



## MET LAB, LLC

411 INDUSTRY DRIVE SUITE 100

P.O. BOX 9517 HAMPTON, VIRGINIA 23670-0517 TELEPHONE: (757) 827-7176

In Reply Refer To:

ML 17012-02

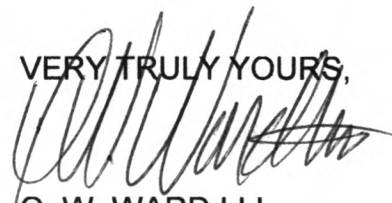
8-Aug-17

SUBJECT: INSPECTION OF CLAS12-RICH MODULE LIFTING &  
STIFFENING TOOL ASSCMBLY

TO: G & R METALS  
ATTN: BUCK SYKES  
810 KWIANNIS STREET  
HAMPTON, VA 23661

1. REFERENCE IS MADE TO:
  - A. DRAWING RM\_LST\_1.0
  - B. DRAWING A00000-23-00-0001
2. AS DIRECTED IN THE GENERAL NOTES OF REFERENCE D,  
I HAVE PERFORMED THE REQUIRED INSPECTIONS LISTED BELOW:
  - A. MATERIALS AND APPLICABLE MTRS.
  - B. WELDING PROCEDURE SPECIFICATION INCLUDING PQRS
  - C. WELDER QUALIFICATION RECORDS
  - D. VISUAL INSPECTION OF WELDS
3. I HAVE ENCLOSED A COPY OF MY QUALIFICATIONS ALONG  
WITH THE REQUIRED DOCUMENTATION

VERY TRULY YOURS,



O. W. WARD III  
CERTIFIED WELDING  
INSPECTOR

OWW/hm  
cc: file  
ENC.:

1918-1919  
1920-1921  
1922-1923

1924-1925  
1926-1927  
1928-1929

1930-1931  
1932-1933  
1934-1935

1936-1937  
1938-1939  
1940-1941

1942-1943  
1944-1945  
1946-1947

1948-1949  
1950-1951

1952-1953  
1954-1955  
1956-1957  
1958-1959  
1960-1961

1962-1963  
1964-1965  
1966-1967

1968-1969  
1970-1971

1972-1973  
1974-1975

# GENERAL NOTES FOR HALL-A STEEL STRUCTURAL DRAWINGS OR WELD DETAILS

## GENERAL NOTES FOR WELDING FABRICATION, INSPECTION AND DOCUMENTATION

1. FABRICATION, QUALIFICATION, INSPECTION, AND DOCUMENTATION SHALL BE IN ACCORDANCE WITH ANSI/AISC 360-05 AND AWS D1. 1 :2008. IN THE CASE OF A DIFFERENCE BETWEEN THE TWO CODES, THE MORE STRINGENT OF THE TWO SHALL APPLY.
2. WELDING SYMBOLS IN THE DRAWINGS ARE BASED ON AWS A2.4:2007.

## FABRICATION

1. STEEL PLATES SHALL BE PER ASTM A36, A572-GR-42 OR A572 GR-50 (AS DEFINED ON RESPECTIVE DRAWINGS), AND SHAPES SHALL BE PER ASTM A992, A500-OR A53 AS APPROPRIATE.
2. STEEL PLATES AND SHAPES SHALL MEET THE STRAIGHTNESS AND FLATNESS REQUIREMENTS OF ASTM A6.
3. ALL WELDING SHALL BE DONE BY AWS-CERTIFIED WELDERS WITH THE APPROPRIATE QUALIFICATIONS.
4. CRACKING SHALL BE PREVENTED THROUGH THE USE OF LOW-HYDROGEN PROCESSES OR BY CONTROLLING PREHEAT AND INTERPASS TEMPERATURES IN ACCORDANCE WITH AWS D1. 1, SECTION 4.7.4.
5. WELDING SURFACES DEPOSITED SHALL BE SMOOTH, UNIFORM, AND FREE FROM FINS, TEARS, CRACKS, AND OTHER DISCONTINUITIES.
6. WELDING SURFACES AND THEIR ADJACENT AREAS SHALL ALSO BE FREE FROM LOOSE OR THICK SCALES, SLAG, RUST, MOISTURE, GREASE, AND OTHER FOREIGN MATERIALS.
7. PRIOR TO WELDING OVER PREVIOUSLY DEPOSITED METAL, ALL SLAG SHALL BE REMOVED AND BRUSHING OR OTHER SUITABLE MEANS SHALL BE USED TO CLEAN THE WELD AND ADJACENT BASE METAL. CLEANING OF COMPLETED WELDS SHALL INCLUDE REMOVING SLAG, AND CLEANING THE WELD AND ADJACENT BASE METAL.
8. SUFFICIENT WELDING HEAT INPUT INTO THE PLATE SHALL BE PROVIDED TO GIVE THE DESIRED SLOW RATE OF COOLING.
9. TOLERANCE OF JOINT DIMENSIONS SHALL CONFORM TO SUBSECTION 5.22, AWS D1. 1 :2008; DIMENSIONAL TOLERANCE OF EACH WELDMENT SHALL BE IN ACCORDANCE WITH SUBSECTION 5.23, AWS D1.1:2008.
10. DEVIATIONS FROM THE DESIGN DRAWINGS FOR PURPOSE OF PRODUCTIBILITY ARE PERMITTED ONLY WITH APPROVAL FROM JLAB OR ITS TECHNICAL REPRESENTATIVE.
11. TO ACHIEVE COMPLETE JOINT PENETRATION (CJP) WELDS, BACKGOUGING OR BACKING STRIPS (WHICH MUST BE THE SAME MATERIAL AS THE BASE METAL) SHALL BE USED.
12. SUBSTITUTIONS TO WELD JOINT DESIGNS SHOWN ON THESE PLANS MAY BE MADE (SUBJECT TO JLAB ENGINEERING APPROVAL THROUGH SHOP DRAWING SUBMITTALS) PROVIDED THAT THE SUBSTITUTE DESIGN MAINTAINS THE STRENGTH OF THE JOINT AS SHOWN AND MEETS THE REQUIREMENTS OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC).
13. PLANS AND SPECIFICATION REQUIREMENTS THAT NEED TO BE REVISED, MODIFIED OR SUBSTITUTED BECAUSE OF AVAILABILITY OF MATERIAL OR TO SUIT SHOP PRACTICES SHALL REQUIRE JLAB ENGINEERING APPROVAL.
14. GRIND SMOOTH ALL SHARP CORNERS AND ROUGH EDGES THAT MAY CAUSE INJURY TO PERSONNEL OR EQUIPMENT.
15. THIS NOTE IS APPLICABLE TO THE STRUCTURAL WELDMENT AND IT'S ASSOCIATED SUBASSEMBLIES:  
PAINT ALL EXTERIOR SURFACES, UNLESS OTHERWISE NOTED, AS SPECIFIED ON APPROPRIATE STRUCTURAL DRAWING. PAINT ALL INTERIOR SURFACES, UNLESS OTHERWISE NOTED, WITH AN APPROPRIATE RUST INHIBITOR. FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR PRIMING AND PAINTING. DO NOT PAINT, WITHIN THREE INCHES, PORTIONS OF STRUCTURAL WELDMENTS THAT WILL BE FIELD WELDED TO OTHER WELDMENTS/PLATES UNTIL AFTER ASSEMBLED IN THE HALL WHERE APPLICABLE.

## INSPECTION

1. THE SUBCONTRACTOR'S INSPECTOR, AT A MINIMUM, SHALL HAVE A CURRENT CERTIFICATION AS AN AWS CERTIFIED WELDING INSPECTOR (CWI) IN CONFORMANCE WITH THE PROVISIONS OF AWS QC1, STANDARD FOR AWS CERTIFICATION OF WELDING INSPECTOR.
2. THE SCOPE OF SUBCONTRACTOR INSPECTION INCLUDES INSPECTION OF MATERIAL AND EQUIPMENT, INSPECTION OF WPS, INSPECTION OF WELDER, WELDING OPERATORS, AND TACK WELDER QUALIFICATIONS, INSPECTION OF WORK AND RECORDS.
3. THE RESULTS OF INSPECTION SHALL BE DOCUMENTED. ALL WELDS SHALL BE VISUALLY INSPECTED AND DOCUMENTED IN ACCORDANCE WITH TABLE 6.1, AWS D1.1:2008.
4. VERIFICATION INSPECTION SHALL BE PERFORMED IF DEEMED NECESSARY BY JEFFERSON LAB.

## REQUIRED DOCUMENTATION

1. THE FOLLOWING DOCUMENTATION SHALL BE PROVIDED TO JEFFERSON LAB:
  - a. WELDING PROCEDURE SPECIFICATIONS (CONFORMING TO AWS D1.1 :2008)
  - b. PROCEDURE QUALIFICATION RECORDS (CONFORMING TO AWS D1.1 :2008)
  - c. PERFORMANCE QUALIFICATIONS OF WELDERS, WELDING OPERATORS, AND TACK WELDERS.
  - d. EITHER A CERTIFIED TEST REPORT (MATERIAL TEST REPORT OR MILL CERTIFICATION) OR A CERTIFICATE OF COMPLIANCE OF THE BASE METAL.
  - e. CERTIFIED REPORT OF FILLER METAL.
  - f. CERTIFICATION OF AWS CERTIFIED WELDING INSPECTOR, IN ACCORDANCE WITH INSPECTION NOTE (1).
  - g. REPORT OF VISUAL INSPECTION, IN ACCORDANCE WITH INSPECTION NOTE (3).
  - h. WRITTEN WELDING SEQUENCE AND DISTORTION CONTROL PROGRAM ON ANY MEMBER OR STRUCTURE WHERE EXCESSIVE SHRINKAGE OR DISTORTION COULD BE EXPECTED, PRIOR TO THE START OF WELDING ON THAT STRUCTURE.
2. PERFORMANCE QUALIFICATIONS OF WELDERS, WELDING OPERATORS, AND TACK WELDERS SHALL BE IN ACCORDANCE WITH AWS D1.1 :2008. EXCEPTION: QUALIFICATIONS, WHICH WERE PERFORMED TO AND MET THE REQUIREMENTS OF EARLIER EDITIONS OF AWS D1.1 OR AWS D1.0 OR AWS 2.0 WHILE THOSE EDITIONS WERE IN EFFECT, ARE VALID AND MAY BE USED.

|                                                                                          |  |                                                                                                                                                                                                                 |  |                                                                                                     |  |                                                                                                                                                |  |
|------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|--|
| DOCUMENT CONTROL STAMP                                                                   |  | DATE & TIME PER ASME Y14.5<br>UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ARE:<br>FINISHES: DECIMAL ANGLES<br>± N/A ± .010 ± N/A<br>DEC. INCHES DEC. INCHES<br>DEC. INCHES DEC. INCHES |  | TRACKING NO.<br>N/A<br>APPROVALS DATE<br>DRAWN C. SOWA 25 MAR 14<br>CHECKED<br>APPROVED<br>APPROVED |  | United States<br>Department of<br>Energy<br><b>Jefferson Lab</b><br>Thomas Jefferson National Accelerator Facility<br>Newport News<br>Virginia |  |
| MATERIAL                                                                                 |  | THIRD ANGLE PROJECTION                                                                                                                                                                                          |  | HALL A - TEMPLATE - A00000<br>DOCUMENTS<br>WELDING NOTES<br>GEN. NOTES FOR WELDING FABRICATION      |  | SIZE (DWG. NO.)<br>D A00000-23-00-0001<br>SCALE 1:1 SHEET 1 OF 1                                                                               |  |
| FINISH<br>MACHINED<br>SURFACES<br>DEBURR & BREAK ALL SHARP EDGES<br>DO NOT SCALE DRAWING |  |                                                                                                                            |  |                                                                                                     |  |                                                                                                                                                |  |

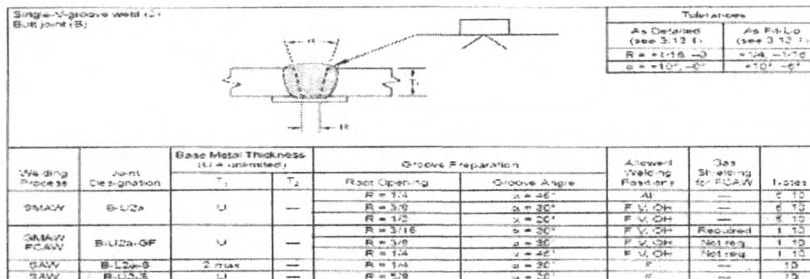


**G & R Metals**  
**810 Kiwanis Street**  
**Hampton VA 23661**  
**Phone (757) 244-5693 Fax (757) 245-1132**  
**PROCEDURE QUALIFICATION RECORD (PQR)**  
**AWS D1.1/D1.1M**

Oscar W Ward III  
 CWI 17030491  
 QC1 EXP. 3/1/2020

|                                                  |                            |                       |          |
|--------------------------------------------------|----------------------------|-----------------------|----------|
| <b>Procedure Qualification Record (PQR) No:</b>  | FCAW-L303 (ST-37587/37643) | <b>Date:</b>          | 10-14-10 |
| <b>Weld Procedure Specification (WPS) No(s):</b> | FCAW-L303                  | <b>Date:</b>          | 10-14-10 |
| <b>Welding Process(es):</b>                      | FCAW-G (Gas Shielded)      | <b>Transfer Mode:</b> | NA       |
| <b>Types: Manual, Automatic, Semi-Auto:</b>      | Semi-Automatic             |                       |          |
| <b>Applicable Fabrication Document:</b>          | AWS D1.1/D1.1              |                       |          |

|                                                                                      |  |                                                                              |                         |
|--------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------|-------------------------|
| <b>JOINT DESIGN</b>                                                                  |  |                                                                              |                         |
| AWS D1.1/D1.1M: B-U2a-GF                                                             |  | Root Gap: 1/4"                                                               | Root Face: 1/16"        |
| <input checked="" type="checkbox"/> Single Weld <input type="checkbox"/> Double Weld |  | Backing: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Backing Material: Metal |
| Back Gouge: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No      |  | Back Gouging/Cleaning Method(s): NA                                          |                         |
| <b>JOINT DETAIL (Actual)</b>                                                         |  |                                                                              |                         |



\*Base Material Preparation Method(s): Machine, Grind, Burr, Sand, Wire Brush

|                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BASE MATERIAL(S)</b><br>Specification: ASTM-A572 To ASTM-A572<br>Type/Grade: Grade 50 To Grade 50<br>TABLE 3.1 GROUP II<br>Base Metal Size/Sch: 12" X 18" Plate, 1.00" Thick<br>Thickness of Material: 1.00"                                                  | <b>SHIELDING</b><br>Type of Gas: Argon/CO2<br>Composition: 75/25<br>Shielding Gas: Argon/CO2 Flow Rate: 35-40 CFH<br>Purge/Trail Gas: NA Flow Rate: NA<br>Cup Size: 5/8" Dew Point: NA                                                                                                                                                                                                       |
| <b>FILLER METAL(S)</b><br>Specification: AWS A5.20<br>Classification: E71T-1MH8<br>E71T-9MH8<br>Diameter of Filler Metal: 1/16"<br>Flux Spec/Size: NA Type: NA<br>Consumable Insert <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA | <b>ELECTRICAL CHARACTERISTICS</b><br>Machine Model/Type: Esab Multipower 460<br>Wire Feed Model/Type: Miller 22A/24V<br>Wire Feed Speed (IPM): 192<br>Amps: 241 Amp Range: 241<br>Volts: 24.5 Volt Range: 24.5<br>Polarity: DCRP High Freq <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Tungsten Type/Size: NA<br>Electrode Extension/Stick-out: 1/2"<br>Other: NA |
| <b>POSITION(S)</b><br>Position(s) of Groove: 3G<br>Position(s) of Fillet: NA<br>Vertical Progression: <input checked="" type="checkbox"/> Up <input type="checkbox"/> Down <input type="checkbox"/> N/A                                                          | <b>TECHNIQUE</b><br>Torch Type: Air Cooled Bernard Model 23015 AE8 XM<br>Travel Speed: 6-10 IPM<br>Avg Bead Width: .250" <input checked="" type="checkbox"/> Stringer<br>Multipass or Single Pass (per side): Multiple<br>Single or Multiple Electrodes: Single                                                                                                                              |
| <b>PREHEAT</b><br>Preheat Temp: 60° F<br>Interpass Temp: 350° F<br>Preheat Method: NO SPECIAL PRE-HEAT REQUIRED<br>Max. Heat Input: 59,045 joules per inch                                                                                                       | <b>NONDESTRUCTIVE AND DESTRUCTIVE TEST RESULTS—SEE ATTACHED REPORTS.</b><br>Acceptance Standard: AWS D1.1/D1.1M                                                                                                                                                                                                                                                                              |
| <b>POSTWELD HEAT TREATMENT</b><br>Temperature: NA<br>Holding Time: NA<br>Welder/Badge No.: 4465                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                              |

|                                  |                                          |                   |              |
|----------------------------------|------------------------------------------|-------------------|--------------|
| Procedure Number (PQR):          | PCAW-L303 (ST-37587/37643)               | Date:             | 10-14-10     |
| Joint Design (AWS D1.1/D1.1M):   | B-U2a-GF                                 | Welding Position: | 3G (Up Hill) |
| Base Material(s) Heat/Lot No.:   | 182P84840                                |                   |              |
| Filler Material(s) Heat/Lot No.: | LINCOLN ULTRACORE TM 71A85, LOT#12294354 |                   |              |
| Welder's Name/Badge No.:         | JEFF AMICK #4465                         |                   |              |

### MECHANICAL TEST REPORT TENSILE TEST

| Test No. | Specimen Type | Ultimate Tensile Strength/ PSI | Fail Site | Results                     | Type of Failure |
|----------|---------------|--------------------------------|-----------|-----------------------------|-----------------|
| 1        | Transverse    | 77,729                         | BOW       | Satisfactory AWS D1.1/D1.1M | Ductile         |
| 2        | Transverse    | 72,116                         | BOW       | Satisfactory AWS D1.1/D1.1M | Ductile         |

### GUIDED-BEND TEST

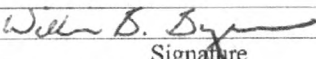
| Specimen Number | Bend Type | Mandrel Radius | Specimen Width | Specimen Thickness | Results               |
|-----------------|-----------|----------------|----------------|--------------------|-----------------------|
| 1               | SIDE      | .750"          | .375"          | 1.00"              | Satisfactory AWS D1.1 |
| 2               | SIDE      | .750"          | .375"          | 1.00"              | Satisfactory AWS D1.1 |
| 3               | SIDE      | .750"          | .375"          | 1.00"              | Satisfactory AWS D1.1 |
| 4               | SIDE      | .750"          | .375"          | 1.00"              | Satisfactory AWS D1.1 |

### CHARPY IMPACT TESTS

| Test No. | Notch Location | Notch Type | Impact Strength Required | Test Temperature | Impact Strength Achieved | Results               |
|----------|----------------|------------|--------------------------|------------------|--------------------------|-----------------------|
| 1        | Weld Metal     | V-Notch    | 20 ft-lb                 | -40° F           | 100                      | Satisfactory AWS D1.1 |
| 2        | Weld Metal     | V-Notch    | 20 ft-lb                 | -40° F           | 98                       | Satisfactory AWS D1.1 |
| 3        | Weld Metal     | V-Notch    | 20 ft-lb                 | -40° F           | 94                       | Satisfactory AWS D1.1 |
| 4        | Weld Metal     | V-Notch    | 20 ft-lb                 | -40° F           | 90                       | Satisfactory AWS D1.1 |
| 5        | Weld Metal     | V-Notch    | 20 ft-lb                 | -40° F           | 97                       | Satisfactory AWS D1.1 |
| 1        | 1mm HAZ        | V-Notch    | 20 ft-lb                 | -40° F           | 20                       | Satisfactory AWS D1.1 |
| 2        | 1mm HAZ        | V-Notch    | 20 ft-lb                 | -40° F           | 30                       | Satisfactory AWS D1.1 |
| 3        | 1mm HAZ        | V-Notch    | 20 ft-lb                 | -40° F           | 32                       | Satisfactory AWS D1.1 |
| 4        | 5mm HAZ        | V-Notch    | 20 ft-lb                 | -40° F           | 39                       | Satisfactory AWS D1.1 |
| 5        | 5mm HAZ        | V-Notch    | 20 ft-lb                 | -40° F           | 34                       | Satisfactory AWS D1.1 |
| 6        | 5mm HAZ        | V-Notch    | 20 ft-lb                 | -40° F           | 30                       | Satisfactory AWS D1.1 |

### ADDITIONAL TESTING

|                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MACROETCH:</b> <input type="checkbox"/> Required <input checked="" type="checkbox"/> Not Required<br>Final Results: <input type="checkbox"/> Pass <input type="checkbox"/> Fail<br>Lab Report Number:                                                                      | <b>FILLET BREAK TEST:</b> <input type="checkbox"/> Required <input checked="" type="checkbox"/> Not Required<br>Final Results: <input type="checkbox"/> Pass <input type="checkbox"/> Fail<br>Lab Report Number:                               |
| <b>VT INSPECTION:</b> <input type="checkbox"/> Required <input type="checkbox"/> Not Required<br>Final Results: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail<br>Lab Report Number: SI-TECH VT ST-37587 10-7-10                                      | <b>PT/MT INSPECTION:</b> <input type="checkbox"/> Required <input type="checkbox"/> Not Required<br>Final Results: <input type="checkbox"/> Pass <input type="checkbox"/> Fail<br>Lab Report Number:                                           |
| <b>UT INSPECTION:</b> <input type="checkbox"/> Required <input checked="" type="checkbox"/> Not Required<br>Final Results: <input type="checkbox"/> Pass <input type="checkbox"/> Fail<br>Lab Report Number:                                                                  | <b>RT INSPECTION:</b> <input type="checkbox"/> Required <input type="checkbox"/> Not Required<br>Final Results: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail<br>Lab Report Number: SI-TECH RT ST-37587 Dated 10-7-10 |
| <b>CHEMICAL ANALYSIS</b> <input type="checkbox"/> Required <input checked="" type="checkbox"/> Not Required<br><input type="checkbox"/> Filler <input type="checkbox"/> Base Metal Results: <input type="checkbox"/> Pass <input type="checkbox"/> Fail<br>Lab Report Number: | <b>OTHER TESTS PERFORMED:</b> <input type="checkbox"/> N/A<br>Description of Test/Results: Charpy Impact, Bends & Tensiles<br>Description of Test/Results: TENSILE TEST, BEND TEST, Charpy AWS B4.0 -2007 Report Dated 10-8-10 and 10-14-10    |

|                                                                                                                                                                                                   |                                                |                 |                                                                                    |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------|------------------------------------------------------------------------------------|-----------|
| Tests conducted by:                                                                                                                                                                               | SI-TECH INC. Lab # ST-37587/37643 Richard Senn |                 | Title:                                                                             | Level III |
| <p>*The Mechanical Test documented above are certified to be correct and the weld specimens were prepared and tested in accordance with the requirements of AWS D1.1/D1.1M and ANSI/AWS B4.0.</p> |                                                |                 |                                                                                    |           |
| Company Name:                                                                                                                                                                                     | G & R Metals                                   |                 |                                                                                    |           |
| Certified By:                                                                                                                                                                                     | William Sykes                                  | Project Manager |  | 10-14-10  |
|                                                                                                                                                                                                   | Name                                           | Title           | Signature                                                                          | Date      |

**G & R Metals**  
**810 Kiwanis Street**  
**Hampton VA 23661**  
**Phone (757) 244-5693 Fax (757) 245-1132**  
**WELDING PROCEDURE SPECIFICATION (WPS)**  
**AWS D1.1/D1.1M Structural Welding Code Steel**

|                                    |                                                            |          |                |       |          |
|------------------------------------|------------------------------------------------------------|----------|----------------|-------|----------|
| Welding Procedure Spec. No.        | FCAW-L303                                                  | Rev:     | 0              | Date: | 10-14-10 |
| Supporting PQR No(s):              | FCAW-L303 (ST-37587/37643)                                 | Rev:     | 0              | Date: | 10-14-10 |
| Welding Procedure Qualification:   | <input checked="" type="checkbox"/> Original Qualification |          |                |       |          |
| Welding Process(es):               | FCAW-G (Gas Shielded)                                      | Type(s): | SEMI-AUTOMATIC |       |          |
| Applicable Qualification Document: | <input checked="" type="checkbox"/> AWS D1.1/D1.1M         |          |                |       |          |
| Applicable Fabrication Document:   | <input checked="" type="checkbox"/> AWS D1.1/D1.1M         |          |                |       |          |

|                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                    |                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>JOINT DESIGN</b>                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                    |                                                                                                                                                                                     |
| Applicable Joint Designs: <i>(Limited to Requirements of AWS D1.1/D1.1M)</i>                                                                                                                                                                         |                                                                                                                                                                                                                                    |                                                                                                                                                                                     |
| <b>Standard Butt Joints:</b><br><input type="checkbox"/> Joints Welded From One Side/No Backing<br><input checked="" type="checkbox"/> Joints Welded From One Side/With Backing<br><input checked="" type="checkbox"/> Joints Welded From Both Sides | <b>Standard Fillet Welded Joints:</b><br><input checked="" type="checkbox"/> Partial Penetration Fillets<br><input checked="" type="checkbox"/> Fillet Reinforced Welds<br><input checked="" type="checkbox"/> Socket Fillet Welds | <b>Special Joint Designs:</b><br><input checked="" type="checkbox"/> Not Applicable/None<br><input type="checkbox"/> Open Root<br><input type="checkbox"/> Other (see Joint Detail) |
| Backing Material / Type(s): METAL                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |                                                                                                                                                                                     |

**JOINT DETAILS AS LISTED IN AWS D1.1/D1.1M**  
**FIGURES 3.3 AND 3.4**

\*Joint Preparation/Base & Weld Metal Cleaning: Grind, Machine, Wirebrush, Burr, Chipping Hammer

|                                          |         |                                 |                                                                     |
|------------------------------------------|---------|---------------------------------|---------------------------------------------------------------------|
| <b>BASE METAL(S)</b>                     |         |                                 |                                                                     |
| Group I or II                            | To      | Group I or II                   | Base Metal Form: Plate, Tube, Pipe, Forgings, Bar, Shapes, Castings |
| Specification / Type, Class or Grade:    |         | See Table 3.1 of AWS D1.1/D1.1M |                                                                     |
| To Specification / Type, Class or Grade: |         | See Table 3.1 of AWS D1.1/D1.1M |                                                                     |
| <b>Thickness Range Qualified:</b>        |         |                                 |                                                                     |
| Plate Base Metal                         | Groove: | 1/8 to Unlimited                | Fillet: All                                                         |

|                                 |                      |                      |       |
|---------------------------------|----------------------|----------------------|-------|
| <b>FILLER METAL(S)</b>          |                      |                      |       |
| Specification:                  | E71T-1MH8, E71T-9MH8 |                      |       |
| Classification:                 | AWS A5.20            |                      |       |
| Size of Filler Metals:          | 1/16"                | Max. Size Qualified: | 1/16" |
| Flux Trade Name:                | NA                   |                      |       |
| Flux Specification:             | NA                   |                      |       |
| Electrode-Flux (Size/Type):     | NA                   |                      |       |
| Consumable Insert Specification | NA                   | Type/Size:           | NA    |

**WELDING PROCEDURE SPECIFICATION (WPS)**  
**AWS D1.1/D1.1M Structural Welding Code Steel**

WPS No.: FCAW-L303

Rev: 0

Date: 10-14-10

|                                                                                                                                                                                                           |  |  |  |                                                                                          |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|------------------------------------------------------------------------------------------|--|--|--|
| <b>POSITION(S) QUALIFIED</b>                                                                                                                                                                              |  |  |  | <b>POSTWELD HEAT TREATMENT</b>                                                           |  |  |  |
| Position(s) of Groove: 3G                                                                                                                                                                                 |  |  |  | PWHT: <input type="checkbox"/> Required <input checked="" type="checkbox"/> Not Required |  |  |  |
| Position(s) of Fillet: 3F                                                                                                                                                                                 |  |  |  | Holding Time: NA                                                                         |  |  |  |
| Position(s) of Socket: NA                                                                                                                                                                                 |  |  |  | Temperature Range: NA                                                                    |  |  |  |
| Vertical Progression: <input checked="" type="checkbox"/> Up <input type="checkbox"/> Down <input type="checkbox"/> N/A                                                                                   |  |  |  |                                                                                          |  |  |  |
| <b>PREHEAT</b>                                                                                                                                                                                            |  |  |  | <b>SHIELDING</b>                                                                         |  |  |  |
| Preheat Temp °F (Min): 60                                                                                                                                                                                 |  |  |  | Shielding Gas(es): Argon/CO2                                                             |  |  |  |
| Interpass Temp °F (Max): 350                                                                                                                                                                              |  |  |  | Composition (%): 75/25                                                                   |  |  |  |
| Preheat Maintenance: No special maintenance required.                                                                                                                                                     |  |  |  | Shielding: Argon/CO2 Flow Range: 30-60 CFH                                               |  |  |  |
| Max Heat Input: Table I                                                                                                                                                                                   |  |  |  | Purge: NA Flow Range: NA                                                                 |  |  |  |
|                                                                                                                                                                                                           |  |  |  | Trailing: NA Flow Range: NA                                                              |  |  |  |
|                                                                                                                                                                                                           |  |  |  | Dew point: NA                                                                            |  |  |  |
| <b>ELECTRICAL CHARACTERISTICS</b>                                                                                                                                                                         |  |  |  |                                                                                          |  |  |  |
| Current: <input type="checkbox"/> AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Pulse                                                                                                |  |  |  | Polarity: <input checked="" type="checkbox"/> Reverse <input type="checkbox"/> Straight  |  |  |  |
| High Frequency: <input type="checkbox"/> Continuous <input type="checkbox"/> Start Up <input checked="" type="checkbox"/> N/A                                                                             |  |  |  |                                                                                          |  |  |  |
| Amps (Range): 217 to 265                                                                                                                                                                                  |  |  |  | Volts (Range): 22.5 to 26                                                                |  |  |  |
| Tungsten Electrode Size Type: NA                                                                                                                                                                          |  |  |  | Size: NA                                                                                 |  |  |  |
| Mode of Metal Transfer: <input type="checkbox"/> Short-Circuiting <input type="checkbox"/> Globular <input checked="" type="checkbox"/> Spray <input type="checkbox"/> Other <input type="checkbox"/> N/A |  |  |  |                                                                                          |  |  |  |
| Wire Feed Speed Range (IPM): 211-173                                                                                                                                                                      |  |  |  |                                                                                          |  |  |  |
| Other Characteristics: Machine Model/Type: Esab Multipower 460 , Wire Feed Model/Type: Miller 22A/24V                                                                                                     |  |  |  |                                                                                          |  |  |  |
| Torch Model/Type: Air Cooled Bernard Model 23015 AE8 XM                                                                                                                                                   |  |  |  |                                                                                          |  |  |  |
| <b>TECHNIQUE</b>                                                                                                                                                                                          |  |  |  |                                                                                          |  |  |  |
| Orifice or Gas Cup Size: 1/2" MINIMUM                                                                                                                                                                     |  |  |  |                                                                                          |  |  |  |
| Stringer Bead (Max Width): NA                                                                                                                                                                             |  |  |  |                                                                                          |  |  |  |
| Initial and Interpass Cleaning: Grind, Machine, Wirebrush, Burr, Chipping Hammer                                                                                                                          |  |  |  |                                                                                          |  |  |  |
| Method of Back Gouging: GRIND OR THERMAL WHEN REQUIRED                                                                                                                                                    |  |  |  |                                                                                          |  |  |  |
| Electrode Lead or Trail Angle: NA                                                                                                                                                                         |  |  |  |                                                                                          |  |  |  |
| Oscillation: NA                                                                                                                                                                                           |  |  |  |                                                                                          |  |  |  |
| Electrode Extension/Stick-out: 1/2" MAXIMUM                                                                                                                                                               |  |  |  |                                                                                          |  |  |  |
| Multiple or Single Pass (per side): MULTIPLE                                                                                                                                                              |  |  |  |                                                                                          |  |  |  |
| Multiple or Single Electrode: SINGLE                                                                                                                                                                      |  |  |  |                                                                                          |  |  |  |
| Travel Speed (Range): See Table I                                                                                                                                                                         |  |  |  |                                                                                          |  |  |  |
| Peening: NA                                                                                                                                                                                               |  |  |  |                                                                                          |  |  |  |
| Other: Electrode Lincoln Ultracore TM 71A85                                                                                                                                                               |  |  |  |                                                                                          |  |  |  |

| Weld Layer      | Welding Process | Filler Metal           |             | Current       |              | Volt Range | Travel Speed Range (IPM) | Other: Technique, Remarks, Comments, etc. |
|-----------------|-----------------|------------------------|-------------|---------------|--------------|------------|--------------------------|-------------------------------------------|
|                 |                 | Spec (Class)           | Size (Dia.) | Polarity Type | Ampere Range |            |                          |                                           |
| 1 <sup>ST</sup> | FCAW            | E71T-1MH8<br>E71T-9MH8 | 1/16"       | DCRP          | 217-265      | 22.5-26    | See Table I              |                                           |
| FILL            | FCAW            | E71T-1MH8<br>E71T-9MH8 | 1/16"       | DCRP          | 217-265      | 22.5-26    | See Table I              |                                           |

TABLE I

## Travel Speed Table (in/min)

|                        |        |
|------------------------|--------|
| Min Heat Input (kJ/in) | 35.427 |
| Max Heat Input (kJ/in) | 59.045 |

|            |     | Volts | Min Volt   |            |            |            | Max Volt   |
|------------|-----|-------|------------|------------|------------|------------|------------|
|            |     |       | 22.5       | 23.5       | 24.5       | 25.5       | 26         |
| Amps       |     |       |            |            |            |            |            |
| Min<br>Amp | 217 |       | 5.0 - 8.2  | 5.2 - 8.6  | 5.5 - 9.0  | 5.7 - 9.3  | 5.8 - 9.5  |
|            | 227 |       | 5.2 - 8.6  | 5.5 - 9.0  | 5.7 - 9.4  | 5.9 - 9.8  | 6.0 - 9.9  |
|            | 237 |       | 5.5 - 9.0  | 5.7 - 9.4  | 6.0 - 9.8  | 6.2 - 10.2 | 6.3 - 10.4 |
|            | 247 |       | 5.7 - 9.4  | 5.9 - 9.8  | 6.2 - 10.2 | 6.5 - 10.6 | 6.6 - 10.8 |
|            | 257 |       | 5.9 - 9.7  | 6.2 - 10.2 | 6.4 - 10.6 | 6.7 - 11.0 | 6.8 - 11.3 |
| Max<br>Amp | 265 |       | 6.1 - 10.0 | 6.4 - 10.5 | 6.6 - 10.9 | 6.9 - 11.4 | 7.1 - 11.6 |

**Notes:** Enter Input Ranges in **yellow** boxes  
Heat Input can range from 10-110 kJ/in  
Voltage can range from 8-50 Volts  
Amperage can range from 60-1000 Amps

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|                                  |                                    |                                        |
|----------------------------------|------------------------------------|----------------------------------------|
| <b>CUSTOMER:</b><br>G & R Metals | <b>TEST:</b><br>Charpy V-Notch     | <b>P.O. NUMBER</b><br>13258            |
| <b>DATE:</b><br>10-8-10          | <b>ST JOB NUMBER:</b><br>ST-37587  | <b>SUBJECT:</b><br>L-303               |
| <b>BASE MATERIAL:</b><br>C/S     | <b>CLASS:</b><br>IAW-WPS-FCaw-L303 | <b>FILLER:</b><br>E71T-1MH8, E71T-9MH8 |

[illegible]

Johnny R. Holt

DATE: 10-8-10

Page 1 of 1

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|                                  |                                   |                                        |
|----------------------------------|-----------------------------------|----------------------------------------|
| <b>CUSTOMER:</b><br>G & R Metals | <b>TEST:</b><br>Charpy V-Notch    | <b>P.O. NUMBER</b><br>13298            |
| <b>DATE:</b><br>10-14-10         | <b>ST JOB NUMBER:</b><br>ST-37643 | <b>SUBJECT:</b><br>L-303               |
| <b>BASE MATERIAL:</b><br>C/S     | <b>CLASS:</b><br>M1               | <b>FILLER:</b><br>E71T-1MH8, E71T-9MH8 |

INSPECTED BY:

DATE: 10-14-10

Page 1 of 1

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[illegible]

DATE: 10-7-10 LEVEL: III

Page 1 of 1

SI-TECH / TIDEWATER  
804-F Industrial Avenue  
Chesapeake, Virginia 23324  
(757) 545-2553



## SI-TECH TESTING LABS

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### TENSILE TEST REPORT

AWS B4.0-2007

|                           |                                       |                               |
|---------------------------|---------------------------------------|-------------------------------|
| CUSTOMER:<br>G & R Metals | ST JOB NUMBER:<br>ST-37587            | DATE:<br>10-8-10              |
| P.O. NUMBER:<br>13258     | WELDING PROCEDURE:<br>WPS FCAW-L303   | JOINT DESIGN:<br>V Groove/WB  |
| BASE MATERIAL:<br>C/S     | FILLER METAL:<br>E71T-1MH8, E71T-9MH8 | TECHNICIAN:<br>Jeremy Roberts |

| TENSILE ID                          | SPECIMEN #1 | SPECIMEN #2 | SPECIMEN #3 | SPECIMEN #4 |
|-------------------------------------|-------------|-------------|-------------|-------------|
| SPECIMEN TYPE                       | Transverse  | Transverse  |             |             |
| ULTIMATE<br>TENSILE<br>STRENGTH/PSI | 77729       | 72116       |             |             |
| LOCATION OF<br>FAILURE:             | BOW         | BOW         |             |             |
| TYPE OF<br>FAILURE:                 | Ductile     | Ductile     |             |             |

NOTES:

TECHNICIAN:

*Jeremy Roberts*

DATE: 10-8-10

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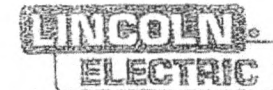
AWS B4.0-2007

TECHNICIAN: John S. [Signature] ~~LEVEL: II~~ DATE: 10-8-10

Page 1 of 1

The Lincoln Electric Company  
22901 St. Clair Avenue  
Cleveland, Ohio 44117-1199

CERTIFICATE OF CONFORMANCE  
(APPLIES ONLY TO U.S. PRODUCTS)



Q1 Lot Number: 12294354

Product: UltraCore™ 71A85  
Classification: E71T-1MH8, E71T-9MH8  
Specification: AWS A6.20-2005, ASME SFA-5.20  
Test Completed: January 22, 2010

[ 1 Year ]

This is to certify that the product named above and supplied on the referenced order number is of the same classification, manufacturing process, and material requirements as the material which was used for the test that was concluded on the date shown, the results of which are shown below. All tests required by the specifications shown for classification were performed at that time and the material tested met all requirements. It was manufactured and supplied according to the Quality System Program of the Lincoln Electric Company, Cleveland, Ohio, U.S.A., which meets the requirements of ISO9001, NCA3800, ANSI/AWS A5.01, and other specification and Military requirements, as applicable. The Quality System Program has been approved by ASME, ABS, and VdTUV.

| Operating Settings                                                     | AWS/ASME Requirements                     | Results                      |
|------------------------------------------------------------------------|-------------------------------------------|------------------------------|
| Electrode Size                                                         |                                           | 1/16 inch                    |
| Polarity                                                               | DC+                                       | DC+                          |
| Shielding Gas (per AWS A5.32)                                          | 75-80% Ar, bal CO <sub>2</sub> (SG-AC-25) | 25% CO <sub>2</sub> , 75% Ar |
| Voltage V                                                              |                                           | 26                           |
| Wire Feed Speed cm/min (in/min)                                        |                                           | 635 (25in)                   |
| Current amps                                                           |                                           | 285                          |
| Heat Input Avg., kJ/min (kJ/in.)                                       |                                           | 1.6 (37)                     |
| Contact Tip to Work Distance mm (in.)                                  | (25 - 55)                                 | 29 (1)                       |
| Passes/Layers                                                          |                                           | 14/7                         |
| Preheat Temp °C (°F)                                                   | (60 min.)                                 | 20 (68)                      |
| Interpass Temp °C (°F)                                                 | (275-325)                                 | 165 (325)                    |
| Mechanical properties of the weld deposit (in the as-welded condition) |                                           |                              |
| Tensile Strength MPa (ksi)                                             | (70 - 95)                                 | 540 (93)                     |
| Yield Strength, 0.2% offset MPa (ksi)                                  | (58 min.)                                 | 530 (80)                     |
| Elongation (%)                                                         | 22 min.                                   | 27                           |
| Average Hardness (Rockwell B)                                          | Not Required                              | 94                           |
| Avg. Charpy V-notch Impact Properties                                  |                                           | 51 (37)                      |
| Joules @ -29 °C (ft-lbf @ -20 °F)                                      | (20 min.)                                 | 43,45,64 (32,33,47)          |
| Avg. Joules @ -18 °C (ft-lbf @ 0 °F)                                   | (20 min.)                                 | 93 (68)                      |
| Chemical composition (weight %)                                        |                                           |                              |
| C                                                                      | 0.18 max.                                 | 0.04                         |
| Mn                                                                     | 1.75 max.                                 | 1.58                         |
| Si                                                                     | 0.90 max.                                 | 0.61                         |
| S                                                                      | 0.03 max.                                 | 0.05                         |
| P                                                                      | 0.03 max.                                 | 0.01                         |
| Diffusible Hydrogen (mL/100g) per AWS A4.3                             | 6.0 max.                                  | 5.1                          |
| Absolute Humidity (grains moisture/dry air)                            |                                           | 29                           |

The strength and elongation properties were obtained from 12.5 mm (0.500 in.) A4 tensile specimen artificially aged at 105°C (220 °F) for 48 hours, as permitted by AWS A6.20-2005. A naturally aged tensile specimen may take months to achieve the specified properties. See AWS A5.20-2005, paragraph A8.3. The time required for the natural aging of weld deposits is dependent upon ambient conditions, weldment geometry, the metallurgical structure of the weld deposit and other factors.

The electrode diameter required to be tested for this classification is 1/16 inch. The 0.045 and the 0.062 inch sizes will also meet these requirements.

Radiographic Test: Met requirements. Fillet Weld Test: (positions as required): Met requirements.

Test assembly constructed of ASTM A36. This certificate complies to the requirements of EN 10204, Type 2.2.

Results below the detection limits of the instrument or lower than the precision required by specification are reported as zero.

Strength values in SI units are reported to the nearest 10 MPa converted from actual data. Preheat and Interpass temperature values in SI units are reported to the nearest 5 degrees.

Page 1 of 1

James R. Fogli, Certification Supervisor

January 25, 2010

Date

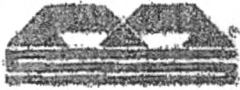
David A. Finley

25 Jan. 2010

Date

David A. Finley, Manager, Compliance Engineering,  
Consumables R&D Department

Cert. No. 17360



# AMERICAN ALLOY STEEL

6230 N. HOUSTON ROSSLYN ROAD

HOUSTON, TEXAS 77091

Phone: 713-462-8081 Fax: 713-462-8209

M.T.R. COVER SHEET

01/07/2010

Customer Name : G & R METALS  
Address :  
City, State Zip : HAMPTON, VA 23661  
Attention : CHRIS  
Phone Number : 757-244-5693  
Reference Number : 358980  
Notes 1 : P.O. NO. 12569

Control Number: 726332  
Queued By :  
Page Number : 1  
Total Pages : 4  
Fax Number : 757-245-1132

*THE INFORMATION YOU REQUESTED IS ATTACHED.  
THANK YOU FOR YOUR BUSINESS !*

| AASI PLATE NUMBER | HEAT # / SLAB # | MILL          |
|-------------------|-----------------|---------------|
| G65509            | 182P84840       | ARCELORMITTAL |

01/07/2010 From: AMERICAN ALLOY STEEL

To: G &amp; R METALS

P.O.# 12569

S.O.# :358980

AA PL#:G65509

Item :1 (1 PC) 1" X 36" X 36"

## ArcelorMittal Burns Harbor Plate

QUALITY ASSURANCE  
REPORT OF TEST AND ANALYSES

| INSTRUMENT NO.                                                    | DATE SHIPPED                                                                                      | CAR OR VEHICLE NO.             | PAGE |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------|------|
| 802-40049                                                         | 10-16-08                                                                                          | EVS-WCHGO-UP-TULSA-LMIC 266007 | 6    |
| AMERICAN ALLOY STEEL INC<br>PO BOX 40469<br>HOUSTON TX 77040-0469 | AMERICAN ALLOY STEEL INC<br>C/O SAND SPRINGS RAILWAY CO<br>TRANS LOAD FACILITY<br>SAND SPRINGS OK |                                |      |

| S<br>O<br>L<br>D<br>T<br>O | N<br>O<br>T<br>E | SERIAL<br>NUMBER | PAT<br>NO. | HEAT<br>NUMBER | NO.<br>PCS. | SIZE AND QUANTITY |               |        |        | YIELD<br>POINT | TENSILE<br>STRENGTH | ELONG. | RED. |
|----------------------------|------------------|------------------|------------|----------------|-------------|-------------------|---------------|--------|--------|----------------|---------------------|--------|------|
|                            |                  |                  |            |                |             | THICKNESS         | WIDTH OR DIA. | LENGTH | WEIGHT |                |                     |        |      |

QUALITY STEEL MELTED &amp; MANUFACTURED IN THE U. S. A.

TEST PERFORMED AT A ARCELORMITTAL APPROVED LABORATORY

PLATES - , CSA G40.21-98 GR 50W ELD FINE  
GRAIN PRAC, ASTM A572-97 GR 50 TYPE  
2, ASTM A709-97A GR 50 TYPE 2 ---  
TEST CERTS ARE PREPARED IN ACCORD  
WITH PROCEDURES OUTLINED IN EN  
10204:2004 PARA 3.1

CO# 77001-OK GH 361-6732

| SERIAL NUMBER | PAT NO. | HEAT NUMBER | NO. PCS. | THICKNESS | WIDTH OR DIA. | LENGTH | WEIGHT | YIELD POINT | TENSILE STRENGTH | ELONG. | RED. |
|---------------|---------|-------------|----------|-----------|---------------|--------|--------|-------------|------------------|--------|------|
| 181P72890     | 1       | 1           | 1        | 96        | 480           | 13068  | 54300  | 77700       | 8                | 25     |      |
| 182P84840     | 1       | 1           | 1        | 96        | 480           | 13068  | 58600  | 80500       | 8                | 24     |      |
| 182P84840     | 2       | .75         | 2        | 96        | 480           | 19602  | 58400  | 82200       | 8                | 21     |      |
| 181P72890     | 2       | .625        | 2        | 96        | 480           | 16336  | 57400  | 80500       | 8                | 21     |      |

1" A572

| QUENCH TEMPERATURE | TEMPER TEMPERATURE | MINIMIZE TEMPERATURE |
|--------------------|--------------------|----------------------|
|--------------------|--------------------|----------------------|

| SERIAL<br>NUMBER | PAT<br>NO | HEAT<br>NUMBER | HARD<br>BHN | BHN | THICKNESS<br>INCHES | TYPE | SIZE | DRY<br>TEST<br>TIME<br>SEC | SHARP IMPACT  |   |   |            |   |   |          |   |   |      |
|------------------|-----------|----------------|-------------|-----|---------------------|------|------|----------------------------|---------------|---|---|------------|---|---|----------|---|---|------|
|                  |           |                |             |     |                     |      |      |                            | INCHES FT LBS |   |   | SHEAR (IN) |   |   | LAT. EXP |   |   | MILS |
|                  |           |                |             |     |                     |      |      |                            | 1             | 2 | 3 | 1          | 2 | 3 | 1        | 2 | 3 |      |

17.09  
Certified a true copy of the  
test. Retained in the  
AMERICAN ALLOY STEEL.

| HEAT NUMBER | CHEMICAL ANALYSIS |      |      |      |      |      |     |     |      |      |      |      |       |      |      |      | MOULD<br>DRAIN<br>SIZE |
|-------------|-------------------|------|------|------|------|------|-----|-----|------|------|------|------|-------|------|------|------|------------------------|
|             | C                 | Mn   | P    | S    | Si   | Cu   | Ni  | Cr  | Mo   | V    | Ti   | Al   | S     | Ca   | N    | Bn   |                        |
| 181P72890   | .19               | 1.22 | .007 | .004 | .261 | .019 | .01 | .12 | .005 | .055 | .002 | .041 | .0003 | .001 | .005 | .006 |                        |
| 182P84840   | .19               | 1.26 | .008 | .003 | .274 | .014 | .01 | .13 | .004 | .058 | .002 | .029 | .0001 | .001 | .005 | .003 |                        |

I certify that the above results are a true and correct copy of actual results obtained in records maintained by ArcelorMittal Burns Harbor and are in full compliance with the requirements of the specification cited above. This test result cannot be altered and must be transmitted intact with any subsequent test results, if required.

DRY TEST TIME

SURV. QUALITY ASSURANCE

D. W. ELWOOD PER WAKC

PLATE G65509



Independence Tube

6226 W. 74th St  
Chicago, IL 60638  
708-496-0380  
Fax: 708-563-1950

independencetube.com  
itctube.com  
Certificate Number: TRI 579671

**Sold By:**  
**INDEPENDENCE TUBE CORPORATION**  
6226 W. 74th St.  
Chicago, IL 60638  
Tel: 708-496-0380  
Fax: 708-563-1950

Purchase Order No: 71158971  
Sales Order No: TRI 8553 - 6  
Bill of Lading No: TRI 6955 - 4  
Invoice No:

Shipped: 6/20/2017  
Invoiced:

**Sold To:**  
**270 - BMG METALS INC.**  
P.O. BOX 46555  
RALEIGH, NC 27620 27620

**Ship To:**  
**1 - BMG METALS INC.**  
950 MASONIC LANE  
804-298-2215  
RICHMOND, VA 23223

# **CERTIFICATE of ANALYSIS and TESTS**

Customer Part No:

**TUBING A500 GRADE B(C)**  
**3" SQ X 1/4" X 24'**

**Oscar W Ward III**  
**CWI 17030491**  
**QC1 EXP. 3/1/2028**

Certificate No: TRI 579671

Test Date: 6/16/2017

Total Pieces 25  
Total Weight 5,286

| Bundle Tag | Mill | Heat   | Specs                        | Y/T Ratio | Pieces | Weight |
|------------|------|--------|------------------------------|-----------|--------|--------|
| 45234      | 40   | SF3973 | YLD=69600/TEN=76100/ELG=23.5 | 0.9146    | 25     | 5,286  |

Mill #: 40 Heat #: SF3973 Carbon Eq: 0.1497 Heat Src Origin: MELTED AND MANUFACTURED IN THE USA

| C      | Mn     | P      | S      | Si     | Al     | Cu     | Cr     | Mo     | V      | Ni     | Nb     | Cb     |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.0600 | 0.4000 | 0.0100 | 0.0030 | 0.2340 | 0.0240 | 0.1100 | 0.0500 | 0.0100 | 0.0020 | 0.0500 | 0.0090 | 0.0090 |

| Sn     | N      | B      | Ti     | Ca     |
|--------|--------|--------|--------|--------|
| 0.0090 | 0.0061 | 0.0001 | 0.0010 | 0.0017 |

LEED Information (based on the most recent LEED information from the producing mill)

| Method | Location    | Recycled Content | Post Consumer | Post Industrial |
|--------|-------------|------------------|---------------|-----------------|
| EAF    | Decatur, AL | 57.7%            | 22.6%         | 35.1%           |

## **Certification:**

I certify that the above results are a true and correct copy of records prepared and maintained by Independence Tube Corporation. Sworn this day, 6/16/2017

WE PROUDLY MANUFACTURE ALL OUR PRODUCT IN THE USA.  
INDEPENDENCE TUBE PRODUCT IS MANUFACTURED, TESTED,  
AND INSPECTED IN ACCORDANCE WITH ASTM STANDARDS.  
MATERIAL IDENTIFIED AS A500 GRADE B(C) MEETS BOTH  
ASTM A500 GRADE B AND A500 GRADE C SPECIFICATIONS.

*Chris Allen*

Chris Allen, ASQ CMQ/OE  
Quality Management Systems Manager

## **CURRENT STANDARDS:**

A252-10  
A500/A500M-13  
A513-13  
ASTM A53/A53M-12 | ASME SA-53/SA-53M-13  
A847/A847M-14  
A1085/A1085M-15

CC-000-0000-00  
CIVIL  
JAN 10 1991  
FBI - NEW YORK



3525 Richard Arrington, Jr., Blvd. N.  
Birmingham, Alabama 35234  
Phone: (205) 251-1884  
Lab Fax (205) 421-4561  
Lab@SouthlandTube.com

## TEST REPORT

Customer Name: BMG METALS, INC.

Customer PO No.: 71159751

Customer Part No: 46641225

Spec/Grade: A500-13 Grade B/C

Heat No.: 2707332

Description: CARBON STEEL TUBING

Print Date: 6/21/2017

Size/Length: 4" X 4" X 1/4" 24'

Nominal Thickness: 0.250

|                 |          |                  |          |                     |        |
|-----------------|----------|------------------|----------|---------------------|--------|
| Carbon (C):     | 0.2200 ✓ | Tin (Sn):        | 0.0050   | Vanadium (V):       | 0.0050 |
| Manganese (Mn): | 0.8400 ✓ | Nickel (Ni):     | 0.0400 ✓ | Columbium (Cb):     | 0.0010 |
| Phosphorus (P): | 0.0130 ✓ | Chromium (Cr):   | 0.0600 ✓ | Titanium (Ti):      | 0.0010 |
| Sulphur (S):    | 0.0030 ✓ | Molybdenum (Mo): | 0.0100   | Boron (B):          | 0.0000 |
| Silicon (Si):   | 0.0200   | Aluminum (Al):   | 0.0220   | Calcium (Ca):       | 0.0020 |
| Copper (Cu):    | 0.0800 ✓ | Nitrogen (N):    | 0.0060   | Carbon Equiv. (CE): | 0.3830 |

| Sample Number | Sample Date | Tensile (psi) | Yield (psi) | Elongation (%) |
|---------------|-------------|---------------|-------------|----------------|
| SL57496       | 6/6/2017    | 80,100 ✓      | 63,700 ✓    | 29.00 ✓        |

We hereby certify that the above figures are correct as contained in the records of this company. Testing, where it is performed, is performed according to applicable standards (Yield Strength determined using 0.2% offset method and Elongation is measured over a 2" gauge length). Finished goods that require destructive testing by either flattening or flaring to meet the requirements of the standard to which they are certified have been destructively tested in accordance with the pertinent standard. Further, this certification is compliant with the EN10204:2004 Standard for Type 3.1 Inspection Documents.

Ron Lowery

Laboratory Manager  
Southland Tube Incorporated

Melted & Manufactured in the U.S.A.

STI Pickup No.: 06DC127

STI Order No.: 00-13/019

STI Item No.: 4.0S25024

RECEIVED  
FEBRUARY 1964  
OSOS THE GREAT FISH



P.O. Box 2259  
 Mt. Pleasant, SC 29465  
 Phone: 843-336-6000  
 Sales Fax: 843-336-6150  
 MTR BER INQUIRIES@NUCOR.COM  
 Issuance Date 4/27/17 MTR# 1427978  
 Sold OLYMPIC STEEL Ship OLYMPIC STEEL Ship Date 4/27/17  
 To: 587 BARROW PARK DR To: 509 BANKHEAD HWY Bill of Lading # 1265642  
 Vehicle # CSXT498693  
 WINDER, GA 30686 WINDER, GA 30680

Gauge x Width .3650 MIN X 48.0000 MIN HR HOT ROLL COIL  
 CONVERSION TO / ASTM A36 / REV: 2014  
 P/O # 221858  
 Mill Order # 412850-2  
 Part # 1703048 A36CONU  
 EXP: 5/1/2019

SUITABLE FOR CONVERSION TO ASME SA-36

Heat C Mn P S Si Cu Ni Cr Mo Sn Al V Nb N Ti B Ca  
 2706257 .18 .48 .006 .002 .02 .09 .03 .03 .01 .004 .023 .002 .000 .007 .001 .000 .002

| Heat/Coil# | YIELD STRENGTH (ksi) |        | TENSILE STRENGTH (ksi) |        | ELONGATION (% IN 2") |        | HARDNESS (Rockwell B) | N Value |        |
|------------|----------------------|--------|------------------------|--------|----------------------|--------|-----------------------|---------|--------|
|            | long.                | trans. | long.                  | trans. | long.                | trans. |                       | long.   | trans. |
| 2706257-4  |                      | 47.0   |                        | 67.3   | 35                   |        | 72                    |         | .17    |
| 2706257-8  |                      | 45.5   |                        | 64.7   | 33                   |        | 73                    |         | .18    |

Coil (tag) 2706257-4 2706257-5 2706257-7  
 (43760.00 LB) (44200.00 LB) (44140.00 LB)

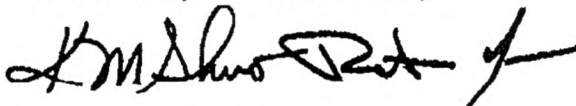
Mill Test Reports according to EN10204 3.1

All material is sold subject to the description, specifications and terms and conditions set forth on the face and reverse side of Nucor Steel - Berkeley's sales order acknowledgment.

Tensile Testing, when applicable, is performed in accordance with ASTM A-370 specifications.  
 Specimen is machined to standard rectangular test configuration (Figure 3 of ASTM A-370 )  
 with a 2" gage length. Yield Strength is determined at 0.2% offset.

This material has been produced in compliance with the chemistry and established rolling practices  
 of the ordered specification. If material is ordered to a chemical composition only and if  
 physical testing is not a requirement of the customer's order, testing is not performed by the  
 producer.

We hereby certify the above information is correct as contained in the records of the corporation.  
 Kevin Skero Robert Moses \*\* 100% MELTED AND MANUFACTURED IN THE USA \*\*  
 Hot Mill Metallurgist Chief Metallurgist



100-411111-1000  
100-411111-1000  
100-411111-1000



Lincoln Electric Company of Canada LP  
179 Wicksteed Ave  
Toronto, Ontario  
Canada M4G 2B9

Product: Outershield® 71 Elite  
Classification: E71T-1C-H8, E71T-9C-H8, E71T-1M-H8, E71T-9M-H8  
Specification: AWS A5.20-2005, ASME SFA-5.20  
Test Completed: December 12, 2014

Certificate of Conformance to Requirements  
For Welding Electrode  
(Applies to Canadian Manufactured Product)  
Q1 Lot Number: 15205535

Oscar W Ward III  
CWI 17030491  
QC1 EXP. 3/1/2020



TYPICAL VALUES ONLY

This is to certify that the product named above and supplied on the referenced order number is of the same classification, manufacturing process and material requirements as the material which was used for the test that was concluded on the date shown, the results of which are shown below. All tests required by specifications shown for classification were performed at that time and the material tested met all requirements. It was manufactured and supplied according to the Quality System Program of Lincoln Electric Company of Canada LP, Toronto, Ontario, which meets the requirements of ISO 9001:2008 and other specifications as applicable. The Quality System Program has been approved by ABS Quality Evaluations.

| Operating Settings                                                             | AWS A5.20 / ASME SFA-5.20 Requirements | Results                   |                                       |
|--------------------------------------------------------------------------------|----------------------------------------|---------------------------|---------------------------------------|
| Electrode size (in)                                                            |                                        | 1/16                      | 1/16                                  |
| Polarity                                                                       | DC+                                    | DC+                       | DC+                                   |
| Shielding Gas (per AWS A5.32)                                                  |                                        | 100% CO <sub>2</sub> (C1) | 75%Ar/25%CO <sub>2</sub> (M21-ArC-25) |
| Voltage (V)                                                                    |                                        | 26                        | 26                                    |
| Wire Feed Speed cm/min (in/min)                                                |                                        | 635 (250)                 | 635 (250)                             |
| Current (A)                                                                    |                                        | 280                       | 280                                   |
| Contact tip to work distance mm (in)                                           |                                        | 19 (3/4)                  | 19 (3/4)                              |
| Heat Input Avg. kJ/mm (kJ/in)                                                  | 1.0-2.2 (25-55)                        | 1.8 (45)                  | 1.7 (42)                              |
| Passes/Layers                                                                  |                                        | 14 / 7                    | 14 / 7                                |
| Preheat Temperature °C (°F)                                                    | (60 min.)                              | 20 (70)                   | 20 (70)                               |
| Interpass Temperature °C (°F)                                                  | (275-325)                              | 150 (300)                 | 150 (300)                             |
| <b>Mechanical properties of the weld deposits (in the as welded condition)</b> |                                        |                           |                                       |
| Tensile Strength MPa (ksi) *                                                   | (70-95)                                | 608 (88) ✓                | 648 (94) ✓                            |
| Yield Strength MPa (ksi) *                                                     | (58) min                               | 546 (79) ✓                | 581 (84) ✓                            |
| Elongation % *                                                                 | 22 min.                                | 26 ✓                      | 24 ✓                                  |
| <b>Charpy V-notch Impact Properties</b>                                        |                                        |                           |                                       |
| Average                                                                        |                                        | 28 (20)                   | 84 (62)                               |
| Joules @ -29°C (ft-lbf @ -20°F) †                                              | 27 (20) min.                           | 28, 26, 29 (21, 19, 21)   | 89, 77, 86 (66, 57, 63)               |
| <b>Chemical Composition of the weld deposit (weight %)</b>                     |                                        |                           |                                       |
| C                                                                              | 0.12 max                               | 0.03 ✓                    | 0.04 ✓                                |
| Mn                                                                             | 1.75 max                               | 1.28 ✓                    | 1.48 ✓                                |
| Si                                                                             | 0.90 max                               | 0.44 ✓                    | 0.59 ✓                                |
| S                                                                              | 0.03 max                               | 0.01 ✓                    | 0.01 ✓                                |
| P                                                                              | 0.03 max                               | 0.01 ✓                    | 0.01 ✓                                |
| Ni                                                                             | 0.50 max                               | 0.02 ✓                    | 0.02 ✓                                |
| Cr                                                                             | 0.20 max                               | 0.05 ✓                    | 0.05 ✓                                |
| Mo                                                                             | 0.30 max                               | 0.02 ✓                    | 0.02 ✓                                |
| V                                                                              | 0.08 max                               | 0.03 ✓                    | 0.04 ✓                                |
| Cu                                                                             | 0.35 max                               | 0.08 ✓                    | 0.08 ✓                                |
| B                                                                              | Not required                           | 0.003 ✓                   | 0.003 ✓                               |
| Diffusible Hydrogen (mL/100g) as per AWS A4.3                                  | 8.0 max.                               | 4.3                       | 4.9                                   |
| Absolute Humidity (grains moisture/lb dry air)                                 |                                        | 42                        | 42                                    |

Preheat and interpass temperature values in SI units are reported to the nearest 5 degrees.

\* The strength and elongation properties were obtained from a 0.500" tensile specimen artificially aged at 220°F (104°C) for 48 hours, as permitted by AWS A5.20-2005. A naturally aged specimen may take months to achieve the specified properties. See AWS A5.20-2005 paragraph A8.3. The time required for the natural aging of the weld deposits is dependant upon the ambient conditions, weldment geometry, the metallurgical structure of the weld deposit and other factors.

Strength values in SI units are reported to the nearest 10 MPa converted from actual data.

CVN Impact values in SI units are reported to the nearest Joule converted from actual data.

Results below the detection limits of the instrument or lower than the precision required by specification are reported as zero.

Test assembly constructed of ASTM A36. This certificate complies to the requirements of EN 10204, Type 2.2.

Radiographic Tests: Met requirements

Fillet Weld Tests (positions as required): Met requirements

The electrode diameter required to be tested for this classification is 1/16". The .045" and .052" sizes will also meet these requirements.

† - The required test temperature per AWS A5.20-2005 for the E71T-1C and E71T-1M classifications is 0°F (-20°C). Tests conducted at temperatures below the required test temperature also meet the requirements of AWS A5.20-2005 without additional testing at the required temperature.

Technologist - Production Testing and Certification

DEC 12 2014  
Date

Quality Assurance Manager,  
Consumables Division

DEC 16, 2014  
Date

III 678W W 12320  
18402011 WAO  
0005116 9X3 100  
OCT EXP 31/10/2020  
2112

Lincoln Electric Company of Canada LP  
179 Wicksteed Ave  
Toronto, Ontario  
Canada M4G 2B9

**Certificate of Conformance to Requirements  
For Welding Electrode  
(Applies to Canadian Manufactured Product)**



TYPICAL VALUES ONLY

Product: Outershield® 71 Elite  
Classification: E71T1-C1A2-CS1-H8, E71T1-M21A2-CS1-H8  
Specification: AWS A5.36:2012, ASME SFA-5.36  
Test Completed: December 12, 2014

This is to certify that the product named above and supplied on the referenced order number is of the same classification, manufacturing process and material requirements as the material which was used for the test that was concluded on the date shown, the results of which are shown below. All tests required by specifications shown for classification were performed at that time and the material tested met all requirements. It was manufactured and supplied according to the Quality System Program of Lincoln Electric Company of Canada LP, Toronto, Ontario, which meets the requirements of ISO 9001:2008 and other specifications as applicable. The Quality System Program has been approved by ABS Quality Evaluations.

| Operating Settings                                                             | AWS A5.36 / ASME SFA-5.36 Requirements | Results<br>E71T1-C1A2-CS1-H8 | Results<br>E71T1-M21A2-CS1-H8         |
|--------------------------------------------------------------------------------|----------------------------------------|------------------------------|---------------------------------------|
| Electrode size (in)                                                            |                                        | 1/16                         | 1/16                                  |
| Polarity                                                                       | DC+                                    | DC+                          | DC+                                   |
| Shielding Gas (per AWS A5.32)                                                  |                                        | 100% CO <sub>2</sub> (C1)    | 75%Ar/25%CO <sub>2</sub> (M21-ArC-25) |
| Voltage (V)                                                                    |                                        | 26                           | 26                                    |
| Wire Feed Speed cm/min (in/min)                                                |                                        | 635 (250)                    | 635 (250)                             |
| Current (A)                                                                    |                                        | 280                          | 280                                   |
| Contact tip to work distance mm (in)                                           |                                        | 19 (3/4)                     | 19 (3/4)                              |
| Heat Input Avg. kJ/mm (kJ/in)                                                  | 1.0-2.2 (25-55)                        | 1.8 (45)                     | 1.7 (42)                              |
| Passes/Layers                                                                  |                                        | 14 / 7                       | 14 / 7                                |
| Preheat Temperature °C (°F)                                                    | (60 min.)                              | 20 (70)                      | 20 (70)                               |
| Interpass Temperature °C (°F)                                                  | (275-325)                              | 150 (300)                    | 150 (300)                             |
| <b>Mechanical properties of the weld deposits (in the as welded condition)</b> |                                        |                              |                                       |
| Tensile Strength MPa (ksi) *                                                   | (70-95)                                | 608 (88)                     | 648 (94)                              |
| Yield Strength MPa (ksi) *                                                     | (58) min.                              | 546 (79)                     | 581 (84)                              |
| Elongation % *                                                                 | 22 min.                                | 26                           | 24                                    |
| <b>Charpy V-notch Impact Properties</b>                                        |                                        |                              |                                       |
| Average                                                                        |                                        | 28 (20)                      | 84 (62)                               |
| Joules @ -29°C (ft-lbf @ -20°F)                                                | 27 (20) min.                           | 29, 26, 29 (21, 19, 21)      | 89, 77, 86 (66, 57, 63)               |
| <b>Chemical Composition of the weld deposit (weight %)</b>                     |                                        |                              |                                       |
| C                                                                              | 0.12 max.                              | 0.03                         | 0.04                                  |
| Mn                                                                             | 1.75 max.                              | 1.28                         | 1.48                                  |
| Si                                                                             | 0.90 max.                              | 0.44                         | 0.59                                  |
| S                                                                              | 0.030 max.                             | 0.008                        | 0.009                                 |
| P                                                                              | 0.030 max.                             | 0.012                        | 0.014                                 |
| Ni                                                                             | 0.50 max.                              | 0.02                         | 0.02                                  |
| Cr                                                                             | 0.20 max.                              | 0.05                         | 0.05                                  |
| Mo                                                                             | 0.30 max.                              | 0.02                         | 0.02                                  |
| V                                                                              | 0.08 max.                              | 0.03                         | 0.04                                  |
| Cu                                                                             | 0.35 max.                              | 0.06                         | 0.08                                  |
| B                                                                              | Not required                           | 0.003                        | 0.003                                 |
| Diffusible Hydrogen (mL/100g) as per AWS A4.3                                  | 8 max.                                 | 4                            | 5                                     |
| Absolute Humidity (grains moisture/lb dry air)                                 |                                        | 42                           | 42                                    |

Preheat and Interpass temperature values in SI units are reported to the nearest 5 degrees.

\* The strength and elongation properties were obtained from a 0.500" tensile specimen artificially aged at 220°F (104°C) for 48 hours, as permitted by AWS A5.36:2012. A naturally aged specimen may take months to achieve the specified properties. See AWS A5.36:2012 paragraph A8.3. The time required for the natural aging of the weld deposits is dependant upon the ambient conditions, weldment geometry, the metallurgical structure of the weld deposit and other factors.

Strength values in SI units are reported to the nearest 10 MPa converted from actual data.

CVN Impact values in SI units are reported to the nearest Joule converted from actual data.

Results below the detection limits of the instrument or lower than the precision required by specification are reported as zero.

Test assembly constructed of ASTM A36. This certificate complies to the requirements of EN 10204, Type 2.2.

Radiographic Tests: Met requirements

The electrode diameter required to be tested for this classification is 1/16". The .045" and .052" sizes will also meet these requirements.

Technologist - Production Testing and Certification

DEC 12, 2014  
Date

Quality Assurance Manager,  
Consumables Division

DEC 16, 2014  
Date





**American Welding Society®**

*Certifies that Welding Inspector*  
***Oscar W Ward III***

*has complied with the requirements of AWS QC1,  
Standard for AWS Certification of Welding Inspectors*

**17030491**

CERTIFICATE NUMBER

**March 1 2020**

EXPIRATION DATE



*John R Bray*  
AWS PRESIDENT

*Bill Behnke*  
AWS QUALIFICATION COMMITTEE CHAIR

*George Whiffo*  
AWS CERTIFICATION COMMITTEE CHAIR





# MET LAB, LLC

411 INDUSTRY DRIVE SUITE 100  
HAMPTON, VIRGINIA 23661-1312

TELEPHONE: (757) 827-7176 FAX: (757) 827-7181

## VISUAL INSPECTION TEST REPORT

IN REPLY REFER TO:

|                                                                                                      |                      |            |       |            |          |                                                                                                                                 |     |                    |                    |                 |     |                                                         |     |             |       |     |
|------------------------------------------------------------------------------------------------------|----------------------|------------|-------|------------|----------|---------------------------------------------------------------------------------------------------------------------------------|-----|--------------------|--------------------|-----------------|-----|---------------------------------------------------------|-----|-------------|-------|-----|
| <b>TO:</b><br>G & R METALS<br>ATTN: BUCK SYKES (757) 879-5375<br>KWIANNIS STREET<br>HAMPTON VA 23661 |                      |            |       |            |          | <b>CLAS12-RICH MODULE LIFTING &amp; STIFFENING TOOL ASSEMBLY</b>                                                                |     |                    |                    |                 |     | Job No.: ML 17012-01                                    |     | Page 1 of 2 |       |     |
| <b>CONTACT</b><br>Buck (757) 272-9901                                                                |                      |            |       |            |          |                                                                                                                                 |     |                    |                    |                 |     | P. O. No.: VERBAL                                       |     | Release: 1  |       |     |
|                                                                                                      |                      |            |       |            |          |                                                                                                                                 |     |                    |                    |                 |     | Contract No.:                                           |     |             |       |     |
| <b>MATERIAL</b><br>ASTM A36 and A500 Gr B                                                            |                      |            |       |            |          |                                                                                                                                 |     |                    |                    |                 |     | Project: RICH MODULE LIFTING & STIFFENING TOOL ASSEMBLY |     |             |       |     |
|                                                                                                      |                      |            |       |            |          | Drawing No.: RM_LST_1.0                                                                                                         |     | Rev.: 5/30/2017    |                    |                 |     |                                                         |     |             |       |     |
| <b>INSPECTION PROCEDURE</b><br>Procedure Number: ML VT AWS D14.1-A                                   |                      |            |       |            |          | Specification: AWS D14.1                                                                                                        |     | Rev.: 2005         |                    |                 |     |                                                         |     |             |       |     |
|                                                                                                      |                      |            |       |            |          | Acceptance Criteria : AWS D14.1;<br>Section 10 Paragraphs: 10.6, 10.7, 10.7.1, 10.7.2, 10.7.3, 10.7.4, 10.7.5, 10.7.6 & Fig. 32 |     |                    |                    |                 |     |                                                         |     |             |       |     |
| <b>WELD IDENTIFICATION AND LOCATION</b>                                                              |                      |            |       |            |          | <b>INTERPRETATION - EVALUATION - DISPOSITION</b>                                                                                |     |                    |                    |                 |     |                                                         |     |             |       |     |
| Connection<br>NO.                                                                                    | ITEM NO.<br>Pc to Pc | WELD       |       | INSPECTION |          | Align/Fit-Up                                                                                                                    |     | WELD               |                    |                 |     | REPAIRS                                                 |     |             | FINAL |     |
|                                                                                                      |                      | TYPE       | Class | EXTENT     | DATE     | Acc                                                                                                                             | Rej | SIZE               | PROFILE            | DISCONTINUITIES | Loc | Seq                                                     | Acc | Rej         | Acc   | Rej |
| 1 L a, c<br>b, d                                                                                     | PI1 - PI2            | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
| 1 L a, c<br>b, d                                                                                     | G1 - PI1&2           | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
| 1 L a, c<br>b, d                                                                                     | G2 - PI1&2           | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
| 1 L a, c<br>b, d                                                                                     | G3 - PI1&2           | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
| 1 L a, c<br>b, d                                                                                     | PI2 - Tube           | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
| 1 L a, c<br>b, d                                                                                     | G4 - PL2<br>Tube     | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
| 2 L a, c<br>b, d                                                                                     | Block -<br>PI Tube   | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
| 2 L a, c<br>b, d                                                                                     | PI Tube<br>PI Tube   | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      | .25 Fillet | V     | 100% FW    | 7-Aug-17 | X                                                                                                                               |     | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |     |                                                         |     |             | X     |     |
|                                                                                                      |                      |            |       | 100% FW    |          |                                                                                                                                 |     | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                 |     |                                                         |     |             |       |     |
|                                                                                                      |                      |            |       | 100% FW    |          |                                                                                                                                 |     | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                 |     |                                                         |     |             |       |     |
|                                                                                                      |                      |            |       | 100% FW    |          |                                                                                                                                 |     | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                 |     |                                                         |     |             |       |     |
|                                                                                                      |                      |            |       | 100% FW    |          |                                                                                                                                 |     | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                 |     |                                                         |     |             |       |     |



| WELD IDENTIFICATION AND LOCATION |              |                     |            |            |         | INTERPRETATION - EVALUATION - DISPOSITION |     |      |                    |                    |                 |         |     |     |       |     |     |
|----------------------------------|--------------|---------------------|------------|------------|---------|-------------------------------------------|-----|------|--------------------|--------------------|-----------------|---------|-----|-----|-------|-----|-----|
| Connection NO.                   | ITEM NO.     | WELD                |            | INSPECTION |         | Align/Fit-Up                              |     | WELD |                    |                    |                 | REPAIRS |     |     | FINAL |     |     |
|                                  |              | Pc to Pc            | TYPE       | Class      | EXTENT  | DATE                                      | Acc | Rej  | SIZE               | PROFILE            | DISCONTINUITIES | Loc     | Seq | Acc | Rej   | Acc | Rej |
| 1 R                              | a, c<br>b, d | PI1 - PI2           | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 1 R                              | a, c<br>b, d | G1 - PI1&2          | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 1 R                              | a, c<br>b, d | G2 - PI1&2          | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 1 R                              | a, c<br>b, d | G3 - PI1&2          | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 1 R                              | a, c<br>b, d | PI2 - Tube          | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 1 R                              | a, c<br>b, d | G4 - PL2 Tube       | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 2 R                              | a, c<br>b, d | Block - Tube PI     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 2 R                              | a, c<br>b, d | PI - Tube PI - Tube | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 4 L                              | a, c<br>b, d | O - 3 X 3 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 5 L                              | a, c<br>b, d | P - 3 X 3 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 8 L                              | a, c<br>b, d | L - 3 X 3 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 4 R                              | a, c<br>b, d | O - 3 X 3 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 5 R                              | a, c<br>b, d | P - 3 X 3 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 8 R                              | a, c<br>b, d | L - 3 X 3 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 6 L                              | a, c<br>b, d | L - 4 X 4 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 6 R                              | a, c<br>b, d | L - 4 X 4 Tube      | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 7                                | a, c<br>b, d | Block - Tube PI     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
| 7                                | a, c<br>b, d | PI - Tube PI - Tube | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |
|                                  |              |                     | .25 Fillet | V          | 100% FW | 7-Aug-17                                  | X   |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0               |         |     |     |       | X   |     |

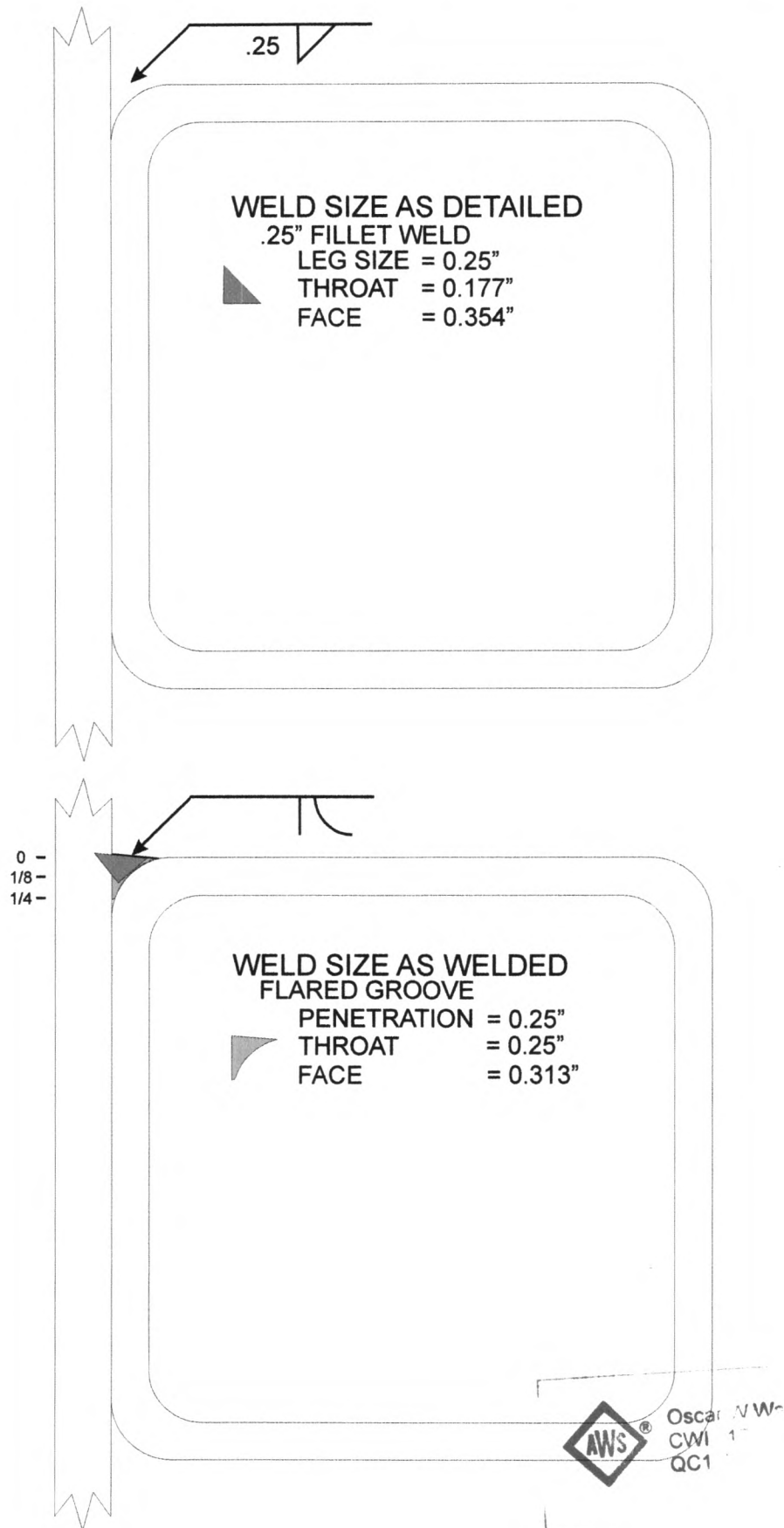


| WELD IDENTIFICATION AND LOCATION |          |                 |            |            | INTERPRETATION - EVALUATION - DISPOSITION |              |          |      |                    |                    |                    |         |     |     |       |     |     |
|----------------------------------|----------|-----------------|------------|------------|-------------------------------------------|--------------|----------|------|--------------------|--------------------|--------------------|---------|-----|-----|-------|-----|-----|
| Connection NO.                   | ITEM NO. | WELD            |            | INSPECTION |                                           | Align/Fit-Up |          | WELD |                    |                    |                    | REPAIRS |     |     | FINAL |     |     |
|                                  |          | Pc to Pc        | TYPE       | Class      | EXTENT                                    | DATE         | Acc      | Rej  | SIZE               | PROFILE            | DISCONTINUITIES    | Loc     | Seq | Acc | Rej   | Acc | Rej |
| 9 L                              | a, c     | AA - 3 X 3 Tube | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
|                                  | b, d     |                 | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
| 10 L                             | a, c     | AB - 3 X 3 Tube | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
|                                  | b, d     |                 | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
| 9 R                              | a, c     | Y - 3 X 3 Tube  | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
|                                  | b, d     |                 | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
| 10 R                             | a, c     | Z - 3 X 3 Tube  | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
|                                  | b, d     |                 | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
| < Conn                           | a, c     | G1 - PI         | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
|                                  | b, d     |                 | G2 - PI    | .25 Fillet | V                                         | 100% FW      | 7-Aug-17 | X    |                    | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0       |     |     |       |     | X   |
| < Conn                           | a, c     | G1 - PI         | .25 Fillet | V          | 100% FW                                   | 7-Aug-17     | X        |      | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0                  |         |     |     |       | X   |     |
|                                  | b, d     |                 | G2 - PI    | .25 Fillet | V                                         | 100% FW      | 7-Aug-17 | X    |                    | [ ] Usat [ X ] Sat | [ ] Usat [ X ] Sat | 0       |     |     |       |     | X   |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |
|                                  |          |                 |            |            |                                           |              |          |      | [ ] Usat [ ] Sat   | [ ] Usat [ ] Sat   |                    |         |     |     |       |     |     |

DCI EXP. 3115050  
CMI 1103061  
Oscar W. Ward III



# WELDS JOINING PLATE ALONG SIDE OF TUBE



THE FLARED GROOVE WELD WILL PROVIDE THE SAME STRENGTH AS THE .25" FILLET WELD

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1947  
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