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BY: Jennifer Fitch DATE: 11/18/2014

Welding Procedure Specification

Material specification ASTM A 709 GRSO & ASTM A588 GRSO
 Welding process SMAW
 Manual or machine Manual
 Position of welding Horizontal
 Filler metal specification AWS 5.5
 Filler metal classification Low Alloy, Low Hydrogen E. 8018-C3 MR
 Flux N/A
 Shielding gas N/A Flow rate N/A
 Single or multiple pass Multiple
 Single or multiple arc Single ARC
 Welding current DC
 Polarity Reverse
 Welding progression N/A
 Root treatment Clean & Dried to Remove Contaminants
 Preheat and interpass temperature Pre heat to 150°F
 Postheat treatment N/A

WELDING PROCEDURE

Pass no.	Electrode size	Welding current		Travel speed	Joint detail
		Amperes	Volts		
All	5/32 or 3/16	130-210 or 180-300	N/A	N/A	See Attached Front Elevation Detail From project plans Labeled Exhibit A

This procedure may vary due to fabrication sequence, fit-up, pass size, etc., within the limitation of variables given in Section 5. (of the AASHTO/AWS D1.5 Bridge Welding Code and latest revision)

Procedure no. ROC BR 19-2

Contractor W M Schultz

Revision no. 2

Authorized by Mike Gunn

Welder Herb Sieber

Date 11/14/14

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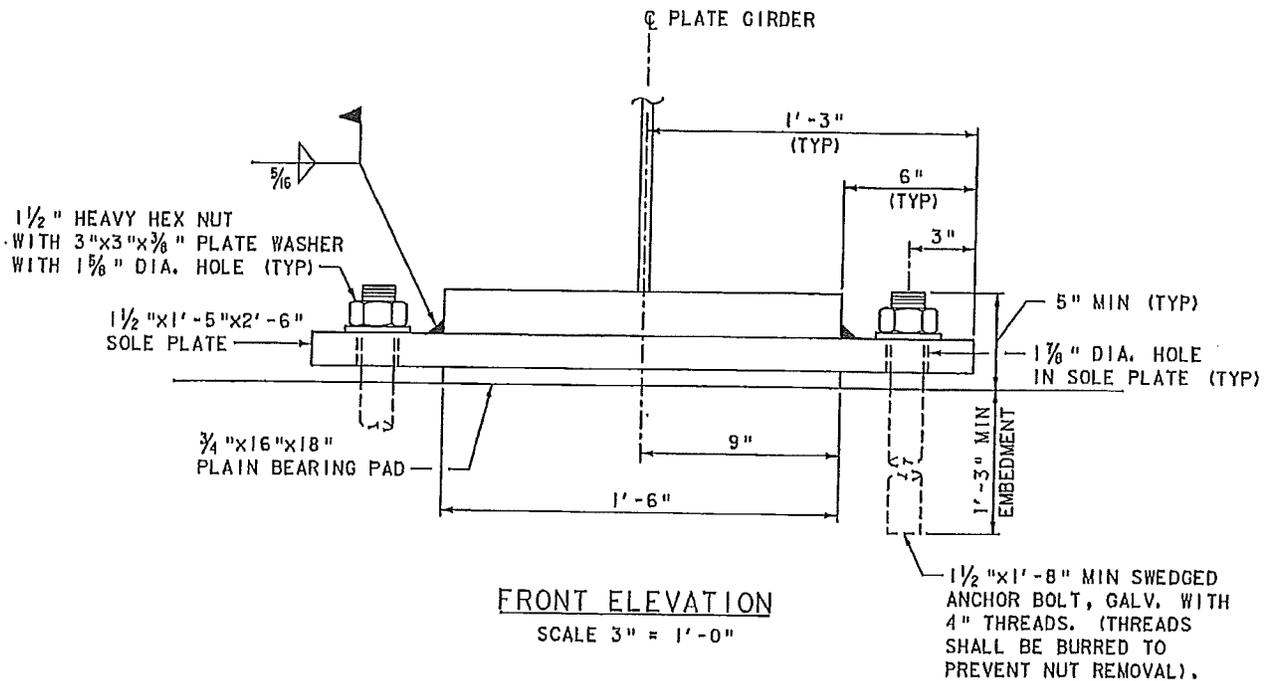
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BY: Jennifer Fitch DATE: 11/18/2014

Exhibit A

ROCBR 19 Weld Procedure

(TYP)



PROJECT NAME:	ROCHESTER	BR19	
PROJECT NUMBER:	ER BRF 0162(18)		
FILE NAME:	zllc332brg.dgn	PLOT DATE:	9/3/2013
PROJECT LEADER:	S.E. BURBANK	DRAWN BY:	B.J. MASSE
DESIGNED BY:	E.A. FIALA	CHECKED BY:	G.S. GOODRICH
BR 19 FIXED BEARING DETAILS		SHEET	207 OF 238



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Modern Welding School 1842 State St. Schenectady, NY 12304

Type of Welder Manual
 Name Herbert Sieber Identification No. 8793
 Welding Procedure Specification No. B2.1-1-016-94R Rev. _____ Date 7/2/14

Variables	Record Actual Values Used in Qualification	Qualification Range
Process/Type [Table 4.11, Item (1)]	<u>SMAW</u>	<u>SMAW</u>
Electrode (single or multiple) [Table 4.11, Item (8)]	<u>single</u>	
Current/Polarity	<u>DCEP</u>	
Position [Table 4.11, Item (4)]	<u>4G Overhead</u>	<u>1G, 4G, 1F, 2F, 4F</u>
Weld Progression [Table 4.11, Item (6)]	<u>overhead</u>	
Backing (YES or NO) [Table 4.11, Item (7)]	<u>YES</u>	<u>CJP Grooves require backing</u>
Material/Spec.	<u>A-36 to A-36</u>	
Base Metal		
Thickness: (Plate)		
Groove		
Fillet	<u>1"</u>	<u>1/8" to UNLIMITED</u>
Thickness: (Pipe/tube)		<u>UNLIMITED</u>
Groove	<u>N/A</u>	<u>1/8" to UNLIMITED</u>
Fillet		<u>UNLIMITED</u>
Diameter: (Pipe)	<u>N/A</u>	<u>24" diameter or greater</u>
Groove		<u>with backing</u>
Fillet		<u>or backgouging or both</u>
Filler Metal [Table 4.11, Item (3)]		
Spec. No.	<u>SFA 5.1 & 5.5</u>	
Class	<u>E 7018</u>	
F.No. [Table 4.11, Item (2)]	<u>4</u>	<u>F 1, F 2, F 3 and F 4</u>
Gas/Flux Type [Table 4.11, Item (3)]	<u>NA</u>	
Other		

VISUAL INSPECTION (4.8.1)
 Acceptable YES or NO YES

Guided Bend Test Results (4.30.5)

Type	Result	Type	Result
side bend	<u>ACCEPTABLE</u>		
side bend	<u>ACCEPTABLE</u>		

Fillet Test Results (4.30.2,3 and 4.30.4.1)

Appearance _____ Fillet Size _____
 Fracture Test Root Penetration _____ Macroetch _____
 (Describe the location, nature, and size of any crack or tearing of the specimen.)

Inspected by Jeffrey Daubert Test Number 2466
 Organization MWSI ph.#518-374-1216 Date 7/2/14

RADIOGRAPHIC TEST RESULTS (4.30.3.1)

Film Identification Number	Results	Remarks	Film Identification Number	Results	Remarks
<u>N/A</u>					

Interpreted by _____ Test Number _____
 Organization _____ Date _____

We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in conformance with the requirements of Section 4 of AWS; D1.1/D1.1M, (2010 _____) Structural Welding Code-Steel.

Manufacturer or Contractor Modern Welding School Authorized By Dana Gillenwalters
 Date 7/2/14

 Jeffrey S Daubert
 CWI 02080281
 QC1 EXP. 8/1/2017


 Jeffrey S Daubert CWI

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BY: **Jennifer Fitch** DATE: **11/18/2014**

Modern Welding School 1842 State St. Schenectady, NY 12304

Type of Welder semiautomatic
 Name Herbert Sieber Identification No. 8793
 Welding Procedure Specification No. ANSI/AWS B2.1-1-020-94 Rev _____ Date 7/2/14

Variables	Record Actual Values Used In Qualification	Qualification Range
Process/Type [Table 4.11, Item (1)] Electrode (single or multiple) [Table 4.11, Item (8)] Current/Polarity	FCAW single DCEP	FCAW
Position [Table 4.11, Item (4)] Weld Progression [Table 4.11, Item (6)]	4G Overhead overhead	1G,4G, 1F,2F,4F
Backing (YES or NO) [Table 4.11, Item (7)] Material/Spec.	YES A-36 to A-36	CJP Grooves require backing
Base Metal Thickness: (Plate) Groove Fillet	1 inch	1/8" to UNLIMITED UNLIMITED
Thickness: (Pipe/tube) Groove Fillet	N/A	1/8" to UNLIMITED UNLIMITED
Diameter: (Pipe) Groove Fillet	N/A	24" or greater diameter with backing or back gouging
Filler Metal [Table 4.11, Item (3)] Spec. No. Class	SFA -5.20 E71T1 .045 dia. 6	AWS 5.20 and 5.29 FCAW electrodes
Gas/Flux Type [Table 4.11, Item (3)] Other	Argon/CO2 75/25	

VISUAL INSPECTION (4.8.1) Acceptable YES or NO YES			
Guided Bend Test Results (4.30.6)			
Type	Result	Type	Result
side bend	ACCEPTABLE		
side bend	ACCEPTABLE		

Fillet Test Results (4.30.2.3 and 4.30.4.1)

Appearance _____ Fillet Size _____
 Fracture Test Root Penetration _____ Macroetch _____
 (Describe the location, nature, and size of any crack or tearing of the specimen.)

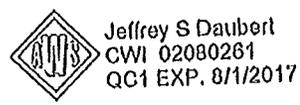
Inspected by Jeffrey Daubert Test Number 2465
 Organization MWSI ph.#518-374-1216 Date 7/2/14

RADIOGRAPHIC TEST RESULTS (4.30.3.1)					
Film Identification Number	Results	Remarks	Film Identification Number	Results	Remarks
N/A					

Interpreted by _____ Test Number _____
 Organization _____ Date _____

We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in conformance with the requirements of Section 4 of AWS; D1.1/D1.1M, (2010 _____) Structural Welding Code-Steel.
 (year)

Manufacturer or Contractor Modern Welding School Authorized By Dana Gillenwalters
 Date 7/2/14



Jeffrey Daubert
 Jeffrey Daubert CWI

Excalibur® 8018-C3 MR®

AWS E8018-C3 H4R • Low Alloy, Low Hydrogen

Typical Applications

- ▶ Shipbuilding
- ▶ Piping and gas storage tanks
- ▶ Weathering steels
- ▶ Cross country pipe repair

Conformances

AWS A5.5/A5.5M: 2006	E8018-C3 H4R
ASME SFA-A5.5:	E8018-C3 H4R
ABS:	E8018-C3 H4R
CWB/CSA W48-06:	E5518-C3
EN ISO 2560-B:	E5518-N2 A U H5

Key Features

- ▶ Designed to produce a 1% nickel deposit
- ▶ Premium arc performance
- ▶ Square coating burn-off
- ▶ Easy strike and re-strike
- ▶ Effortless slag removal

Welding Positions

All, except vertical down

DIAMETERS / PACKAGING

Diameter in (mm)	Length in (mm)	10 lb (4.5 kg) Easy Open Can 30 lb (13.6 kg) Master Carton	50 lb (22.7 kg) Easy Open Can
3/32 (2.4)	14 (350)	ED032599	ED030892
1/8 (3.2)	14 (350)	ED032600	ED030893
5/32 (4.0)	14 (350)		ED030894
3/16 (4.8)	14 (350)		ED030895
7/32 (5.6)	18 (450)		ED030897
1/4 (6.4)	18 (450)		ED030896

MECHANICAL PROPERTIES⁽¹⁾ – As Required per AWS A5.5/A5.5M: 2006

	Yield Strength ⁽²⁾ MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf) @ -40°C (-40°F)
Requirements - AWS E8018-C3 H4R	470-550 (68-80)	550 (80) min.	24 min.	27 (20) min.
Typical Results ⁽³⁾ - As-Welded	505-590 (73-86)	550-675 (80-98)	24-32	81-163 (60-120)

DEPOSIT COMPOSITION⁽¹⁾ – As Required per AWS A5.5/A5.5M: 2006

	%C	%Mn	%Si	%P	%S
Requirements - AWS E8018-C3 H4R	0.12 max.	0.40-1.25	0.80 max.	0.03 max.	0.03 max.
Typical Results ⁽³⁾	0.04-0.07	0.40-1.25	0.23-0.46	≤ 0.01	≤ 0.009
	%Ni	%Cr	%Mo	%V	Diffusible Hydrogen (mL/100g weld deposit)
Requirements - AWS E8018-C3 H4R	0.80-1.10	0.15 max.	0.35 max.	0.05 max.	4.0 max.
Typical Results ⁽³⁾	0.81-1.09	0.04-0.06	0.07-0.27	≤ 0.01	1-2

TYPICAL OPERATING PROCEDURES

Polarity ⁽⁴⁾	Current (Amps)					
	3/32 in (2.4 mm)	1/8 in (3.2 mm)	5/32 in (4.0 mm)	3/16 in (4.8 mm)	7/32 in (5.6 mm)	1/4 in (6.4 mm)
DC±	70-110	90-160	130-210	180-300	250-330	300-400
AC	80-120	100-160	140-210	200-300	270-370	325-425

⁽¹⁾Typical all weld metal. ⁽²⁾Measured with 0.2% offset. ⁽³⁾See test results disclaimer below. ⁽⁴⁾Preferred polarity is listed first.

Material Safety Data Sheets (MSDS) and Certificates of Conformance are available on our website at www.lincolnelectric.com

TEST RESULTS

Test results for mechanical properties, deposit or electrode composition and diffusible hydrogen levels were obtained from a weld produced and tested according to prescribed standards, and should not be assumed to be the expected results in a particular application or weldment. Actual results will vary depending on many factors, including, but not limited to, weld procedure, plate chemistry and temperature, weldment design and fabrication methods. Users are cautioned to confirm by qualification testing, or other appropriate means, the suitability of any welding consumable and procedure before use in the intended application.

CUSTOMER ASSISTANCE POLICY

The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

LINCOLN[®]
ELECTRIC
THE WELDING EXPERTS[®]

An excellent stick electrode with excellent impact properties. Jet-LH 8018-C3 MR produces a nominal 1% nickel deposit that is a great fit for a wide range of welding applications. A good choice for welding on weathering type steels.

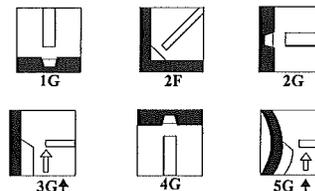
ADVANTAGE LINCOLN

- All-position welding.
- Produces x-ray quality welds.
- Manufactured under a quality system certified to ISO 9001 requirements.

TYPICAL APPLICATIONS

- Primarily designed for all position fabrication or repair of 1% nickel steels and a wide variety of other low alloy and carbon steels.
- General purpose welding of many high strength alloy that require a deposit with a tensile strength of 80,000 psi.
- Also used for fillet welds on 110,000 psi steel quenched and tempered such as ASTM A514 and A517.

WELDING POSITIONS



CONFORMANCE

AWS A5.5: E8018-C3 H4R
 ASME SFA-5.5: E8018-C3 H4R
 ABS: E8018-C3 H4R
 Military: MIL-E-22200/1; MIL-8018-C3
 CSA W48.3: E55018-C3

MECHANICAL PROPERTIES ⁽¹⁾ - As Welded per AWS A5.5-96

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft-lbs (Joules)	
				@ -40°F (-40°C)	@ -75°F (-59°C)
Required E8018-C3 H4R	68,000 - 80,000 (470 - 550)	80,000 (550) min.	24 min.	20 (27) min.	—
Test Results As welded	68,000 - 79,000 (470 - 545)	80,000 - 94,000 (550 - 648)	24 - 31	40 - 115 (54 - 156)	16 - 65 (22 - 88)
Stress relieved 2 hrs @ 1150°F (620°C)	67,000 - 73,000 (462 - 503)	76,000 - 84,000 (524 - 579)	30 - 32	—	—

⁽¹⁾ Typical all weld metal.

DIAMETERS / PACKAGING

Diameter Inches (mm)	50 Lb. (23 kg) Easy Open Cans
1/8 (3.2)	ED015153
5/32 (4.0)	ED015146
3/16 (4.8)	ED015157
7/32 (5.6)	ED015583
1/4 (6.4)	ED015582

TYPICAL OPERATING PROCEDURES

Polarity	Current (Amps)				
	1/8" (3.2mm)	5/32" (4.0mm)	3/16" (4.8mm)	7/32" (5.6mm)	1/4" (6.4mm)
DC+	110 - 150	130 - 190	180 - 270	250 - 330	300 - 400
AC	120 - 170	140 - 225	210 - 290	270 - 370	325 - 420

NOTE: Preferred polarity is listed first.

DEPOSIT COMPOSITION ⁽¹⁾

	%C	%Mn	%Si	%S	%P	%Cr	%Mo	%Ni	%V
Requirements AWS E8018-C3 H4R	.12 max.	.40-.125	.80 max.	.03 max.	.03 max.	.15 max.	.35 max.	.80-1.10	.05 max.
Test Results	.04-.08	.64-1.24	.32-.62	.012-.023	.006-.018	.01-.10	.01-.26	.83-1.09	.001-.013

⁽¹⁾ Typical all weld metal.