



CSA/ANSI PRD 1:20
National Standard of Canada
American National Standard



Pressure relief devices for natural gas vehicle (NGV) fuel containers



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CSA/ANSI PRD 1:20

*Pressure relief devices for natural
gas vehicle (NGV) fuel containers*



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Preface

This is the third edition of CSA/ANSI PRD 1, *Pressure relief devices for natural gas vehicle (NGV) fuel containers*. It supersedes the previous editions published in 2013 and 1998.

This publication represents a standard for safe operation, substantial and durable construction and performance testing of pressure relief devices (PRD) for natural gas vehicle (NGV) fuel containers, for the on-board storage of compressed natural gas for vehicle operation within limitations given below and in the scope of this Standard.

This Standard is based on proven engineering principles, research, and the combined expertise of gas utilities, manufacturers, users, and others having specialized experience.

Nothing in this Standard is to be considered in any way as indicating a measure of quality beyond compliance with the provisions it contains. It is designed to allow compliance of products which may exceed that specified in the provisions herein. In its preparation, full recognition has been given to possibilities of improvement through ingenuity of design. This Standard is subject to revision as further experience and investigation may show it is necessary and desirable.

This Standard does not apply to fuel system components that will be incorporated during original manufacture of motor vehicles which comply with *Federal Motor Vehicle Safety Standards (FMVSS)* or *Canadian Motor Vehicle Safety Standards (CMVSS)* for Natural Gas Powered Vehicles.

Users of this Standard are advised that the devices/products/activities within its scope may be subject to regulation at the federal, state, or local levels. Users are strongly urged to investigate this possibility through appropriate channels. In the event of a conflict with this Standard, the federal, state, or local regulations should be followed.

CSA Group acknowledges that the development of this Standard was made possible, in part, by the financial support of Natural Resources Canada.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was prepared by the Subcommittee on Standards for Pressure Relief Devices for Natural Gas, under the jurisdiction of the Technical Committee on Natural Gas Transportation and the Strategic Steering Committee on Transportation, and has been formally approved by the Technical Committee on Natural Gas Transportation and the Interprovincial Gas Advisory Council.

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.

This Standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

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- 1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
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 - c) wording of the proposed change; and
 - d) rationale for the change.

CSA/ANSI PRD 1:20

Pressure relief devices for natural gas vehicle (NGV) fuel containers

0 History of the development of CSA/ANSI PRD-1

In 1988, a group of U.S. gas utility companies formed the Natural Gas Vehicle (NGV) Coalition (the Coalition) to promote the widespread use of natural gas as a vehicle fuel. The Coalition organized committees to address technical, marketing, and legislative issues which would affect future expansion.

The Coalition recognized that an important consideration in the successful commercialization of natural gas as a vehicle fuel was the issue of codes and standards (or lack of codes and standards, or harmonized codes and standards) pertaining to both fuel stations and vehicle fuel systems. The Coalition's Technology Committee undertook the goal of establishing a program for the development of an organized family of coordinated codes, standards and regulations addressing natural gas vehicles and fuelling stations. To help achieve this goal, the Technology Committee established the Standards and Standardization Subcommittee.

The Standards and Standardization Subcommittee is comprised of interests from gas utilities, vehicle and fuelling station original equipment manufacturers (OEM), component OEM's and NGV conversion industries, among others. The Subcommittee also has "liaison" representation from the Society of Automotive Engineers (SAE), the Gas Research Institute (GRI), the American Gas Association (A.G.A.), the Canadian Gas Association, the Compressed Gas Association, the National Fire Protection Association's (NFPA) Technical Committee on Compressed Natural Gas Vehicular Fuel Systems, and the International Association for Natural Gas Vehicles (IANGV). International Approval Services (formerly the American Gas Association Laboratories) serves as Administrative Secretariat to the Subcommittee.

One of the major technical obstacles to the above goal concerned the on-board fuel containers. It was acknowledged that the lack of a design standard and certification program for vehicle fuel supply containers was a major obstacle to wider use of compressed natural gas as a vehicle fuel. U.S. Department of Transportation (DOT) regulations and exemptions do not address the use of cylinders as vehicle fuel containers. Such government regulations only cover cylinders which are approved for use in interstate transportation.

At its July 19, 1990, meeting, the Standards and Standardization Subcommittee's On-Board Fuel Cylinders Working Group established a task group (NGV2 Task Group) to prepare a draft standard addressing NGV on-board fuel containers. This Standard, *Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers*, ANSI/AGA NGV2, was approved by ANSI in 1992.

The NGV2-1992 standard covered requirements for pressure relief devices (PRDs) as separate components by referencing the Compressed Gas Association's standard, *Pressure Relief Device Standards, Part 1 — Cylinders for Compressed Gases*. At its July 19–20, 1995, meeting, the NGV2 Task Group agreed to form a working group to evaluate the applicability of the CGA S-1.1 standard for on-board NGV fuel containers. After meetings between the working group and the Compressed Gas Association's Pressure Relief Device Standing Subcommittee, it was mutually agreed upon that an entirely new standard should be developed for PRDs applied to NGV fuel containers. The NGV2 Task Group agreed that the task of developing a draft standard for PRDs for NGV fuel containers should be

assigned to the original working group. The working group chairman assembled a review committee consisting of individuals who had expressed an interest in PRDs. Many of the review group members were also members of the Compressed Gas Association's Pressure Relief Device Standing Subcommittee.

The first draft of the Standard for *Basic Requirements for Pressure Relief Devices for Natural Gas Vehicle Fuel Containers*, PRD-1, dated January 19, 1996, was distributed to the review committee. As a result of comments received from the review committee, a second draft, dated February 16, 1996 was developed. As a result of additional comments received from the review committee on the second draft, a third draft of the PRD-1 standard was developed. The third draft was distributed for canvass ballot on December 13, 1996. In light of favourable ballot results, the third draft of the PRD-1 standard was submitted to ANSI. The first edition of the standard for Basic Requirements for Pressure Relief Devices for Natural Gas Vehicle Fuel Containers was approved as an American National Standard by ANSI on June 4, 1998.

In 2007, in response to industry requests, the Standard was revised and was published as the second edition of PRD 1. This occurred again in 2013 for the third edition.

Previous editions of this Standard are as follows:

- IAS PRD 1-1998; and
- ANSI PRD 1-2013 (R2018).

The following identifies the designation and the year of the harmonized standard:

- CSA/ANSI PRD 1:20.

1 Scope

1.1 General

1.1.1

This Standard establishes minimum requirements for pressure relief devices (PRDs) intended for use on fuel containers that comply with ANSI/CSA NGV2, 49 CFR Part 571.304 (FMVSS 304), CSA B51, Part 2, and/or ISO 11439.

PRDs can be of any design or manufacturing method that meets the requirements of this Standard.

1.1.2

This Standard does not apply to reseating or resealing devices.

1.1.3

PRDs designed to comply with this Standard are expected to be used with natural gas fuel containing no more than 2% hydrogen by volume.

1.2 Relevant documents

Documents which apply to fuel container installation and vehicle systems include 49 CFR Part 571.303 (FMVSS 303), TC 301.2, NFPA 52, CSA B109, and CSA/ANSI NGV 6.1.

Other regulations, standards, or codes may permit or require the use of PRDs certified to comply with this Standard. Additional service conditions or requirements beyond the scope of this document are the responsibility of those standards development organizations or the authority having jurisdiction.

1.3 Informative annex

Annex [A](#) presents an informative record of the recommended fuel container, fuel storage subsystem, and vehicle level requirements that were identified by the Subcommittee during the development of this Standard. As this Standard contains component level requirements, these recommendations are outside the scope of this document.

Annex [A](#) statements are intended as recommendations for consideration of inclusion to the organizations and committees developing these subsystem and vehicle level standards.

1.4 Notes

Fuel containers might accidentally be exposed to fire or elevated temperature. These conditions could act to increase the contained pressure and/or to degrade the structural materials, depending on the container type and materials of construction. A PRD provides a means to vent the fuel container under these conditions.

A specific PRD might not be suitable for all container types, sizes, and/or installations. Fuel container or installation standards may require that a PRD be tested in conjunction with other components.

CGA S-1.1 states “relief devices may not prevent burst of a cylinder under all conditions of fire exposure. When the heat transferred to the cylinder is localized, intensive, and remote to the relief device, or when the fire builds rapidly, such as in an explosion, and is of very high intensity, the cylinder can weaken sufficiently to rupture before the relief device operates, or while it is operating”.

1.5 Terminology

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (nonmandatory) to define their application.

1.6 Units

The values given in SI units are the units of record for the purposes of this Standard. The values given in parentheses are for information and comparison only.