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USACE / NAVFAC / AFCESA / NASA **NASA-05096 (December 2005)**

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UNIFIED FACILITIES GUIDE SPECIFICATIONS

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12/05

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SECTION 05096

WELDING ALUMINUM CONSTRUCTION
12/05

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer/specifier information and will not appear in the final project specification.

This specification covers the minimum requirements for qualifying welding procedures, welders, and welding operators for making and inspecting welds in structural and non-structural fabrications of weldable aluminum materials.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.
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PART 1 GENERAL

1.1 REFERENCES

****
NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile

references in the publish print process.
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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel
AWS D1.2/D1.2M	(2003) Structural Welding Code-Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM E 165	(2002) Standard Test Method for Liquid Penetrant Examination

1.2 DEFINITIONS

The following classifications must establish levels of fabrication.

1.2.1 Class A Fabrication

Class A fabrication must include complete penetration weld joints only, and must apply to those welds where failure would cause a loss of the system and be hazardous to personnel. Classify welds as a Class A fabrication for highly stressed dynamic and cyclic loading. Characterize welds as a single point of failure with no redundancy for the redistribution of stress into another member.

1.2.2 Class B Fabrication

Class B fabrication must include complete and partial penetration groove weld joints and fillet weld joints, and must apply to those welds where failure would reduce the overall efficiency of the system but loss of system or hazard to personnel would not be experienced.

1.2.3 Class C Fabrication

Class C fabrication must include complete and partial penetration groove weld joints and fillet weld joints, and must apply to those welds where failure would not affect the efficiency of the system nor create hazard to personnel. Classify welds as a Class C fabrication for connections of secondary members not subject to dynamic action and low stressed miscellaneous applications.

1.2.4 Class D Fabrication

Plug and slot weld joints may be used for subcritical construction joints, when the joints meet all the applicable Sections 2, and [8], [9], [10], [11], design and fabrication requirements of AWS D1.2/D1.2M.

1.3 HEAT INPUT REQUIREMENTS

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NOTE: Welding a material which is at an initial temperature below 38 degrees C 100 degrees F may require localized preheating to remove moisture from

the surface of the material.

****

1.3.1 Preheat

Do not weld at ambient temperature below 0 degrees C 32 degrees F, or when the surfaces are wet or exposed to rain, snow, or high wind. Temperature of the metals in the area where the welding is to be done must be a minimum 10 degrees C 50 degrees F. When the ambient conditions are such that the normal temperature of the base metal is below 10 degrees C 50 degrees F, the area surrounding the joint must be preheated to provide a base metal temperature of 38 degrees C 100 degrees F for a distance of at least 75 millimeter 3 inch in all directions from the joint to be welded.

1.3.2 Interpass

In a multipass weld, the interpass temperature is the temperature of the weld metal before the next pass is started.

1.3.3 Postweld

Postweld heat treatment of weldments is prohibited unless noted in the applicable [NASA approved] Code qualified/certified welding documentation, Certified Welding Procedure Specifications (WPS), Certified Procedure Qualification Records (PQR), and Certified Welder Performance Qualifications (WPQ).

1.4 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force

and NASA projects, or choose the second bracketed item for Army projects.

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SD-07 Certificates

Submit the following items in accordance with paragraph entitled, "Welding Documentation," of this section:

Certified Welding Procedure Specifications (WPS)
Certified Procedure Qualification Records (PQR)
Certified Welder Performance Qualifications (WPQ)

1.5 QUALIFICATIONS

1.5.1 Certificates

Welding Contractor must be certified in accordance with American Institute of Steel Construction (AISC) Quality Certification Program for the applicable category:

[Category I - Conventional Steel Structures]
[Category II - Complex Steel Building Structures]
[Category III - Major Steel Bridges]

1.5.2 Welding Documentation

Submit [two] [_____] copies of Certified Welding Procedure Specifications (WPS) and Certified Procedure Qualification Records (PQR) for approval to the Contracting Officer within [15] [_____] calendar days after receipt of Notice to Proceed.

Submit [two] [_____] copies of Certified Welder Performance Qualifications (WPQ), for approval to the Contracting Officer within [15] [_____] calendar days prior to any employee welding on project material.

Do not allow pre-qualified welding procedures. Qualify the welding procedures, welders and welder operators in accordance with Section 5 of AWS D1.2/D1.2M.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION

3.1.1 Class A Fabrication

Use complete penetration groove weld joints where possible. Fabricate weldment in accordance with Section [9] [10] of AWS D1.2/D1.2M.

3.1.2 Class B Fabrication

Fabricate weldment in accordance with the requirements of applicable section, Section [8] [10] of AWS D1.2/D1.2M.

3.1.3 Class C Fabrication

Fabricate weldment in accordance with the requirements of Section 11 of AWS D1.2/D1.2M.

3.1.4 Class D Fabrication

Apply the minimum applicable requirements of Section 2 and [8], [9], [10], [11], of AWS D1.2/D1.2M for welding of plugs and slot joints.

3.2 INSPECTION/NONDESTRUCTIVE EXAMINATION (NDE)

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NOTE: Inspection and acceptance requirements of these Codes and Standards are the minimum requirements. Additional inspections and tighter acceptance requirements may be used, but the specifier must note the additional NDE requirements in the specifications/drawings.

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3.2.1 Inspection

Perform fabrication/erection inspection as necessary prior to assembly, during assembly, during welding, and after welding to ensure that materials and workmanship meet the minimum requirements of the contract documents.

Final acceptance of all welded joints shall be by the Contracting Officer.

Unacceptable welds will be immediately repaired and made ready for Government reinspection at no additional cost to the Government.

After weld joints have been satisfactorily completed by the Contractor and accepted by the Contracting Officer, clean the joint area to a bright, unpitted, and unscarred surface and protect in accordance with the applicable contract documents.

3.2.2 Methods of NDE

Perform examination/inspection of structural aluminum weldments in accordance with AWS D1.2/D1.2M.

3.2.2.1 Visual Inspection (VT)

Visual Inspection (VT) for cracks and other discontinuities must be aided by a magnifying lens of [5X] [10X] power wherever required to discern indications or defects otherwise not clear. Measure size and contour of welds with suitable gages.

3.2.2.2 Liquid Penetrant Inspection (PT)

Perform Liquid Penetrant Inspection (PT) of welds in accordance with ASTM E 165.

3.2.2.3 Radiographic Inspection (RT)

Perform Radiographic Inspection (RT) of welds in accordance with the requirements of Section 6.10, AWS D1.1/D1.1M.

3.2.2.4 Ultrasonic Inspection (UT)

When ultrasonic testing is required by the contract documents, specify the extent of testing, the procedure, and the acceptance criteria.

3.2.3 Levels of Examination

3.2.3.1 Level I Examination

Level I examination must require 100 percent VT, and 100 percent RT where practical. Where RT is not practical, perform PT of the root pass and the final surface of each weld joint.

Where applicable, each radiograph must, as a minimum, have the following additional information permanently included in the image:

Agency Weld No. (including repair cycle no.)

Agency Drawing No.

Agency View No.

Agency Contract No.

Final interpretation and acceptance of all radiographs of welded joints is performed by the Contracting Officer.

3.2.3.2 Level II Examination

Level II examination must require 100 percent VT, and PT of the final surface of each weld joint.

3.2.3.3 Level III Examination

Level III examination must require 100 percent VT of each weld joint.

3.2.4 Acceptance Requirements

3.2.4.1 Class A Fabrication

Class A fabrication must receive a Level I examination. Weldments must be in accordance with Section 3 and Section [9] [10], AWS D1.2/D1.2M.

3.2.4.2 Class B Fabrication

Class B fabrication must receive a Level II examination. Weldments must be in accordance with Section 3 and Section [8] [10], AWS D1.2/D1.2M.

3.2.4.3 Class C & D Fabrication

Class C & D fabrication must receive a Level III examination. Weldments must be in accordance with Section 3 and Section 11, AWS D1.2/D1.2M.

3.3 PROTECTION OF ADJACENT MATERIALS

Contractor shall sufficiently protect equipment adjacent to the welding/brazing operations to prevent any damage from these operations.

-- End of Section --