



Line pressure regulators



Legal Notice for Standards

Canadian Standards Association and CSA America, Inc. (operating as "CSA Group") develop standards through a consensus standards development process approved by the Standards Council of Canada and the American National Standards Institute. 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 license 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 format.

Limited copies of this document in printed 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 must 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

Revision from previous edition	Revision symbol (in margin)
Clauses 1.9 , 4.3 , 5.1.1 , 5.6 , and 5.10	Δ

Standards Update Service

CSA/ANSI Z21.80:19 • CSA 6.22:19
June 2019

Title: *Line pressure regulators*

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

- go to store.csagroup.org
- click on **CSA Update Service**

The **List ID** that you will need to register for updates to this publication is **242521**.

If you require assistance, please e-mail techsupport@csagroup.org or call 415-747-2233.

Visit CSA Group's policy on privacy at 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.

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.

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



Standards Council of Canada
Conseil canadien des normes

Cette Norme Nationale du Canada n’est disponible qu’en anglais.

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”*

CSA Group

The 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 Groups standards development by volunteering their time and skills to Committee work and supporting CSA Groups objectives through sustaining memberships. The more than 7000 committee volunteers and the 2000 sustaining memberships together form CSA Groups total membership from which its Directors are chosen. Sustaining memberships represent a major source of income for CSA Groups 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,
Canada M9W 1R3

American National Standards Institute

The American National Standards Institute (ANSI), Inc. is the nationally recognized coordinator of voluntary standards development in the United States through which voluntary organizations, representing virtually every technical discipline and every facet of trade and commerce, organized labor and consumer interests, establish and improve the some 10,000 national consensus standards currently approved as American National Standards.

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.
25 West 43rd Street, Fourth floor
New York, NY 10036

National Standard of Canada

CSA/ANSI Z21.80:19 • CSA 6.22:19 *Line pressure regulators*



*American National
Standards Institute, Inc.*



*®A trademark of the Canadian Standards Association
and CSA America Inc., operating as "CSA Group"*

IGAC

*Interprovincial
Gas Advisory Council*



Approved on February 4, 2019 by ANSI

Approved on October 20, 2018 by IGAC

Effective in Canada August 1, 2020

Published in June 2019 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.*

ICS 75.200

ISBN 978-1-4883-1508-4

© 2019 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 Gas Advisory Council (IGAC)	3
Z21/83 Technical Committee on Performance and Installation of Gas Burning Appliances and Related Accessories	5
Technical Committee on Gas Appliances and Related Accessories	9
Z21/CSA Joint Technical Subcommittee on Standards for Automatic Gas Controls	12
Preface	16
1 Scope	19
2 Reference publications	20
3 Definitions	21
4 Construction	23
4.1 General	23
4.2 Data to be furnished by the manufacturer	23
4.3 Assembly	23
4.4 Connections	23
4.5 Bolts and screws	26
4.6 Adjustments	26
4.7 Strength	27
4.8 Vent connections and vent limiters	27
4.9 Springs	27
4.10 Finish	27
4.11 Materials	27
4.12 Instructions	28
4.13 Marking	28
4.14 Overpressure protection devices	29
5 Performance	30
5.1 General	30
5.2 Test and reference gases	30
5.3 Test pressures	31
5.4 Leakage	31
5.5 Strength and deformation	32
5.5.1 Bending effort	32
5.5.2 Bending moment	33
5.6 Mounting regulator for test	35
5.7 Outlet pressure range	37
5.7.1 Adjustable regulators	37
5.7.2 Nonadjustable regulators	38
5.8 Range of regulation capacity	38
5.8.2 Nonadjustable regulators	38

5.8.3	Adjustable regulators	42
5.9	Regulator lockup pressure	42
5.10	Continued operation	42
5.11	Vent limiter venting rate	43
5.12	Marking material adhesion and legibility	44
6	Performance — Overpressure protection devices	45
6.2	General	45
6.3	Test and reference gases	45
6.4	Test pressures	45
6.5	Leakage	45
6.6	Strength and deformation	45
6.7	Mounting for test	45
6.8	Overpressure protection	46
6.9	Continued operation	47
6.9.1	Overpressure shutoff devices	47
6.9.2	Monitoring regulators	47
6.9.3	Overpressure relief devices	47
7	Manufacturing and production tests	48
8	Items unique to Canada	48

Annex A (informative) — Table of conversion factors	50
---	----

Preface

This is the fourth edition of CSA/ANSI Z21.80 • CSA 6.22, *Line pressure regulators*. It supersedes the previous editions published in 2011, 2003, and 1997.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was prepared by the Z21/CSA Joint Technical Subcommittee on Standards for Automatic Gas Controls under the jurisdiction of the Technical Committee on Gas Appliances and Related Accessories, the Z21/83 Technical Committee on Performance and Installation of Gas Burning Appliances and Related Accessories, and the Strategic Steering Committee for Fuels and Appliances and has been formally approved by the Technical Committee(s), American National Standards Institute, and the Interprovincial Gas Advisory Council.

Interpretations: The Strategic Steering Committee on Standards for Fuel Burning Appliances has provided the following direction for the interpretation of standards under its jurisdiction: “The literal text shall be used in judging compliance of products with the safety requirements of this Standard. When the literal text cannot be applied to the product, such as for new materials or construction, and when a relevant committee interpretation has not already been published, CSA Group’s procedures for interpretation shall be followed to determine the intended safety principle.”

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.

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 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.*
- 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 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;*
 - 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.

History of the Development of the Standard for Line Pressure Regulators

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

With the onset of the Free Trade Agreement between the United States and Canada on January 2, 1988, significant attention was given to the harmonization of the United States and Canadian safety standards addressing gas-fired equipment for residential, commercial, and industrial applications. It was believed that the elimination of the differences between the standards would remove potential trade barriers and provide an atmosphere in which North American manufacturers could market more freely in the United States and Canada. The harmonization of these standards was also seen as a step toward harmonization with international standards.

With the formation of joint subcommittees, a Canadian Gas Association Standards Steering Committee on Gas Burning Appliances and Related Accessories was established to parallel Accredited Standards Committees Z21 and Z83, and to support the formation of joint subcommittees. In accordance with American National Standards Institute procedures for joint subcommittees, operating procedures were developed and subsequently approved by ANSI on April 1, 1993.

During its July 12-13, 1994 meeting, the Joint Automatic Gas Controls Subcommittee adopted the harmonized draft standard for line pressure regulators, Z21.80 • CSA 6.22, for distribution for review and comment. The harmonized draft standard for line pressure regulators was based on American National Standard for Gas Appliance Pressure Regulators, ANSI Z21.18-1993.

During its August 15, 1995 meeting, the Automatic Gas Controls Subcommittee (formerly the Automatic Gas Controls Subcommittee and the Thermostat and Gas Ignition Systems Subcommittee) reconsidered the proposed draft harmonized standard in light of comments received. The proposed harmonized standard was revised and recommended to Accredited Standards Committee Z21 and the Canadian Standards Steering Committee for approval.

The Z21 Committee approved the proposed harmonized standard by letter ballot dated January 31, 1996, for submittal to the American National Standards Institute, Inc. The Canadian Standards Steering Committee approved the proposed harmonized standard by letter ballot dated May 8, 1996, for submittal to the Interprovincial Gas Advisory Council.

The Interprovincial Gas Advisory Council (IGAC) approved the proposed harmonized standard by letter ballot dated June 28, 1996. This, the first edition of the harmonized standard for line pressure regulators was approved as American National Standard by the American National Standards Institute, Inc. (ANSI) on March 13, 1997.

The second edition of the harmonized line pressure regulator standard was approved by the IGAC on August 25, 2003, and ANSI on November 14, 2002.

The third edition of the line pressure regulator standard was approved by the IGAC on April 1, 2011 and by ANSI on November 16, 2011.

This, the fourth edition of the harmonized Z21/CSA Standard for Line Pressure Regulators, was approved by the Canadian Interprovincial Gas Advisory Council on October 20, 2018, and by the American National Standards Institute, Inc., on February 4, 2019.

Previous editions of the harmonized line pressure regulator standard, and addenda thereto approved by the IGAC and ANSI are as follows:

ANSI Z21.80-1997 • CSA 6.22-M97 ANSI Z21.80a-2000 • CSA 6.22a-M00 ANSI Z21.80b-2000 • CSA 6.22b-2000	ANSI Z21.80-2003 • CSA 6.22-2003 ANSI Z21.80a-2005 • CSA 6.22a-2005 ANSI Z21.80b-2010 • CSA 6.22b-2010
ANSI Z21.80-2011 • CSA 6.22-2011 ANSI Z21.80a-2012 • CSA 6.22a-2012	

The following identifies the designation and year of this harmonized standard:

Note: This edition of Z21.80 • CSA 6.22 incorporates changes to the 2011 edition of Z21.80 • CSA 2.22 and addenda thereto. Changes are denoted by a delta in the margin.

CSA/ANSI Z21.80:19 • CSA 6.22:19

Line pressure regulators

1 Scope

1.1

This Standard applies to line pressure regulators (see Clause 3, Definitions), constructed entirely of new, unused parts and materials, hereinafter referred to as regulator(s), either individual or in combination with overpressure protection devices, hereinafter referred to as device(s), intended for application in gas piping systems between the service regulator, or LP-gas 2 psi (13.8 kPa) service regulator, and the gas utilization equipment.

1.2

This Standard applies to regulators for operation with natural, manufactured and mixed gases, liquefied petroleum gases, and LP gas-air mixtures.

1.3

This Standard applies to regulators classified in accordance with their intended application with reference to inlet and outlet pressures as follows:

Rated inlet pressure		Maximum outlet pressure			
		Class I		Class II	
2 psi	(13.8 kPa)	1/2 psi	(3.5 kPa)	—	—
5 psi	(34.5 kPa)	1/2 psi	(3.5 kPa)	2 psi	(13.8 kPa)
10 psi	(68.9 kPa)	1/2 psi	(3.5 kPa)	2 psi	(13.8 kPa)

1.4

The tests specified herein are conducted at a room temperature of 77 ± 10 °F (25 ± 5.5 °C). Regulators and vent limiters complying with the provisions of this Standard are considered as having an operating temperature range of 32 °F (0 °C) to 125 °F (51.5 °C). At the option of the manufacturer, a greater operating temperature range may be specified, in which case additional tests as outlined in Clause 5.4, Leakage, and Clause 5.10, Continued operation, will be conducted.

1.5

If a value for measurement as given in this Standard is followed by an equivalent value in other units, the first stated value is to be regarded as the specification.

1.6

All references to psi throughout this Standard are to be considered gauge pressures unless otherwise specified.