Stork FDO B.V.

Certificate

QUALIFIED BY STERLAB Reg.nr. L 048

QUALIFIED BY STIFRIN Reg.nr. I 007

WELDING PROCEDURE QUALIFICATION
NEN-EN 288-3 AND ASME IX

Customer	: Demaco Cryogenics Smeetsweg 4, 1738 ZG Waarland		
Order no cust.	: 50299		
WPS	: 02		
Object	: 2 welded testpipes dim. 48.0 x 1.5 mm		
Welder	: G. J. Blom 9008697		
Material	: 1.4301	Certificate no	: MKA 95-0828A
Welding process	: GTAW (141)	Order no FDO	: OMKA 5367
Welding position	: 6 GU (H-L045)	Amsterdam	: 1995-08-08

RESULTS OF THE TESTS

1. **NON DESTRUCTIVE EXAMINATION :**
   X-Rays no 23 + 24/1-3, stated acceptable, see concerning RTD Report.
   Visual examination, stated acceptable, see FDO Report MIA 95-0204.
   Penetrant examination, stated acceptable, see FDO Report MIA 95-1052

2. **TENSILE TESTS**

				Requirements according to
Type and no		: TD F828	TD F828A	DIN 17457
Dimensions	mm	: 12.1x1.25	11.9x1.22	min. 500
Tensile strength	N/mm2	: 542	546	
Place of fracture		: weld	weld	
Type of fracture		: ductile	ductile	

3. **BEND TESTS**

Angle of bending	degr.	: 180
Former diameter		: 4 x t
Type BU (face bend)		: good
BU		: good
BI (root bend)		: good
BI		: good

4. **MACRO EXAMINATION** : no defects

5. **CONCLUSION/REMARKS** : approved

Stork FDO B.V.
Materials Testing Department

Authorized : G. Kleijn

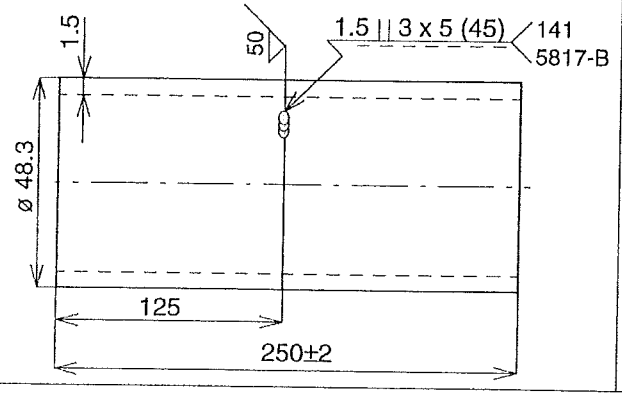
C.A. Stedelaar

See also MKA 95-0828

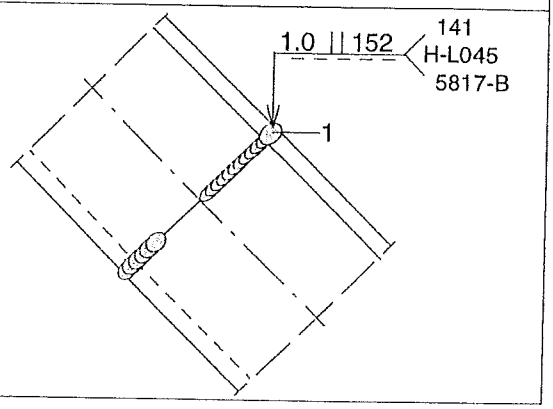
Welding procedure qualification(WPQ)
NEN-EN 288-3 and ASME IX

Manufacturer	DeMaCo Cryogenics Noord-Scharwoude
Order nr.	990021
Doc. nr.	
Draw.nr.	
WPAR nr.	MKA 95-0828A / 9008697
Weld. proces according to ISO 4063	141 GTAW-welding
Weld-edge prep.(method)	Machining,grinding or scratch brushing
Joint preparation	See groove design. incl.tolerances
Basematerial and group of material	1.4301 / 1.04306 to 1.4301 / 1.4306
Material thickness (mm)	1.5 mm
Outside diameter (mm)	48.3 mm
Position of welding according to ISO 6947	H-L045
Indication to EN 287-1	141 T BW W09 t1.5 D48.3 ss mb
Quality level NEN-ISO 5817	level B

Groove design



Bead sequence



Welding variable

Pass nr.	Proces	Diameter wire ø mm	Welding current A	Voltage V	Current and polariteit	Welding speed cm/min	Heat input kJ/mm
tackweld	141	1.0	35-40	12 - 13	DC -		
1	141	1.0	35-40	12 - 13	DC -	8.0 - 9.0	

Consumable and classification

Tackweld AWS A5.9 : ER 308LSi
Pass nr.1 AWS A5.9 : ER 308LSi
EN 12072 : G/W 19 9 LSi

Cleaning

Cleaning of the joint area is essential to remove all traces of oxides, dirt and grease.
It is also desirable to scratch brush the joint after each weld pass to remove any oxide film formed the welding.

Rance of approval according to welding position 287-1

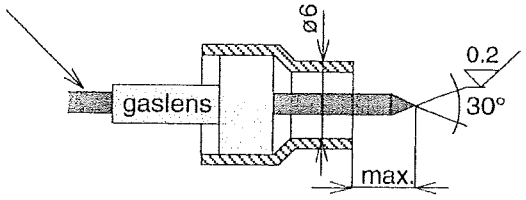
Butt welds PA, PC, PF, PE and H-L045.
0.5 D to 2D, diameter. D in mm
0.8 t to 1.1t, thickness t in mm.
Fillet welds PA, PB, PF and PD
W09

Rance of approval for parent metal

Groep of proceses no. 14

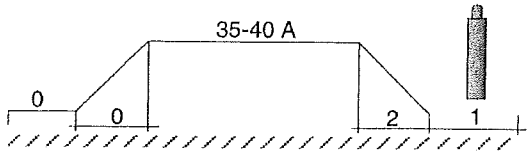
Tungsten electrode, type (EN 26848) and diameter (mm).
Preparation of the point of the electrode.

WT 20 diameter 1.6 mm)



AC-DC, electrode polarity.
Current range, min-max (A)
Pulsewelding: -Peak current, voltage (A / V)
-Backgroundcurrent (A)
-Pulsefrequentie (Hz)
-Balance (%)

DC - HF (high frequency start)



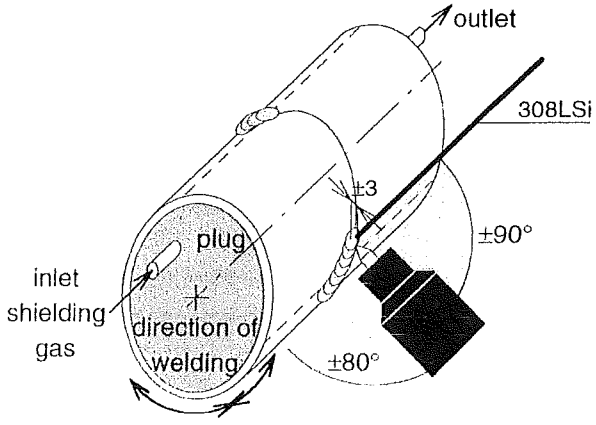
Shieldinggas (NEN-EN 439) and the flowrate (l/min).
Backinggas (NEN-EN439) en the flowrate (l/min).
Back-gouging-method,type of backing.

I1 (Argon) 99,99% 6.0-8.0 l/min
F2 (Formeer) 2.5, 5% H2 bal. %N2 2.0-3.0 l/min
Pipe purging bladder system.

Further information.

Heat-input, min-max (kJ/mm).
Preheating,min (°C). and method.
Interpasstemp.max ° (C).
Heating Rate, max (°C)
Cooling Rate,max (°C)
Post-weld heat treatment.

Manipulate with the arc (for instance weaving).
Position of the gun nozzle in the end and side view.



Points meriting attention during en after welding.

- Lack of root penetration: 1. increase current,
  2. decrease welding speed,
  3. increase joint angel,
  4. reduce arc lenght,
  5. reduce backing gas flow rate.

- Lack of side wall fusion: 1. increase current level,
  2. decrease welding speed,
  3. increase joint angel,
  4. reduce rod diameter,
  5. clean pipe surface.

Recommended torch and filler rod positions for manual but welding in fixed pipe H-L045 position. In this case welding is normally carried out from the 5 or 7 o'clock position.
Pause at te end only to fill crater.

Appr. Customer / Inspection
Date and signature

Corus Training Centre
W.Broersma

141 TW09 95-0833 48x1,5-2
W.Broersma apr 2002
cisy hrs ctc wto ©

Stork FDO B.V.

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Test report

Lokatie Rapport Penetrant Onderzoek
Site Report Liquid Penetrant Examination

Ordernr. FDO	: OMKA 5367	Rapport nummer/ Report number	: MIA 95-1052
Pag. nr.	: 1		
Tot. pag.	: 1		
Klant/Client	: Demaco Cryogenics	Plaats ond./Place of ex.	: FDO Amsterdam
Adres/Adress	: Smeetsweg 4, Waarland	Datum ond./Date of ex.	: 01-08-1995
Ord.nr. klant/Ord. nr. client	: 50299	Onderzochte gedeelten/ Parts examined	: las 100%
Contactpersoon/Repr. Client	: Hr. S. Kooy	Tek.nr./Draw.no.	: -
Object/Object	: lasproefpijpen		
Lasmethode/Weld proces	: -	Specification code	: NEN-EN 288-3
Basismateriaal/Parent metal	: Roestvast staal	Beoordelings Norm/ Assesment Standard	: EN 25817 B
Opp. toest./Surface cogdition	: Acceptabel	Procedure nr.	: -
Temperatuur Object in °C	: 20	Werkinstruktie/Workinst.	: FDO WI 110-009 rev.4
Doel onderzoek/Purpose of exam	: Detecteren oppervlakgebreken		
Opmerking/Remarks	: -		

Methode/ Method ■ Spuitbus/Spray □ Dompelen/Dipping	Reiniger Pre-cleaner : NPU	UV-lichtintensiteit UV-light intensity : - µW/cm²
Techniek/ Technique ■ Kleur/Colour □ Fluorescent	Penetrant : VP30	Penetratietijd Pentration time : 25 min.
UV - lamp □ 111-166-01 (Matcon) UV - lamp □ 111-166-03 (De Looper) UV - lamp □ 111-166-04 (Matcon, stat.)	Verwijderaar Remover : water	Emulgatietijd Emulgation time : 1,5 min.
	Ontwikkelaar Developer : D70	Ontwikkeltijd Developing time : 20 min.

Resultaat/Results

De volgende lasproefpijpen zijn penetrant onderzocht:

- 6x lasproefpijp gemerkt F 826, ø 12.0 x 1.0 mm, WPS 02,
- 6x lasproefpijp gemerkt F 827, ø 18.0 x 1.0 mm, WPS 02,
- 2x lasproefpijp gemerkt F 828, ø 48.0 x 1.5 mm, WPS 02,
- 1x lasproefpijp gemerkt F 830, ø114.0 x 2.0 mm, WPS 02,

- 6x lasproefpijp gemerkt F 831, ø 12.0 x 1.0 mm, WPS 01,
- 6x lasproefpijp gemerkt F 832, ø 18.0 x 1.0 mm, WPS 01,
- 2x lasproefpijp gemerkt F 833, ø 48.0 x 1.5 mm, WPS 01,
- 1x lasproefpijp gemerkt F 834, ø114.0 x 2.0 mm, WPS 01,

Tijdens het onderzoek werden geen relevante te rapporteren indicaties waargenomen.

Conclusie/conclusion

De onderzochte las is acceptabel volgens de criteria zoals vermeld in de toegepaste beoordelingsnorm.

Bijlagen/Appendices : -	Datum rapport/ Date report:	Naam + handtekening onderzoeker/ Name + signature operator
Toezicht van klant/For Client : -	04 augustus 1995	M. Ruijters

Stork FDO B.V.

Test report

Lokatie Rapport Visueel Onderzoek
Site Report Visual Examination

QUALIFIED BY STERLAB Reg.nr L 048

QUALIFIED BY STERIN Reg.nr I 007

Ordernr. FDO	: OMKA 5367	Rapport nummer/ Report number	: MIA 95-0204
Pag. nr.	: 1		
Tot. pag.	: 1		
Klant/Client	: Demaco Cryogenics	Plaats ond./Place of ex.	: FDO Amsterdam
Adres/Adress	: Waarland	Datum ond./Date of ex.	: 1995-08-01
Ord.nr. klant/Ord. nr. client	: 50299	Onderzochte gedeelten/ Parts examined	: 100% per pijp
Contactpersoon/Repr. Client	: Hr. S. Kooy	Tek.nr./Draw.no.	: -
Object/Object	: Lasproefpijpen		
Lasmethode/Weld procedure	: zie onder	Specification code	: NEN-EN 287-1 and
Basismateriaal/Parent metal	: Roestvaststaal	Beoordelings Norm/	NEN-EN 288-3
Opp. toest./Surface condition	: acceptabel	Assesment Standard	: NEN-ISO 25817-C
Temperatuur Object in °C	: kamertemperatuur	Procedure nr.	: -
Doel onderzoek/Purpose of exam	: Quality control	Werkinstruktie/Workinst.	: FDO WI 110-025 rev.1
Opmerking/Remarks	: -		

Methode / Technique	Hulp-apparatuur/Equipment	
Ongewapend oog	Lasdikte meter	

Resultaat/Results

De volgende lasproefpijpen werden visueel onderzocht t.b.v. lasmethodekwalificaties en lasserskwalificaties :

FDO nummer	Aantal / afmeting mm pijp	No. Demaco	Lasser	Overdikte mm	Doorlassing	Opmerkingen
F826	6x ϕ12 x 1.0	WPS 02	1	0.5	ok	Geen
F827	6x ϕ18 x 1.0	WPS 02	1	0.5	ok	Geen
F828	2x ϕ48 x 1.5	WPS 02	1	1.0	ok	Geen
F830	1x ϕ114 x 2.0	WPS 02	1	1.0	ok	Geen
F831	6x ϕ12 x 1.0	WPS 01	2	0.5	ok	Geen
F832	6x ϕ18 x 1.0	WPS 01	2	0.5	ok	Geen
F833	2x ϕ48 x 1,5	WPS 01	2	1.0	ok	Geen
F834	1x ϕ114 x 2.0	WPS 01	2	1.0	ok	Geen
F835	2x ϕ12 x 1.0	WPS 02	5	0.5	ok	Geen
F836	1x ϕ43 x 1,5	WPS 02	5	0.5	ok	Geen
F837	1x ϕ114 x 2.0	WPS 02	5	1.0	ok	Geen
F838	1x ϕ12 x 1.0	WPS 02	6	0.5	ok	Geen
F839	1x ϕ43 x 1,5	WPS 02	6	1.0	ok	Geen
F840	1x ϕ114 x 2.0	WPS 02	6	1.0	ok	Geen
F841	1x ϕ12 x 1.0	WPS 02	7	0.5	ok	Geen
F842	1x ϕ43 x 1.5	WPS 02	7	0.5	ok	Geen
F843	1x ϕ114 x 2.0	WPS 02	7	0.5	ok	Geen

Conclusie :

In de onderzochte lasproefpijpen werden geen onacceptabele indicaties waargenomen.
De in de tabel vermelde lasproefpijpen zijn acceptabel volgens de criteria van EN 25817 klasse C.

Bijlagen/Appendices : -	Datum rapport/ Date report:	Naam + handtekening onderzoeker/ Name + signature operator
Toezicht van klant/For Client :	1 augustus 1995	G. Kleijn

WELDING PROCEDURE QUALIFICATION RECORD (PQR)

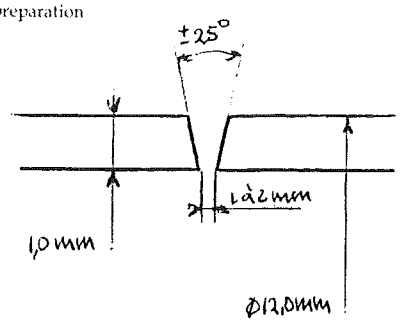
Date of issue	September 5, 1995
LR Office	AMSTERDAM
Qualification: Code/Standards	NEN EN 288-3, NEN-EN 287-1
PQR Certificate number	AMS 540433/5

p WPS * No.	Rev.	Date of welding	Manufacturer's name and address
02	--	21-07-1995	Demaco Holland B.V.
Test place/location shop/site			Smeetsweg 4
Demaco			1738 ZG WAARLAND

RANGE OF APPROVAL

Welding process(es): GTAW	Single pass/multipass: Single pass
Joint type(s): V-Groove	Parent metal group(s): EN-288-3 Group 9
Plate thickness range: NA	Pipe outside diameter range: 12.0x1.0 mm
Filler metal type/designation: A68LC DIN 8556	Heat treatment: NA
Gas/flux: GAS	Type of welding current: DC
Welding positions: 6 GU	Progression (up/down): Up / Down

Test joint details (sketch with dimensions) of weld preparation



WELD AND FILLER METAL DETAILS

Parent Materials: 1.4301/1	Test piece position: 6 GU
Welding process: GTAW	Joint type: V-Groove
Filler material: Wolfraam	Shielding gas/flux flow rate: Argon 10-12 L/min
Make/Type/Diameter: UTP 1.6 mm	Gas composition: 99.99% Argon
Composition: Tungsten 2% Thorium	Flux type: NA

Other information: Backing gas comp: 99.99% Argon Flow rate: 14-20 l/min.

Preheat and interpass temperature (method) and control: NA

Postweld heat treatment temperature (method) and control: NA

Bead sequence detail (sketch to include weld metal thickness and back gouging where applicable)

PROCEDURE DETAIL

RUN NUMBER	PROCESS	SIZE OF FILLER MATERIAL	CURRENT A	VOLTAGE V	AC/DC POLARITY	WIRE FEED/ TRAVEL SPEED	HEAT INPUT kJ/mm
1	GTAW	1.6 mm	± 70	±13	DC	±15	--

Date	Welder's name	WPQ Certificate No.
September 5, 1995	G.J. Blom	

* Manufacturer's preliminary Welding Procedure Specification

TEST RESULTS

NON-DESTRUCTIVE EXAMINATION (STATE 'ACCEPTABLE', 'UNACCEPTABLE' OR 'NONE')

Visual	Magnetic Particle	Liquid Penetrant	Radiography	Ultrasonics
Acceptable	None	Acceptable	None	None

DESTRUCTIVE TESTS

TEST	TENSILE STRENGTH	YIELD STRENGTH	ELONGATION	REDUCTION OF AREA	FRACTURE LOCATION	TEST TEMPERATURE
Units	N/mm²	None	% None	% None		°C
Transverse tensile	1&2 513/514				Pipe/weld	RT
All-weld tensile	None	None	None	None		None

BEND TESTS

ORIENTATION	FORMER DIAMETER	RESULTS
Root/face/side	4xT	Acceptable
Root/face/side	4xT	Acceptable
Root/face/side	4xT	Acceptable
Root/face/side	4xT	Acceptable
Longitudinal	None	None

FILLET WELD FRACTURE (RESULTS)

1. None
2. None
3. None

Macro examination

Acceptable

IMPACT TESTS

Requirement	NOTCH LOCATION/ ORIENTATION	TEMP °C	VALUES (J) 1 2 3	AVERAGE (J)	REMARKS
Size	None	None	None	None	None
	None	None	None	None	None
Type	None	None	None	None	None
Retest	None	None	None	None	None

HARDNESS SURVEY

Type None Load None Location of hardness measurements (sketch)

	Hardness range
Parent material	None
H.A.Z.	None
Weld	None

Additional test(s) and result(s), eg. chemical analysis, micro examination, ferrite measurement

None

We certify that the foregoing statements are correct and the test welds were prepared, welded and tested in accordance with the specified Codes or Standards.

Signature – Manufacturer	Name in BLOCK CAPITALS	Date
AMSTERDAM	Demaco Holland B.V.	
Signature – Witness	Name in BLOCK CAPITALS	Date
Ir. L.P.H.M. v.d. Einden	L.P.H.M. van den Einden	September 5, 1995

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Stork FDO B.V.

Certificate

QUALIFIED BY STURLAB Reg.nr. I. 048

QUALIFIED BY STERIN Reg.nr. I 607

WELDING PROCEDURE QUALIFICATION
NEN-EN 288-3 AND ASME IX

Customer	: Demaco Cryogenics Smeetsweg 4, 1738 ZG Waarland		
Order no cust.	: 50299		
WPS	: 02		
Object	: One welded testpipe dim. 114.3 x 2.0 mm		
Welder	: G. J. Blom 9008697		
Material	: 1.4301	Certificate no	: MKA 95-0830A
Welding process	: GTAW (141)	Order no FDO	: OMKA 5367
Welding position	: 6 GU (H-L045)	Amsterdam	: 1995-08-08

RESULTS OF THE TESTS

1. NON DESTRUCTIVE EXAMINATION :
X-Rays no 5/1-5, stated acceptable, see concerning RTD Report.
Visual examination, stated acceptable, see FDO Report MIA 95-0204.
Penetrant examination, stated acceptable, see FDO Report MIA 95-1052

2. TENSILE TESTS

				Requirements according to
Type and no		: TD F830	TD F830A	DIN 17457
Dimensions	mm	: 12.2x1.65	12.1x1.65	min. 500
Tensile strength	N/mm2	: 612	565	
Place of fracture		: weld	weld	
Type of fracture		: ductile	ductile	

3. BEND TESTS

Angle of bending	degr.	: 180
Former diameter		: 4 x t
Type BU (face bend)		: good
BU		: good
BI (root bend)		: good
BI		: good

4. MACRO EXAMINATION : no defects

5. CONCLUSION/REMARKS : approved

Stork FDO B.V.
Materials Testing Department

Authorized : G. Kleijn

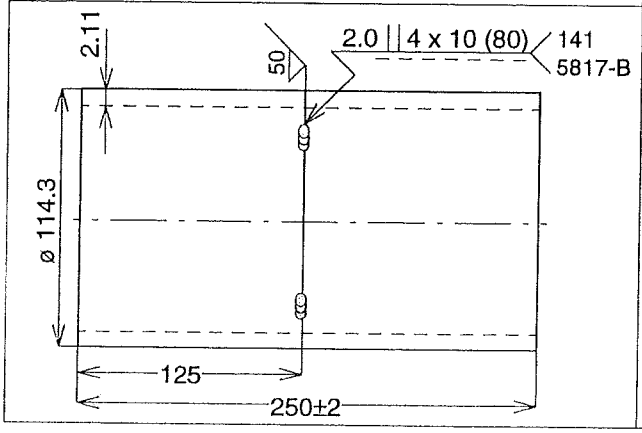
C.A. Stedehouder

See also MKA 95-0830

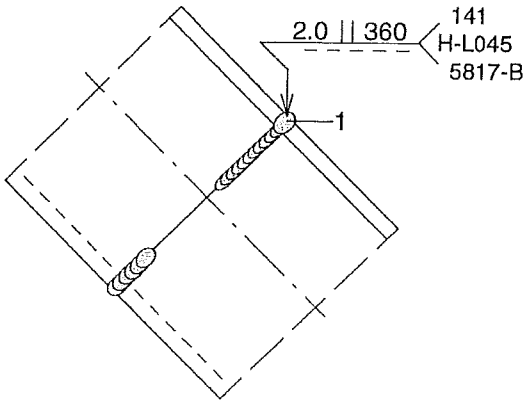
Welding procedure qualification (WPQ)
NEN-EN 288-3 and ASME IX

Manufacturer	DeMaCo Cryogenics Noord Scharwoude
Order nr.	
Doc. nr.	9008704
Draw.nr.	
WPAR nr.	MKA 95-830A / 90086997
Weld. proces according to ISO 4063	141 GTAW-welding
Weld-edge prep.(method)	Machining,grinding or scratch brushing
Joint preparation	See groove design. incl.tolerances
Basematerial and group of material	1.4301 / 1.04306 to 1.4301 / 1.4306
Material thickness (mm)	2.11 mm
Outside diameter (mm)	114.3 mm
Position of welding according to ISO 6947	H-L045
Indication to EN 287-1	141 T BW W09 t2.11 D114.3 ss mb
Quality level NEN-ISO 5817	level B

Groove design



Bead sequence



Welding variable

Pass nr.	Proces	Diameter wire ø mm	Welding current A	Voltage V	Current and polariteit	Welding speed cm/min	Heat input kJ/mm
tackweld	141	1.6	50 - 60	12 - 13	DC -		
1	141	1.6	50 - 60	12 - 13	DC -	9.5 - 10	

Consumable and classification

Tackweld AWS A5.9 : ER 308LSi
Pass nr.1 AWS A5.9 : ER 308LSi
EN 12072 : G/W 19 9 LSi

Cleaning

Cleaning of the joint area is essential to remove all traces of oxides, dirt and grease.
It is also desirable to scratch brush the joint after each weld pass to remove any oxide film formed the welding.

Rance of approval according to welding position 287-1

Butt welds PA, PC, PF, PE and H-L045.
0.5 D to 2D, diameter. D in mm
0.8 t to 1.1t, thickness t in mm.
Fillet welds PA, PB, PF and PD

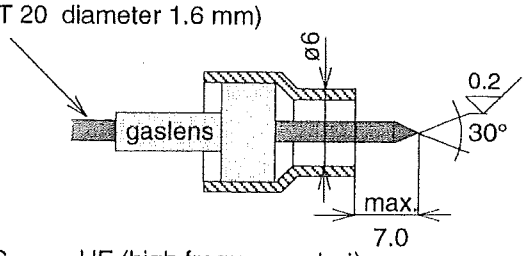
Rance of approval for parent metal

W09

Groep of proceses no. 14

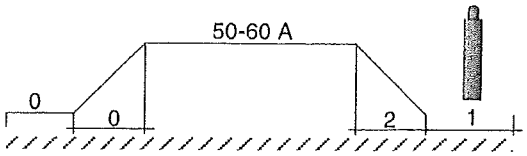
Tungsten electrode, type (EN 26848) and diameter (mm).
Preparation of the point of the electrode.

WT 20 diameter 1.6 mm)



AC-DC, electrode polarity.
Current range, min-max (A)
Pulsewelding: -Peak current, voltage (A / V)
-Backgroundcurrent (A)
-Pulsefrequentie (Hz)
-Balance (%)

DC - HF (high frequency start)

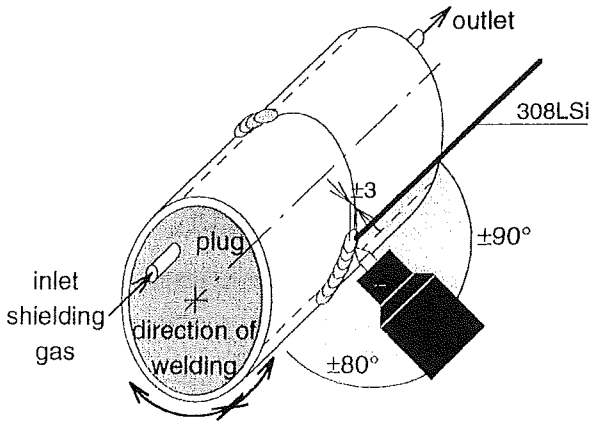


Shieldinggas (NEN-EN 439) and the flowrate (l/min).
Backinggas (NEN-EN439) en the flowrate (l/min).
Back-gouging-method,type of backing.

I1 (Argon) 99,99% 6.0-8.0 l/min
F2 (Formeer) 2.5, 5% H2 bal. %N2 2.0-3.0 l/min
Pipe purging bladder system.

Further information.

Heat-input, min-max (kJ/mm).
Preheating,min (°C). and method.
Interpasstemp.max ° (C).
Heating Rate, max (°C)
Cooling Rate,max (°C)
Post-weld heat treatment.



Manipulate with the arc (for instance weaving).
Position of the gun nozzle in the end and side view.

Points meriting attention during en after welding.
- Lack of root penetration: 1. increase current,
2. decrease welding speed,
3. increase joint angel,
4. reduce arc lenght,
5. reduce backing gas flow rate.

- Lack of side wall fusion: 1. increase current level,
2. decrease welding speed,
3. increase joint angel,
4. reduce rod diameter,
5. clean pipe surface.

Recommended torch and filler rod positions for manual but welding in fixed pipe H-L045 position. In this case welding is normally carried out from the 5 or 7 o'clock position.
Pause at te end only to fill crater.

Appr. Customer / Inspection
Date and signature

Corus Training Centre
W.Broersma

141 TW09 95-0833 114x2-2
W.Broersma apr 2002
cisy hrs ctc wto ©

Stork FDO B.V.

Test report

Lokatie Rapport Penetrant Onderzoek
Site Report Liquid Penetrant Examination

QUALIFIED BY STERLAB Reg.nr L 048
QUALIFIED BY STERIN Reg.nr I 007

Ordernr. FDO	: OMKA 5367	Rapport nummer/ Report number	: MIA 95-1052
Pag. nr.	: 1		
Tot. pag.	: 1		
Klant/Client	: Demaco Cryogenics	Plaats ond./Place of ex.	: FDO Amsterdam
Adres/Adress	: Smeetsweg 4, Waarland	Datum ond./Date of ex.	: 01-08-1995
Ord.nr. klant/Ord. nr. client	: 50299	Onderzochte gedeelten/ Parts examined	: las 100%
Contactpersoon/Repr. Client	: Hr. S. Kooy	Tek.nr./Draw.no.	: -
Object/Object	: lasproefpijpen		
Lasmethode/Weld proces	: -	Specification code	: NEN-EN 288-3
Basismateriaal/Parent metal	: Roestvast staal	Beoordelings Norm/ Assesment Standard	: EN 25817 B
Opp. toest./Surface condition	: Acceptabel	Procedure nr.	: -
Temperatuur Object in C	: 20	Werkinstruktie/Workinst.	: FDO WI 110-009 rev.4
Doel onderzoek/Purpose of exam	: Detecteren oppervlakgebreken		
Opmerking/Remarks	: -		

Methode/ Method ■ Spuitbus/Spray □ Dompelen/Dipping	Reiniger Pre-cleaner : NPU	UV-lichtintensiteit UV-light intensity : - µW/cm²
Techniek/ Technique ■ Kleur/Colour □ Fluorescent	Penetrant : VP30	Penetratietijd Pentration time : 25 min.
UV - lamp □ 111-166-01 (Matcon) UV - lamp □ 111-166-03 (De Looper) UV - lamp □ 111-166-04 (Matcon, stat.)	Verwijderaar Remover : water	Emulgatietijd Emulgation time : 1,5 min.
	Ontwikkelaar Developer : D70	Ontwikkeltijd Developing time : 20 min.

Resultaat/Results

De volgende lasproefpijpen zijn penetrant onderzocht:

- 6x lasproefpijp gemerkt F 826, ø 12.0 x 1.0 mm, WPS 02,
- 6x lasproefpijp gemerkt F 827, ø 18.0 x 1.0 mm, WPS 02,
- 2x lasproefpijp gemerkt F 828, ø 48.0 x 1.5 mm, WPS 02,
- 1x lasproefpijp gemerkt F 830, ø114.0 x 2.0 mm, WPS 02,

- 6x lasproefpijp gemerkt F 831, ø 12.0 x 1.0 mm, WPS 01,
- 6x lasproefpijp gemerkt F 832, ø 18.0 x 1.0 mm, WPS 01,
- 2x lasproefpijp gemerkt F 833, ø 48.0 x 1.5 mm, WPS 01,
- 1x lasproefpijp gemerkt F 834, ø114.0 x 2.0 mm, WPS 01,

Tijdens het onderzoek werden geen relevante te rapporteren indicaties waargenomen.

Conclusie/conclusion

De onderzochte las is acceptabel volgens de criteria zoals vermeld in de toegepaste beoordelingsnorm.

Bijlagen/Appendices : -	Datum rapport/ Date report:	Naam + handtekening onderzoeker/ Name + signature operator
Toezicht van klant/For Client : -	04 augustus 1995	M. Ruijters

Stork FDO B.V.

QUALIFIED BY STERLAB Reg.nr L 048

QUALIFIED BY STERIN Reg.nr I 007

Test report

Lokatie Rapport Visueel Onderzoek
Site Report Visual Examination

Ordernr. FDO	: OMKA 5367	Rapport nummer/ Report number	: MIA 95-0204
Pag. nr.	: 1		
Tot. pag.	: 1		
Klant/Client	: Demaco Cryogenics	Plaats ond./Place of ex.	: FDO Amsterdam
Adres/Adress	: Waarland	Datum ond./Date of ex.	: 1995-08-01
Ord.nr. klant/Ord. nr. client	: 50299	Onderzochte gedeelten/ Parts examined	: 100% per pijp
Contactpersoon/Repr. Client	: Hr. S. Kooy	Tek.nr./Draw.no.	: -
Object/Object	: Lasproefpijpen		
Lasmethode/Weld procedure	: zie onder	Specification code	: NEN-EN 287-1 and
Basismateriaal/Parent metal	: Roestvaststaal	Beoordelings Norm/	NEN-EN 288-3
Opp. toest./Surface condition	: acceptabel	Assesment Standard	: NEN-ISO 25817-C
Temperatuur Object in °C	: kamertemperatuur	Procedure nr.	: -
Doel onderzoek/Purpose of exam	: Quality control	Werkinstruktie/Workinst.	: FDO WI 110-025 rev.1
Opmerking/Remarks	: -		

Methode / Technique	Hulp-apparatuur/Equipment	
Ongewapend oog	Lasdikte meter	

Resultaat/Results

De volgende lasproefpijpen werden visueel onderzocht t.b.v. lasmethodekwalificaties en lasserskwalificaties :

FDO nummer	Aantal / afmeting mm pijp	No. Demaco	Lasser	Overdikte mm	Doorlassing	Opmerkingen
F826	6x ϕ12 x 1.0	WPS 02	1	0.5	ok	Geen
F827	6x ϕ18 x 1.0	WPS 02	1	0.5	ok	Geen
F828	2x ϕ48 x 1.5	WPS 02	1	1.0	ok	Geen
F830	1x ϕ114 x 2.0	WPS 02	1	1.0	ok	Geen
F831	6x ϕ12 x 1.0	WPS 01	2	0.5	ok	Geen
F832	6x ϕ18 x 1.0	WPS 01	2	0.5	ok	Geen
F833	2x ϕ48 x 1,5	WPS 01	2	1.0	ok	Geen
F834	1x ϕ114 x 2.0	WPS 01	2	1.0	ok	Geen
F835	2x ϕ12 x 1.0	WPS 02	5	0.5	ok	Geen
F836	1x ϕ43 x 1,5	WPS 02	5	0.5	ok	Geen
F837	1x ϕ114 x 2.0	WPS 02	5	1.0	ok	Geen
F838	1x ϕ12 x 1.0	WPS 02	6	0.5	ok	Geen
F839	1x ϕ43 x 1,5	WPS 02	6	1.0	ok	Geen
F840	1x ϕ114 x 2.0	WPS 02	6	1.0	ok	Geen
F841	1x ϕ12 x 1.0	WPS 02	7	0.5	ok	Geen
F842	1x ϕ43 x 1.5	WPS 02	7	0.5	ok	Geen
F843	1x ϕ114 x 2.0	WPS 02	7	0.5	ok	Geen

Conclusie :

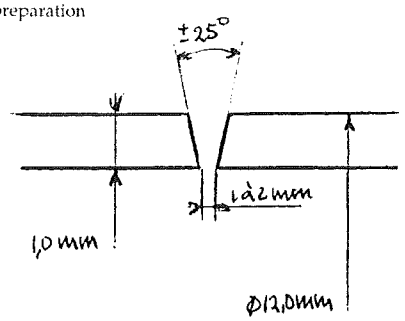
In de onderzochte lasproefpijpen werden geen onacceptabele indicaties waargenomen.
De in de tabel vermelde lasproefpijpen zijn acceptabel volgens de criteria van EN 25817 klasse C.

Bijlagen/Appendices : -	Datum rapport/ Date report:	Naam + handtekening onderzoeker/ Name + signature operator
Toezicht van klant/For Client :	1 augustus 1995	G. Kleijn

WELDING PROCEDURE QUALIFICATION RECORD (PQR)

Date of issue	September 5, 1995
LR Office	AMSTERDAM
Qualification: Code/Standards	NEN EN 288-3, NEN-EN 287-1
PQR Certificate number	AMS 540433/5

p WPS * No.	Rev.	Date of welding	Manufacturer's name and address
02	--	21-07-1995	Demaco Holland B.V.
Test place/location shop/site			Smeetsweg 4
Demaco			1738 ZG WAARLAND
RANGE OF APPROVAL			
Welding process(es)		Single pass/multipass	
GTAW		Single pass	
Joint type(s)		Parent metal group(s)	Test joint details (sketch with dimensions) of weld preparation
V-Groove		EN-288-3 Group 9	
Plate thickness range		Pipe outside diameter range	
NA		12.0x1.0 mm	
Filler metal type/designation		Heat treatment	
A68LC DIN 8556		NA	
Gas/flux		Type of welding current	
GAS		DC	
Welding positions		Progression (up/down)	
6 GU		Up / Down	
WELD AND FILLER METAL DETAILS			
Parent Materials		Test piece position	
1.4301/1		6 GU	
Welding process		Joint type	Bead sequence detail (sketch to include weld metal thickness and back gouging where applicable)
GTAW		V-Groove	
Filler material		Shielding gas/flux flow rate	
Wolfraam		Argon 10-12 L/min	
Make/Type/Diameter		Gas composition	
UTP 1.6 mm		99.99% Argon	
Composition		Flux type	
Tungsten 2% Thorium		NA	
Other information			
Backing gas comp: 99.99% Argon Flow rate: 14-20 l/min.			
Preheat and interpass temperature (method) and control			
NA			
Postweld heat treatment temperature (method) and control			
NA			



PROCEDURE DETAIL

RUN NUMBER	PROCESS	SIZE OF FILLER MATERIAL	CURRENT A	VOLTAGE V	AC/DC POLARITY	WIRE FEED/ TRAVEL SPEED	HEAT INPUT kJ/mm
1	GTAW	1.6 mm	± 70	±13	DC	±15	--

Date	Welder's name	WPQ Certificate No.
September 5, 1995	G.J. Blom	

* Manufacturer's preliminary Welding Procedure Specification

TEST RESULTS

NON-DESTRUCTIVE EXAMINATION (STATE 'ACCEPTABLE', 'UNACCEPTABLE' OR 'NONE')

Visual	Magnetic Particle	Liquid Penetrant	Radiography	Ultrasonics
Acceptable	None	Acceptable	None	None

DESTRUCTIVE TESTS

TEST	TENSILE STRENGTH	YIELD STRENGTH	ELONGATION	REDUCTION OF AREA	FRACTURE LOCATION	TEST TEMPERATURE
Units	N/mm²	None	% None	% None		°C
Transverse tensile	1&2 513/514				Pipe/weld	RT
All-weld tensile	None	None	None	None		None

BEND TESTS

ORIENTATION	FORMER DIAMETER	RESULTS
Root/face/side	4xT	Acceptable
Root/face/side	4xT	Acceptable
Root/face/side	4xT	Acceptable
Root/face/side	4xT	Acceptable
Longitudinal	None	None

FILLET WELD FRACTURE (RESULTS)

1. None
2. None
3. None

Macro examination

Acceptable

IMPACT TESTS

Requirement	NOTCH LOCATION/ ORIENTATION	TEMP °C	VALUES (J) 1 2 3	AVERAGE (J)	REMARKS
Size	None	None	None	None	None
	None	None	None	None	None
Type	None	None	None	None	None
Retest	None	None	None	None	None

HARDNESS SURVEY

Type None Load None Location of hardness measurements (sketch)

	Hardness range
Parent material	None
H.A.Z.	None
Weld	None

Additional test(s) and result(s), eg. chemical analysis, micro examination, ferrite measurement

None

We certify that the foregoing statements are correct and the test welds were prepared, welded and tested in accordance with the specified Codes or Standards.

Signature – Manufacturer	Name in BLOCK CAPITALS	Date
AMSTERDAM	Demaco Holland B.V.	
Signature – Witnessing Surveyor	Name in BLOCK CAPITALS	Date
Ing. L.P.H.M. van den Einden	L.P.H.M. van den Einden	September 5, 1995