



CSA/ANSI HPRD 1:21
National Standard of Canada
American National Standard



Thermally activated pressure relief devices for compressed hydrogen vehicle (HGV) fuel containers



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CSA/ANSI HPRD 1:21

***Thermally activated pressure relief
devices for compressed hydrogen
vehicle (HGV) fuel containers***



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Preface

This is the second edition of CSA/ANSI HPRD 1, *Thermally activated pressure relief devices for compressed hydrogen vehicle (HGV) fuel containers*. It supersedes the previous edition published in 2013.

The major changes to this edition include the following:

- a) additional definitions;
- b) requirements for pilot activated pressure relief devices; and
- c) additional design qualification tests.

This publication represents a standard for safe operation, substantial and durable construction and performance testing of thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers, for the on-board storage of compressed hydrogen 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 that might 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 might 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.

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

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

This Standard was prepared by the HPRD 1 Subcommittee on Pressure Relief Devices for Hydrogen Gas Vehicles, under the jurisdiction of the Technical Committee on Hydrogen Transportation and the Transportation Strategic Steering Committee, 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.

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

Notes

- 1) Use of the singular does not exclude the plural (and vice versa) when the sense allows.
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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.

CSA/ANSI HPRD 1:21

Thermally activated pressure relief devices for compressed hydrogen vehicle (HGV) fuel containers

0 History of the development of CSA/ANSI HPRD 1

In September 2002, CSA America Inc., now operating as CSA Group, met with the U.S. Department of Energy, Renewable Fuels Group in Washington, D.C., to discuss standards development opportunities in the hydrogen technology area.

Industry recognized that the lack of applicable codes and standards related to vehicle fuel system components and fuelling stations would delay the successful commercialization of compressed hydrogen as a vehicle fuel. CSA Group decided to expand the scope of the existing natural gas vehicle and fuelling stations program to support the development of a suite of standards to address the safety and performance of hydrogen gas vehicles and fueling stations.

Industry and CSA Group recognized there was no standard that addressed safety requirements for pressure relief devices for compressed hydrogen vehicle fuel containers. The development of such a standard was a necessity. The focus of the HPRD 1 standard was to establish performance and safety-based requirements for the material, design, manufacture, and testing of pressure relief devices for compressed hydrogen vehicle fuel containers.

The PRD1/HPRD1 Joint Technical Advisory Group (TAG) on Standards for Pressure Relief Devices for Natural Gas Vehicles (NGV) and Hydrogen Vehicle Fuel Containers held several meetings between 2003 and 2009 to develop essential coverage, which was published as a temporary interim requirement in August 2009.

Immediately following the publication of HPRD1-2009 (TIR), the PRD1/HPRD1 TAG began drafting revisions and improvements to the document and ultimately determined that thermally activated pressure relief devices were the highest priority. In January 2012, the TAG began meeting monthly to complete the first edition of the Standard for thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers, ANSI HPRD 1.

1 Scope

1.1 General

This Standard establishes minimum requirements for pressure relief devices intended for use on fuel containers that comply with CSA/ANSI HGV 2, CSA B51, Part 2, or SAE J2579.

Pressure relief devices designed to comply with this Standard are intended to be used with hydrogen fuel complying with SAE J2719 or ISO 14687.

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, are to be in accordance with reasonable concepts of safety, performance, and durability.

This Standard does not apply to reseating, resealing, or pressure activated devices.

1.2 Relevant documents

Documents that apply to hydrogen fuel vehicles and hydrogen fuel subsystems include SAE J2578 and SAE J2579.

Other regulations, standards, or codes might 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 Standard 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 Containers during the development of this Standard. As this Standard contains component level requirements, these recommendations are outside the scope of this Standard.

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

1.4 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 (non-mandatory) to define their application.

1.5 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.

2 Reference publications

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.