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 Document Number : 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
☐	**Code 1**	**REJECTED** - Vendor to revise and Resubmit. Work cannot proceed		
☐	**Code 2**	Comments As Noted - Work May proceed, subject to compliance with and incorporation of comments		
☐	**Code 3**	No Comments - Work may proceed.		
☐	**Code 4**	Information only - Review not required.		

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

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (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	

BASE METALS

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

JOINTS

Joint design	Fillet weld	See addition information	See addition information

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)	8,00
Maximum pass thickness	(mm)	5
Weld deposit chemistry		-
Supplemental filler metal		-
Supplemental filler metal vol.	(mm³)	-

POSITION

Position	2F
Weld progression	-

PREHEAT

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

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
Amperes		237 - 245
Volts		26,4 - 26,6
Travel speed	(mm/min)	315 - 391
Maximum heat input	(kJ/mm)	1,2421
Current/polarity		DCEP (reverse polarity)
Wire feed speed	(m/min)	0
Arc transfer mode		Spray

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

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (PQR) - Test results (as welded)

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	

TENSILE TESTS

Reduced section

Specimen number	Width (mm)	Thickness (mm)	Area (mm²)	Ultimate total load (N)	Ultimate unit stress (MPa)	Type of failure and location

Comments

GUIDED BEND TESTS

Type of test	Acceptance criteria	Result	Comments

Comments

FILLET WELD TESTS

Type of test	Acceptance criteria	Result	Fillet leg size (mm) x (mm)
3x Macroscopic examination multiple pass	AWS D1.1	Acceptable	a=8 mm
3x Macroscopic examination single pass	AWS D1.1	Acceptable	a=6 mm

Comments

CERTIFICATION

Welder's name	ID Number	Stamp number		
T. Lajos	ID Card 353992JA	W-104	Mechanical testing by	Schielab Breda (NLD)
			Laboratory test number	SL 12.6055-1
			Test file number	ARL1559-13
			Tests conducted by	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 D1.1-2010 Structural Welding Code-Steel.

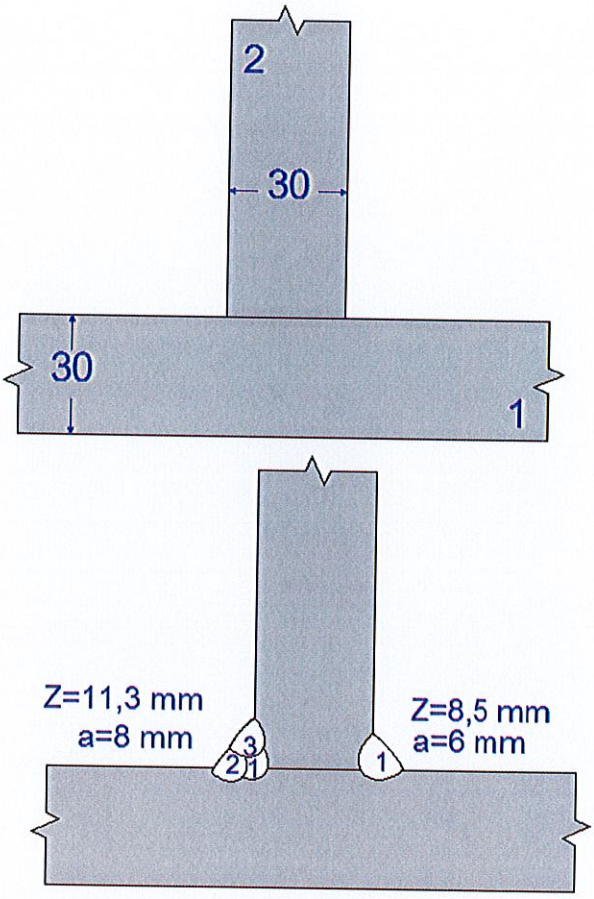
Signature 1

Name	Signature
Franky van Toledo	
Date	
8-6-2012	

Signature 2

Name	Signature
W. Komdeur (Lloyds)	Lloyd's Register Nederland B.V. A member of the Lloyd's Register group. Wim Komdeur Witnessed Approved Lloyd's Register
Date	
8-6-2012	

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

			Welded to:		
Product form		Plate	Product form		Plate
Material control number		362705	Material control number		362705
Specification (type or grade)		API 2W (50)	Specification (type or grade)		API 2W (50)
Nominal composition		C-Mn	Nominal composition		C-Mn
Trade name		Dillinger Hutte	Trade name		Dillinger Hutte
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)	350	Length	(mm)	350
Width (OD)	(mm)	150	Width (OD)	(mm)	150
Thickness	(mm)	30	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

Groeneweegje 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

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.	(mm^3)	-	-	-	-

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

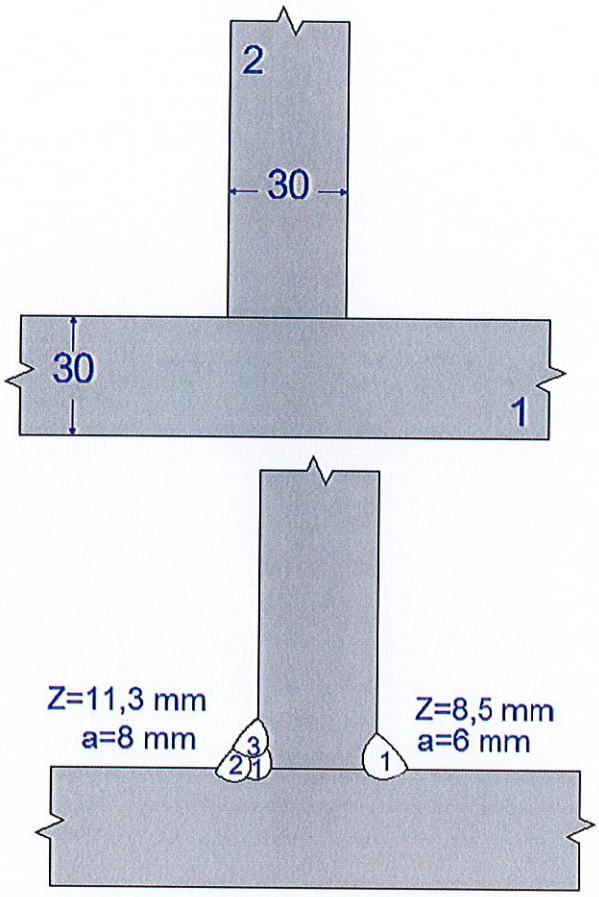
TECHNIQUE

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



Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding Procedure Specification (WPS)

WeldOffice WPS

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.	-	-

DIAMETER RANGE QUALIFIED (mm)

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

FILLER METALS

THICKNESS RANGE QUALIFIED (mm)

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	As-welded Min.	As-welded Max.	With PWHT Min.	With PWHT 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 soucre		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			

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (PQR)

WeldOffice WPS

PQR record number	RET0278790/TK/001	Revision 1	WPS record number	S2600	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)
	Plate	API 2W (50LS)	U	II	-	-	4	-
Welded to:	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	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)	4,00
Maximum pass thickness	(mm)	3
Weld deposit chemistry		-
Supplemental filler metal		-
Supplemental filler metal vol.	(mm³)	-

POSITION

Position	2G
Weld progression	-

PREHEAT

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

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		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

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (PQR) - Test results (as welded)

WeldOffice WPS

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

TENSILE TESTS

Reduced section

Specimen number	Width (mm)	Thickness (mm)	Area (mm²)	Ultimate total load (N)	Ultimate unit stress (MPa)	Type of failure and location
1	20.01	3.83	76,638	-	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)	(% Shear)	(mm)	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		
Dorreman M.	ID Card IKP0996J6	W-013	Mechanical testing by	Element Breda (NL)
			Laboratory test number	ARJ001-16-01-18390-1
			Test file number	ARL2064-1
			Tests conducted by	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

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

Signature 2

Name	Signature
T. Konings(Lloyds)	☐ Witnessed ☑ Reviewed ☐ Examined Ton Konings
Date	
1-6-2016	

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding conditions - (PQRD Welding Data Record)

WeldOffice WPS

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

			Welded to:			
Product form		Plate		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

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.	(mm³)	-	-	-

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)	-	-	-

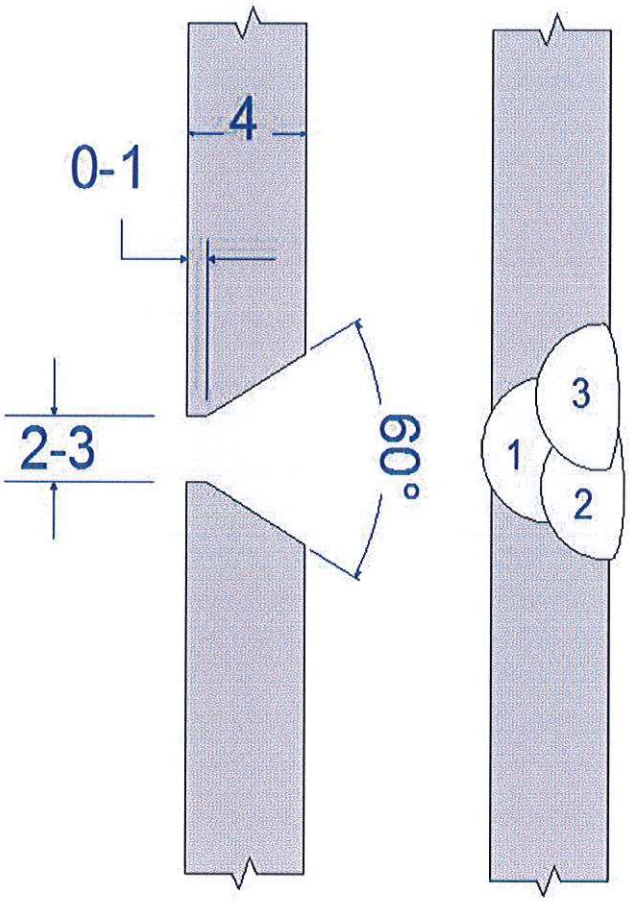
ELECTRICAL

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



Witnessed
Reviewed
Examined

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding Procedure Specification (WPS)

WeldOffice WPS

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)	RET0278790/TK/001 - Rev 1		
Reference docs.			

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

FILLER METALS

THICKNESS RANGE QUALIFIED (mm)

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	As-welded Min.	As-welded Max.	With PWHT Min.	With PWHT Max.
GMAW	5.18	E70C-6MH4	-	-	Lincoln, Outershield MC715-H	3,	8,	-	-
GMAW						-	-	-	-
GMAW						-	-	-	-
Sup. filler						- Required -			
Suppl. filler metal vol. (mm³)	-								

WELDING PROCEDURE

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

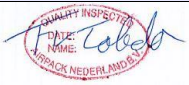
Applicable standard	
AWS D1.1 (Category B)	For thickness 3 to 19(mm): 0(°C). Preheat to 20(°C) if the base metal temperature is below 0(°C).
	Over 19 thru 38.1(mm): 10(°C).
	Over 38.1 thru 63.5(mm): 66(°C).
	Over 63.5(mm): 107(°C).

TECHNIQUE

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

NOTES

Signature 1

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

Signature 2

Name	Signature
Date	

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)
	Plate	API 2W (50LS)	U	II	-	-	8	-
Welded to:	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.	(mm³)	-

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 - 0,87
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

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (PQR) - Test results (as welded)

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	

TENSILE TESTS

Reduced section

Specimen number	Width (mm)	Thickness (mm)	Area (mm²)	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 (J)	(% Shear)	(mm)	Drop weight break
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
Vickers (HV)	Root area 1-2 mm	171-169-165	186-198-206-206-188	173-184-186-186-187	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
Vickers (HV)	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		
Dorreman M.	ID Card IKP0996J6	W-013	Mechanical testing by	Element Breda (NL)
			Laboratory test number	ARJ001-16-01-18390-2
			Test file number	ARL2064-2
			Tests conducted by	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

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

Signature 2

Name	Signature
T. Konings (Lloyds)	☐ Witnessed ☑ Reviewed ☐ Examined Ton Konings
Date	
1-6-2016	

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding conditions - (PQRD Welding Data Record)

WeldOffice WPS

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

			Welded to:			
Product form		Plate		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)	8		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.	(mm³)	-	-	-	-

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)	-	-	-	-

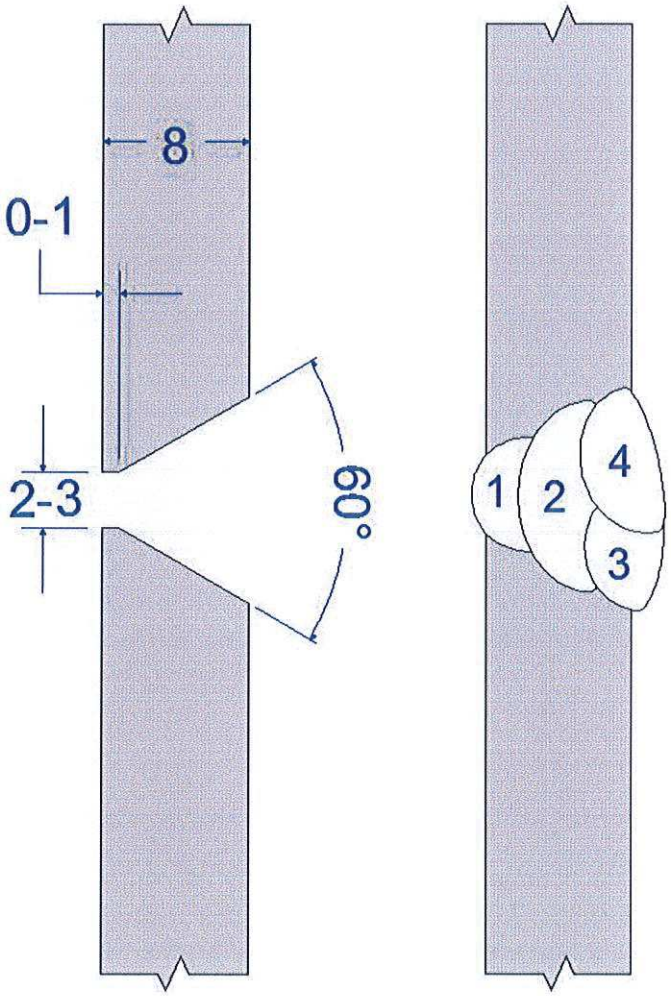
ELECTRICAL

Filler metal size	(mm)	1,2	1,2	1,2	1,2
Waveform control		Not Used	Not Used	Not Used	
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



Witnessed
Reviewed
Examined
Ton Konings
Lloyd's Register Nederland B.V.
Lloyd's Register Energy

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding Procedure Specification (WPS)

WeldOffice WPS

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

FILLER METALS

THICKNESS RANGE QUALIFIED (mm)

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

WELDING PROCEDURE

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

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

Signature 2

Name	Signature
Date	

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (PQR)

WeldOffice WPS

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)
	Plate	API 2W (50)LS	U	II	-	-	20	-
Welded to:	Plate	API 2W (50)LS	U	II	-	-	20	-
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, 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.	(mm³)	-

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

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Procedure Qualification Record (PQR) - Test results (as welded)

WeldOffice WPS

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	

TENSILE TESTS

Reduced section

Specimen number	Width (mm)	Thickness (mm)	Area (mm²)	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

GUIDED BEND TESTS

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

TOUGHNESS TESTS

Specimen number	Notch location	Notch type	Specimen size (mm) x (mm)	Test temperature (°C)	Impact values (J)	(% Shear)	(mm)	Drop weight break
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

HARDNESS TEST

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	176-177-186-203-179	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

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		
Dorreman M.	ID Card IKP0996J6	W-013	Mechanical testing by	Element Breda (NL)
			Laboratory test number	ARJ001-16-01-18390-3
			Test file number	ARL2064-3
			Tests conducted by	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

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

Signature 2

Name	Signature
T. Konings (Lloyds)	☐ Witnessed ☑ Reviewed ☐ Examined Ton Konings Lloyd's Register Nederland B.V.
Date	
1-6-2016	

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding conditions - (PQRD Welding Data Record)

WeldOffice WPS

PQRD number	ARL2064-3	Revision 1	Date	11-01-2016
PQR number	RET0278790/TK/003	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

			Welded to:			
Product form		Plate		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
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)	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-)
	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		122	219	227	223	233	233
Volts		15.8	26.0	26.0	26,0	26,0	26,6
Travel speed	(mm/min)	125	430	360	259	336	297
Maximum heat input	(kJ/mm)	0,9252	0,7945	0,9837	1,3432	1,0818	1,2238
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		Short-circuiting	Spray	Spray	Spray	Spray	Spray

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	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.	(mm³)	-	-	-			

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)	-	-	-			

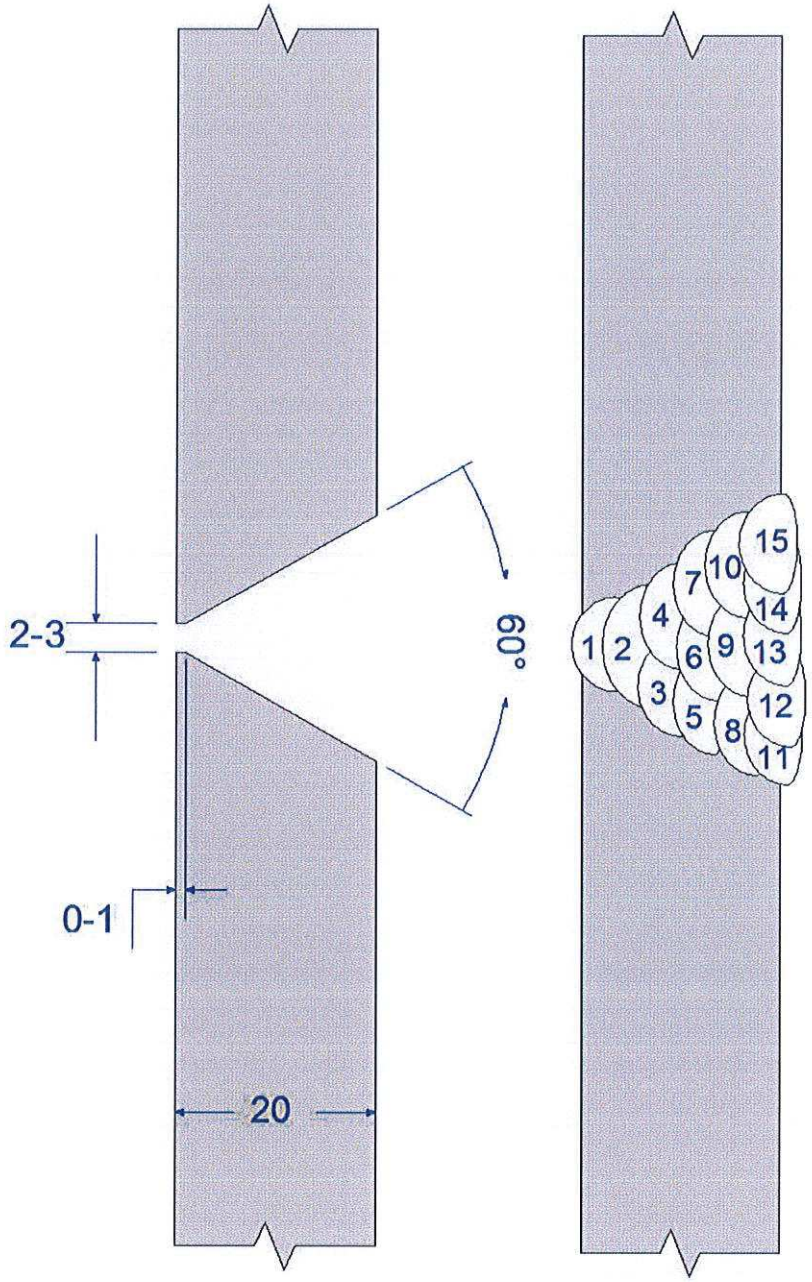
ELECTRICAL

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

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	ARL2064-3	Revision 1	Date	11-01-2016



Witnessed
Reviewed
Examined
Tom Konings
Lloyd's Register Energy

Airpack Netherlands BV

Groeneweegje 19 - 25, 4301 RN Zierikzee, The Netherlands

AWS - Welding Procedure Specification (WPS)

WeldOffice WPS

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

FILLER METALS

THICKNESS RANGE QUALIFIED (mm)

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

WELDING PROCEDURE

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

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

Signature 2

Name	Signature
Date	