

## SECTION 40 17 26.00 20

## WELDING PRESSURE PIPING

04/06

## PART 1 GENERAL

## 1.1 REFERENCES

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.

## ASTM INTERNATIONAL (ASTM)

ASTM A 380 (2006) Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems

## AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT RP SNT-TC-1A (2006) Recommended Practice

## AMERICAN WELDING SOCIETY (AWS)

AWS A2.4 (2007) Standard Symbols for Welding, Brazing and Nondestructive Examination

AWS A3.0 (2001) Standard Welding Terms and Definitions Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting and Thermal Spraying

AWS D1.1/D1.1M (2008) Structural Welding Code - Steel

AWS D10.4 (1986; R 2000) Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing

AWS D10.11/D10.11M (2007) Recommended Practices for root Pass Welding of Pipe Without Backing

AWS D18.1 (1999) Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications

AWS QC1 (2007) AWS Certification of Welding Inspectors

AWS Z49.1 (2005) Safety in Welding, Cutting and Allied Processes

## ASME INTERNATIONAL (ASME)

ASME B31.3 (2006) Process Piping

ASME BPVC SEC II-C (2007) Boiler and Pressure Vessel Code;

Section II, Materials, Part C -  
Specifications for Welding Rods,  
Electrodes and Filler Metals

ASME BPVC SEC IX

(2007) Boiler and Pressure Vessel Code;  
Section IX, Welding and Brazing  
Qualifications

ASME BPVC SEC V

(2007) Boiler and Pressure Vessel Code;  
Section V, Nondestructive Examination

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910

(2008) Occupational Safety and Health  
Standards

29 CFR 1926

Safety and Health Regulations for  
Construction

1.2 RELATED REQUIREMENTS

Section 23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS applies to  
this section with the additions and modifications specified herein.

1.3 DEFINITIONS

- a. CJP: Complete Joint Penetration.
- b. CWI: Certified Welding Inspector.
- c. MT: Magnetic Particle Testing.
- d. NDE: Nondestructive Examination.
- e. NDT: Nondestructive Testing.
- f. PJP: Partial Joint Penetration.
- g. PQR: Procedure Qualification Record.
- h. PT: Liquid Penetrant Testing.
- i. RT: Radiographic Testing.
- j. UT: Ultrasonic Testing.
- k. VT: Visual Testing.
- l. WPQ: Welder/Welding Operator Performance Qualification.
- m. WPS: Welding Procedure Specification.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation;  
submittals not having a "G" designation are for information only. When  
used, a designation following the "G" designation identifies the office  
that will review the submittal for the Government. The following shall be  
submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-02 Shop Drawings

Shop and Field WPSs and PQRs; G

NDT procedure specifications; G prepared in accordance with ASME BPVC SEC V.

Root Pass Purging Procedure; G for all stainless steel piping.

WPQs; G

CWI credentials; G

Nondestructive Testing Agency personnel; G

CWI reports; G

Submit Welding Documentation on appropriate forms in referenced welding codes.

Show on Shop Drawings or a weld map complete information regarding base metal specification designation, location, type, size, and extent of welds with reference called out for WPS and NDE numbers in tails of combined welding and NDE symbols as indicated in AWS A2.4.

Distinguish between shop and field welds.

Indicate, by welding symbols or sketches, details of welded joints and preparation of base metal. Provide complete joint welding details showing bevels, groove angles, and root openings for welds.

For pipe fittings, provide a joint weld beveling diagram. Refer to AWS D1.1/D1.1M, Annex P Local Dihedral Angle that can be used to calculate bevels for weld joint details of intersecting pipes. Welding and NDE symbols shall be in accordance with AWS A2.4.

Welding terms and definitions shall be in accordance with AWS A3.0.

Submit welding data together with shop drawings as a complete package.

### 1.5 QUALIFICATIONS

- a. Shop and Field WPSs and PQRs: In accordance with AWS D1.1/D1.1M (Annex N Forms) OR ASME BPVC SEC IX (Forms QW 482 and QW 483).
- b. WPQs: In accordance with (Annex N Forms) ASME BPVC SEC IX (Form QW 484).
- c. NDT procedure specifications: In accordance with ASME BPVC SEC V.
- d. CWI credentials: Certified in accordance with AWS QC1, and having prior experience with the welding codes specified. Alternate welding inspector qualifications require approval by the Engineer.
- e. Testing Agency: Personnel performing tests shall be NDT Level II certified in accordance with ASNT RP SNT-TC-1A.

## 1.6 ENVIRONMENTAL

Do not perform welding when the quality of the completed weld could be impaired by the prevailing working or weather conditions. The Contracting Officer will determine when weather or working conditions are unsuitable for welding.

## 1.7 DELIVERY AND STORAGE

Deliver filler metals, electrodes, fluxes and other welding materials to the site in manufacturers' original packages and store in a dry space until used. Label and design packages properly to give maximum protection from moisture and to assure safe handling.

## 1.8 Safety

Conform to [AWS Z49.1](#), [29 CFR 1910](#)-SUBPART Q, "Welding, Cutting, and Brazing," [29 CFR 1926](#)-SUBPART J, "Welding and Cutting."

## PART 2 PRODUCTS

### 2.1 WELDING MATERIALS

Comply with [ASME BPVC SEC II-C](#). Welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator using qualified welding procedures.

## PART 3 EXECUTION

### 3.1 GENERAL

a. Welding and Fabrication by Welding: Conform to governing welding codes.

b. Piping weld root pass for CIP single welded butt joint welds, shall be performed by Gas Tungsten Arc Welding (GTAW) per [AWS D10.4](#) Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing with an internal Argon purge per [AWS D10.11/D10.11M](#) 2007 Guide for Root Pass Welding of Pipe without Backing. Backing rings are not permitted, however consumable inserts are allowed.

### 3.2 NONDESTRUCTIVE WELD TESTING REQUIREMENTS

a. Weld Inspection Criteria:

1. Selection of welds to be tested unless 100 percent NDT is specified herein, shall be as agreed upon between Engineer and Contractor.

2. Unless otherwise specified, perform NDT of welds at a frequency as shown below in accordance with the referenced welding codes as follows. Perform UT on CJP groove welds that cannot be readily radiographed. In case there is a conflict the higher frequency level of NDT shall apply:

a) CJP Butt Joint Welds: 25 percent random RT.

- b) CJP Groove Welds: 25 percent random UT.
  - c) All Welds: 100 percent VT.
3. Weld Acceptance:
- a) VT: [AWS D18.1](#).
  - b) RT and UT: [ASME B31.3](#) Normal Fluid Service.

### 3.3 QUALITY CONTROL

a. The CWI shall be present whenever welding is performed. The CWI shall perform inspection, as necessary, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in [AWS D1.1/D1.1M](#) or referenced welding code and as follows:

- 1. Verifying conformance of specified job material and proper storage.
- 2. Monitoring conformance with approved [Shop and Field WPSs and PQRs](#) and [Root Pass Purging Procedure](#).
- 3. Monitoring conformance of WPQ.
- 4. Inspecting weld joint fit-up and performing in-process inspection.
- 5. Providing 100 percent VT of all welds.
- 6. Supervising [Nondestructive Testing Agency personnel](#) and evaluating test results, performed with approved NDT Procedure Specifications.
- 7. Maintaining records and preparing [CWI reports](#) confirming results of inspection and testing comply with the Work.

### 3.4 WELD DEFECT REPAIR AND FINISH

- a. Repair and retest rejectable weld defects until sound weld metal has been deposited in accordance with appropriate welding codes.
- b. The surface finish of all stainless steel products shall be free of tool marks, arc strikes, gouges, scratches and foreign material contamination. The surface finish of all stainless steel surfaces shall be of a high quality and as a minimum, equal to the hot rolled condition specified by the material specification. All stainless steel welds, heated areas of stainless steel plates or shapes, and heat affected zones of stainless steel welds shall be cleaned, descaled and passivated per [ASTM A 380](#) Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems after welding to prevent corrosion rates in excess of unwelded and unheated stainless steel base material.

### 3.5 SUPPORTS

Welding of hangers, supports, and plates to structural members shall conform to [AWS D1.1/D1.1M](#). CWI shall perform 100 percent VT of all welds

per AWS D1.1/D1.1M, Table 6.1 Statically Loaded Nontubular Connections.

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