ABSA
the pressure equipment safety authority

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

September 12, 2011

Susan Wall
BROMLEY MECHANICAL SERVICES INC
A DIVISION OF ARGO SALES LTD
925-23 STREET SW
MEDICINE HAT, AB T1A 8R1

Dear Susan Wall,

The design submission, tracking number 2011-05073, originally received on August 11, 2011 was surveyed and accepted for registration as follows:

CRN : 0H11718.2
Reg Type : New Design
Drawing No. : 34000-REG-1 Rev 0
Fitting Desc:

Accepted on: September 12, 2011
Expiry Date: September 12, 2021

Description	MAWP	Design Temperature	MDMT
Internal Pressure	6205 kPa	288°C	-45°C

The registration is conditional on your compliance with the following notes:

This registration is valid until the indicated expiry date only if the Manufacturer maintains a valid quality management system approved by an acceptable third-party agency until that date. Should the approval of the quality management system lapse before the expiry date indicated above, this registration shall become void.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.
Enclosed are stamped prints for your reference.

Sincerely,

GRYNCHUK, MILLA
Design Survey Engineer

ALBERTA MUNICIPAL AFFAIRS

ABSA, the pressure equipment safety authority
9410 – 20th Avenue
Edmonton, AB T6N 0A4

MANUFACTURER'S DATA REPORT FOR MINIATURE PRESSURE VESSEL

DÉCLARATION DE CONFORMITÉ DU CONSTRUCTEUR D'APPAREILS SOUS PRESSION

Upon shipment of a pressure vessel, this form fully and correctly filled in must be mailed to the office of the Chief Inspector in the province of installation in accordance with the regulations under the Act, governing the construction and installation of pressure vessels.

Au moment de l'expédition d'un appareil sous pression, ce formulaire complété correctement, doit être envoye au bureau de l'inspecteur en chef de la province d'installation tel que prévu dans les règlements de la loi sur les appareils sous pression.

Manufactured by *Construit par*	Name and address of Manufacturer/ *Nom et adresse du constructeur* **Bromley Mechanical Services Inc., A Division Of Argo Sales Ltd., 925-23 Street SW Medicine Hat, Alberta T1A 8R1, CANADA**
Manufactured for *Construit pour*	Name and address of Purchaser or Consignee/ *Nom et adresse du client ou de son représentant* **Husky Oil Operations Ltd., Box 4490, Station "D", Calgary, Alberta T2P 3G7**
Ultimate owner *Utilisateur*	Name and address/ *Nom et adresse* **Husky Oil Operations Ltd., Box 4490, Station "D", Calgary, Alberta T2P 3G7**
Location of installation *Lieu d'installation*	Name and address/ *Nom et adresse* **LSD: 10-04-050-24 W3M** ~~V-908~~ V-108 lc 9/12/11

Pressure vessel/ *Appareil*

Type/ *Genre*	Overall Length/*Longeur totale*	Serial No./ *N° de série*	Year built/Année de fabrication
Float Cage	**22 1/4" s/s**	**3508**	**2011**
Provincial Registration No. – C.R.N./N° d'enregistrement provincial - N.E.C. OH 11718.2 lc 9/12/11			Drawing No./ *N° de dessin* **34000-REG-1 Rev.0**

The chemical and physical properties of all parts meet the requirements of material specifications of the A.S.M.E. Code.
Les propriétés chimiques et physiques de toutes les composantes respectent les exigences des spécifications de matériaux de code ASME.

The design, construction and workmanship conform to CSA B51. *La conception, la construction et la façon sont conformes à ACNOR B51.*	ASME	Division	Addenda/*Supplément*	Code case No. *N ° de cas*
	Section VIII	1	**2010**	**n/a**

Manufacturer's partial data reports properly identified and signed by authorized inspectors have been furnished for the following items of the report, and attached to this report:
rapports partiels du constructeur adqéuatement identifiés et signés par les inspecteurs authorisés ont été produits pour les items suivants du rapport, et attachés à ce rapport:

Names of parts/ *Nom de la composante*	Item No./ *N□ d'item*	Manufacturer's Name/ *Nom du constructeur*	Identifying Stamp/ *Estampe d'identification*

Shell/ *Virole*

Description	Material *Matériau*	Thickness *Épaisseur*	Corr. Allow. *Surépais. de corr.*	Diameter *Diamètre*	Longitudinal Joints *Joints longitudinaux*			P.W.H.T. *Traitement therm*		Girth Joints *Joints de circonférence*		Number of courses *Nombre de sections*
					Type	R.T. *Radiog.*	Efficiency *Efficacité*	Temp.	Time *Durée*	Type	R.T. *Radiog.*	
Shell	**SA333GR6**	**0.337"**	**0.125"**	**4" NPS**	--------	**SMLS**	**85%**	--------	--------	**1**	**NIL**	**1**

Heads/ *Tetes*

Description	Material *Matériau*	Min. Thickn. *Épals minim.*	Corr. Allow *Surép. Corr.*	Crown. Radius *Rayon couron.*	Knuckle Radius *Petit rayon*	Ellipse Ratio *Rapp. ellipse*	Conical Apex Angle *Angle conique*	Hemisph. Radius *Ray. Hémisph*	Flat Diameter *Diam.plat*	Side to pressure *Côte sous pression*
Head	SA420WPL6	**0.337"**	**0.125"**	--------	--------	**WELD CAP**	--------	--------	--------	**Concave**

Removable bolts used (describe other fastenings) *Boulons amovible utilisés (décrire tout autre attache)*	Mat'l Spec./ *Spéc. du mat.*	Grade	Size/ *Dimension*

Pressure - Temperature/ *Pression - température*

Pressure Vessel Part *Partie de l'appareil*	Constructed for max. allowable working pressure *Construit pour une pression maximale de marche permise*	At max. temp. *A une temp. max.*	Minimum design metal temp. *Temp. min.*	Test pressure (hydro-pneumatic or combination) *Pression d'épreuvre (hydro-pneumatique ou combinaison)*
ssel	**900psi** **6206 kpa**	**550°F** **54°C**	**-50°F** **-49°C**	**1170 psi** **8067 kpa**

Tube Section/ *Faisceau tubulaire*

Tubesheet/ *Plaque tubulaire*	Material/ *Matériau*	Diameter/ *Diametre*	Nominal Thickness *Epaisseur nominate*	Corr. Allow. *Surépais. corrosion*	Attachment *Mode d'attachement*
Tube material/ *Materiau des tubes*	Diameter/ *Diamètre*	Nominal Thickness (gauge) *Épaisseur nominale (calibre)*	Number/ *Nbre*	Type (Straight or U) *Type (Droit ou U)*	Heating Surface *Surface de chauffe*

Jacket/ *Chemise*

Type of jacket/ *Genre de chemise*	Jacket closure *Fermeture de chemise*	Proof Test *Pression d'épreuve*	Heating Surface *Surface de chauffe*	Sketch/ *Schéma*

Safety Valve Outlets/ *Soupapes de sûreté*

Number/ *Nombre*	Dimension	Location/ *Endroit*

Nozzles and Openings/ *Tubulures et ouvertures*

Purpose/ *But*	Number *Nombre*	Dimension	Type	Material *Matériau*	Nominal Thickness *Épaisseur nominale*	Reinforcement material *Matériau de renfort*	How attached *Genre d'attaches*	Location/ *Endroit*
LT	**1**	**4"**	CL600RFWN	**SA350LF2CL1**	**0.337"**	---------	**Type 1**	**Head**
Bridle	**2**	**2"**	**CL600RFWN**	**SA350LF2CL1**	**0.218"**		**Type 1**	**Shell**
Drain	**1**	**3/4"**	**TOL**	**SA350LF2CL1**	**CL3000**			**Head**

Supports/ *Supports*

Skirt/ *Jupe* Yes/ *Oui* No/ *Non*	Lugs/ Oreilles *No./ Nbre*	Legs/ Pieds *No./ Nbre*	Other/ *Autres* (Description)	Attached/ *Attaches* (Where and How/ *Méthode et endroit*)
☐ ☒	**N/A**	**0**	**N/A**	**n/a**

Remarks/ *Observations* (Cubical capacity/ Volume)

Volume = 0.207cu.ft or 0.1 cu.m
CA: 0.125"
No-Impact Testing Exempt per UCS 66(a)(b)(g)
Construction Drawing Cad. No. 34000-1 Rev. 0 BMS WO-34000

Certificate of Compliance/ *Certificat de conformité*

We certify that the statements made in this data report are correct and that the said vessel has been constructed in accordance with the Provincial Registered design below and the requirements of standard CSA B51.

Nous certifions que les données de la déclaration de conformité sont correctes et que l'appareil a été construit en accord avec l'enregistrement provincial ci-dessous et les exigences de la norme ACNOR B51.

Provincial Registered Design
Enregistrement provincial OH 11718.2 9/12/11

Manufacturer
Constructeur **Bromley Mechanical Services Inc. A Division of Argo Sales Ltd.**

Signature _____ Date Sept. 12/11
(Representative)

Signature _____ Date Sep 16/11
(Certified Individual)

BROMLEY MECHANICAL SERVICES INC.

Travel Sheet

DO NOT START CONSTRUCTION WITHOUT AI REVIEW TRAVEL SHEET REVISION NO.:

AI REVIEW: N/A. Husky Oil Operations REVIEW DATE:

SERIAL NO.: 3508 JOB/WO NO.: 34000 VESSEL TYPE: 4'-0" x 22'-4" x 300 PSI Float Cage

DRAWING/CAD NO.: 34000-1 DWG/CAD REVISION NO: 0 TRAVEL SHEET INITIATION BY:

Seq.	Item	Comments	Q.C.I.	Date	A.I. Hold Points	A.I.	Date	Owner	Date
1.	Calculations in File	Apply PS		9/12/11	*				
2.	Release of App'd Dwg.			8/24/11					
3.	Heat Numbers Recorded		AUG 30 2011		*				
4.	Material Examination		AUG 30 2011						
5.	MTRs Checked		AUG 30 2011		*				
6.	WPS(s) Checked			8/24/11	*				
7.	Welder(s) Qualified		AUG 30 2011		*				
8.	Thicknesses Verified & Recorded		AUG 30 2011						
9	Shell(s) & Head(s) Fit-up Inspection		AUG 30 2011						
10.	Nozzles & Fittings Fit-up Inspection		AUG 30 2011						
11.	Nozzle Orientation		AUG 30 2011						
12.	Nozzle & Flange Rating Checked		AUG 30 2011						
13.	Impact Tests		Exempt.						
14.	Internals Checked		AUG 30 2011						
15.	Final Internal Inspection	Shell Side / Tube Side	AUG 30 2011		**				
16.	Weld Size Checked		AUG 30 2011						
17.	Welder I.D. Checked		AUG 30 2011		*				
18.	Final External Inspection		AUG 30 2011		*				
19.	Radiography All Butt welds	RT-1	AUG 30 2011		*				
20.	Other N.D.E.								
21.	Final Ext. Prior to P.W.H.T.	N/C	—		**				
22.	PWHT Chart Checked	N/A	—		*				
23.	Hydrostatic Test 1170 PSIG	Shell Side Gauge # / Tube Side Gauge #		8/30/11	**				
24.	CRN Drawing Apply.	CRN# OH 11718.2		9/12/11	*				
25.	N.C.R. #								
26.	Nameplate Stamping			9/12/11	*				
27.	Manuf. Data Report Completed & Verified			9/12/11	**				
28.	Nameplate Installation			9/12/11					

The Authorized Inspector shall be presented with the Travel Sheet prior to construction so that he can designate addition inspection points and/or Hold Points. Any revisions shall be marked with a delta symbol with revision number and described at th bottom of this page.

** Denotes an A.I. Inspection Point* *** Denotes an A.I. Hold Point*

Z:\BMSDOCS\travel sheet.doc

MATERIAL THICKNESS VERIFICATION AND IDENTIFICATION				WPS / WELD I.D. / WELDER SYMBOLS / FIT-UP					
Description	Thickness	Material Spec. & Grade	Heat & Slab Number or I.D. Number	WPS	Weld I.D.	Welder Symbol	Fit-Up Exam.	Verify Type 1 Joint	ABSA COMMENT/INSPECTION
Shell #1	0.337"	SA333Gr6	VB27098	~~Bm11~~	L-				
Shell #2				~~7Hom~~	L-				
Shell #3	↓ 4" SCH 80 ↓	SA420WPL6	↓		L-				
Head #1			~~VSE~~ 06291	Bm11 Bm7Hom	C-1	KU	f	26 AUG	
Head #2					C-2	KU	f	—	
					C-3	KU	f	—	
					C-4	KU	f	—	

ATTACHMENT AND / OR NOZZLE MATERIAL THICKNESS VERIFICATION AND IDENTIFICATION						WELDER ID / WPS & ABSA INSPECTIONS			
Mark	Mat. I.D.	Neck	Fitting	Flange	Repad or Attachment	Cat. B	Cat. D	WPS	ABSA COMMENT/ INSPECTION
N1 4" LT RFWN	Spec.-Grd.			SA350LF2CL1		KU	~~KU~~	AS ABOVE	
	Thk./Rating			4" 600 SCH 80					
	Heat# or ID			82004					
N2A B BRIDLE LFWN	Spec.-Grd.		SA420WPL6	SA350LF2CL1		KU	~~KU~~	Bm11 Bm7Hom	
	Thk./Rating		4"x2" SCH 80	2" 600 SCH 80					
	Heat# or ID		0YS46	H621S-9-20					
C1 3/4" TOL DRAIN	Spec.-Grd.		SA350LF2CL1				KU	Bm12ow	
	Thk./Rating		3/4"x3m TOL						
	Heat# or ID		56593						
	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								
	Spec.-Grd.								
	Thk./Rating								
	Heat# or ID								

Used for recording miscellaneous information (Skirt/ Lift Lug Heat numbers, Another shell etc…)

Designation	Material	Heat Number	WPS	Remarks

Shells & Heads			Final		
Task	Name/Welder symbol	Date	Task	Name/Welder symbol	Date
Layout / Checked by			Weld ID/ Material code/ Vessel Serial number stamped	KU	AUG 30 2011
Shell cut by			Vessel completed by	KU	AUG 30 2011
Internals by			Final Quality Control check	FMC	

CERTIFIED BY: **BROMLEY MECHANICAL SERVICES INC.**
A DIVISION OF ARGO SALES LTD.

Medicine Hat, Alberta
(800) 215 - 9806
(403) 526 - 3142

W
RT 1

M.A.W.P.	900	PSI	AT	550	°F
M.D.M.T.	-40	°F	AT	900	PSI
M.A.E.W.P.	0	PSI	AT	550	°F

MFR'S SER. NO. 3508 YR. BUILT 2011

VESSEL TYPE FLOAT CAGE

TAG HUSKY OIL

M.A.W.P.	6206	KPA	AT	288	°C
SHELL NOM.	0.337	MATERIAL		SA333G6	
HEAD NOM.	0.337	MATERIAL		SA 350LF2	
C.A.	0.125	CRN		OH11718.2	

ALL TEST INTERNATIONAL

PHONE 1-800-442-8721

RADIOGRAPHIC REPORT

104670

CLIENT: Bremley Mechanical
P.O. NO. 75690
AFE NO.
JOB NO. 6955 PAGE 1 OF 1
SUBSISTENCE BREAKFAST ☐ LUNCH ☐ DINNER ☐ ROOM ☐ LATE MEAL ☐ 1 - DAY ☐

LOCATION: Husky
FILM BOX
PROJECT: WO # 34000
DATE: Aug 27 2011
CONSTRUCTION CONTRACTOR: BMS

TIME AND TRAVEL	IN	OUT	IN	OUT	HOURS	KILOMETERS
	8:00	9:00			1.0	—

TECHNIQUE No. RT-84 TYPE OF MATERIAL CS
☑ ISOTOPE Ir 192 MAX. SIZE 2.7 x 2.5 mm ☐ X-RAY MAX. KV ____ No. OF FILM PER CASSETTE 1
LEAD SCREENS FRONT 0.010 BACK 0.010 FILM DENSITY 2.5
WT - WALL THICK WS - WELDER SYMBOL EX - No. OF EXPOSURES
SO - MIN. SOURCE TO OBJECT DISTANCE (C=Contact)
SSF - MAX. DISTANCE FROM SOURCE SIDE OF OBJECT TO FILM

WELD DEFECT
IUC - INTERNAL UNDERCUT
EUC - EXTERNAL UNDERCUT
IC - INTERNAL CONCAVITY
IP - INCOMPLETE PENETRATION
LF - LACK OF FUSION
BT - BURN THROUGH
POR - POROSITY
HB - HOLLOW BEAD
HL - HIGH LOW
AB - ARC BURN
LC - LOW COVER
EP - EXCESSIVE PENETRATION
C - CRACK
S - SLAG
CR - CONCAVE ROOT
1. Slight
2. Medium
3. Reject

WELD NO.		SIZE	WT	WS	EX	SO	SSF	FILM	WELD OK	IUC	EUC	IC	IP	LF	BT	POR	HB	HL	AB	LC	EP	C	S	CR	DEFECT LOCATION & COMMENTS	WELD REJ.
	1																									
	2																									
	3																									
	4			Float Cage																						
	5																									
X1	6	4"	XH	KH	3	E	5"	84	✓																	
X2	7	↓	↓	↓					✓																	
X3	8	↓	↓	↓					✓																	
X4	9	↓	↓	↓					✓																	
X5	10	2"	XH	KH	3	E	3"	84	✓																	
X6	11	↓	↓	↓					✓																	
	12																									
	13																									
	14																									
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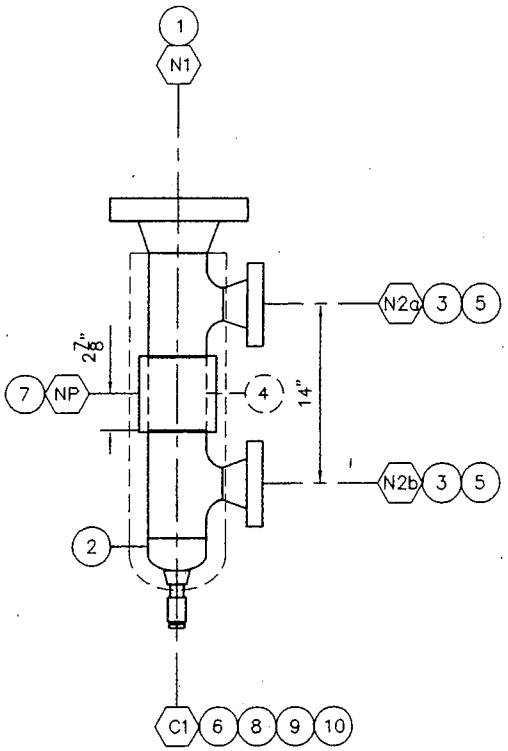
	31																									
	32											SNT # AT 5335 Level 2 RT, MT, PT														

AUTHORIZED BY: CLIENT: [signature] 29 Aug 2011
INSPECTION FIRM:
WELDING CODE: UW51
INTERPRETED BY: [signature]
ASSISTANT: Jessie Marshall

KEVIN HAYWARD
CGSB #5335
LEVEL II RT MT PT

COPY DESIGNATION: WHITE & PINK - CUSTOMER * GREEN & CANARY - OFFICE * GOLD - FILM ENVELOPE



ELEVATION

BROMLEY
MECHANICAL SERVICES INC.

MATERIAL REPORT

DATE: Sept 12/11

CUST: Husky Oil Operations

CHECKED:

SERIAL NO : 3508

SIZE : 4" x 22 ¼" s/s

PRESSURE: 900 psi

W.O.: 34000-1

CRN OH 11718.2

DRAWING NO.: 34000-REG-1 Rev.0

CAD NO; 34000-1 Rev.0

ITEM	DESCRIPTION	HEAT NUMBER	PLATE IDENTIFIER	MATERIAL	MIN.THK.
1	RFWN 4" 600 ANSI SCH.80	82004		SA350LF2CL1	0.337"
2	WELD CAP, 4" SCH.80	C6291		SA420WPL6	
3	WELD REDUCING TEE, 4" X 2" SCH.80	04546		SA420WPL6	0.337"
4	PIPE, 4" SCH.80 (0.337") X 5 ¾" LONG	VS27098.		SA333GR6	0.337"
5	RFWN, 2" 600 ANSI SCH.80	H6215.		SA350LF2CL1	0.218"
6	TOL ¾" 3M X 5 – 3"	56593.		SA350LF2CL1	3M
7	T-BRACKET NAME PLATE HOLDER, ¼" & VESSEL ID PLATE ALUM			SA36/ALUM	
8	TBE PIPE NIPPLE, ¾" X 2" S160			SA333GR6	0.344"
9	FULL CPLG, ¾" 3M			SA350LF2CL1	3M
10	FS HEX PLUG, 3/4" 6M			SA350LF2CL1	6M
11					
12					
13					

34000

SAN ENG STEEL FORGING CO LTD
311, Jen Hsin Road, Jen Wu District
Kaohsiung, Taiwan, R.O.C.
TEL:07-3724249 ; FAX:07-3712923
URL: www.sanang.com.tw
e-mail: sanang@kats.seed.net.tw

MILL TEST CERTIFICATE

EN10204-3.1.B(DIN50049/3.1.B)

Customer: W.F.F.FITTINGS & FLANGES (CANADA) LTD.

Order No.: D0001180/S7590778/5

Certificate No.: SE100934
Date: 05/03/2011
Page: 1 OF 1

PRODUCT	MATERIAL SPECIFICATIONS	DIMENSIONAL SPECIFICATIONS
FORGED CARBON STEEL FLANGES	ASTM A350 LF2-10/ASME SA350 LF2-10	ASME B16.5-09 CSA Z245.12

Item No.	CODE NO	DESCRIPTION	QUANTITY	CHEMICAL COMPOSITION (%) C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Nb	N			CE(*3)
		Min		-	0.150	0.600	-	-	-	-	-	-	-	-	-			
		Max		0.300	0.300	1.350	0.035	0.040	0.400	0.300	0.400	0.120	0.080	0.080	-			
1		150 WNRF STD 10" LF2	15 PCE	0.205	0.280	1.090	0.010	0.018	0.008	0.064	0.052	0.005	0.033	0.005	0.003			0.404
2		150 WNRF STD 4" LF2	135 PCE	0.200	0.220	1.100	0.012	0.004	0.150	0.080	0.060	0.012	0.009	0.001	0.011			0.416
3	→	600 WNRF XS 4" LF2	384 PCE	0.200	0.220	1.100	0.012	0.004	0.150	0.080	0.080	0.012	0.009	0.001	0.011			0.416
4		1500 WNRTJ S160 2" LF2	75 PCE	0.200	0.210	1.110	0.012	0.003	0.100	0.060	0.050	0.011	0.010	0.001	0.008			0.409
5		1500 WNRF S160 2" LF2	75 PCE	0.200	0.210	1.110	0.012	0.003	0.100	0.060	0.050	0.011	0.010	0.001	0.008			0.409

Item No.	Heat No.	T.S.(*1) (MPA)	Y.S.(*1) (MPA)	E.L.(*1) (%)	Hardness (HB)	R.A.(*1) (%)	Impact Test Temp: -46°C Minimum: 20.0 Joule 1	2	3	Material Supplier	HEAT TREATMENT(*2)
	Min	485.0	250.0	22.0	-	30.0					☒ N
	Max	655.0	-	-	197	-					REMARKS
1	25496	517.8	352.1	36.8	151	69.6	38.0	45.0	46.0	NTMX	650°CX3HRS
2	82004	531.5	387.4	32.8	155	70.4	89.0	88.0	64.0	WEI CHIH STEEL	CONFORMS WITH NACE MR0103-07 AND NACE MR0175/ISO15156.2-03
3	82004	531.5	387.4	32.8	155	70.4	89.0	88.0	64.0	WEI CHIH STEEL	CONFORMS WITH Z245.12 CAT II GR.248 SOUR SERVICE-08
4	80400	531.5	377.6	35.6	154	71.3	121.0	97.0	107.0	WEI CHIH STEEL	TEST SPECIMEN SIZE: 10X10
5	80400	531.5	377.6	35.6	154	71.3	121.0	97.0	107.0	WEI CHIH STEEL	TEST SPECIMEN ORIENTATION: TRANSVERSE
											IMPACT TEST TEMP.: -46°C

*1: T.S. = Tensile Strength, Y.S.=Yield Strength, E.L.=Elongation, R.A.=Reduction of Area.

*2: N=Normalized, A=Annealed, Q=Quenched, T=Tempered, S.T=Solution Treated, S.R=Stress Relieved, A.C=Air Cooled, F.C=Furance Cooled, W.C=Water Cooled, O.C=Oil Cooled.

*3: C.E. Value = C + (Mn /6) + (Cr + Mo +V) / 5 + (Ni + Cu) / 15

SAN ENG STEEL FORGING CO., LTD. ★ H.C.J ★ QUALITY ASSURANCE DEPT'

We hereby certify that the material has been tested in accordance with the above specification and also with the requirements called for by the above order.

Manager of Quality Assurance Dept

BROMLEY MECHANICAL SERVICES

MATERIAL INSPECTION REPORT

DIA SIZE OR WITH: 4"

☐ NPS ■ OD ☐ ID

INSPECTED BY: MICHAEL QUINN

GRADE: SA 420WPL6

DATE: AUGUST 12/2011

HEADS ☐ 2:1
☐ HEMI
■ WELD CAP
☐ OTHER

LENGTH

THICKNESS 80

P.O.# PO-75689

PIPE PUBLISHED NOM

PLATE NOM

SUPPLIER: MIDFIELD SUPPLY LTD

SHELL ☐
PIPE ☐ → NDE BY MANUFACTURER
PLATE ☐
REPAD ☐
STRUCT. ☐
OTHER ☐

HYDRO		NDE	
YES		NO	☐
NO		YES	☐
NO		NO	☐
YES		YES	☐

PART ID#: SFW 40379

REQ. MIN TK:

Weight per foot for pipe over 4"

MATERIAL TRACKING NUMBER	QTY	HEAT NUMBERS		MIN. THK.	THICKNESS & LOG				VISUAL EDGE	INSP. SURF.	REQ. MARKINGS VERIFIED	PREPARED BY
		HEAT NUMBER	PLATE NUMBER		A	B	C	D				
	1	06291		0.374	0.421"	0.374"	0.357"	0.352"	ok	ok	ok	MQ
"												

W/O# WO-34000

RECEIVED & ACCEPTED BY:

D CODE MARKINGS:

CUSTOMER: HUSKY

DATE: AUG 18 2011

AWAJI MATERIA CO LTD-MADE IN THAILAND

ALL MARKING STAMPED INTO WELD CAPS

34000

Awaji ASK

INSPECTION CERTIFICATE

EN 10204 3.1 : 2004

AWAJI MATERIA (THAILAND) CO.,LTD.

81,MOO4, PRAKASA ROAD, TAMBOL BANGMUANG, AMPHUR MUANG
SAMUTPRAKARN THAILAND 10270. Tel : (662)701-5226

Date : JUNE 6, 2011

Purchaser : THE BROADHEAD GROUP/MCJUNKIN CANADA

MADE FROM SEAMLESS STEEL PIPE

Certificate No. : T11-6311

Order No.	Job No.	Product	Raw Material Pipe Maker
WPL6/CS759-094881/3	-	CARBON STEEL BUTT WELDING FITTINGS	SUMITOMO METAL INDUSTRIES, LTD.
Inspection Standard	Material Standard		Pipe Charge No. : J8L5267
ASME B16.9(07), ASME B16.25(07) ASTM A960(08a) NACE MR-0175/ ISO 15156(09) MR-0103(07)	ASTM A234(10b) WPB ASME SA234(10) WPB except nuclear usage CSA Z245.11-09, GR.241 CAT.I	Visual: GOOD Dimension: GOOD	*3 UT Inspection: - Magnetic Particle Test: -

Manufacturing No. (Heat Code)	Product code	Material	Article & Size	Quantity	Note.
06291	-	WPB	XS CAP 4"	35 Pcs.	

Specification	Chemical Composition (%)																	*1 Mechanical Test			Hardness	Impact Test
	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti	B	Ca	N	Al	C.E.	Y.S.	T.S.	E		
Min.	X100	X100	X100	X1000	X1000	X100	X100	X100	X100	X100	X100	X100	X10000	X10000	x1000	X1000	X100	MPa		%	HB	J
Max.	-	15	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	240	415	30	-	(-45°C)
Pipe Charge No.	30	40	135	35	40	40	40	30	12	8	2	-	-	-	-	-	-	-	655	-	197	*2 5
J8L5267	12	25	127	12	4	2	2	11	0	0	0	2	1	2	3	31	36	334	473	43.5	153	*3 E 120.77 E 123.28 E 129.45 A 124.50

$$C.E. = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15}$$

*1 Y.S.= Yield Strength, T.S. = Tensile Strength, E = Elongation.

*4 UT = Ultrasonic thickness inspection.

Nocing weld repair is applied to products.

Impact Test

*2 Size of Specimen	A	E	*3
F. 10.0 by 10.0	17.6	13.6	E = Each Test
7. 10.0 by 7.5	13.6	10.8	A = Average Value
5. 10.0 by 5.0	9.5	7.0	
2. 10.0 by 2.5	5.4	4.1	

ISO 9001: 2008 Manufacturing Company
Certified by BV, Certificate No. A-TH10000101

PED 97/23/EC.Annex 1. Par.4.3
: Certified by BVQI.
Certificate No. IND 08-083/003 REV.0

ELBOW . TEE . REDUCER & CAP / Normalizing : 910°C

AT-24(2)14

"We hereby certify that the material described herein has been duly inspected and conforms to the standard as specified above.

BROMLEY MECHANICAL SERVICES INC.
Checked to ASME ~~Div. 1~~

Surveyor to
Sect. IIA 2010 Edd. Add. mm 0.374"
SA 530 Date Aug 10/11

Chief of Inspection Section S. MAEKAWA

34000

INSPECTION CERTIFICATE

AWAJI MATERIA (THAILAND) CO.,LTD.

81,MOO4, PRAKASA ROAD, TAMBOL BANGMUANG, AMPHUR MUANG
SAMUTPRAKARN THAILAND 10270. Tel : (662)701-5226

Date : MARCH 30, 2011

Purchaser : THE BROADHEAD GROUP/MCJUNKIN CANADA

MADE FROM SEAMLESS STEEL PIPE

Certificate No. : T11-31876

Order No.	Job No.	Product	Raw Material Pipe Maker
WPL6/CS759-085084/4	-	CARBON STEEL BUTT WELDING FITTINGS	SUMITOMO METAL INDUSTRIES, LTD.

Inspection Standard	Material Standard						*4
ASME B16.9-07 ASTM A960-08a NACE MR-0175-03, MR-0103-05	ASTM A420-07 WPL6 ASME SA420-07 WPL6 except nuclear usage CSA Z245.11-09 GR.241 CAT.II	Appearance	GOOD	Dimension	GOOD		M.T. GOOD

Manufacturing No.	Product code	Material	Article & Size	Quantity	Note.
0Y546		WPL6	XS REDUCING TEE 4" x 2"	50 Pcs.	"ALL FITTING MANUFACTURED BY AWAJI MATERIA (THAILAND) CO.,LTD. ARE PRODUCED FROM A333 GR.6 SEAMLESS PIPE"

	Chemical Composition (%)																	*1 Mechanical Test			Hardness	Impact Test
Specification	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti	B	Ca	N	Al	C.E.	Y.S.	T.S.	E		
Min.	X100	X100	X100	X1000	X1000	X100	X100	X100	X100	X100	X100	X100	X10000	X10000	X1000	X1000	X100	MPa		%	HB	J
Max.	-	15	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	240	415	25.5	-	(-45°C)
Pipe Charge No.	30	40	135	35	40	40	40	30	12	8	2	-	-	-	-	-	-	-	655	-		*2 7
J0L5381	12	24	130	14	3	1	2	12	1	0	0	1	2	12	4	28	36	333	473	39.8	149	*3 E 302.79 E 300.84 E 298.88 A 300.84

Inspection Certificate : ACCORDING TO EN 10204, 3.1 : 2004

$$C.E. = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15}$$

*1 Y.S.= Yield Strength, T.S. = Tensile Strength, E = Elongation,

*4 UT = Ultrasonic thickness inspection,

Impact Test

*2 Size of Specimen	A	E
F. 10.0 by 10.0	17.6	13.6
7. 10.0 by 7.5	13.6	10.8
6. 10.0 by 6.67	12.0	9.0
5. 10.0 by 5.0	9.5	7.0
3. 10.0 by 3.33	7.0	4.1
2. 10.0 by 2.5	5.4	4.1

*3 E = Each Tes
A = Average Value

ISO 9001: 2008 Manufacturing Company
Certified by BV, Certificate No. TH10000101

ELBOW , TEE , REDUCER & CAP / Normalizing : 900°C

AT-24(2)12

"We hereby certify that the material described herein has been duly inspected and conforms to the standard as specified above.

Surveyor to

Chief of Inspection Section S. Maekawa

BROMLEY MECHANICAL SERVICES INC.

MATERIAL INSPECTION REPORT

INSPECTED BY: Michael Quinn

DATE: July 9/2008

PO #: 69890

SUPPLIER: Midfield Supply

PART ID #: SPI S1297

REQ. MIN THK:

GRADE: SA 333 Gr 6

DIA SIZE OR WIDTH: 4"

☒ NPS ☐ OD ☐ ID

HEADS ☐ 2:1 ☐ HEMI ☐ WELD CAP ☐ OTHER

SHELL ☐

PIPE ☒

PLATE ☐

REPAD ☐

STRUCT. ☐

OTHER ☐

LENGTH 20'

THICKNESS SCH 80

PIPE PUBLISHED NOM 0.337

PLATE NOM

MATERIAL TRACKING NUMBER	QTY	HEAT NUMBERS		MIN. THK.	THICKNESS & LOG				VISUAL EDGE	INSP. SURF.	REQ. MARKINGS VERIFIED	PREP. BY
		HEAT NUMBER	PLATE NUMBER		A	B	C	D				
VS 27048	40'	0723144V		0.345"	.345	.348	.352	.348	ok	ok	ok	MM

W/O#

CUSTOMER: Stock

RECEIVED & ACCEPTED BY:

DATE: JUL 14 2008

REQUIRED CODE MARKINGS:

Hengyang Valin Steel Tube Co Ltd

OMC Meter #1

NOV 13 2009

April 25/11

Contract No. [illegible] **59A721**
L/C NO.DC HCV720046
Name of Customer: IMEX CANADA INC.

HENGYANG VALIN STEEL TUBE CO., LTD

INSPECTION AND TEST CERTIFICATE

Add: 10 Dalixincun, Hengyang City, Hunan, China
Tel and Fax: +86 734 8873739 8872942
Cable: 6993
P.C. 421001

DESCRIPTION: SEAMLESS STEEL PIPE
TOTAL: 571PIECES, 38BUNDLES, 73.797MT

Date: JUL 16, 2007
Page: 6/6

CERTIFICATE NO: 07-02-0709

SPEC: ASTM A333-1999, ASME SA333-2004, GR 6 NACE MR-0175-1999

NO.	BATCH NO.	HEAT NO.	STEEL GRADE	SIZE	BUNDLES	PIECES	FEET	THEORETICAL WEIGHT (MT)
35	976401822	0723158V	SA-333Gr6	4" S40 SRL BE	11	243	4860	23.784
36	976201411	0711927V	SA-333Gr6	4" S80 SRL BE	3	40	800	5.435
36	976201412	0723142V	SA-333Gr6	4" S80 SRL BE	5	73	1460	9.919
36	976201413	0723145V	SA-333Gr6	4" S80 SRL BE	3	34	680	4.62
36	[illegible]	0723144V	SA-333Gr6	4" S80 SRL BE	8	118	2360	16.033
37	876400373	0723151V	SA-333Gr6	4" S160 SRL BE	5	38	760	7.76
38	876400370	0723151V	SA-333Gr6	4" XXH SRL BE	3	25	1000	6.246

NO.	DELIVERY CONDITION	NONDESTRUCTIVE TEST EDDY CURRENT TEST	Heat/Products	C	SI	MN	P	S	CU	NI	CR	MO	V
				CHEMICAL ANALYSIS %									
35	HOT-ROLLED	OK	Products	0.12	0.3	1.07	0.016	0.007	0.09	0.03	0.01	0.02	0.01
			Heat	0.07	0.27	1.04	0.013	0.008	0.1	0.04	0.03	0.03	0.01
36	HOT-ROLLED	OK	Products	0.11	0.25	1.01	0.01	0.005	0.07	0.03	0.02	0.01	0.01
			Heat	0.08	0.35	1.08	0.015	0.007	0.09	0.03	0.03	0.03	0.01
36	HOT-ROLLED	OK	Products	0.11	0.27	1.06	0.014	0.006	0.09	0.03	0.02	0.02	0.01
			Heat	0.11	0.29	1.05	0.013	0.006	0.09	0.04	0.02	0.02	0.01
36	HOT-ROLLED	OK	Products	0.1	0.32	1.06	0.015	0.006	0.09	0.03	0.03	0.02	0.01
			Heat	0.11	0.33	1.06	0.016	0.006	0.08	0.03	0.01	0.01	0.01
36	HOT-ROLLED	OK	Products	0.11	0.3	1.03	0.013	0.005	0.07	0.03	0.02	0.01	0.01
			Heat	0.12	0.25	1.05	0.015	0.009	0.08	0.03	0.02	0.02	0.01
37	HOT-ROLLED	OK	Products	0.07	0.25	1.09	0.017	0.007	0.08	0.03	0.04	0.03	0.01
			Heat	0.07	0.26	1.08	0.017	0.007	0.09	0.03	0.05	0.03	0.01
38	HOT-ROLLED	OK	Products	0.07	0.25	1.09	0.018	0.007	0.09	0.03	0.05	0.03	0.01
			Heat	0.07	0.26	1.08	0.017	0.007	0.09	0.03	0.05	0.03	0.01

NO.	σb (PSI) TENSILE STRENGTH		σs (PSI) YIELD STRENGTH		δ (%) ELONGATION	IMPACT TEST Temp(℃)	Dime(mm)	AKV (J)	Orientation	HARDNESS	HYDRO. TEST(PSI)	FLATTEN TEST	HEAT TREATMENT
35	71775	71050	54375	54375	39.0/39.5	-45	10*5*55	96/99/100 (98)	L	HRC 2.5	2250	OK	
36	63800	64525	42775	42050	47.0/42.5	-45	10*7.5*55	147/141/142 (143)	L	HRC 3.5	3150	OK	
36	63075	64525	44225	44950	47.5/45.0	-45	10*7.5*55	132/135/130 (132)	L	HRC 3.5	3150	OK	
36	62350	63075	41325	42050	51.0/48.0	-45	10*7.5*55	138/137/136 (137)	L	HRC 3	3150	OK	
36	63800	62350	42775	40600	47.0/46.5	-45	10*7.5*55	148/145/141 (145)	L	HRC 4	3150	OK	
37	69600	66700	44950	44950	36.0/37.0	-45	10*10*55	145/148/145 (146)	L	HRC 2	4950	OK	normalized 910 ℃
38	61625	61625	42050	42775	42.5/46.0	-45	10*10*55	145/147/148 (147)	L	HRC 2.5	6300	OK	

REMARKS: 1. We hereby certify that the material has been manufactured, sampled, tested and inspected in accordance with the required standards.

2. Properties compliance to EN 10204 3.1B.
3. BRINELL /Rockwell hardness certified to NACE MR-0175-99.
4. SPECIMEN SIZE: (Pipe end, Longitudinal, Gauge Length=2")
   A. For pipes ≤1" full length specimen were used;
   B. For pipes > 1" longitudinal strip specimen were used; the width of the gauge length portion is 3/4"
5. Origin: Made in China

QUALITY MANAGER

BROMLEY MECHANICAL SERVICES INC.
Checked to ASME Div 1 11/13/09.
Sect. IIA 2010 Edd. 08 Add. MIN 0.345"
4 1/2"
SA530
JUL 14 2008
Date
US27048

34000

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa: 23824 DERVIO (LC) - Via Enrico Fermi, 46
C.C.I.A.A. Lecco n.00205990138 - R.E.A.78815 - C.F. e P.IVA IT00205990138
Stabilimento - Uffici Amministrativi / Workshop - Warehouse - Offices - Mailing address
22010 GERA LARIO (CO) - Località S.Agata - Tel. 0344-97200 - Fax 0344-97210
E-mail : galperti@galperti.com - www.galperti.com

CERTIFICATO DI COLLAUDO EN 10204 TEST CERTIFICATE EN 10204	NS ORDINE / INTERNAL JOB
3.1	100980

SPETT LE / MESSRS:

GALPERTI CANADA ULC

3931 - 76 AVENUE
EDMONTON, ALBERTA, T6B 2S8 (CDN)

CERTIFICATO N.M.T CERTIFICATE N.	DATA / DATE	VS ORDINE / YOUR	DATA / DATE
013079/1	27/04/2011	27373	23/07/2010

POS / ITEM	DESCRIZIONE / DESCRIPTION	QUANTITA' QUANTITY	S/A	MATERIALE / MATERIAL	N° COLATA / PROVA HEAT N°/TEST N°	ACCIAIERIA STEEL MILL	#
120/120	2" 600 WN RF XS NALF2 B1 FSF4 NACE MR-01-75	455	S	ASTM/ASME A350 LF2 CL.1	6215-09/20	OLIFER/ACP SPA	A

ANALISI CHIMICA / CHEMICAL ANALYSIS

#		C %	MN %	SI %	P %	S %	CR %	NI %	MO %	CU %	V %	SN %	AL %	NB %	TI %	N %	CO%	B %	O %
A		0,172	1,170	0,190	0,006	0,008	0,080	0,150	0,044	0,150	0,018	0,010	0,020		0,001	0,010	0,009	0,0005	0,001
A	C	0,170	1,175	0,200	0,008	0,003	0,085	0,135	0,045	0,170	0,010	0,010	0,035	0,001	0,001	0,010	0,009	0,0001	0,001
		CA%														04%	03%	FC%	FL%
A		0,002														0,442	0,124	0,367	0,415
A	C	0,002														0,445	0,130	0,365	0,414

NOTE / NOTES

04=Copper+Nickel+Chromium+Molybd.+Vanadium CU+NI+CR+MO+V
03=Chromium + Molybdenum CR+MO
FC=Carbon Equivalent Short Formula C+(MN/6)
FL=Carbon Equivalent Long Formula C+(MN/6)+((CR+MO+V)/5)+((NI+CU)/15)

C = ANALISI DI PRODOTTO / CHECK ANALISYS

CARATTERISTICHE MECCANICHE / MECHANICAL PROPERTIES

#		TRAZIONE / TENSILE									RESILIENZA / CHARPY TEST			
		TIPO TYPE	DIAMETRO PROVETTA DIAMETER mm.	SEZIONE AREA mmq.	LUNGHEZZA LENGHT mm.	TEMP. TEMPERATURE C	ROTTURA TENSILE Mpa	SNERVAMENTO YIELD Mpa	ALL ELONG %	CONTR. REDUCT %	TIPO TYPE KV	TEMP. TEMPERATURE C	VALORI / VALUES Joule	DUREZZA HB HARDNESS (AVERAGE)
A	S		12,50	122,70	50,00	20	485	250	22,0	30,0		-50	Min. 27 Med. 27	197
A	O		12,50	122,70	50,00	20	547	334	29,5	70,0		-46	106 - 110 - 112	163

NOTE / NOTES

O = OTTENUTE / OBTAINED
S = STANDARD

#	TRATTAMENTI TERMICI / HEAT TREATMENTS
A	Normalized at 900 dgr.C for 1 h.-Cooling from 900 dgr.C in still air
A	

NOTE GENERALI / GENERAL NOTES

FINITURE / ROUGHNESS
FSF4=Ra 3,2 - Ra 6,3

STANDARD
B1 = ASME B16.5 Ed.2003

NOTE / NOTES
Flanges comply with NACE MR-01-75 / ISO 15156-2 and NACE MR-01-03 Ed.2007 and Sour Service Requirements.

MARCHIO DI FABBRICA TRADE MARK	DATA COLLAUDO INT. INT. INSPECT DATE	COLLAUDATORE INT. INT. INSPECTOR
	27/04/2011	E.SBATTELLA

ENTE UFFICIALE DI COLLAUDO
INSPECTION AUTHORITY

LLOYD'S REGISTER QUALITY ASSURANCE ISO9001

SA - 0388
18A-0097
17D-0015

Certified acc. PED 97/23/EC
By LLOYD'S Register
No LRC 160212

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa: 23824 DERVIO (LC) - Via Enrico Fermi, 48
C.C.I.A.A. Lecco n.00205990138 - R.E.A. 79815 - C.F. e P.IVA IT00205990138
Stabilimento - Uffici Amministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) - Località S.Agata - Tel. 0344-97200 - Fax 0344-97210
E-mail : galperti@galperti.com - www.galperti.com

CERTIFICATO DI COLLAUDO EN 10204
TEST CERTIFICATE EN 10204
3.1

NS.ORDINE / INTERNAL JOB
100980

SPETT LE / MESSRS
GALPERTI CANADA ULC

3931 - 76 AVENUE
EDMONTON, ALBERTA, T6B 2S8 (CDN)

Original

CERTIFICATO / M.T.CERTIFICATE N	DATA / DATE	VS.ORDINE / YOUR	DATA / DATE
013043/1	27/04/2011	27373	23/07/2010

POS / ITEM	DESCRIZIONE / DESCRIPTION	QUANTITA' QUANTITY	S/A	MATERIALE / MATERIAL	N° COLATA / PROVA HEAT N°/TEST N°	ACCIAIERIA STEEL MILL	#
120/120	2" 600 WN RF XS NALF2 B1 FSF4 NACE MR-01-75	455	S	CSA Z245.12-09 GR290 SS	6215-09/20	OLIFER/ACP SPA	A

ANALISI CHIMICA / CHEMICAL ANALYSIS

#		C %	MN %	SI %	P %	S %	CR %	NI %	MO %	CU %	V %	SN %	AL %	NB %	TI %	N %	CO%	B %	O %
A		0,172	1,170	0,190	0,006	0,008	0,080	0,150	0,044	0,150	0,018	0,010	0,020		0,001	0,010	0,009	0,0005	0,001
A	C	0,170	1,175	0,200	0,008	0,003	0,085	0,135	0,045	0,170	0,010	0,010	0,035	0,001	0,001	0,010	0,009	0,0001	0,001

#		CA%	04%	03%	FC%	FL%
A		0,002	0,442	0,124	0,367	0,415
A	C	0,002	0,445	0,130	0,365	0,414

NOTE / NOTES

04=Copper+Nickel+Chromium+Molybd.+Vanadium CU+NI+CR+MO+V
03=Chromium + Molybdenum CR+MO
FC=Carbon Equivalent Short Formula C+(MN/6)
FL=Carbon Equivalent Long Formula C+(MN/6)+((CR+MO+V)/5)+((NI+CU)/15)

C = ANALISI DI PRODOTTO / CHECK ANALISYS

CARATTERISTICHE MECCANICHE / MECHANICAL PROPERTIES

#		TRAZIONE / TENSILE									RESILIENZA / CHARPY TEST			
		TIPO TYPE	DIAMETRO PROVETTA DIAMETER mm.	SEZIONE AREA mmq.	LUNGHEZZA LENGHT mm.	TEMP. TEMPERATURE C	ROTTURA TENSILE Mpa	SNERVAMENTO YIELD Mpa	ALL. ELONG %	CONTR. REDUCT. %	TIPO TYPE KV	TEMP TEMPERATURE C	VALORI / VALUES Joule	DUREZZA HB HARDNESS (AVERAGE)
A	S		12,50	122,70	50,00	20	414	290	20,0			-50	Min. 27 Med. 27	197
A	O		12,50	122,70	50,00	20	547	334	29,5	70,0		-46	106 - 110 - 112	163

NOTE / NOTES

O = OTTENUTE / OBTAINED
S = STANDARD

#	TRATTAMENTI TERMICI / HEAT TREATMENTS
A	Normalized at 900 dgr.C for 1 h.-Cooling from 900 dgr.C in still air
A	

NOTE GENERALI / GENERAL NOTES

FINITURE / ROUGHNESS
FSF4=Ra 3,2 - Ra 6,3

STANDARD
B1 = ASME B16.5 Ed.2003

NOTE / NOTES
Flanges comply with the requirements specified for SSC Region 3 sour service in NACE MR-01-75 / ISO 15156-2 and CSA.
Material according to NACE MR-01-03 Ed.2007.

MARCHIO DI FABBRICA TRADE MARK	DATA COLLAUDO INT. INT. INSPECT DATE	COLLAUDATORE INT. INT. INSPECTOR
	27/04/2011	E.SBATTELLA

ENTE UFFICIALE DI COLLAUDO
INSPECTION AUTHORITY

LLOYD'S REGISTER QUALITY ASSURANCE ISO9001

6A-0388
16A-0097
17D-0018

Certified acc PED 97/23/EC
By LLOYD'S Register
No LRC 160212

CERTIFIED MILL TEST REPORT

(2)

The Best Value
Price, Quality, Service
All The Time.

34000

LOG NO. 339445 PAGE 1

BONNEY FORGE
P.O. BOX 330 • 14496 CROGHAN PIKE • MOUNT UNION, PA 17066-
(814) 542-2545 • (800) 345-7546 • FAX (814) 542-4906
www.bonneyforge.com

CUSTOMER: CCTF CORPORATION

Date 12/16/09

CUSTOMER'S Order No.:4887238-00

Bonney Order No000066059

SHIPPED TO: CCTF CORPORATION (EDMONTON)
5407 - 53RD AVE.

EDMONTON, ABT6B 3G2 Canada

ITEM	QUANTITY	LOT NO.	GRADE OR SPECIFICATION NO. CHEMICAL ANALYSIS, PHYSICAL PROPERTIES, REMARKS:
			SA/A350-LF2 CL 1
001	500	57441 7692060	5 -3 X 3/4 3000 LF2 THRD T C .200 MN 1.030 P .011 S .023 SI .200 NI .040 CU .160 CO .004 CR .100 MO .010 V .000 AL .026 NB .018 CE(LONG FORMULA) = 0.41 T/S 76875 Y/S 54375 EL 30.45 RA 61.55 BRINELL HARDNESS1: 141 HARDNESS2: 139 CHARPY: -50F 56.0, 64.0, 41.0 (FT/LBS) AVERAGE 53.6
002	100	57441 7690200	12 -6 X 3/4 3000 LF2 THRD T C .200 MN 1.030 P .011 S .023 SI .200 NI .040 CU .160 CO .004 CR .100 MO .010 V .000 AL .026 NB .018 CE(LONG FORMULA) = 0.41 T/S 76875 Y/S 54375 EL 30.45 RA 61.55 BRINELL HARDNESS1: 141 HARDNESS2: 139 CHARPY: -50F 56.0, 64.0, 41.0 (FT/LBS) AVERAGE 53.6
003	25	56593 7693035	36 -14 X 3/4 3000 LF2 THRD T C .200 MN 1.050 P .007 S .021 SI .220 NI .020 CU .070 CO .004 CR .030 MO .010 V .000 AL .021 NB .014 CE(LONG FORMULA) = 0.39 T/S 74000 Y/S 49400 EL 33.00 RA 67.00 BRINELL HARDNESS1: 144 HARDNESS2: 147 CHARPY: -50F 76.0, 43.0, 68.0 (FT/LBS) AVERAGE 62.3

***** CONTINUED ON NEXT PAGE *****

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 _____

Cris Boozel

CMTR: REV 1

QUALITY PROCESS MANAGER

CERTIFIED MILL TEST REPORT

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All The Time.

LOG NO. 339445 PAGE 5

BONNEY FORGE
P.O. BOX 330 • 14496 CROGHAN PIKE • MOUNT UNION, PA 1706
(814) 542-2545 • (800) 345-7546 • FAX (814) 542-4906
www.bonneyforge.com

CUSTOMER: CCTF CORPORATION

Date 12/16/09

CUSTOMER'S Order No.:4887238-00

Bonney Order No 000066059

SHIPPED TO: CCTF CORPORATION (EDMONTON)
5407 - 53RD AVE.

EDMONTON, AB T6B 3G2 Canada

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 OF THE FITTINGS SUPPLIED IS ASTM A350-LF2 BUT MEETS THE REQUIREMENTS OF ASME SA350-LF2.

3. THE CHARPY V-NOTCH IMPACT TEST WAS PERFORMED AT -50 DEGREES FAHRENHEIT IN ACCORDANCE WITH A350-LF2.

4. CERTIFYING TO ASTM A350 LF2 07 REVISION.

5. THE MATERIAL SUPPLIED WAS NORMALIZED IN ACCORDANCE WITH ASTM A350 HEAT TREATING REQUIREMENTS.

6. ELONGATION TEST RESULTS ARE OBTAINED USING STANDARD ROUND SPECIMEN, 2 INCH OR 50 MM GAGE LENGTH.

7. THE PRODUCT SUPPLIED WAS INSPECTED IN ACCORDANCE WITH EN 10204:2004 EDITION TYPE 3.1 INSPECTION DOCUMENT. (EUROPEAN STANDARD)

8. THE MATERIAL SUPPLIED MEETS THE REQUIREMENTS OF BOTH NACE MR0103-2007 AND NACE MR0175/ISO 15156.

***** END OF CERTIFICATION *****

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 check

by

Cris Boozel

CMTR: REV 1

34000

Phoenix * Capitol * Camco

Cap Products

Commanding a Higher Standard℠

Certified Mill Test Report

1/12/2011

Customer
MRC MIDFIELD
MIDFIELD SUPPLY ULC
1600, 101-6TH AVENUE SW
CALGARY, AB T2P 3P4

P.O. S 759 087131

Heat No 14982
Heat Code R4Y
Phoenix Order # 732810

Material ASTM A333 GR6 2005/ASME SA333 GR6 2007 Edition, No

Part Number
15130704LT

Description
3/4 X 2" SCH 160 SMLS NIPL A333 GR6

Chemical Properties

C	Mn	P	S	Si	Cu	Cr	Ni
0.2000	0.4700	0.0100	0.0120	0.2100	0.0800	0.0400	0.0400

C Eq. Long
0.2963

Mo	V	Co	Al	Cb	N	Pb	Sn	Ta	Ti
0.0100	0.0000								

Additional Chemical Properties

Cr + Cu + Ni
0.1600

Mechanical Properties

Tensile (PSI)	Yield (PSI)	Elong. % in 2 in.	R of A	HBW	HBW2
69,000	48,400	34.0%			

Charpy Minimum Impact - ft/lbs

Test 1	Test 2	Test 3	Average
11	11	10	10.67

* Hydro test passed. at 2500 psi.

This material meets the requirements of the governing specifications We certify that the above material has been inspected and tested in accordance with the methods prescribed in the governing specification and the results of such inspections and test conform with applicable requirements.
We further certify this material was inspected with independent inspectors conforming to the requirements of EN10204 Section 3.1B.

Comments:
Flattening test passed.
MEETS HARDNESS REQUIREMENTS OF NACE MR0175 LATEST EDITION. CONFORMS TO ASME SA106 GRADE B REQUIREMENTS.

CapProducts. Ltd.
25 Winnipeg St
Vanastra, ON N0M 1L0

34000

CERTIFIED MILL TEST REPORT

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LOG NO. F00000000013250

BONNEY FORGE CORPORATION
P.O. BOX 330 • 14496 CROGHAN PIKE • MOUNT UNION, PA 17066-0330
(814) 542-2545 • (800) 345-7546 • FAX (814) 542-4906
www.bonneyforge.com

CUSTOMER: MRC MIDFIELD

DATE 04/13/2011

CUSTOMER ORDER NO.: S759104356

BONNEY ORDER NO. B000095208

SHIP TO: MRC MIDFIELD
502-25 AVENUE
NISKU AB T9E 0K6
Canada

ITEM	QUANTITY	LOT NO.	GRADE OR SPECIFICATION NO. CHEMICAL ANALYSIS, PHYSICAL PROPERTIES, REMARKS:
34	75	4848	3/4 3000 LF2 COUP T SA/A350 LF2 CL1
18C10729			Al 0.020 C 0.200 Cb 0.000 Co 0.003 Cr 0.040 Cu 0.120 Mn 1.050 Mo 0.010 N 0.004 Nb 0.013 Ni 0.030 P 0.007 S 0.018 Si 0.200 V 0.004
			CE(Long Formula) = 0.40
			T/S(PSI) 74,375 Y/S(PSI) 49,375 EL(%) 32.20 RA(%) 64.20
			Brinell 137 BHN 135 BHN
			Charpy -50 F 25/45/50 (Ft-Lbs)
			Average 40.00
35	50	4781	1 3000 LF2 COUP T SA/A350 LF2 CL1
18C10744			Al 0.021 C 0.200 Co 0.004 Cr 0.030 Cu 0.080 Mn 1.040 Mo 0.010 N 0.004 Nb 0.014 Ni 0.020 P 0.008 S 0.019 Si 0.220 V 0.004
			CE(Long Formula) = 0.39
			T/S(PSI) 71,250 Y/S(PSI) 50,625 EL(%) 33.00 RA(%) 61.30
			Brinell 132 BHN 132 BHN
			Charpy -50 F 27/26/33 (Ft-Lbs)
			Average 28.70
38	13	4581	3 3000 LF2 COUP T SA/A350 LF2 CL1
18C10816			Al 0.027 C 0.260 Cr 0.050 Cu 0.180 Mn 0.790 Mo 0.020 Nb 0.001 Ni 0.110 P 0.008 S 0.003 Si 0.250 V 0.002
			CE(Long Formula) = 0.43
			T/S(PSI) 79,000 Y/S(PSI) 53,500 EL(%) 31.00 RA(%) 64.00
			Brinell 151 BHN 152 BHN
			Charpy -50 F 25/20/13 (Ft-Lbs)
			Average 19.30

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 Kylee Ruiz

Kylee Ruiz
QUALITY PROCESS MANAGER

CMTR: REV2

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LOG NO. F00000000013250

BONNEY FORGE CORPORATION
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(814) 542-2545 • (800) 345-7546 • FAX (814) 542-4906
www.bonneyforge.com

CUSTOMER: MRC MIDFIELD

DATE 04/13/2011

CUSTOMER ORDER NO.: S759104356

BONNEY ORDER NO. B000095208

SHIP TO: MRC MIDFIELD
502-25 AVENUE
NISKU AB T9E 0K6
Canada

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. CERTIFYING TO ASTM A350 LF2 07 REVISION.
3. THE MATERIAL OF THE FITTINGS SUPPLIED IS ASTM A350-LF2 BUT MEETS THE REQUIREMENTS OF ASME SA350-LF2.
4. THE CHARPY V-NOTCH IMPACT TEST WAS PERFORMED AT -50 DEGREES FAHRENHEIT IN ACCORDANCE WITH A350-LF2.
5. THE MATERIAL SUPPLIED AS A350 LF2 CL1 MEETS THE REQUIREMENTS OF BOTH NACE MRO103-2007 AND NACE MRO175/ISO 15156-2.
6. THE MATERIAL SUPPLIED WAS NORMALIZED IN ACCORDANCE WITH ASTM A350 HEAT TREATING REQUIREMENTS.
7. THE PRODUCT SUPPLIED WAS INSPECTED IN ACCORDANCE WITH EN 10204:2004 EDITION TYPE 3.1 INSPECTION DOCUMENT. (EUROPEAN STANDARD)
8. THE UNIT OF MEASURE FOR TENSILE AND YIELD (0.2%) STRENGTH ARE IN REPORTED IN PSI.
9. ELONGATION TEST RESULTS ARE OBTAINED USING STANDARD ROUND SPECIMEN, 2 INCH OR 50 MM GAGE LENGTH.

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 Kylee Ruiz

Kylee Ruiz
QUALITY PROCESS MANAGER

CMTR: REV2

CERTIFIED MILL TEST REPORT

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LOG NO. F00000000014705 Page 1 of 1

BONNEY FORGE CORPORATION
P.O. BOX 330 • 14496 CROGHAN PIKE • MOUNT UNION, PA 17066-0330
(814) 542-2545 • (800) 345-7546 • FAX (814) 542-4906
www.bonneyforge.com

CUSTOMER: MRC MIDFIELD

DATE 05/19/2011

CUSTOMER ORDER NO.: S759107205

BONNEY ORDER NO. B000096693

SHIP TO: MRC MIDFIELD
502-25 AVENUE
NISKU AB T9E 0K6
Canada

ITEM	QUANTITY	LOT NO.	GRADE OR SPECIFICATION NO. CHEMICAL ANALYSIS, PHYSICAL PROPERTIES, REMARKS:
21	200	4811	3/4 3M/6M LF2 HXPL T SA/A350 LF2 CL1
18C12652			Al 0.025 C 0.200 Co 0.004 Cr 0.090 Cu 0.170 Mn 0.990 Mo 0.010 N 0.004 Nb 0.013 Ni 0.040 P 0.014 S 0.017 Si 0.200 V 0.004 CE(Long Formula) = 0.40 T/S(PSI) 74,375 Y/S(PSI) 51,875 EL(%) 33.05 RA(%) 65.40 Brinell 137 BHN 139 BHN Charpy -50 F 51/69/58 (Ft-Lbs) Average 59.30

1. THE FITTINGS SUPPLIED ARE IN ACCORDANCE WITH PURCHASE ORDER SPECIFICATIONS.
2. CERTIFYING TO ASTM A350 LF2 07 REVISION.
3. THE MATERIAL OF THE FITTINGS SUPPLIED IS ASTM A350-LF2 BUT MEETS THE REQUIREMENTS OF ASME SA350-LF2.
4. THE CHARPY V-NOTCH IMPACT TEST WAS PERFORMED AT -50 DEGREES FAHRENHEIT IN ACCORDANCE WITH A350-LF2.
5. THE MATERIAL SUPPLIED AS A350 LF2 CL1 MEETS THE REQUIREMENTS OF BOTH NACE MR0103-2007 AND NACE MR0175/ISO 15156-2.
6. THE MATERIAL SUPPLIED WAS NORMALIZED IN ACCORDANCE WITH ASTM A350 HEAT TREATING REQUIREMENTS.
7. THE PRODUCT SUPPLIED WAS INSPECTED IN ACCORDANCE WITH EN 10204:2004 EDITION TYPE 3.1 INSPECTION DOCUMENT. (EUROPEAN STANDARD)
8. THE UNIT OF MEASURE FOR TENSILE AND YIELD (0.2%) STRENGTH ARE IN REPORTED IN PSI.
9. ELONGATION TEST RESULTS ARE OBTAINED USING STANDARD ROUND SPECIMEN, 2 INCH OR 50 MM GAGE LENGTH.

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by Meloney Specht

Meloney Specht
QUALITY PROCESS MANAGER

,CMTR: REV2

Name Kevin Hodgson

ABSA File No. W-26983

Process GMAW (sc) (mc)

Date of Test Aug 23, 2010

Examiner [signature]

No. 2628

Bromley Mechanical Services

(Accredited Organization) A.O.Q.P. No. 7119

WELDER PERFORMANCE QUALIFICATION CARD

Kevin Hodgson (Name) W 26983 ABSA File No.

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.

Aug 23, 2010 Date of Test

Signature of Welder or Operator

M.Kmiecik Examiner (Print/Type)

Card No.: 2628

EXPIRY DATE EXTENSION 2628

PQ EXPIRY DATE	INITIAL	PQ EXPIRY DATE	INITIAL

Card No.: 2628

PERFORMANCE QUALIFICATION

Process(es) GMAW(sc) GMAW(mc) Material (P-No.) P1-P11

Filler Metal Group (F No.) F6 F6 Min. Outside Diameter 1" od min

Max. Deposited Weld Metal 0.110" GMAS CWPS Position(s) Qualified FLAT

Backing without/with with Backing Gas ARGON/CO_2

Progression Downhill Downhill

Aug 23, 2012 P.Q. Expiry Date — [signature] Welding Examiner Signature — WG 00031 Certificate No.

Name Kevin Hodgson.

ABSA File No. W 26983

Process SMAW

Date of Test Aug 23, 2010

Examiner

No. 2629

Bromley Mechanical Services

(Accredited Organization) A.O.Q.P. No. 7119

WELDER PERFORMANCE QUALIFICATION CARD

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Aug 23, 2010 Date of Test

Signature of Welder or Operator

M. Kmiewischer Examiner (Print/Type)

Card No.: 2629

EXPIRY DATE EXTENSION 2629

PQ EXPIRY DATE	INITIAL	PQ EXPIRY DATE	INITIAL

Card No.: 2629

PERFORMANCE QUALIFICATION

Process(es)	SMAW	SMAW	Material (P-No.)	P1-P11	
Filler Metal Group (F No.)	F3	F4	Min. Outside Diameter	1" od	
Max. Deposited Weld Metal	0.250"	MAWPS	Position(s) Qualified	ALL	
Backing	~~with/without~~	with	Backing Gas	N/A	
Progression	UPHILL	UPHILL			

Aug 23, 2012 P. Q. Expiry Date

Welding Examiner Signature

WG00031 Certificate No.

12/21/10

Husky Energy

WELDING PROCEDURE REVIEW SHEET

THIS COVER SHEET IS USED TO IDENTIFY VENDOR DOCUMENT REIVIEW STATUS.

VENDOR: BROMLEY MECHANICAL SERVICES INC.
WPS #: BM-11
PQR #: BM-11-1, BM-11-2, BM-11-3, BMS-20N-2
DATE & REV. #: Sep. 17, 2008, Rev. 2

Application	☐ Stuctural	☐ Pipeline	☑ ASME Section IX	
Electrode	F6/F4			
Material	P1 Gr.1 &2 to P1 Gr.1 &2			
Process	GMAW/ SMAW			
Position	DOWN/ FLAT			
Thickness	1.6mm to 38.1mm (Non-impact) , 3.2mm to 38.1mm (Impact specified)			
Diameter	All			
Hardness	☐ Brinnel	☑ Vicker	☐ Rockwell B	☐ Not Done
PWHT	☐ Yes	☑ No		
Impacts	☑ Low Temprerature Impact tested to -46°C		☐ Normal Temperature	
Registered	Alberta			

REVIEW STATUS	
	☐ **Accepted**
	☑ **Accepted as noted**
	☐ **Accepted as noted: Resubmit**
	☐ **Not Accepted**
	☐ **Sour Sevice**
	☑ **Sweet Service**
	☑ **Transitional Sour Service**

COMMENTS

1. Uphand progression only is allowed.
2. Backing rings are not allowed.
3. Max. Weave is restricted to 4 x electrode dia. or 12.7mm for wire feed.
4. Min. Joint thickness for unbevelled joint is 3mm for welding from one side and 6mm for welding from both sides.
5. Accepted for Transitional sour and sour service for piping up to 12.7mm thickness. Production Hardness values not to exceed 210 Hv.

Ram Sridharan — *Signature*

Feb. 03, 2011 — *Date*

Rev April 4, 2008

ABSA
the pressure equipment safety authority

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

September 30, 2008

Merle Kanewischer
BROMLEY MECHANICAL SERVICES INC
A DIVISION OF ARGO SALES LTD
925-23 STREET SW
MEDICINE HAT, AB T1A 8R1

Dear Merle Kanewischer,

The welding procedures received on September 26, 2008 are accepted for registration as follows:

Reg. No. : WP-0505.2 **Accepted on:** September 30, 2008

Tracking No. : 2008-07110

Reg Type : New Design

Spec. No. : BM-11 As Noted

Please note the acceptance of the registration does not allow the use of this welding procedure in the construction, modification, or repair of 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.

Welding procedures, which specify impact testing, have been accepted in accordance with A.S.M.E. Section IX only. Other A.S.M.E. Code Sections may have additional requirements respecting impact testing.

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

Enclosed is a stamped welding procedure for your reference.

Sincerely,

R. Roseberg

ROSEBERG, BOB, P. Eng.
Design Survey Engineer

WPS Number: BM-11

PQR Number: BM-11-1
BM-11-2
BM-11-3
BMS – 20N-2

QUALIFIED FOR

Material P Number: P Gr 1 and Gr 2
Material Type (typical): SA-333 Grade 6, SA-350-LF2, SA- 420 WPL6
SA-516 Gr 70, etc
Process: GMAW/SMAW
Position: 45°/Flat
Diameter: All Diameters
Joint Design: All Groove & Fillet Designs
AWS Classification: ER70S-6, E-7018-1

Thickness: With PWHT: N/A

As Welded: .0625" to 1.5" (Non-Impact)
.0125" to 1.5" (Impact Tested)

ABSA

SAFETY CODES ACT - PROVINCE OF ALBERTA
WELDING PROCEDURE

Reg. No. WP 505.2
Spec. No. BM-11
Weld Process GMAW/SMAW
Matl. Gr. P No. 1 Gr 1+2 to P No. 1 Gr 1+2
Elec. Gr. F No. 6+4 A No. 1
Th. Qual. For 38.1mm P.W.H.T. NO
MIN Th. QUAL 3.2mm, CVN -46°C

Yr. 08 Mo. 09 Day 30 Signed
R. ROSEBERG, P.ENG.
WELDING SPECIALIST

WELDING PROCEDURE SPECIFICATIONS

Company Name: Bromley Mechanical Services Inc. By: Paul Frederick
Welding Procedure Specification No.:BM-11 Date: September 17, 2008
Supporting PQR No.(s):BM-11-1, BM-11-2, BM-11-3, BMS-20N-2 Rev.#: 2
Welding Process(es): GMAW/SMAW Type(s):Semi Automatic/Manual
Revision 1 is for editorial updates to the WPS and to change the name of the company. Revision 2 is to add PQR, BMS-20N-2 for thickness increase.

JOINTS (QW-402)
Joint Design: All Groove and Fillet designs. See attached sketches
Backing: with or without Backing Material (type): Weld Metal NO RETAINERS

BASE METALS (QW-403)
P.No. 1 Group No. 1 or 2 to P.No. 1 Group No. 1 or 2
Thickness Range
Base Metal: .
Groove Welds: 0625" to 1.5" (Non-Impact)
.0125" to 1.5" (Impact Specified)
Fillet Welds: All fillet welds
Pipe Diameter Range: All diameters
Deposited Weld Metal Thickness per pass: 0.500 in. Max

FILLER METALS (QW-404)		
Spec. No (SFA)	SFA 5.18	SFA 5.1
AWS No. (Class)	ER70-S6	E-7018-1
F. No.	F6	F4
A. No.	A1	A1
Size of Filler Metals	.035" to .045" inclusive	3/32'' to ¼'' inclusive
Deposited Weld Metal Thickness Range		
Groove	.138" max.	1.5"max
Fillet	All	All
Electrode Flux (class)	N/A	N/A
Flux Trade Name	N/A	N/A
Consumable Insert	N/A	N/A
Other	GMAW for root pass only No Supplementry Filler Metals	N/A No Supplementry Filler Metals

POSITIONS (QW-405)
Position(s) of Groove: GMAW 45°/ SMAW1G
Welding Progression: Down/Flat
Position of Fillet: All

POSTWELD HEAT TREATMENT (QW-407)
Temperature Range: None
Time Range: N/A

PREHEAT (QW-406)
Preheat Temp. Min.: 50°F

Interpass Temp. Max.: 450°F
Preheat Maintenance: Welding & Reheating:

GAS (QW-408)
Shielding Gas(es): Argon/CO2

Percent composition (mixtures): 75%/25%

Flow Rate: 20-40 cfph
Gas Backing: N/A
Trailing Shielding Gas Composition: N/A

ELECTRICAL CHARACTERISTICS (QW-409)

Current AC or DC: DC Polarity: Reverse
Amps (Range): See table Volts (Range): See Table
Tungsten Electrode Size and Type: N/A

Mode of Metal Transfer for GMAW: Short Circuiting Arc
Electrode Wire Fed Speed Range: 46-160 ipm
Max. Heat Input:

Base Metal Thickness Range	Heat Input Joules/in.
.125" to .375"	48,000
.500" to .888"	64,000
.375" to .500"	52,364
.500" to 1.5"	75,667

TECHNIQUE (QW-410)

String or Weave Bead: String and Weave
Orifice or Gas Cup Size: N/A
Initial and Interpass Cleaning (Brushing, Grinding, etc.): Brushing, Chipping, Grinding

Method of Back Gouging: Air Carbon Arc
Oscillation: N/A
Contact Tube to Work Distance: N/A
Multiple or Single Pass (per side): Multiple
Multiple or Single Electrodes: Single
Travel Speed (Range): See table
Peening: None
Other: N/A

		Filler Metal		Current				
Weld Layers	Process	Class	Diameter Inches	Type Polar	Amp. Range	Volt Range	Travel Speed Range(ipm)	Other *
1	GMAW	ER-70S-6	.035	DCRP	100-150	15-21	7-12	7
1	GMAW	ER-70S-6	.045	DCRP	135-250	16.21	5-14	5
2 to Rem	SMAW	E-7018-1	3/32	DCRP	60-110	19-24	1.5-12	2.5
2 to Rem	SMAW	E-7018-1	1/8	DCRP	90-140	20-25	1.5-14	3
2 to Rem	SMAW	E-7018-1	5/32	DCRP	110-190	20-26	2-14	5
2 to Rem	SMAW	E-7018-1	3/16	DCRP	180-275	21-26	4-13	7
2 to Rem	SMAW	E-7018-1	7/32	DCRP	260-350	22-27	8-20	9
2 to Rem	SMAW	E-7018-1	¼	DCRP	300-400	23-28	10-25	11

*Minimum Travel Speed At Maximum Volts and Amps

GROOVE DESIGN

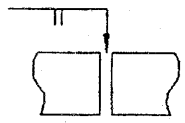


FIGURE 1
SINGLE SQUARE BUTT

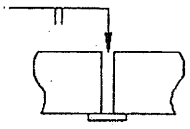


FIGURE 2
SINGLE SQUARE BUTT
WITH BACKING STRIP

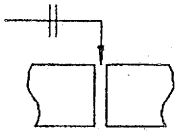


FIGURE 3
DOUBLE SQUARE BUTT

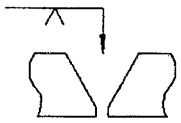


FIGURE 4
SINGLE VEE BUTT

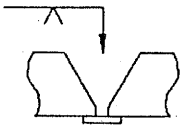


FIGURE 5
SINGLE VEE BUTT
WITH BACKING STRIP

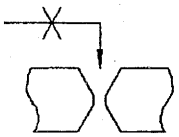


FIGURE 6
DOUBLE VEE BUTT

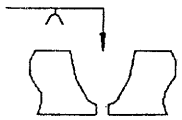


FIGURE 7
SINGLE U BUTT

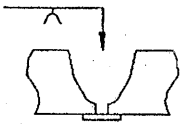


FIGURE 8
SINGLE U BUTT
WITH BACKING STRIP

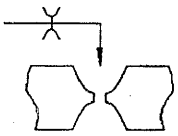


FIGURE 9
DOUBLE U BUTT

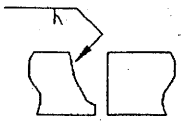


FIGURE 10
SINGLE J BUTT

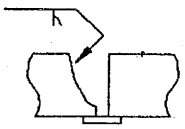


FIGURE 11
SINGLE J BUTT
WITH BACKING STRIP

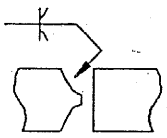


FIGURE 12
DOUBLE J BUTT

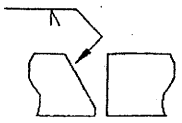


FIGURE 13
SINGLE BEVEL BUTT

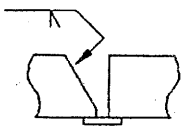


FIGURE 14
SINGLE BEVEL BUTT
WITH BACKING STRIP

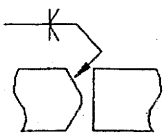


FIGURE 15
DOUBLE BEVEL BUTT

TYPICAL JOINT DESIGN

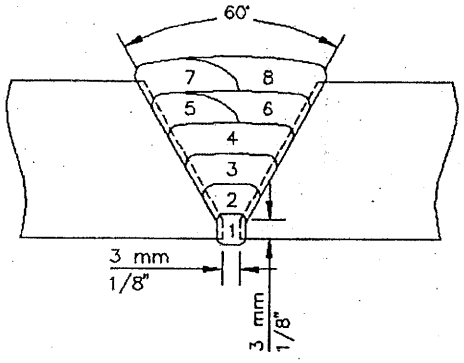


FIGURE 16

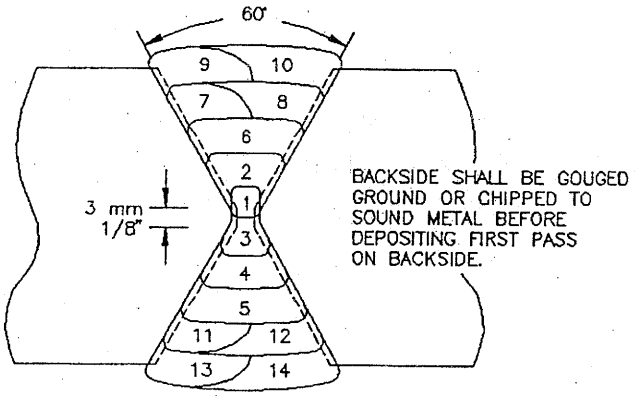


FIGURE 17

Husky Energy

WELDING PROCEDURE REVIEW SHEET

THIS COVER SHEET IS USED TO IDENTIFY VENDOR DOCUMENT REIVIEW STATUS.

VENDOR: BROMLEY MECHANICAL SERVICES INC.
WPS #: BMS-20N
PQR #: BMS-20N-1, BMS-20N-2
DATE & REV. #: Nov.14, 2007, Rev. 0

Application	☐ Stuctural	☐ Pipeline	☑ ASME Section IX	
Electrode	F3/F4			
Material	P1 Gr.1 &2 to P1 Gr.1 &2			
Process	SMAW			
Position	All – Without impact, 1G- With impact			
Thickness	1.6mm to 38.1mm (Non-impact) , 3.2mm to 38.1mm (Impact specified)			
Diameter	All			
Hardness	☐ Brinnel	☑ Vicker	☐ Rockwell B	☐ Not Done
PWHT	☐ Yes	☑ No		
Impacts	☑ Low Temprerature	Impact tested to -46°C	☐ Normal Temperature	
Registered	Alberta			

REVIEW STATUS

☐ **Accepted**

☑ **Accepted as noted**

☐ **Accepted as noted: Resubmit**

☐ **Not Accepted**

☐ **Sour Sevice**

☑ **Sweet Service**

☑ **Transitional Sour Service**

COMMENTS

1. Up hand progression only is allowed.
2. Backing rings are not allowed.
3. Max. Weave is restricted to 4 x electrode dia.
4. Min. Joint thickness for unbevelled joint is 3mm for welding from one side and 6mm for welding from both sides.
5. Accepted for Transitional sour and sour service for piping up to 12.7mm thickness. Production Hardness values not to exceed 210 Hv.

Ram Sridharan — *Signature*

Feb. 03, 2011 — *Date*

Rev April 4, 2008

ABSA
the pressure equipment safety authority

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

December 14, 2007

Merle Kanewischer
BROMLEY MECHANICAL SERVICES INC
925-23 STREET SW
MEDICINE HAT, AB T1A 8R1

Dear Merle Kanewischer,

The welding procedures received on December 04, 2007 are accepted for registration as follows:

Reg. No. : WP-0505.2 **Accepted on:** December 14, 2007

Tracking No. : 2007-08619

Reg Type : New Design

Spec. No. : BMS-20N

Please note the acceptance of the registration does not allow the use of this welding procedure in the construction, modification, or repair of 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.

Welding procedures, which specify impact testing, have been accepted in accordance with A.S.M.E. Section IX only. Other A.S.M.E. Code Sections may have additional requirements respecting impact testing.

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

Enclosed is a stamped welding procedure for your reference.

Sincerely,

R. Roseberg

ROSEBERG, BOB, P. Eng.
Design Survey Engineer

WPS Number: BMS-20N

PQR Number: BMS-20N-1, BMS-20N-2

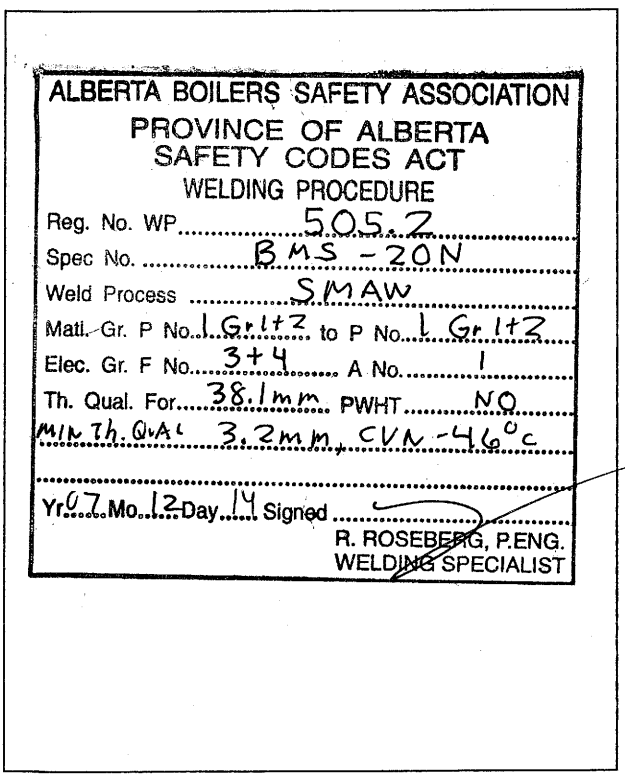
QUALIFIED FOR

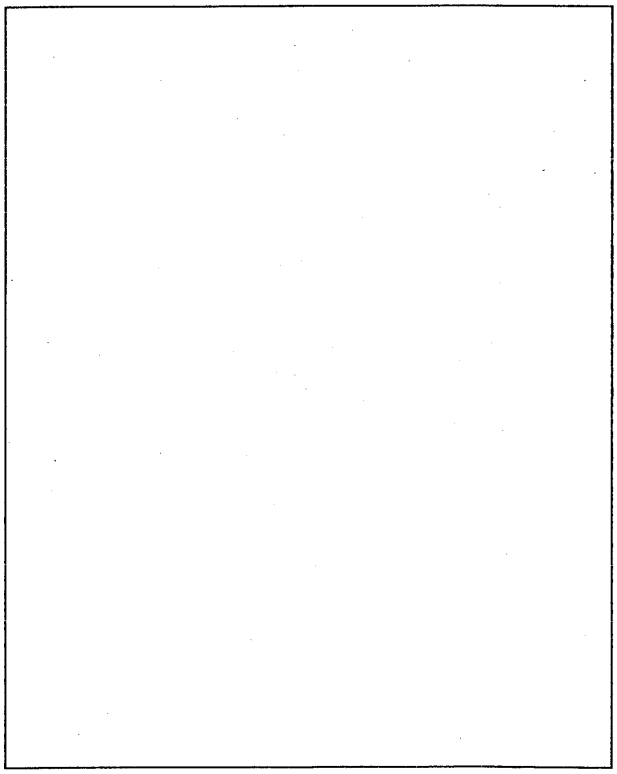
Material P Number: P1 Group 1 and 2 to P1 Group 1 and 2
Material Type (typical): SA-333 Grade 6, SA-350 Grade LF2, SA-420 Grade WPL6

Process: SMAW
Position: All without impacts / Flat with impacts
Diameter: All diameters
Joint Design: All grove and fillets
AWS Classification: E-6010, E-7018-1

Thickness:

As Welded: 0.125" to 1.5"





WELDING PROCEDURE SPECIFICATIONS

Company Name: Bromley Mechanical Services Inc.
Welding Procedure Specification No.: BMS-20N
Supporting PQR No.(s): BMS-20N-1, BMS-20N-2
Welding Process(es): SMAW

By: Paul Frederick
Date: November 14, 2007
Rev.#: 0
Type(s): Manual

JOINTS (QW-402)
Joint Design: All groove and fillet weld types are qualified (See chart)
Backing: with or without Backing Material (type): Weld Metal
Retainers: No Retainers

BASE METALS (QW-403)
P.No. 1 Group No. 1 or 2 to P.No. 1 Group No. 1 or 2

Thickness Range
Base Metal: 0.125" to 1.5"

Groove Welds: 0.0625" to 1.5" without impacts, 0.125" to 1.5" with impacts
Fillet Welds: All fillet welds
Pipe Diameter Range: All pipe diameter ranges
Deposited Weld Metal Thickness per pass: 0.500" **MAXIMUM**

FILLER METALS (QW-404)		
Spec. No (SFA)	SFA 5.1	SFA 5.1
AWS No. (Class)	E-6010	E-7018-1
F. No.	F3	F4
A. No.	A1	A1
Size of Filler Metals	3/32" to 1/4"	3/32" to 1/4"
Deposited Weld Metal Thickness Range		
Groove	0.250"	1.25"
Fillet	All	All
Electrode Flux (class)	n/a	n/a
Flux Trade Name	n/a	n/a
Consumable Insert	n/a	n/a
Supplementary Filler Materials	n/a	n/a
Wire: Solid, Cored, Powder	n/a	n/a
Other	n/a	n/a

POSITIONS (QW-405)
Position(s) of Groove: All without Impact, 1G with impact
Welding Progression: Up down without impacts, Flat with impacts
Position of Fillet: Up down without impacts, Flat with impacts

POSTWELD HEAT TREATMENT (QW-407)
Temperature Range: n/a
Time Range: n/a

PREHEAT (QW-406)
Preheat Temp. Min.: 50°F

Interpass Temp. Max.: 450°F
Preheat Maintenance:
Continuous Welding & Reheating:

GAS (QW-408)
Shielding Gas(es): n/a

Percent composition (mixtures): n/a

Flow Rate: n/a
Gas Backing: n/a
Trailing Shielding Gas Composition: n/a

ELECTRICAL CHARACTERISTICS (QW-409)

Current AC or DC: DC Polarity: Electrode Negative
Amps (Range): See Chart Volts (Range): See chart
Tungsten Electrode Size and Type: n/a

Mode of Metal Transfer for GMAW: n/a
Electrode Wire Fed Speed Range: n/a
Max. Heat Input: J/in

Base Metal Thickness Range	Heat Input Joules/in.
0.125" to 0.500"	42846
0.500" to 1.5"	75667

TECHNIQUE (QW-410)

String or Weave Bead: String and Weave
Orifice or Gas Cup Size: n/a
Initial and Interpass Cleaning (Brushing, Grinding, etc.): Brushing, chipping, grinding, etc.

Method of Back Gouging: Air Carbon Arc and grinding
Oscillation: n/a
Contact Tube to Work Distance: n/a
Multiple or Single Pass (per side): Multiple
Multiple or Single Electrodes: Single
Travel Speed (Range): See Table
Peening: n/a
Other: n/a

	Filler Metal		Current				
Weld Layers	Process	Class	Diameter	Type Polar	Amp. Range	Volt Range	Travel Speed Range(ipm)	Other "*"
1 &/or 2	SMAW	E-6010	3/32"	DCRP	40 – 100	18 – 28	1.5 – 12	3.9
1 &/or 2	SMAW	E-6010	1/8"	DCRP	70 – 120	20 – 30	1.5 – 14	5.0
1 &/or 2	SMAW	E-6010	5/32"	DCRP	90 – 150	21 – 30	2 – 16	6.3
Rem	SMAW	E-7018-1	3/32"	DCRP	60 – 110	18 – 26	1.5 – 12	4.0
Rem	SMAW	E-7018-1	1/8"	DCRP	80 – 150	20 – 27	1.5 – 14	5.7
Rem	SMAW	E-7018-1	5/32"	DCRP	110 – 220	21 – 28	2 – 16	8.6
Rem	SMAW	E-7018-1	3/16"	DCRP	160 – 320	21 – 30	3 – 20	13.4
Rem	SMAW	E-7018-1	7/32"	DCRP	240 – 350	23 – 32	5 – 22	15.7
Rem	SMAW	E-7018-1	1/4"	DCRP	300 – 400	23 – 32	5 – 22	17.9

Note: *"*" Minimum Travel Speed at Maximum Amps and Volts for Impact Requirements*

TYPICAL JOINT DESIGN

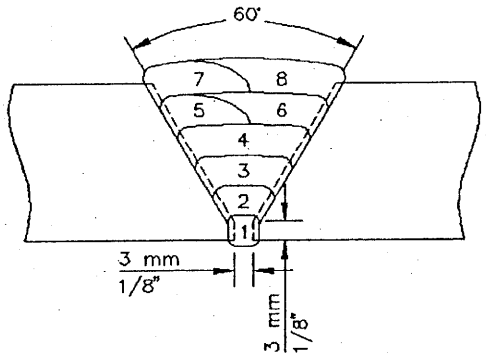


FIGURE 16

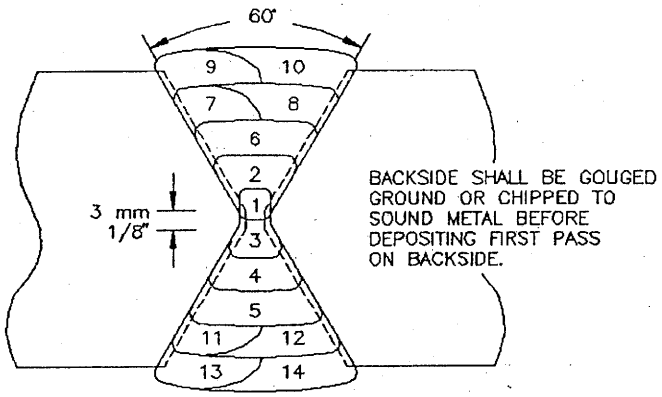


FIGURE 17

GROOVE DESIGN

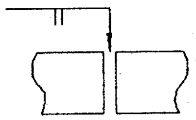


FIGURE 1
SINGLE SQUARE BUTT

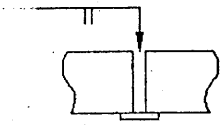


FIGURE 2
SINGLE SQUARE BUTT
WITH BACKING STRIP

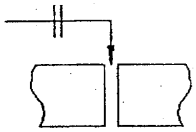


FIGURE 3
DOUBLE SQUARE BUTT

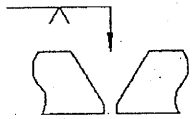


FIGURE 4
SINGLE VEE BUTT

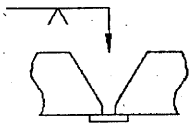


FIGURE 5
SINGLE VEE BUTT
WITH BACKING STRIP

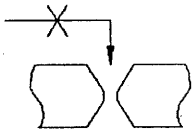


FIGURE 6
DOUBLE VEE BUTT

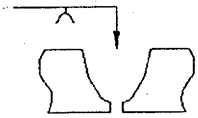


FIGURE 7
SINGLE U BUTT

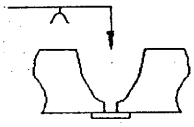


FIGURE 8
SINGLE U BUTT
WITH BACKING STRIP

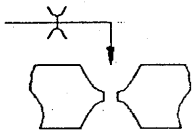


FIGURE 9
DOUBLE U BUTT

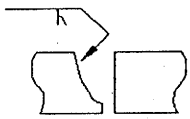


FIGURE 10
SINGLE J BUTT

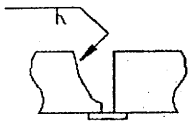


FIGURE 11
SINGLE J BUTT
WITH BACKING STRIP

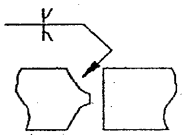


FIGURE 12
DOUBLE J BUTT

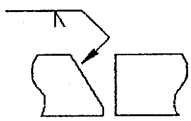


FIGURE 13
SINGLE BEVEL BUTT

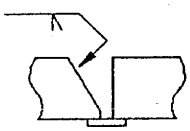


FIGURE 14
SINGLE BEVEL BUTT
WITH BACKING STRIP

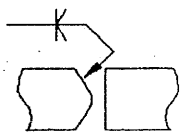


FIGURE 15
DOUBLE BEVEL BUTT

Husky Energy

WELDING PROCEDURE REVIEW SHEET

THIS COVER SHEET IS USED TO IDENTIFY VENDOR DOCUMENT REIVIEW STATUS.

VENDOR: Bromley Mechanical Services Inc.
WPS #: BMS 710M (Rev.2)
PQR #: BMS 710M-5, BMS 710M-6
DATE & REV. #: June 28, 2007, Rev.2

Application	☐ Stuctural	☐ Pipeline	☑ ASME Section IX	
Electrode	ER 70-S2, E70C-6M (F6/F6)			
Material	P1 Gr.1 &2 to P1 Gr.1 &2			
Process	GMAW / GMAW (Metalcore)			
Position	All Positions / Flat, Horizontal			
Thickness	3.2 mm to 203 mm			
Diameter	All			
Hardness	☐ Brinnel	☑ Vicker	☑ Rockwell B	☐ Not Done
PWHT	☐ Yes	☑ No		
Impacts	☑ Low Temprerature	Impact tested at -46°C	☐ Normal Temperature	
Registered	Alberta			

REVIEW STATUS

- ☐ **Accepted**
- ☑ **Accepted as noted**
- ☐ **Accepted as noted: Resubmit**
- ☐ **Not Accepted**

- ☐ **Sour Sevice**
- ☑ **Sweet Service**
- ☐ **Transitional Sour Service**

COMMENTS

1. Uphand progression only is allowed.
2. Backing rings are not allowed.
3. Max. Weave is restricted to 4 x electrode dia. or 12.7mm for wire feed.
4. Max. thickness of unbevelled joint thickness = 3mm for welding from one side and 6mm for welding from both sides.

Ram Sridharan — *Signature*

Jan. 27, 2011 — *Date*

ABSA
the pressure equipment safety authority

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

July 13, 2007

Merle Kanewischer
BROMLEY MECHANICAL SERVICES INC
925-23 STREET SW
MEDICINE HAT, AB

Dear Merle Kanewischer,

The welding procedures received on July 04, 2007 are accepted for registration as follows:

Reg. No. : WP-0505.2 **Accepted on:** July 13, 2007

Tracking No. : 2007-04764

Reg Type : Revision To Acc. Design

Spec. No. : BMS 710M REV 2

Registered under owner / manufacturer name BROMLEY MECHANICAL SERVICES INC

Please note the acceptance of the registration does not allow the use of this welding procedure in the construction, modification, or repair of 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.

Welding procedures, which specify impact testing, have been accepted in accordance with A.S.M.E. Section IX only. Other A.S.M.E. Code Sections may have additional requirements respecting impact testing.

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

Enclosed is a stamped welding procedure for your reference.

Sincerely,

R. Roseberg

ROSEBERG, BOB, P. Eng.
Design Survey Engineer

WELDING PROCEDURE SPECIFICATION NO.: BMS 710M (Rev.2)

WELDING PROCEDURE QUALIFICATION RECORD NO. (S): BMS 710M-4, BMS 710M-5, BMS 710M-6

QUALIFIED FOR

Base Metal (Typical): P1 Groups 1 & 2 to P1 Groups 1 & 2
(SA 333 Gr.6, SA 350 Gr.LF2, SA 420 WPL6, SA 516 Gr.70, etc.)
Process(es): GMAW / GMAW (Metalcore) **Weld Types:** GROOVE & FILLET
Position: GMAW: ALL POSITIONS GMAW (Metalcore): FLAT & HORIZONTAL
Diameter: ALL DIAMETERS
Filler Metal: ER70S-2, E70C-6M

BASE METAL CONDITIONS & GROOVE THICKNESS RANGE QUALIFIED:

NOTCH TOUGHNESS APPLICATIONS TO -46°C AS WELDED
BASE METAL THICKNESS RANGE 3.2 to 203 mm (0.125 to 8.00 in.) inclusive

COMBINED DEPOSITED WELD METAL THICKNESS

ASME B31.1	19.1 mm (0.750 in.) maximum
ASME B31.3	19.1 mm (0.750 in.) maximum
ASME SECT. VIII, DIV.1	38.1 mm (1.500 in.) maximum

ALBERTA BOILERS SAFETY ASSOCIATION
PROVINCE OF ALBERTA
SAFETY CODES ACT
WELDING PROCEDURE
Reg. No. WP 505.2
Spec No. BMS 710M (REV2)
Weld Process GMAW/GMAW(mc)
Matl. Gr. P No. 1 Gr 1+2 to P No. 1 Gr 1+2
Elec. Gr. F No. 6+6* A No. 1+*
Th. Qual. For 3.2 to 203 mm PWHT NO
CVN - 46°C
* E70C-6M ELECTRODE
Yr. 07 Mo. 07 Day 13 Signed
R. ROSEBERG, P.ENG.
WELDING SPECIALIST

PROVINCIAL REGISTRATION

QW-482 WELDING PROCEDURE SPECIFICATION (WPS)

Bromley Mechanical Services Inc.

Welding Procedure Specification No. BMS 710M (Rev.2) Date June 28, 2007

Revision(s) Rev. 2: (Essential) - Replace PQR's BMS 710M-1, BMS 710M-2, BMS 710M-3

Supporting PQR No. (s) BMS 710M-4, BMS 710M-5, BMS 710M-6

Welding Process(es) GMAW / GMAW (Metalcore) Type(s) Semi-automatic

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 Not required

BASE METALS (QW-403)

P-Number P1 Groups 1 & 2 To P-Number P1 Groups 1 & 2

Thickness Range: Groove See cover page for thickness qualified by governing code

Fillet All base metal thicknesses

Pipe Diameter Ranges: Groove All diameters

Fillet All diameters

Deposited Weld Metal (Per Pass) GMAW: 2.79 mm (0.110 in.) maximum

GMAW (Metalcore): 12.7 mm (0.500 in.) maximum

FILLER METALS (QW-404)	GMAW	GMAW (Metalcore)
Specification No. (SFA)	SFA 5.18	SFA 5.18
AWS No. (Class)	ER70S-2	E70C-6M
F-No.	F6	F6
A-No.	A1	*
Size	.030 to .045 in. inclusive	0.035 to 1/16 in. inclusive
Filler Metal Product Form	Solid wire	Metal cored wire
Supplemental Filler Metal	Without	Without
Deposited Weld Metal Thickness Range:		
Groove	2.79 mm (0.110 in.) max.**	38.1 mm (1.50 in.) max.**
Fillet	All fillet sizes	All fillet sizes

Other * Chemical composition shall meet the requirements of ASME Sec.II, Part C SFA 5.18 for E70C-6M

** Combined deposited weld metal thickness shall not exceed 19.1 mm (0.750 in.) for ASME B31.1, B31.3 and 38.1 mm (1.50 in.) for ASME Section VIII, Div.1

POSITION (QW-405)

Position of Groove	GMAW: All positions	GMAW (Metalcore): Flat, Horizontal
Position of Fillet	GMAW: All positions	GMAW (Metalcore): Flat, Horizontal
Weld Progression	GMAW: Vertical down	GMAW (Metalcore): N/A

PREHEAT (QW-406)

Preheat Temperature (Minimum) See attached preheat sheet

Interpass Temperature (Maximum) 232°C (450°F)

Preheat Maintenance See attached preheat sheet prior to welding. Preheat maintenance is not required if welding is interrupted or after the completion of welding unless required by the code of construction.

POST WELD HEAT TREATMENT (QW-407)

Temperature Range N/A Time Range N/A

GAS (QW-408)

Specification No. (SFA) SFA 5.32
AWS No. (Class) GMAW: SG-AC-25 GMAW (Metalcore): SG-AC-8
Shielding GMAW: 75% Argon, 25% CO_2, 10 - 25 liters per minute (20 - 50 cfph)
Shielding GMAW (Metalcore): 92% Argon, 8% CO_2, 10 - 25 liters per minute (20 - 50 cfph)
Backing Not Required Trailing Not Required

ELECTRICAL CHARACTERISTICS (QW-409)

Current Direct Polarity Reverse, electrode positive
Amps See Table #1 Volts See Table #1
Mode of Metal Transfer GMAW: Short circuiting
Mode of Metal Transfer GMAW (Metalcore): Spray or Globular
Maximum Heat Input

Base Metal Thickness Range	ER70S-2	E70C-6M
0.125 - 0.499 in.	26,320 J/in.	21,320 J/in.
0.500 - 0.624 in.	30,080 J/in.	25,200 J/in.
0.625 - 8.00 in.	30,080 J/in.	46,200 J/in.

TECHNIQUE (QW-410)

String or Weave Either Travel Speed See Table #1
Orifice or Gas Cup Size 9.52 mm (0.375 in.) to 19.1 mm (0.750 in.)
Initial & Interpass Cleaning Brushing, chipping or grinding as required
Method of Back Gouging Air carbon arc, back-grind as required
Oscillation N/A
Contact Tube to Work Distance GMAW: 6.35 mm (0.250 in.) to 19.1 mm (0.750 in.)
Contact Tube to Work Distance GMAW (Metalcore): 12.7 mm (0.500 in.) to 25.4 mm (1.00 in.)
Multiple or Single Pass Per Side GMAW: Single, root pass only
GMAW (Metalcore): Multiple
Multiple or Single Electrodes Single
Electrode Spacing N/A
Peening Not permitted

TABLE 1 - WELDING PARAMETERS

Process	Filler Metal	Diameter mm (in.)	Current Type & Polarity	Amperage Range	Voltage Range	Travel Speed mm/min. (i.p.m.)
GMAW	ER70S-2	0.8 (0.030)	DCRP	70 - 130	12 - 21	43 - 250 (1.7 - 10)
GMAW	ER70S-2	0.9 (0.035)	DCRP	80 - 200	13 - 22	53 - 600 (2.1 - 25)
GMAW	ER70S-2	1.1 (0.045)	DCRP	100 - 250	14 - 23	71 - 900 (2.8 - 35)
GMAW (Metalcore)	E70C-6M	0.9 (0.035)	DCRP	130 - 260	24 - 30	103 - 254 (4.1 - 10)
GMAW (Metalcore)	E70C-6M	1.1 (0.045)	DCRP	150 - 400	25 - 35	124 - 508 (4.9 - 20)
GMAW (Metalcore)	E70C-6M	1.3 (0.052)	DCRP	200 - 400	25 - 36	165 - 635 (6.5 - 25)
GMAW (Metalcore)	E70C-6M	1.6 (1/16)	DCRP	250 - 500	26 - 36	215 - 762 (8.5 - 30)

Note: Welding parameters shall be adjusted to insure that the maximum heat input value specified in QW-409 above is not exceeded. Heat Input (J/in.) = $\frac{\text{Volts X Amps X 60}}{\text{Travel Speed (ipm)}}$

TYPICAL JOINT DESIGNS

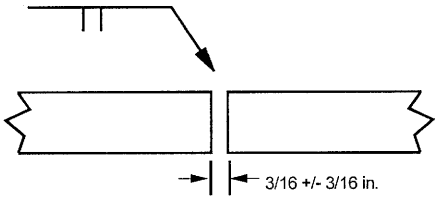


Figure 1
Single Square Butt

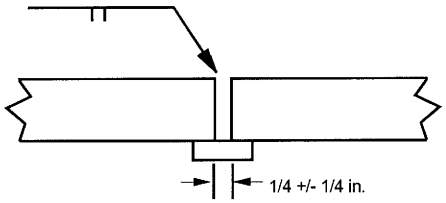


Figure 2
Single Square Butt with Backing Strip

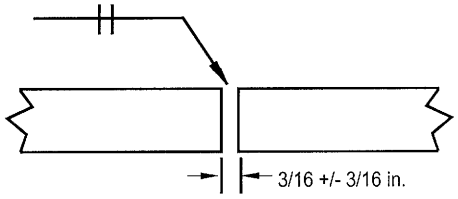


Figure 3
Double Square Butt

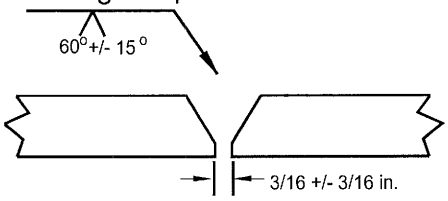


Figure 4
Single Vee Butt

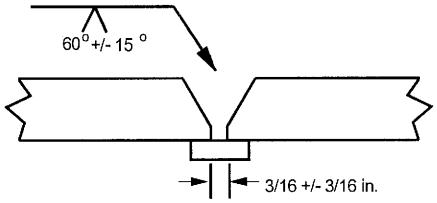


Figure 5
Single Vee Butt with Backing Strip

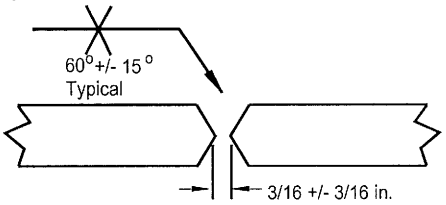


Figure 6
Double Vee Butt

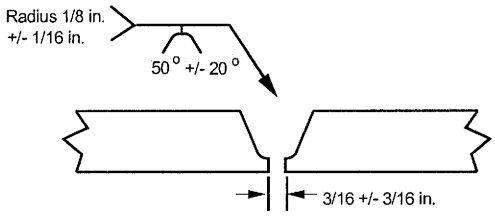


Figure 7
Single U Butt

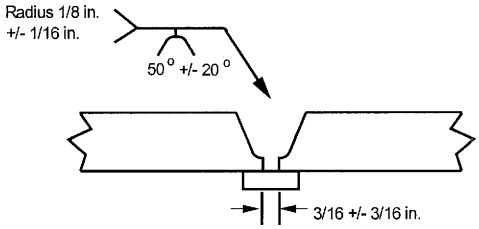


Figure 8
Single U Butt with Backing Strip

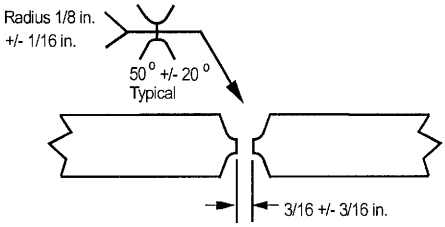


Figure 9
Double U Butt

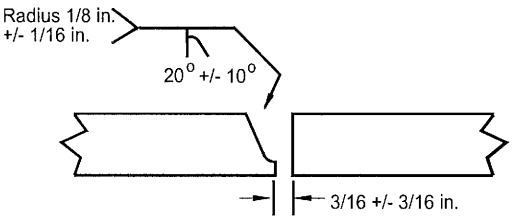


Figure 10
Single J Butt

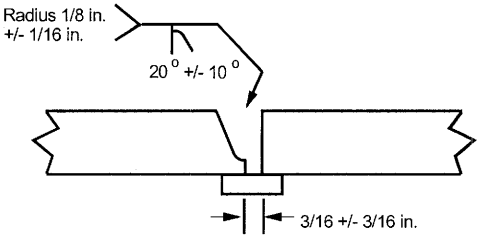


Figure 11
Single J Butt with Backing Strip

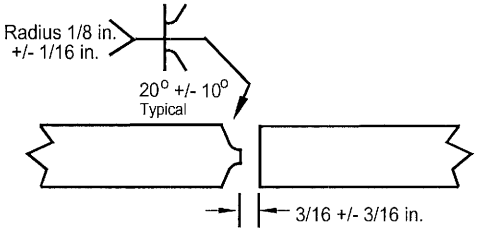


Figure 12
Double J Butt

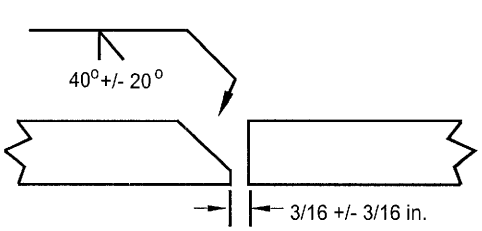


Figure 13
Single Bevel Butt

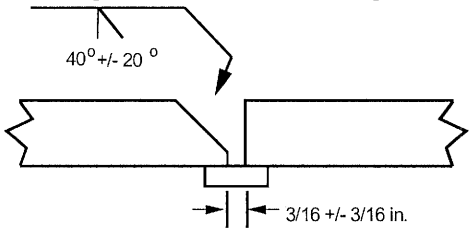


Figure 14
Single Bevel Butt with Backing Strip

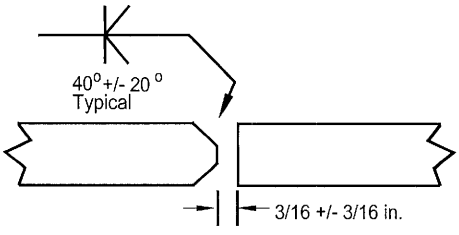


Figure 15
Double Bevel Butt

Or as per the joint design on the approved construction drawing.

PREHEAT
P-No. 1

1. Welds joining pressure parts or attachments shall be preheated to not less than the minimum preheat temperatures stated in paragraph 5.

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 5, prior to the start of welding.

4. Preheat temperatures shall be checked by the welder or inspector, using temperature indicating crayons or other reputable methods.

5. 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 32 mm (0 to 1.25 in)	10°C (50°F)
Over 32 mm (Over 1.25 in.)	95°C (200°F)
Over 25 mm (1.0 in.) & specified maximum carbon content in excess of 0.30%.	79°C (175°F)

- The conditions of UW-30 shall apply for base metal temperatures below 0°C (32°F).
- The preheat zone shall extend at least 50 mm (2.0 in.) beyond each edge of the weld.

PROCESS PIPING IN ACCORDANCE WITH ASME B31.3

NOMINAL WALL THICKNESS	MINIMUM SPECIFIED BASE METAL TENSILE STRENGTH	MINIMUM PREHEAT TEMPERATURE
< 25 mm (1.0 in.)	≤ 490 MPa (71 ksi)	10°C (50°F)
≥ 25 mm (1.0 in.)	All	79°C (175°F)
All	> 490 MPa (71 ksi)	79°C (175°F)

- The preheat zone shall extend at least 25 mm (1.0 in.) beyond each edge of the weld.
- The interruption of welding shall be subject to the requirements of paragraph 330.2.4.

POWER PIPING IN ACCORDANCE WITH ASME B31.1

NOMINAL WALL THICKNESS	MINIMUM PREHEAT TEMPERATURE
Over 25 mm (1.0 in.) & specified maximum carbon content in excess of 0.30%.	80°C (175°F)
All others	10°C (50°F)

- The preheat zone shall extend beyond each edge of the weld for at least 76.2 mm (3.0 in.) or 1.5 times the base metal thickness (as defined in paragraph 131.4.1), whichever is greater.

QW-483 PROCEDURE QUALIFICATION RECORD (PQR)

Bromley Mechanical Services Inc.

Procedure Qualification Record No. BMS 710M-4 Date June 4, 2007
Welding Procedure Specification No. BMS 710M (Rev.2)
Welding Process(es) GMAW / GMAW (Metalcore) Type(s) Semi-automatic

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
Heat Numer 521650 to 97267
P-No. P1 Grp.1 To P-No. P1 Grp.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.
Deposited Weld Metal (Per pass) Did not exceed 12.7 mm (0.500 in.)

FILLER METALS (QW-404)	GMAW	GMAW (Metalcore)
Specification No. (SFA)	SFA 5.18	SFA 5.18
AWS No. (Class)	ER70S-2	E70C-6M
Filler Metal F-No.	F6	F6
Filler Metal A-No.	A1	*
Filler Metal Product Form	Solid wire	Metal cored wire
Filler Metal Trade Name	Not recorded	Megafil 710M
Supplemental Filler Metal	Without	Without
Size of Electrode	See attached sketch	
Deposited Weld Metal Thickness	2.54 mm (0.100 in.)	3.78 mm (0.149 in.)

Other * Chemical composition meets the requirements of ASME Sec. II, Part C, for E70C-6M

POSITION (QW-405)

Position of Groove GMAW: 30° off flat GMAW (Metalcore): 1G
Weld Progression GMAW: Vertical down GMAW (Metalcore): N/A

PREHEAT (QW-406)

Preheat Temperature 66°C (150°F) Interpass Temp. (Max.) 232°C (450°F)

POSTWELD HEAT TREATMENT (QW-407)

Temperature N/A Time N/A

GAS (QW-408)

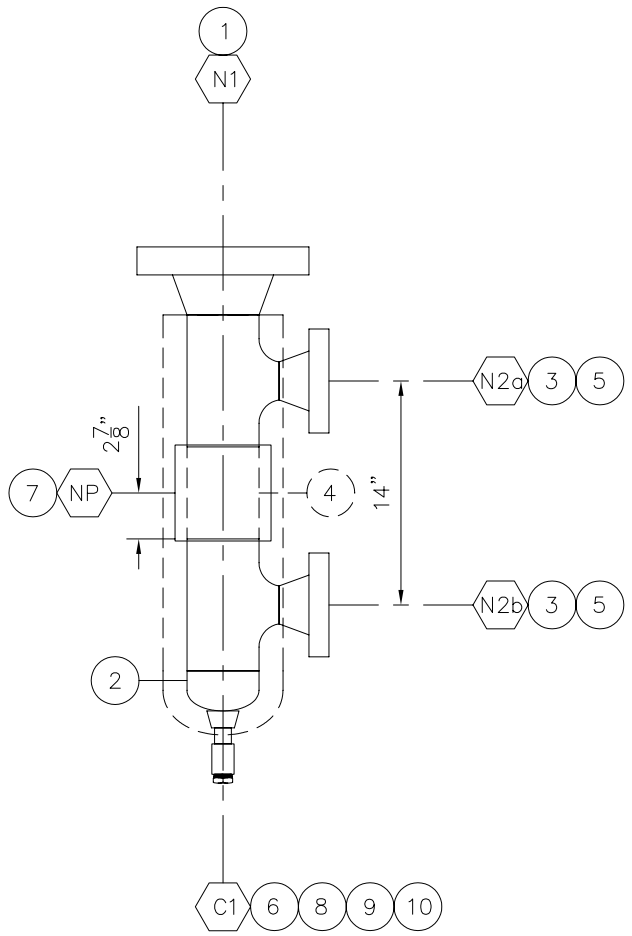
Specification No. (SFA) SFA 5.32
AWS No. (Class) GMAW: SG-AC-25 GMAW (Metalcore): SG-AC-8
Shielding GMAW: 75% Argon, 25% CO2, 12.5 liters per minute (25 cfph)
Shielding GMAW (Metalcore): 92% Argon, 8% CO2, 12.5 liters per minute (25 cfph)
Backing Without Trailing Without

ELECTRICAL CHARACTERISTICS (QW-409)

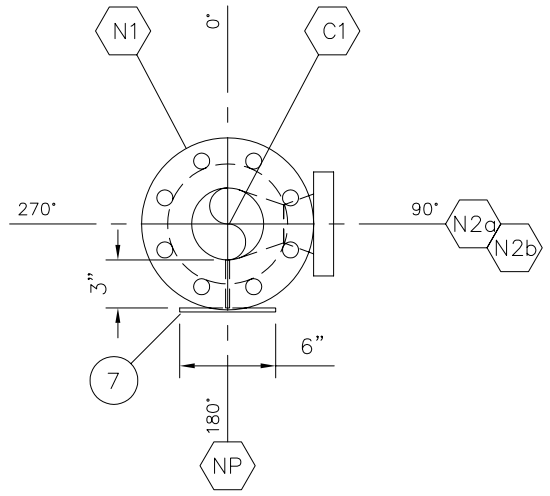
Current Direct Polarity Reverse, electrode positive
Amps See next page Volts See next page
Heat Input ER70S-2: 26,320 J/in. maximum E70C-6M: 21,320 J/in. maximum
Mode of Metal Transfer GMAW: Short circuiting arc GMAW (Metalcore): Spray arc

TECHNIQUE (QW-410)

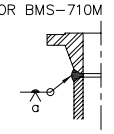
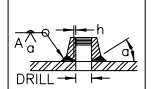
String or Weave GMAW: Weave GMAW (Metalcore): Weave
Travel Speed See next page
Multiple or Single Pass Per Side GMAW: Single GMAW (Metalcore): Multiple
Multiple or Single Electrodes Single



ELEVATION



ORIENTATION

WELD DETAIL 1	WELD DETAIL 2
ROOT: BMS-20N OR BM-11 F&C: BMS-20N OR BMS-710M	ROOT: BMS-20N F&C: BMS-20N OR BMS-710M
	
R=1/8" (±1/8") a=75° (±15°)	R=1/8" (±1/8") a=MIN. 30° h=1/16" (±1/16")

NOZ NO.	NO. REQ'D	SIZE REQ'D	RATING	TYPE OF SERVICE	OD OF NOZ NECK	PROJECTION OUTSIDE	PROJECTION INSIDE	REIF PAD OD x THK	WELD DETAIL	FILLET WELD SIZE A	FILLET WELD SIZE B	FILLET WELD SIZE C	BILL OF MAT'L ITEM No.	REMARKS
N1	1	4"	600	LT	4.500"	·	·	·	1	·	·	·	1	INSPECTION
N2ab	2	2"	600	BRIDLE	2.375"	·	·	·	1	·	·	·	3,5	·
C1	1	3/4"	3000	DRAIN	TOL	·	·	·	2	3/8	·	·	6,8,9,10	·

BILL OF MATERIAL

ITEM	QTY.	DESCRIPTION
1	1	RFWN, 4" 600 ANSI SCH. 80, SA350-LF2 CL1
2	1	WELD CAP, 4" SCH. 80, SA420WPL6
3	2	WELD REDUCING TEE, 4" X 2" SCH. 80, SA420WPL6
4	1	PIPE, 4" SCH. 80 (0.337") X 5 3/4" LONG, SA333GR.6
5	2	RFWN, 2" 600 ANSI SCH. 80, SA350-LF2 CL1
6	1	TOL, 3/4" 3M X 5 – 3", SA350LF2 CL1
7	1	T-BRACKET NAME PLATE HOLDER, 1/4" SA36/44W & VESSEL ID PLATE, ALUM
8	1	TBE PIPE NIPPLE, 3/4" X 2" S160, SA333GR.6
9	1	FULL CPLG, 3/4" 3M, SA350LF2 CL1
10	1	FS HEX PLUG, 3/4" 6M, SA350LF2 CL1

NOTES: (1)
- 100% X-RAY ON ALL VESSEL AND NOZZLE BUTT WELDS
- COMMERCIAL SANDBLAST TO SSPC-SP6 (FLANGES ONLY)
- PRIME: CLOVERDALE INORGANIC ZINC PRIMER, 2 MILS DFT (FLANGES ONLY)
- FINISH: CLOVERDALE SILOCON ACRYLIC, 1.5 MILS DFT (FLANGES ONLY)
- COLOUR: SILVER GREY
- 1 1/2" THK MINERAL WOOL INSULATION C/W 0.020" STUCCO EMBOSSED ALUM CLADDING AND SS BANDING

REV. No.	DATE MM	DD	YY	DESCRIPTION	CALC NO.	BY	CHK'D	SIGN'D
1	09	20	11	AS-BUILT		SW	SW	SW
0	08	05	11	ISSUED FOR CONSTRUCTION		MWC	SW	SW

ASME 2010 ED. CODE SECT. VIII DIV. 1

BMS AQP 1009 (S)	REGISTERED WELD PROCEDURE 505.2
FOR VESSEL TOLERANCES, SEE WELDER HANDBOOK	
VESSEL TYPE: FITTING	
M.A.W.P.: 900 PSIG (6206 kPa) AT +550°F (+288°C)	
M.D.M.T.: −49°F (−45°C) AT 900 PSIG (6206 kPa)	
IMPACT TESTING EXEMPT PER UCS 66(a)(b)(g)	
P.W.H.T.: NIL	
RADIOGRAPHY: X-RAY (RT-1)	CIRC.: FULL LONG: SMLS
JOINT EFFICIENCY:	HEADS: 1.00 SHELL: 1.00
CORROSION ALLOWANCE: 1/8"	
HYDROSTATIC TEST: 1170 PSIG (8067 kPa)	
VOLUME: 0.20 ft³ (0.01 m³)	
WEIGHT (DRY): 123 lb (56 kg)	

CLIENT:
HUSKY OIL OPERATIONS LIMITED

BROMLEY MECHANICAL SERVICES
A DIVISION OF ARGO SALES LTD.
925 23 Street SW, Medicine Hat, Alberta, Canada T1A 8R1
Ph: (403) 526-3142 Fax: (403) 526-1061
Toll Free (800) 215-9806

PROJECT: HOT WATER VAPOR PROCESS PILOT PROJECT
LSD: 10-04-050-24 W3M
V-108

TITLE: 4"NPS X 22 1/4" S/S X 900 PSI FLOAT CAGE

C.R.N.: 0H11718.2	Wo No.: 34000	SERIAL No.: 3508	
DRAWN BY: S. WALL	REV. No.: 1	DATE: MM/DD/YY	09/20/11
DATE: MM/DD/YY 08/01/11	SCALE: 1"=1'-0"	CAD No.:	34000-1