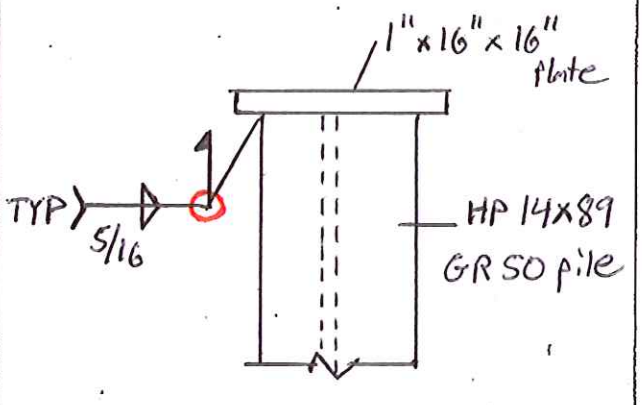
# Welding Procedure Specification

Material specification: ASTM A572 GR50
Welding process: SMAW
Manual or machine: Manual
Position of welding: Overhead Horizontal
Filler metal specification: AWS A 5.1
Filler metal classification: Low Carbon E7018
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 & Dryed to Remove Contaminents
Preheat and interpass temperature: ~~N/A~~ Preheat to 70°F
Postheat treatment: N/A

**WELDING PROCEDURE**

| Pass no. | Electrode size | Welding current: Amperes | Welding current: Volts | Travel speed | Joint detail |
|---|---|---|---|---|---|
| All | 5/32 or 3/16 | 140-200 or 180-255 | N/A | N/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)**

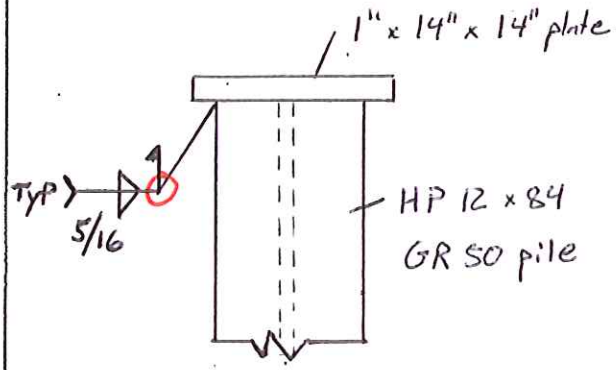
Procedure no. ROCBR15-1
Revision no. ~~0~~ 1
Welder

Contractor W. M. Schultz Const.
Authorized by Mike Gorin (AAM)
Date 6/19/14

# Welding Procedure Specification

Material specification: ASTM A572 GR50
Welding process: SMAW
Manual or machine: Manual
Position of welding: Overhead Horizontal
Filler metal specification: AWS A 5.1
Filler metal classification: Low Carbon
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 & Dryed to Remove Contaminents
Preheat and interpass temperature: ~~N/A~~ Pre heat to 70°F
Postheat treatment: N/A

**WELDING PROCEDURE**

| Pass no. | Electrode size | Welding current: Amperes | Welding current: Volts | Travel speed | Joint detail |
|---|---|---|---|---|---|
| All | 5/32 or 3/16 | 140-200 or 180-255 | N/A | N/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. ROCBR16-1
Revision no. ~~0~~ 1
Welder

Contractor W.M. Schultz Const.
Authorized by Mike Garn (APM)
Date 6/19/14

## 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)] | SMAW | |
| Electrode (single or multiple) [Table 4.11, Item (8)] | single | SMAW |
| Current/Polarity | DCEP | |
| Position [Table 4.11, Item (4)] | 4G Overhead | 1G, 4G, 1F, 2F, 4F |
| Weld Progression [Table 4.11, Item (6)) | overhead | overhead |
| Backing (YES or NO) [Table 4.11, Item (7)] | YES | CJP Grooves require backing |
| Material/Spec. | A-36 to A-36 | |
| Base Metal | | |
| Thickness: (Plate) | | |
| Groove | 1" | 1/8" to UNLIMITED |
| Fillet | | UNLIMITED |
| Thickness: (Pipe/tube) | | |
| Groove | N/A | 1/8" to UNLIMITED |
| Fillet | | UNLIMITED |
| Diameter: (Pipe) | N/A | 24" diameter or greater |
| Groove | | with backing |
| Fillet | | or backgouging or both |
| Filler Metal [Table 4. 1 1, Item (3)] | | |
| Spec. No. | SFA 5.1 & 5.5 | |
| Class | E 7018 | |
| F-No. [Table 4. 1 1, Item (2)] | 4 | F 1, F 2, F 3 and F 4 |
| Gas/Flux Type [Table 4.1 1, Item (3)] | NA | |
| Other | | |

**VISUAL INSPECTION (4.8.1)**
Acceptable YES or NO YES

**Guided Bend Test Results** (4.30.5)

| 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 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 |
|---|---|---|---|---|---|
| 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 (year)) Structural Welding Code-Steel.

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

Jeffrey S Daubert
CWI 02080261
QC1 EXP. 8/1/2017

Jeffrey Daubert CWI

## 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)] | FCAW | |
| Electrode (single or multiple) [Table 4.11, Item (8)] | single | FCAW |
| Current/Polarity | DCEP | |
| Position [Table 4.11, Item (4)] | 4G Overhead | 1G,4G, 1F,2F,4F |
| Weld Progression [Table 4.11, Item (6)) | overhead | |
| Backing (YES or NO) [Table 4.11, Item (7)] | YES | CJP Grooves require backing |
| Material/Spec. | A-36 to A-36 | |
| Base Metal | | |
| Thickness: (Plate) | | |
| Groove | 1 inch | 1/8 " to UNLIMITED |
| Fillet | | UNLIMITED |
| Thickness: (Pipe/tube) | | |
| Groove | N/A | 1/8" to UNLIMITED |
| Fillet | | UNLIMLTED |
| Diameter: (Pipe) | N/A | 24" or greater diameter with |
| Groove | | backing or back gouging |
| Fillet | | |
| Filler Metal [Table 4. 1 1, Item (3)] | | |
| Spec. No. | SFA -5.20 | |
| Class | E71T 1 .045 dia. | AWS 5.20 and 5.29 |
| F-No. [Table 4. 1 1, Item (2)] | 6 | FCAW electrodes |
| Gas/Flux Type [Table 4.1 1, Item (3)] | Argon/CO2 75/25 | |
| Other | | |

**VISUAL INSPECTION (4.8.1)**
Acceptable YES or NO YES

**Guided Bend Test Results** (4.30.5)

| 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 (year)) Structural Welding Code-Steel.

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

Jeffrey S Daubert
CWI 02080261
QC1 EXP. 8/1/2017

Jeffrey Daubert CWI

# Excalibur® 7018-1 MR®

**Mild Steel, Low Hydrogen • AWS E7018-1 H4R**

## Key Features

- Premium arc performance
- Square coating burn-off
- Easy strike and re-strike and effortless slag removal
- Impact toughness tested to -46°C (-50°F)
- Q2 Lot® - Certificate showing actual deposit chemistry available online

## Typical Applications

- Power generation
- Petrochemical
- Pressure vessels
- Pressure piping
- Fill and cap pass welding of up to X65 grade pipe

## Conformances

| | |
|---|---|
| AWS A5.1/A5.1M: 2004 | E7018-1 H4R |
| ASME SFA-A5.1: | E7018-1 H4R |
| ABS: | 3Y H5 |
| Lloyd's Register: | 3YM H5 |
| DNV Grade: | 3 YH5 |
| GL: | 3YH5 |
| BV Grade: | 3YHHH |
| CWB/CSA W48-06: | E4918-1 |
| TUV: | DIN EN ISO 2560-A:E |
| EN ISO 2560-B: | E4918-1 A U H5 |

## Welding Positions

All, except vertical down

## DIAMETERS / PACKAGING

| Diameter in (mm) | Length in (mm) | 8 lb (3.6 kg) Easy Open Can 24 lb (10.9 kg) Master Carton | 10 lb (4.5 kg) Easy Open Can 30 lb (13.6 kg) Master Carton | 50 lb (22.7kg) Easy Open Can |
|---|---|---|---|---|
| 3/32 (2.4) | 12 (300) | ED033179 | | |
| 3/32 (2.4) | 14 (350) | | ED032591 | ED028700 |
| 1/8 (3.2) | 14 (350) | | ED032592 | ED028702 |
| 5/32 (4.0) | 14 (350) | | | ED028704 |
| 3/16 (4.8) | 14 (350) | | | ED028706 |
| 7/32 (5.6) | 18 (450) | | | ED028919 |
| 1/4 (6.4) | 18 (450) | | | ED028920 |

## MECHANICAL PROPERTIES[1] – *As Required per AWS A5.1/A5.1M: 2004*

| | Yield Strength[2] MPa (ksi) | Tensile Strength MPa (ksi) | Elongation % | Charpy V-Notch J (ft•lbf) @ -46°C (-50°F) |
|---|---|---|---|---|
| **Requirements** - AWS E7018-1 H4R | 400 (58) min. | 490 (70) min. | 22 min. | 27 (20) min. |
| **Typical Results**[3] - As-Welded | 405-515 (59-75) | 530-605 (77-88) | 22-36 | 56-178 (42-131) |

## DEPOSIT COMPOSITION[1] – *As Required per AWS A5.1/A5.1M: 2004*

| | %C | %Mn | %Si | %P | %S | %Ni |
|---|---|---|---|---|---|---|
| **Requirements** - AWS E7018-1 H4R | 0.15 max. | 1.60 max. | 0.75 max. | 0.035 max. | 0.035 max. | 0.30 max. |
| **Typical Results**[3] | 0.04-0.07 | 0.80-1.44 | 0.28-0.51 | 0.006-0.019 | 0.003-0.013 | 0.01-0.07 |

| | %Cr | %Mo | %V | %Mn + Ni + Cr + Mo + V | Diffusible Hydrogen (mL/100g weld metal) |
|---|---|---|---|---|---|
| **Requirements** - AWS E7018-1 H4R | 0.20 max. | 0.30 max. | 0.08 max. | 1.75 max. | 4.0 max. |
| **Typical Results**[3] | 0.01-0.07 | 0.11-0.28 | ≤ 0.01 | 0.93-1.75 | 2-3 |

## 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 | 325-420 |

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