



CAPE MANUFACTURING Ltd.

Box 216
Halkirk, Alberta
Canada
T0C 1M0
www.capemfg.ca

Calgary Sales: 403-539-0850
Halkirk Plant: 403-884-2442
Calgary Direct: 403-279-1811
sales@capemfg.ca

QUALITY CONTROL DOCUMENTATION



DESCRIPTION	12 3/4" x 3' Vertical Scrubber
LSD LOCATION	1-20-60-17 W5M
CAPE JOB #.	CML-242338V-7
CRN #.	R9415-2
S/N:	PV-1033
A #.	A-528920
DATE OF MANUFACTURE	December 2024
MANUFACTURED FOR	Fuelled

"Passionate People Producing Premium Products"

Certificate of Authorization Permit

Quality Management System

Expiry Date: **August 20, 2026**

Reg. No.: **AQP-1529**

CAPE MANUFACTURING LTD.

LSD 16-01-40-16-W4M

HALKIRK, ALBERTA

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

	<u>Construction</u>	<u>Repair</u>	<u>Alter</u>
Pressure Vessels			
ASME Section VIII-1 Pressure Vessels	Shop	Shop/Field	Shop/Field
Miniature Vessels in accordance with CSA B51	Shop	---	---
Indirect Fired Heater Coils			
ASME B31.3 Indirect Fired Heater Coils	Shop/Field	Shop/Field	Shop/Field
Pressure Piping			
ASME B31.1 Power Piping	Shop/Field	Shop/Field	Shop/Field
ASME B31.3 Process Piping	Shop/Field	Shop/Field	Shop/Field
Fittings			
Category A,E,H	Shop/Field	Shop/Field	Shop/Field

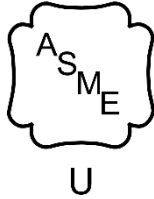


As a condition of this permit, the holder is required to participate in interim audits by a safety codes officer to verify that the quality management system is being maintained in a manner acceptable to a safety codes officer.

Dated at Edmonton, this 26th day of June, 2023

Chief Inspector and Administrator

Certificate No.: 15928



CERTIFICATE OF AUTHORIZATION

The named company is authorized by The American Society of Mechanical Engineers (ASME) for the scope of activity shown below in accordance with the applicable rules of the ASME Boiler and Pressure Vessel Code. The use of the ASME Single Certification Mark and the authority granted by this Certificate of Authorization are subject to the provisions of the agreement set forth in the application. Any construction stamped with the ASME Single Certification Mark shall have been built strictly in accordance with the provisions of the ASME Boiler and Pressure Vessel Code.

COMPANY:

CAPE MANUFACTURING LTD.
LSD 16-01-40-16-W4M
Halkirk, Alberta T0C 1M0
Canada

SCOPE:

Manufacture of pressure vessels at the above location only

AUTHORIZED: **August 20, 2023**

EXPIRES: **August 20, 2026**

CERTIFICATE NUMBER: **31246**

A handwritten signature in black ink, appearing to read 'Richard B. Caplan'.

Board Chair, Conformity Assessment

A handwritten signature in black ink, appearing to read 'LM Eisenberg'.

Managing Director, Standards & Engineering Services



Partnerships

IN INJURY REDUCTION

Certificate of Recognition

This certificate recognizes that

CAPE MANUFACTURING LTD. (CAPE MANUFACTURING LTD.)

In keeping with the principles of *Partnerships* has

- developed and implemented an occupational health and safety program and,
- met the standard for *Partnerships* through an independent evaluation of their health and safety program.



Alberta Association For Safety Partnerships
Certifying Partner

Certificate #20230616-3886

WCB Industry Code(s): 30100



Ian Hooper
Government of Alberta

Expiry Date: June 16, 2026



LETTER OF VALIDATION

The CWB acknowledges that

Cape Manufacturing Ltd.

PO Box 216 16-01-40-16 West of the 4th
Halkirk AB T0C 1M0 Canada

is certified to **CSA Standard W47.1**

“Certification of Companies for Fusion Welding of Steel”

In DIVISION 2

for the period **April 18, 2024 to May 17, 2025**

Company Code: CAPEM1

Scope:

Structural steel skids and piping supports for oil & gas production equipment

Reason for Issue: Renewal

Issue Date: April 23, 2024

*For the latest CWB Documents
and forms and certification terms
and conditions, please visit
www.cwbgroup.org*

Registrar



8260 Parkhill Drive, Milton, Ontario L9T 5V7
1-800-844-6790 | Int: 905-542-1312 | Fax: 905-542-1318
Email: info@cwbgroup.org | Web: www.cwbgroup.org



**THE NATIONAL BOARD
OF
BOILER & PRESSURE VESSEL INSPECTORS**

***Certificate of Authorization
to Register***



This is to certify that

**CAPE MANUFACTURING LTD.
LSD 16-01-40-16-W4M
Halkirk, Alberta T0C 1M0
Canada**

*is authorized to apply the "NB" mark and register boilers,
pressure vessels or other pressure retaining items with the
National Board.*

*The scope of Authorization is limited to items
manufactured in accordance with:*

ASME Designator(s): U

Issue Date: June 4, 2015

Revision Date: August 21, 2020

*This Certificate of Authorization to Register will remain
in effect as long as the manufacturing organization holds
a valid Certificate of Authorization issued by the
American Society of Mechanical Engineers.*

Executive Director

A handwritten signature in black ink, appearing to read 'John E. ...', written over a faint, large, light-blue background watermark of the NB logo.



Vessel QC

④ 528920

FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS
(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

1. Manufactured and certified by Corlac Industries Lot 9, County Energy Park, Lloydminster, Alberta. T9V 3A2
(Name and address of Manufacturer)

2. Manufactured for Stettler Oil & Gas, P. O. Box 652, Stettler, Alberta. T0C 2L0 ④ 528920
(Name and address of Purchaser)

3. Location of installation Stock
(Name and address)

4. Type: Vertical PV-1033 R9415.231 EDS-6098 Rev. 3
(HORIZ. or vert., tank) (Mfg.'s serial no.) (CRN) (Drawing No.) N/A 2005
(Natl. Bd. No.) (Year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction and workmanship conform to ASME Rules, Section VIII, Division 1

6. Shell: 2001 to 2003 N/A N/A
Year Addenda (Date) Code Case Nos. Special Service per UG-120(d)

7. Seams: SA-106-B 0.688" 0.0625" 12"
Mat'l. (Spec. No., Grade) Nom. Thk. (in.) Corr. Allow. (in.) Diam. I.D. (ft. & in.)
Smls N/A 1 N/A N/A Butt
Long. (Welded, Dbl., Singl., Lap, Butt) R.T. (Spot or full) Eff. (%) H.T. Temp. (°F) Time (hr) Grth (Welded, Dbl., Singl., Lap, Butt) R.T. (Spot, Partial, or Full) No. of Courses

8. Heads: (a) Mat'l. SA-516-70N (b) Mat'l. SA-516-70N
(Spec. No., Grade) (Spec. No., Grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP	0.625"	0.0625"	N/A	N/A	2:1	N/A	N/A	N/A	Concave
(b)	BOTTOM	0.625"	0.0625"	N/A	N/A	2:1	N/A	N/A	N/A	Concave

If removable, bolts used (describe other fastenings)

9. MAWP 1440 N/A psi at max. temp 100 N/A °F
(internal) (external) (internal) (external)
 Min. design metal temp. -20 °F at 1440 psi. Hydro, pneu., or comb. test pressure 2160 psi

10. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain)	No.	Diameter or Size	Type	Mat'l.	Nom. Thk.	Reinforcement Mat'l.	How Attached	Location

11. Supports: Skirt Yes N/A Lugs N/A Legs N/A Other N/A Attached Bottom, Welded
(Yes or No) (No.) (No.) (Describe) (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: N/A

(Name of part, item number, Mfg.'s name and identifying stamp)

Job No. 004452 Impact testing not mandatory per UG-20(f) (1-5). AS BUILT DWG. V-004452-D101 Rev.0.
 Capacity 2.42 ft³ PSV installed by others. SPOT RT2 UW-12(d).

CERTIFICATE OF SHOP/FIELD COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1. "U" Certificate of Authorization No. 30498
 Expires August, 26 2007.

Date 05/04/12 Co. Name Corlac Industries Ltd. Signed [Signature]
(Manufacturer) (Representative)

CERTIFICATE OF SHOP/FIELD INSPECTION

Vessel constructed by Corlac Industries Ltd. at Lloydminster, Alberta
 I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Alberta and employed by ABSA
 have inspected the component described in this Manufacturer's Data Report on April 12, 2005
 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME Code, Section VIII, Division 1. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 05-04-12 Signed [Signature] Commissions AS54(A)
(Authorized Inspector) (Natl. Board (incl. endorsements) State Prov. and No.)

FORM U-4 MANUFACTURER'S DATA REPORT SUPPLEMENTARY SHEET
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

1. Manufactured and certified by Corlac Industries Lot 9, County Energy Park, Lloydminster, Alberta.
(Name and address of Manufacturer)
2. Manufactured for Stettler Oil & Gas, P. O. Box 652, Stettler, Alberta. T0C 2L0 **④ 528920**
(Name and address of Purchaser)
3. Location of installation Stock
(Name and address)
4. Type: Vertical Vertical Separator PV-1033
(Horiz., vert. or sphere) (Tank, separator, heat exch., etc.) (Mfg's. serial no.)
- R9415.231 EDS-6098 Rev. 3 As Noted N/A 2005
(CRN) (Drawing No.) (Nat'l. Bd. No.) (Year built)

[illegible]

Certificate of Authorization: Type "U" No. 30498 Expires August 26, 2007

Date 05-04-12 Name Corlac Industries Ltd. Signed [Signature]
(Manufacturer) (Representative)

Date 05-04-12 Name  Commissions AB541A
(Authorized Inspector) (Nat'l. Board incl. endorsement, State, Province and No.)



the pressure equipment safety authority

BOILERS AND PRESSURE VESSELS REPAIR OR ALTERATION REPORT

AB-40 (Side A) 2019-12

(A) #: 528920

OWNER EQUIP. NO: _____

REPAIR ORG. JOB NO: V-242338-7

REPAIR ☐

and/or

ALTERATION ☒

Partial ☐

Final ☒

1. Name of Organization doing Repair/Alteration CAPE Manufacturing Ltd.
Address LSD: 16-01-40-16-W4M Halkirk, AB. T0C 1M0, Canada AQP No. & Expiry Date AQP No.1529 & August 20, 2026
2. Name of Owner Chadwick Energy Services
Address #200, 3605 29th Street NE Calgary, AB. T1Y 5W4, Canada
Location of Installation CAPE yard LSD: 16-01-40-16-W4M Halkirk, AB. (stock)

3. Boiler/Pressure Vessel Description Vertical Scrubber CRN R9415.2
Manufacturer's Name Corlac Industries Serial No. PV-1033

4. Original Design Conditions:
a) Vessel/Shellside/Boiler: Max Allowable Working Press. 1440 psig Min/Max Design Temp -20°F / 100°F
b) Jacket/Tubeside: Max Allowable Working Press. _____ Min/Max Design Temp /
5. New Design Conditions:
a) Vessel/Shellside/Boiler: Max Allowable Working Press. 1440 psig Min/Max Design Temp -20°F / 100°F
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).

No defects

7. Original Code Edition and Addenda ASME Sect. VIII Div.1 Year 2001 Addenda 2003

8. Code Edition and Addenda used for performing the work ASME Sect. VIII Div.1 Year 2023 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.)

-Replace 1" TOL on top head (C7) with 2" TOL (C7R).
-Add 2" TOL to shell (C10R).
-MPI new holes in shell, head and where N/P bracket will be welded to shell.
-Add new TOL's and N/P bracket using approved welding procedures and qualified welders.
-Perform MPI on all areas that had weld added.
-Hydro scrubber to 2160 psig
-Install nameplate to bracket and have witnessed by A.I.

10. Heat Treatment: Preheat Temp 100°F Post Weld HT (Temp./Time) N/A Other _____

11. Non Destructive Examination (Specify type and extent).

MPI new holes in shell, head and where N/P bracket attaches to shell.
MPI new TOL's and N/P bracket after being welded to shell.

12. Pressure Test
a) Hydrostatic 2160 psig
b) Other Test _____

(A) #: 528920

OWNER EQUIP. NO. _____

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	SA-106B	0.688"	12.75" OD	Heads/ Ends	SA-516-70N	0.625"	12.75" OD
Tubesheet				Tubes			
Nozzles				Flanges/Fittings	2" NPT Threadolet SA-105N	Class 3000	2.375" ID

14. Welding Procedures – Alberta Registration Number WP- 3326.2

WPS Numbers used: Cape-4/Cape-12

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 _____ 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:
CAPE Manufacturing Ltd.

(Repair/Alteration Organization Name)

AQP#1529 Expires AUG.20, 2026

(AQP Number & Expiry Date)

(Signature & Date)

12/19/24

(Print Name)

Jason Wetter

b) For items identified in 16 only:

(Owner/Client Organization Name)

(AQP Number & Expiry Date)

(Signature & Date)

(Print Name)

19. DATE WORK WAS COMPLETED: 12/19/24

20. 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).

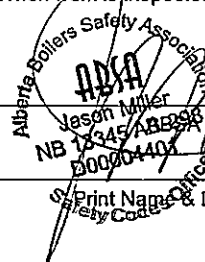
Owner-User/Inspection Company Name

AQP#

In-Service Inspector Signature & Date

In-Service Inspector Name (Please Print)

In-Service Inspector Alberta Cert #



12/19/24

Print Name & Designation of Powers Number

Report Reviewed and Accepted by ABSA SCO :

Print Name & Designation of Powers Number

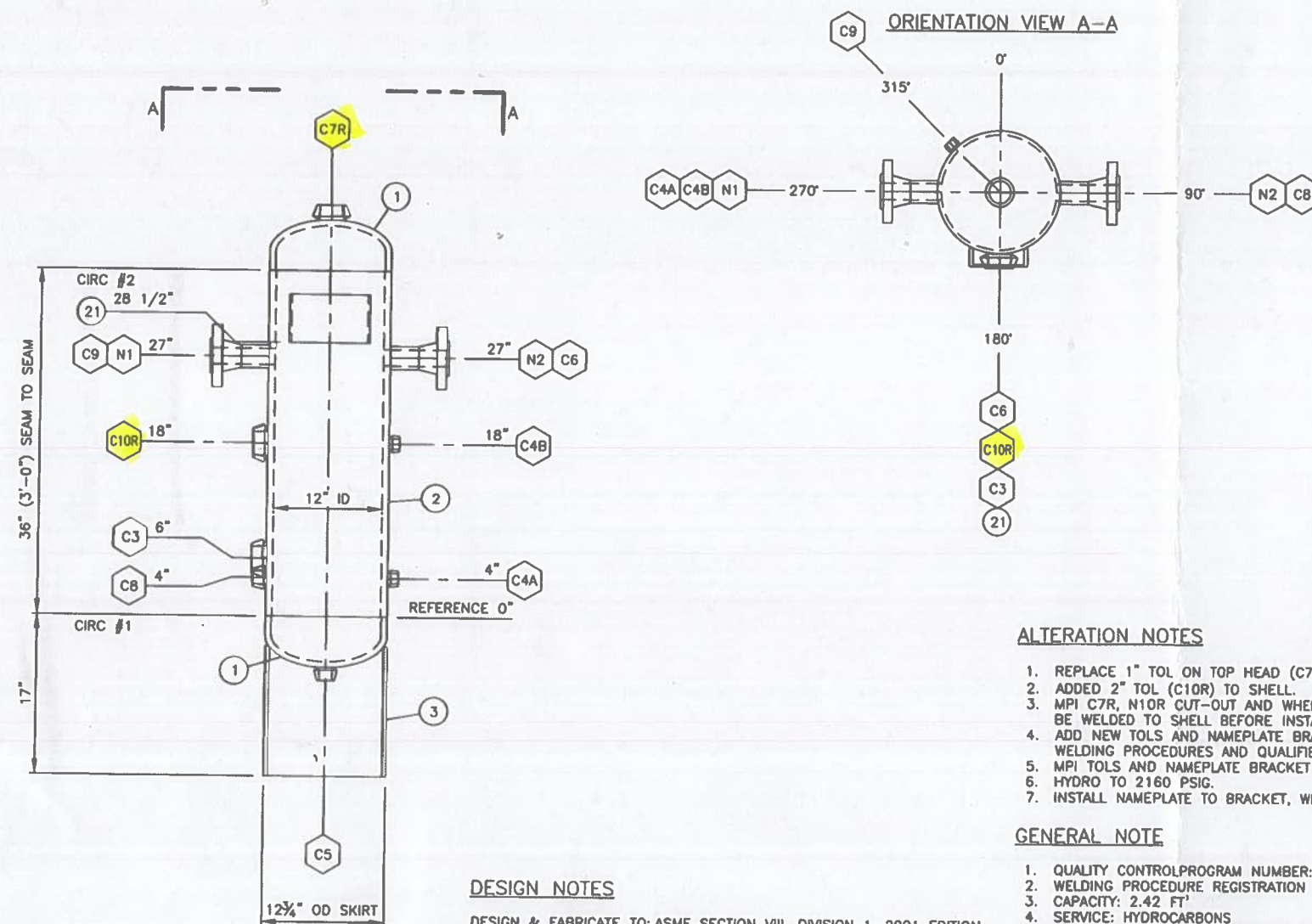
ABSA SCO Signature & Date

WD-5	STANDARD TOLERANCES
	FABRICATION:
	GENERAL DEVIATION: $\pm \frac{1}{8}$ "
	OVERALL LENGTH: $\pm \frac{1}{4}$ "
CUT-OUT DIA TO MATCH IS 2 1/8" MAX	WELD PREPARATION:
	LAND: $\frac{1}{8}$ " $\pm \frac{1}{32}$ "
	ROOT GAP: $\frac{1}{8}$ " $\pm \frac{1}{16}$ "
WPS: CAPE-4	ANGULAR: $\pm 1^\circ$
WPS: CAPE-12	

Issued For
Construction

Issued to Fab. Manager *KC Oct 7 2024*
Released for Fabrication *JW Oct. 7, 2024*

SHOP



ELEVATION VIEW

DESIGN NOTES

DESIGN & FABRICATE TO: ASME SECTION VIII, DIVISION 1, 2001 EDITION,
2003 ADDENDA
MAXIMUM ALLOWABLE WORKING PRESSURE (MAWP): 1440 PSIG
DESIGN TEMPERATURE: 100°F
MINIMUM DESIGN METAL TEMPERATURE: -20°F AT 1440 PSIG
IMPACT TESTS: PER U1-A
RADIOGRAPHY: SPOT PER UW-11(a)(5)(b) (RT-2)
PREHEAT: 100°F
PWHT PER UCS-56: NO
HYDROSTATIC TEST PRESSURE: 2160 PSIG
CORROSION ALLOWANCE: 1/16"
WEIGHT EMPTY: 400 LBS
WEIGHT FULL OF WATER: 700 LBS

ALTERATION NOTES

1. REPLACE 1" TOL ON TOP HEAD (C7) WITH 2" TOL (C7R).
2. ADDED 2" TOL (C10R) TO SHELL.
3. MPI C7R, N10R CUT-OUT AND WHERE NAMEPLATE BRACKET WILL BE WELDED TO SHELL BEFORE INSTALL.
4. ADD NEW TOLS AND NAMEPLATE BRACKET USING APPROVED WELDING PROCEDURES AND QUALIFIED WELDERS.
5. MPI TOLS AND NAMEPLATE BRACKET AFTER WELDING.
6. HYDRO TO 2160 PSIG.
7. INSTALL NAMEPLATE TO BRACKET, WITNESSED BY SCO.

GENERAL NOTE

1. QUALITY CONTROL PROGRAM NUMBER: AQP-1529
2. WELDING PROCEDURE REGISTRATION NUMBER: WP-3326.2
3. CAPACITY: 2.42 FT³
4. SERVICE: HYDROCARBONS
5. EXPOSED INSIDE OR OUTSIDE EDGES OF NOZZLES OR OPENINGS SHALL HAVE AN 1/8" MINIMUM RADIUS.
6. ALL BOLT HOLES TO STRADDLE CENTERLINES.
7. CLEAN AND COVER ALL OPENINGS FOR SHIPMENT.
8. EXTERNAL SURFACE PREPARATION: SSPC-SP3
9. EXTERNAL COATING: ONE COAT CLOVERDALE PRIMER
10. USE WELD PROCEDURE (CAPE-12) FOR ALL TACK WELDS.
11. CRN: R9415.231
12. S/N: PV-1033
13. A#: 528920

CONNECTION SCHEDULE

MARK	QTY.	SIZE	SCH	CLASS & TYPE	SERVICE	MINIMUM PROJECTION		WELD SIZE			WELD DETAIL	BOM ITEM NO.
						INSIDE	OUTSIDE	A	B	C		
N1	1	2"	160	600 RFWN	INLET	-	6"	-	-	-	-	5, 7
N2	1	2"	160	600 RFWN	GAS OUTLET	-	-	-	-	-	-	5, 7
C3	1	2"	NPT	3000 TOL	LC	-	-	-	-	-	-	10
C4AB	2	3/4"	NPT	3000 TOL	LG	-	-	-	-	-	-	12
C5	1	1"	NPT	3000 TOL	DRAIN	-	-	-	-	-	-	11
C6	1	3/4"	NPT	3000 TOL	PI	-	-	-	-	-	-	12
C7R	1	2"	NPT	3000 TOL	VENT/INSPECTION	-	-	W 3/8"	-	-	-	9
C8	1	1"	NPT	3000 TOL	DUMP	-	-	-	-	-	-	11
C9	1	1"	NPT	3000 TOL	RELIEF	-	-	-	-	-	-	11
C10R	1	2"	NPT	3000 TOL	LSHH	-	-	3/8"	-	-	5	13

BILL OF MATERIALS

ITEM	QTY.	COMMENT	DESCRIPTION	MATERIAL
1	2	HEADS	PLATE - 12 3/4" OD x 3/4" THK 2:1 SE (0.625" min)	SA-516-70N
2	1	SHELL	PIPE - 12" SCH 80 (.688") x 3'-0" LG	SA-106B
3	1	SKIRT	PIPE - 12" SCH STD (.375")	EXISTING
4				
5	2	N1-2	FLANGE - 2" CLASS 600 x SCH 160 BORE	EXISTING
6				
7	2	N1-2	PIPE - 2" SCH 160 (.344")	EXISTING
8				
9	2	C7R, C10R	THREDOLET - 2"-NPT CLASS 3000 ON 12"	SA-105N
10	1	C3	THREDOLET - 2"-NPT CLASS 3000 ON 12"	EXISTING
11	3	C5, C8-9	THREDOLET - 1"-NPT CLASS 3000 ON 12"	EXISTING
12	3	C4, C6	THREDOLET - 3/4"-NPT CLASS 3000 ON 12"	EXISTING
13				
14				
15				
16				
17				
18				
19				
20				
21	1	NAME PLATE	STANDARD NAME PLATE AND BRACKET	EXISTING
22				

CAPE MANUFACTURING LTD.

BOX 216, HALKIRK, AB T0C 1M0
TELEPHONE: (403) 884-2442 EMAIL: SALES@CAPEMFG.COM

CLIENT: STOCK

DATE: 24-08-21

JOB NO: CML-242338

DRAWN BY: KG

CHECKED BY: *[Signature]*

APP BY:

VERTICAL SCRUBBER VESSEL
12 3/4" OD x 3'-0" s/s
1440 PSIG AT -20°F / 100°F

DWG NO:

CML-242338V-7

REV

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Repair / Alteration Inspection Checklist

Boiler/Vessel Title	Manufacturer/Serial Number	Alberta (A) No.
12 3/4" OD x 3'-0" S/S Vertical Scrubber	PV-1033	528920
AI REVIEW: <i>mm</i>		REVIEW DATE: 09/05/24

Indicate Sequence Numbers And Hold Points Which Are Applicable By

Seq.	Operations	Hold Points	Comments	Rep. Org.	ABSA AI	Owner Insp.		
1	Repair/Alteration Procedure Accepted by Authorized Inspector	**		IN 09/05/24	<i>mm</i> 12/19/24			
2	Welding Procedures Registered for Welding to be done	*		IN 09/05/24	<i>mm</i> 12/19/24			
3	Welders have valid Alberta P.Q. Card for work to be done	*		IN 09/05/24	<i>mm</i> 12/19/24			
4	Cracks MT/PT check after removal	*	WELD PREPS	DE 12/11/2024	<i>mm</i> 12/19/24			
5a	Materials to be used - checked against PO/Drawing			IN 12/09/24				
5b	- material identified with correct SA/SB specifications			IN 12/09/24				
5c	- material test reports checked against specifications			OS 12/11/2024				
6a	Fit up - shell courses-flush patches-heads							
6b	- tubesheet /shell - firetube							
6c	- nozzles and fittings			IN 12/10/24				
7	Radiographic Examination							
8	Ultrasonic Examination/MT/PT	*		DE 12/11/2024	<i>mm</i> 12/19/24			
9	Internal Visual after welding	**		IN 12/11/24	<i>mm</i> 12/19/24			
10	External Visual after welding	*		IN 12/11/24	<i>mm</i> 12/19/24			
11	Heat Treatment							
12	Hardness Tests							
13	Hydrostatic Pressure Test	**	Gauge No.'s CAP-5006 CAP-5008	IN 12/19/24	<i>mm</i> 12/19/24			
14	Alternative Test (Specify)							
15	Alberta Repair/Alteration Form AB-40 completed	**		IN 12/19/24	<i>mm</i> 12/19/24			
16	Repair/Alteration Nameplate attached	*		IN 12/19/24	<i>mm</i> 12/19/24			
OUTLINE SKETCH (Record Welders' 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					
			Flanges					

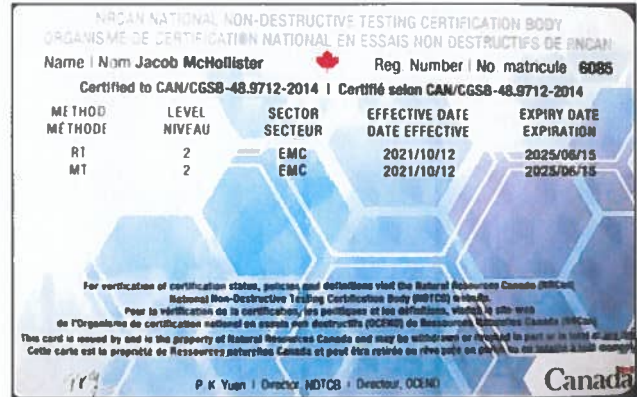


Travel Sheet (Back) 242338V-7



MATERIAL THICKNESS VERIFICATION AND IDENTIFICATION				WPS #/ WELD I.D. / WELDER SYMBOLS / FIT-UP						
Description	Thickness	Material Spec. & Grade	Heat & Plate Identifier or I.D. Number	Weld I.D.	Welder Symbol	Fit-Up Exam.	Weld I.D.	Welder Symbol	Fit-Up Exam.	Verify Type 1 Joint
Shell #1				L -			C -			
ITEM #				L -			C -			
Shell # 2				L -			C -			
ITEM #				L -			C -			
Shell #				L -			C -			
ITEM #				L -			C -			
Head #1							C -1			
ITEM #							C -			
Head #2							C -2			
ITEM #							C -			
Boot #1 Shell							C -			
Boot #1 Head							C -			
Boot #2 STUB							C -			
Boot #2 Head							C -			
Consumable										

						WPS# /WELDER SYMBOLS / FIT-UP			
Mark	Mat. I.D.	Neck	Fitting	Flange	Repad or Attachment	Cat. B	Cat. C	Cat. D	Pad OD
C7R	Spec.-Grd.		SA-105N			E			
VENT/ INSP.	Thk./Rating		2" TOL CL 3000			CAPE - 12			
	Heat# or ID		51185			<i>9N</i>			
C10R	Spec.-Grd.		SA-105N			E			
LSHH	Thk./Rating		2" TOL CL 3000			CAPE- 12			
	Heat# or ID		51185			<i>9N</i>			
	Spec.-Grd.		SA-36/SS			E			
	Thk./Rating		STANDARD NAME PLATE AND BRACKET			CAPE- 12			
	Heat# or ID		EHK			<i>9N</i>			
	Spec.-Grd.								
	Thk./Rating								
	Heat# or ID								
	Spec.-Grd.								
	Thk./Rating								
	Heat# or ID								
	Spec.-Grd.								
	Thk./Rating								
	Heat# or ID								
	Spec.-Grd.								
	Thk./Rating								
	Heat# or ID								

Jacob McHollister	CGSB 48.9712	Level II	RT - MT	#6085
	SNT	Level II	RT - MT - PT- HT UT Digital Thickness	#6085



	SNT CERTIFICATION #6085
<p align="center">Jacob McHollister</p> <p>has met the requirements of SNT certification in accordance with <i>Hunt Inspection Ltd.</i> written practice PQ-1 Rev. 22 that meets the requirements of ASNT recommended practice SNT-TC-1A 2020 edition, in the nondestructive testing methods listed on the reverse side of this card.</p>	

	SNT CERTIFICATION #6085																														
<p>Technician: Jacob McHollister</p> <table border="1"> <thead> <tr> <th>SNT Method</th> <th>Level</th> <th>Initial Cert. Date</th> <th>Re Cert. Date</th> <th>Expiry Date</th> </tr> </thead> <tbody> <tr> <td>RT</td> <td>II</td> <td>Jan. 05, 2005</td> <td>Dec. 30, 2019</td> <td>Dec. 29, 2024</td> </tr> <tr> <td>MT</td> <td>II</td> <td>Jan. 18, 2005</td> <td>Dec. 30, 2019</td> <td>Dec. 29, 2024</td> </tr> <tr> <td>PT</td> <td>II</td> <td>Jan. 22, 2007</td> <td>Dec. 30, 2019</td> <td>Dec. 29, 2024</td> </tr> <tr> <td>UT-DT</td> <td>II</td> <td>Apr. 15, 2017</td> <td>Dec. 30, 2019</td> <td>Dec. 29, 2024</td> </tr> <tr> <td>HT</td> <td>II</td> <td>Jan. 03, 2019</td> <td>Dec. 30, 2019</td> <td>Dec. 29, 2024</td> </tr> </tbody> </table> <p>Name of Level III Examiner & Certifying Authority: Joel Norman Signature of Level III Examiner & Certifying Authority: </p> <p>Date of Issue: April 25, 2024</p>		SNT Method	Level	Initial Cert. Date	Re Cert. Date	Expiry Date	RT	II	Jan. 05, 2005	Dec. 30, 2019	Dec. 29, 2024	MT	II	Jan. 18, 2005	Dec. 30, 2019	Dec. 29, 2024	PT	II	Jan. 22, 2007	Dec. 30, 2019	Dec. 29, 2024	UT-DT	II	Apr. 15, 2017	Dec. 30, 2019	Dec. 29, 2024	HT	II	Jan. 03, 2019	Dec. 30, 2019	Dec. 29, 2024
SNT Method	Level	Initial Cert. Date	Re Cert. Date	Expiry Date																											
RT	II	Jan. 05, 2005	Dec. 30, 2019	Dec. 29, 2024																											
MT	II	Jan. 18, 2005	Dec. 30, 2019	Dec. 29, 2024																											
PT	II	Jan. 22, 2007	Dec. 30, 2019	Dec. 29, 2024																											
UT-DT	II	Apr. 15, 2017	Dec. 30, 2019	Dec. 29, 2024																											
HT	II	Jan. 03, 2019	Dec. 30, 2019	Dec. 29, 2024																											


 APR 26 2024

**NDT PERSONNEL CERTIFICATION TO THE STANDARD
CAN/CGSB 48.9712-2022 & ASNT SNT-TC-1A 2020
ANNUAL EYE EXAMINATION REPORT**

In accordance with the Standard CAN/CGSB 48.9712 "Non-destructive Testing – Qualification and Certification of Personnel" and ASNT recommended practice SNT-TC-1A, this Eye Examination Report, consisting of three vision requirements: Near Vision, Distance Vision, and Colour Vision for examination in any of the of NDT Methods

APPLICANT'S NAME: JACOB MCHOLLISTER **REGISTRATION NUMBER:** #6085

I am submitting for the following: (Please check)

EXAMINATION ☐

RENEWAL ☒

RE-CERTIFICATION ☐

NEAR VISION ACUITY: shall permit reading of a Jaeger number 1 or equivalent letters at not less than 30.5 cm with one or both eyes, either corrected or uncorrected.

I CONFIRM THAT THE CANDIDATE:

- ☐ Meets the requirement without correction
☒ Meets the requirement with correction
☐ Does not meet

Dorrian Hunt
Examiners Name


Examiners Signature

President
Appointment/Title

January 4, 2024
Date of Eye Examination

COLOUR & GRAYSCALE CONTRAST DIFFERENTIATION

The following tests must be completed:

- (1) Colours using the HHR 4th Edition 24 tablet test for colour blindness for the NDT method(s) concerned.
(2) Grayscale using Skerik Grey Scale test or a calibrated step tablet, density strip with a minimum of 10 steps for the NDT method(s) concerned.

I CONFIRM THAT THE CANDIDATE CAN DISTINGUISH BETWEEN THE COLOURS AND CONTRASTS OF THE ABOVE TESTS IN THE NDT METHOD(S) CONCERNED:

Dorrian Hunt
Examiners Name


Examiners Signature

President
Appointment/Title

January 4, 2024
Date of Eye Examination


JAN 08 2024

Material Legend		Equipment		Inspection Information		Report Acceptance	
C	= Carbon Steel	Parker B300 AC Yoke	Ser:	11615	Method:	MT - Wet Visible, Black On White	
S	= Stainless Steel	Ardrox 8901W White Contrast Paint	Lot:	65050322	Lighting:	Visible Light > 100 fc	
C/S	= Carbon Steel to	Ardrox 8032 Black Magnetic Particle Suspension	Lot:	65041823	Surface Condition:	As Ground	
	Stainless Steel	Certified 10LB Lift Test Block	Ser:	1121	Surface Temperature:	15 C	Current: A.C.
A	= Aluminum				Daily Yoke Verification:	10 lb Lift at 9" Leg Spacing - <input checked="" type="checkbox"/> Pass	
						Client Rep.	<u>Darcy Erion</u>
						Client Rep. Sign:	<u>Darcy Erion</u>

REVIEWED
DEC 11 2024



Exhibit 18.2: Pressure Test Affidavit

CAPE MANUFACTURING LTD. PRESSURE TEST AFFIDAVIT

ISSUED: V-242338-7		DATE: Dec.19,2024	
LOCATION	ISSUED CAPE MANUFACTURING LTD.		
DESIGN PRESSURE 1440 psi	TEST PRESSURE REQUIRED 2160 psi	GAUGE NO'S USED: Two (2)	
TEST HOLD TIME REQUIRED 60 Minutes		ID NO: CAP-5006	RANGE: 0-5000 psi
		ID NO: CAP-5008	RANGE: 0-5000 psi
TEST MEDIUM Water		MEDIUM TEMPERATURE REQUIRED 50F	
PRESSURE INCREASE NOT TO EXCEED 1,000 kPa / MINUTE			
DESCRIPTION EQUIPMENT / SYSTEM			
- Hydro Test 1 (One) 12 3/4"OD X 3'-0" S/S Vertical Scrubber Vessel.			
NOTES:			
1. EQUIPMENT / SYSTEM TO BE INSPECTED BY QUALITY CONTROL REPRESENTATIVE AND AUTHORIZED INSPECTOR BEFORE HYDROSTATIC TEST.			
2. SEAL ALL NOZZLES USING BLANK FLANGES AND GASKETS - NO GREASE OR OTHER COMPOUNDS TO BE APPLIED TO GASKET SURFACE.			
3. COUPLINGS AND WELD-O-LETS ETC. TO BE PLUGGED AND TEFLON TAPE OR WHITELEAD MIXTURE MAY BE USED FOR SEALING.			
4. PROVIDE AT LEAST ONE (1) VENT OPENING AT HIGHEST POINT DURING FILLING.			
5. WATER TEMPERATURES SHOULD BE AS SPECIFIED BUT NOT LESS THAN 30F ABOVE MINIMUM DESIGN METAL TEMPERATURES OR MORE THAN 120F FOR ALLOY STEELS.			
6. MINIMUM OF TWO CALIBRATED GAUGES, INSTALLED ON THE EQUIPMENT TESTED.			
7. TEST GAUGES SHOULD SHOW CALIBRATION DATE WITHIN 12 MONTHS OF DATE OF FIRST USE.			
8. TEST PRESSURE SHOULD BE HELD AS SPECIFIED BEFORE VIEWING.			
CONTRACTOR		OWNER INSPECTOR	
CAPE MANUFACTURING LTD. <i>Tristan van Zandbergen</i>		_____ PRINT OR TYPE NAME HERE DATE: _____	
TEST COMPLETED BY <i>[Signature]</i> SIGN		_____ SIGN	
DATE: Dec.19,2024		AUTHORIZED INSPECTOR	
QUALITY CONTROL WITNESS <i>[Signature]</i> SIGN		_____ PRINT OR TYPE NAME HERE DATE: _____	
DATE: Dec.19,2024		_____ SIGN	

Certificate of Calibration

Harvie Instruments Ltd. certifies this gauge has been calibrated using measurement standards traceable to the National Research Council, the National Institute of Standards and Technology, or derived from accepted values of natural physical constants.

Pressure Standard #1 TB-1 Dead Weight Tester 573

Pressure Standard #2 TB-2

Client: Cape Manufacturing Ltd.

Date: May 8, 2024

Cal Due: May 7, 2025

FIRST USED Aug 21, 2024

Make: Winters

Device: Wet Pressure Gauge

Serial #: CAP 5008

Device Accuracy Rating

Pressure Range: 5,000 PSI

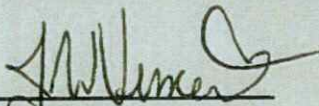
+/- 1.0 % of Full Span

Final Comparison Results

Step #	% Scale	Standard PSI	Gauge PSI	Deviation PSI	% of Full Span
1	0	0	0	0.0	0
2	10	500.0	494.0	-6.0	-0.12
3	20	1,000.0	1,002.0	2.0	0.04
4	40	2,000.0	2,003.0	3.0	0.06
5	60	3,000.0	3,019.0	19.0	0.38
6	80	4,000.0	4,045.0	45.0	0.90
7	100	5,000.0	5,050.0	50.0	1.00
8	50	2,500.0	2,515.0	15.0	0.30
9	0	0	0	0.0	0.00
Maximum Deviation				50.0	1.00

ACCEPTED AT STATED ACCURACY

Calibrated / Certified by or under the direct supervision of:


J. Vincent
Calibration Technician

Remarks: Gauge was received out of accuracy. It was adjusted or repaired as required and returned to accuracy.
Any number of factors can cause the gauge to drift out of tolerance at any time following its calibration.



6879A - 52 Ave
Red Deer, AB, Canada T4N 4L2

Ph: 403-347-6001

Certificate of Calibration

Harvie Instruments Ltd. certifies this gauge has been calibrated using measurement standards traceable to the National Research Council, the National Institute of Standards and Technology, or derived from accepted values of natural physical constants.

Pressure Standard #1 TB-1 Dead Weight Tester 573
Pressure Standard #2 TB-2

Client: Cape Manufacturing Ltd.

Date: May 8, 2024

Cal Due: May 7, 2025

FIRST USED Aug 21, 2024

Make: GT *DH*

Device: Wet Pressure Gauge

Serial #: CAP 5006

Device Accuracy Rating

Pressure Range: 5,000 PSI

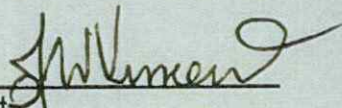
+/- 1.0 % of Full Span

Final Comparison Results

Step #	% Scale	Standard PSI	Gauge PSI	Deviation PSI	% of Full Span
1	0	0	0	0.0	0
2	10	500.0	477.0	-23.0	-0.46
3	20	1,000.0	982.0	-18.0	-0.36
4	40	2,000.0	1,980.0	-20.0	-0.40
5	60	3,000.0	2,981.0	-19.0	-0.38
6	80	4,000.0	3,978.0	-22.0	-0.44
7	100	5,000.0	4,962.0	-38.0	-0.76
8	50	2,500.0	2,480.0	-20.0	-0.40
9	0	0	0	0.0	0.00
Maximum Deviation				38.0	0.76

ACCEPTED AT STATED ACCURACY

Calibrated / Certified by or under the direct supervision of:


J. Vincent

Calibration Technician

Remarks:

Any number of factors can cause the gauge to drift out of tolerance at any time following its calibration.



6879A - 52 Ave
Red Deer, AB. Canada T4N 4L2

Ph: 403-347-6001


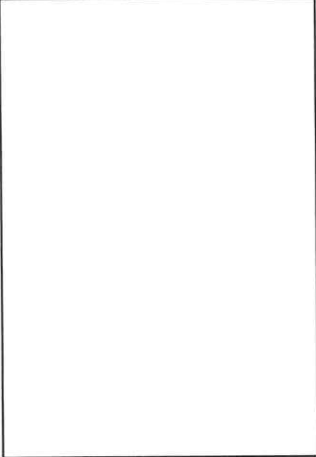
Proudly Serving Industry Since 1967

© 2024



Name Plate Facsimile

*NOTE: The "NB STAMP" and the National Board serial number shall only be marked on nameplates if the item is registered with the National Board.

* 					
	ALTERED BY				
	CAPE MANUFACTURING LTD.				
	ALTERED DECEMBER 2024				
YEAR BLT.	<input type="text" value="2005"/>	SERIAL No.	<input type="text" value="PV-1033"/>		
VESSEL TYPE	<input 3'-0"="" od="" s="" scrubber="" type="text" value="12 3/4" vertical="" vessel"="" x=""/>				
M.A.W.P.	<input type="text" value="1440"/>	PSI	AT	<input type="text" value="100"/>	oF
M.D.M.T.	<input type="text" value="-20"/>	oF	AT	<input type="text" value="1440"/>	PSI
SHELL TK.	<input type="text" value="0.688"/>	IN	HEAD TK.	<input type="text" value="0.625"/>	IN
CRN	<input type="text" value="R9415.231"/>		C.A.	<input type="text" value="0.0625"/>	IN
A#:	<input type="text"/>				
CAPE JOB # V-242338-7					
Mailing Address: Box 216 Halkirk Alberta Canada T0C 1M0					

Markings shall be produced by casting, etching, embossing, debossing, stamping or engraving and the characters must be either indented or raised at least 0.004 inches (0.10 mm). Letters and numbers must be at least 5/32" high.

ALTERED BY

ALTERED

DECEMBER 2024



CAPE MANUFACTURING LTD.

YEAR BLT 2005

SERIAL NO. PV-1033

VESSEL TYPE 12 3/4" OD x 3'-0" S/S VERTICAL SCRUBBER VESSEL

M.A.W.P. 1440 PSI

AT 100 °F

M.D.M.T. -20 °F

AT 1440 PSI

SHELL TK. 0.688 IN

HEAD TK. 0.625 IN

CRN R9415.28

C.A. 0.0625 IN

A#

CAPE JOB# V-242338-7

MAILING ADDRESS: BOX 216 HALKIRK ALBERTA T0C 1M0

Alberta
29603

ABSA

the pressure equipment safety authority

Grade "A" Pressure Welder's
Certificate of Competency
Ethan Stevenson

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



W-33674

File no.

Dated at Edmonton
June 21, 2016

W. Bellman
Chief Inspector and Administrator

012-0/1040106

181019A

THIS IS TO CERTIFY THAT
ETHAN GREGORY STEVENSON
HAS COMPLETED AN ALBERTA APPRENTICESHIP PROGRAM AND HAVING ACHIEVED
THE STANDARDS ESTABLISHED UNDER THE ALBERTA APPRENTICESHIP AND
INDUSTRY TRAINING ACT, IS HEREBY AUTHORIZED TO WORK IN THE TRADE AS A
JOURNEYMAN AND TO USE THE TITLE CERTIFIED JOURNEYMAN

WELDER

EFFECTIVE DATE
July 5th, 2016

ISSUE DATE
July 12th, 2016

Marlin Schmidt
HONOURABLE MARLIN SCHMIDT,
MINISTER
OF ADVANCED EDUCATION

Alberta

Carla Corbett
CARLA CORBETT
EXECUTIVE DIRECTOR
OF APPRENTICESHIP
& INDUSTRY TRAINING



'E'
Stamp

WELDER QUALIFICATION RECORD (WQR)

Welder's Name Ethan Stevenson ABSA File No.: W-33674 Stamp# E
 Identification of WPS followed by welder during welding of test coupon: CAPE-12(rev3) W.P. Reg. #WP 3326.2
 Base material(s) welded: SA-106 GRD-B Thickness: 15.875mm X Test Coupon ☐ Prod. Weld

Testing Conditions and Qualification Limits

Welding Variables (QW-350)		Actual Values		Range Qualified	
Welding Process(es) Used:		GMAW	GMAW(MC)	GMAW	GMAW(MC)
Type of Welding (e.g., Manual, Semi-Automatic) Used:		SEMI AUTO	SEMI AUTO	SEMI AUTO	SEMI AUTO
Base Metal P or S Number: To P or S Number:		P-1 To P1		P-1-P15F,P34,P4X	
Plate <input checked="" type="checkbox"/> Tube (enter diameter if pipe or tube):		64 mm		25 mm min. O.D.	
Backing (metal, weld metal, double-welded, etc.):		NONE	WELD METAL	With/Without	With
Filler Metal or Electrode Specification(s) (SFA) (info only):		5.18	5.18	F6 F6 (MC)	
Filler Metal or Electrode Classification(s) (info only):		ER70S-2	ER70C-6M		
Filler Metal or Electrode F-Number (s):		F6	F6 (MC)		
Filler Type (solid/metal or flux cored/powder) (GTAW or PAW):		N/A		N/A	
Consumable Insert for GTAW or PAW:		N/A		N/A	
Deposit Thickness for each process:		F6 2.79		F6 3.07mm	
Process 1: GMAW 3 Layers minimum <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		F6(MC)13.085mm		F6(MC)MTBW	
Process 2: GMAW(MC) 3 Layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		6G 2G		All Flat Hor	
Welding Position (2G, 6G, 3F, etc.):		DOWNHILL N/A		DOWNHILL N/A	
Progression (Uphill or Downhill):		None		With/Without	
Fuel Gas for OFW, Inert Gas Backing for GTAW, PAW, GMAW:		SHORT-CIRCUIT / Spray		SHORT-CIRCUIT/SP,G,P	
Transfer Mode (spray/globular or pulse to short circuit-GMAW):		N/A		N/A	
GTAW Current Type/Polarity (AC, DCEP, DCEN):					

Results

Visual Examination of Fit up Root Gap: 6mm Tack Welds: Bridge (Length: 10mm Number: 2)
 Root Pass: (Describe Discontinuity if Unacceptable): Acceptable
 Completed Weld: (Describe defects if Unacceptable): Acceptable
 Bend Test: Transverse Root and Face [QW-462.3(a)] Longitudinal Root and Face QW-462.3(b)] X Side [QW 462.2]
☐ Pipe Bend Specimen, corrosion resistant overlay [QW462.5(c)] ☐ Plate Bend Specimen, corrosion resistant overlay [QW462.5(d)]
☐ Macro Test for Fusion [QW462.5(b)] ☐ Macro Test for Fusion [QW462.5(e)]

Type	Result	Type	Result	Type	Result
Side BEND 1	Acceptable	Side BEND 2	Acceptable		
Side BEND 3	Acceptable	Side BEND 4	Acceptable		

(For alternative qualification of groove welds by radiography to QW-191)

R.T. Results: _____ U.T Results: _____
 Fillet Weld Fracture Test (Describe location, nature and size of any crack or tearing of specimen): N/A
 Length and Per Cent of Defects: N/A inches N/A

Record Information

Film or Specimens Evaluated by: Bruce Macleod Company: Red Deer Polytechnic
 Welding supervised by: Jim Gonda
 Mechanical tests conducted by: Bruce Macleod Laboratory test no.: _____

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

ACCREDITED ORGANIZATION: Red Deer Polytechnic AOQP No.: 7114 Expiry Date MARCH 26 /2024
 Certified by: Bruce Macleod Examiner File No: E-00258 Date: May 24, 2023
 Company Representative: Jim Gonda Examiner Bruce Macleod
 P.Q. Card No. (When issued): 4692 Performance Test Reference No.: _____
 Test Coupon I.D. No.: BM-2 Date Coupon is to be retained to: June 24, 2023



Red Deer Polytechnic
Box 5005, Red Deer Alberta
T4N 5H5

7114
A.O.Q.P.No.

WELDER PERFORMANCE QUALIFICATION CARD

Ethan Stevenson

W-33674

(Name) [ABS A File No.]
This card is issued pursuant to the Safety Codes Act and Pressure Welder's
Regulations. The performance qualification is in accordance with Section IX,
A.S.M.E. Code and subject to the limitations on the reverse side.

May 24, 2023

Ethan Stevenson

Bruce Macleod

Signature of Welder

Examiner (Print/Type)

CARD

4692

PERFORMANCE QUALIFICATION CARD NO. **4692**

Process(es) GMAW GMAW (GIC)	Materials (P No.) PLP15F P34, P4X
Filler Metal F-6 F-6	Min. Outside 25mm
Group (F No.) F-6	Pipe Diameter 25mm
Max Deposited 307mm	Position(s) all Flat, Hor
Weld Metal MTBW	Qualified All Flat, Hor
Backing without with	Backing Gas with/without
Progression Downhill N/A	
May 24, 2025	Bruce Macleod
P.Q. Expiry Date	Weld Examiner Signature
	Certification No. F-00258

WELDER QUALIFICATION RECORD (WQR)

Welder's Name Ethan Stevenson ABSA File No.: W- 33674 Stamp No.: E
 Identification of WPS followed by welder during welding of test coupon: CAPE-1SR(REV 1) W.P. Reg. #WP 3326.2
 Base material(s) welded: SA 106 GRD B Thickness: 15.875mm xTest Coupon ☐ Prod. Weld

Testing Conditions and Qualification Limits

Welding Variables (QW-350)	Actual Values SMAW	Range Qualified SMAW
Welding Process(es) Used:	MANUAL	MANUAL
Type of Welding (e.g., Manual, Semi-Automatic) Used:	MANUAL	MANUAL
Base Metal P or S Number: To P or S Number:	P-1	P1-P15F, P34, P4X
<input type="checkbox"/> Plate <input checked="" type="checkbox"/> Tube (enter diameter if pipe or tube):	64 mm	25 mm min O.D.
Backing (metal, weld metal, double-welded, etc.):	NONE WELD METAL	With/Without With
Filler Metal or Electrode Specification(s) (SFA) (info only):	SFA 5.1	F3 / F4
Filler Metal or Electrode Classification(s) (info only):	E6010 E7018	
Filler Metal or Electrode F-Number (s):	F3 / F4	
Filler Type (solid/metal or flux cored/powder) (GTAW or PAW):	N/A	
Consumable Insert for GTAW or PAW:	N/A	N/A
Deposit Thickness for each process:		
Process 1: SMAW F3 3 Layers minimum <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	F3 2.875 mm	F3 5.75mm
Process 2: SMAW F4 3 Layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	F4 13mm	F4 MTBW
Welding Position (2G, 6G, 3F, etc.):	6G	ALL
Progression (Uphill or Downhill):	UPHILL	UPHILL
Fuel Gas for OFW, Inert Gas Backing for GTAW, PAW, GMAW:	N/A	N/A
Transfer Mode (spray/globular or pulse to short circuit-GMAW):	N/A	N/A
GTAW Current Type/Polarity (AC, DCEP, DCEN):	N/A	N/A

Results

Visual Examination of Fit up Root Gap: 3mm Tack Welds: Bridge (Length: 10mm Number: 3)

Root Pass: (Describe Discontinuity if Unacceptable): Acceptable

Completed Weld: (Describe defects if Unacceptable): Acceptable

Bend Test: Transverse Root and Face [QW-462.3(a)] ☐ Longitudinal Root and Face QW-462.3(b)] ☒ Side [QW 462.2]

☐ Pipe Bend Specimen, corrosion resistant overlay [QW462.5(c)] ☐ Plate Bend Specimen, corrosion resistant overlay [QW462.5(d)]

☐ Macro Test for Fusion [QW462.5(b)] ☐ Macro Test for Fusion [QW462.5(e)]

Type	Result	Type	Result	Type	Result
SIDE BEND 1	Acceptable	SIDE BEND 2	Acceptable		
SIDE BEND 3	Acceptable	SIDE BEND 4	Acceptable		

For alternative qualification of groove welds by radiography to QW-191)

R.T. Results: U.T. Results:

Fillet Weld Fracture Test (Describe location, nature and size of any crack or tearing of specimen): N/A

Length and Per Cent of Defects: N/A inches N/A

Record Information

Film or Specimens Evaluated by: Lee Yasinski Company: Red Deer Polytechnic

Welding supervised by: Jason Wetter

Mechanical tests conducted by: Lee Yasinski Laboratory test no.: _____

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

ACCREDITED ORGANIZATION: RED DEER POLYTECHNIC AOQP No.: 7114 Expiry Date MARCH 26, 2027

Certified by: Jason Wetter Examiner File No: E-00326 Date: Sept 24th, 2024

Company Representative: Jason Wetter Examiner Lee Yasinski

P.Q. Card No. (When issued:) 4143

Performance Test Reference No.: _____

Test Coupon I.D. No.: LY-1

Date Coupon is to be retained to: Oct 24th, 2024



Red Deer Polytechnic
Box 5005, Red Deer Alberta
T4N 5H5

7114
A.O.Q.P.No.

WELDER PERFORMANCE QUALIFICATION CARD

Ethan Stevenson **W-33674**

[Name] [ABSA File No.]
This card is issued pursuant to the Safety Codes Act and Pressure Welder's Regulations. The performance qualification is in accordance with Section IX, A.S.M.E. Code and subject to the limitations on the reverse side.

Sept 24th, 2024 Ethan Stevenson
Date of Test Signature of Welder

Lee Yasinowski
Examiner (Print/Type) CARD **4143**

PERFORMANCE QUALIFICATION CARD NO. **4143**

Process(es)	<u>SMAW</u>	<u>SMAW</u>	Materials (P. No.)	<u>P1-P15P, F34, P4X</u>
Filler Metal			Min. Outside	
Group (F.No.)	<u>F3</u>	<u>F4</u>	Pipe Diameter	<u>25mm</u>
Max Deposited			Position(s)	
Weld Metal	<u>5.75mm</u>	<u>MTBW</u>	Qualified	<u>All</u>
Backing	<u>With/Without</u>	<u>With</u>	Backing Gas	<u>N/A</u>
Progression	<u>Uphill</u>	<u>Uphill</u>		

Sept 24th / 2026 Lee Yasinowski E-00326
P.Q. Expiry Date Weld Examiner Signature Certification No.

WELDER QUALIFICATION RECORD (WQR)

Welder's Name Ethan Stevenson ABSA File No.: W-33674 E
 Identification of WPS followed by welder during welding of test coupon: CAPE10(Rev.0) W.P. Reg. #WP 3326.2
 Base material(s) welded: SA 106B Thickness: 11mm X Test Coupon ☐ Prod. Weld

Testing Conditions and Qualification Limits

Welding Variables (QW-350)		Actual Values		Range Qualified	
Welding Process(es) Used:		GMAW	FCAW	GMAW	FCAW
Type of Welding (e.g., Manual, Semi-Automatic) Used:		SEMI AUTO		SEMI AUTO	
Base Metal P or S Number: To P or S Number:		P-1		P-8 To P-8, P1	
Plate	X Pipe (enter diameter if pipe or tube):	60.3mm		25mm min. O.D.	
Backing (metal, weld metal, double-welded, etc.):		NONE	WELD METAL	With/without with	
Filler Metal or Electrode Specification(s) (SFA) (info only):		5.9	5.22	F6 F6	
Filler Metal or Electrode Classification(s) (info only):		ER316L-Si	E316LT1-1		
Filler Metal or Electrode F-Number (s):		F6	F6		
Filler Type (solid/metal or flux cored/powder) (GTAW or PAW):		N/A		N/A	
Consumable Insert for GTAW or PAW:		N/A		N/A	
Deposit Thickness for each process, electrode type, etc. (in.):		F6 3 mm	F6 8 mm	F6 3.3mm	F6 16 mm
Welding Position (2G, 6G, 3F, etc.):		6G		All	
Progression (Uphill or Downhill):		DOWNHILL	UPHILL	DOWNHILL	UPHILL
Fuel Gas for OFW, Inert Gas Backing for GTAW, PAW, GMAW:		None	NA	With/without	NA
Transfer Mode (spray/globular or pulse to short circuit-GMAW):		SHORT-CIRCUIT	N/A	SHORT-CIRCUIT	N/A
		WAVEFORM RMD		WAVEFORM RMD	
GTAW Current Type/Polarity (AC, DCEP, DCEN):		N/A		N/A	

Results

Visual Examination of Fit up Root Gap: 2mm Tack Welds: Bridge (Length: 7mm Number: 2)
 Root Pass: (Describe Discontinuity if Unacceptable): Acceptable
 Completed Weld: (Describe defects if Unacceptable): Acceptable
 Bend Test: Transverse Root and Face [QW-462.3(a)] ☐ Longitudinal Root and Face QW-462.3(b)] X Side [QW 462.2]
☐ Pipe Bend Specimen, corrosion resistant overlay [QW462.5(c)] ☐ Plate Bend Specimen, corrosion resistant overlay [QW462.5(d)]
☐ Macro Test for Fusion [QW462.5(b)] ☐ Macro Test for Fusion [QW462.5(e)]

Type	Result	Type	Result	Type	Result
SIDE BEND 1	Acceptable	SIDE BEND 2	Acceptable		
SIDE BEND 3	Acceptable	SIDE BEND 4	Acceptable		

(For alternative qualification of groove welds by radiography to QW-191)

R.T. Results: _____ U.T Results: _____
 Fillet Weld Fracture Test (Describe location, nature and size of any crack or tearing of specimen): N/A
 Length and Per Cent of Defects: N/A inches N/A

Record Information

Film or Specimens Evaluated by: Lee Yasinski Company: Red Deer Polytechnic
 Welding supervised by: Jason Wetter
 Mechanical tests conducted by: Lee Yasinski Laboratory test no.: _____

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

ACCREDITED ORGANIZATION: RED DEER POLYTECHNIC AOQP No.: 7114 Expiry Date MARCH 26 /2027
 Certified by: Jason Wetter Examiner File No: E-00326 Date: July 10th/2024
 Company Representative: Jason Wetter Examiner Lee Yasinski
 P.Q. Card No. (When issued:): 4744 Performance Test Reference No.: _____
 Test Coupon I.D. No.: LY-6 Date Coupon is to be retained to: Aug 10th/2024



Red Deer Polytechnic
Box 5005, Red Deer Alberta
T4N 5H5

7114
A.O.Q.P.No.

WELDER PERFORMANCE QUALIFICATION CARD

Ethan Stevenson

W- 33674

[Name]

[ABS A File No.]

This card is issued pursuant to the Safety Codes Act and Pressure Welder's Regulations. The performance qualification is in accordance with Section IX, A.S.M.E. Code and subject to the limitations on the reverse side.

Date of Test

July 10th/2024

Ethan Stevenson

Signature of Welder

Examiner (Print/Type)

Lee Yasuki

CARD

4744

PERFORMANCE QUALIFICATION

CARD NO. 4744

Process(es) GMAW FCAW

Materials

(P. No.)

P8 to P8, P1

Filler Metal

Group (F.No.) F6

F6 (FC)

Min. Outside

Pipe Diameter

25mm

Max Deposited

Weld Metal 3.3mm

16mm

Position(s)

Qualified

All

Backing with/without

with

Backing Gas

with/without

Progression Downhill

Uphill

July 10th, 2026

P.Q. Expiry Date

Lee Yasuki

Weld Examiner Signature

E-00326

Certification No

TACK WELDS

Tack welds may be used on welded parts to hold edges in proper alignment until final welds are made and shall use an appropriate qualified welding procedure.

REMOVAL

Insofar as practicable, tack welds shall be removed completely when they have completed their purpose. Removal shall be by grinding and shall completely remove tack weld material exposing sound base metal. Surfaces shall be inspected by the welder to be free from defects as to prevent inclusion of any impurities into the weld joint.

INCORPORATION

Tack welds to be left in place shall be:

- (a) made by qualified welders to an appropriate qualified welding procedure.
 - (b) made at the root of the joint with the same electrode as that used in the root pass.
 - (c) completely fused with the root pass.
 - (b) cleaned to sound metal and blended into surrounding metal along their entire length.
 - (b) satisfactorily visually inspected by the welder before incorporation into the final weld.
- Inspection shall be over the entire length of the tack weld (including stopping and starting ends) and shall ensure full fusion, complete penetration and that it be free from defects (slag, cracks, porosity etc).

If found to be defective, tack welds shall be removed as outlined above.

STOPS & STARTS

If welding is stopped for any reason, extra care shall be taken in restarting. The stops / starts shall be ground to secure sound metal at the base of weld metal first deposited. Edges shall be blended into surrounding metal and ends feathered to produce a continuous groove surface free from abrupt ridges, valleys or discontinuities. Welders shall inspect stops and starts before incorporation into the final weld to ensure it be free from any defects and that it allows full penetration and complete fusion to the existing stop / start.

Ethan Stevenson
Welder Signature

July 16/19
Date

CERTIFIED MILL TEST REPORT

Line#

PO# 242338401

LOG NO. F00000000198688

Page 4 of 6

BONNEY FORGE CORPORATION

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CUSTOMER:

DATE 02/23/2024

CUSTOMER
ORDER NO.:

BONNEY ORDER NO. B000339882

SHIP TO:

ITEM	QUANTITY	LOT NO.	GRADE OR SPECIFICATION NO. CHEMICAL ANALYSIS, PHYSICAL PROPERTIES, REMARKS:
7551916		51185	18-12X2 3M A105N THRD T SA/A105N ✓ C 0.200 Cb 0.012 Co 0.003 Cr 0.080 Cu 0.040 Mn 1.110 Mo 0.004 Ni 0.020 ✓ P 0.005 S 0.021 Si 0.220 V 0.004 CE(Long Formula) = 0.41 T/S(PSI) 74,278 Y/S(PSI) 50,871 EL(%) 36.60 RA(%) 57.90 Brinell Hardness 139 BHN MPA 512.178 MPA 350.743 Cr + Cu + Mo + Ni + V = .148 Cr + Mo = .084
7552025	26	10	51169 8X3 3000 A105N THRD T SA/A105N C 0.180 Co 0.009 Cr 0.160 Cu 0.250 Mn 0.990 Mo 0.020 Nb 0.004 Ni 0.070 P 0.009 S 0.018 Si 0.205 V 0.022 CE(Long Formula) = 0.41 T/S(PSI) 75,565 Y/S(PSI) 51,924 EL(%) 35.20 RA(%) 61.92 Brinell Hardness 137 BHN 137 BHN
7552572	28	25	51292 3 X 2 3000 A105N SOCK S SA/A105N C 0.190 Cb 0.010 Co 0.003 Cr 0.120 Cu 0.020 Mn 1.020 Mo 0.002 Ni 0.010 P 0.005 S 0.015 Si 0.220 V 0.005 CE(Long Formula) = 0.39 T/S(PSI) 72,104 Y/S(PSI) 46,632 EL(%) 36.00 RA(%) 64.89 Brinell Hardness 137 BHN 137 BHN
7550026	29	25	51204 10-8 X2 3000 A105N SOCK S SA/A105N C 0.190 Cb 0.002 Co 0.009 Cr 0.230 Cu 0.220 Mn 0.990 Mo 0.020 Ni 0.080 P 0.010 S 0.015 Si 0.209 V 0.021 CE(Long Formula) = 0.43 T/S(PSI) 76,132 Y/S(PSI) 51,289 EL(%) 35.50 RA(%) 61.34 Brinell Hardness 141 BHN 139 BHN

Qty-12
T-501
west Co
11/9/24 PO# 242338401

ASME STAMP SEC.II

ED. 2023 ADD. _____
INT. al DATE 11/09/2024

We certify that the data on this sheet is a true copy taken from our records of material furnished us by the production mill, or as obtained by additional laboratory checks.

by Billie Jo Clemens
Billie Jo Clemens
Quality Assurance Representative

CMTR: Rev 3

SCANNED

CERTIFIED MILL TEST REPORT

LOG NO. F00000000198688

Page 6 of 6

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DATE 02/23/2024

CUSTOMER
ORDER NO.:

BONNEY ORDER NO. B000339882

SHIP TO:

ITEM QUANTITY LOT NO.

GRADE OR SPECIFICATION NO.
CHEMICAL ANALYSIS, PHYSICAL PROPERTIES, REMARKS:

1. THE FITTINGS SUPPLIED ARE IN ACCORDANCE WITH PURCHASE ORDER SPECIFICATIONS.
2. THE MATERIAL SUPPLIED IDENTIFIED AS A105N WAS NORMALIZED IN ACCORDANCE WITH ASTM A105 HEAT TREATING REQUIREMENTS.
3. THE MATERIAL SUPPLIED AS A105N MEETS THE REQUIREMENTS OF BOTH NACE MR0103/ISO 17945 - 2015 & NACE MR0175/ISO 15156-2 - 2015 EDITION.
4. CERTIFYING ASTM A105-21 / ASME SA105-21 EDITION.
5. THE PRODUCT SUPPLIED WAS INSPECTED IN ACCORDANCE WITH EN 10204:2004 EDITION TYPE 3.1 INSPECTION DOCUMENT. (EUROPEAN STANDARD)
6. THE UNIT OF MEASURE FOR TENSILE AND YIELD (0.2%) STRENGTH ARE REPORTED IN PSI.
7. ELONGATION TEST RESULTS ARE OBTAINED USING STANDARD ROUND SPECIMEN, 2 INCH OR 50 MM GAGE LENGTH.

ASME STAMP SEC.II

ED. 2023 ADD _____
INT. 28 DATE 11/09/2024

We certify that the data on this sheet is a true copy taken from our records of material furnished us by the production mill, or as obtained by additional laboratory checks.

by Billie Jo Clemens

Billie Jo Clemens
Quality Assurance Representative

CMTR: Rev 3

ESSEX STEEL ALBERTA INC.

13881-05 2010/11/09 2010/12/31 207349 105 West Street, Suite 210, N.W. - Ontario, Canada P8A 7B4

ALBERTA INDUSTRIAL METALS LTD
4021 - 78TH STREET
RED DEER ALBERTA
T4P 1N5

ALBERTA INDUSTRIAL METALS LTD
7660 49TH AVENUE
CALGARY, ALBERTA
T4P 4C6

-611052

MILL TEST REPORTS

ESSEX STEEL ALBERTA INC. HEREBY
CERTIFIES THAT THE MATERIALS FROM THE
SPECIMENS FROM WHICH THESE TESTS WERE
OBTAINED WERE TAKEN FROM THE SAME
SPECIFICATION WITH THE SAME GRADE, TYPE
AND TOLERANCE. THE RESULTS OF THESE
TESTS ARE REPORTED IN ACCORDANCE WITH THE
APPLICABLE STANDARDS AND PRACTICES.

M. McLENN

SYSTEMS/STAMP

THESE TESTS WERE PERFORMED BY
ESSEX STEEL ALBERTA INC. IN ACCORDANCE
WITH THE APPLICABLE STANDARDS AND
PRACTICES. IF YOU HAVE ANY
QUESTIONS, PLEASE CALL (403) 241-1111
OR VISIT OUR WEBSITE AT
WWW.ESSEXSTEELALBERTA.COM

EHK

SUPPLEMENTARY REQUIREMENTS

TEST CERT 1: BRDGDADIM.CA TEST CERT 2: PLATE TEST COUPON:

ASME STAMP SEC. II

TEST REPORTS REQUIRED

CEN MPC

ED. 2015 ADD

200160791 CM

2010/12/31 20:08

100 QUALITY AND ENVIRONMENTAL CERTIFICATIONS AVAILABLE AT WWW.ESSEXSTEELALBERTA.COM
CERTS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS

PRODUCT SHIPPED

CUSTOMER ITEM 00001 OUR ITEM 001 DIMENSIONS .178 IN X 48 X COIL

COIL NUMBER	HEAT-MS	NO. PIECES	WEIGHT	COIL NUMBER	HEAT-MS	NO. PIECES	WEIGHT
75027007	0040L-52	1	37820	75027003	0040L-53	1	37960
75027004	0040L-54	1	38602				

MECHANICAL PROPERTIES

HEAT	SOURCE	GAUGE	COND	TEST	DIR	YIELD	TENSILE	ELONG
1040L	USPC	.1780	AR	.2	T	63.3	75.0	20(2")

ASME STAMP SEC. II

ED. 2010 ADD

CHEMICAL PROPERTIES

HEAT	(WT %)	C	MN	P	S	SI	CR	NI	CU	MO	AL
1040L		0.00	0.06	0.009	0.005	0.04	0.02	0.01	0.03	0.00	0.033

ED. 2010 DATE 2010/12/31

.019 < .008

ASME STAMP SEC. II

ED. 2013 ADD

INT. 2013 DATE 03/03/2014

THE TEST RESULTS AND VALUES REPORTED HEREON INDICATE ONLY THAT (1) THE PARTICULAR HEAT, FOR WHICH THIS CERTIFICATE IS ISSUED, MEETS THE REQUIREMENTS OF THE SPECIFICATION AND (2) THE CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OF VALUES REPORTED HEREON CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THOSE INDICATED AND CANNOT BE USED FOR ANY FURTHER INSURANCE DESIGN OR CONSTRUCTION OF ANY TYPE.

ASME STAMP SEC. II

ED. 2017 ADD

INT. 08 DATE 02/01/2018

CM2-160527

DATE 04/02/2020

Welding Procedure



the pressure equipment safety authority

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

Attention: Daryl Hussey
CAPE MANUFACTURING LTD
PO BOX 216
HALKIRK, AB T0C 1M0

The welding procedure, tracking number 2019-08622, originally received on December 23, 2019 was surveyed and accepted in accordance with the requirements of ASME section IX for registration as follows:

Reg. No. : WP-3326.2

Accepted on: December 23, 2019

Reg Type: NEW DESIGN

Spec. No. : CAPE-4 REV 1

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

Enclosed is a stamped welding procedure for your reference.

If you have any question don't hesitate to contact me by phone at (780) 433-0281 ext 3342 or fax (780) 437-7787 or e-mail Reinhart@absa.ca.

Please note:

- (1) Construction shall be completed per the requirements of the applicable construction code, and*
- (2) 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,

REINHART, JASON, P. Eng.
DOP Cert. No. D00003629

WELDING PROCEDURE SPECIFICATION NO.: CAPE-4 (Rev. 1)

WELDING PROCEDURE QUALIFICATION RECORD NO.(S): COS-P1-A (Rev. 2),
IPS-4-1 (Rev. 2)

QUALIFIED IN ACCORDANCE WITH ASME SECTION IX FOR

Base Metal (Typical): P1 to P1 (SA 36, SA 106 Gr. B, SA 105, SA 516 Gr. 70 etc.)
Process(es): SMAW Weld Types: GROOVE & FILLET
Position: ALL POSITIONS Diameter: ALL DIAMETERS
Filler Metal: E6010, E7018, E7018-1

BASE METAL CONDITIONS & GROOVE THICKNESS RANGE QUALIFIED:
STANDARD APPLICATIONS AS WELDED
BASE METAL THICKNESS RANGE 0.062 to 8.00 in. inclusive

COMBINED DEPOSITED WELD METAL THICKNESS

ASME B31.1 8.00 in. maximum
ASME B31.3 8.00 in. maximum
ASME SECTION VIII, DIVISION 1 1.50 in. maximum

ADSA
SAFETY CODES ACT - PROVINCE OF ALBERTA
WELDING PROCEDURE

Reg. No. WP 3326.2
Spec No. CAPE-4 (Rev. 1)
Weld Process SMAW
Matl. Gr. P No. 1 to P No. 1
Elect Gr. F No. 3+4 A No. 1
Th. Qual For 203mm P.W.H.T. NO

Yr. 19 Mo. 12 Day 23 Signed [Signature]
JASON REINHART, P.ENG.
WELDING SPECIALIST

PROVINCIAL REGISTRATION

This WPS was prepared to the requirements of ASME Section IX 2019 and includes some of the additional requirements of the construction codes listed. The application of this WPS is outside the work scope of SGS Canada Inc.

Prepared By: Jim Cebedo
Signed: [Signature]
Date: December 20, 2019

Reviewed By: Timothy Colpitts, C.E.T., I.W.T.
Signed: [Signature]
Date: December 20, 2019

(File C19-808)

QW-482 WELDING PROCEDURE SPECIFICATION (WPS)

Organization Name CAPE Manufacturing Ltd.
Welding Procedure Specification No. CAPE-4 (Rev. 1) Date December 20, 2019
Revision(s) Rev. 1 (Essential) - Deletion of PQR No.'s: COS-P1-A & IPS-4-1.
Addition of PQR No.'s: COS-P1-A (Rev. 2) & IPS-4-1 (Rev. 2).
(Nonessential) - Addition of preheat sheet and maximum interpass
temperature. Removed metric units. Format and code update.
Supporting PQR No.(s) COS-P1-A (Rev. 2), IPS-4-1 (Rev. 2)
Welding Process(es) Shielded Metal Arc Welding (SMAW)

JOINTS (QW-402)

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

BASE METALS (QW-403)

P-Number P1 To P-Number P1
Thickness Range: Groove 0.062 to 8.00 in. inclusive
Fillet All base metal thicknesses
Pipe Diameter Ranges: Groove All diameters
Fillet All diameters
Deposited Weld Metal (Per Pass) E6010: 0.188 in. maximum
E7018, E7018-1: 0.250 in. maximum

FILLER METALS (QW-404)

	SMAW	SMAW
Specification No. (SFA)	<u>SFA 5.1</u>	<u>SFA 5.1</u>
AWS No. (Class)	<u>E6010</u>	<u>E7018, E7018-1</u>
F-No.	<u>F3</u>	<u>F4</u>
A-No.	<u>A1</u>	<u>A1</u>
Diameter	<u>3/32 to 3/16 in. inclusive</u>	<u>3/32 to 1/4 in. inclusive</u>
Deposited Weld Metal Thickness Range:		
ASME Section VIII, Div. 1: Groove	<u>0.250 in. max. (1)</u>	<u>1.50 in. max. (1)</u>
All Other Applications: Groove	<u>0.250 in. max. (1)</u>	<u>8.00 in. max. (1)</u>
All Applications: Fillet	<u>All fillet sizes</u>	<u>All fillet sizes</u>
(1) <u>Combined deposited weld metal thickness shall not exceed 8.00 in. for ASME B31.1</u> <u>and ASME B31.3 and 1.50 in. for ASME Section VIII, Div. 1.</u>		

POSITION (QW-405)

Position of Groove All positions Position of Fillet All positions
Weld Progression E6010: Vertical up or down where applicable
E7018, E7018-1: Vertical up where applicable

PREHEAT (QW-406)

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

WPS NO. CAPE-4 (Rev. 1)

POSTWELD HEAT TREATMENT (QW-407)

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

ELECTRICAL CHARACTERISTICS (QW-409)

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

TECHNIQUE (QW-410)

Manual or Automatic Manual
 String or Weave String or Weave
 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 (2) Multiple or Single
 Peening Not permitted
 Use of Thermal Process N/A
 Travel Speed See Table 1
 (2) Multiple layers shall be used for ASME B31.1 and ASME B31.3 when the nominal material thickness is greater than 0.188 in.

TABLE 1 - WELDING PARAMETERS

Process	Filler Metal	Diameter in.	Current Type & Polarity	Amperage Range	Voltage Range	Travel Speed i.p.m.
SMAW	E6010	3/32	DCRP	50 - 100	18 - 32	1.0 - 12
SMAW	E6010	1/8	DCRP	60 - 140	19 - 32	1.5 - 14
SMAW	E6010	5/32	DCRP	115 - 250	21 - 32	2.0 - 16
SMAW	E6010	3/16	DCRP	120 - 300	21 - 32	2.0 - 18
SMAW	E7018, E7018-1	3/32	DCRP	60 - 110	18 - 26	1.0 - 12
SMAW	E7018, E7018-1	1/8	DCRP	90 - 170	19 - 28	1.5 - 14
SMAW	E7018, E7018-1	5/32	DCRP	110 - 220	20 - 30	1.5 - 16
SMAW	E7018, E7018-1	3/16	DCRP	160 - 320	20 - 30	2.0 - 20
SMAW	E7018, E7018-1	7/32	DCRP	240 - 340	20 - 32	3.0 - 22
SMAW	E7018, E7018-1	1/4	DCRP	275 - 360	21 - 32	4.0 - 22

Note: Size of electrode, filler metal, number of passes, voltage, amperage, and travel speed will vary with position, joint thickness, joint type etc.

TYPICAL JOINT DESIGNS

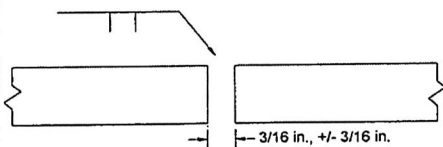


Figure 1
Single Square Butt

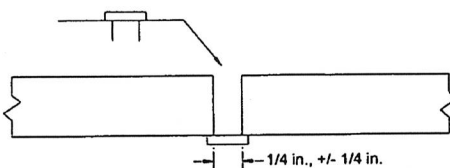


Figure 2
Single Square Butt with Backing Strip

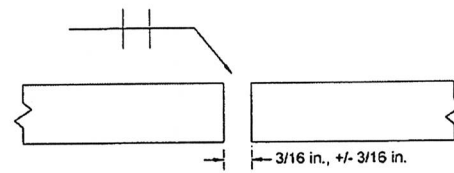


Figure 3
Double Square Butt

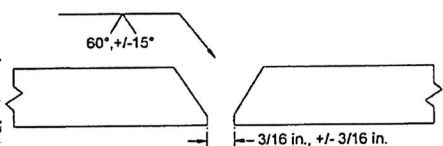


Figure 4
Single Vee Butt

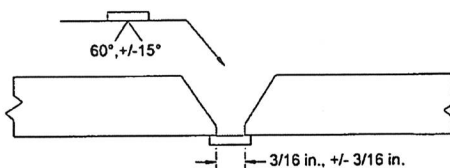


Figure 5
Single Vee Butt with Backing Strip

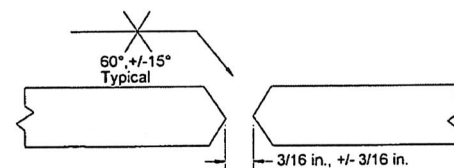


Figure 6
Double Vee Butt

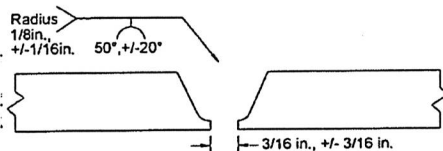


Figure 7
Single U Butt

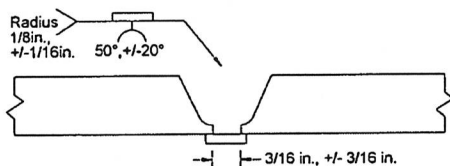


Figure 8
Single U Butt with Backing Strip

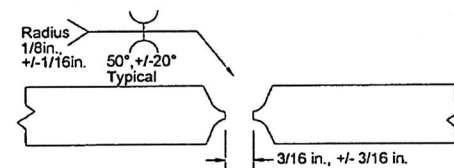


Figure 9
Double U Butt

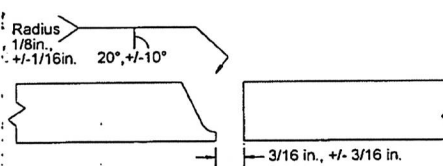


Figure 10
Single J Butt

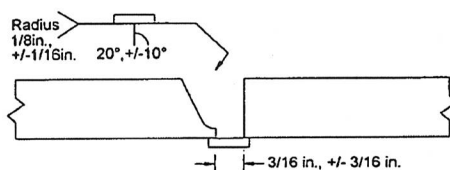


Figure 11
Single J Butt with Backing Strip

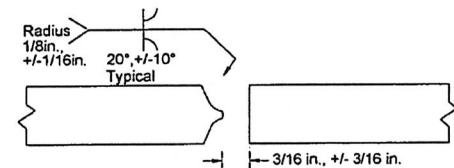


Figure 12
Double J Butt

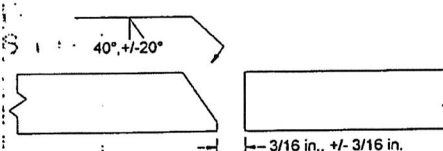


Figure 13
Single Bevel Butt

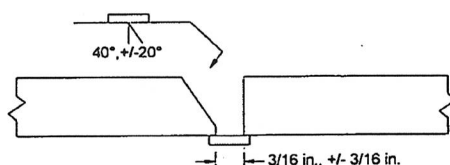


Figure 14
Single Bevel Butt with Backing Strip

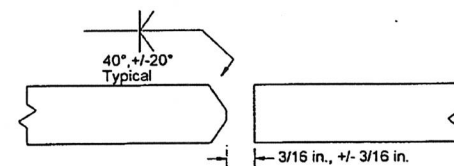


Figure 15
Double Bevel Butt

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

PREHEAT
P-No. 1 (Without PWHT)

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

POWER PIPING IN ACCORDANCE WITH ASME B31.1 - 2018

GREATER MATERIAL THICKNESS	SPECIFIED MAXIMUM CARBON CONTENT	MINIMUM PREHEAT TEMPERATURE
Less than or equal to 1.0 in.	All	100 °F
Greater than 1.0 in.	All	200 °F

- The base metal temperature for the parts to be welded shall be at or above the specified minimum temperature in all directions from the point of welding for a distance of the larger of 3.0 in. or 1.5 times the greater nominal thickness (as defined in paragraph 132.4.3). The base metal temperature for tack welds shall be at or above the specified minimum temperature for a distance not less than 1.0 in. in all directions from the point of welding.
- Greater material thickness is the thicker of the pressure-retaining materials being joined at the weld.

PROCESS PIPING IN ACCORDANCE WITH ASME B31.3 - 2018

GREATER MATERIAL THICKNESS	SPECIFIED MAXIMUM CARBON CONTENT	MINIMUM PREHEAT TEMPERATURE
Less than or equal to 1.0 in.	All	100 °F
Greater than 1.0 in.	All	200 °F

- The preheat zone shall be at or above the specified minimum temperature in all directions from the point of welding for a distance of the larger of 3.0 in. or 1.5 times the greater nominal thickness (as defined in paragraph 331.1.3(c)). The base metal temperature for tack welds shall be at or above the specified minimum temperature for a distance not less than 1.0 in. in all directions from the point of welding.
- Greater material thickness is that of the nominal material thickness of the thicker of the materials being joined at the weld.

PRESSURE VESSELS IN ACCORDANCE WITH ASME SECTION VIII, DIV. 1 - 2019

NOMINAL THICKNESS (THICKER OF THE MATERIALS AT THE JOINT)	SPECIFIED MAXIMUM CARBON CONTENT	NOMINAL THICKNESS (PER UW-40(f))	MINIMUM PREHEAT TEMPERATURE
Less than or equal to 1.0 in.	All	Less than or equal to 1.25 in.	100 °F
Greater than 1.0 in. to 1.25 in.	Less than or equal to 0.30%	Less than or equal to 1.25 in.	100 °F
Greater than 1.0 in. to 1.25 in.	Greater than 0.30%	Less than or equal to 1.25 in.	175 °F
All	All	Greater than 1.25 in.	200 °F

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

CAPE MANUFACTURING LTD.

Welding Procedure Specification

in accordance with

ASME Section IX

Welding Procedure Specification No.:

CAPE-12 Revision 3

Supporting PQR No. (s):

CAPE-12-1 Rev. 0, CAPE-12-2 Rev. 0, CAPE-12-3 Rev. 0, CAPE-12-4 Rev. 0,
CAPE-12-5 Rev. 0, CAPE-12-6 Rev. 1, CAPE-12-7 Rev. 1, CAPE-12-8 Rev. 1,
CAPE-12-9 Rev. 1, CAPE-12-10 Rev. 1, CAPE-12-11 Rev. 1, CAPE-12-12 Rev.0,
CAPE-12-13 Rev.0, CAPE-12-14 Rev.0

Qualified for

Process(es):	GMAW(S.C.) / GMAW / SAW	Position(s):	All / All / Flat or Horizontal ²
Filler Metal F-No.:	F-6 / F-6 / F-6	A-No.:	A-1 / A-1 / Unspecified ³
AWS Classification:	ER70S-X ¹ / E70C-6M / EC1	Weld Type(s):	Groove, Fillet, Weld Buildup
Base Metal:	P-1 Group 1 or 2	To:	P-1 Group 1 or 2
Typical Materials:	This procedure is qualified for all P-1 materials as specified in Table QW-422 of ASME Section IX for normal service applications, and for welding P-1 Group 1 or 2 materials only for applications where toughness properties are required.		
Diameter Range:	All Diameters	Condition(s):	With or Without Postweld Heat Treatment

Thickness Range:	(As Welded)	Normal Service	Impact Tested to -50°F
	ASME Section IX	0.062" to 8.000"	0.125" to 8.000"
	ASME Section VIII	0.062" to 1.500"	0.125" to 1.500"
	ASME B31.1	0.062" to 8.000"	0.125" to 8.000"
	ASME B31.3	0.062" to 8.000"	0.125" to 1.750"
Thickness Range:	(Postweld Heat Treated)	Normal Service	Impact Tested to -50°F
	ASME Section IX	0.062" to 8.000"	0.125" to 8.000"
	ASME Section VIII	0.062" to 8.000"	0.125" to 8.000"
	ASME B31.1	0.062" to 8.000"	0.125" to 8.000"
	ASME B31.3	0.062" to 8.000"	0.125" to 2.000"

Revision 3 – Additional PQR to expand the base metal thickness and the weld deposit thicknesses.

¹GMAW (S.C.) wire is limited to ER70S-6 only when toughness properties are required.

²SAW limited by usability restrictions of the process.

³Nominal chemical composition shall be limited to AWS classification EC1.

Provincial Registration

2020-03507

ABSA

SAFETY CODES ACT - PROVINCE OF ALBERTA
WELDING PROCEDURE

Reg. No.: WP-3326.2

Spec No.: CAPE-12 REV 3

Processes: GMAW/GMAW/SAW

Base Mat'ls: P-No. 1 Gr.1/2 to

P-No. 1 Gr.1/2

Filler Mat'ls: F-No. 6/6/6, A-No. 1/1/*

Thk. Qual. For: 203 mm P.W.H.T.: Both

MIN TH QUAL 3.2mm, CVN -46°C, *Chemical composition

Signed:



Date: 2020-07-17

JASON REINHART, P. Eng.

This stamp and signature have been affixed electronically to this registered procedure as required by Section 21(1) of the Pressure Equipment Safety Regulation, in accordance with the Electronic Transactions Act.

Provincial Registration

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

Company Name: <u>Cape Manufacturing Ltd.</u>	By: <u>Jim Gonda</u>
WPS No.: <u>CAPE-12</u>	Date: <u>May 26, 2017</u>
Revision No.: <u>3</u>	Revision Date: <u>July 10, 2020</u>
Supporting PQR's: <u>CAPE-12-1 Rev. 0, CAPE-12-2 Rev. 0, CAPE-12-3 Rev. 0, CAPE-12-4 Rev. 0, CAPE-12-5 Rev. 0, CAPE-12-6 Rev. 1, CAPE-12-7 Rev. 1, CAPE-12-8 Rev. 1, CAPE-12-9 Rev. 1, CAPE-12-10 Rev. 1, CAPE-12-11 Rev. 1, CAPE-12-12 Rev.0, CAPE-12-13 Rev.0, CAPE-12-14 Rev.0</u>	
Welding Process(es): <u>GMAW(S.C.) / GMAW / SAW</u>	Type(s): <u>Semiautomatic / Semiautomatic / Machine</u>

JOINTS QW-402		Joint Details	
Joint Design:	Butt, Tee, Lap, Corner, etc.	All ASME joint designs. Reference construction	
Backing:	F-6 GMAW: With or without backing.	drawings for joint details. Where joint details are not	
	F-6 SAW: With or without backing.	specified, refer to typical joint detail sheet provided.	

Backing Material (Type): Similar base or weld metal or backwelding as required. No Retainers.			
BASE METALS QW-403			
P-No.: <u>P-1</u>	*Group No.: <u>1 or 2</u>	to P-No.: <u>P-1</u>	*Group No.: <u>1 or 2</u>
OR			
Spec. type & grade: <u>Not Applicable</u>		to Spec. type & grade: <u>Not Applicable</u>	
OR			
Chem. Analysis & Mech. Prop.: <u>Not Applicable</u>		to Chem. Analysis & Mech. Prop.: <u>Not Applicable</u>	
Thickness Range			
Base Metal: Groove (As Welded):	ASME Section IX	Normal Service 0.062" to 8.000"	Impact Tested to -50°F 0.125" to 8.000"
	ASME Section VIII	0.062" to 1.500"	0.125" to 1.500"
	ASME B31.1	0.062" to 8.000"	0.125" to 8.000"
	ASME B31.3	0.062" to 8.000"	0.125" to 1.750"
Base Metal: Groove (PWHT):	ASME Section IX	0.062" to 8.000"	0.125" to 8.000"
	ASME Section VIII	0.062" to 8.000"	0.125" to 8.000"
	ASME B31.1	0.062" to 8.000"	0.125" to 8.000"
	ASME B31.3	0.062" to 8.000"	0.125" to 2.000"
Pipe Dia Range: Groove:	All diameters	Fillet: All diameters	
Base Metal Condition: Normalized for ASME Section VIII-1 when toughness properties are required.			
Other: Maximum thickness of any weld layer shall not exceed 0.500"			
* Limited to P-1 Group 1 or 2 only when toughness properties are required.			
** Limited to 0.125" minimum for applications where toughness properties are required.			
Reference to relevant construction code is mandatory prior to production welding to determine any supplementary restrictions			
FILLER METALS QW-404			
Process:	GMAW (S.C.)	GMAW	SAW
Specification No. (SFA):	5.18	5.18	5.17
AWS Classification No.:	ER70S-X ¹	E70C-6M	EC1
F-No.:	F-6	F-6	F-6
A-No.:	A-1	A-1	Unspecified ²
Size of Filler Metals:	0.035", 0.045", 0.062"	0.035", 0.045", 0.062"	3/32", 1/8", 5/32"
Weld Metal Thickness - Groove:	0.138" max. (As Welded)	8.000" max. (As Welded)	8.000" max. (As Welded)
	0.138" max. (PWHT)	8.000" max. (PWHT)	8.000" max. (PWHT)
- Fillet:	Unlimited	Unlimited	Unlimited
Electrode-Flux (Class):	Not Applicable	Not Applicable	F7A10-EC1 (As Welded)
	Not Applicable	Not Applicable	F7P8-EC1 (PWHT)
Wire Trade Name:	Not Applicable	Not Applicable	Hobart SubCOR EM13K-S MOD
Flux Trade Name:	Not Applicable	Not Applicable	Hobart SWX 120
Flux Type:	Not Applicable	Not Applicable	Neutral
Alloy/Flux Element:	None	None	No Supplemental Filler
Recrushed Slag:	Not Applicable	Not Applicable	Recrushed slag not to be used
Consumable Insert:	Not Applicable	Not Applicable	Not Applicable
Supplemental Filler Metals:	None	None	None
Product Form:	Coiled Solid Wire	Metal Cored Wire	Coiled Composite Wire
Other:	Alloy content of the weld metal is not largely dependent upon the composition of the flux		

Revision 3 – Additional PQR to expand the base metal thickness and the weld deposit thicknesses.

¹GMAW (S.C.) wire is limited to ER70S-6 only when toughness properties are required.

²Nominal chemical composition shall be limited to AWS classification EC1.

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

WPS # CAPE-12 Revision 3

POSITIONS QW-405		POSTWELD HEAT TREATMENT QW-407	
Position(s) of Groove:	All	Temp. Range:	
Welding Progression:	F-6 GMAW(S.C.): Vertical Down	Time Range:	
	F-6 GMAW: Vertical Down	With or Without Postweld Heat Treatment	
	F-6 SAW: Flat or Horizontal	Heating:	(See Page 5)
Position(s) of Fillet:	All	Cooling:	
PREHEAT QW-406		GAS QW-408	
Temperature Min.:		Process(es):	F-6 GMAW (S.C.) F-6 GMAW
Interpass Temp Max.:	(See Page 5)	Shielding Gas(es):	SFA 5.32; SG-AC-8 SFA 5.32; SG-AC-8
Interpass Temp Min.:		Composition:	92% Argon, 8% CO ₂ 92% Argon, 8% CO ₂
Preheat Maintenance:	Monitor using tempilstiks, pyrometer or other suitable methods.	Flow Rate:	10 - 50 c.f.h. 10 - 50 c.f.h.
	-----	Backing Gas:	SFA 5.32; SG-A; With or without
	-----	Backing Gas Rate:	5 - 45 c.f.h. (if required)
		Trailing Gas:	SFA 5.32; SG-A; With or without
		Trailing Gas Rate:	5 - 45 c.f.h. (if required)
ELECTRICAL CHARACTERISTICS QW-409			
Current:	F-6 GMAW (S.C.): Direct (DC)	F-6 GMAW:	Direct (DC) F-6 SAW: Direct - DC
Polarity:	F-6 GMAW (S.C.): Reverse (EP)	F-6 GMAW:	Reverse (EP) F-6 SAW: Reverse - EP
Volts (Range):	F-6 GMAW (S.C.): 50 - 220	F-6 GMAW:	60 - 360 F-6 SAW: 200 - 750
Amps (Range):	F-6 GMAW (S.C.): 11 - 26	F-6 GMAW:	14 - 32 F-6 SAW: 22 - 45
Travel Speed (Range) - ipm:	F-6 GMAW (S.C.): 1 - 20	F-6 GMAW:	1 - 20 F-6 SAW: 10 - 70
Max. Heat Input (As Welded)	Heat input qualified as per ASME Section IX. Additional Heat Input limitations on page 4..		
0.125" to 0.625":	F-6 GMAW (S.C.): 24 256 J/in	F-6 GMAW:	23 758 J/in F-6 SAW: 54 188 J/in
0.625" to 8.000":	F-6 GMAW (S.C.): 24 256 J/in	F-6 GMAW:	40 998 J/in F-6 SAW: 54 473 J/in
Max. Heat Input (PWHT)	Heat input qualified as per ASME Section IX. Additional Heat Input limitations on page 4..		
0.125" to 0.625":	F-6 GMAW (S.C.): 24 376 J/in	F-6 GMAW:	31 156 J/in F-6 SAW: 54 375 J/in
0.625" to 8.000":	F-6 GMAW (S.C.): 24 460 J/in	F-6 GMAW:	34 724 J/in F-6 SAW: 54 375 J/in
Mode of Metal Transfer :	F-6 GMAW (S.C.): Short Circuit	F-6 GMAW:	Globular, Spray, Pulsed Spray
Wire Feed Speed (Range) - ipm:	F-6 GMAW (S.C.): 50 - 250 ipm	F-6 GMAW:	100 - 525 ipm F-6 SAW: 30 - 400
Tungsten Electrode Type & Size:	Not Applicable		
Other:	Heat input shall not exceed the maximum specified on this page only when toughness properties are required.		
TECHNIQUE QW-410			
String or Weave Bead:	String and weave. Weave size shall be controlled to prevent exceeding maximum heat input. F-6 GMAW (S.C.) limited to string bead only where toughness properties are required.		
Orifice or Gas Cup Size:	F-6 GMAW (S.C.): 1/4" to 1"	F-6 GMAW:	1/4" to 1" F-6 SAW: 3/4" to 1 1/4"
Initial Cleaning:	Base material must be thoroughly cleaned of all foreign material (scale, rust, oil, grease, paint, tar, etc.) at least 1" back on each side of the joint prior to welding. All surfaces to be welded shall be smooth, uniform and free from notches, slag, fins and burrs.		
Interpass Cleaning:	Perform by wire brush, chipping hammer, power brushing, grinding, etc. after each weld layer.		
Method of Back Gouging:	Arc air, gouge, grinding, etc., if required. Grind to clean metal where thermal processes are used.		
Oscillation:	Not Applicable		
Wire Stickout:	F-6 GMAW (S.C.): 1/4" to 3/4"	F-6 GMAW:	1/4" to 3/4" F-6 SAW: 1/4" to 1 1/2"
Multiple or Single Pass (per side):	Single or multiple passes per side. Multiple only when toughness properties are required		
Multiple or Single Electrodes:	Single electrodes only		
Peening:	Peening is not allowed		
Closed /Out of Chamber Welding:	Not Applicable		
Thermal Processes:	Thermal Process may be used		

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

WPS # CAPE-12 Revision 3

TYPICAL WELDING PARAMETERS						
Process	Filler Metal		Current		Volt Range	Travel Speed (IPM)
	AWS Classification	Diameter (in)	Type & Polarity	Amp. Range		
GMAW (S.C.)	ER70S-X	0.035	DC EP	50 - 140	11 - 18	1 - 16
GMAW (S.C.)	ER70S-X	0.045	DC EP	60 - 180	12 - 20	2 - 18
GMAW (S.C.)	ER70S-X	0.062	DC EP	80 - 220	12 - 26	3 - 20
GMAW	E70C-6M	0.035	DC EP	60 - 300	14 - 30	1 - 17
GMAW	E70C-6M	0.045	DC EP	70 - 330	15 - 31	1 - 18
GMAW	E70C-6M	0.062	DC EP	80 - 360	16 - 32	1 - 20
SAW	EC1	3/32, 1/8, 5/32	DC EP	200 - 750	22 - 45	10 - 70
Notes:	Number of weld layers and size of filler metal may vary with thickness of base material and position of weld.					
	GMAW (S.C.) is limited to ER70S-6 when toughness properties are required.					
	ER70S-6, if used, shall meet A-1 chemical composition (Mn ≤ 1.60%, Si ≤ 1.00%)					
	Parameters depend on joint details, joint position and base metal thickness.					

HEAT INPUT LIMITATIONS - ASME B31.1						
Max. Heat Input (As Welded)						
0.125" to 0.625":	F-6 GMAW (S.C.):	24 256 J/in	F-6 GMAW:	23 758 J/in	F-6 SAW:	54 188 J/in
0.625" to 8.000":	F-6 GMAW (S.C.):	24 256 J/in	F-6 GMAW:	40 998 J/in	F-6 SAW:	54 473 J/in
Max. Heat Input (PWHT)						
0.125" to 0.625":	F-6 GMAW (S.C.):	24 376 J/in	F-6 GMAW:	31 156 J/in	F-6 SAW:	54 375 J/in
0.625" to 8.000":	F-6 GMAW (S.C.):	24 460 J/in	F-6 GMAW:	34 724 J/in	F-6 SAW:	54 375 J/in
Note:	Reference to the relevant construction code is mandatory prior to production welding to determine any supplementary restrictions.					

HEAT INPUT LIMITATIONS - ASME B31.3						
Max. Heat Input (As Welded)						
0.125" to 0.500":	F-6 GMAW (S.C.):	24 256 J/in	F-6 GMAW:	23 758 J/in	F-6 SAW:	54 188 J/in
0.500" to 0.750":	F-6 GMAW (S.C.):	22 824 J/in	F-6 GMAW:	40 998 J/in	F-6 SAW:	54 473 J/in
0.750" to 1.250":	F-6 GMAW (S.C.):	22 824 J/in	F-6 GMAW:	40 998 J/in	F-6 SAW:	54 473 J/in
1.250" to 1.750":	F-6 GMAW (S.C.):	13 266 J/in	F-6 GMAW:	48 821 J/in	F-6 SAW:	54 659 J/in
Max. Heat Input (PWHT)						
0.125" to 0.500":	F-6 GMAW (S.C.):	24 376 J/in	F-6 GMAW:	31 156 J/in	F-6 SAW:	54 375 J/in
0.500" to 1.250":	F-6 GMAW (S.C.):	24 460 J/in	F-6 GMAW:	46 588 J/in	F-6 SAW:	54 188 J/in
1.250" to 2.000":	F-6 GMAW (S.C.):	17 368 J/in	F-6 GMAW:	42 051 J/in	F-6 SAW:	54 117 J/in
Note:	Reference to the relevant construction code is mandatory prior to production welding to determine any supplementary restrictions.					

HEAT INPUT LIMITATIONS - ASME SECTION VIII-1						
Max. Heat Input (As Welded)						
0.125" to 1.500":	F-6 GMAW (S.C.):	24 256 J/in	F-6 GMAW:	23 758 J/in	F-6 SAW:	54 188 J/in
Max. Heat Input (PWHT)						
0.125" to 0.625":	F-6 GMAW (S.C.):	24 376 J/in	F-6 GMAW:	31 156 J/in	F-6 SAW:	54 188 J/in
0.625" to 8.000":	F-6 GMAW (S.C.):	24 376 J/in	F-6 GMAW:	46 588 J/in	F-6 SAW:	54 188 J/in
Note:	Reference to the relevant construction code is mandatory prior to production welding to determine any supplementary restrictions.					

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

WPS # CAPE-12 Revision 3

PREHEAT & INTERPASS TEMPERATURE MINIMUM AND MAXIMUM	
ASME Section VIII :	50°F minimum for all P-1 materials except as listed below: 175°F if the joint thickness exceeds 1.00" and the specified carbon content exceeds 0.30%
ASME B31.1 :	50°F minimum for all P-1 materials except as listed below: 200°F if the joint thickness exceeds 1.00" and the specified carbon content exceeds 0.30%
ASME B31.3 :	50°F minimum for all P-1 materials except as listed below: 200°F if the joint thickness exceeds 1.00" and the specified carbon content exceeds 0.30%
Max. Interpass Temp.:	650°F for normal service, 550°F for applications requiring toughness properties

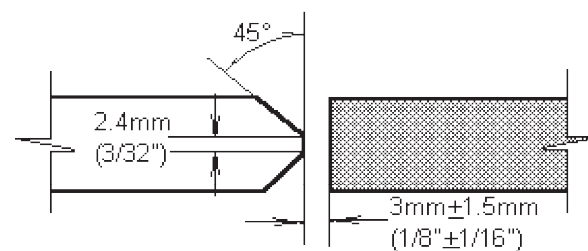
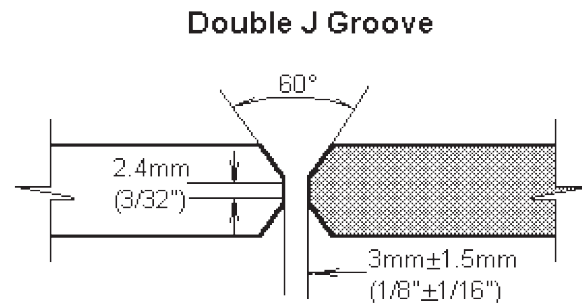
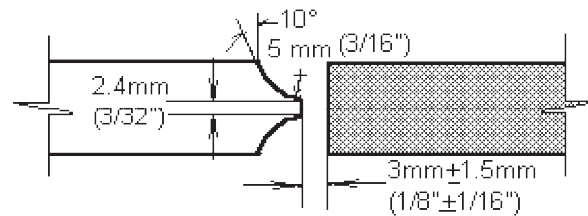
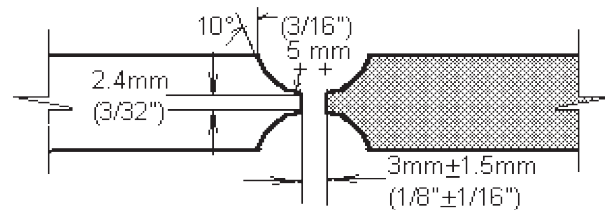
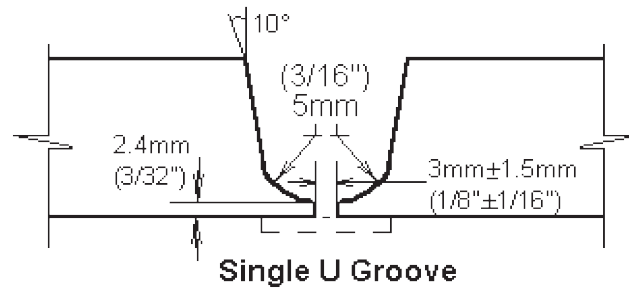
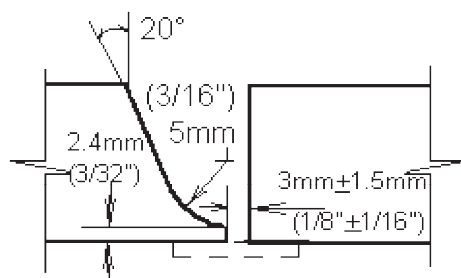
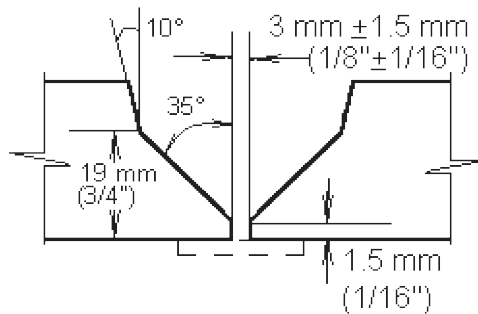
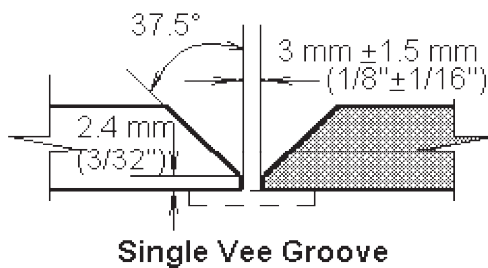
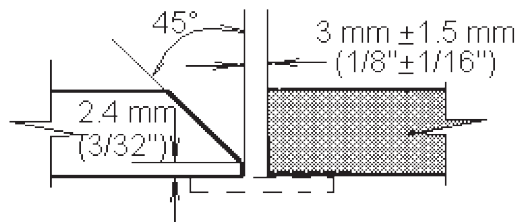
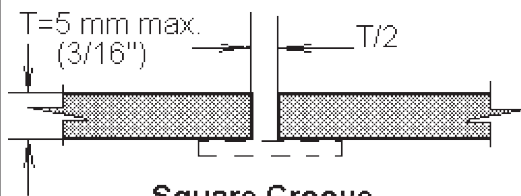
POSTWELD HEAT TREATMENT (IF REQUIRED)	
ASME Section VIII :	1100°F minimum holding temperature Up to 2" wt: 1 hour per inch nominal wall thickness, 15 minutes minimum holding time Over 2" wt: 2 hours plus 15 minutes for each additional inch over 2"
ASME B31.1 :	1100°F to 1200°F holding temperature range Up to 2" wt: 1 hour per inch nominal wall thickness, 15 minutes minimum holding time Over 2" wt: 2 hours plus 15 minutes for each additional inch over 2"
ASME B31.3 :	1100°F to 1200°F holding temperature range Up to 2" wt: 1 hour per inch nominal wall thickness, 15 minutes minimum holding time Over 2" wt: 2 hours plus 15 minutes for each additional inch over 2"
Maximum PWHT Time:	0.125" to 0.625" 2 hours 30 minutes for applications where toughness is required 0.625" to 8.000" 5 hours for applications where toughness is required

PWHT HEATING & COOLING REQUIREMENTS	
ASME Section VIII * :	Heating: Ambient to 800°F at moderate rate 800°F to holding temperature at 400°F ÷ wt per hr; maximum 400°F per hr Cooling: Holding temperature to 800°F at 500°F ÷ wt per hr; maximum 500°F per hr 800°F to ambient by still air cooling
ASME B31.1 :	Heating: 600°F to holding temperature at 600°F ÷ 1/2 wt per hr; maximum 600°F per hr Cooling: Holding temperature to 600°F at 600°F ÷ 1/2 wt per hr; maximum 600°F per hr
ASME B31.3 :	Heating: 600°F to holding temperature at 600°F ÷ 1/2 wt per hr; maximum 600°F per hr Cooling: Holding temperature to 600°F at 600°F ÷ 1/2 wt per hr; maximum 600°F per hr
* Note :	Section VIII heating & cooling rates are suitable for most applications

Reference to relevant construction codes is mandatory prior to production welding to determine any supplementary restrictions.

Typical Joint Details QW-482

Prepared by: **Qualimet**



Final Documents



Date June 11/2025.

BILL OF LADING
1673

Destination _____ Postal Code _____

[illegible]

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