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Z662-15

Oil and gas pipeline systems

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Preface

This is the seventh edition of CSA Z662, *Oil and gas pipeline systems*. It supersedes the previous editions published in 2011, 2007, 2003, 1999, 1996, and 1994.

The following are the most significant changes, relative to the previous edition:

- a) updating and revising the requirements for safety and loss management systems, integrity management programs, and engineering assessments process. This resulted in significant changes to Clause 3 to clarify the requirements and highlight that requirements for safety and loss management system and for the pipeline system integrity management program must address the full lifecycle of a pipeline, including design, material selection, construction, operation, and maintenance;
- b) clarification of the requirements for mitigation programs for internal corrosion and monitoring of the effectiveness of the programs when pipelines are susceptible to internal corrosion (Clause 9);
- c) new requirements for training and certification of field applied coating applicators through a Clause 9 reference to CSA Z245.30;
- d) clarification of requirements for steam distribution pipelines and high temperature pipelines (Clause 14);
- e) broader inclusion of, and additional requirements for, CO₂ pipelines;
- f) further requirements for abandonment of pipelines (Clause 10);
- g) new requirements for addressing ripples and wrinkles, buckles, and out of roundness on pipe (Clause 10);
- h) clarification of the requirements for reinforced composite, thermoplastic-lined, and polyethylene pipelines;
- i) clarification of the sour service requirements for gas-free pipeline systems for crude oil, crude oil blends, and low vapour pressure condensate (Clause 16);
- j) updating of the requirements for leak detection on liquid hydrocarbon pipelines previously published in Update 3 (August 2013) to CSA Z662-11. The recommended practice considers computational methods and direct leak detection methods (Annex E);
- k) expansion of Annex M to address system control, monitoring, and protection for all hydrocarbon pipelines; and
- l) new Annex P to provide guidance on the development and qualification of welding procedure specifications.

The requirements of this Standard are considered to be adequate under conditions normally encountered in the oil and natural gas industry. Specific requirements for abnormal or unusual conditions are not prescribed, nor are all details related to engineering and construction prescribed. It is intended that all work performed within the scope of this Standard meet the standards of safety and integrity expressed or implied herein, and that the requirements of this Standard be applied with due regard to the protection of the environment, which includes land, water, plant life, and animal life. Detailed requirements concerning the protection of the environment are not prescribed.

It is expected that changes will be made from time to time, based on new experience and technology. Where necessary, amendments and supplements will be prepared by the Technical Committee and published in accordance with CSA Group practices.

This Standard was prepared by the Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials, under the jurisdiction of the Strategic Steering Committee on Petroleum and Natural Gas Industry Systems, and has been formally approved by the Technical Committee.

This edition of CSA Z662 is dedicated to the memories of Richard Caesar and Mike Hallihan.

Notes:

- 1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- 2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- 3) *This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
- 4) *To submit a request for interpretation of this Standard, please send the following information to inquiries@csagroup.org and include “Request for interpretation” in the subject line:*
 - a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
 - b) *provide an explanation of circumstances surrounding the actual field condition; and*
 - c) *where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.*

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at standardsactivities.csa.ca.

- 5) *This Standard is subject to review five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include “Proposal for change” in the subject line:*
 - a) *Standard designation (number);*
 - b) *relevant clause, table, and/or figure number;*
 - c) *wording of the proposed change; and*
 - d) *rationale for the change.*

Z662-15

Oil and gas pipeline systems

1 Scope

Δ **1.1**
G [There is a commentary available for this Clause.](#)

This Standard covers the design, construction, operation, maintenance, deactivation, and abandonment of oil and gas industry pipeline systems that convey

- a) liquid hydrocarbons, including crude oil, multiphase fluids, condensate, liquid petroleum products, natural gas liquids, and liquefied petroleum gas;
- b) oilfield water;
- c) oilfield steam;
- d) liquid or dense phase carbon dioxide; or
- e) gas.

Notes:

- 1) *Vapour phase carbon dioxide pipeline systems fall under Item e).*
- 2) *Designers are cautioned that the requirements in this Standard might not be appropriate for gases other than natural gas, manufactured gas, vapour phase carbon dioxide, and synthetic natural gas.*

Δ **1.2**
G [There is a commentary available for this Clause.](#)

The scope of this Standard, as shown in Figures 1.1 and 1.2, includes

- a) for oil industry fluids, piping and equipment in offshore pipelines, 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) carbon dioxide pipelines;
- e) for gas industry fluids, piping and equipment in offshore pipelines, onshore pipelines, compressor stations, measuring stations, and pressure-regulating stations;
- f) gas compressor stations; and
- g) gas storage lines and pipe-type and bottle-type gas storage vessels.

Δ **1.3**
G [There is a commentary available for this Clause.](#)

This Standard does not apply to

- a) piping with metal temperatures below $-70\text{ }^{\circ}\text{C}$;
- b) gas piping beyond the outlet of the customer's meter set assembly (covered by CSA B149.1);
- c) piping in natural gas liquids extraction plants, gas processing plants (except main gas stream piping in dehydration and all other processing plants installed as part of gas pipeline systems), gas manufacturing plants, industrial plants, and mines;
- d) oil refineries, terminals other than pipeline terminals, and marketing bulk plants;
- e) abandoned piping;
- f) in-plant piping for drinking, make-up, or boiler feed water;

- g) casing, tubing, or pipe in oil or gas wells, wellheads, separators, production tanks, and other production facilities;
- h) vent piping for waste gases of any kind operating at or near atmospheric pressure;
- i) heat exchangers;
- j) liquefied natural gas systems (covered by CSA Z276);
- k) liquid fuel distribution systems;
- l) loading/unloading facilities for tankers or barges;
- m) refuelling facilities; and
- n) hydrocarbon storage in underground formations and associated equipment (covered by CSA Z341 Series).

1.4

C [There is a commentary available for this Clause.](#)

This Standard is intended to establish essential requirements and minimum standards for the design, construction, operation, and maintenance of oil and gas industry pipeline systems. This Standard is not a design handbook, and competent engineering judgment should be employed with its use.

Note: *For steel pipe of grade higher than Grade 555, requirements in addition to those specified in this Standard might be needed. Matters that should be considered include joining, thermal aging effects during coating application, strain capacity (including cold bending), pressure testing, assessment of imperfections, and repair.*

1.5

C [There is a commentary available for this Clause.](#)

The requirements of this Standard are applicable to the operation, maintenance, and upgrading of existing installations. It is not intended that such requirements be applied retroactively to existing installations insofar as design, materials, construction, and established operating pressures are concerned, except as required by Clause 10.7.1 for changes in class location and Clause 10.8.1 for crossings of existing pipelines.

1.6

C [There is a commentary available for this Clause.](#)

Unless otherwise stated, to determine conformance with the specified requirements, it is intended that observed or calculated values be rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding method of ASTM E29.

1.7

C [There is a commentary available for this Clause.](#)

Where any requirements of this Standard are at variance with the requirements of other publications referenced in this Standard, it is intended that the requirements of this Standard govern.

1.8

C [There is a commentary available for this Clause.](#)

It is not the intent of this Standard to prevent the development of new equipment or practices, or to prescribe how such innovations are to be handled.