CSA Z260:19
National Standard of Canada

Pipeline system safety metrics

Standards Council of Canada
Conseil canadien des normes

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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 to judge its suitability for their particular purpose.

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Contents

Preface

This is the first edition of CSA Z260, *Pipeline system safety metrics*.

This Standard provides requirements to establish a set of common safety metrics for pipeline systems along with an approach that can be used across the pipeline industry and regulatory jurisdictions for categorizing unintentional pipeline system releases and developing leading indicators. Reporting requirements are defined by regulatory agencies, and this Standard does not supersede incident reporting requirements set by these agencies. This Standard is intended for use in process and performance improvement of pipeline system safety and communicating pipeline system safety performance where organizations have discretion in setting metric definitions.

In developing this Standard, previous and existing standards were used to provide the basis and background as appropriate. These include, but are not limited to, legislation, best practices, policies, standards, and applicable codes.

CSA Group and the Z260 Technical Committee acknowledge the contribution of American Petroleum Institute (API) and its employees to provide input to this Standard and its industry wide approach to pipeline system safety metrics.

CSA Group acknowledges that the development of this Standard was made possible, in part, by the financial support of the Canadian Energy Pipeline Association (CEPA) and its member organizations.

This Standard was prepared by the Technical Committee on Pipeline System Safety Metrics, 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 Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

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   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

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0 Introduction

0.1 General

The purpose of carrying out performance assessments is to determine how well an individual, organization or system is meeting its objectives, as well as to identify opportunities for performance improvements. A meaningful performance assessment not only requires the right metrics but also clear definitions of those metrics to ensure consistency and reduce ambiguity. A pipeline system's safety performance and the performance of the operating company's safety systems can be reflected in the number and severity of pipeline system safety events (PSSEs) where a service fluid is unintentionally released from primary containment. A loss of primary containment (LOPC) can occur when one or more layers of protection fail to operate as intended. As such, in order to improve the safety of pipeline systems, it is essential to have an in-depth understanding of how effectively existing safety controls and barriers are performing, identify gaps, and implement the necessary corrective measures.

Safety management systems, as defined in this Standard, require that operating companies have an internal process of continual improvement that includes reporting, collecting, evaluating, and trending of data related to PSSEs, including near misses, learning from PSSEs, and performance monitoring. (See CAN/CSA-Z662, Clause 3.1.2 h), ANSI/API RP 1173, Clause 11, and CAN/CSA-Z767, Clause 8.4.) A standard system for categorizing PSSEs is a fundamental requirement for ensuring that PSSEs are documented, triaged, and assessed within a continual improvement process. In order to achieve this, it is necessary to have consistent terminology and clear definitions for PSSEs that occur on pipeline systems.

This Standard is intentionally aligned with ANSI/API RP 754. This alignment recognizes that companies that operate pipeline systems may also operate petrochemical, treating, or refining facilities under a single safety management system with consistent definitions of LOPC events across all assets. The framework, definitions, and thresholds for PSSEs have been adapted from ANSI/API RP 754 for the Canadian pipeline industry. In particular, an effort has been made to remain as consistent as practicable with ANSI/API RP 754 on refining, processing, petrochemical, and pipeline facilities in order to ensure that operating companies following this Standard will be able to accurately compare performance against data collected using ANSI/API RP 754. In addition to the value of benchmarking and comparative analysis, the alignment with ANSI/API RP 754 reduces the potential for confusion or misinterpretation arising from multiple definitions for a pipeline system or process safety event.

No unplanned or uncontrolled release of a hazardous substance from a pipeline system is considered acceptable. The thresholds that define the severity of pipeline system safety events are not intended to be interpreted in the context of what is a tolerable leak or release.

As with ANSI/API RP 754, the thresholds for categorizing PSSEs were set to ensure the capture of a meaningful and sufficient number of incidents from which the causes and contributing factors to loss of containment events could be studied, analyzed, and understood. Inherent in this approach is an understanding that pipeline systems are complex, and a singular or limited number of loss of containment events will not necessarily fully identify all weaknesses in safety barriers or the presence of inadequate controls.

0.2 Users

This Standard is intended to be used by companies operating oil and gas industry pipeline systems (operating companies), regulatory authorities, industry associations, researchers, and organizations that study or report on the safety performance of oil and gas pipeline systems.

This Standard can be applied to any pipeline system, regardless of the technical codes and standards to which it is designed and constructed, and the jurisdiction under which it operates.

This Standard can be used by anyone to process publicly available incident data (i.e., data that is already collected and published by various regulators and government agencies) in order to categorize that data based on impact or harm for reconciling and comparing the performance of different companies in similar industries.

Although this Standard has been written for the Canadian oil and gas industry pipeline system operating environment, there is nothing herein which precludes its use in other jurisdictions or locations. However, it is the responsibility of the user of this Standard to judge its suitability for their particular purpose.

0.3 Application

Note: *See Annex D for additional information.*

0.3.1

This Standard

a) defines metrics for communicating the safety performance of pipeline systems that gather, transport, store, and deliver service fluids;
b) establishes consistent, industry-wide severity categories for incidents involving an unplanned or uncontrolled release from a pipeline system containing service fluids; and
c) fulfills the performance assessment needs of other CSA Group standards (e.g., CAN/CSA-Z662 and CAN/CSA-Z767).

0.3.2

This Standard has been written in a manner that it can be used by operating companies, industry associations, and interested parties concerned with North American-wide performance.

0.3.3

The definitions and metrics of this Standard are intended to be used to assist in understanding and learning from incidents with the ultimate goal of reducing the number and severity of loss of primary containment (LOPC) events through the following:

a) prioritizing LOPC events for investigation;
b) measuring pipeline system safety performance over time;
c) benchmarking pipeline system safety performance between operating divisions, operating companies, or industry sectors; and
d) trending and analyzing precursor events to potentially catastrophic failures for the purpose of strengthening safety barriers and controls.

1 Scope

1.1

This Standard applies to oil and gas industry pipeline systems that convey

a) liquid hydrocarbons, including crude oil, multiphase fluids, condensate, liquid petroleum products;
b) natural gas liquids and liquefied petroleum gas;
c) oilfield water;
d) oilfield steam;
e) liquid or dense phase carbon dioxide; or
f) gas, including but not limited to natural gas, fuel gas, compressed air, carbon dioxide, and nitrogen.

See Figures 1 and 2.

Notes:

1) *Non-hydrocarbon products used as process fluids and transported by operating companies by pipeline or within pipeline facilities, are considered within the scope of this Standard provided that those products are used in facilities connected to the pipeline system.*
2) *Fluids used within equipment supporting the pipeline system operation, including consumables such as lubricating or hydraulic fluids, are considered within the scope of this Standard, provided that the equipment is connected to the pipeline system at the time of the PSSE.*

1.2

This Standard covers

a) piping and equipment in onshore liquids 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) piping and equipment in onshore gas pipelines, compressor stations, measuring stations, and pressure-regulating stations;
f) gas storage lines and pipe-type and bottle-type gas storage vessels; and
g) loading and unloading facilities for tankers or barge, truck, and rail when connected to the process.

See Figures 1 and 2.

1.3

This Standard does not apply to the following facilities and asset classes:

a) gas distribution systems as defined by CAN/CSA-Z662, Clause 12;
b) gas piping beyond the outlet of the customer's meter set assembly (e.g., piping covered by CSA B149.1);
c) abandoned piping;
d) in-plant piping for drinking, make-up, boiler feed, or fire suppression water;
e) vent piping for waste gases of any kind operating at or near atmospheric pressure;
f) refueling facilities and refueling activities not directly connected to the pipeline system;
g) hydrocarbon storage in underground formations and associated equipment;
h) piping in natural gas liquids extraction plants, gas processing plants, gas manufacturing plants, industrial plants, and mines;
i) oil and gas production facilities; and