



Eastend Iron Industries Ltd. Phone: (403) 223-2620  
6215 – 54 Avenue Fax: (403) 223-8626  
Taber, AB T1G 1X4 [www.eastendiron.com](http://www.eastendiron.com)

Quality Control  
For the Repairs of  
Firetubes

Constructed For  
C.N.R.L.  
@ 5-14-18-10W4

Repaired By:  
Eastend Iron Ind. Ltd.  
Taber Alberta

AQP.-#2972  
Expires-July 27,2016  
WPS#2178.2 EII-2  
Job #092815F

## Certificate of Authorization Permit

### Quality Management System

Expiry Date: **July 27, 2016**

Reg. No.: **AQP-2972**

### EASTEND IRON INDUSTRIES LTD.

6215 - 54 AVENUE  
TABER, 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
<b>Pressure Vessels</b>			
ASME Section VIII-1	---	Shop/Field	Shop/Field
<b>Boilers</b>			
ASME Section I Power Boilers	---	Shop/Field	Shop/Field
ASME Section IV	---	Shop/Field	Shop/Field
<b>Pressure Piping</b>			
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



*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 17th day of July, 2013

Chief Inspector and Administrator

**Certificate No.: 9342**

# EASTEND IRON INDUSTRIES (1995) LTD.

## RECORD OF QUALIFICATION OF WELDING PERSONNEL

WELDER'S NAME AND FILE NUMBERS	SYMBOL	PROCESS	WELDING PROCEDURE [WPS #]	[P] NO.	[F] NO.	POSITION WELD PREGRESSION	MAX DEP. WELD METAL THK.	MIN. PIPE OD	EXPIRY DATE
PERRY WEINBERGER W-17416	<b>W</b>	SMAW	2178.2	P1- P11	F3- F4	6G-ALL	0.250" to Max to be welded	1"OD	Nov 8/2016
TINH NGUYEN W-17671	<b>T</b>	SMAW	2178.2	P1- P11	F3- F4	6G-ALL	.0250" to Max to be welded	1"OD	May 21/2017
CUONG NGUYEN W-16221	<b>C</b>	SMAW	2178.2	P1- P11	F3- F4	6G-ALL	0.250" to Max to be welded	1"OD	May 21/2017
Tuan Vo W-26969	<b>X</b>	SMAW	2178.2	P1- P1	F2- F4	6G-All	.025" to Max to be Welded	1" OD	Nov 8/2016
George Vandermulen W16936	<b>V</b>	SMAW	2178.2	P1- P11	F3- F4	6G-All	0.250" to Max to be welded	1"OD	Sept 12/2017
Larry Garrett W-17676	<b>G</b>	SMAW	2178.2	P1- P11	F3- F4	6G-All	0.250" to 0.438"	1" OD	July 17/2016



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**Saskatchewan Post-Secondary Education and Skills Training** Apprenticeship and Trade Certification

This is to certify that  
**PERRY J. WEINBERGER**  
 holds a journeyman certificate of qualification in the  
**WELDER** trade  
 Date of Issue: 18/12/98  
 N<sup>o</sup> 50436  
*Doug Meier*  
 Director



**Alberta LABOUR** **ABSA**

**Grade "B" Pressure Welder's Certificate of Competency**

This is to Certify that: **Perry J. Weinberger**  
 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, this  
**February 17, 1999**  
 W. 17416  
 File No. *[Signature]*  
 Chief Inspector and Administrator

**Eastend Iron Industries Ltd.** **7285**  
**WELDER PERFORMANCE QUALIFICATION CARD** **A. O. Q. P. No.**

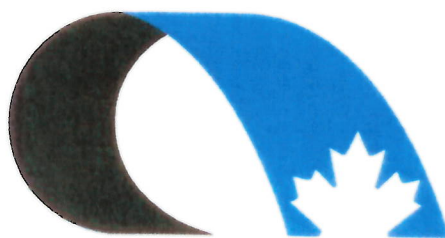
NAME: PERRY WEINBERGER ABSA FILE NO.: W17416  
 This card is issued pursuant to the Alberta Safety Codes Act and the Pressure Welders Regulations. The performance qualification is in accordance with Section IX of the ASME Code and subject to the limitations on the reverse side.

Nov. 8/14 *Perry Weinberger*  
 Date of Test Signature of Welder or Machine Welding Operator  
 This performance qualification is valid for two years from date of test.

BINH NGUYEN  
 Welding Examiner (Print/Type) Card N<sup>o</sup> **1021**

**PERFORMANCE QUALIFICATION**

Process(es)	<u>SMAW SMAW</u>	Material (P-No.)	<u>1</u>
Filler Metal Group (F-No.)	<u>F3 F4</u>	Min. Outside Pipe Diameter	<u>1" OD</u>
Max. Deposited Weld Metal	<u>0.250" MAX. TO BE WELDED</u>	Position(s) Qualified	<u>ALL</u>
Backing	<u>WITH/ WITHOUT WITH</u>	Backing Gas	<u>N/A</u>
Progression	<u>UPHILL UPHILL</u>		
<u>Nov. 8/16</u> P. O. Expiry Date	<i>[Signature]</i> Welding Examiner Signature	<u>E-00418</u> Examiner File No.	



# Canadian Natural

Procedure Number: TC-OVR-PRO-INT-000014

## Owner User Program – Pressure Vessel Repair Procedure Vessel Firetube Repair - Replacement of Damaged Sections

### Contents

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### Revision History

Date	Revision	By	Chk	Approver
August 14, 2014	1	IS	AM	AM
Nov 24, 2014	0	AM	KM	AM



## Vessel Firetube Repair – Replacement of Damaged Sections Static Data Form

Date:	September 28, 2015	CNRL Facility:	Ralston 05-14
Facility LSD:	05-14-018-10 W4M	Vessel Description:	FWKO
A #:	A0191862	CRN:	E1466.2
Vessel Serial #:	81-7900-A	Firetube Material:	
Vessel MAWP:	75 PSI	Firetube Thickness:	0.50"
Owners Inspector:	Dale Toews	Repair Organization:	East End Iron

**Scope of Work:**

**Replace a section 4-5 feet long, through the flange, on cold side of the firetube**

1. Cut the tube at least 24" from fubsheet (greater is okay)
2. Remove the old firetube from the tubesheet
  - a. This shall be removed carefully to as there could be Hydrogen in this space
3. Fit-up and tack weld the straight sections of the firetube (circ and tubesheet)
4. Weld out the circ and tubesheet welds
5. NDE (100% RT all circ welds, 100% MT all fillet welds)
6. Post Weld Heat Treatment

KH  
SEP 29/2015

\*\*This firetube shall be PWHT after completion of repairs\*\*  
 \*\*\*Section of damaged tube shall be carefully removed to allow for further analysis\*\*\*

## Scope

Installation of replacement section of severely pitted, corroded or collapsed firetube from ASME Section VIII Division I pressure vessel constructed of P-I Group 1 or 2 materials. Note that due to the high likelihood of repeat failure, all repairs on vessel firetubes must be post-weld heat treated (PWHT) regardless of whether the firetube was PWHT at time of manufacture.

Materials shall be of the same specification, grade, and dimensions as defined in the manufacturer's original registered design.

Note that due to the high likelihood of repeat failure, repairs on firetubes are typically post-weld heat treated (PWHT) regardless of whether the firetube was PWHT at time of manufacture. There are some exemptions to this rule (south-east Saskatchewan) - the failure mode of firetubes is internal corrosion due to the use of sour natural gas in the burners and not cracking due to stresses. Confirm with the area Asset Integrity Lead if in doubt as to the requirement to perform PWHT.

## Procedure

### Vendor Qualification

1. CNRL Owner's Inspector must review Contractor's Quality Control Program, welding procedures, and welder qualifications prior to the start of the repair. Any concerns must be brought the attention of the CNRL Integrity group.

### Jurisdiction Notification

2. The applicable Jurisdictional Authority (ABSA, BCSA, TSASK) is to be notified prior to beginning repair activities.

### Cut-Out

3. Define the area to be removed.
4. Perform UT of the cut area to determine if any laminations or discontinuities exist.
5. If laminations or discontinuities are identified, move the cut out area to attempt to avoid these defects.
6. Owner's Inspector shall approve the layout of the area to be removed prior to the initial cut being made.
7. Make sure the firetube has been sanitized and there are no explosive environments present.
8. Perform the cut.

### Weld Preparation

9. The joint preparation shall be in accordance with the contractor's registered WPS.
10. The surface shall be cleaned to white metal for a distance of 10 mm beyond the expected weld area.
11. The weld area shall be MPI (where practical Wet Fluorescent MPI) examined for laminations and surface discontinuities. If laminations or surface discontinuities are identified they shall be brought to the attention of the Asset Integrity representative.

### Hydrogen Bake Out and Sulfur Removal

**Note:** Indicate "NA" on the Travel Sheet if not required – usually because the vessel has not been in sour service

12. Vessels that have been exposed to sour or sulfur bearing process streams shall required the weld attachment area to undergo a "Bake Out" procedure. This procedure shall consist of heating the weld attachment area and 10 cm on each side to 315°C (600°F) for and holding that temperature for a minimum of 60 minutes. Bake out should be done prior to cutting out, if cutout is done thermally. Stipulate controls methods.
13. Bake Out is performed by either induction coil (use thermocouples as control instrumentation) or propane torch (use temperature-sensitive crayons – upper and lower temperature to be controlled). Oxyacetylene torches are not acceptable.

14. If induction coils are used, a 250°C (482°F) four-hour heat treatment may be substituted for the normal 450°C (842°F) one-hour heat treatment.

## Welding

15. Minimum pre-heat shall be 80°C (176°F) for a 100 mm band on both sides of the weld attachment area.
16. The CNRL Inspector shall witness seal on the box being broken and ensure that once the box has been opened the electrodes are stored in an oven.
17. The CNRL Inspector shall approve the alignment and fit-up of the replacement section with only the tack welds in place.
18. Welding shall be in accordance with the contractor's registered WPS utilizing new E 7018-1 electrodes. The WPS is to be approved by CNRL prior to use.
19. Inspect root weld using dry powder MT.
20. Complete the butt welds. No down hand welding shall be used.
21. Perform dry powder or black on white MT of the final weld.
22. Perform post weld heat treatment (PWHT). If firetube was PWHT at time of manufacture, perform PWHT as per U1A. If firetube was not PWHT at time of manufacture, perform PWHT by heating to 620°C (1150°F) and holding for 1 hour. PWHT may be performed by either oven or stress-relief truck. Heating rates shall be as per ASME Section VIII Division 1. Refer to the comments in the "Scope" for further information.
23. After PWHT, the weld area shall be wrapped with an insulating blanket and allowed to slow cool to 100°C (212°F). The cooling rate shall not exceed 260°C (500°F) / hour.

## Post Weld Non-Destructive Examination (NDE)

24. Perform MT of the final weld 12 hours after completion if the weld does not require post weld heat treatment (PWHT). If PWHT is required, perform MT after the weld has cooled prior to PWHT and repeat the MT 12 hours after PWHT is completed.
25. Complete 100% RT of butt weld joints.
26. No hydro-test is required.

## Documentation

**Note:** The travel sheet included within this Procedure will be used to document the repair activities. Mandatory "hold" points have been provided, others will be identified depending on the job scope.

27. The CNRL Inspector must make sure that Contractor has completed required QC documentation and jurisdictional documents. The Contractor performing the work may use their own Travel Sheet as per their Quality Control program but the process is to meet all CNRL requirements as per this Procedure.
28. The Travel Sheet provides for the identification of Hold, Witness and Review points to be assigned by CNRL Asset Integrity, the Contractor performing the work and the CNRL Inspector.

**Hold Point:** work does not proceed beyond this unless approved by the party assigning the action.

**Witness Point:** work may proceed but at some time during the process will be "witnessed" by the party assigning the action.

**Review Point:** work may proceed - identifies the need to review documents such as inspection reports, test reports, mill test reports, etc..

**NA:** identifies a step in a generic procedure that is not applicable to the work being performed.

29. Typically the process for assigning actions (done prior to the start of work) is as follows:
  - Contractor identifies their action items – typically all steps are considered to be "Hold Points" for the Contractor/Fabricator.
  - CNRL Asset Integrity representative identifies action items.
  - CNRL Inspector identifies action items per discussion and agreement with the CNRL Asset Integrity representative.



There is no set rule in regards to the action items that are assigned by the CNRL Asset Integrity representative or the CNRL Inspector but sufficient actions are to be assigned to ensure a quality product is produced by the Contractor. A developed level of trust based on familiarity of the Contractor's work may influence the level of involvement by Asset Integrity and the CNRL Inspector.

30. The CNRL Inspector must sign off the jurisdictional documents and make sure one copy is submitted to the jurisdictional authority and one is included in the QC package.
31. CNRL Asset Integrity is to update the equipment database (Maxitrak) to reflect repair activities. The final QC package may be retained (hard copy or electronic) at the regional business office or off-site storage facilities. Records are to be kept for the life of the equipment.

**Note:** "CNRL Inspector" refers to a pressure equipment Inspector (staff or contract) that has the required Jurisdictional certifications to perform the required inspections and to certify the applicable Jurisdictional documents.

**Alberta:** Inspectors who inspect and certify repairs to boilers and pressure vessels must hold an Alberta In-service Inspector certification. API510 certified Inspectors may assist (but not certify) as per the CNRL OUP.

**British Columbia:** Inspection and certification shall be made by an Inspector holding the appropriate commission issued by the National Board and employed by an Authorized Inspection Agency (BCSA).

**Saskatchewan:** Inspectors who inspect and certify repairs to boilers and pressure vessels must hold a Saskatchewan Pressure Equipment Inspector's License Class 1 (boilers and pressure vessels) or Class 2 (pressure vessels only). API510 certified Inspectors may assist (but not certify) as per the CNRL OUP.

# Travel Sheet – Vessel Firetube Repair

A#:	A0191862	Date:	September 28, 2015				
Vessel LSD:	05-14-018-10 W4M	Facility:	Ralston 05-14				
Step #	Description of Step	CNRL Asset Integrity		Contractor		Owners Inspector	
		Action	Initial & Date	Action	Initial & Date	Action	Initial & Date
<b>Scope Sign-Off</b>		H	14 Sept 29/15				
<b>Vendor Qualification</b>							Oct 14/15
Step 1	Ensure Vendor is Qualified	H	14 Sept 29/15				
Step 2	Jurisdiction Notification	H	14 Sept 29/15		Per Sept 29/15		
<b>Cut-Out</b>							
Step 3	Mark Area				Per Sept 29/15		
Step 4	Perform UT				Per Sept 29/15		
Step 5	Move Area if Defects Found				NA	H	Oct 14/15
Step 6	Owners Inspector Approval						
Step 7	Ensure Removal of LEL						
Step 8	Perform Cut				Per Sept 29/15		
<b>Weld Preparation</b>							
Step 9	Joint Prep as per WPS					H	Oct 14/15
Step 10	Surface Prep						
Step 11	Weld Area MPI for Discontinuities					H	Oct 14/15
<b>Hydrogen Bake Out</b>							
Step 12	Perform Bake-Out (If Required)				Per Oct 6/15		
Step 13	Heating Method Used for Bake-Out				Per Oct 6/15		
Step 14	Substitution of Induction Coils				NA		
<b>Welding</b>							
Step 15	Pre-Heat				Per Oct 19/15		
Step 16	New Electrodes				Per Oct 19/15		
Step 17	Owners Acceptance of Fit-Up					H	Oct 14/15
Step 18	Approved WPS	H					
Step 19	Inspect Root Weld					H	Oct 16/15
Step 20	Completion of Weld				Per Oct 21/15		
Step 21	MT of final weld					H	Oct 21/15
Step 22	PWHT				Per Oct 23/15		
Step 23	Slow Cool				Per Oct 23/15		
<b>Post-Weld Non-Destructive Examination (NDE)</b>							
Step 24	Completion of Radiography				Per Oct 26/15		
Step 25	12 Hour MT					H	Oct 26/15
Step 26	No Hydrotest				NA		
<b>Documentation</b>							
Step 27	Completion of Contractor Documentation				Per Oct 26/15		
Step 28	Owners Inspector Signs Jurisdictional Docs				Per Oct 26/15	H	DT Oct 26/15
Step 29	File final QC Package and update Maxitrac	H			Per Oct 26/15	H	DT Oct 26/15

Action Required: H = Hold Point, W = Witness Point, R = Review Point

Final Sign-Off	
Contractor: <u>Perry Weinberger</u>	Owners Inspector: <u>Dale Turner</u>

TC-OVR-FM-INT-000045



BOILERS AND PRESSURE VESSELS  
REPAIR OR ALTERATION REPORT

AB-40 (Side A) 2012-09

(A) #: 191862  
OWNER EQUIP. NO: 81-7900-A  
REPAIR ORG. JOB NO: 092815F

REPAIR  and/or ALTERATION  Partial  Final

1 Name of Organization doing Repair/Alteration Eastend Iron Industries LTD.  
Address 6215 54 AVE Taber Alberta AQP No. & Expiry Date 2972 July 27 / 2016

2 Name of Owner C.N.R.L.  
Address \_\_\_\_\_  
Location of Installation 5-14-18-10W4

3 Boiler/Pressure Vessel Description Horizontal (Firetube) CRN E1466.2  
Manufacturer's Name Maloney Steel Ltd. Serial No. 81-7900-A

4 Original Design Conditions:  
a) Vessel/Shellside/Boiler: Max Allowable Working Press 75 Psi Min/Max Design Temp /200F  
b) Jacket/Tubeside: Max Allowable Working Press \_\_\_\_\_ Min/Max Design Temp /

5 New Design Conditions:  
a) Vessel/Shellside/Boiler: Max Allowable Working Press 75 Psi Min/Max Design Temp /200F  
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). Two blisters found on inside of pipe near tubsheet

7 Original Code Edition and Addenda ASME Sect. VIII Year 1980 Addenda June 81

8 Code Edition and Addenda used for performing the work ASME Sect VIII Year 2013 Addenda \_\_\_\_\_

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)  
It was determined to replace a section of the 30" leg that extended through the tubsheet. The pipe was zip cut off, then baked out at 600F for one hour. The same was done on the tubsheet. The prepared joints were checked with mag partical prior to tack up. The new pipe was tacked in place and verified by owners inspector. The weld area was preheated to 176F and the root pass done with E-6010 electrodes. The fill and cap passes were completed using new E-7018 electrodes. After the weld was completed, the weld area was wrapped with an insulating blanket to allow for a slow cool.

10 Heat Treatment: Preheat Temp 176F Post Weld HT (Temp /Time) 1150F /120 minutes Other Bake 600F/60 min.

11 Non Destructive Examination (Specify type and extent).  
Mag partical weld preps, mag partical root pass, white/black mag after welding, Xray butt weld before P.W.H.T. X-ray butt weld, and mag partical completed welds after P.W.H.T.

12 Pressure Test  
a) Hydrostatic Vessel/Shellside/Boiler NA Tubeside/Jacket NA  
b) Other Test Vessel/Shellside/Boiler NA Tubeside/Jacket NA

(A) #: 191862

OWNER EQUIP. NO. 81-7900-A

13 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	SA 516-70	.500"	30"
Nozzles				Flanges/Fittings		Class	

14 Welding Procedures -- Alberta Registration Number WP- 2178.2 WPS Numbers used: EII-4

15 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 NA      b) Repair/Alteration Procedure: O      c) Material Control C  
 d) Welding Control C      e) NDE C      f) Heat Treatment C      g) Pressure Test NA

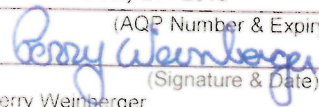
Note 2: Owner/client must have a valid Alberta Quality Program (AQP), for the scope of work, to assume responsibility for function c, d, e, f, or g.

17 REMARKS

After a review of the NDT reports, there were no rejectable indications to note

**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:  
 Eastend Iron Industries Ltd.  
 (Repair/Alteration Organization Name)  
 AQP# 2072 July 27 / 2016  
 (AQP Number & Expiry Date)  
  
 (Signature & Date)  
 Perry Weinberger  
 (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 October 26, 2015

**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).

Perion Inspection Inc      8039  
 Owner-User/Inspection Company Name      AQP#  
  
 In-Service Inspector Signature & Date  
 Dale Toews  
 In-Service Inspector Name (Please Print)  
000036  
 In-Service Inspector Alberta Cert #

\_\_\_\_\_  
 ABSA SCO Signature & Date  
 \_\_\_\_\_  
 Print Name

OCT. 26/15

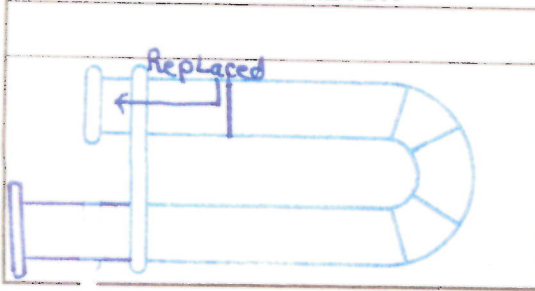


<b>Vessel Title</b>	<b>Manufacturer/Serial Number</b>	<b>Identification Number</b>
Horizontal (firtube)	81-7900-A	A# 191862
<b>CODE INSPECTOR REVIEW:</b>		<b>REVIEW DATE:</b>

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			BAW 09/29/15	BZ 26/10/15	
2	Welding Procedures Registered for Welding to be done			BAW 09/29/15	BZ 26/10/15	Oct 26/15
3	Welders have valid Alberta P.Q. Card for work to be done			BAW 09/29/15	BZ 26/10/15	Oct 26/15
4	Cracks MT/PT check after removal					Oct 26/15
5a	Materials to be used - checked against PO/Drawing			NA		
5b	- material identified with correct SA/SB specifications			BAW 09/01/15	BZ 26/10/15	Oct 26/15
5c	- material test reports checked against specifications			BAW 09/01/15	BZ 26/10/15	Oct 26/15
6a	Fit up - shell courses-flush patches-heads			NA		
6b	- tubesheet/shell - firtube			BAW 09/10/15	BZ 26/10/15	Oct 26/15
6c	- nozzles and fittings			NA		
7	Radiographic Examination			BAW 10/22/15 10/26/15	BZ 26/10/15	
8	Ultrasonic Examination(MT/PT)			BAW 10/14/15	BZ 26/10/15	Oct 26/15
9	Internal Visual after welding			BAW 10/20/15	BZ 26/10/15	Oct 26/15
10	External Visual after welding			BAW 10/21/15	BZ 26/10/15	Oct 26/15
11	Heat Treatment			BAW 10/23/15	BZ 26/10/15	Oct 26/15
12	Hardness Tests			NA		
13	Hydrostatic Pressure Test		Gauge No 's Recorder No.	NA		
14	Alternative Test (Specify)			NA		
15	Nonconformance Report # Cleared			NA		
16	Pressure Vessel Repair or Alteration Report (AB 40) completed			BAW 10/26/15	BZ 26/10/15	Oct 26/15
17	Repair/Alteration Nameplate attached			NA		

**OUTLINE SKETCH**



**MATERIAL USED IN REPAIR/ALTERATION**

Item	Mat'l Spec	Plate & Heads Heat & Plate#	Thk/	Sch.	Rating
Shell/Patches					
Heads End					
Tubesheet					
Firetube	SA 516-70	30685	1/2"		
Nozzles					
Fittings					



EASTEND IRON IND. LTD.  
6215 54 AVENUE  
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TELEPHONE (403) 223-2620  
FAX. (403) 223-8626

**CERTIFYING STATEMENT**

**ACCEPTANCE OF PROCEDURES MANUAL**

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

**Law Inspection Services Ltd.  
P.O. Box 1971  
Lethbridge, Alberta T1J 4K5**

In my opinion, they comply in all respects with the requirements of:

**CGSB AND ASNT-TC-1A  
Law Inspection Service Inc.  
Are hereby appointed to perform:**

**RADIOGRAPHY, ULTRASOUND, DYE PENETRANT &  
MAGNETIC PARTICLE INSPECTION**

**FOR**

**Eastend Iron Ind. Ltd.  
6215 54 Ave  
Taber, Alberta.  
T1G 1X4**

**Appointment of Level III Examiner  
Warren Graham**

Is by this statement to act as the Level III examiner for:

**Eastend Iron Ind. Ltd.  
To Conduct:**

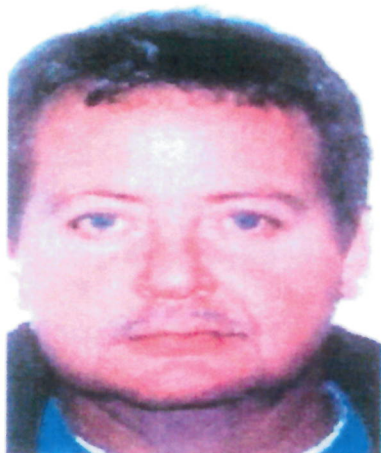
**RADIOGRAPHY, ULTRASOUND, DYE PENETRANT, AND  
MAGPARTICLE INSPECTION.**

Date: October 22/ 2015 Signature of QCManager *Berry Weimberger*



Natural Resources  
Canada

Ressources naturelles  
Canada



Name / Nom **Austin J. McNeely**  
 Reg. No. **4918**  
 No. matricule  
 Issue Date / Date d'émission **2012/12/08**

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 | *Austin J. McNeely*



Natural Resources  
Canada

Ressources naturelles  
Canada

Certified to / Certifié selon CAN CGSB 48 9712

4918

Method / Methode	Level / Niveau	Sector / Secteur	Cert. Date / Date cert.	Date recert. / Date recert.	Expires / Expiration
MT	2	EMC	1993/04/22		2015/12/31
RT	2	EMC	1991/06/06		2015/12/31
UT	1	EMC	1995/09/14		2015/12/31

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

Manager / Certifying Agency  
 Gestionnaire / Organisme de certification



# LAW Inspection Services Inc.



## NDT Personnel Certification to the Latest Accepted Edition of SNT-TC-1A EYE EXAMINATION REPORT

In accordance with the latest accepted edition of SNT-TC-1A, Section 8.2 this Eye Examination Report, consisting of two vision requirements (Near Vision Part A) and (Colour Vision Part B), is to be completed annually.

Employee's Name: Justin McNeil

Registration Number: 1918

Exam Submitting for the following: Reactivation

### Part A Near Vision

Near vision acuity shall permit reading a minimum of target number 2.0 not less than 30.5 cm with one or both eyes, either corrected or uncorrected.

I CONFIRM THAT THE ABOVE MENTIONED EMPLOYEE: (Please check one.)

Meets WITHOUT Correction  Meets WITH Correction  Does Not Meet

Warren Graham

Examiner's Name (Please Print Type)

  
Examiner's Signature

NDI III, Owner

Appointment Title

August 25, 2015

Date of Eye Examination

### Part B Colour Vision

I CONFIRM THAT THE ABOVE- MENTIONED EMPLOYEE CAN DISTINGUISH AND DIFFERENTIATE CONTRAST BETWEEN THE COLOURS USED IN THE NDT METHOD(S) CONCERNED

Warren Graham

Examiner's Name (Please Print Type)

  
Examiner's Signature

NDI III, Owner

Appointment Title

August 25, 2015

Date of Eye Examination

### Part C Shades of Gray

To be completed by any of the following: employer, medically recognized personnel, or certified level 3 personnel

I CERTIFY THE ABOVE MENTIONED APPLICANT CAN DISTINGUISH AND DIFFERENTIATE CONTRAST BETWEEN THE SHADES OF GRAY USED IN THE NDT METHODS CONCERNED

Warren Graham

Examiner's Name (Please Print Type)

  
Examiner's Signature

NDI III, Owner

Appointment Title

August 25, 2015

Date of Eye Examination





# LAW INSPECTION SERVICES INC.

P.O. Box 1971 Lethbridge, AB  
T1J - 4K5 Ph. (403) 380-3555

Date Oct 27/15  
Page 1 of 1

R - 50717

## Radiographic Inspection Report

LAW Job # \_\_\_\_\_

Client: CNRL Client # \_\_\_\_\_  
 Location: S-14-18-10N4 Client # \_\_\_\_\_  
 Material: Carbon steel Source: 3.5mm / Ir 192 Screens: 0.010 Pb F+B Film: Fuji HD80

SOD 14.5" SFD 15" Technique(s) Refer to back Code(s) ASME Sec VIII Div I Part UW-51

T = Technique      LF = Lack of Fusion      LC = Low Cover      EUC = External Undercut      1 = Slight  
 WS = Welder Stamp      S = Slag      HL = High Low      ACC = Accept      2 = Moderate  
 IP = Incomplete Penetration      BT = Burn Through      CK = Crack      Rej = Reject      3 = Severe  
 P = Porosity      IC = Internal Concavity      IUC = Internal Undercut      O = Other

Film #	SIZE/SCH	ACC	T	WS	IP	LF	A	S	BT	IC	LC	HL	CK	IUC	EUC	O	Comments	REJ
1																		
2																		
3	<u>X-1 30x50</u>																	
4	<u>0-36</u>	✓																
5	<u>36-72</u>	✓																
6	<u>72-108</u>	✓																
7	<u>108-144</u>	✓																
	<u>144-180</u>	✓																
	<u>180-216</u>	✓																
10	<u>216-0</u>	✓																
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		

Weld or film quantity	Other (specify)
2"	
3"	<u>1-30" weld</u>
4"	
6"	

Stamp  
Austin McKeely  
CGSB RT#  
#4918

Reg. hrs.	O.T. Hrs.	kms	Sub-days	Est. cost
<u>4</u>	<u>-</u>	<u>-</u>	<u>-</u>	

Client Signature Gerry Whimberger  
 Client Print Gerry Whimberger  
 Technician Signature [Signature]



# LAW INSPECTION SERVICES INC.

P.O. Box 1971 Lethbridge, AB  
T1J - 4K5 Ph. (403) 380-3555

Date Oct 26/15  
Page 1 of 1

R - 50110

## Radiographic Inspection Report

LAW Job # \_\_\_\_\_

Order # 548-4125

Client: CNRL Client # \_\_\_\_\_

Location: S-14-18-10W4 Client # \_\_\_\_\_

Material: Carbon steel Source: 3.5mm / Ir 192 Screens: 0.010" Pb F+B Film: FUJI / HD80  
SIZE TYPE BRAND TYPE

SOD: 14.5 SFD: 15 Technique(s): Refer to back Code(s): NSMC Sec VIII Div 1 Part UW51

- T = Technique
- WS = Welder Stamp
- IP = Incomplete Penetration
- P = Porosity
- LF = Lack of Fusion
- S = Slag
- BT = Burn Through
- IC = Internal Concavity
- LC = Low Cover
- HL = High Low
- CK = Crack
- IUC = Internal Undercut
- EUC = External Undercut
- ACC = Accept
- Rej = Reject
- O = Other
- 1 = Slight
- 2 = Moderate
- 3 = Severe

Film #	SIZE/SCH	ACC	T	WS	IP	LF	P	S	BT	IC	LC	HL	CK	IUC	EUC	O	Comments	REJ
1																		
2	<u>X-1 30x50</u>			<u>7W</u>														
3	<u>0-36</u>			✓														
4	<u>26-72</u>			✓														
5	<u>72-108</u>			✓														
6	<u>108-144</u>			✓														
7	<u>144-180</u>			✓														
	<u>180-216</u>			✓														
	<u>216-0</u>			✓														
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		

Weld or film quantity	
2"	Other (specify)
3"	<u>1-30" weld</u>
4"	
5"	

Stamp  
Austin NiDee 14  
ASB RTE  
04910

Reg. hrs.	O.T. Hrs.	kms	Sub-days	Est. cost
<u>4</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>

Client Signature: Bruce Weinberger  
 Client Print: Bruce Weinberger  
 Technician Signature: [Signature]



Eastend Iron Industries Ltd. Phone: (403) 223-2620

6215 – 54 Avenue

Fax: (403) 223-8626

Taber, AB T1G 1X4

[www.eastendiron.com](http://www.eastendiron.com)

Dale Toews From Perilon Inspection Inc will supply  
C.N.R.L. with NDT reports.

PROJECT: C.N.R.L. Firetube5-14-18-10W4

JOB NUMBER: 092815F

DESCRIPTION: 30" Firetube

DATE: October 23 / 2015

COMPONENT DESCRIPTION

DWG. NO. AND LINE NO.	DIAMETER	THICKNESS	MATERIAL	LENGTH	WEIGHT
Tubesheet		2"	SA 516-70N	40"X72"	
Legs	30"	.500"	SA 516-70N	22'	

TYPE OF HEAT TREATMENT:

INSTRUCTIONS: STRESS RELIEVE

Temperature to be raised from 800°F (426°C) to 1150°F (621°C) at a maximum rate of 200°F (\_\_\_°C) per hour.

NOTE: MUST NOT EXCEED 400°F (222°C) PER HOUR.

(Calculated rate = 400°F/h. Divided by governing metal thickness)

Temperature to be held at 1150°F (621°C) plus or minus 25°F (14°C) for 120 minutes.


Temperature to be lowered from 1150°F (621°C) to 800°F (426°C) at a rate of 250 °F (\_\_\_\_°C) per hour.

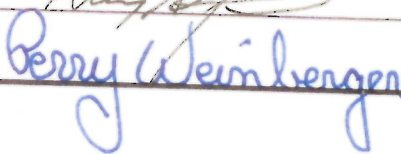
NOTE: MUST NOT EXCEED 500°F (278°C) PER HOUR.

(Calculated rate = 500°F/h. Divided by governing metal thickness)

Additional requirements: Job number and description required on heat treatment chart.

Furnace Heat Number: #1-23-OCT-2015

Furnace Operator's Signature: 

Q.C. Inspector's Signature: 



# SUPERHEAT FGH CONTROL UNIT CERTIFICATE OF CALIBRATION

Asset Number \_\_\_\_\_ Supercontroller Number 23600

Range 0 - 2000°F Sensor Type K

Calibration Procedure Number QEP-SC-CCAL (Rev.8)

Date September 11, 2015 Calibration Due March 9, 2016

This instrument has been calibrated within the manufacturer's specifications.

These specifications state that the maximum allowable error is  $\pm$  6°F

During calibration, if the "°F As Found"/"°F As Left" numbers (values) are the same and no adjustments have been made, only one number (value) will be noted.

Zone 1A	Input Signal	200	600	1000	1400	1800
	°F As Found	202	602	1002	1402	1802
	°F As Left					
Zone 7A	Input Signal	200	600	1000	1400	1800
	°F As Found					
	°F As Left					
Zone 1B	Input Signal	200	600	1000	1400	1800
	°F As Found					
	°F As Left					
Zone 7B	Input Signal	200	600	1000	1400	1800
	°F As Found					
	°F As Left					

Environmental Conditions: Temperature (°F): 62.0

The above unit has been calibrated and tested. It is directly traceable to the National Institute of Standards & Technology (N.I.S.T) or the National Research Council (N.R.C).

Kevin Wilkins

Calibrated By

Signature

## MEASURING & TEST EQUIPMENT USED

Make: FGH Type: Ezeval Model: MK3

Serial No.	Cert. Date	Due Date
3172	July 3, 2015	January 2, 2016



# CCPI North America

A Subsidiary of CCPI Inc. USA

49 Raykwich Road

Naugatuck

CT 06770

USA

Tel: 001 203 723 1111 Fax: 001 203 723 1151

E-mail: info@ccpi-inc.com

## Certificate of Calibration

Issue date : June 11, 2014

Certificate Serial Number : CCPI/C/03280

Page 1 of 4 pages

Customer See Certificate of Conformity for Details

Calibration Date June 11, 2014

Our ref: 37532 (2045)

Equipment Tested 2 simplex Type K thermocouples CBL-20-KK-CF4-CF construction

Description 3 feet long x 20awg dia. wire. Serial Nos. 37532/F and 37532/B.  
The above thermocouples are samples taken from the front (F) and back (B) of coil number 37532. Coil length 1005 feet from master coil 3053/3054-2.

Measurements Calibration over the range 200 °F to 2300 °F.

Procedure The calibration was carried out in accordance with CCPI North America laboratory procedures LWI 1. (Comparison with standard thermocouples traceable to National Stds). The following results give the required correction figures for the test thermocouples at the test temperature against ASTM E230 and the mean correction values of all thermocouple results and graph on page 3 and the end to end differences on page 2 plus graph showing front and back corrections on page 4. The temperature scale used during tests is ITS-90

Uncertainty of measurement =  $\pm 2.0$  °F at 200 °F to 1200 °F  
 $\pm 2.2$  °F at 1400 °F to 2000 °F  
 $\pm 2.7$  °F at 2200 °F to 2300 °F

Standard Equipment Traceable thermocouples Serial No WSL544L/WSL545L UKAS cert by UKAS lab. No.0600 cert. No.17074/17075 calibration due August 2014/August 2014. Standard DMM Serial No. MY44059437 NVLAP cert. By NVLAP Lab. No. 200935-0 Certificate number 00185 calibration due May 2015.

Notes The ambient temperature during tests was 70 °F ( $\pm 5.0$  °F)  
The relative humidity was 50% rh ( $\pm 10\%$  of reading).  
Immersion depth during calibrations was from 9 to 20 inches.  
All results are normalised to the test temperature.

All tests are fully traceable to the SI (the International System of Units) through standards maintained by NIST or other internationally recognized institutes via calibrated traceable equipment.

For and on behalf of CCPI North America Approved Signatory

Certified by

Erik Beaudoin

**ESSAR Steel Algomina Inc.**

CUSTOMER PURCHASE ORDER NUMBER  
K-04223

ENTRY DATE  
2011/08/26

CREATE DATE  
2011/10/11

FULLY NUMBER  
245729

SHIPPER'S NO.  
-

CARRIER  
TPPX

-80751

MILL ORDER  
10706

CHARGE TO CUSTOMER NAME AND ADDRESS  
CESSCO FABRICATING AND ENGINEERING  
7310 -99TH STREET  
EDMONTON, ALBERTA  
T6E 3R7

SHIP TO CUSTOMER NAME AND ADDRESS  
CESSCO FABRICATION AND ENGINEERING  
7310-99TH STREET  
EDMONTON ALBERTA

105 West Street, Sault Ste. Marie, Ontario Canada P6A 7B4

**MILL TEST REPORTS**

CESSAR STEEL ALGOMINA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWING ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES.

**CUSTOMER SPECIFICATION**

HR MULTIPLE CERTIFIED PLATE - CARBON - ASTM A516 GR 70/ASME SA516 GR 70 (10)  
(10) - CVNL 20/15 FT LBS AT -50 F - PER PLATE - NACE MR0175-BHN 200 MAX - MADE TO FINE GRAIN PRACTICE - TO MEET CESSCO SIX MAT SPEC STKCHEM1401R03 (JUNE '11) DEOXIDATION ACHVD W/ADD'N OF AL & SI DESULPH ACHVD W/ADD'N OF CA HEAT & PRD ANAL - PVQ - NORMALIZED - FLATNESS 1/2 A-20 - NORM 17 MINS MIN. @1670 F

**SUPPLEMENTARY INSTRUCTIONS**

TEST CERT 1: KENMEPLANET.EON.NET TEST CERT 2: PLATE TEST COU

INSTR TEST REPORTS INCL. HEAT & PRODUCT ANALYSIS

2000199964 PF  
2011/10/12 21:06

**CUSTOMER ITEM 0002**

OUR ITEM 001 DIMENSIONS ..500 X 120.5 X 480 "  
MEETS EN 10204:2004 TYPE 3.1  
ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM  
ALL HEATS FULLY KILLED  
HEATS INDICATED WITH (+) FINE GRAINED  
HEATS INDICATED WITH (\*) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS

**CESSCO**

PLATE LOG NO  
FABRICATION & ENGINEERING LTD  
LOG No. PREFIX

PLATE NUMBER	HEAT-MS	PIECES	NO.	WEIGHT	PLATE NUMBER	HEAT-MS	PIECES	NO.	WEIGHT
37849	8742L-54	1	8201	30695	37856	8742L-01	2	16403	30686
37857	8742L-01	2	16403	30695	37858	8742L-01	2	16403	30679
37859	8742L-02	2	16403	30696	37862	8742L-02	2	16403	30690
37861	8742L-02	2	16403	30688	37864	8742L-52	2	16403	30681
37863	8742L-52	2	16403	30689					

**TENSILE TESTS:**

HEAT	PLATE NUMBER	SRCZ	SAMPLE GAUGE	COND METH	TEST DIR	YIELD TENSILE KSI	TENSILE KSI	% ELONG
8742L	37849	166"	.5000	N	T	50.2	75.0	27(8)"
8742L	37856	166"	.5000	N	T	52.4	76.0	26(8)"
8742L	37857	166"	.5000	N	T	52.0	76.0	26(8)"
8742L	37858	166"	.5000	N	T	51.4	76.0	26(8)"
8742L	37859	166"	.5000	N	T	51.0	76.0	26(8)"
8742L	37860	166"	.5000	N	T	52.0	76.0	26(8)"

**\*\*WARNING\*\***

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

APR 09 2012  
CESSCO By [Signature]  
R.S.M.E. Ed. [Signature]  
APR 09 2012  
-PAGE 001 of 001

LAB ALG  
ALG ALG  
ALG ALG  
ALG ALG  
ALG ALG

CHEMICAL & PHYSICALS CHECKED

A.S.M.E. Ed. 2013

DATE: 09/11/14

Booy Wainbaga Oct 1/2015

**ESSAR Steel Alcoma Inc.**

CUSTOMER PURCHASE ORDER NUMBER: **K-04223**  
 ENTRY DATE: **2011/08/26**  
 CREATE DATE: **2011/10/11**  
 FULLY NUMBER: **245729**  
 SHIP TO CUSTOMER NAME AND ADDRESS: **105 West Street, Sault Ste. Marie, Ontario Canada P6A 7B4**  
 CARRIER: **TPPX**  
 MILL ORDER: **10706**  
 -80751

CHARGE TO CUSTOMER NAME AND ADDRESS:  
**CESSCO FABRICATING AND ENGINEERING**  
**7310 - 99TH STREET**  
**EDMONTON, ALBERTA**  
**T6E 3R7**

SHIP TO CUSTOMER NAME AND ADDRESS:  
**CESSCO FABRICATION AND ENGINEERING**  
**7310-99TH STREET**  
**EDMONTON ALBERTA**

**MILL TEST REPORTS**

ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES.

**SUPPLEMENTARY INSTRUCTIONS**

**K. UGHADPAGA**  
 MANAGER METALLURGICAL SERVICES  
 THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-2624 TO COLLECT FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.

TEST CERT 1: **KENLM@PLANET.EON.NET TEST CERT 2: PLATE TEST COU**

INSP YR: **2000199964 PF**  
 CUST USE: **2011/10/12 21:06**

\*\*\* M E C H A N I C A L P R O P E R T I E S \*\*\*  
 HEAT NUMBER: **8742L 37861**  
**8742L 37862**  
**8742L 37863**  
**8742L 37864**

SRCE	GUAGE	COND METH	DIR	YIELD	TENSILE	% ELONG
166"	.5000	N	T	51.0	76.0	28(8")
166"	.5000	N	T	51.0	75.0	25(8")
166"	.5000	N	T	51.4	76.0	26(8")
166"	.5000	N	T	52.0	75.0	24(8")

HARDNESS TESTS:  
 PLATE NUMBER: **8742L 37849**  
**8742L 37856**  
**8742L 37857**  
**8742L 37858**  
**8742L 37859**  
**8742L 37860**  
**8742L 37861**  
**8742L 37862**  
**8742L 37863**  
**8742L 37864**

SRCE	GUAGE	COND METH	DIR	TEST DIR	SIZE	TEMP	ENERGY
166"	.5000	N	N	L	FULL	-50F	93
166"	.5000	N	N	L	FULL	-50F	84
166"	.5000	N	N	L	FULL	-50F	83
166"	.5000	N	N	L	FULL	-50F	80
166"	.5000	N	N	L	FULL	-50F	81
166"	.5000	N	N	L	FULL	-50F	93
166"	.5000	N	N	L	FULL	-50F	85

IMPACT TESTS:  
 PLATE NUMBER: **8742L 37849**  
**8742L 37856**  
**8742L 37857**

LAB: **ALG ALG ALG ALG ALG ALG ALG ALG**  
 SPEC LAB: **ASTM ALG ASTM ALG ASTM ALG**



**ESSAR Steel Algoma Inc.**

CUSTOMER PURCHASE ORDER NUMBER: X-04223  
 ENTRY DATE: 2011/08/26  
 CREATE DATE: 2011/10/11  
 TALLY NUMBER: 245729  
 SHIP TO CUSTOMER NAME AND ADDRESS: CESSCO FABRICATING AND ENGINEERING, 7310-99TH STREET, EDMONTON, ALBERTA T6E 3R7  
 105 West Street, Sault Ste. Marie, Ontario Canada P6A 7B4  
 SHIPPER'S NO.: -  
 CARRIER: TTPX  
 MILL ORDER: 10706  
 -80751

**MILL TEST REPORTS**

ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREON DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES.

K. UGHADPAGA  
 MANAGER METALLURGICAL SERVICES

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SHIP TO CUSTOMER NAME AND ADDRESS  
 CESSCO FABRICATION AND ENGINEERING  
 7310-99TH STREET  
 EDMONTON ALBERTA

CUSTOMER SPECIFICATION  
 HR MULTIPLE CERTIFIED PLATE - CARBON - ASTM A516 GR 70/ASME SA516 GR 70 (10) (10) - CVNL 20/15 FT LBS AT -50 F - PER PLATE - NACE MR0175-BHN 200 MAX - MADE TO FINE GRAIN PRACTICE - TO MEET CESSCO STK MAT SPEC STKCHEM1401R03 (JUNE 7 11) DEOXIDATION ACHVD W/ADD'N OF AL & SI DESULPH ACHVD W/ADD'N OF CA HEAT & PRD ANVAL - PQV - NORMALIZED - FLATNESS 1/2 A-20 - NORM 17 MINS MIN. @1670 F

SUPPLEMENTARY INSTRUCTIONS  
 TEST CERT 1: KENLM@PLANET.EON.NET TEST CERT 2: PLATE TEST COU  
 FON:

INSP TR TEST REPORTS INCL. HEAT & PRODUCT ANALYSIS  
 CUST USE RESALE  
 2000199964 DF  
 2011/10/12 21:06

HEAT	PLATE NUMBER	SRCE	GAUGE IN	COND METH	DIR SIZE	TEST	M E C H A N I C A L	FULLSIZE ENERGY	PRO P E R T I E S	CB	V	SPEC LAB
8742L	37858	166"	5000	N	FULL	-50F	CVN L	84	84	102	90	ASTM ALG
8742L	37859	166"	5000	N	FULL	-50F	CVN L	85	87	138	103	ASTM ALG
8742L	37860	166"	5000	N	3/4	-50F	CVN L	122	119	126	103	ASTM ALG
8742L	37861	166"	5000	N	FULL	-50F	CVN L	119	123	103	115	ASTM ALG
8742L	37862	166"	5000	N	3/4	-50F	CVN L	124	117	115	119	ASTM ALG
8742L	37863	166"	5000	N	FULL	-50F	CVN L	179	112	114	102	ASTM ALG
8742L	37864	166"	5000	N	FULL	-50F	CVN L	96	122	97	105	ASTM ALG

PLATE NUMBER	COND	TI	MN	SN	P	AS	SI	CR	NI	CU	MO	AL	CB	V	CA	DO
8742L	37849	.003	.19	1.11	.009	.005	.31	.03	.14	.03	.01	.040	.000	.015	.0005	.40
8742L	37856	.004	.18	1.13	.014	.007	.32	.03	.13	.03	.01	.038	.000	.015	.0005	.39
8742L	37857	.004	.17	1.002	.014	.007	.31	.03	.13	.02	.01	.036	.000	.014	.0005	.37
8742L	37858	.003	.17	1.009	.013	.008	.31	.03	.14	.03	.01	.037	.002	.014	.0005	.37
8742L	37859	.003	.17	1.009	.012	.007	.31	.03	.14	.03	.01	.037	.000	.014	.0005	.37
8742L	37860	.003	.18	1.008	.011	.006	.30	.03	.14	.03	.01	.038	.001	.014	.0005	.38
8742L	37861	.003	.18	1.002	.010	.006	.30	.03	.14	.03	.01	.038	.000	.014	.0005	.38

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

**FSSAR Steel Algoma Inc.**

CUSTOMER PURCHASE ORDER NUMBER

K-04223

CHARGE TO CUSTOMER NAME AND ADDRESS

CESSCO FABRICATING AND ENGINEERING  
7310 - 99TH STREET  
EDMONTON, ALBERTA  
T6E 3R7

ENTRY DATE

2011/08/26

CREATE DATE

2011/10/11

TALLY NUMBER

245729

SHIP TO CUSTOMER NAME AND ADDRESS

CESSCO FABRICATING AND ENGINEERING  
7310 - 99TH STREET  
EDMONTON ALBERTA

CARRIER

TPPX

105 West Street, Sault Ste. Marie, Ontario Canada P6A 7B4

-80751

MILL ORDER

10706

**MILL TEST REPORTS**

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K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

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TEST CERT 1: KENLM@PLANET.EON.NET TEST CERT 2: PLATE TEST COU

INSP TR TEST REPORTS INCL. HEAT & PRODUCT ANALYSIS

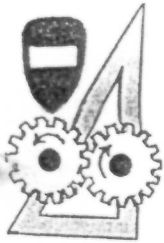
CUST USE RESALE

2000199964 PF

2011/10/12 21:06

HEAT NUMBER	COND	TI	C	MN	SN	P	N	S	AS	SI	ZR	CR	PB	NI	SB	CU	MO	AL	CB	V	DO	
8742L	37862	.003	.18	1.08	.012	.006	.004	.30	.30	.14	.14	.03	.03	.01	.038	.000	.014	.014	.000	.014	.0005	.38
8742L	37863	.003	.17	1.07	.010	.005	.003	.30	.30	.14	.14	.03	.03	.01	.038	.000	.014	.014	.000	.014	.00220	.37
8742L	37864	.003	.17	1.09	.012	.005	.004	.31	.31	.15	.15	.03	.03	.01	.038	.000	.014	.014	.000	.014	.00180	.37
8742L**		.003	.20	1.09	.010	.005	.003	.32	.32	.15	.15	.03	.03	.01	.039	.000	.016	.016	.000	.016	.0004	.40

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



# EASTEND IRON INDUSTRIES (1995) LTD.

6215 - 54 Avenue

Taber, Alberta T1G 1X4

Telephone (403) 223-2620

Fax (403) 223-8626

WELDING PROCEDURE SPECIFICATION NO: EII-4

WELDING PROCEDURE QUALIFICATION RECORD NO(S): PQ12, PQ13, PQ14

### QUALIFIED FOR

Base Metal (Typical): P1 Groups 1 & 2 to P1 Groups 1 & 2 (SA 333 Gr. 6, SA 420 WPL6, SA 350 Gr. LF2, SA 516 Gr. 70 etc.)

Process(es): SMAW Weld Types: GROOVE & FILLET

Position: ALL POSITIONS Diameter: ALL DIAMETERS

Filler Metal: E6010, E7018-1

### BASE METAL CONDITIONS & THICKNESS RANGE QUALIFIED:

NOTCH TOUGHNESS APPLICATIONS TO -46°C WITH P.W.H.T.

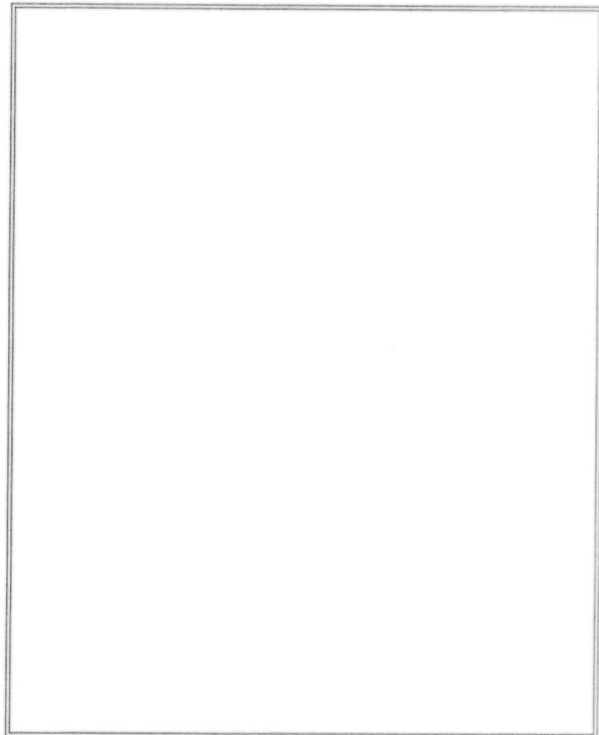
ASME B31.1	<u>3.2 to 203 mm (0.125 to 8.0 in.) inclusive.</u>
ASME B31.3	<u>3.2 to 203 mm (0.125 to 8.0 in.) inclusive.</u>
ASME SECT. VIII, DIV.1	<u>3.2 to 203 mm (0.125 to 8.0 in.) inclusive.</u>

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

Reg. No. WP 2178.2  
 Spec No. EII-4  
 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 3.2 to 203mm PWHT YES  
CVN-46°C

Yr. 99 Mo. 8 Day 4 Signed [Signature]  
 R. ROSEBERG, P. ENG.  
 WELDING SPECIALIST

PROVINCIAL REGISTRATION



## QW-482 WELDING PROCEDURE SPECIFICATION (WPS)

Eastend Iron Industries (1995) Ltd., 6215 - 54 Avenue, Taber, Alberta T1G 1X4  
Welding Procedure Specification No. EII-4 Date July 26, 1999  
Revision(s) ---  
Supporting PQR No.(s) PQ12, PQ13, PQ14  
Welding Process(es) SMAW Type(s) Manual

### 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.  
Backing With or without Root Opening 0 - 6.4 mm (0 - 1/4 in.)  
Retainers Not required

### BASE METALS (QW-403)

P-Number P1 Groups 1 & 2 To P-Number P1 Groups 1 & 2  
Thickness Range: Groove 3.2 to 203 mm (0.125 to 8.0 in.) inclusive.  
Fillet All base metal thicknesses  
Pipe Diameter Ranges: Groove All diameters  
Fillet All diameters  
Deposited Weld Metal (Per Pass) 12.7 mm (0.500 in.) maximum

### FILLER METALS (QW-404)

Specification No. (SFA)	<u>SFA 5.1</u>	<u>SFA 5.1</u>
AWS No. (Class)	<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 5/32 in. inclusive</u>	<u>3/32 to 1/4 in. inclusive</u>
Deposited Weld Metal Thickness Range:		
Groove	<u>6.35 mm (0.250 in.) max.</u>	<u>203 mm (8.0 in) max.</u>
Fillet	<u>All fillet sizes</u>	<u>All fillet sizes</u>

### POSITION (QW-405)

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

### PREHEAT (QW-406)

Preheat Temperature (Minimum) See attached preheat sheet  
Interpass Temperature (Maximum) 232°C (450°F)  
Preheat Maintenance Per attached preheat sheet prior to welding. Preheat maintenance is not required if welding is interrupted or after the completion of welding.

**POST WELD HEAT TREATMENT (QW-407)**

Temperature Range See P.W.H.T. sheet Time Range See P.W.H.T. sheet

**ELECTRICAL CHARACTERISTICS (QW-409)**

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

Maximum Heat Input

Base Metal Thickness Range	E6010 Electrode	E7018-1 Electrode
(0.125 - 0.499 in. T)	27 872 J/in.	49 020 J/in.
(0.500 - 0.624 in. T)	31 430 J/in.	83 600 J/in.
(0.625 - 1.50 in. T)	38 571 J/in.	69 268 J/in.

**TECHNIQUE (QW-410)**

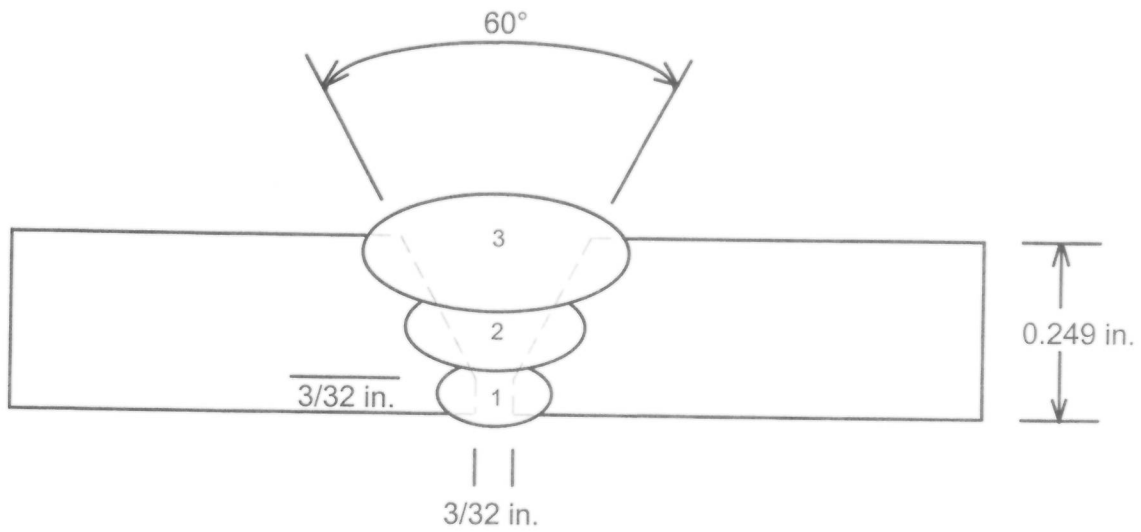
String or Weave Either Travel Speed See Table #1  
 Initial & Interpass Cleaning Brushing, chipping or grinding as required  
 Method of Back Gouging Air carbon arc, back-grind as required  
 Multiple or Single Pass Per Side Either  
 Multiple or Single Electrodes Single  
 Peening Not required

**TABLE 1 - WELDING PARAMETERS**

Process	Filler Metal	Diameter mm (in.)	Current Type & Polarity	Amperage Range	Voltage Range	Travel Speed mm/min (ipm.)
SMAW	E6010	2.4 (3/32)	DCRP	50 - 110	18 - 30	36 - 300 (1.4 - 12)
SMAW	E6010	3.2 (1/8)	DCRP	60 - 140	19 - 32	46 - 350 (1.8 - 14)
SMAW	E6010	4.0 (5/32)	DCRP	115 - 250	21 - 32	97 - 400 (3.8 - 16)
SMAW	E7018-1	2.4 (3/32)	DCRP	60 - 110	17 - 26	18 - 300 (0.7 - 12)
SMAW	E7018-1	3.2 (1/8)	DCRP	90 - 150	18 - 28	30 - 350 (1.2 - 14)
SMAW	E7018-1	4.0 (5/32)	DCRP	110 - 220	19 - 28	38 - 400 (1.5 - 16)
SMAW	E7018-1	5.0 (3/16)	DCRP	160 - 320	20 - 30	58 - 500 (2.3 - 20)
SMAW	E7018-1	5.5 (7/32)	DCRP	240 - 350	21 - 32	91 - 550 (3.6 - 22)
SMAW	E7018-1	6.4 (1/4)	DCRP	300 - 400	22 - 32	119 - 550 (4.7 - 22)

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

PQR NO. PQ12



Pass	Process	Filler Metal	Diameter mm (in.)	Current & Polarity	Amperage Range	Voltage Range	Travel Speed mm/min (ipm.)
1	SMAW	E6010	3.2 (1/8)	DCRP	80 - 90	22 - 25	109 (4.3)
2	SMAW	E7018-1	2.4 (3/32)	DCRP	90 - 100	20 - 23	109 (4.3)
3	SMAW	E7018-1	2.4 (3/32)	DCRP	90 - 100	20 - 23	64 (2.5)

## TYPICAL GROOVE DESIGNS

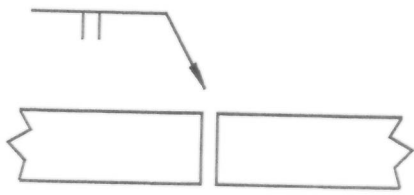


Figure 1  
Single Square Butt

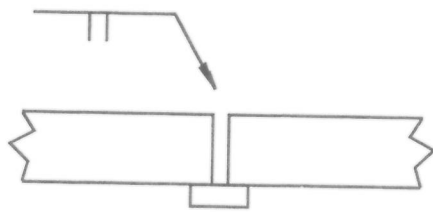


Figure 2  
Single Square Butt with Backing Strip

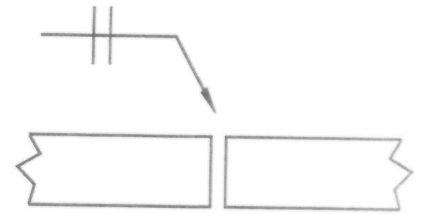


Figure 3  
Double Square Butt

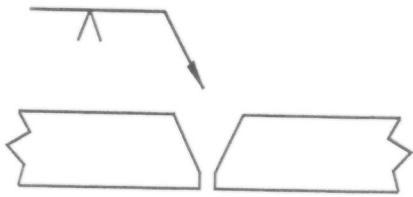


Figure 4  
Single Vee Butt

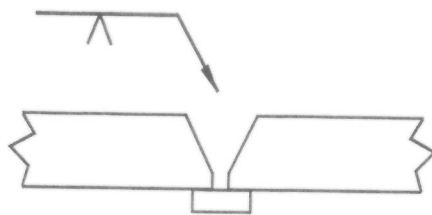


Figure 5  
Single Vee Butt with Backing Strip

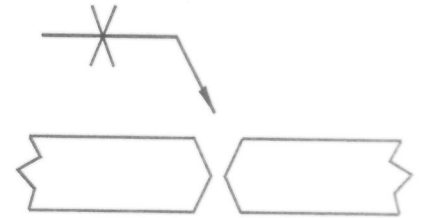


Figure 6  
Double Vee Butt

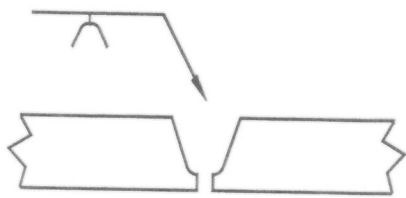


Figure 7  
Single U Butt

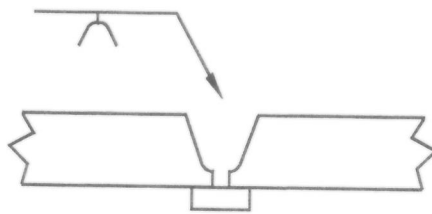


Figure 8  
Single U Butt with Backing Strip

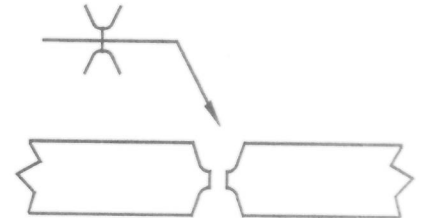


Figure 9  
Double U Butt

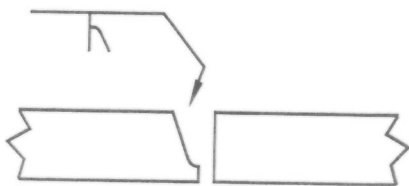


Figure 10  
Single J Butt

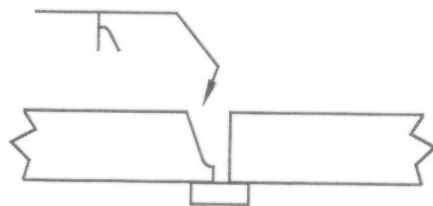


Figure 11  
Single J Butt with Backing Strip

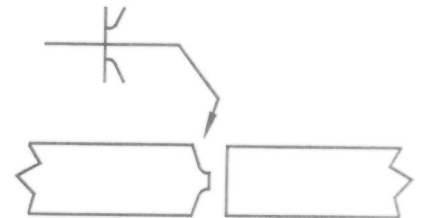


Figure 12  
Double J Butt

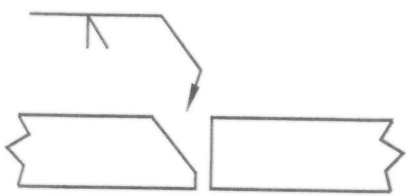


Figure 13  
Single Bevel Butt

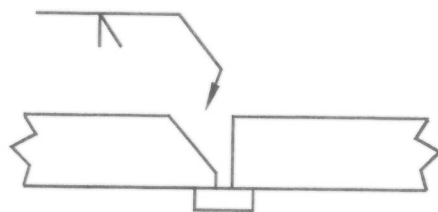


Figure 14  
Single Bevel Butt with Backing Strip



Figure 15  
Double Bevel Butt

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

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

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

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

### CHEMICAL PLANT & PETROLEUM REFINERY PIPING IN ACCORDANCE WITH ASME B31.3

NOMINAL WALL THICKNESS	MINIMUM SPECIFIED BASE METAL TENSILE STRENGTH	MINIMUM PREHEAT TEMPERATURE
< 25.4 mm (1.0 in.)	≤ 490 MPa (71 ksi)	10°C (50°F)
≥ 25.4 mm (1.0 in.)	All	80°C (175°F)
All	> 490 MPa (71 ksi)	80°C (175°F)

### POWER PIPING IN ACCORDANCE WITH ASME B31.1

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



**POSTWELD HEAT TREATMENT**  
**P-No. 1 Groups 1, 2 & 3**

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

1. All postweld heat treatment shall be in accordance with ASME Section VIII, Division I, UW-40 & UCS-56 latest edition and addenda.
2. Post weld heat treatment temperatures and minimum holding times are as follows:

NOMINAL WALL THICKNESS	HEAT TREAT TEMPERATURE	HOLDING TIME
Up to 50.8 mm (2.0 in.)	595°C (1100°F) minimum	1 Hr./25.4 mm (inch), 15 minutes minimum
Over 50.8 mm (2.0 in.)	595°C (1100°F) minimum	2 Hours plus 15 minutes for each additional 25.4 mm (inch) over 50.8 mm (2.0 in.)

**CHEMICAL PLANT & PETROLEUM REFINERY PIPING IN ACCORDANCE WITH ASME B31.3**

1. All postweld heat treatment shall be in accordance with Table 331.1.1 of ASME B31.3 latest edition and addenda.
2. Post weld heat treatment temperatures and minimum holding times are as follows:

NOMINAL WALL THICKNESS	HEAT TREAT TEMPERATURE	HOLDING TIME
All	595 - 650°C (1100 - 1200°F)	1 Hr./25.4 mm (inch), 1 hour minimum

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

1. All postweld heat treatment shall be done in accordance with Table 132 of ASME B31.1 latest edition and addenda.
2. Post weld heat treatment temperatures and minimum holding times are as follows:

NOMINAL WALL THICKNESS	HEAT TREAT TEMPERATURE	HOLDING TIME
Up to 50.8 mm (2.0 in.)	595 - 650°C (1100 - 1200°F)	1 Hr./25.4 mm (inch), 15 minutes minimum
Over 50.8 mm (2.0 in.)	595 - 650°C (1100 - 1200°F)	2 Hours plus 15 minutes for each additional 25.4 mm (inch) over 50.8 mm (2.0 in.)

## QW-483 PROCEDURE QUALIFICATION RECORD (PQR)

Eastend Iron Industries (1995) Ltd., 6215 - 54 Avenue, Taber, Alberta T1G 1X4  
Procedure Qualification Record No. PQ12 Date July 15, 1999  
Welding Procedure Specification No. EII-4  
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 Group 1 To P-No. P1 Group 2 Thickness 6.32 mm (0.249 in.)  
Diameter 114.3 mm (4.50 in.) O.D. Other Schedule 80 m/c to 0.249 in. w.t.

### FILLER METALS (QW-404)

Specification No. (SFA)	<u>SFA 5.1</u>	<u>SFA 5.1</u>
AWS No. (Class)	<u>E6010</u>	<u>E7018-1</u>
Filler Metal F-No.	<u>F3</u>	<u>F4</u>
Filler Metal A-No.	<u>A1</u>	<u>A1</u>
Size of Electrode	<u>See attached sketch</u>	
Deposited Weld Metal Thickness	<u>2.38 mm (0.094 in.)</u>	<u>3.94 mm (0.155 in.)</u>

### POSITION (QW-405)

Position of Groove 5G  
Weld Progression Vertical up

### PREHEAT (QW-406)

Preheat Temperature 10°C (50°F) Interpass Temp. (Max.) 232°C (450°F)

### POSTWELD HEAT TREATMENT (QW-407)

Temperature 621°C (1150°F) Time 1 Hour

### ELECTRICAL CHARACTERISTICS (QW-409)

Current	<u>Direct</u>	Polarity	<u>Reverse, electrode positive</u>
Amps	<u>See next page</u>	Volts	<u>See next page</u>
Heat Input	<u>F3: 27 872 J/in. Max.</u>		<u>F4: 49 020 J/in. Max.</u>

### TECHNIQUE (QW-410)

String or Weave F3: String F4: Weave Travel Speed See next page  
Multiple or Single Pass Per Side Multipass from groove side  
Multiple or Single Electrodes Single

PQR NO. PQ12

**TENSILE TEST (QW-150)**

Specimen No.	Width mm (in.)	Thickness mm (in.)	Area Sq. mm (Sq. in.)	Ultimate Load N (lbs.)	Ultimate Stress Mpa (Psi)	Character & Fracture Location
T1	19.1 (0.752)	4.58 (0.180)	87.5 (0.136)	42 100 (9,460)	481 (69,800)	Partial cup & cone Parent metal (Gr. 6)
T2	19.2 (0.756)	5.08 (0.200)	97.5 (0.151)	45 400 (10,200)	465 (67,500)	Partial cup & cone Parent metal (Gr. 6)

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

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

**CHARPY IMPACT TOUGHNESS**

Type of Test Charpy V Notch Orientation Transverse  
 Test Temperature -48°C (-55°F) Specimen Size 10 x 5 mm

Specimen No.	Notch Location	Impact Values J (ft. lbs)
O2.1	Weld Metal	42.0 (31.0)
O2.2	Weld Metal	40.4 (29.8)
O2.3	Weld Metal	82.7 (61.0)
O3.1	Gr. 6 - HAZ	46.6 (34.4)
O3.2	Gr. 6 - HAZ	65.3 (48.2)
O3.3	Gr. 6 - HAZ	33.3 (24.6)
P3.1	Gr. LF2 - HAZ	52.8 (39.0)
P3.2	Gr. LF2 - HAZ	40.1 (29.6)
P3.3	Gr. LF2 - HAZ	58.5 (43.2)

**OTHER TESTS**

Vickers hardness survey - see attached report. C99-474.17

Welders Name Larry Czerniak Certificate File No. W-12887  
 Tests Conducted By Ludwig & Associates Ltd.  
 Laboratory Test No. C99-474.17

We certify 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 EASTEND IRON INDUSTRIES (1995) LTD.

Date July 28, 1999 Signed [Signature]



3 Street SW Medcote Hbt. AB T1A 8R1

HEAT TREATMENT SERVICES

Date Started:	23-Oct-15	Date Finished:	23-Oct-15
Customer/PO Ref:	Eastend Iron Industries Ltd.		
Furnace S/N	ST-15013	23600	
Furnace Cal Date:	9/11/2015		
Procedure:	Internal PWHT Instructions/Cust Supplied		
Heat Treating Per:	A S M E		

Rate of Rise:	800°F to 1150°F at 200°F per hour.
Holding Temp:	1150°F
Holding Time:	120 min. Minimum
Cooling Rate:	1150°F to 800°F at 250°F per hour
Material(s):	P1
Operator:	Barry Gutfriend

Notes:	(1) 30"X 22' Fire Tube LSD 5-14-18-10W4
--------	--

Signature:		Date:	Oct 23/15
------------	--	-------	-----------

Heat Number: #1-23-OCT-2015

### HEAT TREATMENT RECORD



Time	+ WP TC/1	△ WP TC/2	■ WP TC/3	◆ WP TC/4
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