

October 21, 2014 Co. Code: **RJVGA1**

Mr. Joel Girard, ing. P. Eng. Metex Consulting Inc. 7345 du Mousquet Quebec, QC, G2K 1Y4

Dear Mr. Girard:

RE: ALTERNATE WPS FOR RJV GAS FIELD SERVICES (W47.1)

Your recent submission has been reviewed by the Canadian Welding Bureau. Our comments are as follows:

GMAW: GMAW-STEEL, Rev 0 / 1401 (pages 1 through 47); Stamped accepted.

For the most current list of CWB certified consumables please access the following link: http://eng.cwbgroup.org/Certification/Pages/ConsumablesSearch.aspx.

For complimentary information on the Canadian welding standards, requirements and regulations and how they support public safety, please visit www.weldquality.org.

If you have any questions relating to the above comments, please do not hesitate to contact me or the CWB area representative.

Thank you for your cooperation.

Yours very truly, CANADIAN WELDING BUREAU

Ashiqur Khan, M.Eng., P.Eng.Procedures and Electrodes

Canadian Welding Bureau 8260 Parkhill Drive, Milton, ON L9T 5V7

Ashiqur.Khan@cwbgroup.org www.cwbgroup.org

Tel: 1 (800) 844-6790, ext. 217

Fax: 1 (905) 542-1318

c: Wes Markowsky, RJV Gas Field Services

c: Scott Wilson, CWB











October 27, 2014 Co. Code: **RJVGA1**

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RJV GAS FIELD SERVICES LTD.

Welding Procedure Specification

in accordance with

ASME Sections VIII, IX, B31.1 & B31.3

100 Revision 3

WPS No.:	<u> </u>	100 Revision 3				
Supporting PQR No. (s):	100-1, 100-B, 100-C, 100-D					
	Qualifi	ed for				
Process(es):	SMAW / SMAW	Position(s):	All			
Filler Metal F-No:	F-3 / F-4	A-No.:	A-1 / A-1			
VIVIC Clase:	F6010 / E7018-1	Weld Type(s):	Groove, Fillet			
m Matak	P.4 Group 1 or 2	To: P-1	Group 1 or 2			
	CA 36 SA-53 SA-106 A/B, SA-234	WPB, SA-350 LF1, SA-516 6	10/65, SA-CSA G40.21 Gr. 3844 / 4444			
P-1 Gr. 2:	SA-105, SA-106 C, SA-234 WPC, SA	A-350 LF2, SA-516 70, SA-5	37 CI. 1, SA-660 WCB / WCC			
	All	Condition(s):	As Welded			
Thickness Range:	0.062" to 1.00"	Normal and Sour S	Service			
	0.425" to 4.00"	Low Temperature	Service to -46° C (-50°F) update to the current edition of the ASI			
PROVINCE SAFETY O WELDING Reg, No. WP	SAFETY ASSOCIATION OF ALBERTA CODES ACT PROCEDURE 1317.7 00 (REV 3) SMAW 2 to P No. 1 Gr. 117. A No					
MINTH-QUAL 3.1	mm CVN -46C					

WELDING PROCEDURE SPECIFICATION (WPS) QW-482 (Section IX, ASME Boiler and Pressure Vessel Code)

Company Name: RJV	Gas Field Services Ltd.	D-fa:	September 08, 1987		
WPS No.: 100		Date:	July 08, 2002		
Revision No: 3	100 0 100 0	- Kealzion nare:	outy 00, 2002		
Oupport	1, 100-B, 100-C, 100-D	Type(s):	Manual / Manual		
Welding Process(es): SMA	W / SMAW	- Type(3).			
JOINTS C	VV. 402		Joint Details		
		All ASME joint d	esigns. Reference construction		
Joint Design: Butt, Tee, La	p, comer, etc.	drawings for joint	details. Where joint details are not		
	les with or without backing	specified refer to	typical joint detail sheet provided.		
F-4 SMAW elctrode	es with backing only.	Specified, force to	Poteiners		
Backing Material (Type):	Similar base or weld meta	as required. No r	ACIAINOTO.		
Backing Material (Type).	BASE META	ILS GVV-AUS	1 Group No: 1 or 2		
P-No: 1 Group	No: 1 or 2 t	o P-No:1	Group No: 1012		
OR		to Spec. type & g	ırade: N/A		
Spec. type & grade: N/A		to apec, type a g			
OR	op.: N/A	to Chem. Analysi	is & Mech. Prop.: N/A		
Chem. Analysis & Mech. Pro	· p···	•			
Base Metal Thickness Ran	n neo" to 1 da" → Nobba	and Sour Service	Fillet: All		
Groove:	0.125" to 1.00" – Low Te	mperature Service	to -46° C (-50°F)		
nt Die Demois	Unlimited		Luier Vii		
Other: Maximum thickn	ess of any weld layer shall	not exceed 0,500"			
Other.	FILLER MET	ALS QW-404			
Process:	SMAW		SIVIAVV		
Spec No. (SFA):	5.1		5.1		
AWS No. (Class):	E6010		E7018-1 F-4		
F-No.:	F-3		A-1		
A-No.:	A-1	040"	3/32", 1/8", 5/32", 3/16", 1/4"		
Size of Filler Metals:	3/32", 1/8", 5/3	2", 3/16"	0.853" max. (0.850" for Low Tempetature)		
Weld Thickness - Groove:	0.157" max.(0.150" for L	· · · · · · · · · · · · · · · · · · ·	unlimited		
- Fillet:	unlimite	<u> </u>	N/A		
Electrode-Flux (Class):	N/A N/A		N/A		
Flux Trade Name:	N/A N/A		N/A		
Consumable Insert:	Covered Flei	ctrode	Covered Electrode		
Other:	Covered Fled	vice and editorial revi	iew and update to the current edition of the AS		

Addition of PQR's for low temperature service and editorial review and update to the current edition of the ASME Revision 3: codes.

WELDING PROCEDURE SPECIFICATION (WPS) QW-482 (Section IX, ASME Boiler and Pressure Vessel Code)

DOIII POLITY	Gas Field Services Ltd.	Date:	September 08, 1987		
WPS No.: 100		Revision Date:	July 08, 2002		
Revision No: 3	- 100 O 100 D	- Kevision Date.	- Odiy 00, 2002		
	1, 100-B, 100-C, 100-D W / SMAW	Type(s):	Manual / Manual		
Welding Process(es): SMA	AA V OIMWAA	_			
JOINTS C	W-402	- December 1 - Si	Joint Details		
			esigns. Reference cons	truction	
Joint Design: Butt, Tee, La	p, Comer, etc.	denvings for joint	details. Where joint deta	ils are not	
	es with or without backing	Grawings for joint	typical joint detail sheet	provided.	
F-4 SMAW elctrode	s with backing only.	specified, refer to	typical joint detail shoot		
Backing Material (Type):	Similar base or weld meta	al as required. No R	etainers.		
	BASE META	LS QW-403	THOUGH .	4 2	
P-No: 1 Group		o P-No: 1	Group No:	1 or 2	
OR		_	. 31/4		
Spec. type & grade: _N/A_		to Spec. type & g	rade: <u>N/A</u>		
OR		. at Australia	- 9 Mach Dron :	N/A	
Chem. Analysis & Mech. Pro	sp.:N/A	to Chem. Analysis	S of Infects, Lipp.		
Dans Matal Thickness Ran	ae e	I and Cour Condes	Fillet:	Ali	
O manufact	- n ng2" to 1 Ha" — Normai	and Sour Service			
Groove:	0.125" to 1.00" – Low Te	mperature Service	Fillet:	All	
Pipe Dia Range:	Unlimited	I not exceed 0.500"			
Other: Maximum thickne	ess of any weld layer shal	ALC CIVI 404		FE OF DISTRICT	
ALM SOCIETY WITH MEDICAL SE	FILLER MET		SMAW		
Process:	SMAW		5.1		
Spec No. (SFA):	5.1 E6010		E7018-1		
AWS No. (Class):	F-3		F-4		
F-No.:	F-3 A-1		A-1		
A-No.:	3/32", 1/8",	5/32"	3/32", 1/8", 5/32", 3/	16", 1/4"	
Size of Filler Metals:	0.157" max.(0.150" for L	ow Tempetature) C	0.853" max. (0.150" for Low	Tempetature)	
Weld Thickness - Groove:	unlimited		unlimited		
- Fillet:	N/A	· ·	N/A		
Electrode-Flux (Class):	N/A		N/A		
Flux Trade Name:	N/A		N/A		
Consumable Insert: Other:	Covered Elec	ctrode	Covered Elect	rode	
		ULI CAC	ew and update to the currer		

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WELDING PROCEDURE SPECIFICATION (WPS) QW-482 (Section IX, ASME Boiler and Pressure Vessel Code)

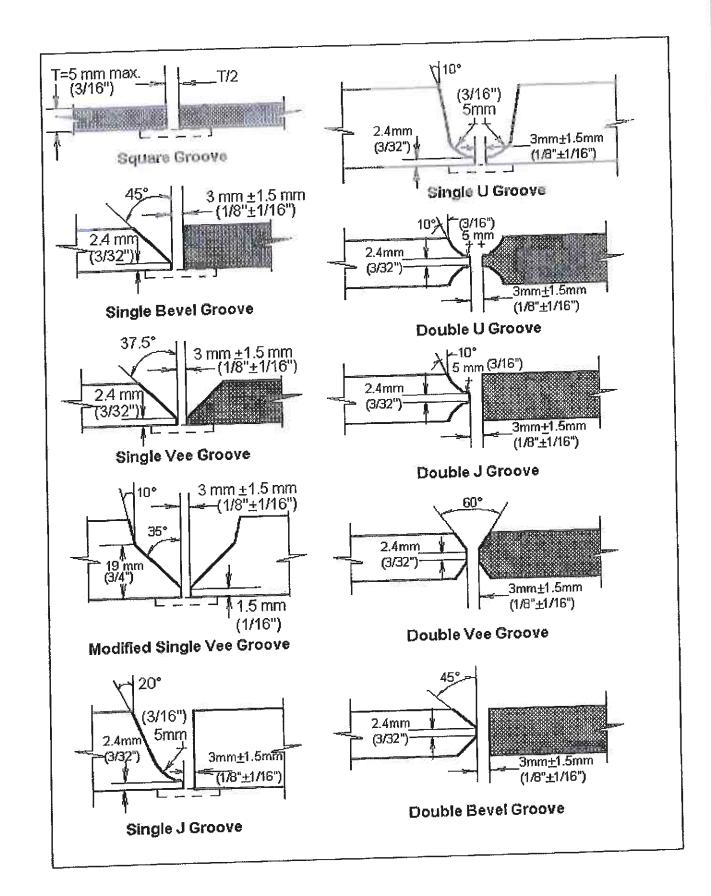
WPS # 100 Revision 3

D	OSITIONS QV	-405	POST	TWELD HEAT TRE	AIMEN	T QW-407
	CO. C. S.	180 1-11	Tempe	erature Range: <u>N/A</u>		
	Int or many	Electrodes		Time Range: N/A		
Welding Progre	901011L	Electrodes				
.80	Op 0, 001	Liectiogos				
	On(a) Or Fines.			GAS (2W-408	110 11
	PREHEAT QW	406	21111		274-400	
Preheat Tem	ip Min: 50°F	-				
Interpase Tem	p Max: 600*F			100 100 100		
Interpass Ten	nn Min: 50°F					
	Monitor usin	g pyrometer temp	ilstiks Ga	s Backing: N/A	_ 741 _ m s	N/A
	or other suita	able method.	Trailing S	hielding Gas Compo	sition:	THE THE
1000	FI FI FI	CTRICAL C	HARACTERIST	rics QW-409	TI PHILIP	- 2/2 1/44
ASSISTED BY	Current Type:	SMAW (F-3)	Direct Current (D	OC) SMAVV (F		t Current (DC)
	Polarity:	SMAW (F-3)	Reverse (EP)	SMAW (F		rse (EP)
		SMAW (F-3)	60 - 180	SMAW (F		
	Amps (Range):	SMAW (F-3)	20 - 32	SMAW (F		
	Volts (Range):	SMAW (F-3)	28 080 J/in	SMAW (F	-4) 59 80	00 J/in
Max Heat Input:	. 0.125" - 0.500"	SMAW (F-3)	22 080 J/In	SMAW (I		50 J/in
	0.500" - 1.00"		22 000 0111			
Electrode	Wire feed speed rai	nge: N/A				
Tunastei	n Electrode Size & T	ype: <u>N/A</u>				
Tunastei	Wire feed speed rain The Electrode Size & T The Electrode Size & T	ype: N/A AW: N/A				s second
Tungster Mode of Mo	n Electrode Size & Tretal Transfer for GM.	ype: N/A AW: N/A	HNIQUE QV	/-410	Autor)	um host input
Tungster Mode of Mo	n Electrode Size & T etal Transfer for GM.	ype: N/A AW: N/A	INIQUE QV	/-410 rolled to prevent excee	ding maxim	num heat input.
Tungstei Mode of Mo Stri	n Electrode Size & T etal Transfer for GM. ng or Weave Bead:	ype: N/A AW: N/A TECI Either, Weave	size shall be cont	rolled to prevent excee		
Tungstei Mode of Mo Stri	n Electrode Size & T etal Transfer for GM. ng or Weave Bead: se or Gas Cup Size:	ype: N/A AW: N/A TECI Either, Weave N/A Base material	size shall be cont	rolled to prevent excee		
Tungstei Mode of Mo Stri	n Electrode Size & T etal Transfer for GM. ng or Weave Bead:	ype: N/A AW: N/A TECI Either, Weave N/A Base material	must be thorough	ly cleaned of grease, re	ust, mill sca	
Tungstei Mode of Mo Stri Orific	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning:	ype: N/A AW: N/A TECI Either, Weave N/A Base material least1" back o	must be thorough n each side of the wer brushing, grin	ly cleaned of grease, re joint prior to welding, ding, etc. after each we	ust, mill sca	
Tungstei Mode of Mo Stri Orific	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning:	ype: N/A AW: N/A TECI Either, Weave N/A Base material least1" back o	must be thorough n each side of the wer brushing, grin	ly cleaned of grease, re joint prior to welding, ding, etc. after each we	ust, mill sca	
Tungstei Mode of Mo Stri Orific	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: ce or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging:	ype: N/A AW: N/A TECI Either. Weave N/A Base material least1" back o Perform by po Arc air, gouge	must be thorough n each side of the wer brushing, grin	ly cleaned of grease, re	ust, mill sca	
Tungstei Mode of Mo Stri Orific	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: se or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation:	N/A N/A TECI Either. Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A	must be thorough n each side of the wer brushing, grin , grind, etc. to clea	ly cleaned of grease, re joint prior to welding, ding, etc. after each we	ust, mill sca	
Tungstei Mode of Mo Stri Orific	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: e to Work Distance:	ype: N/A AW: N/A TECI Either. Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable	must be thorough n each side of the wer brushing, grin , grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required.	ust, mill sca	
Tungstei Mode of Mo Stri Orific i Contact Tube Multiple or Sin	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: e to Work Distance: gle pass (per side):	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult	must be thorough n each side of the wer brushing, grin , grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each we an metal if required.	ust, mill sca	
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: nterpass Cleaning: Back Gouging: Oscillation: e to Work Distance: gle pass (per side): Single Electrodes:	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult	must be thorough n each side of the wer brushing, grin , grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each we an metal if required.	ust, mill sca	
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing	n Electrode Size & Tretal Transfer for GM. Ing or Weave Bead: In or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: In to Work Distance: Ingle pass (per side): It is Single Electrodes: It is size of the control of	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM	must be thorough n each side of the wer brushing, grin , grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each we an metal if required.	ust, mill sca	
Tungstei Mode of Me Stri Orific i Contact Tube Multiple or Sing Multiple or	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: nterpass Cleaning: Back Gouging: Oscillation: e to Work Distance: gle pass (per side): Single Electrodes:	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed	must be thorough n each side of the wer brushing, grin , grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des.	ust, mill sca	
Tungstei Mode of Me Stri Orific i Contact Tube Multiple or Sing Multiple or	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: e to Work Distance: gle pass (per side): Single Electrodes: Ivel Speed (Range): Peening:	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed	must be thorough n each side of the wer brushing, grin , grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding, ding, etc. after each wan metal if required. des.	ust, mill sca	
Tungstei Mode of Me Stri Orific i Contact Tube Multiple or Sing Multiple or	n Electrode Size & Tretal Transfer for GM. Ing or Weave Bead: In or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: In to Work Distance: Ingle pass (per side): It is Single Electrodes: It is size of the control of	ype: N/A AW: N/A TECI Either. Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL Metal	must be thorough n each side of the wer brushing, grind, grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding, ding, etc. after each wan metal if required. des. AMETERS	ust, mill sca	ale, dirt, etc., at
Tungstei Mode of Me Stri Orific i Contact Tube Multiple or Sing Multiple or	n Electrode Size & Tretal Transfer for GM. ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: to Work Distance: gle pass (per side): Single Electrodes: Ivel Speed (Range): Peening: Filler M. AWS	ype: N/A AW: N/A TECI Either. Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL Notal	must be thorough n each side of the wer brushing, grind, grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des. AMETERS	ust, mill sca eld layer.	ale, dirt, etc., at
Tungstei Mode of Me Stri Orific I Contact Tube Multiple or Sing Multiple or Tra	ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Oscillation: to Work Distance: gle pass (per side): Single Electrodes: Ivel Speed (Range): Peening: Filler M AWS Classification	ype: N/A AW: N/A TECI Either. Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL \ lotal Diameter (in)	must be thorough n each side of the wer brushing, grind, grind, etc. to clea	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des. AMETERS Trent Amp Range	ust, mill sca	Travel Speed (IPM)
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing Multiple or Tra Process	n Electrode Size & Tretal Transfer for GM. Ing or Weave Bead: In or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Interpass Cleaning: Oscillation: In to Work Distance: In	ype: N/A AW: N/A TECI Either, Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL \ lotal Diameter (in) 3/32	must be thorough n each side of the wer brushing, grin , grind, etc. to clea pliple for F-4 electro VELDING PAR Type & Polarity DC RP	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des. AMETERS Trent Amp Range 60 - 100	ust, mill sca eld layer. Volt Range	Travel Speed (IPM) 2-12 3-14
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing Multiple or Tra Process SMAW SMAW	n Electrode Size & Tretal Transfer for GM. Ing or Weave Bead: It or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Dack Gouging: Oscillation: It to Work Distance: It of Gas (per side): It of Speed (Range): Peening: Filler Mass Classification E6010 E6010	ype: N/A AW: N/A TECI Either. Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL \ lotal Diameter (in) 3/32 1/8	must be thorough n each side of the wer brushing, grin , grind, etc. to clea piple for F-4 electro VELDING PAR Cu Type & Polarity DC RP DC RP	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des. AMETERS Trent Amp Range	volt Range	Travel Speed (IPM) 2 - 12 3 - 14 4 - 16
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing Multiple or Tra Process SMAW SMAW SMAW	ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: to Work Distance: gle pass (per side): Single Electrodes: Ivel Speed (Range): Peening: Filler N AWS Classification E6010 E6010	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL \ Iotal Diameter (in) 3/32 1/8 5/32	must be thorough n each side of the wer brushing, grind, grind, etc. to cleat ple for F-4 electro VELDING PAR Cu Type & Polarity DC RP DC RP DC RP	ly cleaned of grease, rejoint prior to welding. ding, etc. after each wan metal if required. des. AMETERS: Trent Amp Range 60 - 100 80 - 150	Volt Range 20 - 26 22 - 32 18 - 24	Travel Speed (IPM) 2-12 3-14 4-16 2-10
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing Multiple or Tra Process SMAW SMAW SMAW SMAW	ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: to Work Distance: gle pass (per side): Single Electrodes: Ivel Speed (Range): Peening: Filler N AWS Classification E6010 E6010 E7018-1	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL \ Iotal Diameter (in) 3/32 1/8 5/32 3/32	must be thorough n each side of the wer brushing, grin , grind, etc. to clea pliple for F-4 electro VELDING PAR Type & Polarity DC RP DC RP DC RP DC RP	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des. AMETERS Trent Amp Range 60 - 100 80 - 150 90 - 180	Volt Range 20 - 26 22 - 32 18 - 24 20 - 24	Travel Speed (IPM) 2-12 3-14 4-16 2-10 4-12
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing Multiple or Tra Process SMAW SMAW SMAW SMAW SMAW SMAW	ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: to Work Distance: gle pass (per side): Single Electrodes: Ivel Speed (Range): Peening: Filler N AWS Classification E6010 E6010 E7018-1	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL \ letal Diameter (in) 3/32 1/8 5/32 3/32 1/8	must be thorough n each side of the wer brushing, grind, grind, etc. to cleat ple for F-4 electro VELDING PAR Cu Type & Polarity DC RP DC RP DC RP	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des. AMETERS Trent Amp Range 60 - 100 80 - 150 90 - 180 70 - 130 90 - 150 120 - 190	Volt Range 20 - 26 22 - 32 18 - 24 20 - 26	Travel Speed (IPM) 2 - 12 3 - 14 4 - 16 2 - 10 4 - 12 5 - 14
Tungstei Mode of Me Stri Orific Contact Tube Multiple or Sing Multiple or Tra Process SMAW SMAW SMAW SMAW	ng or Weave Bead: e or Gas Cup Size: Initial Cleaning: Interpass Cleaning: Back Gouging: Oscillation: to Work Distance: gle pass (per side): Single Electrodes: Ivel Speed (Range): Peening: Filler N AWS Classification E6010 E6010 E7018-1	ype: N/A AW: N/A TECI Either Weave N/A Base material least1" back o Perform by po Arc air, gouge N/A Not Applicable Single or Mult Single 2 - 16 IPM Not allowed TYPICAL \ Iotal Diameter (in) 3/32 1/8 5/32 3/32	must be thorough n each side of the wer brushing, grin , grind, etc. to clea piple for F-4 electro VELDING PAR Cu Type & Polarity DC RP	rolled to prevent excee ly cleaned of grease, re joint prior to welding. ding, etc. after each wan metal if required. des. AMETERS Trent Amp Range 60 - 100 80 - 150 90 - 180 70 - 130 90 - 150	Volt Range 20 - 26 22 - 32 18 - 24 20 - 24	Travel Speed (IPM) 2-12 3-14 4-16 2-10 4-12

Addition of PQR's for low temperature service and editorial review and update to the current edition of the ASME Revision 3: codes.

Typical Joint Details QW-482

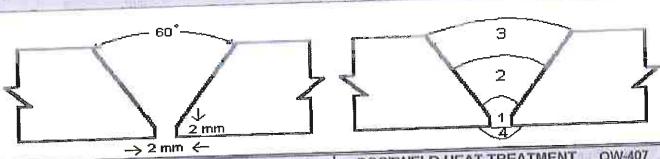
Prepared by: Qualimet



PROCEDURE QUALIFICATION RECORD (PQR) QW-483 (Section IX, ASME Boiler and Pressure Vessel Code)

Company Name: RJV Gas Field Services Ltd. Date: July 08, 2002 PQR No: 100-C Revision Date: ----**Revision No.:** WPS No: 100 Revision 3 Welding Process(es): SMAW / SMAW Types: Manual / Manual

JOINTS QW-402



	→ 2 mm ←		701 107
BASE	METALS QW	-403	POSTWELD HEAT TREATMENT QW-407
Material Spec.: Type or Grade:	SA-516 Grade 60 P1 Group 1	SA-516 Grade 70 P-1 Group 2	Temperature: N/A Time: N/A Other: N/A
Thickness of Test C	oupon: 0.249" 2648-015071-2	Plate C.E.: 0.37	GAS QW-408
FILLER Process SFA Spec: AWS Class.: F-No:	METALS QV SMAVV	V-404 SMAW 5.1 E7018-1 F-4 A-1	Type or Gas(es): N/A Composition: N/A Flow Rate: N/A Gas Backing Rate: N/A Other: N/A
A-No: Filler Metal Size: Deposited Metal: Other:	1/8" 0.075" Covered Electrode	1/8" 0.174" Covered Electrode	ELECTRICAL CHARACTERISTICS QW-409 Current: F-3: Direct (DC) F-4: Direct (DC) Polarity: F-3: Reverse(EP) F-4: Reverse(EP) Amps: F-3: 65 - 80 F-4: 70 - 100 Volts: F-3: 23 - 36 F-4: 20 - 23
Position of Groove Weld Progression Othe	r: Vertical Up r: N/A		Heat Input: F-3: 28 080 J/in F-4: 59 800 J/in Other: N/A TECHNIQUE QW-410 Travel Speed: F-3: 2 - 7.0 ipm F-4: 2.5 - 4.1 ipm
PREHEAT QW-406 Preheat Temp Min.: 50° F Interpass Temp Max.: 50° F Other: Temperature monitored using Templistiks			String or Weave Bead: Oscillation: Multiple or Single Pass: Single or Multiple Electrodes: Other: N/A String and weave N/A Multiple + single per side Single Single

PROCEDURE QUALIFICATION RECORD (PQR) QW-483 (Section IX, ASME Boiler and Pressure Vessel Code)

						PQR	# <u>100-</u> C	<u> </u>
			T	ensile Test	;			
Specimen	Width		kness in	QW 462 Area in²	Ultimate Total Load	Ultim Unit St ps	ress	Type of Failure & Location
			No	t Applicable				
			Guid	ded Bend T	ests			
				QW462		Result		
	Type and	Figure No.						
			N	ot Applicable)			
					-4-			
	•		То	ughness Te QW 170				Metaba
Specimen	Notch	Notch	Test	Impact	Latera % Shear	ıl Exp Mils	Drop Break	Weight No Br
No.	Location	Type	Temp	Values				
			See	Attached R	eport			
			J		<u></u>			
				Other Test				
				Not Applicab	le			
Type of Tes	st:							
Other:							······································	
Welder's N Tests Cond		vin Boe Qualimet l	nc.	ABSA No.:	W-6943	Stan Lab. Tes	np ID: K	X 64-02001
16313 0011	that the stat		u-i- maand	ara correct i	and that the I	test welds v	vere prep	ared, wel
We certify and tested	that the stat I in accordan	ements in t ace with the	e requirem.		-			
			Mai	nufacturer:	RJV Gas Fie	ld Services	Eld.	
	_				Dale Larriuk	C. Constitution	<u>بسريس</u> لر	
Date: J	uly 08, 2002							



• 7817 CORONET ROAD, EDMONTON, AB T6E 4N7 (780) 469-5870 • FAX (780) 465-5829 • CALGARY (403) 278-9862 • 1-800-621-8979



CHARPY V-NOTCH IMPACT TEST RESULTS

For Procedure Qualification Report # 100-C

	0.040	as Field Services Ltd.	Job Number:	664-02001
Address:		47 street Vegreville, Alberta	Date:	July 08, 2002
Materials:		6 Grade 60 to 70		
Sizes	0.249	5" wt plate machined	Condition:	As Welded
Specimen	Type:	5.0 mm Charpy V Notch impact specimens		
Specific	ation:	ASTM A-370, ASME Section VIII UG-84		
Qualification T	emp.:	-46°C (-50°F)		

Sample	Sample	Impact ft-lb	Energy (Joule)	Converted Full Size Impact Energy (J)	% Shear
Set Williams	Number	47	64	85	60
Weld Zone		55	75	99	60
32 Table 144 Carrier 18 18 18 18 18 18 18 18 18 18 18 18 18	2		79	105	70
The product of the pr	3	58		96	63
	Average:	53	72	Processor and the second of the second	PART OF EXPRESS
CONTRACTOR OF THE	STATE NOW	Walter State of the State of th	Herrist Barrier	119	80
Heat Affected Zone	1	66	89	127	80
3A-516 Gr, 60	2	70	95		90
COUNTY OF SERVICE AND AND ADDRESS.	3	65	88	118	83
n (13) selection of the selection	Average:	67	91	121	Constitution and
ALCOHOLOGICAL MANAGEMENT AND ALC	1 Harr	ANADAWA INDI	数据编机模的。不	Massach de la Companya de la Company	90
Heat Affected Zone	1	86	117	155	90
SA-516 Gr. 70	2	78	106	141	
STATE OF THE STATE	3	71	96	128	85
	Average:	78	106	142	88
			Mass - Mary	THE WAR WITH THE PARTY	

Remarks:

These Charpy v-notch impact test results exceed the minimum requirements of ASME Section VIII and B31.3 Codes for -46°C; or CSA Z662-99 Codes for -46°C.

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

TEST RESULTS CERTIFIED BY:

Qualimet









Date: July 08, 2002

Revision Date:

PROCEDURE QUALIFICATION RECORD (PQR) QW-483 (Section IX, ASME Boiler and Pressure Vessel Code)

Company Name: RJV Gas Field Services Ltd.

100-D PQR No:

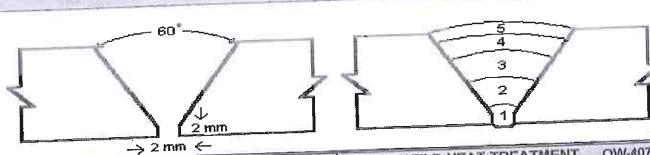
Revision No.: ----

WPS No: 104 Revision 2

Welding Process(es): SMAW / SMAW

Types: Manual / Manual

JOINTS QW-402



	→ 2 mm ←		COLUMN CO		
		403	POSTWELD HEAT TREATMENT QW-407		
BASE METALS OW-403 Material Spec.: SA-516 to Grade 70 Type or Grade: Grade 60 Grade 70 P-No.: P1 Group 1 P-1 Group 2 Thickness of Test Coupon: 0.500" plate			Temperature: N/A Time: N/A Other: N/A		
Other: Heat No.: 94	030-54885 C.E.		GAS QW-408		
FILLER I	METALS QV	V-404 SMAW	Type or Gas(es): N/A Composition: N/A		
Process	SMAW	5.1	Flow Rate: N/A		
SFA Spec:	5,1 E6010	E7018-1	Gas Backing Rate: N/A		
AWS Class.: F-No:	F-3	F-4	Other: N/A		
A-No:	A-1	A-1	ELECTRICAL CHARACTERISTICS QW-409		
Filler Metal Size:	1/8"	1/8"	ELECTRICAL CHARACTERS (Discol (DC)		
Deposited Metal:	0.075"	0.425"	Current: 1-5 Billet (FD) E.d. Reverso(FP)		
Other:	Covered Electrode	Covered Electrode	Amps: F-3: 70 - 80 F-4: 70 - 100		
	TION QW-4	05	Volts: F-3: 20 - 23 F-4: 20 - 23 Heat Input: F-3: 22 080 J/in F-4: 72 450 J/in		
Position of Groov Weld Progression	re: 3G Vertical Up		Other: N/A		
Weld Progression			TECHNIQUE QW-410 Travel Speed: F-3: 5.0 - 6.0 ipm F-4: 2.0 - 3.5 ipn		
	HEAT QW-4	06	String or Weave Bead: String and weave		
Preheat Temp Min.: 50° F Interpass Temp Max.: 500°F			Oscillation: N/A		
Interpass Temp Mi			Single or Multiple Electrodes: Single		
Otti	Templistiks		Other: N/A		

PROCEDURE QUALIFICATION RECORD (PQR) QW-483 (Section IX, ASME Boiler and Pressure Vessel Code)

						PQR#	100-D
				Tensile Tes	t		
Specimen	Width	,	kness in	QW 462 Area in²	Ultimate Total Load Ib	Ultimate Unit Stres psi	
			ľ	lot Applicable			
			Gu	ided Bend T QW462	ests		
	Type and	l ⊮igure No.		777402		Result	
				lot Applicable			
	<u>.</u>			Ant Whileapis			
			10	oughness Te	ests		
	, , , , , , , , , , , , , , , , , , , 		T = 4	QW 170	Lateral E	xn T	Drop Weight
Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values	% Shear	Mils	Break No Brk
			50	e Attached Re	nort		
			36	e Attached Ite			
Type of Tes Other:	st:			Other Tests Not Applicab			
Welder's Na Tests Cond		/in Boe Qualimet Inc	3.	ABSA No.:	W-6943	Stamp II Lab. Test No	D: KZ 664-02001
	that the state	ements in th	is record requireme	ents of Sectica	n ix of the Asi	JE Cinge,	prepared, welde
We certify and tested	in accordance					DIVINER TO	
We certify and tested	!n accordan		Mai		RJV Gas Fleld S	Sex 1000 Fig.	A STATE OF THE PARTY OF THE PAR
and tested	ily 08, 2002		Mai		Dale Lafliuk		And the state of t



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CHARPY V-NOTCH IMPACT TEST RESULTS

For Procedure Qualification Report # 100-D

A SHOW	PWG	as Field St	ervices Ltd.	Job Number:	664-02001
Address		47 street	Vegreville, Alberta	Date:	July 08, 2002
Materials:		6 Grade 60			
Size:	0.500			Condition:	As Welded
Specimen	Type:	10,0 mm	Charpy V Notch impact s	specimens	
Specification:		ASTM A-	370, ASME Section VIII t	UG-84	
Qualification 3	The second secon	maco.			

Sample	Sample		Energy (Joule)	% Shear
Set -	Number	ff-lb	76	45
Weld Zone	1	56	64	25
Charles and the second	2	47		35
Control Control Service	3	52	71	
	Average:	51	70	25
	May Water	THE PERSON NAMED OF THE PARTY O	Meyer of Allen Par	
Heat Affected Zone	1	101	137	75
	2	111	131	90
SA-516 Gr. 60	3	94	128	65
11111000111		102	138	77
。 T. (1) A.W.M. B.W. B.W. B.	Average:	POWER AS AN AMERICAN	CHINA CONTRACTOR AND	ANCORPORTY TORK SHOULD
######################################	EMPONDER NEW	MANAGE STATE OF STATE	148	1 80
Heat Affected Zone		109	162	88
SA-516 Gr. 70	2	119	155	80
	3	114		
	Average:	114	155	83
15 15 16 HE AT 18 16 WAY AT	La company of the same	据从2007年1月20日 - 1000 -	AMALE STATE	HOLLING (WHITE CLASSING FORE

Remarks:

These Charpy v-notch impact test results exceed the minimum requirements of ASME Section VIII and B31.3 Codes for -46°C; or CSA Z662-99 Codes for -46°C.

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

Test Results Certified By:

MJ Janv.

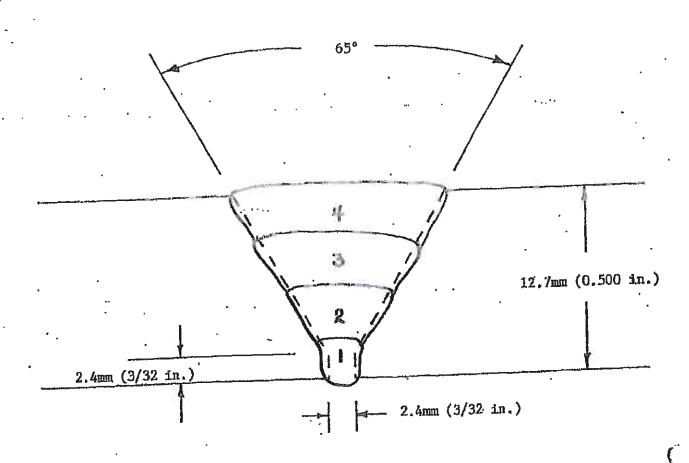
Qualimet





PROCEDURE QUALIFICATION RECORD

		יייי מבטטט ו	UNARER	100-1		Vegreville, Ather	September	2,	1981
* JOCEDUR	E QUALIFICAT	IN KECOUD (MUMBER	100 (Re	y. 2)		·		
WELDING .	PROCEDURE SPI PROCESS(ES)_	EUTLICH LION	MOLIDER	TYRES	Manual			 _	
WELDING	PROCESS(ES)_	J.M.	,	_ (• •	•	
JOINTS (QW-402)								
	Butt: S		•	······································					
	ALS (QW-403)		-	Tyne o	r Grade	Grade B			
P-No	1		V .	Other.			a ₁ a ₁		
FILLER M	ETALS (QW-40	(4)	c 1 —			5 <u>.1</u>	W. C.	- Tables	
SFA Spec	ification		74-1		•	E7018		g a West	_
VÃ2 CTBS	sification_		2 E00717			4			
Filler M	letal F-No	, , , , , , , , , , , , , , , , , , ,	1			1			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Weld Met	al Analysis	A-No-	I	ch next na	ze				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Size of	Filler Metal		500 SKEL	Cit Hear pa		F4: 10.7mm			
Deposite	d Weld Metal	'IUICKUERA	FJ: - Z	2 7 - A					
and a r	No single i	pass with ov	er 3'''	Z./IIII! OL.	(Giboa reer	-EIII			
Other			444	an its					
Other	(QW-405)		د د دیگری د د مدمد	eren .s Manual D	reserver!	metal			
Other_ SITION Vosition	(QW-405) of Groove		1 <u>G</u>	Weld F	rogressi	on			
osition	(UW-403) of Groove		1G	Weld F	rogressi	on			
osition PREHEAT Preheat	(QW-405) Of Groove (QW-406) Temp.		1G None	Weld F	rogressi	onNone			
osition PREHEAT Preheat POSTWELL	(QW-405) of Groove (QW-406) Temp. HEAT TREATA	MENT (QW-40	1G None	Weld F	rogressi ess Temp	on			
PREHEAT Preheat POSTWELL	(QW-405) Of Groove (QW-406) Temp.	MENT (QW-40	1G None	Weld F	rogressi	on			
PREHEAT Preheat POSTWELL Temperat	(QW-405) of Groove (QW-406) Temp. HEAT TREATM	MENT (QW-40)	None () None	Weld F Interp	rogressi eass Temp	None	•		
PREHEAT Preheat POSTWELL Temperat GAS (OW-	(QW-405) of Groove (QW-406) Temp. HEAT TREATM	MENT (QW-40)	None () None	Weld F Interp	rogressi eass Temp	on	•		
PREHEAT Preheat POSTWELL Temperat GAS (QW-	(QW-405) of Groove (QW-406) Temp. HEAT TREATM LUTE -408) Gas(es)	MENT (QW-40)	None None None	Weld F Interp	rogressi eass Temp	None	•		
PREHEAT Preheat POSTWELL Temperat GAS (GW- Type of	(QW-405) of Groove (QW-406) Temp. HEAT TREATM LUFE 408) Gas(es)	MENT (QW-40)	None None None	Weld F Interp Time Compos	rogressi pass Temp	None None			
PREHEAT Preheat POSTWELL Temperat GAS (GW- Type of Other ELECTRIC	(UW-405) of Groove (QW-406) Temp. HEAT TREATM LUTE 408) Gas(es)	MENT (QW-40)	None None N/A 409)	Weld F Interp Time Compose	rogressi pass Temp	None None Mixtures Reverse			
PREHEAT Preheat POSTWELL Temperat GAS (QW- Type of Other ELECTRIC	(QW-405) OF Groove (QW-406) Temp. DHEAT TREATM EUFE -408) Gas(es) CAL CHARACTE	MENT (QW-40)	None None N/A 409) Direct	Weld F Interp Time Compose Polar Volts	rogressions Temp	None Mixtures Reverse			
JOSITION JOSITION PREHEAT Preheat POSTWELL Temperat GAS (GW- Type of Other ELECTRIC Current Amps Other	(UW-405) of Groove (QW-406) Temp. HEAT TREATM LUTE 408) Gas(es) CAL CHARACTE	MENT (QW-40)	None None N/A 409) Direct	Weld F Interp Time Compose Polar Volts	rogressions Temp	None Mixtures Reverse			
JOSITION JOSITION PREHEAT Preheat POSTWELL Temperat GAS (GW- Type of Other ELECTRIC Current Amps Other	(UW-405) of Groove (QW-406) Temp. HEAT TREATM LUTE 408) Gas(es) CAL CHARACTE	MENT (QW-40)	None None N/A 409) Direct	Weld F Interp Time Compose Polar Volts	rogressions Temp	None None Mixtures Reverse			
PREHEAT Preheat POSTWELL Temperat GAS (GW- Type of Other Current Amps Other TECHNIQUE	(QW-405) OF Groove (QW-406) Temp. DHEAT TREATM EUFE 408) Gas(es) CAL CHARACTE See ske	MENT (QW-407	None None N/A 409) Direct	Weld F Interp Time Compose Polar Volts	rogressions Temp	None None Mixtures Reverse	1		
PREHEAT Preheat PostWELD Temperat GAS (GW- Type of Other ELECTRIC Current Amps Other TECHNIQUE Travel	CAL CHARACTES See ske	MENT (QW-40)	None None N/A None Direct se	Weld F Interp Time Compose Polar Vults Multipass	rogressions Temp	None None Mixtures Reverse	1		
PREHEAT Preheat PostWELD Temperat GAS (GW- Type of Other ELECTRIC Current Amps Other TECHNIQUE Travel	CAL CHARACTES See ske	MENT (QW-40)	None None N/A None N/A Side)	Weld F Interp Time Compose Polar Volts Multipass Single	rogressions Temp	None None Reverse			
PREHEAT Preheat PostWell Temperat GAS (QW- Type of Other ELECTRIC Current Amps Other TECHNIQUE Travel Multipes	(QW-405) OF Groove (QW-406) Temp. DHEAT TREATM EUFE 408) Gas(es) CAL CHARACTE See ske	RISTICS (QW-407) tch next part part (per Electrodes	None None N/A 409) Direct ge '	Weld F Interp Time Compose Polar Volts Multipass Single	rogressions Temp	None None Mixtures Reverse			



Root: 3,2mm (1/8 in.), E6010, 110 amps; 24 volts.

2 Fill: 4.0mm (5/32 in.), E7018, 140-200 amps, 24 volts.

Cap: 5.0mm (3/16 in.), E7018, 245 amps, 24 volts.

TENSILE TEST

<	Specimen Number	Width mm. (in.)	Thick. mm. (in.)	Area sq. mm. (sq.in.)	Ultimate Load N (lbs.)	Ultimate Strese MPa (psi)	Character & Location of Failure
	T1	18.67 (.735)	11.43 (.450)	213.4 (.331)	101,500 (22,800)	476 (68,900)	Parent metal
	T-2	18.67 (.735)	11,43	213.4	103,000 (23,100)	4 82 (69,800)	Parent metal

GUIDED-BEND TEST

. Type and Figure Number	Result	. Type and Figure Number	Result
Face	Pass	Root	Pass
Face	Pass	Root	Pass

HARDNESS TEST

•		
•	Type of Test:	
	Weld Zone:	
	Heat Affected Zones	•
		• •

Welders Name:	Dale Isniuk
Certificate Number:	W-6597
Tests Conducted By:	Hanson Material Disingering (Western) Ltd.
Per:	Gilles Perreault, C.E.T.
Laboratory Test Numb	er: R81-8-1051

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 IX of the

ASME Boiler and Pressure Vessel Code.

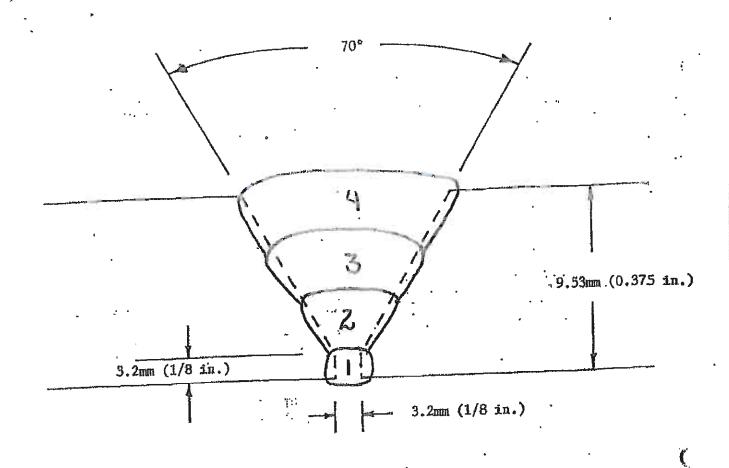
Signed Radavas rich Service rich	,
	_ ;
by San	

Date

November 24, 1982

PROCEDURE QUALIFICATION RECORD

DATE Avenuet 3 10	***
TOO B WALL AGEST	987
CCEDURE QUALIFICATION RECORD NOMBER 100-(Rev. 2)	*
WELDING PROCESS(ES) SMAW TYPES Manual	
WELDING PROCESS(ES)	
JOINTS (QW-402)	
Type Butt: single vee	ē
BASE METALS (QW-403) Material Spec. SA 516 Type or Grade Grade 70N (C. 275 in)	
P-No. 1 Gpr. 2 to P-No. 1 Grp. 2 Thickness 9.55mm (0.573 En.7) Diameter Other	
Diameter	
FILLER METALS (QW-404) SFA Specification 5.1 5.1 R7018	
SFA Specification R7018	
Filler Metal 1-No.	
The etterhed eketch next base	
Size of Filler Metal See attached sketch 15-7-59mm Deposited Weld Metal Thickness F3: 2mm F4: 7.59mm	
Deposited Weld Metal Thickness 13. Deposited Weld Metal Other No single pass with vover &" (12.7mm) of deposited metal	
:	
SITION (QW-405) Paition of Groove 1G Weld Progression	
5 J	
PREHEAT (QW-406) Preheat Temp. 20°C (70°F) Interpass Temp. Weld build up	
Preheat Temp. 20°C (70°T)	
POSTWELD HEAT TREATMENT (QW-407) None Time	
Temperature Home	
GAS (QW-408) Type of Gas(es) N/A Composition of Mixtures	
Type of Gas(es) N/A	
Other	
ELECTRICAL CHARACTERISTICS(QW-409) Current Direct Polarity Reverse	
Amps See attached sketch Volts	
See attached sketch	
Other	
TECHNIQUE (QW-410)	
Multipass or Single Pass (per side) F3: Single; F4: Multiple	
Multipass or Single Pass (per side)	
ring or Weave Bead Both	1



Pass #1: 3.2mm (1/8 in.), E6010, DCRP, 90-120 amps, 24-28 volts.

Pass #2: 4.0mm (5/32 in.), E7018, DCRP, 180-210 amps, 24-26 volts.

Pass #3: 5.0mm (3/16 in.), E7018, DCRP, 240-280 amps, 24-28 volts.

Pass #4: 6.0mm (1/4 in.), E7018, DCRP, 340-380 amps,

TENSILE TEST

Specimen Number	Width mm. (in.)	Thick. mm. (in.)	Area sq. mm. (sq.in.)	Ultimate . Load N (1bs.)	Ultimate Stress MPa (psi)	Character & Location of Failure
T-1	38.4	8.90 (.350)	342 (.530)	191,600 (43,100)	561 (81,300)	Partial cup.& cone Weld metal
T-2	38.4 (1.51)	8.90 (.350)	342 (.530)	189,100 (42,500)	553 (80,300)	Partial cup & cone Weld metal

GUIDED-BEND TEST

Type and Figure Number	Result	Typerand Figure	Result
Side S-1	Fass	Side S-3	Pass
Side S-2	Pass	Side S-4	Pass

HARDNESS' TEST

	Type of Test: Brinell
	Weld Zone: (cap) 161, 162
	Heat Affected Zone: (root) 163, 166
• .	

Welders Name:	Ernie Bullock
Certificate Number:	W-9101
	Ludwig's Welding Consulting Ltd.
10000 001100000	
Per:	Vic Lukey, C.E.T.
Laboratory Test Number	LWC-9701-816E

We certify that the statements in this record are correct and that the test welds were ---prepared, weekded and tested in accordance with the requirements of Section IX of the

ASME Boiler and Pressure Vessel Code. Signed R.J.V. Gastieta Service Itd.

*		319/100
		By Solo.
ate	September 24, 1987	By Clark
		•

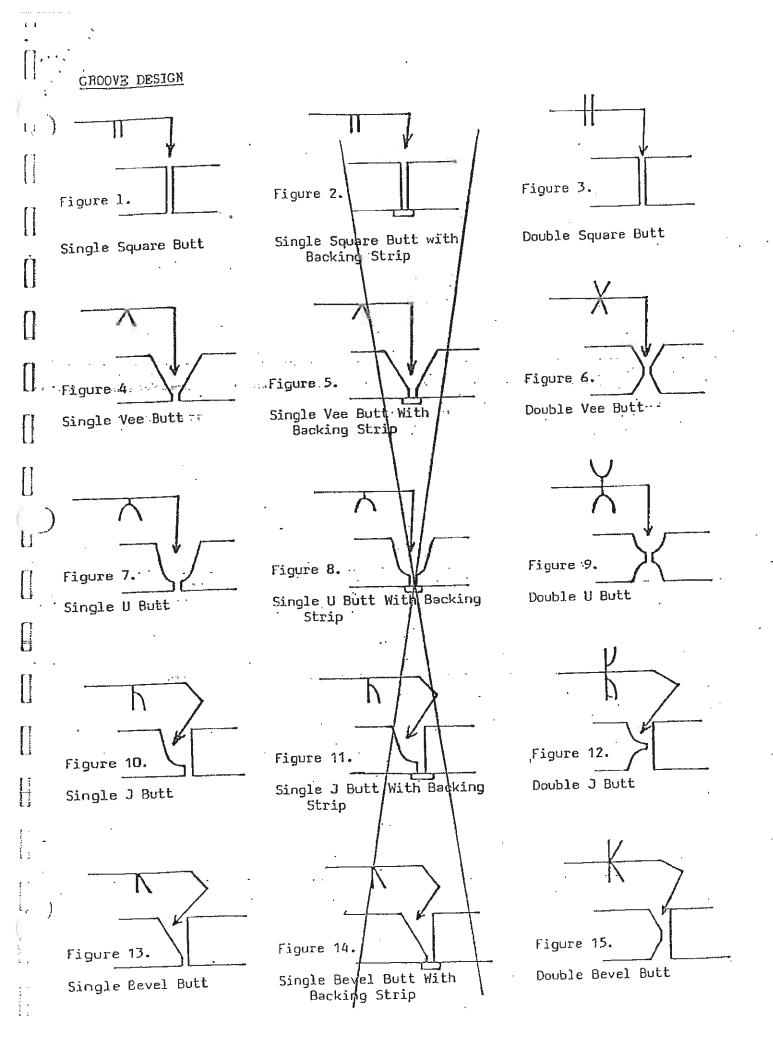
		101 (Rev. 2)	
PQR NUMBER		TOTA	
		<u> </u>	
QUALIFI	IED FO	₹	
		-	
D1 - D1 (C4 10)	ነድ ሮ ለ.	106 CA 516 of	a)
P1 to P1 (SA 105	D, DA	100, 58 JIO, EL	
			Company P Pallot
			Groove & Fillet
,,	·	JIAMEIEK:	AL1
170S-X, E7018, E	E7018-	<u>.</u>	
	. —		(3/16 to 1.0 in.)
	. — —		,
	. — — —		
	_ _ _ _		
VESSELS ACT			
VESSELS ACT EDURE 2			
VESSELS ACT EDURE 2 (REV 2) W/SMAW			
VESSELS ACT EDURE 2. (REV 3.) W./SMAW 10 P No. A No.			
VESSELS ACT EDURE .2. (REV Z) W / SMAW IO P NO. A NO. Position A!-L			
VESSELS ACT EDURE 2. (REV 3.) W./SMAW 10 P No. A No.			
VESSELS ACT EDURE .2. (REV Z) W / SMAW IO P NO. A NO. Position A!-L			
VESSELS ACT EDURE . 2. (REV 2.) W. SMAW. TO P NO. A NO. Position ALL			,

WELDING PROCEDURE SPECIFICATION

LE	R.J.V. Gasfield Service Ltd. 4901 - Bruce T	d,, Box 295, Wegreville, Alberta TOB 4LO
	JELDING PROCEDURE SPECIFICATION NUMBER	101 (Rev. 2) DATE September 23, 1987
Ļ	EVISIONS #1 July 31, 1984	
	#A A N N 11 . II	
1	SUPPORTING PQR NUMBERS(S) 101A	
	WELDING PROCESS(ES) GMAW, SMAW	TYPES Semi-automatic, Manual
		•
	JOINTS (QW-402)	
1.1	Joint Design See attached sketches, f	igures 1 to 15
	Joint Design See attached sketches, 1: Backing	Other
Π.	BASE METALS (QW-403)	to P-Number
U	P-Number 1	to P-Number 1
	Thickness Range: Groove 4.8 to 2	to P-Number 1 5.4mm (3/16 to 1.0 in.)
J		
r		
	Fillet All	
	9ther	
)	
	FILLER METALS (QW-4D4)	5.1
	Specification No. (SFA) 5.18	
	AWS No. (Class) ER70S-X	F4
T.	T-MO.	
	C-a t-b1.	e next page
	Size See table	o single pass with over 2" (12.7mm) of deposited metal
i	Deposited weld wetar file these hange.	= 22 nm
[]		
POLICE OF THE PARTY.	LITTEE Class)	
£ 1		
F	Uther	
	POSITION (QW-405)	
	Position of Groupe All	Weld Progression Vertical up when applicable
	LOSTCIOII OI OLOGOO	
:	?REHEAT (QW-406)	
÷	Preheat Temp. Min. 10°C (50°F)	Interpass Temp. Max. Weld build up

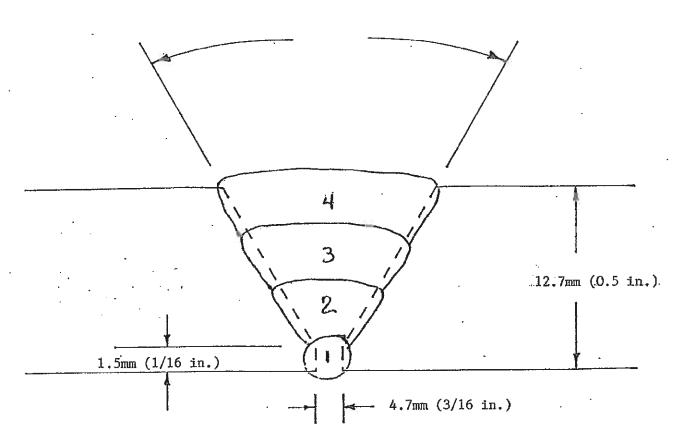
	ROSTWELD HEAT TREATMENT (QW-407)		•
1 -	remperature N/A	Time Range	
į i	uÁs (QW-408)		
	Shielding Gas(es) Carbon Dioxide	······	
11	Flow Rate 20 cfm		
П	Other		· · · · · · · · · · · · · · · · · · ·
	Other		
а	Current Direct	Polarity	Reverse
	Amps See table below	Volts	
	Tungsten Electrode Size and Type		
	Mode of Metal Transfer GMAW: Short circ	cuiting arc	
	Electrode Wire Feed Speed Range		
	Other		
Iii	rechnique (QW-410)		
	String or Weave Both Trav		
	Initial and Interpass Cleaning <u>Brushing, chipp</u>		
	Method of Back Gouging Air carbon arc		
	Multiple or Single Pass (per side) <u>Multiple</u>		
	This is a strict of the strict		
1	ther		

		FILLER	METAL	CURF	RENT	VOLTACE	T/S	
WELD	PROCESS	CLASS.	DIAMETER mm. (in.)	TYPE POLAR.	AMP RANGE	VOLTAGE RANGE	RANGE mm/min. (ipm)	OTHER
1 or 2	GMAW	ER70S-X	.76 (.030)	DCRP	40-80	19-30	30-300 (1.5-12)	Size of elec- trode, number
1 or 2	GMAW	ER70S-X	.9	DCRP	60-120	20-32	38-350	of passes, amp-
1 or 2	GMAW	ER70S-X	(.035) 1.14 (.045)	DCRP	130-210	21-20	(1.5-14) 50-350 (2-14)	erage, voltage and travel speed will dif-
Remaining	SMAW	E7018. E7018-1	2.4	DCRP	60-110	19-24	.38-300	fer with posi-
Remaining	SMAW	E7018 E7018-1	(3/32) 3.2 (1/8)	DCRP	90-160	20-25	(1.5-12) 38-350 (1.5-14)	tion, thickness and joint configuration.
Remaining	SMAW	E7018 E7018-1	4.0 (5/32)	DCRP	125-200	21-26	100-400 (4-16)	_
Remaining	SMAW	E7018 E7018-1	5.0 (3/16)	· DCRP ·	200-310	21-27	125-400 (5-16)	
Remaining	SMÄW	E7018 E7018-1	6.0 (1/4)	DCRP	280-380	22-30	175-350 (7-14)	
	į							



PROCEDURE QUALIFICATION RECORD

K.J. V. Casileid Service Lui.	and - arice wit. Tok Say Asserting Armerica . Jon din.
CEDURE QUALIFICATION RECORD NUMB	ER 101A DATE July 14, 1983
	BER 101 (Rev. 2)
ELDING PROCESS(ES) GMAW, SMAW	TYPES Semi-Automatic, Manual
JOINTS (QW-402)	
ype Butt: single vee	
BASE METALS (QW-403)	
	Type or Grade Grade B
	1Thickness12.7mm (.500 in.)
	Other
ILLER METALS (QW-404)	
SFA Specification 5.1	8 5.1
WS Classification ER7	0S-6 E7018
L 3	. 4
eld Metal Analysis A-No. 1	. 1
Size of Filler Metal See	sketch next page
Peposited Weld Metal Thickness <u>F6</u>	
ther No single pass with over 3"	(12.7mm) of deposited metal
<u>):TION</u> (QW-405)	
Josition of Groove 6G	Weld Progression <u>Vertical up</u>
PREHEAT (QW-406)	
reheat Temp. 15°C (60°F)	Interpass Temp. Weld build up
POSTWELD HEAT TREATMENT (QW-407)	
emperature None	Time
GAS (QW-408)	•
ype of Gas(es) Carbon Dioxio	de Composition of Mixtures 99.985%
Uther	
FLECTRICAL CHARACTERISTICS (QW-409)	
	Polarity Reverse
Amps 160-390	Volts
ther	·
TECHNIQUE (QW-410)	
Multipass or Single Pass (per side)	Multipass
ingle or Multiple Electrodes	Single
ing or Weave Bead	
3r	



	ALO MONDEN	102 (Rev. 2)	
	PQR NUMBER	102A	
	QUALIFIED	FOR	
	<u> </u>	Manage Academy	
MATERIAL (TYPICAL):	P1 to P1 (SA 105,	SA 106, SA 516, et	.c.)
PROCESS: FCAW		_ JOINT DESIGN: _	Groove & Fille
POSITION: All		DIAMETER:	A11
AWS CLASSIFICATION:	•		
	AS WELDED	:_ 4.8 to 38.1mm (3/16 to 1.5 in.)
	AS WELDED	:_ 4.8 to 38.1mm (3/16 to 1.5 in.)
	AS WELDED	:_ 4.8 to 38.1mm (3/16 to 1.5 in.)
ALBER		: 4.8 to 38.1mm (3/16 to 1.5 in.)
ALBEF LABO BOILERS & PRESSU	RTA UR	4.8 to 38.1mm (3/16 to 1.5 in.)
LÀBO BOILERS & PRESSU WELDING PR	RTA UUR RE VESSELS ACT	4.8 to 38.1mm (3/16 to 1.5 in.)
LABO BOILERS & PRESSUI WELDING PR Reg. No. WP	RTA OUR RE VESSELS ACT OGEDURE 12. Z. O.Z. CREV.Z.)	4.8 to 38.1mm (3/16 to 1.5 in.)
LABO BOILERS & PRESSUI WELDING PR Reg. No. WP	RTA UR RE VESSELS ACT OCEDURE 12. Z. O.Z. (RFVZ) AW. to P No.	4.8 to 38.1mm (3/16 to 1.5 in.)
LABO BOILERS & PRESSUI WELDING PR Reg. No. WP	RTA UR RE VESSELS ACT OGEDURE 12. Z. OZ. (REVZ.) AW.	4.8 to 38.1mm (3/16 to 1.5 in.)
LABO BOILERS & PRESSUI WELDING PR Reg. No. WP	RTA UR RE VESSELS ACT OGEDURE 12. Z. OZ. (REVZ.) AW.	:_ 4.8 to 38.1mm (3/16 to 1.5 in.)
LABO BOILERS & PRESSUI WELDING PR Reg. No. WP	RTA UUR RE VESSELS ACT OGEDURE 12.7 O.Z. (REV.Z.) ANO. A NO. Position ALL.	2 4.8 to 38.1mm (3/16 to 1.5 in.)
LABO BOILERS & PRESSUI WELDING PR Reg. No. WP	RTA UR RE VESSELS ACT OGEDURE 12. Z. OZ. (REVZ.) AW.	:_ 4.8 to 38.1mm (3/16 to 1.5 in.)

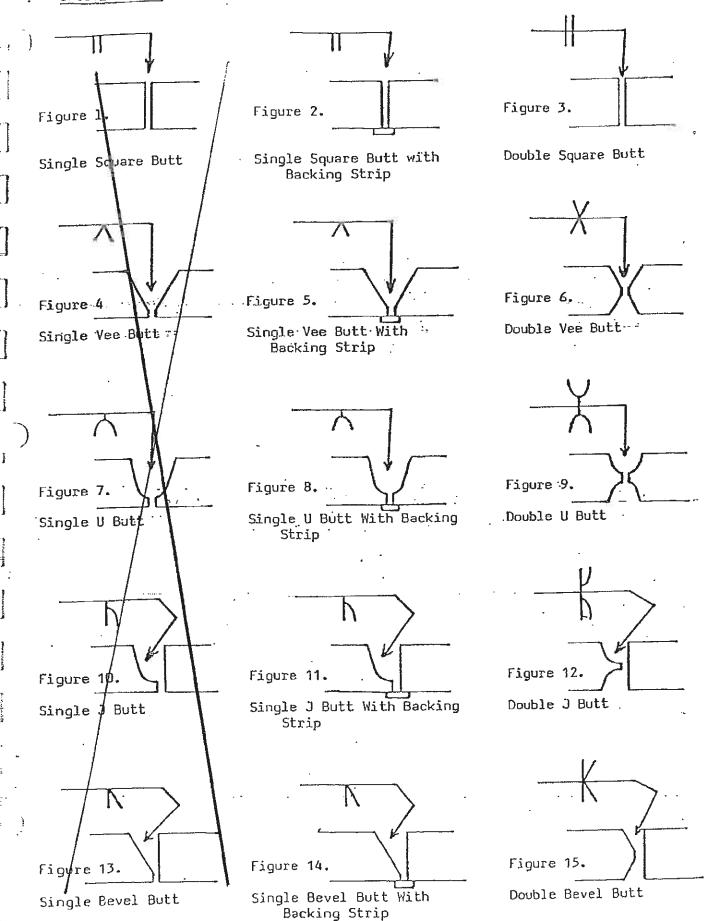
WELDING PROCEDURE SPECIFICATION

						ta TOB 4LO	
ELDING PROCE	OURE SPECIF	ICATION	NUMBER	102 (Rev. 2)	DATE	September 23,	1987
REVISIONS							
				ddenda - 9/87		•	
SUPPORTING PQ							
SUPPLIKTING FU	/ MONDENS(-		<u></u>				
אבו הזאמ פפחרד י	20(50)			TYPES	Comi	utomatic	
WELDING PROCE	35(£5)I	FCAW		, , , , , , , , , , , , , , , , , , , ,	Senit_5	IU LOMACIC	
JOINTS (QW-40				•			
Joint Design Backing	See atta	ached ske	etches .				
Backing	<u></u>			Other			
•			•				
BASE METALS (W-403)						•
P_Number	1			to P-Number	1		
Thickness Ran	je: (Groove	4.8 to 38	.1mm (3/16 to .	.5 in.)		
	F	- Fillet	A11	100			
Pipe Diameter	Rannes: ((2.0 in.)			
Libe Digmerer	, mangoo i	-		(2.0 in.)			
	*	11101	7 30.0mm	(2.0 In.)			
ther							
FILLER METALS	(QW-404)						
Specification	No. (SFA)						
AWS No. (Clas	3)						
F-No.	<u> </u>		F6				
A-No			1				
Size Se	e table ne	xt page					
Deposited Wel	d Metal Thi	ickness	Range: Ño s	ingle pass wit	n over ½" (12.7mm) of depo	sited meta
Flantrode F	lux (Llace,)			•		
TTEGGT ONE - L	FOY (CTGGG)	´ 					
other							
•							
POSITION (QW-	405)						
Position of G	roove	A11		_Weld Progres	sion <u>Vert</u>	ical up when ap	<u>piicable</u>
	•		- "				•
•							
REHEAT (QV-	406) 93°C	(200°F)) <u>></u> 19mm				
benevi (OM-	406) 93°C Min. 10°C	C (200°F) C (50°F)) <u>></u> 19mm < 19mm	Interpass Te	np. Max	Weld build up	<u> </u>

•	POSTWELD HEAT TREA	THENT (QW-4	07)					•
	remperature N/	Α			Timo	Range		
ı	' <u>AS</u> (QW-408)							
	Shielding Gas(es)	Carbon D	ioxide				-	
ł	Flow Rate 1	5 - 25 litr	es/min. (3	0 - 50 cf	h)			
ſ	Other 99.9	85% pure						
	ELECTRICAL CHARACT		W-409)					
_	Current <u>Dire</u>	et			Polar	rity <u>Re</u>	verse	
	Amps See 1	table below			Volts	·		
_	Tungsten Electrode	Size and T	ype <u>N/A</u>					
	Mode of Metal Tran	sfer	N/A					
ked	Electrode Wire Fee	d Speed Ran	ge			· · · · · · · · · · · · · · · · · · ·		
	Other						<u> </u>	
	Other TECHNIQUE (QW-410)							
Π	String or Weave	Both		Trav	vel Speed	(Range)_		
Ц	Initial and Interp	ass Cleanin	g Brush	ing, chip	ping, gri	nding		
r)	Method of Back Gou	ging	Air c	arbon arc	when requ	ired		
	Multiple or Single	Pass (per	side) <u>Mu</u>	ltiple			· · · · · · · · · · · · · · · · · · ·	
	Tyltiple or Single	Electrodes	Si	ngle				
Fi	Jther						,,	
ر.,						<u>.</u>		
		FILLER	METAL	CURF	RENT		T/S	,
4	WELD PROCESS		O. M. METER	TVDE	Δ MD	VOLTAGE	RANGE	OTHER

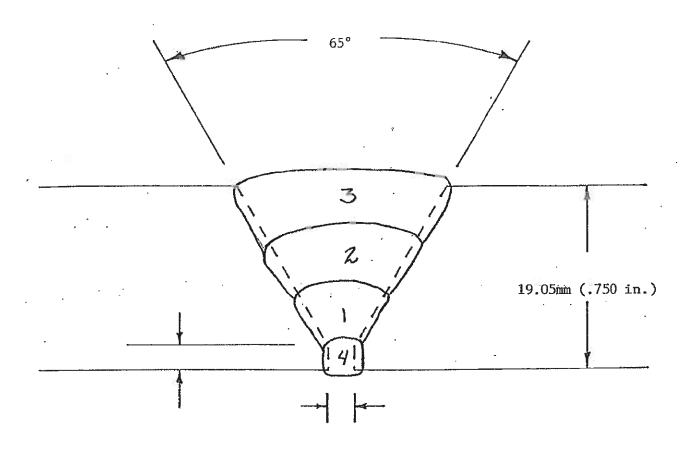
		FILLER	METAL	CURR	RENT	VOLTACE	T/S	,
WELD LAYER	PROCESS	CLASS.	DIAMETER mm. (in.)	TYPE POLAR.	AMP RANGE	VOLTAGE RANGE	RANGE mm/min. (ipm)	OTHER
All All All All	FCAW FCAW FCAW	E70T-1 E70T-1 E70T-1 E70T-1	1.14 (.045) 1.6 (1/16) 2.0 (5/64) 2.4 (3/32)	DCRP DCRP DCRP	120-230 200-360 240-400 300-500	23-28 25-36 26-34 26-34		Size of electrode, number of passes, amperage and voltage and travel speed will differ with thickness and joint configuration.

<u>i</u>.,



PROCEDURE QUALIFICATION RECORD

R.J.V. Gasfield Service Ltd., 4901 - F	Bruce Rd., Box 295, Vegreville, Alberta TOB 4LO
CEDURE QUALIFICATION RECORD NUMBER	102A DATE July 14, 1983
, WELDING PROCEDURE SPECIFICATION NUMBER	
WELDING PROCESS(ES) FCAW	TYPES Semi-automatic
JOINTS (QW-402)	
Type Butt: single vee .	
BASE METALS (QW-403)	•
	Type or Grade Grade 70
J 1	Thickness 19.05 (.750 in.)
Diameter	
FILLER METALS (QW-404)	
OSFA Specification 5.20	·
AWS Classification E70T-1	
Filler Metal F-No. 6	
Size of Filler Metal 2.0mm	
Deposited Weld Metal Thickness No single	pass with over ½" (12.7mm) of deposited metal
Other	
)ITION (QW-405)	
· · · · · · · · · · · · · · · · · · ·	Weld Progression Forward
PREHEAT (QW-406)	
Preheat Temp. 15°C (60°F)	Interpass Temp. Weld build up
POSTWELD HEAT TREATMENT (QW-407)	
Temperature None	
GAS (QW-408)	
Type of Gas(es) <u>Carbon Dioxide</u>	Composition of Mixtures 99.985%
Other	
ELECTRICAL CHARACTERISTICS(QW-409)	·
	PolarityReverse
Amps See sketch next page	Volts
Other	
TECHNIQUE (QW-410)	
Travel Speed	
Multipass or Single Pass (per side)	fultipass
Single or Multiple Electrodes S	Single
ing or Weave Bead E	3oth
ucher	



Pass #1: 2mm (5/64 in.), E70T-1, DCRP, 280-310 amps, 20-22 volts.

Pass #2 - #4: 2mm (5/64 in.), E70T-1, DCRP, 320-360 amps, 23-26 volts.

PQR	No.	102A
1 (0)11	110 -	10211

TENSILE TEST

Specimen Number	Width mm (in.)	Thick. mm (in.)	Area sq.mm (sq.in.)	Ultimate Load N (lbs.)	Ultimate Stress MPa (psi)	Character & Location of Failure
T-1	26.9	18.8	507	267,100	527	Base metal
	(1.061)	(.741)	(.786)	(60,100)	(76,400)	
T-2	26.9	19.1	514	271,300	528	Base metal
	(1.059)	(.750)	(.794)	(61,050)	(76,900)	

GUIDED BEND TEST

Type and Figure Number	Result	Type and Figure Number	Result	
TSB S-1	PASS	TSB S-3	PASS	
TSB S-2	PASS	TSB S-4	PASS .	
-				

Welder's Name Dal	e Lanuik						
Certificate Number	W-6537						
Tests Conducted by	Hanson Materials Engineering (Western) Ltd.						
Per:	Gilles Perreault, C.E.T.						
Laboratory Test Num	ber <u>E84-5-645</u>						
We certify that the	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 IX							
of the ASME Boiler and Pressure Vessel Code.							
	Signed R.J.V. Gasfield Service Ltd.						

Date June 14, 1983

WPS NUMBER	104 (Rev. 1)	
PQR NUMBER	104A	
	104B	
\		
QUALIFIED	FOR	
MATERIAL (TYPICAL): P1 to.P1 (SA 516, SA	105, SA 106, etc	2.)
PROCESS: SMAW	JOINT DESIGN:	Groove & Fillet
POSITION: All	DIAMETER:	A11
AWS CLASSIFICATION: E6010, E6011, E701	8, E7018-1, E7018	B-A1
BASE METAL THICKNESS RANGE QUALIFIED:		
	: 1.6 to 50.8mm	(1/16 to 2.0 in.)
·		
		-
ALDERTA LABOUR		• ,
BOILERS & PRESSURE VESSELS ACT		
WELDING PROCEDURE Reg. No. WP		
Ren. No. WP 1214:4 Spec No. #104 (REV.1) Weld Process 5 MAW		
Matt, Gr. P.No		
Th. Qual. For 50.8 mm. Position . A.L		
	i .	
Yr. 8 Mo. 3. Day 3. Signed		·
WELDINGSPECIALIST		
Boilers Branch Registration		

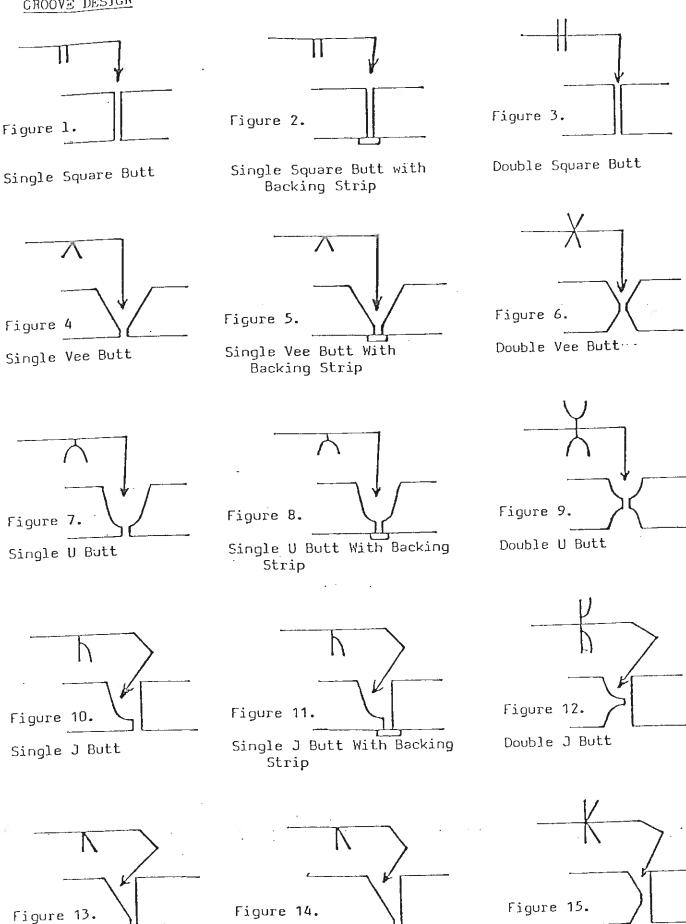
WELDING PROCEDURE SPECIFICATION

R.J.V. GAsfield	Service Ltd	., 4901 - I	Bruce Rd., Box.	295, Vegreevi	lle, Alber	rta. TOB 410	
ELDING PROCEDURE SPEC	IFICATION	NUMBER _	104 (Rev.	1) DA	ATE	September	8, 1987
REVISIONS add PQR	104B						
		<u>.</u>					
SUPPORTING PQR NUMBERS	(S) <u>10</u> 4	4A, 104B					
	CMALL						
WELDING PROCESS(ES)	SMAW			- Tan	nuar		
JOINTS (QW-402)							
Joint Design See att	ached she	et, figur	res 1 to 15				
Backing							
						·	
BASE METALS (QW-403)							
P-Number 1			to P-Num	oer	1		
Thickness Range:	Groove _	1.6 to	50.8mm (1/1	6 to 2.0 i	n.)		
Pipe Diameter Ranges:							
`ther	· · · · · · · · · · · · · · · · · · ·		··· · · · · · · · · · · · · · · · · ·				
STATE WETNIG (ON 606)			÷				
FILLER METALS (QW-404)		F 1 F	F				
Specification No. (SFA AWS No. (Class)				8 E7018-1	E7018-	-A1	
F-No		1 2	•				
Size							
Deposited Weld Metal							
Groove F3 "t" =							
Fillet All							
Electrode - Flux (Clas							
Other							
POSITION (QW-405)							
Position of Groove	<u>A11</u>		Weld Pi	ogression	Uph	ill when appl	licable
;		11.65			* • •		• 0
'REHEAT (QW-406)	_		* '	-	4	1.11 111	
Preheat Temp. Min S					1ax	veid build up)
Preheat Maintenance _							

POSTWELD HEAT TREATMENT	(QW-407)			•		
Tamperature	See attached	l section	Time Range	See attached page		
<u>GAS</u> (QW-408)						
Shielding Gas(es) N/A	1					
Flow Rate						
Other						
ELECTRICAL CHARACTERIST	ICS (QW-409)					
Current <u>Direct</u>			_Polarity <u>Reve</u>	erse		
Amps See table	below		_ Volts			
Tungsten Electrode Size	and Type	N/A				
Mode of Metal Transfer		N/A				
Electrode Wire Feed Spe	ed Range					
Other						
TECHNIQUE (QW-410)						
String or Weave Both	1	Travel	Speed (Range)			
Initial and Interpass C	leaning	Brushing, chij	oping, gouging, g	rinding		
Method of Back Gouging		Air carbon arc	when required			
Multiple or Single Pass	(per side)_	Multiple				
		single				
Uther						
•						

		FILLER METAL		CURRENT		VOLTACE	T/S	
.WELD LAYER	PROCESS	CLASS.	DIAMETER mm. (in.)	TYPE POLAR.	AMP RANGE	VOLTAGE RANGE	RANGE mm/min. (ipm)	OTHER
	SMAW	E6010 E6011	2.4 (3/32)	DCRP	40-80	18-24	38-300 (1.5-12)	Size of electrode, number
	SMAW	as above	3.2 (1/8)	DCRP	70-140	19-26	38-350 (1.5-14)	of passes, amp- erage, voltage
	SMAW	as above	4.0 (5/32)	DCRP	100-160	20-28	50-400	and travel speed will dif-
	SMAW	E7018 E7018-1	2.4 (3/32)	DCRP	60-110	18-24	38-300 (1.5-14)	fer with posi- tion, thickness
	SMAW	as above	3.2 (1/8)	DCRP	90-150	19-26	38-350 (1.5-14)	and joint configuration.
	SMAW	as above	4.0 (5/32)	DCRP	110-220	21-28	50-400 (2-16)	j
	SMAW	as above	5.0 (3/16)	DCRP	160-320	22-30	75–500 (3–20)	
	SMAW	as above		DCRP	260-350	23-32	125-500 (5-20)	
	SMAW	as above	6.35	DCRP	300-400	23-32	125-550 (5-22)	

Single Bevel Butt



Single Bevel Butt With

Backing Strip

Double Bevel Butt

PREHEAT

- 1. Welds joining pressure parts or attachments shall be preheated to not less than the minimum preheat temperature stated in 6.
- 2. The preheat temperature shall be maintained until welding is completed.
- 3. If welding is interrupted, the weld joint and adjacent areas shall be re-heated to the minimum preheat temperature specified in 6.
- 4. The preheated area shall not be less than 50.8mm (2.0 in.) wide on each side of the weld.
- Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.
- 6. Minimum preheating temperatures:

PRESSURE VESSELS

THICKNESS	MINIMUM PREHEATING TEMPERATURES
0 to 31.75mm (0 to 1 1/4 in.)	24°C (75°F)
Over 31.75 to 203mm (1 1/4 to 8 in.)	80°C (175°F)

PRESSURE PIPING

TENSI	UM SPECIFIED LE STRENGTH, METAL MPa (Ksi)	MINIMUM PREHEATING TEMPERATURE
Less than 25.4mm (1.0 in.)	<490 (71)	24°C (75°F)
Greater than 25.4mm (1.0 in.)		80°C (175°F)
A11	>490 (71)	80°C (175°F)

POSTWELD HEAT TREATMENT .

P-No.1 Groups 1, 2 & 3

Pressure Vessels in accordance with ASME BPVC Section VIII, Division I

- 1. All postweld heat treatment shall be done in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division I, UW-40 & UCS-56, 1986 edition.
- 2. Postweld heat treatment temperatures and minimum holding times are as follows:

NOMINAL THICKNESS	HEAT TREAT	TMENT TEMPERATURE (°F)	HOLDING TIME
Up to 50.8 mm (2.0 in.)	595	(1100) minimum	l hr./25.4 mm (inch), 15 minutes minimum
Over 50.8 mm (2.0 in.)	595	(1100) minimum	2 hours plus 15 minutes for each additional 25.4 mm (inch) over 50.8 mm (2.0 in.)

Chemcial Plant and Petroleum Refinery Piping in accordance with ANSI B31.3

- 1. All postweld heat treatment shall be done in accordance with Table 331.1.1 of ANSI B31.3-1984.
- 2. Postweld heat treatment temperatures and minimum holding times as follows:

NOMINAL THICKNESS	HEAT TREATMENT TEMPERATURE C (°F)	HOLDING TIME
ATT	595 - 650 (1100 - 1200)	1 hour/25.4 mm (inch), 1 hour minimum

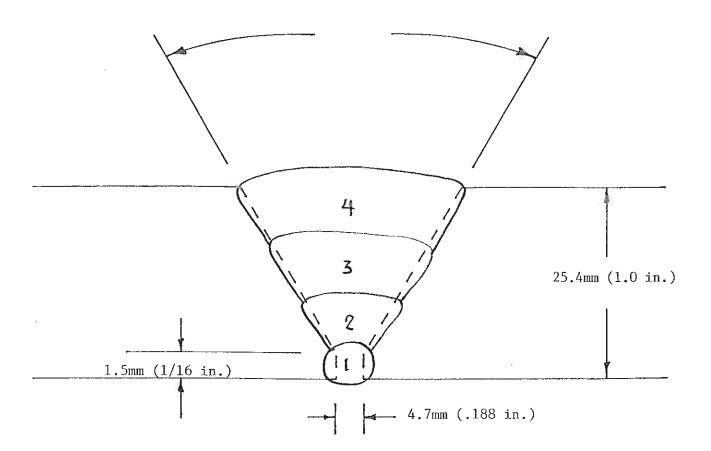
Power Piping in accordance with ANSI B31.1

- 1. All postweld heat treatments shall be done in accordance with Table 132 of ANSI B31.1-1983 edition.
- 2. Postweld heat treatment temperatures and minimum holding times are as follows:

NOMINAL THICKNESS	HEAT TREATM	MENT TEMPERATURE (°F)	HOLDING TIME
Up to 50.8 mm (2.0 in.)	~595 - ~650	(1100 - 1200)	l hr./25 mm (inch), 15 minutes minimum
Over 50.8 mm (2.0 in.)	595 - 650		2 hr. plus 15 min. for each additional 25 mm (inch) over 50.8 mm (2.0 in.)

PROCEDURE QUALIFICATION RECORD

R.J.V. Gasfield Service Ltd.,	4901 - Bruce Rd., Box	295, Vegreville, Alberta TOB 410
OCEDURE QUALIFICATION RECORD NUMBER	R104A	DATE <u>June 1, 1984</u>
WELDING PROCEDURE SPECIFICATION NUMBER		
WELDING PROCESS(ES)SMAW		
JOINTS (QW-402)		
Туре		
BASE METALS (QW-403)		
Material Spec. SA 516	Type or Grad	de Grade 70
		25.4mm (1.0 in.)
Diameter		
FILLER METALS (QW-404)		
SFA Specification 5.1		
AWŞ Classification <u>E6010.</u>		
Filler Metal F-No. 3, 4		
Weld Metal Analysis A-No. 1		
Size of Filler Metal		
Deposited Weld Metal Thickness No si		
Other		
SITION (QW-405)		
Position of Groove 1G (Flat	<u>t)</u> Weld Progres	ssion
PREHEAT (QW-406)		
Preheat Temp. 10°C (50°F)	Interpass To	emp. 260°C (500°F)
POSTWELD HEAT TREATMENT (QW-407)		
Temperature 1150°F	Time	1 hour
GAS (QW-408)	ľ	
Type of Gas(es) N/A	Composition	of Mixtures
Other		
ELECTRICAL CHARACTERISTICS(QW-409)		
Current Direct	Polarity	Reverse
Amps 90-150		
Other		
TECHNIQUE (QW-410)		
Travel Speed		
Multipass or Single Pass (per side)		
Single or Multiple Electrodes		
ring or Weave Bead		
Other		



PQR	No.	104-A	

TENSILE TEST

Specimen Number	Width in.	Dia- meter in.	Area sq.in.	Ultimate Load lbs.	Ultimate Stress psi	Character & Location of Failure
2		0.502	0.198	14,000	70,700	Weld
5		0.505	0.200	14,100	70,400	Weld

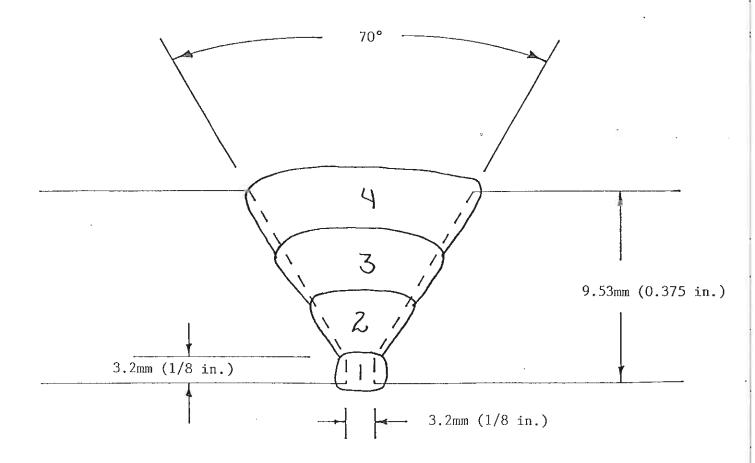
GUIDED BEND TEST

Type and Figure Number	Result	Type and Figure Number	Result
Side bend as per QW 462.2a	All 4 passed		
	5 12	•	

Welder's Name	Dale Laniuk
Certificate Number	W-6537
Tests Conducted by	Hanson Materials Engineering (Western) Ltd.
Per:	Gilles Perreault, C.E.T.
Laboratory Test Number	E83-7-717
We certify that the sta	tements in this record are correct and that the test welds
were prepared, welded a	nd tested in accordance with the requirements of Section IX
of the ASME Boiler and	Pressure Vessel Code.
Date June 14, 1983 :	Signed R.J.V. Gasfield Service Ltd.

PROCEDURE QUALIFICATION RECORD

R.J.V. Casfield Service Ltd., 4	1901 - Bruce Rd., Box 295, Vegreville, Alberta 1908 410
PROCEDURE QUALIFICATION RECORD NUMB	ER <u>104-B</u> DATE <u>August 3, 1987</u>
WELDING PROCEDURE SPECIFICATION NUMBER	BER 104-(Rev. 1)
WELDING PROCESS(ES) SMAW	TYPES Manual
JOINTS (QW-402)	
Type Butt: single vee	
BASE METALS (QW-403)	
Material Spec. SA 516	Type or Grade Grade 70N
P-No. 1 Gpr. 2 to P-No 1 Gr	p. 2 Thickness 9.53mm (0.375 in.)
Diameter	Other
FILLER METALS (QW-404)	
SFA Specification 5.1	5.1
AWS Classification EOUIU	E7018
Filler Metal F-No3	4
werd Metal Analysis A-Nol	1
Size of Filler Metal See att	ached sketch next page
Deposited Weld Metal Thickness F3	3: 2mm F4: 7.53mm
Other No single pass with over $\frac{1}{2}$ " (12)	2.7mm) of deposited metal
PUSITION (QW-405)	
Position of Groove 1G	Weld Progression
PREHEAT (QW-406)	
Preheat Temp. 20°C (70°F)	Interpass Temp. Weld build up
PUSIWELD HEAT TREATMENT (QW-407)	
Temperature 607°C (1125°F)	Time 90 minutes
GN3 (411-400)	
Type of Gas(es) N/A	Composition of Mixtures
Other	
ELECTRICAL CHARACTERISTICS(QW-409)	
Current Direct	Polarity <u>Reverse</u>
Amps See attached sketch	Volts
Other	
TECHNIQUE (QW-410)	
Travel Speed	
regression of studie rass (het stue)	F3: Single: F4: Multiple
tring or Weave Bead	Both
Other	



Pass #1: 3.2mm (1/8 in.), E6010, DCRP, 90-120 amps, 24-28 volts.

Pass #2: 4.0mm (5/32 in.), E7018, DCRP, 180-210 amps, 24-26 volts.

Pass #3: 5.0mm (3/16 in.), E7018, DCRP, 240-280 amps, 24-28 volts.

Pass #4: 6.0mm (1/4 in.), E7018, DCRP, 340-380 amps,

TENSILE TEST

Specimen Number	Width mm (in.)	Thick. mm (in.)	Area sq.mm (sq.in.)	Ultimate Load N (lbs.)	Ultimate Stress MPa (psi)	Character & Location of Failure
T-1	38.55	8.80	339	179,600	530	Partial cup & cone
	(1.52)	(.346)	(.526)	(40,400)	(76,800)	Weld metal
T-2	38.4	9.00	346	182,100	527	Partial cup & cone
	(1.51)	(.354)	(.536)	(41,000)	(76,400)	Weld metal

GUIDED BEND TEST

Type and Figure Number	Result	Type and Figure Number	Result
Side S-1	Pass	Side S-3	Pass
Side S-2	Pass	Side S-4	Pass
	·		

Welder's Name	Ernie Bullock
Certificate Number _	W-9101
Tests Conducted by _	Ludwig's Welding Consulting Ltd,
Per: _	V. Lukey, C.E.T.
Laboratory Test Numb	er <u>LWC-9702-816E</u>
We certify that the	statements in this record are correct and that the test welds
were prepared, welde	d and tested in accordance with the requirements of Section IX
of the ASME Boiler a	nd Pressure Vessel Code.
	Signed R.J.V. Gasfield Service Ltd.

Date September 24, 1987

RJV GAS FIELD SERVICES LTD.

Welding Procedure Specification

in accordance with

ASME Sections VIII, IX, B31.1 & B31.3

	-			-,,			
WPS No.:				104	Revision 2		
Supporting PQR No. (s	upporting PQR No. (s):				4B, 104C,	104D	
			Qualif	ied for			
Process(es):		SMAW/S	MAW	Р	osition(s):		All
Filler Metal F-No.:					A-No.:	A	-1 / A-1
AWS Class.:	I	E6010 / E7018-1			Weld Type(s):		eve, Fillet
Base Metal:	Base Metal: P-1 Group 1 or 3			To:	P-1	Group _	1 or 2
ypical Materials P-1 Gr. 1: SA-36, SA-53, SA-106 A/B, SA-23				WPB, SA-35	0 LF1, SA-516 6	0/65, SA-CSA G	40.21 Gr. 38W / 44W
P-1 Gr. 2:	SA-105	5, SA-106 C, SA	A-234 WPC, S.	A-350 LF2, S	A-516 70, SA-5	37 CI. 1, SA-660	WCB / WCC
Diameter Range:		All		Condition(s): Postweld Heat Tre			l Heat Treated
Thickness Range:	0	.062" to 2	.00"	Normal and Sour Service			
•	0	.125" to 1	.00"	Low Te	mperature :	Service to	–46° C (-50°F)
evision 2: Addition of PC codes.				and editoria	I review and u	pdate to the cu	rrent edition of the AS
Provincial	Registr	ration				181	

Provincial Registration	
ALBERTA BOILERS SAFETY ASSOCIATION PROVINCE OF ALBERTA SAFETY CODES ACT WELDING PROCEDURE Reg. No. WP 1312.2 Spec No. 104 (REV 2) Weld Process Matt. Gr. P No. 1 Gr. 113 to P No. 1 Gr. 112 Elec. Gr. F No. 314 A No. Th. Qual. For. 50.8 mm PWHT YES WARACT 3.1 to 25.4 mm (CVA 746°c) Yr0.2 Mo. 08. Day 01. Signed R. ROSEBERG, P.ENG. WELDING SPECIALIST	

WELDING PROCEDURE SPECIFICATION (WPS) QW-482 (Section IX, ASME Boiler and Pressure Vessel Code)

Company Name: RJ\	/ Gas Field Services Ltd.					
WPS No.: 104		Date:	September 08, 1987			
Revision No: 2	_	Revision Date:	July 08, 2002			
	A, 104B, 104C, 104D	-				
	AW / SMAW	Type(s):	Manual / Manual			
		-				
JOINTS	QW-402		Joint Details			
Joint Design: Butt, Tee, L	ap, Corner, etc.		esigns. Reference construction			
Backing: F-3 electrode	es with or without backing		details. Where joint details are not			
	with backing only.	specified, refer to	typical joint detail sheet provided.			
	Similar base or weld meta					
Dacking material (1)pc/.		LS QW-403				
DNs 1 Cross	CONTRACTOR OF THE PROPERTY OF	P-No: 1	Group No: 1 or 2			
	p 1012 10	, -140.				
OR Spec. type & grade: N/A		to Spec. type & gr	ade: N/A			
OR						
Chem. Analysis & Mech. Pr	op.: N/A	to Chem. Analysis	& Mech. Prop.: N/A			
Base Metal Thickness Rar	nge	ge				
Groove:	0.0625" to 2.00" - Norma	I and Sour Service	Fillet: All			
Groove:	0.125" to 1.00" - Low Ter	nperature Service t	o –46° C (-50°F)			
Pipe Dia Range:	Unlimited		Fillet: All			
Other: Maximum thickn	ess of any weld layer shall					
	FILLER META	ALS QW-404				
Process:	SMAW		SMAW			
Spec No. (SFA):	5.1		5.1			
AWS No. (Class):	E6010		E7018-1			
F-No.:	F-3		F-4 A-1			
A-No.:	A-1	local.	3/32", 1/8", 5/32", 3/16", 1/4"			
Size of Filler Metals:	3/32", 1/8", 5/		3/32 , 1/3 , 3/32 , 3/10 , 1/4 853" max. (0.850" for Low Tempetature)			
Weld Thickness - Groove:	0.157" max.(0.150" for Lov unlimited	w reimpetature) 0.0	unlimited			
- Fillet:	N/A		N/A			
Electrode-Flux (Class):	N/A N/A		N/A			
Flux Trade Name:	N/A N/A		N/A			
Consumable Insert: Other:	Covered Electr	ode	Covered Electrode			
Other:	COVERED LIECTI		t to the assessment addition of the AS			

Addition of PQR's for low temperature service and editorial review and update to the current edition of the ASME Revision 2: codes.

WELDING PROCEDURE SPECIFICATION (WPS) QW-482

(Section IX, ASME Boiler and Pressure Vessel Code)

<u> </u>						
Company Name: RJ\	/ Gas Field Services Ltd.					
WPS No.: 104		Date: September 08, 1987				
Revision No: 2		Revision Date: July 08, 2002				
	A, 104B, 104C, 104D					
	AW / SMAW	Type(s): Manual / Manual				
JOINTS	QW-402	Joint Details				
Joint Design: Butt, Tee, L	ap, Comer, etc.	All ASME joint designs. Reference construction				
Backing: F-3 electrode	es with or without backing	drawings for joint details. Where joint details are not				
F-4 elctrodes	with backing only.	specified, refer to typical joint detail sheet provided.				
Backing Material (Type):	Similar base or weld meta	I as required. No Retainers.				
		LS QW-403				
P-No: 1 Grou		P-No: 1 Group No: 1 or 2				
OR OR						
Spec. type & grade: N/A		to Spec. type & grade: N/A				
OR		N/A				
Chem. Analysis & Mech. Pr		to Chem. Analysis & Mech. Prop.: N/A				
Base Metal Thickness Rar	nge	t to Occurr Millett All				
	0.0625" to 2.00" - Norma					
		mperature Service to -46° C (-50°F) Fillet: All				
Pipe Dia Range:	Unlimited					
Other: Maximum thickn	ess of any weld layer shall					
20 m 10 m		ALS QW-404 SMAW				
Process:	SMAW 5.1	5.1				
Spec No. (SFA):	E6010	E7018-1				
AWS No. (Class): F-No.:	F-3	F-4				
A-No.:	A-1	A-1				
Size of Filler Metals:	3/32", 1/8", 5	/32" 3/32", 1/8", 5/32", 3/16", 1/4"				
Weld Thickness - Groove:	0.157" max.(0.150" for Lo					
- Fillet:	unlimited	unlimited				
Electrode-Flux (Class):	N/A	N/A				
Flux Trade Name:		N/A				
Flux Haue Maine.	N/A					
Consumable Insert:	N/A N/A Covered Elect	N/A				

Revision 2: Addition of PQR's for low temperature service and editorial review and update to the current edition of the ASME codes.

WELDING PROCEDURE SPECIFICATION (WPS) QW-482 (Section IX, ASME Boiler and Pressure Vessel Code)

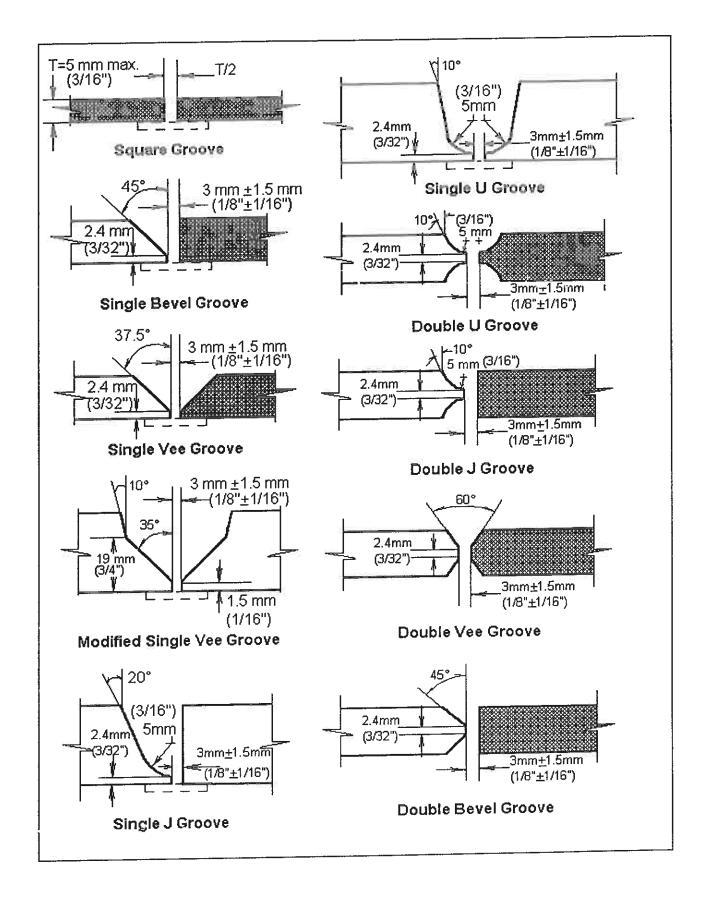
WPS # 104 Revision 2

Tir 2	mperature Range: ne Range: 1 hour plus 15 minutes per bling rates as per ASM GA	oer inch th inch over	minimum ickness to 2 inches.	o 2 inches.	
2 00	plus 15 minutes per bling rates as per ASM	oer inch th inch over	ickness t	o 2 inches.	
2 00	plus 15 minutes per bling rates as per ASM	nch over	2 inches.	Heating and	
co	oling rates as per ASM			i icaliilu allu	
F		THE RESERVE	408		
•	Shielding Gas(es):	N/A			
1	Composition:	N/A			
F	Flow Rate:	N/A			
tempilstiks	Gas Backing:	N/A			
			ne M/	Δ	
			711.		
the second second second			D: 10	(DO)	
	·				
			the state of the s)	
-3) 20 – 32					
-3) 28 080 J/ii	n SA	1AW (F-4)			
-3) 22 080 J/I	n SA	1AW (F-4)	72 450 J	//in	
		-			
CHNIQUE	QW-410		2007		
ave size shall b	e controlled to prevent	exceeding	maximum	heat input.	
rial must be the	roughly cleaned of gre	ase, rust, n	nill scale, (dirt, etc., at	
k on each side	of the joint prior to wel	ding.			
power brushin	g, grinding, etc. after e	ach weld la	yer.		
uge, grind, etc.	to clean metal if requir	ed.			
Not Applicable					
Single or Multiple for F-4 electrodes.					
Single					
2 – 16 IPM					
Not allowed					
	DADAMETEDS	Wasing State of the			
L WELDING					
r Tyne		Vol	t	Travel Speed	
	l '			(IFM)	
		20 - 2	26	2 - 12	
	P 80 - 150			3 - 14	
DC R	P 90 - 180			4 - 16	
				2 - 10	
				4 - 12	
				5 - 14	
				6 - 16 8 - 16	
				0-10	
		nd position of	weia.		
lat (1G) position or					
	ECHNIQUE ave size shall be rial must be thouse of the polaric	Trailing Shielding Gas C LCHARACTERISTICS QW-4 -3) Direct Current (DC) SM -3) Reverse (EP) SM -3) 60 – 180 SM -3) 20 – 32 SM -3) 28 080 J/in SM -3) 22 080 J/in SM -3) 22 080 J/in SM -3) 22 080 J/in SM -4 -5 -6 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7	Trailing Shielding Gas Composition L CHARACTERISTICS QW-409 -3) Direct Current (DC) SMAW (F-4) -3) Reverse (EP) SMAW (F-4) -3) 60 - 180 SMAW (F-4) -3) 20 - 32 SMAW (F-4) -3) 28 080 J/in SMAW (F-4) -3) 22 080 J/in SMAW (F-4) -3) 22 080 J/in SMAW (F-4) -3) 22 080 J/in SMAW (F-4) -4 -5 -6 -6 -6 -6 -7 -7 -7 -7 -7 -7	Trailing Shielding Gas Composition: N// L CHARACTERISTICS QW-409 -3) Direct Current (DC) SMAW (F-4) Direct Cu-3 (F-4) Reverse (EP) SMAW (F-4) Reverse (EP) Reverse (EP) Reverse (EP) SMAW (F-4) Reverse (EP) Reverse	

Addition of PQR's for low temperature service and editorial review and update to the current edition of the ASME Revision 2: codes.

Typical Joint Details QW-482

Prepared by: Qualimet



PROCEDURE QUALIFICATION RECORD (PQR) QW-483

(Section IX, ASME Boiler and Pressure Vessel Code)

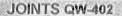
Company Name: RJV Gas Field Services Ltd.

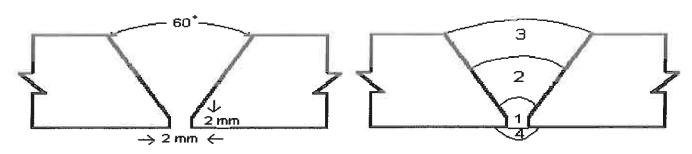
PQR No: 104C Date: July 08, 2002 Revision No.: Revision Date: -----

WPS No: 104 Revision 2

Welding Process(es): SMAW / SMAW

Types: Manual / Manual





BASE M	ETALS QV	V-403	POSTV	VELD HEAT TREATMENT QW-407	
Material Spec.: Type or Grade: P-No.		SA-516 Grade 70 P-1 Group 2	Temperature: 1 150°F ±25°F Time: 2.0 hours Other: N/A		
Thickness of Test Co	oupon: 0.249	Plate			
Other: Heat No.: 22	648-015071-2	C.E.: 0.37	draw land	GAS QW-408	
FILLER I	METALS Q	N-404	Туре о	or Gas(es): N/A	
Process	SMAW	SMAW	Con	nposition: N/A	
SFA Spec:	5.1	5.1] F	Flow Rate: N/A	
AWS Class.:				king Rate: N/A	
F-No:	F-3	F-4]	Other: N/A	
A-No:	A-No: A-1 A-1				
Filler Metal Size:	1/8"	1/8"	ELECTR	ICAL CHARACTERISTICS QW-409	
Deposited Metal:	0.075"	0.174"	Current:	F-3: Direct (DC) F-4: Direct (DC)	
Other:	Covered	Covered	Polarity:	F-3: Reverse(EP) F-4: Reverse(EP)	
Example 1	Electrode	Electrode	Amps:	F-3: 65 - 80 F-4: 70 – 100	
POSIT	TION QW-4	05	Volts:	F-3: 23 - 36 F-4: 20 - 23	
Position of Groove:	3G		Heat Input:	F-3: 28 080 J/in F-4: 59 800 J/in	
Weld Progression:	Vertical Up		Other:	N/A	
Other: N/A			Assaulti	TECHNIQUE QW-410	
PREHEAT QW-406			Travel Spe	ed: F-3: 2 – 7.0 ipm F-4: 2.5 – 4.1 ipm	
Preheat Temp Min.: 50° F			String or W	Veave Bead: String and weave	
Interpass Temp Max.	Interpass Temp Max.: 500°F			: N/A	
Interpass Temp Min.	nterpass Temp Min.: 50° F			Single Pass: Multiple + single per side	
Other	Temperature Templistiks	e monitored using	_	Multiple Electrodes: Single N/A	

PROCEDURE QUALIFICATION RECORD (PQR) QW-483 (Section IX, ASME Boiler and Pressure Vessel Code)

Specimen Width Thickness Area Total Load Unit Stress Failure	PQR # 104C								
Specimen No. In Thickness in a specimen No. In Thickness in a specimen No. In									
Guided Bend Tests QW462 Type and Figure No. Result Toughness Tests QW 170 Specimen Notch Notch Test Impact Lateral Exp Drop Weight No. Location Type Temp Values % Shear Mils Break No I See Attached Report Other Tests Not Applicable Type of Test: Other: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we		24.2444 (20)	h Thi	177	Area	Ultimate Total Loa	d Unit Stre	ss	Type of Failure &
Guided Bend Tests QW462 Type and Figure No. Result Not Applicable Toughness Tests QW 170 Specimen Notch Notch Test Impact Lateral Exp Drop Weight No. Location Type Temp Values % Shear Mills Break No I See Attached Report Other Tests Not Applicable Type of Test: Other: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we	11101								
Type and Figure No. Not Applicable Toughness Tests QW 170 Specimen Notch Notch Test Impact Lateral Exp Drop Weight No. Location Type Temp Values % Shear Mills Break No I See Attached Report Other Tests Not Applicable Type of Test: Other: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Gests Conducted By: Qualimet Inc. We certify that the statements in this record are correct and that the test welds were prepared, we				I	ot Applica	able			
Toughness Tests QW 170 Specimen Notch Notch Test Impact Lateral Exp Drop Weight No. Location Type Temp Values % Shear Mils Break No I See Attached Report Other Tests Not Applicable Type of Test: Other: Melder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. We certify that the statements in this record are correct and that the test welds were prepared, we				Gu	7/17/7				
Toughness Tests QW 170 Specimen Notch Notch Test Impact Lateral Exp Drop Weight No. Location Type Temp Values % Shear Mils Break No I Other Tests Not Applicable Type of Test: Dther: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we		Type and	d Figure No.	·			Result		
Toughness Tests QW 170 Specimen Notch Notch Test Impact Lateral Exp Drop Weight No. Location Type Temp Values % Shear Mills Break No I Other Tests Not Applicable Type of Test: Dther: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we				<u> </u>	Not Applica	ble			
Specimen Notch Notch Test Impact Lateral Exp Drop Weight No. Location Type Temp Values % Shear Mils Break No I Other Tests Not Applicable Type of Test: Other: Melder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we									
No. Location Type Temp Values % Shear Mils Break No I Other Tests Not Applicable Type of Test: Other: Nelder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we				To					
Other Tests Not Applicable Type of Test: Other: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we	•			10.00		1	- 1		
Other Tests Not Applicable Type of Test: Other: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we	No.	Location	Туре	Temp	values	% Snear	MITS	Dieak	NODIK
Not Applicable Type of Test: Other: Nelder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 Ne certify that the statements in this record are correct and that the test welds were prepared, we				Se	e Attached	Report			
Not Applicable Type of Test: Other: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we									
Type of Test: Other: Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KY Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we									
Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we		t:							
Tests Conducted By: Qualimet Inc. Lab. Test No.: 664-02001 We certify that the statements in this record are correct and that the test welds were prepared, we	19								
We certify that the statements in this record are correct and that the test welds were prepared, we and tested in accordance with the requirements of Section IX of the ASME Code.		-		o	ABSA No	.: <u>W-6943</u>			02001
	Ne certify tl and tested i	hat the state in accordanc	ments in the	is record a equireme	are correct nts of Sec	and that the tellion IX of the AS	st welds were SMF Code	prepar	ed, welded,
Manufacturer: RJV Gas Field Services-Ltd.				Man	ufacturer:	RJV Gas Field	Services Lld.		
Date: July 08, 2002 By: Dale smilk	Tato: Jul	v 08 2002			Bv:		ے کے		<u>~</u>
Jac. 00, 00, 2002	Jate. Jul	7 00, 2002							



• 7817 CORONET ROAD, EDMONTON, AB T6E 4N7 (780) 469-5870 • FAX (780) 465-5829 • CALGARY (403) 278-9862 • 1-800-621-8979



CHARPY V-NOTCH IMPACT TEST RESULTS

for Procedure Qualification Record # 104C

Client:	RJV Gas Field Services Ltd.	Job Number:	664 - 02001				
Address:	4901 - 47 Street Vegreville, Alberta Date: July 08, 2002						
Materials:	SA-516 Grade 60 to 70						
Size:	0.2495" wt plate machined	Condition:	Postweld Heat Treated				
Specimen Type:	5.0 mm Charpy V Notch impact specimens						
THE RESIDENCE OF THE PERSON OF	ASTM A-370, ASME Section VIII UG-84						
Qualification Temp.:	-46°C (-50°F)						

Sample Set	Sample Number	Impact ft-lb	Energy (Joule)	Converted Full Size Impact Energy (J)	% Shear
Weld Zone	1	23	31	62	55
340000000000000000000000000000000000000	2	21	28	57	60
10.00	3	26	35	71	55
	Average:	23	32	63	57
		M STEEL			
Heat Affected Zone	1	34	46	92	70
SA-516 Gr. 60	2	25	34	68	60
	3	29	39	79	65
	Average:	29	40	80	65
		ter b			
Heat Affected Zone	1	41	56	111	90
SA-516 Gr. 70	2	37	50	100	75
	3	36	49	98	80
	Average:	38	52	103	82
	7			The Property of the Company of the C	A STATE OF THE STA

Remarks:

These Charpy v-notch impact test results exceed the minimum requirements of ASME Section VIII and B31.3 Codes for -46°C; or CSA Z662-99 Codes for -46°C.

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

TEST RESULTS CERTIFIED BY:

N SPanni

Qualimet





Certified by the Canadian Welding Bureau & Alberta Bollers Safety Association; Registered as an Alberta Professional Engineering consulting firm with engineers registered in Alberta and British Columbia

Visit us at our website: www.qualimetinc.com





PROCEDURE QUALIFICATION RECORD (PQR) QW-483 (Section IX, ASME Boiler and Pressure Vessel Code)

Company Name: RJV Gas Field Services Ltd.

PQR No: 104D

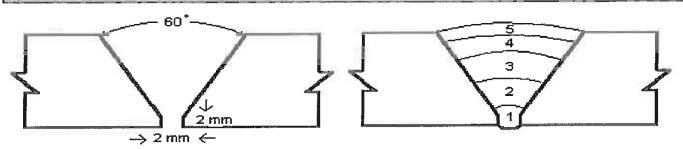
Date: July 08, 2002 Revision No.: -----**Revision Date:**

WPS No: 104 Revision 2

Welding Process(es): SMAW / SMAW

Types: Manual / Manual

JOINTS QW-402



BASE I	WETALS QW	/-403	POSTWELD HEAT TREATMENT QW-407			
Material Spec.:	SA-516	SA-516	Temperature: 1 150°F ±25°F			
Type or Grade:		Grade 70	Time: 2.0 hours			
	P1 Group 1	P-1 Group 2	Other: N/A			
Thickness of Test C						
	4030-54885 C.E		GAS QW-408			
FILLER	METALS QV	V-404	Type or Gas(es): N/A			
Process	SMAW	SMAW	Composition: N/A			
SFA Spec:	5.1	5.1	Flow Rate: N/A			
AWS Class.:	E6010	E7018-1	Gas Backing Rate: N/A			
F-No:	F-3	F-4	Other: N/A			
A-No:	A-1	A-1				
Filler Metal Size:	1/8"	1/8"	ELECTRICAL CHARACTERISTICS QW-409			
Deposited Metal:	0.075"	0.425"	Current: F-3: Direct (DC) F-4: Direct (DC)			
Other:	Covered	Covered	Polarity: F-3: Reverse(EP) F-4: Reverse(EP)			
	Electrode	Electrode	Amps: F-3: 70 – 80 F-4: 70 – 100			
POS	TION QW-40)5	Volts: F-3: 20 – 23 F-4: 20 – 23			
Position of Groov	re: 3G		Heat input: F-3: 22 080 J/in F-4: 72 450 J/in			
Weld Progressio	n: Vertical Up		Other: N/A			
Other: N/A			TECHNIQUE QW-410			
PREHEAT QW-406			Travel Speed: F-3: 5.0 - 6.0 ipm F-4: 2.0 - 3.5 ipm			
Preheat Temp Min.: 50° F			String or Weave Bead: String and weave			
Interpass Temp Max	x.: 500°F		Oscillation: N/A			
Interpass Temp Mir			Multiple or Single Pass: Multiple			
Othe	er: Temperature	monitored using	Single or Multiple Electrodes: Single Other: N/A			
	Templistiks		Other: N/A			

PROCEDURE QUALIFICATION RECORD (PQR) QW-483 (Section IX, ASME Boiler and Pressure Vessel Code)

							PQR # 10	4D
				Tensile '				
		· I	1	QW 46	52 Ultima	ite I	Iltimate	Type of
Specimen	Widi	th Th	ickness	Area	Total Le		it Stress	Failure &
No.	in		in	in ²	lb		psi	Location
				Not Applic	able			
		<u></u>						
			Gı	ided Ben	d Toete			
			G	QW46				
	Type an	d Figure No),		_	Resu	ilt	
				Not Applica	ıble			
			Υ.	oughness	Tests			
			•	QW 17				
Specimen	Notch	Notch	Test	Impac		ral Exp	Dro	p Weight
No.	Location	Туре	Temp	Values	% Shear	Mils	Break	No Brk
				<u> </u>				
	<u></u>		Se	e Attached	Report			
1					- 1	1		
				Other Te				
Compact Tool	4.			Not Applica	able			
Type of Test Other:	t: 						,-	
mer.								
110								==
Velder's Nar		in Boe		ABSA No	.: <u>W-6943</u>		amp ID: 🔟	
Tests Condu	ıcted By: _	Qualimet In-	C			_ Lab. Te	est No.: 66	4-02001
					. 4 (1) = 4 (2) = 4			
		ments in th						area, weiaea
-				THE DE LOCK	on ix on the A	ISIVIE COO	e.	
-	nat the state n accordanc		requiremei	ns or secu				
-			·			d Services	Lid.	
	n accordanc		·	ufacturer:	RJV Gas Flel	d Services	Lid.	
nnd tested ii			·			d Services	Lid.	
ind tested ii	n accordanc		·	ufacturer:	RJV Gas Flel	d Services	Lid.	



7817 CORONET ROAD, EDMONTON, AB T6E 4N7 (780) 469-5870 FAX (780) 465-5829
 CALGARY (403) 278-9862 1-800-621-8979



CHARPY V-NOTCH IMPACT TEST RESULTS

for Procedure Qualification Record # 104D

Client:	RJV Gas Field Services Ltd.	Job Number:	664 - 02001
Address:	4901 – 47 Street Vegreville, Alberta	Date:	July 08, 2002
Materials:	SA-516 Grade 60 to 70		
Size:	0.500" wt.	Condition:	Postweld Heat Treated
Specimen Type:	10.0 mm Charpy V Notch impact specimens		
Specification:	ASTM A-370. ASME Section VIII UG-84		
Qualification Temp.:	-46°C (-50°F)		

Sample Set	Sample Number	Impact ft-lb	Energy (Joule)	% Shear
Weld Zone	10	48	65	40
Both SMAW	2	65	88	60
processes	3	57	77	50
	Average:	57	77	50
and the control of th	12	San	"一""在外是决	TO WANTED TO SEE THE SECOND
Heat Affected Zone	1	91	123	85
SA-516 Gr. 60	2	77	104	80
	3	86	117	85
	Average:	85	115	83
		E ST		
Heat Affected Zone	1	66	89	80
SA-516 Gr. 70	2	73	99	90
	3	49	66	70
	Average:	63	85	80
				International Part

Remarks:

These Charpy v-notch impact test results exceed the minimum requirements of ASME Section VIII and B31.3 Codes for -46°C; or CSA Z662-99 Codes for -46°C.

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

TEST RESULTS CERTIFIED BY:

MSamu

QUALIMET INC.







		•	
· .	WPS NUMBER	105	
	PQR NUMBER	105A	
			
	QUALIFIED	FOR	
	**************************************		·
MATERIAL (TYPICAL): PI	+ D1 /QA 105 (34 106 SA 516 etc	.)
TITLE STATE OF THE PROPERTY OF	. to 11 (ox 105, t	, DA 2101 Cue	
		TOTAL DESTEN.	Croove & Fillet
PROCESS: GMAW, FCAW, S			
POSITION: All		DIAMETER:	<u>A11</u>
AWS CLASSIFICATION: E	170S-6, E70T-1, E7	7018, E7018-1	
BASE METAL THICKNESS RAN	GE QUALIFIED:		
)		: 4.8 to 50.8mm (3/16 to 2.0 in.)
•			
			-
•	•		
			•
ALBERTA LABOUR			
BOILERS & PRESSURE V WELDING PROCE	DURE	·	
1 Day No WD 312	2		•
Spec No. # 105 Weld Process GMAW./S			
Mati. Gr. P.No	PNo.		
Th. Qual. For 50,8,00 p.	A No.		
PWHT	1000012 1 0% TA 1 4 1 4		
Yr 88, Mo 3 . Day 3. Signed	ashin	1	· 🕻 *
Yr. Wo. 2. Day 7. Signed Y. / R.	ROSEBERG A ENG.		
<u> </u>	VERNITO SPECIMENTI		
Boilers Branch Regi	stration		

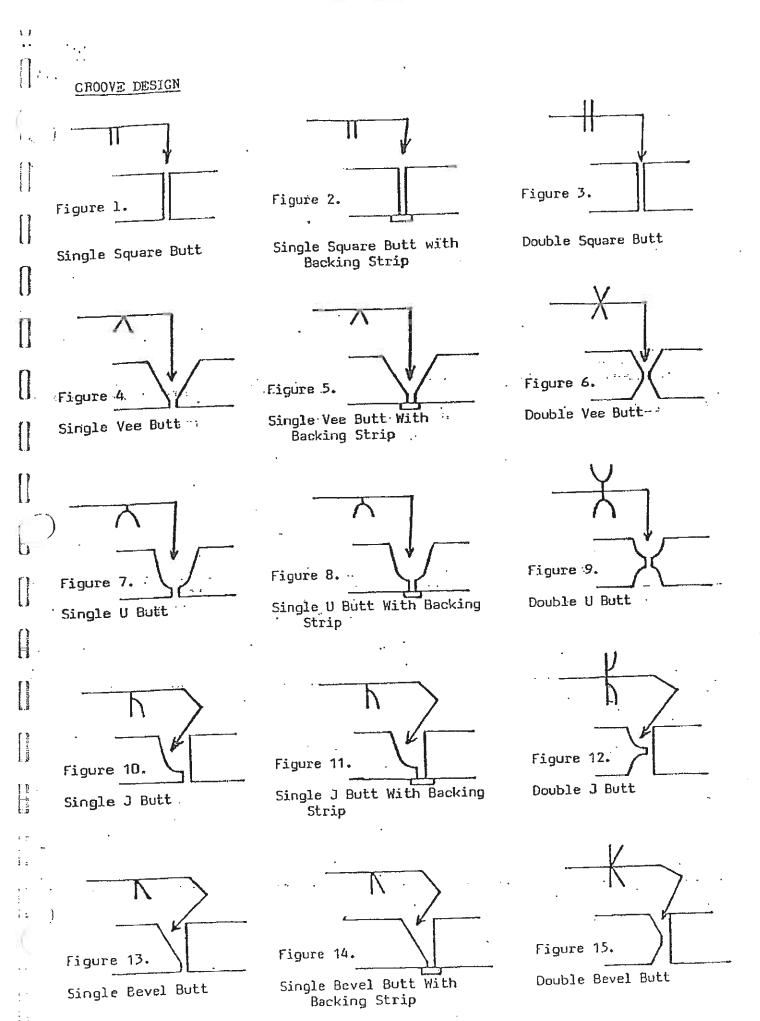
WELDING PROCEDURE SPECIFICATION

R.J.V. G	sfield Service Ltd., 4	1901 Bruce Rd	., Box 295, Vegn	eville, Alberta TOB	410 2 53
ELDING PROCEDURE SPEREVISIONS				E <u>September 8</u>	, 1987
SUPPORTING PQR NUMBER	5(S) 105A				
WELDING PROCESS(ES)	GMAW, FCAW, SM	IAW	TYPES Sem	i-Automatic, Mar	ual, Semi-Auto
JOINTS (QW-402) Joint Design	See attached sket	ches, figur	es 1 to 15		
Backing Weld m	etal where applica	othe	r -		
BASE METALS (QW-403) P-Number 1		to P-Nu	mber	1	
Thickness Range:	Groove 4.8 to	50.8mm (3/	16 to 2.0 in.		
Pipe Diameter Ranges:	Groove All Fillet All				
ther			-		
FILLER METALS (QW-404 Specification No. (SF		5.20	5.1		
AWS No. (Class)	ER70S-6	E70T-1	E7018, E70 F4	018-1, E7018-A1	
A-No.	See table no	ext page	. 1		
Deposited Weld Metal Groove GMAW: 4 Fillet All	.4mm; SMAW: 16mm	; FCAW: 48n	ım		
Electrode - Flux (Cla	ss)				
POSITION (QW-405) Position of Groove	1G	Weld I	Progression _		
)REHEAT (QW-406) Preheat Temp. Min Preheat Maintenance	See attached sect	ion Inter	oass Temp. Ma	x. Weld buil	d up

11/00	K E	
WP5	No.	105

1.1				WPS No.	105
					-
POSTWELD HEAT TREATIVE	MENT (9W-407)				•
cmoerature		tion	Time Range		
UAS (QW-408)					
[Shielding Gas(es)	Carbon Dioxide				
Flow Rate	10 - 25 litres/	min. $(20 - 50 c)$	fh)		
⊕ Other	99.9%				
FLECTRICAL CHARACTER	RISTICS (QW-409)		•		·
Current	Direct		_Polarity	Reverse	
Amps	<u>See table below</u>	V	_Volts		
Tungsten Electrode S					
Mode of Metal Transf	fer GMAW: Short	circuit; FCAW	: Globular		
Electrode Wire Feed	Speed Range				
Other					
TECHNIQUE (QW-410)					
[] String or Weave	Both	Travel	Speed (Range)	
Initial and Interpas	ss Cleaning	Brushing, chipp	ing, grindin	g	
n Method of Back Goug	ing	Air carbon arc	when require	d ·	
Multiple or Single I					
Atiple or Single	Electrodes	Single			
other		<u> </u>			

			FILLER METAL		CURRENT		VOLTAGE RANGE		OZUCD
	WELD LAYER	PROCESS	CLASS.	DIAMETER mm. (in.)	TYPE POLAR. /	AMP RANGE	RANGE	mm/min. (ipm)	OTHER
		GMAW	ER70S-X	0.9 (.035)	DCRP	90–150	18-22	100-600 (5-25)	Size of electrode, number of
	• !	SMAW	E7018 E7018-1	3.2 (1/8)	DCRP	90-160	20-25	38-350 (1.5-14)	passes, amperage voltage and travel speed
		SMAW	E7018-A1 As above	4.0 (5/32)	DCRP	125-200	21~26	100-400 (4-16)	will differ with thickness and
		SMAW	As above	5.0 (5/16)	DCRP	200-310	21-27	125-400 (5-16)	joint configura- tion.
1		SMAW	As above	6.0 (1/4)	DCRP	280-380	22-30	175-350 (7-14)	
ļ		FCAW	E70T-1	1.6 (1/16)	DCRP	200-300	24-28		
		FCAW	As above	2.0 (5/64)	DCRP	250-400	24-28		
		FCAW	As above	2.4 (3/32)	DCRP	350-500	26-32		
\\ !				{ }					
ij.			1	1					



PREHEAT

- Welds joining pressure parts or attachments shall be preheated to not less than the minimum preheat temperature stated in 6.
- 2. The preheat temperature shall be maintained until welding is completed.
- 3. If welding is interrupted, the weld joint and adjacent areas shall be re-heated to the minimum preheat temperature specified in 6.
- 4. The preheated area shall not be less than 50.8mm (2.0 in.) wide on each side of the weld.
- 5. Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.
- 6. Minimum preheating temperatures:

PRESSURE VESSELS

THICKNESS	MINIMUM PREHEATING TEMPERATURES
0 to 31.75mm (0 to 1 1/4 in.)	24°C (75°F)
Over 31.75 to 203mm (1 1/4 to 8 in.)	80°C (175°F)

PRESSURE PIPING

THICKNESS	MINIMUM SPECIFIED TENSILE STRENGTH, BASE METAL MPa (Ksi)	MINIMUM PREHEATING TEMPERATURE
Less than 25.4mm (1.0	in.) <490 (71)	24°C (75°F)
Greater than 25.4mm (80°C (175°F)
A11	>490 (71)	80°C (175°F)

POSTWELD HEAT TREATMENT

P-No.1 Groups 1, 2 & 3

Pressure Vessels in accordance with ASME BPVC Section VIII, Division I

- 1. All postweld heat treatment shall be done in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division I, UW-40 & UCS-56, 1986 edition.
- 2. Postweld heat treatment temperatures and minimum holding times are as follows:

NOMINAL THICKNESS	HEAT TREA	TMENT TEMPERATURE	HOLDING TIME
Up to 50.8 mm (2.0 in.)	595	(1100) minimum	l hr./25.4 mm (inch), 15 minutes minimum
Over 50.8 mm (2.0 in.)	595	(1100) ໝ່ຳກຳຫບໝ	2 hours plus 15 minutes for each additional 25.4 mm (inch) over 50.8 mm (2.0 in.)

Chemcial Plant and Petroleum Refinery Piping in accordance with ANSI B31.3

- 1. All postweld heat treatment shall be done in accordance with Table 331.1.1 of ANSI B31.3-1984.
- 2. Postweld heat treatment temperatures and minimum holding times as follows:

NOMINAL THICKNESS	HEAT TREATMENT TEMPERATURE C (°F)	HOLDING TIME
All	595 - 650 (1100 - 1200)	l hour/25.4 mm (inch), l hour minimum

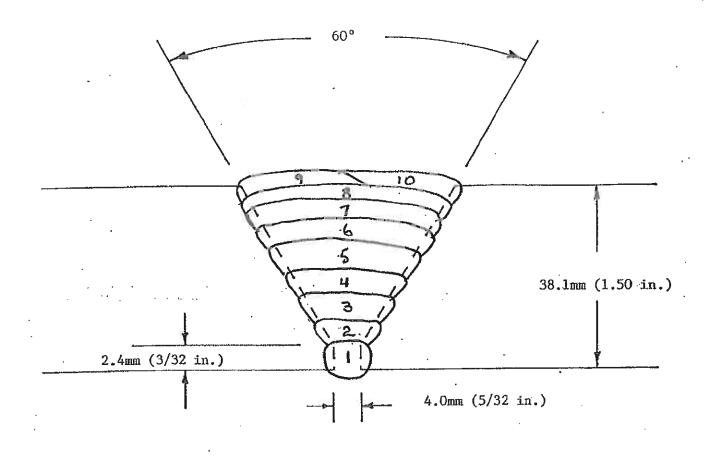
Power Piping in accordance with ANSI 831.1

- 1. All postweld heat treatments shall be done in accordance with Table 132 of ANSI B31.1-1983 edition.
- Postweld heat treatment temperatures and minimum holding times are as follows:

NOMINAL THICKNESS	HEAT TREATI	MENT TEMPERATURE (°F)	-	HOLDING TIME
Up to 50.8 mm (2.0 in.)	595 - 650	(1100 - 1200)		l hr./25 mm (inch), l5 minutes minimum
Over 50.8 mm (2.0 in.)	595 - 650			2 hr. plus 15 min. for each additional 25 mm (inch) over 50.8 mm (2.0 in.

PROCEDURE QUALIFICATION RECORD

WELDING PROCESS(ES) GMAW, SMAW, FCAW TYPES Semi-automatic, Manual, Semi-automatic JOINTS (QW-402)
WELDING PROCEDURE SPECIFICATION NUMBER 105 WELDING PROCESS(ES) GMAW, SMAW, FCAW TYPES Semi-automatic, Manual, Semi-automatic
VELDING PROCESS(ES) GMAW, SMAW, FCAW TYPES Semi-automatic, Manual, Semi-automatic
Type Butt: single vee
BASE METALS (QW-403)
Material Spec. SA 516 Type or Grade Grade 70N Type or Grade Grade 70N Type or Grade Grade 70N Type or Grade 38.1mm (1.50 in.)
P-No. 1 Grp. 2 to P-No 1 Grp. 2 Thickness 38.1mm (1.50 in.)
DiameterOther
FILLER METALS (QW-404)
SFA Specification 5.18 5.1 5.20
AWS Classification ER70S-6 E7018 E70T-1
Filler Metal F-No. 6 4 6
Weld Metal Analysis A-No. 1 1 1
Size of Filler Metal See sketch next page
Deposited Weld Metal Thickness GMAW: 4mm SMAW: 8mm FCAW: 24mm
Uther No single pass with over 3" (12.7mm) or deposited metal
)ITION (QW-405)
Position of Groove 1G Weld Progression
PREHEAT (QW-406)
Preheat Temp. 80°C (175°F) Interpass Temp. Weld build up
POSTWELD HEAT TREATMENT (QW-407)
remperature 607°C (1125°F) Time 90 minutes
GAS (QW-408) Type of Gas(es) Carbon Dioxide Composition of Mixtures Welding grade
Strong Gas(es) Carbon Dioxide Composition of Anxiones Weighing grade
Other Flow Rate: 18 litres/min. (35 cfh) [ELECTRICAL CHARACTERISTICS(QW-409)
Current Direct Polarity Reverse
Amps See sketch next page Volts
Other .
TECHNIQUE (QW-410)
Travel Speed
Multipass or Single Pass (per side) <u>Multipass</u>
Single or Multiple Electrodes Single
cing or Weave Bead Both
cner



Pass #1: .89mm (0.035 in.), ER70S-6, DCRP, 95-105 amps, 20 volts, short circuiting transfer.

Pass #2: .89mm (0.035 in.), ER70S-6, DCRP, 190-195 amps, 30 volts, globular transfer.

Pass #3: 6.0mm (1/4 in.), E7018, DCRP, 340-380 amps, 24-28 volts.

Pass #4 - #8: 2.4mm:(3/32 in.), E70T-1, DCRP, 400-425 amps, 29-30 volts.

Pass #9 & #10: 6.0mm (1/4 in.), E7018, DCRP, 340-380 amps, 24-28 volts.

TENSILE TEST

<u>}</u>	Specimen Number	Width mm (in.)	Thick. mm (in.)	Area sq.mm (sq.in.)	Ultimate Load N (lbs.)	Ultimate Stress MPa (psi)	Character & Location of Failure
	T-1	.19.65	37.0	727	380,600	524	Partial cup & cone
		(.774)	(1.46)	(1.13)	(85,600)	(75,900)	Weld metal
	T-2	19.2	36.2	695	364,700	525	Partial cup & cone
-		(.756)	(1.43)	(1.08)	(82,100)	(76,100)	Parent metal

GUIDED BEND TEST

Type and Figure Number	Resu lt	Type and Figure Number	Result
Side S-1	Pass	Side S-3	Pass
Side S-2	Pass	Side S-4	Pass

Welder's Name	Ernie Bullock
Certificate Number	W-9190
Tests Conducted by	Ludwig's Welding Consulting Ltd.
Per:	V. Lukey, C.E.T.
Laboratory Test Num	ber <u>LWC-9703-816E</u>
We certify that the	statements in this record are correct and that the test welds
were prepared, welc	led and tested in accordance with the requirements of Section IX
of the ASME Boiler	and Pressure Vessel Code.
	Signed R.J.V. Gasfield Service Ltd.
Date September 2	4, 1987 By

RJV GAS FIELD SERVICES LTD. 4901 - 47 STREET VEGREVILLE AB T9C 1C3

्रवाद्याच्याताल्यः चरावाद्याच्यापात्रः स्वयं च्यापात्रः स्वयं व्यवस्थाने ।

R.IV106

OKIGEOREA (OLIVE) SELICIO DE ESTADO DE ESTADO

RJV106(PQR)

QUALIFIED FOR:

BASE METAL (TYPICA	.L):	AISI 4130	"10"	P1-GROUP1
PROCESS(ES):	SMAW	WE	LD TYPE(S):	MANUAL
POSITION(S):	•	A	LL.	-
FILLER METAL(S):		E8010G,	E10018-D2	
BASE METAL THICKNI	ESS RANGE(S) QI	JALIFIED:	.0625	' TO .674"
PROCEDURAL DETAIL	.S:		PREHEAT =	400F MINIMUM
			PWHT = 1	225F (+/-) 25F
			(1 HOU	R PER INCH)
			BRINELL HAI	RDNESS SURVEY

Application-Weld Procedure #RJV 106 to be used on Nutron N1 angle body chokes CRN# 0C0078.2 PROVINCE OF ALBERTA
SAFETY CODES ACT
WELDING PROCEDURE
RESTRICTED APPLICATION*

Reg. No. WP 1312.2 Spec. No.RJV 106
Weld Process SMAW
Matl. No.AISI 4130 to Matl. No. P1
Elec. Gr. F No. 3 + 4 A No. 1
Th. Qual. For 17.1 mm PW.H.T. YES
* Limited To: NUTRON NI ANGLE BIPY
CHOKES (CRN # ocgo78.2)

Yr.O.2. Mo.O.2. Day 2.3. Signed

NEBERTA BOILERS SAFETY ASSOCIATION

BOILER BRANCH REGISTRATION

	MAE SPEC	2000	
Company Name: RJV GAS FIELD S	EDVICES L	rD.	By: DALE LANIUK
Company Name: RJV GAS FIELD S Welding Proc. Spec. No.: RJV106		23-SEPT-94	By: DALE LANIUK PQR(s): RJV106(PQR)
Revision No.: Rev.1		06-Feb02	rands. Horioti and
Welding Process(es): SMAW	Type(s):	00 100. 02	MANUAL
Vielding Frocess(es).	1 ypc(s).	/Automatic	Munual, Machine, or Semi-Auto.)
JOINTS: (QW-402)		(Actionistic	History History at Gottle Control
(ASME JOINT DES	16NS)		
Joint Design GROOVE, FILLET, REPAIR		For Joint	Details: See attached sheet.
Backing (Yes) X (No)	<u>`</u>	. 0. 00	Dotallo. Goo ditacilos olioci.
Backing Material Type WELD METAL WHERE APPLICATION			
(Refer to both bucking and retainers)			
NO RETAINER		\	,
Metal Nonfusing Metal	_	\ 	60 degrees
		/	7
Nonmetallic Other			/
			,
Sketches, Production Drawings, Weld Symbols or Written Description			
should show the general arrangement of the parts to be welded. Where		Ì	∖ / ↓
applicable, the root spacing and the details of the weld groove may be			1/16" - 1/8"
specified.	<u> </u>	1/16" - 1/8"	→
(At the option of the Manufacturer, sketches may be attached to illustrate			21 1-
joint design, weld layers and bead sequence, e.g. for notch toughness			
procedures, for multiple process procedures, etc.)		~	
BASE METALS: (QW-403)			
P - No. UNASSIGNED Group No. AISI 4130 OR Specification type and grade to Specification type and grade OR		P-No. P1	
Chem. Analysis and Mech. Prop.			
to Chem. Analysis and Mech. Prop.			
Thickness Range:			
Base MetalGroove .0625" TO		<u> </u>	
	.674"	Fil	et ALL
Pipe Dia. RangeGroove ALL		Fil Fil	
		Fil	
Other No sin		Fil	
		Fil	
Other No sin		Fil	
Other No sin		Fill ceed 1/2".	et ALL
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA)		Fill ceed 1/2". 5.1	et ALL 5.5
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA) AWS No. (Class)	ngle pass to exc	5.1 E8010G F3	5.5 E10018-D2 F4 A11
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA) AWS No. (Class) F - No.	ngle pass to exc	5.1 E8010G F3	5.5 E10018-D2 F4
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA) AWS No. (Class) F - No. A - No.	ngle pass to exc	5.1 E8010G F3	5.5 E10018-D2 F4 A11
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA) AWS No. (Class) F - No. A - No. Size of Filler Metal	ngle pass to exc	5.1 E8010G F3 A1 3/32", 1/8"	5.5 E10018-D2 F4 A11 3/32", 1/8", 5/32"
Other No sin	ngle pass to exc	5.1 E8010G F3	5.5 E10018-D2 F4 A11 3/32", 1/8", 5/32"
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA) AWS No. (Class) F - No. A - No. Size of Filler Metal Weld Metal Thickness: Groove Fillet	ngle pass to exc	Fill teed 1/2". 5.1 E8010G F3 A1 3/32", 1/8"	6.5 E10018-D2 F4 A11 3/32", 1/8", 5/32"
Other No sin	ngle pass to exc	5.1 E8010G F3 A1 3/32", 1/8"	5.5 E10018-D2 F4 A11 3/32", 1/8", 5/32" .424" Max. ALL NA
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA) AWS No. (Class) F - No. A - No. Size of Filler Metal Weld Metal Thickness: Groove Fillet Electrode Flux (Class) Ffux Trade Name	ngle pass to exc	Fill seed 1/2". 5.1 E8010G F3 A1 3/32", 1/8" 250" Max. ALL NA NA	5.5 E10018-D2 F4 A11 3/32", 1/8", 5/32" .424" Max. ALL NA NA
Other No sin FILLER METALS: (QW-404) Spec. No. (SFA) AWS No. (Class) F - No. A - No. Size of Filler Metal Weld Metal Thickness: Groove Fillet Electrode Flux (Class)	ngle pass to exc	5.1 E8010G F3 A1 3/32", 1/8"	5.5 E10018-D2 F4 A11 3/32", 1/8", 5/32" .424" Max. ALL NA

W	/ELD PI	ROCEDI	JRE NO	2.2	RJV106		REV:				PG: 2
POSITIONS: (Q)	W-405)				POSTWELD HEAT TREATMENT: (QW-407)						
Position(s) of Group	•	AL	L POSITIOI	NS	Temp. Rar	nge	1:	225F (+/-) 2	5F		_
Weld Progression:	Up	UPHILL	Down		Time Rang	je	1 HR PER INCH MINIMUM				
Position(s) of Fillet		AL	L POSITIO	NS	Other						,
										···	
PREHEAT: (QW	<i>I-</i> 406)				GAS: (QW-408)					
Minimum Preheat Ter	np.		400F				%	Compositi	on		
							Gas(es)	Mixture	Flow Rate		-
Maximum Interpass T	emp.		650F		Shiel	ding	NA	NA	NA		-
Preheat Maintenance		ALLOW TO	COOL AS	REQUIRE	Traili	•	NA	NA	NA	***	.
			(MIN. 400F)		Back	ing	NA	NA	NA		.
Continuous / special hea	ating should be r	recorded where	applicable.		Othe	•		NA			-
					<u></u>					<u></u>	
ELECTRICAL CI	HARACTI	ERISTICS	: (QW-40	9)							
Current: AC and DC			DC			Polarity			REVERSE		
Amps (Range)			40 - 220			Volts (Ran	ge)		17 - 30		-
	(Ampere and v	oit ranges shoul	d be recorded fo	or each electrod	le size,						
	position, thickn	ess, etc. This in	nformation may b	oe listed in tabu	lar form		Max Heat I	Input =	1.689 l	kJ/mm	
	similar to that s	•									
Tungsten Electrode S	ize and Typ	e			NA						-
					(Pure Tungsten, 2% Thoriated, etc.)						
Mode of Metal Transf	er for GMAV	N			NA (2) A (3) (4) (4) (4) (4) (4) (4)						-
					(Spray Arc, Short Circuiting Arc, etc.)						
Electrode Wire Feed	Speed Rang	je				NA	****				-
TEOMINOUE: (C	NU 440)										
TECHNIQUE: (C						вотн					
String or Weave Beac		_				NA NA					-
Orifice or Gas Cup Si Initial and Interpass C		uahina Grin	ding Chinni	na)		110					-
Initial and Interpass C	ileaning (bh	usining, Grin	ину, стіррі		GRINDING,	BRUSHING	3 CHIPPING	G			
Method of Back Goug	ina				SOUGING O						_
Oscillation	jii ig					NA					-
Contact Tube to Work	Distance					NA					_
Multipass or Single P		e)				MULTIPAS	S				-
Multiple or Single Ele		-,	-			SINGLE		·		-	-
Travel Speed (Range						(1 - 14 IPM)	_			-
Peening	,				NO PE	ENING AL	LOWED				-
Other											_
		Filler M	etal	Curre	int	Volt	Travel S	peed		Heat Input	
Weld Layers	Process	Class	Diameter	Polarity	Range	Range	Range	(IPM)		(kJ/mm)	
1	SMAW	E6010	3/32"	DCRP	40 - 120	17 - 30	2 - 8	IPM		1.063	kJ/mm
1	SMAW	E6010	1/8"	DCRP	80 - 150	17 - 30	2 - 10	IPM		1.063	kJ/mm
2 - REM	SMAW	E7018-1	3/32"	DCRP	40 - 120	17 - 30	2 - 8	IPM		1.063	kJ/mm
2 - REM	SMAW	E7018-1	1/8"	DCRP	80 - 160	17 - 30	2 - 10	IРМ		1.134	kJ/mm

		Filler N	etal	Curre	ent	Volt	Travel Speed		Heat Inpu	i
Weld Layers	Process	Class	Diameter	Polarity	Range	Range	Range (PM)	(kJ/mm)	Y
1	SMAW	E6010	3/32"	DCRP	40 - 120	17 - 30	2 - 8	IPM	1.063	kJ/mm
1	SMAW	E6010	1/8"	DCRP	80 - 150	17 - 30	2 - 10	IPM	1.063	kJ/mm
2 - REM	SMAW	E7018-1	3/32"	DCRP	40 - 120	17 - 30	2 - 8	IPM	1.063	kJ/mm
2 - REM	SMAW	E7018-1	1/8"	DCRP	80 - 160	17 - 30	2 - 10	IPM	1.134	kJ/mm
2 - REM	SMAW	E7018-1	5/32"	DCRP	140 - 220	17 - 30	2 - 14	IPM	1.114	kJ/mm
			[

	PRO	CEDURE QUAL	IFICATION RE	CORD (PQR)		PG: 3
Company Name	:	RJ	V GAS FIELD SE	RVICES L'	TD.		
	ication Record No	.: R	JV106(PQR)		Date:	23-SEPT-94	_
WPS No.:			RJV106		•		
Welding Process	(es):		SMAW				
•	tomatic, Machine, or Semi-Au	to.)		MANUAL			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	<u>-</u>					
JOINTS: (QW-40)2)					<u> </u>	
(Section)	100	_			/		
Coupon Thickness =	.337"	—	60 degrees	>	./		
Root Opening =	1/8"						
Land Thickness =	3/32"						
							:
							_
<u> </u>)_<			
			~~~/<	/ \	3		
				·	2		
<b> </b>		7			1		
			<u></u>				
		Groove	Design of the First Coupon				
	(For combination	qualification, the deposit weld m	etal thickness will be recorded	for each filler me	tal or process u	sed.)	
BASE METALS:	(QW-403)	<del> </del>	POSTWELD HE	AT TREA	TMENT:	(QW-407)	
Material Spec.	AISI 4130 TO SA	\106-gr.B	Temperature	1	225F (+/-) 2	5F	
Type and Grade			Time	1 HR	SOAK MIN	IIMUM	
P - No. AISI 4130	"TO" P - N	o. P1 - Gr.1	Other				
Thickness of Test Co	- pupon	.337"					
Diameter of Test Cou		4.50" OD					
Carbon Equivalent		NA	GAS: (QW-408	)			
Heat Number		NA		9	% Compositi	ion	
Other	No single pass	exceed 1/2"	1	Gas(es)	Mixture	Flow Rate	
			Shielding	NA	NA	NA	
FILLER METAL	(QW-404)		Trailing	NA	NA	NA	
SFA Spec.	5.1	5.5	Backing	NA	NA	NA	_
AWS Class.	E8010G	E10018-D2	- -				
F - No.	F3	F4	ELECTRICAL C	CHARACT	ERISTICS	S: (QW-409)	
A - No.	A1	A11	Current		DC		
Filler Metal Size	1/8"	3/32",1/8",5/32"	Polarity		REVERSE	=	
Other			Amps SEE PAG	E 5	Volts	SEE PAGE 5	_
Thickness of			Tungsten Electrode	Size	_	NA	. –
Weld Metal	.125"	.212"	Other			NA	_
POSITION: (QV	V-405)		TECHNIQUE: (	QW-410)		<del></del>	
Position of Groove	,	1G	Travel Speed	ŕ		2-10 IPM	
Weld Progression (U	phill, Downhill)	UPHILL	String or Weave Bea	ad		STRING	
Other	,, =		Oscillation			NA .	
		<u>-</u>	Multipass or Single	Pass (per sid	de)	MULTIPASS	
PREHEAT: (QV	V-406)	<u></u>	Multiple or Single El			SINGLE	
Preheat Temperature		400F MINIMUM	Other	_			_
Interpass Temperatu		650F MAXIMUM	<b> </b>	· - ·			_
Other	ALLOW TO COOL A		1				_

#### PROCEDURE QUALIFICATION RECORD (PQR) NO.: RJV106(PQR) PG: 4 TENSILE TEST: (QW-150) Type and Location Thickness Ultimate Ultimate Unit Width Area of Failure Total Load (lb) Stress (psi) (sq.in.) Specimen No. (in) (in) **Ductile in parent A106** 1 0.740 0.324 0.240 19,000 79,200 **Ductile in parent A106** 18,400 80,100 2 0.743 0.309 0.230 GUIDED BEND TESTS: (QW-160) Results Type and Figure No. Both passed. 2 Face Bends 2 Root Bends Both passed. TOUGHNESS TESTS: (QW-170) Drop Weight Notch Test Impact Lateral Expansion Notch No Break % Shear Mils Break Values Location Type Temperature Specimen No. FILLET - WELD TEST: (QW-180) Satisfactory Results: Yes Penetration: Yes Macro - Results: **OTHER TESTS** Hardness Survey - See attached report #94-09-2178 Type(s) of Test(s): Deposit Analysis: Other Welder's Name: Mark Reithmeyer Clock No. W11550 Stamp No. Laboratory Test No. 94-09-2178 Test Conducted by: CANSPEC GROUP INC. Gilles Perreault, R.E.T. Manager, Laboratory Services RJV GAS FIELD SERVICES LTD. Manufacturer:

Date: SEP 2 6 1994

## PROCEDURE QUALIFICATION RECORD WELD DATA

PG: 5

PQR No.: RJV106(PQR)

Date: SEPT 22/94

WELD DATA										
		Filler M	etal	tal Current		Volt	Travel Speed		Heat Input	
Layer(s)	Process	Class	Diameter:	Polarity	Range	Range	Rang	e	(kJ/mm)	
1	SMAW	E8010-G	1/8"	DCRP	95-110	19-26	2 - 4	IPM	1.689	kJ/mm
2	SMAW	E10018-D	1/8'	DCRP	110-120	20-25	7 - 9	IPM	0.787	kJ/mm
FILL/CAP	SMAW	E10018-D	5/32'	DCRP	185 -195	22-29	6 - 9	IPM	1.484	kJ/mm
									·	
									··· <del>-</del> ····	
			·							
	-									
	<del>                                     </del>	-								
		<del>  -</del>					<u> </u>			_

Comments:	

Witness by:

Name of Witness



### HARDNESS TEST REPORT

CUSTOMER: RJV Gas Field Services Ltd.

PURCHASE ORDER NO.: N/A

ADDRESS: 4901 - 47 Street, Vegreville, AB

DATE TESTED: September 23, 1994

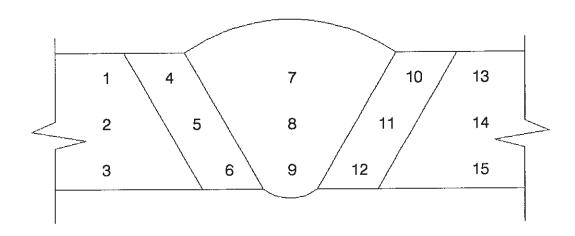
ATTENTION: Dale Laniuk

**CANSPEC JOB NO.:** 94-09-2178

MATERIAL DESCRIPTION: Weld Procedure RJV-106

4" OD STD Welded Pipe, PWHT at 1225°F for 1 hour

ASME SA106 Grade B to AISI 4130



LOCATION	HRB	LOCATION	HRB
1	89.0	9	90.0
2	91.5	10	75.0
3	91.0	11	78.0
4	97.0	12	75.0
5	98.5	13	73.0
6	95.0	14	75.0
7	98.0	15	75.0
8	98.5		
	1	9	

GILLES PERREAULT, R.E.T. MANAGER, LABORATORY SERVICES

CANSPEC GROUP INC.



### HARDNESS TEST REPORT

**CUSTOMER:** RJV Gas Field Services Ltd.

PURCHASE ORDER NO.: N/A

ADDRESS: 4901 - 47 Street, Vegreville, AB

DATE TESTED: September 23, 1994

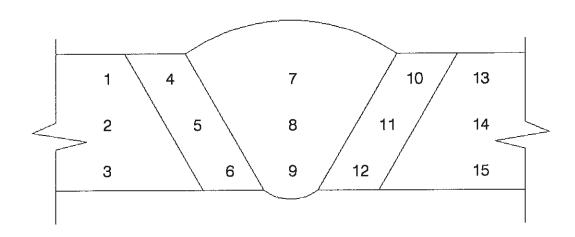
**ATTENTION:** Dale Laniuk

**CANSPEC JOB NO.:** 94-09-2178

MATERIAL DESCRIPTION: Weld Procedure RJV-106

4" OD STD Welded Pipe, PWHT at 1225°F for 1 hour

ASME SA106 Grade B to AISI 4130



LOCATION	HRB	LOCATION	HRB
1	89.0	9	90.0
2	91.5	10	75.0
3	91.0	11	78.0
4	97.0	12	75.0
5	98.5	13	73.0
6	95.0	14	75.0
7	98.0	15	75.0
Z 8	98.5		

GILLES PERREAULT, R.E.T. MANAGER, LABORATORY SERVICES

CANSPEC GROUP INC.

QW - 482

COMPANY NAME RJV Gasfield Service Ltd			
WELDING PROCEDURE SPEC. No. RJV-107		DATE	May - 30 -95
REVISION NoDATE	SUPPORT PQR	No.(S) RJV-107A	
			DOME (Automatic)
WELDING PROCESS(ES) GMAW/SMAW/SAW	as Welded TYPE(S)	MAW (Semi-auto) Si (AUTOMATIC, I	MAW (Manual) SAW (Automatic) MANUAL, MACHINE OR SEMI-AUTO.)
JOINTS (QW - 402)			
JOINT DESIGN Vee-Groove and all ASME jo	oint design		ALBERTA LABOUR
BACKING (YES) X (NO) X		BOILERS &	PRESSURE VESSELS ACT
BACKING MATERIAL (TYPE) Weld metal wher	e applicable	WE	LDING PROCEDURE
DACKING WATERIAL (TTL)	1 1	Reg. No. WP	1317.2 RJV-107
METAL NONFUSING	3 METAL	Spec No.	MAW /SMAW /SAW
		Mol Gr P No	Grator No. 1 Or 3
NONMETALLIC OTHER		Flec Gr F No 6	+4+6 ANO
		Th. Qual. For	38-1mn pwht. NO
		MIR Th. St. A.L.	15.9 mm FORCUN -46°C
		198 40 6 Day	a Signed
		11.5 a a MIV. a a a Day 4 a	R. ROSEBBAG, P. ENG. WELDING SPECIALIST
			WELDING SPECIALIST
BASE METALS (QW-403)			
P - No. 1 GROUP No. 2	ТО Р	- No. 1	GROUP No. 2
	OR		
SPECIFICATION TYPE AND GRADE  TO SPECIFICATION TYPE AND GRADE			
PECIFICATION TIPE AND GRADE	OR		
CHEM. ANALYSIS AND MECH. PROP.			
TO CHEM. ANALYSIS AND MECH. PROP.	······		
THICKNESS RANGE:	T 45 075 40 00 0		FILET All thickness
BASE METAL GROOVE WITH IMPAC	T 15.875mm to 38.0mm	<u> </u>	
	1.00		
PIPE DIA. RANGE GROOVE All diamete	r		FILLET All diameter
OTHER Maximum deposited per layer =	GMAW (3.3mm) SMAW	(10.0mm) SAW (12	.0mm)
FILLER METALS (QW-404)			
SPECIFICATION No. (SFA)	5.18	5.1	5.17
AWS No. (CLASS)	ER70S-2/-6	E7018-1	F7A6-EM14K
F - No.	F6 .	F4	F6
A - No. OR CHEMICAL ANALYSIS	1	1	1
SIZE OF FILLER METALS	0.035"	5/32",3/16",1/4"	1/8",5/32"
DEPOSITED WELD METAL THICKNESS RANGE			
GROOVE	3.3mm	38.0mm	38.0mm
FILLET.	All thickness	All thickness	All thickness
F COTRODE - FLUX (CLASS)			
TE JX TRADE NAME			Lincolmweld 880M (NEUTRAL)
CONSUMABLE INSERT			

QW - 482 (back) REVISION No. **RJV-107** WPS No. POSTWELD HEAT TREATMENT (QW - 407) POSITIONS (QW - 405) TEMPERATURE RANGE N/A Flat POSITIONS OF GROOVE Forward DOWN TIME RANGE "" DING PROGRESSION UP Flat . ITIONS OF FILLET _ GAS (QW - 408) PRECENT COMPOSITION PREHEAT (QW - 406) FLOW RATE MIXTURE PREHEAT TEMP. 100'F min. GAS(ES) 20 - 30 cufthr SHIELDING Argon/CO2 75/25 600'F INTERPASS TEMP, MAX. PREHEAT MAINTENANCE Continuous by Gas or Electric N/A TRAILING N/A (CONTUNUOUS OR SPECIAL HEATING SHOULD BE RECORDED) BACKING ELECTRICAL CHARACTERISTICS (QW 409) 90 - 650 VOLTS Range 18 - 32 POLARITY Reverse AMP, Range CURRENT Direct N/A TUNGSTEN ELECTRODE SIZE AND TYPE PURE TUNGSTERN 2% THORISTED, ETC. Short circuiting arc MODE OR METAL TRANSFER FOR GMAW SPRAY ARC, SHORT CIRCUITING ARC, ETC. 120 to 200 inches per minute ELECTRODE WIRE FEED SPEED RANGE TECHNIQUE (QW - 410) String & Weave STRING OR WEAVE BEAD ORIFICE OR GAS CUP SIZE 1/2" to 1.0" INITIAL AN INTERPASS CLEANING (BRUSHING, GRINDING, ETC.) Grind all tie in on stop and start to a feather edge on the root. Grind to sound metal for interpass welding. METHOD OF BACK GOUGING Arc-Air when required, then grind to sound metal. OSCILLATION 1.56 mm past each side of bevel 1.56mm CONTACT TUBE TO WORK DISTANCE Multi MULTIPLE OR SINGLE PASS (PER SIDE) Single TIPLE OR SINGLE ELECTRODES As per Table below TRAVEL SPEED (RANGE) PEENING Not permitted OTHER Depending on the thickness of material being welded, different diameter of electrode for SMAW should be used care must be taken not to exceed the maximum Heat Input permitted. Heat Input = Amp. X Volt X 60 = Joules Inches travel per minute GMAW = (26,000 Joules) SMAW = (52,000 Joules) SAW = (26,400 Joules) FILLER METAL CURRENT VOLT WELD TRAVEL SPEED RANGE PROCESS **RANGE** AMP. RANGE TYPE LAYERS DIAMETER CLASS 3.0" to 8.0" per minute 18 - 22 DC Rev 90 - 150 0.035" **GMAW** ER70S-2/-6 1 20 - 25 4.0" to 16.0" per minute 125 - 210 DC Rev 5/32" **SMAW** E7018-1 2-3-4 21 - 26 5.0" to 16.0" per minute 200 - 310 E7018-1 3/16" DC Rev 2-3-4 **SMAW** 7.0" to 14.0" per minute 22 - 301/4" DC Rev 280 - 390 2-3-4 **SMAW** E7018-1 3 - & 350 - 650 27 - 32 30.0" to 48.0" per minute DC Rev 1/8"

DC Rev

30.0" to 48.0" per minute

27 - 32

350 - 650

others

SAW

SAW

LA-71/880M

LA-71/880M

5/32

# PREHEAT P-No. 1 Groups 1,2 and 3

- 1. Welds joining pressure parts or attachments shall be preheated to not less than the minimum preheat temperature stated in item 6.
- The preheat temperature shall be maintained until welding is completed.
- 3. If welding in interrupted, the weld joint and adjacent areas shall be reheated to the minimum preheat temperature specified in item 6.
- 4. The preheated area shall not be less then 50.8 mm (2.0") wide on each side of the weld.
- Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.
- 6. Minimum preheating temperatures shall be as follows:

# Pressure Vessels in accordance with ASME BPVC Section VIII, Division L.

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
· 0 TO 31.8 mm (0 to 1.25")	10℃ (50°F)
Over 31.8 mm (over 1.25")	93°C (200°F)
Over 25.4 mm (1.0") and a specified maximum carbon content in excess of 0.30%	80°C (175°F)

# Chemical Plant & Petroleum Refinery Piping in accordance with ANSI B31.3

MINIMUM SPECIFIED TENSILE STRENGTH, BASE METAL	MINIMUM PREHEAT TEMPERATURE
≤ 490 MPa (71 Ksi)	10°C (50°F)
All	80°C (175°F)
>490 MPa (71 Ksi)	80°C (175°F)
	STRENGTH, BASE METAL  ≤ 490 MPa (71 Ksi)  All

# Power Piping in accordance with ANSI B31.1

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
Over 25.4 mm (1.0") and a speified maximum carbon content in excess of 0.30%	80℃ (175℉)
All others	10°C (50°F)

aten: thatank

LINCOLN ELECTRIC COMPANY 1 ST Clair Avenue eland, Ohio 44117-1199

CERTIFICATE OF CONFORMANCE

(APPLIES CNLY TO U.S. PRODUCTS)



# TYPICAL VALUES ONLY

supplied on the above order number is of the same classification, manufacturing process and material requirements as the were performed in conformance with these specifications and the above All lests required by material metall requirements. Joint configuration and pass sequence are shown at lower right combination, classification FALCENTAL March 13, 1995. flux and electrode used for this annual test, concluded on This is to certify that Lincohweld Anoth FluillA-77 Rections and ASME SFA-5.17

Operating Settings:

Z' Electrode )
Wire Feed Speed (in/min)
Current (amps) DC+
Voltage (volts)

Travel Speed (in/mln)

Electrical Stickoul (in)
Passes/Layers
Preheat Temp. (oF)
Interpass Temp. (oF)



Mechanical Properties of the weld deposit (in the as-welded condition) and Chemical analyses of the wech and condition and chemical analyses of the

020			<u> </u>				· · ·	ينتن		
	*	Ų	\$	S	· •		Cichal	,	-	
						T				
Deposit			3,43	76,300	31	g		201	(100, 110, 110)	
	Sign		8	oj.n		rired				
AVS/ASHE	MEGUINEME		70-95,000	58,000 min	2 E	Not Reg	1.11	20 目		
<b></b>		17	\$1)			Hardness, Rockwell B (avg)				
-			Tensile Strength (psi)	Yield Strength (psi)	Elongation, % in 2"	ckvell	rties	wtch)	10 09-	
			le Stre	Streng	pation,	ess, Ro	Impact Properties	(Charpy V-notch)	ft-  bs at -60 of	
			Yensi	Yield	E ( one	Hard	Impa	CCF	-11	

_		The state of the s	THE PROPERTY OF THE PARTY OF TH		
		REQUIREMENTS: Analysis	Analysis	RECOURENEMENTS	Analysis
1	7			S (8) 13) 181 1.1111	- 10
_		PK- 10	-10		80.
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_	2	90-1:40	1.29	**************************************	. 25.1
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	SI				
	v	XC10 520	.8		500.
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	۵	. 00% # CX	20.	(e.1.)	
	1 4 4 4 7 7 7 8	AC	.21		31.
	רמ לומושו				5
	<u>;                                    </u>	.0317	99.		70.
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		_			

Radiographic Test: Met requirements. Test assembly constructed of ASIN A36 steel.

state (1) lest atmospheric condition of 25 % Relative Humidity at 65 of.

Diffusible Hydrogan (1)
(Aus A4.3-98): ml/100 g

UNSCRIPTION OF THE PRISON OF CUTANOCA HE PHIS

CERTIFICATION SUPERVISOR

Actives Active Actives Actives

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	TOTAL STATE	_

"Igoma Steel Inc. P.O. Box 1400

* * ¥ * * FULLSIZE ENERGY , TLB FTLB FTLB AVG 72 68 55 65 . 02¢ 01 × NO. PIECES S 2 ELONG 2 8 8 30 ഗ ш ALS CB. T L œ œ HEAT ۵. TENSILE KSI 81 <u>م</u> 0 A. 032 0 E STOP 0: Р 55 SHAPE TE . 68 PLATE NUMBER YIELD KSI 55 Œ Þ آ ပ TEST DIR. TEST DIR. O ¥.6° z TEST METH, TEST METH: CVN Σ Œ 5.1.9 H r TEST COND. TERT COND. \$ لنا S. S. 22870 ¥ .008 PIECES . 800. SAMPLE GAUGE 1.7500 SAMPLE GAUGE 1.7500 ĸ C MN. *

PLATE NUMBER 43969

HEAT 0732S

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HEAT 0732S

* * *

TESTS

IMPACT

WEIGHT

1.650F

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MINUTES

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WEIGHT

HEAT 0732S

PLATE NUMBER 43969

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PL.ATE NUMBER 43969

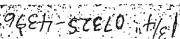
HEAT 0732S

NORMALIZED FOR A MINIMUM OF

PL.ATES

CONTINUED ON NEXT PAGE

** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL. * * WARNING



COMPA	NY NAME			RJV Gast	ield Services	s Ltd			
	-	FICATION RECO		RJV-107-	A		DATE	May - :	30 - 95
WPS No									
		S(ES)		GMAW/S	MAW/SAW	as Welded			
		JTOMATIC, SEMI		GMAW (	Semi-Auto)	SMAW ( Man	ual) SAW	( Automatic	)
	S (QW - 40			GROOVE I	DESIGN OF	TEST COUP	ON -		
ayer	Process	Filler	Size	Amp.	Volt	mm/Min Travel	Deposit	Joules	
1	GMAW	ER70S-2	.035"	120 - 130	20	152mm	3.0mm	26,000	
2	SMAW	E7018-1	5/32"	165- 175	20 - 25	254mm	3.0mm	26,250	, 30 ,
3	SMAW	E7018-1	3/16"	255 - 265	21 - 26	266mm	5.0mm	39,371	K
4	SMAW	E7018-1	1/4"	335 - 350	21 - 26	266mm	3.5mm	52,000	
5	SMAW	E7018-1	1/4"	335 - 350	21 - 26	266mm	3.5mm	52,000 -	SAM
6	SMAW	E7018-1	1/4"	335 - 350	21 - 26	266mm	4.0mm	52,000	V V
7	SAW	LA-71/880M	5/32"	500 - 550	27 - 32	1016mm	6.0mm	26,400	1 SMA
8	SAW	LA-71/880M	5/32"	500 - 550	27 - 32	1016mm	6.0mm	26,400	3,0MM & GMAW
9	SAW	LA-71/880M	5/32"	500 - 550	27 - 32	1016mm	6.0mm	26,400	-> 1 1.5mm
10	SAW	LA-71/880M	5/32"	500 - 550	27 - 32	1016mm	5.0mm	26,400	7.3 mm
' - No. " "CKN IET	TER OF TEST	T COUPON45	5.0mm 10mm by	914mm Plai	0 le	THER			
HER					G,	AS (QW - 408	) GAS	MIXTURE	FLOW RATE
						HIELDING Arg	ion/CO2	75/2	5 25cufthr
II I E E	METAIS	(QW - 404)		-::-		RAILING	N/A		
	ECIFICATION		5.	1 5.	4	ACKING	N/A		
ws c	LASSIFICATI	ON ER70S		7018-1 *	FI	ECTRICAL C	HARACTE	RISTICS (C	)VV - 409)
	METAL F-			4 F6		URRENT Dire		, (10, 100 (4	100/
	METAL ANS.		1	<del></del>		OLARITY Rev			
	F FILLER MET * F7A6-EI		5/	32to1/4 5/3	A	MPS. 120	- 550	VOLTS 2	
	mweld 880					UNGSTEN ELEC	TRODE SIZE	N/A	
						THER			
		METAL 3.0mm	19	).0mm 23.	.0mm -				
	ION (QW -	-		1 G		ECHNIQUE (			
	ON OF GROO		MILITA			RAVEL SPEED			
		ON (UP OR DOW	IALIEF) "	Loiwaid		TRING OR WEA			
Ų I∏⊏ľ	·				IC	SCILLATION 1.	SSSQ minoc	s each Side :	DI DEVEL

MULTIPASS OR SINGLE PASS (PER SIDE) Multi SINGLE OR MULTIPLE ELECTRODES Single

OTHER

PREHEAT (QW - 406)

PREHEAT TEMP. 200'F
INTERPASS TEMP. 600'F

PQR No.

RJV-107A

24 ft/lb

TENSIL	E	TEST	(OM) -	150 )
IENOIL	.ㄷ	ICOL	(QVV -	100

SPECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOTAL	ULTIMATE UNIT	TYPE OF FAILURE
# 5 Top	0.750"	0.781"	0.586 Sq In	49,600 Lb	84,700 psi	Ductile/Weld.
# 5 Bottom	0.753"	0.799"	0.602 Sq In	49,850 Lb	82,900 psi	Ductile/Weldl.
#6 Top	0.745"	0.734"	0.547 Sq In	46,750 Lb	85,500 psi	Ductile/Weld.
#6 Bottom	0.750"	0.780"	0.585 Sq In	48,750 Lb	83,300 psi	Ductile/Weld

GUIDED BEND TESTS (QW - 160)

TYPE AND FIGURE NO.	RESULT
# 1 side bend	Pass
# 2 side bend	Pass
# 3 side bend	Pass
# 4 side bend	Pass

#### TOUGHNESS TEST (QW - 170)

TEST TEMPERATURE	-50'C( -58'F)
NOTCH TYPE	Vee Notch

Weld zone

9

SPECIMEN	NOTON CONTION	IMPACT TEST		
NO.	NOTCH LOCATION	JOULES	FOOT / Lb.	
1	Weld zone Top	130 Joules	96 ft/lb	
2	Weld zone Top	198 Joules	146 ft/lb	
3	Weld zone Top	61 Joules	45 ft/lb	
4	Heat zone	52 Joules	38 ft/lb	
5	Heat zone	99 Joules	73 ft/lb	
6	Heat zone	146 Joules	108 ft/lb	
7	Weld zone	33 Joules	24 ft/lb	
8	Weld zone	20 Joules	15 ft/lb	

#### FILLET-WELD TEST (QW - 180)

33 Joules

RESULTS SATISFACTORY YESNOPENETRATION INT	TO PARENT METAL YESNO
MACRO RESULTS	
OTHER TESTS	
TYPE OF TEST Vickers Hardness Test see Test Report Sheet (File #95-31	(5))
DEPOSIT ANALYSIS	
OTHER	
WELDER'S NAME Albert Welin	STAMP NO. W-11912
TESTS CONDUCTED BY: Alfor Metallurgical Comp. Ltd	LAB TEST NO. File # 95-315

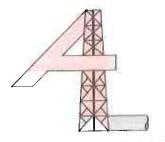
We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX or the ASME Code.

DATE May - 30 - 95

MANUFACTURER RJV Gasfield Services Ltd

BY

BY



CONSULTING ENGINEERS

FILE #95-315

PQR #RJV-107A

RJV Gasfield Service Ltd. 4901 - 47 Street Vegreville, Alberta T9C 1C3

June 1, 1995

#### METAL TEST REPORT

Material Description: ASME SA-516, Grade 70; 1.750"-thick normalized plate;

GMAW/SMAW/SAW welded; as-welded condition.

Specimen Type: Reduced-section tensile, as per Figure QW-462.1(a) of the ASME

Code; guided side bend, as per Figure QW-462.2 of the ASME Code.

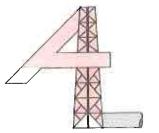
Results:	Sample 5 Top	Sample 5 Bottom	Sample 6 Top	Sample 6 Bottom
Width:	0.750 in.	0.753 in.	0.745 in.	0.750 in.
Thickness:	0.781 in.	0.799 in.	0.734 in.	0.780 in.
Area:	0.586 sq. in.	0.602 sq. in.	0.547 sq. in.	0.585 sq. in.
Ultimate Load:	49 600 lb	49 850 lb	46 750 1b	48 750 lb
Tensile Strength:	84 700 psi	82 900 psi	85 500 psi	83 300 psi
Break Character:	Ductile	Ductile	Ductile	Ductile
Break Location:	Weld Material	Weld Material	Weld Material	Weld Material

Guided side bend samples 1, 2, 3, and 4: Pass Tests.

The Association of Professional Engineers, Geologists and Geophysicists of Alberta Yours very truly,

ALFOR METALLURGICAL COMPANY LITD.

CHARLES E. MOZESON, D. Eng.



CONSULTING ENGINEERS

FILE #95-315

PQR #RJV-107A

RJV Gasfield Service Ltd. 4901 - 47 Street Vegreville, Alberta T9C 1C3

June 1, 1995

#### CHARPY V-NOTCH IMPACT TEST RESULTS

Material Description: ASME SA-516, Grade 70; 1.750"-thick normalized plate;

GMAW/SMAW/SAW welded; as-welded condition.

Specimen Type: Charpy V-notch full-sized weld zone and heat-affected zone im-

pact specimen, as per Part UG-84 of the ASME Code.

Testing Temperature: -50 C (-58 F).

Results: Weld zone (Top of weldment): 96 ft-lb (130 Joules);

146 ft-1b (198 Joules);

45 ft-lb (61 Joules).

Heat-affected zone: 38 ft-lb (52 Joules);

73 ft-lb ( 99 Joules);

108 ft-1b (146 Joules).

Weld zone (Bottom of weldment): 24 ft-1b (33 Joules);

15 ft-lb ( 20 Joules);

24 ft-lb (33 Joules).

PERMIT TO PRACTICE ALFOR HETALLURGICAL COMPANY LTD.

Signature

Date

PERMIT/NUMBER: P 2753

The Association of Professional Engineers, Geologiets and Geophysiciets of Aberta Yours very truly

ALFOR METALLURGICAL COMPANY LID.

CHARLES E MOTESON P. Eng.



CONSULTING ENGINEERS

FILE #95-315

PQR #RJV-107A

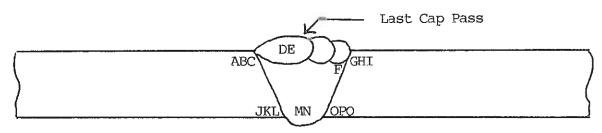
RJV Gasfield Service Ltd. 4901 - 47 Street Vegreville, Alberta T9C lC3

June 1, 1995

#### VICKERS HARDNESS TESTING OF STEEL WELDMENT

Materrial Description: ASME SA-516, Grade 70; 1.750"-thick normalized plate; GMAW/SMAW/SAW welded; as-welded condition.

Vickers hardness testing at 1 kg mass (HV1) was performed on a prepared cross-section of the weldment, in accordance with ASTM E 92. All tests were performed at 1.5 mm below the surface; the spacing between adjacent tests was 0.5 mm, with heat-affected zone tests initiating at 0.5 mm from the fusion line. The results are tabulated below.



Location	HVl	Location	HVl	Location	HVl
А	226	G	237	М	176
В	245	H	227	N	178
С	244	I	212	0	212
D	213	J	198	P	208
E	215	K	199	Q	199
म	212	T,	210	-	

PERMIT TO PRACTICE
ALFOR METALLUPA CALCOMPANY LTD.
Signature
Date

PARMIT TO PRACTICE

ALFOR METALLUPA CALCOMPANY LTD.

Signature

Date

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Signature

PARMIT TO PRACTICE

ALFOR METALLUPA CALCOMPANY LTD.

ALFOR METAL

Yours very truly

ALFOR MEDALLURGICAL COMPANY LID.

CHARLES E. MOZESON, F. Eng

**QW - 482 (back)** RJV-107

WPS No.

REVISION No.

POSITIONS (QW - 405)					NT (QW - 407)	
POSITIONS OF GROOVE Flat		TEMPERATURE RANGE 1150'F				
DING PROGRESSION UP Forward DOWN	٧	TIME RANGE		1 hour p	per inches	
I JITIONS OF FILLET Flat		GAS (QW -	408)			
PREHEAT (QW - 406)		(411	•	PRECENT C	OMPOSITION	•
PREHEAT TEMP. 100'F			GAS(E		MIXTURE	FLOW RATE
INTERPASS TEMP. MAX. 600'F	•	SHIELDING			75/25	20 - 30 cufthr
PREHEAT MAINTENANCE Continuous by Gas	or Electric	TRAILING	N/A			
(contunuous or special heating should be		BACKING	N/A	<u> </u>		
ELECTRICAL CHARACTERISTICS (QW 409		MP Range	90 - 650		VOLTS Range 18	- 32
CURRENT Direct POLARITY Reverse TUNGSTEN ELECTRODE SIZE AND TYPE N/A		uvir. Itange			VOLTO Range 10	
		TUNGSTERN 2% T	HORISTED, E	TC.		
MODE OR METAL TRANSFER FOR GMAW Short	circuiting arc	Y ARC, SHORT CIR	CLUTING ARC	FIC		
ELECTRODE WIRE FEED SPEED RANGE 120 to	200 inches per mi			1 14 14 1		
TECHNIQUE (QW - 410)				I.I		
STRING OR WEAVE BEAD String & Weave				:		
ORIFICE OR GAS CUP SIZE 1/2" to 1.0"						
INITIAL AN INTERPASS CLEANING (BRUSHING, GRI	NDING, ETC.) Grir	nd all tie in o	n stop a	nd start to	a feather edge o	n the root.
Grind to sound metal for interpass welding.		<del> </del>	<u></u> .			
METHOD OF BACK GOUGING Arc-Air when req	uired, then grind to	sound meta	al			
OSCILLATION 1.56 mm pass each side of			<u></u>			
CONTACT TUBE TO WORK DISTANCE1.5						
Mu" TIPLE OR SINGLE PASS (PER SIDE) Mu						
i. , iple or single electrodes Sin	gle					
,	per Table below					
PEENING Not permitted	* . t	-1166		alastrada	for CMANA shoul	d ho used
OTHER Depending on the thickness of mate			meter or	electrode	101 SIVIAVV SITOUI	u pe useu
care must be taken not to exceed the ma		permittea.				
Heat Input = Amp. X Volt X 60 =	Joules					
Inches travel per minute	100 Joules) SAM =	(26.400 los	iles)			
GMAW = (26,000 Joules) SMAW = (52,0	00 300les) 3/444 -	(20,400 001	1169)			
WELD PROCESS FILLER METAL		URRENT		VOLT	TRAVEL SPE	ED RANGE
LAYERS CLASS DIAME		AMP. RA		RANGE		
1 GMAW ER70S-2/-6 0.035		90 - 15	E .	8 - 22	3.0" to 8.0" per i	
2-3-4 SMAW E7018-1 5/32"	DC Rev	125 - 2		0 - 25	4.0" to 16.0" per	
2-3-4 SMAW E7018-1 3/16"	DC Rev	200 - 3	- 1	1 - 26	5.0" to 16.0" pe	
2-3-4 SMAW E7018-1 1/4"	DC Rev	280 - 3	390   2	2 - 30	7.0" to 14.0" per	minute
3 - &	<u>_</u>			<b>-</b>	00.00	
others SAW LA-71/880M 1/8"	DC Rev	350 - 6	- 1	7 - 32	30.0" to 48.0" pe	
SAW LA-71/880M 5/32"	DC Rev	350 - 6	550  2	7 - 32	30.0" to 48.0" p	er minute
			ŀ			

# PREHEAT P-No. 1 Groups 1,2 and 3

- 1. Welds joining pressure parts or attachments shall be preheated to not less than the minimum preheat temperature stated in item 6.
- 2. The preheat temperature shall be maintained until welding is completed.
- 3. If welding in interrupted, the weld joint and adjacent areas shall be reheated to the minimum preheat temperature specified in item 6.
- 4. The preheated area shall not be less then 50.8 mm (2.0") wide on each side of the weld.
- 5. Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.
- 6. Minimum preheating temperatures shall be as follows:

# Pressure Vessels in accordance with ASME BPVC Section VIII, Division L

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
· 0 TO 31.8 mm (0 to 1.25")	10°C (50°F)
Over 31.8 mm (over 1.25")	93°C (200°F)
Over 25.4 mm (1.0") and a specified maximum carbon content in excess of 0.30%	80°C (175°F)

# Chemical Plant & Petroleum Refinery Piping in accordance with ANSI B31.3

NOMINAL WALL THICKNESS	MINIMUM SPECIFIED TENSILE STRENGTH, BASE METAL	MINIMUM PREHEAT TEMPERATURE
< 25.4 mm (1.0")	≤ 490 MPa (71 Ksi)	10℃ (50°F)
≥ 25.4 mm (1.0")	All	80℃ (175°F)
All	>490 MPa (71 Ksi)	80℃ (175℉)

#### Power Piping in accordance with ANSI B31.1

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
Over 25.4 mm (1.0") and a speified maximum carbon content in excess of 0.30%	80°C (175°F)
All others	10°C (50°F)

	QW 4	482	
COMPANY NAME RJV Gasfield Service Ltd			
LDING PROCEDURE SPEC. No. RJV-108			May - 30 -95
, "SION NoDATE	SUPPORT	PQR No.(S) RJV-108A	
VELDING PROCESS(ES) GMAW/SMAW/SAW		(o) GMAW (Semi-auto) S	
JOINTS (QW - 402)			ALBERTA
DINT DESIGN Vee-Groove and all ASME	oint design		LABOUR
BACKING (YES) X (NO) X			PRESSURE VESSELS ACT DING PROCEDURE
NCKING MATERIAL (TYPE) Weld metal when	re applicable	Reg. No. WP	1315.5
		Spec No.	3  2,2   RJV-108
METAL NONFUSIN	G METAL		MAW ISMAW SAW
NONMETALLIC OTHER			Gr 2 to P No. 1 Gr 2 1
NONWETACLO STILL			203mm PWHT YES
· ••••••••••••••••••••••••••••••••••••		impact. Range	15.9 to 57.mm. (VA-76°C.)
A-+4-Eugen		1.95 y 60 15	Signed
		Yr. 2.2-Mo Yr. Day 1.7.	R. ROSEBEAG, P. ENG. WELDING SPECIALIST
			WELDING SPECIALIST
			====
BASE METALS (QW-403) -No. 1 GROUP No. 2		TO P - No. 1	GROUP No. 2
No. 1 GROOF No. 2	O	₹	<del>-</del> , , , , , , , , , , , , , , , , , , ,
PECIFICATION TYPE AND GRADE	OR		
CHEM, ANALYSIS AND MECH. PROP.		•	
O CHEM. ANALYSIS AND MECH. PROP.			
j	•		cuter All thickness
BASEMETAL GROOVE WITH IMPAC	T 15.875mm to 57 PACT 5.0mm to 203	.0mm	FIELE All disolators
WITHOUT IN	PACT 5.0Hill to 200		
PIPE DIA. RANGE GROOVE All diamete	er		FILLET All diameter
THER Maximum deposited per layer	GMAW (3.3mm) SN	IAW (10.0mm) SAW (12	.0mm)
FILLER METALS (QW-404)			•
PECIFICATION No. (SFA)	5.18	5.1	5.17
AWS No. (CLASS)	ER70S-2/-6	E7018-1	F7A6-EM14K
- No.	F6 .	F4	F6
A - No. OR CHEMICAL ANALYSIS	1	1	1
TIZE OF FILLER METALS	0.035"	5/32",3/16",1/4"	1/8", 5/32"
POSITED WELD METAL THICKNESS RANGE	0.000		
GROOVE	3.3mm	203mm	203mm
FILLET	All thickness	All thickness	All thickness
TRODE - FLUX (CLASS)			
X TRADE NAME			Lincolmweld 880M (NEUTRAL)
ONSUMABLE INSERT -			

# PREHEAT P-No. 1 Groups 1,2 and 3

- 1. Welds joining pressure parts or attachments shall be preheated to not less than the minimum preheat temperature stated in item 6.
- The preheat temperature shall be maintained until welding is completed.
- 3. If welding in interrupted, the weld joint and adjacent areas shall be reheated to the minimum preheat temperature specified in item 6.
- 4. The preheated area shall not be less then 50.8 mm (2.0") wide on each side of the weld.
- Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.
- 6. Minimum preheating temperatures shall be as follows:

# Pressure Vessels in accordance with ASME BPVC Section VIII, Division I.

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
· 0 TO 31.8 mm (0 to 1.25")	10°C (50°F)
Over 31.8 mm (over 1.25 ⁿ )	93°C (200°F)
Over 25.4 mm (1.0") and a specified maximum carbon content in excess of 0.30%	80°C (175°F)

# Chemical Plant & Petroleum Refinery Piping in accordance with ANSI B31.3

minimum specified tensile strength, base metal	MINIMUM PREHEAT TEMPERATURE
< 490 MPa (71 Ksi)	10°C (50°F)
	80°C (175°F)
	80°C (175°F) .
	MINIMUM SPECIFIED TENSILE STRENGTH, BASE METAL  ≤ 490 MPa (71 Ksi)  All  >490 MPa (71 Ksi)

# Power Piping in accordance with ANSI B31.1

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE	
Over 25.4 mm (1.0") and a speified maximum carbon content in excess of 0.30%	80°C (175°F)	
All others	10°C (50°F)	

axen: Traham

Avenue 44 117-1199 ELECTRIC COMPANY

ELECTRIC

VALUES ONLY TYPICAL supplied on the above order number is of the same classification, manufacturing process and material requirements as the were performed in conformance with these specifications and the above Joint configuration and pass sequence are shown at lower right FZA6-5M14K combination, classification. flux and electrode used for this annual test, concluded on and ASME SFA-5.17 material met all requirements. XWS A5.17-89

Travel Speed (in/min) Wire Feed Speed (in. Current (amps) OCA Voltage (volts) Operating Settings:

Electrical Stickout (in) Interpass Temp Passes/Layers Preheat Temp.



as-welded condition; and Chemical analyses of the were as follows: Mechanical Properties of the weld deposit and electrode were

	the contra	
Deposit.	. 76,300 31	167
AVS/ASHE	58,000 min.	20 000
	rensile Strength (psi) yield Strength (psi) Elongation, % in 2" warrances Rockwell B (avg)	impact Properties (therpy V-notch) ft-lbs at -60 of

180

cu (total)

Radiagraphic Lest: Met requirements. Jest assembly constructed of ASIM A36 steel

A Second 19 19 Secretaring the second of 25 % Relative Humidity at 65 of .

Orthusible Hydrogan (Aux A4.3-93): ml/l

DAY OF

	dit (visite) Saturbia		ete (1777) Talifold (1777) Talifold (1884)	i de la companya de l		13/9	07325-4	13967	Parket State
CONTINU  ** WARNING ** THE TEST RESULTS AND VALUES REPORTED HEREN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM  ** WARNING ** THE TEST RESULTS AND VALUES REPORTED HEREN AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF  THE SPECIFICATION INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OF CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.  THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OF CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.	* * * * * * * * * * * * * * * * * * *	732S 43969 1.7500 R .2 1 55 St.  MPACT TESTS  PLATE SAMPLE TEST TEST COUPON TEST * FULLS  FOR NUMBER GAUGE COND. METH. DIR. SHAPE TEMP. FTLB FT  732S 43969 1.7500 N CWN L FULL -50F 72	* * * * * * * * * * * * * * * * * * *	TES NORMALIZED FOR A MINIMUM OF 15 MINUTES @ 1.650F.  TE NO. WEIGHT PLATE NUMBER HEAT	TOMER ITEM	MARK ON B/L FOR TRUCK DELIVERY TO EDMONTON EXCHANGER 5545-89TH ST., EAST EDMONTON - FAX COPY OF B/L TO MCCOSHANS 403-425-0387- FAX SM/TR TO 403-466-5155 ATTN: BEV RICHARDSON  MSPIR TEST REPORTS REQ'D - INCL C.E.  CUST VESSEL STOCK	HR MULTIPLE CERTIFIED PLATE - CARBON - ASME SA 516 70 (1992) - CUNL 15/12 FT HR MULTIPLE CERTIFIED PLATE - CARBON - ASME SA 516 70 (1992) - CUNL 15/12 FT LBS AT -50 F - C 0.22 MAX - CE .49 MAX (AIM .42 MAX) PER SA 20, SUPP REQT S20 LBS AT -50 F - C 0.22 MAX, NI .25 MAX, CR .25 MAX, MO .08 MAX & S21 - CU .20 MAX, NI .25 MAX, CR .25 MAX, MO .08 MAX MO) = .70 MAX - PUQ - NORMALIZED - FLAME CUT - ALSO CERTIFIED TO ASME SA 537	SHIP TO CUSTOMER NAME AND ADDRESS  SHIP TO CUSTOMER NAME AND ADDRESS  SHIP TO CUSTOMER NAME AND ADDRESS  EDMONTON EXCHANGER & MANUFACTURING LTD.  EDMONTON, ALBERTA  SHIP TO CUSTOMER NAME AND ADDRESS  EDMONTON, ALBERTA	Algoma Steel Inc. P.O. Box 1400 Sault Ste. Marie, Ontario, Canada P6A 5P2  CUSTOMER PURCHASE ORDER NUMBER DCT 17/94 94-11-23 237143 92- DWC  Algoma Steel Inc. P.O. Box 1400 Sault Ste. Marie, Ontario, Canada P6A 5P2
CONTINUED ON NEXT PAGE THE MINIMUM UNREMENTS OF DATION OTHER PSUCH STEEL.	TI N D, O. * * * *	CONTON EXCHANGER	* * * * * * * * * * * * * * * * * * * *		* * * * * * * * * * * * * * * * * * * *		SHOWN HEREIN AND AS CONTAINED IN THE COMPANY RECORDS.  A. Riutta  MANAGING METALLURGIST	MILL TEST REPORTS ALGOMA STEEL INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION	-606447 1 12294

		D.N./ Conf	QW -				
COMPANY NAME			rield Servic	คอง เวเน		Mov	30 - 95
PROCEDURE QUALIFICA	TION RECORD No.	RJV-108-	A		DATE	IVIAY -	30 - 83
'S No.		RJV-108		C DIAGUE		•	
LDING PROCESS(ES)			MAW/SAV		augl) CAIN/	( Automotic	^ `
es (Manual, Autom) الأم، ،	IATIC, SEMI-AUTO)			) SMAW (Mai		( Automatic	<u> </u>
OINTS (QW - 402)		GROOVE	DESIGN O	TEST COUP			
Layer Process	Filler Size	Amp.	Volt	Travel	Deposit	Joules	
1 GMAW E	R70S-2 .035"	120 - 130	20	152mm	3.0mm	26,000	
2 SMAW E	7018-1 5/32"	165- 175	20 - 25	254mm	3.0mm	26,250	1,300
3 SMAW E	7018-1 3/16"	255 - 265	21 - 26	266mm	5.0mm	39,371	
4 SMAW E	7018-1 1/4"	335 - 350	21 - 26	266mm	3,5mm	52,000	
5 SMAW E	7018-1 1/4"	335 - 350	21 - 26		3.5mm	52,000	SAW
6 SMAW E	7018-1 1/4"	335 - 350	21 - 26		4.0mm	52,000	
7 SAW LA-	71/880M 5/32"	500 - 550	27 - 32		6.0mm	26,400	SMAN
8 SAW LA-	71/880M 5/32"	500 - 550	27 - 32	1016mm	6.0mm	26,400	3.0MM GMAW
9 SAW LA-	71/880M 5/32"	500 - 550	27 - 32	1016mm	6.0mm	26,400	->114.
10 SAW LA-	71/880M 5/32"	500 - 550	27 - 32	1016mm	5,0mm	26,400	
P-No. P1 Gr2  KNESS OF TEST COUNTER  CONTINUE METALS (QW. SFA SPECIFICATION AWS CLASSIFICATION FILLER METAL F-No. WELD METAL ANS. A-N SIZE OF FILLER METAL COTHER * F7A6-EM14* Lincolmweld 880M F1	VPON45.0mm_by	1 5.1 7018-1 * 4 F6	32"	SAS (QW - 408 SHIELDING AM TRAILING BACKING ELECTRICAL C CURRENT Dire POLARITY Rev AMPS. 120 TUNGSTEN ELEC	gas gon/CO2 N/A N/A CHARACTER ect /erse 1 - 550 CTRODE SIZE	VOLTS 2	25 25cufthr QW - 409)
DEPOSITED WELD META		9.0mm 23.	0mm				
OSITION (QW - 405 POSITION OF GROOVE WELD PROGRESSION (U	P OR DOWNHILL)	Forward		TECHNIQUE (C TRAVEL SPEED STRING OR WEA OSCILLATION 1. MULTIPASS OR S SINGLE OR MULT	152mm to 1 VE BEAD St .56mm past SINGLE PASS (	ring & Wea each side PER SIDE)	of bevel Multi
REHEAT (QW - 406) PREHEAT TEMP. NTERPASS TEMP. ER	200'F 600'F			OTHER			

PQR No. RJV-108A

TENSII		TECT	COSST	450 \
+ $ NSH$	-	11531	ILJVV •	- 150 1

		1 bar 1 1 1	\$1HH 1HH 1 / HIS		<del> </del>	
ECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOTAL	ULTIMATE UNIT	TYPE OF FAILURE
# 5 Top	0.745"	0.798"	0.595 Sq In	49,350 Lb	83,000 psi	Ductile/Weld
# 5 Bottom	0.743"	0,816"	0.606 Sq In	48,550 Lb	80,100 psi	Dctile/Weld
#6 Top	0.742"	0.807"	0.599 Sq In	50,550 Lb	84,400 psi	Ductile/Parent
#6 Bottom	0.746"	0,824"	0.615 Sq In	49,800 Lb	81,000 psi	Ductile/Parent

**GUIDED BEND TESTS (QW - 160)** 

TYPE AND FIGURE NO.	RESULT
# 1 side bend	Pass
# 2 side bend	Pass
# 3 side bend	Pass
# 4 side bend	Pass

#### TOUGHNESS TEST (QW - 170)

TEST TEMPERATURE -50'C (-58'F)

NOTCH TYPE Vee Notch

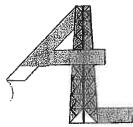
SPECIMEN		IMPACT 1	rest
NO.	NOTCH LOCATION	JOULES (	FOOT/Lb.
1	Weld zone Top	207 Joules	153 ft/lb
2	Weld zone Top	136 Joules	100 ft/lb
$\frac{1}{3}$	Weld zone Top	198 Joules	146 ft/lb
4	Heat zone	72 Joules	53 ft/lb
5	Heat zone	99 Joules	73 ft/lb
6	Heat zone	61 Joules	45 ft/lb
7	Weld zone Bottom	26 Joules	19 ft/lb
8	Weld zone Bottom	43 Joules	32 ft/lb
9	Weld zone Bottom	33 Joules	24 ft/lb

FILLET-WELD TI	EST (QW - 180)
RESULTS SATISFACTORY YESNOPENET	RATION INTO PARENT METAL YESNO
MACRO RESULTS	
OTHER	rests
TYPE OF TEST Vickers Harness Test see Vickers Test Report (	File #95-317)
DEPOSIT ANALYSIS	
THER	
'ELDER'S NAME Albert Welin	STAMP NO. <u>W-11912</u>
ESTS CONDUCTED BY: Alfor Metallurgical Comp. Ltd	LAB TEST NO. File #95-317

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 IX or the ASME Code.

MANUFACTURER	RJV Genfield Services Ltd.	
	) L-	<del>-</del>
ВУ		

ATE May - 30 - 95



CONSULTING ENGINEERS

FILE #95-317

PQR #RJV-108A

RJV Gasfield Service Ltd. 4901 - 47 Street Vegreville, Alberta T9C 1C3

June 2, 1995

#### METAL TEST REPORT

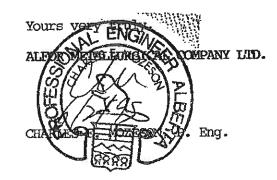
Material Description: ASME SA-516, Grade 70; 1.750"-thick normalized plate; GMAW/SMAW/SAW welded; PWHT condition.

Specimen Type: Reduced-section tensile, as per Figure QW-462.1(a) of the ASME Code; guided side bend, as per Figure QW-462.2 of the ASME Code.

Results:	Sample 5	Sample 5	Sample 6	Sample 6
	Top	Bottom	Top	Bottom
Width: Thickness: Area: Ultimate Load: Tensile Strength: Break Type/Location	0.745 in. 0.798 in. 0.595 sq. in. 49 350 lb 83 000 psi	0.743 in. 0.816 in. 0.606 sq. in. 48 550 lb 80 100 psi Ductile/Weld	0.742 in. 0.807 in. 0.599 sq. in. 50 550 lb 84 400 psi Ductile/Parent	0.746 in. 0.824 in. 0.615 sq. in. 49 800 lb 81 000 psi Ductile/Weld

Guided side bend samples 1, 2, 3, and 4: Pass Tests.

PERMIT TO PRACTICE ALFOR METALLURGICAL-COMPANY LTD.
Signature
Date June 2/75
PERMIT NUMBER: P 2753
The Association of Professional Engineers,
Geologists and Geophysiciets of Alberta





CONSULTING ENGINEERS

FILE #95-317

POR #RJV-108A

RJV Gasfield Service Ltd. 4901 - 47 Street Vegreville, Alberta T9C 1C3

June 2, 1995

#### CHARPY V-NOICH IMPACT TEST RESULTS

Material Description: ASME SA-516, Grade 70; 1.750"-thick normalized plate; GMAW/SMAW/SAW welded; PWHT condition.

Specimen Type: Charpy V-notch full-sized weld zone and heat-affected zone impact specimen, as per Part UG-84 of the ASME Code.

Testing Temperature: -50 C (-58 F).

Weld zone (Top of weldment): 153 ft-lb (207 Joules); Results:

100 ft-1b (136 Joules);

146 ft-lb ( 198 Joules).

53 ft-lb ( 72 Joules); Heat-affected zone:

73 ft-lb ( 99 Joules);

45 ft-lb (61 Joules).

19 ft-lb ( 26 Joules); Weld zone (Bottom of weldment):

32 ft-lb ( 43 Joules);

24 ft-lb ( 33 Joules).

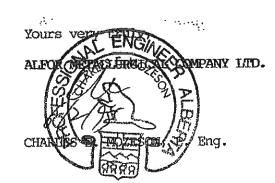
PERMIT TO PRACTICE ALFOR METALLURGICAL COMPANY LTD.

Signature

Of@CI PERMIZ NUMBER: P 2753

The Association of Professional Engineers,

Geologica and Geophysician of Alberta





CONSULTING ENGINEERS

FILE #95-317

PQR #RJV-108A

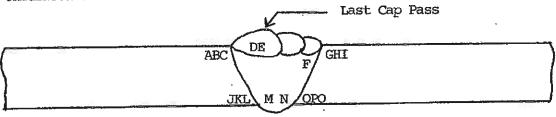
RJV Gasfield Service Ltd. 4901 - 47 Street Vegreville, Alberta T9C 1C3

June 2, 1995

#### VICKERS HARDNESS TESTING OF STEEL WELDMENT

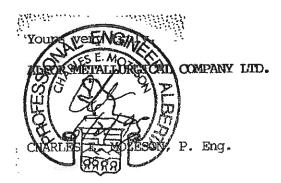
Material Description: ASME SA-516, Grade 70; 1.759"-thick normalized plate; GMAN/SMAW/SAW welded; PWHT condition.

Vickers hardness testing at 1 kg mass (HV1) was performed on a prepared cross-section of the weldment, in accordance with ASTM E 92. All tests were performed at 1.5 mm below the surface; the spacing between adjacent tests was 0.5 mm, with heat-affected zone tests initiating at 0.5 mm from the fusion line. The results are tabulated below.



Location	HV1	Location	<u>HVl</u>	Location	HV1
A	217	G	228	M	162
В	223	H	218	N	160
·č	223	I	196	0	195
ď	221	J	189	P	191
E	222	K	194	Q	189
न	207	L	196	~	

PERMIT TO PRACTICE
ALFOR NETALLURGICAL COMPANY LTD.
Signature
Date 2/95
PERMIT NUMBER: P 2753
The Association of Professional Engineers,
Geologiets and Osophysicists of Alberta



QW - 482				
COMPANY NAME RJV Ges Field ServiceLtd				
DINGPROCEDUREPEC.No. RJV-108		DATE September 20, 1995		
PASIONNODATE	SUPPORTPORNO.(8) R.	JV-109		
ELDINGPROCESS(ES) GTAW/SMAW	ELDINGPROCESS(ES) GTAW/SMAW TYPE(S) Manual as-welded (AUTOMATIC, MANUAL MACHINE OR DEMINAUTO.)			
JOINTS(QW - 402)		H (415.15)		
NTDESIGN Vee-Groove and all ASME	iolat desions	ALBERTA BOILERS SAFETY ASSOCIATION		
INCIGNG(YES) X (NO) X		PROVINCE OF ALBERTA SAFETY CODES ACT		
	re applicable (no retainers)	WELDING PROCEDURE		
Chinamit Energi ( )	·	Reg. No. WP 1312.2 Spec No		
METAL NONFUSI	NGMETAL	Weld Process GTAN/SMAW		
NONMETALLIC OTHER		Matt. Gr. P No to P No.		
I I NORMETALIS		Elec. Gr. F No. 6 +5 A No. 8		
F1	,	Th. Qual. For 17mm. PWHT NO.		
reconstruction of the second o		***************************************		
		Yr.95.Mo.9. Day 25Signed		
		R. ROSEBERG, P. ENG. WELDING SPECIALIST		
( )		WELDING SPECIALIST		
BASE METALS (QW-403) No. 8 GROUPNO	TOP- No. 8	GROUPNo.		
	OR	Tareet		
PROPERTY AND GRADE				
SCIFICATION YPEAND GRADE	OR			
CHEM ANALYSIS AND MECH.PROP.				
CHEMANALYSIS AND MECH.PROP.				
Licknessrange: Basemetal Groove Withimpag	т	FILLET		
WITHOUTIM		All thickness		
All diamet	ole .	FILLET All thickness		
PIPEDIA RANGE GROOVE All diamet	GTAW= 6mm SMAW = 11mm	Lipre, Su analytass		
Mer Hearthall all all all all all all all all all				
V.LERMETALS (QW-404)				
ECIFICATIONIO. (SFA)	5.9	5.4		
AWS No. (CLASS)	ER3XXL	E3XXL-15/16		
No.	Fe	PS		
No. OR CHEMICALANALYSIS	8	8		
EOF FILLERMETALS 1/16", 3/32", 1/8"		5/84", 3/32", 1/8", 5/32"		
POSITEDVELDMETALTHICKNESSRANGE				
GROOVE Up to 6mm		Up to 11 mm		
FILLET	All thickness	All thickness		
P RODE FLUX (CLASS)	N/A			
RADENAME	N/A			
ONSUMABLEINSERT	N/A			
	*	<del></del>		

QW - 482 (back)

			WPS No.	RJV-109			REVISIONNO		
	NS(QW - 40	5)			POSTWELL	DHEA.	TTREATME	NT(QW - 407)	
	SOF GROOVE	All posit	ions		TEMPERATU	RERANG	BE N/A		
	PROGRESSION	v UP Up	DOWN		TIMERANGE				
	SOF FILLET _	All posit	ions		GAS (QW-	408)			
1.1					1 0/10 (Carr -	400)	DDECENT	OMPOSITION	
KEHEA	T(QW - 406)	) 				046	•	MIXTURE	FLOWRATE
	TEMP. 100.	40015			OUIEL BING		S(ES) Irgon	99.9%	12-15 cfh.
	STEMP,MAX.	400 'F	with Gas/Elec	rtelo	SHIELDING		N/A	00.070	
	MAINTENANCE	<del></del>			BACKING		rgon	99.9%	12-30 cfh.
(contunu	JOUSOR SPEC	IALHEATINGSHOU	EDBE RECORDI	eu)	BACKING				
ECTRI	ECTRICALCHARACTERISTICSQW 409)								
JRRENT	RRENT Direct POLARITY GTAW-SP SMAW-RP AMP, Range 30 - 140 VOLTS Range 9 - 24								
	ELECTRODES		3/32" (2.5m	m) , 1/8" (3.:	2mm) 2% The TUNGSTERN 2%	roriate	d		
	ACTAL TO ANOC	EDEOD CMAM	N/A	PUR	e jungsiern 2%	IHUKISTE	D, EIG.		
ThEORIA	IETAL TRANSL	ERFOR GMAW		SPR	AYARC, SHORT CIR	CUTTING	ARC, ETC.		
ELECTROD	EWIREFEEDS	PEEDRANGE .	N/A						
CHNIC	QUE(QW - 4	(0)							
14.3			Veave				•		
	STRINGOR WEAVE BEAD String & Weave  ORIFICEOR GAS CUPSIZE 1/4" (6.3mm) to 1" (25.4mm)								
TITIALAN INTERPASSOL FANING/BRUSHING GRINDINGETC.) Grind all tie in on stop and start to a feather edge, grind and brush									
Chinesia	MITERIA PROGO			to sound m	etal between	each i	interpass wit	h stainless stee	I disc and brush
CHETHODO	F BACK GOUG	eing Grindtos	ound metal						
SCILLAT		mm past each	side of bevel						
	TUBETO WOR		N/A						
	OR SINGLEPA		Multi						
	OR SINGLEEL	_	Single						
	PEED(RANGE)		As per ta	ble below				<u> </u>	
MEENING			Not perm	itted					
THER_									
15									
r i									
							•		
VELD		FILLERM	FTAI.	T 0	CURRENT		VOLT		20000
YERS	PROCESS	CLASS	DIAMETER	TYPE	AMP. RA	ANGE	RANGE	TRAVEL SI	PEEDRANGE
,	<u>.                                    </u>	02,50							
1-2	GTAW	ER3XXL	  1/16"	DC Straig	ht 30 - 50	)	9 - 12	2" - 4" per min	ute
<b>1-2</b>	GTAW	ER3XXL	3/32"	DC Straig	- 1		9 - 12	2" - 5" per min	
# 1-2 # 1-2	GTAW	ER3XXL	1/8"	DC Straig	1		9 - 12	3" - 6" per min	
t . 1/			5/64"	DC Rever			18 - 23	2" - 4" per min	
_2 & _etc.	SMAW SMAW	E3XXL E3XXL	3/32"	DC Rever	- ·		19 - 24	3.5" - 5" per m	
eto.	1	1	1/8"	DC Rever	I		20 - 24	4" - 8" per min	
-	SMAW	E3XXL	5/32"	DC Rever	1		18 - 24	5.5" - 9" per m	
	SMAW	E3XXL	0/32	DO Kevel	30 110-1	70	10-24	0.0 0 po. 11.	
· •									
				.L			<u> </u>	<u> </u>	

iximum of 36 000 Joules is permitted with ER3XXL maximum of 39 085 Joules is permitted with E3XXL

QW - 483 RJV Gas Field Service Ltd. COMPANY NAME September 20, 1995 **RJV-109** DATE CEDUREQUALIFICATIONRECORDNO. RJV-109 GTAW/SMAW DINGPROCESS(ES) Manual TYPES (MANUAL, AUTOMATIC, SEMI-AUTO) **GROOVEDESIGN OF TEST COUPON** OINTS(QW - 402) mm/Mln Joules Volt Deposit Filler Size Amp. Process ayer Travel 30 600 1.5mm 50mm ER316L 3/32" 75 - 85 10 -12 **GTAW** 20 400 10 - 12 76mm 1,5mm 75 - 85 **GTAW ER316L** 3/32" 33 942 19 - 22 89mm 2.5mm 80 - 90 3 SMAW E316L 3/32" 89mm 3.0mm 33 942 80 - 90 19 - 22 SMAVV E316L 3/32" 101mm Cap 29 700 80 - 90 12 - 22 5 **SMAW** E316L 3/32" POSTWELDHEAT TREATMENT(QW - 407) PASE METALS (QW - 403) TEMPERATURE N/A MATERIAL SPEC. SA312 TYPEOR GRADE 316L TIME to P - No. 8 OTHER KNESSOF TEST COUPON 8.5mm DIAMETEROF TEST COUPON 104mm OTHER GAS (QW - 408) FLOW RATE MIXTURE GAS Argon 99.9% 12 cfh. SHIELDING _ TRAILING N/A TILLERMETALS (QW - 404) Argon 99.9% 15 cfh. 5.4 SFA SPECIFICATION BACKING E316L AWS CLASSIFICATION ___ ER316L ELECTRICALCHARACTERISTICSQW - 409) F5 FILLERMETAL F - No. _ F6 CURRENT Direct WELDMETALANS, A - No. 8 POLARITY GTAW-Straight SMAW-Reverse SIZE OF FILLERMETAL 3/32" 3/32" AMPS. 75 - 90 VOLTS 10 - 22 OTHER TUNGSTENELECTRODESIZE 1/8" (3.2mm) OTHER ____ 5,5mm DEPOSITEDWELDMETAL 3mm OSITION(QW - 405) TECHNIQUE(QW - 410) 6G POSITIONOF GROOVE TRAVEL SPEED 2" to 5" per minute WELDPROGRESSIONUP OR DOWNHILL) Uphill STRINGOR WEAVE BEAD . String & Weave oscillation 1.5mm past each side of bevel MULTIPASSOR SINGLEPASS (PERSIDE) Multi SINGLEOR MULTIPLEELECTRODES Single PREHEAT (QW - 406) OTHER PREHEATTEMP. 100'F RPASSTEMP. 400'F

# QW - 483 (back)

PQR No. RJV-109

		TEN	SILETEST (QW -	150)		
CIMENIO.	WIDTH	THICKNESS	AREA	ULTIMATETOTAL	ULTIMATEUNIT	TYPE OF FAILURE
5	0.740 in.	0,326 in.	0.241 sq.in.	22 500 lb	93 300 psi	Ductile/Paren
6.	0.750 in.	0.320 in.	0,240 sq.in.	22 350 lb	93 100 psi	Ductile/Paren
						<u> </u>
		GUIDEL	DBEND TESTS (Q	W - 160)	-	
	· TYPE AND FIGUR	ENO,			RESULT	
	Face bend # 2			·	Pass	
<u> </u>	Face bend#4				Pass	
	Root bend # 1	49 494			Pass	
	Root bend # 3				Pass	
		TOUG	HNESSTEST(QV	V- 170)		
ESTTEMPE	RATURE					
OTCHTYPE						-
				IMPACTTE		
ECIMENNO.	NOTCHLOCATION		JOULES		FOOT/	Lb.
						-
				-	<del> </del>	
				·	<u> </u>	
· · · · · · · · · · · · · · · · · · ·						
		FILLE	T-WELDTEST (Q)	N - 180)		
SULTSSATIS	FACTORY YES			NTOPARENTMETAL.	YES	NO
CRO RESULT				······································		
			OTHERTESTS			
			<u> </u>			
LDER'SNAME	Mike Hyndman			STAMPNO\	N-4359	
TSCONDUCT		urgical Company L		LAB TESTNC.		
						otod
e certify that	at the statements in thi	s record are corre	ct and that the tes he ASME Code	at weias were prepa	area, welded and te	2100
pordance	with the requirements	OF SECTION IX OF E			iold Convent	
			MANU <del>[ACTU</del>	RJV Gas F	ICIO OCI VICE LIU:	Maria .

DATE September 20, 1995



CONSULTING ENGINEERS

FILE #95-516

PQR #RJV-109

RJV Gas Field Service Ltd. 4901 - 47 Street Vegreville, Alberta T9C 1C3

September 20, 1995

#### METAL TEST REPORT

Material Description: ASME SA-312, Grade TP316L; NPS4 X 0.337" W.T. pipe; GTAW

Root + SMAW Fill & Cap; as-welded condition.

Specimen Type: Reduced-section tensile, as per Figure QW-462.1(b) of the ASME

Code; guided face and root bend, as per Figure QW-462.3(a) of

the ASME Code.

Results:	Sample 5	Sample 6
Width:	0.740 in.	0.750 in.
Thickness:	0.326 in.	0.320 in.
Area:	0.241 sq. in.	0.240 sq. in.
Ultimate Load:	22 500 lb	22 350 lb
Ultimate Tensile Strength:	93 300 psi	93 100 psi
Fracture Character:	Ductile	Ductile
Fracture Location:	Parent	Parent

Guided face bend samples 2 and 4: Pass Tests; Guided root bend samples 1 and 3: Pass Tests.

PERMIT TO PRACTICE ALFOR METALLURGICAL COMPANY LTD.

Signature

Date 20 9

PERMIT MUSISPER 2753

The Association of Professional Engineers,
Geologists and Goophyzicing of Alforda

ALFOR METABLEMENT ALFOR METABLEMENT LID.

CHARLES EN MOZEBONY E Eng.



WELDING PROCEDUR	WELDING PROCEDURE SPECIFICATION NO.: 115 (Rev. 1)				
WELDING PROCEDUR	WELDING PROCEDURE QUALIFICATION RECORD NO.(S): 115-1, 115-2, 115-3				
	QUALIFIED FOR				
Base Metal (Typical):	P1 Groups 1 & 2 to	P1 Groups 1 & 2 350 Gr.LF2, SA 420 WPL	6 94 546 Or 70 mtg.)		
Process(es): Position: Filler Metal:	SMAW ALL POSITIONS	Weld Types:	GROOVE & FILLET		
BASE METAL CONDITI NOTCH TOUGHNESS AP BASE METAL THICKNESS	ONS & GROOVE TI	HICKNESS RANGE Q			
SAFETY CODES ACT - PROV WELDING PROCI Reg. No. WP 312 Spec. No. 15 (R) Weld Process SA/A Mall, Gr. P. No. 214 (A) Th. Oual. For 22 a Hy Ham P.W.  PROVINCIAL REGIS	II, DIVISION 1  INCE OF ALBERTA EDURE  Z EV. )  IV. NO  ROSEBERG PENG EDING PPECIALIST	19.1 mm (0.75	0 in.) maximum in.) maximum		

Prepared by SGS LUDWIG ASSOCIATES LTD. in accordance with the requirements of ASME Section IX

WPS Page 1 of 5

# QW-482 WELDING PROCEDURE SPECIFICATION (WPS)

Company Name		R,J,V, (	<u> SASFIELD S</u>	SERVICES	
Welding Procedur	e Specificati	on No.	115	Date	August 16, 2013
Supporting PQR N	lo.(s)	115-1, 1	115-2, 115-3	3	
Supporting PQR N Welding Process(e	es) (	Shielded Metal	-Arc Weldin	a (SMAW)	4000
, t	/			(3) ( V ( ) ( ) ( ) ( ) ( ) ( ) ( )	WASTE PARTY OF THE
JOINTS (QW-40	2)				
		E groove & fills	st rotoropas	a a a a a derivadi	on drawing for joint details.
Oolite Deolgii	Mhere i	<u>cint details ere</u>	not one if	e Constructi	on grawing for joint details.
Root Opening	An per o	office details are	not specifie	ed, refer to	figures 1 to 15 attached
Posting	AS per a	ittached typical	groove des	signs, see r	gures 1 to 15 attached
backing	vvitn or v	witnout	Ret	tainers	Not required
DAGENERALO	(0)11 (00)				
BASE WETALS	(QVV-403)				
P-Number	P1 Grou	ps 1 & 2	To I	P-Number	P1 Groups 1 & 2
Thickness Range:	Groove	See cover pa	age for thick	kness quali	fied by governing code (1)
	(1)	Reference A	SME B31.3	Table 323	3.1 Impact Testing
					limitations for Tests on
		Welds in Fat	orication or	Assembly	
	Fillet	All base met	al thickness	es	
Pipe Diameter Ran	ges: Groov	e All diame	eters		
•	Fillet	All diame	eters		
Deposited Weld Me	etal (Per Par	38) F	6010 3 2 n	nm (0 125 i	n.) maximum
			7018-1-48	3 mm (0.120)	B in.) maximum
		S	.7010-1. 4.0	3 111111 (O. 10)	o m.) maximum
FILLER METALS	(OM_404)	SMAW			BAALAE
Charification No. (C	.·L.∀/ · (@taa <del>t</del> Ω\+}				MAW
Specification No. (S	>FA)	SFA 5.1		<u>S</u>	FA 5.1
AWS No. (Class)		<u> </u>	.,	<u> </u>	7018-1
F-No.		F3		ļ-,	4
A-NO.		A1		. A	1
Size		3/32 to 3	<u>/16 in. inclu</u>	<u>sive 3/</u>	/32 to 1/4 in. inclusive
Deposited Weld Me	tal Thicknes	ss Range:			
Groove		4.8 mm (	<u>0.188 in.) m</u>	1ax. (1) 38	8.1 mm (1.50 in.) max. (1)
Fillet	,,,q	All fillet s	izes	A	ll fillet sizes
m On white					
(1) Combin	ed deposite	d weld metal th	<u>iickness sh</u>	all not exce	ed 19.1 mm (0,750 in.)
tor ASIV	IE B31.1, B.	31.3 and 38.1 r	<u>nm (1.50 in</u>	.) for ASME	Section VIII, Division 1
POSITION (QW-4					
Position of Groove		l positions		tion of Fille	tAll positions
Weld Progression	F3	3: Vertical up o	or down		F4: Vertical up
				**************************************	
PREHEAT (QW-4	06)				
Preheat Temperatur		) See attac	hed prebes	at sheet pric	or to welding
Interpass Temperat	ure (Maxim	im) 28	38°C (550°F	=)	7 WORKING.
Preheat Maintenand	e See atta	ched preheat s	sheet prior t	o welding	Preheat maintenance is
	not renu	ired if welding	is intermenta	od or offer H	ne completion of welding
					ie combietion of Melalud
unless required by the code of construction.					

WPS	MO	115	
	unico.	113	

# POSTWELD HEAT TREATMENT (QW-407)

T T	1.1/A	Proper 9 Service		
i emperatire Pange	NI//\	Lima Danga	V1/V	
Lemperature Range	13/75	Time Range	N/A	
		1 1/110 1 1001110310	1 1// 1	

#### **ELECTRICAL CHARACTERISTICS (QW-409)**

Current	Direct	Polarity _	Reverse, electrode positive
Amps	See Table #1	Volts	See Table #1
Maximum Heat Ing	out		

Base Metal Thickness Range	E6010 Electrode	E7018-1 Electrode
0.125 - 0.499 in.	33,730 J/in.	40,460 J/in.
0.50 - 0.624 in.	39,550 J/in.	53,500 J/in.
0.625 - 1.750 in	32 430 1/in	74 550 1/in

#### **TECHNIQUE (QW-410)**

Manual or Automatic	Manual
Multiple or Single Pass Per Side	F3: Either F4: Multiple
String or Weave	Either
Travel Speed	See Table #1
Initial & Interpass Cleaning	Brushing, chipping or grinding as required
Method of Back Gouging	Air carbon arc, back-grind as required
Peening	Not permitted
Use of Thermal Process	N/A

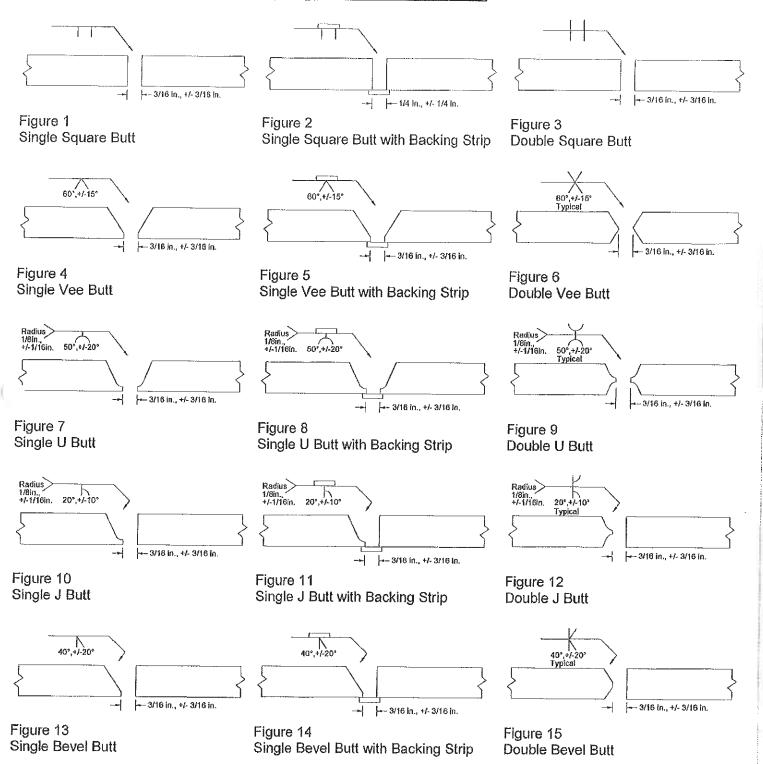
#### **TABLE 1 - WELDING PARAMETERS**

Process	Filler Metal	Diameter mm (in.)	Current Type & Polarity	Amperage Range	Voltage Range	Travel Speed mm/min (i.p.m.)
SMAW	E6010	2.4 (3/32)	DCRP	50 - 100	18 - 34	35 - 300 (1.4 - 12)
SMAW	E6010	3.2 (1/8)	DCRP	60 - 140	19 - 34	44 - 350 (1.7 - 14)
SMAW	E6010	4.0 (5/32)	DCRP	115 - 250	21 - 34	93 - 400 (3.7 - 16)
SMAW	E6010	5.0 (3/16)	DCRP	120 - 300	21 - 34	97 - 460 (3.8 - 18)
SMAW	E7018-1	2.4 (3/32)	DCRP	60 - 110	18 - 26	22 - 300 (0.9 - 12)
SMAW	E7018-1	3.2 (1/8)	DCRP	90 - 170	19 - 28	35 - 350 (1.4 - 14)
SMAW	E7018-1	4.0 (5/32)	DCRP	110 - 220	20 - 30	45 - 400 (1.8 - 16)
SMAW	E7018-1	5.0 (3/16)	DCRP	160 - 320	20 - 30	65 - 500 (2.6 - 20)
SMAW	E7018-1	6.4 (1/4)	DCRP	275 - 360	21 - 32	118 - 550 (4.6 - 22)

Note: Welding parameters shall be adjusted to insure that the maximum heat input value specified in QW-409 above is not exceeded.

Heat Input (joules per inch) = (Amperage X Voltage X 60) / Travel Speed (inches per minute)

# **TYPICAL JOINT DESIGNS**



...dditional joint designs and internal misalignment on circumferential welds shall be within the dimensional limits stated on the approved construction drawing and/or the engineering design.

WPS No. 115	
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#### PREHEAT P-No. 1

- 1. Welds joining pressure parts or attachments shall be preheated to not less than the minimum preheat temperatures stated in paragraph 5.
- 2. The preheat temperature shall be maintained during welding.
- 3. If welding is interrupted, the weld joint and adjacent areas shall be reheated to the minimum preheat temperature stated in paragraph 5, prior to the start of welding.
- 4. Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.
- 5. Minimum preheating temperatures shall be as follows:

# PRESSURE VESSELS IN ACCORDANCE WITH ASME SECTION VIII, DIV. 1

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
0 to 32 mm (0 to 1.25 in)	10°C (50°F)
Over 32 mm (Over 1.25 in.)	95°C (200°F)
Over 25 mm (1.0 in.) & specified maximum carbon content in excess of 0.30%.	79°C (175°F)

⁻ The conditions of UW-30 shall apply for base metal temperatures below 0°C (32°F).

# PROCESS PIPING IN ACCORDANCE WITH ASME B31.3

NOMINAL WALL THICKNESS	MINIMUM SPECIFIED BASE METAL TENSILE STRENGTH	MINIMUM PREHEAT TEMPERATURE
< 25 mm (1.0 in.)	≤ 490 MPa (71 ksi)	10°C (50°F)
≥ 25 mm (1.0 in.)	All	79°C (175°F)
All	> 490 MPa (71 ksi)	79°C (175°F)

⁻ The preheat zone shall extend at least 25 mm (1.0 in.) beyond each edge of the weld.

# POWER PIPING IN ACCORDANCE WITH ASME B31.1

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
Over 25 mm (1.0 in.) & specified maximum carbon content in excess of 0.30%.	80°C (175°F)
All others	10°C (50°F)

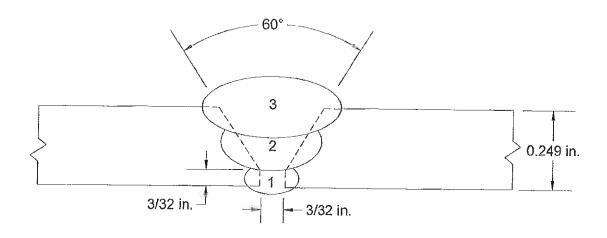
⁻ The preheat zone shall extend beyond each edge of the weld for at least 76.2 mm (3.0 in.) or 1.5 times the base metal thickness (as defined in paragraph 131.4.1), whichever is greater.

⁻ The preheat zone shall extend at least 50 mm (2.0 in.) beyond each edge of the weld.

⁻ The interruption of welding shall be subject to the requirements of paragraph 330.2.4.

# QW-483 PROCEDURE QUALIFICATION RECORD (PQR)

Company Name	R.J.V. GASFI	<b>ELD SERVIC</b>	ES	
Procedure Qualification Record No	). 115-1	Dat	e Au	oust 9, 2013
Welding Procedure Specification N	lo,	115		
Welding Process(es) Shie	ded Metal-Arc V	Velding (SMA)	N)	77/17/14
JOINTS (QW-402)				
Type Butt joint, sir	rale vee aroove	see nevt nag	e	
	1910 100 g10010,	Dec Hext pag		
BASE METALS (QW 403)				
Material Specification No. SA 3	33 to SA 350	Type or Gr	ado Gra	Sto Crl Ea
P-No. P1 Grp.1 To P-No.	P1 Gro 2	_ Type or Gre	6 2.	2 mm (0.240 in )
Heat Number 81183 to 12/	1 1 OID.2 32057	_ Carbon Ear	ivolont w (	2 11111 (U.249 III.)
Heat Number 81183 to 12/ Diameter 168.3 mm (6.625 in.	\	_ Carbon ∈qu	IIvalent (1)	0.22 to 0.37
Denosited Weld Metal (Per Pass)	Did no	_ Office	Scriedule 4	0 m/c to 0.249 in.
Deposited Weld Metal (Per Pass)	Did 110	C mm (0.40F)	nm (0.094 m.	) TOF E6010,
(4) Per CSA 7662 Carbon Equivo	lont formula Ca	2 mm (0.125 i	n.) for E7018	-1
(1) Per CSA Z662 Carbon Equiva analysis material test report	iencionnula, se	e attached ch	<u>iemicai comp</u>	osition product
analysis material test report				
EILLED METALC (OW 404)				
FILLER METALS (QW-404)	05454			
Specification No. (SFA)	SFA 5.1			
AWS No. (Class)	E6010 (1)		E7018-1 (2)	
Filler Metal F-No.	<u>F3</u>		F4	
Filler Metal A-No.	<u>A1</u>		ΑI	
Size of Electrode	See attached	sketch		
Deposited Weld Metal Thickness	2.38 mm (0.09	4 in.)	3.94 mm (0	.155 in.)
(1) Lincoln Electric Comp	<u>any: Lincoln Fle</u>	etweld 5P+		
(2) Air Liquide Canada In	<u>c.: LA 18 Plus</u>		-	
B. 6. 4				
POSITION (QW-405)				
Position of Groove	5G	. Weld Progre	ession Vert	ical up
PREHEAT (QW-406)				
Preheat Temperature10°C	(50°F)	Interpass Te	mp. (Max.)	232°C (450°F)
		•	, _	· · · · · · · · · · · · · · · · · · ·
POSTWELD HEAT TREATMEN	T (QW-407)			
TemperatureN/A	( )	Time	N/A	
ELECTRICAL CHARACTERIST	ICS (QW-409)			
O :	(	Polarity	Reverse al	ectrode positive
Amps See next page		Volts		
Heat Input F3: 33,700 J/	in maximum	VOIG	EA: 40 460	J/in. maximum
10. 00,100 0	III. IIIGAIIIGIII	· · · · · · · · · · · · · · · · · · ·	14, 40,400	Jill. Hlaxillulli
TECHNIQUE (QW-410)				
Vianual or Automatic	Manual			
Multiple or Single Pass Per Side		™ d. R t.	Minle	- 10 page 10 pa
	F3: Single	F4: Mu	***************************************	
String or Weave	Root: String		nder: Weave	)
Travel Speed	See next page			
ose of Thermal Process	N/A			



Pass	Process	Filler Metal	Diameter mm (in.)	Current & Polarity	Amperage Range	Voltage Range	Travel Speed mm/min (i.p.m.)
1	SMAW	E6010	3.2 (1/8)	DCRP	82 - 86	24 - 26	95 (3.7)
2	SMAW	E7018-1	2.4 (3/32)	DCRP	80 - 84	21 - 22	126 (5.0)
3	SMAW	E7018-1	2.4 (3/32)	DCRP	80 - 84	21 - 22	65 (2.0)

POR NO.	115-1
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#### **TENSILE TEST (QW-150)**

Specimen No.	Width mm (in.)	Thickness mm (in.)	Area Sq. mm	Ultimate Load	Ultimate Stress	Character & Fracture Location
V		, i	(Sq. in.)	N (lbs.)	MPa (psi)	, details accurati
T1	19.3	5.06	97.7	50 250	515	Partial Cup & Cone
	(0.760)	(0.199)	(0.151)	(11,300)	(74,600)	Parent Metal (SA 333 Gr.6)
T2	19.3	5.21	101	51 608	513	Partial Cup & Cone
	(0.760)	(0.205)	(0.156)	(11,600)	(74,400)	Parent Metal (SA 333 Gr.6)

#### **GUIDED BEND TEST (QW-160)**

Type & Figure No.	Result	Type & Figure No.	Result
QW-462.3a, TRB - R1	Pass	QW-462.3a, TFB - F1	Pass
QW-462.3a, TRB - R2	Pass	QW-462.3a, TFB - F2	Pass

#### **NOTCH-TOUGHNESS TEST**

Type of Test Charpy V Test Temperature -48° C (-		Transverse 10 X 5 mm
Specimen No.	Notch Location	Impact Values J (ft. lbs)
D2.1	Weld Metal	18.7 (13.8)
D2.2	Weld Metal	20.1 (14.8)
D2.3	Weld Metal	28.2 (20.8)
D3.1	P1 Grp.1 - HAZ	>141 (>104)
D3.2	P1 Grp.1 - HAZ	40.7 (30.0)

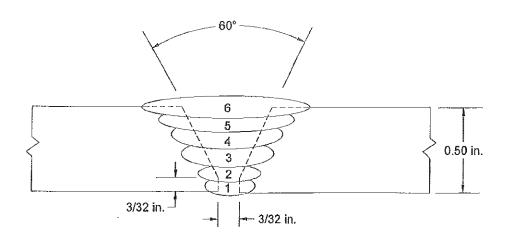
# D3.2 P1 Grp.1 - HAZ 40.7 (30.0) D3.3 P1 Grp.1 - HAZ >141 (>104) D4.1 P1 Grp.2 - HAZ 59.9 (44.2) D4.2 P1 Grp.2 - HAZ 35.3 (26.0) D4.3 P1 Grp.2 - HAZ 48.8 (36.0)

#### **OTHER TESTS**

	Vickers Hardness - see att	ached laboratory test repor	t
Welders Name	SGS Ludwig Assoc	Certificate File No ciates Ltd.	W-6819
We certify the states	nents in this record are co accordance with the require	orrect and that the test we ements of Section IX of the A	elds were prepared, ASME Code.
Manufacturer	R.J.V. GASFIELD SERVIC	ES	
Date	7776	Signed	

# QW-483 PROCEDURE QUALIFICATION RECORD (PQR)

Company Name	R.J.V. GASF	IELD SERVICE	S		
Procedure Qualification Rec	ord No. 115-2	Date	Augus	t 9. 2013	
Welding Procedure Specific	ation No.	115		, , , , , , , , , , , , , , , , , , , ,	
Welding Process(es)	Shielded Metal-Arc \	Velding (SMAV	/)	Waterfax Washington	
· · · · · · · · · · · · · · · · · · ·	MANAGEMENT OF THE PARTY OF THE	To Tribunico	- Control of the Cont		
JOINTS (QW-402)					
Type Butt j	nint sinale vee aronve	saa navt nada			
	onit, onigio voo groove	, oco next page		***************************************	
BASE METALS (QW-403	81				
Material Specification No.	') 	Tuno or Gro	do Coen	to C = 70	
P-No P1 Gro 1 To E	2.No 10 10 07 0 10	Type or Grad	12.7 ×	10 G1.70	
P-No. P1 Grp.1 To F	20 to 25/629	_ THICKHESS _	12.7 II	1111 (U.SU III.)	
Heat Number 35463	NI/A	Carbon ⊏qui	valent (1)	3 10 U.38	
Deposited Wold Motel (Par	N/A Dood Didw	_ Other	Plate I	Fooduct Form	
Deposited Weld Metal (Per	rass) <u>Did no</u>	ot exceed 2.4 m	m (0.094 in.) to	or E6010,	
Mar CCA 7000 Conhan	and 3	.2 mm (0.125 in	.) for E/U18-1	4.	
(1) Per CSA Z662 Carbon	Equivalent formula. S	<u>ee attached che</u>	emicai composi	tion product	
analysis material test re	port			\rangle	
THE ED SETTLE O TOLL A					
FILLER METALS (QW-40					
Specification No. (SFA)	SFA 5,1		SFA 5.1		
AWS No. (Class)	E6010 (1)	E7018-1 (2)			
Filler Metal F-No.	<u>F3</u>				
Filler Metal A-No.	A1		Al		
Size of Electrode	See attached	sketch			
Size of Electrode Deposited Weld Metal Thick	ness <u>2.38 mm (0.0</u>	94 in.)	10.3 mm (0.40	)6 in.)	
(1) Lincoln Electric	: Company: Lincoln Fle	etweld 5P+			
(2) Air Liquide Car	nada Inc.: LA 18 Plus				
POSITION (QW-405)					
Position of Groove	3G	Weld Progres	ssion Vertica	du J	
		-			
PREHEAT (QW-406)					
Preheat Temperature	10°C (50°F)	Interpass Ter	np. (Max.)	260°C (500°F)	
POSTWELD HEAT TREA	TMENT (OW-407)				
Temperature		_ Time	N/A		
	11// 1	_ 11110	1477		
ELECTRICAL CHARACT	ERISTICS (ONLAND)	1			
			Dougrap plant	rada nanitiva	
Current <u>Direct</u> Amps See no	nut nava		Reverse, elect		
Amps See no Heat Input F3: 39	EXL page	_ voits	See next page		
rieat input	_า งจบ จ/m. maximum		F4: 53,500 J/ir	ı. maxımum	
TECHNICHE (OVAL 440)					
TECHNIQUE (QW-410)					
Manual or Automatic	Manual Side Side Side Side Side Side Side Side				
Multiple or Single Pass Per S		F4: Mu			
String or Weave	Root: String		ider: Weave		
Travel Speed	· · · · · · · · · · · · · · · · · · ·	<u> </u>			
Use of Thermal Process	N/A				



Pass	Process	Filler Metal	Diameter	Current &	Amperage	Voltage	Travel Speed
			mm (in.)	Polarity	Range	Range	mm/min (i.p.m.)
1	SMAW	E6010	3.2 (1/8)	DCRP	<b>76 -</b> 80	23 - 25	72 (3.8)
2	SMAW	E7018-1	2.4 (3/32)	DCRP	81 - 85	21 - 22	73 (2.9)
3	SMAW	E7018-1	2.4 (3/32)	DCRP	85 - 89	21 - 22	81 (3.2)
4	SMAW	E7018-1	2.4 (3/32)	DCRP	84 - 88	21 - 22	88 (3.5)
5	SMAW	E7018-1	2.4 (3/32)	DCRP	84 - 88	21 - 22	95 (3.7)
6	SMAW	E7018-1	2.4 (3/32)	DCRP	84 - 88	21 - 22	51 (2.0)

PQR	NO.	115-2

### **NOTCH-TOUGHNESS TEST**

Type of Test	Charpy V-Notch	Orientation	Transverse
Test Temperature _	-46° C (-50° F)	Specimen Size	10 X 10 mm

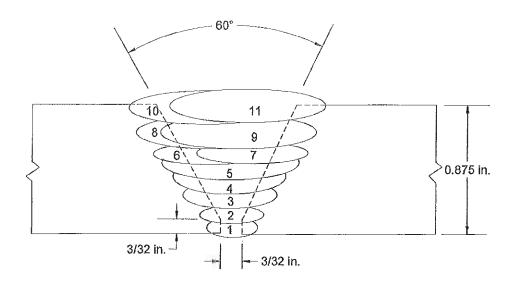
Specimen No.	Notch Location	Impact Values J (ft. lbs)
E2.1	Weld Metal	79.2 (58.4)
E2.2	Weld Metal	54.8 (40.4)
E2.3	Weld Metal	102 (75.0)
E3.1	P1 Grp.1 - HAZ	>141 (>104)
E3.2	P1 Grp.1 - HAZ	114 (84.0)
E3.3	P1 Grp.1 - HAZ	118 (87.0)
E4.1	P1 Grp.2 - HAZ	132 (97.2)
E4.2	P1 Grp.2 - HAZ	>141 (>104)
E4.3	P1 Grp.2 - HAZ	104 (76.4)

### **OTHER TESTS**

· · · · · · · · · · · · · · · · · · ·	Vickers Hardness - see att	ached laboratory test repor	<u>t</u>
Welders Name		Certificate File No	W-6819
Tests Conducted By Laboratory Test No.	SGS Ludwig Assoc	iates Ltd.	
We certify the states	nents in this record are co		
Manufacturer	R.J.V. GASFIELD SERVIC	ES	
Date		Signed	

### QW-483 PROCEDURE QUALIFICATION RECORD (PQR)

Company Name	R.J.V. GASFIE	ELD SERVICE	ES	
Procedure Qualification Record No.	115-3	Date	Aug	ust 9, 2013
Welding Procedure Specification No	),	115		
Welding Process(es) Shield	ed Metal-Arc W	eldina (SMAV	V)	
				2/E/422
JOINTS (QW-402)				
TypeButt joint, sinc	ile vee aroove	see nevt nane	<u> </u>	
	no voo groove,	oo noxe page	,	
BASE METALS (QW-403)				
Material Specification No. SA 51	6 to SA 516	Type or Gra	do Cre	10 to Gr 70
P-No. P1 Grp.1 To P-No.	D1 (2rp 2	Thickness	00 on	mm (0.975 in )
Hoot Number 365903 to 365	F 1 GID.2	Corbon Fau	<u> </u>	30 to 0.30
Heat Number 365803 to 365	1003	Carbon Equ	Ivalent (1) U	.39 10 U.39
Diameter N/A	D:-14	Other	Plate	e Product Form
Deposited Weld Metal (Per Pass)	Dig not	exceed 2.4 m	<u>1m (U.U94 in.)</u>	1 TOT E6010,
Day 004 7000 Oadles Facilities	and 3.2	mm (0.125 ir	1.) for E7018-	1
(1) Per CSA Z662 Carbon Equivale		e attached ch	emical compo	osition product
analysis material test report				
FILLER METALS (QW-404)				
Specification No. (SFA)	SFA 5.1		SFA 5.1	
AWS No. (Class)	E6010 (1)		E7018-1 (2)	
Filler Metal F-No.	F3		F4	
Filler Metal A-No.	AT			
Size of Electrode	See attached s	ketch		
Size of Electrode Deposited Weld Metal Thickness	2.38 mm (0.09	4 in.)	19.8 mm (0.	781 in.)
(1) Lincoln Electric Compa	ny: Lincoln Flee	tweld 5P+		
(2) Air Liquide Canada Inc	.; LA 18 Plus	***************************************	The state of the s	
POSITION (QW-405)				
Position of Groove	3G	Weld Progre	ssion Verti	cal un
		7,014,708,0		our up
PREHEAT (QW-406)				
Preheat Temperature 10°C (	50°F\	Internace Te	mn /Mav \	260°C (500°E)
To o g	70 1 7	interpass re	mp. (max.)	200 0 (000 1)
DOSTINE D HEAT TOGATMENT	" /O\AL AOT\			'
POSTWELD HEAT TREATMENT		T:	N.1/A	
Temperature <u>N/A</u>		Time	IV/A	
ELECTRICAL CUADACTERICE	00 (0111 (00)			
ELECTRICAL CHARACTERISTI	CS (QW-409)			
Current <u>Direct</u>		Polarity		ectrode positive
Amps <u>See next page</u>		Volts	See next pa	
Heat Input F3: 32,430 J/i	n. <u>maximum</u>		F4: 74,550 c	l/in. maximum
TECHNIQUE (QW-410)				
Manual or Automatic	Manuai			
	F3: Single	F4: Mu	ıltiple	
	Root: String		nder: Weave	
	See next page			
	N/A			



Pass	Process	Filler Metal	Diameter mm (in.)	Current & Polarity	Amperage Range	Voltage Range	Travel Speed mm/min (i.p.m.)
1	SMAW	E6010	3.2 (1/8)	DCRP	84 - 88	24 - 26	101 (4.0)
2	SMAW	E7018-1	2.4 (3/32)	DCRP	88 - 92	21 - 22	81 (3.2)
3	SMAW	E7018-1	2.4 (3/32)	DCRP	92 - 96	21 - 22	74 (2.9)
4	SMAW	E7018-1	3.2 (1/8)	DCRP	118 - 122	21 - 22	71 (2.8)
5	SMAW	E7018-1	3.2 (1/8)	DCRP	116 - 120	21 - 22	51 (2.0)
6	SMAW	E7018-1	3.2 (1/8)	DCRP	119 - 123	21 - 22	122 (4.8)
7	SMAW	E7018-1	3.2 (1/8)	DCRP	119 - 123	21 - 22	114 (4.5)
8	SMAW	E7018-1	3.2 (1/8)	DCRP	119 - 123	21 - 22	122 (4.8)
9	SMAW	E7018-1	3.2 (1/8)	DCRP	115 - 119	21 - 22	121 (4.8)
10	SMAW	E7018-1	3.2 (1/8)	DCRP	115 - 119	21 - 23	92 (3.6)
11	SMAW	E7018-1	3.2 (1/8)	DCRP	115 - 119	21 - 23	77 (3.0)

PQR NO.	115-3
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### **TENSILE TEST (QW-150)**

Specimen No.	Width mm (in.)	Thickness mm (in.)	Area Sq. mm (Sq. in.)	Ultimate Load N (lbs.)	Ultimate Stress MPa (psi)	Character & Fracture Location
T1	19.0	20.6	391	205 772	526	Partial Cup & Cone
	(0.748)	(0.811)	(0.606)	(46,300)	(76,300)	Parent Metal (SA 516 Gr.60)
T2	19.1	20.3	388	207	535	Partial Cup & Cone
and the grant of t	(0.752)	(0.799)	(0.601)	(46,700)	(77,600)	Parent Metal (SA 516 Gr.60)

### **GUIDED BEND TEST (QW-160)**

Type & Figure No.	Result	Type & Figure No.	Result
QW-462.2, TSB - S1	Pass	QW-462.2, TSB - S3	
QW-462.2, TSB - S2	Pass	QW-462.2. TSB - S4	Pass
	Martin Control of the		газэ

### **NOTCH-TOUGHNESS TEST**

ype of Test		Orientation	Transverse
est Temperature	-46° C (-50° F)	Specimen Size	10 X 10 mm
Specimen No	). N	otch Location	Impact Values J (ft. lbs)
F2.1		Weld Metal	92.5 (68.2)
F2.2	·	Weld Metal	16.8 (12.4)
F2.3		Weld Metal	52.1 (38.4)
F3.1	P	Grp.1 - HAZ	>141 (>104)
F3.2		Grp.1 - HAZ	107 (79.0)
F3.3		Grp.1 - HAZ	>141 (>104)
F4.1	P1	Grp.2 - HAZ	21.7 (16.0)
F4.2		Grp.2 - HAZ	>141 (>104)
F4.3		Grp.2 - HAZ	89.5 (66.0)

### **OTHER TESTS**

	Vickers Hardness - see att	ached laboratory test repor	Ł
Welders Name Tests Conducted By Laboratory Test No.	SGS Ludwig Assoc	Certificate File No lates Ltd.	W-6819
We certify the statem	nents in this record are co accordance with the require	errect and that the test we ments of Section IX of the A	lds were prepared,
Manufacturer	R.J.V. GASFIELD SERVIC	ES	
Date		Signed	





### TENSILE / BEND TEST

Customer:

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C 1C3

Attention:

Dale Laniuk

POR No.:

Material: Size:

SA 333 Gr. 6 to SA 350 Gr. LF2

168.3 mm (6.625 in.) O.D. x 6.32 mm (0.249 in.) w.t.

Thermal Condition:

Governing Spec.:

As Welded

ASME Section IX, 2011a edition and latest addenda

SAMPLE NO.(QW-150) T1 **T2** WIDTH mm (in.) 19.3 (0.760)19.3 THICKNESS mm (in.) 5.06 (0.199)5.21 AREA sq. mm (sq. in.) 97.7 (0.151)101 **ULTIMATE LOAD N (lbf)** 50 250 (11,300)51 608 ULTIMATE STRESS MPa (psi) 515 (74,600)513 FRACTURE TYPE Partial Cup & Cone Partial Cup & Cone FRACTURE LOCATION Parent Metal Parent Metal (SA 333 Gr. 6) (SA 333 Gr. 6)

Note: Imperial values calculated by direct conversion.

SAMPLE TYPE(QW-462.3a)

SAMPLE NO.

RESULTS

Face Bend

F1

Face Bend

Root Bend

Root Bend R2

Laboratory Test No.: E13-551.1

81183 to 12/32057

(0.760)

(0.205)

(0.156)

(11,600)

(74.400)

Date: August 20, 2013

Heat No.:

Pass

F2 Pass R1 **Pass** 

**Pass** 

Test Conducted By: Nina Laderoute, T.T.

Certified By:

Karen Koens, R.E.T.

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### CHARPY V-NOTCH IMPACT TEST

Customer:

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C 1C3

Attention:

Dale Laniuk

PQR No.:

115-1

Heat No.:

81183 to 12/32057

Laboratory Test No.: E13-551.1

Date: August 19, 2013

Material:

SA 333 Gr. 6 to SA 350 Gr. LF2

Size:

168.3 mm (6.625 in.) O.D. x 6.32 mm (0.249 in.) w.t.

Thermal Condition:

As Welded

Specimen Size:

10 x 5 mm (0.394 x 0.197 in.)

Machine:

Satec SI-1K3, S/N: 1503

Orientation:

Transverse

Capacity:

407 J (300 ft-lbf)

Test Temperature:

-48°C (-55°F)

Verified Range:

3.4-141 J (2.5-104 ft-lbl)

Governing Spec.:

ASME Section VIII, Div. I, UG-84 - 2011a edition and latest addenda

Specimen	Notch	Impact Values	
Number	Location	Joules	(ft-lbf)
D0.4	Mold Motal within 4/40" of cont	40.7	442 O)
D2.1	Weld Metal within 1/16" of root	18.7	(13.8)
D2.2	Weld Metal within 1/16" of root	20.1	(14.8)
D2.3	Weld Metal within 1/16" of root	28.2	(20.8)
D3.1	Gr. 6 - HAZ	>141	(>104)
D3.2	Gr. 6 - HAZ	40.7	(30.0)
D3.3	Gr. 6 - HAZ	>141	(>104)
D4.1	Gr. LF2 - HAZ	59.9	(44.2)
D4.2	Gr. LF2 - HAZ	35.3	(26.0)
D4.3	Gr. LF2 - HAZ	48.8	(36.0)

Note: Imperial values calculated by direct conversion.

Test Conducted By: Natashua Collier, C.E.T.

Certified By:

Natashua Collier, C.E.T.

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LUDWIG ASSOCIATES LTD. IS NOW PART OF SGS, THE WORLD'S LEADING INSPECTION, VERIFICATION, TESTING AND CERTIFICATION COMPANY.

4027 14 Street S.E. Calgary AB T2G 3K6 t+1 (403) 262-7072 f+1 (403) 266-3169





### HARDNESS TEST

Customer:

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C 1C3

Attention:

Dale Laniuk

PQR No.: Material:

115-1

SA 333 Gr. 6 to SA 350 Gr. LF2

Size:

168.3 mm (6.625 in.) O.D. x 6.32 mm (0.249 in.) w.t.

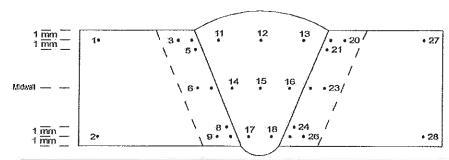
Thermal Condition:

As Welded

Type of Test:

Vickers 10kg (HV10)

Instrument: Governing Speca Leco V-100-C1 ASTM E384-11⁶¹



	SA 350	Gr. L	F2	10/0	del Materi		SA 3	33 Gr. (	3
Pare	ent Metal		HAZ	vve	id Metal		HAZ	Pare	nt Wetal
1	191	3	171	11	179	19	164	27	149
2	169	4	178	12	191	20	141	28	157
		5	169	13	184	21	177		
		6	173	14	162	22	180		
		7	178	15	161	23	172		
		8	173	16	172	24	172		
		9	167	17	165	25	170		Λ
		10	177	18	171	26	162		I

Test Conducted By: Natashua Collier, C.E.T.

Certified By:_

Natashua Collier, C.E.T.

Laboratory Test No.: E13-551.1

Heat No.: 81183 to 12/32057

Date: August 16, 2013

This report (or certificate) is issued by the Company mater its General Conditions for Inspection and Testing Services (copy available upon request). The issuance of this report (or certificate) does not exonerate buyers or sellers from exercising all their eights and direburging all their liabilities under the Contract of Sale. Stipulations to the contract we multihoding on the Company. The Company's responsibility under this report (or certificate) is limited to proven orging one and will in an ease the source than ten times the amount of the fees or commission. Except by special arrangement, samples, it drawn, will not be retained by the Company for more than 20 days. The information stated in this report for certificate) is derived from the results of impercion or testing procedures excepted out in accordance with the instructions of our Client, not/or our assessment of such results on the bash of any irchitect atomical standards, feate austion or practice, or other circumstances which about in any irchitect and in the limit of any irchitect and professional opinion by taken into account.



## LUDWIG

### CHARPY V-NOTCH IMPACT TEST

Customer:

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C 1C3

Attention:

Dale Laniuk

PQR No.:

115-2

Material:

SA 516 Gr. 60 to SA 516 Gr. 70

Thickness:

12.7 mm (0.500 in.)

Thermal Condition:

As Welded

Specimen Size:

10 x 10 mm (0.394 x 0.394 in.)

Machine:

Salec SI-1K3, S/N: 1503

Orientation:

Transverse

Capacity:

407 J (300 ft-lbf)

354638 to 354638

Laboratory Test No.: E13-551.2

Date: August 19, 2013

Test Temperature:

-46°C (-50°F)

Verified Range:

Heat No.:

3.4-141 J (2.5-104 II-lbf)

Governing Spec.:

ASME Section VIII, Div. I, UG-84 - 2011a edition and latest addenda

Specimen	Notch	Impact	Values
Number	Location	Joules	(ft-lbf)
E2.1	Weld Metal within 1/16" of root	79.2	(58.4)
E2.2	Weld Metal within 1/16" of root	54.8	(40.4)
E2.3	Weld Metal within 1/16" of root	102	(75.0)
E3.1	Gr. 60 - HAZ	>141	(>104)
E3.2	Gr. 60 - HAZ	114	(84.0)
E3.3	Gr. 60 - HAZ	118	(87.0)
E4.1 E4.2	Gr. 70 - HAZ Gr. 70 - HAZ	132 >141	(97.2) (>104)
E4.3	Gr. 70 - HAZ	104	(76.4)

Note: Imperial values calculated by direct conversion.

Test Conducted By: Natashua Collier, C.E.T.

Certified By:

Natashua Collier, C.E.T.

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# LUDWIG

### HARDNESS TEST

**Customer:** 

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C 1C3

Attention:

Dale Laniuk

POR No.:

115-2

material:

SA 516 Gr. 60 to SA 516 Gr. 70

Thickness:

12.7 mm (0.500 in.)

Thermal Condition:

As Welded

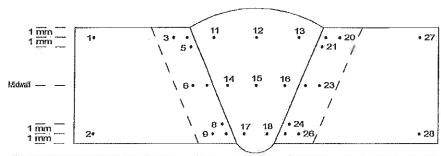
Type of Test:

Vickers 10kg (HV10)

Instrument:

Governing Spec.:

Buehler 5112 ASTM E384-11^{E1}



	SA 516	Gr.	70	1010	Let BRoket		SA 51	6 Gr. 6	0
Pare	ent Metal		HAZ	vve	ld Metal		HAZ	Pare	ent Metal
1	156	3	176	11	180	19	204	27	152
2	155	4	200	12	182	20	180	28	158
		5	189	13	197	21	194		
		6	170	14	76	22	175		
- 1		7	175	15	177	23	161		
	:	8	192	16	172	24	193		
		9	189	17	189	25	180		
		10	194	18	192	26	178		f.

Test Conducted By: Karen Koens, R.E.T.

Certified By:

Karen Koens, R.E.T.

Laboratory Test No.: E13-551.2

354638 to 354638

Date: August 19, 2013

Heat No.:

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### TENSILE / BEND TEST

Customer:

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C 1C3

Attention:

Dale Laniuk

POR No.:

Material:

SA 516 Gr. 60 to SA 516 Gr. 70

Thickness:

22.2 mm (0.875 in.)

Thermal Condition:

As Welded

Governing Spec .:

ASME Section IX, 2011a edition and latest addenda

SAMPLE NO.(QW-150) WIDTH mm (in.) THICKNESS mm (in.) AREA sq. mm (sq. in.) **ULTIMATE LOAD N (lbf)** ULTIMATE STRESS MPa (psi) FRACTURE TYPE FRACTURE LOCATION

T1 19.0 (0.748)20.6 (0.811)391 (0.606)205 772 (46,300)526 (76,300)Partial Cup & Cone **Parent Metal** 

(SA 516 Gr. 60)

365803 to 365803 Heat No.:

T2

19.1

20.3

Laboratory Test No.: E13-551.3

Date: August 19, 2013

388 (0.601)207 565 (46,700)

(0.752)

(0.799)

535 (77,600)Partial Cup & Cone

Parent Metal (SA 516 Gr. 60)

Note: Imperial values calculated by direct conversion.

SAMPLE TYPE(QW-462.2) SAMPLE NO.

RESULTS

Side Bend

**S**1

Pass

Side Bend S2

**Pass** 

Side Bend **S**3

**Pass** 

Side Bend

**S4** Pass

Test Conducted By: Wilson Symington, T.T.

Certified By:

Karen Koens, R.E.T.

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### CHARPY V-NOTCH IMPACT TEST

Customer:

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C 1C3

Attention:

Dale Laniuk

POR No.:

115-3

Material: Thickness: SA 516 Gr. 60 to SA 516 Gr. 70

....

22.2 mm (0.875 in.)

Thermal Condition:

As Welded

Specimen Size:

10 x 10 mm (0.394 x 0.394 in.)

Machine:

Salec SI-1K3, S/N: 1503

Orientation:

Transverse

Capacity:

407 J (300 ft-lbf)

365803 to 365803

Laboratory Test No.: E13-551.3

Date: August 20, 2013

Test Temperature:

-46°C (-50°F)

Verified Range:

Heat No.:

3.4-141 J (2.5-104 ft-lbf)

Governing Spec.:

ASME Section VIII, Div. I, UG-84 - 2011a edition and latest addenda

Specimen	Notch	Impact	Values
Number	Location	Joules	(ft-lbf)
F2.1	Weld Metal within 1/16" of root	92.5	(68.2)
F2.2	Weld Metal within 1/16" of root	16.8	(12.4)
F2.3	Weld Metal within 1/16" of root	52.1	(38.4)
F3.1	Gr. 60 - HAZ	>141	(>104)
F3.2	Gr. 60 - HAZ	107	(79.0)
F3.3	Gr. 60 - HAZ	>141	(>104)
F4.1	Gr. 70 - HAZ	21.7	(16.0)
F4.2	Gr. 70 - HAZ	>141	(>104)
F4.3	Gr. 70 - HAZ	89.5	(66.0)

Note: Imperial values calculated by direct conversion.

Test Conducted By: Nina Laderoute, T.T.

Certified By:

Karen Koens, R.E.T.

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## LUDWIG

### HARDNESS TEST

Customer:

R.J.V. Gasfield Services

4901 Bruce Road Vegreville, Alberta

T9C:1C3

Attention:

Dale Lanluk

PQR No.:

115-3

Material:

SA 516 Gr. 60 to SA 516 Gr. 70.

Thickness:

22.2 mm (0.875 in.)

Thermal Condition:

As Welded

Type of Test:

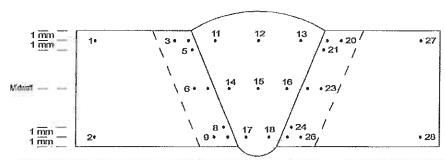
Vickers 10kg (HV10)

Instrument:

Buehler 5112

Governing Spec.:

ASTM E384-11cl



	SA 510	Gr.	60	10/	del Matel		SA 51	6 Gr. 7	0
Pare	nt Metal		HAZ	VVE	id Metal		HAZ	Pare	nt Metal
1	157	3	177	11	212	19	212	27	158
2	157	4	225	12	204	20	176	28	159
		5	217	13	205	21	212		
		6	179	14	193	22	178		
		7	188	15	187	23	173		
	!	8	171	16	194	24	176		
		9	184	17	172	25	197		
		10	180	18	173	26	177	V	5.5

Test Conducted By: Karen Koens, R.E.T.

Certified By:

Karen Koens, R.E.T.

Laboratory Test No.: E13-551.3

365803 to 365803

Date: August 19, 2013

Heat No.:

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Manufusturing Process! Process de Me ef at ac SEALLESS HOT ROLLED

# INSPECTION CERTIFICATE

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45901497-21804
Product Type / Tipe de Products
CARBON STEEL FOR LOW TEMPERATI

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# **WELDER LOG SHEET**

		ā i	WELDING PROCEDURES	MATERIAL "P"	MATERIAL "F"	MATERIALMATERIAL POSITION "P" (S)	DEPOSITION THICKNESS RANGE	MINIMUM PIPE DIA.	DATE OF EXPIRY OF
WELDERS' NAME	SYMBOL	PROCESS	QUALIFIED TO	GROUP	GROUP	QUALIFIED		QUALIFIED	ALTA P.Q. CARD
Marvin Boe	≥	S.M.A.W.	100, 104, 115	7	F3 F4	99	22.2 mm	25.4 mm O.D.	Nov 14, 2016
		G.M.A.W./S.M.A.W.	107,108	<u>P</u>	F4 F6	16	36.53 mm	73 mm O.D.	April 11, 2016
File # W-6943			At the second se						
Dave Moroz	Z	S.M.A.W.	100, 104,115	P	F3 F4	99	22.2mm	25.4 mm O.D.	August 9,2015
File # W-12783									
Bernie Sorbara	0	S.M.A.W.	100, 104,115	Δ.	F3 F4	99	22.2mm	25.4 mm O.D.	November 4, 2015
Eile # W 6810						1			
Travor McKain	14/	C M A W	777	č	I CL	C			
II GAOL MCNAIL	AΛ	O.IM.A.W.	100, 104, 115	ì		9	72.2mm	25.4 mm 0.D.	April 4,2015
"C" Ticket # 19259	M	G.M.A.W./S.M.A.W.	107,108	P	F6 F4	9	19.5mm	25.4 mm O.D.	April 4,2015
Chris Gaudet	7	S.A.W.	107, 108	Ρ1	F6	16	Maximum	73mm O.D.	July 31,2016
MW-72180		S.M.A.W.	100, 104,115	<u>۳</u>	F3 F4	16	Maximum	25.4 mm O.D.	June 12,2016
W-30227									
Dallas Hoffman	H	S.M.A.W.	100, 104,115	P1	F3 F4	16	Maximum	25.4 mm O.D.	June 12,2016
W-27746						1			
Jordan Charuk	ፈ	S.M.A.W.	100, 104,115	P1	F3 F4	16	Maximum	25.4 mm O.D.	June 12,2016
7000 7110	T T T T T T T T T T T T T T T T T T T								
C#19261 Reid Zeigler	×	S.A.W.	107,108	Ь4	F6	16	Maximum	73mmO.D.	November 26,2015
MW-72151									

# WELDER LOG SHEET

DATE OF EXPIRY OF ALTA P.O. CARD	+		J. January 16,2016		June 26,2016	J. July 14, 2016	July 31,2016										
MINIMUM PIPE DIA. QUALIFIED	25.4mm O.D.		25.4mm O.D		25.4 mm O.D	25.4 mm O.D	73mm O.D										
DEPOSITION THICKNESS RANGE QUALIFIED	22.2mm		22.2mm		Maximum	Maximum	Maximum										
POSITION (S) QUALIFIED	16		99		10	16	16										ľ
MATERIALMATERIAL "P" "F" GROUP GROUP	F3,F4		F3,F4		F3 F4	F3 F4	F6				İ		1				
MATERIAL "P" GROUP	P1		P4		P-	P	P					j					
WELDING PROCEDURES QUALIFIED TO	100, 104,115		100, 104,115		100, 104,115	 100, 104,115	107, 108							:			
PROCESS	S.M.A.W.		S.M.A.W.		S.M.A.W.	S.M.A.W.	S.A.W.		****						:	į	
SYMBOL	I		A		7	n	)										
WELDERS' NAME	Maury Kushnir	W-17008	Jeremy Tchir	W-28281	Jacob Regier	Ian Males	MW-9260	W-32305		•				•		•	•

### **Gauge Number and Pressure**

		T	
Gauge	Gauge	Calibrated	CPW
Number	Pressure	Date	S/N
		) psi.	
#1	1,000 psi.	Sept 19,2014	PI-4449
#2	1,000 psi.	Sept 19,2014	PI-4566
#3	1,000 psi.	Nov 20,2014	PI-4568
	3,000		
#22	3,000 psi.	Dec 4,2014	PI-4451
#23	3,000 psi.	June 6,2014	PI-4830
#24	3,000 psi.	June 6,2014	PI-4831
#25	3,000 psi.	June 6,2014	PI-4832
#26	3,000 psi.	June 6,2014	PI-4833
#27	3,000 psi.	June 6,2014	PI-4834
	5,000	) psi.	
#32	5,000 psi.	Dec 4,2014	PI-4570
#33	5,000 psi.	Dec 4,2014	PI-4569
#34	5,000 psi.	June 4,2014	PI-4814
#35	5,000 psi.	June 4,2014	PI-4815
#36	5,000 psi.	Dec 4,2014	PI-4571
#37	5,000 psi.	April 29,2014	PI-4747
#38	5,000 psi.	April 29,2014	PI-4748
#39	5,000 psi.	April 29,2014	PI-4745
#40	5,000 psi.	April 29,2014	PI-4819
#41	5,000 psi.	June 4,2014	PI-4816
#42	5,000 psi.	June 4,2014	PI-4817
#43	5,000 psi.	April 29,2014	PI-4750
#44	5,000 psi.	June 4,2014	PI-4818
#45	5,000 psi.		
#46	5,000 psi.	Nov 20,2013	PI-4572
	, ,	,	
	10.00	0 psi.	
#47	10,000 psi.	April 29,2014	PI-4751
#48	10,000 psi.	April 29,2014	PI-4752
#49	10,000 psi.	April 29,2014	PI-4753
#50	10,000 psi.	April 29,2014	PI-4755
	, 1 -	, -	<del>-</del>
	15,00	0 psi.	
#53	15,000 psi.	April 29,2014	PI-4756
#54	15,000 psi.	April 29,2014	PI-4757
		0 psi.	
#52	20,000 psi.	June 6,2014	PI-4828
#55	20,000 psi.	June 6,2014	PI-4829
<del></del>			<del></del>



### FLANGE TORQUE PROCEDURE

The assembly of all piping systems shall be done in accordance with ASME B31.3, 335, 335.1, 335.2, 335.3, and 335.4

Before assembly the gasket surfaces (Flange Face) should be totally cleaned and inspected for damage as per ASME B16.5 Table II-3

The "Bill of Materials" shall be checked to ensure the proper gaskets, grade, size and length of studs and size and grade of nuts are being used.

The torque value used shall be that of the gasket manufacturer, This value will ensure the gasket does not get crushed during tightening.

Listed below is the sequence that shall be followed during the flange torque procedure. All tightening of nuts shall be done with calibrated torque wrenches.

- A. Lubricate bolt and nut threads and nut bearing face (where it contacts the flange).with Jet-Lube "Coper Kote" or equivalent lube.
- B. After flange assembly and all nuts have been run down by hand, start wrench tightening following the sequence of the numbers indicated on the following pages, (marking the number on the flange with a crayon aids in keeping track of the tightening process).
- C. During all of the following steps, keep any gap between flanges even all around the circumference, and nuts made up approximately the same amount on each end of the bolt.
  - 1. First time around just snug the nuts with a hand wrench.
  - 2. Second time around tighten the nuts firmly with the same wrench.
  - 3. Third time around apply approximately 25% recommended torque.
  - 4. Fourth time around apply approximately 50% recommended torque.
  - 5. Fifth time around, apply 100% of recommended torque.



- 6. If possible, re-torque after 24 hours. Most of any bolt preload loss occurs within 24.
- 7. The final torque load shall be done in the presence of the shop foreman and representation of the Q.C department and owners inspector.
- 8. After all the flanged pipe connections have been completed, the "Torque Test Record" shall be filled out and signed by the fitter, shop foreman, Q.C. Manager and the owners inspector indicating compliance with ASME B16.5 and RJV Gas Field Services "Torque Test Procedure".

Revision #2
December 16, 2013





## **Certificate of Authorization Permit**

**Quality Management System** 

Expiry Date: August 12, 2017

Reg. No.: AQP-1129

# RJV GAS FIELD SERVICES LTD. 4901 BRUCE ROAD VEGREVILLE, ALBERTA

having complied with the provisions of the SAFETY CODES ACT, is hereby authorized to perform the activities identified in the following table:

	Construction	Repair	Alter
Pressure Vessels	المراحد التبية إلى أراد والمستدرة		
ASME Section VIII-1 Pressure Vessels	Shop	Shop/Field	Shop/Field
Miniature Vessels in accordance with CSA B51	Shop	(-	
Indirect Fired Heater Colls			
ASME B31.3 Indirect Fired Heater Coils	Shop		
Pressure Piping			
ASME B31.1 Power Piping	Shop/Field	Shop/Field	Shop/Field
ASME B31.3 Process Piping	Shop/Field	Shop/Field	Shop/Field
Fittings			* — T
Category A,E,H	Shop	*** -	



As a condition of this permit, the holder is required to participate in interim audits by a safety codes officer to verify that the quality management system is being maintained in a manner acceptable to a safety codes officer.

Dated at Edmonton, this 8th day of August, 2014

Chief Inspector and Administrator

Certificate No.: 10073

Form No. AB-121 Rev. (2012/09)