CSA Group

**ANSI PRD 1-2013**
*(reaffirmed 2018)*

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

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25 West 43rd Street, Fourth floor
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# *ANSI PRD 1-2013*

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


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# Preface

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.

**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.*

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- 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.*

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

## History of the development of ANSI PRD-1

**Note:** *This history is informative and is not part of the standard.*

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 fueling 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 fueling 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 (PRD's) 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 PRD's applied to NGV fuel containers. The NGV2 Task Group agreed that the task of developing a draft standard for PRD's for NGV fuel containers should be assigned to the original working group. The working group chairman assembled a review committee consisting on individuals who had expressed an interest in PRD's. 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 favorable 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 PRD1.

This, the second edition of the Standard for Pressure relief devices for natural gas vehicle (NGV) fuel containers was approved by the American National Standards Institute, Inc. on January 29, 2013 and by the Joint Automotive Technical Committee on January 9, 2013.

Previous editions of this standard, approved by the American National Standards Institute and the Joint Automotive Technical Committee are as follows:

IAS PRD1-1998

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

ANSI PRD 1-2013

# *ANSI PRD 1-2013*
# *Pressure relief devices for natural gas vehicle (NGV) fuel containers*

## 1 Scope

### 1.1

This standard establishes minimum requirements for pressure relief devices intended for use on fuel containers that comply with *ANSI/CSA NGV2, Compressed Natural Gas Vehicle (NGV) Fuel Containers, FMVSS 304, Federal Motor Vehicle Safety Standards, 49 CFR Part 571.304, Compressed Natural Gas Fuel Container Integrity, CSA B51, Part 2, High Pressure Cylinders for On-Board Storage of Natural Gas as a Fuel for Automotive Vehicles* and/or ISO 11439 *Gas Cylinders – High Pressure Cylinders for the Onboard Storage of Natural Gas as a Fuel for Automotive Vehicles.*

Pressure relief devices may be of any design or manufacturing method that meets the requirements of this standard.

The construction of pressure relief devices, whether specifically covered in this standard or not, shall be in accordance with reasonable concepts of safety, performance and durability.

This standard does not apply to reseating or resealing devices.

### 1.1.1

Pressure relief devices designed to comply with this standard are expected to be used with natural gas fuel containing no more than two percent hydrogen by volume.

Resistance to chloride stress corrosion cracking shall be taken under consideration if selecting stainless steel materials. Resistance to stress corrosion cracking and sustained load cracking shall be taken under consideration if selecting aluminum materials. Resistance to sulfide stress cracking shall be taken under consideration if selecting steel materials.

### 1.2 Relevant documents

Documents which apply to fuel container installation and vehicle systems include FMVSS 303, *Federal Motor Vehicle Safety Standards*, 49 CFR Part 571.303, *Fuel System Integrity of Compressed Natural Gas Vehicles*, CS 301.2, *Transport Canada, Motor Vehicle Safety Regulations, Schedule IV, CNG Fuel System Integrity*, NFPA 52, *Vehicular Fuel Systems Code*, and B109, *Natural Gas for Vehicles Installation Code*.

Other regulations, standards or codes may permit or require the use of pressure relief devices 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 PRD1/HPRD1 Joint Technical Advisory Group on Standards for Pressure Relief Devices for Natural Gas Vehicles (NGV) and Hydrogen Vehicle Fuel