

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 22 11 16 - Domestic Water Piping.
- .2 Section 23 05 05 - Piping Installation.

### **1.2 REFERENCES**

- .1 Unless otherwise indicated, all the works must be done in accordance with the in force edition of the "Code de construction du Québec".
- .2 Furthermore, the works will be done in accordance with any other code or norm having jurisdiction, as per the latest edition, notably including, but not limited to:
  - .1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME).
    - .1 ANSI/ASME B31-2007, Power Piping.
    - .2 ANSI/ASME B31.3-2006, Process Piping.
    - .3 ANSI/ASME Boiler and Pressure Vessel Code-2007:
      - .1 BPVC 2007, Section I: Power Boilers.
      - .2 BPVC 2007, Section V: Nondestructive Examination.
      - .3 BPVC 2007, Section IX: Welding and Brazing Qualifications.
  - .2 American National Standards Institute/American Water Works Association (ANSI/AWWA).
    - .1 ANSI/AWWA C206-03, Field Welding of Steel Water Pipe.
  - .3 American Welding Society (AWS).
    - .4 AWS C1.1M/C1.1-2000(R2006), Recommended Practices for Resistance Welding.
    - .5 AWS Z49.1-2005, Safety in Welding, Cutting and Allied Process.
    - .6 AWS W1-2000, Welding Inspection Handbook.

- .3 Canadian Standards Association (CSA International).
  - .1 CSA W47.2-M1987(R2008), Certification of Companies for Fusion Welding of Aluminum.
  - .2 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
  - .3 CSA B51-03(R2007), Boiler, Pressure Vessel and Pressure Piping Code.
  - .4 CSA-W117.2-2006, Safety in Welding, Cutting and Allied Processes.
  - .5 CSA W178.1-2008, Certification of Welding Inspection Organizations.
  - .6 CSA W178.2-2008, Certification of Welding Inspectors.

### **1.3 QUALITY ASSURANCE**

- .1 Qualifications of welders.
    - .1 Welding qualifications in accordance with CSA B51 Standard.
    - .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 Standard.
  - .2 Qualification of Inspectors.
    - .1 Inspectors qualified to CSA W178.2 Standard.
  - .3 Certification.
    - .1 Registration of welding procedures in accordance with CSA B51 Standard.
    - .2 Copy of welding procedures available on site for reference purposes.
    - .3 Safety in welding, cutting, and allied processes in accordance with CSA-W117.2 Standard.
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## **1.4 SUBMITTALS**

- .1 Submit documents and samples required.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

## **PART 2 - PRODUCTS**

### **2.1 ELECTRODES**

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

## **PART 3 - EXECUTION**

### **3.1 QUALITY OF WORK**

- .1 Welding: In accordance with ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX, and ANSI/AWWA C206 Standards, using procedures conforming to AWS B3 and C1.1 Standards, and applicable requirements of provincial authority having jurisdiction.

### **3.2 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.
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### **3.3 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. Repair or replace defects as required by Codes and as specified in this section.

### **3.4 SPECIALIST EXAMINATIONS AND TESTS**

- .1 General:
  - .1 Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2 Standards, and approved by Departmental Representative.
  - .2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 Standard, and requirements of authority having jurisdiction.
  - .3 Inspect and test 100% of welds in accordance with "Inspection and Test Plan" by non-destructive visual examination and magnetic particle (hereinafter referred to as "particle" tests) and spot gamma ray radiographic (hereinafter referred to as "radiography" tests).
- .2 Hydrostatically test welds to ANSI/ASME B31.1 Standard.
- .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 tests.

### **3.5 DEFECTS CAUSING REJECTION**

- .1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code Standards.
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- .2 Piping network below 1,000 kPa (145 psi):
  - .1 Undercutting greater than 0.8 mm (0.031 in.) adjacent to cover bead on outside of pipe.
  - .2 Undercutting greater than 0.8 mm (0.031 in.) adjacent to root bead on inside of pipe.
  - .3 Undercutting greater than 0.8 mm (0.031 in.) at combination of internal and external surfaces.
  - .4 Incomplete penetration and incomplete fusion greater than total length of 38 mm (1½ in.) in 1,500 mm (59 in.) length of weld depth of such defects being greater than 0.8 mm (0.031 in.).
  - .5 Repair cracks and defects in excess of 0.8 mm (0.031 in.) in depth.
  - .6 Repair defects whose depth cannot be determined accurately on basis of visual examination.

### **3.6 REPAIR OF WELDS WHICH FAILED TESTS**

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

### **3.7 CLEANING**

- .1 Perform cleaning site.

**END OF SECTION**

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