



ASPC Project



END CUSTOMER	: Arya Sasol Polymer Company
CONTRACTOR	: DYPNF Co., Ltd.
VENDOR NAME	: Airpack Netherlands BV
EQUIPMENT DESCRIPTION	: Screw Compressor & Roots Blower Package
PURCHASE ORDER NUMBER	: PO-PC2312-08

Customer Number Document : 3944-VD-0171-DYP-RE-400-PRC-0017

Airpack Document Number : 23383-25

Document Title : PQR / WPS for Skid

Review Code and Status		Contractor Initials/Signature	Date signed
<input type="checkbox"/>	Code 1 REJECTED - Vendor to revise and Resubmit. Work cannot proceed		
<input checked="" type="checkbox"/>	Code 2 Comments As Noted - Work May proceed, subject to compliance with and incorporation of comments	H.J, Kim	2025-07-17
<input type="checkbox"/>	Code 3 No Comments - Work may proceed.		
<input type="checkbox"/>	Code 4 Information only - Review not required.		

Rev. No.	Description	Date	Prepared by	Checked by	Approved by
00	Issued for Information	16-04-2025	SC	SC	JJ

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (PQR)

WeldOffice WPS



PQR record number Date	RET 0245029-001-25 13-6-2012	Revision 1	WPS record number Company name Welding standard	S2300 Airpack Netherlands BV AWS D1.1/D1.1M:2010	Revision 0
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BASE METALS

	Product form	Specification (type or grade)	P no.	Grp-no.	Size	Sch.	Thick. (mm)	Dia. (mm)
Welded to:	Plate	API 2W (50)	U	II	-	-	30	-
	Plate	API 2W (50)	U	II	-	-	30	-
and tested:	Without PWHT, Fillet-weld test							
Notes								

JOINTS

Joint design	
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1. Add welding map
 2. Such WPS shall not have been in effect for more than six years prior to the date of the purchase order.
 3. Procedure tests for all welding processes shall be qualified using the same welding consumables and flux as will be used on the actual item. A change from one Manufacturer's consumable or flux to that from another Manufacturer, or change of type or grade from the same Manufacturer shall require requalification
 4. GMAW shall not be used where impact testing is required on carbon steel welds.
 5. Procedure tests for all welding processes shall be qualified using the same welding consumables and flux as will be used on the actual item. A change from one Manufacturer's consumable or flux to that from another Manufacturer, or change of type or grade from the same Manufacturer shall require requalification. The procedure qualification for low alloy and carbon steels shall have impact test at either - 18 ° C or the minimum design temperature (MDT), whichever is lower. The minimum value of an individual specimen shall not be less than 80% of the average value of acceptance criteria specified in ASME code
 6. When rutile type (i.e. E71T - 1 type) consumables are used with impact testing required, test reports on a Certified Material Test Report should be required per A/SFA 5.01. Alternatively, the specific brand and trade name of the consumable used in production should be qualified on supporting PQRs with impact test results meeting the minimum design code requirements.
 7. The materials of PQR and WPS are different (Only materials applicable to the ASPC Project should be submitted.)

WELDING PROCESSES

Welding process Type	
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FILLER METALS

SFA specification	
AWS classification	
Filler metal F-number	
Weld metal A-number	
Filler metal nominal composition	
Filler metal trade name	
Filler metal size	
Deposited thickness	
Maximum pass thickness	
Weld deposit chemistry	
Supplemental filler metal	
Supplemental filler metal vol.	

POSITION

Position	
Weld progression	

PREHEAT

Preheat temperature	
Maximum interpass temperature	

GAS

Shielding gas:	Type	
	Flow rate	
Trailing gas:	Type	
	Flow rate	
Backing gas:	Type	
	Flow rate	

ELECTRICAL

Filler metal size	
Amperes	
Volts	
Travel speed	(m)
Maximum heat input	(k)
Current/polarity	
Wire feed speed	(l)
Arc transfer mode	

TECHNIQUE

String or weave	Stringer and Weave
Orifice/gas cup size	15
C.T.W.D (mm)	15
Multi/single electrode	Single electrode
Multi/Single pass per side	Single and Multiple passes
Peening	Not used
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

Airpack Netherlands BV

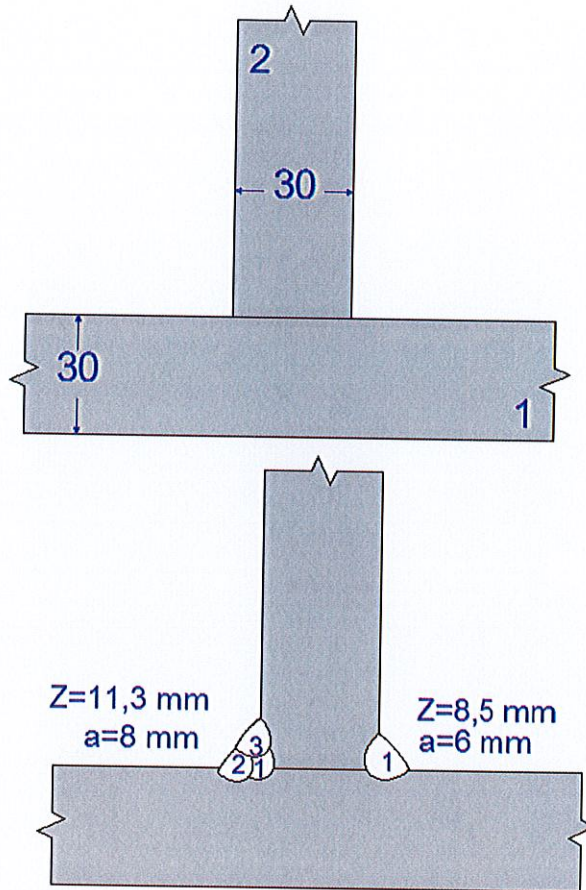
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AWS - Additional information (PQR)

WeldOffice WPS



PQR record number	RET 0245029-001-25	Revision 1	WPS record number	S2300	Revision 0
Date	13-6-2012		Company name	Airpack Netherlands BV	
			Welding standard	AWS D1.1/D1.1M:2010	



Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding conditions - (PQRD Welding Data Record)

WeldOffice WPS



PQRD number	ARL1559-13	Revision 1	Date	29-5-2012
PQR number	RET 0245029-001-25	Revision 1	Welding standard	AWS D1.1/D1.1M:2010
WPS number	S2300	Revision 0	Company name	Airpack Netherlands BV
			To be tested	Without PWHT

WELDING PROCESSES

Welding process	GMAW
Type	Semi-automatic

BASE METALS

Product form	Plate
Material control number	362705
Specification (type or grade)	API 2W (50)
Nominal composition	C-Mn
Trade name	Dillinger Hutte
P number	U
G number	
AWS group number	II
Nominal pipe/tube size	-
Schedule	-
Length	(mm) 350
Width (OD)	(mm) 150
Thickness	(mm) 30

Welded to:

Product form	Plate
Material control number	362705
Specification (type or grade)	API 2W (50)
Nominal composition	C-Mn
Trade name	Dillinger Hutte
P number	U
G number	
AWS group number	II
Nominal pipe/tube size	-
Schedule	-
Length	(mm) 350
Width (OD)	(mm) 150
Thickness	(mm) 30

JOINTS

Joint design	Fillet weld	See addition information	See addition information

CLEANING/ROOT TREATMENT

Surface preparation	Grinding
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

Airpack Netherlands BV

Groenewegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding parameters - (PQRD Welding Data Record)

WeldOffice WPS



PQRD number	ARL1559-13	Revision 1	Date	29-5-2012
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PASS INFORMATION

Pass number	1 single layer	1 Multi layer	1 Multi layer	2 Multi layer
Layer number	1	1	2	2

WELDING PROCESSES

Welding process	GMAW	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic

FILLER METALS

Material control number	P1FC110214	P1FC110214	P1FC110214	P1FC110214
SFA specification	5.18	5.18	5.18	5.18
AWS classification	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4
Filler metal F-number	6	6	6	6
Weld metal A-number	-	-	-	-
Filler metal nominal composition	N.A.	N.A.	N.A.	N.A.
Filler metal trade name	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H
Filler metal size (mm)	1,2	1,2	1,2	1,2
Length of filler metal consumed (mm)	-	-	-	-
Deposited thickness (mm)	4	4	4	4
Maximum pass thickness (mm)	5	5	5	5
Weld deposit chemistry	-	-	-	-
Supplemental filler metal	-	-	-	-
Supplemental filler metal vol. (mm³)	-	-	-	-

POSITION

Position	2F	2F	2F	2F
Weld progression	-	-	-	-

PREHEAT

Preheat temperature (°C)	10	10	10	10
Maximum interpass temperature (°C)	10	10	85	112

GAS

Shielding gas: Type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	15	15	15	15
Trailing gas: Type	None	None	None	None
Flow rate (l/min)	-	-	-	-
Backing gas: Type	None	None	None	None
Flow rate (l/min)	-	-	-	-

ELECTRICAL

Filler metal size (mm)	1,2	1,2	1,2	1,2
Amperes	245	247	237	240
Volts	26.4	26.4	26.6	26.4
Travel speed (mm/min)	315	315	391	382
Maximum heat input (kJ/mm)	1,232	1,2421	0,9674	0,9952
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Wire feed speed (m/min)	-	-	-	-
Arc transfer mode	Spray	Spray	Spray	Spray

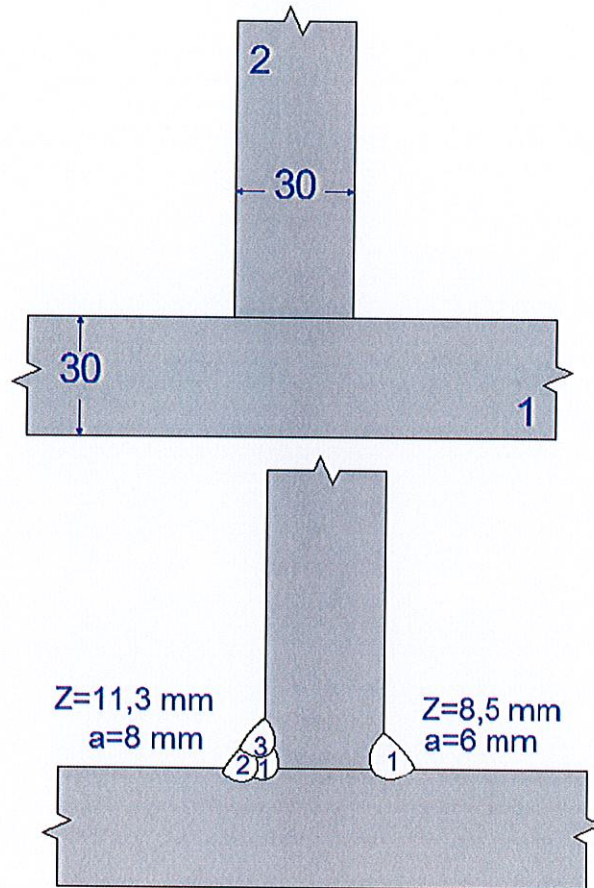
TECHNIQUE

String or weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave
Orifice/gas cup size	15	15	15	15
C.T.W.D (mm)	15	15	15	15
Multi/single electrode	Single electrode	Single electrode	Single electrode	Single electrode
Multi/Single pass per side	Multiple passes	Single pass	Multiple passes	Multiple passes
Peening	Not used	Not used	Not used	Not used
Initial/interpass cleaning	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding
Back gouging method	None	None	None	None

PASS PERFORMED/WITNESSED BY

Welders name	T. Lajos	T. Lajos	T. Lajos	T. Lajos
Recorded/witnessed by	A.J.H. Roza (IWT/IWI)	A.J.H. Roza (IWT/IWI)	A.J.H. Roza (IWT/IWI)	A.J.H. Roza (IWT/IWI)
Date	29-5-2012	29-5-2012	29-5-2012	29-5-2012
Data entry by	A.J.H. Roza (IWT/IWI)	A.J.H. Roza (IWT/IWI)	A.J.H. Roza (IWT/IWI)	A.J.H. Roza (IWT/IWI)

PQRD number	ARL1559-13	Revision 1	Date	29-5-2012
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WPS record number	S2300	Revision 6	Qualified to	AWS D1.1/D1.1M:2020
Date	Tuesday, 03 January 2023		Company name	Airpack Netherlands BV
Supporting PQR(s)	RET0245029-001-25 – Rev 1			
Reference docs.	Test record: ARL 1559-13			

Scope	Fillet welds single layer a = ≤ 6 mm and multi-layer fillet welds a = ≥ 8 mm without PWHT, Fillet-weld test
Joint	Joint details for this welding procedure specification in: Production drawings,

BASE METALS

Type	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Welded to	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Backing:	None
Retainers	
Notes	

THICKNESS RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Complete pen.	-	-	-	-
Impact tested	-	-	-	-
Partial pen.	-	-	-	-
Fillet welds	3,0	No max.	-	-

RQR is API 2W(50)

DIAMETER RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Nominal pipe size	600.	no max.	-	-

FILLER METALS

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	THICKNESS RANGE QUALIFIED (mm)			
						As-welded		With PWHT	
						Min.	Max.	Min.	Max.
GMAW	5.18	ER70C-6MH4	-	-	Lincoln, Outershield MC715-H	3,	No max.	-	-
Note	-	-	-	-	-	Single pass a=6 mm and smaller Multi pass a=8 mm and larger			

WELDING PROCEDURE

Welding process	GMAW	
Type	Semi-automatic	
Minimum preheat/interpass temperature (°C)	10	
Maximum interpass temperature (°C)	112 Method contact thermometer	
Filler metal size (mm)	1,2	
Layer number	All	
Position	F, H	
Weld progression	-	
Current/polarity	DCEP (Reverse polarity)	
Amperes	1 Single Layer 220 – 269 1 Multi layer 222 – 271 2 Multi layer 213 -260 3 Multi layer 216 -264	
Volts	1 Single Layer 24,5 – 28,2 1 Multi layer 24,5 – 28,2 2 Multi layer 24,7 -28,4 3 Multi layer 24,5 – 28,2	
Travel speed (mm/min)	1 Single Layer 236 – 293 1 Multi layer 236 – 293 2 Multi layer 293 - 488 3 Multi layer 286 -477	
Maximum heat input (kJ/mm)	1 Single Layer 1,23 1 Multi layer 1,24 2 Multi layer 0,96 3 Multi layer 0,99	
Arc transfer mode	Spray	
Shielding: Gas type	AC-20 (A5.32 SG)	
Flow rate (l/min)	12-22	
Trailing: Gas type	None	
Flow rate (l/min)	None	
Backing: Gas type	None	
Flow rate (l/min)	None	
String or weave	Stringer and Weave	
Orifice/gas cup size	15	
C . T . W . D (mm)	15	
Multi/Single pass per side	Single or Multi passes	
Multi/Single electrode	Single electrode	
Maximum pass thickness (mm)	5	
Weld deposit chemistry	-	
Power source	CV	

WPS record number	S2300	Revision 6	Qualified to	AWS D1.1/D1.1M:2020
Date	Tuesday, 03 January 2023		Company name	Airpack Netherlands BV

PREHEAT TABLE



Applicable standard	
AWS D1.1 (Category A)	For thickness 3 to 19(mm): 0(°C). Preheat to 20(°C) if the base metal temperature is below 0(°C). Over 19 thru 38.1(mm): 66(°C) Over 38.1 thru 63.5(mm): 107(°C) Over 63.5 (mm): 150(°C)

TECHNIQUE

Peening	Not used
Surface preparation	Grinding
Initial/interpass cleaning	Grinding and Brushing
Back gouging method	None

NOTES

Signature 1

Name	Signature	Name	Signature
F. van Toledo			
Date		Date	
Tuesday, 03 January 2023			

PQR record number Date	RET0278790/TK/001 1-6-2016	Revision 1	WPS record number Company name Welding standard	S2600 Airpack Netherlands BV AWS D1.1/D1.1M:2015	Revision 1
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BASE METALS

	Product form	Specification (type or grade)	P no.	Grp-no.	Size	Sch.	Thick. (mm)	Dia. (mm)
Welded to:	Plate	API 2W (50LS)	U	II	-	-	4	-
	Plate	API 2W (50LS)	U	II	-	-	4	-
and tested:	Without PWHT, With impacts, With hardness							
Notes								

JOINTS

Joint design	Single-V-groove	See addition information	See addition information
Backing:	None		
Retainers	None		
Groove angle (deg.)	60		
Root opening (mm)	2-3		
Root face (mm)	0-1		

WELDING PROCESSES

Welding process Type	GMAW Semi-automatic
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FILLER METALS

SFA specification	5.18
AWS classification	E70C-6MH4
Filler metal F-number	6
Weld metal A-number	-
Filler metal nominal composition	N.A.
Filler metal trade name	Lincoln, Outershield MC715-H
Filler metal size (mm)	1,2
Deposited thickness (mm)	4,00
Maximum pass thickness (mm)	3
Weld deposit chemistry	-
Supplemental filler metal	-
Supplemental filler metal vol. (mm ³)	-

POSITION

Position Weld progression	2G -
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PREHEAT

Preheat temperature (°C)	10
Maximum interpass temperature (°C)	124

GAS

Shielding gas:	Type	Flow rate (l/min)	AC-20 (A5.32 SG-) 15
Trailing gas:	Type	Flow rate (l/min)	None -
	Type	Flow rate (l/min)	None -
Backing gas:	Type	Flow rate (l/min)	None -
	Type	Flow rate (l/min)	None -

ELECTRICAL

Filler metal size (mm)	1,2
Waveform control	Not Used
Energy (J)	Not Used
Power (J/s)	Not Used
Arc time (sec)	Not Used
Weld bead length (mm)	Not Used
Amperes	87 - 183
Volts	14,5 - 20,1
Travel speed (mm/min)	117 - 485
Maximum heat input (kJ/mm)	0,45 - 0,64
Current/polarity	DCEP (reverse polarity)
Wire feed speed (m/min)	0
Arc transfer mode	Short-circuiting, Globular

TECHNIQUE

String or weave	Stringer and Weave
Orifice/gas cup size	15
C.T.W.D (mm)	15
Multi/single electrode	Single electrode
Multi/Single pass per side	Multiple passes
Peening	Not used
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None



PQR record number Date	RET0278790/TK/001 1-6-2016	Revision 1	WPS record number Company name Welding standard	S2600 Airpack Netherlands BV AWS D1.1/D1.1M:2015	Revision 1
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TENSILE TESTS						Reduced section
Specimen number	Width (mm)	Thickness (mm)	Area (mm ²)	Ultimate total load (N)	Ultimate unit stress (MPa)	Type of failure and location
1	20.01	3.83	76,838	-	527	Ductile-BM
2	20.02	3.82	76,476	-	502	Ductile-BM
Comments						

GUIDED BEND TESTS			
Type of test	Acceptance criteria	Result	Comments
Root bend	AWS D1.1	Acceptable	
Root bend	AWS D1.1	Acceptable	
Face bend	AWS D1.1	Acceptable	
Face bend	AWS D1.1	Acceptable	
Comments			

TOUGHNESS TESTS								
Specimen number	Notch location	Notch type	Specimen size (mm) x (mm)	Test temperature (°C)	Impact values (J)	Impact values (% Shear)		Drop weight break
1	Weld Metal	Charpy V	10 x 3	-40	29/34/36	-	-	No
2	HAZ	Charpy V	10 x 3	-40	34/48/38	-	-	No
3	HAZ + 1 mm	Charpy V	10 x 3	-40	55/47/48	-	-	No
4	HAZ + 2 mm	Charpy V	10 x 3	-40	52/52/53	-	-	No
5	HAZ + 5 mm	Charpy V	10 x 3	-40	48/48/51	-	-	No
Comments								

HARDNESS TEST						
Type (Scale)	Distance from surface	API 2W (50LS)	HAZ	Weld	HAZ	API 2W (50LS)
Vickers (HV)	Cap area 1-2 mm	170-172-170	192-208-218-218-214	203-211-211-211-208	209-207-203-208-208	169-167-167
Vickers (HV)	Cap area 1-2 mm	166-167-167	192-204-212-211-206	207-203-207-205-200	216-214-216-211-194	170-170-169
Comments						

OTHER TESTS			
Type of test	Acceptance criteria	Result	Comments
2x Macroscopic examination	AWS D1.1	Acceptable	
RT examination	AWS D1.1	Acceptable	
MT examination	AWS D1.1	Acceptable	
Comments			

CERTIFICATION				
Welder's name	ID Number	Stamp number	Mechanical testing by Laboratory test number Test file number Tests conducted by	Element Breda (NL) ARJ001-16-01-18390-1 ARL2064-1 A. Karstanje
Dorremans M.	ID Card IKP0996J6	W-013		

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of section 4 of ANSI/AWS D1.1 Structural Welding Code-Steel.

Signature 1

Name F. van Toledo	Signature
Date 1-6-2016	

Signature 2

Name T. Konings(Lloyds)	Signature
Date 1-6-2016	



PQRD number	ARL2064-1	Revision 1	Date	11-01-2016
PQR number	RET0278790/TK/001	Revision 1	Welding standard	AWS D1.1/D1.1M:2015
WPS number	S2600	Revision 1	Company name	Airpack Netherlands BV
			To be tested	Without PWHT

WELDING PROCESSES

Welding process	GMAW
Type	Semi-automatic

BASE METALS

Product form	Plate	Welded to:	Product form	Plate
Material control number	816729 293819/1		Material control number	816729 293819/1
Specification (type or grade)	API 2W (50LS)		Specification (type or grade)	API 2W (50LS)
Nominal composition	C-Mn		Nominal composition	C-Mn
Trade name	Voestalpine Grobblech		Trade name	Voestalpine Grobblech
P number	U		P number	U
G number			G number	
AWS group number	II		AWS group number	II
Nominal pipe/tube size	-		Nominal pipe/tube size	-
Schedule	-		Schedule	-
Length (mm)	500		Length (mm)	500
Width (OD) (mm)	200		Width (OD) (mm)	200
Thickness (mm)	4		Thickness (mm)	4

JOINTS

Joint design	Single-V-groove	See addition information	See addition information
Backing:	None		
Retainers	None		
Groove angle (deg.)	60		
Root opening (mm)	2-3		
Root face (mm)	0-1		

CLEANING/ROOT TREATMENT

Surface preparation	Grinding
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

PQRD number	ARL2064-1	Revision 1	Date	11-01-2016
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PASS INFORMATION

Pass number	1	2	3
Layer number	1	2	2

WELDING PROCESSES

Welding process	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic

FILLER METALS

Material control number	P1FC150311	P1FC150311	P1FC150311
SFA specification	5.18	5.18	5.18
AWS classification	E70C-6MH4	E70C-6MH4	E70C-6MH4
Filler metal F-number	6	6	6
Weld metal A-number	-	-	-
Filler metal nominal composition	N.A.	N.A.	N.A.
Filler metal trade name	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H
Filler metal size (mm)	1,2	1,2	1,2
Length of filler metal consumed (mm)	-	-	-
Deposited thickness (mm)	2	2	2
Maximum pass thickness (mm)	3	3	3
Weld deposit chemistry	-	-	-
Supplemental filler metal	-	-	-
Supplemental filler metal vol. (mm ³)	-	-	-

POSITION

Position	2G	2G	2G
Weld progression	-	-	-

PREHEAT

Preheat temperature (°C)	10	10	10
Maximum interpass temperature (°C)	10	69	124

GAS

Shielding gas: Type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	15	15	15
Trailing gas: Type	None	None	None
Flow rate (l/min)	-	-	-
Backing gas: Type	None	None	None
Flow rate (l/min)	-	-	-

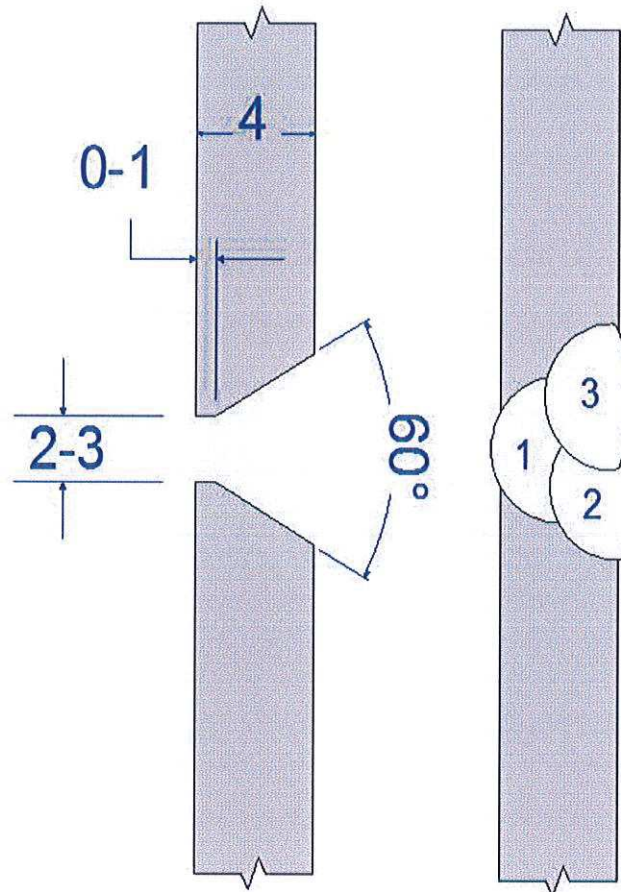
ELECTRICAL

Filler metal size (mm)	1,2	1,2	1,2
Waveform control	Not Used	Not Used	Not Used
Energy (J)	-	-	-
Power (J/s)	-	-	-
Arc time (sec)	-	-	-
Weld bead length (mm)	-	-	-
Amperes	87	182	183
Volts	14.5	20.1	20.1
Travel speed (mm/min)	117	485	450
Maximum heat input (kJ/mm)	0,6469	0,4526	0,4904
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Wire feed speed (m/min)	-	-	-
Arc transfer mode	Short-circuiting	Globular	Globular

TECHNIQUE

String or weave	Stringer and Weave	Stringer and Weave	Stringer and Weave
Orifice/gas cup size	15	15	15
C.T.W.D (mm)	15	15	15
Multi/single electrode	Single electrode	Single electrode	Single electrode
Multi/Single pass per side	Multiple passes	Multiple passes	Multiple passes
Peening	Not used	Not used	Not used
Initial/interpass cleaning	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding
Back gouging method	None	None	None

PQRD number	ARL2064-1	Revision 1	Date	11-01-2016
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WPS record number	S2600	Revision 5	Qualified to	AWS D1.1/D1.1M:2020
Date	Thursday, 29 September 2022		Company name	Airpack Netherlands BV
Supporting PQR(s) Reference docs.	RET0278790/TK/001 - Rev 1			

Scope	Groove, no PWHT (As-welded), impact testing
Joint	Joint details for this welding procedure specification in: Production drawings

BASE METALS

Type	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Welded to	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Backing:	None
Retainers	None
Notes	

THICKNESS RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Complete pen.	3,	8,	-	-
Impact tested	3,	8,	-	-
Partial pen.	3,	8,	-	-
Fillet welds	no min.	no max.	-	-

DIAMETER RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Nominal pipe size	600,	no max.	-	-

FILLER METALS

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	THICKNESS RANGE QUALIFIED (mm)			
						As-welded		With PWHT	
						Min.	Max.	Min.	Max.
GMAW	5.18	E70C-6MH4	-	-	Lincoln, Outershield MC715-H	3,	8,	-	-
GMAW						-	-	-	-
GMAW						-	-	-	-
Sup. filler						- Required -			
Suppl. filler metal vol. (mm ³)	-								

WELDING PROCEDURE

	GMAW	GMAW	GMAW
Welding process	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic
Minimum preheat/interpass temperature (°C)	10	10	10
Maximum interpass temperature (°C)	124 Method contact thermometer	124 Method contact thermometer	124 Method contact thermometer
Filler metal size (mm)	1,2	1,2	1,2
Layer number	Root	Fill	Cap
Position	F,H	F,H	F,H
Weld progression	Not applicable	Not applicable	Not applicable
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Waveform control	Not Used	Not Used	Not Used
Energy (J)	Not Used	Not Used	Not Used
Power (J/s)	Not Used	Not Used	Not Used
Amperes	80 - 100	175 - 185	175 - 185
Volts	14 - 16	19 - 21	19 - 21
Travel speed (mm/min)	110 - 120	460 - 500	440 - 470
Maximum heat input (kJ/mm)	0,57 - 0,70	0,40 - 0,49	0,44 - 0,53
Wire feed speed (m/min)	Not used	Not used	Not used
Arc transfer mode	Short-circuiting	Globular	Globular
Shielding: Gas type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	14 - 16	14 - 16	14 - 16
Trailing: Gas type	None	None	None
Flow rate (l/min)	-	-	-
Backing: Gas type	None	None	None
Flow rate (l/min)	-	-	-
String or weave	Stringer or Weave	Stringer or Weave	Stringer or Weave
Orifice/gas cup size	15	15	15
C.T.W.D (mm)	15	15	15
Multi/Single pass per side	Single pass	Multiple passes	Multiple passes
Multi/single electrode	Single electrode	Single electrode	Single electrode
Maximum pass thickness (mm)	5	5	5
Weld deposit chemistry	-	-	-
Power Source	CV	CV	CV

WPS record number	S2600	Revision 5	Qualified to	AWS D1.1/D1.1M:2020
Date	Thursday, 29 September 2022		Company name	Airpack Netherlands BV

PREHEAT TABLE

Applicable standard	
AWS D1.1 (Category B)	For thickness 3 to 19(mm): 0(°C). Preheat to 20(°C) if the base metal temperature is below 0(°C). Over 19 thru 38.1(mm): 10(°C). Over 38.1 thru 63.5(mm): 66(°C). Over 63.5(mm): 107(°C).


TECHNIQUE

Peening	Not used
Surface preparation	Grinding
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

NOTES

Signature 1

Signature 2

Name	Signature	Name	Signature
F. van Toledo			
Date		Date	
Thursday, 29 September 2022			



Airpack Netherlands BV
 Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands
AWS - Procedure Qualification Record (PQR)
 WeldOffice WPS

PQR record number	RET0278790/TK/002	Revision 1	WPS record number	S2700	Revision 1
Date	31-5-2016		Company name	Airpack Netherlands BV	
			Welding standard	AWS D1.1/D1.1M:2015	

BASE METALS

	Product form	Specification (type or grade)	P no.	Grp-no.	Size	Sch.	Thick. (mm)	Dia. (mm)
Welded to:	Plate	API 2W (50LS)	U	II	-	-	8	-
	Plate	API 2W (50LS)	U	II	-	-	8	-
and tested:	Without PWHT, With impacts, With hardness							
Notes								

JOINTS

Joint design	Single-V-groove	See addition information	See addition information
Backing:	None		
Retainers	None		
Groove angle (deg.)	60		
Root opening (mm)	2-3		
Root face (mm)	0-1		

WELDING PROCESSES

Welding process	GMAW
Type	Semi-automatic

FILLER METALS

SFA specification	5.18
AWS classification	E70C-6MH4
Filler metal F-number	6
Weld metal A-number	-
Filler metal nominal composition	N.A.
Filler metal trade name	Lincoln, Outershield MC715-H
Filler metal size (mm)	1,2
Deposited thickness (mm)	6,00
Maximum pass thickness (mm)	3
Weld deposit chemistry	-
Supplemental filler metal	-
Supplemental filler metal vol. (mm ³)	-

POSITION

Position	2G
Weld progression	-

PREHEAT

Preheat temperature (°C)	10
Maximum interpass temperature (°C)	178

GAS

Shielding gas:	Type	AC-20 (A5.32 SG-)
	Flow rate (l/min)	15
Trailing gas:	Type	None
	Flow rate (l/min)	-
Backing gas:	Type	None
	Flow rate (l/min)	-

ELECTRICAL

Filler metal size (mm)	1,2
Waveform control	Not Used
Energy (J)	Not Used
Power (J/s)	Not Used
Arc time (sec)	Not Used
Weld bead length (mm)	Not Used
Amperes	130 - 197
Volts	15,9 - 22,2
Travel speed (mm/min)	142 - 383
Maximum heat input (kJ/mm)	0,67 - 0,67
Current/polarity	DCEP (reverse polarity)
Wire feed speed (m/min)	0
Arc transfer mode	Short-circuiting, Globular

TECHNIQUE

String or weave	Stringer and Weave
Orifice/gas cup size	15
C.T.W.D (mm)	15
Multi/single electrode	Single electrode
Multi/Single pass per side	Multiple passes
Peening	Not used
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

PQR record number Date	RET0278790/TK002 31-5-2016	Revision 1	WPS record number Company name Welding standard	S2700 Airpack Netherlands BV AWS D1.1/D1.1M:2015	Revision 1
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TENSILE TESTS						Reduced section
Specimen number	Width (mm)	Thickness (mm)	Area (mm ²)	Ultimate total load (N)	Ultimate unit stress (MPa)	Type of failure and location
1	20.03	7.23	144,817	-	529	Ductile-BM
2	20.03	7.28	145,818	-	530	Ductile-BM

Comments

GUIDED BEND TESTS			
Type of test	Acceptance criteria	Result	Comments
Face bend	AWS D1.1	Acceptable	
Face bend	AWS D1.1	Acceptable	
Root bend	AWS D1.1	Acceptable	
Root bend	AWS D1.1	Acceptable	

Comments

TOUGHNESS TESTS								
Specimen number	Notch location	Notch type	Specimen size (mm) x (mm)	Test temperature (°C)	Impact values			Drop weight break
					(J)	(% Shear)	(mm)	
1	Weld Metal	Charpy V	10 x 5	-40	56/56/60	-	-	No
2	HAZ	Charpy V	10 x 5	-40	51/69/60	-	-	No
3	HAZ + 1 mm	Charpy V	10 x 5	-40	115/104/84	-	-	No
4	HAZ + 2 mm	Charpy V	10 x 5	-40	104/99/100	-	-	No
5	HAZ + 5 mm	Charpy V	10 x 5	-40	119/115/104	-	-	No

Comments

HARDNESS TEST						
Type (Scale)	Distance from surface	API 2W (50LS)	HAZ	Weld	HAZ	API 2W (50LS)
Vickers (HV)	Cap area 1-2 mm	166-164-164	184-193-204-205-204	213-214-217-199-211	205-199-198-196-186	167-170-170
	Root area 1-2 mm	171-169-165	186-198-206-206-188	173-184-186-188-187	187-186-186-188-170	165-166-164
Vickers (HV)	Cap area 1-2 mm	165-168-167	197-206-211-211-211	220-221-207-208-219	209-211-207-209-198	168-165-166
	Root area 1-2 mm	167-170-164	187-199-196-191-207	192-196-188-194-189	178-186-180-175-174	162-163-166

Comments

OTHER TESTS			
Type of test	Acceptance criteria	Result	Comments
2x Macroscopic examination	AWS D1.1	Acceptable	
RT examination	AWS D1.1	Acceptable	
MT examination	AWS D1.1	Acceptable	

Comments

CERTIFICATION				
Welder's name	ID Number	Stamp number	Mechanical testing by	Element Breda (NL)
Dorremans M.	ID Card IKP0996J6	W-013	Laboratory test number Test file number Tests conducted by	ARJ001-16-01-18390-2 ARL2064-2 A. Karstarje

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of section 4 of ANSI/AWS D1.1 Structural Welding Code-Steel.

Signature 1

Signature 2

Name F. van Toledo	Signature 	Name T. Konings (Lloyds)	Signature 
Date 1-6-2016		Date 1-6-2016	



PQRD number	ARL2064-2	Revision 1	Date	11-01-2016
PQR number	RET0278790/TK/002	Revision 1	Welding standard	AWS D1.1/D1.1M:2015
WPS number	S2700	Revision 1	Company name	Airpack Netherlands BV
			To be tested	Without PWHT

WELDING PROCESSES

Welding process	GMAW
Type	Semi-automatic

BASE METALS

Product form	Plate
Material control number	816729 293819/1
Specification (type or grade)	API 2W (50LS)
Nominal composition	C-Mn
Trade name	Voestalpine Grobblech
P number	U
G number	
AWS group number	II
Nominal pipe/tube size	-
Schedule	-
Length	(mm) 500
Width (OD)	(mm) 200
Thickness	(mm) 8

Welded to:	Product form	Plate
	Material control number	816729 293819/1
	Specification (type or grade)	API 2W (50LS)
	Nominal composition	C-Mn
	Trade name	Voestalpine Grobblech
	P number	U
	G number	
	AWS group number	II
	Nominal pipe/tube size	-
	Schedule	-
	Length	(mm) 500
	Width (OD)	(mm) 200
	Thickness	(mm) 8

JOINTS

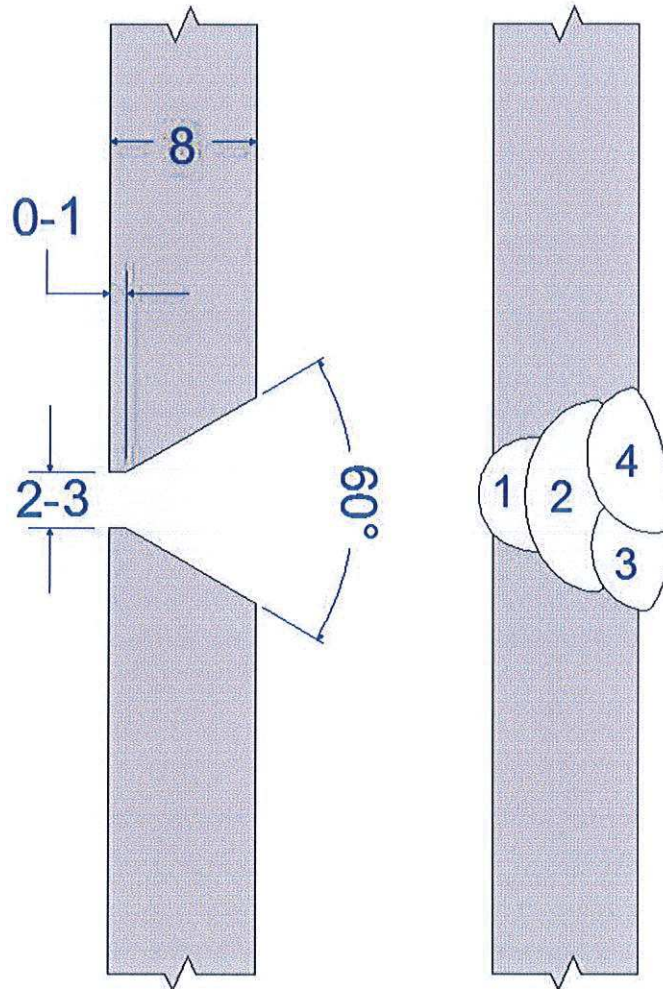
Joint design	Single-V-groove	See addition information	See addition information
Backing:	None		
Retainers	None		
Groove angle	(deg.) 60		
Root opening	(mm) 2-3		
Root face	(mm) 0-1		

CLEANING/ROOT TREATMENT

Surface preparation	Grinding
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

PQRD number	ARL2064-2	Revision 1	Date	11-01-2016
PASS INFORMATION				
Pass number	1	2	3	4
Layer number	1	2	3	3
WELDING PROCESSES				
Welding process	GMAW	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic
FILLER METALS				
Material control number	P1FC150311	P1FC150311	P1FC150311	P1FC150311
SFA specification	5.18	5.18	5.18	5.18
AWS classification	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4
Filler metal F-number	6	6	6	6
Weld metal A-number	-	-	-	-
Filler metal nominal composition	N.A.	N.A.	N.A.	N.A.
Filler metal trade name	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H	Lincoln, Outershield MC715-H
Filler metal size (mm)	1,2	1,2	1,2	1,2
Length of filler metal consumed (mm)	-	-	-	-
Deposited thickness (mm)	2	2	2	2
Maximum pass thickness (mm)	3	3	3	3
Weld deposit chemistry	-	-	-	-
Supplemental filler metal	-	-	-	-
Supplemental filler metal vol. (mm ³)	-	-	-	-
POSITION				
Position	2G	2G	2G	2G
Weld progression	-	-	-	-
PREHEAT				
Preheat temperature (°C)	10	10	10	10
Maximum interpass temperature (°C)	10	69	129	178
GAS				
Shielding gas: Type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	15	15	15	15
Trailing gas: Type	None	None	None	None
Flow rate (l/min)	-	-	-	-
Backing gas: Type	None	None	None	None
Flow rate (l/min)	-	-	-	-
ELECTRICAL				
Filler metal size (mm)	1,2	1,2	1,2	1,2
Waveform control	Not Used	Not Used	Not Used	Not Used
Energy (J)	-	-	-	-
Power (J/s)	-	-	-	-
Arc time (sec)	-	-	-	-
Weld bead length (mm)	-	-	-	-
Amperes	130	196	197	194
Volts	15,9	21,7	22,2	22,2
Travel speed (mm/min)	142	340	383	355
Maximum heat input (kJ/mm)	0,8734	0,7506	0,679	0,7214
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Wire feed speed (m/min)	-	-	-	-
Arc transfer mode	Short-circuiting	Globular	Globular	Globular
TECHNIQUE				
String or weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave
Orifice/gas cup size	15	15	15	15
C.T.W.D (mm)	15	15	15	15
Multi/single electrode	Single electrode	Single electrode	Single electrode	Single electrode
Multi/Single pass per side	Multiple passes	Multiple passes	Multiple passes	Multiple passes
Peening	Not used	Not used	Not used	Not used
Initial/interpass cleaning	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding
Back gouging method	None	None	None	None

PQRD number	ARL2064-2	Revision 1	Date	11-01-2016
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WPS record number	S2700	Revision 5	Qualified to	AWS D1.1/D1.1M:2020
Date	Thursday, 29 September 2022		Company name	Airpack Netherlands BV
Supporting PQR(s)	RET0278790/TK/002 - Rev 1			
Reference docs.				

Scope	General instruction welding structural for skids Groove, fillet, no PWHT (As-welded), impact testing
Joint	Joint details for this welding procedure specification in: Production drawings

BASE METALS

Type	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Welded to	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Backing:	None P-no. Grp-no.
Retainers	None
Notes	

THICKNESS RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Complete pen.	3,	16,	-	-
Impact tested	8,	16,	-	-
Partial pen.	3,	16,	-	-
Fillet welds	no min.	no max.	-	-

DIAMETER RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Nominal pipe size	600,	no max.	-	-

FILLER METALS

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	As-welded		With PWHT	
						Min.	Max.	Min.	Max.
GMAW	5.18	E70C-6MH4	-	-	Lincoln, Outershield MC715-H	3,	16,	-	-
GMAW						-	-	-	-
GMAW						-	-	-	-
Sup. filler	-	-	-	-	-	- None -			

WELDING PROCEDURE

	GMAW	GMAW	GMAW
Welding process	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic
Minimum preheat/interpass temperature (°C)	10	10	10
Maximum interpass temperature (°C)	178 Method contact thermometer	178 Method contact thermometer	178 Method contact thermometer
Filler metal size (mm)	1,2	1,2	1,2
Layer number	Root	Filler	Cap
Position	F, H	F, H	F, H
Weld progression	Not applicable	Not applicable	Not applicable
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Waveform control			
Energy (J)			
Power (J/s)			
Amperes	117 - 143	190 - 210	190 - 210
Volts	15 - 17	21 - 23	22 - 24
Travel speed (mm/min)	135 - 150	320 - 350	350 - 390
Maximum heat input (kJ/mm)	0,8 - 1,0	0,7 - 0,8	0,6 - 0,8
Wire feed speed (m/min)	0,	0	0
Arc transfer mode	Short-circuiting	Globular	Globular
Shielding: Gas type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	12- 22	12 - 22	12 - 2
Trailing: Gas type	None	None	None
Flow rate (l/min)	-	-	-
Backing: Gas type	None	None	None
Flow rate (l/min)	-	-	-
String or weave	Stringer and Weave	Stringer or Weave	Stringer or Weave
Orifice/gas cup size	15	15	15
C.T.W.D (mm)	15	15	15
Multi/Single pass per side	Multiple passes	Multiple passes	Multiple passes
Multi/single electrode	Single electrode	Single electrode	Single electrode
Maximum pass thickness (mm)	5	5	5
Weld deposit chemistry	-	-	-
Power source	CV	CV	CV

WPS record number	S2700	Revision 5	Qualified to	AWS D1.1/D1.1M:2020
Date	Thursday, 29 September 2022		Company name	Airpack Netherlands BV

PREHEAT TABLE

Applicable standard	
AWS D1.1 (Category B)	For thickness 3 to 19(mm): 0(°C). Preheat to 20(°C) if the base metal temperature is below 0(°C). Over 19 thru 38.1(mm): 10(°C). Over 38.1 thru 63.5(mm): 66(°C). Over 63.5(mm): 107(°C).


TECHNIQUE

Peening	Not used
Surface preparation	Grinding
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

NOTES

Signature 1

Signature 2

Name	Signature	Name	Signature
F. van Toledo			
Date		Date	
Thursday, 29 September 2022			

PQR record number	RET0278790/TK/003	Revision 1	WPS record number	S2800	Revision 1
Date	1-6-2016		Company name	Airpack Netherlands BV	
			Welding standard	AWS D1.1/D1.1M:2015	

BASE METALS

	Product form	Specification (type or grade)	P no.	Grp-no.	Size	Sch.	Thick. (mm)	Dia. (mm)
Welded to:	Plate	API 2W (50)LS	U	II	-	-	20	-
	Plate	API 2W (50)LS	U	II	-	-	20	-
and tested:	Without PWHT, With impacts, With hardness							
Notes								

JOINTS

Joint design	Single-V-groove		
Backing:	None	See addition information	See addition information
Retainers	None		
Groove angle (deg.)	60		
Root opening (mm)	2-3		
Root face (mm)	0-1		

WELDING PROCESSES

Welding process	GMAW
Type	Semi-automatic

FILLER METALS

SFA specification	5,18
AWS classification	E70C-6MH4
Filler metal F-number	6
Weld metal A-number	-
Filler metal nominal composition	N.A.
Filler metal trade name	Lincoln, OS MC715-H
Filler metal size (mm)	1,2
Deposited thickness (mm)	24,00
Maximum pass thickness (mm)	5
Weld deposit chemistry	-
Supplemental filler metal	-
Supplemental filler metal vol. (mm ³)	-

POSITION

Position	2G
Weld progression	-

PREHEAT

Preheat temperature (°C)	10
Maximum interpass temperature (°C)	196

GAS

Shielding gas:	Type	AC-20 (A5.32 SG-)	
	Flow rate (l/min)	15	
Trailing gas:	Type	None	
	Flow rate (l/min)	-	
Backing gas:	Type	None	
	Flow rate (l/min)	-	

ELECTRICAL

Filler metal size (mm)	1,2
Waveform control	Not Used
Energy (J)	Not Used
Power (J/s)	Not Used
Arc time (sec)	Not Used
Weld bead length (mm)	Not Used
Amperes	122 - 233
Volts	15,8 - 26,8
Travel speed (mm/min)	125 - 577
Maximum heat input (kJ/mm)	2,9078
Current/polarity	DCEP (reverse polarity)
Wire feed speed (m/min)	0
Arc transfer mode	Short-circuiting, Spray, Globular

TECHNIQUE

String or weave	Stringer and Weave
Orifice/gas cup size	15
C.T.W.D (mm)	15
Multi/single electrode	Single electrode
Multi/Single pass per side	Multiple passes
Peening	Not used
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None



PQR record number Date	RET0278790/TK/003 1-6-2016	Revision 1	WPS record number Company name Welding standard	S2800 Airpack Netherlands BV AWS D1.1/D1.1M:2015	Revision 1
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Reduced section						
Specimen number	Width (mm)	Thickness (mm)	Area (mm ²)	Ultimate total load (N)	Ultimate unit stress (MPa)	Type of failure and location
1	20,02	19,75	380,00	-	513	Ductile-BM
2	20,04	19,43	380,76	-	518	Ductile-BM
Comments						

Type of test	Acceptance criteria	Result	Comments
side bend	AWS D1.1	Acceptable	
side bend	AWS D1.1	Acceptable	
side bend	AWS D1.1	Acceptable	
side bend	AWS D1.1	Acceptable	
Comments			

Specimen number	Notch location	Notch type	Specimen size (mm) x (mm)	Test temperature (°C)	Impact values			Drop weight break
					(J)	(% Shear)	(mm)	
1	Weld Metal	Charpy V	10 x 10	-40	106/108/92	-	-	No
2	HAZ	Charpy V	10 x 10	-40	188/174/262	-	-	No
3	HAZ + 1 mm	Charpy V	10 x 10	-40	318/323/299	-	-	No
4	HAZ + 2 mm	Charpy V	10 x 10	-40	374/377/338	-	-	No
5	HAZ + 2 mm	Charpy V	10 x 10	-40	360/357/375	-	-	No
Comments								

Type (Scale)	Distance from surface	API 2W (50)LS	HAZ	Weld	HAZ	API 2W (50)LS
Vickers (HV)	Cap area 1-2 mm	175-179-177	173-179-188-196-187	208-188-211-210-212	199-195-191-189-179	177-174-176
Vickers (HV)	Root area 1-2 mm	174-176-174	171-178-189-186-183	186-186-180-180-179	173-176-176-175-174	173-170-171
Vickers (HV)	Cap area 1-2 mm	175-179-179	176-177-188-203-179	206-202-214-208-205	196-195-194-192-189	174-174-177
Vickers (HV)	Root area 1-2 mm	179-178-179	172-178-176-182-178	184-186-184-190-189	174-179-178-176-171	176-175-175
Comments						


Type of test	Acceptance criteria	Result	Comments
2x Macroscopic examination	AWS D1.1	Acceptable	
RT examination	AWS D1.1	Acceptable	
MT examination	AWS D1.1	Acceptable	
Comments			

Welder's name	ID Number	Stamp number	Mechanical testing by	Element Breda (NL)
Dorremans M.	ID Card IKP0996J6	W-013	Laboratory test number Test file number Tests conducted by	ARJ001-16-01-18390-3 ARL2064-3 A. Karstanje

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of section 4 of ANSI/AWS D1.1 Structural Welding Code-Steel.

Signature 1

Signature 2

Name	Signature	Name	Signature
F. van Toledo		T. Konings (Lloyds)	
Date		Date	
1-6-2016		1-6-2016	

<input checked="" type="checkbox"/> Witnessed <input checked="" type="checkbox"/> Reviewed <input checked="" type="checkbox"/> Examined Ten Konings	 Keyfit Register Energy
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PQRD number	ARL2064-3	Revision 1	Date	11-01-2016
PQR number	RET0278790/TK003	Revision 1	Welding standard	AWS D1.1/D1.1M:2015
WPS number	S2800	Revision 1	Company name	Airpack Netherlands BV
			To be tested	Without PWHT

WELDING PROCESSES

Welding process	GMAW
Type	Semi-automatic

BASE METALS

Product form	Plate	Welded to:	Product form	Plate
Material control number	815634 272762/1		Material control number	815634 272762/1
Specification (type or grade)	API 2W (50)LS		Specification (type or grade)	API 2W (50)LS
Nominal composition	C-Mn		Nominal composition	C-Mn
Trade name	Voestalpine Grobblech		Trade name	Voestalpine Grobblech
P number	U		P number	U
G number			G number	
AWS group number	II		AWS group number	II
Nominal pipe/tube size	-		Nominal pipe/tube size	-
Schedule	-		Schedule	-
Length (mm)	500		Length (mm)	500
Width (OD) (mm)	200		Width (OD) (mm)	200
Thickness (mm)	20		Thickness (mm)	20

JOINTS

Joint design	Single-V-groove	See addition information	See addition information
Backing:	None		
Retainers	None		
Groove angle (deg.)	60		
Root opening (mm)	2-3		
Root face (mm)	0-1		

CLEANING/ROOT TREATMENT

Surface preparation	Grinding
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

PQRD number	ARL2064-3		Revision 1	Date		11-01-2016	
PASS INFORMATION							
Pass number	1	2	3	4	5	6	
Layer number	1	2	3	3	4	5	
WELDING PROCESSES							
Welding process	GMAW	GMAW	GMAW	GMAW	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic
FILLER METALS							
Material control number	P1FC150311	P1FC150311	P1FC150311	P1FC150311	P1FC150311	P1FC150311	P1FC150311
SFA specification	5.18	5.18	5.18	5.18	5.18	5.18	5.18
AWS classification	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4
Filler metal F-number	6	6	6	6	6	6	6
Weld metal A-number	-	-	-	-	-	-	-
Filler metal nominal composition	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Filler metal trade name	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H
Filler metal size (mm)	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Length of filler metal consumed (mm)	-	-	-	-	-	-	-
Deposited thickness (mm)	4	4	4	4	4	4	4
Maximum pass thickness (mm)	5	5	5	5	5	5	5
Weld deposit chemistry	-	-	-	-	-	-	-
Supplemental filler metal	-	-	-	-	-	-	-
Supplemental filler metal vol. (mm ³)	-	-	-	-	-	-	-
POSITION							
Position	2G	2G	2G	2G	2G	2G	2G
Weld progression	-	-	-	-	-	-	-
PREHEAT							
Preheat temperature (°C)	10	10	10	10	10	10	10
Maximum interpass temperature (°C)	10	35	56	84	106	119	
GAS							
Shielding gas: Type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	15	15	15	15	15	15	15
Trailing gas: Type	None	None	None	None	None	None	None
Flow rate (l/min)	-	-	-	-	-	-	-
Backing gas: Type	None	None	None	None	None	None	None
Flow rate (l/min)	-	-	-	-	-	-	-
ELECTRICAL							
Filler metal size (mm)	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Waveform control	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
Energy (J)	-	-	-	-	-	-	-
Power (J/s)	-	-	-	-	-	-	-
Arc time (sec)	-	-	-	-	-	-	-
Weld bead length (mm)	-	-	-	-	-	-	-
Amperes	122	219	227	223	233	233	233
Volts	15,8	26,0	26,0	26,0	26,0	26,6	26,6
Travel speed (mm/min)	125	430	360	259	336	297	297
Maximum heat input (kJ/mm)	0,9252	0,7945	0,9837	1,3432	1,0818	1,2238	1,2238
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Wire feed speed (m/min)	-	-	-	-	-	-	-
Arc transfer mode	Short-circuiting	Spray	Spray	Spray	Spray	Spray	Spray
TECHNIQUE							
Stringer or weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave
Orifice/gas cup size	15	15	15	15	15	15	15
C.T.W.D (mm)	15	15	15	15	15	15	15
Multi/single electrode	Single electrode	Single electrode	Single electrode	Single electrode	Single electrode	Single electrode	Single electrode
Multi/Single pass per side	Multiple passes	Multiple passes	Multiple passes	Multiple passes	Multiple passes	Multiple passes	Multiple passes
Peening	Not used	Not used	Not used	Not used	Not used	Not used	Not used
Initial/interpass cleaning	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding
Back gouging method	None	None	None	None	None	None	None



PQRD number	ARL2064-3	Revision 1	Date	11-01-2016
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PASS INFORMATION

Pass number	7	8	9	10	11	12
Layer number	5	5	5	5	6	6

WELDING PROCESSES

Welding process	GMAW	GMAW	GMAW	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic	Semi-automatic

FILLER METALS

Material control number	P1FC150311	P1FC150311	P1FC150311	P1FC150311	P1FC150311	P1FC150311
SFA specification	5.18	5.18	5.18	5.18	5.18	5.18
AWS classification	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4	E70C-6MH4
Filler metal F-number	6	6	6	6	6	6
Weld metal A-number	-	-	-	-	-	-
Filler metal nominal composition	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Filler metal trade name	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H
Filler metal size (mm)	1,2	1,2	1,2	1,2	1,2	1,2
Length of filler metal consumed (mm)	-	-	-	-	-	-
Deposited thickness (mm)	4	4	4	4	4	4
Maximum pass thickness (mm)	5	5	5	5	5	5
Weld deposit chemistry	-	-	-	-	-	-
Supplemental filler metal	-	-	-	-	-	-
Supplemental filler metal vol. (mm³)	-	-	-	-	-	-

POSITION

Position	2G	2G	2G	2G	2G	2G
Weld progression	-	-	-	-	-	-

PREHEAT

Preheat temperature (°C)	10	10	10	10	10	10
Maximum interpass temperature (°C)	106	98	116	137	153	159

GAS

Shielding gas: Type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	15	15	15	15	15	15
Trailing gas: Type	None	None	None	None	None	None
Flow rate (l/min)	-	-	-	-	-	-
Backing gas: Type	None	None	None	None	None	None
Flow rate (l/min)	-	-	-	-	-	-

ELECTRICAL

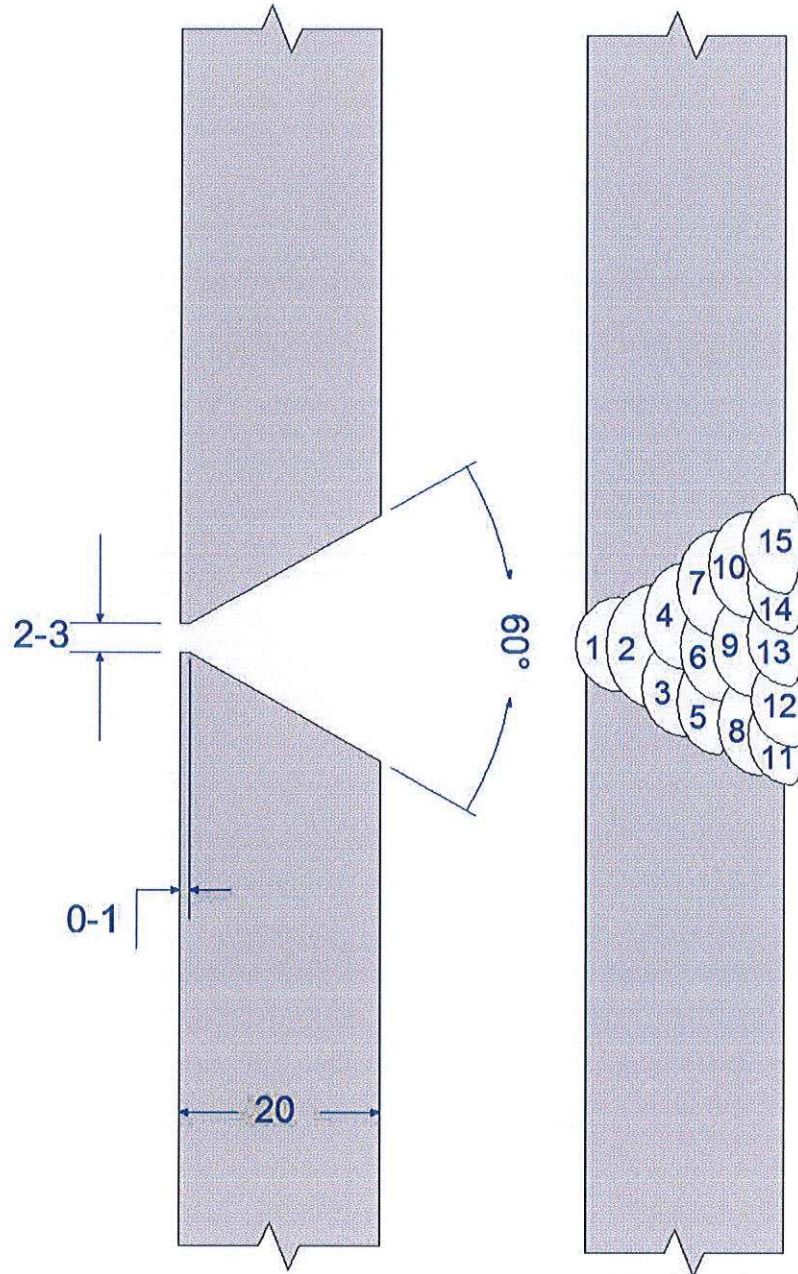
Filler metal size (mm)	1,2	1,2	1,2	1,2	1,2	1,2
Waveform control	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
Energy (J)	-	-	-	-	-	-
Power (J/s)	-	-	-	-	-	-
Arc time (sec)	-	-	-	-	-	-
Weld bead length (mm)	-	-	-	-	-	-
Amperes	226	233	227	217	224	222
Volts	26.6	26.6	26.6	26.7	26.6	26.8
Travel speed (mm/min)	248	577	443	291	527	351
Maximum heat input (kJ/mm)	1,4544	0,6445	0,8178	1,1946	0,6784	1,017
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Wire feed speed (m/min)	-	-	-	-	-	-
Arc transfer mode	Spray	Spray	Spray	Spray	Spray	Globular

TECHNIQUE

String or weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	Stringer and Weave
Orifice/gas cup size	15	15	15	15	15	15
C.T.W.D (mm)	15	15	15	15	15	15
Multi/single electrode	Single electrode	Single electrode	Single electrode	Single electrode	Single electrode	Single electrode
Multi/Single pass per side	Multiple passes	Multiple passes	Multiple passes	Multiple passes	Multiple passes	Multiple passes
Peening	Not used	Not used	Not used	Not used	Not used	Not used
Initial/interpass cleaning	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding
Back gouging method	None	None	None	None	None	None

PQRD number	ARL2064-3	Revision 1	Date	11-01-2016
PASS INFORMATION				
Pass number	13	14	15	
Layer number	6	6	6	
WELDING PROCESSES				
Welding process	GMAW	GMAW	GMAW	
Type	Semi-automatic	Semi-automatic	Semi-automatic	
FILLER METALS				
Material control number	P1FC150311	P1FC150311	P1FC150311	
SFA specification	5.18	5.18	5.18	
AWS classification	E70C-6MH4	E70C-6MH4	E70C-6MH4	
Filler metal F-number	6	6	6	
Weld metal A-number	-	-	-	
Filler metal nominal composition	N.A.	N.A.	N.A.	
Filler metal trade name	Lincoln, OS MC715-H	Lincoln, OS MC715-H	Lincoln, OS MC715-H	
Filler metal size (mm)	1,2	1,2	1,2	
Length of filler metal consumed (mm)	-	-	-	
Deposited thickness (mm)	4	4	4	
Maximum pass thickness (mm)	5	5	5	
Weld deposit chemistry	-	-	-	
Supplemental filler metal	-	-	-	
Supplemental filler metal vol. (mm ³)	-	-	-	
POSITION				
Position	2G	2G	2G	
Weld progression	-	-	-	
PREHEAT				
Preheat temperature (°C)	10	10	10	
Maximum interpass temperature (°C)	178	196	169	
GAS				
Shielding gas: Type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	
Flow rate (l/min)	15	15	15	
Trailing gas: Type	None	None	None	
Flow rate (l/min)	-	-	-	
Backing gas: Type	None	None	None	
Flow rate (l/min)	-	-	-	
ELECTRICAL				
Filler metal size (mm)	1,2	1,2	1,2	
Waveform control	Not Used	Not Used	Not Used	
Energy (J)	-	-	-	
Power (J/s)	-	-	-	
Arc time (sec)	-	-	-	
Weld bead length (mm)	-	-	-	
Amperes	220	210	194	
Volts	26.8	26.8	21.7	
Travel speed (mm/min)	387	382	430	
Maximum heat input (kJ/mm)	0,9141	0,884	0,5685	
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)	
Wire feed speed (m/min)	-	-	-	
Arc transfer mode	Globular	Globular	Globular	
TECHNIQUE				
Stringer or weave	Stringer and Weave	Stringer and Weave	Stringer and Weave	
Orifice/gas cup size	15	15	15	
C.T.W.D (mm)	15	15	15	
Multi/single electrode	Single electrode	Single electrode	Single electrode	
Multi/Single pass per side	Multiple passes	Multiple passes	Multiple passes	
Peening	Not used	Not used	Not used	
Initial/interpass cleaning	Brushing and Grinding	Brushing and Grinding	Brushing and Grinding	
Back gouging method	None	None	None	

PQRD number	ARL2064-3	Revision 1	Date	11-01-2016
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WPS record number	S2800	Revision 6	Qualified to	AWS D1.1/D1.1M:2020
Date	Monday, 02 January 2023		Company name	Airpack Netherlands BV
Supporting PQR(s)	RET0278790/TK/003 - Rev 1			
Reference docs.				

Scope	General instruction welding structural for skids Groove, fillet, no PWHT (As-welded), impact testing
Joint	Joint details for this welding procedure specification in: Production drawings

BASE METALS

Type	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Welded to	Plate: API 2W (50) AWS D1.1 Grp-no II / ISO 15608 Grp-no II
Backing:	None P-no. Grp-no.
Retainers	None
Notes	

THICKNESS RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Complete pen.	3,	40,	-	-
Impact tested	16,	40.	-	-
Partial pen.	3,	40,	-	-
Fillet welds	no min.	no max.	-	-

DIAMETER RANGE QUALIFIED (mm)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Nominal pipe size	600,	no max.	-	-

FILLER METALS

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	As-welded		With PWHT	
						Min.	Max.	Min.	Max.
GMAW	5.18	E70C-6MH4	-	-	Lincoln, Outershield MC715-H	3,	40,	-	-
GMAW						-	-	-	-
GMAW						-	-	-	-
Sup. filler	-	-	-	-	-	- None -			

WELDING PROCEDURE

	GMAW	GMAW	GMAW
Welding process	GMAW	GMAW	GMAW
Type	Semi-automatic	Semi-automatic	Semi-automatic
Minimum preheat/interpass temperature (°C)	10	10	10
Maximum interpass temperature (°C)	200 Method contact thermometer	200 Method contact thermometer	200 Method contact thermometer
Filler metal size (mm)	1,2	1,2	1,2
Layer number	Root	Filler	Cap
Position	H	H	H
Weld progression	Not applicable	Not applicable	Not applicable
Current/polarity	DCEP (reverse polarity)	DCEP (reverse polarity)	DCEP (reverse polarity)
Waveform control			
Energy (J)			
Power (J/s)			
Amperes	110 - 140	215 - 240	190 - 225
Volts	15 - 17	25 - 27	21 - 26
Travel speed (mm/min)	135 - 150	250 - 500	290 - 500
Maximum heat input (kJ/mm)	0,8 - 1,0	0,6 - 1,4	0,5 - 1,1
Wire feed speed (m/min)	0,	0	0
Arc transfer mode	Short-circuiting	Spray	Globular
Shielding: Gas type	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)	AC-20 (A5.32 SG-)
Flow rate (l/min)	12- 22	12 - 22	12 - 2
Trailing: Gas type	None	None	None
Flow rate (l/min)	-	-	-
Backing: Gas type	None	None	None
Flow rate (l/min)	-	-	-
String or weave	Stringer and Weave	Stringer or Weave	Stringer or Weave
Orifice/gas cup size	15	15	15
C.T.W.D (mm)	15	15	15
Multi/Single pass per side	Multiple passes	Multiple passes	Multiple passes
Multi/single electrode	Single electrode	Single electrode	Single electrode
Maximum pass thickness (mm)	6	6	6
Weld deposit chemistry	-	-	-
Power Source	CV	CV	CV

WPS record number	S2800	Revision 6	Qualified to	AWS D1.1/D1.1M:2020
Date	Monday, 02 January 2023		Company name	Airpack Netherlands BV

PREHEAT TABLE

Applicable standard	
AWS D1.1 (Category B)	For thickness 3 to 19(mm): 0(°C). Preheat to 20(°C) if the base metal temperature is below 0(°C). Over 19 thru 38.1(mm): 10(°C). Over 38.1 thru 63.5(mm): 66(°C). Over 63.5(mm): 107(°C).


TECHNIQUE

Peening	Not used
Surface preparation	Grinding
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	None

NOTES

Signature 1

Signature 2

Signature 1		Signature 2	
Name	Signature	Name	Signature
F. van Toledo			
Date		Date	
Monday, 02 January 2023			