



Natural gas and propane code handbook

CSA B149HB:20

Currently in preview, click buy full version



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.



Standards Update Service

CSA B149HB:20 January 2020

Title: *Natural gas and propane code handbook*

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

- go to store.csagroup.org
- click on **Product Updates**

The **List ID** that you will need to register for updates to this publication is **24277-1**

If you require assistance, please e-mail techsupport@csagroup.org or call 419-747-2233.

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

CSA B149HB:20
***Natural gas and propane code
handbook***



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

*Published in January 2020 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 store.csagroup.org
or call toll-free 1-800-463-6727 or 416-747-4044.*

ISBN 978-1-4883-2629-5

*© 2020 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

Preface 5

4.1 Application 6

- 4.2 Approval of appliances, accessories, components, equipment, and materials 6
- 4.3 Responsibilities of the installer 7
- 4.4 Training and quality of labour 8
- 4.5 Suitability of use 9
- 4.6 Meter and service regulator installations 9
- 4.7 Electrical connections and components 10
- 4.8 Mobile homes 10
- 4.9 Hazardous locations 11
- 4.10 Smoking 11
- 4.11 Isolation of safety devices 12
- 4.12 Leak detection 12
- 4.14 Accessibility 15
- 4.15 Outdoor installations 18
- 4.16 Appliances in garages 19
- 4.17 Appliance ductwork connections 20
- 4.18 Combined heating systems 20
- 4.19 Appliances protected by automatic fire-extinguishing systems 21
- 4.20 Control of appliances with self-energized pilots 22
- 4.21 Defective heat exchangers 22
- 4.22 High-altitude installations 22
- 4.23 Protection of appliances from physical damage 22
- 4.24 Odorization 23
- 4.25 Mobile homes and recreational vehicles 24

5 Pressure Controls 24

- 5.1 Gas pressure system 25
- 5.2 Pressure regulators 26
- 5.3 Relief devices 30
- 5.4 Hydrostatic relief device for propane applications 31
- 5.5.6 to 5.5.11 33
- 5.6 Appliance and pilot pressure regulators 33

6 Piping and tubing systems, gas hose, and fittings 34

- 6.1 General 35
- 6.2 Materials 35
- 6.3 Size 40
- 6.4 Volume of gas to be used for sizing piping and tubing systems 42
- 6.5 Allowable pressure and pressure drop 42
- 6.6 Extensions 42
- 6.7 Location 43
- 6.8 Piping practices 44
- 6.9 Joints and connections 47
- 6.10 Branch piping outlets 47

6.11	Appliance connections	47
6.12	Piping outlets	48
6.13	Drip and dirt pockets	49
6.14	Prohibited practices	51
6.15	Underground piping and tubing	52
6.16	Protection of piping and tubing	54
6.17	Identification of piping or tubing	56
6.18	Manual shut-off valves	57
6.19	Manual-reset valves	60
6.20	Gas hose and fittings	61
6.21	Gas connectors	61
6.22	Testing of piping, tubing, hose, and fittings	62
6.23	Purging of piping and tubing systems and hose after leak testing	62
6.24	Purging gas from a piping or tubing system	63
6.25	Rooftop gas piping and tubing	63
6.26	Inspection	64
6.27	Highway vehicles, recreational vehicles, outdoor food service units, and wash mobiles	64
7.1	Boilers	65
7.3	Carbon dioxide generators	67
7.4	Commercial-type clothes dryers	67
7.5	Domestic-type clothes dryer	69
7.6	Conversions	70
7.7	Conversion burners	70
7.8	Conversion of warm air furnaces	71
7.9	Conversion of ranges	72
7.10	Counter appliances	73
7.11	Direct-vent appliances	73
7.12	Furnaces used with cooling units	73
7.13	Central furnaces	73
7.14	Downflow furnaces	74
7.15	Duct furnaces	75
7.16	Horizontal furnaces	76
7.17	Wall furnaces (recessed heaters)	76
7.18	Construction heaters and torches	77
7.19	Direct-fired door and heaters	77
7.20	Direct-fired make-up air heaters	78
7.21	Non-recirculating direct-gas-fired industrial air heaters	80
7.22	Direct-gas-fired process air heaters	80
7.24	Room heaters	82
7.25	Decorative appliances and gas logs	83
7.26	Pool heaters	83
7.27	Water heaters	85
7.28	Unit heaters	85
7.29	Hotplates	86
7.30	Incinerators	86
7.31	Lighting	86
7.32	Commercial cooking appliances	86
7.33	Residential-type ranges	88
7.34	Refrigerators	89

Preface

This is the sixth edition of CSA's B149HB, *Natural gas and propane code handbook*. It supersedes the previous editions, published in 2015, 2005, 2000, 1995, and 1991 by CSA.

In 1991, members of the natural gas and propane industry recommended that an appliance installation Code handbook be written. This recommendation included a suggestion that the handbook provide clarification of Code requirements. Regulatory documents, such as the Code, contain technical language conveying both legal and field-usage requirements, but the complexity of such language may at times diminish the clarity of the information communicated.

This Handbook serves as a means of clarifying Code requirements. The committee members who develop the Code have had experience with most of the information contained in this Handbook and this experience has served to facilitate their work. The content of the Handbook was derived primarily from submissions made to the CSA B149 Installation Code Committee from a variety of sources. Much of the background information for this Handbook, therefore, originated from requests for changes to the requirements of the Code. The background information provided with a proposal for a change to the Code may be used in future editions of this Handbook. It is, therefore, important that the intent and rationale for any proposal be clear.

The scope of coverage in this edition has been expanded. It now addresses some of the content of CAN/CSA B149.2-15, *Propane storage and handling code*, specifically related to typical propane applications but excluding industrial applications, such as bulk storage.

CSA acknowledges the contribution of the Handbook's key author, Ted Kesik of Knowledge Mapping Inc. Jean-François Bussi eres, Barry Cavens, Brad Diggins, Casey LaRose, Bob Pattison, Gary Potter, George Prociw, John Marshall, John McCormack, Ron McRae, David Stainrod, Dale C. Stewart, Ivo Svorinic, David Weishuhn, and Gord Williams reviewed the content prior to publication, and their contributions are gratefully acknowledged.

4.1 Application

The values given in yard/pound units are the standard. The B149.1 and B149.2 Codes contain SI (metric) equivalents to yard/pound units so that the Code can be used in SI (metric) units. As SI (metric) equivalents are approximate, imperial units of measurement must be used to determine compliance with Code requirements.

The manufacturer's certified instructions and the Code must be used when an appliance, accessory, component, equipment, or any other item is installed. Manufacturer's certified instructions are based on approved test methods intended to ensure that performance standards and code compliance are achieved.

Where a **conflict** exists between the manufacturer's certified installation instructions and the Code, the requirements of the Code must prevail unless otherwise approved by the **authority having jurisdiction**, for reasons of safety, performance, and enforceability.



When installing unfamiliar equipment (e.g., duct furnaces), check the applicable installation requirements in **Clause 7** to identify any conflicting requirements between the Code and the manufacturer's certified installation instructions. Where conflicts are identified, resolve these by contacting the authority having jurisdiction prior to installation.

4.2 Approval of appliances, accessories, components, equipment, and materials

The requirements of **Clause 4.2** are intended to establish the procedures for the approval of appliances, accessories, components, equipment, and materials for which they are employed.

Where an installation does not match Code requirements, permission in writing from the authority having jurisdiction is required. This permission applies only to the particular installation for which it is given because each situation may be different and what makes sense in one case may not make sense in another.

In some cases, an installation may require field assembly or construction of an appliance. Such cases always require prior approval of the authority having jurisdiction to ensure suitability and proper appliance performance. The field assembly or construction of appliances falls under CSA B149.3, *Code for the field approval of fuel-reducer components on appliances and equipment*.

Note: B149.3 applies only to appliances and equipment that are not approved.



Refer to **Clause 7** of the Code to determine whether a proposed installation is covered by these requirements. Where it is not, check to see if the application is covered by the manufacturer's certified installation instructions.

Consult with the authority having jurisdiction if the suitability of the installation is still unclear.