

TSSA Fuels Safety High Pressure Piping Code TSSA HPP-2020



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TECHNICAL STANDARDS AND SAFETY AUTHORITY

FOREWORD

The Gaseous Fuels and Fuel Oil Regulations made under the Technical Standards and Safety Act adopt this Code for the Province of Ontario.

Definitions in this Code have the same meaning as those contained in the relevant regulations made under the *Technical Standards and Safety Act*.

This document was developed in consultation with the TSSA Gaseous Fuels Advisory Council and the TSSA Fuel Oil Risk Reduction Group.

Inquiries regarding this document may be addressed to:

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Foreword

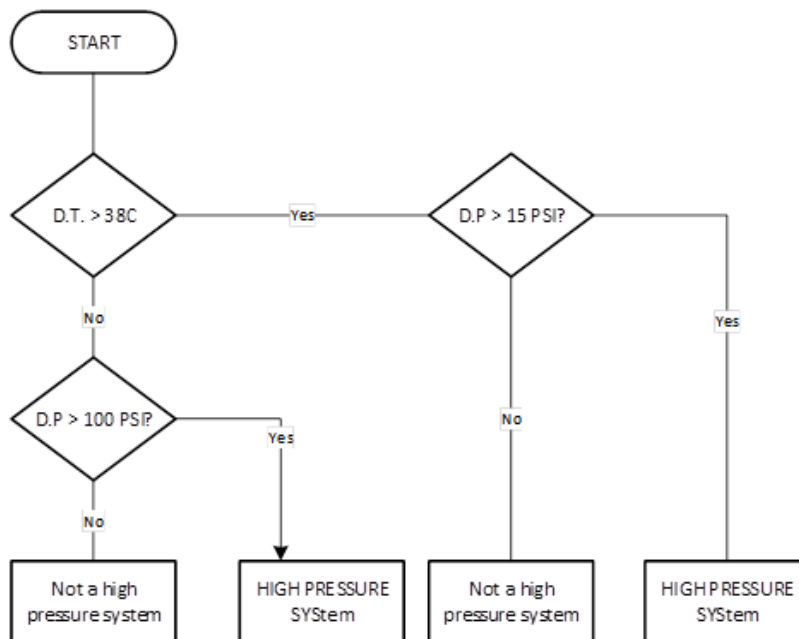
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1 SCOPE

1.1 This code contains requirements for high pressure piping systems handling

- a) natural gas downstream of the customer meter, where the system has been designed for pressure exceeding:
 - i) 125 psig (860 kPa) in piping systems installed outdoors, or
 - ii) 66 psig (450) kPa) for piping systems installed indoor.
- b) gaseous fuels, except natural gas, where the system has been designed for pressures exceeding:
 - i) 125 psig (860 kPa) in piping systems installed outdoors, or
 - ii) 66 psig (450 kPa) for piping systems installed indoor.
 - iii) 21 psig (138 kPa) or 26 psig (172 kPa) for Propane indoor piping system as shown on table 5.1 of CSA B149.1; or
 - iv) Specific or no threshold as defined by the respective Code Adoption Document or standard.
- c) fuel oil according to the following chart:
D.T. = Design Temperature
D.P. = Design Pressure



Note: Gas or fuel oil pressure piping systems covered in this code are those systems extending from the custody transfer point into a building or outside, above or below ground and where the design pressure exceeds the values in 1.1 a) or b) or c). Piping installations designed for a maximum pressure up to and including the values shown in 1.1 shall be

installed in accordance with the applicable code adoption document.

2 GENERAL REQUIREMENTS

2.1 GENERAL

High pressure gas or fuel oil piping systems shall be designed and installed in accordance with the requirements of a recognized piping code. Acceptable codes are CSA Z662 Oil and Gas Pipeline Systems, ANSI/ASME codes B31.1 or B31.3.

2.2 DESIGN

2.2.1 All components in a system or subsystem shall be designed for the pressure at which the safety valve protecting that system or subsystem is set to open. The design temperature range as a minimum shall be -20 to 65° C (-4 to 149° F) for buried piping, from -40 to 65° C (-40 to 149° F) for above ground installations and from 10 to 65° C (50 to 149° F) for above ground indoor installations.

2.2.2 The minimum wall thickness of piping and tubing shall be determined in accordance with the requirements of CSA Z662, ANSI/ASME B31.1 or B31.3 or an alternative code acceptable to the Director.

2.2.3 Nonstandard fittings shall be capable of withstanding a proof test of at least four times the design pressure specified in Clause 2.2.1.

2.2.4 The design of all piping systems and fittings shall be approved by TSSA, Fuels Safety Program (FSP) as required in 2.4.

2.3 MATERIALS

Piping, tubing, flanges, fittings valve bodies and other components materials shall conform to the specifications or standards referenced in piping codes that the applicant have selected for the design of the pressure piping system (see clause 2.2.2) or alternatives approved by the Director.

2.4 APPROVAL

An application form for High Pressure System Approval shall be submitted to the TSSA FSP for approval for every piping system installation, accompanied by "site-specific drawings" and corresponding bill of materials for the pressure piping system. Legible PDFs are acceptable.

The following shall be demonstrated and included in the application for approval:

- (a) the pressure piping code of construction;
- (b) design and operating pressures and design temperature of systems and subsystems;
- (c) material specifications (as permitted by the code of construction);
- (d) approved fittings (CRN or certified by an agency acceptable to the Director or FSP approved);
- (e) pre-approved piping subassemblies (i.e., shop-built assemblies or buried piping)
- (f) Primary pressure relief device and its setpoint. This device must be certified as a primary overpressure protection and capacity rated device as defined in Table 1 of the CSA B51. The device must be registered as a category G device. The CRN number must be included on a rating plate attached to each device; and
- (g) Service interval of the primary pressure relief device mentioned in f above must be 3 years according to Table 5 of CSA B51.

3. INSTALLATION AND WELDING

3.1 Piping and tubing not buried

- (a) may be connected by using welding, threading, compression fittings or flanges; however flared connections shall not be used;
- (b) shall be protected from external corrosion by a suitable coating and also protected from damage from external sources;
- (c) shall be supported and anchored as required by CSA Standard Z662 or by other code acceptable to the Director.

3.2 Buried piping shall be

- (a) connected by welding. (Threaded joints, or joints using compression fittings, flanges, or flared connections shall not be used in buried piping.), and
- (b) coated, cathodically protected, and monitored in accordance with CSA Standard Z662.

4 INSPECTION

4.1 All final inspections at the site shall include, but not be limited to the following:

- (a) review of a approved copy of the site-specific drawing of the pressure piping system;

- (b) witness of hydrostatic or pneumatic pressure tests in accordance with the pressure piping code of construction for any items not previously tested according to and acceptable Partial Data Report (form attached);
- (c) witness leak test at operating pressure of mechanical joints between previously tested subassemblies;
- (d) review of Partial Data Reports substantiating the shop inspection and the witnessing of shop tests which have been carried out on pre-approved shop fabricated piping and fitting subassemblies; and
- (e) review of Partial Data Reports substantiating previous field inspections and/or witnessing of field test of buried pipe subassemblies.

4.2 A Piping Systems Installation and Test Data Report covering the pressure piping system at the site shall be completed and signed by the designer or installer of the system and shall be countersigned by a TSSA inspector (form attached).

5 NONDESTRUCTIVE EXAMINATION

5.1 Unless deigned by section 5.2 and 5.3, the required amount of radiography test is defined by the Code of Construction used (See Sections 2.1). Except for joints in interstage compressor piping, each butt welded joint shall be examined radiographically for their full length, using procedures in accordance with the CSA Z662, Section 7 or ASME Code, Section V. The acceptance criteria of CSA Z662 or ANSI Standard B31.1 or B31.3 shall be met.

5.2 Butt welded joints in interstage compressor piping shall be examined radiographically as required by the inspector.

5.3 For piping inside buildings, all circumferential welds shall be radiographed inspected in accordance to the design code selected but in no case shall be less than 10% of the welds for each welder. An interpretation of the results of the radiographic examination shall be made by an experienced radiographer, qualified in accordance with the requirements of CGSB Standard CAN/CGSB-48.9712. Records of interpretation of radiographs shall be kept by the facility owner and produced upon the request to a TSSA inspector.

5.4 Socket welded joints shall be examined visually, or if the Director so requires, by magnetic particle or liquid penetrant examination.

6 PRESSURE TESTING

6.1 Pressure testing shall be in accordance with the CSA Z662 or ASME Code for Pressure Piping B31.1 or B31.3, except as required or permitted otherwise by this Clause.

6.2 Except as permitted by Clause 6.3, all joints shall be hydrostatically tested to not less than 1.5 times the system design pressure, or pneumatically tested to not less than 1.2 times the system design pressure.

6.3 Flanged, threaded, or compression-type joints made in the field to connect shop-fabricated, shop-tested, subassemblies may be leak-tested at the operating pressure of the system.

6.4 If the tie-in or closure connections are not any of the types mentioned in section 6.3, an examination method must be accepted by TSSA.

6.5 Where the entire system is accessible for inspection, the test pressure shall be held for a minimum of 30 min or for longer if necessary to conduct the examinations for leakage. When a pneumatic test is made, all joints shall be examined for leakage with a suitable leak-detecting solution.

6.6 If part of a system has been buried or is otherwise inaccessible for inspection, the test pressure shall be held for 4 hr. for liquid-medium testing or 24 hr for gaseous-medium testing and a recording chart shall be used, unless a pressure test procedure has been approved by the Director for the specific installation.

6.7 Any evidence of leakage is unacceptable.

6.8 All shop pressure tests for piping subassemblies required by this code shall be witnessed by a TSSA inspector or by a third party authorized by the Director.

6.9 All pressure tests of field installations required by this code shall be witnessed by a TSSA inspector.