



the pressure equipment safety authority

BOILERS AND PRESSURE VESSELS REPAIR OR ALTERATION REPORT

AB-40 (Side A) 2015-11

(A) #:

607657

OWNER EQUIP. NO:

62066035

REPAIR ORG. JOB NO:

REPAIR ☒

and/or

ALTERATION ☐

Partial ☐

Final ☒

1. Name of Organization doing Repair/Alteration KRM WELDING SERVICES LTD
Address 16232 83B STREET NW EDMONTON AB AQP No. & Expiry Date 21784 2017/06/04
2. Name of Owner Husky Oil Operations Ltd.
Address 4335 44 street LLOYDMINSTER, SK.
Location of Installation LSO 100/10-34-51-1 W4m
3. Boiler/Pressure Vessel Description Firetube Boiler CRN U1463.2
Manufacturer's Name Saskatoon Boiler Manufacturing Serial No. 7119
4. Original Design Conditions:
a) Vessel/Shellside/Boiler: Max Allowable Working Press. 1103 KPA. Min/Max Design Temp 1 121°C
b) Jacket/Tubeside: Max Allowable Working Press. Min/Max Design Temp /
5. New Design Conditions:
a) Vessel/Shellside/Boiler: Max Allowable Working Press. Min/Max Design Temp /
b) Jacket/Tubeside: Max Allowable Working Press. Min/Max Design Temp /
6. Description of defects (location and types of deterioration that resulted in the repair/alteration).
Crack on outer shell at saddle.
7. Original Code Edition and Addenda ASME Sect. IV Year 2011 Addenda
8. Code Edition and Addenda used for performing the work ASME Sect. IV Year 15 Addenda Ø
9. Description of Work performed. (Step by step description of repair/alteration method used. Attach additional pages as required, and reference any additional documents used to provide the required information; such as repair or alteration procedures, drawings, and specifications)
MPI Remove indications
Preheat
E6010
MPI
E7018
MPI
Hydro.
10. Heat Treatment: Preheat Temp 50°F Post Weld HT (Temp./Time) Other
11. Non Destructive Examination (Specify type and extent).
MPI, Visual, hydro
12. Pressure Test
a) Hydrostatic 240psi
b) Other Test

(A) #: 607657OWNER EQUIP. NO. 6206603513. **Material** - List any material used in repair/alteration and any base material welded on:

Item	Material Specifications	Thickness / Schedule	Diameter	Item	Material Specifications	Thickness / Schedule	Diameter
Shell/Drums				Heads/ Ends			
Tubesheet				Tubes			
Nozzles				Flanges/Fittings		Class	

14. **Welding Procedures** - Alberta Registration Number WP- 2917.2WPS Numbers used: KRM-2 rev 115. **Welded Replacement Parts:** Attached are Manufacturer's Partial Data Reports or Repair/Alteration Reports properly identified and signed by Authorized Inspector for the following items of this report: (Welded parts supplied by others).16. **Responsibility Owner/Client.** Identify below items that the owner/client has assumed responsibility for. **Note (2)**

a) Alteration Design Submission _____ b) Repair/Alteration Procedure: _____ c) Material Control _____

d) Welding Control _____ e) NDE _____ f) Heat Treatment _____ g) Pressure Test _____

Note 2: Owner/client must have a valid Alberta Quality Program (AQP), for the scope of work, to assume responsibility for function c, d, e, f, or g.17. **REMARKS:**
18. **CERTIFICATE OF COMPLIANCE**

We certify that the statements made in this Report are correct and that all design, material, construction and workmanship on this repair/alteration conform to the requirements of the Alberta Safety Codes Act and Regulations and the AB-513.

a) For all items except for items identified in 16:
KRM WELDING SERVICES LTD(Repair/Alteration Organization Name)
21784 2017/06/04

(AQP Number & Expiry Date)

(Signature & Date) May 30, 2017

KEVIN MARTIN

(Print Name)

b) For items identified in 16 only:

(Owner/Client Organization Name)

(AQP Number & Expiry Date)

(Signature & Date)

(Print Name)

19. **DATE WORK WAS COMPLETED:** May 30, 201720. **CERTIFICATE OF INSPECTION**

I have inspected the repairs and/or alterations described in this report. To the best of my knowledge, this work has been done in accordance with the Safety Codes Act and Regulations and the requirements established in AB-513.

a) **In-service Inspector (ISI) Certification**

(When the repair is inspected by an ISI per the requirements established in AB-513)

b) **ABSA Safety Codes Officer Certification**

(When work is inspected by ABSA).

Owner-User/Inspection Company Name

AQP#

In-Service Inspector Signature & Date

In-Service Inspector Name (Please Print)

In-Service Inspector Alberta Cert #

Ryan Sinfield 30 May 17
 ABSA SCO Signature & Date
Ryan Sinfield
 Print Name

Vessel Title Firetube	Manufacturer/Serial Number Eas Katon 7119	Identification Number 607657
CODE INSPECTOR REVIEW:		REVIEW DATE:

Indicate Sequence Numbers And Hold Points Which Are Applicable By *

Seq.	Operations	Hold Points	Comments	Rep. Org.	Code Insp.	Owner Insp.
1	Repair/Alteration Procedure Accepted by ABSA Safety Codes Officer/and OUP Inspector when applicable		May 29	KM	K.1 30 May 17	
2	Welding Procedures Registered for Welding to be done		May 29	KM	K.1 30 May 17	
3	Welders have valid Alberta P.Q. Card for work to be done		May 29	KM	K.1 30 May 17	
4	Cracks MPI/PT check after removal		May 30	KM	K.1 30 May 17	
5a	Materials to be used - checked against PO/Drawing			N/A		
5b	- material identified with correct SA/SB specifications	rod	May 30	KM		
5c	- material test reports checked against specifications			N/A		
6a	Fit up - shell courses-flush patches-heads		May 30	KM		
6b	- tubesheet/shell - firetube			N/A		
6c	- nozzles and fittings			N/A		
7	Radiographic Examination			N/A		
8	Ultrasonic Examination MPI/PT		May 30	KM	K.1 30 May 17	
9	Internal Visual after welding			N/A		
10	External Visual after welding		May 30	KM	K.1 30 May 17	
11	Heat Treatment			N/A		
12	Hardness Tests			N/A		
13	Hydrostatic Pressure Test 240 PSI		Gauge No.'s 4001 4002	KM	K.1 30 May 17	
14	Alternative Test (Specify)			N/A		
15	Nonconformance Report # Cleared			N/A		
16	Pressure Vessel Repair or Alteration Report (AB 40) completed		May 30	KM	K.1 30 May 17	
17	Repair/Alteration Nameplate attached			N/A		

OUTLINE SKETCH

(Record Welder's Symbols and Heat No.'s, Radiograph ID No.'s) Attach separate sketch if required.

MATERIAL USED IN REPAIR/ALTERATION

Item	Mat'l Spec	Plate & Heads Heat & Plate#	Thk/	Sch.	Rating
Shell/Patches					
Heads' End					
Tubesheet					
Firetube					
Nozzles					
Fittings					

Procedure: 5.0 Technique: MT-2V Code: ASME Sect I - A-260.4 Other:		Rev 2.0 Client: HUSKY OPERATIONS IRISNDT #: LYD1700791 Location: 10-34-51-04W4M Item Inspected: H-120 GLYCOL BOILER REPAIR ; SN#7119		Date: 30-May-17 WO #: 81200130 PO #: 8401128487	
Surface Condition: Painted <input type="checkbox"/> Sandblasted <input type="checkbox"/> Machined <input type="checkbox"/> As Cast <input type="checkbox"/> As Forged <input type="checkbox"/> Weldment <input checked="" type="checkbox"/> Other <input type="checkbox"/>					
Material: P1		Thickness: >3/16"		Heat Treatment: AS WELDED	
Magnetizing Equipment: Yoke <input checked="" type="checkbox"/> Coil <input type="checkbox"/> Permanent <input type="checkbox"/> IRISNDT #: 40099 Mfg: Contour Probe Calibration Date: 30-May-17					
Method of Magnetization: AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Continuous <input checked="" type="checkbox"/>					
Blacklight: Y <input type="checkbox"/> N/A <input type="checkbox"/> IRISNDT #: Verification per ASME V Art 7 T.777.2		Blacklight Meter: IRISNDT #: Calibration Date: - -			
Whitelight: Y <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Verification per ASME V Art 7 T.777.1		Lighting Equipment: Yoke Light (10W)			
Magnetic Particles: Dry <input type="checkbox"/> Wet <input checked="" type="checkbox"/> Batch #: 301-12		Red <input type="checkbox"/> Grey <input type="checkbox"/> Black <input checked="" type="checkbox"/> Fluorescent <input type="checkbox"/>		Mfg: MAGNAFLUX Type: 7C	
Background: <input checked="" type="checkbox"/> Batch #: 1333		Mfg: ARDROX		Type: 8901W	

A MAGNETIC PARTICLE EXAMINATION WAS CARRIED OUT AS REQUESTED ON H-120 GLYCOL BOILER ON N.E. SADDLE TO SHELL FILLET WELD TO DETERMINE IF CRACK WAS PRESENT.

RESULTS: 1 -3" LONG CRACK WAS FOUND. THE INDICATION WAS THEN GROUND AND REMPI'D UNTILL GONE. THE CRACK HAD PROPAGATED RIGHT THROUGH THE SHELL. THE GROUND AREA WAS THEN ROOTED. WELDER: "KM". AFTER COOLING THE ROOT AREA WAS MPI'D. NO INDICATIONS OF DEFECTS WERE PRESENT. THE GROUND AREA WAS THEN FILLED AND CAPPED. FINAL MPI FOUND WELD TOBE ACCEPTABLE TO CODE.

REQ. TYSON LOWRIE
APPROVER: MARC CASE
2Z-02018989



Inspection Limitation(s):

Unit#: 601	Kilometers: 50
In: 0800	Out: 1100 Hrs: 3.0
In: 1530	Out: 1630 Hrs: 1.0

Personnel:
RANDY TRADEWELL
JASON ANDERSON

Consumables:
MIN.

Interpretation by:

RANDY TRADEWELL
(Print)

SNT-TC-1A:

II

C.G.S.B.:

II
(Level)

C.G.S.B. #:

5357

(Signature)
Client Representative:
(Print)

I am in full
agreement with
report contents

(Sign)

5311- 86 Steel, Edmonton, Alberta T6E 5T8 Phone: (780) 437-2022 fax: (780) 436-4873
 Calgary (403) 279-6121
 Lloydminster (780) 875-6455
 Barrhead (780) 674-3018
 Nisku (780) 955-7616

Cold Lake (780) 826-6105
 Fort McMurray (780) 743-1536
 Red Deer (403) 347-1742

www.irisndt.com

Engineering, Calgary (403) 217-9684
 Engineering, Edmonton (780) 437-2022
 Rope Access Services (780) 437-2022
 Offices also located in USA and UK

IRISNDT-E-2003H



MAGNETIZING YOKE CALIBRATION LOG

CONTOUR
Manufacturer: PROBE Model: B800 IRISNDT#: 40099 Calibration Frequency: DAILY
Calibration weights: lbs/AC: 10 lbs/DC: 40 Serial #: AC: 49159 DC: 49038

This yoke was calibrated in accordance with IRISNDT Procedures 5.0 (MT) as per section 8.4. Note: If yoke fails to lift the weights as per IRISNDT MT procedure, the equipment shall be red tagged for repair and removed from service.

Upon completion of the calibration of this piece of equipment a copy of this certification record is to be submitted with your reports on a daily basis to the client you are working for. Please ensure a copy of this certification record is submitted with your MT reports at your branch at the completion of your shift.

Date of Calibration		Meets Requirements		Maximum pole spacing used	Certified Personnel	Signature
		Yes(√)	No(√)			
1	30-MAY-2017	YES		6"	RANDY TRADEWELL	<i>Randy Tradewell</i>
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Date: May 30, 2017KRM Welding Services Ltd. Contact: Kevin Martin Job Number: _____Deliver Reports and Film To: Kevin Martin

Inspection Method

Radiography: _____ Ultrasonic _____ Magnetic Particle ☒

Liquid Penetrant _____ Hardness Testing _____

Minimum Technician Qualification

CGSB Level II ☒ SNT Level II _____

Acceptance Criteria:

ASME B31.3 _____ (Year) ASME B31.1 _____ (Year)

ASME B31.3 Service Category _____ (Normal, Cat. D, Cat. M, High Pressure, Sever Cyclic)

Customer Specification: ASME I

Maximum Allowable Hardness: _____

Joints to be tested (Attach NDE location drawing showing joints to be tested, welder names and any other information required to be on the test reports)

Quantity	Identification	Size and Schedule	Test Method

Additional Instructions:

Note: Radiographic examination to comply with ASME Section V Article 2.

Ultrasonic examination to comply with ASME Section V Article 4

Liquid Penetrant examination to comply with ASME Section V Article 6

Magnetic Particle examination to comply with ASME Section V Article 7

Hardness testing to comply with written procedure _____

CERTIFYING STATEMENTDate May 30, 2017

I have reviewed the written practice, procedures, personnel records and certification of

IRIS npt

(Name of Subcontracted NDE Company)

In my opinion, they comply, in all respects, with requirements of ASME Section V Non-destructive Examination and the CGSB (Canadian General Standards Board) or ASNT (American Society for Non-Destructive Testing).

IRIS npt

(Name of Subcontracted NDE Company)

Are appointed to perform

MT

Radiography (RT), Ultrasonics (UT), Liquid Penetrant (PT), Magnetic Particle (MT)

Non-destructive examinations for KRM Welding Services Ltd.

(Name of Subcontracted NDE companies Level III person)

Is by this statement, certified to act as the Level III person for KRM Welding Services Ltd. to be responsible for the following non-destructive examination.

MT

Radiography (RT), Ultrasonics (UT), Liquid Penetrant (PT), Magnetic Particle (MT)

May 30, 2017
Date

[Signature]
Signature of Quality Control Manager

HYDROSTATIC TESTPNEUMATIC TESTDate: May 30, 2017Job Number: 10-34-51-1 W4MLSD: 10-34-51-1 W4MDescription of Product: Firetube BoilerTests Conducted By: Kevin MartinTest Pressure: 240 PSITest Temperature: 20°CTest Medium: 240 PSIHolding Time at Test Pressure: 10 minsResults: PassedOwner's Inspector Witnessing Test: + MhGauge Number(s): 400-1
400-2Dead Weight Number: W/AChart Recorder Number: N/AMh

Signature of Owner's Inspector

May 30 2017

Date

[Signature]

Signature of QC Inspector

May 30, 2017

Date

25 JUNE 2014

CONTRACT REVIEW

PAGE 3 OF 3

TURNOVER PACKAGE REQUIREMENTS

Number of Copies: Digital: 0Number of Copies: Paper: 1


Turnover package to be sent to: _____

TURNOVER PACKAGE CONTENTS

ITEM	REQUIRED BY CUSTOMER	Stored for 5 years by KRM Welding Services Ltd.
Contract Review Form	✓	✓
Design Specifications	N/A	✓
Drawings and Calculations	N/A	✓
Physical test reports: charpy, hardness	N/A	✓
Nonconformity Reports	N/A	✓
Materials Lists, Spool Lists, Purchase Orders generated by KRM Welding Services Ltd.	N/A	✓
Material Test Reports	N/A	✓
Materials Heat Number Identification Drawings	N/A	✓
NDE Location Map	✓	✓
Radiography Reports	N/A	✓
Radiographic Film	N/A	ASME B31.1 and B31.1 BEP only
Other NDE Reports, MT UT	✓	✓
Welding Procedures	✓	✓
Welder Log and Tickets	✓	✓
Welder Identification Map	N/A	✓
Heat treatment records	N/A	✓
Heat Treatment Identification Drawings	N/A	✓
Examination Report(s) for Pressure Piping	N/A	✓
Pressure/ Temperature Gauge Calibration Records	✓	✓
Pressure test records	N/A	✓
AB-83, AB-83F, AB-83 Partial Data Report	N/A	✓
AB-81 Completion of Construction	N/A	✓
As Built Drawings	N/A	✓

✓ Designates documents to be stored by KRM Welding Services Ltd. for a minimum of 5 years.

Contract Review Notes acknowledged by the following parties:


 Owner's Representative


 Date


 KRM Welding Services Ltd. Representative


 Date



Certificate of Calibration

Number# C8970

Customer: KRM WELDING
Customer P/O:
Order: OE0017693
Accuracy +/- : 1% OF FULL SCALE
CALIBRATION DATE : JUNE 6, 2016

Manufacturer: WIKA
Serial Number: PG-400-1
Pressure Range: 0/400 PSI/KPA
Part Number:

Test Equipment Used

Gauge: 3-D DIGITAL
Serial Number: AC 8780169

Date Calibrated: May 21/ 16
Range: 30"HG/500 PSI

Test Gauge	Upscale Pressure	Error + / -
0 PSI	0 PSI	0 PSI
100	98	-2
200	198	-2
300	298	-2
400	398	-2

Technician: 
BRENTT STARRATT

Q.C. Manager: 
RANDY GABRUCK

Western Gauge and Instruments Ltd. Certifies that the above information is traceable to N.I.S.T.

6624 50 ST S.E. Edmonton, Alberta T6B 2N7 :780-463-3800, F: 780-463-3990.
E-Mail : brentt@wgiltld.ca



Certificate of Calibration

Number# C8971

Customer:	KRM WELDING	Manufacturer:	WIKA
Customer P/O:		Serial Number:	PG-400-2
Order:	OE0017693	Pressure Range:	0/400PSI/KPA
Accuracy +/- :	1% OF FULL SCALE	Part Number:	
CALIBRATION DATE : JUNE 6, 2016			

Test Equipment Used

Gauge: 3-D DIGITAL
Serial Number: AC 8780169

Date Calibrated: May 21/ 16
Range: 30"HG/500 PSI

Test Gauge	Upscale Pressure	Error + / -
0 PSI	0 PSI	0 PSI
100	100	0
200	200	0
300	300	0
400	400	0

Technician: 
BRENTT STARRATT

Q.C. Manager: 
RANDY GABRUCK

Western Gauge and Instruments Ltd. Certifies that the above information is traceable to N.I.S.T.

6624 50 ST S.E. Edmonton, Alberta T6B 2N7 :780-463-3800, F: 780-463-3990.
E-Mail : brentt@wgiltld.ca

25 JUNE 2014

WELDER LOG

PAGE 1 OF 1

[illegible]

Performance Qualification GRS Card No. 23116

Process(es)	SAW	Material (RND)	P-1 Thru P-8F
Filler Metal (FND)	E3 E4	Min. Cupula rod Diameter	1/20
Max. Gasconnet Weld Metal	0.25 max	Post Weld Condition	OK
Backing	Waterproof with	Backing Gas	50%
Preparation	uphill uphill	Temp	22
Date	Feb-09-2013	Signature	[Signature]
By	Supervisor	Signature	[Signature]

GRB Enterprises Ltd
Edmonton Alberta

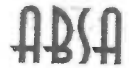
ACQP 7107

WELDER PERFORMANCE QUALIFICATION CARD

Name KEVIN R. MARTIN W- 23560
Job # FRB-09-2016

This card is issued pursuant to the ASME Code and the ASME Boiler and Pressure Vessel Code. The performance of the welder is subject to the ASME Code and the ASME Boiler and Pressure Vessel Code. The welder is not to be used for any other purpose than that for which it was issued.

Signature G.R. Behrman 23116
Date 09-2016



19339

Grade "B" Pressure Welder's
Certificate of Competency


This is to certify that Kevin Martin
having complied with provisions of the Safety Codes Act, is authorized to engage
in pressure welding in accordance with the prescribed Regulations.

Dated at Edmonton
December 15, 2005



W-23560

File no.


Chief Inspector and Administrator



CERTIFICATE OF TYPICAL ANALYSIS

EN 10204 Certificate 2.2

ESAB Part Number	-	255440026
Lot Number	-	TYPICAL
Trade Name	-	ESAB
Trade Type	-	7018
Diameter	-	1/8

ESAB 7018

Classification:

Classification: E7018
Material conforms to: AWS A5.1

Chemistry Analysis:

Carbon	0.058 %
Manganese	1.09 %
Silicon	0.49 %
Phosphorus	0.013 %
Sulfur	0.013 %
Chromium	0.01 %
Nickel	0.01 %
Molybdenum	0.02 %
Vanadium	0.00 %

This material is manufactured in USA

This material is certified to be free of any mercury

The ESAB Group, Inc is certified to ISO 9001:2008, ISO 14001:2004 and OSHAS 18001:2007.
Registered under the following certificate numbers:
106973-2011-AQ-SWE-SWEDCA/2006-SKM-AE-1093/2008-SKM-AHSO-143.

The undersigned certifies that the product supplied will meet the requirements of the applicable
AWS Filler Metal Specification when tested in accordance with that specification

CERTIFICATE OF CONFORMANCE
(APPLIES ONLY TO U.S. PRODUCTS)



Q1 Lot Number: 14623963

Product: **Fleetweld® 5P+**
Classification: **E6010**
Specification: **AWS A5.1:2012, ASME SFA-5.1**
Date: **June 16, 2015**

This is to certify that the product named above and supplied on the referenced order number is of the same classification, manufacturing process, and material requirements as the material which was used for the test that was concluded on the date shown, the results of which are shown below. All tests required by the specifications shown for classification were performed at that time and the material tested met all requirements. It was manufactured and supplied according to the Quality System Program of the Lincoln Electric Company, Cleveland, Ohio, U.S.A., which meets the requirements of ISO9001, NCA3800, AWS A5.01, and other specification and Military requirements, as applicable. The Quality System Program has been approved by ASME, ABS, and VdTUV.

Operating Settings	E6010 Requirements	RESULTS	
Electrode Size		5/32 inch	3/16 inch
Polarity		DC+	DC+
Plate Thickness, mm (in)		19 (3/4)	19 (3/4)
Current, A		140	170
Pass/Layers		18/9	16/8
Preheat Temperature, °C (°F)	(225 min.)	105 (225)	105 (225)
Interpass Temperature, °C (°F)	(225 - 350)	150 (300)	150 (300)
Postweld Heat Treatment	As-welded	As-welded	As-welded

Mechanical properties of weld deposits

Tensile Strength, MPa (ksi)	(60 min.)	520 (76)	540 (79)
Yield Strength, 0.2% Offset, MPa (ksi)	(48 min.)	420 (62)	440 (63)
Elongation %	22 min.	27	29
Average Impact Energy Joules @ -29 °C (ft-lbs @ -20 °F)	(20 min.)	63 (46) 59.65.65 (44.48.48)	83 (61) 79.80.89 (58.59.65)
Average Hardness, HRB	Not Required	86	83

Chemical composition of weld deposits (weight %)

C	0.20 max.	0.15	0.14
Mn	1.20 max.	0.55	0.67
Si	1.00 max.	0.17	0.23
S	Not Required	0.007	0.006
P	Not Required	0.008	0.009
Cr	0.20 max.	0.03	0.03
Ni	0.30 max.	0.07	0.06
Mo	0.30 max.	0.02	0.02
V	0.08 max.	0.01	0.00
B	Not Required	0.000	0.000

- This certificate complies with the requirements of EN 10204, Type 2.2.
- The electrode sizes required to be tested for this classification are 5/32 inch and 3/16 inch. All other sizes manufactured will also meet these requirements.
- Test assembly constructed of ASTM A36 steel.
- Fillet Weld Test (positions as required): Met requirements.
- Radiographic Inspection: Grade 2 - Met requirements.
- The strength and elongation properties reported here were obtained from tensile specimens artificially aged at 105°C (220°F) for 48 hours.
- Results below the detection limits of the instrument or lower than the precision required by the specification are reported as zero. Strength values in SI units are reported to the nearest 10 MPa converted from actual data. Preheat and interpass temperature values in SI units are reported to the nearest 5 degrees.

Toronto Cunningham June 16, 2015
Toronto Cunningham, Certification Supervisor Date

David A. Fink June 16, 2015
Dave Fink, Manager, Compliance Date
Engineering, Consumable R&D



the pressure equipment safety authority

Certificate of Authorization Permit

Quality Management System

Expiry Date: **June 4, 2017**

Reg. No.: **AQP-21784**

KRM WELDING SERVICES LTD.

**16232 - 83B STREET
EDMONTON, 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			
ASME Section VIII-1 Pressure Vessels	---	Shop/Field	Shop/Field
Boilers			
ASME Section I Power Boilers	---	Shop/Field	Shop/Field
ASME Section IV Heating Boilers	---	Shop/Field	Shop/Field
Pressure Piping			
ASME B31.1 Boiler External Piping	Shop/Field	Shop/Field	Shop/Field
ASME B31.1 Power Piping	Shop/Field	Shop/Field	Shop/Field
ASME B31.3 Process Piping	Shop/Field	Shop/Field	Shop/Field
ASME B31.5 Refrigeration Piping	Shop/Field	Shop/Field	Shop/Field
ASME B31.9 Building Services Piping	Shop/Field	Shop/Field	Shop/Field
Fittings			
Category H	---	Shop/Field	Shop/Field

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 June, 2014



Chief Inspector and Administrator

Certificate No.: 9965



the pressure equipment safety authority

9410 - 20 Ave N.W.
Edmonton, Alberta, Canada T6N 0A4
Tel: (780) 437-9100 / Fax: (780) 437-7787

Attention: Kevin Martin
KRM WELDING SERVICES LTD
16232 83B STREET
EDMONTON, AB

The welding procedure, tracking number 2014-01974, originally received on March 12, 2014 was surveyed and accepted for registration as follows:

Reg. No. : WP-2917.2

Accepted on: March 16, 2014

Reg Type: Revision To accepted Design

Spec. No. : KRM-2 REV 1 As Noted

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

Enclosed is a stamped welding procedure for your reference.

Please note the acceptance of this registration does not allow the use of this welding procedure in the construction, modification, on any boiler, pressure vessel, pressure piping system or fitting in Alberta unless the contractor/manufacturer has registered a Quality Control System for such work with ABSA.

Sincerely,

ROSEBERG, BOB, P. Eng.

WELDING PROCEDURE SPECIFICATION

WPS No.: KRM-2 (Rev1)

SUPPORTING PQR No.(s): KRM-2A - KRM-2B
in accordance with
ASME Section I, IV, VIII, IX, B31.1 and B31.3
qualified for

Process(s): SMAW
Filler Metal F-No.: F3 / F4
AWS Classification: E6010 / E7018-1

Position(s): All
A-No.: A1
Weld Type(s): Groove / Fillet

Base Metal: P- 1

Thickness Ranges

As Welded Thermal Condition

	Without Impacts	Without Impacts
ASME BPV Section.VIII	0.0625"	0.375" to 0.750"
ASME BPV Section.I	0.0625" to 0.750"	0.375" to 0.750"
ASME BPV Section.IV	0.0625" to 0.750"	0.375" to 0.750"
ASME B31.1	0.0625" to 0.750"	0.375" to 0.750"
ASME B31.3	0.0625" to 0.750"	0.375" to 0.750"

Revision Content: Rev 1 Addition of Charpy and Vickers

Provincial Registrations:

ABCA	
SAFETY CODES ACT - PROVINCE OF ALBERTA	
WELDING PROCEDURE	
Reg. No. WP	2917.2
Spec. No.	KRM-2 (REV1)
Weld Process	SMAW
Matl. Gr. P No.	1 G+1+2
to P No.	1 G+1+2
Elec. Gr. F No.	3+4
A No.	1
Th. Qual. For	19.1mm P.W.H.T.
	N.O.
	MIN TH. QUAL 9.5mm, CVA -46°C
Val 4 Mo. 3 Day 16 signed	
R. ROSEBERG, P.ENG.	
WELDING SPECIALIST	

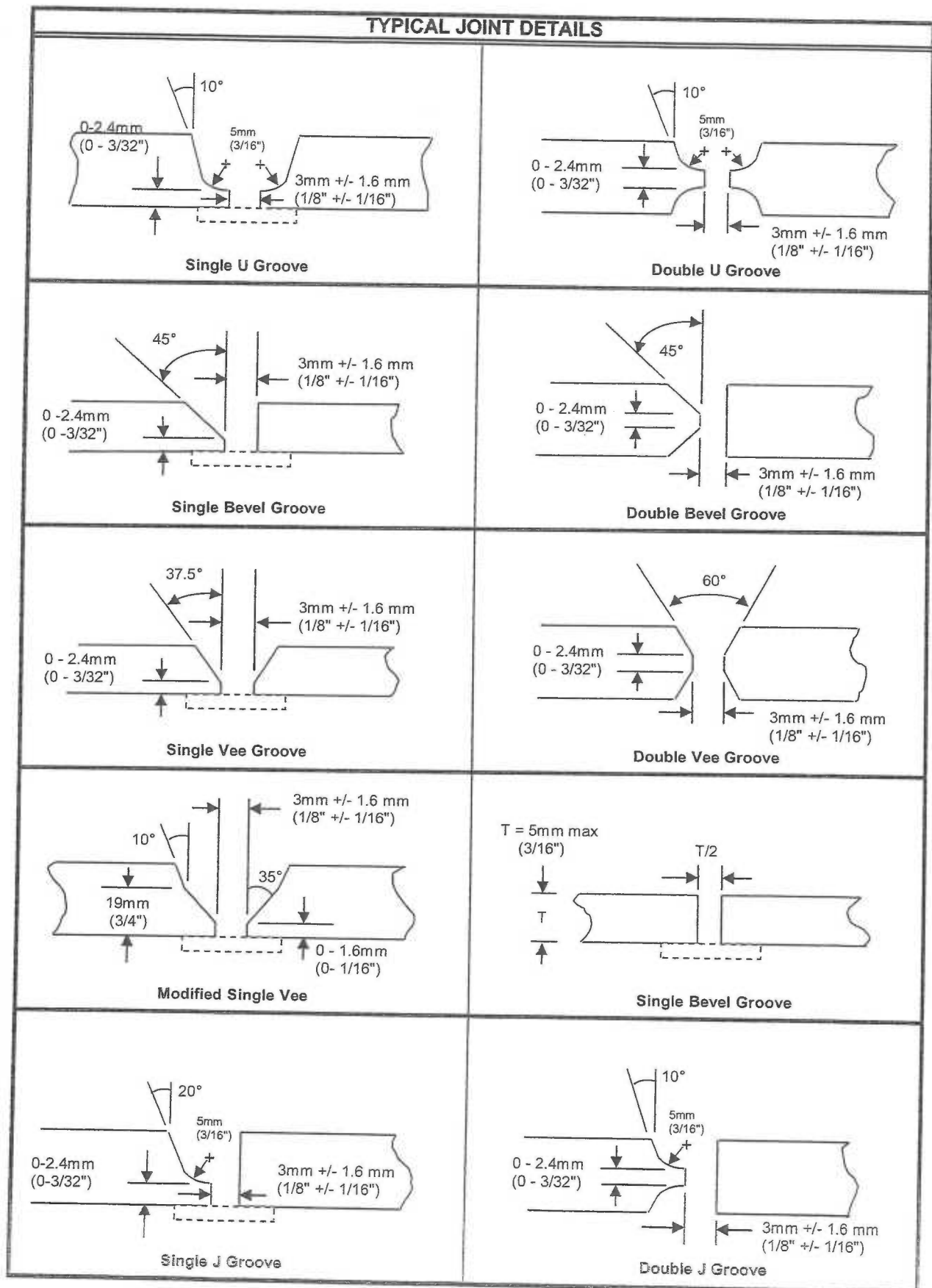
Company Name: KRM Welding Services Ltd.		Date: January 18, 2008
WPS No.: KRM-2		
Revision No.: 1		Revision Date: March - 11- 2014
Supporting PQR No(s): KRM-2A		Revised By: Gerald R. Belhumeur
Welding Process(es): SMAW As Welded		Process(es) Mode: Manual

JOINTS (QW-402)	JOINT DETAILS
Joint Design: All ASME joint designs.	Note: See reference construction detail drawings for joint details.
Backing: F-3 with or without backing, F-4 with backing only..	Where details not specified, refer to typical joint detail sheet.
Retainers: None	(WPS page 4 of 6)
Backing Material (Type): <input checked="" type="checkbox"/> Metal <input type="checkbox"/> Nonfusing Metal <input type="checkbox"/> Nonmetallic <input type="checkbox"/> Other Weld metal where applicable.	

BASE METALS (QW-403)	
P-No.: 1 Group No.: 1&2 to P-No.: 1 Group No.: 1&2	
or	
Specification Type and Grade: As above	
to	
Specification Type and Grade: As above	
or	
Chemical Analysis and Mechanical Properties:	None
to	
Chemical Analysis and Mechanical Properties:	None
Base Metal Thickness Range: Groove: As welded: 0.0625" to 0.750" Sec I, IV, B31.1, B31.3 Fillet: All As welded: 0.0625" to 0.75 VIII With Impact 0.375" to 0.750" Sec I, IV, B31.1, B31.3 With Impact 0.375" to 0.75 Sec VIII	
Pipe Diameter Range:	Groove: All Fillet: All Other: Maximum weld thickness per layer not to exceed 1/2"

FILLER METALS (QW-404)		
Process:	SMAW	SMAW
Spec No. (SFA):	5.1	5.1
AWS No.:	E6010	E7018-1
F-No.	F-3	F-4
A-No.	A-1	A-1
Size:	3/32", 1/8", 5/32"	3/32", 1/8", 5/32", 3/16", 1/4"
Weld thickness:	Groove: up to 0.188" Fillet: All	Groove: up to 0.562" Fillet: All
Electrode-Flux (Class)	None	None
Consumable Insert:	None	None
Other:	Covered Solid Electrode	Covered Solid Electrode

POSITIONS (QW-405)				POSTWELD HEAT TREATMENT (QW-407)			
Position(s): All				Temp Range: Not Applicable			
Welding Progression: Up: F4				Time Range: Not Applicable			
Up or Down: F3							
PREHEAT (QW-406)				GAS (QW-408)			
Preheat Temp Min: 50°F				Shielding Gas(es): None			
Interpass Temp Max: 500°F				Flow Rate: None			
Preheat Maintenance: 100°F min				Trailing: None			
Other: See Preheat Instructions Page 5 of 6				Backing: None			
				Gas Cup Size: None			
ELECTRICAL CHARACTERISTICS (QW-409)							
Process: SMAW (F-3)				Process: SMAW (F-4)			
Current Type: DC				Current Type: DC			
Polarity: Electrode Positive or Negative				Polarity: Electrode Positive			
Amps (Range): 40 -160 Amps				Amps (Range): 70-400 Amps			
Volts (Range): 20 - 32 Volts				Volts (Range): 18-34 Volts			
Max Heat Input: F3 max= 28,800 J/in Max.				Max Heat Input: F4 Max = 53,485 J/in Max.			
Electrode Wire Feed Speed: None				Electrode Wire Feed Speed: None			
Tungsten Electrode Type: None				Tungsten Electrode Type: None			
Tungsten Electrode Size: None				Tungsten Electrode Size: None			
TECHNIQUE (QW-410)							
String or Weave Bead:		Weld layers may be deposited by string or weave technique.					
Initial Cleaning:		Base material shall be thoroughly cleaned of grease, rust, mill scale, oxidation, deleterious material, paint, primer, etc. at least one inch back on each side of the joint prior to welding.					
Interpass Cleaning:		Mandatory between passes and after final weld using chipping, wire brush/wheel or grinding disk.					
Method of Back Gouging:		Back grinding or air carbon arc gouging followed by cleaning to solid clean metal.					
Oscillation:		2 to 3 times diameter of electrode					
Contact Tube to Work Distance:		None					
Multiple or Single Pass per Side:		Multiple or Single					
Multiple or Single Electrodes:		Single					
Travel Speed:		2 -16 IPM					
Peening:		None					
TYPICAL WELDING PARAMETERS							
Process	Filler Metal		Current		Voltage Range	Travel Speed IPM	Other
	AWS Classification	Diameter	Type and Polarity	Amperage Range			
SMAW	E6010	3/32"	DC+ or DC -	40 to 80	20 to 28	2 to 12	Note: Number of weld layers and size of filler metal may vary with thickness of base material and position of weld.
SMAW	E6010	1/8"	DC+ or DC -	70 to 120	20 to 32	3 to 14	
SMAW	E6010	5/32"	DC+ or DC -	110 to 160	20 to 32	4 to 16	
SMAW	E7018-1	3/32"	DC+	70 to 110	18 to 24	2 to 10	
SMAW	E7018-1	1/8"	DC+	100 to 150	20 to 28	3 to 12	
SMAW	E7018-1	5/32"	DC+	120 to 200	20 to 30	5 to 14	
SMAW	E7018-1	3/16"	DC+	200 to 270	22 to 32	6 to 16	
SMAW	E7018-1	1/4"	DC+	315 to 400	22 to 34	6 to 16	



SUPPLEMENTARY PWHT INSTRUCTIONS			
PREHEAT INSTRUCTIONS P - No. 1 Groups 1, 2,3			
CODE			
	Nominal Wall Thickness	Minimum Preheat Temperature	
ASME Section I ASME Section IV	0 to 1.25 in.	50 F	
	Over 1.25 in.	200 F	
	Over 1.0 in. and a specified maximum carbon content in excess of 0.30%	175 F	
	Nominal Wall Thickness	Minimum Preheat Temperature	
ASME Section VIII	0 to 1.25 in.	50 F	
	Over 1.25 in.	200 F	
	Over 1.0 in. and a specified maximum carbon content in excess of 0.30%	175 F	
	Nominal Wall Thickness	Minimum Preheat Temperature	
ASME B31.1	Over 1.0 in. and a specified maximum carbon content in excess of 0.30%	175 F	
	All Others	50 F	
	Nominal Wall Thickness	Minimum Specified Base Metal Tensile Strength	Minimum Preheat Temperature
ASME B31.3	Less than 1.0 in.	Less than or equal to 71 Ksi	50 F
	Greater than or equal to 1.0 in.	All	175 F
	All Others	Greater than 71 Ksi	175 F

COMMENTS:

1. Welds joining pressure parts or attachment shall be preheated to not less than the minimum preheat temperatures as stated above.
2. The preheat temperature shall be maintained until welding is completed.
3. If the welding is interrupted, the weld joint and adjacent areas shall be reheated to minimum preheat temperature as stated above, prior to the start of welding.
4. The preheated area shall not be less than 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, direct contact thermometers, or infrared indicators.

SUPPLEMENTARY PWHT INSTRUCTIONS			
CODE	HOLDING TEMPERATURE	HOLDING TIME	
		up to 2.0 inches	over 2.0 inches
ASME Section I	1100°F	1 hour per inch 15 minute minimum	2 hours plus 15 minutes for each additional inch over 2.0 inches
ASME Section VIII	1100°F	1 hour per inch 15 minute minimum	2 hours plus 15 minutes for each additional inch over 2.0 inches
ASME B31.1	1100°F - 1200°F	1 hour per inch 15 minute minimum	2 hours plus 15 minutes for each additional inch over 2.0 inches
ASME B31.3	1100°F - 1200°F	over 0.750"	
		1 hour per inch 1 hour minimum	

COMMENTS:

Holding time not to exceed 1.25 hours maximum when impact specified.

Company Name: KRM Welding Services Ltd.
 PQR No.: KRM-2A
 WPS No.: KRM-2
 Welding Process(es): SMAW (As welded)

Date: January 9, 2008Mode: Manual**JOINTS (QW-402)**

See Next Page

BASE METALS (QW-403)

Material Spec: SA516 to SA516
 Type or Grade: Grade 60/70 to Grade60/ 70
 P-No.: 1, Group 1&2 to P-No.: 1, Group 1&2
 Thickness of Test Coupon: 0.375"
 Diameter of Test Coupon: Plate
 Other: None

POSTWELD HEAT TREATMENT (QW-407)

Temperature: Not Applicable
 Holding Time: Not Applicable
 Other: None

FILLER METALS (QW-404)

	5.1	5.1
AWS Classification:	E6010	E7018-1
F-No.:	F3	F4
A-No.:	A1	A1
Size:	3/32"	3/32", 1/8"
Weld Metal Thickness:	0.094"	0.281"
Other:		

SHIELDING GAS (QW-408)

	Percent Composition		
	Gas(es)	Mixture	Flow Rate
Shielding:	None		
Trailing:	None		
Backing:	None		
Other:	None		

POSITION (QW-405)

Position of Groove: 1G
 Weld Progression: N/A
 Other: None

ELECTRICAL CHARACTERISTICS (QW-409)

Current: DC
 Polarity: DCEP
 Amps: 50 - 130
 Volts: 21 - 28
 Wire Feed Speed: N/A
 Other: Heat Input F3 max= 28,800 J/in Max.
Heat Input F4 Max = 53,485 J/in Max.

PREHEAT (QW-406)

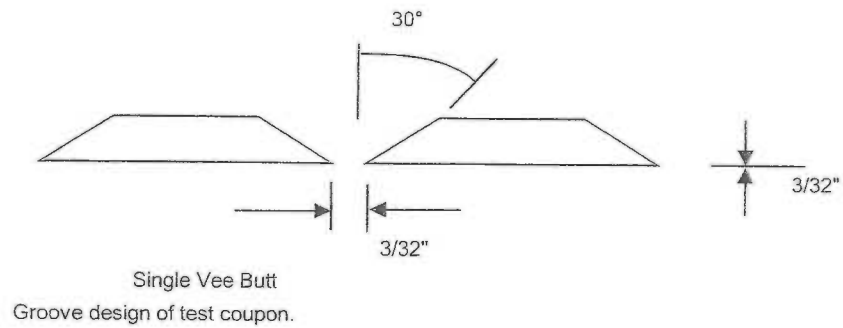
Preheat Temperature: 70°F
 Interpass Temperature: 150°F Min, 400°F Max
 Other: None

TECHNIQUE (QW-410)

Travel Speed: 3.5" to 5.0" IPM
 String and/or Weave: String and Weave
 Oscillation: 2.5 times diameter of electrode
 Single or Multi Pass: Single or Multiple
 Single or Multiple Electrodes: Single
 Other: None

JOINTS (QW-402 Cont.)

Layer	Process	Filler	Size	Amps	Volts	Travel Speed (min)	Joules	Deposit
1	SMAW	E6010	3/32"	50 - 60	25 - 28	3.5"	28,800	0.094"
2	SMAW	E7018-1	3/32"	90 - 100	21 - 23	5.0"	27,600	0.094"
3	SMAW	E7018-1	1/8"	120 - 130	21 - 24	5.0"	37,440	0.187"
Cap	SMAW	E7018-1	1/8"	120 - 130	21 - 24	3.5"	53,485	Cap



TENSILE TEST (QW-150)

Specimen No.	Width (in)	Thickness (in)	Area (sq in)	Ultimate Total Load (lbs)	Ultimate Unit Stress (psi)	Type of Failure and Location
5	0.752 in	0.371 in	0.279 sq in	22 800	81 700	Ductile Weld
6	0.754 in	0.363 in	0.274 sq in	22 350	81 700	Ductile Parent

GUIDED BEND TESTS (QW-160)

Type and Figure No.	Result
# 1 Root Bend QW-462.3a	Pass
# 2 Face Bend QW-462.3a	Pass
# 3 Root Bend QW-462.3a	Pass
# 4 Face Bend QW-462.3a	Pass

TOUGHNESS TESTS (QW-170)

Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values ft-lb	Lateral Expansion		Drop Weight	
					% Shear	Mils	Break	No Break

Destructive Testing Comments:

FILLET WELD TEST (QW-170)

Result - Satisfactory: Yes _____ No _____ Penetration into Parent Metal: Yes _____ No _____

Macro Results:

OTHER TESTS

Type of Test: None
Deposit Analysis: None See attached reports.
Other: None

Welder's Name: Kevin Martin Stamp No. W-23560
Tests Conducted By: Alfor Metallurgical Company Ltd. Laboratory Test No. 08-045A

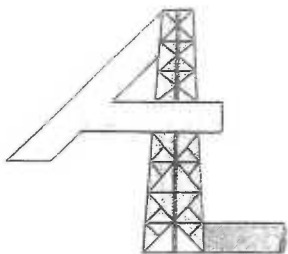
We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: KRM Welding Services Ltd.

Date: January 18, 2008

By:





ALFOR METALLURGICAL COMPANY LTD.
CONSULTING ENGINEERS

KRM Welding Services Ltd.
13339 - 109 A Avenue N. W.
Edmonton, Alberta T5M 2J5

FILE #08-045A

PQR #KRM-2A

January 11, 2008

METAL TEST REPORT

Material Description: ASME SA-516, Grade 60/70; 0.375"-thick plate; SMAW welded; as-welded condition.

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

Results:	<u>Sample 5</u>	<u>Sample 6</u>
Width:	0.752 in.	0.754 in.
Thickness:	0.371 in.	0.363 in.
Area:	0.279 sq. in.	0.274 sq. in.
Ultimate Load:	22 800 lb	22 350 lb
Ultimate Tensile Strength:	81 700 psi	81 700 psi
Fracture Character:	Ductile	Ductile
Fracture Location:	Weld	Parent

Yours very truly,

ALFOR METALLURGICAL COMPANY LTD.

Jan 11/2008

1/11/08
CHARLES. E. MOZESON, P. Eng.

Company Name: KRM Welding Services Ltd.
PQR No.: KRM-2B
WPS No.: KRM-2
Welding Process(es): SMAW (As welded)

Date: Feb - 28 - 2014Mode: Manual**JOINTS (QW-402)**

See Next Page

BASE METALS (QW-403)

Material Spec: SA516 to SA516
Type or Grade: Grade 60/70 to Grade60/ 70
P-No.: 1, Group 1&2 to P-No.: 1, Group 1&2
Thickness of Test Coupon: 0.375"
Diameter of Test Coupon: Plate
Other: None

POSTWELD HEAT TREATMENT (QW-407)

Temperature: Not Applicable
Holding Time: Not Applicable
Other: None

FILLER METALS (QW-404)

SFA Specification:	5.1	5.1
AWS Classification:	E6010	E7018-1
F-No.:	F3	F4
A-No.:	A1	A1
Size:	1/8"	3/32", 1/8"
Weld Metal Thickness:	0.125"	0.250"
Other:		

SHIELDING GAS (QW-408)

	Percent Composition		
	Gas(es)	Mixture	Flow Rate
Shielding:	None		
Trailing:	None		
Backing:	None		
Other:	None		

POSITION (QW-405)

Position of Groove: 3G
Weld Progression: N/A
Other: None

ELECTRICAL CHARACTERISTICS (QW-409)

Current: DC
Polarity: DCEP
Amps: 65 - 100
Volts: 20 - 30
Wire Feed Speed: N/A
Other: Heat Input F3 max= 29,571 J/in Max.
Heat Input F4 Max = 39,600 J/in Max.

PREHEAT (QW-406)

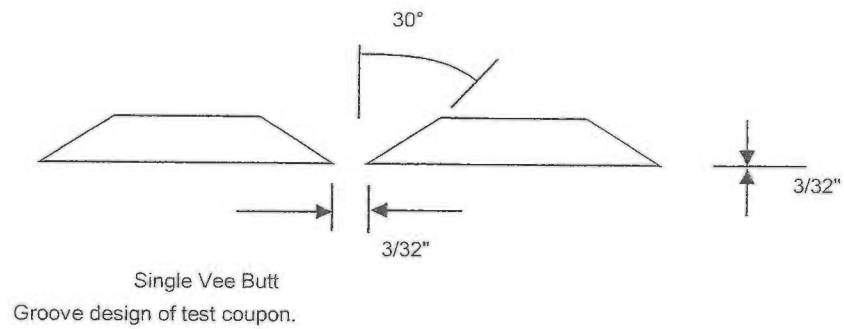
Preheat Temperature: 150°F
Interpass Temperature: 150°F Min, 400°F Max
Other: None

TECHNIQUE (QW-410)

Travel Speed 3.5" to 5.0" IPM
String and/or Weave String and Weave
Oscillation: 2.5 times diameter of electrode
Single or Multi Pass: Single or Multiple
Single or Multiple Electrodes: Single
Other: None

JOINTS (QW-402 Cont.)

Layer	Process	Filler	Size	Amps	Volts	Travel Speed (min)	Joules	Deposit
1	SMAW	E6010	1/8"	65 - 70	25 - 30	4.0"	31,500	0.125"
2	SMAW	E7018-1	3/32"	65 - 75	20 - 23	3.5"	29,571	0.125"
3	SMAW	E7018-1	1/8"	100 - 110	21 - 24	5.0"	31,680	0.125"
Cap	SMAW	E7018-1	1/8"	100 - 110	21 - 24	4.0"	39,600	Cap



TENSILE TEST (QW-150)

Specimen No.	Width (in)	Thickness (in)	Area (sq in)	Ultimate Total Load (lbs)	Ultimate Unit Stress (psi)	Type of Failure and Location

GUIDED BEND TESTS (QW-160)

Type and Figure No.	Result

TOUGHNESS TESTS (QW-170)

Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values ft-lb	Lateral Expansion % Shear	Mils	Drop Weight Break	No Break

See Attached Acuren CVN Impact Report

Destructive Testing Comments:

FILLET WELD TEST (QW-170)

Result - Satisfactory: Yes _____ No _____ Penetration into Parent Metal: Yes _____ No _____

Macro Results:

OTHER TESTS

Type of Test: 10kg Vickers Hardness Testing (See Attached)

Deposit Analysis: None

Other: None

Welder's Name: Kevin Martin

Tests Conducted By: Acuren Group Inc.

Stamp No. W-23560

Laboratory Test No. 207-0078739

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: KRM Welding Services Ltd.

Date: March - 11- 2014

By:





Acuren Group Inc.
7450 - 18th Street
Edmonton, AB, Canada T6P 1N8
Phone: (780) 440-2131
Fax: (780) 440-1167
Materials Engineering & Testing
a Rockwood Company

CVN IMPACT TEST

Client: GRB Enterprises Ltd.
Address: 9712 - 54 Ave
Edmonton, AB
T6E 0A9

Acuren Project #: 207-0078739
Client Reference #: 716750

Test Date: March 3, 2014

Attention: Gerald Belhumeur

Sample Description: KRM-2B: 3/8 in. Welded Plate, ASME SA 516 Grade 60/70, SMAW As Welded

Specimen Type & Preparation: 10mm x 7.5mm - Transverse to Weld

Test Procedure: ASTM A370; V-Notch; ASME VIII Div 1 UG-84

Governing Specification: No governing specification stipulated

Test Result: As reported below

Test Temperature: -55°F

Weld within 1/16 in. of Surface	Test Results				Gov. Spec. Minimum Requirements	
	Energy Absorbed		Shear	Lateral Expansion		
	(J)	(ft. lbs.)*	(%)	(mm)	(J)	(ft. lbs.)
A	68	50	40	1.58	N/S	N/S
B	43	32	30	1.00	N/S	N/S
C	57	42	30	1.21	N/S	N/S
Average	56	41	33	1.26	N/S	N/S

HAZ	Test Results				Gov. Spec. Minimum Requirements	
	Energy Absorbed		Shear	Lateral Expansion		
	(J)	(ft. lbs.)*	(%)	(mm)	(J)	(ft. lbs.)
A	178	131	85	2.69	N/S	N/S
B	150	111	80	2.45	N/S	N/S
C	217	160	100	2.35	N/S	N/S
Average	182	134	88	2.50	N/S	N/S

*Denotes values obtained by conversion.; N/S = Not Specified

Reviewed By: Rebecca Mattis, C.E.T.

Tested By:

Alicia McGrotty

Specimens will be
disposed of 60 days
after test date.





Acuren Group Inc.
 7450 - 18th Street
 Edmonton, AB, Canada T6P 1N8
 Phone: (780) 440-2131
 Fax: (780) 440-1167

**Materials Engineering & Testing
 a Rockwood Company**

HARDNESS TEST

Client: GRB Enterprises Ltd.
 Address: 9712 - 54 Ave
 Edmonton, AB
 T6E 0A9

Acuren Project #: 207-0078739
 Client Reference #: 716750

Test Date: March 5, 2014

Attention: Gerald Belhumeur

Sample Description: KRM-2B: 3/8 in. Welded Plate, ASME SA 516 Grade 60/70, SMAW As Welded

Specimen Type & Preparation: Surveyed on polished weld cross section

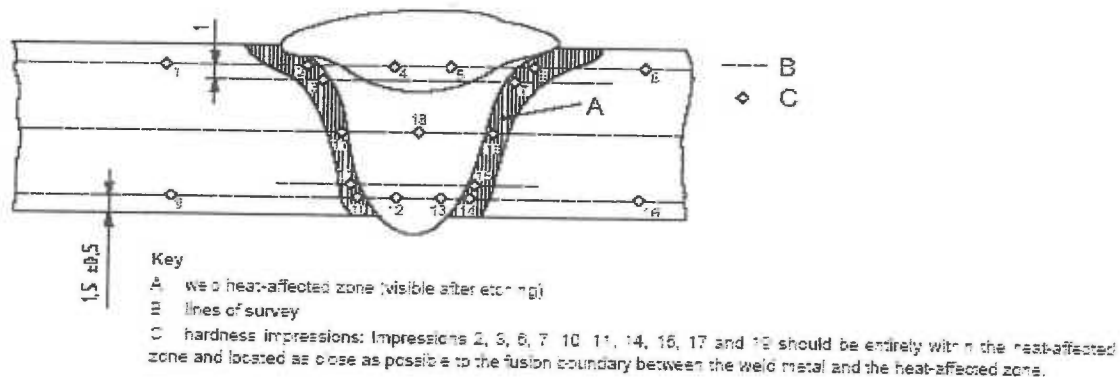
Test Procedure: ASTM E84 (Vicker's Hardness), Locations as per NACE MR0175

Governing Specification: NACE MR0175 (250 HV maximum)

Test Result: The specimen met the governing specification requirements.

Hardness Scale: HV10

Dimensions in millimetres



Base		HAZ		Weld		HAZ		Base	
Point	HV10	Point	HV10	Point	HV10	Point	HV10	Point	HV10
1	154	2	188	4	178	6	174	9	155
		3	178	5	174	7	181		
		17	160	18	155	19	161		
		11	166	12	158	15	165		
9	152	10	168	13	156	14	165	16	153

Reviewed By: Rebecca Mattis, C.E.T.

Tested By: Minh Le, C.E.T.

Rebecca Mattis

Specimens will be
 disposed of 60 days
 after test date.

