Ballard Power Systems Europe A/S
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Denmark

Revision history		
Rev.	**Date.**	**Description**
001	05/06/2024	First Issue

Document Title:	**BLPH Project - WPS and PQR Records**
Document Number:	K559-2254-CWIWP4202202-J02-001
Revision:	Rev001
Sequence Number:	001
File Name:	K559-2254-CWIWP4202202-J02-001Rev001
Purchaser Job:	K559-2254
Purchase Order:	CWIWP4202202
Code:	J02
Requsition Number:	n/a
Customer:	CrossWind C.V., Rotterdam, The Netherlands

Svejseprocedureprøvedokumentation

Welding Procedure Qualification Record

Complete documentation

DS/EN ISO 15613:2005

WPQR nr.:	141 T/T BBW 8.1 01
Dimension:	Rør: Ø20x3,0 - Ø50x2 mm
Materiale:	1.4301 - 1.4301

Udarbejdet af

weldadvice

Europæisk Svejse Rådgivning

For

TJ TECHNOLOGY

Ågade 65
7850 Stoholm

Indholdsfortegnelse / Table of contents

Svejseprocedureprøveattest / Welding procedure qualification record

141 T/T BBW 8.1 01

Visuel Kontrol 2015554-VT 01

Ikke Destruktiv Kontrol / Non Destructive Testing
Radiographic testing 78961-116-20219
Penetrant testing 78961-116-20219

Destruktiv Kontrol / Destructive Testing
Mechanical test report M026517:1

Materialecertifikater / Material Certificates
Chandan Steel Limited EN 10204, 3.1: Heat No: CH-2861
Siderinox S.p.a. EN 10204, 3.1: Heat No: 0440628

Tilsatsmateriale / Consumables
Hyundai SMT-316LSi, Ø1,6 mm EN 10204, 3.1: Lot No: V9988

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SVEJSEPROCEDUREPRØVEATTEST
WELDING PROCEDURE QUALIFICATION RECORD

Kvalifikation i henhold til: Qualification i according to: DS/EN ISO 15613:2005
Standard/Norm: Standard/Code:
Kundens specifikation: Client's specification:

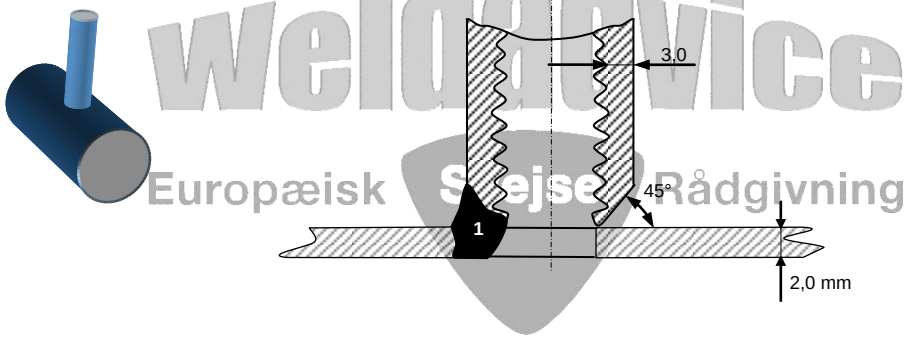
WPQR NO. 141 T/T BBW 8.1 01
Date: 15/01-2016
Blad/Sheet 1/ 1
Side/Page 1 / 2

Kunde/Client | Projekt/Project

Svejsning udført af /Welding carried out by: Brian Ravn | Mærke nr./Stamp no.

Standard/Code: EN 10217-7			Grundmaterialer/Base Materials	Standard/Code: EN 10088-3		
Betegnelse Designation/grade: 1.4301 X5CrNi18-10	Gruppe nr. / Group no. DS/CEN ISO/TR 15608: 8.1	Ceqv. actual: -		Betegnelse Designation/grade: 1.4301 X5CrNi18-10	Gruppe nr. / Group no. DS/CEN ISO/TR 15608: 8.1	Ceqv. actual: -
Plade/rør Plate/pipe: Rør/pipe	Tykkelse/WT mm Thickness/WT mm: 2,0	Dia. mm: 50,8	til/to	Plade/rør Plate/pipe: Rør/pipe	Tykkelse/WT mm Thickness/WT mm: 3,0	Dia. mm: 20,0

Fugedetaljer og sømopbygning (Skitse)
Joint details and welding sequence (Sketch)



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Svejsestilling/ Welding position: PC

Hæftning/Tacking:	Som Streng 1 / As run no. 1
Min. Forvarmetemp.: Min. preheat temp.:	16 °C
Længde: Length:	2 stk. af 4 mm
Antal strenge: No of runs:	1
Andre data: Other data:	
2. side: Fugning/Gouging:	☐ Ja Yes ☒ Nej No
Forvarmetemp.: Preheat temp.:	°C
Elektrode dia.: Electrode dia.:	mm
Lufttryk: Air pressure:	bar
2. side: Slibning/Grinding:	☐ Ja Yes ☒ Nej No

Streng No. / Run No.	Svejse-proces / Weld. proces	G Gas, T Tråd/Wire, P Pulver/Flux, E Electrode; ∇ Fabrikat og betegnelse / Manufacture and trade mark	Dimension: Diameter -Længde/ Diameter -Length mm	Standard: Klassifikation/ Classification (G EN ISO 14175:2008, T EN ISO 14343-A, E EN ISO 6848)	H_2 Skala/ Scale EN 1011	Beskyttelsesgas Shielding Gas: l/min	Dyse/ Nozzle mm Ø	Baggas Back shielding gas: Type/ l/min	Bem. Note No.
1	141	G *Strandmøllen, Pro Line H_2*	-	*R1*	-	*9*	*7*	*Formier* / *10*	-
1	141	T *Hyundai SMT-316LSi*	*1,6*	*G 19 12 3 L Si*	*D*	-	-	- / -	-
1	141	E *Wolframelektrode LaO_2*	*1,6*	*WL20*	-	-	-	- / -	-
								/	
								/	
								/	

Streng No. / Run No.	Program nr. / Program No.	AC DC / Pol.	Strøm/Current Amp	Tråd-hast. / Wire speed m/min	mm	Svejsehast mm/min. eller strækkelængde mm / Travel speed mm/min. or run-out length mm: Volt		S: XX: ∇ U.pendling/stringer pendling/weaving Strengbredde/ run width Max. mm	Heat input KJ/mm	Forvarme/ Preheat °C / Interpass-temp.	Bem. Note No.
1	-	*DC-*	*75*	-	-	*9,0*	*40*	*5,6*	*0,61*	*16* / -	-
										/	
										/	
										/	
										/	
										/	
										/	

Efterfølgende varmebeh./PWHT: ☒ Nej No ☐ Ja, se bilag nr.: Yes, see enclosure No.:

Bemærkninger-andre oplysninger/Notes-other informations

Vi bekræfter, at de givne oplysninger er korrekte og at prøven er tildannet, svejst og varmebehandlet i.h.t. ovennævnte standard/norm og/eller kundens specifikation./We confirm that the statements in this record are correct and that the test was prepared, welded and heat treated according to the above specified standard/code and/or client's specification.

Sted/Place | Dato/Date

Producentens underskrift
Contractor's signature

Prøvesvejsningen var mærket: The test coupon was marked: 2015544-01A, PC H.H. 15/01-2016

Charge/Heat: CH-2861
Charge/Heat: 0440628
Filler metal Lot: V9988

weldadvice
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Messingvej 32 B DK 8940 Randers SV
Tlf.: +45 8640 6805 - Fax: +45 8640 6807

Gennemgået/bevidnet
Reviewed/witnessed by

Repræsenterende
Representing

Prøvningsresultat og godkendelse; Se bagside / Test results and approvals; See revers side

NON-DESTRUCTIVE EXAMINATION	WPQR No.: 141 T/T BBW 8.1 01	Blad/Sheet 1/1	Side/Page 2/2

Metode/ Method - resultat / result	Standard	Rapport nr./ Report no.
1. Visual examination Result: ***Accepteret/ Accepted***	Procedure standard: ***DS/EN ISO 17637:2011*** according to: ***DS/EN ISO 5817, Level B (C)***	***2015544-VT-01***
2. Radiographic examination Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 17636-1:2013 Class B*** according to: ***EN ISO 10675-1:2013, Level 1***	***78961-116-20219***
3. Ultrasonic examination Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 17640:2011 class B*** according to: ***EN 11666:2011- level 2***	
4. Magnetic particle testing Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 17638:2009*** according to: ***DS/EN ISO 23278:2009 Level 2x***	
5. Dye penetrant testing Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 3452-1:2013*** according to: ***DS/EN 23277:2009- Level 2x***	***78961-116-20219***
6. Other examination Procedure: Result:	Type: according to:	

Place Randers	Date 19/01-2016	Witnessed/reviewed by (Name/Signature)
Laboratory signature ***or*** Data transferred from enclosed laboratory report by- Signature		Representing (Examiner or Notified Body)

Heino Harstad

MECHANICAL TESTING

According to DS/EN ISO 15614-1:2004/A1:2008/A2:2012; PED 97/23/EC

1. Tensile tests

EN ISO 6892-1:2009; EN ISO 4136:2012

Specified Y.S. min. *N/mm²* Specified U.T.S. min. *N/mm²*

Test no.	Dim.	Area	Gauge length	Yield Load	$R_{P0,2}$ N/mm²	$R_{P1,0}$ Load	R_{eH} N/mm²	R_m N/mm²	Elong A %	Remarks

2. Bend tests

DS/EN ISO 5173:2010 / EN ISO 7438:2005

Specified degr. 180° Former dia. mm

Type and dimensions	Bend angel	Results	Type and dimensions	Bend angel	Results

3. Impact tests

EN ISO 148-1:2013/ ISO 9016

Dim.: mm Specified type of test : V-notch Specified: J Testing temp. °C

Test no. VWT	Result J	Test no. VHT 0/1	Result J	Test no. VHT 2/1	Result J	Test no. VHT 5/1	Result J	Test no. VHT 0/1	Result J	Test no. VHT 2/1	Result J	Test no. VHT 5/1	Result J
Average WM		Average FL		Average FL+2		Average FL+5		Average FL		Average FL+2		Average FL+5	

4. Macro Examination

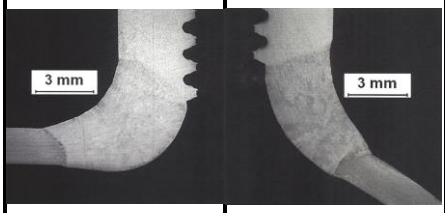
Separate sheet with picture ☐ Yes ☒ No Results:

5. Hardness tests

ISO 9015-1, EN ISO 6507-1:2006

Specified type of test: HV10 Req. max.

Sketch showing indentations



	Base metal (2mm)			HAZ (0,5 mm)				Weld metal			HAZ (0,5mm)				Base metal (2mm)		
A																	
B																	
C																	
D																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

6. Other/Supplementary Tests.

☒ No ☐ Yes See enclosures:

7. Further enclosures:

M026517:1

Place Randers	22/01-2016	Witnessed/reviewed (Name/Signature)
Laboratory signature ***or*** Data transferred from enclosed laboratory report by- Signature		Representing (Examiner or Test Body)

Heino Harstad

Vi godkender herved denne svejseprocedure til svejsning på omtalte projekt under de begrænsninger, der er givet i standarden/normen og/eller kundens specifikation.

We hereby approve this welding procedure for welding on the referring projekt within the limitations given in the standard/code and/or client´s specifikation.

Place Date

Underskrift af kunde/kunderepræsentant
Client´s or representative´s signature

Markrapport
Visuel kontrol af svejsesømme

Rekvirent TJ Technology, Ågade 65, 7850 Stoholm	**Sag nr.** 2015544	**Rapport nr.** VT-01
Entreprenør	**Dato.** 15/01-2016	**side af** 1 / 1
Emne Branch Connection Ø20x3 mm – Ø50,8x2 mm	**Tegning ref.:** 222446-D1324559	
Mrk. 2015544-01A	**Materiale:** X5 CrNi18-10	

Fugetype ☒ Stumpsøm	☐ Kantsøm	☐ Andet	☐ Slebet	**PWHT** ☐ Ja	☒ Nej	**Timer efter svejsning**
Undersøgelsesprocedure / klasse ☒ EN ISO 17637	☐ NS 10250	☐ ASME Sect. V	☐ Andet:			
Kvalitetskrav ☒ EN ISO 5817 Level B (C)	☐ ASME Sect.	☐ Andet:				
Udstyr ☒ Hulspejl	☒ Lygte	☐ Skydelære	☐ Kantsømlære	☐ Andet:		
Undersøgelsesomfang ☒ Kontrol før svejsning	☒ Kontrol under udførelse	☒ Kontrol efter svejsning	☐			
Omfang ☐ Visuel besigtigelse %	☒ Visuel kontrol 100 %	☐ Tilfældigt udvalgt	☐ Udpeget			

Undersøgelsens resultat

Accepteret / Accepted

Rep. opmærkning. ☐ På emne ☐ På skitse	**Kontrol af** ☐ Opslibning ☐ Reparation	**Bilag vedlagt** ☐ Ingen ☐ Stk.	**Inspektø**	**Certifikat type. / nr.** IWT-NO/0147

Attestationer	**Tekniker**	**Certifikat type / nr.**
	Tekniker	**Certifikat type / nr.**

9-11-01-L

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CVR nr.: 2768 9620 · E-Mail: mail@weldadvice.dk ·Internet: www.weldadvice.dk/ www.weldadvice.com

Prøvningsrapport - Ikke-destruktiv Prøvning

KUNDE Weldadvice, Europæisk Svejse Rådgivning I/S, Messingvej 32 B, 8940 Randers SV, Denmark

KONTAKT Heino Harstad, Weldadvice, Europæisk Svejse Rådgivning I/S, Messingvej 32 B, 8940 Randers SV, Denmark

ENTREPRENØR

BYGHERRE

ARBEJDSSTED Force - Lab.

REKVISITIONS ID. 2015544-01

Rekvisitions Beskrivelse	Specifik Job Information
	6. Stk. svejseprøver/ kantsømme

78961-KHC A

Sammenfatning

Svejsninger, ingen sporbarhed, EN ISO 15614-1:2006/A2:2012

NDT Metode	Prøvningsspecifikation	Acceptkriterie	Andre krav
Penetrant (PT)	EN/ISO 3452-1:2013	EN/ISO 23277:2009 - 2X	
Radiografi (RT)	EN/ISO 17636-1:2013 - B	EN/ISO 10675-1:2013 - 1	

PRØVNINGSRESULTAT

	Svejsning Status	
	Acceptkriterie opfyldt	6 svejsninger

Detaljer om prøvningsresultat kan findes i "PRØVNINGSRESULTAT DETALJER" sektionen.

Tekniske data, NDT informationer, identifikation af udstyr, kalibreringsdata for udstyr, og andre relevante data, er registreret for hver NDT-metode i sektionen for Prøvningsmetode Detaljer. Uddrag fra Prøvningsrapporten må kun gengives efter skriftlig tilladelse fra FORCE Technology. Den elektroniske version af Prøvningsrapporten, som er gemt i "FORCE NDT Online", er defineret som originalen. Prøvningsresultaterne gælder kun for de emner som er testet. FORCE Technology - Almindelige betingelser er en integreret del af aftalen, medmindre andet er skriftligt aftalt.

PRØVNINGSRESULTAT - DETALJER

	Svejsninger hvor acceptkriterie er opfyldt		
Reference	**Svejsning Id. (Rep./Udv.)**	**Svejser(e)**	**Prøvningsmetode(r)**
2015544-01	01A-1	-	PT, RT
	01A-2	-	PT, RT
	02B-1	-	PT, RT
	02B-2	-	PT, RT
	03C	-	PT, RT
	04D	-	PT, RT

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PRØVNINGSOMFANG

RT. og PT. af 6. stk. svejseprøver, i muligt omfang.

SVEJSNING DETALJER

Reference	Svejsning Id. (Rep./Udv.)	Materialer	Overfladebeskaffenhed	Varmebehandling
		Dimensioner	Tidspunkt for prøvning	Temperatur (ca.)
		Nominel tykkelse	Timer efter sidste fremstillingstrin	Svejsningstype-fugeform-metode(r)
2015544-01	01A-1, 01A-2	Rustfrit stål	Som svejst	Ingen information
		20 mm	Ingen information	-
		3 mm	-	Ingen information-Ingen information-Ingen information
	02B-1, 02B-2	Rustfrit stål	Som svejst	Ingen information
		50 mm	Ingen information	-
		2 mm	-	Ingen information-Ingen information-Ingen information
	03C	Rustfrit stål	Som svejst	-
		50 mm	Ingen information	-
		2-2 mm	-	Ingen information-Ingen information-Ingen information
	04D	Rustfrit stål	Som svejst	-
		50 mm	Ingen information	-
		1,6-15 mm	-	Ingen information-Ingen information-Ingen information

Ovenstående oplysninger er til information og angives kun i den udstrækning, de er tilgængelige og relevante. Deres angivelse i denne prøvningsrapport kan ikke betragtes som en verifikation af deres rigtighed og de er ikke omfattet af nogen akkreditering.

PRØVNINGSMETODE - DETALJER

Penetrant Prøvning (PT) **Prøvningstidspunkt 19-01-2016 - 19-01-2016**

Personale

Navn (Tekniker Nr.)	Certifikattype	Certifikat nr.	Reference [Svejsning Ids]
Keld Hald Christensen (1)	EN ISO 9712 PT (EN 473) Level 2	0063-N2-P	2015544-01 [01A-1, 01A-2, 02B-1, 02B-2, 03C, 04D]

Produkter

Type	Parti Nr.	Produkt	Prøvningstekniske oplysninger Nr.
Halogenfri Opløsningsmiddel Fremkalder		Spotcheck SKD-S2	1
Vandafvaskelig/Opløsningsmiddel Rød Penetrant		Spotcheck SKL-WP	1
Halogenfri Rensevæske/Afrensning af Overskudspenetrant		Spotcheck SKC-S	1

Prøvningstekniske oplysninger

Nr.	Reference [Svejsning Ids]	For-rengøring	Penetreringstid	Fremkaldertid	Lysforhold
		Betegnelse	Emulgeringstid	-	Lys intensitet
1	2015544-01 [01A-1, 01A-2, 02B-1, 02B-2, 03C, 04D]	Penetrant Rensemiddel	15 min.	15 min.	Hvidt lys - kunstig
		IICd2	-	-	> 1000 LUX

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Radiografi Prøvning (RT) **Prøvningstidspunkt 19-01-2016 - 19-01-2016**

Personale

Navn (Tekniker Nr.)	Certifikattype	Certifikat nr.	Reference [Svejsning Ids]
Keld Hald Christensen (1)	EN ISO 9712 RT (EN 473) Level 2 (incl. aluminium)	0063-N2-R	2015544-01 [01A-1, 01A-2, 02B-1, 02B-2, 03C, 04D]

Udstyr

Type	Id.	Andre data	Prøvningstekniske oplysninger Nr.
RT X-RAY TUBE, SMART 225	XRL-10	FOCAL SPOT 3 MM, EN 12543, (DIRECT BEAM), 70-225 kV, 4,0 mA	1-4
RT FILM VIEWING UNIT, WILNOSOL	VGA-110	H UNIVERSAL, DENSITY D UP TO 3,7	1-4
RT DENSITOMETER, WILNOS LCD 51	PDE-21	MAXIMUM DENSITY D = 5,0	1-4

Prøvningstekniske oplysninger

Nr.	Optageteknik	Fremkaldelse	IQI (Certifikat nr.)	Spænding
	Antal film per svejsning/objekt	Folietype (tykkelse)	IQI placering	Strøm / Aktivitet
	Filmtype	Kilde/Brændplet størrelse	Gennemstrålet tykkelse	Eksponeringstid
	Kilde / detektor eller film afstand (SFD / SDD)	Kilde / objekt afstand (f/D)	Objekt / film afstand (b/d)	Opløsning
1	Dobbeltvæg/Enkeltbillede - Rør, Kontakt (DV/EB)	Maskine	10 FE EN ()	140 kV
	1	Pb (0.02 / 0.02 mm)	Kildeside	4.0 mA
	Foma / Indux R5	3.0 mm	2.0 mm	55 sek
	800.0 mm	750.0 mm	50.0 mm	-
2	Dobbeltvæg/Dobbeltbillede - Rør, Ellipse (DV/DB)	Maskine	10 FE EN ()	140 kV
	2	Pb (0.02 / 0.02 mm)	Kildeside	4.0 mA
	Foma / Indux R5	3.0 mm	2.0 mm	55 sek
	800.0 mm	750.0 mm	50.0 mm	-
3	Enkeltvæg/Enkeltbillede - Plade (EV/EB)	Maskine	10 FE EN ()	140 kV
	4	Pb (0.02 / 0.02 mm)	Kildeside	4.0 mA
	Foma / Indux R5	3.0 mm	2.0 mm	55 sek
	800.0 mm	790.0 mm	10.0 mm	-
4	Enkeltvæg/Enkeltbillede - Plade (EV/EB)	Maskine	13 FE EN ()	200 kV
	4	Pb (0.02 / 0.02 mm)	Filmside	4.0 mA
	Foma / Indux R5	3.0 mm	15.0 mm	90 sek
	800.0 mm	785.0 mm	15.0 mm	-

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Film

Film id.	Prøvningstekniske oplysninger Nr.	Sværtning	IQI Nr.	Følsomhed	Ug
01, 02, 05	1	2,5	16	5.00 %	0.20 mm
03, 04	2	2,5	16	5.00 %	0.20 mm
06-09	3	2,5	16	5.00 %	0.04 mm
10-13	4	2,5	13	1.33 %	0.06 mm

Svejsning på film

Reference	Svejsning Id [Film Id'er]
2015544-01	01A-1 [01], 01A-2 [02], 02B-1 [03,04], 02B-2 [05], 03C [06-09], 04D [10-13]

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PROVNINGSRAPPORT

utfärdad av ackrediterat provningslaboratorium

TEST REPORT issued by an Accredited Testing Laboratory

SWEDAC ACKREDITERING 5622 ISO/IEC 17025

SAFE CONTROL MATERIALTEKNIK

Beställare / Ordered by Weldadvice Messingvej 32B DK-8940 Randers SV	**Orderdatum / Date of order** 2016-01-20	**Reg. nummer / Reg. number** M026517:1
Er referens / Your reference Heino Harstad	**Inlämningsdatum / Object (-s) received** 2016-01-20	**Sidnummer / Page** 1(2)
Ordernummer / Order number 2015544-02	**Rapportdatum / Date of report** 2016-01-25	**Vår referens / Our reference** Johan Ageryd

Assignment:	Procedure qualification test according to EN ISO 15 614-1:2004.	
Test object(s):	Branch connection. Half V- groove.	
Material:	1.4301/ 1.4307	1.4301/ 1.4307
Group:	8.1	8.1
Dimension:	Ø 20 x 3.0 mm	Ø 50 x 2.0 mm
Heat number:	CH-2861	0440628
pWPS:	WPS TJ Tech 02	
Procedure number:	2015544-01A	
Identification mark:	2015544-01A	
Weld method:	141	
Position:	PC	
Filler metal:	Hyundai SMT-316LSi, Ø 1.6 mm	
Note:	-	
Result:	Accepted according to referenced standard.	
Signature:	SAFE CONTROL Johan Ageryd	

"Laboratorier ackrediteras av Styrelsen för ackreditering och teknisk kontroll (SWEDAC) enligt svensk lag. Den ackrediterade verksamheten vid laboratoriet uppfyller kraven i SS-EN ISO/IEC 17 025 (2005). Denna rapport får endast återges i sin helhet, om inte utfärdande laboratorium i förväg skriftligen godkänner annat". Provningsresultaten i denna rapport avser endast provade objekt.

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E-mail: info@safecontrol.se • www.safecontrol.se

PROVNINGSRAPPORT

utfärdad av ackrediterat provningslaboratorium

TEST REPORT issued by an Accredited Testing Laboratory

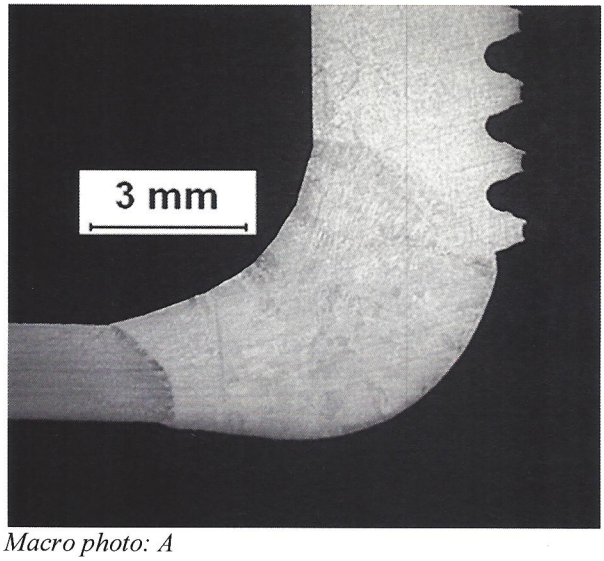
Teknisk instruktion / Technical instruction	Märkning / Marking	Reg. nummer / Reg. number
Macroscopic and microscopic examination of welds	2015544-01A	M026517:1
TI Dokumentnr./ TI Document no.	**Provningsutrustning / Testing equipment**	**Sidnummer / Page**
SCMM1	SCM 9	2(2)
Provning enligt / Testing according to	**Provningsdatum / Testing date**	**Utfört av / Performed by**
SS-EN 1321	2016-01-22	Johan Ageryd

Macroscopic examination:

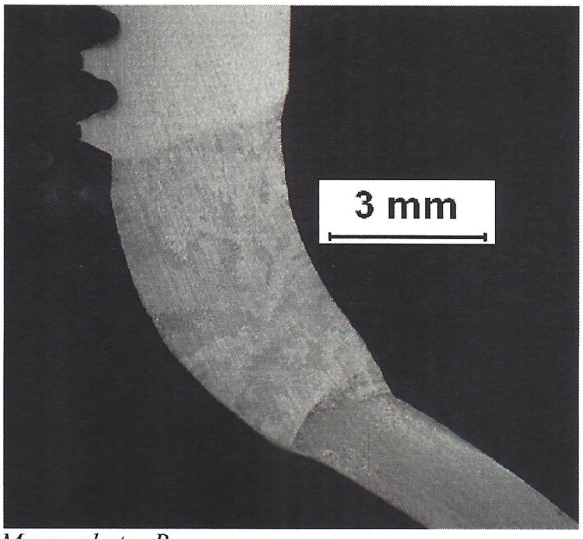
Two macro samples were cut out for macroscopic examination of weld metal, HAZ and base metal. The macro samples were ground (to 2000- paper) and examined in not etched and etched condition at magnification of 1× - 20×.

Macro sample			Base metal		Filler metal	Etchant *(acc. to SIS-CEN/CR 12361:1996)*
ID / No	Position	Orientation	Horizontal	Vertical		
2015544-01A	PC	Perpendicular to the weld direction	1.4301/ 1.4307	1.4301/ 1.4307	Hyundai SMT-316LSi	B.5 (Kalling´s)
Examined macro samples are assessed to fulfil the requirements in EN ISO 5817:2014. See macro photos below.						

Macro photos:



Macro photo: A



Macro photo: B

Den rapporterade utvidgade mätosäkerheten är baserad på en standardosäkerhet multiplicerad med täckningsfaktor, k=2, vilket för en normaldistribution motsvarar en sannolikhet med ca 95 %. Mätosäkerhetsberäkningarna är utförda i enlighet med EA-4/16:2003.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor, k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. The uncertainty evaluation was carried out in accordance with EA-4/16:2003.

Length measurement: ± 1.5 %

Not.: Avsteg från punkt 10 i SS-EN 1321 har gjorts. Beteckning har ej redovisats i enlighet med exemplifierade versioner.
Note: Deviation from clause 10 in SS-EN 1321 has been done. Description has not been presented in accordance with exemplified versions.

Signatur/ Signature:

SAFE CONTROL
Johan Ageryd

CHANDAN STEEL LIMITED

(GOVT. OF INDIA RECOGNISED EXPORT HOUSE)

ISO 9001 : 2008 CERTIFICATE No. 04 100 011022-E3

ADM. OFFICE: 504, SUKH SAGAR, N. S. PATKAR MARG, MUMBAI 400 007, INDIA

Tel.: 91-22- 66290600. Fax.: 91-22-66290633/34

Website : www.chandansteel.net

Email : csl@chandansteel.net

WORKS: Plot No. 35, G. I. D. C., Umbergaon

Dist Valsad, Gujarat - 396 171.

Tel.: 91-260- 308 9999 Fax.: 91-260 308 9872

E-mail : exports@chandansteel.net

CE 0045 14 0045-CPR-1394

L/c. No.:

L/c. Date:

F824 QC 09A / 02 / 10.12.2012

MILL TEST /INSPECTION CERTIFICATE 3.1

ACCORDING TO EN 10204 : 2005

Consignee		Test Certificate No.	: EXP/00645 - 09/2015-2016
DACAPO STAINLESS A/S		Date of Issue	: 22.09.2015
NEPTUNVEJ 1		P. O. No.	: 45060220
8600 SILKEBORG		SC_No. & Date	: 15-16/00345, Dt.01.08.2015
DENMARK		Invoice No. & Date	: EXP/00645/2015-16 Dt.22.09.2015
PRODUCT DESCRIPTION		LENGTH	Net Wt.
STAINLESS STEEL ROUND BARS		Ordered	Actual
[CONDITION - 1D & 2D]		6.0 - 6.1 Mtrs.	6.0 - 6.1 Mtrs.
			2731 Kgs.

Article No.	Item No.	Heat No.	Material/Grade	Size mm	Tolerance	Process Route
-	5000200006	CH-2861	1.4301/1.4307	20.00 mm	h9	Electric Melting, A.O.D. Refining, Continuous Casting

CHEMICAL COMPOSITION (Weight %)

	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Ti	Co	N
Min.	-	-	-	-	-	18.00	-	8.00	-	-	-	-
Max.	0.030	1.00	2.00	0.045	0.030	19.50	-	10.50	-	-	-	0.1000
Results	0.029	0.43	1.65	0.045	0.028	18.30	-	8.03	-	-	-	0.0650

MECHANICAL PROPERTIES

Specified Values	Test Method :- EN ISO 6892-1					Hardness EN ISO 6506-1	Test Method :- DIN EN ISO 148 - 1 Charpy (V) Impact Test (2mm) at 20 °C (Joules) Sample Size - 10 x 10 x 55 mm			
	Proof Strength N/mm² /MPa		Tensile Strength N/mm²/MPa (Rm)	Elongation after Fracture A %	Reduction of Area %					
	0.2%(Rp0.2)	1%(Rp1.0)				(BHN)	I	II	III	Avg.
Results	448	485	715	44	65	222-225	230	240	245	238

Remarks:

1. Condition : 1D & 2D (Bright drawn & Polished).
2. Solution annealed at 1050 °C.
3. PMI test done 100% & found Satisfactory.
4. Both ends Chamfered.
5. The material is fully killed and calcium treated.
6. Material has improved machinability.
7. Material is free from radio-active contamination.
8. Intergranular Corrosion test carried out as per EN/ISO 3651-2-1998 (Test method A) found satisfactory.
9. Surface Defects found satisfactory as per EN 10277-1 Class 3.
10. The material conforms to DIN EN 10088-3:2005, EN 10088-5:2009, EN 10272-2008, AD2000 W2/W10, ASTM A276-13/A182-13/A479-13a, ASME SA276-10/ SA182-10/SA 479- 2010 SECTION II, PART A Specification.
11. Location of sample - off centre, Direction - Longitudinal, Test Temp - Room Temp., Shape of Test Piece - Round.
12. Marking details - Company Logo, Size, Grade & Heat No.
13. The material is manufactured /melt in Chandan Steel Mill and is of Indian Origin.

BUNDLE NO.: 64, 65, 67 to 69 COLOUR : BLUE

Intended use : Building construction or civil engineering.

Regulated substance : No performance determined.

It is hereby certified that the above results are true and correct in every details and are meeting the requirements of specification & purchase order.

D.O.P. No.: 1.4301/ROUND BAR

D.O.P. can be seen here: www.chandansteel.net

BSR

B. S. RAUTELA

MANAGER - Q.A./WORKS INSPECTOR

SIDERINOX

Siderinox S.p.a. Frazione Caselle 20081 Morimondo (MI) Italia
Ufficio Commerciale: Tel. 02 9498151 - Fax 02 949815250/251
Ufficio Amministrativo: Tel. 02 9498161 - Fax 02 949816350
Ufficio Spedizioni: Tel. 02 949816222 - Fax 02 949815350
Ufficio Acquisti : Tel. 02 949816345 - Fax 02 949816350
Casella e-mail: sx@siderinox.it Sito web: www.siderinox.it

Capitale Sociale Euro 3.300.000 i.v.
Cod. Fiscale e Reg. Imp. MI N. 01825510157
R.E.A. Milano N. 878116
Centro Meccanografico n. MI074282
Partita IVA 01825510157

AZIENDA CON SISTEMA
DI GESTIONE QUALITÀ
CERTIFICATO DA DNV GL
=ISO 9001=

INSPECTION CERTIFICATE EN 10204 3.1 N° 424885 of 02.02.2015

Purchaser **INOX STAAL A/S**

DDT	SIDERINOX order number	Customer's order
N 8 of 02.02.2015	N 5 of 22.01.2015	N 15836-1 of 22.01.2015

Product description

Stainless steel round pipe Ø 50,8 x 2 mm AISI 304/304L brushed EN 10217-7 Longitudinally welded

Dimension	Steel type	Quantity (m)	Weight (kg)
50,8 x 2 mm	EN 1.4301/1.4307 / AISI 304/304L	366	815

Production Norm	Rolling	Tolerances	Welding factor
EN 10217-7	Hot rolled	D3 \ T3	V=1

Marking MANUFACTURER'S MARK - DIMENSION - STEELGRADE - HEAT N. - PRODUCTION NORM - EXECUTION - E.C. INSPECTOR - WORK INSPEKTOR

Manufacturing process — Surface finishing W0

CHEMICAL COMPOSITION

Heat	% C	%Mn	%P	% S	%Si	%Cr	% Ni	% Mo	% Ti
	0,000 - 0,030	0,000 - 2,000	0,000 - 0,040	0,000 - 0,010	0,000 - 1,000	17,500 - 19,500	8,000 - 10,000	0,000 - 0,000	0,000 - 0,000
0440628	0,022	1,680	0,027	0,001	0,380	18,240	8,090		

The chemical values refer to the certificate issued by the steel mill according to EN 10088 / 10028-7 / ASTM A 240 and stored at our office.

TEST RESULTS

* (D) Direction: (L) Longitudinal, (T) Transverse - ** (P) Position: (W) Welding, (M) Material

Test unit	Test Class	(D) *	(P) **	TENSILE TEST in Nmm2=MPa				HARDNESS
				Yield Strength		Tensile Strength	Elongation	
				Rp 0,2%	Rp 1%	Rm	A %	HRB
				195 -	230 -	500 - 740	40 -	
T14100996	TC1	L	M	246	330	658	48	
T14100998	TC1	L	M	235	314	627	49	

Visual inspection	OK	Drift expanding test		Sealing test	
		UNI EN ISO 8493	OK	UNI EN ISO 10893-1	OK
Check on dimensions	OK	Flattenning test		Non destructive Eddy Current test	
		UNI EN ISO 8492	OK	UNI EN ISO 10893-2	OK
Antimixing test	OK	Weld bend test		Intergranular corrosion test	
		EN 910	OK	N. P.	N. P.

WE CERTIFY THAT THE MATERIAL SUPPLIED COMPLIES WITH THE REQUIREMENTS AGREED ON THIS ORDER

Remarks:

Cerfications:
UNI EN ISO 9001
Dir. PED 97/23/EC Encl. 1, Point 4.3, Comma 3
AQUAP from Nr. 7293-06-TU to Nr 7298-06-TU

Qualifications:
WPS/WPAR: UNI EN ISO 15609-1/UNI EN ISO 15614-11
WLD: UNI EN ISO 14732 operator
NDT: UNI EN ISO 9712 operator

Document issued by the mill's Inspector
D. Ricco

Document confirmed by the authorized company responsible
W. Amodeo

CERTIFIED MATERIAL REPORT

CMR No. : 1502253500015 Date of Issue : 2015-02-25

Customer	HYUNDAI WELDING EUROPE OFFICE		
Trade Name	SMT-316LSi Inox	Size	1.6mm*1000mm*5kg
Lot No.	V9988	Purchaser's Order No.	
Applicable Specification	AWS A5.9 ER316LSi	* According to EN 10204-2004 : 3.1	

Welding Current		Shielding Gas		Post Weld Heat Treatment (℃ × hr.)	

Mechanical Properties	Tensile Test			Impact Test (CVN - Joule)				
	YS(MPa)	TS(MPa)	EL(%)	Temp.(℃)	X1	X2	X3	Avg.
	-	-	-		-	-	-	-
Spec.								

Chemical Composition (%)

	C	Si	Mn	P	S	Cu	Ni	Cr	Mo		
(WIRE)	0.021	0.97	1.71	0.027	0.011	0.20	11.33	18.30	2.57		
Spec.	≤0.03	0.65 ~1.00	1.0 ~2.5	≤0.03	≤0.03	≤0.75	11.0 ~14.0	18.0 ~20.0	2.0 ~3.0		

We hereby certifies that the material covered by this report has been inspected in accordance with and been found to meet the applicable requirements of specification and customer's requirements.

Approved by

K.W. Park

QA Manager Park K. W.

HYUNDAI HYUNDAI WELDING CO., LTD.
Head Office #507,Teheran-ro,Gangnam-gu,Seoul,Republic of Korea
Pohang Plant #100,Daesong-ro,Nam-gu,Pohang,Republic of Korea

SVEJSEPROCEDURE-SPECIFIKATION
WELDING PROCEDURE SPECIFICATION

TJ TECHNOLOGY

Ågade 65
7850 Stoholm

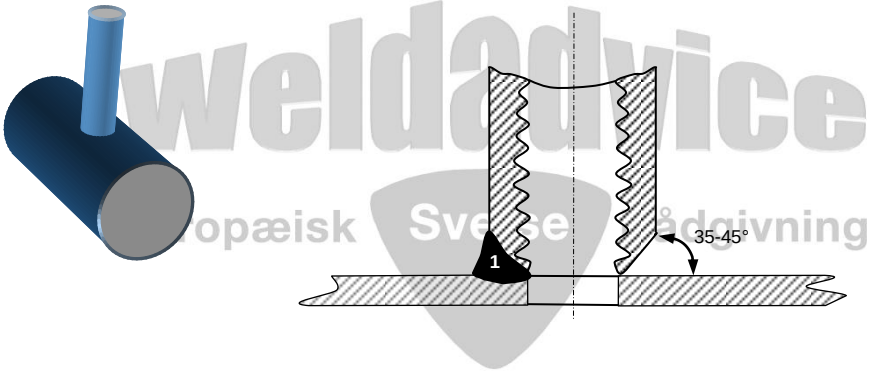
Kvalifikation i henhold til: DS/EN ISO 15613:2005
Qualification i according to:
Standard/Norm:
Standard/Code:
kundens specifikation:
Client's specification:

WPS NO. 141 T-T BBW 8.1 001
Rev No. 0 | Blad/Sheet 1/ 1
Date: 26-01-2016
Dækket af WPQR ./Supported by WPQR 141 T-T BBW 8.1 01

Kunde/Client | Projekt/Project

Standard/Code: EN 10088-3			Grundmaterialer/Base Materials	Standard/Code: EN 10217-7		
Betegnelse Designation/grade	Gruppe nr. / Group no.	Ceqv. max.		Betegnelse Designation/grade	Gruppe nr. / Group no.	Ceqv. max.
1.4301 304L	DS/CEN/CR ISO/TR 15608 *8.1*	-		*1.4301 304L*	DS/CEN/CR ISO/TR 15608 *8.1*	-
Plade/rør Plate/pipe	Tykkelseområde mm Thickness range mm			Plade/rør Plate/pipe	Tykkelseområde mm Thickness range mm	
Rør/pipe	*2,10 - 3,90*	-	til/to	*Rør/Pipe*	*1,40 - 2,60*	-
Rørdiameterområde/ Pipe diameter range Ø mm	*10,0 - 40,0*			Rørdiameterområde/ Pipe diameter range	*≥25,4*	

Fugedetaljer og sømopbygning (Skitse)
Joint details and welding sequence (Sketch)



weldadvice
Europæisk Svejse Rådgivning

Svejsestilling/Welding position: Alle positioner undentaget PG og J-L045/All positions except PG and J-L045

Hæftning/Tacking:	som streng 1 as run no. 1
Min. Forvarmetemp.: Min. preheat temp.:	16°C
Længde: Length:	1-4 mm
Antal strenge: No of runs:	1
Andre data: Other data:	-
2. side: Fugning/Gouging:	
☐ Ja Yes ☒ Nej No	
Forvarmetemp.: Preheat temp.:	°C
Elektrode dia.: Electrode dia.:	mm
Lufttryk: Air pressure:	bar
2. side: Slibning/Grinding:	
☐ Ja Yes ☒ Nej No	

Streng No. / Run No.	Svejse-proces / Weld. proces	G Gas, T Tråd/Wire, P Pulver/Flux, E Electrode ∇ Fabrikat og betegnelse / Manufacture and trade mark	Dimension Diameter -Længde/ Diameter -Length mm	Standard Klassifikation/ Classification G: T: T: E:	H_2 Skala/ Scale	Gas l/min	Gas Dyse/ Nozzle mm^{Ø}	Baggas Back shielding gas Type/ l/min	Bem. Note No.
1	*141*	*G*	*Strandmøllen, Pro Line H_2*	*-*	*R1*	*-*	*8 - 12*	*7-12*	*Formier / 6-10*	-
1	*141*	*T*	*Hyundai SMT-316 LSi*	*1,6*	*G 19 12 3 L Si*	*D*	-	-	- / -	-
1	*141*	*E*	*Wolframelektrode LaO_2*	*1,6 - 2,0*	*WL20*	*-*	-	-	- / -	-
									/	
									/	
									/	
									/	

Streng No. / Run No.	Program nr. / Program No.	AC DC Pol	Strøm/Current Amp	Tråd-hast. Wire speed m/min	mm	Svejsehast mm/min. eller strækkelængde mm Travel speed mm/min. or run-out length mm Volt		S: XX: ∇ U.pendling/stringer pendling/weaving Strengbredde/ run width Max. mm Heat input KJ/mm	Andre data/ Other data	Bem. Note No.
1	-	*DC-*	*70 - 80*	-	-	*8,5 - 9,5*	*36 - 47*	-	*0,46 - 0,76*	-	-

Specielle krav/Special requirements:

Forvarmning/Preheat: 16°C | Mellemstrengstemp:/Interpass temp. max.: °C | Mellemkøling temp /Inter cool temp.: °C time: h

Efterfølgende varmebeh./ Post Weld Heat Treatment PWHT:: ☒ Nej/ no ☐ Ja/ yes

Temperatur/ Temperature: °C | Tid/Time: min. | Opvarmning/heating: °C/ t(/h) | Afkølingsrate/ Cool down rate: °C/ t(/h)

Bemærkninger/Notes:

Dato/Date	Dato/Date 26-01-2015	Dato/Date
Producentens underskrift/ Contractor's signature	Underskrift af eksaminator eller prøvningsorgan Examiner's or examining body's signature	Underskrift af godkendende myndighed/ Certifying Authority's signature

weldadvice Europæisk Svejse Rådgivning Ivan Hvidstad

Svejseprocedureprøvedokumentation

Welding Procedure Qualification Record

Complete documentation

DS/EN ISO 15614-1:2006/A1:2008/A:2:2012

WPQR nr.:	141 T BW 8.1 02
Dimension:	Rør: Ø50,8x2,0 mm
Materiale:	1.4301 - 1.4301

Udarbejdet af

weldadvice

Europæisk Svejse Rådgivning

For

TJ TECHNOLOGY

Ågade 65
7850 Stoholm

Indholdsfortegnelse / Table of contents

Svejseprocedureprøveattest / Welding procedure qualification record

141 T BW 8.1 02

Visuel Kontrol 2015554-VT 02

Ikke Destruktiv Kontrol / Non Destructive Testing
Radiographic testing 78961-116-20219
Penetrant testing 78961-116-20219

Destruktiv Kontrol / Destructive Testing
Mechanical test report M026517:2

Materialecertifikater / Material Certificates
Siderinox S.p.a. EN 10204, 3.1: Heat No: 0440628

Tilsatsmateriale / Consumables
Hyundai SMT-316LSi, Ø1,6 mm EN 10204, 3.1: Lot No: V9988

weldadvice Europæisk Svejse Rådgivning

TJ TECHNOLOGY
Ågade 65
7850 Stoholm

SVEJSEPROCEDUREPRØVEATTEST
WELDING PROCEDURE QUALIFICATION RECORD

Kvalifikation i henhold til: Qualification i according to: DS/EN ISO 15614-1:2006/A1:2008/A:2:2012
Standard/Norm: Standard/Code:
Kundens specifikation: Client's specification:

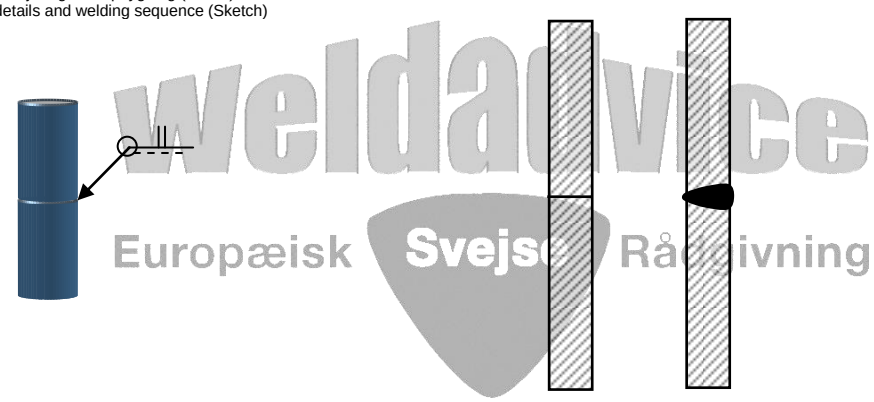
WPQR NO. 141 T BW 8.1 02
Date: 15/01-2016
Blad/Sheet 1/ 1
Side/Page 1 / 2

Kunde/Client | Projekt/Project

Svejsning udført af /Welding carried out by: Brian Ravn | Mærke nr./Stamp no.

Standard/Code: EN 10217-7			Grundmaterialer/Base Materials	Standard/Code: EN 10217-7		
Betegnelse Designation/grade: 1.4301 X5CrNi18-10	Gruppe nr. / Group no. DS/CEN ISO/TR 15608: 8.1	Ceqv. actual: -		Betegnelse Designation/grade: 1.4301 X5CrNi18-10	Gruppe nr. / Group no. DS/CEN ISO/TR 15608: 8.1	Ceqv. actual: -
Plade/rør Plate/pipe: Rør/pipe	Tykkelse/WT mm Thickness/WT mm: 2,0	Dia. mm: 50,8	til/to	Plade/rør Plate/pipe: Rør/pipe	Tykkelse/WT mm Thickness/WT mm: 2,0	Dia. mm: 50,8

Fugedetaljer og sømopbygning (Skitse)
Joint details and welding sequence (Sketch)



weldadvice Europæisk Svejse Rådgivning

Svejsestilling/Welding position: PC

Hæftning/Tacking:	Som Streng 1 / As run no. 1
Min. Forvarmetemp.: Min. preheat temp.:	16 °C
Længde: Length:	4 stk. 2-4 mm
Antal strenge: No of runs:	1
Andre data: Other data:	
2. side: Fugning/Gouging:	☐ Ja Yes ☒ Nej No
Forvarmetemp.: Preheat temp.:	°C
Elektrode dia.: Electrode dia.:	mm
Lufttryk: Air pressure:	bar
2. side: Slibning/Grinding:	☐ Ja Yes ☒ Nej No

Streng No. / Run No.	Svejse-proces / Weld. proces	G T P E ∇	Gas, Tråd/Wire, Pulver/Flux, Electrode; Fabrikat og betegnelse / Manufacture and trade mark	Dimension: Diameter -Længde/ Diameter -Length mm	Standard: Klassifikation/ Classification G T E	H_2 Skala/ Scale EN 1011	Beskyttelsesgas Shielding Gas: l/min	Dyse/ Nozzle mm Ø	Baggas Back shielding gas: Type/ l/min	Bem. Note No.
1	141	G	Strandmøllen, Pro Line H_2	-	EN ISO 14175:2008 / EN ISO 6848: R1	-	9,0	7	Formier / 10	-
1	141	E	Wolframelektrode LaO_2	1,6	WL20	-	-	-	- / -	-
									/ -	-
									/	
									/	
									/	

Streng No. / Run No.	Program nr. / Program No.	AC DC Pol.	Strøm/Current Amp	Tråd-hast. Wire speed m/min	mm	Svejsehast mm/min. eller strækkelængde mm. Travel speed mm/min. or run-out length mm	Volt	S: XX: ∇ U.pendling/stringer pendling/weaving Strengbredde/ run width Max. mm	Heat input KJ/mm	Forvarme/ Preheat /Interpass-temp. °C	Bem. Note No.
1	Pulsed		82	-	-	9,0	99		0,27	16 / -	1*)
										/	
										/	
										/	
										/	
										/	
										/	

Efterfølgende varmebeh./PWHT: ☒ Nej No ☐ Ja, se bilag nr.: Yes, see enclosure No.:

Bemærkninger-andre oplysninger/Notes-other informations
1*) Welding without filler metal

Vi bekræfter, at de givne oplysninger er korrekte og at prøven er tildannet, svejst og varmebehandlet i.h.t. ovennævnte standard/norm og/eller kundens specifikation./We confirm that the statements in this record are correct and that the test was prepared, welded and heat treated according to the above specified standard/code and/or client's specification.

Sted/Place | Dato/Date

Producentens underskrift
Contractor's signature

Prøvesvejsningen var mærket: The test coupon was marked: 2015544-02B, PC H.H. 15/01-2016

Charge/Heat:
Charge/Heat: 0440628
Filler metal Lot: Welded without filler metal

weldadvice Europæisk Svejse Rådgivning
Messingvej 32 B DK 8940 Randers SV
Tlf.: +45 8640 6805 - Fax: +45 8640 6807

Gennemgået/bevidnet
Reviewed/witnessed by

Repræsenterende
Representing

Prøvningsresultat og godkendelse; Se bagside / Test results and approvals; See revers side

NON-DESTRUCTIVE EXAMINATION	WPQR No.: 141 T BW 8.1 02	Blad/Sheet 1/1	Side/Page 2/2

Metode/ Method - resultat / result	Standard	Rapport nr./ Report no.
1. Visual examination Result: ***Accepteret/ Accepted***	Procedure standard: ***DS/EN ISO 17637:2011*** according to: ***DS/EN ISO 5817, Level B (C)***	***2015544-VT-02***
2. Radiographic examination Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 17636-1:2013 Class B*** according to: ***EN ISO 10675-1:2013, Level 1***	***78961-116-20219***
3. Ultrasonic examination Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 17640:2011 class B*** according to: ***EN 11666:2011- level 2***	
4. Magnetic particle testing Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 17638:2009*** according to: ***DS/EN ISO 23278:2009 Level 2x***	
5. Dye penetrant testing Result: ***Accepteret/ Accepted***	Procedure standard: ***EN ISO 3452-1:2013*** according to: ***DS/EN 23277:2009- Level 2x***	***78961-116-20219***
6. Other examination Procedure: Result:	Type: according to:	

Place Randers	Date 19/01-2016	Witnessed/reviewed by (Name/Signature)
Laboratory signature ***or*** Data transferred from enclosed laboratory report by- Signature Heino Harstad		Representing (Examiner or Notified Body)

MECHANICAL TESTING

According to DS/EN ISO 15614-1:2004/A1:2008/A2:2012; PED 97/23/EC

1. Tensile tests

EN ISO 6892-1:2009; EN ISO 4136:2012

Specified Y.S. min. *≥195; ≥230 N/mm²* Specified U.T.S. min. *500 - 700 N/mm² - 470 670 N/mm²*

Test no.	Dim.	Area mm²	Gauge length	Yield Load	$R_{P0,2}$ N/mm²	$R_{P1,0}$ Load	R_{eH} N/mm²	R_m N/mm²	Elong A %	Remarks
TT/1	12.01x1.58	19.16						638		HAZ
TT/2	12.02x1.77	21.49						632		HAZ

2. Bend tests

DS/EN ISO 5173:2010 / EN ISO 7438:2005

Specified degr. 180° Former dia. 4x2 mm

Type and dimensions	Bend angel	Results	Type and dimensions	Bend angel	Results
TFBB/1 (2x18 mm)	180	Accepteret / Accepted	TRBB/1 (2x19 mm)	180	Accepteret / Accepted
TFBB/2 (2x21 mm)	180	Accepteret / Accepted	TRBB/2 (2x19 mm)	180	Accepteret / Accepted

3. Impact tests

EN ISO 148-1:2013/ ISO 9016

Dim.: mm Specified type of test : V-notch Specified: J Testing temp. °C

Test no. VWT	Result J	Test no. VHT 0/1	Result J	Test no. VHT 2/1	Result J	Test no. VHT 5/1	Result J	Test no. VHT 0/1	Result J	Test no. VHT 2/1	Result J	Test no. VHT 5/1	Result J
Average WM		Average FL		Average FL+2		Average FL+5		Average FL		Average FL+2		Average FL+5	

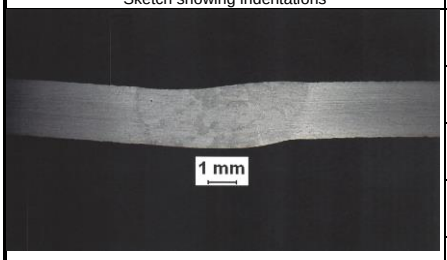
4. Macro Examination

Separate sheet with picture ☒ Yes ☐ No Results: Accepteret / Accepted

5. Hardness tests

ISO 9015-1, EN ISO 6507-1:2006

Specified type of test: HV10 Req. max.

Sketch showing indentations		Base metal (2mm)			HAZ (0,5 mm)				Weld metal			HAZ (0,5mm)				Base metal (2mm)		
	A																	
	B																	
	C																	
	D																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

6. Other/Supplementary Tests.

☒ No ☐ Yes See enclosures:

7. Further enclosures:

M026517:2

Place Randers	25/01-2016	Witnessed/reviewed (Name/Signature)
Laboratory signature ***or*** Data transferred from enclosed laboratory report by- Signature Heino Harstad		Representing (Examiner or Test Body)

Vi godkender herved denne svejseprocedure til svejsning på omtalte projekt under de begrænsninger, der er givet i standarden/normen og/eller kundens specifikation.

We hereby approve this welding procedure for welding on the referring projekt within the limitations given in the standard/code and/or client´s specifikation.

Place Date

Underskrift af kunde/kunderepræsentant
Client´s or representative´s signature

Markrapport
Visuel kontrol af svejsesømme

Rekvirent TJ Technology, Ågade 65, 7850 Stoholm	**Sag nr.** 2015544	**Rapport nr.** VT-02
Entreprenør	**Dato.** 15/01-2016	**side af** 1 / 1
Emne Rør: Ø50,8x2 mm	**Tegning ref.:** 222446-D1324560	
Mrk. 2015544-02B	**Materiale:** X5 CrNi18-10	

Fugetype
☒ Stumpsøm ☐ Kantsøm ☐ Andet ☐ Slebet

PWHT
☐ Ja ☒ Nej

Timer efter svejsning

Undersøgelsesprocedure / klasse
☒ EN ISO 17637 ☐ NS 10250 ☐ ASME Sect. V ☐ Andet:

Kvalitetskrav
☒ EN ISO 5817 Level B (C) ☐ ASME Sect. ☐ Andet:

Udstyr
☒ Hulspejl ☒ Lygte ☐ Skydelære ☐ Kantsømlære ☐ Andet:

Undersøgelsesomfang
☒ Kontrol før svejsning ☒ Kontrol under udførelse ☒ Kontrol efter svejsning ☐

Omfang
☐ Visuel besigtigelse % ☒ Visuel kontrol 100 % ☐ Tilfældigt udvalgt ☐ Udpeget

Undersøgelsens resultat

Accepteret / Accepted

Rep. opmærkning.	**Kontrol af**	**Bilag vedlagt**	**Inspektør**	**Certifikat type. / nr.**
☐ På emne ☐ På skitse	☐ Opslibning ☐ Reparation	☐ Ingen ☐ Stk.		IWT-NO/0147

Attestationer	**Tekniker**	**Certifikat type / nr.**
	Tekniker	**Certifikat type / nr.**

9-11-01-L

PROVNINGSRAPPORT

utfärdad av ackrediterat provningslaboratorium

TEST REPORT issued by an Accredited Testing Laboratory

SWEDAC ACKREDITERING 5022 ISO/IEC 17025

SAFE CONTROL MATERIALTEKNIK

Beställare / Ordered by
Weldadvice
Messingvej 32B
DK-8940 Randers SV

Orderdatum / Date of order
2016-01-20

Reg. nummer / Reg. number
M026517:2

Er referens / Your reference
Heino Harstad

Inlämningsdatum / Object (-s) received
2016-01-20

Sidnummer / Page
1(4)

Ordernummer / Order number
2016544-02

Rapportdatum / Date of report
2016-01-25

Vår referens / Our reference
Johan Ageryd

Assignment:	Procedure qualification test according to EN ISO 15 614-1:2004.
Test object(s):	Butt weld. Two welded pipes.
Material:	1.4301/1.4307
Group:	8.1
Dimension:	Ø 50.8 x 2 mm
Heat number:	0440628 – C1309304
pWPS:	WPS TJ Tech 01
Procedure number:	2015544-02B
Identification mark:	2015544-02B
Weld method:	141
Position:	PC
Filler metal:	Hyundai SMT-316LSi, Ø1,6 mm.
Note:	-
Result:	Accepted according to referenced standard.
Signature:	SAFE CONTROL Johan Ageryd

"Laboratorier ackrediteras av Styrelsen för ackreditering och teknisk kontroll (SWEDAC) enligt svensk lag. Den ackrediterade verksamheten vid laboratoriet uppfyller kraven i SS-EN ISO/IEC 17 025 (2005). Denna rapport får endast återges i sin helhet, om inte utfärdande laboratorium i förväg skriftligen godkänner annat". Provningsresultaten i denna rapport avser endast provade objekt.

"Laboratories are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) under the terms of Swedish legislation. The accredited laboratory activities meet the requirements in SS-EN ISO/IEC 17 025 (2005). This report may not be reproduced other than in its full, except with the prior written approval of the issuing laboratory". The test results in this report refer only to tested objects.

Safe Control Materialteknik AB • Tillgängligheten 1 • S-417 01 Göteborg
Tel. +46 (0)31 65 64 70 • Fax +46 (0)31 65 64 80
E-mail: info@safecontrol.se • www.safecontrol.se

SWEDAC ACKREDITERING 5622 ISO/IEC 17025

PROVNINGSRAPPORT

utfärdad av ackrediterat provningslaboratorium

TEST REPORT issued by an Accredited Testing Laboratory

Teknisk instruktion / Technical instruction
Tensile testing

Märkning / Marking
2015544-02B

Reg. nummer / Reg. number
M026517:2

TI Dokumentnr./ TI Document no.
SCDR1

Provningsutrustning / Testing equipment
SCM 1, 39, UTM V.2.10.02
SCM 107 extensometer L_e 50 mm

Sidnummer / Page
2(4)

Provning enligt / Testing according to
SS-EN ISO 6892-1:2009B10

Provningsdatum / Testing date
2016-01-21

Utfört av / Performed by
Harald Fredriksson

Tensile testing:

Pipe strip acc. to ISO 4136 / No	Dimensions		Square-area	Yield strength				Tensile strength	Elongation	Location of fracture
	Diameter/ width	Thickness		$R_{p0.2}$	$R_{p1.0}$	R_{eL}	R_{eH}	R_m	A_5	
	mm		mm^2	MPa					%	
TT/1	12.01	1.58	19.16	-	-	-	-	638	-	HAZ
TT/2	12.02	1.77	21.49	-	-	-	-	632	-	HAZ
SS-EN 10217-7:2005 1.4307:				≥180	≥215	-	-	470-670	≥35 T ≥40 L	-
SS-EN 10217-7:2005 1.4301:				≥195	≥230	-	-	500-700	≥35 T ≥40 L	-

Result: Satisfactory according to the requirement for the base material.

Den rapporterade utvidgade mätosäkerheten är baserad på en standardosäkerhet multiplicerad med täckningsfaktor, k=2, vilket för en normaldistribution motsvarar en sannolikhet med ca 95 %. Mätosäkerhetsberäkningarna är utförda i enlighet med EA-4/16:2003.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor, k=2, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The uncertainty evaluation was carried out in accordance with EA-4/16:2003.

R_m: 2.0 % *$R_{p0.2}$ / $R_{p1.0}$:3.0 %* *R_{eH} / R_{eL}: 2.0 %*

Signatur/ Signature:

SAFE CONTROL Harald Fredriksson

PROVNINGSRAPPORT

utfärdad av ackrediterat provningslaboratorium

TEST REPORT issued by an Accredited Testing Laboratory

Teknisk instruktion / Technical instruction	Märkning / Marking	Reg. nummer / Reg. number
Bend testing	2015544-02B	M026517:2
TI Dokumentnr./ TI Document no.	**Provningsutrustning / Testing equipment**	**Sidnummer / Page**
SCSP1	SCM 1 and mandrel Ø 8mm	3(4)
Provning enligt / Testing according to	**Provningsdatum / Testing date**	**Utfört av / Performed by**
SS-EN ISO 7438:2005	2016-01-21	Harald Fredriksson

Bend testing:

Sample type acc. to SS-EN ISO 5173 / No	Dimensions		Bending-angle	Diameter of mandrel	Observations and result
	Thickness (a)	Width (b)			
	mm	mm	°		
TFBB/1	2	18	180	4 x Test thickness (a)	Satisfactory, without remarks.
TFBB/2	2	21	180	4 x Test thickness (a)	Satisfactory, without remarks.
TRBB/1	2	19	180	4 x Test thickness (a)	Satisfactory, without remarks.
TRBB/2	2	19	180	4 x Test thickness (a)	Satisfactory, without remarks.

Result: Satisfactory according to the requirement in EN ISO 15614-1.

Den rapporterade utvidgade mätosäkerheten är baserad på en standardosäkerhet multiplicerad med täckningsfaktor, k=2, vilket för en normaldistribution motsvarar en sannolikhet med ca 95 %. Mätosäkerhetsberäkningarna är utförda i enlighet med EA-4/16:2003.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor, k=2, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The uncertainty evaluation was carried out in accordance with EA-4/16:2003.

Length measurment: ± 0.2mm

Signatur/ Signature: SAFE CONTROL Harald Fredriksson

PROVNINGSRAPPORT

utfärdad av ackrediterat provningslaboratorium

TEST REPORT issued by an Accredited Testing Laboratory

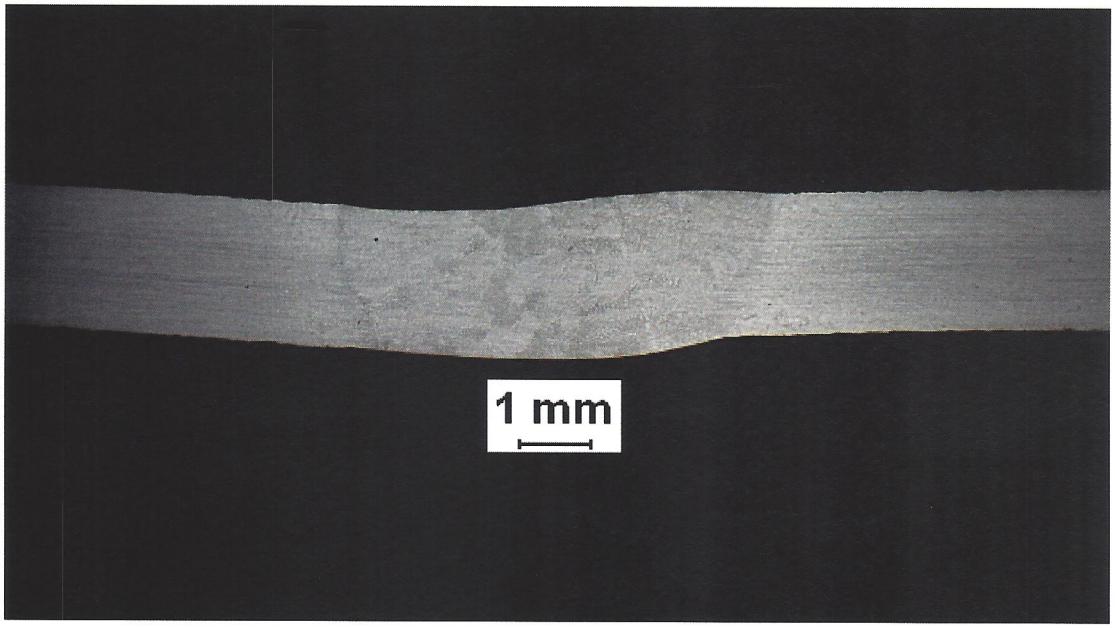
Teknisk instruktion / Technical instruction Macroscopic and microscopic examination of welds	**Märkning / Marking** 2015544-02B	**Reg. nummer / Reg. number** M026517:2
TI Dokumentnr./ TI Document no. SCMM1	**Provningsutrustning / Testing equipment** SCM 9	**Sidnummer / Page** 4(4)
Provning enligt / Testing according to SS-EN 1321	**Provningsdatum / Testing date** 2016-01-21	**Utfört av / Performed by** Johan Ageryd

Macroscopic examination:

One macro sample was cut out for macroscopic examination of weld metal, HAZ and base metal. The macro sample was ground (to 2000- paper) and examined in not etched and etched condition at magnification of 1× - 20×.

Macro sample			Base metal		Filler metal	Etchant *(acc. to SIS-CEN/CR 12361:1996)*
ID / No	Position	Orientation	Left	Right		
2015544-02B	PC	Perpendicular to the weld direction	1.4301/1.4307	1.4301/1.4307	Hyundai SMT-316LSi	B.5 (Kalling´s)
Examined macro sample is assessed to fulfil the requirements in EN ISO 5817:2014. See macro photo below.						

Macro photo:



Den rapporterade utvidgade mätosäkerheten är baserad på en standardosäkerhet multiplicerad med täckningsfaktor, k=2, vilket för en normaldistribution motsvarar en sannolikhet med ca 95 %. Mätosäkerhetsberäkningarna är utförda i enlighet med EA-4/16:2003.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor, k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. The uncertainty evaluation was carried out in accordance with EA-4/16:2003.

Length measurement: ± 1.5 %

Not.: Avsteg från punkt 10 i SS-EN 1321 har gjorts. Beteckning har ej redovisats i enlighet med exemplifierade versioner.
Note: Deviation from clause 10 in SS-EN 1321 has been done. Description has not been presented in accordance with exemplified versions.

Signatur/ Signature:

SAFE CONTROL
Johan Ageryd

SIDERINOX

Siderinox S.p.a. Frazione Caselle 20081 Morimondo (MI) Italia
Ufficio Commerciale: Tel. 02 9498151 - Fax 02 949815250/251
Ufficio Amministrativo: Tel. 02 9498161 - Fax 02 949816350
Ufficio Spedizioni: Tel. 02 949816222 - Fax 02 949815350
Ufficio Acquisti : Tel. 02 949816345 - Fax 02 949816350
Casella e-mail: sx@siderinox.it Sito web: www.siderinox.it

Capitale Sociale Euro 3.300.000 i.v.
Cod. Fiscale e Reg. Imp. MI N. 01825510157
R.E.A. Milano N. 878116
Centro Meccanografico n. MI074282
Partita IVA 01825510157

AZIENDA CON SISTEMA
DI GESTIONE QUALITÀ
CERTIFICATO DA DNV GL
=ISO 9001=

INSPECTION CERTIFICATE EN 10204 3.1 N° 424885 of 02.02.2015

Purchaser **INOX STAAL A/S**

DDT	SIDERINOX order number	Customer's order
N 8 of 02.02.2015	N 5 of 22.01.2015	N 15836-1 of 22.01.2015

Product description

Stainless steel round pipe Ø 50,8 x 2 mm AISI 304/304L brushed EN 10217-7 Longitudinally welded

Dimension	Steel type	Quantity (m)	Weight (kg)
50,8 x 2 mm	EN 1.4301/1.4307 / AISI 304/304L	366	815

Production Norm	Rolling	Tolerances	Welding factor
EN 10217-7	Hot rolled	D3 \ T3	V=1

Marking MANUFACTURER'S MARK - DIMENSION - STEELGRADE - HEAT N. - PRODUCTION NORM - EXECUTION - E.C. INSPECTOR - WORK INSPEKTOR

Manufacturing process — Surface finishing W0

CHEMICAL COMPOSITION

Heat	% C	%Mn	%P	% S	%Si	%Cr	% Ni	% Mo	% Ti
	0,000 - 0,030	0,000 - 2,000	0,000 - 0,040	0,000 - 0,010	0,000 - 1,000	17,500 - 19,500	8,000 - 10,000	0,000 - 0,000	0,000 - 0,000
0440628	0,022	1,680	0,027	0,001	0,380	18,240	8,090		

The chemical values refer to the certificate issued by the steel mill according to EN 10088 / 10028-7 / ASTM A 240 and stored at our office.

TEST RESULTS

* (D) Direction: (L) Longitudinal, (T) Transverse - ** (P) Position: (W) Welding, (M) Material

Test unit	Test Class	(D) *	(P) **	TENSILE TEST in Nmm2=MPa				HARDNESS
				Yield Strength		Tensile Strength	Elongation	
				Rp 0,2%	Rp 1%	Rm	A %	HRB
				195 -	230 -	500 - 740	40 -	
T14100996	TC1	L	M	246	330	658	48	
T14100998	TC1	L	M	235	314	627	49	

Visual inspection	OK	Drift expanding test		Sealing test	
		UNI EN ISO 8493	OK	UNI EN ISO 10893-1	OK
Check on dimensions	OK	Flattenning test		Non destructive Eddy Current test	
		UNI EN ISO 8492	OK	UNI EN ISO 10893-2	OK
Antimixing test	OK	Weld bend test		Intergranular corrosion test	
		EN 910	OK	N. P.	N. P.

WE CERTIFY THAT THE MATERIAL SUPPLIED COMPLIES WITH THE REQUIREMENTS AGREED ON THIS ORDER

Remarks:

Cerfications:
UNI EN ISO 9001
Dir. PED 97/23/EC Encl. 1, Point 4.3, Comma 3
AQUAP from Nr. 7293-06-TU to Nr 7298-06-TU

Qualifications:
WPS/WPAR: UNI EN ISO 15609-1/UNI EN ISO 15614-11
WLD: UNI EN ISO 14732 operator
NDT: UNI EN ISO 9712 operator

Document issued by the mill's Inspector
D. Ricco

Document confirmed by the authorized company responsible
W. Amodeo

CERTIFIED MATERIAL REPORT

CMR No. : 1502253500015 Date of Issue : 2015-02-25

Customer	HYUNDAI WELDING EUROPE OFFICE		
Trade Name	SMT-316LSi Inox	Size	1.6mm*1000mm*5kg
Lot No.	V9988	Purchaser's Order No.	
Applicable Specification	AWS A5.9 ER316LSi	* According to EN 10204-2004 : 3.1	

Welding Current		Shielding Gas		Post Weld Heat Treatment (℃ × hr.)	

Mechanical Properties	Tensile Test			Impact Test (CVN - Joule)				
	YS(MPa)	TS(MPa)	EL(%)	Temp.(℃)	X1	X2	X3	Avg.
	-	-	-		-	-	-	-
Spec.								

Chemical Composition (%)

	C	Si	Mn	P	S	Cu	Ni	Cr	Mo		
(WIRE)	0.021	0.97	1.71	0.027	0.011	0.20	11.33	18.30	2.57		
Spec.	≤0.03	0.65 ~1.00	1.0 ~2.5	≤0.03	≤0.03	≤0.75	11.0 ~14.0	18.0 ~20.0	2.0 ~3.0		

We hereby certifies that the material covered by this report has been inspected in accordance with and been found to meet the applicable requirements of specification and customer's requirements.

Approved by

K.W. Park

QA Manager Park K. W.

HYUNDAI HYUNDAI WELDING CO., LTD.
Head Office #507,Teheran-ro,Gangnam-gu,Seoul,Republic of Korea
Pohang Plant #100,Daesong-ro,Nam-gu,Pohang,Republic of Korea

SVEJSEPROCEDURE-SPECIFIKATION
WELDING PROCEDURE SPECIFICATION

TJ TECHNOLOGY

Ågade 65
7850 Stoholm

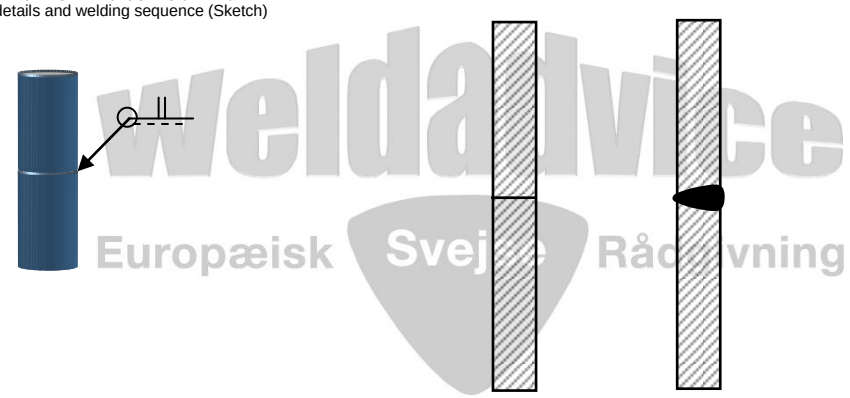
Kvalifikation i henhold til: Qualification i according to: DS/EN ISO 15614-1:2006/A1:2008/A2:2012
Standard/Norm: Standard/Code:
kundens specifikation: Client's specification:

WPS NO. 141 T BW 8.1 002
Rev No. 1 | Blad/Sheet 1/ 1
Date: 06-02-2016
Dækket af WPQR ./Supported by WPQR 141 T BW 8.1 02

Kunde/Client | Projekt/Project

Standard/Code: EN 10217-7			Grundmaterialer/Base Materials	Standard/Code: EN 10217-7		
Betegnelse Designation/grade	Gruppe nr. / Group no.	Ceqv. max.		Betegnelse Designation/grade	Gruppe nr. / Group no.	Ceqv. max.
1.4301 X5CrNi 18-10	DS/CEN/ ISO/TR 15608 *8.1*	-		*1.4301 X5CrNi 18-10*	DS/CEN/ ISO/TR 15608 *8.1*	-
Plade/rør Plate/pipe	Tykkelseområde mm Thickness range mm			Plade/rør Plate/pipe	Tykkelseområde mm Thickness range mm	
Rør/pipe	*1,4 - 2,6*	-	til/to	*Rør/Pipe*	*1,4 - 2,6*	-
Rørdiameterområde/ Pipe diameter range Ø mm	*≥25,4*			Rørdiameterområde/ Pipe diameter range	*≥25,4*	

Fugedetaljer og sømopbygning (Skitse)
Joint details and welding sequence (Sketch)



WeldAdvice Europæisk Svejse Rådgivning

Svejsestilling/Welding position: Alle positioner undentaget PG og J-L045/All positions except PG and J-L045

Hæftning/Tacking:	som streng 1 as run no. 1
Min. Forvarmetemp.: Min. preheat temp.:	16°C
Længde: Length:	1-4 mm
Antal strenge: No of runs:	1
Andre data: Other data:	-
2. side: Fugning/Gouging:	☐ Ja Yes ☒ Nej No
Forvarmetemp.: Preheat temp.:	°C
Elektrode dia.: Electrode dia.:	mm
Lufttryk: Air pressure:	bar
2. side: Slibning/Grinding:	☐ Ja Yes ☒ Nej No

Streng No. / Run No.	Svejse-proces / Weld. proces	G Gas, T Tråd/Wire, P Pulver/Flux, E Electrode ∇ Fabrikat og betegnelse Manufacture and trade mark	Dimension Diameter -Længde/ Diameter -Length mm	Standard Klassifikation/ Classification G: T: T: E:	H_2 Skala/ Scale	Gas l/min	Gas Dyse/ Nozzle mm Ø	Baggas Back shielding gas Type/ l/min	Bem. Note No.
	141	*G Strandmøllen, Pro Line H_2*	*-*	*R1*	*-*	*8 - 12*	*7-12*	*Formier / 6-10*	*-*
	141	*E Wolframelektrode LaO_2*	*1,6 - 2,0*	*WL20*				/	
								/	
								/	
								/	
								/	
								/	

Streng No. / Run No.	Program nr. / Program No.	AC DC Pol	Strøm/Current Amp	Tråd-hast. Wire speed m/min	mm	Svejsehast mm/min. eller strækkelængde mm Travel speed mm/min. or run-out length mm Volt		S: XX: U.pendling/stringer pendling/weaving Strengbredde/ run width Max. mm ∇ Heat input KJ/mm	Andre data/ Other data	Bem. Note No.
1			*75 - 90*	*-*	*-*	*8,5 - 9,5*	*90 -110*	*-* *0,20 - 0,34*	*-*	*1*)

Specielle krav/Special requirements:

Forvarmning/Preheat: 16°C | Mellemstrengstemp:/Interpass temp. max.: °C | Mellemkøling temp /Inter cool temp.: °C time: h

Efterfølgende varmebeh./ Post Weld Heat Treatment PWHT:: ☒ Nej/ no ☐ Ja/ yes

Temperatur/ Temperature: °C | Tid/Time: min. | Opvarmning/heating: °C/ t(/h) | Afkølingsrate/ Cool down rate: °C/ t(/h)

Bemærkninger/Notes:

1*) Svejst uden tilsatsmateriale i rundbord Migatronic type 1002/ *Welded without filler metal in round table type Migatronic 1002*

Dato/Date	Dato/Date 06-02-2016	Dato/Date
Producentens underskrift/ Contractor's signature	Underskrift af eksaminator eller prøvningsorgan Examiner's or examining body's signature	Underskrift af godkendende myndighed/ Certifying Authority's signature

WeldAdvice Europæisk Svejse Rådgivning Larstad