

RJV GAS FIELD SERVICES LTD.

Welding Procedure Specification

in accordance with

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

WPS No.: 100 Revision 3
Supporting PQR No. (s): 100-1, 100-B, 100-C, 100-D
Qualified for

Process(es):	<u>SMAW / SMAW</u>	Position(s):	<u>All</u>
Filler Metal F-No.:	<u>F-3 / F-4</u>	A-No.:	<u>A-1 / A-1</u>
AWS Class.:	<u>E6010 / E7018-1</u>	Weld Type(s):	<u>Groove, Fillet</u>
Base Metal:	<u>P-1 Group 1 or 2</u>	To:	<u>P-1 Group 1 or 2</u>
Typical Materials P-1 Gr. 1:	<u>SA-36, SA-53, SA-106 A/B, SA-234 WPB, SA-350 LF1, SA-516 60/65, SA-CSA G40.21 Gr. 38W / 44W</u>		
P-1 Gr. 2:	<u>SA-106, SA-106 C, SA-234 WPC, SA-350 LF2, SA-516 70, SA-537 Cl. 1, SA-660 WCB / WCC</u>		
Diameter Range:	<u>All</u>	Condition(s):	<u>As Welded</u>
Thickness Range:	<u>0.062" to 1.00"</u>	<u>Normal and Sour Service</u>	
	<u>0.125" to 1.00"</u>	<u>Low Temperature Service to -46° C (-50°F)</u>	

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

Provincial Registration

ALBERTA BOILERS SAFETY ASSOCIATION
PROVINCE OF ALBERTA
SAFETY CODES ACT
WELDING PROCEDURE

Reg. No. WP 1312.2
Spec No. 100 (REV.3)
Weld Process SMAW
Matl. Gr. P No. 1 Gr. 1 & 2 to P No. 1 Gr. 1 & 2
Elec. Gr. F No. 3+4 A No. 1
Th. Qual. For 25.4mm PWHT NO
Min Th. Qual 3.1mm, CVN -46°C

Yr 02 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: RJV Gas Field Services Ltd. Date: September 08, 1987
WPS No.: 100 Revision Date: July 08, 2002
Revision No.: 3
Supporting PQR's: 100-1, 100-B, 100-C, 100-D
Welding Process(es): SMAW / SMAW Type(s): Manual / Manual

JOINTS QW-402		Joint Details	
Joint Design:	Butt, Tee, Lap, Corner, etc.	All ASME joint designs. Reference construction	
Backing:	F-3 SMAW electrodes with or without backing F-4 SMAW electrodes with backing only.	drawings for joint details. Where joint details are not specified, refer to typical joint detail sheet provided.	
Backing Material (Type): Similar base or weld metal as required. No Retainers.			
BASE METALS QW-403			
P-No:	<u>1</u>	Group No:	<u>1 or 2</u>
OR		to P-No:	<u>1</u>
Spec. type & grade:	<u>N/A</u>	to Spec. type & grade:	<u>N/A</u>
OR			
Chem. Analysis & Mech. Prop.:	<u>N/A</u>	to Chem. Analysis & Mech. Prop.:	<u>N/A</u>
Base Metal Thickness Range			
Groove:	<u>0.062" to 1.00" – Normal and Sour Service</u>		Fillet: <u>All</u>
Groove:	<u>0.125" to 1.00" – Low Temperature Service to -46° C (-50°F)</u>		Fillet: <u>All</u>
Pipe Dia Range:	<u>Unlimited</u>		
Other:	<u>Maximum thickness of any weld layer shall not exceed 0.500"</u>		
FILLER METALS 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-No.:	A-1	A-1	
Size of Filler Metals:	3/32", 1/8", 5/32", 3/16"	3/32", 1/8", 5/32", 3/16", 1/4"	
Weld Thickness - Groove:	0.157" max. (0.150" for Low Temperature)	0.853" max. (0.850" for Low Temperature)	
- Fillet:	unlimited	unlimited	
Electrode-Flux (Class):	N/A	N/A	
Flux Trade Name:	N/A	N/A	
Consumable Insert:	N/A	N/A	
Other:	Covered Electrode	Covered Electrode	

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

Company Name: RJV Gas Field Services Ltd.
WPS No.: 100
Revision No.: 3
Supporting PQR's: 100-1, 100-B, 100-C, 100-D
Welding Process(es): SMAW / SMAW

Date: September 08, 1987
Revision Date: July 08, 2002
Type(s): Manual / Manual

JOINTS QW-402		Joint Details	
Joint Design:	<u>Butt, Tee, Lap, Corner, etc.</u>	All ASME joint designs. Reference construction	
Backing:	<u>F-3 SMAW electrodes with or without backing</u> <u>F-4 SMAW electrodes with backing only.</u>	drawings for joint details. Where joint details are not specified, refer to typical joint detail sheet provided.	
Backing Material (Type): <u>Similar base or weld metal as required. No Retainers.</u>			
BASE METALS QW-403			
P-No:	<u>1</u>	Group No:	<u>1 or 2</u>
OR		to P-No: <u>1</u> Group No: <u>1 or 2</u>	
Spec. type & grade: <u>N/A</u>		to Spec. type & grade: <u>N/A</u>	
OR		to Chem. Analysis & Mech. Prop.: <u>N/A</u>	
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Base Metal Thickness Range			
Groove: <u>0.062" to 1.00" - Normal and Sour Service</u>		Fillet: <u>All</u>	
Groove: <u>0.125" to 1.00" - Low Temperature Service to -46° C (-50°F)</u>		Fillet: <u>All</u>	
Pipe Dia Range: <u>Unlimited</u>			
Other: <u>Maximum thickness of any weld layer shall not exceed 0.500"</u>			
FILLER METALS QW-404			
Process:	<u>SMAW</u>	<u>SMAW</u>	
Spec No. (SFA):	<u>5.1</u>	<u>5.1</u>	
AWS No. (Class):	<u>E6010</u>	<u>E7018-1</u>	
F-No.:	<u>F-3</u>	<u>F-4</u>	
A-No.:	<u>A-1</u>	<u>A-1</u>	
Size of Filler Metals:	<u>3/32", 1/8", 5/32"</u>	<u>3/32", 1/8", 5/32", 3/16", 1/4"</u>	
Weld Thickness - Groove:	<u>0.157" max. (0.150" for Low Temperature)</u>	<u>0.853" max. (0.150" for Low Temperature)</u>	
- Fillet:	<u>unlimited</u>	<u>unlimited</u>	
Electrode-Flux (Class):	<u>N/A</u>	<u>N/A</u>	
Flux Trade Name:	<u>N/A</u>	<u>N/A</u>	
Consumable Insert:	<u>N/A</u>	<u>N/A</u>	
Other:	<u>Covered Electrode</u>	<u>Covered Electrode</u>	

Revision 3: 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 # 100 Revision 3

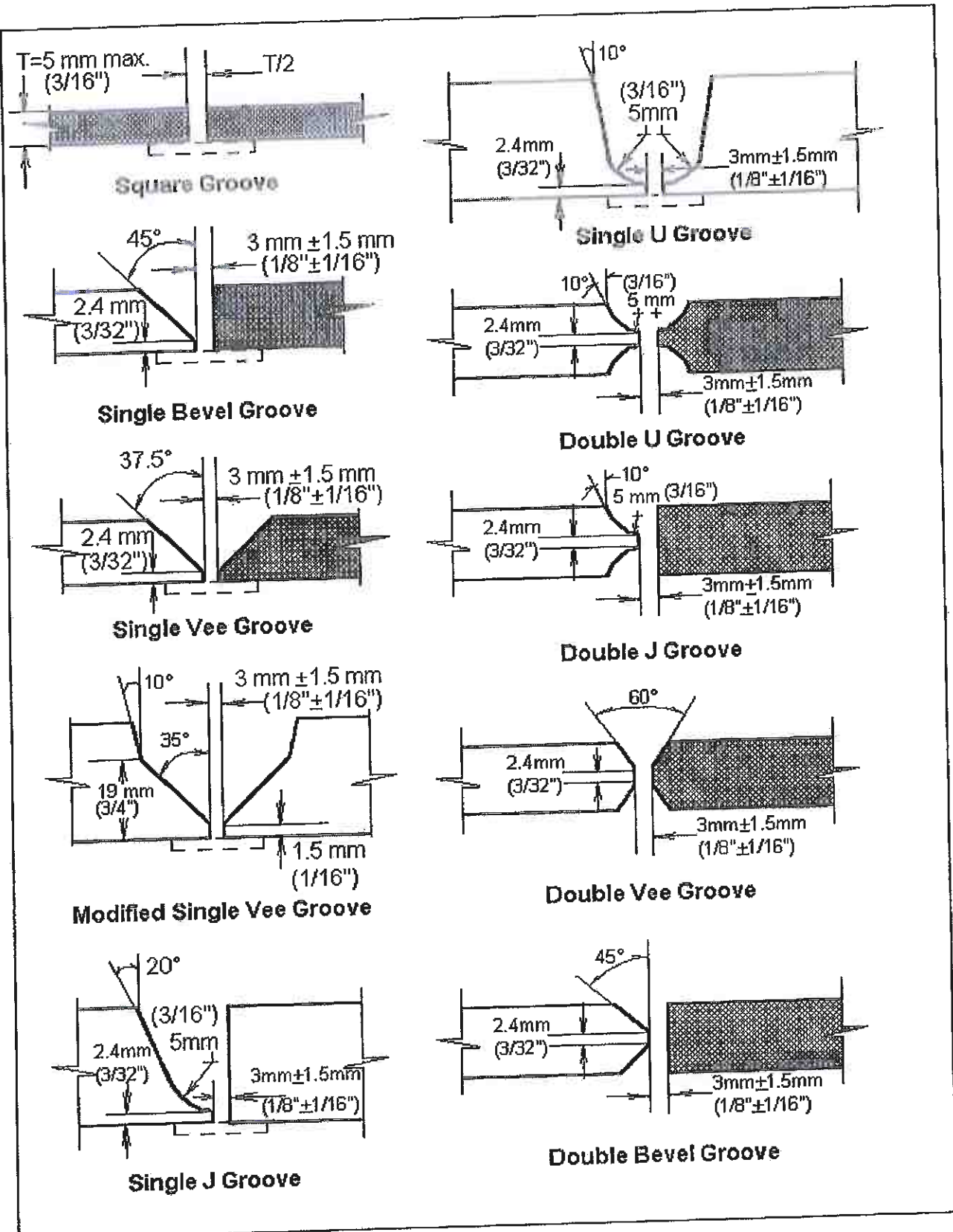
POSITIONS QW-405			POSTWELD HEAT TREATMENT QW-407			
Position(s) of Groove: All			Temperature Range: N/A			
Welding Progression: Up: F-4 Electrodes			Time Range: N/A			
Up or Down: F-3 Electrodes						
Position(s) of Fillet: All						
PREHEAT QW-406			GAS QW-408			
Preheat Temp Min: 50°F			Shielding Gas(es): N/A			
Interpass Temp Max: 600°F			Composition: N/A			
Interpass Temp Min: 50°F			Flow Rate: N/A			
Monitor using pyrometer tempilstiks or other suitable method.			Gas Backing: N/A			
			Trailing Shielding Gas Composition: N/A			
ELECTRICAL CHARACTERISTICS QW-409						
Max Heat Input:	Current Type:	SMAW (F-3) Direct Current (DC)	SMAW (F-4) Direct Current (DC)			
	Polarity:	SMAW (F-3) Reverse (EP)	SMAW (F-4) Reverse (EP)			
	Amps (Range):	SMAW (F-3) 60 - 180	SMAW (F-4) 70 - 360			
	Volts (Range):	SMAW (F-3) 20 - 32	SMAW (F-4) 18 - 32			
	0.125" - 0.500"	SMAW (F-3) 28 080 J/in	SMAW (F-4) 59 800 J/in			
	0.500" - 1.00"	SMAW (F-3) 22 080 J/in	SMAW (F-4) 72 450 J/in			
Electrode Wire feed speed range:		N/A				
Tungsten Electrode Size & Type:		N/A				
Mode of Metal Transfer for GMAW:		N/A				
TECHNIQUE QW-410						
String or Weave Bead:		Either. Weave size shall be controlled to prevent exceeding maximum heat input.				
Orifice or Gas Cup Size:		N/A				
Initial Cleaning:		Base material must be thoroughly cleaned of grease, rust, mill scale, dirt, etc., at least 1" back on each side of the joint prior to welding.				
Interpass Cleaning:		Perform by power brushing, grinding, etc. after each weld layer.				
Back Gouging:		Arc air, gouge, grind, etc. to clean metal if required.				
Oscillation:		N/A				
Contact Tube to Work Distance:		Not Applicable				
Multiple or Single pass (per side):		Single or Multiple for F-4 electrodes.				
Multiple or Single Electrodes:		Single				
Travel Speed (Range):		2 - 16 IPM				
Peening:		Not allowed				
TYPICAL WELDING PARAMETERS						
Process	Filler Metal		Current		Volt Range	Travel Speed (IPM)
	AWS Classification	Diameter (in)	Type & Polarity	Amp Range		
SMAW	E6010	3/32	DC RP	60 - 100	20 - 26	2 - 12
SMAW	E6010	1/8	DC RP	80 - 150	20 - 28	3 - 14
SMAW	E6010	5/32	DC RP	90 - 180	22 - 32	4 - 16
SMAW	E7018-1	3/32	DC RP	70 - 130	18 - 24	2 - 10
SMAW	E7018-1	1/8	DC RP	90 - 150	20 - 24	4 - 12
SMAW	E7018-1	5/32	DC RP	120 - 190	20 - 26	5 - 14
SMAW	E7018-1	3/16	DC RP	150 - 270	22 - 28	6 - 16
SMAW	E7018-1	1/4	DC RP	180 - 360	24 - 32	8 - 16
Notes: 1) Number of weld layers and size of filler metal may vary with thickness of base material and position of weld. 2) 3/16" & 1/4" E7018 electrodes limited to flat (1G) position only.						

Revision 3:

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Typical Joint Details QW-482

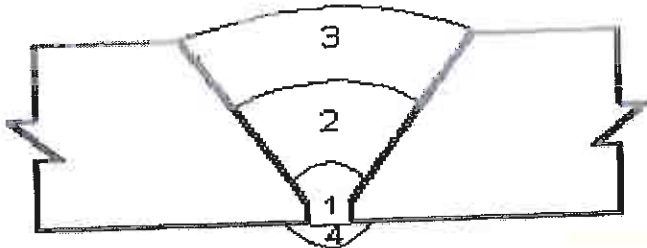
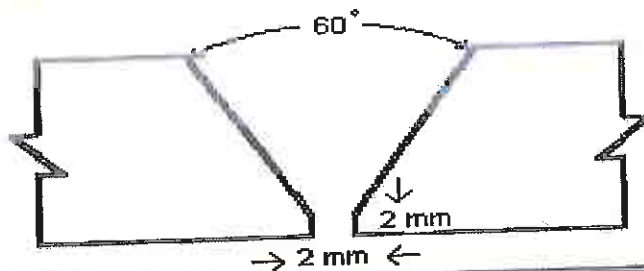
Prepared by: Qualimet



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



BASE METALS QW-403 Material Spec.: <u>SA-516</u> to <u>SA-516</u> Type or Grade: <u>Grade 60</u> <u>Grade 70</u> P-No. <u>P1 Group 1</u> <u>P-1 Group 2</u> Thickness of Test Coupon: <u>0.249" Plate</u> Other: Heat No.: <u>22648-015071-2</u> C.E.: <u>0.37</u>		POSTWELD HEAT TREATMENT QW-407 Temperature: <u>N/A</u> Time: <u>N/A</u> Other: <u>N/A</u>																									
FILLER METALS QW-404 <table border="1"> <tr> <td>Process</td> <td><u>SMAW</u></td> <td><u>SMAW</u></td> </tr> <tr> <td>SFA Spec:</td> <td><u>5.1</u></td> <td><u>5.1</u></td> </tr> <tr> <td>AWS Class.:</td> <td><u>E6010</u></td> <td><u>E7018-1</u></td> </tr> <tr> <td>F-No:</td> <td><u>F-3</u></td> <td><u>F-4</u></td> </tr> <tr> <td>A-No:</td> <td><u>A-1</u></td> <td><u>A-1</u></td> </tr> <tr> <td>Filler Metal Size:</td> <td><u>1/8"</u></td> <td><u>1/8"</u></td> </tr> <tr> <td>Deposited Metal:</td> <td><u>0.075"</u></td> <td><u>0.174"</u></td> </tr> <tr> <td>Other:</td> <td><u>Covered Electrode</u></td> <td><u>Covered Electrode</u></td> </tr> </table>		Process	<u>SMAW</u>	<u>SMAW</u>	SFA Spec:	<u>5.1</u>	<u>5.1</u>	AWS Class.:	<u>E6010</u>	<u>E7018-1</u>	F-No:	<u>F-3</u>	<u>F-4</u>	A-No:	<u>A-1</u>	<u>A-1</u>	Filler Metal Size:	<u>1/8"</u>	<u>1/8"</u>	Deposited Metal:	<u>0.075"</u>	<u>0.174"</u>	Other:	<u>Covered Electrode</u>	<u>Covered Electrode</u>	GAS QW-408 Type or Gas(es): <u>N/A</u> Composition: <u>N/A</u> Flow Rate: <u>N/A</u> Gas Backing Rate: <u>N/A</u> Other: <u>N/A</u>	
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POSITION QW-405 Position of Groove: <u>3G</u> Weld Progression: <u>Vertical Up</u> Other: <u>N/A</u>		ELECTRICAL CHARACTERISTICS QW-409 <table border="1"> <tr> <td>Current:</td> <td><u>F-3: Direct (DC)</u></td> <td><u>F-4: Direct (DC)</u></td> </tr> <tr> <td>Polarity:</td> <td><u>F-3: Reverse(EP)</u></td> <td><u>F-4: Reverse(EP)</u></td> </tr> <tr> <td>Amps:</td> <td><u>F-3: 65 - 80</u></td> <td><u>F-4: 70 - 100</u></td> </tr> <tr> <td>Volts:</td> <td><u>F-3: 23 - 36</u></td> <td><u>F-4: 20 - 23</u></td> </tr> <tr> <td>Heat Input:</td> <td><u>F-3: 28 080 J/in</u></td> <td><u>F-4: 59 800 J/in</u></td> </tr> <tr> <td>Other:</td> <td colspan="2"><u>N/A</u></td> </tr> </table>		Current:	<u>F-3: Direct (DC)</u>	<u>F-4: Direct (DC)</u>	Polarity:	<u>F-3: Reverse(EP)</u>	<u>F-4: Reverse(EP)</u>	Amps:	<u>F-3: 65 - 80</u>	<u>F-4: 70 - 100</u>	Volts:	<u>F-3: 23 - 36</u>	<u>F-4: 20 - 23</u>	Heat Input:	<u>F-3: 28 080 J/in</u>	<u>F-4: 59 800 J/in</u>	Other:	<u>N/A</u>							
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Other:	<u>N/A</u>																										
PREHEAT QW-406 Preheat Temp Min.: <u>50° F</u> Interpass Temp Max.: <u>500° F</u> Interpass Temp Min.: <u>50° F</u> Other: <u>Temperature monitored using Templistiks</u>		TECHNIQUE QW-410 Travel Speed: <u>F-3: 2 - 7.0 ipm</u> <u>F-4: 2.5 - 4.1 ipm</u> String or Weave Bead: <u>String and weave</u> Oscillation: <u>N/A</u> Multiple or Single Pass: <u>Multiple + single per side</u> Single or Multiple Electrodes: <u>Single</u> Other: <u>N/A</u>																									

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

PQR # 100-C

Tensile Test
QW 462

Specimen No.	Width in	Thickness in	Area in ²	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
			Not Applicable			

Guided Bend Tests
QW462

Type and Figure No.	Result
Not Applicable	

Toughness Tests
QW 170

Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values	Lateral Exp % Shear	Mils	Drop Weight Break	No Brk
			See Attached Report					

Other Tests
Not Applicable

Type of Test: _____
Other: _____

Welder's Name: Marvin Boe
Tests Conducted By: Qualimet Inc.

ABSA No.: W-6943

Stamp ID: KX
Lab. Test No.: 664-02001

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 Code.

Manufacturer: RJV Gas Field Services Ltd.

Date: July 08, 2002

By: Dale Laniuk

CHARPY V-NOTCH IMPACT TEST RESULTS

For Procedure Qualification Report # 100-C

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	Condition:	As Welded
Size:	0.2495" wt plate machined		
Specimen Type:	5.0 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)	Converted Full Size Impact Energy (J)	% Shear
Weld Zone	1	47	64	85	60
	2	55	75	99	60
	3	58	79	105	70
	Average:	53	72	96	63
Heat Affected Zone SA-516 Gr. 60	1	66	89	119	80
	2	70	95	127	80
	3	65	88	118	90
	Average:	67	91	121	83
Heat Affected Zone SA-516 Gr. 70	1	86	117	155	90
	2	78	106	141	90
	3	71	96	128	85
	Average:	78	106	142	88

Remarks: These Charpy v-notch impact test results exceed the minimum requirements of ASME Section VIII and E31.3 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:

M. Spinnu

Qualimet



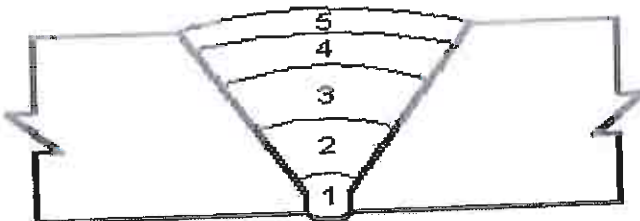
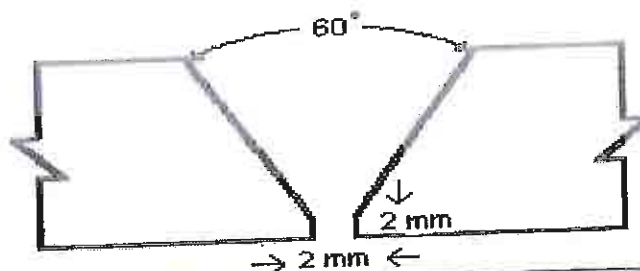
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"Your source of Quality Materials Engineering"



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-D Revision Date: -----
Revision No.: -----
WPS No: 104 Revision 2
Welding Process(es): SMAW / SMAW
Types: Manual / Manual

JOINTS QW-402



BASE METALS QW-403 Material Spec.: <u>SA-516</u> to <u>SA-516</u> Type or Grade: <u>Grade 60</u> <u>Grade 70</u> P-No.: <u>P1 Group 1</u> <u>P-1 Group 2</u> Thickness of Test Coupon: <u>0.500" plate</u> Other: <u>Heat No.: 94030-54885 C.E.: 0.38</u>		POSTWELD HEAT TREATMENT QW-407 Temperature: <u>N/A</u> Time: <u>N/A</u> Other: <u>N/A</u>																									
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Deposited Metal:	<u>0.075"</u>	<u>0.425"</u>																									
Other:	<u>Covered Electrode</u>	<u>Covered Electrode</u>																									
POSITION QW-405 Position of Groove: <u>3G</u> Weld Progression: <u>Vertical Up</u> Other: <u>N/A</u>		ELECTRICAL CHARACTERISTICS QW-409 <table border="1"> <tr> <td>Current:</td> <td>F-3: <u>Direct (DC)</u></td> <td>F-4: <u>Direct (DC)</u></td> </tr> <tr> <td>Polarity:</td> <td>F-3: <u>Reverse(EP)</u></td> <td>F-4: <u>Reverse(EP)</u></td> </tr> <tr> <td>Amps:</td> <td>F-3: <u>70 - 80</u></td> <td>F-4: <u>70 - 100</u></td> </tr> <tr> <td>Volts:</td> <td>F-3: <u>20 - 23</u></td> <td>F-4: <u>20 - 23</u></td> </tr> <tr> <td>Heat Input:</td> <td>F-3: <u>22 080 J/in</u></td> <td>F-4: <u>72 450 J/in</u></td> </tr> <tr> <td>Other:</td> <td colspan="2"><u>N/A</u></td> </tr> </table>		Current:	F-3: <u>Direct (DC)</u>	F-4: <u>Direct (DC)</u>	Polarity:	F-3: <u>Reverse(EP)</u>	F-4: <u>Reverse(EP)</u>	Amps:	F-3: <u>70 - 80</u>	F-4: <u>70 - 100</u>	Volts:	F-3: <u>20 - 23</u>	F-4: <u>20 - 23</u>	Heat Input:	F-3: <u>22 080 J/in</u>	F-4: <u>72 450 J/in</u>	Other:	<u>N/A</u>							
Current:	F-3: <u>Direct (DC)</u>	F-4: <u>Direct (DC)</u>																									
Polarity:	F-3: <u>Reverse(EP)</u>	F-4: <u>Reverse(EP)</u>																									
Amps:	F-3: <u>70 - 80</u>	F-4: <u>70 - 100</u>																									
Volts:	F-3: <u>20 - 23</u>	F-4: <u>20 - 23</u>																									
Heat Input:	F-3: <u>22 080 J/in</u>	F-4: <u>72 450 J/in</u>																									
Other:	<u>N/A</u>																										
PREHEAT QW-406 Preheat Temp Min.: <u>50° F</u> Interpass Temp Max.: <u>500°F</u> Interpass Temp Min.: <u>50° F</u> Other: <u>Temperature monitored using Tempstiks</u>		TECHNIQUE QW-410 Travel Speed: <u>F-3: 5.0 - 6.0 ipm F-4: 2.0 - 3.5 ipm</u> String or Weave Bead: <u>String and weave</u> Oscillation: <u>N/A</u> Multiple or Single Pass: <u>Multiple</u> Single or Multiple Electrodes: <u>Single</u> Other: <u>N/A</u>																									

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

PQR # 100-D

Tensile Test
QW 462

Specimen No.	Width in	Thickness in	Area in ²	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
			Not Applicable			

Guided Bend Tests
QW462

Type and Figure No.	Result
Not Applicable	

Toughness Tests
QW 170

Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values	Lateral Exp % Shear	Mils	Drop Weight Break	No Brk
				See Attached Report				

Other Tests
Not Applicable

Type of Test:	
Other:	

Welder's Name: Marvin Boe ABSA No.: W-6943 Stamp ID: KZ
 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, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: RJV Gas Field Services Ltd.

Date: July 08, 2002 By: Dale Laniuk

• 7817 CORONET ROAD, EDMONTON, AB T6E 4N7 (780) 469-5870 • FAX (780) 465-5829
 • CALGARY (403) 273-9862 • 1-800-621-8979

CHARPY V-NOTCH IMPACT TEST RESULTS

For Procedure Qualification Report # 100-D

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:	As Welded
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 Energy		% Shear
		ft-lb	(Joule)	
Weld Zone	1	56	76	45
	2	47	64	25
	3	52	71	35
	Average:	51	70	25
Heat Affected Zone SA-516 Gr. 60	1	101	137	75
	2	111	151	90
	3	94	128	65
	Average:	102	138	77
Heat Affected Zone SA-516 Gr. 70	1	109	148	80
	2	119	162	88
	3	114	155	80
	Average:	114	155	83

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:

M. J. Pannu

Qualimet



An Alberta Company
 Certified by the Canadian Welding Bureau & Alberta Boilers 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
 "Your source of Quality Materials Engineering"



PROCEDURE QUALIFICATION RECORD

R.J.V. Gasfield Service Ltd, 4901 Bruce Rd., Box 295, Vegreville, Alberta T0B 4L0

PROCEDURE QUALIFICATION RECORD NUMBER 100-1 DATE September 2, 1981

WELDING PROCEDURE SPECIFICATION NUMBER 100 (Rev. 2)

WELDING PROCESS(ES) SMAW TYPES Manual

JOINTS (QW-402)

Type Butt: single vee

BASE METALS (QW-403)

Material Spec. SA 106 Type or Grade Grade B

P-No. 1 to P-No. 1 Thickness 12.7mm (1/2 in.)

Diameter 219.1mm (8.625 in.) Other

FILLER METALS (QW-404)

SFA Specification 5.1 5.1

AWS Classification E6010 E7018

Filler Metal F-No. 3 4

Weld Metal Analysis A-No. 1 1

Size of Filler Metal See sketch next page

Deposited Weld Metal Thickness F3: 2.0mm F4: 10.7mm

Other No single pass with over 1/2" (12.7mm) of deposited metal

POSITION (QW-405)

Position of Groove 1G Weld Progression

PREHEAT (QW-406)

Preheat Temp. None Interpass Temp. None

POSTWELD HEAT TREATMENT (QW-407)

Temperature None Time

GAS (QW-408)

Type of Gas(es) N/A Composition of Mixtures

Other

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) Multipass

Single or Multiple Electrodes Single

String or Weave Bead Both

Other

Other

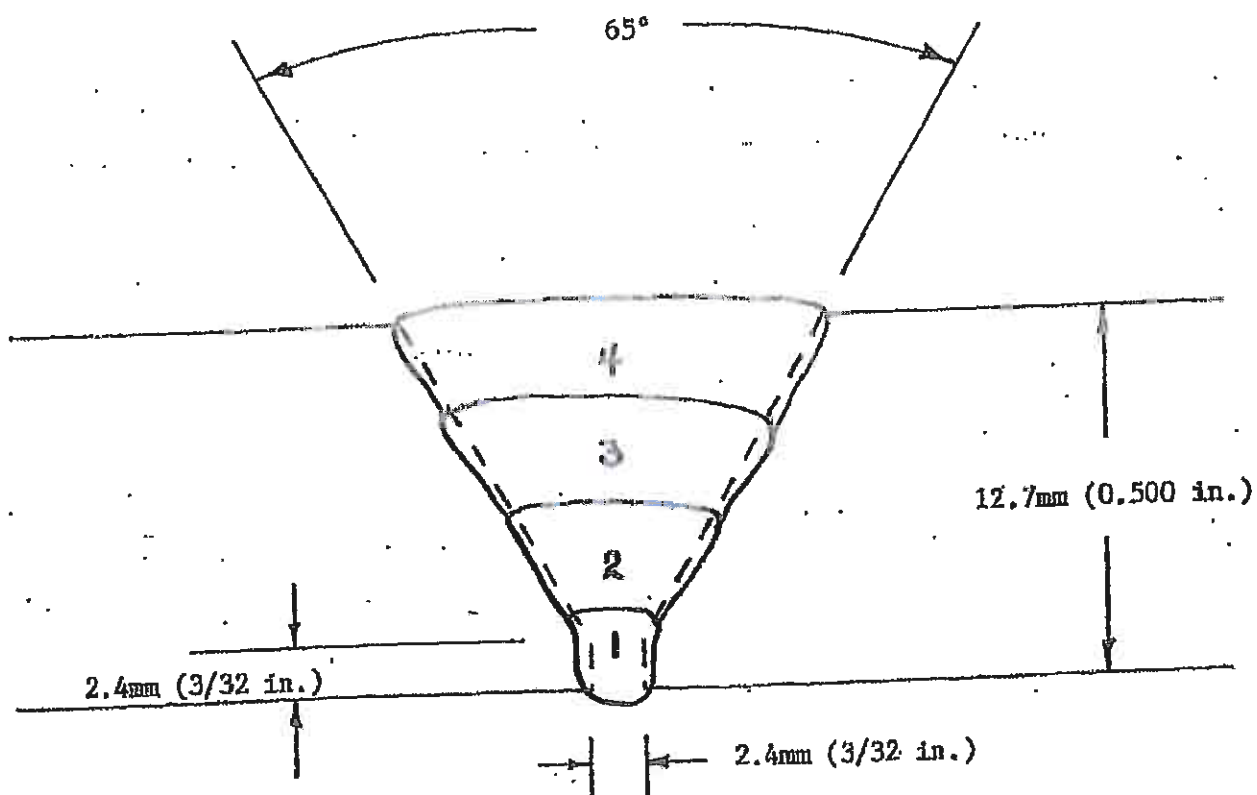
Other

Other

Other

Other

Other



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 Stress MPa (psi)	Character & Location of Failure
T-1	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 (.450)	213.4 (.331)	103,000 (23,100)	482 (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 Zone: _____

Welders Name: Dale Laniuk

Certificate Number: W-6597

Tests Conducted By: Hanson Material Engineering (Western) Ltd.

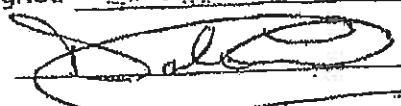
Per: Gilles Perreault, C.E.T.

Laboratory Test Number: B81-8-1061

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 November 24, 1982

By 

PROCEDURE QUALIFICATION RECORD

PROCEDURE QUALIFICATION RECORD NUMBER 100-B DATE August 3, 1987

WELDING PROCEDURE SPECIFICATION NUMBER 100-(Rev. 2)

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 Grp. 2 to P-No. 1 Grp. 2 Thickness 9.53mm (0.375 in.)
Diameter _____ Other _____

FILLER METALS (QW-404)
SFA Specification 5.1 5.1
AWS Classification E6010 E7018
Filler Metal F-No. 3 4
Weld Metal Analysis A-No. 1 1
Size of Filler Metal See attached sketch next page
Deposited Weld Metal Thickness F3: 2mm F4: 7.53mm
Other No single pass with over 1/2" (12.7mm) of deposited metal

POSITION (QW-405)
Position of Groove 1G Weld Progression _____

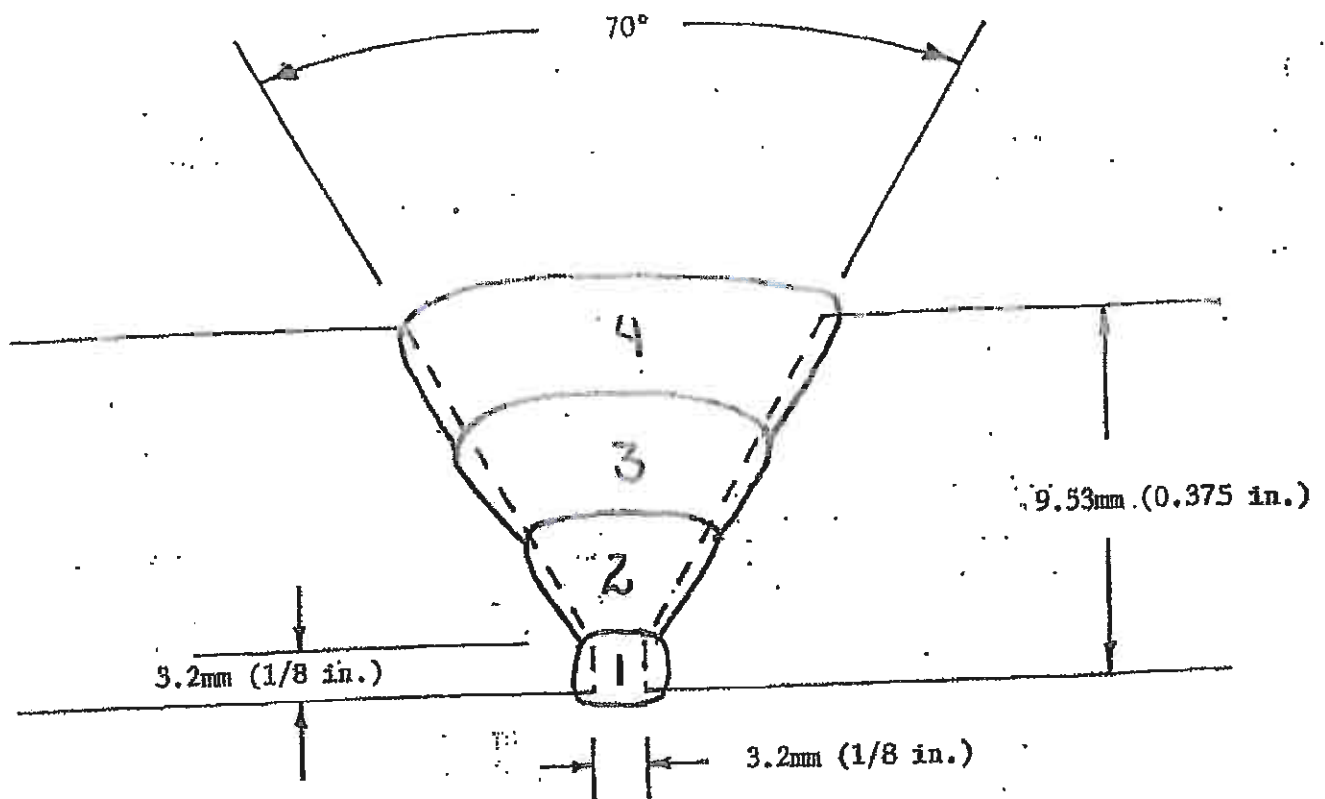
PREHEAT (QW-406)
Preheat Temp. 20°C (70°F) Interpass Temp. Weld build up

POSTWELD HEAT TREATMENT (QW-407)
Temperature None Time _____

GAS (QW-408)
Type of Gas(es) N/A Composition of Mixtures _____
Other _____

ELECTRICAL CHARACTERISTICS (QW-409)
Current Direct Polarity Reverse
Amps See attached sketch Volts _____
Other _____

TECHNIQUE (QW-410)
Travel Speed _____
Multipass or Single Pass (per side) F3: Single; F4: Multiple
Single or Multiple Electrodes Single
Ping 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	38.4 (1.51)	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	Type and Figure Number	Result
Side S-1	Pass	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

Tests Conducted By: Ludwig's Welding Consulting Ltd.

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, 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.

By [Signature]

Date September 24, 1987