



## **Welding Data and Testing Report**

**Select 78**  
**(E71T-8-H8 per AWS A5.20)**  
**(E71T8-A2-CS3-H8 per AWS A5.36)**

**Date: 17 August 2015**



## Select 78

**Objective:** The goal of this report is to demonstrate the exceptional weldability, chemistry and mechanical properties of Select 78 self-shielded welding wire.

**Description:** Select 78 is a self-shielded carbon steel electrode classified as an E71T-8-H8 per AWS A5.20. This product exhibits excellent weldability and performance in all positions. Select 78 operates on DCEN polarity and is well suited for field construction applications where the use of a shielding gas is either not possible or impractical.

**Diameters:** 5/64" (2.0mm), .072" (1.9mm) and 1/16" (1.6mm)

**Approvals:** Select 78 possesses the following welding approvals

- AWS D1.8 Seismic
- CWB E491T-8-H8
- ABS 3YSA
- DNV IIIYMS

**Chemistry:** Typical deposited chemistry is shown below, compared with the requirements per AWS A5.20 and A5.36.

Select 78 Chemistry (Typical)						
	<u>Carbon</u>	<u>Manganese</u>	<u>Silicon</u>	<u>Sulphur</u>	<u>Phosphorus</u>	<u>Aluminum</u>
<b>Requirements:</b>	0.30 max.	1.75 max.	0.60 max.	0.030 max.	0.030 max.	1.8 max.
<b>Deposit Analysis:</b>	0.21	0.72	0.20	0.004	0.010	0.54

### Weldability and Performance:

**Wire Diameter** – 2.0mm (5/64")

**Welding Position** – 2F (PB)

**Welding Parameters** – 21 Volts, 250 Amps, 380 cm/min (150 in/min) WFS, 25 mm (1") ESO

Shown below are pictures of the completed 2F weld before and after slag removal. The arc exhibits a very smooth globular transfer and low spatter emission. Very little spatter can be seen adjacent to the weld, and any remaining spatter can be easily removed with a chipping hammer or wire brush. The weld bead shows a smooth surface and a flat profile with straight toe lines. Electrode stick-out (ESO) should be approx. 1" – 1-1/4" (25-30 mm). \*Note- For welding in the 1G (PA) down-flat position, increase weld parameters to 22 Volts, 290 Amps and 460 cm/min (180 in/min) for increased deposition rate.

**Before slag removal**



**After wire brushing**



**Wire Diameter** – 2.0mm (5/64")

**Welding Position** – 3F (PF)

**Welding Parameters** – 20 Volts, 220 Amps, 330 cm/min (130 in/min) WFS, 25 mm (1") ESO

The pictures below show welding performed in the vertical position with an upward progression. Similar to welding in the horizontal position, the arc exhibits superior stability and a smooth globular transfer. Any superficial spatter adjacent to the weld is easily brushed away. The vertical weld maintains a penetrating arc and is stable at high wire feed speeds for high deposition rates. Slag is easily removed in large pieces in this position by lightly tapping with a slag hammer.

**Before Slag Removal**



**After wire brushing**



**Certification Documents:** The following product documents include datasheets, Certificates of Conformance, AWS D1.8 Seismic certificates and agency approvals.

## Select 78

### Description:

**Select 78** is a self-shielded, carbon steel, flux cored electrode. It is intended for the welding without a shielding gas of carbon and certain low alloy steels where excellent low temperature toughness is required. A fast freezing slag facilitates welding in all positions. It has a smooth globular transfer, excellent bead shape and easily removed slag. **Select 78** is designed for structural applications such as bridge fabrication, ship and barge construction, as well as other general fabrication.

### Classification & Approvals:

- E71T-8-H8 per AWS A5.20, ASME SFA 5.20
- E71T8-A2-CS3-H8 per AWS A5.36, ASME SFA 5.36
- AWS D1.8 Seismic, CWB E491T-8-H8, ABS 3YSA, DNV IIIYMS

### Advantages:

- Operates on straight polarity (DCEN) with no external shielding gas.
- Fast freezing slag facilitates excellent weldability in all positions.
- Exhibits a smooth globular transfer, minimal spatter and easily removed slag.

### Typical Mechanical Properties:

Ultimate Tensile Strength (psi)	87,000
Yield Strength (psi)	64,000
Percent Elongation	27
CVN (ft•lb f) @ +70° F	77
@ -20° F	38

### Typical Deposit Composition (wt%):

<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>P</u>	<u>S</u>	<u>Al</u>
0.21	0.72	0.20	0.010	0.005	0.55

### Recommended Welding Parameters (DCEN):

<u>Diameter</u>	<u>WFS</u>	<u>Amperage</u>	<u>Voltage</u>	<u>CTWD (in.)</u>
1/16"	120	165	17-18	5/8
	170	200	18-19	3/4
	220	235	20-21	1
	270	270	21-22	1
	350	310	23-24	1
.072"	125	185	18-19	3/4
	175	220	20-21	1
	200	245	21-23	1
	225	265	22-24	1
	250	275	22-24	1
5/64"	60	140	17-18	3/4
	100	210	18-19	3/4
	150	255	21-22	1
	200	300	22-23	1
	250	330	23-24	1

\*These parameters may be used in all positions. The ability to weld out of position at the higher current levels will depend on plate thickness and welder skill.

Rev 2 (07/09/2015)

Notice: The results reported are based upon testing of the product under controlled laboratory conditions in accordance with American Welding Society Standards. Actual use of the product may produce different results due to varying conditions. An example of such conditions would be electrode size, plate chemistry, environment, weldment design, fabrication methods, welding procedure and service requirements. Thus the results are not guarantees for use in the field.

## Select 78

### Description:

**Select 78** is a self-shielded, carbon steel, flux cored electrode. It is intended for the welding without a shielding gas of carbon and certain low alloy steels where excellent low temperature toughness is required. A fast freezing slag facilitates welding in all positions. It has a smooth globular transfer, excellent bead shape and easily removed slag. **Select 78** is designed for structural applications such as bridge fabrication, ship and barge construction, as well as other general fabrication.

### Classification & Approvals:

- E71T-8-H8 per AWS A5.20, ASME SFA 5.20
- E71T8-A2-CS3-H8 per AWS A5.36, ASME SFA 5.36
- AWS D1.8 Seismic, CWB E491T-8-H8, ABS 3YSA, DNV IIIYMS

### Advantages:

- Operates on straight polarity (DCEN) with no external shielding gas.
- Fast freezing slag facilitates excellent weldability in all positions.
- Exhibits a smooth globular transfer, minimal spatter and easily removed slag.

### Typical Mechanical Properties:

Ultimate Tensile Strength (MPa)	600
Yield Strength (MPa)	441
Percent Elongation	27
CVN (Joules) @ +21° C	104
@ - 30° C	52

### Typical Deposit Composition (wt%):

<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>P</u>	<u>S</u>	<u>Al</u>
0.21	0.72	0.20	0.010	0.005	0.55

### Recommended Welding Parameters (DCEN):

Diameter	WFS (cm/min)	Amperage	Voltage	CTWD (mm)
1.6mm	305	165	17-18	16
	432	200	18-19	19
	559	235	20-21	25
	686	270	21-22	25
	889	310	23-24	25
1.9mm	318	185	18-19	16
	445	220	20-21	25
	508	245	21-23	25
	572	265	22-24	25
	635	275	22-24	25
2.0mm	152	140	16-17	16
	254	210	18-19	19
	381	255	21-22	25
	508	300	22-23	25
	635	330	23-24	25

\*These parameters may be used in all positions. The ability to weld out of position at the higher current levels will depend on plate thickness and welder skill.

Rev 2 (07/09/2015)

Notice: The results reported are based upon testing of the product under controlled laboratory conditions in accordance with American Welding Society Standards. Actual use of the product may produce different results due to varying conditions. An example of such conditions would be electrode size, plate chemistry, environment, weldment design, fabrication methods, welding procedure and service requirements. Thus the results are not guarantees for use in the field.



CERTIFICATE OF CONFORMANCE

Manufactured in the U.S.A. by :
SELECT-ARC, INC.
600 Enterprise Dr.
P. O. Box 259
Fort Loramie, OH 45845

Supplied to :

Date:
Customer Order Number :
Order Number :
Weight :
Lot/ Production No. Shipped:

This is to certify that Select 78 electrode classification E71T-8-H8, as supplied on the above order number, is of the same classification, manufacturing process and material requirements as the electrode used for testing on June 2, 2014. All tests required by specifications AWS A5.20/ASME SFA-5.20, for wire diameter 5/64" were performed in conformance with these specifications and the results met all requirements. The test results were as follows:

CHEMICAL ANALYSIS (%)

Table with 7 columns: Requirements, Deposit Analysis, Carbon, Manganese, Silicon, Sulphur, Phosphorus, Aluminum. Values range from 0.03 max to 1.8 max.

RADIOGRAPHIC TESTS

Met requirements

FILLET WELD TESTS

Met requirements

WELD METAL DIFFUSIBLE HYDROGEN (mL/100g) by Gas Chromatography method per AWS A4.3-93

6.8

MECHANICAL PROPERTIES

AS WELDED [X]

STRESS RELIEVED ( hr @ °F) [ ]

WELDING PARAMETERS:

Electrode Diameter (in): 5/64
Amperage: 250
Arc Voltage: 21
Current Polarity: DCEN
Electrical Extension (in): 1.0
Shielding Gas: None
No. of Passes/Layers: 10/5
Interpass Temperature (°F): 300 +/- 25
Heat Input (KJ/in): 47

TEST RESULTS:

Table with 3 columns: Test Name, Requirements, Actual Results. Rows include Tensile Strength, Yield Strength, Elongation, Charpy V-notch Impact.

The undersigned certifies that the product supplied will meet the requirements of the applicable AWS Filler Metal Specification when tested in accordance with that specification, and that no significant change has been made in the formulations and manufacturing procedures described in the qualification approval. This certificate complies with the requirements of EN 10204, Type 2.2.

Signed by: [Signature]
Ben A. Pletcher, Technical Director



## CERTIFICATE OF CONFORMANCE

Manufactured in the U.S.A. by :  
**SELECT-ARC, INC.**  
 600 Enterprise Dr.  
 P. O. Box 259  
 Fort Loramie, OH 45845

Supplied to :

Date:  
 Customer Order Number :  
 Order Number :  
 Weight :  
 Lot/ Production No. Shipped:

This is to certify that **Select 78** electrode classification **E71T-8-H8**, as supplied on the above order number, is of the same classification, manufacturing process and material requirements as the electrode used for testing on **March 13, 2015**. All tests required by specifications **AWS A5.20/ASME SFA-5.20**, for wire diameter .072" were performed in conformance with these specifications and the results met all requirements. The test results were as follows:

**CHEMICAL ANALYSIS (%)**

	Carbon	Manganese	Silicon	Sulphur	Phosphorus	Aluminum
Requirements:	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Deposit Analysis:	0.21	0.76	0.23	0.007	0.006	0.62

**RADIOGRAPHIC TESTS**

Met requirements

**FILLET WELD TESTS**

Met requirements

**WELD METAL DIFFUSIBLE HYDROGEN** (mL/100g) by Gas Chromatography method per AWS A4.3-93

4.7

**MECHANICAL PROPERTIES**

AS WELDED

STRESS RELIEVED (    hr @    °F)

**WELDING PARAMETERS:**

Electrode Diameter (in): .072  
 Amperage: 265  
 Arc Voltage: 22  
 Current Polarity: DCEN  
 Electrical Extension (in): 1.0  
 Shielding Gas: None  
 No. of Passes/Layers: 9/5  
 Interpass Temperature (°F): 300 +/- 25  
 Heat Input (KJ/in): 54

**TEST RESULTS:**

	<u>Requirements</u>	<u>Actual Results</u>
Tensile Strength (psi):	70-95,000 min.	87,600
Yield Strength (psi):	58,000 min.	66,400
Elongation (%):	22 min.	31
Charpy V-notch Impact:		31, 31, 31
ft•lb f @ -20°F	20 min. avg.	31 avg.

**The undersigned certifies that the product supplied will meet the requirements of the applicable AWS Filler Metal Specification when tested in accordance with that specification, and that no significant change has been made in the formulations and manufacturing procedures described in the qualification approval. This certificate complies with the requirements of EN 10204, Type 2.2.**

Signed by:   
**Ben A. Pletcher, Technical Director**



# CERTIFICATE OF CONFORMANCE

Manufactured in the U.S.A. by :  
SELECT-ARC, INC.  
600 Enterprise Dr.  
P. O. Box 259  
Fort Loramie, OH 45845

Supplied to :

Date:  
Customer Order Number :  
Order Number :  
Weight :  
Lot/ Production No. Shipped:

This is to certify that **Select 78** electrode classification **E71T-8-H8**, as supplied on the above order number, is of the same classification, manufacturing process and material requirements as the electrode used for testing on **February 17, 2015**. All tests required by specifications **AWS A5.20/ASME SFA-5.20**, for wire diameter 1/16" were performed in conformance with these specifications and the results met all requirements. The test results were as follows:

### CHEMICAL ANALYSIS (%)

	Carbon	Manganese	Silicon	Sulphur	Phosphorus	Aluminum
Requirements:	0.30 max.	1.75 max.	0.60 max.	0.03 max.	0.03 max.	1.8 max.
Deposit Analysis:	0.19	0.69	0.18	0.005	0.010	0.46

### RADIOGRAPHIC TESTS

Met requirements

### FILLET WELD TESTS

Met requirements

### WELD METAL DIFFUSIBLE HYDROGEN (mL/100g) by Gas Chromatography method per AWS A4.3-93

7.7

### MECHANICAL PROPERTIES

AS WELDED

STRESS RELIEVED (    hr @    °F)

### WELDING PARAMETERS:

Electrode Diameter (in): 1/16  
Amperage: 255  
Arc Voltage: 22  
Current Polarity: DCEN  
Electrical Extension (in): 1.0  
Shielding Gas: None  
No. of Passes/Layers: 13/7  
Interpass Temperature (°F): 300 +/- 25  
Heat Input (KJ/in): 40

### TEST RESULTS:

	<u>Requirements</u>	<u>Actual Results</u>
Tensile Strength (psi):	70-95,000 min.	88,800
Yield Strength (psi):	58,000 min.	62,800
Elongation (%):	22 min.	27
Charpy V-notch Impact:		28, 30, 38
ft•lb f @ -20°F	20 min. avg.	31 avg.

The undersigned certifies that the product supplied will meet the requirements of the applicable AWS Filler Metal Specification when tested in accordance with that specification, and that no significant change has been made in the formulations and manufacturing procedures described in the qualification approval. This certificate complies with the requirements of EN 10204, Type 2.2.

Signed by:

Ben A. Pletcher, Technical Director



## AWS D1.8 SEISMIC CERTIFICATION OF CONFORMANCE

Manufactured in the U.S.A. by :  
**SELECT-ARC, INC.**  
 600 Enterprise Dr.  
 P. O. Box 259  
 Fort Loramie, OH 45845

Supplied to :

Date :  
 Customer Order Number :  
 Order Number :  
 Lot/ Production No. Shipped :

Lot/ Production No. Tested: **0648D510A4801, 0647D510A4801, 0649D510A4801**  
 Test No: WC247G, WC247H, WC247I, WC247J, WC247K, WC247L

This is to certify that **Select 78** electrode, classification **E71T-8-H8** as supplied on the above order number, is of the same classification, manufacturing process and material requirements as the electrode used for testing. All tests required by specifications **AWS D1.8/D1.8M:2009**, for wire diameter **5/64"**, were performed in conformance with these specifications and the results met all requirements. The test results were as follows:

**MECHANICAL PROPERTIES**

AS WELDED       STRESS RELIEVED (    hr @    °F)

**WELDING PARAMETERS:**

**HIGH HEAT INPUT:**

Amperage: 299  
 Arc Voltage: 22.0  
 Current Polarity: DCEN  
 Electrical Extension (in): 1.0  
 Shielding Gas: None  
 No. of Passes/Layers: 8/5  
 Preheat Temp (°F): 250 min.  
 Interpass Temp (°F): 450 min.  
 Heat Input Avg (kJ/in): 75  
 Travel Speed (ipm): 5.3

**LOW HEAT INPUT:**

Amperage: 294  
 Arc Voltage: 22  
 Current Polarity: DCEN  
 Electrical Extension (in): 1.0  
 Shielding Gas: None  
 No. of Passes/Layers: 19/7  
 Preheat Temp (°F): RT  
 Interpass Temp (°F): 250 max.  
 Heat Input Avg (kJ/in): 29  
 Travel Speed (ipm): 13.4

**TEST RESULTS:**

**HIGH HEAT INPUT:**

Tensile Strength (psi):  
 Yield Strength (psi):  
 Elongation (%):  
 Avg Charpy Impact  
 ft•lb f @ 70°F:  
 Avg Charpy Impact  
 ft•lb f @ 32°F:

**LOW HEAT INPUT:**

Tensile Strength (psi):  
 Yield Strength (psi):  
 Elongation (%):  
 Avg Charpy Impact  
 ft•lb f @ 70°F:  
 Avg Charpy Impact  
 ft•lb f @ 32°F:

**REQUIREMENTS:**

70,000 min  
 58,000 min  
 22 min  
 40 min  
 40 min

**LOT 0648:**

76,800  
 59,100  
 29.4  
 83, 84, 80  
 82 avg.  
 75, 78, 84  
 79 avg.

**LOT 0647:**

79,600  
 62,000  
 25.7  
 75, 76, 78  
 76 avg.  
 65, 62, 64  
 64 avg.

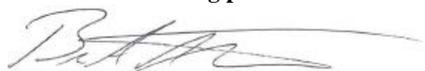
**LOT 0649:**

79,100  
 61,900  
 25.5  
 80, 84, 83  
 82 avg.  
 79, 77, 78  
 78 avg.

This product meets the requirements for a 7 Day exposure at 80°F, 80% humidity.

This certification expires in May, 2018.

**The undersigned certifies that the product supplied will meet the requirements of the applicable AWS Specification when tested in accordance with that specification, and that no significant change has been made in the formulations and manufacturing procedures described in the qualification approval.**

Signed by:   
**Ben A. Pletcher, Technical Director**



## AWS D1.8 SEISMIC CERTIFICATION OF CONFORMANCE

Manufactured in the U.S.A. by :  
**SELECT-ARC, INC.**  
 600 Enterprise Dr.  
 P. O. Box 259  
 Fort Loramie, OH 45845

Supplied to :

Date :  
 Customer Order Number :  
 Order Number :  
 Lot/ Production No. Shipped :

Lot/ Production No. Tested: **2168F508A5101, 2168F508A5101, 9008C517A9701**  
 Test No: WC269A, WC269B, WC269C, WC269D, WC269E, WC269F

This is to certify that **Select 78** electrode, classification **E71T-8-H8** as supplied on the above order number, is of the same classification, manufacturing process and material requirements as the electrode used for testing. All tests required by specifications **AWS D1.8/D1.8M:2009**, for wire diameter **.072"**, were performed in conformance with these specifications and the results met all requirements. The test results were as follows:

**MECHANICAL PROPERTIES**

AS WELDED  STRESS RELIEVED (    hr @    °F)

**WELDING PARAMETERS:**

**HIGH HEAT INPUT:**

Amperage: 296  
 Arc Voltage: 22.0  
 Current Polarity: DCEN  
 Electrical Extension (in): 1.0  
 Shielding Gas: None  
 No. of Passes/Layers: 8/5  
 Preheat Temp (°F): 250 min.  
 Interpass Temp (°F): 450 min.  
 Heat Input Avg (kJ/in): 75  
 Travel Speed (ipm): 5.2

**LOW HEAT INPUT:**

Amperage: 295  
 Arc Voltage: 22  
 Current Polarity: DCEN  
 Electrical Extension (in): 1.0  
 Shielding Gas: None  
 No. of Passes/Layers: 19/8  
 Preheat Temp (°F): RT  
 Interpass Temp (°F): 250 max.  
 Heat Input Avg (kJ/in): 29  
 Travel Speed (ipm): 13.4

**TEST RESULTS:**

**HIGH HEAT INPUT:**

Tensile Strength (psi):  
 Yield Strength (psi):  
 Elongation (%):  
 Avg Charpy Impact  
 ft•lb f @ 70°F:  
 Avg Charpy Impact  
 ft•lb f @ 32°F:

**LOW HEAT INPUT:**

Tensile Strength (psi):  
 Yield Strength (psi):  
 Elongation (%):  
 Avg Charpy Impact  
 ft•lb f @ 70°F:  
 Avg Charpy Impact  
 ft•lb f @ 32°F:

**REQUIREMENTS:**

70,000 min  
 58,000 min  
 22 min  
 40 min  
 40 min

**LOT 2168:**

84,400  
 66,700  
 25.1  
 70, 71, 67  
 69 avg.  
 56, 55, 53  
 55 avg.

**LOT 2169:**

82,800  
 63,900  
 25  
 65, 66, 66  
 66 avg.  
 52, 54, 53  
 53 avg.

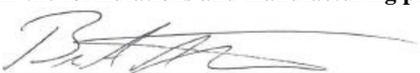
**LOT 9008:**

82,000  
 62,600  
 24.6  
 60, 62, 65  
 62 avg.  
 52, 52, 51  
 52 avg.

This product meets the requirements for a 7 Day exposure at 80°F, 80% humidity.

This certification expires in May, 2018.

**The undersigned certifies that the product supplied will meet the requirements of the applicable AWS Specification when tested in accordance with that specification, and that no significant change has been made in the formulations and manufacturing procedures described in the qualification approval.**

  
 Signed by: \_\_\_\_\_  
**Ben A. Pletcher, Technical Director**



## AWS D1.8 SEISMIC CERTIFICATION OF CONFORMANCE

Manufactured in the U.S.A. by :  
**SELECT-ARC, INC.**  
 600 Enterprise Dr.  
 P. O. Box 259  
 Fort Loramie, OH 45845

Supplied to :

Date :  
 Customer Order Number :  
 Order Number :  
 Lot/ Production No. Shipped :

Lot/ Production No. Tested: **0650D510A4801, 0630D510A4801, 0652D510A4801**  
 Test No: WC247A, WC247B, WC247C, WC247D, WC247E, WC247F

This is to certify that **Select 78** electrode, classification **E71T-8-H8** as supplied on the above order number, is of the same classification, manufacturing process and material requirements as the electrode used for testing. All tests required by specifications **AWS D1.8/D1.8M:2009**, for wire diameter **1/16"**, were performed in conformance with these specifications and the results met all requirements. The test results were as follows:

**MECHANICAL PROPERTIES**

AS WELDED       STRESS RELIEVED (    hr @    °F)

**WELDING PARAMETERS:**

**HIGH HEAT INPUT:**

Amperage: 300  
 Arc Voltage: 22.0  
 Current Polarity: DCEN  
 Electrical Extension (in): 1.0  
 Shielding Gas: None  
 No. of Passes/Layers: 8/5  
 Preheat Temp (°F): 250 min.  
 Interpass Temp (°F): 450 min.  
 Heat Input Avg (kJ/in): 75  
 Travel Speed (ipm): 5.3

**LOW HEAT INPUT:**

Amperage: 297  
 Arc Voltage: 22  
 Current Polarity: DCEN  
 Electrical Extension (in): 1.0  
 Shielding Gas: None  
 No. of Passes/Layers: 19/7  
 Preheat Temp (°F): RT  
 Interpass Temp (°F): 250 max.  
 Heat Input Avg (kJ/in): 29  
 Travel Speed (ipm): 13.4

**TEST RESULTS:**

**HIGH HEAT INPUT:**

Tensile Strength (psi):  
 Yield Strength (psi):  
 Elongation (%):  
 Avg Charpy Impact  
 ft•lb f @ 70°F:  
 Avg Charpy Impact  
 ft•lb f @ 32°F:

**LOW HEAT INPUT:**

Tensile Strength (psi):  
 Yield Strength (psi):  
 Elongation (%):  
 Avg Charpy Impact  
 ft•lb f @ 70°F:  
 Avg Charpy Impact  
 ft•lb f @ 32°F:

**REQUIREMENTS:**

70,000 min  
 58,000 min  
 22 min  
 40 min  
 40 min

**LOT 0650:**

78,200  
 59,800  
 26.6  
 88, 90, 90  
 89 avg.  
 72, 73, 69  
 71 avg.

**LOT 0630:**

77,200  
 60,200  
 29.5  
 75, 72, 75  
 74 avg.  
 65, 68, 70  
 68 avg.

**LOT 0652:**

77,100  
 58,600  
 30.6  
 74, 73, 75  
 74 avg.  
 70, 65, 66  
 67 avg.

This product meets the requirements for a 7 Day exposure at 80°F, 80% humidity.

This certification expires in May, 2018.

**The undersigned certifies that the product supplied will meet the requirements of the applicable AWS Specification when tested in accordance with that specification, and that no significant change has been made in the formulations and manufacturing procedures described in the qualification approval.**

Signed by:   
**Ben A. Pletcher, Technical Director**



## AWS D1.8 SEISMIC CERTIFICATION – ANNEX B INTERMIX TESTING

Manufactured in the U.S.A. by :  
 SELECT-ARC, INC.  
 600 Enterprise Dr.  
 P. O. Box 259  
 Fort Loramie, OH 45845

Date: June 8, 2015

**Select 70TR** Lot/ Production No. Tested: **1250LE501A10**  
**Select 78** (1/16") Lot/ Production No. Tested: **0650D510A4801**  
**Select 78** (.072") Lot/ Production No. Tested: **1306E504A6901**  
**Select 78** (5/64") Lot/ Production No. Tested: **0648D510A4801**  
 Test No: WC268A, WC268B, WC268C

This is to certify that the electrode combinations listed below were tested in accordance with AWS D1.8, Annex B (Intermix CVN Testing of Filler Metal Combinations). The test results met the requirements and are as follows:

Root Electrode		Fill Electrode		CVN Results (ft-lbs) @ 0F	CVN Results (ft-lbs) @ 70F
Diameter	Product Name	Diameter	Product Name		
3/32"	Select 70TR (75Ar/25CO <sub>2</sub> )	1/16"	Select 78	62, 55, 52 ( <b>56 avg.</b> )	72.5, 74, 74.5 ( <b>74 avg.</b> )
3/32"	Select 70TR (75Ar/25CO <sub>2</sub> )	0.072"	Select 78	44, 39, 42 ( <b>42 avg.</b> )	67, 64, 65 ( <b>65 avg.</b> )
3/32"	Select 70TR (75Ar/25CO <sub>2</sub> )	5/64"	Select 78	54, 50.5, 46 ( <b>50 avg.</b> )	73, 72, 73 ( <b>73 avg.</b> )
<b>Requirements:</b>				<b>20 min. avg.</b>	<b>40 min. avg.</b>

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

Signed by:   
 Ben A. Pletcher, Technical Director



## AWS D1.8 SEISMIC CERTIFICATION – ANNEX B INTERMIX TESTING

Manufactured in the U.S.A. by :  
**SELECT-ARC, INC.**  
 600 Enterprise Dr.  
 P. O. Box 259  
 Fort Loramie, OH 45845

Date: June 8, 2015

**Select 70TR** Lot/ Production No. Tested: **1250LE501A10**  
**Select 78** (1/16") Lot/ Production No. Tested: **0650D510A4801**  
**Select 78** (.072") Lot/ Production No. Tested: **1306E504A6901**  
**Select 78** (5/64") Lot/ Production No. Tested: **0648D510A4801**  
 Test No: WC268D, WC268E, WC268F

This is to certify that the electrode combinations listed below were tested in accordance with **AWS D1.8, Annex B (Intermix CVN Testing of Filler Metal Combinations)**. The test results met the requirements and are as follows:

Root Electrode		Fill Electrode		<b>CVN Results (ft-lbs) @ 0F</b>	<b>CVN Results (ft-lbs) @ 70F</b>
<b>Diameter</b>	<b>Product Name</b>	<b>Diameter</b>	<b>Product Name</b>		
3/32"	Select 70TR (100CO <sub>2</sub> )	1/16"	Select 78	60, 50, 53.5 ( <b>54.5 avg.</b> )	70.5, 71.5, 73.5 ( <b>72 avg.</b> )
3/32"	Select 70TR (100CO <sub>2</sub> )	0.072"	Select 78	42, 42, 41.5 ( <b>42 avg.</b> )	69, 64, 66.5 ( <b>66.5 avg.</b> )
3/32"	Select 70TR (100CO <sub>2</sub> )	5/64"	Select 78	39, 41, 40 ( <b>40 avg.</b> )	68.5, 53.5, 57 ( <b>63 avg.</b> )
<b>Requirements:</b>				<b>20 min. avg.</b>	<b>40 min. avg.</b>

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

Signed by:   
 Ben A. Pletcher, Technical Director



Date: August 05, 2015

Effective Date: October 29, 2014

### CERTIFICATION OF WELDING CONSUMABLE

This is to advise you the Canadian Welding Bureau has witnessed tests on the following :

Company Name: **SELECT-ARC, INC.**  
Electrode Designation: **SELECT 78**  
Point of Manufacture: **Fort Laramie, USA**  
Standard: **CSA W48-06**  
Classification: **E491T-8-H8**  
Gas or Flux: **None**  
Size (mm): **Min: 1.6 Max: 2.0**

#### Others Details:

In addition, the diffusible hydrogen tests was conducted in accordance with the latest ISO 3690 or AWS A4.3 and within the limits sets by the standard above.

Expiry date: **October 29, 2015**

This certification, may be extended by meeting the check test requirements of the applicable standard and CWB rules.

CANADIAN WELDING BUREAU

Alice Y. Lau, P. Eng.  
Operations Manager, Procedures & Electrodes

AYL  
SELECT78

The product certification system operated by the Canadian Welding Bureau most closely resembles that described by ISO/IEC Guide 67, *Conformity assessment — Fundamentals of product certification, System 5.*



8260 Parkhill Drive, Milton, Ontario L9T 5V7  
Tel: 1.800.844.6790 info@cwbgroup.org  
Fax: 905.542.1318 www.cwbgroup.org



**ABS**

# WELDING CONSUMABLE CERTIFICATE

Certificate No.: 522989-2766478-001

Report No.: C2766478.R1

Port of: CLEVELAND

Date: 2 JULY 2015 (revised 23 July 2015)

## THIS IS TO CERTIFY

THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF SELECT-ARC, INC., ATTEND THEIR PLANT AT 600 ENTERPRISE DRIVE, FORT LORAMIE, OH 45845 , ON THE 18TH DAY OF NOVEMBER, 2014 AND ON SUBSEQUENT DATES, IN ORDER TO CARRY OUT A PLANT SURVEY OF FACILITIES AND ASSOCIATED QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES AND TO WITNESS AND REPORT ON THE INITIAL APPROVAL TESTING OF WELDING CONSUMABLES; AND,

THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE GAS METAL ARC WELDING AND FLUX CORED ARC WELDING SECTION:

<u>TRADE NAME</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
Select 78	ABS	3YSA	NONE	All	DCEN	1/16"-5/64"

  
Thomas Perk, SURVEYOR



Note: This Certificate evidences compliance with one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping and is issued solely for the use of the Bureau, its committees, its clients or other authorized entities. This Certificate is a representation only that the structure, item of material, equipment, machinery or any other item covered by this Certificate has met one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping as of the date of issue. Parties are advised to review the Rules for the scope and conditions of classification and to review the survey records for a fuller description of any restrictions or limitation on the vessel's service or surveys. The validity, applicability and interpretation of this Certificate is governed by the Rules and standards of American Bureau of Shipping who shall remain the sole judge thereof. Nothing contained in this Certificate or in any notation made in contemplation of this Certificate shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied.

# TYPE APPROVAL CERTIFICATE

**This is to certify:**

**That the Flux Cored Wire**

with trade name  
**Select 78**

Manufacturer  
**Select-Arc, Inc.**  
**FORT LORAMIE OH, United States**

is found to comply with  
**Det Norske Veritas' Rules for Classification PT.2**

with this approval

<b>Grade</b>	<b>III YMS(H10)</b>
<b>Current</b>	<b>DC(-)</b>
<b>Approved diameter</b>	<b>1.6 mm - 2.0 mm (1/16" - 5/64")</b>
<b>Positions</b>	<b>All</b>
<b>Remarks</b>	<b>Self-shielded wire. Also for fillet welding.</b>

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

This Certificate is valid until **2019-08-03**.

Issued at **Høvik** on **2015-08-04**

DNV GL local station: **New York**

Approval Engineer: **Maxim Bobrov**

for **DNV GL**



Digitally Signed By: Gran, Terje  
Location: DNV GL Høvik, Norway  
Signing Date: 07.08.2015, on behalf of

**Hanne Anita Hjerpetjønn**  
**Head of Section**

Any significant change in design or construction may render this Certificate invalid.