

**Part 1 General****1.1 REFERENCE STANDARDS****.1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)**

- .1 ANSI/ASME B31.1-2018, Power Piping.
- .2 ANSI/ASME B31.3-2020, Process Piping.
- .3 ANSI/ASME Boiler and Pressure Vessel Code-2017:
  - .1 BPVC 2017 Section I: Power Boilers.
  - .2 BPVC 2017 Section V: Nondestructive Examination.
  - .3 BPVC 2017 Section IX: Welding and Brazing Qualifications.

**.2 CSA Group (CSA)**

- .1 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
- .2 CSA B51-19, Boiler, Pressure Vessel and Pressure Piping Code.
- .3 CSA-W117.2-2012, Safety in Welding, Cutting and Allied Processes.
- .4 CSA W178.1-2018, Certification of Welding Inspection Organizations.
- .5 CSA W178.2-2018, Certification of Welding Inspectors.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

**1.3 QUALITY ASSURANCE****.1 Qualifications:****.1 Welders:**

- .1 Welding qualifications in accordance with CSA B51.
- .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
- .3 Submit welder's qualifications to Departmental Representative.
- .4 Each welder to possess identification symbol issued by authority having jurisdiction.
- .5 Certification of companies for fusion welding of aluminum in accordance with CSA W47.2.

**.2 Inspectors:**

- .1 Inspectors qualified to CSA W178.2.

**.3 Certifications:**

- .1 Registration of welding procedures in accordance with CSA B51.
- .2 Copy of welding procedures available for inspection.
- .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 00 10 – General Instructions.

**Part 2 Products****2.1 ELECTRODES**

- .1 Electrodes: in accordance with CSA W48 Series.

**Part 3 Execution****3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**3.2 QUALITY OF WORK**

- .1 Welding: in accordance with ANSI/ASME B31.1, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B3.0, AWS C1.1, and special procedures specified elsewhere in Division 15 applicable requirements of provincial authority having jurisdiction.

**3.3 INSTALLATION REQUIREMENTS**

- .1 Identify each weld with welder's identification symbol.
- .2 Backing rings:
  - .1 Where used, fit to minimize gaps between ring and pipe bore.
  - .2 Do not install at orifice flanges.
- .3 Fittings:
  - .1 NPS 2 and smaller: install welding type sockets.
  - .2 Branch connections: install welding tees or forged branch outlet fittings.

**3.4 INSPECTION AND TESTS - GENERAL REQUIREMENTS**

- .1 Review weld quality requirements and defect limits of applicable codes and standards with Departmental Representative before work is started.
- .2 Formulate "Inspection and Test Plan" in co-operation with Departmental Representative
- .3 Do not conceal welds until they have been inspected, tested and approved by inspector.

- .4 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

### 3.5 SPECIALIST EXAMINATIONS AND TESTS

- .1 General:
  - .1 Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2 and approved by Departmental Representative
  - .2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.
  - .3 Inspect and test welds in accordance with "Inspection and Test Plan" by non-destructive visual examination and magnetic particle (hereinafter referred to as "particle") tests and spot full gamma ray radiographic (hereinafter referred to as "radiography") tests.
- .2 Hydrostatically test welds to ANSI/ASME B31.1.
- .3 Visual examinations: include entire circumference of weld externally and wherever possible internally.
- .4 Failure of visual examinations:
  - .1 Upon failure of welds by visual examination, perform additional testing as directed by Departmental Representative of total of up to 10 % of welds, selected at random by Departmental Representative by radiographic particle tests.
- .5 Full radiographic tests for hydronic piping systems.
  - .1 Spot radiography:
    - .1 Conduct spot radiographic tests of up to 10% of welds, selected at random by Departmental Representative from welds which would be most difficult to repair in event of failure after system is operational.
  - .2 Radiographic film:
    - .1 Identify each radiographic film with date, location, name of welder, and submit to Departmental Representative. Replace film if rejected because of poor quality.
  - .3 Interpretation of radiographic films:
    - .1 By qualified radiographer.
  - .4 Failure of radiographic tests:
    - .1 Extend tests to welds by welder responsible when those welds fails tests.
- .6 Magnetic particle tests for hydronic piping systems.

### 3.6 DEFECTS CAUSING REJECTION

- .1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.

### 3.7 REPAIR OF WELDS WHICH FAILED TESTS

- .1 Re-inspect and re-test repaired or re-worked welds at Contractor's expense.

**3.8            CLEANING**

- .1            Clean in accordance with Section 01 74 11 - Cleaning.
- .2            Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.

**END OF SECTION**