza di penetrazione/Lack of penet.
(100)	E	Cricca o fessura/Crack
(101)	Ea	Cricca longitudinale/Longitudinal crack
(102)	Eb	Cricca trasversale/Transverse crack
(104)	Ec	Cricca di cratere/Crater crack
(502)		Sovrametallo in eccesso/Excess weld metal
(504)	Ex	Eccesso di penetrazione/Penetration excess.
(5041)		Sgocciolamento/Local protrusion
(5011)	F	Solco o incisione/Undercut
(514)	Fa	Irregolarità superficiale/Surface irregularity
(509)		Avvallamento/Sagging
(511)		Incom. riempimento/Incom. Filled groove
(515)	In	Insellamento/Root concavity
(517)		Ripresa difettosa/Poor restart
(2024)	K	Cavità di ritiro/Shrinkage cavity
(506)		Traboccamento/Overlap
(507)	Sl	Slivellamento/Misalignment
(3041)	W	Inclusione di tungsteno/Tungsten inclusion
(601)		Innesco d'arco/Arc strike

GIUDIZIO / Judgment

NX-CF	To repeat to confirm defect
A	Accettabile/Acceptable
R	Riparare/To repair
NT	Tagliare/To cut
NX	Ripetere film/To repeat film
EX	Estendere il controllo/Extende test
DF	Difetto film/Film defect
TM	Taglio o modifica/Cut or modification

RADIOGRAPHIC TECHNIQUE DETAILS

Films: 25 — **Type film and Manufact.**: AGFA Structurix D7-D4

IQI type: ASTM ☐ 6-10 FE EN ■

Data di esposizione:31-07-2006

Sorgente X - Unità (X-Ray Unit): SEIFERT65

Pellicole per cassetta (Nr) (Films box): 1

I.Q.I. - Posizione (I.Q.I. - Location): ☐ Lato film/Film Side ■ Lato sorgente/Source

Distanza sorgente-pellicola (mm) (Distance Source-Film): 150(diretta) / Øe - 1Thk.

Sorgente γ (γ-Ray Activity): N.A.

Schermi di rinforzo (mm) (Intensifying screens Front-Back): Pb 0,10 x 0,10

Distanza pezzo lato sorgente-pellicola (mm) (Distance Object (source side)-Film): Weld Thk.

Energia (keV) (Energy): 200KVolt/3mA

Sviluppo (Development): ■ Automatic ☐ Manual

Tecnica radiografica (Radiographic techniques): ■ Single wall exp. ■ Double wall exp. ■ Single wall view. ☐ Double wall view.

Macchia Focale (mm) (Focal Spot): 3

TECNICO II° livello CND - IMPRESA	CONTROLLO QUALITA'	ISPETTORE CLIENTE	ISPETTORE A.I.
Operator NDE II° Level SNT-TC-1A / EN473	Q.C. Supervisor	Company Repr.	Inspection Agency
MERCATALI RICCARDO II° Liv. UT/PT/MT/RX CICPND		ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Salvini	RINA S. Salvatino
NDE Company - Date	Q.C. Supervisor - Date	Company Repr.- Date	I. A. - Date

CONTROL S.N.C.
Via Attilio Monti 15 48100
RAVENNA

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - LIQUIDI PENETRANTI
NDT REPORT - DYE PENETRANT TEST

NDE-PT Report No

COMMITTENTE/Customer	**ORDINE N°**/Order No	**COMMESSA N°**/Job No	**PROGETTO**/Project
ROSETTI MARINO S.p.A.		**106A10**	
MATERIALE/Material	**LINEA N°**/ Line No	**OGGETTO** / Object	**DATA**/Date
ASTM A 312 TP 316L		**WPQR 39/2006**	**15-set-06**

In accordance with specification and rule: **UNI EN 571.1 - UNI EN 1289**

Stato della superficie / Surface Condition

COME SALDATO As Welded	■	SPAZZOLATO Brushed	■	LAV DI MACCHINA Machined	☐	COME CALANDRATO As Bent	☐
MOLATO Ground	☐	COME LAMINATO As Rolled	☐	GREZZO As Forged	☐		☐

PRODOTTI UTILIZZATI / Products used	PROCEDURA DI ESECUZIONE / Execution of Procedure
PULITORE PRELIMINARE/ Cleaner **VELNET CGM**	1 PULITURA PRELIMINARE / Preliminary Cleanign **SPRAY**
PENETRANTE / Penetrant **RED W - CGM**	2 APPLICAZIONE PENETRANTE / Penetrant application **SPRAY**
PULITORE PENETRANTE/ Penetrant Remover **WATER**	3 RIMOZIONE PENETRANTE / Removal penetrant ■ **WATER** ☐ ☐
RIVELATORE / Developer **WHITE W - CGM**	4 ESSICAZIONE / Drying process **NATURAL**
NOTE / Remarks	5 APPLICAZIONE RIVELATORE / Developer application **SPRAY**
	a (2) TEMPO PENETRAZIONE / Penetrating time (minuti / minutes) **15**
PULITORE POST-CONTROLLO / Cleaner after examination **Cloths and water**	**b** TEMPO DI LETTURA / Checking time (min) (minuti / minutes) **5**
TEMPERATURA SUPERFICI / Surfaces temperature (°C) (standard range 16-52 °C) **ambient**	**c** ISPEZIONE VISIVA / Visual Inspection ☐ luce bianca min 1000 Lux ☐ luce U V min 1000 mW/cmq

NOTE / Remarks	Difetti / Discontinuities	
	a) Cricca a freddo / Crack	e) Cordone irregolare / Irreg searm
	b) Cricca da stress / Stress Crack	f) Incisione marginale / Undercutting
	c) Difetto di ripresa / 1st run defect	g)
	d) Porosità / Porosity	h)

Saldatura / Weld	spessore/thickness	material/material

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

RESULTS

NDE CONTROL - II Level NDE Inspector	**CONFORME ALLA SPECIFICA (*)** conforming to specification	**NON CONFORME ALLA SPECIFICA (*)** not conforming to specification
MERCATALI ALESSIO II° liv. MT/PT CIC PND	■	☐

Q.C. Supervisor	**CUSTOMER INSPECTOR**
Date	RINA S. Sabatino Date

ROSETTI MARINO	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 39-06 data: 30.08.2006

progetto / project	cliente / client	ordine / PO	commessa / job
disegno / dwg	ITP N° /	fase / step	

oggetto - item

Welding Procedure Qualification Record (WPQR) 39/06

Certificato di Qualifica di Procedimento di Saldatura (WPQR) 39/06

WE CERTIFY THAT THE SAMPLE ABOVE MENTIONED HAS BEEN SUBMITTED TO 100% VISUAL EXAMINATION IN AS WELDED STATUS IN ACCORDANCE WITH UNI EN 970:1997.

SI CERTIFICA CHE LA SALDATURA DEL SAGGIO SOPRA CITATO E' STATA SOTTOPOSTA AD ESAME VISIVO AL 100% ALLO STATO COME SALDATO IN ACCORDO ALLE UNI EN 970:1997.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

note - remarks

No visible defects have been detected.

Non sono stati rilevati difetti visibili.

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

UNI EN 970 : 1997

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client

39/06

T.T.I. - Tubacex Tubos Inoxidables, S.A.

Registro Mercantil de Alava, Tomo 587, Folio 198, Hoja VI 2885 - N.I.F. A-01140227

TUBACEX

Printed on: 19.06.2006

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 380274 Page: 1 / 2 | Rev: 1

Date: 14.06.2006 | 14.06.2006

CUSTOMER :RACCORTUBI S.P.A. PO :OS0002758 1/12/05 OUR REFERENCE: J4586

STANDARD :ASTM-ASME A/SA312M-05A ED.04

ADDIT. SPECS :312S REV.1 AND NACE MR01.75-03

GRADE :TP316-316L

DIMENSIONS :60,33 X 2,77

MATERIAL :SEAMLESS STAINLESS STEEL TUBE COLD ROLLED; PASSIVATED; PLAIN ENDS SQUARE CUT;

-114318

REVIEWED

----ITEM---- YOUR	TTI.	-HEAT- NR.	NO. OF PIECES	---WEIGHT-- KG	-TOTAL LENGTH-	--UNIT LENGTH--
	14	36602	144	3512	881,79	5,5 - 6,5 MT

RAW MATERIAL

MELTING PROCESS: ELECTRIC FURNACE + A.O.D FROM: ACERALAVA
PEELED BARS; MACROETCH TESTING: GOOD;

(1)	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	B	N
L	0,018	1,39	0,430	0,028	0,0010	11,15	16,78	2,16	0,44	0,0009	0,0615
C	0,019	1,38	0,440	0,027	0,0020	11,00	16,55	2,17	0,46	0,0005	0,0615

(1) L: LADLE; C: PRODUCT

HEAT TREATMENT

SOLUTION ANNEALED 1100 °C WATER QUENCHED

= TESTS = NR. HEAT	NR. TEST	TEMP.	TENSION MPA RM	RP 0,2	A %	Z %	IMPACT TESTS TEMP.	MINIMUM	AVERAGE	HARDNESS HRB
36602	605001	20	547,0	323,0	348,0	46,2				78 80
36602	605001	20	554,0	334,0	355,0	45,0				79 79

TECHNOLOGICALS

FLATTENING TEST: GOOD
FLARING TEST: GOOD
RING EXPANDING TEST: GOOD

METALLURGICAL TEST

INTERGRANULAR CORROSION: A-262"E", DIN 50914, NF A05-159 T1, ISO 3651-2: NOT OBJECTIONS

NON DESTRUCTIVE TEST

100 % EDDY CURRENT TEST AT E.426 , GOOD
100 % HYDROSTATIC PRESSURE TESTED AT 98 BAR , DURING 6 SEC, GOOD
STEEL GRADE CHECKING ON EACH TUBE BY SPECTROMETRY (PMI)
DIMENSIONAL CHECKING ON EACH TUBE, SATISFACTORY
VISUAL INSPECTION ON EACH TUBE, SATISFACTORY

OTHER MATERIAL SPECIFICATIONS

DIN 17458 PK1 / NF A49117-85 1.4401-1.4404/Z6=Z2CND17.11/12

MARKS

TXA
TUBACEX 60,33 X 2,77 ASTM-ASME A-SA 312 TP316-316L - DIN 17458 PK1
1.4401-1.4404 NF A49-117 Z6CND17.11-Z2CND17.12 SMLS HEAT/..... PMI

REMARKS

T.T.I GARANTIT QUE TOUS LES TUBES LIVRES SONT CONFORMES AUX SPEC.S DE L'ARTICLE 15 DE L'ARRETE MINISTERIEL DU 24 MARS 1978 MODIFIE
C<=0,25%, P<=0,05%, S<=0,05%, R<800 N/MM2, E<=0,9 * R
A% (LO=5,65VSO) MIN, 16% EN LONG. R(A _2)>=10500
MATERIAL MANUFACTURER APPROVED WITH CERTIFICATE NR. 07/2001/MUC BY TÜV SÜDDEUTSCHLAND (NOTIFIED BODY 0036) TO ISSUE CERTIFICATES OF SPECIFIC PRODUCT CONTROL IN ACCORDANCE WITH PRESSURE EQUIPMENT DIRECTIVE 97/23/EC ANNEX I, POINT 4.3.

AENOR ER Empresa Registrada ER-0006/1998 | IQNet | AENOR Gestión Ambiental GA-2001/0177

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above requirements and specifications and satisfies the order requirements.
This certificate is issued by a computerized system and it is valid without signature. On the original certificate the responsible's hand coloured signature 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, assuming the responsibility for any unlawful use of T.T.I. S.A. not allowed this.
Any forgery or falsification of this certificate shall legally prosecuted

T.T.I.
Tubacex Tubos Inoxidables, S.A.
INGENIERIA DE CALIDAD
Jon Alkorta Zubiaga

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n.: 7.000
Descr. : 60.33x2.77
Heat n°/Pcs. marking : 36602 Qtà/Qty:155,46
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi CERTIFICATE N 160065

T.T.I. - TubacexTubos Inoxidables,S.A.

Registro Mercantil de Alava, Tomo 687, Folio 188, Hoja VI 2585 - N.I.F. A01140227

TUBACEX

Printed on: 19.06.2006

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 380274 Page: 2 / 2 | Rev: 1

Date: 14.06.2006 | 14.06.2006

CUSTOMER :RACCORTUBI S.P.A. PO :OS0002759 1/12/05008 REFERENCE :J4586

STANDARD :ASTM-ASME A/SA312M-05A ED.04

ADDIT.SPECS :312S REV.1 AND NACE MR01.75-03

GRADE :TP316-316L

DIMENSIONS :60,33 X 2,77

MATERIAL :SEAMLESS STAINLESS STEEL TUBE
COLD ROLLED; PASSIVATED;
PLAIN ENDS SQUARE CUT;

MATERIAL CHARACTERISTICS COMPLY WITH POINT 7.5 OF ANNEX I TO PED BY HAVING AN ELONGATION AFTER RUPTURE AT TENSILE TEST NO LESS THAN 14 % AND A BENDING RUPTURE ENERGY AT IMPACT TEST NO LESS THAN 27 J AT 20°C.

ROSETTI MARINO
Conforme alla spec.
According to the spec A312 TP316+P0.
TMUGF Firma / MTSMD Signature
Data / Date 04 LUG 2006
☒ REVIEW
☐ WITNESS

AENOR ER Empresa Registrada ER-0006/1991

IQNet

AENOR Gestión Ambiental GCM-0117/97

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above standards and specifications and satisfies the order's requirements.
This certificate is issued by a computerized system and it is valid without signature. On the original certificate the responsible's real colored signature is stamped.
In case the owner of this original certificate would release a copy of it, he must attest its conformity to the original one, assuming his responsibility for any unlawful or T.T.I.S.A. not allowed use.
Any forgery or falsification of this certificate shall legally prosecuted.

T.T.I.
Tubacex Tubos Inoxidables,S.A.
INGENIERIA DE CALIDAD
Jon Alfaro Zubeldia

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n.: 7.000
Descr. : 60.33x2.77
Heat n°/Pcs. marking : 36602 Qtà/Qty:155,46
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N. 160065

Inspection certificate(Certificato di collaudo) UNI EN 10204-3.1.B

ESAB Saldatura SpA

CERTIFICAZIONE
CERTIFICATION

No 375339

RINA QUACER ISO 9002 IQNet CISQ
ASME ACCREDITED MATERIAL ORGANIZATION
TÜV Rheinland MANUFACTURER CERTIFIED TO Vd TÜV 1153

Ns. rif./Our ref. Bolla 827384 Mag. A Del 06/11/1998

Vs. rif./Your ref. 821170 Del 26/10/1998

Vostro Ordine N°/Your Order No. _____ Del

Cliente/Customer

ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA

Prodotto Marchio: ESAB
Inf.Suppl.

Pos. No.	Codice/Item No.	Descrizione/Description	Lotto/Lot	Colata/Heat
	163024R150	OK TIGROD 16.30 2,4 MM	--	444361

Analisi/Analysis

C	Mn	Si	S	P	Cr	Ni	Mo
0,01	1,56	0,40	0,010	0,019	18,39	12,28	2,60
Cu							
0,12							

Trazione/Tensile test.

	R_p 0,2 N/mm²	R_{eL} N/mm²	R_{eH} N/mm²	R_m N/mm²	A5 %
Metallo d'apporto All weld metal				552	36

Resilienza/Impact test.

	Temp. °C	Media/average J	J
Metallo d'apporto All weld metal			

Note/Remarks

Il prodotto è conforme alle norme / This welding consumable conforms to
1. SFA-AWS A 5.9 ER 316 L
2.
3.

ROSETTI MARINO S.p.A.
Conforme alla spec. A5.9 ER316L
According to the spec.
C.Q. Firma / Q.C.Signature
Data / Date 12-04-99

Località/Locality: Mesero

Data/Date: 11/03/1999

Direzione Tecnica

Certificazione - Certification

Certifichiamo che i sopraelencati materiali sono conformi ai requisiti dell'ordine e forniti in accordo col ns. Sistema di Qualità approvato secondo UNI EN ISO 9002 dal Rina, Certificato N. 57/93, e che i valori riportati sono stati verificati in accordo a quanto stabilito all'atto della vendita.

We hereby certify that the above stated products conform to the sales contract and are supplied in accordance with our Quality System approved to UNI EN ISO 9002 by Rina, Certificate N. 57/93, and that the goods, with indicated results have been tested according to the instructions in the sales contract.

20010 MESERO (MI)
Via Mattei, 24
Tel. 02 97968.1

Amministrazione: Fax 02 9787865
Divisione materiali d'apporto: Fax 02 97289300
Divisione impianti: Fax 02 97289181
Assistenza tecnica impianti: Fax 02 9789140

Codice Fiscale/Partita Iva 00775990153
Capitale Sociale 6.600.000.000
Sede legale: Via V. Pisani, 16 Milano
Tribunale Milano 35367 - C.C.I.A.A. 236795

ROSETTI MARINO	Welding Procedure Approval Record (WPQR) Verbale di Qualifica di Procedura di Saldatura	No. 40/06	Sheet/Foglio 1/4

Manufacturer's Welding Procedure. Reference No **Procedura di saldatura del costruttore. N. di riferimento**	**40/06** REV. **0**				
Manufacturer / Costruttore	**ROSETTI MARINO S.p.A.**				
Address / Indirizzo	**VIA TRIESTE 230 - 48100 RAVENNA**				
Code, Testing Standard / Codice, Normativa	EN 15614:2004 & MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4				
Date of welding / Data esecuzione saggio	30.08.2006				
EXTENT OF APPROVAL / VALIDITA' DELL'APPROVAZIONE					
Welding process / Processo di saldatura	**a)** 141 - GTAW		**b)** 111 - SMAW		**c)** /
Type(s) / Tipo	**a)** Manual / Manuale		**b)** Manual / Manuale		**c)** /
Joint type / Tipo di giunto	BW on pipe				
Parent Material Group & sub-Group	Group 8.1				
Parent material thickness / Spessore (mm)	2,77 mm 1,9÷5,54	**Fillet weld (mm)**	Unlimited throat, base metal thickness 1,9÷5,54		
Weld metal thickness/ spessore saldato	141 1,1÷3,54 mm 111 0,7÷2,0 mm				
Single or Multi-pass / passata singola o multipla	MULTIPLE				
Outside diameter / Diametro esterno (mm)	60,3				
Filler material Designation / **Classificazione materiale d'apporto**	**141** :EN 12072 S 19 12 3 L **111** :EN 1600 E 19 12 3 L B 2 2				
Filler material Maker / **Produttore materiale d'apporto**	ESAB SALDATURA				
Filler material Size / **Dimensioni materiale d'apporto**	141 Ø 2,4 mm 111 Ø 2,5 mm				
Shielding gas, flux / Gas di protezione, flusso	I 1				
Backing gas, / Gas di supporto	I 1				
Type of welding current & polarity	DC – SP/RP	**Heat input / Apporto termico (kJ/mm)**	± 25% see sheet 2/4		
Welding position / Posizione di saldatura	PC				
Preheat / Preriscaldo (°C)	20	**Interpass temperature / Temp. di interpass (°C)**	150		
Post-Weld Heat Treatment and/or ageing / Trattamento Termico e/o Invecchiamento	N.A.				
Other information / Altre informazioni	NONE				
Welder's name / Nome del saldatore	**Bernabei Mirko** (punzone 6)				
Welding test conducted by / Prove condotte da	Rosetti Marino S.p.A. – Ravenna				
Mechanical tes conducted by / Prove meccaniche condotte da	Control – Ravenna				
Laboratory report reference N. / Rapporto di prova N.	Report N° 365 Dated 15-09-2006				
Test carried out in the presence of **Test condotti alla presenza di**	**RINA INDUSTRY**	**Test results are** **Risultato prove**	**Acceptable**		

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 EN 15614:2004 +MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Si certifica che i dati riportati in questo rapporto sono corretti e che i saggi di saldatura sono preparati, saldati e testati in accordo con le richieste di EN 15614:2004 + OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Location / Luogo	**Date of issue / Data di emissione**	**Examiner or Examining Body /**
RAVENNA	**15-09-2006**	**RINA INDUSTRY**

ROSETTI MARINO S.p.A.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

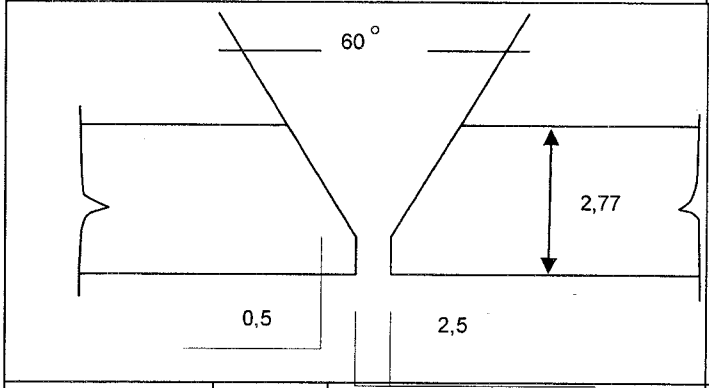
EWF
S. SOLMI
I EWT 30416
EUROPEAN WELDING TECHNOLOGIST

Name and signature / Nome e firma

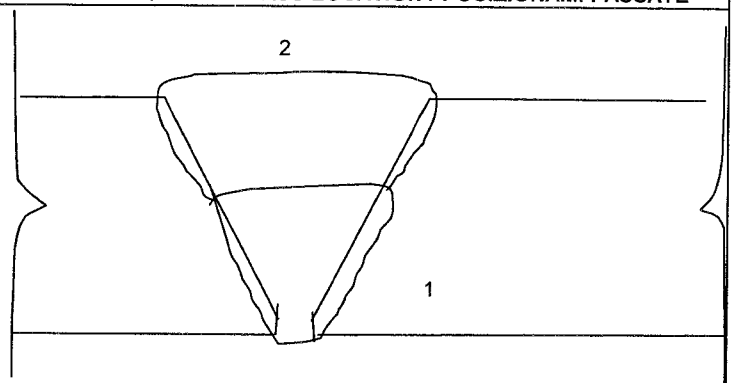
RINA
1861
RINA
S. Sabatino

Manufacturer / Costruttore	ROSETTI MARINO S.p.A.					
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA			Examiner or Examining body / Ente certificante		
Procedure approval record (WPAR) N° / Qualifica di procedimento N.	40/06	Date/Data	15-09-2006	Ref. N./N. Rif.	RINA INDUSTRY	
WPS No. / Procedure N.	40/06	Rev.	0	Date/Data	30-08-2006	
Welding Process(es) / Processo(i) di saldatura	a) 141 - GTAW	b) 111 - SMAW	c) /			
Types / Tipi (Man., Autom., Semi-autom.)	a) Manual / Manuale	b) Manual / Manuale	c) /			
JOINTS / GIUNTI Joint type / Tipo di giunto	Butt weld "V" groove					
BACKING / Sostegno	WELD METAL GTAW (first pass)					

EDGE PREPARATION / PREPARAZIONE GIUNTO



WELDING SEQUENCE - PASS LOCATION / POSIZIONAM. PASSATE



Run or layers / Passate o strati	Proc.	Filler metal / Materiale d'apporto Size / Dim (mm)		Amp.		Volt.		Travel Speed / Veloc. Sald.	Heat Input / Apporto Termico
		1E	2E	1E	2E	1E	2E	mm/min	kJ/mm
1	141	2.4		88		10		50	1,06
2	111	2,5		65		22		100	0.85

PARENT MATERIAL / MATERIALE DI BASE

Spec. Type & Grade / Specif. Tipo e Grado		ASTM A312		Tp 316L	
to Spec. Type & Grade / Specif. Tipo e Grado		ASTM A312		Tp 316L	
Group No. / Gruppo	8.1	To / al	Group No. / Gruppo	8.1	
Thickness of test coupon / Spessore del saggio (mm)		2,77	to / con	2,77	
Diameter of test coupon / Diametro del saggio (mm)		60,3	to / con	60,3	
Other / Altro	Heat number 36275				

FILLER METALS / MATERIALE D'APPORTO	a) 141	b) 111	c)
Specification No. EN	12072 (AWS 5.9)	1600 (AWS 5.4)	
Class / Classificazione	S 19 12 3 L (ER 316L)	E 19 12 3 L B 2 2 (E 316L-15)	
Size of filler metal / Dimensioni materiale d'apporto (mm)	2,4 (heat 444361)	2,4 (heat 4385111)	
F.M. Trade name / Nome commerciale materiale d'apporto	OK TIGROD 16.30	OK 63.35	
Manufacturer / Fabbricante	ESAB SALDATURA	ESAB SALDATURA	
Flux Trade name / Nome Commerciale Flusso	N.A.	N.A.	
Manufacturer / Fabbricante	N.A.	N.A.	
Deposited Weld Metal / Metallo depositato (mm)	1,2	1,0	
Other / Altro			

EWF S.SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

RINA S. Sabatino

ELECTRICAL CHARACTERISTICS / CARATTERISTICHE ELETTRICHE		
Current / Corrente		DC
Polarity / Polarità		141 : SP 111 : RP
Ampere – Volt		See table page 2/4 / Vedi tabella pagina 2/4
Tungsten Electrode Type & Size / Tipo e Dimensioni Elettrodo W		AWS 5.12 EWTh2
Mode of Metal Transfer for GMAW / Modo di trasf. per MAG		N.A.
Other / Altro		None
TECHNIQUE / TECNICA		
Orifice or gas cup size / Diametro dell'ugello o ceramica		8 mm
String or Weave Bead / Cordoni Stretti o Larghi		String/Stretti
Initial and interpass cleaning / Pulizia iniziale e tra le passate		Brushing and/or grinding - Molatura e/o spazzolatura
Method of back gouging / Metodo di solcatura		N.A.
Oscillation / Oscillazione:		
	Amplitude / Ampiezza	N.A.
	Frequency / Frequenza	N.A.
Distance contact tube-work piece / Distanza libera filo		/
Multiple, Single Pass (per Side) / Passata Singola o Mult. (per lato)		Multiple
Single or Multiple Electrodes / Elettrodi Multipli o Singoli		Single
Torche angle direction of welding / Angolo e direzione torcia		N.A.
Other / Altro		/
WELDING POSITIONS / POSIZIONI DI SALDATURA		
Position of groove or fillet/Posizione dello smusso o del cordone d'angolo		PC
Other / Altro		/
PREHEAT / PRERISCALDO		
Preheat Temperature / Temperatura di Preriscaldo (°C)		20
Interpass Temperature / Temperatura di Interpass (°C)		150
Other / Altro		/
POSTWELD HEAT TREATMENT / TRATTAMENTO TERMICO		
Temperature / Temperatura (°C)		N.A.
Time / Tempo (h)		N.A.
Other / Altro		

GAS

	Percent Composition / Composizione %			
	Gas(es) / Gas	(Mixture) / (Miscela)	Flow rate / Portata	
Plasma	/	/	/	
Shielding / Protezione	I 1	99,99	12	
Trailing /Aggiuntivo	/	/	/	
Backing / Al rovescio	I 1	99,99	13	
Other / Altro	/	/	/	

EWF EUROPEAN WELDING FEDERATION S. SOLMI I EWT 30416

RINA 1861

RINA S. Sabatino

NON DESTRUCTIVE EXAMINATIONS / ESAMI NON DISTRUTTIVI

	Acceptable/Accettabile			Not performed / Non eseguito			Report No. / Rapporto N.
Visual examinations / Visivo		X					VDR 40/06
Penetrant test / Liquidi penetr.		X					PT Report 40/06
Magnetic particle test / Magnet.					X		
Radiographic test / Radiografico		X					RT Report 275
Ultrasonic test / Ultrasonoro					X		

TEST RESULT / RISULTATO DELLE PROVE

TENSILE TEST / PROVA DI TRAZIONE

Specimen type and No. / Provette tipo e N.	Re N/mm²	Rm N/mm²	A % on/su	Z %	Fracture Location Posizione Rottura	Remarks Note
Requirements / Richieste	/	≥ 485	/	/		
TRANSVERSE 1	/	541	/	/	Weld metal	
TRANSVERSE 2	/	583	/	/	Weld metal	

BEND TEST / PROVA DI PIEGAMENTO — Former diameter / Diametro Mandrino 10 mm

Type & N. / Tipo e N.	Bend angle / Angolo di piega	Elongation / Allungamento	Results / Risultati
N. 2 Transverse root bend	180°	Not required	Satisfactory
N. 2 Transverse face bend	180°	Not required	Satisfactory

IMPACT TEST / PROVA DI RESILIENZA — Requirements / Richieste Joule

Specimen Dimens. Dim. Provette (mm)	Notch Locations / Direction Posiz. Intaglio / Direzione	Notch Type / Tipo Intaglio	Test Temp. Temp. Prova (°C)	Impact value/average Valori/media (joule)		Remarks / Note
/						
/						
/						
/						

FILLET WELD TEST / PROVA SALDATURA D'ANGOLO

Result – Satisfactory Risultato - Soddisfacente	Yes -	/	No -	/		Penetration into Parent Metal Penetrazione nel Materiale Base	Yes -	/	No -	/
Macro Results / Risultati Macro: -	/									

OTHER TESTS / ALTRE PROVE

Location of measurement (Sketch) (if required) / Posizione delle impronte (quando richieste)

Type of test / Tipo di prova	
Macro results	Satisfactory-See CONTROL Certificate No. 365 dated 15-09-2006

Date / Data
15-09-2006

Examiner or Examining Body / Esaminatore o Ente Certificante
RINA INDUSTRY

ROSETTI MARINO S.p.A.

Name and signature / Nome e firma

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

EWF S. SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

RINA 1861

RINA S. Sabatino

Control Snc
Sede Amministrativa - Laboratorio
Via Attilio Monti, 15 - 48100 Ravenna
Telefono - 0544 590597

LABORATORIO DI CONTROLLI E PROVE

CERTIFICATO PROVE MATERIALI
TEST CERTIFICATE

N. 365 Fg.1/2
DATA / Date
15-set-2006

COMMITTENTE / *CUSTOMER*: **ROSETTI MARINO S.p.A.**

OGGETTO / *OBJECT*	Dimensione Provino mm. / Size Test mm. :	Commessa / Job	Materiale / Type Material
WPQR 40/2006	Diam.: **2"** Spess.: **2,77**	**106A10**	**A312 TP 316L**

NORME DI COLLAUDO / *SPECIFICATIONS*: **UNI EN 15614-1:2004 / TS-12**
ENTE COLLAUDO / *INSPECTOR*: **RINA S.p.A.**

PROVE MECCANICHE
MECHANICAL TESTS

CARATTERISTICHE RICHIESTE / REQUIREMENTS	Snervamento Yeld stress Fs(N)	Rs N/mmq	Massimo Total Load Fm(N)	Rm N/mmq		Allung Elong. %	Resilienza/Impact Test JOULE °C Individual	Average
				> 485				

Pos. Pos.	Prova Nr Test N°	Dimensioni Size mm	Area So mmq	L0 mm	LU mm	RISULTATI / RESULT Fs	Rs	Fm	Rm		A%		
TRANSVERSE TENSILE TEST UNI EN 895													
TWT	1a	25,2 x 2,5	**63,0**					34100	**541**	**FIW**			
TWT	1b	25,2 x 2,5	**63,0**					36700	**583**	**FIW**			

BEND TEST UNI EN 910

SBB	n° 4	x	
RBB	n° 2	20 x 3	ANGLE: 180° DIAMETER OF THE FORMER 10 mm **ACCEPTABLE**
FBB	n° 2	20 x 3	ANGLE: 180° DIAMETER OF THE FORMER 10 mm **ACCEPTABLE**

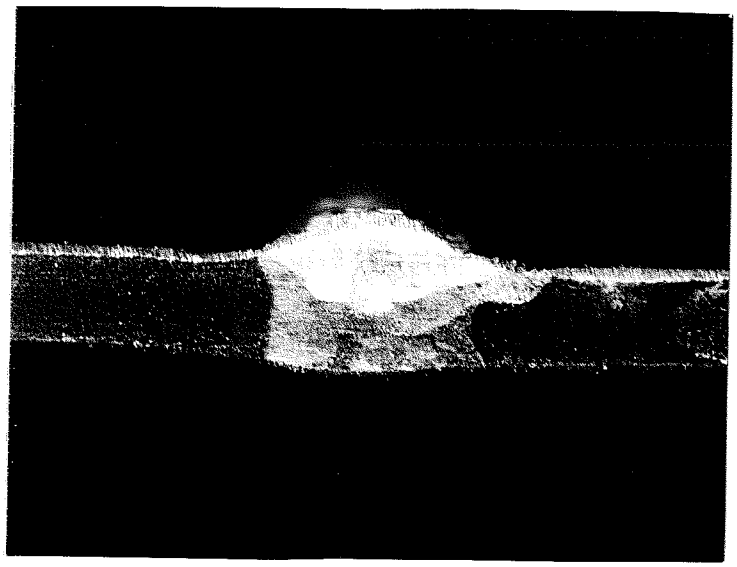
VWT 0/2=ZONA FUSA/WELD MATERIAL
VHT 0/2=LINEA DI FUSIONE/FUSION LINE
VHT2/2=LINEA DI FUSIONE + 2mm /FUSION LINE + 2mm
VHT5/2=LINEA DI FUSIONE + 5mm /FUSION LINE + 5mm
TWT=TRAZIONE TRASVERSALE SALDATURA/TRANSVERSE WELD TENSILE TEST
TWL=TRAZIONE LONG. SALDATURA / ALL WELD LONG TENSILE
FOW=ROTTURA DUTTILE FUORI SALDATURA/ DUCTILE FAILURE OUT OF WELD
SBB=PIEGA LATERALE TRASVERSALE/TRANSVERSE SIDE BEND TEST
RBB=PIEGA TRASVERSALE AL ROVESCIO/TRANSVERSE ROOT BEND TEST
FBB= PIEGA TRASVERSALE AL DIRITTO/TRANSVERSE FACE BEND TEST
FIW=ROTTURA DUTTILE IN SALDATURA/ DUCTILE FAILURE IN WELD

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL Snc Sez. Laboratorio Prove Materiali Il Tecnico Mercatelli Alessio	ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Solmi	RINA S. Sabatino

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	*LABORATORIO DI CONTROLLI E PROVE*	
	CERTIFICATO PROVE MATERIALI *TEST CERTIFICATE* **MACRO EXAMINATION**	**N. 365** **Fg. 2/2** DATA / Date **15-set-06**

COMMITTENTE *CUSTOMER*	**ROSETTI MARINO S.p.A.**			
OGGETTO *OBJECT*	**WPQR 40/2006**	Dimensione Provino/Size mm. Diam.: **2"** Spess.: **2,8**	Commessa/Job **106A10**	Materiale/Material **A312 TP 316L**

MACRO EXAMINATION UNI EN 1321



MACROEXAMINATION:	**ACCEPTABLE**
VISUAL EXAMINATION	**ACCEPTABLE**
ETCH/ATTACCO :	**ACQUA REGIA**
MAGNIFICATION/INGRANDIMENTO:	**5 X**

OPERATORE/Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL SNC Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA 1861 RINA S. Sabatino

ROSETTI MARINO SPA

TABELLA DI SALDATURA
Welding Table

pWPS	40/06	Posizione / Position	2G

Tipo di saldatura / Welding Process: **GTAW+SMAW**

PQR 40/06

Filo / Wire: **ESAB OK TIGROD 16.30 diam. 2,4 mm heat 444361**

Filo / Wire:

Materiale base: **ASTM A 312 Tp 316L**

Base material: **PIPE 2" Thk. 2,77 Heat 36602**

	Gas / Gas (es)	Miscela / Mixture	Portata / Flow Rate
Protezione/Shielding	**Ar**	**99,990%**	**12 L/min**
Protezione/Shielding	**N.A**	**N.A**	**N.A**
Al rovescio/Backing	**Ar**	**99,990%**	**13 L/min**

Welder Name/Nome saldatore: **Bernabei Mirko stamp 6**

Welder Name/Nome saldatore:

Prerisc: / Preheat: **20°C**

Temp. max. di interpass: **150°C**

Elettrodo / Electrode: **ESAB OK 63.35 Diam 2,5mm heat 4385111**

Ravenna: **30/08/06**

Officina Rosetti: **X**

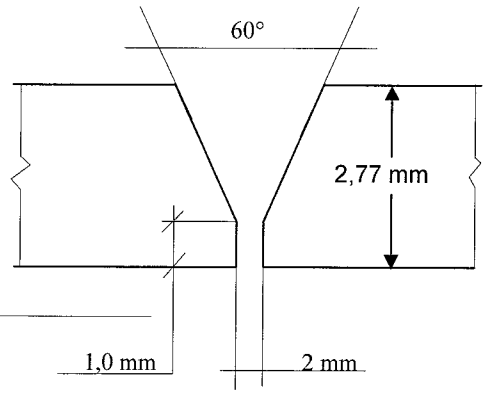
Cantiere:

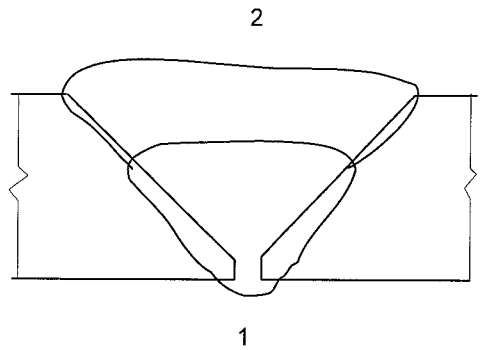
Corrente / Current: **DC**

Polarità / Polarity: **GTAW DP**, **SMAW RP**

Preparazione / Joint Design: **V**

Pass. N. / Pass N.	Proced. / Process	Elettr. / Electr.	Ampere / Amps	Volts / Volts	Vel.mm/1' / Trav.Sp.	H.I. / KJ/mm
1	**GTAW**	**2,4**	**88**	**10**	**50**	**1,06**
2	**SMAW**	**2,5**	**65**	**22**	**100**	**0,86**





Note / Notes:

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

ROSETTI MARINO SPA
Ravenna Works

PROCEDURA DI SALDATURA (in accordo EN 15614/1+TS-12)
Welding Procedure Specification (according EN 15614/1+TS-12)

WPS N°:	40/06
PQR ref.:	40/06 to qualify
REV.:	0
Data /date	30-08-2006

Procedimento di saldatura / Welding process: **GTAW + SMAW** Tipo / Type: **MANUAL +**

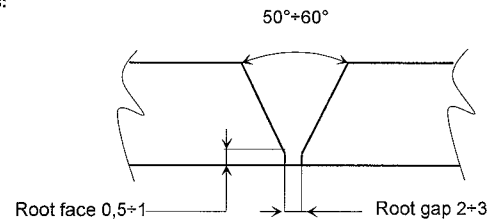
GIUNTO – JOINT (QW-402)

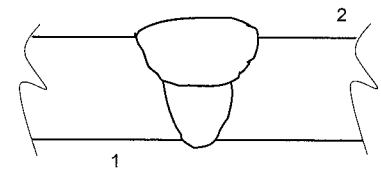
Tipo di giunto / Joint Design: **V**

Supporto / Backing: ☒ Si / Yes **Only for second and other passes** ☒ No **Only for first pass**

Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403)

Da / from P-N°:	-	Group N°:	(EN 15608) 8.1
A / to P-N°:	-	Group N°	(EN 15608) 8.1
Da Tipo e grado / From type and grade	ASTM A312 Tp 316L		
A Tipo e grado / To type and grade	ASTM A312 Tp 316L		

Gamma spessori / Thickness range:
- ► Materiale base / Base material: Piena penetrazione / Groove **2,77 mm (range 1,9 to 5,54)**
- ► Gamma diametri / Pipe dia Range: Piena penetrazione / Groove **2" (range 1" and over)**

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW 141	SMAW 111
Spec. N° (SFA)	EN 12072 (5.9)	EN 1600 (5.4)
AWS N° (CLASS)	W 19 12 3 L (ER 316L)	E 19 12 3 L B 2 2 (E316L-15)
F-N°	6	5
A-N°	8	8
Diametro mat. d'apporto / Size of filler metal	2,4	2,5 mm
Metallo depositato / Deposit weld metal		
Gamma spessori /Thick. range Piena penetrazione / Groov	1,7 mm	1,0
Accoppiamento filo-flusso / Electrode-flux (CLASS)	N.A.	N.A.
Denom. Comm. flusso / FLUX trade name	N.A.	N.A.
Inserto consumabile / Consumable insert	N.A.	N.A.
Altro / other	WIRE: ESAB TIGROD 61.30	ELETTRODO: OK 63.35

POSIZIONI – POSITION (QW 405)

Posizione del giunto / Joint position: **Cianfrino / groove** Posizione / position **PC (2G)** Progressione / weld progression: **N.A.**

PRERISCALDO – PRE-HEAT (QW406)

Temp preriscaldo minima / Min pre-heat temp: **20 °C** Max temp Di interpass / Max interpass temp: **150°C** Mantenimento posriscaldo / Postheat maintenance: **N.A.** Tempo di mantenimento posriscaldo / Postheat time: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

Riscaldamento / Heating rate (°C/Hrs): **N.A.** Temperatura di stasi / Holding temperature °C: **NA** Tempo di stasi / Holding time (min): **NA** Velocità di raffreddamento / Cooling rate (°C/Hrs): **N.A.**

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port / Flow rate
Protezione / Shielding:	Ar	99,99 %	10-13 lt/min.
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot Al rovescio / Backing:	Ar	99,99 %	10-13 lt/min.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW –409)

Corrente / Current: **DC** Polarità / Polarity **SP**

Dia e tipo elettr Tungsteno / Tungsten elctr Size & type: **AWS A 5.12 EWTh2 dia.2,4mm**

Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**

Velocità alimentazione filo / Electr Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String** Dimensione bocchello gas / Orifice of gas cup size: **3/8"** Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura e Molatura/Brushing Grinding**

Metodo di solcatura a rovescio / Method of back gouging: **N.A.** Oscillazione / Oscillation: **N.A.** Distanza tra zona di contatto e pezzo / Contact zone to work distance: **N.A.**

N°Passate / Passes nr.: **Multipla/Multiple** Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single** Martellatura / Peening: **N.A.**

Altro / Other: **Leave gas backing up to completion**

N° Passate Weld layers nr.	Processo Process	Materiale d'apporto Filler metal		Corrente Current		Voltaggio Volt range	Vel. avanzamento Travel speed range (mm/min)	Apporto termico Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. range			
1	GTAW	ER 316L	2,4	DC/SP	80 - 90	10 - 12	40 - 50	0,96 – 1,6
2	SMAW	E316L-15	2,5	RP	60 - 70	20 - 22	80 - 100	0,7 – 1,1

Preparato da / prepared by: ***A.Khalifa***

Approvato da / approved by: ***S.Solmi***

ROSETTI MARINO	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 40-06 data: 30.08.2006

progetto / project	cliente / client	ordine / PO	commessa / job
disegno / dwg	ITP N° /	fase / step	

oggetto - item

Welding Procedure Qualification Record (WPQR) 40/06

Certificato di Qualifica di Procedimento di Saldatura (WPQR) 40/06

WE CERTIFY THAT THE SAMPLE ABOVE MENTIONED HAS BEEN SUBMITTED TO 100% VISUAL EXAMINATION IN AS WELDED STATUS IN ACCORDANCE WITH UNI EN 970:1997.

SI CERTIFICA CHE LA SALDATURA DEL SAGGIO SOPRA CITATO E' STATA SOTTOPOSTA AD ESAME VISIVO AL 100% ALLO STATO COME SALDATO IN ACCORDO ALLE UNI EN 970:1997.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

note - remarks

No visible defects have been detected.

Non sono stati rilevati difetti visibili.

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

UNI EN 970 : 1997

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client

CONTROL S.N.C.
Via Attilio Monti 15 48100
RAVENNA

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - LIQUIDI PENETRANTI
NDT REPORT - DYE PENETRANT TEST

NDE-PT Report No

COMMITTENTE/Customer	**ORDINE N°**/Order No	**COMMESSA N°**/Job No	**PROGETTO**/Project
ROSETTI MARINO S.p.A.		**106A10**	
MATERIALE/Material	**LINEA N°**/ Line No	**OGGETTO** / Object	**DATA**/Date
ASTM A 312 TP 316L		**WPQR 40/2006**	**15-set-06**

In accordance with specification and rule: **UNI EN 571.1 - UNI EN 1289**

Stato della superficie / Surface Condition

COME SALDATO As Welded	■	SPAZZOLATO Brushed	■	LAV DI MACCHINA Machined	☐	COME CALANDRATO As Bent	☐
MOLATO Ground	☐	COME LAMINATO As Rolled	☐	GREZZO As Forged	☐		☐

PRODOTTI UTILIZZATI / Products used	PROCEDURA DI ESECUZIONE / Execution of Procedure
PULITORE PRELIMINARE/ Cleaner **VELNET CGM**	1 PULITURA PRELIMINARE / Preliminary Cleanign **SPRAY**
PENETRANTE / Penetrant **RED W - CGM**	2 APPLICAZIONE PENETRANTE / Penetrant application **SPRAY**
PULITORE PENETRANTE/ Penetrant Remover **WATER**	3 RIMOZIONE PENETRANTE / Removal penetrant ■ **WATER** ☐ ☐
RIVELATORE / Developer **WHITE W - CGM**	4 ESSICAZIONE / Drying process **NATURAL**
NOTE / Remarks	5 APPLICAZIONE RIVELATORE / Developer application **SPRAY**
	a (2) TEMPO PENETRAZIONE / Penetrating time (minuti / minutes) **15**
PULITORE POST-CONTROLLO / Cleaner after examination **Cloths and water**	**b** TEMPO DI LETTURA / Checking time (min.) (minuti / minutes) **5**
TEMPERATURA SUPERFICI / Surfaces temperature (°C) (standard range 16-52 °C) **ambient**	**c** ISPEZIONE VISIVA / Visual Inspection ☐ luce bianca min 1000 Lux ☐ luce U V min 1000 mW/cmq

NOTE / Remarks

Difetti / Discontinuities

a) Cricca a freddo / Crack	e) Cordone irregolare / Irreg. searm
b) Cricca da stress / Stress Crack	f) Incisione marginale / Undercutting
c) Difetto di ripresa / 1st run defect	g)
d) Porosità / Porosity	h)

Saldatura / Weld	spessore/thickness	material/material	

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

RESULTS

NDE COMPANY - II level NDT Operator	**CONFORME ALLA SPECIFICA (*)** conforming to specification	**NON CONFORME ALLA SPECIFICA (*)** not conforming to specification
MERCATALI ALESSIO II° liv. MT/PT CIC PND	■	☐

Q.C. Supervisor	**CUSTOMER INSPECTOR**
Date	Date

RINA
S. Sabatino

CONTROL snc
via Attilio Monti,15 48100 (RA)
tel. 0544 590597 - fax 590599

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - RADIOGRAFICO

NDE REPORT -RADIOGRAPHIC TEST

Data / Date 07/09/2006
NDE-RT Report Nr 275
foglio / sheet n° 01 of 01

COMMITTENTE / Customer	OGGETTO / Object	COMMESSA N° / Job No	ORIDINE N°/Order n°	PROGETTO / Project
ROSETTI MARINO Spa	QUALIFICHE PROCEDIMENTO	106A10	-	-

LINEA N°/ Line No	DWG N° / DWG No	CODICE - PROCEDURA/In accordance with	ACCETTABILITA'/Acceptance levels
-	-	EN 15614 - 1	EN 25817 Classe B

ITP N° / ITP No	FASE ITP / Phase ITP		
-	-	● PRIMA ESECUZIONE/ First test	○ PRIMA DEL TT/ Before PWHT
		○ DOPO RIPARAZIONE/ After repair	○ DOPO IL TT/ After PWHT

TRACEABILITY		JOINT TYPE				RESULT		
weld No - dwg - item	Radiographic Tecniques	material	Φ	thickness	welder No	position film	defect	judgment
WPQR 24 - 06	contatto	A 333 Gr.6	4"	17,12mm	-	0-1		A
						1-2	Aa	A
						2-3		A
						3-4		A
						4-5		A
						5-0		A
WPQR 26 - 06	contatto	316 L	2"	11,07mm	-	0-1		A
						1-2		A
						2-3		A
						3-0		A
WPQR 25 - 06	contatto	A 333 Gr.6	3"	15,24mm	-	0-1		A
						1-2		A
						2-3		A
						3-4		A
						4-0	Aa	A
WPQR 27 - 06	diretta	UNS 31254	2"	2,77mm	-	A		A
						B		A
WPQR 40 - 06	diretta	316 L	2"	2,77mm	-	A		A
						B		A
WPQR 41 - 06	diretta	UNS 31254	2"	2,77mm	-	A		A
						B		A
WPQR 39 - 06	diretta	316 L	2"	2,77mm	-	A		A
						B		A
WPQR 42 - 06	diretta	S 355	PLATE	20mm	-	0-1	Aa-Bb	A
WPQR 43 - 06	diretta	S 355	PLATE	20mm	-	0-1	Ab	A

NOTE / Remarks

CLASSIFICAZIONE DIFETTI
Classification defects ref. ISO 6520

(2011)	Aa	Soffiattura tondeggiante/Porosity < Φ 1mm
(2012)		Uniformly distributed porosity
(2013)		Localized porosity (Clustered)
(2014)		Linear porosity
(2017)		Surface pore
(2015)	Ab	Cavità allungata/Elongated cavity
(2016)	Ab	Tarli/Worm-hole
(300)		Inclusione solide/Solid inclusion
(301)	Ba	Inclusione di scoria/Slag inclusion
(3013)	Bb	Scoria d'orient. diverso/Of any shape in
	Be	Difetto di ripresa/ 1st run irregular
(400)	C	Mancanza di fusione/Lack of fusion
(402)	D	Mancanza di penetrazione/Lack of penet.
(100)	E	Cricca o fessura/Crack
(101)	Ea	Cricca longitudinale/Longitudinal crack
(102)	Eb	Cricca trasversale/Transverse crack
(104)	Ec	Cricca di cratere/Crater crack
(502)		Sovrametallo in eccesso/Excess weld metal
(504)	Ex	Eccesso di penetrazione/Penetration excess
(5041)		Sgocciolamento/Local protrusion
(5011)	F	Solco o incisione/Undercut
(514)	Fa	Irregolarità superficiale/Surface irregularity
(509)		Avvallamento/Sagging
(511)		Incom. riempimento/Incom. Filled groove
(515)	In	Insellamento/Root concavity
(517)		Ripresa difettosa/Poor restart
(2024)	K	Cavità di ritiro/Shrinkage cavity
(506)		Traboccamento/Overlap
(507)	Sl	Slivellamento/Misalignment
(3041)	W	Inclusione di tungsteno/Tungsten inclusion
(601)		Innesco d'arco/Arc strike

GIUDIZIO / Judgment

NX-CF	To repeat to confirm defect
A	Accettabile/Acceptable
R	Riparare/To repair
NT	Tagliare/To cut
NX	Ripetere film/To repeat film
EX	Estendere il controllo/Extende test
DF	Difetto film/Film defect
TM	Taglio o modifica/Cut or modification

RADIOGRAPHIC TECHNIQUE DETAILS

Films: 25 — **Type film and Manufact.**: AGFA Structurix D7-D4 — IQI type: ASTM ☐ 6-10 FE EN ■

Data di esposizione:31-07-2006

Sorgente X - Unità X-Ray Unit: SEIFERT65	**Pellicole per cassetta** (Nr) Films box: 1	**I.Q.I. - Posizione** I.Q.I. - Location: ☐ Lato film/Film Side ■ Lato sorgente/Source	**Distanza sorgente-pellicola** (mm) Distance Source-Film: 150(diretta) / Øe - 1Thk.
Sorgente γ γ-Ray Activity: N.A.		**Schermi di rinforzo** (mm) Intensifying screens Front-Back: Pb 0,10 x 0,10	**Distanza pezzo lato sorgente-pellicola** (mm) Distance Object (source side)-Film: Weld Thk.
Energia (keV) Energy: 200KVolt/3mA	**Sviluppo** Development: ■ Automatic ☐ Manual	**Tecnica radiografica** Radiographic techniques: ■ Single wall exp. ■ Double wall exp. ■ Single wall view ☐ Double wall view.	
Macchia Focale (mm) Focal Spot: 3			

TECNICO II° livello CND - IMPRESA	CONTROLLO QUALITA'	ISPETTORE CLIENTE	ISPETTORE A.I.
Operator NDE II° Level SNT-TC-1A / EN473	Q.C. Supervisor	Company Repr.	Inspection Agency
MERCATALI RICCARDO II° Liv. UT/PT/MT/RX CICPND		ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Salmi	RINA S. Sabatino
NDE Company - Date	Q.C. Supervisor - Date	Company Repr.- Date	I.A. - Date

40/06

T.T.I. - Tubacex Tubos Inoxidables, S.A.

Registro Mercantil de Alava, Tomo 587, Folio 199, Hoja VI 2885 - N.I.F. A-01140227

TUBACEX

Printed on: 19.06.2006

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 380274 Page: 1 / 2 Rev: 1

Date: 14.06.2006 | 14.06.2006

CUSTOMER :RACCORTUBI S.P.A. PO :OS000275S 1/12/05 OUR REFERENCE:J4586
STANDARD :ASTM-ASME A/SA312M-05A ED.04
ADDIT.SPECS :312S REV.1 AND NACE MR01.75-03
GRADE :TP316-316L
DIMENSIONS :60,33 X 2,77
MATERIAL :SEAMLESS STAINLESS STEEL TUBE
COLD ROLLED; PASSIVATED;
PLAIN ENDS SQUARE CUT;

-114318

REVIEWED

----ITEM----- YOUR	TTI.	-HEAT- NR.	NO. OF PIECES	---WEIGHT-- KG	-TOTAL LENGTH-	--UNIT LENGTH--
	14	36602	144	3512	881,79	5,5 - 6,5 MT

RAW MATERIAL

MELTING PROCESS: ELECTRIC FURNACE + A.O.D FROM: ACERALAVA
PEELED BARS; MACROETCH TESTING: GOOD;

(1)	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	B	N
L 36602	0,018	1,39	0,430	0,028	0,0010	11,15	16,70	2,16	0,44	0,0009	0,0615
C 102	0,019	1,38	0,440	0,027	0,0020	11,00	16,55	2,17	0,46	0,0005	0,0615

(1) L: LADLE; C: PRODUCT

HEAT TREATMENT

SOLUTION ANNEALED 1100 °C WATER QUENCHED

= TESTS = NR. HEAT	NR. TEST	TEMP.	TENSION MPA RM	RP 0,2	RP 1,0	% A	% Z	IMPACT TESTS TEMP.	MINIMUM	AVERAGE	HARDNESS HRB
36602	605001	20	547,0	323,0	348,0	46,2					78 80
36602	605001	20	554,0	334,0	355,0	45,0					79 79

TECHNOLOGICALS

FLATTENING TEST: GOOD
FLARING TEST: GOOD
RING EXPANDING TEST: GOOD

METALLURGICAL TEST

INTERGRANULAR CORROSION: A-262"E", DIN 50914, NF A05-159 T1, ISO 3651-2: NOT OBJECTIONS

NON DESTRUCTIVE TEST

100 % EDDY CURRENT TEST AT E.426 , GOOD
100 % HYDROSTATIC PRESSURE TESTED AT 98 BAR , DURING 6 SEC, GOOD
STEEL GRADE CHECKING ON EACH TUBE BY SPECTROMETRY (PMI)
DIMENSIONAL CHECKING ON EACH TUBE, SATISFACTORY
VISUAL INSPECTION ON EACH TUBE, SATISFACTORY

OTHER MATERIAL SPECIFICATIONS

DIN 17458 PK1 / NF A49117-85 1.4401-1.4404/Z6-Z2CND17.11/12

MARKS

TXA
TUBACEX 60,33 X 2,77 ASTM-ASME A-SA 312 TP316-316L - DIN 17458 PK1
1.4401-1.4404 NF A49-117 Z6CND17.11-Z2CND17.12 SMLS HEAT/..... PMI

REMARKS

T.T.I GARANTIT QUE TOUS LES TUBES LIVRES SONT CONFORMES AUX SPEC.S DE L'ARTICLE 15
DE L'ARRETE MINISTERIEL DU 24 MARS 1978 MODIFIE
C<=0,25%, P<=0,05%, S<=0,05%, R<800 N/MM2, E<=0,9 * R
A% (LO=5,65VSO) MIN, 16% EN LONG. R(A_2)>=10500
MATERIAL MANUFACTURER APPROVED WITH CERTIFICATE NR. 07/2001/MUC BY TÜV SÜDDEUTSCHLAND
(NOTIFIED BODY 0036) TO ISSUE CERTIFICATES OF SPECIFIC PRODUCT CONTROL IN
ACCORDANCE WITH PRESSURE EQUIPMENT DIRECTIVE 97/23/EC ANNEX 1 POINT 4.3.

AENOR ER Empresa Registrada ER-0006/1991

IQNet

AENOR Gestión Ambiental GCM-01/127

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above standards and specifications and satisfies the order's requirements.
This certificate is issued by a computerized system and it is valid without signature. On the original certificate the responsible's red coloured signature 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, assuming the responsibility for any unlawful or T.T.I.S.A. not allowed use.
Any forgery or falsification of this certificate shall legally prosecuted

T.T.I.
Tubacex Tubos Inoxidables,S.A.
INGENIERIA DE CALIDAD
Jon Altuna Zubeldia

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n.: 7.000
Descr. : 60.33x2.77
Heat n°/Pcs. marking : 36602 Qtà/Qty:155,46
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N. 160065

T.T.I. - Tubacex Tubos Inoxidables, S.A.

Registro Mercantil de Alava, Tomo 587, Folio 188, Hoja VI 2885 - N.I.F. A-01140227

TUBACEX

Printed on: 19.06.2006

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 380274 Page: 2 / 2 | Rev: 1

Date: 14.06.2006 | 14.06.2006

CUSTOMER :RACCORTUBI S.P.A. PO :OS000275S 1/12/05 OUR REFERENCE :J4586
STANDARD :ASTM-ASME A/SA312M-05A ED.04
ADDIT.SPECS :312S REV.1 AND NACE MR01,75-03
GRADE :TP316-316L
DIMENSIONS :60,33 X 2,77
MATERIAL :SEAMLESS STAINLESS STEEL TUBE
COLD ROLLED; PASSIVATED;
PLAIN ENDS SQUARE CUT;

MATERIAL CHARACTERISTICS COMPLY WITH POINT 7.5 OF ANNEX I TO PED BY HAVING AN ELONGATION AFTER RUPTURE AT TENSILE TEST NO LESS THAN 14 % AND A BENDING RUPTURE ENERGY AT IMPACT TEST NO LESS THAN 27 J AT 20°C.

ROSETTI MARINO
Conforme alla spec.
According to the spec. A312 TP316+PO.
TMUGF Firma / MTSMD Signature
Data / Date
04 LUG 2006
☒ REVIEW
☐ WITNESS

AENOR ER Empresa Registrada ER-0006/1991

IQNet

AENOR Gestión Ambiental GCM-01/127

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above standards and specifications and satisfies the order's requirements.
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Heat n°/Pcs. marking : 36602 Qtà/Qty:155,46
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N 160065

Inspection certificate(Certificato di collaudo) UNI EN 10204-3.1.B

ESAB Saldatura SpA

CERTIFICAZIONE
CERTIFICATION

No 375339

Ns. rif./Our ref.
Bolla 827384 Mag. A Del 06/11/1998

Vs. rif./Your ref.
821170 Del 26/10/1998

Vostro Ordine N°/Your Order No.
Del

Cliente/Customer

ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA

Prodotto Marchio: ESAB
Inf.Suppl.

Pos. No.	Codice/Item No.	Descrizione/Description	Lotto/Lot	Colata/Heat
	163024R150	OK TIGROD 16.30 2.4 MM	--	444361

Analisi/Analysis

C	Mn	Si	P	S	Ni	Mo
0.01	1.56	0.40	0.010	0.019	18.39	12.28	2.60
Cu							
0.12							

Trazione/Tensile test.

	R_p 0,2 N/mm²	R_{eL} N/mm²	R_{aH} N/mm²	R_m N/mm²	A5 %
Metallo d'apporto All weld metal				552	36

Resilienza/Impact test.

	Temp. °C	Media/average J	J
Metallo d'apporto All weld metal			

Note/Remarks

Il prodotto è conforme alle norme / This welding consumable conforms to
1. SFA-AWS A 5.9 ER 316 L
2.
3.

ROSETTI MARINO S.p.A.
Conforme alla spec. A5.9 ER316L
According to the spec.
C.Q. Firma
Q.C.Signature
Data
Date 12-04-99

Località/Locality
Mesero

Data/Date
11/03/1999

Direzione Tecnica

Certificazione - Certification
Certifichiamo che i sopraelencati materiali sono conformi ai requisiti dell'ordine e forniti in accordo col ns. Sistema di Qualità approvato secondo UNI EN ISO 9002 dal Rina, Certificato N. 57/93, e che i valori riportati sono stati verificati in accordo a quanto stabilito all'atto della vendita.

We hereby certify that the above stated products conform to the sales contract and are supplied in accordance with our Quality System approved to UNI EN ISO 9002 by Rina, Certificate N. 57/93, and that the goods, with indicated results have been tested according to the instructions in the sales contract.

20010 MESERO (MI)
Via Mattei, 24
Tel. 02 97968.1
Amministrazione: Fax 02.9787865
Divisione materiali d'apporto: Fax 02.97289300
Divisione impianti: Fax 02.97289181
Assistenza tecnica impianti: Fax 02.9789140
Codice Fiscale/Partita Iva 00775990153
Capitale Sociale 6.600 000.000
Sede legale: Via V. Pisani, 16 Milano
Tribunale Milano 35367 C.C.I.A.A. 236705

ATTESTATO DI CONTROLLO/ TEST REPORT

in accordo a/acc to EN 10204 - 2.2

Data/Date: 2006-01-10

Numero certificato/Cert no: **EC20283833 rev. 0**

Nostro ordine/Our order:	142506	Vostro ordine/Your order:	**Rif. Ord. Nr. OH 20053703**
Nostro riferimento/Our ref:	PIT - SALES ADMINISTRATION	Vostro riferimento/Your ref:	R01
Codice Cliente/Cust no:	00016620	Vostro numero fax/Your fax:	
Data ordine Cliente/Your date:	20051019	Vostra e-mail/Your e-mail:	

Indirizzo di fatturazione/Invoice address
ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA
Italy

Destinatario del certificato/Cert receiver

Indirizzo di spedizione/Delivery address
ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA
Italy

CONSEGNA/DELIVERY Numero di lotto/Lot no: 4385111 Quantità/Quantity: 7200 PK

PRODOTTO/PRODUCT

Marchio/Brand: ESAB
Descrizione/Desc: OK 63.35 2.5 X 300 1/4 VP
Codice/Item no: **63352520K0**

CLASSIFICAZIONE/CLASSIFICATIONS

EN 1600	E 19 12 3 L B 2 2
SFA/AWS A5.4	E316L-15
Werkstoffnummer	1.4430

COMPOSIZIONE CHIMICA/ CHEMICAL COMPOSITION

All weld metal
Altro/Auxiliary:

C	0.04%
Si	0.4%
Mn	1.6%
P	0.014%
S	0.006%
Cr	18.3%
Mo	2.7%
Ni	12.6%
Cu	0.12%
FN WRC-92	4

CARATTERISTICHE MECCANICHE/MECHANICAL PROPS

Norma/Standard:
Altro/Auxiliary:
Condizione/Condition:

TRAZIONE/TENSILE

Rp0.2	Rm	A4
430 MPa	560 MPa	40 %

RESILIENZA/IMPACT

Temp	KV
-120 °C	60 J

COMMENTI/COMMENTS

Materiale fornito in accordo al Sistema Qualità conforme alla norma EN ISO 9000.
Questo certificato è stampato elettronicamente ed è valido senza firma.
Per ogni chiarimento, rivolgersi a:

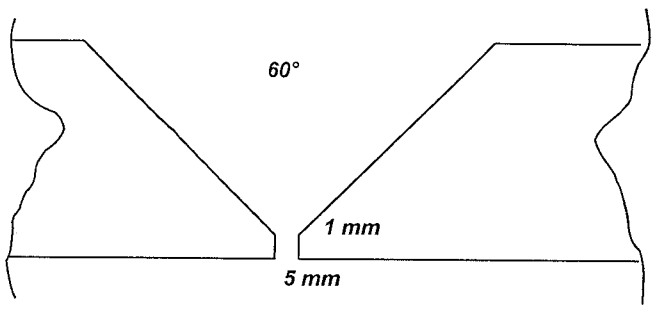
ESAB Saldatura Spa Via E.Mattei 24, I-20010 Mesero (MI), +39 02 979 68.1

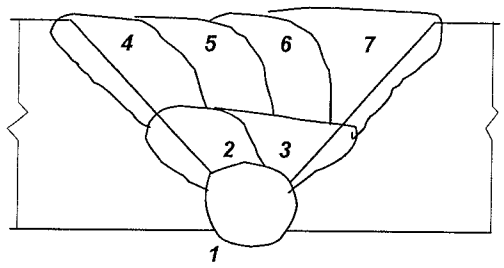
Product supplied under a QA Programme fulfilling the EN ISO 9000 standard.
This certificate is produced electronically and is valid without signature.
Please refer any queries to: (see above)

Validazione/Validation
Tapio Huhtala Product Manager

ROSETTI MARINO SPA	PQR N°	45/05
PROCEDURE QUALIFICATION RECORD	Sheet: 1	Of: 2
	Prepared by: GCT	Date: 14/11/2005

COMPANY NAME:	ROSETTI MARINO SPA		
WPS N°	*45/05 rev. 1*	DATE:	*26/10/2005*
WELDING PROCESS(ES):	*GTAW +FCAW*		
TYPES:	*MANUAL + SEMIAUTOMATIC*		





BASE METAL		
Material Specification:	ASTM A 671	ASTM A 516
Type or grade:	Gr. CC 60	Gr. 70
P.Number	P 1 Gr. 1	P 1 Gr. 2
Thickness of Test Coupon.	12,00 mm (obtained from 15,9 mm)	12,00 mm (obtained from 18,0 mm)
Diameter of Test Coupon:	760 mm (obtained with rolled plates)	
Other:	Heat n° 7S9137	Heat n° 189901

FILLER METALS	GTAW	FCAW
SFA Specification	5.18	5.29
AWS Classification	ER 70 S-3	E81T1Ni1
Filler Metal F-No	6	6
Weld Metal Analysis A-No.	1	10
Size of Filler Metal (mm)	2,4	1,2
Deposited Weld Metal:	2,0 mm	10,00 mm

Other:	GTAW: ESAB OK Tigrod 12.60 Heat No. PG431AQ3367 FCAW: ESAB FILARC PZ 6138 SR diam. 1,2 mm Heat No. PV5330820

POSITION	
Position of Groove	5G
Weld progression (Uphill, Downhill)	UPHILL
Other	NONE

PREHEAT	
Preheat temperature:	20°
Interpass temperature:	250°
Other	None

POSTWELD HEAT TREATMENT	
Temperature:	N.A.
Time:	N.A.
Other	N.A.

GAS	Percent composition		
	Gas(es)	(Mixture)	Flow rate
Shielding	Gtaw: Ar Fcaw: Ar+CO2	99,995 % 80 + 20 %	12 lt/min 16 lt/min
Shielding	N.A.	N.A.	N.A.
Backing	N.A.	N.A.	N.A.

ELECTRICAL CHARACTERISTICS			
Current	DC		
Polarity	GTAW: SP; FCAW: RP		
Amps.	GTAW: 175 FCAW: 200 to 230	Volts	GTAW: 19 SMAW: 24 to 27
Tungsten Electrode Size	EWTH 2% Diam. 2,4 mm		
Other:	GTAW: 3,33 KJ/mm Heat input: FCAW: 1,42 ÷ 1,80 KJ/mm		

TECHNIQUE	
Travel speed	GTAW: 60 mm/min FCAW: 160 to 230 mm/min
String or Weave Bead	STRING
Oscillation	N.A.
Multipass or single pass (per side)	MULTIPASS
Single or multiple electrodes	Single
Other	None

RINA S.Stefano

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

ROSETTI MARINO SPA	PQR N°	45/05
PROCEDURE QUALIFICATION RECORD	Sheet: 2	Of: 2
	Prepared by: GCT	Date: 14/11/2005

TENSILE TEST

SPECIMEN No.	WIDTH (mm)	THICKNESS (mm)	AREA (mm^2)	ULTIMATE TOTAL LOAD N	ULTIMATE UNIT STRESS N/mm2	TYPE OF FAILURE & LOCATION
TWT	*19,0*	*12,3*	*233,7*	*114700*	*491*	*DUCTILE/FAILURE OUT WELD*
TWT	*19,0*	*12,8*	*243,2*	*119700*	*492*	*DUCTILE/FAILURE OUT WELD*

TOUGHNESS TESTS

SPECIMEN No.	NOTCH LOCATION	NOTCH TYPE	SPECIMEN SIZE (mm)	TEST TEMP. (°C)	IMPACT VALUES				DROP WEIGHT	
					JOULES	% SHEAR	MILS	LATERAL EXP.	BREAK	No. BREAK
1	*WELD METAL*	*KV*	*10x10x55*	*-46*	*58-100-109 (89)*					
2	*FUSION LINE side 60*	*KV*	*10x10x55*	*-46*	*98-112-52 (87)*					
3	*FUSION LINE+2 side60*	*KV*	*10x10x55*	*-46*	*178-110-157 (148)*					
4	*FUSION LINE side 70*	*KV*	*10x10x55*	*-46*	*145-255-80 (160)*					
5	*FUSION LINE+2 Side 70*	*KV*	*10x10x55*	*-46*	*40-27-145 (71)*					

GUIDED BEND TEST

TYPE & FIGURE No.	RESULT
No. 4 TRANSVERSE SIDE BEND	*ANGLE 180° ∅ FORMER 40mm ACCEPTABLE*

FILLET WELD

Result - Satisfactory	Yes. *N.A.*	No *N.A.*	Penetration into Parent Metal;	Yes *N.A.* No. *N.A.*
Macro – Results	*N.A.*			

OTHER TESTS

Type of test	*VISUAL EXAMINATION:*	*Satisfactory*					
	MT EXAMINATION	*Satisfactory see report n° 105A20 dated 2-11-2005*					
	RADIOGRAPHIC EXAMINATION	*Satisfactory see report n° 303 dated 27-10-2005*					
	MACROGRAPHIC EXAMINATION:...	*Satisfactory see report n° 454 dated 14-11-2005*					
Chemical Analysis	*N.A.*						
Other	**Hardness** HV 10	BASE MATERIAL	HEAT AFFECTED ZONE	WELD METAL	HEAT AFFECTED ZONE	BASE MATERIAL	Note
		173-179	213-229	187-223	181-224	163-186	
Welder's Name	*GTAW Palmieri Luigi* *FCAW Cavalieri Sebastiano*	Clock No				Stamp No.	*H 112* *H 20*
Test conducted by	*Control S.n.c.*	*Laboratory Test No. 454 dated 14-11-2005*					

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 ASME IX ed. 2004

Date: *14/11/2005*

Manufacturer: ROSETTI MARINO S.p.A.

By: Responsabile saldatura
Welding Engineer
S. Solmi

RINA 1861 — RINA Sabatino

EWF S. SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	***LABORATORIO DI CONTROLLI E PROVE***	
	CERTIFICATO PROVE MATERIALI *TEST CERTIFICATE*	**N. 454 Fg.1/2** DATA / Date **14-nov-2005**

COMMITTENTE / *CUSTOMER*: **ROSETTI MARINO S.p.A.**

OGGETTO / *OBJECT*	**Dimensione Provino mm.** Size Test mm :	**Posizione** Pos.	**Materiale** Type Material
PQR 45/2005	Diam.: / Spess.: **12,00**	/	**ASTM A516 Gr.70-A671 Gr.CC60**

NORME DI COLLAUDO / *SPECIFICATIONS*	*ENTE COLLAUDO* / *INSPECTOR*
ASME IX ed.2001 add.2003 - Client Spec. KE01-00-000-KD-V-SS-0018-000	**RINA Spa**

PROVE MECCANICHE
MECHANICAL TESTS

CARATTERISTICHE RICHIESTE / *REQUIREMENTS* ---------->	*Snervamento* *Yeld stress* *Fs(N)*	*Rs* *N/mmq*	*Massimo* *Total Load* *Fm(N)*	*Rm* *N/mmq*		*Allung* *Elong* *%*	*Resilienza/Impact Test* JOULE °C -46 *Individual*	*Average*
				485-630			**14**	**18**

Pos. *Pos.*	*Prova Nr* *Test N°*	*Dimensioni* *Size mm*	*Area* *So mmq*	*L0 mm*	*LU mm*	*RISULTATI / RESULT* *Fs*	*Rs*	*Fm*	*Rm*		*A%*		
TRANSVERSE TENSILE TEST ASME IX													
TWT	1	19,0 x 12,3	**233,7**					114700	**491**	**FOW**			
TWT	2	19,0 x 12,8	**243,2**					119700	**492**	**FOW**			
BEND TEST ASME IX													
SBB		10 x 12	ANGLE: 180° DIAMETER OF THE FORMER 40 mm							**ACCEPTABLE**			

IMPACT TEST ASTM A370-CLIENT SPEC.								
W.M.		10 x 10		58	100	109	**89**
F.L.		10 x 10	SIDE Gr.70	145	255	80	**160**
F.L.		10 x 10	SIDE Gr.CC60	98	112	52	**87**
F.L.+2		10 x 10	SIDE Gr.70	40	27	145	**71**
F.L.+2		10 x 10	SIDE Gr.CC60	178	110	157	**148**

W.M.=ZONA FUSA/WELD MATERIAL
F.L.=LINEA DI FUSIONE/FUSION LINE
F.L.+2=LINEA DI FUSIONE + 2mm /FUSION LINE + 2mm
F.L.+5=LINEA DI FUSIONE + 5mm /FUSION LINE + 5mm
TWT=TRAZIONE TRASVERSALE SALDATURA/TRANSVERSE WELD TENSILE TEST
TWL=TRAZIONE LONG. SALDATURA / ALL WELD LONG. TENSILE
FOW=ROTTURA DUTTILE FUORI SALDATURA/ DUCTILE FAILURE OUT OF WELD
SBB=PIEGA LATERALE TRASVERSALE/TRANSVERSE SIDE BEND TEST
RBB=PIEGA TRASVERSALE AL ROVESCIO/TRANSVERSE ROOT BEND TEST
FBB= PIEGA TRASVERSALE AL DIRITTO/TRANSVERSE FACE BEND TEST
FIW=ROTTURA DUTTILE IN SALDATURA/ DUCTILE FAILURE IN WELD

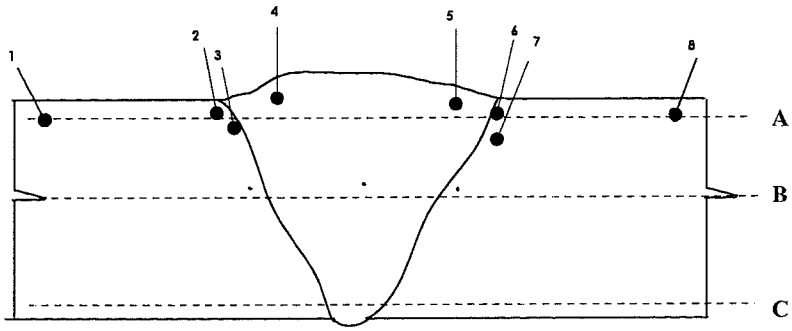
OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
Control Snc Sez. Laboratorio Prove Materiali Il Tecnico Marcatelli Alessio	ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA S. Sabatino

Control Snc	LABORATORIO DI CONTROLLI E PROVE	
Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	CERTIFICATO PROVE MATERIALI TEST CERTIFICATE	N. 454 Fg. 2/2 DATA / Date 14-nov-05

COMMITTENTE / CUSTOMER: **ROSETTI MARINO S.p.A.**

OGGETTO / OBJECT	Dimensione Provino/Size Test mm	Posizione	Materiale/Material
PQR 45/2005	Diam.: / Spess.: 12,00	/	ASTM A516 Gr.70-A671 Gr.CC60

ESAME MACROGRAFICO/DUREZZE
MACRO EXAMINATION / HARDNESS TEST

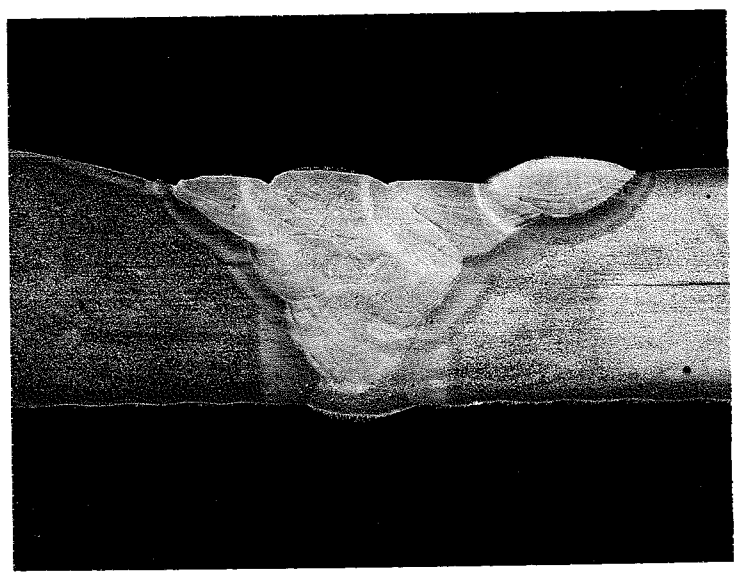


HARDNESS TEST HV10 ASME IX-CLIENT SPEC.

	ROW A	ROW B	ROW C	
1	179		173	PM
2	219		215	HAZ
3	229	216	213	HAZ
4	223		194	WM
5	214	197	187	WM
6	224	193	188	HAZ
7	221		181	HAZ
8	186		163	PM

WM= WELD METAL
HAZ(s)= HEAT AFFECTED ZONE
PM= PARENT MATERIAL (s)

MACRO EXAMINATION ASME IX-CLIENT SPEC.



MACROEXAMINATION : **ACCEPTABLE According ASME IX**
ETCH/ATTACCO : **NITAL 5%**
MAGNIFICATION/INGRANDIMENTO: **2x**

CONTROL S.N.C. Sez. Laboratorio Prove Materiali

OPERATORE / Operator

ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Solmi

COMMITTENTE / Customer

ISPETTORE / Inspector

RINA S. Sabatino

ROSETTI MARINO SPA

TABELLA DI SALDATURA
Welding Table

pWPS	45/05	Posizione Position	5G - UP HILL

Tipo di saldatura / Welding Process: GTAW+~~SMAW~~ FCAW *

PQR 45/05

Filo / Wire	ESAB OK TIGROD 12,60 DIAM 2,4 mm
Filo / Wire	ESAB FILARC PZ 6138 SR diam. 1,2 mm

Materiale base
Base material **PIPE 760 Thk. 12,00 mm - obtained from thk 15,9 - Heat 7S9137 with PIPE 760 Thk. 12,00 mm obtained from thk 18,0 mm - Heat 189901**

	Gas Gas (es)	Miscela Mixture	Portata Flow Rate
Protezione/Shielding	GTAW:Ar	99,995%	12 L/min
	FCAW:Ar+CO2	80+20%	16 L/min
Protezione/Shielding	N.A	N.A	N.A
Al rovescio/Backing	N.A	N.A	N.A

Welder Name/Nome saldatore: **Palmieri Luigi stamp H 112 (GTAW)**
Welder Name/Nome saldatore: **Cavalieri Sebastiano H 20 (FCAW)**

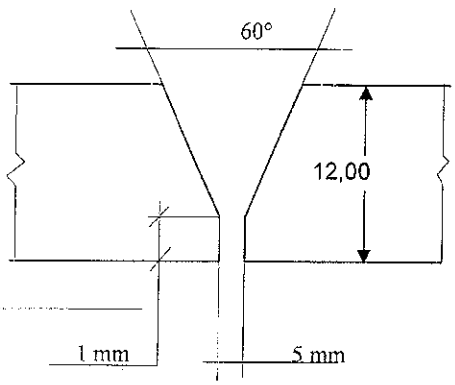
Prerisc: Preheat: **20°C**
Temp. max. di interpass: **250°C**

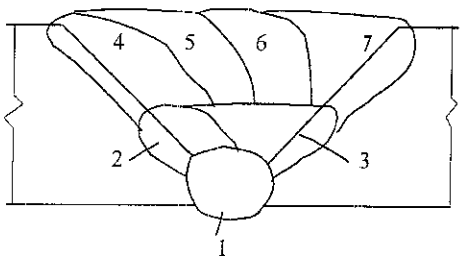
Elettrodo / Electrode: /
Ravenna: **26/10/05**
Officina Rosetti
Cantiere: **X**

Corrente / Current: **DC**
Polarità / Polarity: GTAW **DP**, FCAW **RP**
Preparazione / Joint Design: **V**

Pass. N. Pass N.	Proced. Process	Elettr. Electr.	Ampere Amps	Volts Volts	Vel.mm/1' Trav.Sp.	H.I. KJ/mm
1	GTAW	2,4	175	19	60	3,33
2	FCAW	1,2	200	24	160	1,80
3	FCAW	1,2	230	27	220	1,69
4	FCAW	1,2	220	26	230	1,49
5	FCAW	1,2	200	26	210	1,49
6	FCAW	1,2	200	26	220	1,42
7	FCAW	1,2	210	26	230	1,42

CONSUMABLE — **HEAT No.**
ESAB OK TIGROD 12,60 DIAM 2,4 mm — **PG431AQ3367**
ESAB FILARC PZ 6138 SR diam 1,2 mm — **PV5330820**





Note / Notes

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi
20/10/2008

* correction FCAW

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

ROSETTI MARINO SPA
Ravenna Works

PROCEDURA DI SALDATURA (in accordo ASME IX)
Welding Procedure Specification (according ASME IX)

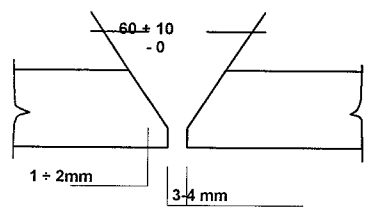
WPS N°: 45/05
PQR ref.: 45/05 to qualify
REV.: 1
Data /date 26.10.2005

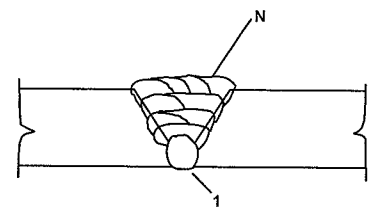
Procedimento di saldatura / Welding process: **GTAW + FCAW**
Tipo / Type: **MANUAL + SEMIAUTOMATIC**

GIUNTO – JOINT (QW-402)

Tipo di giunto / Joint Design: **V**
Supporto / Backing: ☒ Si / Yes **Only for second and other passes** ☒ No **Solo prima passata/Only for first pass**
Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403) MDMT FOR IMPACT TEST

Da / from P-N°: **1** Group N°: **1** A / to P-N°: **1** Group N° **2**

Da Tipo e grado / From type and grade: **ASTM A671Gr.CC60**

A Tipo e grado / To type and grade: **ASTM 516 Gr70**

Gamma spessori / Thickness range:
► Materiale base / Base material: Piena penetrazione / Groove **12,00 mm**
► Gamma diametri / Pipe dia. Range: Piena penetrazione / Groove **760 mm (rolled plate)**

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW	FCAW	-
Spec. N° (SFA)	5.18	5.29	
AWS N° (CLASS)	ER 70S3	E81T1-Ni1	
F-N°	6	6	
A-N°	1	10	
Diametro mat. d'apporto / Size of filler metal	2,4	1,2	
Metallo depositato / Deposit weld metal	2,0 mm	10,00 mm	
Gamma spessori /Thick. range Piena penetrazione / Groove	12,00 mm	12,00 mm	
Accoppiamento filo-flusso / Electrode-flux (CLASS)	NA	NA	
Denom. Comm. flusso / FLUX trade name	NA	NA	
Inserto consumabile / Consumable insert	NA	NA	
Altro / other	WIRE: OK TIGROD 12,60 ESAB	Wire: Filarc PZ 6138 SR	

POSIZIONI – POSITION (QW 405)

Posizione del giunto / Joint position: **Cianfrino / groove**
Posizione / position **5G**
Progressione / weld progression: **N.A.**

PRERISCALDO – PRE-HEAT (QW406)

Temp preriscaldo minima / Min pre-heat temp: **20°C**
Max temp Di interpass / Max interpass temp: **250°C**
Mantenimento interpass / Interpass maintenance: **N.A.**
Tempo di mantenimento prerisc / Maintenance timing: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

Riscaldamento / Heating rate (°C/Hrs): **NA**
Temperatura di stasi / Holding temperature °C: **NA**
Tempo di stasi / Holding time (min): **NA**
Velocità di raffreddamento / Cooling rate (°C/Hrs): **NA**

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port / Flow rate
Protezione / Shielding:	GTAW: Ar GS FCAW: Ar+CO2	99,99 % 80%-20%	10-12 lt/min 16-18 lt/min
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot Al rovescio / Backing:	N.A.	N.A.	N.A.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW -409)

Corrente / Current: **DC** Polarità / Polarity **SP/RP**
Dia e tipo elettr Tungsteno / Tungsten elctr Size & type: **EWTh2 dia.2,4mm**
Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **Spray arc**
Velocità alimentazione filo / Electr Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String**
Dimensione bocchello gas / Orifice of gas cup size: **GTAW: 3/8" GS FCAW: 1/2"**
Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura e Molatura/Brushing Grinding**
Metodo di solcatura a rovescio / Method of back gouging: **N.A.**
Oscillazione / Oscillation: **N.A.**
Distanza tra zona di contatto e pezzo / Contact zone to work distance: **GS FCAW: 15 mm**
N°Passate / Passes nr.: **Multipla/Multiple**
Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single**
Martellatura / Peening: **N.A.**
Altro / Other: **None**

N° Passate / Weld layers nr.	Processo / Process	Materiale d'apporto / Filler metal		Corrente / Current		Voltaggio / Volt range	Vel. avanzamento / Travel speed range (mm/min)	Apporto termico / Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. range			
1	GTAW	ER 70S-3	2,4	DC/SP	170 ÷ 180	18 ÷ 20	55 ÷ 65	2,83 ÷ 3,93
2	FCAW	E81T1-Ni1	1,2	DC/RP	190 ÷ 210	23 ÷ 25	150 ÷ 170	1,54 ÷ 2,10
3 - n	FCAW	E81T1-Ni1	1,2	DC/RP	200 ÷ 230	25 ÷ 27	210 ÷ 230	1,31 ÷ 1,78

Preparato da / prepared by: ***A. KHALIFA***

Approvato da / approved by: ***G.C.TESEI***

CONTROL snc
via Attilio Monti,15 48100 (RA) tel. 0544 590597 - fax 590599

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - RADIOGRAFICO

NDE REPORT -RADIOGRAPHIC TEST

Data / Date **27-10-2005**

NDE-RT Report Nr **303**

foglio / sheet n° 01 of 01

COMMITTENTE / Customer	OGGETTO / Object	COMMESSA N° / Job No	ORDINE N° / Order No	PROGETTO / Project
ROSETTI MARINO Spa *Ravenna*	**QUALIFICHE PROCEDIMENTO**	**105B00** **105A20**		

LINEA N°/ Line No	DWG N° / DWG No	Codice di riferimento/ In accordance with specification	Accettabilità / Acceptance level
		ASME IX	**ASME IX**

ITP N° / ITP No	FASE ITP / Phase ITP		
-	-	● **PRIMA ESECUZIONE**/ First test	○ **PRIMA DEL TT**/ Before PWHT
		○ **DOPO RIPARAZIONE**/ After repair	○ **DOPO IL TT**/ After PWHT

TRACEABILITY		*JOINT TYPE*				*RESULT*		
weld No - dwg - item	WPS	material	Φ	thickness	welder No	position film	defect	judgment
PQR 42-05		A516Gr70	24"	31mm		0-1	Ba	R
		A671GrCC60				1-2	In-F	A
						2-3		A
						3-4	Aa	A
						4-5		A
						5-0		A
PQR 45-05		A516Gr70	770mm	12mm		0-1		A
		A671GrCC60				1-2	Aa	A
						2-3		A
						3-4		A
						4-5		A
						5-6		A
						6-0		A

COPY CONFORMING TO THE ORIGINAL

CLASSIFICAZIONE DIFETTI
Classification defects ref. ISO 6520

(2011)	Aa	Soffiattura tondeggiante/Porosity < Φ 1mm
(2012)		Uniformly distributed porosity
(2013)		Localized porosity (Clustered)
(2014)		Linear porosity
(2017)		Surface pore
(2015)	Ab	Cavità allungata/Elongated cavity
(2016)	Ab	Tarli/Worm-hole
(300)		Inclusione solide/Solid inclusion
(301)	Ba	Inclusione di scoria/Slag inclusion
(3013)	Bb	Scoria d'orient. diverso/Of any shape in.
	Be	Difetto di ripresa/ 1st run irregular
(400)	C	Mancanza di fusione/Lack of fusion
(402)	D	Mancanza di penetrazione/Lack of penet.
(100)	E	Cricca o fessura/Crack
(101)	Ea	Cricca longitudinale/Longitudinal crack
(102)	Eb	Cricca trasversale/Transverse crack
(104)	Ec	Cricca di cratere/Crater crack
(502)		Sovrametallo in eccesso/Excess weld metal
(504)	Ex	Eccesso di penetrazione/Penetration excess.
(5041)		Sgocciolamento/Local protrusion
(5011)	F	Solco o incisione/Undercut
(514)	Fa	Irregolarità superficiale/Surface irregularity
(509)		Avvallamento/Sagging
(511)		Incom. riempimento/Incom. Filled groove
(515)	In	Insellamento/Root concavity
(517)		Ripresa difettosa/Poor restart
(2024)	K	Cavità di ritiro/Shrinkage cavity
(506)		Traboccamento/Overlap
(507)	Sl	Slivellamento/Misalignment
(3041)	W	Inclusione di tungsteno/Tungsten inclusion
(601)		Innesco d'arco/Arc strike

GIUDIZIO / Judgment

NX-CF	To repeat to confirm defect
A	Accettabile/Acceptable
R	Riparare/To repair
NT	Tagliare/To cut
NX	Ripetere film/To repeat film
EX	Estendere il controllo/Extende test
DF	Difetto film/Film defect
TM	Taglio o modifica/Cut or modification

NOTE :

RADIOGRAPHIC TECHNIQUE DETAILS

Films: 13 — Type film: AGFA Structurix *D4*

Indicator Quality Image - Type: DIN ☐ ASTM ■ 10 FE EN ☐ altro/other ☐ *minimum wire visible No*

Data esposizione - Exposure date: *27 ott 05*

Sistema di marcatura - System of marking used: *numbers/letters (Pb) h 10 mm*

Sorgente X - Unità *(matricola)* — X-Ray Unit *(serial number)*

Pellicole per cassetta (Nr) — Films box: 1

I.Q.I. - Posizione T-233 — I.Q.I. - Location: ■ Lato film/Film Side ☐ Lato sorgente/Source

I.Q.I. - Sensibilità rihiesta/ottenuta (%) — I.Q.I. - Required/reading Sensibility

Sorgente γ *(matricola)* T272.2 — γ-Ray *(sn)* IR192 — Activity

Densità film — Film density: 2,3-4,0

Schermi di rinforzo (mm) T-232 — Intensifying screens Front-Back

Penombra Ug (mm) T-285 — Unsharpness geom. Ug: < 0,5

Energia (KeV) — Energy

Sviluppo T-231.2 — Development: ■ Automatic ☐ Manual

Tecnica radiografica T-271.1 — Radiographic techniques: ■ Panoramic ☐ Direct ☐ Contact ☐ Ellipse — ~~Ref. Par. 6.1.8. Fig. 14~~

Distanza sorgente-pellicola (mm) — Distance Source-Film: 1/2Øe

Macchia Focale (mm) T261.2 — Focal Spot 2X2 *Diagonal*

Tempo di esposizione (Min.) — Exposure time: 5-7

Distanza pezzo lato sorgente-pellicola (mm) — Distance Object (source side)-Film: WELD THK

TECNICO II° livello CND - IMPRESA	CONTROLLO QUALITA'	ISPETTORE CLIENTE	ISPETTORE A.I.
Operator NDT II° Level SNT-TC-1A / EN473	Q.C. Supervisor	Company Repr.	Inspection Agency

CONTROL snc — Via A. Monti, 15 — RAVENNA

NDE Company - Date: 27/10/05 — Q.C. Supervisor - Date — Company Repr.- Date — I.S.G. - Date

RINA S. Sabatino

file: *303 QUALIFICHE PROC. ROSETTI*

CONTROL S.N.C.
Via Attilio Monti 15 48100
RAVENNA

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - LIQUIDI PENETRANTI
NDT REPORT - DYE PENETRANT TEST

NDE-PT Report No 105A20

COMMITTENTE/Customer	ORDINE N°/Order No	COMMESSA N°/Job No	PROGETTO/Project
ROSETTI MARINO S.p.A.		**105B00**	
MATERIALE/Material	**LINEA N°**/ Line No	**OGGETTO** / Object	**DATA**/Date
ASTM A516 Gr.70 - A671 Gr.CC60		**PQR 42-43-44-45-46-47 / 2005**	**2-nov-05**

In accordance with specification and rule: **ASME V - ASME VIII**

Stato della superficie / Surface Condition

COME SALDATO As Welded	■	SPAZZOLATO Brushed	■	LAV. DI MACCHINA Machined	☐	COME CALANDRATO As Bent	☐
MOLATO Ground	☐	COME LAMINATO As Rolled	☐	GREZZO As Forged	☐		☐

PRODOTTI UTILIZZATI / Products used	PROCEDURA DI ESECUZIONE / Execution of Procedure
PULITORE PRELIMINARE/ Cleaner **VELNET CGM**	1 PULITURA PRELIMINARE / Preliminary Cleanign **SPRAY**
PENETRANTE / Penetrant **RED W - CGM**	2 APPLICAZIONE PENETRANTE / Penetrant application **SPRAY**
PULITORE PENETRANTE/ Penetrant Remover **WATER**	3 RIMOZIONE PENETRANTE / Removal penetrant ■ **WATER** ☐ ☐
RIVELATORE / Developer **WHITE W - CGM**	4 ESSICAZIONE / Drying process **NATURAL**
NOTE / Remarks	5 APPLICAZIONE RIVELATORE / Developer application **SPRAY**
	a (2) TEMPO PENETRAZIONE / Penetrating time (minuti / minutes) **15**
PULITORE POST-CONTROLLO / Cleaner after examination **Cloths and water**	b TEMPO DI LETTURA / Checking time (min.) (minuti / minutes) **5**
TEMPERATURA SUPERFICI / Surfaces temperature (°C) (standard range 16-52 °C) **ambient**	c ISPEZIONE VISIVA / Visual Inspection ☐ luce bianca min.1000 Lux ☐ luce U.V. min.1000 mW/cmq

NOTE / Remarks

PENETRANT AND VISUAL TEST AT 100 %

Difetti / Discontinuities

a) Cricca a freddo / Crack	e) Cordone irregolare / Irreg. searm
b) Cricca da stress / Stress Crack	f) Incisione marginale / Undercutting
c) Difetto di ripresa / 1st run defect	g)
d) Porosità / Porosity	h)

Saldatura / Weld	spessore/thickness	material/material	

RESULTS

NDE COMPANY - II° level NDE Operator	CONFORME ALLA SPECIFICA (*) conforming to specification	NON CONFORME ALLA SPECIFICA (*) not conforming to specification
MERCATALI ALESSIO II LIV. MT-LP SNT - TC-1A	■	☐

Q.C. Supervisor	CUSTOMER INSPECTOR
Date	

Trametal S.p.A.

STABILIMENTO: 33058 S. GIORGIO DI NOGARO (UD)
Via E. Fermi, 44 - Tel. 0431/629989 - Fax 0431/629985
SEDE LEGALE: 16121 GENOVA - Via XII ottobre
CAP. SOC. Euro 10.320.000,00 I.V.
C.C.I.A.A. N.R.E.A. GE312155
P.IVA IT 11827130151 – C.F./R.I. 03026980106

CERTIFICATO DI COLLAUDO / INSPECTION CERTIFICATE EN 10204 3.1B / DIN 50049 3.1B

Certificato prove N° / Certificate N°
34094 1 di 2 data 24/08/05
34094 1 of 2 date 24/08/05

Lamiere/plates
ASTM A516 Gr.60

Stato di fornitura / Plate condition
Normalizzato / normalized 910°C (+-10°C) 1,5 MIN/mm STILL AIR

	ReH (N/mm2)	Rm (N/mm2)	A %	Temp (°C)	Resilienze / impact test Media / average	Resilienze / impact test Valore singolo / singol value
	>220	415-550	>25	-46	>18 J	>14 J

	C %	Mn %	Si %	P %	S %	Cu %	Ni %	Cr %	Mo %	Al %	V+Nb+Ti %	CE %	Pcm %
MIN		0.85	0.15										
MAX	0.18	1.20	0.40	0.025	0.003						0.10	0.38	0.30

Cliente/Customer
ARMANDO CIMOLAI
CENTRO SERVIZI SRL

Ordine cliente / Customer order
385/AC

Ns ordine / Mill order
20503397

(2) Posizione / location: 1 = Testa / top; 2 = Piede / bottom
(3) Direzione / direction: L = Longitudinale / longitudinal; T = Trasversale / transverse; S = Spessore / thickness
(4) C = Cuore / core sample; P = Pelle / rolled surface; ¼ = ¼ spessore / ¼ thickness
(5) E = Elettrico / electric; LI = Lingotto / ingott; CC = Colata continua / continuous casting

AC **Analisi chimica** / Heat Chemical Analysis
AP **Analisi prodotto** / Check Chemical Analysis

(5) COLATA Heat	(5) Provino Test		C %	Mn %	Si %	P %	S %	Cu %	Ni %	Cr %	Mo %	Al %	V %	Nb %	Ti %	B %	CE %	Pcm %
7S9137		*AC*	0.14	1.02	0.23	0.013	0.001	0.01	0.02	0.03	0	0.03	0	0	0	0.0002	0.32	0.20
7S9137		*AP*	0.15	1.03	0.23	0.012	0.001	0.01	0.02	0.03	0	0.03	0	0	0	<0.0005	0.33	0.21

N° LAMIERA Plate	PROVINO Test	Temp (°C)	(2)	TRAZIONE Tensile test (4)	(5)	ReH N/mm2	Rm N/mm2	A 2" %	Z test (EN 10164) Z %	RESILIENZE Impact test TIPO Type	(3)	Temp (°C)	(4)	KV J			MEDIA Average
7S9137/05/01A	WY48	+20	2	P	CC	344	452	45	62	KV	L	-46	P	184	191	152	175.7
7S9137/05/02A	WY49	+20	2	P	CC	340	461	44	67	KV	L	-46	P	135	154	154	147.7
7S9137/05/03A	WY50	+20	2	P	CC	337	453	47	65	KV	L	-46	P	162	182	201	181.7
7S9137/06/01A	WY51	+20	2	P	CC	336	448	46	64	KV	L	-46	P	172	187	198	185.7
7S9137/06/02A	WY52	+20	2	P	CC	341	465	46	63	KV	L	-46	P	183	156	157	165.3
7S9137/06/03A	WY53	+20	2	P	CC	329	467	48	59	KV	L	-46	P	201	202	180	194.3
7S9137/06/04A	WY54	+20	2	P	CC	333	456	44	60	KV	L	-46	P	149	167	168	161.3
7S9137/06/05A	WY55	+20	2	P	CC	347	471	41	66	KV	L	-46	P	172	188	192	184.0
7S9137/07/01A	WY56	+20	2	P	CC	340	452	42	67	KV	L	-46	P	163	167	181	170.3

ACCS S.r.l
RECEIVED ☐
WITNESSED ☐ DATE 2/09/2005
REVIEWED ☒
SIGNATURE

N° LAMIERA Plate	DIMENSIONI / SIZE (mm) Spes. Thickn.	Larghezza Width	Lunghezza Length
(05-419) 7S9137/05/01A	15.9	2659	11550
(05-421) 7S9137/05/02A	15.9	2659	11550
(05-420) 7S9137/05/03A	15.9	2659	11550
7S9137/06/01A	15.9	2659	11400
7S9137/06/02A	15.9	2659	11400
7S9137/06/03A	15.9	2659	11400
7S9137/06/04A	15.9	2659	11400
(05-418) 7S9137/06/05A	15.9	2659	11550
7S9137/07/01A	15.9	2659	11400

CERTIFICHIAMO che le lamiere sopra elencate, sono conformi alla prescrizione dell'ordine ,che i controlli della marcatura, dell'aspetto superficiale e dimensionale hanno dato esito positivo. Le lamiere sono state ispezionate ad UT secondo ASTM A 578 livello C. Materiale sec. spec. AGIP SPC 00-000-KD-V-SS-0007-000 Rev. D04. Acciao calmato a grano fine, degasato sottovuoto, trattato al calcio.
In allegato certificato UT n° 20051260U e certificato HIC test
WE CERTIFY that the above mentioned are consistent with the order prescriptions: marking, inspection and measurement without objection.
The plates are inspected by UT acc. to ASTM A 578 level C. Material acc. to spec. AGIP SPC 00-000-KD-V-SS-0007-000 Rev. D04. Fully killed steel, fine grain size, vacuum degassed and Ca treated.
Herewith certificate UT n° 20051260U and certificate HIC test
Pcm = C + V/10 + Mo/15 + (Cr+Mn+Cu)/20 + Si/30 + Ni/60 + 5B CE = C + Mn/6 + (Cr+Mo+V)/5 + (Cu+ Ni)/15

IL CAPO SERVIZIO COLLAUDI
Chief inspection Dpt.

TRAMETAL S.p.A.
CONTROLLO QUALITÀ

ENTE DI COLLAUDO

Trametal S.p.A.

STABILIMENTO: 33058 S. GIORGIO DI NOGARO (UD)
Via E. Fermi, 44 - Tel. 0431/629989 - Fax 0431/629985
SEDE LEGALE: 16121 GENOVA - Via XII ottobre
CAP. SOC. Euro 10.320.000,00 I.V.
C.C.I.A.A. N.R.E.A. GE312155
P.IVA IT 11827130151 – C.F./R.I. 03026980106

CERTIFICATO DI COLLAUDO / INSPECTION CERTIFICATE EN 10204 3.1B / DIN 50049 3.1B

Certificato prove N° / Certificate N°
34094 2 di 2 data 24/08/05
34094 2 of 2 date 24/08/05

Lamiere/plates
ASTM A516 Gr.60

Stato di fornitura / Plate condition
Normalizzato / normalized 910°C (+-10°C) 1,5 MIN/mm STILL AIR

	ReH (N/mm2)	Rm (N/mm2)	A %	Temp (°C)	Resilienze / impact test Media / average	Resilienze / impact test Valore singolo / singol value
	>220	415-550	>25	-46	>18 J	>14 J

	C %	Mn %	Si %	P %	S %	Cu %	Ni %	Cr %	Mo %	Al %	V+Nb+Ti %	CE %	Pcm %
MIN		0.85	0.15										
MAX	0.18	1.20	0.40	0.025	0.003						0.10	0.38	0.30

Cliente/Customer
ARMANDO CIMOLAI
CENTRO SERVIZI SRL

Ordine cliente / Customer order
385/AC

Ns ordine / Mill order
20503397

(2) Posizione / location: 1 = Testa / top; 2 = Piede / bottom
(3) Direzione / direction: L = Longitudinale / longitudinal; T = Trasversale / transverse; S = Spessore / thickness
(4) C = Cuore / core sample; P = Pelle / rolled surface; ¼ = ¼ spessore / ¼ thickness
(5) E = Elettrico / electric; LI = Lingotto / lingott; CC = Colata continua / continuous casting

(5) COLATA Heat / Provino Test

AC **Analisi chimica** / Heat Chemical Analysis
AP **Analisi prodotto** / Check Chemical Analysis

			C %	Mn %	Si %	P %	S %	Cu %	Ni %	Cr %	Mo %	Al %	V %	Nb %	Ti %	B %	CE %	Pcm %
7S9137	***AC***		0.14	1.02	0.23	0.013	0.001	0.01	0.02	0.03	0	0.03	0	0	0	0.0002	0.32	0.20
7S9137	***AP***		0.15	1.03	0.23	0.012	0.001	0.01	0.02	0.03	0	0.03	0	0	0	<0.0005	0.33	0.21

N° LAMIERA Plate	PROVINO Test	Temp (°C)	(2)	TRAZIONE Tensile test (4)	(5)	ReH N/mm2	Rm N/mm2	A 2" %	Z test (EN 10164) Z %
7S9137/07/02A	WY57	+20	2	P	CC	332	455	39	66
7S9137/07/03A	WY58	+20	2	P	CC	330	449	45	64
7S9137/07/04A	WY59	+20	2	P	CC	341	450	46	60
7S9137/07/05A	WY60	+20	2	P	CC	327	451	47	68
7S9137/08/01A	WY61	+20	2	P	CC	329	461	44	59
7S9137/08/02A	WY62	+20	2	P	CC	337	464	45	63
7S9137/08/03A	WY63	+20	2	P	CC	335	454	43	61
7S9137/08/04A	WY64	+20	2	P	CC	329	472	44	59
7S9137/08/05A	WY65	+20	2	P	CC	333	466	48	65

RESILIENZE
Impact test

TIPO Type	(3)	Temp (°C)	(4)	KV J			MEDIA Average
KV	L	-46	P	177	174	152	167.7
KV	L	-46	P	183	191	172	182.0
KV	L	-46	P	181	174	163	172.7
KV	L	-46	P	145	182	181	169.3
KV	L	-46	P	194	207	186	195.7
KV	L	-46	P	191	145	183	173.0
KV	L	-46	P	187	182	193	187.3
KV	L	-46	P	142	167	194	167.7
KV	L	-46	P	182	167	171	173.3

ACCS S.r.l
RECEIVED ☐
WITNESSED ☐ DATE 21/09/2005
REVIEWED ☑
SIGNATURE

N° LAMIERA Plate	DIMENSIONI / SIZE (mm) Spes. Thickn.	Larghezza Width	Lunghezza Length
7S9137/07/02A	15.9	2659	11400
7S9137/07/03A	15.9	2659	11400
7S9137/07/04A	15.9	2659	11400
7S9137/07/05A	15.9	2659	11400
7S9137/08/01A	15.9	2659	11400
7S9137/08/02A	15.9	2659	11400
7S9137/08/03A	15.9	2659	11400
7S9137/08/04A	15.9	2659	11400
7S9137/08/05A	15.9	2659	11400

CERTIFICHIAMO che le lamiere sopra elencate, sono conformi alla prescrizione dell'ordine ,che i controlli della marcatura, dell'aspetto superficiale e dimensionale hanno dato esito positivo. Le lamiere sono state ispezionate ad UT secondo ASTM A 578 livello C. Materiale sec. spec. AGIP SPC 00-000-KD-V-SS-0007-000 Rev. D04. Acciao calmato a grano fine, degasato sottovuoto, trattato al calcio.
In allegato certificato UT n° 20051260U e certificato HIC test
WE CERTIFY that the above mentioned are consistent with the order prescriptions: marking, inspection and measurement without objection.
The plates are inspected by UT acc. to ASTM A 578 level C. Material acc. to spec. AGIP SPC 00-000-KD-V-SS-0007-000 Rev. D04. Fully killed steel, fine grain size, vacuum degassed and Ca treated.
Herewith certificate UT n° 20051260U and certificate HIC test
Pcm = C + V/10 + Mo/15 + (Cr+Mn+Cu)/20 + Si/30 + Ni/60 + 5B CE = C + Mn/6 + (Cr+Mo+V)/5 + (Cu+ Ni)/15

IL CAPO SERVIZIO COLLAUDI
Chief inspection Dpt.

TRAMETAL S.p.A.
CONTROLLO QUALITÀ

ENTE DI COLLAUDO

Trametal S.p.A.

STABILIMENTO: 33058 S. GIORGIO DI NOGARO (UD)
Via E. Fermi, 44 - Tel. 0431/629989 - Fax 0431/629985
SEDE LEGALE: 16121 GENOVA - Via XII ottobre
CAP. SOC. Euro 10.320.000,00 I.V.
C.C.I.A.A. N.R.E.A. GE312155
P.IVA IT 11827130151 – C.F./R.I. 03026980106

CERTIFICATO DI COLLAUDO / INSPECTION CERTIFICATE EN 10204 3.1B / DIN 50049 3.1B

Certificato prove N° / Certificate N°: **34094/B 1 di 1 data 24/08/05**
34094/B 1 of 1 date 24/08/05

Lamiere/plates: **ASTM A516 Gr.60**

Stato di fornitura / Plate condition: **Normalizzato / normalized** 910°C (+-10°C) 1,5 MIN/mm STILL AIR

ReH (N/mm2)	Rm (N/mm2)	A %	Temp (°C)	Resilienze / impact test Media / average	Resilienze / impact test Valore singolo/ singol value
>220	415-550	>25	-46	>18 J	>14 J

	C %	Mn %	Si %	P %	S %	Cu %	Ni %	Cr %	Mo %	Al %	V+Nb+Ti %	CE %	Pcm %
MIN		0.85	0.15										
MAX	0.18	1.20	0.40	0.025	0.003						0.10	0.38	0.30

Cliente/Customer: **ARMANDO CIMOLAI CENTRO SERVIZI SRL**

Ordine cliente / Customer order: **385/AC**

Ns ordine / Mill order: **20503397**

(2) Posizione / location: 1 = Testa / top; 2 = Piede / bottom
(3) Direzione / direction: L = Longitudinale / longitudinal; T = Trasversale / transverse; S = Spessore / thickness
(4) C = Cuore / core sample; P = Pelle / rolled surface; ¼ = ¼ spessore / ¼ thickness
(5) E = Elettrico / electric; LI = Lingotto / lingott; CC = Colata continua / continuous casting

(5) COLATA Heat / Provino Test

AC **Analisi chimica** / Heat Chemical Analysis
AP **Analisi prodotto** / Check Chemical Analysis

		C %	Mn %	Si %	P %	S %	Cu %	Ni %	Cr %	Mo %	Al %	V %	Nb %	Ti %	B %	CE %	Pcm %
7S9137	*AC*	0.14	1.02	0.23	0.013	0.001	0.01	0.02	0.03	0	0.03	0	0	0	0.0002	0.32	0.20
7S9137	*AP*	0.15	1.03	0.23	0.012	0.001	0.01	0.02	0.03	0	0.03	0	0	0	<0.0005	0.33	0.21

N° LAMIERA Plate	PROVINO Test	Temp (°C)	(2)	TRAZIONE Tensile test (4)	(5)	ReH N/mm2	Rm N/mm2	A 2" %	Z test (EN 10164) Z %
7S9137/05/01A	K400	+20	2	P	CC	307	439	47	67

RESILIENZE Impact test

TIPO Type	(3)	Temp (°C)	(4)	KV J			MEDIA Average
KV	L	-46	P	131	163	156	150

ACCS S.r.l
RECEIVED ☐
WITNESSED ☐ DATE 01/09/2005
REVIEWED ☒
SIGNATURE

PAGE 218 OF 254

DIMENSIONI / SIZE (mm)

N° LAMIERA Plate	Spes. Thickn.	Larghezza Width	Lunghezza Length	N° LAMIERA Plate	Spes. Thickn.	Larghezza Width	Lunghezza Length
7S9137/05/01A	15.9	2659	11550	7S9137/07/02A	15.9	2659	11400
7S9137/05/02A	15.9	2659	11550	7S9137/07/03A	15.9	2659	11400
7S9137/05/03A	15.9	2659	11550	7S9137/07/04A	15.9	2659	11400
7S9137/06/01A	15.9	2659	11400	7S9137/07/05A	15.9	2659	11400
7S9137/06/02A	15.9	2659	11400	7S9137/08/01A	15.9	2659	11400
7S9137/06/03A	15.9	2659	11400	7S9137/08/02A	15.9	2659	11400
7S9137/06/04A	15.9	2659	11400	7S9137/08/03A	15.9	2659	11400
7S9137/06/05A	15.9	2659	11550	7S9137/08/04A	15.9	2659	11400
7S9137/07/01A	15.9	2659	11400	7S9137/08/05A	15.9	2659	11400

DIMENSIONI / SIZE (mm)

N° LAMIERA Plate	Spes. Thickn.	Larghezza Width	Lunghezza Length

DIMENSIONI / SIZE (mm)

N° LAMIERA Plate	Spes. Thickn.	Larghezza Width	Lunghezza Length

CERTIFICHIAMO che le lamiere sopra elencate, sono conformi alla prescrizione dell'ordine ,che i controlli della marcatura, dell'aspetto superficiale e dimensionale hanno dato esito positivo. Le lamiere sono state ispezionate ad UT secondo ASTM A 578 livello C. Materiale sec. spec. AGIP SPC 00-000-KD-V-SS-0007-000 Rev. D04. Acciao calmato a grano fine, degasato sottovuoto, trattato al calcio.
Prove eseguite dopo PWHT: temp. 621°C, salita e discesa 100°C/h da e per 300°C.
WE CERTIFY that the above mentioned are consistent with the order prescriptions: marking, inspection and measurement without objection.
The plates are inspected by UT acc. to ASTM A 578 level C. Material acc. to spec. AGIP SPC 00-000-KD-V-SS-0007-000 Rev. D04. Fully killed steel, fine grain size, vacuum degassed and Ca treated.
Tests after PWHT: temp. 621° C, holding time 1 hr / inch, heating / cooling = 100° C/hr start and finish at 300°C.
Pcm = C + V/10 + Mo/15 + (Cr+Mn+Cu)/20 + Si/30 + Ni/60 + 5B CE = C + Mn/6 + (Cr+Mo+V)/5 + (Cu+ Ni)/15

IL CAPO SERVIZIO COLLAUDI
Chief inspection Dpt.

TRAMETAL S.p.A.
CONTROLLO QUALITÀ

ENTE DI COLLAUDO

TRAMETAL S.p.A.

SEDE LEGALE : GENOVA - Via XII Ottobre, 2 II° piano - CAP SOC EURO 10 320.000,00 I V - C C I A A GE 312155 - P.IVA IT11827130151 - C.F. 03026980106
STABILIMENTO : 33058 S. GIORGIO DI NOGARO (UDINE) - VIA E. FERMI,44 - TEL. 0431 / 629989 (R A) - TELEFAX 0431 / 629985

CERTIFICATO DI CONTROLLO ULTRASONORO
ULTRASONIC EXAMINATION REPORT

NUMERO: **20051260U**

DATA / DATE: 24/08/2005

CLIENTE / CUSTOMER: **ARMANDO CIMOLAI CENTRO SERVIZI SRL**

N° ORDINE / N° ORDER: 385/AC

N° CONFERMA: 20503397

OGGETTO

CODICE LAMIERA / PLATE CODE	DIMENSIONI [mm] / DIMENTIONS			QUALITA' / QUALITY	ALLEGATO N° / ATTACHED N°
	Spessore	Larghezza	Lunghezza		
7S9137/05/01/A	15,9	2659	11550	ASTM A 516 Gr.60	
7S9137/05/02/A	15,9	2659	11550	ASTM A 516 Gr.60	
7S9137/05/03/A	15,9	2659	11550	ASTM A 516 Gr.60	
7S9137/06/01/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/06/02/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/06/03/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/06/04/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/06/05/A	15,9	2659	11550	ASTM A 516 Gr.60	
7S9137/07/01/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/07/02/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/07/03/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/07/04/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/07/05/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/08/01/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/08/02/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/08/03/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/08/04/A	15,9	2659	11400	ASTM A 516 Gr.60	
7S9137/08/05/A	15,9	2659	11400	ASTM A 516 Gr.60	

ACCS S.r.l RECEIVED WITNESSED REVIEWED SIGNATURE DATE 01/09/2005

DESCRIZIONE ESAME

APPARECCHIATURA / EQUIPMENT	N° SERIE	CONDIZIONI SUPERFICIE / SURFACE CONDITIONS		ACCOPPIANTE / COUPLANT
GILARDONI MG 15	**P 20759 - 25**	**GREZZO DI LAMINAZIONE**		**ACQUA**
NOTE / REMARKS	DIAMETRO SONDE / PROBES DIMENTION	FREQUENZA / FREQUENCE	ANGOLO / ANGLE	NOTE / REMARKS
	mm 20	**5 MHz**	**0 °**	

NORMATIVA DI RIFERIMENTO / STANDARD SPECIFICATIONS	CLASSE DI ACCETTABILITA' / ACCEPTANCE SPECIFICATIONS	RETICOLO / RETICLE	BORDI / EDGES
ASTM A 578	**LIVELLO C**	**225x225**	**50**

MODALITA' OPERATIVE / PROCEDURE	TARATURA / CALIBRATION	ESITO / RESULT	INDICAZIONI / INDICATIONS
In accordo alla specifica	**In accordo alla specifica**	**ACCETTABILE**	**NESSUNA**

NOTE / REMARKS	ENTE ISPETTIVO / INSPECTOR	OPERATORE / OPERATOR	CONTROLLO QUALITA' / QUALITY CONTROL
		Paravano L. II Liv. SNT - TC - 1A II Liv. EN473	TRAMETAL S.p.A. CONTROLLO QUALITÀ

Trametal S.p.A.

STABILIMENTO : 33058 S. GIORGIO DI NOGARO (UD)
VIA E.FERMI , 44 - TEL 0431/629989 (RIC. AUT.)
TELEFAX 0431 / 629985 (RIC. AUT.)
SEDE LEGALE : 16121 GENOVA - VIA XII OTTOBRE, 2 14° piano
CAP.SOC.Eur.10.320,000,00 I.V. -C.C.I.A.A. N.R.E.A. GE312155
P.IVA IT 11827130151 - C.F./R.I. 03026980106

Certificato di Collaudo / Inspection Certificate UNI En 10204 3.1.B / Din 50049 3.1.B 104B50

Cliente/Customer	Certificato/Certificate Del	Bolla Del	Ord.N / Vs
ROSETTI MARINO SPA	95980 1-1 12/10/2004	20414106 11/10/2004	20402808 / OH20043073

Lamiere/Plates	Stato Fornitura	Rs	Rm	A5%	Piega / bend	Temp	Resilienze/ impact test	Temp	Resilienze/ Impact test	Z%	Rp02	Temp
ASME SA516GR70	GL											

	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	V	Nb	Ti	C.Eq.
MIN														
MAX														

Gl =grezzo di lam.
LC = Lam.Temp.Controllat
N = Normalizzato

Analisi Chimica di Colata / Chemical Analysis (heat)

Colata	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	V	Nb	Ti	B	C.Eq.
2S8330	0,19	1,06	0,29	0,01	0,01	0,04	0,02	0,02	0	0,042	0	0	0	0,000	0,375
2S8348	0,19	1,1	0,3	0,016	0,015	0,05	0,04	0,05	0	0,04	0	0	0	0,000	0,389

Analisi Chimica di Prodotto / Chemical Analysis (product)

C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	V	Nb	Ti	C.Eq.

N° Lamiera	Lotto	Provino	Dimensioni	Trazione / Traction (2)	(4)	(5)	Temp	ReH N/mm2	Rm N/mm2	A %	Temp	Rp 02 N/mm2	Z%	Piega	Resilienze / Impact test Tipo	(3)	Temp	(4)	KV J	Media
2S8330/03/06B	71477		016x2500x06000	2	P	CC	+20	336	510	39					KV	L		P		
2S8348/11/06B	71476	IN90-2004	010x2500x08000	2	P	CC	+20	337	525	35					KV	L		P		
2S8348/11/06A	71476	IN90-2004	010x2500x08000	2	P	CC	+20	337	525	35					KV	L		P		
2S8348/11/05B	71476	IN89-2004	012x2500x08000	2	P	CC	+20	341	535	36					KV	L		P		
2S8348/11/05A	71476	IN89-2004	012x2500x08000	2	P	CC	+20	341	535	36					KV	L		P		
2S8330/03/05B	71479	IN88-2004	018x1800x06200	2	P	CC	+20	345	524	32					KV	L		P		

ROSETTI MARINO SpA

Conforme alla spec. According to the spec. SA516GR70+P.O

TMUGF Firma MTSMD Signature — Data Date 16/10/04

☒ REVIEW
☐ WITNESS

(2) Posizione: 1 = Testa 2 = Piede
(3) Direzione: L = Longitudinale T = Trasversale S = Spessore
(4) C = Cuore P = Pelle D = Diverso
(5) E = Elettrico LI = Lingotto CC = Colata continua

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.

IL COLLAUDATORE

CAPO COLLAUDO QUALITA'

TRAMETAL S.p.A. CONTROLLO QUALITÀ

Inspection certificate(Certificato di collaudo) UNI EN 10204-3.1.B **

ESAB Saldatura SpA

CERTIFICAZIONE
CERTIFICATION

No 464389

Ns. rif./Our ref. Bolla 417622 Mag. A Del 06/09/2004

Vs. rif./Your ref. VS.ORD.TELEF.SIG.FABBRI

Vostro Ordine N°/Your Order No.

REGISTERED ISO 9000 QUALITY ASSURED COMPANY

Cliente/Customer

FERROTECNICA S.R.L.
VIA CLASSICANA 556
48100 RAVENNA RA

20043640-OH-R01

Pos. No.	Codice/Item No.	Descrizione/Description	Lotto/Lot	Colata/Heat
	126024R150	OK TIGROD 12.60 2,4 MM	PG431AQ3367	**

Conforme alla spec. / According to the spec. ... Data 10/09/04
W. Dept. Firma / W. Dept Signature

HOSETTI MARINO S.p.A.

Analisi/Analysis

C	Mn	Si	P	S	Cr	Ni	Mo
0,080	1,09	0,69	0,011	0,007	0,04	0,10	0,020
Cu	V	Al	N	Zr	Ti		
0,13	0,001	0,004	0,001	0,00			

Trazione/Tensile test.

	R_p 0,2 N/mm²	R_{eL} N/mm²	R_{eH} N/mm²	R_m N/mm²	A5 %
Metallo d'apporto / All weld metal					

Resilienza/Impact test.

	Temp. °C	Media/average J	J
Metallo d'apporto / All weld metal			

Note/Remarks

Il prodotto è conforme alle norme / This welding consumable conforms to
1. UNI 8031 P M1 EN 1668 W 42 5 W2SI
2. AWS A5.18 ER 70S-3
3. DIN 8559 S G1

Località/Locality Mesero

Data/Date 10/09/2004

Assicurazione qualità
QA Dept.

G.Raimondi

Ferrotecnica S.R.L.
COPIA CONFORME ALL'ORIGINALE

Certificazione - Certification

Certifichiamo che i sopraelencati materiali sono conformi ai requisiti dell'ordine e forniti in accordo col ns. Sistema di Qualità approvato secondo EN ISO 9001 e che i valori riportati sono stati verificati in accordo a quanto stabilito all'atto della vendita.

We herby certify that the above stated products conform to the sales contract and are supplied in accordance with our Quality System approved to EN ISO 9001, and that the goods, with indicated results have been tested according to the instructions in the sales contract.

20010 **MESERO** (MI)
Via Mattei, 24 - Tel. 02 97968.1
E-mail: info@esab.it
http://www.esab.it

Amministrazione: Fax 02 9787865
Divisione materiali d'apporto: Fax 02 97289300
Divisione impianti: Fax 02 97289181
Assistenza tecnica impianti: Fax 02 9789140
Produzione: Fax 02 97289950

Codice Fiscale./Partita Iva 00775990153
Capitale Sociale € 3 408 900,00
Tribunale Milano 35367 - C.C.I.A.A. 236795
Sede Legale Corso Garibaldi, 49 Milano

Test report(Attestato di conformità) UNI EN 10204-2.2 *

ESAB Saldatura SpA

CERTIFICAZIONE
CERTIFICATION

No 482095

Ns. rif./Our ref.
Bolla 520156 Mag. A Del 06/10/2005

Vs. rif./Your ref.

Vostro Ordine N°/Your Order No.
Rif. ord. N. DH 20053342

REGISTERED ISO 9000 QUALITY ASSURED COMPANY

Cliente/Customer

ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA

Pos. No.	Codice/Item No.	Descrizione/Description	Lotto/Lot	Colata/Heat
	2887127730	PZ 6138 SR - 1,2 MM	PV5330820	

Analisi/Analysis

	C	Mn	Si	Ni	S	P		
Min	0,040	1,10	0,30	0,80				
Max	0,090	1,50	0,50	1,10	0,020	0,015		
Min								
Max								

Trazione/Tensile test.

		R_p 0,2 N/mm²	R_{eL} N/mm²	R_{eH} N/mm²	R_m N/mm²	A5 %
Metallo d'apporto All weld metal	Min		470		550	22
	Max				650	

Resilienza/Impact test.

	Temp. °C	Media/average J	J
Metallo d'apporto All weld metal	- 60	> 35 J	

Note/Remarks

Il prodotto è conforme alle norme / This welding consumable conforms to
1. AWS A - SFA 5.29 E 81 T1-NI1
2.EN 758 T 46 5 1NI P M 1 H5
3.

Località/Locality Mesero

Data/Date 06/10/2005

Assicurazione qualità
QA Dept.

G.Raimondi

Certificazione - Certification

Certifichiamo che i sopraelencati materiali sono conformi ai requisiti dell'ordine e forniti in accordo col ns. Sistema di Qualità approvato secondo EN ISO 9001 e che i valori riportati sono stati verificati in accordo a quanto stabilito all'atto della vendita.

We herby certify that the above stated products conform to the sales contract and are supplied in accordance with our Quality System approved to EN ISO 9001, and that the goods, with indicated results have been tested according to the instructions in the sales contract.

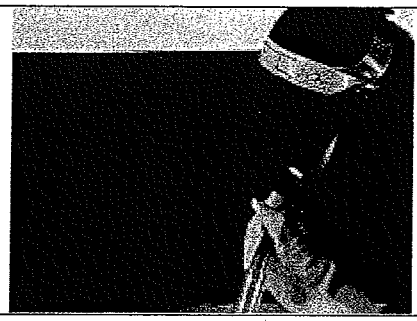
20010 **MESERO** (MI)
Via Mattei, 24 - Tel. 02 97968.1
E-mail: info@esab.it
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Divisione impianti: Fax 02 97289181
Assistenza tecnica impianti: Fax 02 9789140
Produzione: Fax 02 97289950

Codice Fiscale./Partita Iva 00775990153
Capitale Sociale € 3.408.900,00
Tribunale Milano 35367 - C.C.I.A.A. 236795
Sede Legale Corso Garibaldi, 49 Milano

AIR LIQUIDE

U.O. RAVENNA



CERTIQUALITY

SISTEMA QUALITA'
CERTIFICATO
Norma UNI EN ISO 9001:2000
Certificato n. 752/2

ATTESTATO DI CONFORMITA'

Il prodotto fornito risponde alle specifiche sotto indicate:

DENOMINAZIONE : **ARCAL 1**

Miscela di gas appartenente alla Classe I 1

COMPOSIZIONE	:	Ar	99.995%
IMPUREZZE	:	O_2	< 5 PPM
		N_2	< 20 PPM
		CnHm	< 25 PPM
		H_2O (a 10 bar)	< 5 PPM
		H_2	< 10 PPM

Data:

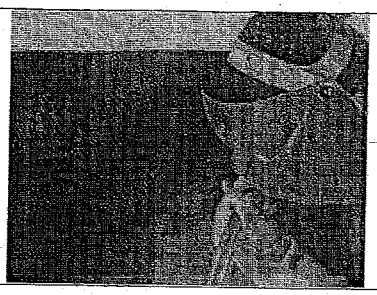
09/12/2004

(QUALITY ASSURANCE)
Dott.sa Martina Campese

AIR LIQUIDE ITALIA SERVICE S.R.L.
U.O. RAVENNA - P. IVA 03270040961
Via Baiona, 160 - 48100 RAVENNA
T 452880 Fax 0544 453374

AIR LIQUIDE

Regione Adriatica
Sito di Ravenna



SISTEMA QUALITA'
CERTIFICATO
Norma UNI EN ISO 9001:2000
Certificato n. 752/2

ATTESTATO DI CONFORMITA'

Il prodotto fornito risponde alle specifiche sotto indicate:

DENOMINAZIONE :	**ATAL 6**		
COMPOSIZIONE :	CO_2	20%	(+/- 2% assoluto)
	Ar	Resto	
IMPUREZZE :	H_2O	< 40 PPM	
	N_2	< 250 PPM	

Data:

06/07/2005

(Resp. Supply Chain)
Paride FIUZZI

ROSETTI MARINO	Welding Procedure Approval Record (WPQR) Verbale di Qualifica di Procedura di Saldatura	No. 45/06	Sheet/Foglio 1/4

Manufacturer's Welding Procedure. Reference No Procedura di saldatura del costruttore. N. di riferimento	**45/06 REV. 0**				
Manufacturer / Costruttore	**ROSETTI MARINO S.p.A.**				
Address / Indirizzo	**VIA TRIESTE 230 - 48100 RAVENNA**				
Code, Testing Standard / Codice, Normativa	EN 15614:2004 & MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4				
Date of welding / Data esecuzione saggio	27.09.2006				
EXTENT OF APPROVAL / VALIDITA' DELL'APPROVAZIONE					
Welding process / Processo di saldatura	**a)** 141 - GTAW	**b)**		**c)** /	
Type(s) / Tipo	**a)** Manual / Manuale	**b)**		**c)** /	
Joint type / Tipo di giunto	BW on pipe				
Parent Material Group & sub-Group	Group 8.1				
Parent material thickness / Spessore (mm)	4,78 mm 3,0÷9,56	**Fillet weld (mm)**	Unlimited throat, base metal thickness 3,0÷5,7		
Weld metal thickness/ spessore saldato	141 3,0÷9,56 mm				
Single or Multi-pass / passata singola o multipla	MULTIPLE				
Outside diameter / Diametro esterno (mm)	21,34 Range 10,67 to 42,				
Filler material Designation / Classificazione materiale d'apporto	**141** :EN 12072 S 19 12 3 L				
Filler material Maker / Produttore materiale d'apporto	ESAB SALDATURA				
Filler material Size / Dimensioni materiale d'apporto	141 ∅ 2,4 mm				
Shielding gas, flux / Gas di protezione, flusso	I 1				
Backing gas, / Gas di supporto	I 1				
Type of welding current & polarity	DC – SP	**Heat input / Apporto termico (kJ/mm)**	± 25% see sheet 2/4		
Welding position / Posizione di saldatura	PC				
Preheat / Preriscaldo (°C)	20	**Interpass temperature / Temp. di interpass (°C)**	150		
Post-Weld Heat Treatment and/or ageing / Trattamento Termico e/o Invecchiamento	N.A.				
Other information / Altre informazioni	NONE				
Welder's name / Nome del saldatore	**Masacci Alberto** (punzone 10)				
Welding test conducted by / Prove condotte da	Rosetti Marino S.p.A. – Ravenna				
Mechanical tes conducted by / Prove meccaniche condotte da	Control – Ravenna				
Laboratory report reference N. / Rapporto di prova N.	Report N° 407 Dated 13-10-2006				
Test carried out in the presence of Test condotti alla presenza di	**RINA SpA**	**Test results are Risultato prove**	**Acceptable**		

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 EN 15614:2004 +MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Si certifica che i dati riportati in questo rapporto sono corretti e che i saggi di saldatura sono preparati, saldati e testati in accordo con le richieste di EN 15614:2004 + OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Location / Luogo	**Date of issue / Data di emissione**	**Examiner or Examining Body /**
RAVENNA	**13-10-2006**	**RINA SpA**

ROSETTI MARINO S.p.A.

Name and signature / Nome e firma

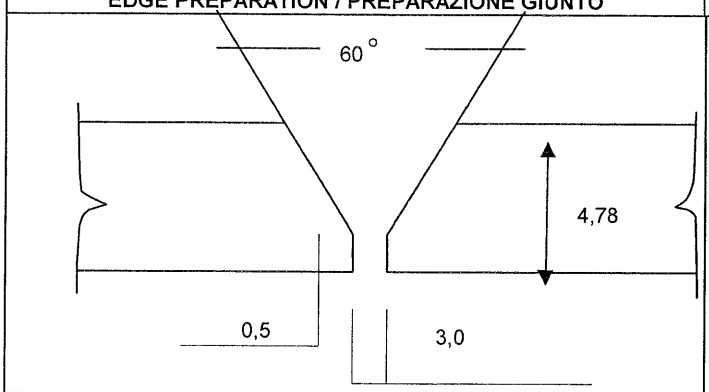
EWF S. SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

RINA 1861

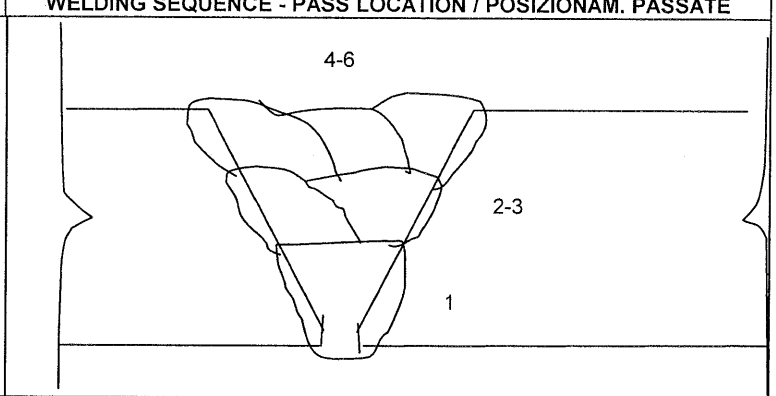
RINA S. Sabatino

Manufacturer / Costruttore	ROSETTI MARINO S.p.A.						
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA				Examiner or Examining body / Ente certificante		
Procedure approval record (WPAR) N° / Qualifica di procedimento N.	45/06	Date/Data	13-10-2006		Ref. N./N. Rif.	RINA	
WPS No. / Procedure N.	45/06		Rev.	0	Date/Data	27-09-2006	
Welding Process(es) / Processo(i) di saldatura	a) 141 - GTAW		b)		c) /		
Types / Tipi (Man., Autom., Semi-autom.)	a) Manual / Manuale		b)		c) /		
JOINTS / GIUNTI Joint type / Tipo di giunto	Butt weld "V" groove						
BACKING / Sostegno	WELD METAL GTAW (first pass)						

EDGE PREPARATION / PREPARAZIONE GIUNTO



WELDING SEQUENCE - PASS LOCATION / POSIZIONAM. PASSATE



Run or layers / Passate o strati	Proc.	Filler metal / Materiale d'apporto Size / Dim (mm)		Amp.		Volt.		Travel Speed / Veloc. Sald.	Heat Input / Apporto Termico
		1E	2E	1E	2E	1E	2E	mm/min	kJ/mm
1	141	2.4		85		11		60	0,94
2-3	141	2,4		82		11		60	0.90
4-6	141	2,4		82		11		80	0,68

PARENT MATERIAL / MATERIALE DI BASE				
Spec. Type & Grade / Specif. Tipo e Grado	ASTM A312		Tp 316L	
to Spec. Type & Grade / Specif. Tipo e Grado	ASTM A312		Tp 316L	
Group No. / Gruppo	8.1	To / al	Group No. / Gruppo	8.1
Thickness of test coupon / Spessore del saggio (mm)	4,78	to / con	4,78	
Diameter of test coupon / Diametro del saggio (mm)	21,34	to / con	21,34	
Other / Altro	Heat number 34693			

FILLER METALS / MATERIALE D'APPORTO	a) 141	b) 111	c)
Specification No. EN	12072 (AWS 5.9)		
Class / Classificazione	S 19 12 3 L (ER 316L)		
Size of filler metal / Dimensioni materiale d'apporto (mm)	2,4 (heat 444361)		
F.M. Trade name / Nome commerciale materiale d'apporto	OK TIGROD 16.30		
Manufacturer / Fabbricante	ESAB SALDATURA		
Flux Trade name / Nome Commerciale Flusso	N.A.		
Manufacturer / Fabbricante	N.A.		
Deposited Weld Metal / Metallo depositato (mm)	4,78		
Other / Altro			

EWF EUROPEAN WELDING TECHNOLOGIST S. SOLMI I EWT 00416

RINA 1861

RINA S.Sabatino

ELECTRICAL CHARACTERISTICS / CARATTERISTICHE ELETTRICHE		
Current / Corrente		DC
Polarity / Polarità		141 : SP
Ampere – Volt		See table page 2/4 / Vedi tabella pagina 2/4
Tungsten Electrode Type & Size / Tipo e Dimensioni Elettrodo W		AWS 5.12 EWTh2 D 2,4mm
Mode of Metal Transfer for GMAW / Modo di trasf. per MAG		N.A.
Other / Altro		None
TECHNIQUE / TECNICA		
Orifice or gas cup size / Diametro dell'ugello o ceramica		8 mm
String or Weave Bead / Cordoni Stretti o Larghi		String/Stretti
Initial and interpass cleaning / Pulizia iniziale e tra le passate		Brushing and/or grinding - Molatura e/o spazzolatura
Method of back gouging / Metodo di solcatura		N.A.
Oscillation / Oscillazione:		
	Amplitude / Ampiezza	N.A.
	Frequency / Frequenza	N.A.
Distance contact tube-work piece / Distanza libera filo		/
Multiple, Single Pass (per Side) / Passata Singola o Mult. (per lato)		Multiple
Single or Multiple Electrodes / Elettrodi Multipli o SIngoli		Single
Torche angle direction of welding / Angolo e direzione torcia		N.A.
Other / Altro		/
WELDING POSITIONS / POSIZIONI DI SALDATURA		
Position of groove or fillet/Posizione dello smusso o del cordone d'angolo		PC
Other / Altro		/
PREHEAT / PRERISCALDO		
Preheat Temperature / Temperatura di Preriscaldo (°C)		20
Interpass Temperature / Temperatura di Interpass (°C)		150
Other / Altro		/
POSTWELD HEAT TREATMENT / TRATTAMENTO TERMICO		
Temperature / Temperatura (°C)		N.A.
Time / Tempo (h)		N.A.
Other / Altro		

GAS

	Percent Composition / Composizione %			
	Gas(es) / Gas	(Mixture) / (Miscela)	Flow rate / Portata	
Plasma	/	/	/	
Shielding / Protezione	I 1	99,99	14	
Trailing /Aggiuntivo	/	/	/	
Backing / Al rovescio	I 1	99,99	16	
Other / Altro	/	/	/	

EWF EUROPEAN WELDING TECHNOLOGIST S. SOLMI I EWT 30416

RINA 1861

RINA S. Sabatino

ROSETTI MARINO	Welding Procedure Approval Record (WPQR) Verbale di Qualifica di Procedura di Saldatura	No. 45/06	Sheet/Foglio 4/4

NON DESTRUCTIVE EXAMINATIONS / ESAMI NON DISTRUTTIVI							
	Acceptable/Accettabile			Not performed / Non eseguito			Report No. / Rapporto N.
Visual examinations / Visivo		X					VDR 45/06
Penetrant test / Liquidi penetr.		X					PT Report 45/06
Magnetic particle test / Magnet.					X		
Radiographic test / Radiografico		X					RT Report 303
Ultrasonic test / Ultrasonoro					X		

TEST RESULT / RISULTATO DELLE PROVE

TENSILE TEST / PROVA DI TRAZIONE

Specimen type and No. / Provette tipo e N.	Re N/mm²	Rm N/mm²	A % on/su	Z %	Fracture Location Posizione Rottura	Remarks Note
Requirements / Richieste	/	≥ 485	/	/		
TRANSVERSE 1	/	669	/	/	Base material	
TRANSVERSE 2	/	677	/	/	Base material	

BEND TEST / PROVA DI PIEGAMENTO — Former diameter / Diametro Mandrino mm

Type & N. / Tipo e N.	Bend angle / Angolo di piega	Elongation / Allungamento	Results / Risultati
N. 2 Transverse root bend	180°	Not required	Satisfactory
N. 2 Transverse face bend	180°	Not required	Satisfactory

IMPACT TEST / PROVA DI RESILIENZA — Requirements / Richieste Joule

Specimen Dimens. Dim. Provette (mm)	Notch Locations / Direction Posiz. Intaglio / Direzione	Notch Type / Tipo Intaglio	Test Temp. Temp. Prova (°C)	Impact value/average Valori/media (joule)		Remarks / Note
/						
/						
/						
/						

FILLET WELD TEST / PROVA SALDATURA D'ANGOLO

Result – Satisfactory Risultato - Soddisfacente	Yes -	/	No -	/		Penetration into Parent Metal Penetrazione nel Materiale Base	Yes -	/	No -	/

Macro Results / Risultati Macro: - /

OTHER TESTS / ALTRE PROVE

Location of measurement (Sketch) (if required) / Posizione delle impronte (quando richieste)

Type of test / Tipo di prova	
Macro results	Satisfactory-See CONTROL Certificate No. 407 dated 13-10-2006

Date / Data
13-10-2006

ROSETTI MARINO S.p.A.

Examiner or Examining Body / Esaminatore o Ente Certificante
RINA SpA

Name and signature / Nome e firma

EWF S. SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

RINA S. Sabatino

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	***LABORATORIO DI CONTROLLI E PROVE***	
	CERTIFICATO PROVE MATERIALI *TEST CERTIFICATE*	**N. 407 Fg.1/2** DATA / Date **13-ott-2006**

COMMITTENTE *CUSTOMER*	**ROSETTI MARINO S.p.A.**		
OGGETTO *OBJECT*	**WPQR 45/2006**	**Dimensione Provino mm.** Size Test mm. : Diam.: **1/2"** Spess.: **4,78**	**Commessa** Job **106A10**
			Materiale Type Material **ASTM A312 Tp 316L**

NORME DI COLLAUDO *SPECIFICATIONS* **UNI EN 15614-1:2004 / TS-12**	***ENTE COLLAUDO*** *INSPECTOR* **RINA Spa**

PROVE MECCANICHE
MECHANICAL TESTS

CARATTERISTICHE RICHIESTE *REQUIREMENTS ---------->*						*Snervamento* *Yeld stress* *Fs(N)*	*Rs* *N/mmq*	*Massimo* *Total Load* *Fm(N)*	*Rm* *N/mmq*		*Allung* *Elong.* *%*	*Resilienza/Impact Test* **JOULE °C** *Individual*	*Average*
									> 485				
Pos. ***Pos.***	***Prova Nr*** ***Test N°***	***Dimensioni*** ***Size mm***	***Area*** ***So*** ***mmq***	***L0*** ***mm***	***LU*** ***mm***	***RISULTATI / RESULT*** ***Fs***	***Rs***	***Fm***	***Rm***		***A%***		
TRANSVERSE TENSILE TEST UNI EN 895													
TWT	1a	12,3 x 4,7	**57,8**					38700	**669**	**FOW**			
TWT	1b	12,6 x 4,5	**56,7**					38400	**677**	**FOW**			

BEND TEST UNI EN 910				
FBB	n° 2	20 x 5,0	ANGLE: 180° DIAMETER OF THE FORMER 20 mm	**ACCEPTABLE**
RBB	n° 2	20 x 5,0	ANGLE: 180° DIAMETER OF THE FORMER 20 mm	**ACCEPTABLE**

VWT 0/2=ZONA FUSA/WELD MATERIAL

VHT 0/2=LINEA DI FUSIONE/FUSION LINE

VHT2/2=LINEA DI FUSIONE + 2mm./FUSION LINE + 2mm.

VHT5/2=LINEA DI FUSIONE + 5mm./FUSION LINE + 5mm.

TWT=TRAZIONE TRASVERSALE SALDATURA/TRANSVERSE WELD TENSILE TEST

TWL=TRAZIONE LONG. SALDATURA / ALL WELD LONG. TENSILE

FOW=ROTTURA DUTTILE FUORI SALDATURA/ DUCTILE FAILURE OUT OF WELD

SBB=PIEGA LATERALE TRASVERSALE/TRANSVERSE SIDE BEND TEST

RBB=PIEGA TRASVERSALE AL ROVESCIO/TRANSVERSE ROOT BEND TEST

FBB= PIEGA TRASVERSALE AL DIRITTO/TRANSVERSE FACE BEND TEST

FIW=ROTTURA DUTTILE IN SALDATURA/DUCTILE FAILURE IN WELD

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Marcatali Alessio	ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Solmi	RINA S. Sabatino

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti, 15 - 48100 Ravenna Telefono - 0544 590597	LABORATORIO DI CONTROLLI E PROVE	
	CERTIFICATO PROVE MATERIALI TEST CERTIFICATE **MACRO EXAMINATION**	**N. 407** Fg. 2/2 DATA / Date **13-ott-06**

COMMITTENTE / CUSTOMER	ROSETTI MARINO S.p.A.		
OGGETTO / OBJECT **WPQR 45/2006**	Dimensione Provino/Size mm. Diam.: **1/2"** Spess.: **4,8**	Commessa/Job **106A10**	Materiale/Material **ASTM A312 Tp 316L**

MACRO EXAMINATION UNI EN 1321



MACROEXAMINATION:	**ACCEPTABLE**
VISUAL EXAMINATION	**ACCEPTABLE**
ETCH/ATTACCO :	**ACQUA REGIA**
MAGNIFICATION/INGRANDIMENTO:	**4 X**

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL SNC Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Solmi	RINA S. Sabatino

ROSETTI MARINO SPA

TABELLA DI SALDATURA
Welding Table

pWPS	45/06	Posizione / Position	2G

Tipo di saldatura / Welding Process	GTAW

PQR45/06

Filo / Wire	ESAB OK TIGROD 16.30 diam. 2,4 mm heat 444361
Filo / Wire	

Materiale base **ASTM A 312 Tp 316L**
Base material **PIPE 1/2" Thk. 4,78 Heat 34693**

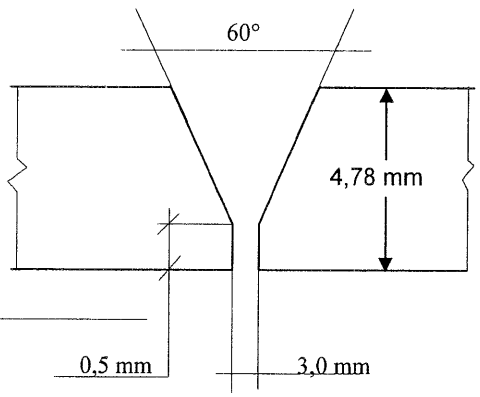
	Gas / Gas (es)	Miscela / Mixture	Portata / Flow Rate
Protezione/Shielding	Ar	99,990%	14 L/min
Protezione/Shielding	N.A	N.A	N.A
Al rovescio/Backing	Ar	99,990%	16 L/min

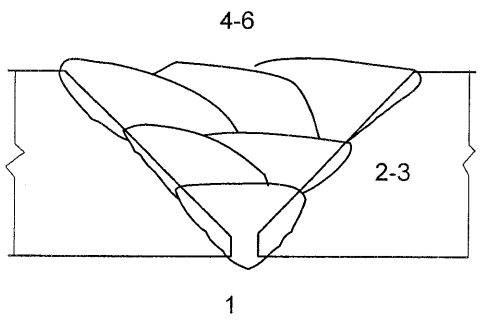
Welder Name/Nome saldatore **Masacci Alberto stamp 10**
Welder Name/Nome saldatore

Prerisc: / Preheat **20°C**
Temp. max. di interpass: **150°C**

Elettrodo / Electrode
Ravenna **27/09/06**
Officina Rosetti **X**
Cantiere

Corrente / Current	DC	Pass. N. / Pass N.	Proced. / Process	Elettr. / Electr.	Ampere / Amps	Volts / Volts	Vel.mm/1' / Trav.Sp.	H.I. / KJ/mm
Polarità / Polarity	GTAW DP	1	GTAW	2,4	85	11	60	0,94
		2-3	GTAW	2,4	82	11	60	0,90
Preparazione / Joint Design	V	4-6	GTAW	2,4	82	11	80	0,68





Note / Notes

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

ROSETTI MARINO SPA
Ravenna Works

PROCEDURA DI SALDATURA (in accordo EN 15614/1+TS-12)
Welding Procedure Specification (according EN 15614/1+TS-12)

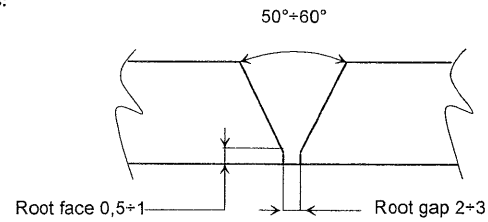
pWPS N°:	45/06
PQR ref.:	45/06 to qualify
REV.:	0
Data /date	27-09-2006

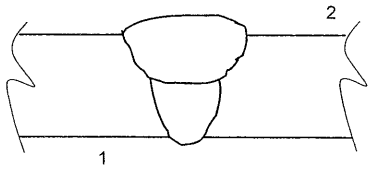
Procedimento di saldatura / Welding process: **GTAW** +
Tipo / Type: **MANUAL** +

GIUNTO – JOINT (QW-402)

Tipo di giunto / Joint Design: **V**
Supporto / Backing: ☒ Si / Yes **Only for second and other passes** ☒ No **Only for first pass**
Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403)

Da / from P-N°:	-	Group N°:	(EN 15608) 8.1
A / to P-N°:	-	Group N°	(EN 15608) 8.1
Da Tipo e grado / From type and grade	ASTM A312 Tp 316L		
A Tipo e grado / To type and grade	ASTM A312 Tp 316L		

Gamma spessori / Thickness range:
► Materiale base / Base material: Piena penetrazione / Groove **4,78 mm (range 3,0 to 9,56)**
► Gamma diametri / Pipe dia Range: Piena penetrazione / Groove **1/2" (range 1/4" to 1")**

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW 141	
Spec. N° (SFA)	EN 12072 (5.9)	
AWS N° (CLASS)	W 19 12 3 L (ER 316L)	
F-N°	6	
A-N°	8	
Diametro mat. d'apporto / Size of filler metal	2,4	
Metallo depositato / Deposit weld metal		
Gamma spessori /Thick range Piena penetrazione / Groov	4,78 mm	
Accoppiamento filo-flusso / Electrode-flux (CLASS)	N.A.	
Denom. Comm. flusso / FLUX trade name	N.A.	
Inserto consumabile / Consumable insert	N.A.	
Altro / other	WIRE: ESAB TIGROD 316L	

POSIZIONI – POSITION (QW 405)

Posizione del giunto / Joint position: **Cianfrino / groove**
Posizione / position **PC (2G)**
Progressione / weld progression: **N.A.**

PRERISCALDO – PRE-HEAT (QW406)

Temp preriscaldo minima / Min. pre-heat temp: **20 °C**
Max temp Di interpass / Max interpass temp.: **150°C**
Mantenimento posriscaldo / Postheat maintenance: **N.A.**
Tempo di mantenimento posriscaldo. / Postheat time: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

Riscaldamento / Heating rate (°C/Hrs): **N.A.**
Temperatura di stasi / Holding temperature °C: **NA**
Tempo di stasi / Holding time (min.): **NA**
Velocità di raffreddamento / Cooling rate (°C/Hrs): **N.A.**

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port. / Flow rate
Protezione / Shielding:	Ar	99,99 %	10-14 lt/min.
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot. Al rovescio / Backing:	Ar	99,99 %	12-16 lt/min.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW-409)

Corrente / Current: **DC**
Polarità / Polarity **SP**
Dia e tipo elettr. Tungsteno / Tungsten elctr. Size & type: **AWS A 5.12 EWTh2 dia.2,4mm**
Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**
Velocità alimentazione filo / Electr. Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String**
Dimensione bocchello gas / Orifice of gas cup size: **3/8"**
Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura e Molatura/Brushing Grinding**
Metodo di solcatura a rovescio / Method of back gouging: **N.A.**
Oscillazione / Oscillation: **N.A.**
Distanza tra zona di contatto e pezzo / Contact zone to work distance: **N.A.**
N°Passate / Passes nr.: **Multipla/Multiple**
Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single**
Martellatura / Peening: **N.A.**
Altro / Other: **Leave gas backing up to completion**

N° Passate Weld layers nr.	Processo Process	Materiale d'apporto Filler metal		Corrente Current		Voltaggio Volt range	Vel. avanzamento Travel speed range (mm/min)	Apporto termico Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. range			
1	GTAW	ER 316L	2,4	DC/SP	80 - 90	10 - 12	50 - 60	0,8 – 1,3
2-n	GTAW	ER 316L	2,4	DC/SP	80 - 90	10 - 12	70 - 80	0,6 – 0,9

Preparato da / prepared by: *A.Khalifa*
Approvato da / approved by: *S.Solmi*

CONTROL S.N.C.
Via Attilio Monti 15 48100
RAVENNA

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - LIQUIDI PENETRANTI
NDT REPORT - DYE PENETRANT TEST

NDE-PT Report No

COMMITTENTE/Customer	**ORDINE N°**/Order No	**COMMESSA N°**/Job No	**PROGETTO**/Project
ROSETTI MARINO S.p.A.		**106A10**	
MATERIALE/Material	**LINEA N°**/ Line No	**OGGETTO** / Object	**DATA**/Date
ASTM A 312 Tp 316L		**WPQR 45/2006**	

In accordance with specification and rule: **UNI EN 571.1 - UNI EN 1289**

Stato della superficie / Surface Condition

COME SALDATO As Welded	■	SPAZZOLATO Brushed	■	LAV. DI MACCHINA Machined	☐	COME CALANDRATO As Bent	☐
MOLATO Ground	☐	COME LAMINATO As Rolled	☐	GREZZO As Forged	☐		☐

PRODOTTI UTILIZZATI / Products used	PROCEDURA DI ESECUZIONE / Execution of Procedure
PULITORE PRELIMINARE/ Cleaner **VELNET CGM**	1 PULITURA PRELIMINARE / Preliminary Cleanign **SPRAY**
PENETRANTE / Penetrant **RED W - CGM**	2 APPLICAZIONE PENETRANTE / Penetrant application **SPRAY**
PULITORE PENETRANTE/ Penetrant Remover **WATER**	3 RIMOZIONE PENETRANTE / Removal penetrant ■ **WATER** ☐ ☐
RIVELATORE / Developer **WHITE W - CGM**	4 ESSICAZIONE / Drying process **NATURAL**
NOTE / Remarks	5 APPLICAZIONE RIVELATORE / Developer application **SPRAY**
	a (2) TEMPO PENETRAZIONE / Penetrating time (minuti / minutes) **15**
PULITORE POST-CONTROLLO / Cleaner after examination **Cloths and water**	**b** TEMPO DI LETTURA / Checking time (min.) (minuti / minutes) **5**
TEMPERATURA SUPERFICI / Surfaces temperature (°C) (standard range 16-52 °C) **ambient**	**c** ISPEZIONE VISIVA / Visual Inspection ☐ luce bianca min.1000 Lux ☐ luce U.V. min.1000 mW/cmq

NOTE / Remarks	Difetti / Discontinuities	
	a) Cricca a freddo / Crack	e) Cordone irregolare / Irreg. searm
	b) Cricca da stress / Stress Crack	f) Incisione marginale / Undercutting
	c) Difetto di ripresa / 1st run defect	g)
	d) Porosità / Porosity	h)

Saldatura / Weld	spessore/thickness	material/material	

ROSETTI MARINO S.p.A.
Responsabile saldatura

RESULTS

NDE COMPANY - II° level NDE Operator	**CONFORME ALLA SPECIFICA (*)** conforming to specification	**NON CONFORME ALLA SPECIFICA (*)** not conforming to specification
MERCATALI ALESSIO II° liv. MT/PT CIC PND	■	☐
Q.C. Supervisor	**CUSTOMER INSPECTOR**	
Date	Date	

RINA 1861 S. Sabatino

CONTROL snc	NDE ACTIVITIES - TEST SHEET	Data / Date 04/10/2006
via Attilio Monti,15 48100 (RA) tel. 0544 590597 - fax 590599	**RAPPORTO CND - RADIOGRAFICO** NDE REPORT -RADIOGRAPHIC TEST	**NDE-RT** Report Nr 303 foglio / sheet n° 01 of 01

COMMITTENTE / Customer	OGGETTO / Object	COMMESSA N° / Job No	ORDINE N°/Order n°	PROGETTO / Project
ROSETTI MARINO Spa	QUALIFICHE PROCEDIMENTO	106A10	-	-
LINEA N°/ Line No	**DWG N° / DWG No**	**CODICE - PROCEDURA/In accordance with**		**ACCETTABILITA'/Acceptance levels**
-	-	EN 15614 - 1		EN 25817 Classe B

ITP N° / ITP No	FASE ITP / Phase ITP		
-	-	● PRIMA ESECUZIONE/ First test	○ PRIMA DEL TT/ Before PWHT
		○ DOPO RIPARAZIONE/ After repair	○ DOPO IL TT/ After PWHT

TRACEABILITY		*JOINT TYPE*				*RESULT*		
weld No - dwg - item	Radiographic Tecniques	material	Φ	thickness	welder No	position film	defect	judgment
WPQR 45/06 A	diretta	316 L	1/2"	4,78mm	-	0		A
						1		A
						2		A
						3		A
WPQR 45/06 B	diretta	316 L	1/2"	4,78mm	-	0		A
						1		A
						2		A
						3		A
WPQR 45/06 C	diretta	316 L	1/2"	4,78mm	-	0		A
						1		A
						2		A
						3		A

NOTE / Remarks

CLASSIFICAZIONE DIFETTI
Classification defects ref. ISO 6520

(2011)	Aa	Soffiattura tondeggiante/Porosity < Φ 1mm
(2012)		Uniformly distributed porosity
(2013)		Localized porosity (Clustered)
(2014)		Linear porosity
(2017)		Surface pore
(2015)	Ab	Cavità allungata/Elongated cavity
(2016)	Ab	Tarli/Worm-hole
(300)		Inclusione solide/Solid inclusion
(301)	Ba	Inclusione di scoria/Slag inclusion
(3013)	Bb	Scoria d'orient. diverso/Of any shape in.
	Be	Difetto di ripresa/ 1st run irregular
(400)	C	Mancanza di fusione/Lack of fusion
(402)	D	Mancanza di penetrazione/Lack of penet.
(100)	E	Cricca o fessura/Crack
(101)	E	Cricca longitudinale/Longitudinal crack
(102)	E	Cricca trasversale/Transverse crack
(104)	E	Cricca di cratere/Crater crack
(502)		Sovrametallo in eccesso/Excess weld metal
(504)	E	Eccesso di penetrazione/Penetration excess.
(5041)		Sgocciolamento/Local protrusion
(5011)	F	Solco o incisione/Undercut
(514)	Fa	Irregolarità superficiale/Surface irregularity
(509)		Avvallamento/Sagging
(511)		Incom. riempimento/Incom. Filled groove
(515)	In	Insellamento/Root concavity
(517)		Ripresa difettosa/Poor restart
(2024)	K	Cavità di ritiro/Shrinkage cavity
(506)		Traboccamento/Overlap
(507)	Sl	Slivellamento/Misalignment
(3041)	W	Inclusione di tungsteno/Tungsten inclusion
(601)		Innesco d'arco/Arc strike

GIUDIZIO / Judgment

NX-CF	To repeat to confirm defect
A	Accettabile/Acceptable
R	Riparare/To repair
NT	Tagliare/To cut
NX	Ripetere film/To repeat film
EX	Estendere il controllo/Extende test
DF	Difetto film/Film defect
TM	Taglio o modifica/Cut or modification

RADIOGRAPHIC TECHNIQUE DETAILS

Films: 12	Type film and Manufact.: AGFA Structurix D7	IQI type: ASTM ☐ 10 FE EN ■	
Data di esposizione: 28-09-2006			
Sorgente X - Unità X-Ray Unit: N.A.	Pellicole per cassetta (Nr) Films box: 1	I.Q.I. - Posizione I.Q.I. - Location: ■ Lato film/Film Side ☐ Lato sorgente/Source	Distanza sorgente-pellicola (mm) Distance Source-Film: 300
Sorgente γ γ-Ray Activity: IRIDIO 192		Schermi di rinforzo (mm) Intensifying screens Front-Back: Pb 0,10 x 0,10	Distanza pezzo lato sorgente-pellicola (mm) Distance Object (source side)-Film: Weld Thk.
Energia (keV) Energy: N.A.	Sviluppo Development: ■ Automatic ☐ Manual	Tecnica radiografica Radiographic techniques: ■ Single wall exp. ☐ Double wall exp. ■ Single wall view. ☐ Double wall view.	
Macchia Focale (mm) Focal Spot: 2x2			

TECNICO III livello CND - IMPRESA (Operator NDE II° Level SNT-TC-1A/ EN473)	CONTROLLO QUALITA' (Q.C. Supervisor)	ISPETTORE CLIENTE (Company Repr.)	ISPETTORE A.I. (Inspection Agency)
MERCATALI SNT - TC - 1A		ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA S. Sabatino
NDE Company - Date	Q.C. Supervisor - Date	Company Repr.- Date	Date

ROSETTI MARINO	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 45-06 data: 27.09.2006

progetto / project	cliente / client	ordine / PO	commessa / job
disegno / dwg	ITP N° /	fase / step	

oggetto - item

Welding Procedure Qualification Record (WPQR) 45/06

Certificato di Qualifica di Procedimento di Saldatura (WPQR) 45/06

WE CERTIFY THAT THE SAMPLE ABOVE MENTIONED HAS BEEN SUBMITTED TO 100% VISUAL EXAMINATION IN AS WELDED STATUS IN ACCORDANCE WITH UNI EN 970:1997.

SI CERTIFICA CHE LA SALDATURA DEL SAGGIO SOPRA CITATO E' STATA SOTTOPOSTA AD ESAME VISIVO AL 100% ALLO STATO COME SALDATO IN ACCORDO ALLE UNI EN 970:1997.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer

note - remarks

No visible defects have been detected.

Non sono stati rilevati difetti visibili.

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

UNI EN 970 : 1997

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client

Inspection certificate(Certificato di collaudo) UNI EN 10204-3.1.B

ESAB Saldatura SpA

CERTIFICAZIONE
CERTIFICATION

No 375339

Ns. rif./Our ref.
Bolla 827384 Mag. A Del 06/11/1998

Vs. rif./Your ref.
821170 Del 26/10/1998

Vostro Ordine N°/Your Order No.
Del

RINA QUACER ISO 9002 — IQNet — CISQ — ASME ACCREDITED MATERIAL ORGANIZATION — TÜV Rheinland MANUFACTURER CERTIFIED TO Vd TÜV 1153

Cliente/Customer

ROSETTI MARINO SPA
VIA TRIESTE 230
48100 RAVENNA RA

Prodotto Marchio: ESAB
Inf.Suppl.

Pos. No.	Codice/Item No.	Descrizione/Description	Lotto/Lot	Colata/Heat
	163024R150	OK TIGROD 16.30 2,4 MM	--	444361

Analisi/Analysis

C	Mn	Si	S	P	Cr	Ni	Mo
0,01	1,56	0,40	0,010	0,019	18,39	12,28	2,60
Cu							
0,12							

Trazione/Tensile test.

	R_p 0,2 N/mm²	R_{eL} N/mm²	R_{eH} N/mm²	R_m N/mm²	A5 %
Metallo d'apporto All weld metal				552	36

Resilienza/Impact test.

	Temp. °C	Media/average J	J
Metallo d'apporto All weld metal			

Note/Remarks

Il prodotto è conforme alle norme / This welding consumable conforms to
1. SFA-AWS A 5.9 ER 316 L
2.
3.

ROSETTI MARINO S.p.A.
Conforme alla spec. A5.9 ER316L
According to the spec.
C.Q. Firma / Q.C.Signature
Data / Date 12-04-99

Località/Locality
Mesero

Data/Date
11/03/1999

Direzione Tecnica

Certificazione - Certification
Certifichiamo che i sopraelencati materiali sono conformi ai requisiti dell'ordine e forniti in accordo col ns. Sistema di Qualità approvato secondo UNI EN ISO 9002 dal Rina, Certificato N. 57/93, e che i valori riportati sono stati verificati in accordo a quanto stabilito all'atto della vendita

We hereby certify that the above stated products conform to the sales contract and are supplied in accordance with our Quality System approved to UNI EN ISO 9002 by Rina, Certificate N. 57/93, and that the goods, with indicated results have been tested according to the instructions in the sales contract.

20010 MESERO (MI)
Via Mattei, 24
Tel 02 97968 1

Amministrazione: Fax 02 9787865
Divisione materiali d'apporto: Fax 02 97289300
Divisione impianti: Fax 02 97289181
Assistenza tecnica impianti: Fax 02 9789140

Codice Fiscale/Partita Iva 00775990153
Capitale Sociale 6.600.000 000
Sede legale: Via V. Pisani, 16 Milano
Tribunale Milano 35367 - C.C.I.A.A. 236795

T.T.I. - Tubacex Tubos Inoxidables,S.A.

Registro Mercantil de Alava, Tomo 587, Folio 169, Hoja VI 2985 - N.I.F. A-01140227

TUBACEX

Printed on: 17.01.2006

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 375595 Page: 1 / 2 | Rev: 1

Date: 13.12.2005 | 17.01.2006

CUSTOMER :RACCORTUBI, S.R.L. PO :OS0000174S - 28/7/05 OUR REFERENCE:J4065

STANDARD :ASTM-ASME A/SA312M-04 ED.04

ADDIT.SPECS :312S REV.0 AND NACE MR01.75-03

GRADE :TP316-316L

DIMENSIONS :21,34 X 4,78

MATERIAL :SEAMLESS STAINLESS STEEL TUBE
COLD ROLLED; PASSIVATED;
PLAIN ENDS SQUARE CUT;

110970

REVIEWED

----ITEM----- YOUR	TTI.	-HEAT- NR.	NO. OF PIECES	---WEIGHT-- KG	-TOTAL LENGTH-	--UNIT LENGTH--
	13	34693	2	24	12,31	5,5 - 6,5 MT
	13	35717	53	652	330,00	5,5 - 6,5 MT

RAW MATERIAL

MELTING PROCESS: ELECTRIC FURNACE + A.O.D FROM: ACERALAVA
PEELED BARS; MACROETCH TESTING: GOOD;

(1)	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	B	N
L 35693	0,022	1,47	0,280	0,025	0,0010	11,30	16,60	2,13	0,25	0,0006	0,0630
L 35717	0,010	1,48	0,500	0,030	0,0010	11,30	17,00	2,19	0,50	0,0013	0,0610
C 35717	0,011	1,47	0,490	0,029	0,0010	11,20	17,00	2,21	0,51	0,0008	0,0610
C 34693	0,022	1,47	0,280	0,025	0,0010	11,30	16,60	2,13	0,25	0,0006	0,0630

(1) L: LADLE; C: PRODUCT

HEAT TREATMENT

SOLUTION ANNEALED 1100 °C WATER QUENCHED

= TESTS = HEAT	NR. TEST	TEMP.	TENSION MPA RM	RP 0,2	RP 1,0	% A	% Z	IMPACT TEST TEMP.	IMPACT TEST MINIMUM	IMPACT TEST AVERAGE	HARDNESS HRB	
34693	510470	20	536,0	243,0	278,0	65,0					77	79
35717	510469	20	589,0	274,0	311,0	60,0					80	81

TECHNOLOGICALS

FLATTENING TEST: GOOD
FLARING TEST: GOOD
RING EXPANDING TEST: GOOD

METALLURGICAL TEST

INTERGRANULAR CORROSION: A-262"E", DIN 50914, NF A05-159 T1, ISO 3651-2: NO OBJECTIONS

NON DESTRUCTIVE TEST

100 % EDDY CURRENT TEST AT E.426 , GOOD
100 % HYDROSTATIC PRESSURE TESTED AT 175 BAR , DURING 6 SEC, GOOD
STEEL GRADE CHECKING ON EACH TUBE BY SPECTROMETRY (PMI)
DIMENSIONAL CHECKING ON EACH TUBE, SATISFACTORY
VISUAL INSPECTION ON EACH TUBE, SATISFACTORY

OTHER MATERIAL SPECIFICATIONS

DIN 17458 PK1 / NF A49117-85 1.4401-1.4404/Z6-Z2CND17.11/12

MARKS

TXA
TUBACEX 21,34 X 4,78 ASTM-ASME A-SA 312 TP316-316L - DIN 17458 PK1
1.4401-1.4404 NF A49-117 Z6CND17.11-Z2CND17.12 SMLS HEAT/..... ET
PMI

REMARKS

T.T.I GARANTIT QUE TOUS LES TUBES LIVRES SONT CONFORMES AUX SPEC.S DE L'ARTICLE 15
DE L'ARRETE MINISTERIEL DU 24 MARS 1978 MODIFIE

AENOR ER Empresa Registrada ER-0006/1991

IQNet

AENOR Gestión Ambiental GGM-01/129

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above standards and specifications and satisfies the order's requirements.
This certificate is issued by a computerised system and it is valid without signature. On the original certificate the responsible's red coloured signature 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, assuming the responsibility for any unlawful or T.T.I.S.A. not allowed use.
Any forgery or falsification of this certificate shall legally prosecuted.

T.T.I.
Tubacex Tubos Inoxidables,S.A.
INGENIERIA DE CALIDAD
Jon Aituna Zubeldia

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n.: 5.000
Descr. : 21.34x4.78
Heat n°/Pcs. marking : 34693 Qtà/Qty:12,3
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N. 160065

T.T.I. - Tubacex Tubos Inoxidables, S.A.

Registro Mercantil de Alava, Tomo 567, Folio 189, Hoja VI 2885 - N.I.F. A-01140227

TUBACEX

Printed on: 17.01.2006

INSPECTION CERTIFICATE EN 10204 3.1	Number: 375595 Page: 2 / 2	Rev: 1
	Date: 13.12.2005	17.01.2006

CUSTOMER :RACCORTUBI, S.R.L. PO :OS000174S - 28/7/05 OUR REFERENCE:J4065
STANDARD :ASTM-ASME A/SA312M-04 ED.04
ADDIT.SPECS :312S REV.0 AND NACE MR01.75-03
GRADE :TP316-316L
DIMENSIONS :21,34 X 4,78
MATERIAL :SEAMLESS STAINLESS STEEL TUBE
COLD ROLLED; PASSIVATED;
PLAIN ENDS SQUARE CUT;

110970

C<=0,25%, P<=0,05%, S<=0,05%, R<800 N/MM2, E<=0,9 * R
A% (LO=5,65VSO) MIN, 16% EN LONG. R(A _2)>=10500
MATERIAL MANUFACTURER APPROVED WITH CERTIFICATE NR. 07/2001/MUC BY TÜV SÜDDEUTSCHLAND (NOTIFIED BODY 0036) TO ISSUE CERTIFICATES OF SPECIFIC PRODUCT CONTROL IN ACCORDANCE WITH PRESSURE EQUIPMENT DIRECTIVE 97/23/EC ANNEX 1 POINT 4.3.
MATERIAL CHARACTERISTICS COMPLY WITH POINT 7.5 OF ANNEX I TO PED BY HAVING AN ELONGATION AFTER RUPTURE AT TENSILE TEST NO LESS THAN 14 % AND A BENDING RUPTURE ENERGY AT IMPACT TEST NO LESS THAN 27 J AT 20°C.

ROSETTI MARINO
Conforme alla spec.
According to the spec. ASTM TP316+P.O.
TMUGF Firma
MTSMD Signature
Data
Date
04 LUG. 2006
☒ REVIEW
☐ WITNESS

AENOR ER Empresa Registrada ER-0006/1991

IQNet

AENOR Gestión Ambiental GGM-01/127

We hereby certify that the material herein described has been manufactured, sampled, tested and inspected in accordance with above standards and specifications and satisfies the order's requirements.
This certificate is issued by a computerized system and it is valid without signature. On the original certificate the responsible's red coloured signature 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, assuming the responsibility for any unlawful or T.T.I. S.A. not allowed use.
Any forgery or falsification of this certificate shall legally prosecuted.

T.T.I.
Tubacex Tubos Inoxidables, S.A.
INGENIERIA DE CALIDAD
Jon Aitune Zubiaurre

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n.: 5.000
Descr. : 21.34x4.78
Heat n°/Pcs. marking : 34693 Qtà/Qty:12,3
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N. 160065

ROSETTI MARINO	Welding Procedure Approval Record (WPQR) Verbale di Qualifica di Procedura di Saldatura	No. 49/06	Sheet/Foglio 1/4

Manufacturer's Welding Procedure. Reference No Procedura di saldatura del costruttore. N. di riferimento	49/06 REV. 0				
Manufacturer / Costruttore	ROSETTI MARINO S.p.A.				
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA				
Code, Testing Standard / Codice, Normativa	EN 15614:2004 & MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4				
Date of welding / Data esecuzione saggio	06-12-2006				
EXTENT OF APPROVAL / VALIDITA' DELL'APPROVAZIONE					
Welding process / Processo di saldatura	a) 141 - GTAW	b)	c) /		
Type(s) / Tipo	a) Manual / Manuale	b)	c) /		
Joint type / Tipo di giunto	BW on pipe				
Parent Material Group & sub-Group	Group 1.2 with 8.1				
Parent material thickness / Spessore (mm)	3,73 mm 3,0÷7,46	Fillet weld (mm)	Unlimited throat, base metal thickness 3,0÷4,47		
Weld metal thickness/ spessore saldato	141 3,0÷7,46 mm				
Single or Multi-pass / passata singola o multipla	MULTIPLE				
Outside diameter / Diametro esterno (mm)	21,34 Range 10,67 to 42,				
Filler material Designation / Classificazione materiale d'apporto	**141** :AWS 5.9 ER309L				
Filler material Maker / Produttore materiale d'apporto	ESAB SALDATURA				
Filler material Size / Dimensioni materiale d'apporto	141 ∅ 2,4 mm				
Shielding gas, flux / Gas di protezione, flusso	I 1				
Backing gas, / Gas di supporto	I 1				
Type of welding current & polarity	DC – SP	Heat input / Apporto termico (kJ/mm)	± 25% see sheet 2/4		
Welding position / Posizione di saldatura	PC				
Preheat / Preriscaldo (°C)	20	Interpass temperature / Temp. di interpass (°C)	150		
Post-Weld Heat Treatment and/or ageing / Trattamento Termico e/o Invecchiamento	N.A.				
Other information / Altre informazioni	NONE				
Welder's name / Nome del saldatore	**Farina Salvatore** (punzone H47)				
Welding test conducted by / Prove condotte da	Rosetti Marino S.p.A. – Ravenna				
Mechanical tes conducted by / Prove meccaniche condotte da	Control – Ravenna				
Laboratory report reference N. / Rapporto di prova N.	Report N° 496 Dated 22-12-2006				
Test carried out in the presence of Test condotti alla presenza di	RINA SpA	Test results are Risultato prove	Acceptable		

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 EN 15614:2004 +MAERSK OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Si certifica che i dati riportati in questo rapporto sono corretti e che i saggi di saldatura sono preparati, saldati e testati in accordo con le richieste di EN 15614:2004 + OLIE OG GAS AS TECHNICAL STANDARD TS 12 REV 4

Location / Luogo	Date of issue / Data di emissione	Examiner or Examining Body /
RAVENNA	22-12-2006	RINA SpA

ROSETTI MARINO S.p.A.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

EWF
S. SOLMI
I EWT 30416
EUROPEAN WELDING TECHNOLOGIST

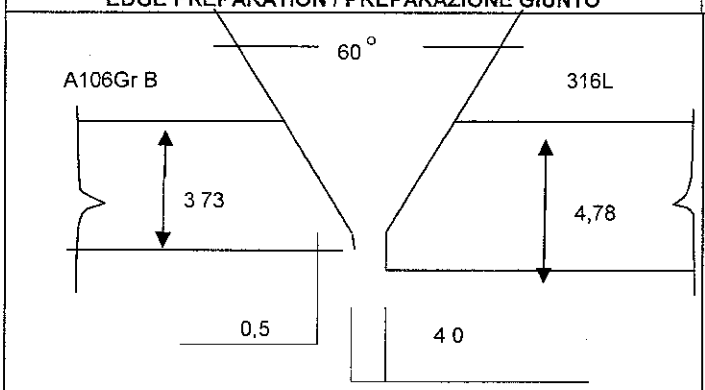
Name and signature / Nome e firma

RINA
1861

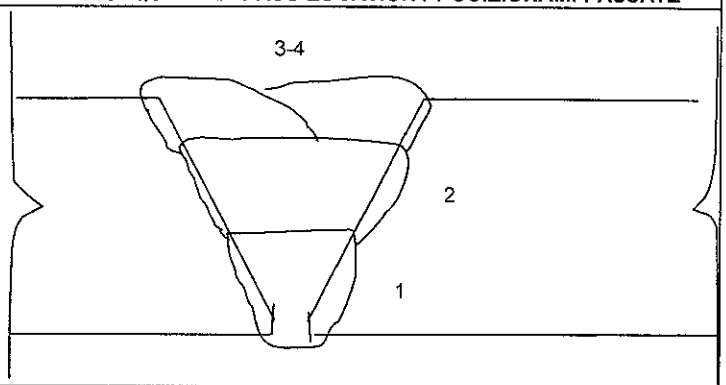
RINA
S. Sabatino

Manufacturer / Costruttore	ROSETTI MARINO S.p.A.						
Address / Indirizzo	VIA TRIESTE 230 - 48100 RAVENNA				Examiner or Examining body / Ente certificante		
Procedure approval record (WPAR) N° / Qualifica di procedimento N.	49/06	Date/Data	22-12-2006		Ref. N./N. Rif.	RINA	
WPS No. / Procedure N.	49/06		Rev.	0	Date/Data	23-11-2006	
Welding Process(es) / Processo(i) di saldatura	a) 141 - GTAW		b)		c) /		
Types / Tipi (Man., Autom., Semi-autom.)	a) Manual / Manuale		b)		c) /		
JOINTS / GIUNTI Joint type / Tipo di giunto	Butt weld "V" groove						
BACKING / Sostegno	WELD METAL GTAW (first pass)						

EDGE PREPARATION / PREPARAZIONE GIUNTO



WELDING SEQUENCE - PASS LOCATION / POSIZIONAM. PASSATE



Run or layers / Passate o strati	Proc.	Filler metal / Materiale d'apporto Size / Dim (mm)		Amp.		Volt.		Travel Speed / Veloc. Sald.	Heat Input / Apporto Termico
		1E	2E	1E	2E	1E	2E	mm/min	kJ/mm
1	141	2,4		82		11		60	0,94
2	141	2,4		85		11		60	0.90
3-4	141	2,4		85		11		80	0,68

PARENT MATERIAL / MATERIALE DI BASE

Spec. Type & Grade / Specif. Tipo e Grado	ASTM A106		Grade B	Yield > 275 N/mm2	
to Spec. Type & Grade / Specif. Tipo e Grado	ASTM A312		Tp 316L		
Group No. / Gruppo	1.2	To / al	Group No. / Gruppo	8.1	
Thickness of test coupon / Spessore del saggio (mm)	3,73	to / con	4,78		
Diameter of test coupon / Diametro del saggio (mm)	21,34	to / con	21,34		
Other / Altro	Heat number 83215 for A106Gr B Heat number 34693 for A312Tp316L				

FILLER METALS / MATERIALE D'APPORTO	a) 141	b) 111	c)
Specification No. EN	AWS 5.9		
Class / Classificazione	ER 309L		
Size of filler metal / Dimensioni materiale d'apporto (mm)	2,4 (heat 672011)		
F.M. Trade name / Nome commerciale materiale d'apporto	SOUDOTIG 309L		
Manufacturer / Fabbricante	SOUDOMETAL		
Flux Trade name / Nome Commerciale Flusso	N.A.		
Manufacturer / Fabbricante	N.A.		
Deposited Weld Metal / Metallo depositato (mm)	3,73		
Other / Altro			

RINA S. Sabatino

EWF EUROPEAN WELDING TECHNOLOGIST S. SOLIMI I EWT 30/06

ELECTRICAL CHARACTERISTICS / CARATTERISTICHE ELETTRICHE		
Current / Corrente		DC
Polarity / Polarità		141 : SP
Ampere – Volt		See table page 2/4 / Vedi tabella pagina 2/4
Tungsten Electrode Type & Size / Tipo e Dimensioni Elettrodo W		AWS 5.12 EWTh2 D 2,4mm
Mode of Metal Transfer for GMAW / Modo di trasf. per MAG		N.A.
Other / Altro		None
TECHNIQUE / TECNICA		
Orifice or gas cup size / Diametro dell'ugello o ceramica		8 mm
String or Weave Bead / Cordoni Stretti o Larghi		String/Stretti
Initial and interpass cleaning / Pulizia iniziale e tra le passate		Brushing and/or grinding - Molatura e/o spazzolatura
Method of back gouging / Metodo di solcatura		N.A.
Oscillation / Oscillazione:		
	Amplitude / Ampiezza	N.A.
	Frequency / Frequenza	N.A.
Distance contact tube-work piece / Distanza libera filo		/
Multiple, Single Pass (per Side) / Passata Singola o Mult. (per lato)		Multiple
Single or Multiple Electrodes / Elettrodi Multipli o SIngoli		Single
Torche angle direction of welding / Angolo e direzione torcia		N.A.
Other / Altro		/
WELDING POSITIONS / POSIZIONI DI SALDATURA		
Position of groove or fillet/Posizione dello smusso o del cordone d'angolo		PC
Other / Altro		/
PREHEAT / PRERISCALDO		
Preheat Temperature / Temperatura di Preriscaldo (°C)		20
Interpass Temperature / Temperatura di Interpass (°C)		150
Other / Altro		/
POSTWELD HEAT TREATMENT / TRATTAMENTO TERMICO		
Temperature / Temperatura (°C)		N.A.
Time / Tempo (h)		N.A.
Other / Altro		

GAS

	Percent Composition / Composizione %			
	Gas(es) / Gas	(Mixture) / (Miscela)	Flow rate / Portata	
Plasma	/	/	/	
Shielding / Protezione	I 1	99,99	14	
Trailing /Aggiuntivo	/	/	/	
Backing / Al rovescio	I 1	99,99	16	
Other / Altro	/	/	/	

RINA 1861

RINA S. Sabatino

EWF S.SOLMI I EWT 30416 EUROPEAN WELDING TECHNOLOGIST

NON DESTRUCTIVE EXAMINATIONS / ESAMI NON DISTRUTTIVI

	Acceptable/Accettabile			Not performed / Non eseguito			Report No. / Rapporto N.
Visual examinations / Visivo		X					VDR 49/06
Penetrant test / Liquidi penetr.		X					PT Report 49/06
Magnetic particle test / Magnet.					X		
Radiographic test / Radiografico		X					RT Report 330
Ultrasonic test / Ultrasonoro					X		

TEST RESULT / RISULTATO DELLE PROVE

TENSILE TEST / PROVA DI TRAZIONE

Specimen type and No. / Provette tipo e N.	Re N/mm²	Rm N/mm²	A % on/su	Z %	Fracture Location Posizione Rottura	Remarks Note
Requirements / Richieste	/	≥ 415	/	/		
TRANSVERSE 1	/	631	/	/	Weld metal	
TRANSVERSE 2	/	787	/	/	Weld metal	

BEND TEST / PROVA DI PIEGAMENTO

Former diameter / Diametro Mandrino mm

Type & N. / Tipo e N.	Bend angle / Angolo di piega	Elongation / Allungamento	Results / Risultati
N. 2 Transverse root bend	180°	Not required	Satisfactory
N. 2 Transverse face bend	180°	Not required	Satisfactory

IMPACT TEST / PROVA DI RESILIENZA

Requirements / Richieste Joule

Specimen Dimens. Dim. Provette (mm)	Notch Locations / Direction Posiz. Intaglio / Direzione	Notch Type / Tipo Intaglio	Test Temp. Temp. Prova (°C)	Impact value/average Valori/media (joule)		Remarks / Note
/						
/						
/						
/						

FILLET WELD TEST / PROVA SALDATURA D'ANGOLO

Result – Satisfactory Risultato - Soddisfacente	Yes -	/	No -	/		Penetration into Parent Metal Penetrazione nel Materiale Base	Yes -	/	No -	/

Macro Results / Risultati Macro: - /

OTHER TESTS / ALTRE PROVE

Location of measurement (Sketch) (if required) / Posizione delle impronte (quando richieste)

Type of test / Tipo di prova	
Macro results	Satisfactory-See CONTROL Certificate No. 496 dated 22-12-2006
Hardness HV 10 side carbon steel	Root Base metal 195 Heat affected zone 245
	Face Base metal 198 Heat affected zone 220-270

Date / Data
22-12-2006

Examiner or Examining Body / Esaminatore o Ente Certificante
RINA SpA

ROSETTI MARINO S.p.A.

Name and signature / Nome e firma

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

EWF
S. SOLMI
I EWT 30416
EUROPEAN WELDING TECHNOLOGIST

Control Snc	**LABORATORIO DI CONTROLLI E PROVE**	
Sede Amministrativa - Laboratorio Via Attilio Monti. 15 - 48100 Ravenna Telefono - 0544 590597	**CERTIFICATO PROVE MATERIALI** *TEST CERTIFICATE*	**N. 496 Fg.1/2** DATA / Date **22-dic-2006**

COMMITTENTE / *CUSTOMER*: **ROSETTI MARINO S.p.A.**

OGGETTO / *OBJECT*	**Dimensione Provino mm.** Size Test mm :	**Commessa** Job	**Materiale** Type Material
WPQR 49/2006	Diam : **1/2"** Spess : **4,8**	**106A10**	**A 312 Tp 316L-A 333 Gr.6**

NORME DI COLLAUDO / *SPECIFICATIONS*	*ENTE COLLAUDO* / *INSPECTOR*
UNI EN 15614-1:2004 / IS 12	**RINA Spa**

PROVE MECCANICHE / *MECHANICAL TESTS*

CARATTERISTICHE RICHIESTE / *REQUIREMENTS* ---------->						*Snervamento* *Yeld stress* *Fs(N)*	*Rs* *N/mmq*	*Massimo* *Total Load* *Fm(N)*	*Rm* *N/mmq*		*Allung* *Elong* *%*	*Resilienza/Impact Test* JOULE °C *Individual*	*Average*
									415				
Pos. *Pos.*	*Prova Nr* *Test N°*	*Dimensioni* *Size mm*	*Area* *So mmq*	*Lo mm*	*Lu mm*	*RISULTATI / RESULT* *Fs*	*Rs*	*Fm*	*Rm*		*A%*		
TRANSVERSE TENSILE TEST UNI EN 895													
TWT	1a	12,2 x 3,6	**43,9**					27700	**631**	**FIW**			
TWT	1b	12,6 x 3,5	**44,1**					34700	**787**	**FIW**			
BEND TEST UNI EN 910													
SBB	n° 4	x	N.A.							N.A.			
RBB	n° 2	10 x 5	ANGLE: 180° DIAMETER OF THE FORMER 20 mm							**ACCEPTABLE**			
FBB	n° 2	10 x 5	ANGLE: 180° DIAMETER OF THE FORMER 20 mm							**ACCEPTABLE**			

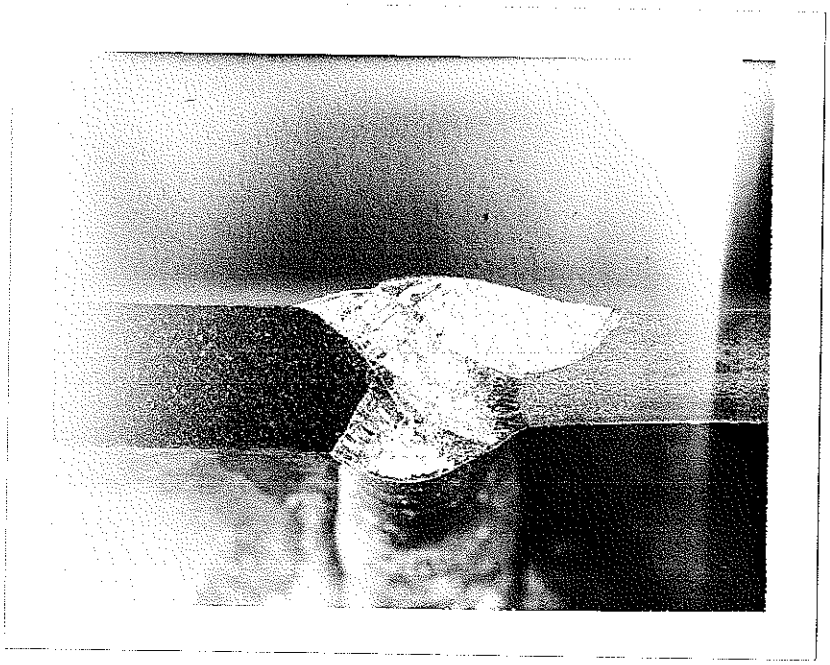
VWT 0/2=ZONA FUSA/WELD MATERIAL
VHT 0/2=LINEA DI FUSIONE/FUSION LINE
VHT 2/2=LINEA DI FUSIONE + 2mm /FUSION LINE + 2mm
VHT 5/2=LINEA DI FUSIONE + 5mm /FUSION LINE + 5mm
TWT=TRAZIONE TRASVERSALE SALDATURA/TRANSVERSE WELD TENSILE TEST
TWL=TRAZIONE LONG SALDATURA / ALL WELD LONG TENSILE
FOW=ROTTURA DUTTILE FUORI SALDATURA/ DUCTILE FAILURE OUT OF WELD
SBB=PIEGA LATERALE TRASVERSALE/TRANSVERSE SIDE BEND TEST
RBB=PIEGA TRASVERSALE AL ROVESCIO/TRANSVERSE ROOT BEND TEST
FBB= PIEGA TRASVERSALE AL DIRITTO/TRANSVERSE FACE BEND TEST
FIW=ROTTURA DUTTILE IN SALDATURA/ DUCTILE FAILURE IN WELD

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Solmi	RINA S. Valentino

Control Snc Sede Amministrativa - Laboratorio Via Attilio Monti 15 - 48100 Ravenna Telefono - 0544 590597	***LABORATORIO DI CONTROLLI E PROVE***	
	CERTIFICATO PROVE MATERIALI *TEST CERTIFICATE* **MACRO EXAMINATION**	**N. 496 Fg. 2/2** DATA / Date **22-dic-06**

COMMITTENTE *CUSTOMER*	**ROSETTI MARINO S.p.A.**		
OGGETTO *OBJECT* **WPQR 49/2006**	Dimensione Provino/Size mm. Diam.: 1/2" Spess.: 4,8	Wps n° **106A10**	Materiale/Material **A 312 Tp 316L-A 333 Gr.6**

MACRO EXAMINATION UNI EN 1321



HARDNESS HV 10



1 = 220
2 = 245
3 = 270
4 = 265
5 = 245
6 = 198
7 = 195

MACROEXAMINATION:	**ACCEPTABLE**
VISUAL EXAMINATION	**ACCEPTABLE**
ETCH/ATTACCO :	**ACQUA REGIA**
MAGNIFICATION/INGRANDIMENTO:	**4 X**

OPERATORE / Operator	COMMITTENTE / Customer	ISPETTORE / Inspector
CONTROL S.N.C. Sez. Laboratorio Prove Materiali Il Tecnico Mercatali Alessio	ROSETTI MARINO S.p.A. Responsabile saldatura Welding Engineer S. Solmi	RINA S. Capatino

ROSETTI MARINO SPA

TABELLA DI SALDATURA
Welding Table

pWPS	49/06	Posizione / Position	2G

Tipo di saldatura / Welding Process	GTAW
Filo / Wire	SOUDOMETAL SOUDOTIG diam. 2,4 mm heat 672011
Filo / Wire	

PQR49/06

Materiale base **ASTM A 312 Tp 316L**
Base material **PIPE 1/2" Thk. 4,78 Heat 34693**
ASTM A 106Gr.B
PIPE 1/2" Thk. 3,73 Heat 83215

	Gas / Gas (es)	Miscela / Mixture	Portata / Flow Rate
Protezione/Shielding	Ar	99,990%	14 L/min
Protezione/Shielding	N.A	N.A	N.A
Al rovescio/Backing	Ar	99,990%	16 L/min

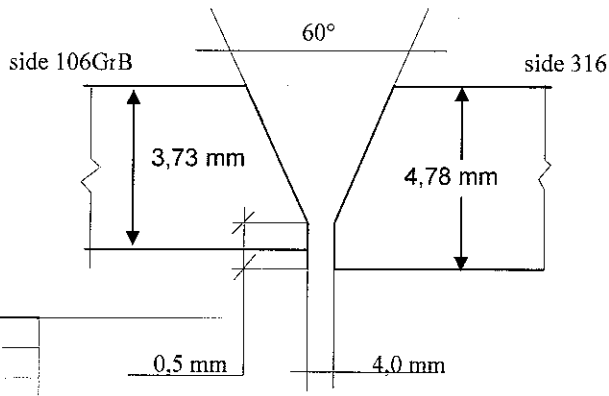
Welder Name/Nome saldatore: **Farina Salvatore stamp H47**
Welder Name/Nome saldatore:

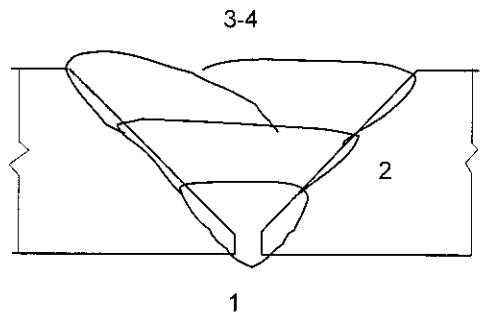
Prerisc: / Preheat: **20°C**
Temp max di interpass: **150°C**

Elettrodo / Electrode
Ravenna: **06/12/06**
Officina Rosetti: **X**
Cantiere:

Corrente / Current: **DC**
Polarità / Polarity: **GTAW DP**
Preparazione / Joint Design: **V**

Pass. N. / Pass N.	Proced. / Process	Elettr. / Electr.	Ampere / Amps	Volts / Volts	Vel.mm/1' / Trav.Sp.	H.I. / KJ/mm
1	GTAW	2,4	82	11	50	1,08
2	GTAW	2,4	85	11	60	0,94
3-4	GTAW	2,4	85	11	70	0,80





Note / Notes

RINA ROSETTI MARINO S.p.A
S. Sabatino Responsabile saldatura
Welding Engineer
S. Solmi

ROSETTI MARINO SPA
Ravenna Works

PROCEDURA DI SALDATURA (in accordo EN 15614/1+TS-12)
Welding Procedure Specification (according EN 15614/1+TS-12)

pWPS N°:	49/06
PQR ref.:	49/06 to qualify
REV.:	0
Data /date	23-11-2006

Procedimento di saldatura / Welding process: **GTAW +** Tipo / Type: **MANUAL +**

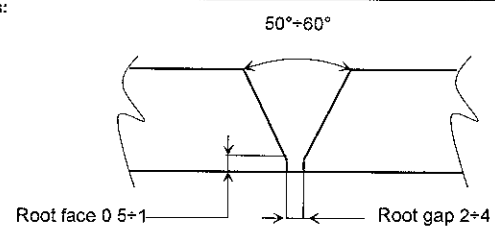
GIUNTO – JOINT (QW-402)

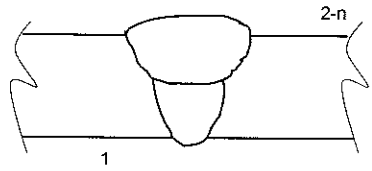
Tipo di giunto / Joint Design: **V**

Supporto / Backing: ☒ Si / Yes **Only for second and other passes** ☒ No **Only for first pass**

Materiale di supporto (tipo) / Backing material (type): ☒ Metallico / Metal ☐ Non metallico / No metal ☐ Metallo non fondente / Non Fusing metal ☐ Altro / Other

Dettagli / Details:





MATERIALE BASE – BASE MATERIAL (QW-403)

Da / from P-N°: -	Group N°: (EN 15608) 8.1	A / to P-N°: -	Group N° (EN 15608) 1.2 (Yield >275)

Da Tipo e grado / From type and grade: **ASTM A312 Tp 316L thickness 4,78**

A Tipo e grado / To type and grade: **ASTM A106Gr.B thickness 3,73**

Gamma spessori / Thickness range: ► Materiale base / Base material: Piena penetrazione / Groove **3,73 mm (range 3,0 to 7,46)**

► Gamma diametri / Pipe dia Range: Piena penetrazione / Groove **1/2" (range 1/4" to 1")**

METALLO D'APPORTO – FILLER METAL (QW-404)

	GTAW 141	
Spec. N° (SFA)	AWS 5.9	
AWS N° (CLASS)	ER 309L	
F-N°	6	
A-N°	8	
Diametro mat. d'apporto / Size of filler metal	2,4	
Metallo depositato / Deposit weld metal		
Gamma spessori /Thick. range Piena penetrazione / Groov	3,73 mm	
Accoppiamento filo-flusso / Electrode-flux (CLASS)	N.A.	
Denom. Comm. flusso / FLUX trade name	N.A.	
Inserto consumabile / Consumable insert	N.A.	
Altro / other	WIRE: SOUDOMETAL SOUDOTIG 309L	

POSIZIONI – POSITION (QW 405)

Posizione del giunto / Joint position: **Cianfrino / groove** Posizione / position **PC (2G)** Progressione / weld progression: **N.A.**

PRERISCALDO – PRE-HEAT (QW406)

Temp preriscaldo minima / Min pre-heat temp: **20 °C** Max temp. Di interpass / Max interpass temp: **150°C** Mantenimento posriscaldo / Postheat maintenance: **N.A.** Tempo di mantenimento posriscaldo. / Postheat time: **N.A.**

TRATTAMENTO TERMICO DOPO SALDATURA – POST WELD HEAT TREATMENT(QW 407)

Riscaldamento / Heating rate (°C/Hrs): **N.A.** Temperatura di stasi / Holding temperature °C: **NA** Tempo di stasi / Holding time (min): **NA** Velocità di raffreddamento / Cooling rate (°C/Hrs): **N.A.**

GAS DI PROTEZIONE – GAS (QW 408)

	GAS	Miscela / Mixture	Port. / Flow rate
Protezione / Shielding:	Ar	99,99 %	10-14 lt/min.
Protezione al seguito / Trailing:	N.A.	N.A.	N.A.
Prot. Al rovescio / Backing:	Ar	99,99 %	12-16 lt/min.

CARATTERISTICHE ELETTRICHE / ELECTRICAL CHARACTERISTICS (QW- 409)

Corrente / Current: **DC** Polarità / Polarity **SP**

Dia e tipo elettr Tungsteno / Tungsten elctr Size & type: **AWS A 5.12 EWTh2 dia.2,4mm**

Metodo di trasferimento per GMAW / GMAW metal tranfer mode: **N.A.**

Velocità alimentazione filo / Electr. Wire feed speed range: **N.A.**

TECNICA – TECHNIQUE (QW-410)

Passata / Bead: **Tirata/String** Dimensione bocchello gas / Orifice of gas cup size: **3/8"** Pulizia iniziale e fra le passate / Initial and interpass cleaning: **Spazzolatura e Molatura/Brushing Grinding**

Metodo di solcatura a rovescio / Method of back gouging: **N.A.** Oscillazione / Oscillation: **N.A.** Distanza fra zona di contatto e pezzo / Contact zone to work distance: **N.A.**

N°Passate / Passes nr.: **Multipla/Multiple** Elettrodo multiplo o singolo / Multiple or single electrodes: **Singolo/Single** Martellatura / Peening: **N.A.**

Altro / Other: **Leave gas backing up to second pass completed**

N° Passate / Weld layers nr.	Processo / Process	Materiale d'apporto / Filler metal		Corrente / Current		Voltaggio / Volt range	Vel. avanzamento / Travel speed range (mm/min)	Apporto termico / Heat input (KJ/mm)
		Classe / Class	Dia. (mm.)	Polarità / Polarity	Amp. range			
1	GTAW	ER 309L	2,4	DC/SP	80 - 90	10 - 12	50 - 60	0,8 – 1,3
2-n	GTAW	ER 309L	2,4	DC/SP	80 - 90	10 - 12	70 - 80	0,6 – 0,9

Preparato da / prepared by: ***A.Khalifa***

Approvato da / approved by: ***S.Solmi***

CONTROL S.N.C.
Via Attilio Monti 15 48100
RAVENNA

NDE ACTIVITIES - TEST SHEET

RAPPORTO CND - LIQUIDI PENETRANTI
NDT REPORT - DYE PENETRANT TEST

NDE-PT Report No 43/06

COMMITTENTE /Customer	**ORDINE N°**/Order No	**COMMESSA N°**/Job No	**PROGETTO**/Project
ROSETTI MARINO S.p.A.		**106A10**	
MATERIALE/Material	**LINEA N°**/ Line No	**OGGETTO** / Object	**DATA**/Date
316 L -333 Gr. 6		**WPQR 49/2006**	

In accordance with specification and rule: **UNI EN 571.1 - UNI EN 1289**

Stato della superficie / Surface Condition

COME SALDATO As Welded	■	SPAZZOLATO Brushed	■	LAV. DI MACCHINA Machined	☐	COME CALANDRATO As Bent	☐
MOLATO Ground	☐	COME LAMINATO As Rolled	☐	GREZZO As Forged	☐		☐

PRODOTTI UTILIZZATI / Products used	PROCEDURA DI ESECUZIONE / Execution of Procedure
PULITORE PRELIMINARE/ Cleaner **VELNET CGM**	1 PULITURA PRELIMINARE / Preliminary Cleanign **SPRAY**
PENETRANTE / Penetrant **RED W - CGM**	2 APPLICAZIONE PENETRANTE / Penetrant application **SPRAY**
PULITORE PENETRANTE/ Penetrant Remover **WATER**	3 RIMOZIONE PENETRANTE / Removal penetrant ■ **WATER** ☐ ☐
RIVELATORE / Developer **WHITE W - CGM**	4 ESSICAZIONE / Drying process **NATURAL**
NOTE / Remarks	5 APPLICAZIONE RIVELATORE / Developer application **SPRAY**
	a (2) TEMPO PENETRAZIONE / Penetrating time (minuti / minutes) **15**
PULITORE POST-CONTROLLO / Cleaner after examination **Cloths and water**	b TEMPO DI LETTURA / Checking time (min) (minuti / minutes) **5**
TEMPERATURA SUPERFICI / Surfaces temperature (°C) (standard range 16-52 °C) **ambient**	c ISPEZIONE VISIVA / Visual Inspection ☐ luce bianca min 1000 Lux ☐ luce U.V. min 1000 mW/cmq

NOTE / Remarks

Difetti / Discontinuities

a) Cricca a freddo / Crack — e) Cordone irregolare / Irreg. searm
b) Cricca da stress / Stress Crack — f) Incisione marginale / Undercutting
c) Difetto di ripresa / 1st run defect — g)
d) Porosità / Porosity — h)

Saldatura / Weld — spessore/thickness — material/material

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Salimbeni

RESULTS

NDE COMPANY - II° level NDE Operator	**CONFORME ALLA SPECIFICA** (*) conforming to specification	**NON CONFORME ALLA SPECIFICA** (*) not conforming to specification
MERCATALI ALESSIO II° liv. MT/PT CIC PND	■	☐
Q.C. Supervisor	**CUSTOMER INSPECTOR**	
Date file PT WPQR 49-2006	Date	

CONTROL snc via Attilio Monti,15 48100 (RA) tel 0544 590597 - fax 590599	NDE ACTIVITIES - TEST SHEET **RAPPORTO CND - RADIOGRAFICO** NDE REPORT -RADIOGRAPHIC TEST	Data / Date 16-12-2006 **NDE-RT** Report Nr 330 foglio / sheet n° 01 of 01

COMMITTENTE / Customer	OGGETTO / Object	COMMESSA N° / Job No	ORDINE N° / Order No	PROGETTO / Project
ROSETTI MARINO SpA *(Ravenna - ITALIA)*	QUALIFICHE PROCEDIMENTO	106A10	-	HALFDAN HCA
LINEA N°/ Line No	**DWG N° / DWG No**	**CODICE / PROCEDURA/In accordance with**		**ACCETTABILITA'/Acceptance levels**
-		EN 1435 Livello B Radiographic Examination procedure		25817 Livello B (Acceptance Criteria)

ITP N° / ITP No | **FASE ITP / Phase ITP**

● PRIMA ESECUZIONE/ First test ○ PRIMA DEL TT/ Before PWHT

○ DOPO RIPARAZIONE/ After repair ○ DOPO IL TT/ After PWHT

TRACEABILITY		*JOINT TYPE*				*RESULT*		
weld No - dwg - item	Radiographic Techniques	material	Φ / L	thickness	welder No	position film	defect	judgment
PQR 49 / A	ELLIPTIC	316	1/2"	3,70		A		NA/Ab
		A 106 Gr B				B		A
PQR 49 / B	ELLIPTIC	316	1/2'	3,70		A		A
		A 106 Gr B				B		A
PQR 49 / C	ELLIPTIC	316	1/2'	3,70		A		A
		A 106 Gr B				B		Aa

CLASSIFICAZIONE DIFETTI
Classification defects ref ISO 6520

(2011)	Aa	Soffiattura tondeggiante/Porosity < Φ 1mm
(2012)		Uniformly distributed porosity
(2013)		Localized porosity (Clustered)
(2014)		Linear porosity
(2017)		Surface pore
(2015)	Ab	Cavità allungata/Elongated cavity
(2016)	Ab	Tarli/Worm-hole
(300)		Inclusione solide/Solid inclusion
(301)	Ba	Inclusione di scoria/Slag inclusion
(3013)	Bb	Scoria d'orient. diverso/Of any shape in
	Be	Difetto di ripresa/ 1st run irregular
(400)	C	Mancanza di fusione/Lack of fusion
(402)	D	Mancanza di penetrazione/Lack of penet
(100)	E	Cricca o fessura/Crack
(101)	Ea	Cricca longitudinale/Longitudinal crack
(102)	Eb	Cricca trasversale/Transverse crack
(104)	Ec	Cricca di cratere/Crater crack
(502)		Sovrametallo in eccesso/Excess weld metal
(504)	Ex	Eccesso di penetrazione/Penetration excess
(5041)		Sgocciolamento/Local protrusion
(5011)	F	Solco o incisione/Undercut
(514)	Fa	Irregolarità superficiale/Surface irregularity
(509)		Avvallamento/Sagging
(511)		Incom. riempimento/Incom. Filled groove
(515)	In	Insellamento/Root concavity
(517)		Ripresa difettosa/Poor restart
(2024)	K	Cavità di ritiro/Shrinkage cavity
(506)		Traboccamento/Overlap
(507)	Sl	Slivellamento/Misalignment
(3041)	W	Inclusione di tungsteno/Tungsten inclusion
(601)		Innesco d'arco/Arc strike

GIUDIZIO / Judgment

NX-CF	To repeat to confirm defect
A	Accettabile/Acceptable
R	Riparare/To repair
NT	Tagliare/To cut
NX	Ripetere film/To repeat film
EX	Estendere il controllo/Extende test
DF	Difetto film/Film defect
TM	Taglio o modifica/Cut or modification

NOTE / Remarks

RADIOGRAPHIC TECHNIQUE DETAILS

Films 6	Film type and Manufact. AGFA Structurix D4	IQI type ASTM 1B-6 ☐	10 FE EN ■ Wire n°12
Exposure Date16/12/2006			
Sorgente X - Unità X-Ray Unit Seifert 75	Pellicole per cassetta (Nr) Films box 1	I Q I - Posizione I Q I - Location ■ Lato film/Film Side ☐ Lato sorgente/Source	Distanza sorgente-oggetto (mm) Distance Source-object 150 +1 Thk
Sorgente γ γ-Ray Activity		Schermi di rinforzo (mm) Intensifying screens Pb 0.10 x 0,16 Front-Back	Distanza pezzo lato sorgente-pellicola (mm) Distance Object (source side)-Film Weld Thk
Energia (Kev) Energy	Sviluppo Developing ■ Automatic ☐ Manual	Tecnica radiografica Radiographic techniques ☐ Single wall exp ■ Double wall exp ■ Single wall view ☐ Double wall view	
Macchia Focale (mm) Focal Spot 3			

TECNICO II° livello CND - IMPRESA	CONTROLLO QUALITA'	ISPETTORE CLIENTE	ISPETTORE AI
Operator NDE II° Level SNT-TC-1A / EN473	Q.C. Supervisor	Company Repr.	Inspection Agency
MERCATALI RICCARDO LIV.II UT/PT/MT/RX SNT - TC - 1A	ROSETTI MARINO S.p.A. Responsabile Saldatura Welding Engineer S. Solmi		FINA C. Cavalcatino
NDE Company - Date	Q.C. Supervisor - Date	Company Repr.- Date	I. A. - Date

ROSETTI MARINO	VERBALE DI CONTROLLO VISIVO/DIMENSIONALE visual/dimensional inspection report	VDR N° 49-06 data: 06.12.2006

progetto / project	cliente / client	ordine / PO	commessa / job
disegno / dwg	ITP N° /	fase / step	

oggetto - item

Welding Procedure Qualification Record (WPQR) 49/06

Certificato di Qualifica di Procedimento di Saldatura (WPQR) 49/06

WE CERTIFY THAT THE SAMPLE ABOVE MENTIONED HAS BEEN SUBMITTED TO 100% VISUAL EXAMINATION IN AS WELDED STATUS IN ACCORDANCE WITH UNI EN 970:1997

SI CERTIFICA CHE LA SALDATURA DEL SAGGIO SOPRA CITATO E' STATA SOTTOPOSTA AD ESAME VISIVO AL 100% ALLO STATO COME SALDATO IN ACCORDO ALLE UNI EN 970:1997.

ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

note - remarks

No visible defects have been detected.

Non sono stati rilevati difetti visibili.

risultato - result ☒ conforme - conforming ☐ non conforme - not conforming

procedure / specifiche applicabili - applicable procedures / specifications

UNI EN 970 : 1997

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client

ROSETTI MARINO	**VERBALE DI CONTROLLO VISIVO/DIMENSIONALE** **visual/dimensional inspection report**	VDR N° 49-06 data: 06.12.2006

progetto / project	cliente / client	ordine / PO	commessa / job
disegno / dwg	ITP N° /	fase / step	

oggetto - item

Welding Procedure Qualification Record (WPQR) 49/06

Certificato di Qualifica di Procedimento di Saldatura (WPQR) 49/06

WE CERTIFY THAT THE SAMPLE ABOVE MENTIONED HAS BEEN SUBMITTED TO 100% VISUAL EXAMINATION IN AS WELDED STATUS IN ACCORDANCE WITH UNI EN 970:1997

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ROSETTI MARINO S.p.A.
Responsabile saldatura
Welding Engineer
S. Solmi

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procedure / specifiche applicabili - applicable procedures / specifications

UNI EN 970 : 1997

Operatore - Operator	Controllo Qualita' - Quality Control	Cliente - Client

T.T.I. - Tubacex Tubos Inoxidables,S.A.

Registro Mercantil de Alava, Tomo 607, Folio 186, Hoja VI 2683 - N.I.F. A-01140227

TUBACEX

Printed on: 17.01.2006

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 375595 Pages: 1 / 2 — Rev: 1

Date: 13.12.2005 — 17.01.2006

CUSTOMER :RACCORTUBI, S.R.L. PO :OS0000174S - 28/7/05 OUR REFERENCE:J4065

STANDARD :ASTM-ASME A/SA312M-04 ED.04

ADDIT. SPECS :312S REV.0 AND NACE MR01.75-03

GRADE :TP316-316L

DIMENSIONS :21,34 X 4,78

MATERIAL :SEAMLESS STAINLESS STEEL TUBE COLD ROLLED; PASSIVATED; PLAIN ENDS SQUARE CUT;

110970

REVIEWED

ITEM YOUR	ITEM TTI.	HEAT NR.	NO. OF PIECES	WEIGHT KG	TOTAL LENGTH	UNIT LENGTH
	13	34693	2	24	12,31	5,5 - 6,5 MT
	13	35717	53	652	330,00	5,5 - 6,5 MT

RAW MATERIAL

MELTING PROCESS: ELECTRIC FURNACE + A.O.D FROM: ACERALAVA
PEELED BARS; MACROETCH TESTING: GOOD;

(1)	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	B	N
L 593	0,022	1,47	0,280	0,025	0,0010	11,30	15,60	2,13	0,25	0,0006	0,0630
L 35717	0,010	1,48	0,500	0,030	0,0010	11,30	17,00	2,15	0,50	0,0013	0,0610
C 35717	0,011	1,47	0,490	0,029	0,0010	11,20	17,00	2,21	0,51	0,0008	0,0610
C 34693	0,022	1,47	0,280	0,025	0,0030	11,30	15,60	2,13	0,25	0,0006	0,0630

(1) L: LADLE; C: PRODUCT

HEAT TREATMENT

SOLUTION ANNEALED 1100 °C WATER QUENCHED

TESTS HEAT NR.	TESTS TEST NR.	TEMP.	TENSION MPA RM	RP 0,2	RP 1,0	% A	% Z	IMPACT TEST TEMP.	IMPACT TEST MINIMUM	IMPACT TEST AVERAGE	HARDNESS HRB	
34693	510470	20	536,0	243,0	278,0	65,0					77	79
35717	510469	20	589,0	274,0	311,0	60,0					80	81

TECHNOLOGICALS

FLATTENING TEST: GOOD
FLARING TEST: GOOD
RING EXPANDING TEST: GOOD

METALLURGICAL TEST

INTERGRANULAR CORROSION: A-262"E", DIN 50914, NF A05-159 T1, ISO 3651-2: NO OBJECTIONS

NON DESTRUCTIVE TEST

100 % EDDY CURRENT TEST AT E.426 , GOOD
100 % HYDROSTATIC PRESSURE TESTED AT 175 BAR , DURING 6 SEC, GOOD
STEEL GRADE CHECKING ON EACH TUBE BY SPECTROMETRY (PMI)
DIMENSIONAL CHECKING ON EACH TUBE, SATISFACTORY
VISUAL INSPECTION ON EACH TUBE, SATISFACTORY

OTHER MATERIAL SPECIFICATIONS

DIN 17458 PK1 / NF A49117-85 1.4401-1.4404/Z6-Z2CND17.11/12

MARKS

TXA
TUBACEX 21,34 X 4,78 ASTM-ASME A-SA 312 TP316-316L - DIN 17458 PK1 1.4401-1.4404 NF A49-117 Z6CND17.11-Z2CND17.12 SMLS HEAT/ .... ET PMI

REMARKS

T.T.I GARANTIT QUE TOUS LES TUBES LIVRES SONT CONFORMES AUX SPEC S DE L'ARTICLE 15 DE L'ARRETE MINISTERIEL DU 24 MARS 1978 MODIFIE

AENOR ER Express Registrada ER-0006/1991 — IQNet — AENOR Gestión Ambiental GA-01/145

We hereby certify that the material herein described has been manufactured, sampled, inspected and tested in accordance with above standards and specifications and satisfies the order requirements.
This certificate is issued by a computerised system and is valid without signature. On the original certificate the responsibility and declaration of engineer of manufacturer is stamped. In case the receiver of this original certificate would require a copy of it, he must attest its conformity to the original one, assuming the responsibility for any untrue of T.T.I. S.A. (or associated).
Any forgery or falsification of this certificate shall legally prosecuted.

T.T.I. Tubacex Tubos Inoxidables,S.A.
INGENIERIA DE CALIDAD
Jon Aburto Zubiaur

Customer: ROSETTI MARINO S.p A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz /Item n.: 5.000
Descr. : 21.34x4.78
Heat n°/Pcs marking : 34693 Qtà/Qty:12,3
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi CERTIFICATE N. 160065

T.T.I. - Tubacex Tubos Inoxidables, S.A.

Registro Mercantil de Alava, Tomo 567, Folio 189, Hoja VI-2885 - N.I.F. A-01140227

TUBACEX

Printed on: 17.01.2006

INSPECTION CERTIFICATE

EN 10204 3.1

Number: 375595 Page: 2 / 2	Rev: 1
Date: 13.12.2005	17.01.2006

CUSTOMER :RACCORTUBI, S.R.L. PO :OS0001748 - 28/7/05 OUR REFERENCE:J4065

STANDARD :ASTM/ASME A/SA312M-04 ED.04

ADDIT.SPECS :3128 REV.0 AND NACE MR01.75-03

GRADE :TP316-316L

DIMENSIONS :21,34 X 4,78

MATERIAL :SEAMLESS STAINLESS STEEL TUBE

COLD ROLLED; PASSIVATED;

PLAIN ENDS SQUARE CUT;

11097

C<=0,25%, P<=0,05%, S<=0,05%, R>800 N/MM2, E<=0,9 * R
A% (LO=5,65VSO) MIN, 16% EN LONG. R(A 2)>=10500
MATERIAL MANUFACTURER APPROVED WITH CERTIFICATE NR. 07/2001/MUC BY TÜV SÜDDEUTSCHLAND (NOTIFIED BODY 0036) TO ISSUE CERTIFICATES OF SPECIFIC PRODUCT CONTROL IN ACCORDANCE WITH PRESSURE EQUIPMENT DIRECTIVE 97/23/EC ANNEX 1 POINT 4.3.
MATERIAL CHARACTERISTICS COMPLY WITH POINT 7.5 OF ANNEX I TO PED BY HAVING AN ELONGATION AFTER RUPTURE AT TENSILE TEST NO LESS THAN 14 % AND A BENDING RUPTURE ENERGY AT IMPACT TEST NO LESS THAN 27 J AT 20°C.

ROSETTI MARINO

Conforme alla spec.
According to the spec. BS2 TP316 + P.O.

TMUGF Firma
MTSMD Signature

Data
Date 04 DIC. 2006

☒ REVIEW
☐ WITNESS

AENOR ER Empresa Registrada ER-0006/1991

IQNet

AENOR Gestión Ambiental GCM-0012/97

We hereby certify that the material herein described has been manufactured, examined, tested and inspected in accordance with above standards and specifications and satisfies the order requirements.
This certificate is issued by a computerized system and it is valid without signature. On the original certificate the responsible's red coloured signature is stamped.
In case this person of the original certificate would release a copy of it, he must attach its conformity to the original one, assuming the responsibility for any wrongful or T.T.I. S.A. not allowed use.
Any forgery or falsification of this certificate shall legally prosecuted.

T.T.I.
Tubacex Tubos Inoxidables, S.A.
INGENIERÍA DE CALIDAD
Jon Altuna Zubiaurre

Customer: ROSETTI MARINO S.p.A.
Order : OH 20061849 - 25.5.06 Job 106A14 Posiz./Item n : 5 000
Descr. : 21.34x4.78
Heat n°/Pcs. marking : 34693 Qtà/Qty:12,3
Protocollo : CTCERC200600005659 * Certified True Copy * Issued 19/06/06

raccortubi

raccortubi

CERTIFICATE N. 160065

PIETRA
SOCIETÀ PER AZIONI
25125 BRESCIA - Via Orzinuovi, 2
telef. 030 3540515 - fax 030 3540204

CERTIFICATO DI COLLAUDO

Inspection certificate - Abnahmeprüfzeugnis - Certificat de Réception

EN 10204/3.1.B

N. 84217 FOGLIO 1 di 1
Sheet - Blatt - Page

DATA 03.12.02
Date - Datum - Date

CLIENTE PROSIDER S.R.L.
Customer - Kunde - Acheteur

ORDINE FAX — DATA 30.10.02 — NS. COMMESSA 18483 — DATA 04.11.02
Order - Bestellung - Commande — Date - Datum - Date — Our order - Una auftrags - Cde usine — Date - Datum - Date

DESCRIZIONE: TUBI S.S Lamin. a caldo
Description - Saomlera tubed - Beschreibung - Nahtlose stahlrohre - Description - Tubes sans soudure

STATO DI FORNITURA: ☒ FINITI DI LAVORAZIONE A CALDO CON APPROPRIATA STRUTTURA
Condition of supply - Hot-working finished with proper structure - Lieferzustand - Warmverarbeitet mit einwandfreiem Gefügezustand - Etat de fourniture - Finis de travail à chaud avec convenable structure

NORME DI COLLAUDO ASTM A 106/99-530/01-API 5L/00
Tests standards - Abnahmevorschriften - Spécifications du produit

☐ TRATTAMENTO TERMICO 000 °C ___ MIN. — Heat treatment - Wärmebehandelt - Traitement thermique
Raffreddamento: aria — Cooling: air — Abkühlung: Luft — Refroidissement: air

PEZZI N. 300 (1800 M) — PESO KG. 2960 — QUALITÀ ACCIAIO Gr.B
Quantity - Stückenmenge - Nombre — Weight - Gewicht - Masse — Quality of steel - Werkstoff - Nuance d'acier

DIMENSIONI 21,30 X 3,73 X lg. 6000 mm - Zincati ASTM A 53
Sizes - Abmessungen - Dimensions

	Rp 0,2	Rm	A 2"	5,65√So	H BB	KV ___ °C	Rm x A ≥ 10600	MANDRINATURA Ring expanding - Ringaufdornversuch - Mandrinage	APPIATTIMENTO Flating test - Abflachversuch - Aplatissement	BORDATURA Flaring test - Bördelversuch - Rabattement	SCHIACCIAMENTO Flattening test - Ringstauchversuch - Aplatissement
VALORI RICHIESTI - Requirements - Anforderungen - Valeurs	≥240	≥415	≥30,00								
PROVETTA (*) - Specimen - Probestab - Eprouvette	SNERVAMENTO Yield point - Streckgrenze - Limite d'élast	ROTTURA Tensil strenght - Zugfestigkeit - Rupture	ALLUNGAMENTO Elongation - Bruchdehnung - Allongement		DUREZZA Hardness - Härte - Dureté	RESILIENZA (J) Impact - Kerbschlagarbeit - Résilience					

RISULTATI OTTENUTI - Results - Ergebnisse - Résultats

N	Sez. mm²	Lo mm	N/mm²	N/mm²	%		1'	2'	3'
1	205,00	51	346	500	40	78			
2	205,30	51	341	494	41	77			

Note : Prove di curvatura a 90 gradi con esito favorevole.
Sec. NACE MR 01.75
Sec. ASME sez II part A ed 2001

Copia conforme all'originale
Cliente: ROSETTI MARINO SPA
Ordine : n. OH-20061929 comm. 105814
Ns. ddt: n. 3666 del 01/06/2006.
Materiale: N. 16x6000 mm
Ravenna: 05 giugno 2006.
PROSIDER SPA

AZIENDA CERTIFICATA — UNI EN ISO 9002:94 — IQNet 9105 — CERTIFIED QUALITY SYSTEM

(*) SENSO PROVINI : LONGITUDINALE
Specimen direction - Probenrichtung - Direction de l'éprouvette — Longitudinal - Längs - Longitudinale

☒ PROVA IDRAULICA ALLA PRESSIONE DI 2500 psi
Hydraulic test pressure - Wasserdruckversuch - Essai hydraulique

☒ CORRENTI INDOTTE SECONDO NORMA A/SA 106
Eddy current according to - Zerstörungsfreie Prüfung - Courant de Foucaut

RISULTATI DELL'ISPEZIONE E CONTROLLO DIMENSIONALE : OK
Results of inspection and dimensional control - Besichtigung und Ausmessung - Résultat de l'inspection et contrôle dimensionnel

DIE ROHRE SIND DICHT UND HABEN FREIEN DURCHGANG

CERTIFICHIAMO CHE LA FORNITURA È CONFORME AGLI ACCORDI DELL'ORDINAZIONE
We here by certify that the material complies with the terms of the order - Es wird bestätigt daßdie Lieferung den Vereinbarungen bei der Bestellung entspricht - Nous certifions que la fourniture est conformeaux accords de la commande

ANALISI CHIMICA PIETRA S.P.A.
Chemical analysis - Chemische analiso - Analyse chimiques

TIPO DI FUSIONE : ELECTRIC FURNACE
Cast type - Erschmelzungsart - Type de fusion

COLATA N. Heat - Schmelze - Coulée	C %	Mn %	Si %	P %	S %	Cr %	Mo %	Ni %	Cu %	Sn %	V %	Al %	N %	Ceq %	CERTIFICATO DI COLATA Heat Certificate - Verhältnisbaugas - Cert. d'origine
83215	0,180	0,830	0,200	0,012	0,007	0,070	0,020	0,110	0,220	0,010	0,000	0,027		0,335	

ROSETTI MARINO

NOTE - Notes - Bemerkungen - Notes

I TUBI HANNO SUBITO UN TRATTAMENTO COMPLETO DI DEMAGNETIZZAZIONE.
The tubes have been subjected to a complete demagnetization treatment.

MARCATURA Marking - Kennzeichnung - Marquage
According to the spec API 5L Gr.B PSL2

TMUGF Firma — Data
MTSMD Signature — Date
28 GIU 2006

☒ REVIEW
☐ WITNESS

Il Collaudatore d'Officina
Internal authorized inspector - Firma Abnahmebeamte - Cachet du contrôleur
QUALITY CONTROL
(A. Zacchi)

S.A. SOUDOMETAL N.V.
Bld. M. Herbettelaan 24
1070 Brussels (Belgium)
Tel.: 32 2 522 98 00 Fax: 32 2 520 08 07 Ilx: 23361 Soudo B
IVA/BTW: BE 401.918.312

Message for FAX number : 13959343297
PLEASE USE OUR REF: CT 00921

FAX : 13959343297
ATTN : Sig. BORTOLACELLI

CERTIFICAT - TESTRAPPORT- TEST REPORT - WERKZEUGNIS - CERTIFICATO - CERTIFICADO
Cliente : E110714 Qualità : SOUDOTIG 309L

SFA 5.9:ER 309 L
ITALSUDO S.R.L. Classificazione
DIN 8556:± SG X2CrNi 24 12

V/o Ordine : V/ FAX DEL 260794 Dimensioni (mm)

N/o Rif : 2,4 x1000

Prodotto : Fili per TIG

N° Produzione(colata,lotto,ecc) 672011

1. Analisi chimica(%) metallo depositato * Valori rilevati

2. Proprieta meccaniche Valori tipici

N°		Rs0,2	Rm	A % (5d)	Z %	KU-J	Tratt.termico Durata(O)
672011	+20	440	620	35		100	

3. Varie Valori tipici Osservazioni

	Cont.Radio.	Sald.d'angolo	FN	Durezza HB	HRC	HRC(WH)
672011						

Conforme alla spec. According to the spec. AWS 5.9
C.Q. Firma / Q.C. Signature Data / Date 06/12/96

4. Composizione chimica del filo(%) Valori tipici

N°	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N
672011	0,015	1,74	0,38	0,009	0,020	23,52	13,55	0,107	0,108	0,049

Data : 18/10/96

Noi certifichiamo che il prodotto sopradescritto risponde alle caratteristiche richieste della sua classific.(Ultima edizione)

T. I & QA Mgr