



# CSA/ANSI NGV 3.1:20

National Standard of Canada  
American National Standard



## Fuel system components for compressed natural gas powered vehicles



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# Contents

Interprovincial Gas Advisory Council	7
Technical Committee on Natural Gas Transportation	9
Subcommittee on Onboard Vehicle Components for Natural Gas Vehicles	12
Preface	15
<b>0 History of the development of CSA/ANSI NGV 3.1</b>	<b>17</b>
<b>1 Scope</b>	<b>19</b>
<b>2 Reference publications</b>	<b>21</b>
<b>3 Definitions</b>	<b>24</b>
<b>4 Construction and assembly</b>	<b>26</b>
4.1 General	26
4.2 Electrical equipment and wiring	26
4.3 Component literature	27
4.4 Marking	27
4.4.1 Marking information	27
4.4.2 Marking methods	28
4.5 Gas composition	28
<b>5 Test methods (general)</b>	<b>28</b>
5.1 General test specifications	28
5.2 Hydrostatic strength	30
5.3 Leakage	30
5.3.1 General	30
5.3.2 External leakage	30
5.3.3 Internal leakage	31
5.3.4 Test conditions	31
5.4 Excess torque resistance	31
5.5 Bending moment	32
5.6 Continuous operation	33
5.6.1 Specific components	33
5.6.2 Other components	33
5.7 Corrosion resistance	34
5.7.1 General	34
5.7.2 Salt spray exposure	35
5.7.3 Accelerated cyclic corrosion	35
5.8 Atmospheric exposure test	37
5.8.1 General	37
5.8.2 Oxygen aging	37
5.8.3 Ozone	38
5.9 Abnormal electrical voltages	38

5.10	Non-metallic material immersion	38
5.10.1	General	38
5.10.2	Natural gas exposure	38
5.10.3	Compressor oil exposure	38
5.11	Vibration resistance	39
5.12	Stress corrosion cracking resistance	39
5.13	Insulation resistance	39
5.14	Ultraviolet resistance of external surfaces	40
5.14.1	General	40
5.14.2	Pass criteria	40
5.15	Automotive fluid exposure	40
5.15.1	General	40
5.15.2	Method	40
5.15.3	Fluids	40
5.15.4	Pass criteria	40
5.16	Resistance to dry heat for vulcanized or thermoplastic rubbers	41
<b>6</b>	<b>Quality assurance</b>	<b>41</b>
6.1	General	41
6.2	Quality system	41
6.3	Independent inspection	41
6.3.1	General	41
6.3.2	System audit	41
6.4	Supplier quality systems	41
6.5	Failure Modes and Effects Analysis (FMEA)	42
<b>7</b>	<b>Inspection and acceptance testing</b>	<b>42</b>
7.1	Inspection and acceptance testing plan	42
7.2	Inspector's responsibilities	42
7.3	Inspection of system critical components	42
7.4	Leak testing	42
<b>8</b>	<b>Check valves</b>	<b>42</b>
8.1	Scope	42
8.2	Marking	43
8.3	Construction and assembly	43
8.4	Tests	43
8.4.1	General	43
8.4.2	Leakage	44
8.4.3	Continuous operation	44
<b>9</b>	<b>Manual valves</b>	<b>44</b>
9.1	Scope	44
9.2	Marking	44
9.3	Construction and assembly	45
9.4	Tests	45
9.4.1	General	45
9.4.2	Continuous operation	46
9.4.3	Operating torque	47



9.4.4	Valve stem retention	47
<b>10</b>	<b>Manual container valves</b>	<b>48</b>
10.1	Scope	48
10.2	Marking	48
10.3	Construction and assembly	48
10.4	Tests	49
10.4.1	General	49
10.4.2	Continuous operation	49
10.4.3	Operating torque	50
10.4.4	Valve stem retention	50
<b>11</b>	<b>Automatic valves and automatic container valves</b>	<b>50</b>
11.1	Scope	50
11.2	Marking	50
11.3	Component literature	51
11.4	Construction and assembly	51
11.5	Tests	52
11.5.1	General	52
11.5.2	Continuous operation	52
<b>12</b>	<b>Gas injectors</b>	<b>52</b>
12.1	Scope	52
12.2	Marking	53
12.3	Construction and assembly	53
12.4	Tests	53
12.4.1	General	53
12.4.2	Pneumatic strength	54
12.4.3	Continuous operation	54
12.4.4	Extreme temperature cycling	54
12.4.5	Insulation resistance	55
<b>13</b>	<b>Pressure indicators</b>	<b>55</b>
13.1	Scope	55
13.2	Marking	56
13.3	Construction and assembly	56
13.4	Tests	56
13.4.1	General	56
13.4.2	Continuous operation	57
<b>14</b>	<b>Pressure regulators</b>	<b>57</b>
14.1	Scope	57
14.2	Marking	57
14.3	Construction and assembly	57
14.4	Tests	58
14.4.1	General	58
14.4.2	Hydrostatic strength	59
14.4.3	External leakage	59
14.4.4	Continuous operation	59

14.4.5	Pressure impulse	60
14.4.6	Water jacket freezing	60
<b>15</b>	<b>Gas flow adjusters</b>	<b>60</b>
15.1	Scope	60
15.2	Marking	61
15.3	Construction and assembly	61
15.4	Tests	61
15.4.1	General	61
15.4.2	Hydrostatic strength	62
15.4.3	External leakage	62
15.4.4	Continuous operation	62
<b>16</b>	<b>Gas/air mixers</b>	<b>62</b>
16.1	Scope	62
16.2	Marking	62
16.3	Construction and assembly	63
16.4	Tests	63
16.4.1	General	63
16.4.2	Hydrostatic strength	64
16.4.3	External leakage	64
16.4.4	Continuous operation	64
<b>17</b>	<b>Pressure relief valves</b>	<b>64</b>
17.1	Scope	64
17.2	Marking	64
17.3	Construction and assembly	64
17.4	Tests	64
17.4.1	General	64
17.4.2	Hydrostatic strength	65
17.4.3	Continuous operation	65
17.4.4	Opening and reseating characteristics	66
<b>18</b>	<b>Pressure relief devices</b>	<b>66</b>
<b>19</b>	<b>Excess flow valves</b>	<b>66</b>
19.1	Scope	66
19.2	Marking	66
19.3	Construction and assembly	66
19.4	Tests	66
19.4.1	General	66
19.4.2	Internal leakage	67
19.4.3	Excess torque	67
19.4.4	Bending moment	67
19.4.5	Continuous operation	67
19.4.6	Pressure impulse	67
19.4.7	Operation	68
19.4.8	Hydrostatic testing	68

<b>20</b>	<b>Gas-tight housing and ventilation hoses and passages</b>	<b>68</b>
20.1	Scope	68
20.2	Marking	68
20.3	Construction and assembly	68
20.3.1	General	68
20.3.2	Inspection and acceptance testing	69
20.4	Tests	69
20.4.1	General	69
20.4.2	External leakage, ventilation hoses, and gas-tight housings	70
20.4.3	External leakage, ventilation passages of pressure-retaining components	70
20.4.4	Venting ability and pressure retention	70
20.4.5	Pull-off	70
<b>21</b>	<b>Rigid fuel lines</b>	<b>71</b>
21.1	Scope	71
21.2	Marking	71
21.3	Construction and assembly	71
21.4	Tests	71
21.4.1	General	71
21.4.2	Continuous operation	72
21.4.3	Bending	72
<b>22</b>	<b>Flexible fuel lines, hoses, and assemblies</b>	<b>73</b>
22.1	Scope	73
22.2	Marking	73
22.3	Construction, assembly, and installation instructions	74
22.3.6	Conductivity	75
22.4	Tests	75
22.4.1	General	75
22.4.2	Hydrostatic strength	76
22.4.3	Leakage	77
22.4.4	Continuous operation — Vehicle hoses	77
22.4.5	Corrosion resistance	78
22.4.6	Atmospheric exposure test	78
22.4.7	Non-metallic material immersion	78
22.4.8	Vibration test	80
22.4.9	Electrical conductivity	81
22.4.10	Kink resistance — Hoses	81
22.4.11	Marking material legibility	82
22.4.12	Automotive fluid exposure	83
22.4.13	Verification of hose cover perforations	84
22.4.14	Hose permeation	84
22.4.15	Tensile test of hose assembly	86
<b>23</b>	<b>Filter</b>	<b>86</b>
23.1	Scope	86
23.2	Marking	86
23.3	Construction and assembly	86
23.4	Tests	87

23.4.1	General	87
23.4.2	Continuous operation	87
23.4.3	Hydrostatic testing	87
<b>24</b>	<b>Fitting</b>	<b>87</b>
24.1	Scope	87
24.2	Marking	88
24.3	Construction and assembly	88
24.4	Tests	88
24.4.1	General	88
24.4.2	Continuous operation	89
24.4.3	Repeated assembly	89
<b>25</b>	<b>Non stainless-steel rigid fuel lines</b>	<b>89</b>
<b>26</b>	<b>Discharge line closures</b>	<b>89</b>
26.1	Scope	89
26.2	Markings	89
26.3	Construction and assembly	90
26.3.1	General	90
26.3.2	Inspection and acceptance testing	90
26.4	Tests	90
26.4.1	General	90
26.4.2	Leakage venting	91
26.4.3	Continuous operation	91
26.4.4	Water jet protection	91

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Annex A (informative)	— Extreme thermal cycling test	93
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# Preface

This is the fourth edition of CSA/ANSI NGV 3.1, *Fuel system components for compressed natural gas powered vehicles*. It supersedes the previous editions published in 2014, 2012, and 1995 as ANSI NGV 3.1 • CSA 12.3.

The major changes to this edition include the following:

- a) References have been updated.
- b) Editorial/notation changes have been made to improve readability.
- c) Notes have been added for guidance.
- d) Technical changes have been made to the following Clauses: [5.3.3](#), [5.4](#), [5.5](#), [5.7.3.3](#), [5.11](#), [7.3](#), [7.4](#), [10.4.2](#), [14.4.4](#), [14.4.6](#), and [16.4.4.2](#).
- e) The following new Clauses have been added: [5.16](#), [6.5](#), [9.4.3.1](#), [9.4.4](#), [10.4.4](#), [11.3](#), [11.4.4](#), [11.4.5](#), [15.4.4.3](#), [19.4.6](#), [19.4.8](#), and [21.4.2](#).

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 Code.

This Standard was prepared by the Subcommittee on Onboard Vehicle Components for Natural Gas Vehicles, 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 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.

## 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](mailto: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.*

*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](http://standardsactivities.csa.ca).*

- 5) *This Standard is subject to review within five years from the date of publication. 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](mailto: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.*

# *CSA/ANSI NGV 3.1:20*

## *Fuel system components for compressed natural gas powered vehicles*

### **0 History of the development of CSA/ANSI NGV 3.1**

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

In 1984 there was a growing need in the U.S. natural gas vehicle industry for guidelines pertaining to the assembly of aftermarket equipment installed on motor vehicles in order to operate alternatively on either gasoline or natural gas. The American Gas Association Laboratories (AGAL), in response to this need, developed an A.G.A. Requirement for Natural Gas Vehicle (CNG) Conversion Kits, No. 1-85. This requirement was intended to help promote the safe development and installation of NGV conversion systems by manufacturers and installers. The first draft of A.G.A. Requirement No. 1-85 was developed during 1984 and 1985, with the final version dated August 20, 1985.

At the time of its issuance, A.G.A. No. 1-85 was in compliance with NGV equipment and fuelling stations specifications published by the National Fire Protection Association (NFPA) under its Standard for Compressed Natural Gas (CNG) Vehicular Fuel Systems, NFPA 52. The first edition of NFPA 52 was issued in 1984. A second edition was issued in 1988.

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

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 was established to achieve the goal 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.

Subsequently, the third edition of NFPA 52 was published in 1992. This edition incorporated many changes developed and recommended by the NGV Coalition's task groups.

During August 1992, an NGV Conversion Equipment Task Group was established to coordinate with the AGAL for requirements for compressed NGV conversion kits. The task group agreed the phrase "NGV fuel system" should replace "NGV conversion kits". (An NGV fuel system is comprised of all major components required to supply, manage, and/or control fuel flow, enabling a vehicle to operate on natural gas.) The task group continued to meet during August, October, and December 1992 to promulgate the development of a standard to cover both dedicated and bi-fuel natural gas systems for light and medium duty vehicles.

A standard for NGV fuel system components existed in Canada, the National Standard of Canada CAN/CGA-12.3, *Fuel System Components for Natural Gas Powered Vehicles*. The genesis for this Canadian document was the Amendment to the 1982 CGA B149.1 *Natural Gas Installation Code* which added to the Code provisions for Natural Gas for Vehicles (NGV) fuel system components on highway

vehicles, as well as coverage of NGV refuelling stations. Subsequently, these NGV aspects evolved into stand-alone Canadian documents, one being the CAN/CGA-12.3 which was first published in February 1991.

In order to further common goals for North American harmonization, the task group and the Canadian Gas Association (CGA) NGV Steering Committee on Natural Gas Powered Vehicles initiated formation of a joint activity involving the CGA Steering Committee's Subcommittee on Fuel System Components for Natural Gas Powered Vehicles and the Coalition's NGV Conversion Equipment Task Group.

On February 17, 1993, the first joint meeting of the NGV Conversion Equipment Task Group and the CGA 12.3 Standards Subcommittee on *Fuel System Components for Natural Gas Powered Vehicles* was held. As a result, the U.S. Task Group and Canadian Subcommittee agreed to establish the Joint NGVC/CGA Subcommittee on Natural Gas Vehicle Conversion Equipment, to develop harmonized requirements for a North American Bi-National standard. The newly established subcommittee agreed to proceed with harmonization of the Canadian Standard for *Fuel System Components for Natural Gas Powered Vehicles*, CAN/CGA-12.3, which was first published in February 1991, and A.G.A. Requirement 1-85. In light of the different approaches in Canada and the U.S. (i.e., systems vs. components), the joint subcommittee agreed that separate harmonized standards be developed for both complete fuel systems and individual system components. Two joint working groups were established to draft the standards requirements for NGV conversion fuel system components and NGV conversion fuel systems, for consideration and final approval by the joint subcommittee.

A standard was prepared by the Joint U.S./Canadian Conversion Component Working Group during several meetings over a period of two years and involved four drafts.

At its July 1994 meeting, the Joint NGVC/CGA Conversion Equipment Subcommittee reviewed and modified the fourth draft of the proposed harmonized standard and voted affirmatively to initiate an ANSI Canvass Ballot and Canadian Public Review and Comment to initiate national recognition and approval of the standard.

During August 1994, the A.G.A. Laboratories and Canadian Gas Association initiated a 60 day ANSI Canvass Ballot and Canadian Public Review and Comment of proposed AGA NGV 3.1/CGA 12.3 — Draft 5. At its November 29, 1994 meeting, the joint subcommittee considered and resolved all comments and criticisms received during public review and accepted several minor editorial modifications of the draft.

The first edition of the harmonized U.S./Canadian Standard for *Fuel System Components for Natural Gas Powered Vehicles* was approved by the American National Standards Institute, Inc. on May 10, 1995, the CGA NGV Standards Steering Committee on Natural Gas Vehicles and Fuelling on April 17, 1995, and by the Canadian Interprovincial Gas Advisory Council (IGAC) on June 16, 1995.

In 2007, in response to industry requests, the standard was revised and rewritten in its entirety, and was published as the second edition of ANSI NGV 3.1 • CSA 12.3.

The second edition of the Standard for *Fuel System Components for Compressed Natural Gas Powered Vehicles* was approved by the American National Standards Institute, Inc. on February 14, 2012, and by the Harmonized Joint Automotive Technical Committee on March 25, 2010.

The third edition of the Standard for *Fuel system components for compressed natural gas powered vehicles* was approved by the American National Standards Institute, Inc. on February 25, 2014, the Joint Automotive Technical Committee on February 20, 2014, the Technical Committee on Natural Gas



Powered Vehicles and Fuelling on January 24, 2014, and by the Canadian Interprovincial Gas Advisory Council (IGAC) on February 27, 2014.

This, the fourth edition of this Standard, was prepared by the Subcommittee on Onboard Vehicle Components for Natural Gas Vehicles, 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, the Interprovincial Gas Advisory Council, the Standards Council of Canada, and the American National Standards Institute.

Previous editions of this Standard are as follows:

ANSI/AGA NGV 3.1-1995/CGA 12.3-M95  
ANSI NGV 3.1-2014 • CSA 12.3-2014

ANSI NGV 3.1-2012 • CSA 12.3-2012

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

CSA/ANSI NGV 3.1:20

## 1 Scope

### 1.1

This Standard establishes requirements for newly produced compressed natural gas fuel system components, intended for use on natural gas powered vehicles, as listed in Table 1.

**Table 1**  
**Fuel system components**  
(See Clauses [1.1](#) and [1.5](#).)

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Check valves
Manual valves
Manual container valves
Automatic valves
Gas injectors
Pressure indicators
Pressure regulators
Gas flow adjusters
Gas/air mixers
Pressure relief valves
Pressure relief devices
Excess flow valves
Gas-tight housing and ventilation hoses
Rigid fuel lines
Flexible fuel line, hoses, and assemblies
Filters
Fittings
Discharge line closures

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