CSA Group

ANSI HPRD 1-2013
(reaffirmed 2018)

Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers

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Responsibility of approving American standards rests with the
American National Standards Institute, Inc.
25 West 43rd Street, Fourth floor
New York, NY 10036

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Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers

American National Standards Institute, Inc.

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Preface

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 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.*

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.*

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5) *This Standard is subject to a review within five years from the date of approval. 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.*

History of the development of ANSI HPRD-1

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

In September 2002, CSA America Inc., 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 fueling stations would delay the successful commercialization of compressed hydrogen as a vehicle fuel. CSA decided to expand the scope of the existing natural gas vehicle and fueling 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 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 HPRD1 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, HPRD 1.

The Standard for Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers was processed as an American National Standard in accordance with procedures of the American National Standards Institute (ANSI).

This the first edition of the Standard for thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers was approved by the Joint Automotive Technical Committee on January 29, 2013 and by the American National Standards Institute, Inc.(ANSI) on February 20, 2013.

ANSI HPRD 1-2013
Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers

1 Scope

1.1

This standard establishes minimum requirements for pressure relief devices intended for use on fuel containers that comply with *CSA B51, Part 2 Boiler, Pressure Vessel and Pressure Piping Code or* SAE J2579, *Technical Information Report for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles*.

Pressure relief devices designed to comply with this standard are intended to be used with hydrogen fuel complying with SAE J2719 *Hydrogen Fuel Quality for Fuel Cell Vehicles*, or ISO 14687 *Hydrogen Fuel-Product Specification.*

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 resealing or pressure activated devices.

1.2 Relevant documents

Documents which apply to hydrogen fuel vehicles and hydrogen fuel subsystems include SAE J2578, *Recommended Practice for General Fuel Cell Vehicle Safety* and SAE J2579, *Technical Information Report for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles*.

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 Containers 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 by the organizations and committees developing these sub system and vehicle level standards.