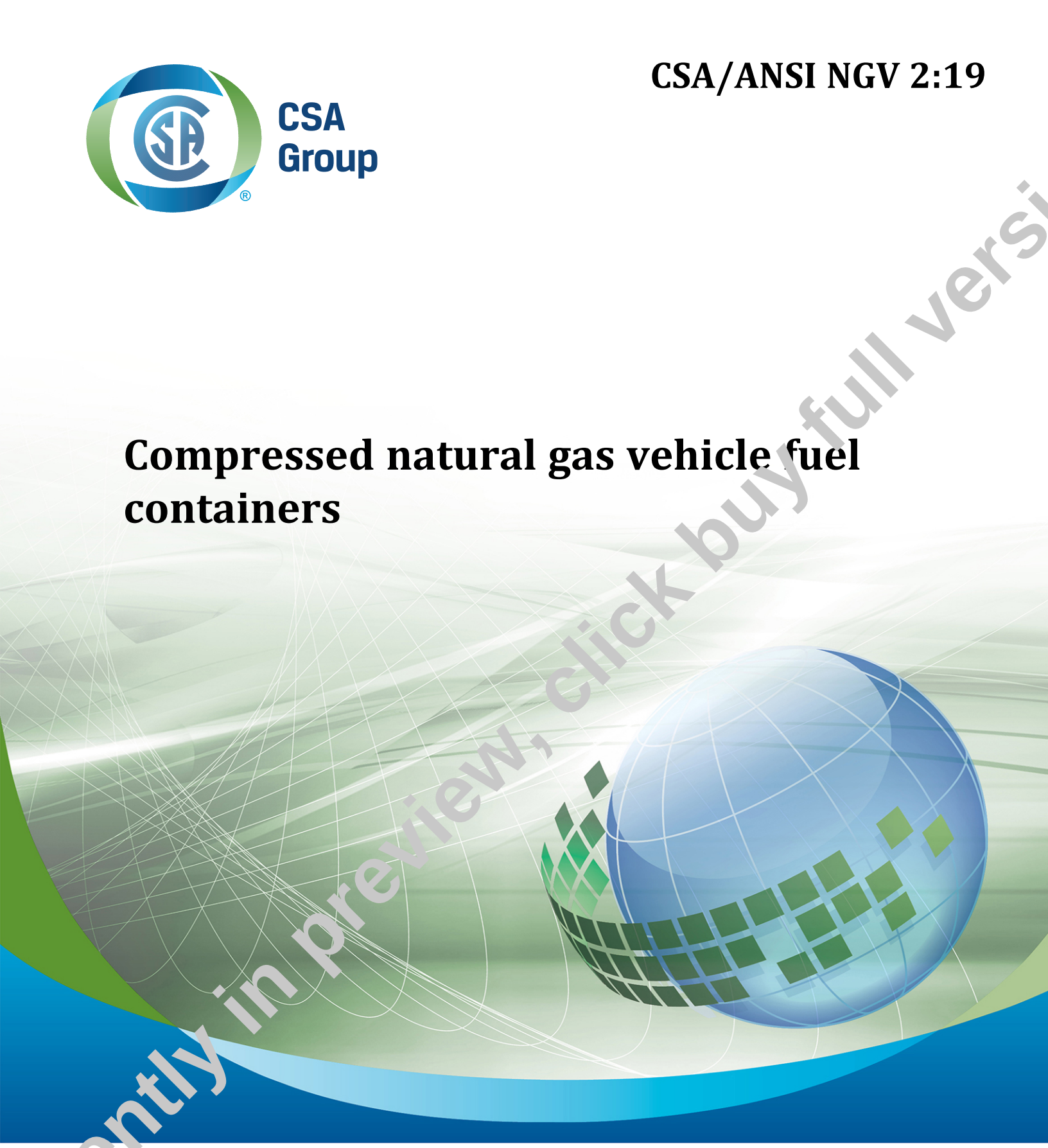
CSA Group

CSA/ANSI NGV 2:19

Compressed natural gas vehicle fuel containers



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ANSI provides that the interests of the public may have appropriate participation and representation in standardization activity, and cooperates with departments and agencies of U.S. Federal, state and local governments in achieving compatibility between government codes and standards and the voluntary standards of industry and commerce.

ANSI represents the interests of the United States in international nontreaty organizations such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). The Institute maintains close ties with regional organizations such as the Pacific Area Standards Congress (PASC) and the Pan American Standards Commission (COPANT). As such, ANSI coordinates the activities involved in the U.S. participation in these groups.

ANSI approval of standards is intended to verify that the principles of openness and due process have been followed in the approval procedure and that a consensus of those directly and materially affected by the standards has been achieved. ANSI coordination is intended to assist the voluntary system to ensure that national standards needs are identified and met with a set of standards that are without conflict or unnecessary duplication in their requirements.

Responsibility of approving American standards rests with the
American National Standards Institute, Inc.
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Compressed natural gas vehicle fuel containers

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Contents

Preface

This is the sixth edition of CSA/ANSI NGV 2, *Compressed natural gas vehicle fuel containers*. It supersedes the previous editions published in 2016, 2007, 2000, 1998, and 1992.

This Standard was prepared by the NGV 2/HGV 2 Technical Subcommittee on Standards for Compressed Natural Gas and Compressed Hydrogen Vehicle Fuel Containers, under the jurisdiction of the Natural Gas Transportation Technical Committee and the Strategic Steering Committee on Transportation, and has been formally approved by the Natural Gas Transportation Technical Committee and the American National Standards Institute.

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
2) *This Standard contains SI (Metric) units corresponding to the yard/pound quantities, the purpose being to allow the standard to be used in SI (Metric) units. (*IEEE/ASTM SI 10, *American National Standard for Metric Practice, or* ISO 80000-1:2009, *Quantities and units – Part 1: General, is used as a guide in making metric conversion from yard/pound quantities.) If a value for a measurement and a corresponding value in other units are stated, the first stated value is to be regarded as the requirement. The given corresponding value may be approximate. If a value for a measurement and a corresponding value in other units are both specified as a quoted marking requirement, the first stated unit, or both, are to be provided.*
3) *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.*
4) *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 the 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.*
5) *This Standard is subject to review at least every five years; 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.*
6) *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;*
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   c) *where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.*

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at standardsactivities.csa.ca.

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

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History of the development of CSA/ANSI NGV 2

Note: *This history is informative and is not part of this Standard.*

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

One of the major technical obstacles to the above goal concerned the on-board fuel container. It was acknowledged that lack of a design standard and certification program for lightweight composite 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 that are approved for use in interstate transport.

The Standards and Standardization Subcommittee's On-Board Fuel Containers Working Group established a task group to prepare a draft standard addressing NGV on-board fuel containers.

The Fuel Cylinder Task Group initiated a proposed draft standard for NGV on-board fuel containers, which

a) was based on existing standards;
b) had no limitation on materials or method of construction;
c) considered the internal and external container environment; and
d) incorporated a certification process for design, manufacturing, and quality control.

The draft standard was initially based on the format of U.S. DOT cylinder regulations and exemptions (e.g., *DOT FRP-1 for Fiber Reinforced, Full Composite Cylinders Using a Seamless Aluminum Liner*).

The draft NGV fuel container standard was processed as an American National Standard under the canvass method, in accordance with procedures of the American National Standards Institute (ANSI).

On June 30, 1997, the Canadian Standards Association (now operating as CSA Group) acquired International Approval Services (IAS), which was until then a joint venture of the American Gas Association (A.G.A.) and the Canadian Gas Association (CGA). Under this agreement CSA Group acquired the complete range of IAS standards administration, certification, and registration products and services for appliances and accessories fueled by natural and liquefied petroleum gases.

The revisions contained in the third edition of NGV 2 were originally intended to be published as an “a” addendum to the 1998 edition. In response to industry requests, these revisions were incorporated in the base document and were released as a new edition of NGV 2. The third edition of the NGV fuel containers standard was approved by the American National Standards Institute, Inc. on March 3, 2000.

The fourth edition of the NGV fuel container standard was approved by the American National Standards Institute, Inc. on June 20, 2007. The “a” addendum was approved by ANSI on April 23, 2012, and the “b” addendum was approved by ANSI on June 5, 2012. The fifth edition of the NGV fuel container standard (redesignated CSA/ANSI NGV 2) was approved by the American National Standards

Institute, Inc. on November 7, 2016. This, the sixth edition of the NGV fuel container standard, was approved by the American National Standards Institute, Inc. on January 28, 2019.

CSA/ANSI NGV 2:19
Compressed natural gas vehicle fuel containers

1 Scope

1.1 General

This Standard contains requirements for the material, design, manufacture, and testing of serially produced, refillable Type NGV 2 containers intended only for the storage of compressed natural gas for vehicle operation. These containers are to be permanently attached to the vehicle. This Standard applies to containers up to and including 1000 L (35.4 ft^3) water capacity.

1.2 Container type

1.2.1

Type NGV 2 containers are designated as follows:

a) Type 1: metal;
b) Type 2: resin-impregnated continuous filament with metal liner with a minimum burst pressure of 125% of service pressure. The container is hoop-wrapped;
c) Type 3: resin-impregnated continuous filament with metal liner. The container is full-wrapped; and
d) Type 4: resin-impregnated continuous filament with a nonmetallic liner.

1.2.2

Conformable container types are designated as follows:

a) CT1: container or assembly of a non-spherocylindrical or non-spherical (i.e., irregular) shape without a protective shell (i.e., outside wall containing gas pressure);
b) CT2: container or assembly of possibly irregular shape within a conformable protective shell that is acting as a shield and not directly assisting the inner container with containing gas pressure; and
c) CT3: container or assembly of possibly irregular shape within a conformable protective shell that is acting as a shield and directly assisting the inner container with containing gas pressure.

The conformable container types are an additional identifier that is used in combination with the container type. A conformable tank is designated based on the design as a Type 1 (metal) to Type 4 (resin-impregnated continuous filament with a nonmetallic liner) with the additional conformable type identifier. For example, a Type 4 CT2 container would be required to meet the criteria for a Type 4 container as well as the criteria specified for a CT2 container.

1.3 Alternative construction or materials

All specifications as to construction or materials set forth herein may be satisfied by the construction or materials actually prescribed or such other construction or materials that will provide at least equivalent level of performance. Additional tests may be required to evaluate potential failure modes that pertain to new construction or materials that are not specifically addressed in this Standard.

