

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 22 05 00 - Common Work Results for Plumbing.
- .2 Section 23 05 00 - Common Work Results for HVAC.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME).
 - .1 ANSI/ASME B31, ASME Code for Pressure Piping and Power Piping.
 - .1 ANSI/ASME B31.1, Power Piping.
 - .2 ANSI/ASME B31.2, Fuel Gas Piping.
 - .3 ANSI/ASME B31.3, Process Piping.
 - .4 ANSI/ASME B31.4, Pipeline Transportation Systems for Liquids and Slurries.
 - .5 ANSI/ASME B31.9, Building Services Piping.
 - .2 ANSI/ASME Boiler and Pressure Vessel Code.
 - .1 Section V: Non-Destructive Examinations.
 - .2 Section IX: Welding and Brazing Qualifications.
- .2 American Water Works Association (AWWA).
 - .1 ANSI/AWWA C206, Field Welding of Steel Water Pipe.
- .3 American Welding Society (AWS).
 - .1 AWS B3.0, Welding Procedures and Performance Qualifications.
 - .2 AWS C1.1, Recommended Practices for Resistance Welding.
 - .3 AWS Z49.1, Safety Welding, Cutting and Allied Process.
 - .4 AWS W1, Welding Inspection Handbook.
- .4 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 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit welding procedures for each application, for all steel and stainless steel network:
 - .1 Natural gas network;
 - .2 Petroleum product network;
 - .3 Heating and cooling water network.
- .3 Submit an inspection and test plan.
- .4 Submit inspection reports.
- .5 Submit welders' qualification certificates.

1.4 QUALITY ASSURANCE

- .1 Labour's Qualifications:
 - .1 Welders' qualifications in accordance with CSA B51.
 - .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
 - .3 Submit welders' qualifications to Departmental Representative.
 - .4 Each welder to possess identification symbol issued by authority having jurisdiction.
- .2 Inspectors:
 - .1 Inspectors qualified to CSA W178.2.
- .3 Certifications:
 - .1 Registration of welding procedures in accordance with CSA B51.
 - .2 A copy of welding procedures shall be available on-site at all time for reference.
 - .3 Safety in welding, cutting, and allied processes in accordance with CSA-W117.2.

1.5 HEALTH AND SAFETY

- .1 Take necessary measures to ensure health and safety on construction site, in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Sort waste in order to re-use and recycle in conformity with section 01 74 21 - Waste Management Plan.
- .2 Collect packaging materials and send to appropriate recycling facilities.

- .3 Collect and sort plastic, paper, and corrugated cardboard wrappings, and dispose them in appropriate designated bins in conformity with the Waste Management Plan.
- .4 Disposed unused metallic elements in designated area for metal recycling.

Part 2 Products

2.1 FILLER METALS

- .1 Electrodes complying with CSA W48 and ASME, section IX, for arc welding.
- .2 Filler metals complying with section IX of ASME Standard Requirements.

Part 3 Execution

3.1 QUALITY OF WORK

- .1 Execute welding in accordance with ANSI/ASME B31.1, B31.2, B31.3 and B31.4, ANSI/ASME Boiler and Pressure Vessel Code, Section IX and ANSI/AWWA C206, using procedures conforming to AWS B3 and AWS C1.1, and special procedures specified elsewhere in others sections and applicable requirements of federal 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 under: install welding type sockets.
 - .2 Branch connections: install welding tees or forged branch outlet fittings.

3.3 SPECIAL REQUIREMENTS – STAINLESS STEEL WELDING

- .1 Special attention must be done when welding stainless steel pipe, as much on-site as in workshop. Avoid welding and grinding carbon steel near stainless steel welding to prevent contamination of the weld carbon steel particles.
- .2 Stainless steel welded pipe joints shall be full penetration.
- .3 The first pass is to be executed with the GTAW-GAS TUNGSTEN ARC (TIG). Provide a minimum of two passes.

- .4 Using backing ring for the butt weld stainless steel tubing is not acceptable.
- .5 The welding of the stainless steel pipe should be performed using a welding method with inert gas purge, which include the protective gas around the welding rod and the support gas within the piping.
- .6 Piping must be pre-purged and purged at a constant rate during welding.

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, CSA W178.2 and ASME, section IX, 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 5 % of welds in accordance with "Inspection and Test Plan" by non-destructive visual examination.
- .2 Hydrostatically test all welds to ANSI/ASME B31.1.
- .3 Visual Examinations: include entire circumference of weld externally and wherever possible internally.

3.6 DEFECTS CAUSING REJECTION

- .1 General :
 - .1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.
- .2 Piping for systems below 1,000 kPa and less than 176°C:
 - .1 Undercutting greater than 0.8 mm adjacent to cover bead on outside of pipe.
 - .2 Undercutting greater than 0.8 mm adjacent to root bead on inside of pipe.

- .3 Undercutting greater than 0.8 mm at combination of internal surface and external surface.
- .4 Incomplete penetration and incomplete fusion greater than total length of 38 mm in 1,500 mm length of weld depth of such defects being greater than 0.8 mm.

3.7

REPAIR OF WELDS WHICH FAILED TESTS

- .1 Repair cracks and defects in excess of 0.8 mm in depth.
- .2 Repair defects whose depth cannot be determined accurately on basis of visual examination.
- .3 Re-inspect and re-test repaired or re-worked welds at Contractor's expense.

END OF SECTION