• 7817 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 468-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimetinc.com

"Your source of Quality Materials Engineering"

CHARPY V-NOTCH IMPACT TEST RESULTS

For Procedure Qualification Report # SAS-1

Client:	Sub Arc Systems	**Job Number:**	636-01001
Address:	4605-47 Steet Vermillion, AB	**Date:**	January 4, 2002
Materials:	SA-516 Grade 60 to 70		
Size:	1.750" wt plate	**Condition:**	As Welded
Specimen Type:	10.0 mm Charpy V Notch impact specimens		
Specification:	ASTM A-370, ASME Section VIII UG-84		
Qualification Temp.:	-46°C (-50°F)		

Sample Set	Sample Number	Impact Energy Ft-lb	(Joule)	Converted Full Size Impact Energy (J)	% Shear
Weld Zone – Root	1	14	19	24	20
Includes Both	2	48	65	81	20
SMAW Processes	3	38	51	64	20
	Average:	33	45	57	20
Weld Zone – Fill	1	58	79	79	10
	2	45	61	61	20
	3	88	119	119	40
	Average:	64	86	86	23
Heat Affected Zone	1	18	24	24	20
SA-516 Gr. 70	2	122	165	165	60
	3	101	137	137	70
	Average:	80	109	109	50
Heat Affected Zone	1	98	133	133	40
SA-516 Gr. 70	2	132	179	179	100
	3	86	117	117	40
	Average:	105	143	143	60

Remarks: These Charpy v-notch impact test results exceed the minimum requirements of ASME Section VIII and B31.3 Codes for –46°C; or CSA Z662-99 Codes for -46°C.

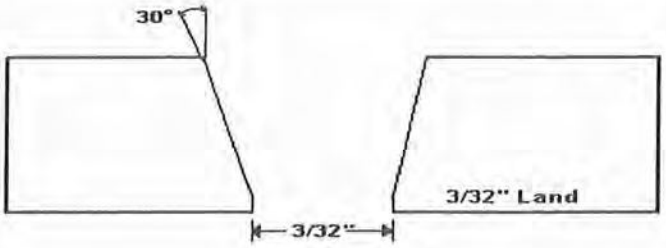
We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

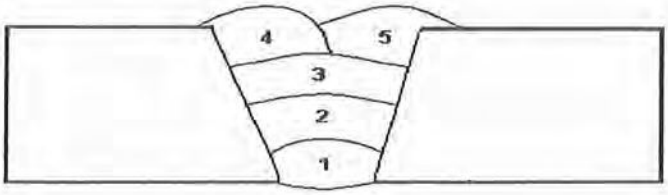
Test Results Certified By: M Flynn **QUALIMET INC.**

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub Arc Systems		
PQR No:	SAS-1-2	**Date:**	January 4, 2002
Revision No.:	-----	**Revision Date:**	-----
WPS No:	SAS-1		
Welding Process(es):	SMAW/ SMAW/ SAW		
Types:	Manual/ Manual/ Machine		

JOINTS QW-402





BASE METALS QW-403

Material Spec.:	SA-516	To	SA-516
Type or Grade:	Grade 60		Grade 70
P-No.:	P-1 Group 1		P-1 Group 2
Thickness of Test Coupon:	0.375" wt.		
Diameter of Test Coupon:	Plate		
Other:	Carbon Equivalent (C.E) : 0.38		

POSTWELD HEAT TREATMENT QW-407

Temperature:	
Time:	
Other:	*Not Applicable*

PREHEAT QW-406

Preheat & Interpass Min.:	50 °F
Interpass Max.:	600°F
	Temperature monitored using Tempilstick

SHIELDING GAS QW-408

Shielding Gas:	N/A
Composition:	N/A
Flow Rate:	N/A

FILLER METALS QW-404

Process	SMAW	SMAW	SAW
SFA Spec No:	5.1	5.1	5.17
AWS Class. No:	E6010	E7018-1	EM12K
F-No:	F-3	F-4	F-6
A-No:	A-1	A-1	A-1
Size of Filler Metal:	1/8"	3/32"	3/32"
Deposited Metal:	0.100"	0.125"	0.150"
Flux Class:	N/A	N/A	F7A6 (Neutral)
Other:	Covered Electrode	Covered Electrode	Coiled Solid Wire
			(Lincoln L61/882)

ELECTRICAL CHARACTERISTICS QW-409

Process:	SMAW	SMAW	SAW
Current:	Direct (DC)	Direct (DC)	Direct (DC)
Polarity:	Reverse (EP)	Reverse (EP)	Reverse (EP)
Volts:	21	21	30
Amps:	110	110	425
Heat Input (J/in):	39 610	55 428	36 428

TECHNIQUE QW-410

Process:	SMAW	SMAW	SAW
Position:	3G	3G	2G
Progression:	Vertical Up	Vertical Up	Horizontal
Travel Speed (ipm):	3.5	2.5	21
String or Weave:	String	String and Weave	String
Oscillation:	N/A	N/A	N/A
Single / Multi Pass:	Multiple	Multiple	Multiple
Single / Multi Electrodes:	Single	Single	Single
Wire Feed Rate:	N/A	N/A	83 ipm

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

PQR # SAS-1-2

Tensile Test
QW-462

Specimen No.	Width In	Thickness In	Area In^2	Ultimate Total Load Lb	Ultimate Unit Stress psi	Type of Failure & Location
		See Attached Report				

Guided Bend Tests
QW-462

Type and Figure No.	Result
See Attached Report	

Toughness Tests
QW-170

Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values	Lateral Exp % Shear	Lateral Exp Mils	Drop Weight Break	Drop Weight No Brk
			See Attached Report					

Fillet-Weld Tests
Not Applicable

Result-Satisfactory: Yes ____ No ____ Pen. Into Parent Material: Yes ____ No ____
Macro-Results:

Other Tests

Type of Test: Vickers Hardness Test to NACE MR01
Deposit Analysis: N/A

Welder's Name: Gary Kolman **Clock No.:** W-2368 **Stamp ID:** CD
Tests Conducted By: Qualimet Inc. **Lab. Test No.:** 636 – 01001

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

Manufacturer: Sub Arc Systems

Date: January 4, 2002 **By:** Gary Kolman

• 7817 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimetinc.com

"Your source of Quality Materials Engineering"

MECHANICAL TEST REPORT

for Procedure Qualification Record # SAS-1-2

Client:	Sub Arc Systems	**Job Number:**	636-01001
Address:	4605-47 Steet Vermillion, AB	**Date:**	January 4, 2002
Materials:	SA-516 Grade 60 to 70		
Size:	0.375" wt plate	**Condition:**	As Welded
Test Specification:	ASME Section IX		

Tensile Tests QW - 462.1(a)

Sample Identification:	CDT1	CDT2
Sample Size - inch:(W x T)	0.7300 x 0.3600	0.7200 x 0.380
Least X-Sect. Area – In^2:	0.263	0.360
Ultimate Load – lbs:	22 340	22 408
Ult. Ten. Strength – ksi:	85.0	86.4
Character of Failure:	Ductile	Ductile
Location of Failure:	Base Metal SA-516 Gr.60 Side	Base Metal SA-516 Gr.60 Side
Req'd Tensile Strength – ksi:	60.0	60.0
Pass or Fail:	Passed	Passed
Remarks:		

*Bend Test QW - 462.2

Sample Identification:	CDB1	CDB2	CDB3	CDB4
Type of Bend Test:	TSB	TSB	TSB	TSB
Pass or Fail:	Pass	Pass	Pass	Pass
Remarks:				

*Types of Bend Tests
TSB, TFB, TRB = transverse side, face or root bend
LSB, LFB, LRB = longitudinal side, face or root bend

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

TEST RESULTS CERTIFIED BY: **QUALIMET INC.**

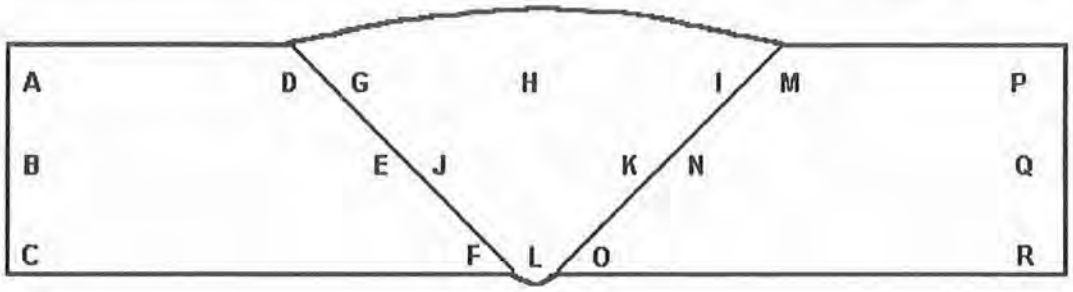
• 7817 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimetinc.com

"Your source of Quality Material Engineering"

HARDNESS TEST REPORT

for Procedure Qualification Record # SAS-1-2

Client:	Sub Arc Systems	**Job Number:**	636-01001
Address:	4605-47 Steet Vermillion, AB	**Date:**	January 4, 2002
Materials:	SA-516 Grade 60 to 70		
Size:	0.375" wt plate	**Condition:**	As Welded
Test Method:	Hardness testing performed in accordance with ASTM E-92 using a Vickers Hardness Tester with a 10 kg load. (HV10)		
Equipment:	Matsuzawa Seiki Co. Ltd. Vickers Hardness Tester S/N: 7193M		
Calibration:	**Test Block :** 197 ± 6 DPH	**Act. Reading:**	197 DPH



Hardness Values

A	198	D	208	G	215	J	212	M	204	P	193
B	195	E	203	H	211	K	215	N	202	Q	189
C	196	F	206	I	210	L	209	O	207	R	195

These hardness values do not exceed 248 HV10 (22 HRC).

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX and NACE MR01

Test Results Certified by: MKamm **QUALIMET INC.**

• 7817 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimetinc.com

"Your source of Quality Materials Engineering"

CHARPY V-NOTCH IMPACT TEST RESULTS

For Procedure Qualification Report # SAS-1-2

Client:	Sub Arc Systems	**Job Number:**	636-01001
Address:	4605-47 Steet Vermillion, AB	**Date:**	January 4, 2002
Materials:	SA-516 Grade 60 to 70		
Size:	0.375" wt plate	**Condition:**	As Welded
Specimen Type:	8.5 mm Charpy V Notch impact specimens		
Specification:	ASTM A-370, ASME Section VIII UG-84		
Qualification Temp.:	-46°C (-50°F)		

Sample Set	Sample Number	Impact Energy Ft-lb	Impact Energy (Joule)	Converted Full Size Impact Energy (J)	% Shear
	1	10	14	16	20
Weld	2	12	16	19	20
	3	24	33	38	20
	Average:	15	21	24	20
Heat Affected Zone	1	82	111	131	70
SA516 Gr. 60	2	106	144	169	80
	3	146	198	233	100
	Average:	111	151	178	83
Heat Affected Zone	1	98	133	166	40
SA516 Gr. 70	2	132	179	224	100
	3	86	117	146	40
	Average:	105	143	179	60

Remarks: These Charpy v-notch impact test results exceed the minimum requirements of ASME Section VIII and B31.3 Codes for -46°C; or CSA Z662-99 Codes for -46°C.

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

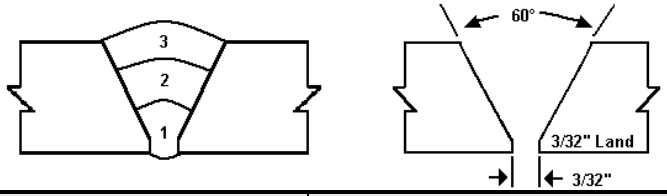
Test Results Certified By: **QUALIMET INC.**

PROCEDURE QUALIFICATION RECORD (PQR) QW-483

(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub Arc Systems	**By:**	Gary Kohlman
PQR No.:	SAS-1-3	**Date:**	January 4, 2002
Revision No.:	1[1]	**Revision Date:**	July 15, 2014
Welding Process(es):	SMAW / SMAW / SAW	**Types:**	Manual / Manual / Machine

JOINTS QW-402



BASE METALS QW-403

Material Spec.:	SA-516		SA-516
Grade/Type/Class:	Gr. 60		Gr. 70
P-No. Group No.:	P-1 Group 1	**to**	P-1 Group 2
Heat No.:	Not Recorded		Not Recorded
ASME C.E.:	Not Recorded		Not Recorded
CSA C.E.:	Not Recorded		Not Recorded
Thickness & Diameter:	0.249" thick plate (machined)		
Max Weld Deposit:	<0.500" per pass		

POSTWELD HEAT TREATMENT QW-407

Temperature:	
Time:	
Heating:	
	(Not Applicable)
Cooling:	
Other:	

PREHEAT QW-406

Preheat Temp. Min.:	50ºF
Interpass Temp. Max.:	600ºF
Interpass Temp. Min.:	50ºF
Other:	Temperature monitored by tempilstiks

POSITIONS QW-405

Process:	F-3 SMAW	F-4 SMAW	SAW
Position:	3-G	3-G	2-G
Progression:	Vertical Up	Vertical Up	Horizontal
Other:	Not Applicable	Not Applicable	Not Applicable

FILLER METALS QW-404

Process:	**SMAW**	**SMAW**	**SAW**
SFA Specification No.:	5.1	5.1	5.17
AWS Classification No.:	E6010	E7018-1	EM12K
F-No.:	F-3	F-4	F-6
A-No.:	A-1	A-1	A-1
Size of Filler Metal:	1/8"	3/32"	3/32"
Deposited Weld Metal:	0.050"	0.075"	0.125"
Electrode-Flux (Class):	Not Applicable	Not Applicable	F7A6
Flux Trade Name:	Not Applicable	Not Applicable	Lincolnweld 882
Alloy Element/Flux:	Not Applicable	Not Applicable	None
Manufacturer:	Not Recorded	Not Recorded	Lincoln Electric
Trade Name:	Not Recorded	Not Recorded	L-61
Heat Number:	Not Recorded	Not Recorded	Not Recorded
Product Form:	Covered Electrode	Covered Electrode	Coiled Metal Cored Wire

SHIELDING GAS QW-408

Shielding Gas:			
Composition:			
Flow Rate:	***(Not Applicable)***	***(Not Applicable)***	***(Not Applicable)***
Trailing / Backing Gas:			
Flow Rate:			

ELECTRICAL CHARACTERISTICS QW-409

Current:	Direct (DC)	Direct (DC)	Direct (DC)
Polarity:	Reverse (EP)	Reverse (EP)	Reverse (EP)
Volts:	21	20	30
Amps:	110	105	425
Travel Speed (ipm):	5.5	4.3	24
Maximum Heat Input (J/in):	25 200	29 640	36 428
Wire Feed Speed (ipm):	Not Applicable	Not Applicable	82
Mode of Metal Transfer:	Not Applicable	Not Applicable	Not Applicable

TECHNIQUE QW-410

String or Weave:	String	String & Weave	String
Oscillation:	Not Applicable	Not Applicable	Not Applicable
Single / Multi Pass:	Single Pass from one side	Single Pass from one side	Single Pass from one side
Single / Multi Electrodes:	Single	Single	Single
Thermal Processes	Not Applicable	Not Applicable	Not Applicable
Wire Stick Out:	Not Applicable	Not Applicable	Not Recorded
Nozzle / Cup Size:	Not Applicable	Not Applicable	Not Applicable

[1] **Revision 1: Revision to correct editorial error.**

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

PQR # SAS-1-3 Revision 1

Tensile Test
QW-462

Specimen No.	Width in	Thickness in	Area in^2	Ultimate Total Load Lb	Ultimate Unit Stress ksi	Type of Failure & Location
		(Not Applicable)				

Guided Bend Tests
QW-462

Specimen No.	Type	Figure	Result
	(Not Applicable)		

Toughness Tests
QW-170

Specimen No.	Notch Location	Notch Type	Test Temp	Full Size Values (ft-lbs)	% Shear	Lateral Exp Inches	Drop Weight Break	Drop Weight No Brk
CE-1	Weld	V-Notch	-50°F	76	80	Not Recorded	N/A	N/A
CE-2	Weld	V-Notch	-50°F	92	80	Not Recorded	N/A	N/A
CE-3	Weld	V-Notch	-50°F	100	100	Not Recorded	N/A	N/A
CE-4	HAZ (Grade 60)	V-Notch	-50°F	56	40	Not Recorded	N/A	N/A
CE-5	HAZ (Grade 60)	V-Notch	-50°F	72	40	Not Recorded	N/A	N/A
CE-6	HAZ (Grade 60)	V-Notch	-50°F	52	30	Not Recorded	N/A	N/A
CE-7	HAZ (Grade 70)	V-Notch	-50°F	82	40	Not Recorded	N/A	N/A
CE-8	HAZ (Grade 70)	V-Notch	-50°F	74	40	Not Recorded	N/A	N/A
CE-9	HAZ (Grade 70)	V-Notch	-50°F	72	40	Not Recorded	N/A	N/A

Fillet-Weld Tests
Not Applicable

Result-Satisfactory: Yes _____ No _____ Pen. into Parent Material: Yes _____ No _____
Macro-Results:

Other Tests
Not Applicable

Type of Test:
Other:

Welder's Name: Gary Kohlman **Reg. No.:** W-2368 **Stamp ID:** CE
Tests Conducted By: Qualimet **Lab. Test No.:** 100-14010
Revisions By: Qualimet

We hereby recertify that the statements in this record have been revised in accordance with paragraph QW-200.2 are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: Sub Arc Systems

Original Cert. Date: January 4, 2002 **Certified By:** Gary Kohlman

Recertification Date: July 16, 14 **Certified By:** 

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

REVISED CHARPY IMPACT TEST REPORT**

for Procedure Qualification Record # SAS-1-3

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-01001
Address:	4605-47 Street, Vermillion AB, T9X 1L6	**Date:**	January 4, 2002
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70	**Revision Date:**	July 15, 2014
Size:	0.249" w.t. Plate (machined)	**Condition:**	As Welded
Test Specification:	ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch		
Qualification Temperature:	-50.0°F	**Test Temperature:**	-50.0°F

Specimen Size (mm): 5

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lat. Exp. (in.)
Weld (Includes all processes)	1	38	76	80	Not Recorded
	2	46	92	80	Not Recorded
	3	50	100	100	Not Recorded
	Average:	**45**	**89**	**87**	**Not Recorded**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

**Revision of test report to correct editorial error.

TEST RESULTS CERTIFIED BY: Qualimet

Hanibal Ghile, E.I.T.

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

REVISED CHARPY IMPACT TEST REPORT**

for Procedure Qualification Record # SAS-1-3

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-01001
Address:	4605-47 Street, Vermillion AB, T9X 1L6	**Date:**	January 4, 2002
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70	**Revision Date:**	July 15, 2014
Size:	0.249" w.t. Plate (machined)	**Condition:**	As Welded
Test Specification:	ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch		
Qualification Temperature:	-50.0°F	**Test Temperature:**	-50.0°F

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lat. Exp. (in.)
HAZ (Grade 60)	1	28	56	40	Not Recorded
	2	36	72	40	Not Recorded
	3	26	52	30	Not Recorded
	Average:	**30**	**60**	**37**	**Not Recorded**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

**Revision of test report to correct editorial error.

TEST RESULTS CERTIFIED BY: Qualimet

Hanibal Ghile, E.I.T.

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

REVISED CHARPY IMPACT TEST REPORT**

for Procedure Qualification Record # SAS-1-3

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-01001
Address:	4605-47 Street, Vermillion AB, T9X 1L6	**Date:**	January 4, 2002
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70	**Revision Date:**	July 15, 2014
Size:	0.249" w.t. Plate (machined)	**Condition:**	As Welded
Test Specification:	ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch		
Qualification Temperature:	-50.0°F	**Test Temperature:**	-50.0°F

Specimen Size (mm): 5

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lat. Exp. (in.)
HAZ (Grade 70)	1	41	82	40	Not Recorded
	2	37	74	40	Not Recorded
	3	36	72	40	Not Recorded
	Average:	**38**	**76**	**40**	**Not Recorded**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

**Revision of test report to correct editorial error.

TEST RESULTS CERTIFIED BY: Qualimet

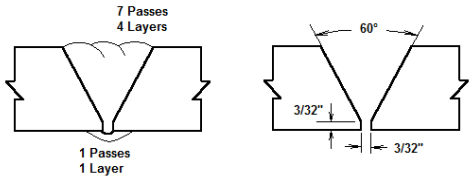
Hanibal Ghile, E.I.T.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483

(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub-Arc Systems Inc.	**By:**	Gary Kohlman
PQR No.:	SAS-1-4	**Date:**	July 15, 2014
Revision No.:	0	**Revision Date:**	-----
Welding Process(es):	SMAW / SMAW /SAW	**Type(s):**	Manual / Manual / Machine

JOINTS QW-402



BASE METALS QW-403

Material Spec.:	SA-516		SA-516
Grade/Type/Class:	Grade 60/70		Grade 60/70
P-No. Group No.:	P-1 Group 1/2	**to**	P-1 Group 1/2
Heat No.:	E3D260		E3D260
Carbon Equivalent (ASME):	0.42		0.42
Carbon Equivalent (CSA):	0.42		0.42
Thickness & Diameter:	0.500" w.t. Plate		
Max Weld Deposit:	<0.500" per pass		

POSTWELD HEAT TREATMENT QW-407

Temperature:	
Time:	
Heating:	***(None – As Welded)***
Cooling:	
Other:	

PREHEAT QW-406

Preheat Temp. Min.:	50°F
Interpass Temp. Max.:	600°F
Interpass Temp. Min.:	50°F
Other:	Temperature monitored using tempilstiks

POSITIONS QW-405

Process:	F-3 SMAW	F-4 SMAW	SAW
Position:	3-G	3-G	2-G
Progression:	Vertical Up	Vertical Up	Horizontal
Other:	N/A	N/A	N/A

FILLER METALS QW-404

Process:	**SMAW**	**SMAW**	**SAW**
SFA Specification No.:	5.1	5.1	5.17
AWS Classification No.:	E6010	E7018-1	EM12K-H8
F-No.:	F-3	F-4	F-6
A-No.:	A-1	A-1	A-1
Size of Filler Metal:	1/8"	3/32"	3/32"
Deposited Weld Metal:	0.125"	0.125"	0.250"
Manufacturer:	Lincoln Electric	ESAB	Lincoln Electric
Trade Name:	Fleetweld 5P+	OK55	LA-61
Heat / Lot Number:	ED511111	SB248224	500344
Electrode-Flux (Class):	Not Applicable	Not Applicable	F7A6-EM12K-H8
Flux Tradename:	Not Applicable	Not Applicable	Lincolnweld 882 Flux
Flux Heat / Lot Number.:	Not Applicable	Not Applicable	12R13
Product Form:	Covered Electrode	Covered Electrode	Coiled Solid Wire

SHIELDING GAS QW-408

Shielding Gas:			
Composition:	***(Not Applicable)***	***(Not Applicable)***	***(Not Applicable)***
Flow Rate:			
Backing Gas:			

ELECTRICAL CHARACTERISTICS QW-409

Current:	Direct (DC)	Direct (DC)	Direct (DC)
Polarity:	Reverse (EP)	Reverse (EP)	Reverse (EP)
Volts:	22	22	30
Amps:	80	80 - 90	420
Travel Speed (ipm):	5.9	4.9 - 5.7	21.8
Maximum Heat Input (J/in):	18 040	23 704	34 650
Tungsten Electrode:	Not Applicable	Not Applicable	Not Applicable
STT Program Settings:	Not Applicable	Not Applicable	Not Applicable

TECHNIQUE QW-410

String or Weave:	String	String	String
Oscillation:	Not Applicable	Not Applicable	Not Applicable
Single / Multi Pass:	Single Pass from one side	Multiple Passes from one side	Multiple Passes from one side
Single / Multi Electrodes:	Single	Single	Single
Wire Stick Out:	Not Applicable	Not Applicable	1/4" to 1 1/4"
Nozzle / Cup Size:	Not Applicable	Not Applicable	Not Applicable

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

PQR # SAS-1-4 Rev.0

Tensile Test
QW-462

Specimen No.	Width (in)	Thickness (in)	Area (in^2)	Ultimate Total Load (lbs)	Ultimate Unit Stress (ksi)	Type of Failure & Location
			(Not Applicable)			

Guided Bend Tests
QW-462

Specimen No.	Type	Figure	Result
		(Not Applicable)	

Toughness Tests
QW-170

Specimen No.	Notch Location	Notch Type	Qual. Temp	Full Size Values (ft-lbs)	% Shear	Lateral Exp Inches	Drop Weight Break	Drop Weight No Brk
DG-1	Weld	V-Notch	-50°F	56	30	0.040	-----	-----
DG-2	Weld	V-Notch	-50°F	58	40	0.041	-----	-----
DG-3	Weld	V-Notch	-50°F	66	40	0.044	-----	-----
DG-4	HAZ	V-Notch	-50°F	56	-----**	-----**	-----	-----
DG-5	HAZ	V-Notch	-50°F	28	30	0.019	-----	-----
DG-6	HAZ	V-Notch	-50°F	89	-----**	-----**	-----	-----

**Shear and Lateral Expansion not recorded – specimen did not break

Fillet-Weld Tests
Not Applicable

Result-Satisfactory: **Yes** _____ **No** _____ Pen. into Parent Material: **Yes** ___ **No** _____
Macro-Results:

Other Tests

Type of Test: Not Applicable
Other: Not Applicable

Welder's Name: Keith Breedon **Reg. No.:** W-11618 **Stamp ID:** DG
Tests Conducted By: Qualimet **Lab. Test No.:** 100-14010

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

Manufacturer: Sub-Arc Systems Inc.
Date: July 15, 2014 **Certified By:** Gary Kohlman

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-1-4

Client:	Sub-Arc Systems Inc.	**Job Number:**	100-14010
Address:	4605-47 Street, Vermillion AB, T9X 1L6	**Date:**	July 15, 2014
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70		
Size:	0.500" w.t. Plate	**Condition:**	As Welded
Test Specification:	ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch		
Qualification Temperature:	-50.0°F	**Test Temperature:**	-50.0°F

Specimen Size (mm): 10

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
Weld (includes all processes)	DG-1	56	56	30	0.040
	DG-2	58	58	40	0.041
	DG-3	66	66	40	0.044
	Average:	**60**	**60**	**37**	**0.042**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

TEST RESULTS CERTIFIED BY: Qualimet

Hanibal Ghile, E.I.T.

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-1-4

Client:	Sub-Arc Systems Inc.	**Job Number:**	100-14010
Address:	4605-47 Street, Vermillion AB, T9X 1L6	**Date:**	July 15, 2014
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70		
Size:	0.500" w.t. Plate	**Condition:**	As Welded
Test Specification:	ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch		
Qualification Temperature:	-50.0°F	**Test Temperature:**	-50.0°F

Specimen Size (mm): 10

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
HAZ	DG-4	56	56	-----**	-----**
	DG-5	28	28	30	0.019
	DG-6	89	89	-----**	-----**
	Average:	**58**	**58**	-----**	-----**

**Shear and Lateral Expansion not recorded – specimen did not break

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

TEST RESULTS CERTIFIED BY: Qualimet

Hanibal Ghile, E.I.T.

SUB-ARC SYSTEMS INC.

Welding Procedure Specification

in accordance with

ASME Section IX

Welding Procedure Specification No.: SAS-2 Revision 2[1]

Supporting PQR No. (s): SAS-2-1 Revision 1, SAS-2-2 Revision 1, SAS-2-3 Revision 1, SAS-2-4 Revision 1

Qualified for

Process(es):	SAW (Leading) / SAW (Trailing)	**Position(s):**	Flat, Horizontal
Filler Metal F-No.:	F7A6-EM12K -H8 / F7A6-EM12K-H8	**A-No.:**	A-1 / A-1
AWS Classification:	F-6 / F-6	**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 applications where proven notch toughness properties are not required, and P-1 Group 1 or 2 materials only for applications where proven notch toughness properties are required.		
Diameter Range:	All diameters	**Condition(s):**	As Welded

Thickness Range:

	Normal Service	Impact Tested to -50°F
ASME Section IX	0.062" to 1.500"	0.125" to 1.500"
ASME Section VIII	0.062" to 1.500"	0.125" to 1.500"
ASME B31.1	0.062" to 0.750"	0.125" to 0.750"
ASME B31.3	0.062" to 0.750"	0.125" to 0.750"

[1]**Revision 2:** Review and update to the current edition of the ASME code.

Provincial Registration

ABSA

SAFETY CODES ACT - PROVINCE OF ALBERTA
WELDING PROCEDURE

Reg. No. WP 2389.2
Spec No. SAS-2 (Rev 2)
Weld Process SAW
Matl. Gr. P No. 1Gr 1+2 to P No. 1 Gr 1+2
Elect Gr. F No. 6 A No. 1
Th. Qual For 38.1mm P.W.H.T. NO
MIN TH QUAL 3.2mm, CVN -46°C

Yr. 14 Mo. 11 Day 5 Signed
JASON REINHART, P.ENG.
WELDING SPECIALIST

Provincial Registration

WELDING PROCEDURE SPECIFICATION (WPS) QW-482

(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub-Arc Systems Inc.	**By:**	Gary Kohlman
WPS No.:	SAS-2	**Date:**	June 4, 2010
Revision No.:	2[1]	**Revision Date:**	October 3, 2014
Supporting PQR's:	SAS-2-1 Revision 1, SAS-2-2 Revision 1, SAS-2-3 Revision 1, SAS-2-4 Revision 1		
Welding Process(es):	SAW / SAW	**Type(s):**	Machine / Machine

JOINTS QW-402		**Joint Details**
Joint Design:	Butt, Tee, Lap, Corner, etc.	**All ASME joint designs.** Reference construction
Backing:	F-6 SAW (Leading) with or without backing	drawings for joint details. Where joint details are not
	F-6 SAW (Trailing) with backing only	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.: P-1 **Group No.:** *1 or 2 **to P-No.:** P-1 **Group No.:** *1 or 2

OR

Spec. type & grade: Not Applicable **to Spec. type & grade:** Not Applicable

OR

Chem. Analysis & Mech. Prop.: Not Applicable **to Chem. Analysis & Mech. Prop.:** Not Applicable

Thickness Range

		Normal Service	**Impact Tested to -50°F**		
Base Metal: Groove:	Section IX	0.062" to 1.500"	0.125" to 1.500"	**Fillet:**	All
	Section VIII	0.062" to 1.500"	0.125" to 1.500"	**Fillet:**	All
	B31.1	0.062" to 0.750"	0.125" to 0.750"	**Fillet:**	All
	B31.3	0.062" to 0.750"	0.125" to 0.750"	**Fillet:**	All
Pipe Dia Range: Groove:	All diameters			**Fillet:**	All

Other: *Limited to P-1 Group 1 or 2 only when proven notch toughness properties are required.

Maximum thickness of any weld layer shall not exceed .500"

FILLER METALS QW-404

	SAW (Leading)	**SAW (Trailing)**
Process:		
Specification No. (SFA):	5.17	5.17
AWS Classification No.:	F7A6-EM12K	F7A6-EM12K
F-No.:	F-6	F-6
A-No.:	A-1	A-1
Size of Filler Metals:	3/32", 1/8", 5/32", 3/16"	3/32", 1/8", 5/32", 3/16"
Weld Metal Thickness - Groove:	1.000"	1.000"
- Fillet:	Unlimited	Unlimited
Electrode-Flux (Class):	F7A6-EM12K-H8	F7A6-EM12K-H8
Manufacturer:	Lincoln Electric	Lincoln Electric
Tradename:	LA-61	LA-61
Flux Trade Name:	Lincoln 882 Flux	Lincoln 882 Flux
Alloy Flux:	Neutral	Neutral
Consumable Insert:	Not Applicable	Not Applicable
Supplemental Filler Metals:	Not Applicable	Not Applicable
Product Form:	Coiled Solid Wire	Coiled Solid Wire

[1]**Revision 2:** Review and update to the current edition of the ASME code.

WELDING PROCEDURE SPECIFICATION (WPS) QW-482

(Section IX, ASME Boiler and Pressure Vessel Code)

WPS # SAS-2 Rev.2

POSITIONS QW-405		POSTWELD HEAT TREATMENT QW-407	
Position(s) of Groove:	All	**Temp. Range:**	
Welding Progression:	F-6 SAW (Leading) Flat or Horizontal only.	**Time Range:**	***(None – As Welded)***
	F-6 SAW (Trailing) Flat or Horizontal only.	**Heating:**	
Position(s) of Fillet:	All	**Cooling:**	
PREHEAT QW-406		**GAS QW-408**	
Temperature Min.:		**Shielding Gas(es):**	
Interpass Temp. Max.:	***(See Next Page)***	**Composition:**	
Interpass Min.:		**Flow Rate:**	***(Not Applicable)***
Preheat Maintenance:	Monitor using tempilstiks, pyrometer or other suitable methods.	**Gas Backing:**	
		Other:	

ELECTRICAL CHARACTERISTICS QW-409

Current:	**F-6 SAW (Leading):**	Direct - DC	**F-6 SAW (Trailing):**	Direct - DC
Polarity:	**F-6 SAW (Leading):**	Reverse - EP	**F-6 SAW (Trailing):**	Reverse - EP
Amps (Range):	**F-6 SAW (Leading):**	250 - 750	**F-6 SAW (Trailing):**	250 - 750
Volts (Range):	**F-6 SAW (Leading):**	22 - 38	**F-6 SAW (Trailing):**	22 - 38
Travel Speed (Range):	**F-6 SAW (Leading):**	4 - 35	**F-6 SAW (Trailing):**	4 - 35
Maximum Heat Input: 0.125" to 0.625":	**F-6 SAW (Leading):**	30 240 J/in	**F-6 SAW (Trailing):**	30 240 J/in
0.625" to 1.500":	**F-6 SAW (Leading):**	30 240 J/in	**F-6 SAW (Trailing):**	30 240 J/in
Electrode Wire feed speed range:	50 - 550 ipm			
Tungsten Electrode Size & Type:	Not Applicable			
Mode of Metal Transfer for GMAW:	Not Applicable			
Other:	Maximum heat input mandatory only when proven notch toughness is required			

TECHNIQUE QW-410

String or Weave Bead:	String and weave. Weave size shall be controlled to prevent exceeding maximum heat inputs.
Orifice or Gas Cup Size:	1/4" to 1"
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, grind, etc., grind to clean metal where thermal processes are used if required.
Oscillation:	Not Applicable
Contact Tube to Work Distance:	1/4" to 1 1/4"
Electrode Spacing:	1" to 6"
Multiple or Single Pass (per side):	Single or multiple passes per side, multiple only when proven notch toughness properties are required.
Multiple or Single Electrodes & Spacing:	Single or Multiple, multiple only when proven notch toughness properties are required.
Peening:	Peening is not allowed

TYPICAL WELDING PARAMETERS

	Filler Metal		Current			
Process	**AWS Classification**	**Diameter (in)**	**Type & Polarity**	**Amp. Range**	**Volt Range**	**Travel Speed (IPM)**
SAW	F7A6-EM12K	3/32	DC EP	250 - 750	22 - 38	4 - 35
SAW	F7A6-EM12K	1/8				
SAW	F7A6-EM12K	5/32				
SAW	F7A6-EM12K	3/16				

Notes: Number of weld layers and size of filler metal may vary with thickness of base material and position of weld.

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

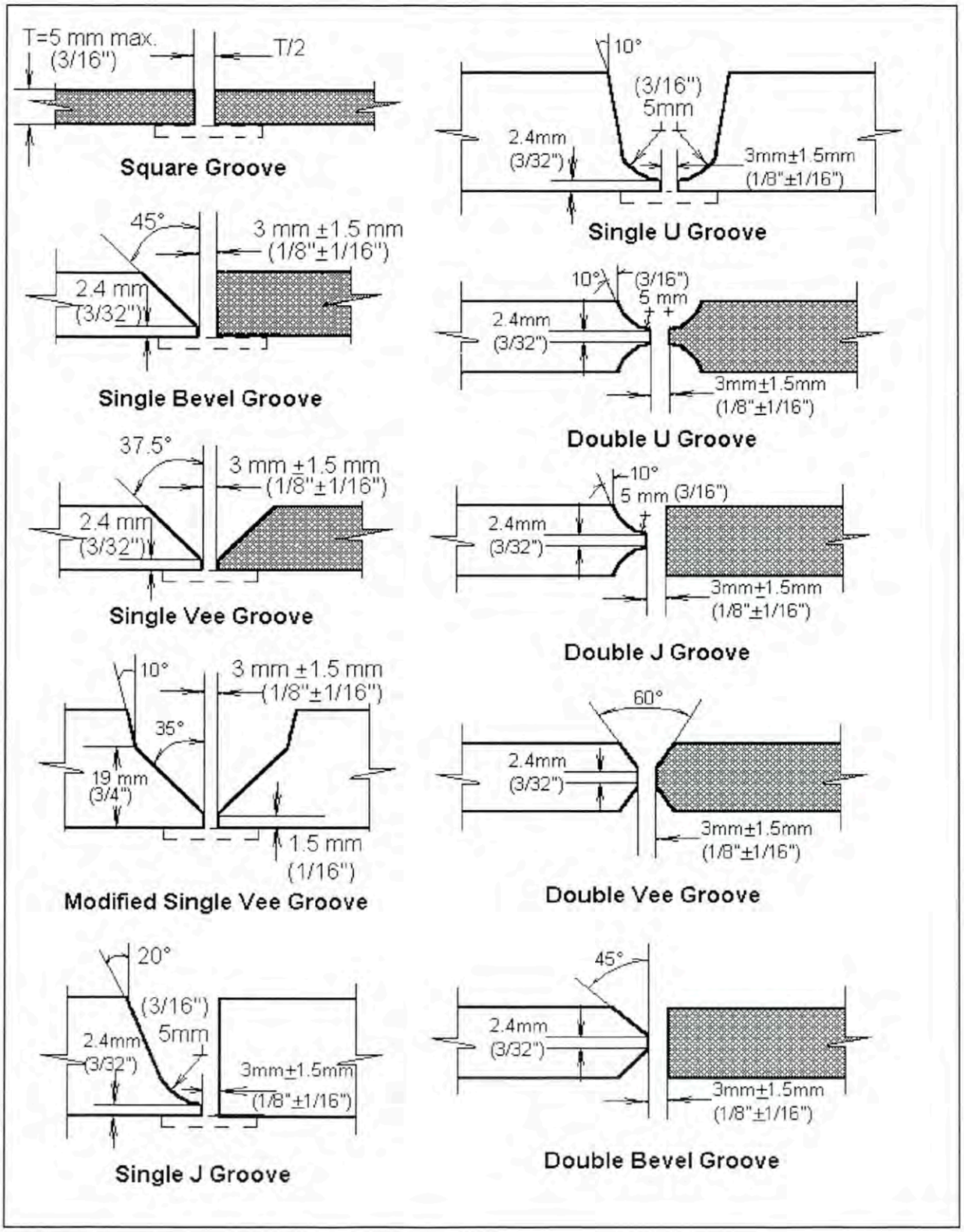
WPS # SAS-2 Rev.2

PREHEAT & INTERPASS TEMPERATURE MINIMUM AND MAXIMUM	
Section VIII :	50°F minimum for all P-1 materials except as listed below :
	175°F if the joint thickness exceeds 1.000" and the specified carbon content exceeds 0.30%
	200°F if the joint thickness is 1.250" to 1.500"
B31.1 :	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%
B31.3 :	50°F for all P-1 materials except as listed below:
	175°F if the specified minimum tensile strength of the base material exceeds 71 ksi
	175°F if the nominal wall thickness exceeds 1"
Max. Interpass Temp.:	650°F for normal service, 550°F for applications where proven notch toughness is required

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

Typical Joint Details QW-482

Prepared by: Qualimet

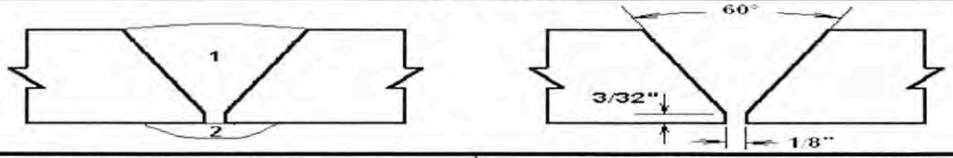


PROCEDURE QUALIFICATION RECORD (PQR) QW-483

(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub-Arc Systems Inc.	**By:**	Gary Kohlman
PQR No.:	SAS-2-1	**Date:**	June 4, 2010
Revision No.:	1[1]	**Revision Date:**	October 3, 2014
Welding Process(es):	SAW / SAW	**Types:**	Machine / Machine

JOINTS QW-402



BASE METALS QW-403			POSTWELD HEAT TREATMENT QW-407	
Material Spec.:	SA-516	SA-516	**Temperature:**	
Grade/Type/Class:	Grade 70	Grade 70	**Time:**	
P-No. Group No.:	P-1 Group 2 to	P-1 Group 2	**Heating:**	*(Not Applicable)*
Heat No.:	0934K-54	0934K-54	**Cooling:**	
Carbon Equivalent (CE):	0.39	0.39	**Other:**	
Thickness & Diameter:	0.249" Plate (machined)			
Max Weld Deposit:	<0.500" per pass			

PREHEAT QW-406		POSITIONS QW-405		
Preheat Temp. Min.:	50°F	**Process:**	**SAW (Leading)**	**SAW (Trailing)**
Interpass Temp. Max.:	550°F	**Position:**	2-G	2-G
Interpass Temp. Min.:	50°F	**Progression:**	Horizontal	Horizontal
Other:	Temperature monitored by tempilsticks	**Other:**	Not Applicable	Not Applicable

FILLER METALS QW-404

Process:	**SAW (Leading)**	**SAW (Trailing)**
SFA Specification No.:	5.17	5.17
AWS Classification No.:	EM12K-H8	EM12K-H8
F-No.:	F-6	F-6
A-No.:	A-1	A-1
Size of Filler Metal:	3/32"	3/32"
Deposited Weld Metal:	0.125"	0.125"
Manufacturer:	Lincoln Electric Co.	Lincoln Electric Co.
Trade Name:	LA-61	LA-61
Heat / Lot Number:	Not Recorded	Not Recorded
Electrode-Flux (Class):	F7A6-EM12K-H8	F7A6-EM12K-H8
Flux Tradename:	Lincolnweld 882 Flux	Lincolnweld 882 Flux
Flux Heat / Lot Number.:	Not Recorded	Not Recorded
Product Form:	Coiled Solid Wire	Coiled Solid Wire
Other:	Recrushed Slag Not Permitted	Recrushed Slag Not Permitted

ELECTRICAL CHARACTERISTICS QW-409

Process:	**SAW (Leading)**	**SAW (Trailing)**
Current:	Direct - DC	Direct - DC
Polarity:	Reverse - EP	Reverse - EP
Volts:	27	27
Amps:	400	300
Travel Speed (ipm):	20.0 - 26.0	20.0 - 24.0
Maximum Heat Input (J/in):	32 400	24 300
Tungsten Electrode:	Not Applicable	Not Applicable
STT Program Settings:	Not Appilcable	Not Appilcable
Other:	Not Applicable	Not Applicable

TECHNIQUE QW-410

String or Weave:	String	String
Oscillation:	Not Applicable	Not Applicable
Single / Multi Pass:	Single Pass Per Side	
Single / Multi Electrodes:	Multiple Electrodes	
Wire Stick Out:	1/4" to 1 1/4"	1/4" to 1 1/4"
Electrode Spacing:	Not Recorded	Not Recorded
Nozzle / Cup Size:	Not Recorded	Not Recorded

[1]**Revision 1:** Review and update to the current edition of the ASME code.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

PQR # SAS-2-1 Revision 1

Tensile Test
QW-462

Specimen No.	Width in	Thickness in	Area in^2	Ultimate Total Load Lb	Ultimate Unit Stress ksi	Type of Failure & Location
ZB-T1	0.742	0.244	0.181	15 054	83.0	Ductile - Base
ZB-T2	0.746	0.241	0.180	14 656	81.5	Ductile - Base

Guided Bend Tests
QW-462

Specimen No.	Type	Figure	Result
ZB-B1	TFB	QW-462.3(a)	Pass
ZB-B2	TFB	QW-462.3(a)	Pass
ZB-B3	TRB	QW-462.3(a)	Pass
ZB-B4	TRB	QW-462.3(a)	Pass

Toughness Tests
QW-170

Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values (ft-lbs)	% Shear	Lateral Exp Inches	Drop Weight Break	Drop Weight No Brk
ZB-1	Weld	V-Notch	-50°F	49	50	0.040	N/A	N/A
ZB-2	Weld	V-Notch	-50°F	30	40	0.026	N/A	N/A
ZB-3	Weld	V-Notch	-50°F	67	60	0.053	N/A	N/A
ZB-4	HAZ	V-Notch	-50°F	67	60	0.054	N/A	N/A
ZB-5	HAZ	V-Notch	-50°F	75	70	0.056	N/A	N/A
ZB-6	HAZ	V-Notch	-50°F	123	100	0.065	N/A	N/A

Fillet-Weld Tests
Not Applicable

Result-Satisfactory: **Yes** _____ **No** _____ Pen. into Parent Material: **Yes** _____ **No** _____
Macro-Results:

Other Tests

Type of Test: Hardness Testing - See Attached Report
Other:

Welder's Name: Matt MacKenzie **Reg. No.:** Not Applicable
Welder's Name: Joel Overguard **Reg. No.:** Not Applicable **Stamp ID:** ZB
Tests Conducted By: Qualimet **Lab. Test No.:** 636-10004
Revised By: Qualimet

We hereby recertify that the statements in this record have been revised in accordance with paragraph QW-200.2 are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: Sub-Arc Systems Inc.
Original Cert. Date: June 4, 2010 **By:** Gary Kohlman
Recertification Date: October 3, 2014 **By:** Gary Kohlman

MECHANICAL TEST REPORT

for Procedure Qualification Record # SAS-2-1

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	0.249" Plate (machined)	**Condition:**	As Welded
Test Specification:	**ASME Section IX**		

Tensile Tests QW-462.1(a)

Sample Identification:	ZB-T1	ZB-T2
Sample Size - inch:(W x T)	0.742 x 0.244	0.746 x 0.241
Least X-Sect. Area - in2:	0.181	0.180
Ultimate Load - lbs:	15 054	14 656
Ult. Ten. Strength - ksi:	83.0	81.5
Character of Failure:	Ductile	Ductile
Location of Failure:	Base Metal	Base Metal
Req'd Tensile Strength - ksi:	70.0	70.0
Pass or Fail:	Pass	Pass
Remarks:	-----	-----

Bend Tests QW-462.3 (a)

Sample Identification:	ZB-B1	ZB-B2	ZB-B3	ZB-B4
***Type of Bend Test:**	TFB	TFB	TRB	TRB
Pass or Fail:	Pass	Pass	Pass	Pass
Remarks:	-----	-----	-----	-----

*Types of Bend Tests **TSB, TFB, TRB = transverse side, face or root bend** **LSB, LFB, LRB = longitudinal side, face or root bend**

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

TEST RESULTS CERTIFIED BY:

Qualimet

Sean Lepine, E.I.T.

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-1

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	0.249" Plate (machined)	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50°F
Test Temperature:	-50°F

Specimen Size (mm): 5.35

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
Weld Zone	ZB-1	26	49	50	0.040
	ZB-2	16	30	40	0.026
	ZB-3	36	67	60	0.053
	Average:	**26**	**49**	**50**	**0.040**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASME Section IX and the latest addenda.

TEST RESULTS CERTIFIED BY:

Qualimet

Sean Lepine, E.I.T.

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-1

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	0.249" Plate (machined)	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50°F
Test Temperature:	-50°F

Specimen Size (mm): 5.35

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
HAZ	ZB-4	36	67	60	0.054
	ZB-5	40	75	70	0.056
	ZB-6	66	123	100	0.065
	Average:	**47**	**88**	**77**	**0.058**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASME Section IX and the latest addenda.

TEST RESULTS CERTIFIED BY:

Qualimet

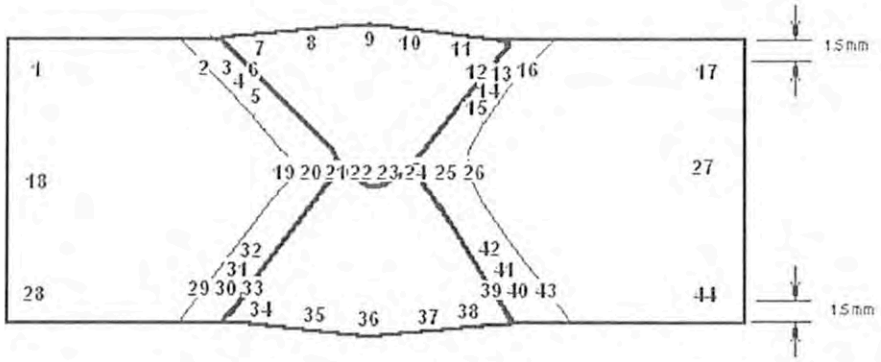
Sean Lepine, E.I.T.

HARDNESS TEST REPORT

for Procedure Qualification Record # SAS-2-1

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	0.249" Plate (machined)	**Condition:**	As Welded
Test Specification:	NACE RP0472		

Test Method:	Hardness testing performed in accordance with ASTM E-92 (Vickers Hardness of Metallic Materials) using a Vickers tester with a 1kg load.



Vickers Hardness Values

1	153	10	190	19	165	28	172	37	193
2	156	11	192	20	171	29	158	38	192
3	169	12	183	21	191	30	189	39	195
4	167	13	183	22	186	31	182	40	176
5	169	14	179	23	204	32	181	41	175
6	182	15	185	24	195	33	206	42	178
7	182	16	163	25	180	34	189	43	172
8	198	17	159	26	169	35	203	44	167
9	179	18	160	27	165	36	203		

We certify that the statements in this record are acceptable, in accordance with the requirements of NACE RP 0472. RP 0472-2005 paragraph 5.3 states "The maximum allowable HAZ hardness shall be 248 HV the maximum weld deposit hardness should be 248 HV and the average weld deposit hardness should not exceed 210 HV"

TEST RESULTS CERTIFIED BY:

Qualimet

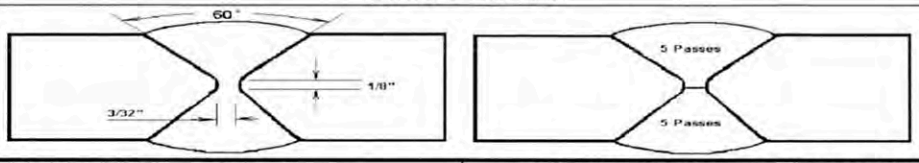
Sean Lepine, E.I.T.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483

(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub-Arc Systems Inc.	**By:**	Gary Kohlman
PQR No.:	SAS-2-2	**Date:**	June 4, 2010
Revision No.:	1[1]	**Revision Date:**	October 3, 2014
Welding Process(es):	SAW / SAW	**Types:**	Machine / Machine

JOINTS QW-402



BASE METALS QW-403

Material Spec.:	SA-516		SA-516
Grade/Type/Class:	Grade 70		Grade 70
P-No. Group No.:	P-1 Group 2	**to**	P-1 Group 2
Heat No.:	8277J		8277J
Carbon Equivalent (CE):	0.40		0.40
Thickness & Diameter:	1.000" Plate		
Max Weld Deposit:	<0.500" per pass		

POSTWELD HEAT TREATMENT QW-407

Temperature:	
Time:	
Heating:	***(Not Applicable)***
Cooling:	
Other:	

PREHEAT QW-406

Preheat Temp. Min.:	50°F
Interpass Temp. Max.:	550°F
Interpass Temp. Min.:	50°F
Other:	Temperature monitored by tempilsticks

POSITIONS QW-405

Process:	**SAW (Leading)**	**SAW (Trailing)**
Position:	2-G	2-G
Progression:	Horizontal	Horizontal
Other:	Not Applicable	Not Applicable

FILLER METALS QW-404

Process:	**SAW (Leading)**	**SAW (Trailing)**
SFA Specification No.:	5.17	5.17
AWS Classification No.:	EM12K-H8	EM12K-H8
F-No.:	F-6	F-6
A-No.:	A-1	A-1
Size of Filler Metal:	3/32"	3/32"
Deposited Weld Metal:	0.500"	0.500"
Manufacturer:	Lincoln Electric Co.	Lincoln Electric Co.
Trade Name:	LA-61	LA-61
Heat / Lot Number:	Not Recorded	Not Recorded
Electrode-Flux (Class):	F7A6-EM12K-H8	F7A6-EM12K-H8
Flux Tradename:	Lincolnweld 882 Flux	Lincolnweld 882 Flux
Flux Heat / Lot Number.:	Not Recorded	Not Recorded
Product Form:	Coiled Solid Wire	Coiled Solid Wire
Other:	Recrushed Slag Not Permitted	Recrushed Slag Not Permitted

ELECTRICAL CHARACTERISTICS QW-409

Process:	**SAW (Leading)**	**SAW (Trailing)**
Current:	Direct - DC	Direct - DC
Polarity:	Reverse - EP	Reverse - EP
Volts:	27	27 - 29
Amps:	400 - 420	320 - 415
Travel Speed (ipm):	18.0 - 25.0	18.0 - 25.0
Maximum Heat Input (J/in):	35 998	33 615
Wirefeed Speed (ipm):	410	400
STT Program Settings:	Not Appilcable	Not Appilcable
Other:	Not Applicable	Not Applicable

TECHNIQUE QW-410

String or Weave:	String	String
Oscillation:	Not Applicable	Not Applicable
Single / Multi Pass:	Multiple Passes Per Side	
Single / Multi Electrodes:	Multiple Electrodes	
Wire Stick Out:	1/4" to 1 1/4"	1/4" to 1 1/4"
Electrode Spacing:	Not Recorded	Not Recorded
Nozzle / Cup Size:	Not Recorded	Not Recorded

[1]**Revision 1:** Review and update to the current edition of the ASME code.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

PQR # SAS-2-2 Revision 1

Tensile Test
QW-462

Specimen No.	Width in	Thickness in	Area in^2	Ultimate Total Load Lb	Ultimate Unit Stress ksi	Type of Failure & Location
YE-T1	0.741	0.983	0.728	58 240	80.0	Ductile - Base
YE-T2	0.735	0.994	0.731	57 482	79.0	Ductile - Base

Guided Bend Tests
QW-462

Specimen No.	Type	Figure	Result
YE-B1	TSB	QW-462.2	Pass
YE-B2	TSB	QW-462.2	Pass
YE-B3	TSB	QW-462.2	Pass
YE-B4	TSB	QW-462.2	Pass

Toughness Tests
QW-170

Specimen No.	Notch Location	Notch Type	Test Temp	Impact Values (ft-lbs)	% Shear	Lateral Exp Inches	Drop Weight Break	Drop Weight No Brk
YE-1	Weld	V-Notch	-50°F	24	40	0.038	N/A	N/A
YE-2	Weld	V-Notch	-50°F	16	30	0.019	N/A	N/A
YE-3	Weld	V-Notch	-50°F	50	50	0.015	N/A	N/A
YE-4	HAZ	V-Notch	-50°F	58	60	0.044	N/A	N/A
YE-5	HAZ	V-Notch	-50°F	16	30	0.013	N/A	N/A
YE-6	HAZ	V-Notch	-50°F	53	60	0.078	N/A	N/A

Fillet-Weld Tests
Not Applicable

Result-Satisfactory: **Yes** _____ **No** _____ Pen. into Parent Material: **Yes** _____ **No** _____
Macro-Results:

Other Tests

Type of Test: Hardness Testing - See Attached Report
Other:

Welder's Name: Matt MacKenzie **Reg. No.:** Not Applicable
Welder's Name: Joel Overguard **Reg. No.:** Not Applicable **Stamp ID:** YE
Tests Conducted By: Qualimet **Lab. Test No.:** 636-10004
Revised By: Qualimet

We hereby recertify that the statements in this record have been revised in accordance with paragraph QW-200.2 are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: Sub-Arc Systems Inc.
Original Cert. Date: June 4, 2010 **By:** Gary Kohlman
Recertification Date: October 3, 2014 **By:** Gary Kohlman

MECHANICAL TEST REPORT

for Procedure Qualification Record # SAS-2-2

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	1.000" Plate	**Condition:**	As Welded
Test Specification:	ASME Section IX		

Tensile Tests QW-462.1(a)

Sample Identification:	YE-T1	YE-T2
Sample Size - inch:(W x T)	0.741 x 0.983	0.735 x 0.994
Least X-Sect. Area - in2:	0.728	0.731
Ultimate Load - lbs:	58 240	57 482
Ult. Ten. Strength - ksi:	80.0	79.0
Character of Failure:	Ductile	Ductile
Location of Failure:	Base Metal	Base Metal
Req'd Tensile Strength - ksi:	70.0	70.0
Pass or Fail:	Pass	Pass
Remarks:	-----	-----

Bend Tests QW-462.2

Sample Identification:	YE-B1	YE-B2	YE-B3	YE-B4
***Type of Bend Test:**	TSB	TSB	TSB	TSB
Pass or Fail:	Pass	Pass	Pass	Pass
Remarks:	-----	-----	-----	-----

*Types of Bend Tests **TSB, TFB, TRB = transverse side, face or root bend** **LSB, LFB, LRB = longitudinal side, face or root bend**

We certify that the statements in this record are acceptable, in accordance with the requirements of ASME Section IX.

TEST RESULTS CERTIFIED BY:

Qualimet

Sean Lepine, E.I.T.

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-2

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	1.000" Plate	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50°F
Test Temperature:	-50°F

Specimen Size (mm): 10

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
Weld	YE-1	24	24	40	0.038
	YE-2	16	16	30	0.019
	YE-3	50	50	50	0.015
	Average:	**30**	**30**	**40**	**0.024**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASME Section IX and the latest addenda.

TEST RESULTS CERTIFIED BY:

Qualimet

Sean Lepine, E.I.T.

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-2

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	1.000" Plate	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50°F
Test Temperature:	-50°F

Specimen Size (mm): 10

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
HAZ	YE-4	58	58	60	0.044
	YE-5	16	16	30	0.013
	YE-6	53	53	60	0.078
	Average:	**42**	**42**	**50**	**0.045**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASME Section IX and the latest addenda.

TEST RESULTS CERTIFIED BY:

Qualimet

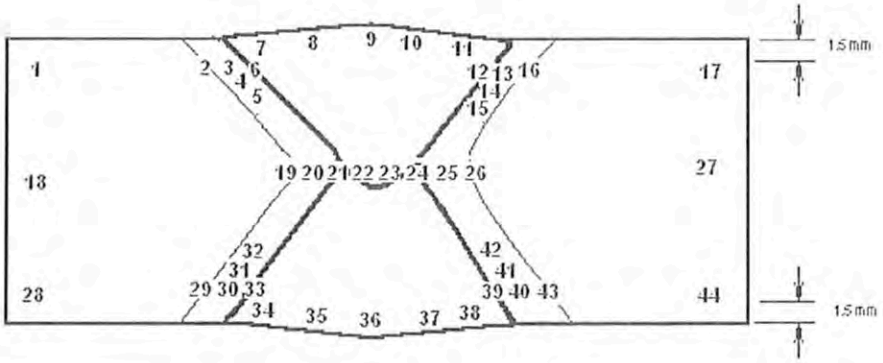
Sean Lepine, E.I.T.

HARDNESS TEST REPORT

for Procedure Qualification Record # SAS-2-2

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-10004
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	June 4, 2010
Materials:	SA-516 Grade 70		
Size:	1.000" Plate	**Condition:**	As Welded
Test Specification:	NACE RP0472		

Test Method:	Hardness testing performed in accordance with ASTM E-92 (Vickers Hardness of Metallic Materials) using a Vickers tester with a 1kg load.



Vickers Hardness Values

1	165	**10**	231	**19**	195	**28**	173	**37**	212
2	191	**11**	212	**20**	183	**29**	191	**38**	224
3	234	**12**	220	**21**	180	**30**	206	**39**	214
4	216	**13**	245	**22**	179	**31**	193	**40**	206
5	219	**14**	246	**23**	184	**32**	187	**41**	197
6	235	**15**	232	**24**	184	**33**	199	**42**	207
7	208	**16**	187	**25**	173	**34**	209	**43**	174
8	194	**17**	164	**26**	170	**35**	208	**44**	161
9	181	**18**	158	**27**	152	**36**	202		

We certify that the statements in this record are acceptable, in accordance with the requirements of NACE RP 0472. RP 0472-2005 paragraph 5.3 states "The maximum allowable HAZ hardness shall be 248 HV the maximum weld deposit hardness should be 248 HV and the average weld deposit hardness should not exceed 210 HV"

TEST RESULTS CERTIFIED BY:

Qualimet

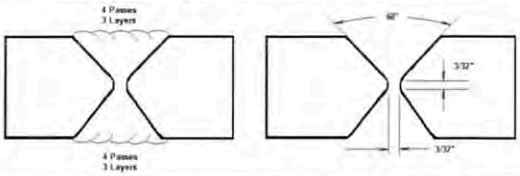
Sean Lepine, E.I.T.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483

(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub-Arc Systems Inc.	**By:**	Gary Kohlman
PQR No.:	SAS-2-3	**Date:**	January 20, 2014
Revision No.:	1[1]	**Revision Date:**	October 3, 2014
Welding Process(es):	SAW / SAW	**Type(s):**	Machine / Machine

JOINTS QW-402



BASE METALS QW-403

Material Spec.:	SA-516		SA-516
Grade/Type/Class:	Grade 60/70		Grade 60/70
P-No. Group No.:	P-1 Group 1/2	**to**	P-1 Group 1/2
Heat No.:	H6/5888		H6/5888
Carbon Equivalent (ASME):	0.41		0.41
Carbon Equivalent (CSA):	0.41		0.41
Thickness & Diameter:	1.000" w.t. Plate		
Max Weld Deposit:	<0.500" per pass		

POSTWELD HEAT TREATMENT QW-407

Temperature:	
Time:	
Heating:	***(None – As Welded)***
Cooling:	
Other:	

PREHEAT QW-406

Preheat Temp. Min.:	50°F
Interpass Temp. Max.:	550°F
Interpass Temp. Min.:	50°F
Other:	Temperature monitored using tempilstiks

POSITIONS QW-405

Process:	**SAW (Leading)**	**SAW (Trailing)**
Position:	2-G	2-G
Progression:	Horizontal	Horizontal
Other:	Not Applicable	Not Applicable

FILLER METALS QW-404

Process:	**SAW (Leading)**	**SAW (Trailing)**
SFA Specification No.:	5.17	5.17
AWS Classification No.:	EM12K-H8	EM12K-H8
F-No.:	F-6	F-6
A-No.:	A-1	A-1
Size of Filler Metal:	3/32"	3/32"
Deposited Weld Metal:	0.500"	0.500"
Manufacturer:	Lincoln Electric	Lincoln Electric
Trade Name:	LA-61	LA-61
Heat / Lot Number:	Not Recorded	Not Recorded
Electrode-Flux (Class):	F7A6-EM12K-H8	F7A6-EM12K-H8
Flux Tradename:	Lincolnweld 882 Flux	Lincolnweld 882 Flux
Flux Heat / Lot Number.:	Not Recorded	Not Recorded
Product Form:	Coiled Solid Wire	Coiled Solid Wire

SHIELDING GAS QW-408

Shielding Gas:		
Composition:	***(Not Applicable)***	***(Not Applicable)***
Flow Rate:		
Backing Gas:		

ELECTRICAL CHARACTERISTICS QW-409

Current:	Direct (DC)	Direct (DC)
Polarity:	Reverse (EP)	Reverse (EP)
Volts:	28 - 30	28 - 30
Amps:	380 - 420	380 - 420
Travel Speed (ipm):	25.0	25.0
Maximum Heat Input (J/in):	30 240	30 240

TECHNIQUE QW-410

String or Weave:	String	String
Oscillation:	Not Applicable	Not Applicable
Single / Multi Pass:	Multiple Passes from both sides	
Single / Multi Electrodes:	Multi	Multi
Wire Stick Out:	1/4" to 1 1/4"	1/4" to 1 1/4"
Electrode Spacing:	Not Recorded	Not Recorded
Nozzle / Cup Size:	Not Recorded	Not Recorded

[1]**Revision 1:** Review and update to the current edition of the ASME code.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

PQR # SAS-2-3 Revision 1

Tensile Test
QW-462

Specimen No.	Width (in)	Thickness (in)	Area (in^2)	Ultimate Total Load (lbs)	Ultimate Unit Stress (ksi)	Type of Failure & Location
			(Not Applicable)			

Guided Bend Tests
QW-462

Specimen No.	Type	Figure	Result
		(Not Applicable)	

Toughness Tests
QW-170

Specimen No.	Notch Location	Notch Type	Qual. Temp	Full Size Values (ft-lbs)	% Shear	Lateral Exp Inches	Drop Weight Break	Drop Weight No Brk
BH-1	Weld	V-Notch	-50°F	94	60	0.064	-----	-----
BH-2	Weld	V-Notch	-50°F	105	70	0.063	-----	-----
BH-3	Weld	V-Notch	-50°F	115	80	0.072	-----	-----
BH-4	HAZ	V-Notch	-50°F	74	40	0.046	-----	-----
BH-5	HAZ	V-Notch	-50°F	68	30	0.044	-----	-----
BH-6	HAZ	V-Notch	-50°F	83	----**	----**	-----	-----

**Shear and Lateral Expansion not recorded – specimen did not break

Fillet-Weld Tests
Not Applicable

Result-Satisfactory: **Yes** _____ **No** _____ Pen. into Parent Material: **Yes** ___ **No** _____
Macro-Results:

Other Tests

Type of Test: Not Applicable
Other: Not Applicable

Welder's Name: Keith Breedon **Reg. No.:** W-11618 **Stamp ID:** BH
Tests Conducted By: Qualimet **Lab. Test No.:** 636-13001
Revised By: Qualimet

We hereby recertify that the statements in this record have been revised in accordance with paragraph QW-200.2 are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: Sub-Arc Systems Inc.
Original Cert. Date: January 20, 2014 **By:** Gary Kohlman
Recertification Date: October 3, 2014 **By:** Gary Kohlman

Qualimet

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-3

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-13001
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	January 20, 2014
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70		
Size:	1.000" w.t. Plate	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50.0°F
Test Temperature:	-50.0°F

Specimen Size (mm): 10

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
Weld (includes all processes)	BH-1	94	94	60	0.064
	BH-2	105	105	70	0.063
	BH-3	115	115	80	0.072
	Average:	**105**	**105**	**70**	**0.066**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

TEST RESULTS CERTIFIED BY: Qualimet

Hanibal Ghile, E.I.T.

Qualimet

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-3

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-13001
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	January 20, 2014
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70		
Size:	1.000" w.t. Plate	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50.0°F
Test Temperature:	-50.0°F

Specimen Size (mm): 10

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
HAZ	BH-4	74	74	40	0.046
	BH-5	68	68	30	0.044
	BH-6	83	83	-----**	-----**
	Average:	**75**	**75**	-----**	-----**

**Shear and Lateral Expansion not recorded – specimen did not break

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

TEST RESULTS CERTIFIED BY: Qualimet

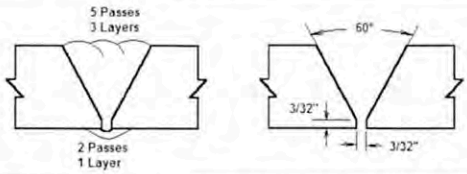
Hanibal Ghile, E.I.T.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483

(Section IX, ASME Boiler and Pressure Vessel Code)

Company Name:	Sub-Arc Systems Inc.	**By:**	Gary Kohlman
PQR No.:	SAS-2-4	**Date:**	January 20, 2014
Revision No.:	1[1]	**Revision Date:**	October 3, 2014
Welding Process(es):	SAW / SAW	**Type(s):**	Machine / Machine

JOINTS QW-402



BASE METALS QW-403				POSTWELD HEAT TREATMENT QW-407	
Material Spec.:	SA-516		SA-516	**Temperature:**	
Grade/Type/Class:	Grade 60/70		Grade 60/70	**Time:**	
P-No. Group No.:	P-1 Group 1/2	**to**	P-1 Group 1/2	**Heating:**	***(None – As Welded)***
Heat No.:	53293		53293	**Cooling:**	
Carbon Equivalent (ASME):	0.39		0.39	**Other:**	
Carbon Equivalent (CSA):	0.39		0.39		
Thickness & Diameter:	0.249" w.t. Plate (machined)				
Max Weld Deposit:	<0.500" per pass				

PREHEAT QW-406		POSITIONS QW-405		
Preheat Temp. Min.:	50°F	**Process:**	**SAW (Leading)**	**SAW (Trailing)**
Interpass Temp. Max.:	550°F	**Position:**	2-G	2-G
Interpass Temp. Min.:	50°F	**Progression:**	Horizontal	Horizontal
Other:	Temperature monitored using tempilstiks	**Other:**	Not Applicable	Not Applicable

FILLER METALS QW-404		
Process:	**SAW (Leading)**	**SAW (Trailing)**
SFA Specification No.:	5.17	5.17
AWS Classification No.:	EM12K-H8	EM12K-H8
F-No.:	F-6	F-6
A-No.:	A-1	A-1
Size of Filler Metal:	3/32"	3/32"
Deposited Weld Metal:	0.125"	0.125"
Manufacturer:	Lincoln Electric	Lincoln Electric
Trade Name:	LA-61	LA-61
Heat / Lot Number:	Not Recorded	Not Recorded
Electrode-Flux (Class):	F7A6-EM12K-H8	F7A6-EM12K-H8
Flux Tradename:	Lincolnweld 882 Flux	Lincolnweld 882 Flux
Flux Heat / Lot Number.:	Not Recorded	Not Recorded
Product Form:	Coiled Solid Wire	Coiled Solid Wire

SHIELDING GAS QW-408		
Shielding Gas:		
Composition:	***(Not Applicable)***	***(Not Applicable)***
Flow Rate:		
Backing Gas:		

ELECTRICAL CHARACTERISTICS QW-409		
Current:	Direct (DC)	Direct (DC)
Polarity:	Reverse (EP)	Reverse (EP)
Volts:	30	30
Amps:	420	420
Travel Speed (ipm):	25.0	25.0
Maximum Heat Input (J/in):	30 240	30 240

TECHNIQUE QW-410		
String or Weave:	String	String
Oscillation:	Not Applicable	Not Applicable
Single / Multi Pass:	Multiple Passes from both sides	
Single / Multi Electrodes:	Multi	Multi
Wire Stick Out:	1/4" to 1 1/4"	1/4" to 1 1/4"
Electrode Spacing:	Not Recorded	Not Recorded
Nozzle / Cup Size:	Not Recorded	Not Recorded

[1]**Revision 1:** Review and update to the current edition of the ASME code.

PROCEDURE QUALIFICATION RECORD (PQR) QW-483
(Section IX, ASME Boiler and Pressure Vessel Code)

PQR # SAS-2-4 Revision 1

Tensile Test
QW-462

Specimen No.	Width (in)	Thickness (in)	Area (in^2)	Ultimate Total Load (lbs)	Ultimate Unit Stress (ksi)	Type of Failure & Location
			(Not Applicable)			

Guided Bend Tests
QW-462

Specimen No.	Type	Figure	Result
		(Not Applicable)	

Toughness Tests
QW-170

Specimen No.	Notch Location	Notch Type	Qual. Temp	Full Size Values (ft-lbs)	% Shear	Lateral Exp Inches	Drop Weight Break	Drop Weight No Brk
BG-1	Weld	V-Notch	-50°F	104	80	0.078	----	----
BG-2	Weld	V-Notch	-50°F	81	70	0.060	----	----
BG-3	Weld	V-Notch	-50°F	77	70	0.058	----	----
BG-4	HAZ	V-Notch	-50°F	40	30	0.027	----	----
BG-5	HAZ	V-Notch	-50°F	35	30	0.024	----	----
BG-6	HAZ	V-Notch	-50°F	46	40	0.033	----	----

Fillet-Weld Tests
Not Applicable

Result-Satisfactory: **Yes** _____ **No** _____ Pen. into Parent Material: **Yes** ___ **No** _____
Macro-Results:

Other Tests

Type of Test: Not Applicable
Other: Not Applicable

Welder's Name: Keith Breedon **Reg. No.:** W-11618 **Stamp ID:** BG
Tests Conducted By: Qualimet **Lab. Test No.:** 636-13001
Revised By: Qualimet

We hereby recertify that the statements in this record have been revised in accordance with paragraph QW-200.2 are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: Sub-Arc Systems Inc.
Original Cert. Date: January 20, 2014 **By:** Gary Kohlman
Recertification Date: October 3, 2014 **By:** Gary Kohlman

Qualimet

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca
"Your source of Quality Materials Engineering"

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-4

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-13001
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	January 20, 2014
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70		
Size:	0.249" w.t. Plate (machined)	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50.0°F
Test Temperature:	-50.0°F

Specimen Size (mm): 5.2

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
Weld (includes all processes)	BG-1	54	104	80	0.078
	BG-2	42	81	70	0.060
	BG-3	40	77	70	0.058
	Average:	**45**	**87**	**73**	**0.065**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

TEST RESULTS CERTIFIED BY: Qualimet

Hanibal Ghile, E.I.T.

Qualimet

• 8055 CORONET ROAD, EDMONTON, AB T6E 4N7 • (780) 469-5870 • FAX (780) 465-5829
• CALGARY (403) 278-9862 • 1-800-621-8979 • www.qualimet.ca

"Your source of Quality Materials Engineering"

CHARPY IMPACT TEST REPORT

for Procedure Qualification Record # SAS-2-4

Client:	Sub-Arc Systems Inc.	**Job Number:**	636-13001
Address:	4605-47 Street Vermillion AB T9X 1L6	**Date:**	January 20, 2014
Materials:	SA-516 Grade 60/70 to SA-516 Grade 60/70		
Size:	0.249" w.t. Plate (machined)	**Condition:**	As Welded
Test Specification:	ASME Section IX, ASME Section VIII UG-84, ASTM A-370		
Test Equipment:	Satec Model S1-10, S/N: 1164		

Specimen Type:	Charpy V-Notch
Qualification Temperature:	-50.0°F
Test Temperature:	-50.0°F

Specimen Size (mm): 5.2

Sample Set	Sample Number	Actual Impact Energy (ft-lb)	Full Size (ft-lb)	Shear (%)	Lateral Expansion Inches
HAZ	BG-4	21	40	30	0.027
	BG-5	18	35	30	0.024
	BG-6	24	46	40	0.033
	Average:	**21**	**40**	**33**	**0.028**

We certify that the statements in this record are acceptable and that the specimen(s) were prepared and tested in accordance with the requirements of the current edition of ASTM A370, ASTM E23 and their latest editions.

TEST RESULTS CERTIFIED BY: Qualimet

Hanibal Ghile, E.I.T.

Item 6 – Welding Consumable

Contents

1. N/A

Item 7 – Foundation

Contents

Inukshuk Construction Limited
Industrial Contracting Project Management

PO Box 654
Rankin Inlet, NU X0C 0G0
T 867.645.4030 F 867.645.4064

Item 7 - Foundation Acceptance Report

PROJECT #:	AEM Tank #2 Pad Sand Grade
PROJECT TITLE:	AEM Tank Farm
SITE:	Rankin Inlet , NU
Date:	July 28, 2017

No.	Northing	Easting	Elevation	Description
1	6963697.448	546007.935	0.000	270
3	6963726.036	546030.269	0.000	90
4	6963722.909	546004.808	0.000	180
2	6963700.575	546033.396	0.000	0
5	6963711.742	546019.102	0.000	center
11	6963648.504	546002.922	7.816	BM1
12	6963667.273	546022.542	7.956	BM2
20	6963662.458	546016.328	6.718	nail
100	6963711.698	546019.037	8.233	PAD
101	6963715.178	546021.045	8.198	PAD
102	6963713.312	546022.745	8.196	PAD
103	6963711.476	546023.032	8.194	PAD
104	6963709.701	546022.557	8.188	PAD
105	6963708.140	546020.837	8.186	PAD
106	6963707.859	546017.903	8.193	PAD
107	6963709.297	546015.856	8.194	PAD
108	6963711.861	546015.038	8.188	PAD
109	6963714.849	546016.565	8.188	PAD
110	6963718.123	546014.307	8.164	PAD
111	6963719.743	546019.425	8.167	PAD
112	6963717.700	546024.421	8.164	PAD
113	6963714.725	546026.494	8.158	PAD
114	6963709.295	546026.704	8.164	PAD

Inukshuk Construction Limited
Industrial Contracting Project Management

PO Box 654
Rankin Inlet, NU X0C 0G0
T 867.645.4030 F 867.645.4064

Item 7 - Foundation Acceptance Report

115	6963705.182	546023.754	8.164	PAD
116	6963703.695	546019.525	8.166	PAD
117	6963704.779	546015.018	8.170	PAD
118	6963708.409	546011.772	8.164	PAD
119	6963706.886	546008.105	8.134	PAD
120	6963712.083	546007.038	8.128	PAD
121	6963717.635	546008.628	8.128	PAD
122	6963721.388	546011.970	8.128	PAD
123	6963723.540	546017.010	8.133	PAD
124	6963723.302	546022.515	8.134	PAD
125	6963720.466	546027.280	8.131	PAD
126	6963716.145	546030.254	8.124	PAD
127	6963710.646	546031.041	8.126	PAD
128	6963705.524	546029.362	8.128	PAD
129	6963701.923	546026.064	8.134	PAD
130	6963700.029	546021.916	8.130	PAD
131	6963699.785	546017.655	8.136	PAD
132	6963701.338	546013.053	8.131	PAD
133	6963704.648	546009.354	8.126	PAD
134	6963701.326	546004.827	8.084	PAD → outter
135	6963698.560	546007.256	8.080	PAD
136	6963696.498	546010.177	8.075	PAD
137	6963694.887	546013.707	8.082	PAD
138	6963694.193	546017.025	8.079	PAD
139	6963694.063	546020.096	8.084	PAD
140	6963694.529	546023.186	8.087	PAD
141	6963695.624	546026.381	8.087	PAD
142	6963697.302	546029.256	8.083	PAD
143	6963699.509	546031.814	8.086	PAD

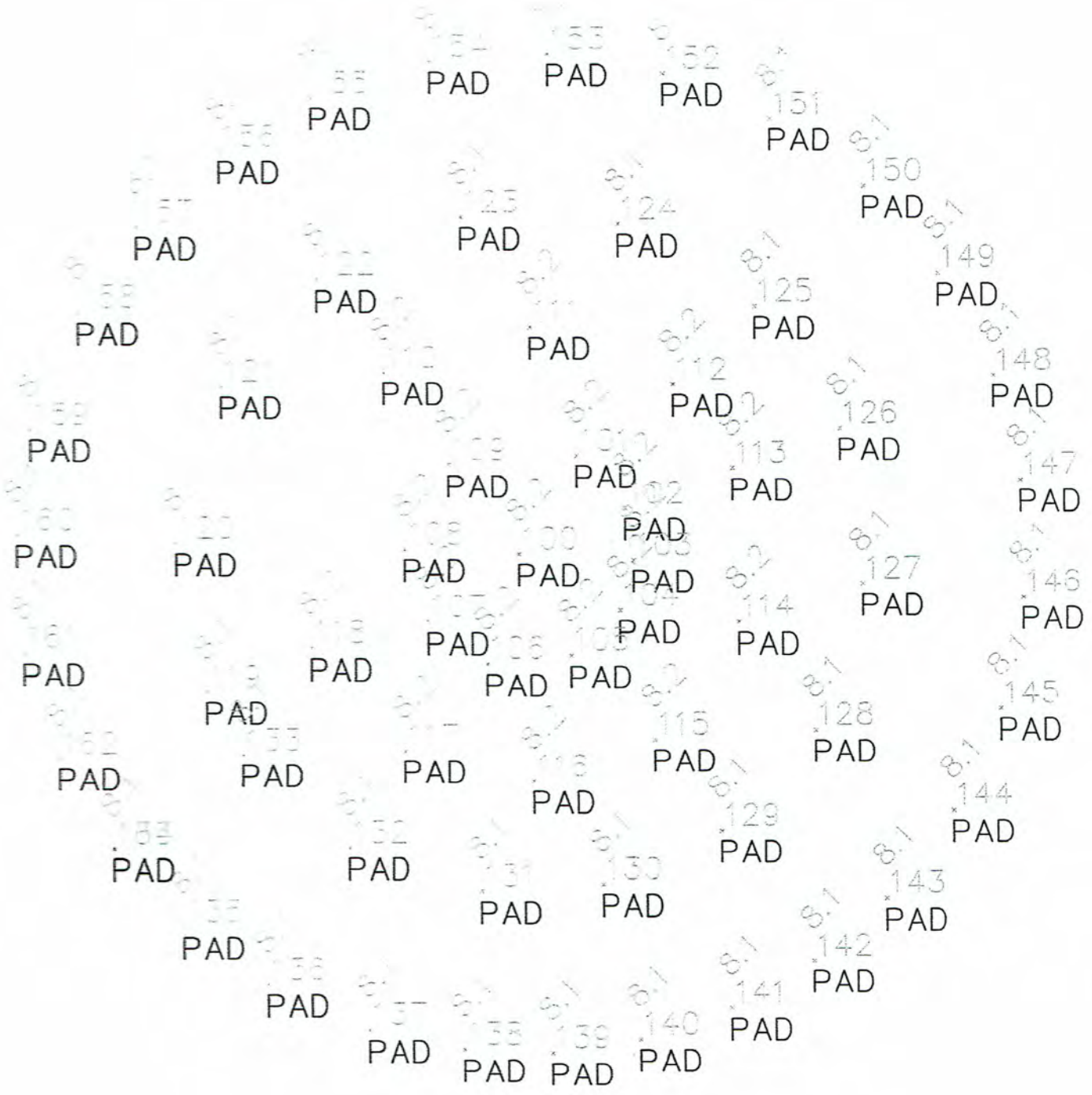
Inukshuk Construction Limited
Industrial Contracting Project Management

PO Box 654
Rankin Inlet, NU X0C 0G0
T 867.645.4030 F 867.645.4064

Item 7 - Foundation Acceptance Report

144	6963702.622	546034.180	8.086	PAD
145	6963706.256	546035.852	8.082	PAD
146	6963710.155	546036.642	8.083	PAD
147	6963714.305	546036.546	8.087	PAD
148	6963718.009	546035.606	8.082	PAD
149	6963721.614	546033.677	8.077	PAD
150	6963724.642	546031.096	8.073	PAD
151	6963727.047	546027.824	8.079	PAD
152	6963728.664	546024.091	8.078	PAD
153	6963729.355	546020.065	8.080	PAD
154	6963729.081	546015.944	8.078	PAD
155	6963727.801	546011.792	8.075	PAD
156	6963725.881	546008.572	8.080	PAD
157	6963723.215	546005.675	8.078	PAD
158	6963720.263	546003.644	8.078	PAD
159	6963716.126	546001.962	8.080	PAD
160	6963712.384	546001.478	8.075	PAD
161	6963708.257	546001.727	8.079	PAD
162	6963704.537	546002.941	8.085	PAD
163	6963701.310	546004.821	8.088	PAD

Tank Pad #2 Sand Top Elevations



Item 8 – Floor

Contents

SSAB

12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

Item 8 - Floor - MTR

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-13 | **Shipping Manifest:** AR240131

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.250 X 120.0 X 480.0 (IN)

Ship Date: 21 Feb 17
Cert Date: 21 Feb 17

Cert No: 081597448
(Page 1 of 2)

Tested Pieces:				Tensiles:						Charpy Impact Tests									
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1	2	3	Avg	% Shear 1	2	3	Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B102	E11	0.256 (DISCRT)	C							33	44	37	38					-50F	L	5.0	
			C							35	27	34	32					-50F	T	5.0	
E7B102	E12	0.256 (DISCRT)	C							39	40	36	38					-50F	L	5.0	
			C							27	25	22	25					-50F	T	5.0	
E7B102	E13	0.255 (DISCRT)	C	55	76		26	T		35	34	30	33					-50F	L	5.0	
			C							27	44	41	37					-50F	T	5.0	
E7B102	E14	0.256 (DISCRT)	C	55	75		24	T		56	41	58	52					-50F	L	5.0	
			C							27	32	30	30					-50F	T	5.0	
W7B598	E06	0.256 (DISCRT)	C							30	30	30	30					-50F	L	5.0	
			C							37	27	23	29					-50F	T	5.0	
W7B598	E07	0.256 (DISCRT)	C	52	72		25	T													
W7B598	E08	0.256 (DISCRT)	C	51	71		25	T													
W7B598	E10	0.256 (DISCRT)	C							32	40	31	34					-50F	L	5.0	
			C							28	34	28	30					-50F	T	5.0	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B102	.18	.94	.009	.001	.25	.027	.025	.26	.12	.11	.05	.002	.005	.011	.0002	.0076	USA
W7B598	.18	.92	.009	.001	.24	.028	.022	.26	.13	.08	.05	.001	.004	.011	.0002	.0078	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
CHARPY FULL SIZE EQUIVALENT = ABSORBED ENERGY AVG X 10 / TEST SIZE IN MM
NORMALIZED PLATES. HEATED AT 1665F FOR 14 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

W7B598 E06	6705201	PCES:	1,	LBS:	4084	W7B598 E06	6705200	PCES:	1,	LBS:	4084
E7B102 E14	6705250	PCES:	1,	LBS:	4084	E7B102 E14	6705249	PCES:	1,	LBS:	4084
E7B102 E13	6705243	PCES:	1,	LBS:	4084	E7B102 E12	6705236	PCES:	1,	LBS:	4084
E7B102 E13	6705244	PCES:	1,	LBS:	4084	W7B598 E06	6705199	PCES:	1,	LBS:	4084
E7B102 E12	6705235	PCES:	1,	LBS:	4084	E7B102 E13	6705234	PCES:	1,	LBS:	4084
E7B102 E11	6705193	PCES:	1,	LBS:	4084	E7B102 E11	6705190	PCES:	1,	LBS:	4084

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

Item 8 - Floor - MTR

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-13 | **Shipping Manifest:** AR240131

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.250 X 120.0 X 480.0 (IN)

Ship Date: 21 Feb 17
Cert Date: 21 Feb 17

Cert No: 081597448
(Page 2 of 2)

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W7B598 E10	6705178	PCES:	1, LBS:	4084					E7B102 E11	6705183	PCES:	1, LBS:	4084				
W7B598 E10	6705177	PCES:	1, LBS:	4084					W7B598 E10	6705181	PCES:	1, LBS:	4084				
W7B598 E10	6705179	PCES:	1, LBS:	4084					W7B598 E10	6705189	PCES:	1, LBS:	4084				
W7B598 E10	6705186	PCES:	1, LBS:	4084					E7B102 E11	6705172	PCES:	1, LBS:	4084				
E7B102 E11	6705176	PCES:	1, LBS:	4084					W7B598 E10	6705180	PCES:	1, LBS:	4084				
E7B102 E11	6705192	PCES:	1, LBS:	4084					E7B102 E11	6705194	PCES:	1, LBS:	4084				
E7B102 E11	6705184	PCES:	1, LBS:	4084					E7B102 E11	6705185	PCES:	1, LBS:	4084				
W7B598 E06	6705207	PCES:	1, LBS:	4084					W7B598 E06	6705206	PCES:	1, LBS:	4084				
E7B102 E12	6705239	PCES:	1, LBS:	4084					E7B102 E12	6705231	PCES:	1, LBS:	4084				
E7B102 E14	6705247	PCES:	1, LBS:	4084					E7B102 E13	6705242	PCES:	1, LBS:	4084				
E7B102 E14	6705248	PCES:	1, LBS:	4084					E7B102 E12	6705237	PCES:	1, LBS:	4084				
W7B598 E06	6705209	PCES:	1, LBS:	4084					E7B102 E13	6705240	PCES:	1, LBS:	4084				
E7B102 E12	6705238	PCES:	1, LBS:	4084					W7B598 E06	6705198	PCES:	1, LBS:	4084				
E7B102 E14	6705251	PCES:	1, LBS:	4084					W7B598 E06	6705197	PCES:	1, LBS:	4084				
E7B102 E13	6705241	PCES:	1, LBS:	4084					E7B102 E12	6705230	PCES:	1, LBS:	4084				

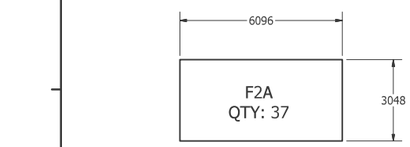
(P) Cust Part #:

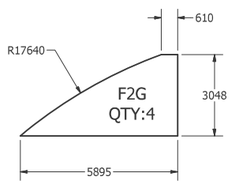
WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

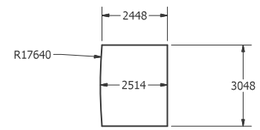
Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

Item 8 - Floor - Weld Map

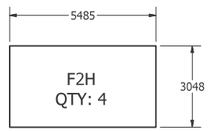
PARTS LIST			
ITEM	QTY	DESCRIPTION	MATERIAL
F2A	37	PL 6.35 X 3048 X 6096	G40.21M-260WT
F2B	2	PL 6.35 X 3048 X 2514	G40.21M-260WT
F2C	4	PL 6.35 X 3048 X 5480	G40.21M-260WT
F2D	4	PL 6.35 X 3048 X 1931	G40.21M-260WT
F2E	4	PL 6.35 X 3048 X3866	G40.21M-260WT
F2F	4	PL 6.35 X 3048 X 5094	G40.21M-260WT
F2G	4	PL 6.35 X 3048 X 5895	G40.21M-260WT
F2H	4	PL 6.35 X 3048 X 5485	G40.21M-260WT
F2I	4	PL 6.35 X 3131 X 845	G40.21M-260WT
F2J	2	PL 6.35 X 838 X 6096	G40.21M-260WT

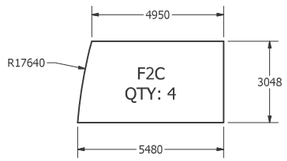


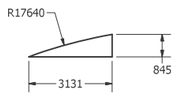




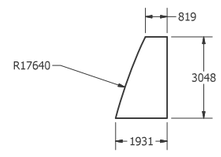
F2B
QTY: 2



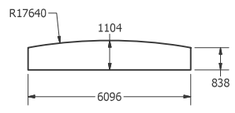




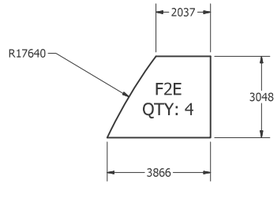
F2I
QTY: 4

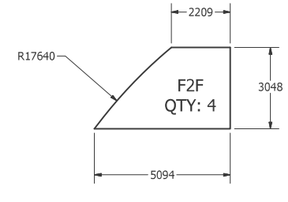


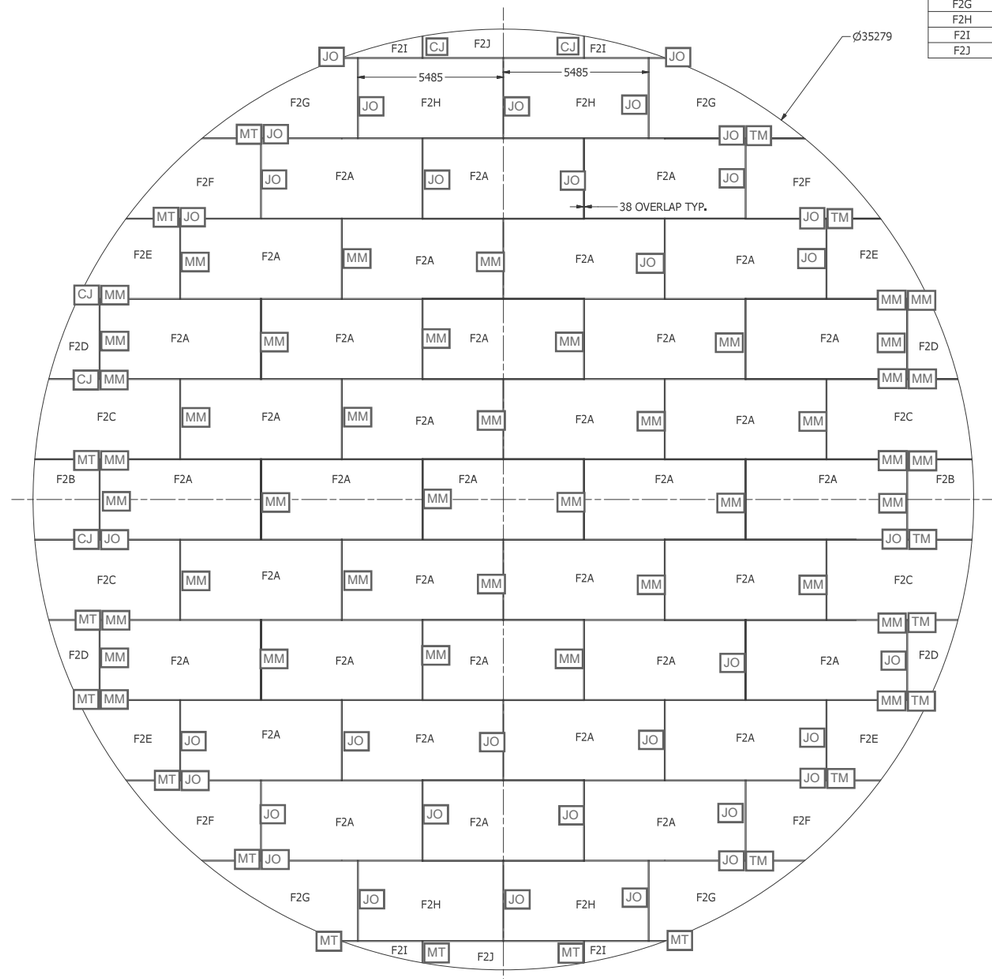
F2D
QTY: 4



F2J
QTY: 2







TANK 2 (13.5ML) FLOOR LAYOUT
SCALE 1 / 100

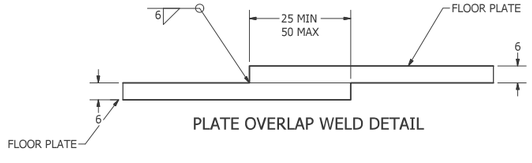


PLATE OVERLAP WELD DETAIL

NOTE - PER API-650 5.1.5.4 - BOTTOM PLATES UNDER THE SHELL SHALL HAVE THE OUTER ENDS OF THE JOINTS FITTED AND LAP-WELDED TO FORM A SMOOTH BEARING SURFACE.

19-Jul-2017
Permit Number: P471

DRAWN	JACOB SAUNDERS	1/10/2017	TK #2 (13.5ML) - FLOOR LAYOUT
CHECKED	MARC LOSIER	3/14/2017	TITLE
QA			MELIADINE FIELD ERECTED TANKS - TANK #2 (13.5ML) FLOOR AND ROOF LAYOUT
MFG			
APPROVED			
SIZE	A1	DWG NO	295-M2 REV 1
SCALE	1 / 100	SHEET 1 OF 2	

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

Exhibit 15c, Rev 1

QUALITY CONTROL MANUAL

VISUAL TEST REPORT

Customer: Agnico Eagle

Location: Rankin Inlet

Code Requiring Test: API 650 (section 8.5.2) Reason for Test: New Construction

A weld shall be acceptable by visual examination if the inspection shows the following.

a) There are no crater cracks, other surface cracks or arc strikes in or adjacent to the welded joints.
b) Maximum permissible undercut is 0.4 mm (1/64 in.) in depth for vertical butt joints, vertically oriented permanent attachments, attachment welds for nozzles, manholes, flush-type openings, and the inside shell-to-bottom welds. For horizontal butt joints, horizontally oriented permanent attachments, and annular-ring butt joints, the maximum permissible undercut is 0.8 mm (1/32 in.) in depth.
c) The frequency of surface porosity in the weld does not exceed one cluster (one or more pores) in any 100 mm (4 in.) of length, and the diameter of each cluster does not exceed 2.5 mm (3/32 in.).
d) The reinforcement of the welds on all thicknesses:

Plate Thickness mm (in.)	Maximum Reinforcement Thickness mm (in.)	
	Vertical Joints	Horizontal Joints
≤ 13 (1/2)	2.5 (3/32)	3 (1/8)
> 13 (1/2) to 25 (1)	3 (1/8)	5 (3/16)
> 25 (1)	5 (3/16)	6 (1/4)

Surface Condition (As Welded)

Test Solution: N/A Test Date(s):

Tested by: Ambient Conditions:

Items Tested:

FLOOR WELDS.

Results:

ALL FLOOR WELD VISUALY TESTED. ALL WELDS ACCEPTABLE.

Sub-Arc Representative Signature: _____ Date: AUG 31/17

Client Representative Signature: Glen Bonia Date: Sept 04/17

Client Signature: _____ Date: _____

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 14, Rev 1

VACUUM BOX TEST REPORT – FLOOR PLATE WELDS

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2

Equipment Tag No.: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(A vacuum box/soap solution test for floor plate weld seams is required for new construction or major alterations, no visible leaks should be observed)

Test Solution: Water / Snoop Ambient Conditions: 10°

Test Date(s): AUG 7/17 Surface Condition: CLEAN

Tested by: MATT MACKENZIE Surface Test Temperature: 10°

Pressure Gauge:

Items Tested:

FLOOR WELDS.

Results:

ALL FLOOR WELDS WERE VACUMM BOX TESTED
ONE LEAK WAS DETECTED. AREA WAS FIXED, THEN RE-TESTED.
NO FURTHER LEAKS WERE FOUND.

Sub-Arc Representative Signature: [signature] Date: Aug 7/17

Client Representative Signature: _____ Date: _____

Client Signature: Clem Bonin CLEM BONIN Date: aug 23/17

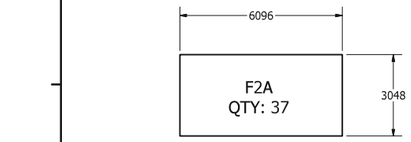
Item 9 – Shell to Floor Seams

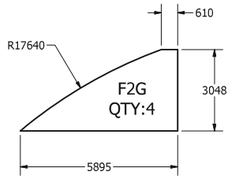
Contents

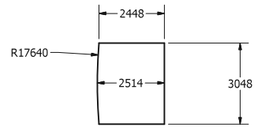
Item 9 - Shell to Floor Seams - Initial and Final Pass Weld Map

Inside shell to floor first pass MM
Inside shell to floor final pass JO

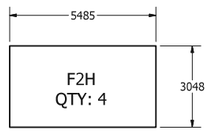
PARTS LIST			
ITEM	QTY	DESCRIPTION	MATERIAL
F2A	37	PL 6.35 X 3048 X 6096	G40.21M-260WT
F2B	2	PL 6.35 X 3048 X 2514	G40.21M-260WT
F2C	4	PL 6.35 X 3048 X 5480	G40.21M-260WT
F2D	4	PL 6.35 X 3048 X 1931	G40.21M-260WT
F2E	4	PL 6.35 X 3048 X3866	G40.21M-260WT
F2F	4	PL 6.35 X 3048 X 5094	G40.21M-260WT
F2G	4	PL 6.35 X 3048 X 5895	G40.21M-260WT
F2H	4	PL 6.35 X 3048 X 5485	G40.21M-260WT
F2I	4	PL 6.35 X 3131 X 845	G40.21M-260WT
F2J	2	PL 6.35 X 838 X 6096	G40.21M-260WT

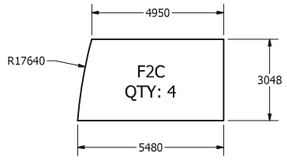


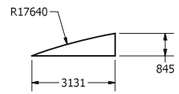




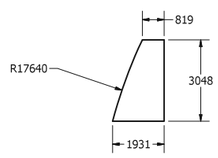
F2B
QTY: 2



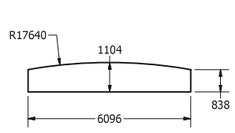




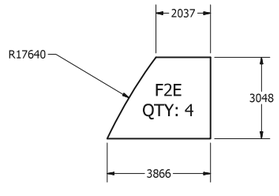
F2I
QTY: 4

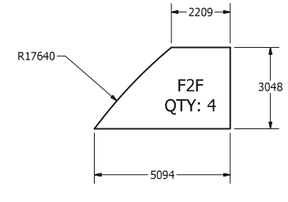


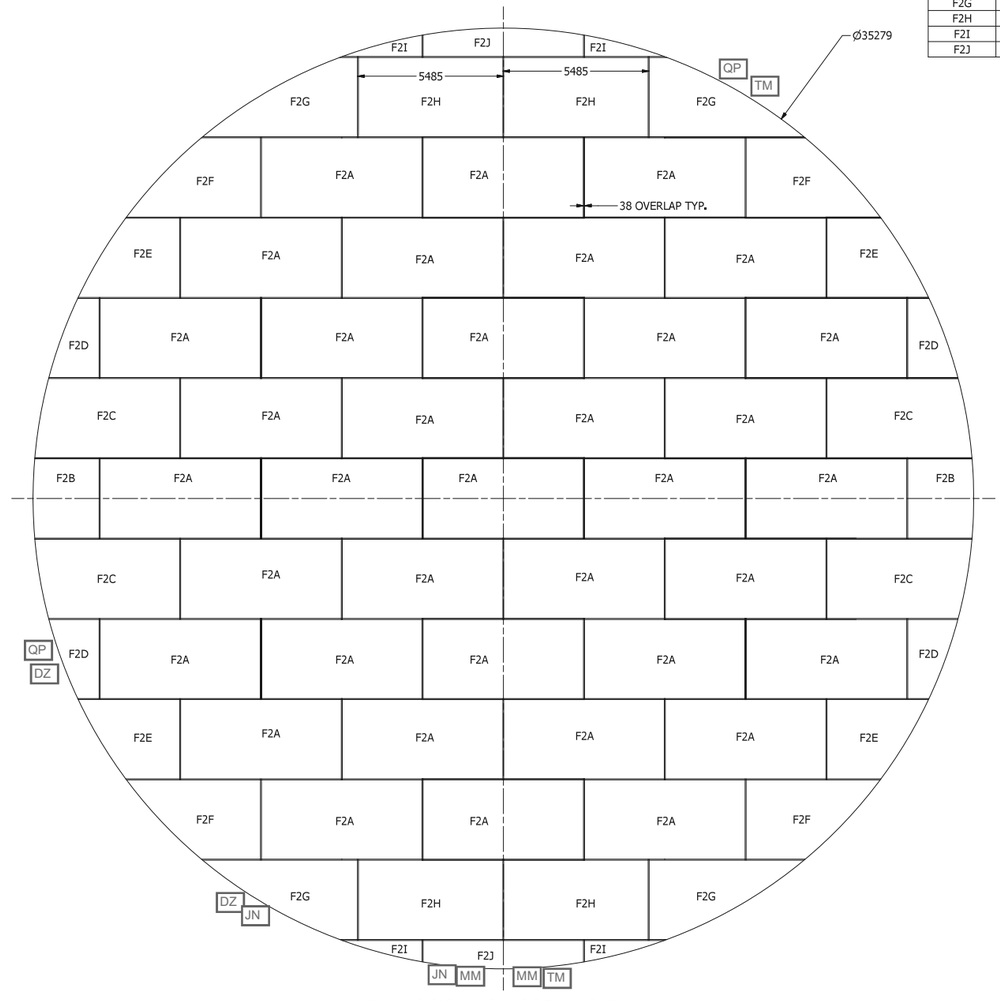
F2D
QTY: 4



F2J
QTY: 2







TANK 2 (13.5ML) FLOOR LAYOUT
SCALE 1 / 100

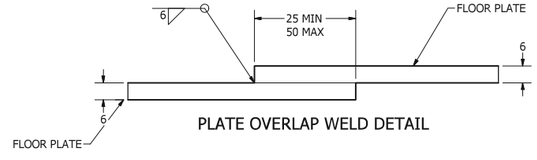


PLATE OVERLAP WELD DETAIL

NOTE - PER API-650 5.1.5.4 - BOTTOM PLATES UNDER THE SHELL SHALL HAVE THE OUTER ENDS OF THE JOINTS FITTED AND LAP-WELDED TO FORM A SMOOTH BEARING SURFACE.

19-Jul-2017
Permit Number: P471

DRAWN	JACOB SAUNDERS	1/10/2017	TK #2 (13.5ML) - FLOOR LAYOUT
CHECKED	MARC LOSIER	3/14/2017	TITLE: MELIADINE FIELD ERECTED TANKS - TANK #2 (13.5ML) FLOOR AND ROOF LAYOUT
QA			
MFG			
APPROVED			

SIZE	DWG NO	REV
A1	295-M2	1

SCALE 1 / 100 SHEET 1 OF 2

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15c, Rev 1

VISUAL TEST REPORT

Customer: Agnico Eagle

Location: Rankin Inlet

Code Requiring Test: API 650 (section 8.5.2) Reason for Test: New Construction

A weld shall be acceptable by visual examination if the inspection shows the following.

a) There are no crater cracks, other surface cracks or arc strikes in or adjacent to the welded joints.
b) Maximum permissible undercut is 0.4 mm (1/64 in.) in depth for vertical butt joints, vertically oriented permanent attachments, attachment welds for nozzles, manholes, flush-type openings, and the inside shell-to-bottom welds. For horizontal butt joints, horizontally oriented permanent attachments, and annular-ring butt joints, the maximum permissible undercut is 0.8 mm (1/32 in.) in depth.
c) The frequency of surface porosity in the weld does not exceed one cluster (one or more pores) in any 100 mm (4 in.) of length, and the diameter of each cluster does not exceed 2.5 mm (3/32 in.).
d) The reinforcement of the welds on all thicknesses:

Plate Thickness mm (in.)	Maximum Reinforcement Thickness mm (in.)	
	Vertical Joints	Horizontal Joints
≤ 13 (1/2)	2.5 (3/32)	3 (1/8)
> 13 (1/2) to 25 (1)	3 (1/8)	5 (3/16)
> 25 (1)	5 (3/16)	6 (1/4)

Surface Condition (As Welded)

Test Solution: N/A Test Date(s): Aug 18/17

Tested by: MATT MACKENZIE. Ambient Conditions: 9°

Items Tested:

SHELL TO FLOOR WELD.

Results:

SHELL TO FLOOR WELD VISUALLY INSPECTED.
NO DEFECTS WERE FOUND ALL WELDS ACCEPTABLE.

Sub-Arc Representative Signature: [signature] Date: Aug 18/17.

Client Representative Signature: _____ Date: _____

Client Signature: [signature] CLEM BONITA Date: Aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15a, Rev 1

DIESEL TEST REPORT (SHELL TO BOTTOM WELD)

Customer: Agnico Eagle

Location: Rankin Inlet Tank #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 (section 7.2.4) Reason for Test: New Construction

(The initial weld pass inside the shell shall have all slag and non-metals removed from the surface of the weld and then examined for its entire circumference both visually and applying a high Flash-point penetrating oil such as light diesel to the gap between the shell and the bottom, letting stand for at least four hours, and examining the weld for evidence of wicking.)

Surface Condition (As Welded)

Test Solution: Diesel Test Date(s): Aug 4/17

Tested by: Matt MacKenzie Ambient Conditions: 12° C

Items Tested:

Shell to bottom Weld.

Results:

No leaks were found at time of inspection.

Sub-Arc Representative Signature: [signature] Date: Aug 4/17

Client Representative Signature: _____ Date: _____

Client Signature: Clem Bonin [signature] Date: Aug 23/17

Item 10 - Shell

Contents

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-06 | **Shipping Manifest:** AR239887

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.562 X 113.0 X 365.0 (IN)

Ship Date: 16 Feb 17 | **Cert No:** 081596751
Cert Date: 16 Feb 17 | (Page 1 of 1)

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B111	B15	0.568 (DISCRT)	C	51	72		26	T		114 106 131 117		-45F	L	10.	
			C							76 81 74 77		-45F	T	10.	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B111	.18	.92	.010	<.001	.24	.027	.026	.26	.14	.11	.04	.002	.005	.011	.0002	.0074	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
NORMALIZED PLATES. HEATED AT 1665F FOR 26 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

E7B111 B15 6704705 PCES: 1, LBS: 6574 E7B111 B15 6704706 PCES: 1, LBS: 6574
E7B111 B15 6704704 PCES: 1, LBS: 6574 E7B111 B15 6704707 PCES: 1, LBS: 6574

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-06 | **Shipping Manifest:** AR239891

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.562 X 113.0 X 365.0 (IN)

Ship Date: 16 Feb 17
Cert Date: 16 Feb 17
Cert No: 081596775
(Page 1 of 1)

Tested Pieces:				Tensiles:						Charpy Impact Tests								
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B111	B15	0.568 (DISCRT)	C	51	72		26	T		114 106 131 117		-45F	L	10.	
			C							76 81 74 77		-45F	T	10.	
E7B111	B16	0.568 (DISCRT)	C	50	72		27	T		135 123 122 127		-45F	L	10.	
			C							112 84 96 97		-45F	T	10.	

Heat Id	Chemical Analysis C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B111	.18	.92	.010	<.001	.24	.027	.026	.26	.14	.11	.04	.002	.005	.011	.0002	.0074	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
NORMALIZED PLATES. HEATED AT 1665F FOR 26 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

E7B111 B16	6704877	PCES:	1,	LBS:	6574	E7B111 B15	6704876	PCES:	1, LBS: 6574
E7B111 B15	6704866	PCES:	1,	LBS:	6574	E7B111 B15	6704867	PCES:	1, LBS: 6574
E7B111 B15	6704865	PCES:	1,	LBS:	6574	E7B111 B15	6704864	PCES:	1, LBS: 6574
E7B111 B15	6704708	PCES:	1,	LBS:	6574	E7B111 B16	6704878	PCES:	1, LBS: 6574

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-08 | **Shipping Manifest:** AR239887

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 16 Feb 17 | **Cert No:** 081596752
Cert Date: 16 Feb 17 | (Page 1 of 1)

Size: 0.437 X 113.0 X 365.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests						
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B111	B14	0.443 (DISCRT)	C	53	74		27	T		143 155 114 137		-45F	L	10.	
			C							90 102 80 91		-45F	T	10.	
W7B608	B11	0.442 (DISCRT)	C	53	75		26	T		121 122 118 120		-50F	L	10.	
			C							104 93 51 83		-50F	T	10.	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B111	.18	.92	.010	<.001	.24	.027	.026	.26	.14	.11	.04	.002	.005	.011	.0002	.0074	USA
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
NORMALIZED PLATES. HEATED AT 1665F FOR 21 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W7B608 B11 6704648 PCES: 1, LBS: 5112 W7B608 B11 6704649 PCES: 1, LBS: 5112
E7B111 B14 6704652 PCES: 1, LBS: 5112

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-08 | **Shipping Manifest:** AR239886

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 16 Feb 17 | **Cert No:** 081596745
Cert Date: 16 Feb 17 | (Page 1 of 1)

Size: 0.437 X 113.0 X 365.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B111	B14	0.443 (DISCRT)	C	53	74		27	T		143 155 114 137		-45F	L	10.	
			C							90 102 80 91		-45F	T	10.	
W7B608	B11	0.442 (DISCRT)	C	53	75		26	T		121 122 118 120		-50F	L	10.	
			C							104 93 51 83		-50F	T	10.	

Heat Id	Chemical Analysis C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B111	.18	.92	.010	<.001	.24	.027	.026	.26	.14	.11	.04	.002	.005	.011	.0002	.0074	USA
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
NORMALIZED PLATES. HEATED AT 1665F FOR 21 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

E7B111	B14	6704428	PCES:	1,	LBS:	5112	W7B608	B11	6704660	PCES:	1, LBS: 5112
W7B608	B11	6704659	PCES:	1,	LBS:	5112	W7B608	B11	6704657	PCES:	1, LBS: 5112
W7B608	B11	6704658	PCES:	1,	LBS:	5112	W7B608	B11	6704656	PCES:	1, LBS: 5112

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-08 | **Shipping Manifest:** AR239888

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.437 X 113.0 X 365.0 (IN)

Ship Date: 16 Feb 17 | **Cert No:** 081596755
Cert Date: 16 Feb 17 | (Page 1 of 1)

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B111	B14	0.443 (DISCRT)	C	53	74		27	T		143 155 114 137		-45F	L	10.	
			C							90 102 80 91		-45F	T	10.	
W7B608	B11	0.442 (DISCRT)	C	53	75		26	T		121 122 118 120		-50F	L	10.	
			C							104 93 51 83		-50F	T	10.	

Heat Id	Chemical Analysis C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B111	.18	.92	.010	<.001	.24	.027	.026	.26	.14	.11	.04	.002	.005	.011	.0002	.0074	USA
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
NORMALIZED PLATES. HEATED AT 1665F FOR 21 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
E7B111 B14 6704427 PCES: 1, LBS: 5112 W7B608 B11 6704442 PCES: 1, LBS: 5112

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-08 | **Shipping Manifest:** AR239887

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 16 Feb 17 | **Cert No:** 081596752
Cert Date: 16 Feb 17 | (Page 1 of 1)

Size: 0.437 X 113.0 X 365.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests						
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B111	B14	0.443 (DISCRT)	C	53	74		27	T		143 155 114 137		-45F	L	10.	
			C							90 102 80 91		-45F	T	10.	
W7B608	B11	0.442 (DISCRT)	C	53	75		26	T		121 122 118 120		-50F	L	10.	
			C							104 93 51 83		-50F	T	10.	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B111	.18	.92	.010	<.001	.24	.027	.026	.26	.14	.11	.04	.002	.005	.011	.0002	.0074	USA
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
NORMALIZED PLATES. HEATED AT 1665F FOR 21 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W7B608 B11 6704648 PCES: 1, LBS: 5112
E7B111 B14 6704652 PCES: 1, LBS: 5112
W7B608 B11 6704649 PCES: 1, LBS: 5112

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-08 | **Shipping Manifest:** AR239891

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 16 Feb 17 | **Cert No:** 081596776
Cert Date: 16 Feb 17 | (Page 1 of 1)

Size: 0.437 X 113.0 X 365.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests						
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W7B608	B11	0.442 (DISCRT)	C	53	75		26	T		121 122 118 120		-50F	L	10.	
			C							104 93 51 83		-50F	T	10.	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
NORMALIZED PLATES. HEATED AT 1665F FOR 21 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W7B608 B11 6704647 PCES: 1, LBS: 5112

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-09 | **Shipping Manifest:** AR239886

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 16 Feb 17
Cert Date: 16 Feb 17

Cert No: 081596746
(Page 1 of 1)

Size: 0.375 X 113.0 X 365.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W7B608	B06	0.381 (DISCRT)	C	53	75		27	T		77 78 103 86		-50F	L	7.5	
			C							46 31 49 42		-50F	T	7.5	
W7B608	B07	0.380 (DISCRT)	C	52	75		27	T		88 103 87 93		-45F	L	7.5	
			C							54 52 48 51		-45F	T	7.5	
W7B608	B08	0.381 (DISCRT)	C	53	74		26	T		100 122 119 114		-45F	L	7.5	
			C							40 57 79 59		-45F	T	7.5	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
CHARPY FULL SIZE EQUIVALENT = ABSORBED ENERGY AVG X 10 / TEST SIZE IN MM
NORMALIZED PLATES. HEATED AT 1665F FOR 19 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

W7B608	B08	6704576	PCES:	1,	LBS:	4386	W7B608	B07	6704580	PCES:	1, LBS: 4386
W7B608	B07	6704579	PCES:	1,	LBS:	4386	W7B608	B08	6704577	PCES:	1, LBS: 4386
W7B608	B08	6704583	PCES:	1,	LBS:	4386	W7B608	B07	6704582	PCES:	1, LBS: 4386
W7B608	B07	6704578	PCES:	1,	LBS:	4386	W7B608	B08	6704589	PCES:	1, LBS: 4386
W7B608	B08	6704585	PCES:	1,	LBS:	4386	W7B608	B08	6704586	PCES:	1, LBS: 4386
W7B608	B08	6704588	PCES:	1,	LBS:	4386	W7B608	B07	6704581	PCES:	1, LBS: 4386
W7B608	B08	6704590	PCES:	1,	LBS:	4386	W7B608	B08	6704587	PCES:	1, LBS: 4386
W7B608	B06	6704488	PCES:	1,	LBS:	4386	W7B608	B07	6704499	PCES:	1, LBS: 4386
W7B608	B06	6704485	PCES:	1,	LBS:	4386	W7B608	B08	6704574	PCES:	1, LBS: 4386
W7B608	B08	6704575	PCES:	1,	LBS:	4386	W7B608	B07	6704498	PCES:	1, LBS: 4386

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

Form TC1: Revision 2: Date 23 Apr 2014

12400 Highway 43 North, Axis, Alabama 36505, US

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-09 | **Shipping Manifest:** AR239888

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 16 Feb 17 | **Cert No:** 081596756
Cert Date: 16 Feb 17 | (Page 1 of 1)

Size: 0.375 X 113.0 X 365.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W7B608	B06	0.381 (DISCRT)	C	53	75		27	T		77 78 103 86		-50F	L	7.5	
			C							46 31 49 42		-50F	T	7.5	
W7B608	B07	0.380 (DISCRT)	C	52	75		27	T		88 103 87 93		-45F	L	7.5	
			C							54 52 48 51		-45F	T	7.5	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
CHARPY FULL SIZE EQUIVALENT = ABSORBED ENERGY AVG X 10 / TEST SIZE IN MM
NORMALIZED PLATES. HEATED AT 1665F FOR 19 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

W7B608	B06	6704489	PCES:	1,	LBS:	4386	W7B608	B07	6704497	PCES:	1, LBS: 4386
W7B608	B07	6704495	PCES:	1,	LBS:	4386	W7B608	B06	6704480	PCES:	1, LBS: 4386
W7B608	B06	6704492	PCES:	1,	LBS:	4386	W7B608	B06	6704491	PCES:	1, LBS: 4386
W7B608	B06	6704490	PCES:	1,	LBS:	4386	W7B608	B07	6704496	PCES:	1, LBS: 4386
W7B608	B06	6704484	PCES:	1,	LBS:	4386	W7B608	B06	6704481	PCES:	1, LBS: 4386
W7B608	B06	6704486	PCES:	1,	LBS:	4386	W7B608	B06	6704487	PCES:	1, LBS: 4386
W7B608	B07	6704500	PCES:	1,	LBS:	4386					

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-09 | **Shipping Manifest:** AR239891

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.375 X 113.0 X 365.0 (IN)

Ship Date: 16 Feb 17
Cert Date: 16 Feb 17
Cert No: 081596777
(Page 1 of 1)

Tested Pieces:				Tensiles:						Charpy Impact Tests								
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W7B608	B09	0.381 (DISCRT)	C	52	73		26	T		97 83 96 92		-45F	L	7.5	
			C							50 58 48 52		-45F	T	7.5	
W7B608	B10	0.380 (DISCRT)	C	52	74		23	T		120 92 86 99		-45F	L	7.5	
			C							53 51 57 54		-45F	T	7.5	

Heat Id	Chemical Analysis C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
W7B608	.18	.92	.008	.001	.24	.027	.026	.26	.18	.10	.05	.001	.005	.011	.0002	.0079	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
CHARPY FULL SIZE EQUIVALENT = ABSORBED ENERGY AVG X 10 / TEST SIZE IN MM
NORMALIZED PLATES. HEATED AT 1665F FOR 19 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

W7B608	B09	6704857	PCES:	1,	LBS:	4386	W7B608	B09	6704863	PCES:	1, LBS: 4386
W7B608	B09	6704858	PCES:	1,	LBS:	4386	W7B608	B09	6704856	PCES:	1, LBS: 4386
W7B608	B09	6704848	PCES:	1,	LBS:	4386	W7B608	B09	6704846	PCES:	1, LBS: 4386
W7B608	B10	6704849	PCES:	1,	LBS:	4386	W7B608	B09	6704853	PCES:	1, LBS: 4386
W7B608	B09	6704855	PCES:	1,	LBS:	4386	W7B608	B09	6704854	PCES:	1, LBS: 4386
W7B608	B10	6704850	PCES:	1,	LBS:	4386	W7B608	B09	6704847	PCES:	1, LBS: 4386

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 18, Rev A

DIMENSIONAL CHECK REPORT – ROUNDNESS

Customer: AGNICO EAGLE

Location: RANKIN INLET. TANK #2.

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A.

Code Requiring Test: API 650 Reason for Test: New Construction

(The tank shell will be checked for roundness at 12" above the tank floor. Roundness will be checked at 45 degree intervals or less, max. 20' spacing)

Test Date(s): Aug 8/17.

Tested by:

Seam Test Results:

Roundness checks were made every 20' around the tank. All Areas were found acceptable.

Sub-Arc Representative Signature: _____ Date: Aug 8/17.

Client Representative Signature: _____ Date: _____

Client Signature: Stephanie Gionet Date: Aug 21/17

Item 10 - Shell Roundness Dimension Report - AmSpec Data (3rd party)

AmSpec

LASER DIAMETERS

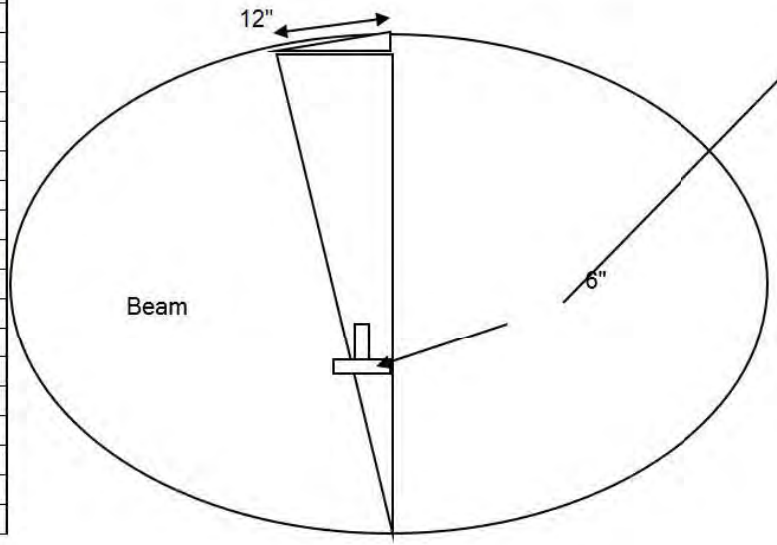
Dia	Beam	Hyp	
14.000		14.000	0.000

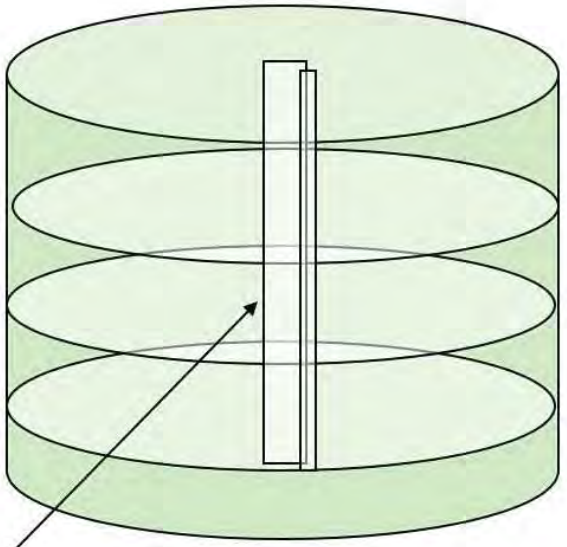
Enter Diameters (or Radii) in decimal Ft. Ex: 45.90

	Diameters left	Right of center beam
1	114.92	114.81
2	114.93	115.05
3	115.15	115.14
4	115.09	115.13
5	115.09	115.11
6	115.11	114.99
7	115.08	115.07
8	115.07	115.90
9	115.05	115.11
10	115.07	115.07
11	115.05	115.07
12	115.12	115.13
13	115.12	115.15
14	114.97	115.11
15	114.94	114.86
16	115.12	115.13
17	115.08	115.12
18	115.04	115.02
19	115.04	115.06
20	115.13	115.11
21	115.08	115.08
22	115.06	115.01
23	115.08	115.07
24	115.12	115.15
25	115.14	115.18
26	114.88	114.95
27		
28		
29		
30		
31		
32		
33		
34		
Average=	115.059	115.099

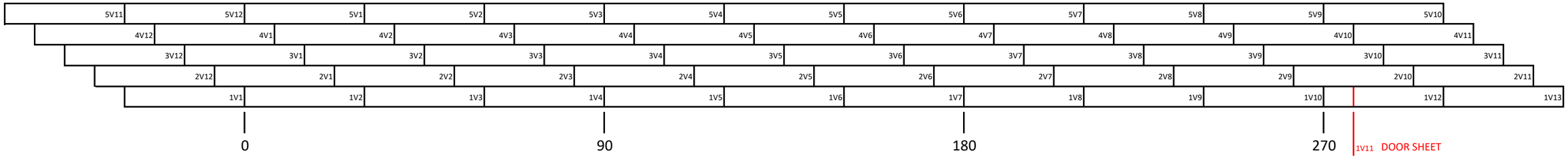
TAKE LASER DIAMETERS ABOUT EVERY 3 to 5 FEET AROUND THE INSIDE PERIMETER OF THE TANK FOR 180 DEGREES (HALF WAY ROUND). TAKING READINGS BOTH (ALTERNATE) SIDES OF THE CENTER POST/COLUMN.

IF DIAMETER DISTANCE IS TOO GREAT FOR LASER, THEN TAKE RADII FROM CENTER PIPE (NOT FROM A COLUMN) ABOUT EVERY 5 FEET AROUND THE INSIDE PERIMETER OF THE TANK FOR 360 DEGREES





Tank #2 Rankin Inlet (AEM)



VERTS (Welder ID)

	IN	OUT
1V1	MG	MG
1V2	MG	KW
1V3	KW	KW
1V4	KW	KW
1V5	DZ	DZ
1V6	DZ	DZ
1V7	DZ	MT
1V8	DZ	MT
1V9	DZ	MT
1V10	MT	MT
1V11 (DOOR SHEET)	MM	MM
1V12	KW	MT
1V13	MG	KW

	IN	OUT
2V1	MT	DZ
2V2	MT	DZ
2V3	DZ	DZ
2V4	DZ	MT
2V5	DZ	MT
2V6	MG	MT
2V7	MG	MG
2V8	KW	MG
2V9	KW	MG
2V10	KW	KW
2V11	KW	KW
2V12	KW	MT

	IN	OUT
3V1	JH	JN
3V2	JH	JN
3V3	JH	JH
3V4	JH	JH
3V5	JN	JH
3V6	JN	DZ
3V7	MG	DZ
3V8	DZ	MG
3V9	DZ	MG
3V10	DZ	MG
3V11	MG	DZ
3V12	JN	DZ

	IN	OUT
4V1	MT	MT
4V2	JO	KW
4V3	JO	JO
4V4	JH	JH
4V5	JN	JH
4V6	JH	JH
4V7	JH	JH
4V8	CJ	DZ
4V9	DZ	DZ
4V10	DZ	DZ
4V11	DZ	DZ
4V12	MT	DZ

	IN	OUT
5V1	DZ	MT
5V2	DZ	MT
5V3	KW	JH
5V4	KW	JO
5V5	JO	JO
5V6	JH	JO
5V7	JH	JN
5V8	JN	JN
5V9	JN	JH
5V10	DZ	DZ
5V11	KW	DZ
5V12	MT	DZ

HORIZONTAL (Welder ID)

	IN	OUT
H1	JO	MG
DOOR SHEET	MM/MT	MM/MT

	IN	OUT
H2	JO/MM	MG/KW

	IN	OUT
H3	JO/MM	MG/KW

	IN	OUT
H4	JO/MM	MG/KW

PLATES IDENTIFICATION (heat numbers)

	Heat Number
1V1	E7B111 B15
1V2	E7B111 B15
1V3	E7B111 B16
1V4	E7B111 B15
1V5	E7B111 B15
1V6	E7B111 B15
1V7	E7B111 B16
1V8	E7B111 B15
1V9	E7B111 B15
1V10	E7B111 B15
1V11	E7B111 B15
1V12	E7B111 B15
1V13	E7B111 B15

	Heat Number
2V1	W7B608 B11
2V2	E7B111 B14
2V3	W7B608 B11
2V4	E7B111 B14
2V5	E7B111 B14
2V6	W7B608 B11
2V7	W7B608 B11
2V8	W7B608 B11
2V9	W7B608 B11
2V10	W7B608 B11
2V11	W7B608 B11
2V12	W7B608 B11

	Heat Number
3V1	W7B608 B09
3V2	W7B608 B06
3V3	W7B608 B07
3V4	W7B608 B06
3V5	W7B608 B08
3V6	W7B608 B06
3V7	W7B608 B09
3V8	W7B608 B07
3V9	W7B608 B06
3V10	W7B608 B07
3V11	W7B608 B06
3V12	W7B608 B06

	Heat Number
4V1	W7B608 B07
4V2	W7B608 B08
4V3	W7B608 B07
4V4	W7B608 B07
4V5	W7B608 B09
4V6	W7B608 B06
4V7	W7B608 B08
4V8	W7B608 B09
4V9	W7B608 B07
4V10	W7B608 B08
4V11	W7B608 B09
4V12	W7B608 B08

	Heat Number
5V1	W7B608 B06
5V2	W7B608 B07
5V3	W7B608 B06
5V4	W7B608 B08
5V5	W7B608 B08
5V6	W7B608 B09
5V7	W7B608 B07
5V8	W7B608 B06
5V9	W7B608 B06
5V10	W7B608 B09
5V11	W7B608 B07
5V12	W7B608 B08

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 17, Rev A

DIMENSIONAL CHECK REPORT – BANDING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each circumferential seam will be checked for banding and max. banding dimension recorded for that seam. Circumferential seams will be checked at 45 degree intervals or less, max. 20' spacing)

Test Date(s): AUG 18/17

Tested by: MATT TURMEL

Seam Test Results:

1ST HORIZONTAL BANDING CHECKS DONE EVERY 20FT
MAX BANDING WAS 1/4" ON A 4FT LEVEL.

ALL CHECKS ACCEPTABLE

Sub-Arc Representative Signature: M Turmel Date: AUG 18/17

Client Representative Signature: _____ Date: _____

Client Signature: Clem Bonin Clem Bonin Date: Aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 17, Rev A

DIMENSIONAL CHECK REPORT – BANDING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2.

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each circumferential seam will be checked for banding and max. banding dimension recorded for that seam. Circumferential seams will be checked at 45 degree intervals or less, max. 20' spacing)

Test Date(s): AUG 19/17

Tested by: MATT TURMEL

Seam Test Results:

2ND HORIZONTAL BANDING CHECKS DONE EVERY 20FT
MAX BANDING WAS 5/16" ON A 4 FT LEVEL

ALL CHECKS ACCEPTABLE

Sub-Arc Representative Signature: M Turmel Date: AUG 19/17

Client Representative Signature: _____ Date: _____

Client Signature: C Bonin CLEM BONIN Date: Aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 17, Rev A

DIMENSIONAL CHECK REPORT – BANDING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2.

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each circumferential seam will be checked for banding and max. banding dimension recorded for that seam. Circumferential seams will be checked at 45 degree intervals or less, max. 20' spacing)

Test Date(s): AUG 19/17.

Tested by: MATT TURMEL

Seam Test Results:

3RD HORIZONTAL BANDING CHECKS DONE EVERY 20FT

MAX BANDING WAS 1/4" ON A 4FT LEVEL

ALL CHECKS ACCEPTABLE

Sub-Arc Representative Signature: _____ Date: AUG 19/17

Client Representative Signature: _____ Date: _____

Client Signature: CHRIS CLELL BORJA Date: Aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 17, Rev A

DIMENSIONAL CHECK REPORT – BANDING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2.

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each circumferential seam will be checked for banding and max. banding dimension recorded for that seam. Circumferential seams will be checked at 45 degree intervals or less, max. 20' spacing)

Test Date(s): AUG 19/17.

Tested by: MATT TURMEL.

Seam Test Results:

4TH HORIZONTAL BANDING CHECKS DONE EVERY 20FT
MAX BANDING WAS 5/16" ON A 4FT LEVEL

ALL CHECKS ACCEPTABLE

Sub-Arc Representative Signature: M Turmel Date: AUG 19/17.

Client Representative Signature: _____ Date: _____

Client Signature: CLEM BONIN Date: aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 16, Rev A

DIMENSIONAL CHECK REPORT – PEAKING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each vertical seam will be checked for peaking and max. peak dimension recorded for that seam.)

Test Date(s): AUG 18/17

Tested by: MATT TURMEL

Seam Test Results:

SR1 - 1V1 1/8", 1V2 1/8", 1V3 1/4", 1V4 Ø, 1V5 1/16", 1V6 1/8", 1V7 Ø, 1V8 1/16", 1V9 1/16", 1V10 (DOORSHEET) ↓1/8", 1V11 (DOORSHEET) ↓1/4", 1V12 Ø, 1V13 1/8"

ALL SR1 VERTS ACCEPTABLE (1V10 + 1V11 WILL BE DONE WHEN DOORSHEET COMPLETE) MM.

Sub-Arc Representative Signature: MTurmel Date: AUG 18/17

Client Representative Signature: _____ Date: _____

Client: CLEM BOIVIN Date: Aug. 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 16, Rev A

DIMENSIONAL CHECK REPORT – PEAKING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2.

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each vertical seam will be checked for peaking and max. peak dimension recorded for that seam.)

Test Date(s): AUG 18/17

Tested by: MATT TURMEL

Seam Test Results:

SR2 - 2V1 1/16", 2V2 Ø, 2V3 1/16", 2V4 Ø, 2V5 Ø, 2V6 1/8", 2V7 1/8", 2V8 3/16", 2V9 1/16", 2V10 Ø, 2V11 1/8", 2V12 1/16"

ALL SR2 VERTS ACCEPTABLE

Sub-Arc Representative Signature: M Turmel Date: AUG 18/17

Client Representative Signature: _____ Date: _____

Client: Glenn Bonia Date: Sept 04/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 16, Rev A

DIMENSIONAL CHECK REPORT – PEAKING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each vertical seam will be checked for peaking and max. peak dimension recorded for that seam.)

Test Date(s): AUG 18/17

Tested by: MATT TURMEL

Seam Test Results:

SR3 – 3V1 3/16", 3V2 1/8", 3V3 Ø, 3V4 1/8", 3V5 1/16", 3V6 3/16", 3V7 1/8, 3V8 Ø, 3V9 1/16, 3V10 1/4", 3V11 1/8", 3V12 Ø

ALL SR3 VERTS ACCEPTABLE

Sub-Arc Representative Signature: MTurmel Date: AUG 18/17.

Client Representative Signature: _____ Date: _____

Client: CBonin CLEM BONIA Date: Aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 16, Rev A

DIMENSIONAL CHECK REPORT – PEAKING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each vertical seam will be checked for peaking and max. peak dimension recorded for that seam.)

Test Date(s): AUG 18/17

Tested by: MATT TURMEL

Seam Test Results:

SR4 - 4V1 Ø, 4V2 1/16", 4V3 1/4", 4V4 3/16", 4V5 1/8", 4V6 1/8, 4V7 Ø, 4V8 3/16", 4V9 1/16", 4V10 Ø, 4V11 1/16", 4V12 Ø

ALL SR4 VERTS ACCEPTABLE

Sub-Arc Representative Signature: _____ Date: AUG 18/17.

Client Representative Signature: _____ Date: _____

Client: CBonia CLENT BONIA Date: Aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 16, Rev A

DIMENSIONAL CHECK REPORT – PEAKING

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(Each vertical seam will be checked for peaking and max. peak dimension recorded for that seam.)

Test Date(s): AUG 18/17

Tested by: MATT TURMEL

Seam Test Results:

SR5 - 5V1 1/16", 5V2 ø, 5V3 1/16", 5V4 1/8", 5V5 1/8",
5V6 3/16", 5V7 1/8, 5V8 ø, 5V9 1/16, 5V10 1/8, 5V11 ø,
5V12 3/16"
ALL SR5 VERTS ACCEPTABLE

Sub-Arc Representative Signature: M Turmel Date: AUG 18/17.

Client Representative Signature: _____ Date: _____

Client: CBonin CLEM BONIN Date: aug 23/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 19, Rev A

DIMENSIONAL CHECK REPORT – PLUMBNESS

Customer: AGNICO EAGLE

Location: RANKIN INLET TANK #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 Reason for Test: New Construction

(The tank shell will be checked for plumb at 12" below the tank roof. Plumb measurements will be checked at 45 degree intervals or less, max. 20' spacing)

Test Date(s): AUG 17/17

Tested by: MATT MACKENZIE

Seam Test Results:

Plumbness measurements were taken every 20'. All measurements were acceptable.

Sub-Arc Representative Signature: _____ Date: Aug 17/17

Client Representative Signature: _____ Date: _____

Client Signature: Stephanie Cinq-Mars Date 21/08/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15b, Rev 1

DIESEL TEST REPORT (SHELL)

Customer: Agnico Eagle

Location: Rankin Inlet Tank #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 (section 7.3.5) Reason for Test: New Construction

(The shell shall be tested by painting all of the joints on the inside with a highly penetrating oil and carefully examining the outside of the joints for leakage.)

Surface Condition (As Welded)

Test Solution: Diesel Test Date(s): Aug 11/17

Tested by: Chris Jagues. Ambient Conditions: 9°C

Items Tested:

2nd horizontal + 2nd Course Verts.

Results:

No leaks were found at time of inspection.

Sub-Arc Representative Signature: _____ Date: Aug 11/17

Client Representative Signature: _____ Date: _____

Client Signature: Stephane Giant Date: Aug 11/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB. T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15b, Rev 1

DIESEL TEST REPORT (SHELL)

Customer: Agnico Eagle

Location: Rankin Inlet TANK #2.

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 (section 7.3.5) Reason for Test: New Construction

(The shell shall be tested by painting all of the joints on the inside with a highly penetrating oil and carefully examining the outside of the joints for leakage.)

Surface Condition (As Welded)

Test Solution: Diesel Test Date(s): Aug 13/17

Tested by: MATT TURNER. Ambient Conditions: 10 °C

Items Tested:

3rd Horizontal + 3rd Course Verts.

Results:

No leaks were found at time of inspection.

Sub-Arc Representative Signature: _____ Date: Aug. 14/17.

Client Representative Signature: _____ Date: _____

Client Signature: _____ Date: August 14/17

Stephane Gionet

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15b, Rev 1

DIESEL TEST REPORT (SHELL)

Customer: Agnico Eagle

Location: Rankin Inlet TANK #2

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 (section 7.3.5) Reason for Test: New Construction

(The shell shall be tested by painting all of the joints on the inside with a highly penetrating oil and carefully examining the outside of the joints for leakage.)

Surface Condition (As Welded)

Test Solution: Diesel Test Date(s): Aug 15/17

Tested by: MATT TURNER Ambient Conditions: 10°C

Items Tested:

4th HORIZONTAL + 4th Course Verts. + 5th Course Verts.

Results:

No leaks were found at time of inspection.

Sub-Arc Representative Signature: [signature] Date: Aug 15/17

Client Representative Signature: _____ Date: _____

Client Signature: [signature] Date: Aug 15/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15b, Rev 1

DIESEL TEST REPORT (SHELL)

Customer: Agnico Eagle

Location: Rankin Inlet

Equipment Tag No.: N/A

Equipment Type: N/A

Equipment Description: N/A

Code Requiring Test: API 650 (section 7.3.5) Reason for Test: New Construction

(The shell shall be tested by painting all of the joints on the inside with a highly penetrating oil and carefully examining the outside of the joints for leakage.)

Surface Condition (As Welded)

Test Solution: Diesel Test Date(s): Aug 6/17.

Tested by: Matt MacKenzie Ambient Conditions: 10° C

Items Tested:

1st horizontal & 1st Course Joints.

Results:

No leaks were found at time of inspection.

Sub-Arc Representative Signature: _____ Date: Aug 6/17

Client Representative Signature: _____ Date: _____

Client Signature: Clem Boivin Date: Aug 23/17

Client :	**Inukshuk Construction Ltd,**	**Date d'intervention :** **Intervention date :**	2017-08-30
Adresse/Address :	PO Box 654 Rankin Inlet, Nunavut X0C 0G0	**Date du rapport :** **Report date :**	2017-09-08
Contact :	Marc Losier		
Entrepreneur : **Contractor :**	N/A	**N° dossier :** **File no :**	INS-117107-01_R01
Endroit du travail : **Job location :**	Rankin Inlet , Nunavut	**Commande :** **Order :**	295-1046

INSP. VISUELLE / VISUAL INSP. ☐ **MAGNÉTOSCOPIE / MAGNETIC PARTICLES** ☒ **RESSUAGE / LIQUID PENETRANT** ☐ **ULTRASONS / ULTRASONIC** ☒

DESCRIPTION :

Magnetic particles inspection and Ultrasonic inspection on tank 2

The client is opting to use an ultrasonic testing, instead of radiographic testing

Remark : Visual testing was performed by client
I

INSP. VISUELLE / VISUAL INSP.

NORME : **SPECIFICATION :**

N° équip. : **Equip. no :** N/A

MAGNÉTOSCOPIE / MAGNETIC PARTICLES

NORME : **SPECIFICATION :** API 650

N° équip. : **Equip. no :** MP-Q-27

Ampérage : **Amperage :**	Culasse/Yoke	**Continue** **Continuous**	☒	**Résiduelle** **Residual**	☐	**Humide** **Wet**	☐	**Sèche** **Dry**	☒
Longitudinale **Longitudinal**	☐	**Circulaire** **Circular**	☐	**C.A.** **A.C.**	☒	**C.C.** **D.C.**	☐	**Démagnétisée** **Demagnetized**	☐

RESSUAGE / LIQUID PENETRANT

NORME : **SPECIFICATION :**

N° équip. : **Equip. no :**

Pénétrant/Penetrant : **Émulsifiant/Emulsifier :** **Révélateur/Developer :**

Temps/Time : **Temps/Time :** **Temps/Time :**

ULTRASONS / ULTRASONIC

NORME : **SPECIFICATION :** API 650

ÉTALONNAGE/CALIBRATION :

Bloc/Block : IIW Type 2 **Trou/Hole :** N/A **C.A.D. /D.A.C. :** X☐

APPAREIL/EQUIPMENT :

Instrument : USM GO+ **Couplant :** Echogel **Échelle/Sweep length :**

N° équip./Equip. no : UT-Q-34 **Palpeur/Transducer :** 0º degré and 70º degré

RÉSULTATS/RESULTS :

For ultrasonic results: **All spots are acceptable. See attached tables for locations.**

Magnetic particles inspection was performed on angle joint between the shell and nozzle, inside and outside the tank:

- *-Inside tank, weld between shell/nozzle, with a 100%: magnetic particles inspection, is acceptable*
- *-Outside tank, weld between shell/pad & weld between pad/nozzle, with 100% (note 1): magnetic particles inspection, is acceptable.*

Note 1: Fourteen (14) nozzles including four (4) manholes and one nozzle outside, does not have pad . Please refer to drawing 295-M10; part section K-K item #10. This nozzle corresponds to a ¾" coupling for a water temperature gauge in the shell and the client has advised that no repad is needed for this specific coupling.

Techniciens : **Technicians :**	Sylvain Germain CSA W178.2 level 2	**Assistants:**		**Approuvé par :** **Approved by :**	Pierre Dostie Technical Supervisor CSA W178.2, niveau 3

Client :	**Inukshuk Construction Ltd,**	**Date d'intervention :** **Intervention date :**	2017-08-30
Adresse/Address :	PO Box 654 Rankin Inlet, Nunavut X0C 0G0	**Date du rapport :** **Report date :**	2017-09-08
Contact :	Marc Losier		
Entrepreneur : **Contractor :**	N/A	**N° dossier :** **File no :**	INS-117107-01_R01
Endroit du travail : **Job location :**	Rankin Inlet , Nunavut	**Commande :** **Order :**	295-1046

Picture : 1

View of some nozzles

Picture : 2

View of tank 2

Techniciens : **Technicians :**	Sylvain Germain CSA W178.2 level 2	**Assistants:**		**Approuvé par :** **Approved by :**	Pierre Dostie Technical Supervisor CSA W178.2, niveau 3

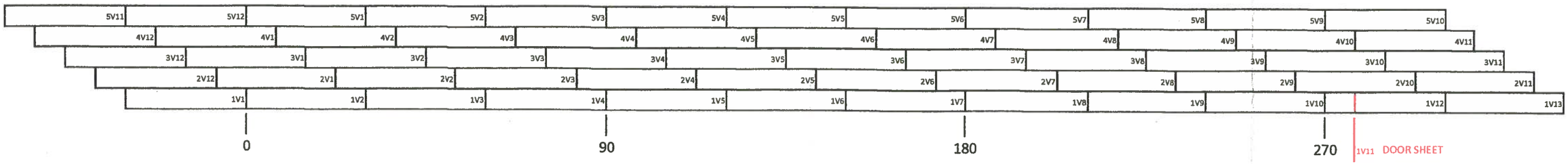
Client :	**Inukshuk Construction Ltd,**	**Date d'intervention :** **Intervention date :**	2017-08-30
Adresse/Address :	PO Box 654 Rankin Inlet, Nunavut X0C 0G0	**Date du rapport :** **Report date :**	2017-09-08
Contact :	Marc Losier		
Entrepreneur : **Contractor :**	N/A	**N° dossier :** **File no :**	INS-117107-01_R01
Endroit du travail : **Job location :**	Rankin Inlet , Nunavut	**Commande :** **Order :**	295-1046

Picture :3

View of manhole before padding

Techniciens : **Technicians :**	Sylvain Germain CSA W178.2 level 2	**Assistants:**		**Approuvé par :** **Approved by :**	Pierre Dostie Technical Supervisor CSA W178.2, niveau 3

Tank #2 Rankin Inlet (AEM)



NDT TECHNICIAN WILL INITIAL EACH BOX WHEN WELD IS ACCEPTABLE

B ----> BOTTOM OF THE VERT (0-6")	M ----> MIDDLE OF THE VERT (53"-59")	T ----> TOP OF THE VERT (104 3/16" - 110 3/16")

VERTICAL SEAMS MAPPING UT

	B	M	T	FULL
1V1	UT FULL BECAUSE NOZZLE INTO VERT			SC
1V2	SG	SG	SG	
1V3	SG	SG	SC	
1V4	UT FULL BECAUSE NOZZLE INTO VERT			SC
1V5	SG	SG	SG	
1V6	SC	SC	SC	
1V7	UT FULL BECAUSE NOZZLE INTO VERT			SG
1V8	SG	SG	SG	
1V9	SG	SG	SC	
1V10	UT FULL BECAUSE NOZZLE INTO VERT			SG
1V11 (DOOR SHEET)	SG	LC	LC	
1V12	SG	SG	SG	
1V13	SC	SC	SC	

	B	M	T
2V1	SG	SC	SG
2V2	SG	SG	SG
2V3	SG	SG	SG
2V4	SC	SG	SG
2V5	SC	SG	SC
2V6	SG	SG	SC
2V7	SC	SG	SC
2V8	SC	SG	SC
2V9	SC	SG	SG
2V10	SG	SC	SG
2V11	SG	SG	SG
2V12	SG	SG	SC

	B	T
3V1	SG	SC
3V2	SC	SG
3V3	SG	SG
3V4	SG	SG
3V5	SC	SG
3V6	SG	SG
3V7	SG	SG
3V8	SG	SG
3V9	SG	SG
3V10	SG	SG
3V11	SG	SG
3V12	SG	SG

	B	T
4V1	SG	SG
4V2	SG	SG
4V3	SG	SG
4V4	SG	SC
4V5	SG	SC
4V6	SG	SC
4V7	SG	SG
4V8	SG	SG
4V9	SC	SG
4V10	SC	SG
4V11	SG	SG
4V12	SC	SG

	B	T
5V1	SG	
5V2	SG	
5V3	SG	
5V4	SG	
5V5	SC	
5V6	SC	
5V7	SG	
5V8	SG	
5V9	SC	
5V10	SG	
5V11	SG	
5V12	SG	

HORIZONTAL SEAMS MAPPING UT

H1V2	48"-54"	SG
H1V8	60"-66"	SG
H1V10	42"-48"	SG

H2V3	48"-54"	SG
H2V9	72"-78"	SC

H3V1	60"-66"	SG
H3V7	42"-48"	SC

H4V5	30"-36"	SG
H4V11	72"-78"	SG

Sub-Arc Representative Signature: _____ Date: Aug 26/17.

Client Representative Signature: _____ Date: _____

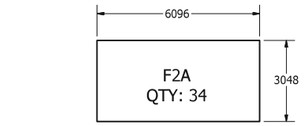
NDT Representative Signature: _____ Date: august 26 2017

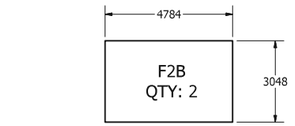
Item 11 – Compression Ring

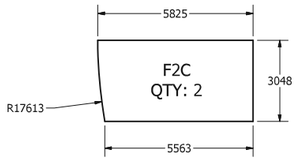
Contents

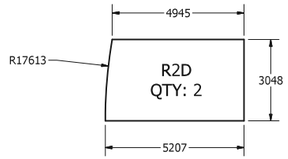
Item 11 - Compression Ring - Rim Angle to Roof Weld Map

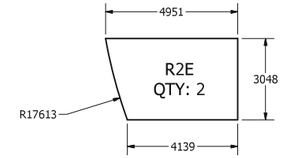
PARTS LIST			
ITEM	QTY	DESCRIPTION	MATERIAL
R2A	34	PL 6.35 X 3048 X 6096	G40.21M-260WT
R2B	2	PL 6.35 X 3048 X 4784	G40.21M-260WT
R2C	2	PL 6.35 X 3048 X 5825	G40.21M-260WT
R2D	2	PL 6.35 X 3048 X 5825	G40.21M-260WT
R2E	2	PL 6.35 X 3048 X 4951	G40.21M-260WT
R2F	2	PL 6.35 X 3048 X 5569	G40.21M-260WT
R2G	2	PL 6.35 X 3048 X 4771	G40.21M-260WT
R2H	2	PL 6.35 X 3048 X 4153	G40.21M-260WT
R2I	2	PL 6.35 X 3048 X 4039	G40.21M-260WT
R2J	2	PL 6.35 X 3048 X 3345	G40.21M-260WT
R2K	2	PL 6.35 X 1066 x 1085	G40.21M-260WT
R2L	2	PL 6.35 X 1659 x 1779	G40.21M-260WT
R2M	2	PL 6.35 X 3048 X 6096	G40.21M-260WT
R2N	2	PL 6.35 X 3048 X 4784	G40.21M-260WT
R2O	2	PL 6.35 X 2833 x 1398	G40.21M-260WT
R2P	2	PL 6.35 X 3451 x 1624	G40.21M-260WT
R2Q	2	PL 6.35 X 2580 x 6096	G40.21M-260WT
R2R	2	PL 6.35 X 2579 x 6096	G40.21M-260WT

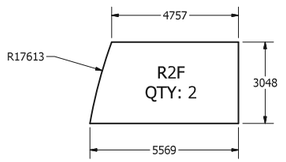


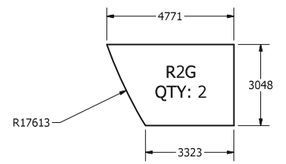


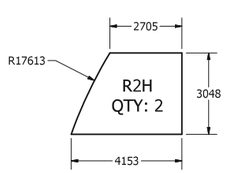


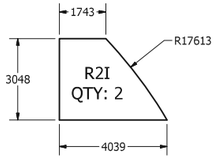


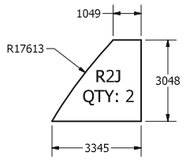


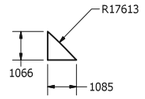




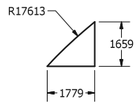




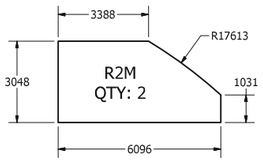


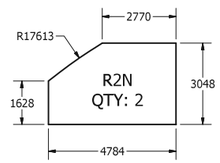


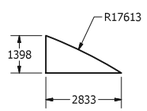
R2K
QTY: 2



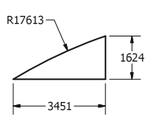
R2L
QTY: 2



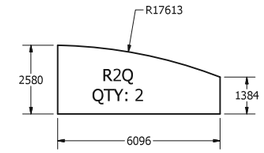


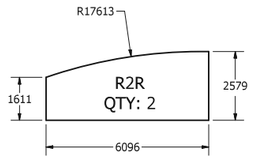


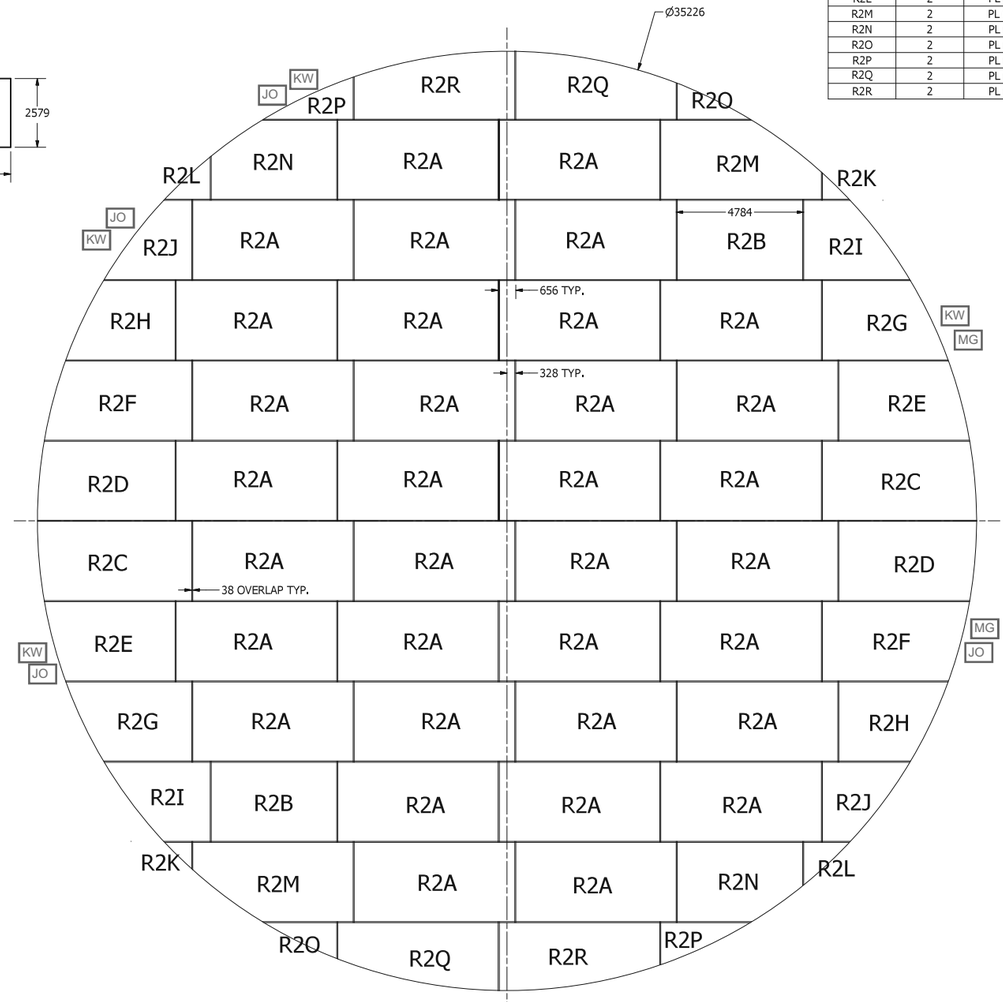
R2O
QTY: 2



R2P
QTY: 2







TANK 2 (13.5ML) ROOF LAYOUT
SCALE 1 / 100

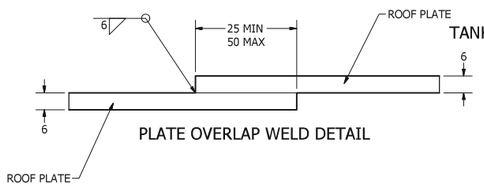


PLATE OVERLAP WELD DETAIL

19-Jul-2017
Permit Number: P471

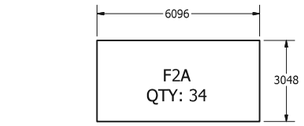
DRAWN	JACOB SAUNDERS	1/10/2017	TK 2 (13.5ML) - ROOF LAYOUT
CHECKED	MARC LOSIER	3/14/2017	TITLE: MELIADINE FIELD ERECTED TANKS - TANK #2 (13.5ML) FLOOR AND ROOF LAYOUT
QA			
MFG			
APPROVED			

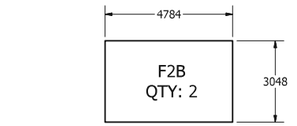
SIZE	DWG NO	REV
A1	295-M2	1

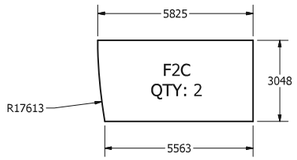
SCALE 1 / 100 — SHEET 2 OF 2

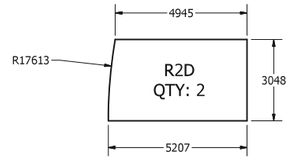
Item 11 - Compression Ring - Rim Angle to Shell Weld Map

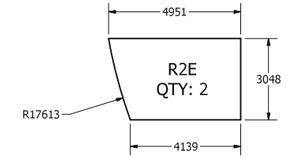
PARTS LIST			
ITEM	QTY	DESCRIPTION	MATERIAL
R2A	34	PL 6.35 X 3048 X 6096	G40.21M-260WT
R2B	2	PL 6.35 X 3048 X 4784	G40.21M-260WT
R2C	2	PL 6.35 X 3048 X 5825	G40.21M-260WT
R2D	2	PL 6.35 X 3048 X 5825	G40.21M-260WT
R2E	2	PL 6.35 X 3048 X 4951	G40.21M-260WT
R2F	2	PL 6.35 X 3048 X 5569	G40.21M-260WT
R2G	2	PL 6.35 X 3048 X 4771	G40.21M-260WT
R2H	2	PL 6.35 X 3048 X 4153	G40.21M-260WT
R2I	2	PL 6.35 X 3048 X 4039	G40.21M-260WT
R2J	2	PL 6.35 X 3048 X 3345	G40.21M-260WT
R2K	2	PL 6.35 X 1066 x 1085	G40.21M-260WT
R2L	2	PL 6.35 X 1659 x 1779	G40.21M-260WT
R2M	2	PL 6.35 X 3048 X 6096	G40.21M-260WT
R2N	2	PL 6.35 X 3048 X 4784	G40.21M-260WT
R2O	2	PL 6.35 X 2833 x 1398	G40.21M-260WT
R2P	2	PL 6.35 X 3451 x 1624	G40.21M-260WT
R2Q	2	PL 6.35 X 2580 x 6096	G40.21M-260WT
R2R	2	PL 6.35 X 2579 x 6096	G40.21M-260WT

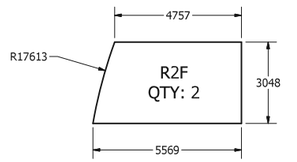


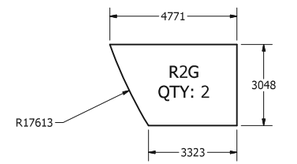


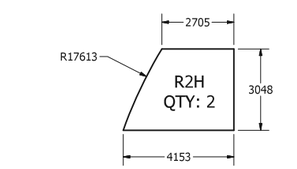


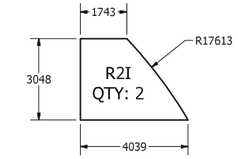


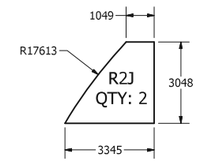


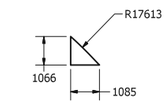




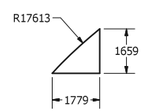




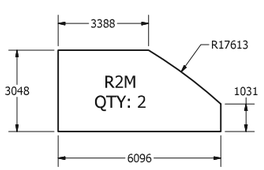


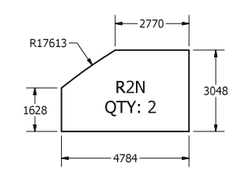


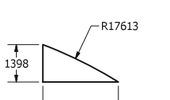
R2K
QTY: 2



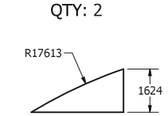
R2L
QTY: 2



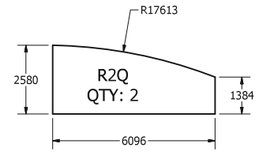


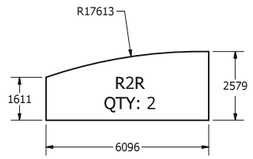


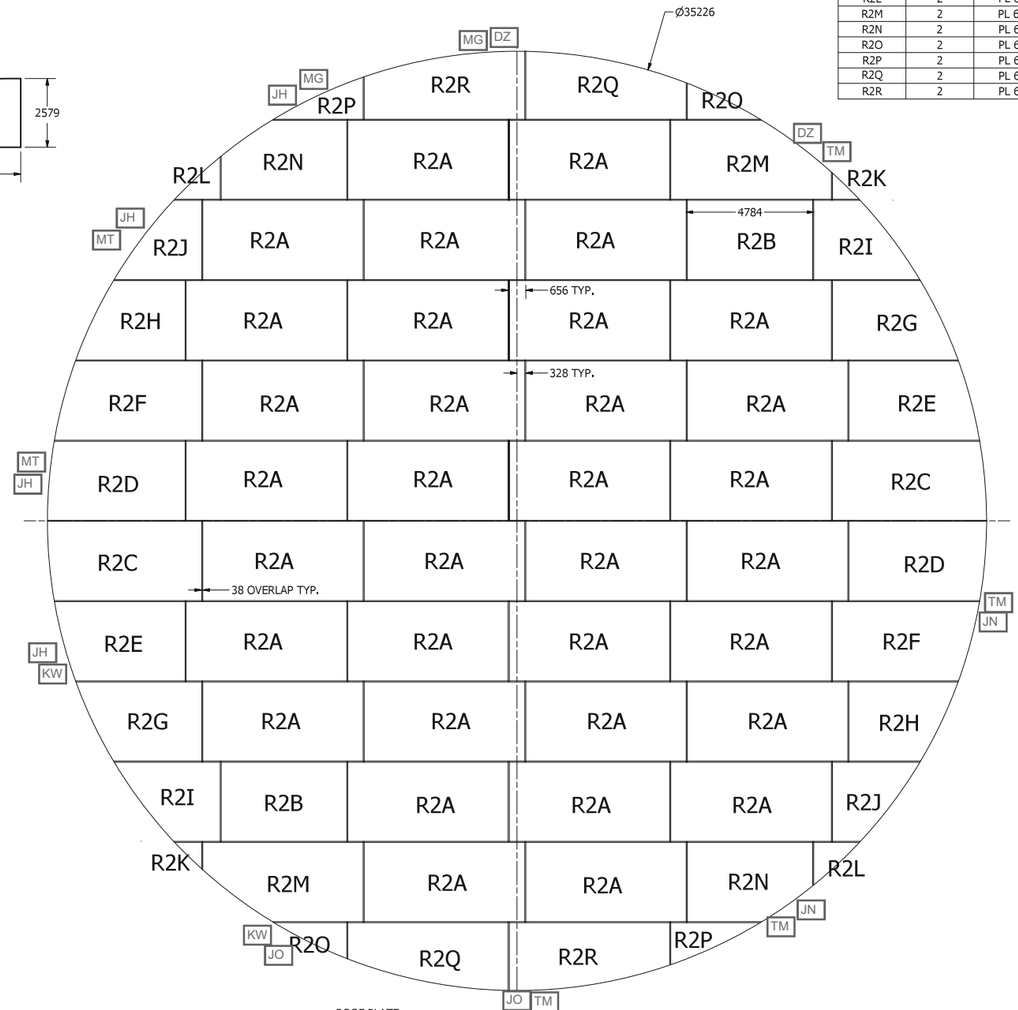
R2O
QTY: 2



R2P
QTY: 2







TANK 2 (13.5ML) ROOF LAYOUT
SCALE 1 / 100

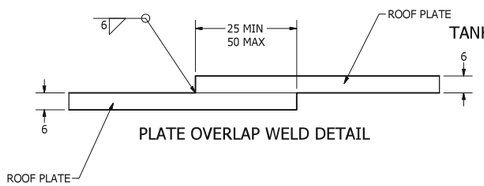


PLATE OVERLAP WELD DETAIL

19-Jul-2017
Permit Number: P471

DRAWN	JACOB SAUNDERS	1/10/2017	TK 2 (13.5ML) - ROOF LAYOUT
CHECKED	MARC LOSIER	3/14/2017	TITLE: MELIADINE FIELD ERECTED TANKS - TANK #2 (13.5ML) FLOOR AND ROOF LAYOUT
QA			
MFG			
APPROVED			

SIZE A1 | DWG NO 295-M2 | REV 1
SCALE 1 / 100 | SHEET 2 OF 2

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15c, Rev 1

VISUAL TEST REPORT

Customer: Agnico Eagle

Location: Rankin Inlet

Code Requiring Test: API 650 (section 8.5.2) Reason for Test: New Construction

A weld shall be acceptable by visual examination if the inspection shows the following.

a) There are no crater cracks, other surface cracks or arc strikes in or adjacent to the welded joints.
b) Maximum permissible undercut is 0.4 mm (1/64 in.) in depth for vertical butt joints, vertically oriented permanent attachments, attachment welds for nozzles, manholes, flush-type openings, and the inside shell-to-bottom welds. For horizontal butt joints, horizontally oriented permanent attachments, and annular-ring butt joints, the maximum permissible undercut is 0.8 mm (1/32 in.) in depth.
c) The frequency of surface porosity in the weld does not exceed one cluster (one or more pores) in any 100 mm (4 in.) of length, and the diameter of each cluster does not exceed 2.5 mm (3/32 in.).
d) The reinforcement of the welds on all thicknesses:

Plate Thickness mm (in.)	Maximum Reinforcement Thickness mm (in.)	
	Vertical Joints	Horizontal Joints
≤ 13 (1/2)	2.5 (3/32)	3 (1/8)
> 13 (1/2) to 25 (1)	3 (1/8)	5 (3/16)
> 25 (1)	5 (3/16)	6 (1/4)

Surface Condition (As Welded)

Test Solution: N/A Test Date(s): Aug 20/17

Tested by: MATT MACKENZIE Ambient Conditions:

Items Tested:

COMPRESSION RING

Results:

NO DEFECTS WERE FOUND. ALL WELDING ACCEPTABLE.

Sub-Arc Representative Signature: _____ Date: Aug 20/17.

Client Representative Signature: _____ Date: _____

Client Signature: CHRIS CLEM BONITA Date: Aug. 23/17

Item 12 – Roof

Contents

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15c, Rev 1

VISUAL TEST REPORT

Customer: Agnico Eagle

Location: Rankin Inlet

Code Requiring Test: API 650 (section 8.5.2) Reason for Test: New Construction

A weld shall be acceptable by visual examination if the inspection shows the following.

a) There are no crater cracks, other surface cracks or arc strikes in or adjacent to the welded joints.
b) Maximum permissible undercut is 0.4 mm (1/64 in.) in depth for vertical butt joints, vertically oriented permanent attachments, attachment welds for nozzles, manholes, flush-type openings, and the inside shell-to-bottom welds. For horizontal butt joints, horizontally oriented permanent attachments, and annular-ring butt joints, the maximum permissible undercut is 0.8 mm (1/32 in.) in depth.
c) The frequency of surface porosity in the weld does not exceed one cluster (one or more pores) in any 100 mm (4 in.) of length, and the diameter of each cluster does not exceed 2.5 mm (3/32 in.).
d) The reinforcement of the welds on all thicknesses:

Plate Thickness mm (in.)	Maximum Reinforcement Thickness mm (in.)	
	Vertical Joints	Horizontal Joints
≤ 13 (1/2)	2.5 (3/32)	3 (1/8)
> 13 (1/2) to 25 (1)	3 (1/8)	5 (3/16)
> 25 (1)	5 (3/16)	6 (1/4)

Surface Condition (As Welded)

Test Solution: N/A Test Date(s): Aug 23/17

Tested by: MATT MACKENZIE Ambient Conditions: 17°

Items Tested:

TK-2 ROOF

Results:

VISUAL COMPLETED ON TK-2 ROOF. NO DEFECTS WERE FOUND. ARC WELDING ACCEPTABLE.

Sub-Arc Representative Signature: _____ Date: Aug 23/17.

Client Representative Signature: _____ Date: _____

Client Signature: Chris Clerk BOMIA Date: Aug 23/17

SSAB

Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

Item 12 - Roof - MTR

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-13 | **Shipping Manifest:** AR240131

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 21 Feb 17
Cert Date: 21 Feb 17

Cert No: 081597448
(Page 1 of 2)

Size: 0.250 X 120.0 X 480.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests									
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1	2	3	Avg	% Shear 1	2	3	Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B102	E11	0.256 (DISCRT)	C							33	44	37	38					-50F	L	5.0	
			C							35	27	34	32					-50F	T	5.0	
E7B102	E12	0.256 (DISCRT)	C							39	40	36	38					-50F	L	5.0	
			C							27	25	22	25					-50F	T	5.0	
E7B102	E13	0.255 (DISCRT)	C	55	76		26	T		35	34	30	33					-50F	L	5.0	
			C							27	44	41	37					-50F	T	5.0	
E7B102	E14	0.256 (DISCRT)	C	55	75		24	T		56	41	58	52					-50F	L	5.0	
			C							27	32	30	30					-50F	T	5.0	
W7B598	E06	0.256 (DISCRT)	C							30	30	30	30					-50F	L	5.0	
			C							37	27	23	29					-50F	T	5.0	
W7B598	E07	0.256 (DISCRT)	C	52	72		25	T													
W7B598	E08	0.256 (DISCRT)	C	51	71		25	T													
W7B598	E10	0.256 (DISCRT)	C							32	40	31	34					-50F	L	5.0	
			C							28	34	28	30					-50F	T	5.0	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B102	.18	.94	.009	.001	.25	.027	.025	.26	.12	.11	.05	.002	.005	.011	.0002	.0076	USA
W7B598	.18	.92	.009	.001	.24	.028	.022	.26	.13	.08	.05	.001	.004	.011	.0002	.0078	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
CHARPY FULL SIZE EQUIVALENT = ABSORBED ENERGY AVG X 10 / TEST SIZE IN MM
NORMALIZED PLATES. HEATED AT 1665F FOR 14 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

W7B598 E06	6705201	PCES:	1,	LBS:	4084	W7B598 E06	6705200	PCES:	1,	LBS:	4084
E7B102 E14	6705250	PCES:	1,	LBS:	4084	E7B102 E14	6705249	PCES:	1,	LBS:	4084
E7B102 E13	6705243	PCES:	1,	LBS:	4084	E7B102 E12	6705236	PCES:	1,	LBS:	4084
E7B102 E13	6705244	PCES:	1,	LBS:	4084	W7B598 E06	6705199	PCES:	1,	LBS:	4084
E7B102 E12	6705235	PCES:	1,	LBS:	4084	E7B102 E13	6705234	PCES:	1,	LBS:	4084
E7B102 E11	6705193	PCES:	1,	LBS:	4084	E7B102 E11	6705190	PCES:	1,	LBS:	4084

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

Item 12 - Roof - MTR

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41966 & 41-490196 | **Mill Order No.** 41-491119-13 | **Shipping Manifest:** AR240131

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Ship Date: 21 Feb 17
Cert Date: 21 Feb 17

Cert No: 081597448

Size: 0.250 X 120.0 X 480.0 (IN)

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W7B598	E10	6705178	PCES: 1, LBS: 4084						E7B102	E11	6705183	PCES: 1, LBS: 4084					
W7B598	E10	6705177	PCES: 1, LBS: 4084						W7B598	E10	6705181	PCES: 1, LBS: 4084					
W7B598	E10	6705179	PCES: 1, LBS: 4084						W7B598	E10	6705189	PCES: 1, LBS: 4084					
W7B598	E10	6705186	PCES: 1, LBS: 4084						E7B102	E11	6705172	PCES: 1, LBS: 4084					
E7B102	E11	6705176	PCES: 1, LBS: 4084						W7B598	E10	6705180	PCES: 1, LBS: 4084					
E7B102	E11	6705192	PCES: 1, LBS: 4084						E7B102	E11	6705194	PCES: 1, LBS: 4084					
E7B102	E11	6705184	PCES: 1, LBS: 4084						E7B102	E11	6705185	PCES: 1, LBS: 4084					
W7B598	E06	6705207	PCES: 1, LBS: 4084						W7B598	E06	6705206	PCES: 1, LBS: 4084					
E7B102	E12	6705239	PCES: 1, LBS: 4084						E7B102	E12	6705231	PCES: 1, LBS: 4084					
E7B102	E14	6705247	PCES: 1, LBS: 4084						E7B102	E13	6705242	PCES: 1, LBS: 4084					
E7B102	E14	6705248	PCES: 1, LBS: 4084						E7B102	E12	6705237	PCES: 1, LBS: 4084					
W7B598	E06	6705209	PCES: 1, LBS: 4084						E7B102	E13	6705240	PCES: 1, LBS: 4084					
E7B102	E12	6705238	PCES: 1, LBS: 4084						W7B598	E06	6705198	PCES: 1, LBS: 4084					
E7B102	E14	6705251	PCES: 1, LBS: 4084						W7B598	E06	6705197	PCES: 1, LBS: 4084					
E7B102	E13	6705241	PCES: 1, LBS: 4084						E7B102	E12	6705230	PCES: 1, LBS: 4084					

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

Item 12 - Roof - MTR

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41965 & 41-490195 | **Mill Order No.** 41-491117-01 | **Shipping Manifest:** AR240135

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.250 X 120.0 X 480.0 (IN)

Ship Date: 21 Feb 17
Cert Date: 21 Feb 17

Cert No: 081597458

Tested Pieces:				Tensiles:					Hardness	Charpy Impact Tests								
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir		Abs. Energy(FTLB) 1	2	3	Avg	% Shear 1	2	3	Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B101	E01	0.256 (DISCRT)	C	53	75		25	T													
E7B101	E02	0.256 (DISCRT)	C							37	27	59	41					-50F	L	5.0	
			C							24	36	28	29					-50F	T	5.0	
E7B101	E03	0.256 (DISCRT)	C	54	75		27	T		51	62	61	58					-50F	L	5.0	
			C							37	30	27	31					-50F	T	5.0	
E7B101	E04	0.256 (DISCRT)	C							22	33	38	31					-50F	L	5.0	
			C							42	37	48	42					-50F	T	5.0	
E7B101	E05	0.256 (DISCRT)	C							61	49	61	57					-50F	L	5.0	
			C							32	41	32	35					-50F	T	5.0	
W7B598	E07	0.256 (DISCRT)	C	52	72		25	T													
W7B598	E08	0.256 (DISCRT)	C	51	71		25	T		33	31	37	34					-45F	L	5.0	
			C							30	28	31	30					-45F	T	5.0	
W7B598	E09	0.256 (DISCRT)	C							43	31	55	43					-50F	L	5.0	
			C							33	30	31	31					-50F	T	5.0	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B101	.19	.92	.010	<.001	.24	.022	.020	.24	.13	.10	.04	.002	.005	.010	.0002	.0069	USA
W7B598	.18	.92	.009	.001	.24	.028	.022	.26	.13	.08	.05	.001	.004	.011	.0002	.0078	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
CHARPY FULL SIZE EQUIVALENT = ABSORBED ENERGY AVG X 10 / TEST SIZE IN MM
NORMALIZED PLATES. HEATED AT 1665F FOR 14 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

E7B101 E05	6705084	PCES:	1,	LBS:	4084	E7B101 E02	6705125	PCES:	1,	LBS:	4084
E7B101 E02	6705123	PCES:	1,	LBS:	4084	E7B101 E05	6705086	PCES:	1,	LBS:	4084
E7B101 E03	6705100	PCES:	1,	LBS:	4084	E7B101 E05	6705085	PCES:	1,	LBS:	4084
E7B101 E02	6705124	PCES:	1,	LBS:	4084	W7B598 E08	6705042	PCES:	1,	LBS:	4084
W7B598 E08	6705041	PCES:	1,	LBS:	4084	W7B598 E08	6705040	PCES:	1,	LBS:	4084
W7B598 E09	6705038	PCES:	1,	LBS:	4084	W7B598 E08	6705043	PCES:	1,	LBS:	4084

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

Item 12 - Roof - MTR

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41965 & 41-490195 | **Mill Order No.** 41-491117-01 | **Shipping Manifest:** AR240135

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT.LBS,TCVN13FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Size: 0.250 X 120.0 X 480.0 (IN)

Ship Date: 21 Feb 17
Cert Date: 21 Feb 17

Cert No: 081597458

Tested Pieces:				Tensiles:						Charpy Impact Tests							
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W7B598	E08	6705039	PCES: 1, LBS: 4084						E7B101	E05	6705087	PCES: 1, LBS: 4084					
W7B598	E08	6705052	PCES: 1, LBS: 4084						W7B598	E08	6705050	PCES: 1, LBS: 4084					
W7B598	E08	6705049	PCES: 1, LBS: 4084						W7B598	E08	6705044	PCES: 1, LBS: 4084					
W7B598	E08	6705045	PCES: 1, LBS: 4084						E7B101	E04	6705126	PCES: 1, LBS: 4084					
E7B101	E02	6705151	PCES: 1, LBS: 4084						E7B101	E02	6705152	PCES: 1, LBS: 4084					
E7B101	E02	6705150	PCES: 1, LBS: 4084						E7B101	E05	6705162	PCES: 1, LBS: 4084					
E7B101	E05	6705160	PCES: 1, LBS: 4084						E7B101	E05	6705153	PCES: 1, LBS: 4084					
E7B101	E05	6705161	PCES: 1, LBS: 4084						E7B101	E04	6705129	PCES: 1, LBS: 4084					
E7B101	E04	6705127	PCES: 1, LBS: 4084						E7B101	E04	6705130	PCES: 1, LBS: 4084					
E7B101	E04	6705128	PCES: 1, LBS: 4084						E7B101	E05	6705163	PCES: 1, LBS: 4084					
E7B101	E02	6705149	PCES: 1, LBS: 4084						E7B101	E04	6705102	PCES: 1, LBS: 4084					
W7B598	E08	6705046	PCES: 1, LBS: 4084														

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

SSAB

Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

Item 12 - Roof - MTR

Form TC1: Revision 2: Date 23 Apr 2014

Customer:
SAMUEL, SON & CO. LTD
1250 APPLEBY LINE

BURLINGTON
ON L7L5G6

Customer P.O.No.: C41965 & 41-496189 | **Mill Order No.** 41-496191-01 | **Shipping Manifest:** AR240215

Product Description: CSA G40.21(2013) 38WT/260WT - CAT 5;LCVN 15FT LBS,1CVN18FT.LBS@-45F/A673-P ALLOYS API650(12TH ED) TABLE 4-1 GR.IIIA NORMALIZED

Item 12 - Roof - MTR

Ship Date: 22 Feb 17
Cert Date: 22 Feb 17

Cert No: 081597726

Size: 0.250 X 120.0 X 480.0 (IN)

Tested Pieces:				Tensiles:					Hardness	Charpy Impact Tests									
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir		Abs. Energy(FTLB) 1	2	3	Avg	% Shear 1	2	3	Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E7B102	E13	0.255 (DISCRT)	C	55	76		26	T		35	34	30	33					-50F	L	5.0	
			C							27	44	41	37					-50F	T	5.0	
W7B598	E07	0.256 (DISCRT)	C	52	72		25	T		36	34	32	34					-45F	L	5.0	
			C							30	29	27	29					-45F	T	5.0	
W7B598	E08	0.256 (DISCRT)	C	51	71		25	T													
W7B598	E09	0.256 (DISCRT)	C							43	31	55	43					-50F	L	5.0	
			C							33	30	31	31					-50F	T	5.0	
W7B598	E10	0.256 (DISCRT)	C							32	40	31	34					-50F	L	5.0	
			C							28	34	28	30					-50F	T	5.0	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	ORGN
E7B102	.18	.94	.009	.001	.25	.027	.025	.26	.12	.11	.05	.002	.005	.011	.0002	.0076	USA
W7B598	.18	.92	.009	.001	.24	.028	.022	.26	.13	.08	.05	.001	.004	.011	.0002	.0078	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
CHARPY FULL SIZE EQUIVALENT = ABSORBED ENERGY AVG X 10 / TEST SIZE IN MM
NORMALIZED PLATES. HEATED AT 1665F FOR 15 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

W7B598 E10	6705182	PCES:	1,	LBS:	4084	W7B598 E07	6705202	PCES:	1,	LBS:	4084
W7B598 E07	6705203	PCES:	1,	LBS:	4084	W7B598 E07	6705204	PCES:	1,	LBS:	4084
W7B598 E07	6705205	PCES:	1,	LBS:	4084	W7B598 E09	6705210	PCES:	1,	LBS:	4084
W7B598 E07	6705211	PCES:	1,	LBS:	4084	W7B598 E07	6705212	PCES:	1,	LBS:	4084
W7B598 E07	6705213	PCES:	1,	LBS:	4084	W7B598 E07	6705214	PCES:	1,	LBS:	4084
W7B598 E07	6705215	PCES:	1,	LBS:	4084	W7B598 E10	6705216	PCES:	1,	LBS:	4084
W7B598 E10	6705217	PCES:	1,	LBS:	4084	W7B598 E10	6705218	PCES:	1,	LBS:	4084
W7B598 E10	6705219	PCES:	1,	LBS:	4084	W7B598 E09	6705220	PCES:	1,	LBS:	4084
W7B598 E09	6705221	PCES:	1,	LBS:	4084	W7B598 E09	6705222	PCES:	1,	LBS:	4084
W7B598 E09	6705223	PCES:	1,	LBS:	4084	E7B102 E13	6705232	PCES:	1,	LBS:	4084
E7B102 E13	6705233	PCES:	1,	LBS:	4084	E7B102 E13	6705245	PCES:	1,	LBS:	4084

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward +1 251 662 4400
SENIOR METALLURGIST - PRODUCT

Item 13 – Roof Structure

Contents

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 19, Rev A

DIMENSIONAL CHECK REPORT – PLUMBNESS

Customer: AGNICO EAGLE

Location: RANKIN INLET. TK.02

Equipment Tag No.:

Equipment Type:

Equipment Description:

Code Requiring Test: API 650 Reason for Test: New Construction

(The tank shell will be checked for plumb at 12" below the tank roof. Plumb measurements will be checked at 45 degree intervals or less, max. 20' spacing)

Test Date(s): AUG 31/17

Tested by: MATT MACKENZIE.

Seam Test Results:

ALL ROOF STRUCTURE COLUMNS ARE PLUMB. & ACCEPTABLE AT TIME OF INSPECTION.

Sub-Arc Representative Signature: _____ Date: Aug 31/17.

Client Representative Signature: _____ Date: _____

Client Signature: _____ Date: Sept 04/17

Sub-Arc Systems Inc.

4605-47 Street
Vermillion, AB, T9X 1L6
780-608-9589

QUALITY CONTROL MANUAL

Exhibit 15c, Rev 1

VISUAL TEST REPORT

Customer: Agnico Eagle

Location: Rankin Inlet

Code Requiring Test: API 650 (section 8.5.2) Reason for Test: New Construction

A weld shall be acceptable by visual examination if the inspection shows the following.

a) There are no crater cracks, other surface cracks or arc strikes in or adjacent to the welded joints.
b) Maximum permissible undercut is 0.4 mm (1/64 in.) in depth for vertical butt joints, vertically oriented permanent attachments, attachment welds for nozzles, manholes, flush-type openings, and the inside shell-to-bottom welds. For horizontal butt joints, horizontally oriented permanent attachments, and annular-ring butt joints, the maximum permissible undercut is 0.8 mm (1/32 in.) in depth.
c) The frequency of surface porosity in the weld does not exceed one cluster (one or more pores) in any 100 mm (4 in.) of length, and the diameter of each cluster does not exceed 2.5 mm (3/32 in.).
d) The reinforcement of the welds on all thicknesses:

Plate Thickness mm (in.)	Maximum Reinforcement Thickness mm (in.)	
	Vertical Joints	Horizontal Joints
≤ 13 (1/2)	2.5 (3/32)	3 (1/8)
> 13 (1/2) to 25 (1)	3 (1/8)	5 (3/16)
> 25 (1)	5 (3/16)	6 (1/4)

Surface Condition (As Welded)

Test Solution: N/A Test Date(s): Aug 23/17

Tested by: MATT MACKENZIE Ambient Conditions: 17°

Items Tested:

ROOF STRUCTURE

Results:

ALL ROOF STRUCTURE WELDING & BOLT UP ACCEPTABLE.

Sub-Arc Representative Signature: _____ Date: Aug 23/17

Client Representative Signature: _____ Date: _____

Client Signature: _____ CLEM BONIA Date: Aug 23/17

Item 14 - Nozzles

Contents