



Fuels Safety Program	Ref. No.: FS-238-18
<b>Oil and Gas Pipeline Systems Code Adoption Document Amendment</b>	Date: February 15 <sup>th</sup> , 2018

IN THE MATTER OF:

*Technical Standards and Safety Act, 2000*, R.S.O. 2000, c. 16, Ontario Regulation 223/01 (Codes and Standards Adopted by Reference), and Ontario Regulation 210/01 (Oil and Gas Pipeline Systems)

The Director for the purposes of Ontario Regulation 210/01 (Oil and Gas Pipeline Systems), pursuant to sections 8(1) and 8(2) of Ontario Regulation 223/01 (Codes and Standards Adopted by Reference) and section 36(3)(a) of the Technical Standards and Safety Act 2000, R.S.O. 2000, c. 16, hereby provides notice that the OIL AND GAS PIPELINE SYSTEMS CODE ADOPTION DOCUMENT published by Technical Standards and Safety Authority dated June 1, 2001, as amended, is further amended as follows:

**All sections of the Oil and Gas Pipeline Systems Code Adoption Document (including previous amendments thereto) are revoked and replaced with the following:**

Background:

This amendment to the Oil and Gas Pipeline Systems Code Adoption Document (CAD) revokes and replaces the previous amendment (FS-220-16, dated July 19, 2016). A delta symbol ( $\Delta$ ) in the left margin indicates a provision that is new or that has changed since the previous CAD amendment.

The following are the most significant changes from the previous CAD amendment:

- Security standard, CSA Z246.1 re-adopted on this version of CAD
- Definition of “ground disturbance” changed to align with the O.Reg.210/01
- Exemption on digester and landfill sites corrected to reflect appropriate code for the pipeline passing through public domain.

## Section 1

### CODES ADOPTED BY REFERENCE

1. The Director hereby adopts and requires all persons to whom O. Reg. 210/01 (Oil and Gas Pipeline Systems) applies to comply with the standards, procedures and other requirements of the following codes and regulations:
  - a) **CSA Z662-15 (Oil and Gas Pipeline Systems)**, published by the Canadian Standards Association, as amended by Section 3 of this document.
  - b) **CSA Z276-15 (Liquefied Natural Gas (LNG) - Production, Storage and Handling)**, published by the Canadian Standards Association,
  - $\Delta$  c) **CSA Z246.1-17 Security management for petroleum and natural gas industry systems**, published by the Canadian Standards Association,

Background:

This Standard adopted in previous Code Adoption Document (CAD), FS-196-12, which was removed from CAD, is being reintroduced.

- d) **CSA Z247-15 Damage Prevention for the Protection of Underground Facilities**, published by the Canadian Standards Association, as amended by section 2 of this document.

Δ **Section 2**

**AMENDMENTS TO CSA Z247-15 (Damage prevention for the protection of underground infrastructure)**

2. The following clauses and/or sections of the CSA-Z247-15 (Damage prevention for the protection of underground infrastructure) are amended as follows:
- (1) Ground disturbance definition is amended as follows:  
Ground disturbance — means; digging, boring, trenching, grading excavation or breaking ground with mechanical equipment or explosives.

Background:

Definition of Ground disturbance changed for consistency with O. Reg. 210\01

**Section 3**

**AMENDMENTS TO CSA Z662-15 (OIL AND GAS PIPELINE SYSTEMS)**

The following clauses and/or sections of the CSA-Z662-15 (Oil and Gas Pipeline Systems) are amended as follows:

- (1) Clause **1.2** is deleted and substituted by the following:
- 1.2**  
The scope of this Standard, as shown in Figures 1.1 and 1.2, includes
- (a) for oil industry fluids, piping and equipment in onshore pipelines, tank farms, pump stations, pressure-regulating stations, and measuring stations;
  - (b) oil pump stations, pipeline tank farms, and pipeline terminals;
  - (c) pipe-type storage vessels;
  - (d) for gas industry fluids, piping and equipment in onshore pipelines, compressor stations, measuring stations, and pressure-regulating stations;
  - (e) gas compressor stations;
  - (f) gas storage lines and pipe-type and bottle-type gas storage vessels; and

(g) pipelines that carry gas to and from a well head assembly of a designated storage reservoir.

(2) Clause **1.3** is amended by adding the following items:

- (o) gathering systems
- Δ (p) digester gas or gas from landfill sites or waste gas within the boundary of the site.
- (q) multiphase fluid systems
- (r) offshore pipeline systems
- (s) oil field water systems
- (t) oilfield steam systems
- (u) carbon dioxide pipeline systems.

Background:

Originally digester and landfill sites were interpreted to be exempt from Z662 as they were within the jurisdiction of O. Reg 212/01. However, O. Reg 212/01 did not account for the possibility that the gas produced by digester and landfill sites would be exported or conveyed via pipeline through the public domain. This addition limits the exemption for these pipelines within the boundary of the sites. When pipes pass through the public domain, they are considered as pipeline and applicable code is CSA Z662.

(3) Clause 2.2 is amended by adding the following clarification:

For the purpose of this Code Adoption Document, within a gas pipeline system, transmission pipelines are those lines that operate at or above 30% of the pipe's specified minimum yield strength (SMYS) at MOP.

(4) Clause **3.2** is amended by renumbering the existing clause 3.2 to 3.2.1 and adding the following clause:

**3.2.2**

Natural gas distributors shall incorporate into the procedures for managing the integrity of pipeline systems required in clause 3.2.1 an action plan that includes:

- a. a description of the steps taken or that will be taken to mitigate the potential of penetration of sewer lines by a natural gas pipeline during trenchless installation;
- b. a program that raises stakeholder awareness of the potential safety issues that could arise when attempting to clear a blocked sewer service line beyond the outside walls of a building; and
- c. an assessment of potential risks and a plan to mitigate these risks.

Δ (5) Clause **4.1.7** is deleted and substituted with the following:

#### 4.1.7

Steel oil and gas pipelines may be designed in accordance with the requirements of Annex C, Limit States Design, provided that such designs are suitable for the conditions to which such pipelines are to be subjected, and provided that the design has been reviewed and approved by the Director prior to installation or use.

**Background:**

An editorial change. Previous version of CAD had mistakenly referred to section 4.1.8. That mistake is corrected in this version.

(6) Clause 4.3.4 is amended by adding the following clauses:

**4.3.4.9 High consequence areas**

**4.3.4.9.1 Definitions**

The following definitions apply to the remainder of clause 4.3.4:

**Assessment** means the use of testing techniques set out in this section to ascertain the condition of a covered pipeline segment.

**Covered segment** or **Covered pipeline segment** means a segment of oil or gas transmission pipeline located in a high consequence area. The terms “oil”, “gas” and “transmission” are defined in O. Reg. 210/01

**High consequence area** means

- (a) for a gas transmission pipeline, an area defined as:
  - (i) a Class 3 location under CSA Z662-15, Clause 4.3.3;
  - (ii) a Class 4 location under Clause 4.3.3;
  - (iii) any area in a Class 1 or Class 2 location where the potential impact radius is greater than 200 metres and the area within the potential impact circle contains 20 or more buildings intended for human occupancy; or
  - (iv) any area in a Class 1 or Class 2 location where the potential impact circle contains an identified site; and
- (b) for an oil pipeline, an area containing:
  - (i) a commercially navigable waterway, which means a waterway where a substantial likelihood of commercial navigation exists;
  - (ii) a high population area, which means an urbanized area, as defined and delineated by the latest Statistics Canada Census, that contains 50,000 or more people or has a population density of at least 385 people per square km;
  - (iii) any other populated area and/or place, as defined by the latest Statistics Canada Census, that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area; or

- (iv) an unusually sensitive area, as defined in company's pipeline integrity management program.

**Identified site** means, for Class 1 and Class 2 locations, any of the following areas:

- (a) an outside area or open structure that is occupied by twenty (20) or more persons on a minimum of fifty (50) consecutive or non-consecutive days in any twelve-month (12) period. Examples include but are not limited to: beaches, playgrounds, recreational facilities, camping grounds, outdoor theaters, stadiums, recreational areas near a body of water, and areas outside rural building such as a religious facility;
- (b) a building that is occupied by twenty (20) or more persons on a minimum of five (5) consecutive or non-consecutive days in any given week for at least ten (10) weeks in any twelve-month (12) period. Examples include, but are not limited to, religious facilities, office buildings, community centers, general stores, 4-H facilities, sporting and entertainment facilities; or
- (c) a facility occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate. Examples include but are not limited to hospitals, prisons, schools, day-care facilities, retirement facilities and assisted-living facilities.

**Potential impact circle**, for natural gas or HVP pipelines systems, is a circle of radius equal to the potential impact radius (PIR).

**Potential impact radius (PIR)** means the radius of a circle within which the potential failure of a pipeline could have significant impact on people or property, determined by the following formula:

Δ

$$r = 0.00313 \text{ times square root of } (pd^2)$$

where:

r is the radius of the circular area surrounding the point of failure in meters (m) p is the MOP of the pipeline in kPa d is the nominal diameter of the pipeline in mm

NOTE: 0.00313 is the factor for natural gas based on conversion from a formula used in GRI-00/0189. This number will vary for other gases depending upon their heat of combustion. An operator transporting gas other than natural gas shall refer to ASME/ANSI B31.8 S for the formula to calculate the potential impact radius.

Background:

This is an editorial change. The formula had a typographical error in the previous version of the CAD and it is corrected in this version.

#### 4.3.4.9.2 Identification of high consequence areas

- (a) *General*. Operating companies shall identify which segments of its oil and gas

transmission pipeline system are in high consequence areas. The operator must describe in its integrity management program the method used to establish high consequence areas, including the determination of the potential impact radius.

- (b) *Identified sites.* The operator shall identify identified sites by:
- (i) using information the operator has obtained from routine operation and maintenance activities; and
  - (ii) obtaining information about locations that are likely to meet the criteria for identified sites from public officials with safety or emergency response or planning responsibilities (such as officials from local emergency planning response agencies or from municipal planning departments).
- (c) *Identified sites - where public officials cannot assist.* If the public officials mentioned above are unable to provide information useable to identify potential identified sites, the operator shall review and use the following information, as appropriate, to identify potential identified sites:
- (i) the presence of signs, public notices, flags or other markings that suggest that the area may qualify as an identified site; and
  - (ii) the existence of publicly available information, including online and at local land registry offices, that suggests the area may qualify as an identified site.
- (d) *Newly identified high consequence areas.* When an operator obtains information suggesting that the area around a pipeline segment not previously identified as a high consequence area could constitute a high consequence area, the operator shall evaluate the area to determine if the area is a high consequence area. If the segment is determined to constitute a high consequence area, it must be incorporated into the operator's baseline assessment plan as a high consequence area within one year from the date the area is identified.

Note: Pipeline operators shall keep records of the above requirements pursuant to section 3.1.2 (f) (v) of CSA Z662-15.

Δ

Background:

Note section was added to reiterate the requirements of "record keeping" which is essential part of Integrity Management Program.

#### **4.3.4.10 Operator's responsibility to implement this clause**

##### **4.3.4.10.1**

An operator of a covered pipeline segment shall develop and follow a written program (as part of the pipeline system integrity management program (IMP)) that contains all the elements described in the IMP and that addresses the risks associated with each covered transmission pipeline segment.

##### **4.3.4.10.2 Implementation standards**

An operator may use an equivalent standard or practice as required by clause 4.3.4 only when the operator demonstrates in its Integrity Management Program that the alternative standard or practice provides an equivalent level of safety to the public and property.

##### **4.3.4.11 Risk assessment**

The operator shall conduct a risk assessment that follows Annex B Guidelines for risk assessment of pipelines falling within the scope of CSA Z662-15 for each covered segment. The risk assessment shall include the high consequence areas and determine if additional preventive or mitigation measures are needed.

The operator shall prioritize the covered pipeline segments according to risk.

**4.3.4.12 Remediation**

For each covered segment, the operator shall develop and establish measures to prevent or reduce the probability of an incident and to limit the potential consequences thereof.

These measures shall include conducting a risk analysis of the pipeline segment to identify additional measures to enhance public safety or environmental protection. Such measures may include, but are not limited to:

- (a) establishing shorter inspection intervals;
- (b) installing emergency flow restricting devices (remote operated valves, check valves and automatic shut off valves, as applicable);
- (c) modifying the systems that monitor pressure or detect leaks, as applicable;
- (d) providing additional training to personnel on response procedures;
- (e) conducting drills with local emergency responders; and
- (f) adopting other management controls.

Evacuation procedures shall take into consideration the PIR.

For oil pipeline segments located in high consequence areas, the operating company shall provide the Ontario Ministry of Natural Resources and Forestry (MNR) and the Ontario Ministry of Environment and Climate Change (MOECC) an opportunity to comment on the company’s contingency plan for leaks or spills and shall address any comments provided by MOECC or MNR.

- (7) **Table 4.2** is amended by substituting the requirements for LVP (non-sour services) with the following:

Class 1 location		Class 2 location	Class 3 location	Class 4 location
Transmission lines (refined products)	1.000	0.900	0.700	0.550
Uncased railway crossings	0.625	0.625	0.625	0.625

This requirement is not retroactive and applies to new pipelines only.

- (8) Clause **7.10.3.2** is deleted and substituted with the following:

**7.10.3.2**

For HVP and for sour service pipeline systems, all butt welds shall be inspected by radiographic or ultrasonic methods, or a combination of such methods, for 100% of their circumferences, in accordance with the requirements of clause 7.10.4.

- (9) Clause **10.3.8.1** is deleted and substituted with the following:

**10.3.8.1**

Prior to a change in service fluid, including from non-sour service to sour service, the operating company shall conduct an engineering assessment to determine whether the pipeline systems would be suitable for the new service fluid. The assessment shall include consideration of the design, material, construction, operating, and maintenance history of the pipeline system and shall be submitted to the Director for approval.

- (10) Clause **10.3** is amended by adding the following clause:

**10.3.11**

For the protection of the pipeline, the public and the environment, the operating company shall develop a pipeline integrity management program for steel pipelines operated at 30% or more of the SMYS of the pipe at MOP that complies with the applicable requirements of clause 3.2 of CSA Z662-15.

- (11) Clause **10.5.2** is amended by adding the following clauses:

**10.5.2.5 Emergency communication meetings**

The operator of a transmission pipeline shall conduct meetings with local authorities, inviting police, firefighting authorities, Ontario Ministry of Transportation (MTO), Ministry of Natural Resources and Forestry (MNR), Ministry of the Environment and Climate Change (MOECC), local conservation authorities and TSSA, to explain to the authorities the characteristics of the pipeline system the operator operates, the type of fuels being transported and the typical behavior of these fuels in case of uncontrolled escapes or spills and the capabilities and the coordination required to respond to pipeline emergencies.

These meetings shall be conducted at intervals not exceeding five years at locations that ensure the key stakeholders can attend. The meetings shall be prioritized to correspond to the operating company's prioritization of the covered pipeline segments according to the risk.

**10.5.2.6**

Operating companies shall prepare an emergency response plan and make it available on request, to local firefighting authorities, as well as the authorities referred to in clause 10.5.2.5.

- (12) Clause **10.6** is amended by adding the following clause:

**10.6.5 Right-of-way encroachment**

**10.6.5.1**

No person shall construct, erect or install any structure or tangible item on or within the pipeline right-of-way, including but not limited to patios, concrete slabs, buildings, pool houses, garden sheds, swimming pools, hot tubs, fish or other man-made ponds, saunas or fences, unless written permission is first obtained from the operating company.

#### **10.6.5.2**

No person shall deposit or store any flammable material, solid or liquid spoil, refuse, waste or effluent on or within the pipeline right-of-way.

#### **10.6.5.3**

Notwithstanding the above, operating companies may erect structures required for purpose of pipeline system operation on the pipeline right-of-way.

#### **10.6.5.4**

No person shall operate a vehicle or mobile equipment except for farm machinery or personal recreation vehicles across or within a pipeline right-of-way unless written permission is first obtained from the operating company or the vehicle or mobile equipment is operated within the travelled portion of a highway or public road already existing in the pipeline right-of-way.

#### **10.6.5.5**

Operating companies shall develop written procedures for periodically determining the depth of cover for pipelines operated over 30% of SMYS of the pipe at MOP. Such written procedures shall include a rationale for the frequency selected for such depth determinations. Where the depth of cover is found to be less than 60 cm in lands being used for agriculture, an engineering assessment shall be done in accordance with clause 3.3 and a suitable mitigation plan shall be developed and implemented to ensure the pipeline is adequately protected from hazards.

(13) Clause **10.15.1.2** is amended by adding the following items:

- (e) maintain warning signs and markers along the pipeline right-of-way;
- (f) maintain existing fences around above ground pipeline facilities; and
- (g) empty tanks and purge them of hazardous vapours within 60 days of deactivation.

(14) Clause **12.4.11.1** is renumbered as clause 12.4.11.1.1. Clause **12.4.11** is amended by adding the following clauses:

#### **12.4.11.1.2**

All new and replacement natural gas service regulators shall comply with the requirements of CSA 6.18-02 (R2008) (Service Regulators for Natural Gas), published by the Canadian Standards Association, including the Drip and Splash Test contained in Appendix A of the said standard. Where a regulator-meter set installation or supplemental protective devices provides equivalent protection against regulator vent freeze up passes a successful test in accordance with Appendix C of the said standard, the requirements of Appendix A (Drip and Splash Test) and those contained in clause

14.15 (Freezing Rain Test) of the standard are waived. Evidence of tests completed in accordance with Appendix C of the standard shall be retained by the operating company as permanent records.

**12.4.11.1.3**

Regulator-meter set configurations shall be included in the operating company’s operating and maintenance procedures.

- (15) Clause 12.4.15.6 is revoked and substituted with the following:

**12.4.15.6**

Where regulator failure would result in the release of gas, open ends of the vents shall be located where the gas can escape freely into the atmosphere and away from any openings in the buildings. Clearances from building openings shall be commensurate with local conditions and the volume of gas that might be released, but shall not be less than those set out in the following table:

**Clearance from service regulator vents discharge (m)**

<i>Column:</i>	I	II	III	IV
Building opening	0.3	1	3	1
Appliance vent outlet	0.3	1	1	1
Moisture exhaust duct (dryers)	1	1	1	1
Mechanical air intake	1	3	3	3
Appliance air intake	0.3	1	3	3
Source of ignition	0.3	1	1	3

**Column I** applies to natural gas regulators certified under CSA 6.18 standard, incorporating an OPCO system and with a limited relief of 1.5m<sup>3</sup>/h.

**Column II** applies to natural gas regulators certified under CSA 6.18 standard (if within the scope of the standard) with a relief capacity up to 55 m<sup>3</sup>/h.

**Column III** applies to natural gas regulators with a relief capacity over 55 m<sup>3</sup>/h.

**Column IV** applies to propane regulators.

Where regulators may be submerged during floods, either a special anti-flood-type breather vent fitting shall be installed or the vent line shall be extended above the height of the expected flood waters.

- (16) Clause 12.4.15 is amended by adding the following item:

**12.4.15.10**

No person other than an employee or person authorized by the distributor shall interfere with or perform any alterations, repairs, tests, services, removals,

changes, installations, connections, or any other type of work on the distributor's system.

(17) Clause 12.10.12 is amended by adding the following items:

(e) For polyethylene piping installed in Class 1 and Class 2 locations, the upgraded maximum operating pressure shall not exceed the design pressure calculated in accordance with the requirements of Clause 12.4.2; and

(f) For polyethylene piping installed in Class 3 and Class 4 locations, the upgraded maximum operating pressure shall not exceed the design pressure calculated in accordance with the requirements of clause 12.4.2 with a combined design factor and temperature derating factor ( $F \times T$ ) of 0.32, unless the operating company conducts an engineering assessment to determine whether it would be suitable for the existing polyethylene piping to be operated at the new pressure. The assessment shall include consideration of the design, material, construction, operating, and maintenance history of the pipeline system and be submitted to the Director for approval.

(18) Clause 12.10 is amended by adding the following clause:

**12.10.16**

Operating companies shall establish effective procedures for managing the integrity of pipeline systems operated at less than 30% of SMYS of the pipe at MOP (Distribution Systems) so that they are suitable for continued service, in accordance with the applicable requirements of clause 3.2 of CSA Z662-15.

**Section 4**

**POLYETHYLENE PIPE CERTIFICATION**

3. Polyethylene piping and fittings that are used in a polyethylene gas pipeline shall be certified by a designated testing organization accredited by the Standards Council of Canada as conforming to CSA-B137.4 (Polyethylene Piping Systems for Gas Services).

**Section 5**

**WELDER QUALIFICATION**

4. Welds shall not be made in any steel pipe that forms or is intended to form a part of a steel oil or gas pipeline or a component of a steel pipeline unless the welding procedures have been approved and the welder is qualified to make the weld in accordance with the requirements of CSA-Z662-15 (Oil and Gas Pipeline Systems) and is the holder of the appropriate authorization issued under O. Reg. 220/01 (Boilers and Pressure Vessels) made under the Act.

**Section 6**

**EFFECTIVE DATE; MISCELLANEOUS**

5. (1) This Code Adoption Document amendment is in effect on **February 15, 2018**.
- (2) Where there is a conflict between this document and a code, standard or publication adopted by this document, this document prevails.
- (3) Any reference to "Director" in a code, standard or publication adopted by this document means the Director for the purposes of O. Reg. 210/01 (Oil and Gas Pipeline Systems).

DATED at Toronto, Ontario, this 15<sup>th</sup> day of February 2018.

ORIGINAL SIGNED BY

---

**John Marshall**  
Director, O. Reg. 210/01 (Oil and Gas Pipeline Systems)

*Any person involved in an activity, process or procedure to which this document applies shall comply with this document.  
This document was developed in consultation with the Pipeline Risk Reduction Group*

---

Fuels Safety Program, Technical Standards and Safety Authority  
345 Carlingview Drive, Toronto, ON M9W 6N9, Tel: (416) 734-3300 Fax: (416) 231-7525