



**CSA B401.1:21**  
National Standard of Canada



# Natural gas vehicle (NGV) maintenance facilities code



scc  ccn

# Legal Notice for Standards

Canadian Standards Association (operating as “CSA Group”) develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

## Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document’s fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party’s intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document’s compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

## Intellectual property rights and ownership

As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group’s and/or others’ intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by treaty or by law, CSA Group reserves all intellectual property rights in this document.

## Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

## Authorized use of this document

This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF form.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way, or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA Group; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



# ***Revision History***

**CSA B401.1:21, Natural gas vehicle (NGV) maintenance facilities code**

<b>Administrative update — March 2021</b>
National Standard of Canada page: French version now available

Currently in preview, click buy full version

# ***Standards Update Service***

## ***CSA B401.1:21 January 2021***

**Title:** *Natural gas vehicle (NGV) maintenance facilities code*

To register for e-mail notification about any updates to this publication

- go to [www.csagroup.org/store/](http://www.csagroup.org/store/)
- click on **Product Updates**

The **List ID** that you will need to register for updates to this publication is **24285**.

If you require assistance, please e-mail [techsupport@csagroup.org](mailto:techsupport@csagroup.org) or call 416-747-2233.

Visit CSA Group's policy on privacy at [www.csagroup.org/legal](http://www.csagroup.org/legal) to find out how we protect your personal information.

**Canadian Standards Association (operating as “CSA Group”)**, under whose auspices this National Standard has been produced, was chartered in 1919 and accredited by the Standards Council of Canada to the National Standards system in 1973. It is a not-for-profit, nonstatutory, voluntary membership association engaged in standards development and certification activities.

CSA Group standards reflect a national consensus of producers and users — including manufacturers, consumers, retailers, unions and professional organizations, and governmental agencies. The standards are used widely by industry and commerce and often adopted by municipal, provincial, and federal governments in their regulations, particularly in the fields of health, safety, building and construction, and the environment.

Individuals, companies, and associations across Canada indicate their support for CSA Group’s standards development by volunteering their time and skills to Committee work and supporting CSA Group’s objectives through sustaining memberships. The more than 7000 committee volunteers and the 2000 sustaining memberships together form CSA Group’s total membership from which its Directors are chosen. Sustaining memberships represent a major source of income for CSA Group’s standards development activities.

CSA Group offers certification and testing services in support of and as an extension to its standards development activities. To ensure the integrity of its certification process, CSA Group regularly and continually audits and inspects products that bear the CSA Group Mark.

In addition to its head office and laboratory complex in Toronto, CSA Group has regional branch offices in major centres across Canada and inspection and testing agencies in eight countries. Since 1919, CSA Group has developed the necessary expertise to meet its corporate mission: CSA Group is an independent service organization whose mission is to provide an open and effective forum for activities facilitating the exchange of goods and services through the use of standards, certification and related services to meet national and international needs.

For further information on CSA Group services, write to  
CSA Group  
178 Rexdale Boulevard  
Toronto, Ontario, M9W 1R3  
Canada

A National Standard of Canada is a standard developed by a Standards Council of Canada (SCC) accredited Standards Development Organization, in compliance with requirements and guidance set out by SCC. More information on National Standards of Canada can be found at [www.scc.ca](http://www.scc.ca).

SCC is a Crown corporation within the portfolio of Innovation, Science and Economic Development (ISED) Canada. With the goal of enhancing Canada’s economic competitiveness and social well-being, SCC leads and facilitates the development and use of national and international standards. SCC also coordinates Canadian participation in standards development, and identifies strategies to advance Canadian standardization efforts.

Accreditation services are provided by SCC to various customers, including product certifiers, testing laboratories, and standards development organizations. A list of SCC programs and accredited bodies is publicly available at [www.scc.ca](http://www.scc.ca).

Standards Council of Canada  
600-55 Metcalfe Street  
Ottawa, Ontario, K1P 6L5  
Canada



Cette Norme Nationale du Canada est disponible en versions française et anglaise.

*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 to judge its suitability for their particular purpose.*

*\*A trademark of the Canadian Standards Association, operating as “CSA Group”*

*National Standard of Canada*

*CSA B401.1:21*

***Natural gas vehicle (NGV)  
maintenance facilities code***

**IGAC**

*Interprovincial Gas Advisory Council*



*®A trademark of the Canadian Standards Association, operating as "CSA Group"*



*Approved on November 27, 2020 by IGAC  
Published in January 2021 by CSA Group  
A not-for-profit private sector organization  
178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3*

*To purchase standards and related publications, visit our Online Store at [www.csagroup.org/store/](http://www.csagroup.org/store/)  
or call toll-free 1-800-463-6727 or 416-747-4044.*

*ICS 91.140.01  
ISBN 978-1-4883-3224-1*

*© 2021 Canadian Standards Association  
All rights reserved. No part of this publication may be reproduced in any form whatsoever  
without the prior permission of the publisher.*

# Contents

Interprovincial/Territorial Gas Advisory Council (IGAC)	3
Technical Committee on Natural Gas Transportation	5
Subcommittee on Vehicle Maintenance Facilities Code	8
Preface	10

## 1 Scope 11

1.1	Inclusions	11
1.1.1	Vehicle maintenance	11
1.1.2	Vehicle parking	11
1.1.3	Parking structure requirements	11
1.2	Exclusions	11
1.3	Purpose	11
1.4	Terminology	11
1.5	Units of record	11
1.6	Gauge pressure	12
1.7	Mandatory language	12

## 2 Reference publications 12

## 3 Definitions 14

## 4 General requirements 19

4.1	Compliance	19
4.2	Retroactivity	19
4.3	Performance-based requirements	19
4.4	Building construction requirements	19
4.5	Vehicle maintenance facility area assignment	20
4.5.1	Facility space	20
4.5.2	Assignment criteria — CNG vehicles	20
4.5.3	Assignment of CNG vehicles	20
4.5.4	Assignment criteria — LNG vehicles	20
4.5.5	Assignment of LNG vehicles	21
4.6	Signage	21
4.6.1	CNG/LNG signage	21
4.6.2	Safety equipment signage	21
4.7	Qualifications	21
4.7.1	Design	21
4.7.2	Construction and installation	21
4.7.3	Operation and maintenance	21

## 5 Facility requirements 22

5.1	Roof and ceilings — Major and minor repair spaces	22
5.1.1	Gas leak movement obstruction	22
5.1.2	Gas leak entrapment	22

5.2	Separation provisions	22
5.2.1	Walls and partitions	22
5.2.2	Fire resistance	23
5.2.3	Penetrations	23
5.2.4	Hinged doors	23
5.2.5	Roll-up doors	23
5.2.6	Windows	23
5.3	Pits, floors, and drains	23
5.3.1	Pits	23
5.3.2	Pit supports	23
5.3.3	Egress from pits	23
5.3.4	Floor drains	24
5.4	Means of egress	24
5.5	Electrical classification	24
5.5.1	Hazardous area classifications	24
5.5.2	Additional requirements for major repair areas	24
5.6	Heating, ventilating, and air conditioning (HVAC)	25
5.6.1	Cross ventilation	25
5.6.2	Purge ventilation	25
5.6.3	Normal ventilation	27
5.6.4	Heating and air conditioning	27
5.6.5	Fired heating equipment	28
5.7	Other sources of ignition	29
5.8	Detection and alarms for gas, fire, fire-suppression, safety, and security systems	29
5.8.1	Gas-detection and -alarm systems	29
5.8.2	Gas safety system controls	31
5.8.3	Gas safety system testing, commissioning, and periodic inspection	32
5.8.4	Fire-detection and fire-alarm systems, and fire-suppression systems	33
5.9	Defuelling and captive venting equipment installation	33
5.9.1	General	33
5.9.2	Defuelling equipment	33
5.9.3	LNG captive vent equipment	34

---

Annex A (informative) — Operation, maintenance, and training — CNG vehicle maintenance facilities 39

Annex B (informative) — Operation, maintenance, and training — LNG vehicle maintenance facilities 47

Annex C (informative) — Work safe/emergency response procedures — CNG and LNG vehicle maintenance facilities 55

Annex D (informative) — Enclosed parking structures — CNG and LNG 59

Annex E (informative) — Commentary 61

# Preface

This is the first edition of CSA B401.1, *Natural gas vehicle (NGV) maintenance facilities code*. It supersedes previous edition published in 2018 as CSA B401 under the title *Vehicle maintenance facilities code*.

The following are the major changes to this edition:

- a) addition of coverage to address maintenance facilities for propane vehicles. This led the creation of separate codes to address different fuel types: CSA B401.1 for natural gas and CSA B401.2 for propane;
- b) addition of Annex **D** for private enclosed parking structures;
- c) information in Annex D from the 2018 edition relocated to new Annex **E**; and
- d) addition of Annex **E**, a commentary, to provide additional guidance to users of this Code.

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

This Code was prepared by the Subcommittee on Vehicle Maintenance Facilities Code, 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/Territorial Gas Advisory Council.

This Code has been developed in compliance with Standard Council of Canada requirements for National Standards of Canada. It has been published as a national standard of Canada by CSA Group.

## 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 Code is stated in its Scope, it is important to note that it remains the responsibility of the users of the Code to judge its suitability for their particular purpose.*
- 3) *This Code 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 in full agreement with all clauses of this Code.*
- 4) *To submit a request for interpretation of this Code, 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 Code 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) *Code designation (number);*
  - b) *relevant clause, table, and/or figure number;*
  - c) *wording of the proposed change; and*
  - d) *rationale for the change.*

# CSA B401.1:21

## Natural gas vehicle (NGV) maintenance facilities code

### 1 Scope

**Note:** See Annex E for explanatory material.

#### 1.1 Inclusions

##### 1.1.1 Vehicle maintenance

This Code applies to the portions of a motor vehicle maintenance facility where natural-gas-fuelled vehicles are maintained, repaired, or stored during maintenance or repair, including areas and systems ancillary thereto.

**Note:** See Annex E for explanatory material.

##### 1.1.2 Vehicle parking

This Code also contains information on private parking structures where natural gas fuelled vehicles are parked or stored, including areas and systems ancillary thereto. See Annex D.

##### 1.1.3 Parking structure requirements

For purposes of this Code, private parking structures have the same requirements as minor repair areas.

#### 1.2 Exclusions

The scope of this Code does not include

- a) indoor or outdoor refuelling operations;
- b) open parking structures;
- c) public parking structures of any construction; or
- d) other fuels used for vehicles.

#### 1.3 Purpose

The purpose of this Code is to provide reasonable means to manage the risks associated with the maintenance and repair of vehicles fuelled with compressed natural gas (CNG) or liquefied natural gas (LNG) inside motor vehicle maintenance facilities.

**Note:** See Annex E for explanatory material.

#### 1.4 Terminology

The terms “fuelling” and “refuelling” are used interchangeably in this Code. The terms “park” and “store” and all derivatives thereof are used interchangeably in this Code.

#### 1.5 Units of record

The values given in SI units are the units of record for the purposes of this Code. The values given in parentheses are for information and comparison only.

**Notes:**

- 1) IEEE/ASTM SI 10 or ISO 80000-1 can be used as a guide when converting Imperial units to metric units.