



Prepared For:

Customer: Repsol Oil & Gas Canada Inc

Location: 12-05-54-20 W5M

Project: Fire Tube Repair

Inspector: Greg Guenette

Project Foreman: Shane Vanderkooi

Job Number: 535.114736

Start Date: May 12, 2016

Prepared By: Amanda Schultz

**Strike Group**

3624 - 1 st Avenue, Edson, Alberta T7E 1N9

(780) 712-4481 office (780) 712-4482 fax

TURNOVER PACKAGE



## Quality Contract Review

Customer: Husky EnergyJob Number: 535.114736Project: Fire Tube RepairSite/Location: Galloway

## PARTY RESPONSIBLE TO PROVIDE

Description	Customer	Contractor	Comments
Drawings & Specifications	X		To <u>Husky</u> Specs.
Design Registration	X		Customer to provide piping design Alberta Registration Number.
Material Procurement	X	X	Customer/ Strike to Order & Receive.
Material Identification & Traceability		X	MTR's to be supplied with delivery, received & color coated by Strike.
Welding Documentation		X	Welder Qualifications, welders declarations & approved weld procedures.
Non-Destructive Examination / Lot Size	X	X	Husky to provide all NDE. Strike to perform quality checks on contractor
Post Weld Heat Treatment	N/A	N/A	Follow PWHT Instructions Form CF-Q-F-500
Measuring & Test Equipment		X	Strike to order & use calibrated test equipment.
Hydrostatic Pressure Test	<u>N/A</u>	<u>X N/A</u>	Strike to conduct and have the Customer & Strike Witness & Sign-off.
Pneumatic Pressure Test	N/A	N/A	
Pneumatic Stored Energy Calculation	N/A	N/A	
Record Retention			Originals to customer, Strike to retain a copy contained in the job binder.
Turnover Documentation & Packages <u>1</u> Hard Copies. <u>1</u> Electronic Copies. Table of Contents Approved.	X	X	Both parties to sign-off & copies made for customer.

*The Alberta Pressure Equipment Safety Regulation requires the Owner/Customer to have an ABSA authorized Quality Control System if they assume any of the quality systems functions listed above. A pressure piping system exceeding 0.5m3 in capacity must be registered with ABSA.*

**Strike Representative:**

Amanda Schultz		May 12, 2016
Name ( print or type )	Signature	Date ( m/d/y )

**Customer Representative:**

Greg Guenette		<u>May 12 / 2016</u>
Name ( print or type )	Signature	Date ( m/d/y )



CF-Q-F-102

## Pressure Piping Examination

Customer: Husky EnergyJob Number: 535.114736Project: Fire TubeSite/Location: Ballouway

No.	FUNCTION	INITIAL & DATE	
		QC Inspector	Owner's Inspector
1.	DRAWINGS: ABSA registration over 0.5m <sup>3</sup> , Approved by Owner, Approved for Construction. <i>less than 0.5m<sup>3</sup></i>	<i>AS 12-May 2016</i>	<i>GPG May 12/2016</i>
2.	A.I. ( when required ) and Owner's Inspector notified. <i>A.I. not req'd</i>	<i>AS 12-May 2016</i>	<i>GPG May 12/2016</i>
3.	Registered WPS, QSM & QC forms available at site. Job file started.	<i>AS 12-May 2016</i>	<i>GPG May 12/2016</i>
4.	Welder is qualified for WPS and has valid Performance Qualification Cards. Welder's Log started. WPS reviewed with welders.	<i>AS 12-May 2016</i>	<i>GPG May 12/2016</i>
5.	Material checked against P.O, drawings & specifications. Identification confirmed. MTR's reviewed. Colour coding applied if required.	<i>no material req'd</i>	<i>no material required</i>
6.	Sample each welder's work examined, including root spacing, Alignment, cleaning, joint preparation, preheat & electrode control.	<i>AS 12-May 2016</i>	<i>GPG May 12/2016</i>
7.	Visual Examination of all completed welds. Welder's ID marked near welds and/or recorded on drawings.	<i>AS 12-May 2016</i>	<i>GPG May 12/2016</i>
8.	NDE completed. Reports and radiographs filed and signed by Level II or III. Radiographer ID detailed on drawings. If other NDE used, same applies.	<i>AS 13-May 2016</i>	<i>GPG May 13/2016</i>
9.	Heat treatment verified and recorded on drawings. Equipment calibrated.	<i>N/A</i>	<i>N/A</i>
10.	System(s) checked against specifications and drawings. Equipment calibrated.	<i>in service test</i>	<i>in service test</i>
11.	Recorded deficiencies signed off (QCI & Owners Inspector ) before pressure test.	<i>in service test</i>	<i>in service test</i>
12.	Pressure test monitored. Gauge calibration verified and Gauge number recorded.	<i>in service test</i>	<i>in service test</i>
13.	System checked after test. Deficiencies recorded & corrected.	<i>in service test</i>	<i>in service test</i>
14.	Construction data reports prepared and signed by Strike & Owners Inspector.	<i>N/A</i>	<i>N/A</i>
15.	Declaration from submitted to Owner / Customer.	<i>AS 18-May 2016</i>	<i>GPG May 18/2016</i>
16.	"AS-BUILT" Drawings accepted by Owner.	<i>N/A</i>	<i>N/A</i>

Note: This form is to be presented to the Owner's Inspector in order that Hold Points can be marked. These are indicated by an asterisk\* in the Owner Inspector column next to the item number, the hold point is for. Construction must not pass this point until the Owner's Inspector has signed off.

*AS - Amanda Schultz*  
Strike Group  
Quality Rep

*GPG - Greg Guenette*  
Husky Energy





CF-Q-F-814

**Completion Of Construction Turnover Certificate**Customer: Husky EnergyJob Number: 535.114736Project: Fire TubeSite/Location: Balloway Plant**MECHANICAL COMPLETION**

It is hereby certified that all of the construction required within the scope of this project has been completed in accordance with the project specifications, with the exception of the deficiencies listed on page (2), which are not deemed to affect the safe operability of the facilities. Upon evidence of the pressure piping system(s) having been successfully hydro-tested, the client hereby accepts care, custody and control of the facilities for the purpose of commissioning and routine operation.

**Strike Representative:**

Amanda Schultz

Name ( print or type )

Signature

18-May-2016

Date ( m/d/y )

**Client Representative:**

Greg Guenette

Name ( print or type )

Signature

May 18 / 2016

Date ( m/d/y )

**FINAL COMPLETION**

It is hereby certified that all deficiencies ( if any ) listed below have been completed to the client's satisfaction.

**Strike Representative:**

Amanda Schultz

Name ( print or type )

Signature

18-May-2016

Date ( m/d/y )

**Client Representative:**

Greg Guenette

Name ( print or type )

Signature

May 18 / 2016

Date ( m/d/y )

**DEFICIENCY LIST**

Item Number	Description	Target Date To Rectify	Customer Rep (initial)	Strike Rep (initial)
1	tested - in service	—	—	—

## PRESSURE EQUIPMENT REPAIR / ALTERATION PROCEDURE

Repair / Alteration Scope Repair Cracks In Stabilizer Fire Tube

IDR# \_\_\_\_\_ Requested By Peter Beres Name \_\_\_\_\_ Signature \_\_\_\_\_ Date May 11/16

Plant Name Galloway Gas Plant Location (LSD) 12-05-54-20W5 Job # 81095708

Equipment Description Fire Tube Tag # \_\_\_\_\_ Prov. Reg # N/A

Manufacturer ALCO Serial # 2001-6729-02 CRN N/A

Work to be performed is a ☒ O/U Repair ☐ Jurisdiction Repair ☐ Alteration ☐ Partial ☐ Final

Work to be performed under ☐ Husky O/U Program ☒ Contract Repair / Alteration Company AQP

MOC Required ☐ MOC Initiated ☐ MOC Tracking # N/A

Authorized Inspector Notified \_\_\_\_\_ Name \_\_\_\_\_ Date \_\_\_\_\_

A.I. Location \_\_\_\_\_ Phone \_\_\_\_\_ A.I. Inspection required Yes ☐ No ☒

Name & Address of Repair Organization Strike Group Partnership, Edson Alberta

Husky/Contractor AQP # 1503 Expiry Date September 2, 2016 Job # 114736

Work Start Date MAY 11, 2016 Contact Dustin Jackson Phone 17807124481

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Original Design Code ☐ ASME I ☐ ASME IV ☒ ASME VIII Year N/A Addenda \_\_\_\_\_

Repair Design Code ☐ ASME I ☐ ASME IV ☒ ASME VIII Year \_\_\_\_\_ Addenda \_\_\_\_\_

Shellside Process Fluid HOT OIL ☒ Sweet ☐ Sour ☐ Low Temp

Tubeside Process Fluid FIRE ☒ Sweet ☐ Sour ☐ Low Temp

Vessel/Shellside/Boiler MAWP \_\_\_\_\_ kPag @ \_\_\_\_\_ °C MDMT \_\_\_\_\_ °C

Jacket/Tubeside MAWP 102 kPag @ 170 °C MDMT \_\_\_\_\_ °C

☐ RT-1 ☐ RT-2 ☐ RT-3 ☐ RT-4 PWHT ☐ Yes ☒ No Test Press \_\_\_\_\_

New Design Condition ☐ ASME I ☐ ASME IV ☐ ASME VIII Year \_\_\_\_\_ Addenda \_\_\_\_\_

Shellside Process Fluid \_\_\_\_\_ ☐ Sweet ☐ Sour ☐ Low Temp

Tubeside Process Fluid \_\_\_\_\_ ☐ Sweet ☐ Sour ☐ Low Temp

Vessel/Shellside/Boiler MAWP \_\_\_\_\_ kPag @ \_\_\_\_\_ °C MDMT \_\_\_\_\_ °C

Jacket/Tubeside MAWP \_\_\_\_\_ kPag @ \_\_\_\_\_ °C MDMT \_\_\_\_\_ °C

☐ RT-1 ☐ RT-2 ☐ RT-3 ☐ RT-4 PWHT ☐ Yes ☐ No Test Press \_\_\_\_\_

Sketch/Picture (use the space provided or attach an additional page to show details of the repair/alteration) Separate page attached ☒ Yes ☐ No

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**PRESSURE EQUIPMENT REPAIR / ALTERATION PROCEDURE****Material List** - List any material(s) used in the repair/alteration and/or the base material being welded on.

Item	Description	Size / Diameter	Material & Grade	Thickness / Schedule / Rating	Quantity

**WELDING REQUIREMENTS**

Welding Procedure Specification Number	SES 201-LT(REV 3)	PQR	QW483
Min Preheat Temp	10°C	PWHT Required	<input type="checkbox"/> Yes (see PWHT Instruction Sheet) <input checked="" type="checkbox"/> No
Welder Qualifications			

**Replacement Parts:** Attached are the Manufacturer's Partial Data Reports properly identified and signed by the Authorized Inspector for the following items of this Procedure. (i.e. formed heads or welded parts supplied by others).

The following Husky Specifications form part of the requirements of this Procedure.

Spec. Number	Name	Spec. Number	Name

The following Drawings and Documents form part of the requirements of this Procedure.

Title	Name/Number

**SCOPE DESCRIPTION**

1. During inspection of the fire tube cracks were found on the burner and exhaust fillet welds that attach the fire tube to the flange. This is a non-code repair. This fire tube is part of a line heater a pressure coil run through.

**DETAILED PROCEDURE**

Describe:

1. Fire tube to be cleaned at location (12-05)
2. Fire tube will be transported to Strike shop in Edson
3. Inspector to review procedure with Strike QC and welder. (Greg Guenette)
4. Grind out cracks and 1 inch of the fillet weld on either side of the cracks
5. NDE (Foothills) to wet visible mag particle the remaining weld to ensure all crack have been removed
6. Welder to weld fire to back to flange using a ¼ inch fillet weld
7. NDE (Foothills) to wet visible mag particle to ensure repair weld has no external under-cut, surface porosity and 3:1 transition to parent material
8. ~~Prep fire tube for leak test.~~ *SPG May 12/2016*
9. In-service test fire tube
10. Drain and prep for transport back to location (12-05)
11. Install fire tube

**PRESSURE TEST: (Use QR-16.4 Leak Test form)**

	Test Pressure / Temperature	Test Medium / Hold Time
Hydrostatic	<u>14 PSI</u> <i>SPG May 11/16</i>	<u>Water/15 min</u> <i>SPG May 12/16</i>
Pneumatic		

**INTERNAL COATING / PAINTING / INSULATION**

Identify specification, inspection and testing requirements.



## PRESSURE EQUIPMENT REPAIR / ALTERATION PROCEDURE

### CRITICAL JOB ACTIVITIES

**AI:** Jurisdictional Authorized Inspector (The AI may identify hold points by initialing the task(s) they would like to witness). All activities are considered to be the responsibility of the Repair Company and should be reflected / transferred to the required documentation referenced in their registered QA / QC Program Manual.

No.	Activity	Husky Energy	Contractor	AI
1.	Engineering design/drawings registered with Jurisdictional Authority	Review	Review	
2.	Contractor Repair/Alteration Procedure accepted by Husky	H	H	
3.	Weld Procedure(s) to be used are accepted by Husky	H	H	
4.	Welder's ID / Qualifications checked	H	H	
5.	Inspector (Visual/NDE) Qualifications checked	V	X	
6.	Material checked against drawing / bill of material			
7.	Mill test reports checked on weld fittings and pipe			
8.	Threaded fittings checked for traceability / identification			
9.	Flange and fitting ratings checked			
10.	Replacement parts verified on Manufacturer's Partial Data Report			
11.	Degas heat treatment (Bake-out)			
12.	Surface preparation acceptable prior to welding	V	X	
13.	NDE completed and acceptable prior to welding	X	X	
14.	Fit-up checked			
15.	In-Process visual inspection completed	V	X	
16.	Final visual inspection (internal and external) completed	V	X	
17.	Post Weld Heat Treatment checked and chart verified / signed			
	<b>NDE Required</b>			
18.	Radiography complete and acceptable			
19.	Ultrasonics complete and acceptable			
20.	Other (MPI, LPI, etc.) complete and acceptable	H	H	
21.	Hardness testing complete and acceptable			
22.	NDE reports reviewed	V	X	
23.	Hydrostatic / Pneumatic test completed and form signed off	H	H	
24.	Alternative testing completed and form signed off			
25.	Internal coating / test report complete			
26.	External painting / insulation complete			
27.	Affidavits, Data Reports and Repair/Alteration Report complete			
28.	Repair/Alteration nameplate stamped and installed on equipment			
29.	In-Service Leak Test Completed			
30.	Document package provided to facility office.	V	X	
31.	Document package sent to Calgary Technical Services	V	X	
H = Hold      V = Verify      X = Required Inspection / Test / Activity (Can be indicated by % required)				

### QUALITY DOCUMENTS

The following documents, as a minimum, along with this Pressure Equipment Repair / Alteration Procedure shall be completed by the Repair Company/Fabrication Vendor and the completed "Quality Job File" submitted to the Lead Asset Integrity Inspector. All documentation shall be stored in the Equipment QA History file.



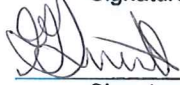
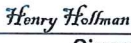

Document Name	Review for Acceptance prior to start of Repair / Alteration	Developed By
Contractor Repair / Alteration Procedure	Husky/Strike	Greg Guenette
Copy of QA Program Certificate (AQP)	Husky	Greg Guenette
Copy of Weld Procedure(s) used	Husky	Greg Guenette
Copy of Welder Certificates	Husky/Strike	Greg Guenette
Copy of Inspector (Visual/NDE) Certifications	Husky/Strike	Greg Guenette
Manufacturer's Partial Data Report		
Copy of completed Jurisdictional Repair / Alteration Report		



### PRESSURE EQUIPMENT REPAIR / ALTERATION PROCEDURE

Completed Contractor Repair / Alteration Procedure		
Completed Inspection and Test Plan	Husky/Strike	Greg Guenette
Engineered Drawings / Data sheets (if applicable)		
As-Built Drawings / Weld Map / NDE Map	Strike	Strike
MTRs, Certificates of Compliance or Heat Log / Map		
NDE Interpretation Reports		
Radiographic Film	Strike	Strike
Leak Test Reports	Strike	Strike
Repair / Alteration Nameplate Facsimile		
Bake-Out Procedure (sour service only)		
Post Weld Heat Treatment Report / Chart		
Alternative Testing & In-Process Examination Report		
Gauge Calibration Certificate		
Coating Application and Testing Reports		
Bolting / Torqueing Procedure	Husky	Husky

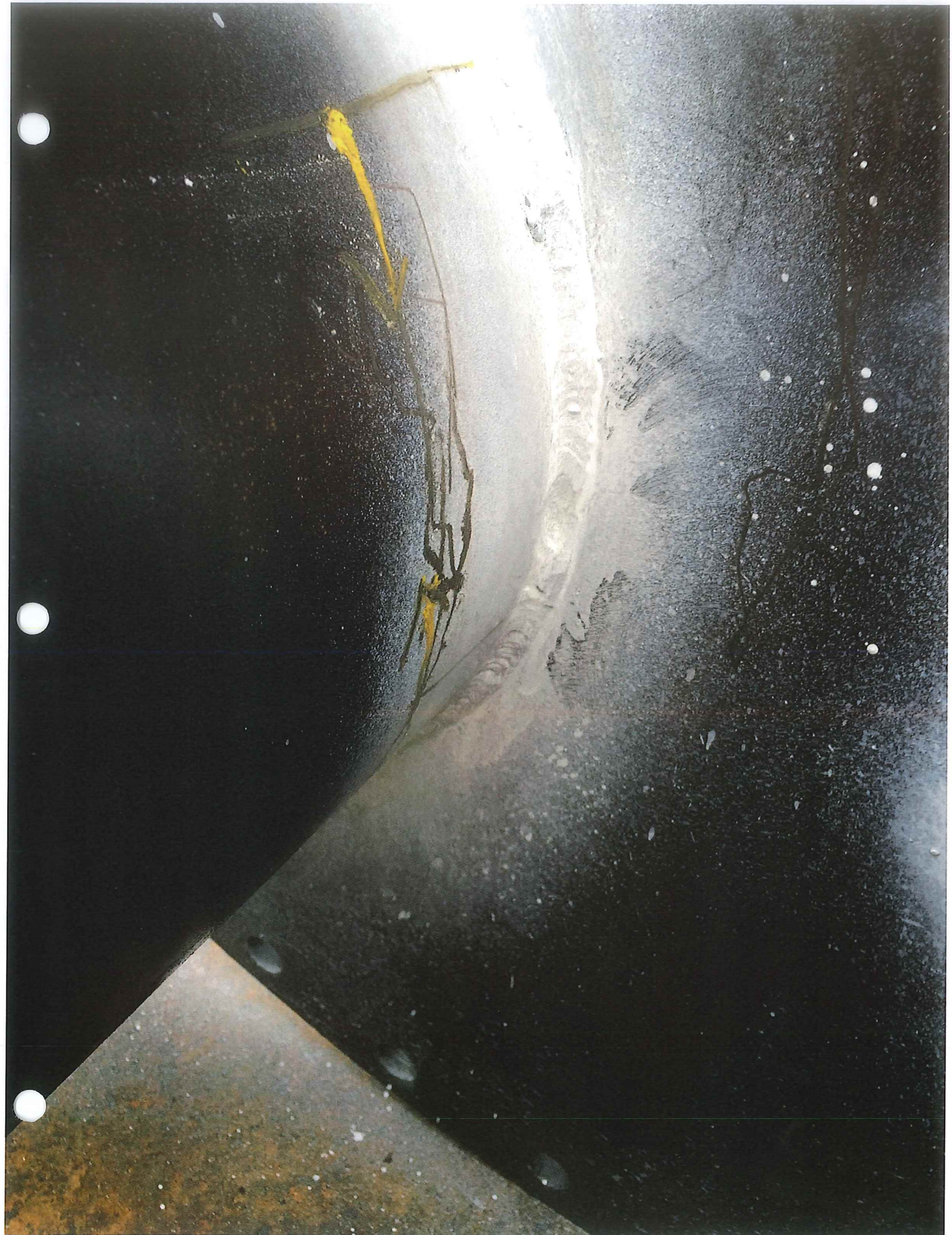
#### Accepted by

Business Unit Leadership	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Peter Beres		05/11/16
		Name	Signature	Date
Facilities/Project Engineer	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Cindy Gillespie		05/11/16
		Name	Signature	Date
Asset Integrity Inspector	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Greg Guenette		May 11/16
		Name	Signature	Date
Lead Asset Integrity Inspector	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Henry Hollman		05-11-16
		Name	Signature	Date
Chief Inspector	<input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No			
		Name	Signature	Date
Authorized Inspector	<input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No			
		Name	Signature	Date
Repair Organization Review & Acceptance		Amanda Schultz		12-May-16
		Name	Signature	Date











# Certificate of Authorization Permit

## Quality Management System

Expiry Date: **September 2, 2016**

Reg. No.: **AQP-1503**

### STRIKE GROUP LIMITED PARTNERSHIP

1027 WESTERN DRIVE  
CROSSFIELD, ALBERTA

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

	<u>Construction</u>	<u>Repair</u>	<u>Alter</u>
<b>Pressure Vessels</b>			
ASME Section VIII-1 Pressure Vessels	Shop	Shop/Field	Shop/Field
Miniature Vessels in accordance with CSA B51	Shop	---	---
<b>Pressure Piping</b>			
ASME B31.1 Power Piping	Shop/Field	Shop/Field	Shop/Field
ASME B31.3 Process Piping	Shop/Field	Shop/Field	Shop/Field
CSA Z662 Steam Pipelines	Shop/Field	Shop/Field	Shop/Field
<b>Fittings</b>			
Category A,E,H	Shop	Shop	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 11th day of February, 2016



Chief Inspector and Administrator

**Certificate No.: 11124**



WELDING PROCEDURE SPECIFICATION NO.: SES-201 LT (Rev. 3)

WELDING PROCEDURE QUALIFICATION RECORD NO.(S): SES-201-5, SES-201-6,  
SES-201-7,  
UG84-AW-1 (Rev. 0)

QUALIFIED IN ACCORDANCE WITH ASME SECTION IX FOR

Base Metal (Typical): Std. Appl.: P1 to P1  
(SA 36, SA 106 Gr. B, SA 105, SA 516 Gr. 70, etc.)  
Notch Appl.: P1 Groups 1 & 2 to P1 Groups 1 & 2  
(SA 333 Gr. 6, SA 350 Gr. LF2, SA 420 WPL6, SA 516 Gr. 70, etc.)  
CSA grades are restricted to Gr. 386 and lower, API grades  
restricted to Gr. X56 and lower.

Process(es): SMAW  
Weld Types: GROOVE & FILLET  
Position: ALL POSITIONS  
Diameter: ALL DIAMETERS  
Filler Metal: Std. Appl.: E6010, E7018, E7018-1 Notch Appl.: E6010, E7018-1

**BASE METAL CONDITIONS & GROOVE THICKNESS RANGE QUALIFIED:**

STANDARD APPLICATIONS AS WELDED  
BASE METAL THICKNESS RANGE 0.062 to 8.00 in. inclusive

NOTCH TOUGHNESS APPLICATIONS TO -50 °F AS WELDED  
BASE METAL THICKNESS RANGE 0.116 to 8.00 in. inclusive

COMBINED DEPOSITED WELD METAL THICKNESS  
ASME B31.1 8.00 in. maximum  
ASME B31.3 8.00 in. maximum  
ASME SECTION VIII, DIVISION 1 1.50 in. maximum  
CSA Z662 Clause 7.2.5 1.25 in. maximum

**ASQA**  
SAFETY CODES ACT - PROVINCE OF ALBERTA  
WELDING PROCEDURE

Reg. No. WP 35842  
Spec No. SES-201 LT (Rev. 3)  
Weld Process SMAW  
Mall. Gr. P No. 1Gr 1+2 to P No. 1Gr 1+2  
Elect Gr. F No. 3+4 A No. 1  
Th. Qual For 203mm P.W.H.T. NO  
MIN TH QUAL 29mm, C/W -46°C  
Yr. 15 Mo. 11 Day 4 Signed J. Reinhart  
JASON REINHART, P.ENG.  
WELDING SPECIALIST

PROVINCIAL REGISTRATION

This WPS was prepared to the requirements of ASME Section IX 2013 and includes some of the additional requirements of the construction codes listed. The application of this WPS is outside the work scope of SGS Canada Inc.

Prepared By: Darren McLean, C.E.T.

Signed: [Signature]

Date: Oct 23/2015

Reviewed By: Steve Rieberger, C.E.T.

Signed: [Signature]

Date: Oct 26/2015

(File C15-01114)

## QW-482 WELDING PROCEDURE SPECIFICATION (WPS)

Company Name Strike Group Limited Partnership (Strike Group LP)  
Welding Procedure Specification No. SES-201 LT (Rev. 3) Date October 21, 2015  
Revisions Rev. 3 (Nonessential) Company name change to Strike Group Limited Partnership  
(Strike Group LP), formerly Strike Industrial Ltd. Full format, and code update.  
Supporting PQR No.(s) SES-201-5, SES-201-6, SES-201-7, UG84-AW-1 (Rev. 0)  
Welding Process(es) Shielded Metal Arc Welding (SMAW)

### JOINTS (QW-402)

Joint Design All ASME groove & fillet, reference construction drawing for joint details.  
Where joint details are not specified, refer to figures 1 to 15 attached.  
Partial penetration butt welds are not permitted for CSA Z662.  
Root Opening As per attached typical groove designs, see figures 1 to 15 attached  
Backing With or without Retainers Not required

### BASE METALS (QW-403)

P-Number Std. Appl.: P1 To P-Number P1  
P-Number Notch Appl.: P1 Groups 1 & 2 To P-Number P1 Groups 1 & 2  
Thickness Range: Groove Std. Appl.: 0.062 to 8.00 in. inclusive  
Notch Appl.: 0.116 to 8.00 in. inclusive (1)  
Fillet Std. Appl.: All base metal thicknesses  
Notch Appl.: 0.116 to 8.00 in. inclusive  
Pipe Diameter Ranges: Groove All diameters  
Fillet All diameters  
Deposited Weld Metal (Per Pass) F3: 0.188 in. maximum  
F4: 0.250 in. maximum

(1) Reference thickness limitations for tests on welds in fabrication or assembly in  
ASME B31.3 Table 323.3.1 - Impact Testing Requirements for metals.

### CSA Z662 BASE METAL RESTRICTIONS

Strength Restricted to materials with a specified minimum yield strength (SMYS)  
not exceeding 56 ksi  
Carbon Equivalent Sweet Service - N/A for SMYS of 52 ksi and lower  
Sweet Service - 0.45% max. for SMYS above 52 to 56 ksi  
Sour Service - carbon equivalent limitations to be determined by Engineer  
in charge (but not greater than 0.45% for SMYS of 56 ksi and lower),  
also refer to CSA Z662 section 16. Carbon Equivalent formula  
per CSA Z662.

### FILLER METALS (QW-404)

	SMAW	SMAW
Specification No. (SFA)	<u>SFA 5.1</u>	<u>SFA 5.1</u>
AWS No. (Class) Std. Appl.:	<u>E6010</u>	<u>E7018, E7018-1</u>
AWS No. (Class) Notch Appl.:	<u>E6010</u>	<u>E7018-1</u>
F-No.	<u>F3</u>	<u>F4</u>
A-No.	<u>A1</u>	<u>A1</u>
Size	<u>3/32 to 3/16 in. inclusive</u>	<u>3/32 to 1/4 in. inclusive</u>
Deposited Weld Metal Thickness Range:		
Groove	<u>0.188 in. max. (2)</u>	<u>8.00 in. max. (2)</u>
Fillet	<u>All fillet sizes (3)</u>	<u>All fillet sizes</u>
(2) <u>Combined deposited weld metal thickness shall not exceed 8.00 in. for ASME B31.1,</u>		
<u>B31.3, and 1.50 in. for ASME Sect. VIII Div. 1, and 1.25 in. for CSA Z662.</u>		
(3) <u>E6010 is not permitted for fillet welds on base metals with a specified minimum yield</u>		
<u>strength higher than 45 ksi for CSA Z662, and restricted to a single pass for fillet weld</u>		
<u>applications requiring an MDMT less than -20 °F for CSA Z662 and ASME B31.3.</u>		

**POSITION (QW-405)**

Position of Groove	All Positions	Position of Fillet	All Positions
Weld Progression	F3: Vertical up or down	F4: Vertical up	

## PREHEAT (QW-406)

Preheat Temperature (Minimum)	See attached preheat sheet prior to welding.	
Interpass Temperature (Maximum)	Std. Appl.: 700 °F	Notch Appl.: 450 °F
Preheat Maintenance	See attached preheat sheet prior to welding. Preheat maintenance is not required if welding is interrupted or after the completion of welding unless required by the code of construction.	

## POSTWELD HEAT TREATMENT (QW-407)

With or Without _____	Without _____		
Temperature Range _____	N/A	Time Range _____	N/A

## ELECTRICAL CHARACTERISTICS (QW-409)

Current _____	Direct _____	Polarity _____	Reverse, electrode positive _____
Amps _____	See Table 1 _____	Volts _____	See Table 1 _____

### Maximum Heat Input For Notch Toughness Applications:

Base Metal Thickness Range (T)	F3	F4
0.116 in. to 0.624 in.	31,385 J/in.	50,286 J/in.
0.625 in. to 8.00 in.	31,385 J/in.	79,200 J/in.

## TECHNIQUE (QW-410)

Manual or Automatic Manual

Multiple or Single Pass Per Side (4)	Std. Appl.: F3: Single (Root layers only) F4: Single or Multiple
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Multiple or Single Pass Per Side (4)	Notch Appl.: F3: Single (Root layers only) F4: Multiple
--------------------------------------	--

String or Weave	F3: String	F4: String or Weave
String	String	String
Weave	Weave	Weave

Travel Speed See Table 1

Initial and 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
------------------------	-----

(4) Multiple layers shall be used for B31.1 and B31.3 when the nominal material thickness is greater than 0.188 in.



**TABLE 1 - WELDING PARAMETERS****Standard Applications**

Process	Filler Metal	Diameter in.	Current Type & Polarity	Amperage Range	Voltage Range	Travel Speed i.p.m.
SMAW	E6010	3/32	DCRP	50 - 100	18 - 32	1.0 - 12
SMAW	E6010	1/8	DCRP	60 - 140	19 - 32	1.5 - 14
SMAW	E6010	5/32	DCRP	115 - 250	21 - 32	3.0 - 16
SMAW	E6010	3/16	DCRP	120 - 300	21 - 32	3.5 - 18
SMAW	E7018, E7018-1	3/32	DCRP	60 - 110	18 - 26	0.5 - 12
SMAW	E7018, E7018-1	1/8	DCRP	90 - 170	19 - 28	1.0 - 14
SMAW	E7018, E7018-1	5/32	DCRP	110 - 220	20 - 30	1.5 - 16
SMAW	E7018, E7018-1	3/16	DCRP	160 - 320	20 - 30	2.0 - 20
SMAW	E7018, E7018-1	7/32	DCRP	240 - 340	20 - 32	3.0 - 22
SMAW	E7018, E7018-1	1/4	DCRP	275 - 360	21 - 32	3.5 - 22
Note: Size of electrode, filler metal, number of passes, voltage, amperage, and travel speed will vary with position, joint thickness, joint type, etc.						

**Notch Toughness Applications**

Process	Filler Metal	Diameter in.	Current Type & Polarity	Amperage Range	Voltage Range	Travel Speed i.p.m.
SMAW	E6010	3/32	DCRP	50 - 100	18 - 32	1.8 - 12
SMAW	E6010	1/8	DCRP	60 - 140	19 - 32	2.2 - 14
SMAW	E6010	5/32	DCRP	115 - 250	21 - 32	4.7 - 16
SMAW	E6010	3/16	DCRP	120 - 300	21 - 32	4.9 - 18
SMAW	E7018-1	3/32	DCRP	60 - 110	18 - 30	0.9 - 12
SMAW	E7018-1	1/8	DCRP	90 - 170	19 - 30	1.3 - 14
SMAW	E7018-1	5/32	DCRP	110 - 220	20 - 30	1.7 - 16
SMAW	E7018-1	3/16	DCRP	160 - 320	20 - 30	2.5 - 20
SMAW	E7018-1	7/32	DCRP	240 - 340	20 - 32	3.7 - 22
SMAW	E7018-1	1/4	DCRP	275 - 360	21 - 32	4.4 - 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 (i.p.m.)						

## TYPICAL JOINT DESIGNS

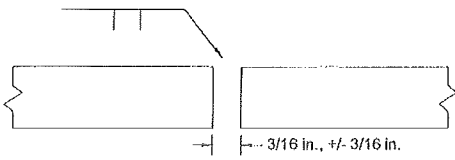


Figure 1  
Single Square Butt

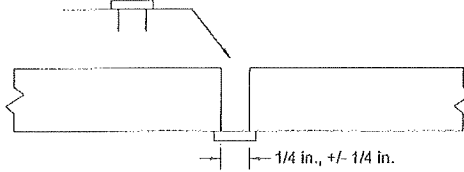


Figure 2  
Single Square Butt with Backing Strip

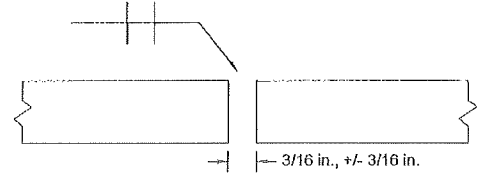


Figure 3  
Double Square Butt

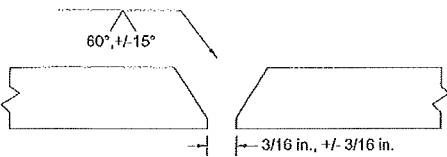


Figure 4  
Single Vee Butt

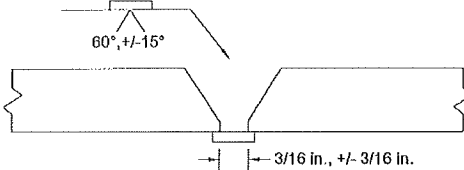


Figure 5  
Single Vee Butt with Backing Strip

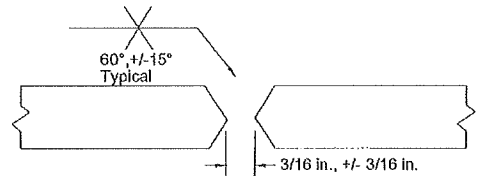


Figure 6  
Double Vee Butt

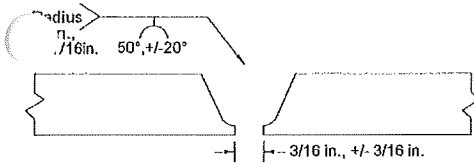


Figure 7  
Single U Butt

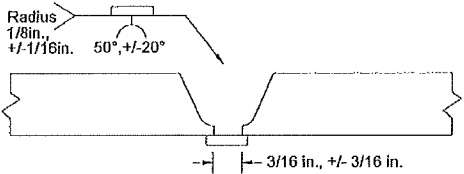


Figure 8  
Single U Butt with Backing Strip

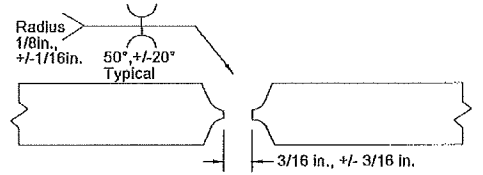


Figure 9  
Double U Butt

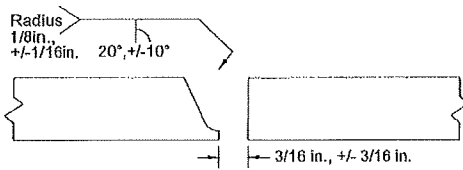


Figure 10  
Single J Butt

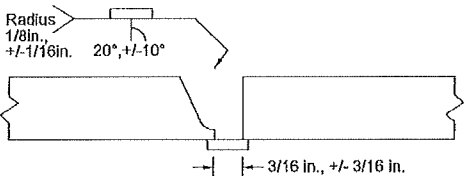


Figure 11  
Single J Butt with Backing Strip

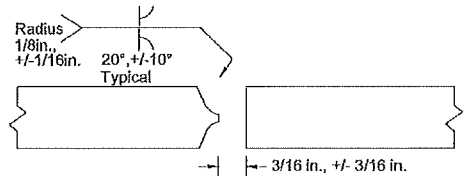


Figure 12  
Double J Butt

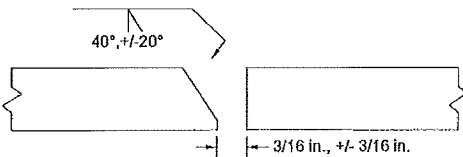


Figure 13  
Single Bevel Butt

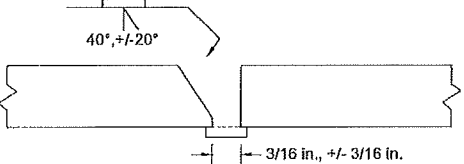


Figure 14  
Single Bevel Butt with Backing Strip

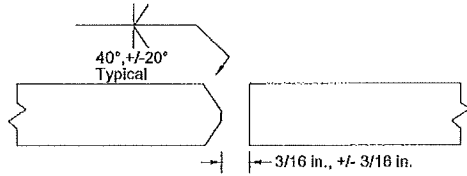


Figure 15  
Double Bevel Butt

Additional 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.

**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 3. If welding is interrupted, the weld joint and adjacent areas shall be reheated to the minimum preheat temperature stated in paragraph 3, prior to the start of welding.
2. Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.
3. Minimum preheating temperatures shall be as follows:

**PRESSURE VESSELS IN ACCORDANCE WITH ASME SECTION VIII, DIV. 1-2013**

NOMINAL THICKNESS	MINIMUM PREHEAT TEMPERATURE
0 to 1.25 in	50 °F
Greater than 1.25 in.	200 °F
Greater than 1.0 in. & specified maximum carbon content greater than 0.30%.	175 °F

- The conditions of UW-30 shall apply for base metal temperatures below 32 °F.
- The preheat zone shall extend at least 3.0 in. beyond each edge of the weld.
- Nominal thickness is the thicker of the materials being joined at the weld.

**PROCESS PIPING IN ACCORDANCE WITH ASME B31.3-2014**

GREATER MATERIAL THICKNESS	MINIMUM PREHEAT TEMPERATURE
Less than or equal to 1.0 in.	50 °F
Greater than 1.0 in. & specified maximum carbon content less than or equal to 0.30%.	200 °F
Greater than 1.0 in. & specified maximum carbon content greater than 0.30%.	200 °F

- The preheat zone shall be at or above the specified minimum temperature in all directions from the point of welding for a distance of the larger of 3 in. or 1.5 times the greater nominal thickness. The base metal temperature for tack welds shall be at or above the specified minimum temperature for a distance not less than 1 in. in all directions from the point of welding.
- Greater material thickness is that of the nominal material thickness of the thicker of the materials being joined at the weld.

**POWER PIPING IN ACCORDANCE WITH ASME B31.1-2014**

GREATER MATERIAL THICKNESS	MINIMUM PREHEAT TEMPERATURE
Less than or equal to 1.0 in.	50 °F
Greater than 1.0 in. & specified maximum carbon content less than or equal to 0.30%.	200 °F
Greater than 1.0 in. & specified maximum carbon content greater than 0.30%.	200 °F

- The base metal temperature for the parts to be welded shall be at or above the specified minimum temperature in all directions from the point of welding for a distance of the larger of 3 in. or 1.5 times the greater nominal thickness (as defined in paragraph 132.4.3). The base metal temperature for tack welds shall be at or above the specified minimum temperature for a distance not less than 1 in. in all directions from the point of welding.
- Greater material thickness is the thicker of the pressure-retaining materials being joined at the weld.

**FABRICATION IN ACCORDANCE WITH CSA Z662-15 CLAUSE 7.2.5**

NOMINAL WALL THICKNESS	MINIMUM SPECIFIED BASE METAL TENSILE STRENGTH	MINIMUM PREHEAT TEMPERATURE
Less than or equal to 1.0 in.	Less than or equal to 71 ksi	50 °F
Greater than 1.0 in.	All	200 °F
All	Greater than 71 ksi	200 °F

- The preheat zone shall extend at least 1.0 in. beyond each edge of the weld.
- For sour service the minimum preheat temperature shall be determined by the engineer in charge, but not less than that listed above.



## QW-483 PROCEDURE QUALIFICATION RECORD (PQR)

Strike Industrial Ltd.

Procedure Qualification Record No. SES-201-5 Date August 22, 2013  
Welding Procedure Specification No. SES-201 LT (Rev. 1)  
Welding Process(es) SMAW Type(s) Manual

### JOINTS (QW-402)

Type Butt joint, single vee groove, see next page

### BASE METALS (QW-403)

Material Spec. SA 333 to SA 350 Type or Grade Gr. 6 to Gr. LF2  
P-No. P1 Grp. 1 To P-No. P1 Grp. 2 Thickness 0.232 in.  
Diameter 6.625 in. O.D. Carbon Equivalent 0.245 to 0.375  
Heat Number 82548 to 560184 Other Schedule 40 m/c to 0.232 in.  
Deposited Weld Metal (Per pass) Did not exceed 0.500 in.  
C.E. formula per CSA Z662-11:  $C + F(Mn/6 + Si/24 + Cu/15 + Ni/20 + Cr/5 + Mo/5 + V/5 + Nb/5 + 5B)$

### FILLER METALS (QW-404)

Specification No. (SFA) SFA 5.1 SFA 5.1  
AWS No. (Class) E6010 E7018-1  
Filler Metal F-No. F3 F4  
Filler Metal A-No. A1 A1  
Size of Electrode See attached sketch See attached sketch  
Deposited Weld Metal Thickness 0.094 in. 0.138 in.  
Trade Name Lincoln Fleetweld 5P+ Air Liquide Blueshield LA 18 Plus

### POSITION (QW-405)

Position of Groove 5G Weld Progression Vertical up

### PREHEAT (QW-406)

Preheat Temperature 50 °F Interpass Temp. (Max.) 450 °F

### POSTWELD HEAT TREATMENT (QW-407)

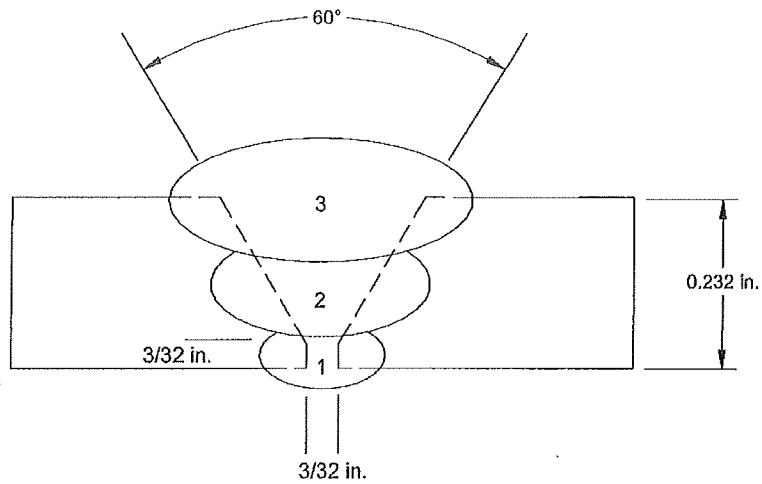
Temperature None Time N/A

### ELECTRICAL CHARACTERISTICS (QW-409)

Current Direct Polarity Reverse, electrode positive  
Amps See next page Volts See next page  
Maximum Heat Input F3: 31,385 J/in. F4: 50,286 J/in.  
Other Heat Input J/in. = Amps x Volts x 60 / Travel speed ipm

### TECHNIQUE (QW-410)

String or Weave F3: String F4: Both Travel Speed See next page  
Initial & Interpass Cleaning Brushing, chipping & grinding to remove slag  
Method of Back Gouging Not used  
Multiple or Single Pass Per Side Multipass from groove side  
Multiple or Single Electrodes Single  
Peening None  
Use of Thermal Processes N/A



Pass	Process	Filler Metal	Diameter in.	Current & Polarity	Amperage Range	Voltage Range	Travel Speed i.p.m.
1	SMAW	E6010	1/8	DCRP	80 - 90	23 - 25	3.9
2	SMAW	E7018-1	3/32	DCRP	80 - 80	21 - 23	3.8
3	SMAW	E7018-1	3/32	DCRP	75 - 85	21 - 23	2.1



## Welder's Declaration

Customer:	Husky Energy	Job Number:	
Project:		Site/Location:	
Welder:	Dennis Berkholtz	File Number:	W-5944
Symbol:	Y		

*This welder's Declaration supplements the terms listed in the Independent Service Provider (ISP) Agreement and is to be signed and filed "before" the above named welder can commence welding on the project.*

**I CERTIFY THAT :**

- a) I have reviewed the Welding Procedure Specifications (WPS's) applicable to the Scope of Work as defined to me by the Contractor.
- b) I am qualified to weld using the WPS's in accordance with the Act and Regulations.
- c) I will follow the instructions of the WPS for each joint that I weld.
- d) I understand, upon request to the Project Supervisor, I have access to each WPS and the welding Control section of the Strike QA/QC Manual and such other sections of the manual as may be applicable to the work I am required to perform.
- e) All fillet welds made by me will comply with the details and symbols identified on the drawings.

**CODE OF ETHICS & RESPONSIBILITIES:**

I, Dennis Berkholtz agree to provide a certified welding service that meets the requirements of the Weld Procedure Specifications, Customer specifications and requirements, Code & Industry Standards, Acts and Regulations, thus providing a safe quality product.

**Backweld Policy:**

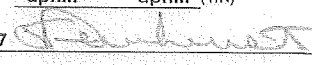

- 1 . Backwelding is to be treated as an "in process" repair.
- 2 . Unauthorized backweld repairs are **STRICTLY PROHIBITED** without written approval.
- 3 . Documented written approval by Strike supervision, QC "and" the Customer's authorized representative is mandatory for all backweld repairs.
- 4 . Backweld repairs can only be made in accordance with an approved Backweld Repair Procedure.
- 5 . ***Failure to comply with this policy will be grounds for termination.***


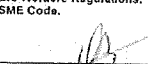
**List of Welding Procedure Specifications:** SES-201 LT Rev 3


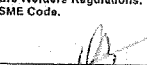
Dennis Berkholtz		May 12, 2016
Name ( print or type )	Signature	Date ( m/d/y )


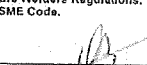


Dennis Berkholtz	W-5944	STRIKE APPROVED STAMP I.D.	Y
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<b>PERFORMANCE QUALIFICATION ( ASME Section IX )</b>				<b>ClearStream</b> <b>WELDING PERFORMANCE QUALIFICATION CARD</b>	
Process(es)	SMAW	SMAW	Materials(P.No.)	P1	7219
Filler Metal (F.No.)	F3	F4	Min. Diameter	1"OD	A.O.Q.P. No. W-5944
Maximum Deposited Weld Metal	0.188"	0.684"	Position(s) Qualified	All	ABSA FILE. NO.
Backing	with/without	with	Backing Gas	N/A	This card is issued pursuant to the Alberta Safety Codes Act and Pressure Welders Regulations. The performance qualification is in accordance with Section IX of the ASME Code.
Progression	uphill	uphill	Consumable Insert (Y/N)	NO	August 14, 2015 Date of Test
August 14, 2017				E-00009	 Signature of Welder
P.Q. Expiry Date	Welding Examiner Signature			Certification No.	ClearStream 087 Acc.Org.Card No.

<b>PERFORMANCE QUALIFICATION ( ASME Section IX )</b>				<b>ClearStream</b> <b>WELDING PERFORMANCE QUALIFICATION CARD</b>	
Process(es)	SMAW		Materials(P.No.)	P1 through P8	7219
Filler Metal (F.No.)	F4		Min. Diameter	1"OD	A.O.Q.P. No. W-5944
Maximum Deposited Weld Metal	max		Position(s) Qualified	All	ABSA FILE. NO.
Backing	fillet weld only		Backing Gas	N/A	This card is issued pursuant to the Alberta Safety Codes Act and Pressure Welders Regulations. The performance qualification is in accordance with Section IX of the ASME Code.
Progression	uphill		Consumable Insert (Y/N)	NO	February 27, 2015 Date of Test
Feb. 27, 2017				E-00009	 Signature of Welder
P.Q. Expiry Date	Welding Examiner Signature			Certification No.	ClearStream 083 Acc.Org.Card No.

<b>PERFORMANCE QUALIFICATION ( ASME Section IX )</b>				<b>ClearStream</b> <b>WELDING PERFORMANCE QUALIFICATION CARD</b>	
Process(es)	SMAW		Materials(P.No.)	P1 through P8	7219
Filler Metal (F.No.)	F4		Min. Diameter	1"OD	A.O.Q.P. No. W-5944
Maximum Deposited Weld Metal	max		Position(s) Qualified	All	ABSA FILE. NO.
Backing	fillet weld only		Backing Gas	N/A	This card is issued pursuant to the Alberta Safety Codes Act and Pressure Welders Regulations. The performance qualification is in accordance with Section IX of the ASME Code.
Progression	uphill		Consumable Insert (Y/N)	NO	February 27, 2015 Date of Test
Feb. 27, 2017				E-00009	 Signature of Welder
P.Q. Expiry Date	Welding Examiner Signature			Certification No.	ClearStream 083 Acc.Org.Card No.

<b>PERFORMANCE QUALIFICATION ( ASME Section IX )</b>				<b>ClearStream</b> <b>WELDING PERFORMANCE QUALIFICATION CARD</b>	
Process(es)	SMAW		Materials(P.No.)	P1 through P8	7219
Filler Metal (F.No.)	F4		Min. Diameter	1"OD	A.O.Q.P. No. W-5944
Maximum Deposited Weld Metal	max		Position(s) Qualified	All	ABSA FILE. NO.
Backing	fillet weld only		Backing Gas	N/A	This card is issued pursuant to the Alberta Safety Codes Act and Pressure Welders Regulations. The performance qualification is in accordance with Section IX of the ASME Code.
Progression	uphill		Consumable Insert (Y/N)	NO	February 27, 2015 Date of Test
Feb. 27, 2017				E-00009	 Signature of Welder
P.Q. Expiry Date	Welding Examiner Signature			Certification No.	ClearStream 083 Acc.Org.Card No.

**FOOTHILLS**  
**RADIOGRAPHY & INSPECTION**  
**SERVICES LTD.**

Box 6374  
Edson, AB. T7E 1T8  
Ph: (780) 723-7766  
Ph: (780) 712-1222  
Fax: (780) 723-7769

Date: May 12, 2016  
Page 1 of 1  
MP - **7334**

**MAGNETIC PARTICLE/LIQUID PENETRANT EXAMINATION REPORT**

CLIENT: Husky Energy AFE/P.O.#: \_\_\_\_\_  
LOCATION: 12-5-54-20 wsm Galloway Plant  
ITEM(S) EXAMINED: Fire Tube  
CONTRACTOR: Strike  
CLIENT/JOB#: \_\_\_\_\_  
ACCEPTANCE SPECIFICATION: Info PROCEDURE: MT-02  
SURFACE CONDITION: ☒ CLEAN BARE METAL ☐ AS GROUND ☐ MACHINED ☐ SHOT BLAST ☐ PAINTED ☐ OTHER \_\_\_\_\_  
EQUIPMENT TYPE: ☒ YOKE SERIAL#: 4254 LAST CALIBRATION DATE: May 12, 2016  
☐ BLACKLIGHT SERIAL#: \_\_\_\_\_ LAST CALIBRATION DATE: \_\_\_\_\_  
MPI METHOD: ☒ AC ☐ DC ☒ CONTINUOUS ☐ RESIDUAL ☒ 110 VOLT ☐ 12 VOLT  
MEDIUM: ☐ DRY (COLOUR \_\_\_\_\_) ☒ WET ☐ FLUORESCENT ☒ BLACK ON WHITE  
CARRIER: ☐ H2O ☒ BAYOIL PRODUCT MANUFACTURER: Fluxo  
LPI PRODUCT MANUFACTURER: \_\_\_\_\_  
PRODUCT TYPE: PENETRANT REMOVER DEVELOPER  
PENETRANT: ☐ VIS ☐ FLUORESCENT ☐ WATER WASH ☐ POST EMULSIFIED ☐ SOLVENT REMOVABLE

**TEST RESULTS**

Performed a black on white inspection of the cracked areas of the fire tube. Crack were ground out and area reinspected. Ground out areas were ~~were~~ welded and another inspection was performed.

No defect indications were evident.

Unit Charges

Reference to D.C.R. #: 29084

Client Signature: [Signature]

Client Print: Greg Guenette

Foothills Technician: [Signature]

Foothills Technician Print: R. Quinlan (10359)

White: Film Green: Client Yellow: Office Pink: Office Gold: File





Natural Resources  
Canada

Ressources naturelles  
Canada



Name/  
Nom  
Reg. No. /  
No. matricule  
Issue Date/  
Date d'émission

**Robert J. Quinlan**  
**10359**  
**2014/01/28**

This card does not identify the stated individual to be an employee or representative of Natural Resources Canada, Government of Canada.  
Cette carte n'identifie pas l'individu d'être un employé ou un représentant de Ressources naturelles Canada, Gouvernement du Canada

Corrective lenses for [ ] near [ ] far vision.  
Verres correctifs pour la vision de [ ] près [ ] distance.

Signature [ ]



Natural Resources  
Canada

Ressources naturelles  
Canada

Certified to / Certifié selon : CAN / CGSB-48.9712

10359

Method Méthode	Level Niveau	Sector Secteur	Cert. Date Date cert.	Date recert. Date recert.	Expires Expiration
MT	2	EMC	2009/08/26		2016/12/31
RT	2	EMC	2006/04/04		2016/12/31

For verification of certification status, policies and definitions, visit website:  
<http://nrc.can.gc.ca/> Pour la vérification de la certification, les politiques, et les définitions,  
visitez le site web: <http://nrc.can.gc.ca/>

Manager, Certifying Agency  
Gestionnaire, Organisme de certification