



Oil-fired steam and hot-water boilers



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 licence 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 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 B140.7:22

July 2022

Title: *Oil-fired steam and hot-water boilers*

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

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

The **List ID** that you will need to register for updates to this publication is **2429944**.

If you require assistance, please e-mail techsupport@csagroup.org or call 416-747-2233.

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.

More than 10 000 members indicate their support for CSA Group’s standards development by volunteering their time and skills to Committee work.

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 fourteen 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



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”

National Standard of Canada

CSA B140.7:22 ***oil-fired steam and hot-water boilers***



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



*Published in July 2022 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/
or call toll-free 1-800-463-6727 or 416-747-4044.*

*ICS 27.060.30
ISBN 978-1-4883-4233-2*

*© 2022 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

Technical Committee on Oil-Burning Appliance Standards	5
Preface	7
1 Scope	9
1.1 Application	9
1.2 Exception	9
1.3 Non-compliance	9
1.4 Terminology	9
1.5 Units of measurement	10
2 Reference publications	10
3 Definitions	11
4 General requirements	11
4.1 General	11
4.2 Oil burners	11
4.2.1 Compliance with CSA B140 series of Standards	11
4.2.2 Positive position and alignment	11
4.2.3 Enclosed burners	11
4.2.4 Installation and maintenance	11
4.3 Controls	11
4.3.1 Primary safety control	11
4.3.2 Safety limit control	11
4.3.3 Other controls	12
4.4 Additional requirements for condensing boilers	12
4.5 Methods of assembly and shipment	12
4.5.1 Components	12
4.5.2 Field assembly	12
4.6 Boilers for heating swimming pool water	12
4.7 Appliance tested with biodiesel content in excess of 5%	12
5 Construction	13
5.1 General	13
5.2 Accessibility of parts	13
5.2.1 Removeable parts	13
5.2.2 Accessibility for cleaning and soot removal	13
5.2.3 Accessibility for service and adjustment	13
5.3 Location of fuel lines and fuel components	13
5.4 Casings or jackets (where supplied)	13
5.4.1 Construction material	13
5.4.2 Access panels design	14
5.4.3 Panel interchangeability	14
5.5 Lubrication	14
5.5.1 General	14
5.5.2 Instructions	14

5.6	Flue-gas passages and vent (flue) collars	14
5.6.1	Boilers with an oil input of less than 117.2 kW (400 000 Btu/h)	14
5.6.2	Boilers with an oil input of 117.2 kW (400 000 Btu/h) or more and high-pressure boilers	14
5.7	Draft regulators	15
5.7.1	Application	15
5.7.2	Compliance with CSA B140.0	15
5.8	Primary and secondary heating surfaces	15
5.9	Observation of the flame zone	15
5.9.1	General	15
5.9.2	Permanently attached cover	15
5.10	Refractory materials	15
5.10.1	General	15
5.10.2	Accessibility and replacement	15
5.11	Metal combustion chambers	15
5.11.1	General	15
5.11.2	Mounting	15
5.11.3	Fatigue	16
5.12	Simulated life test	16
5.13	Simulated endurance test	16
5.14	Flue baffles and flame baffles	16
5.14.1	General	16
5.14.2	Removal and replacement	16
5.15	Insulating materials	16
5.15.1	General	16
5.15.2	Material properties	16
5.15.3	Support	16
5.16	Controls and fittings	17
5.16.1	General	17
5.16.2	Primary safety controls	17
5.16.3	Safety limit and operating controls	17
5.16.4	Burners	18
5.16.5	Safety low-water cut-off	18
5.16.6	Control circuits of safety controls	18
5.16.7	Safety and relief valves	19
5.16.8	Miscellaneous fittings	19
5.16.9	Additional requirements for boilers with an oil input of 117.2 kW (400 000 Btu/h) or more	19
5.16.10	Low-fire start	20
5.16.11	Pilot burners	20
5.16.12	Main burners	20
5.16.13	Explosion-relief doors	20
6	Marking	20
6.1	General	20
6.1.1	Compliance	20
6.1.2	Marking	21
6.2	Installation clearances	21
6.2.1	General	21
6.2.2	Service clearances	22
6.2.3	Installation clearances	22

6.3 Field-mounted burners 22

6.3.1 Packaging marking 22

6.3.2 Location 22

7 Instructions 22

7.1 General 22

7.1.1 Compliance with CSA B140.0 22

7.1.2 Supply of installation and operating instructions 22

7.2 Installation and service manual 23

7.3 Operating instructions and homeowner instructions 24

7.4 Service instructions 25

7.5 Additional homeowner instructions 25

8 Tests 25

8.1 General 25

8.1.1 Performance 25

8.1.2 Defects 25

8.1.3 Boiler set-up 26

8.1.4 Pre-testing conditions 26

8.1.5 Compliance with CSA B140.0 26

8.1.6 Test voltage 26

8.1.7 Fuel 26

8.2 Combustion 27

8.2.1 Test requirements 27

8.2.2 Test procedures 27

8.3 Gross output 28

8.3.1 Test requirements for rated output capacity 28

8.3.2 Test procedures 29

8.3.3 Determination of gross output 29

8.4 Safety limit control performance 31

8.4.1 Test requirements 31

8.4.2 Test procedures 31

8.5 Safety low-water cut-off control performance 32

8.5.1 Test requirements 32

8.5.2 Test procedures 32

8.6 Maximum operation temperatures 32

8.6.1 Test requirements 32

8.6.2 Test requirements for boilers with an oil input of less than 117.2 kW (400 000 Btu/h) 32

8.6.3 Test procedures 33

8.7 Other control tests 34

8.7.1 Test requirements 34

8.7.2 Test procedures 34

8.8 Voltage 34

8.9 Flooded pot burn-off (vapourizing burners) 34

8.9.1 General 34

8.9.2 Test conditions 34

8.9.3 Test result 34

8.10 Light-off 34

8.11 Seepage 35

8.12	Power failure	35
8.13	Vapourizing burners	35
8.14	Atomizing and wall-flame burners	35
8.15	Additional tests for condensing-type oil-fired boilers	35
8.15.1	Condensate removal system test — Blockage	35
8.15.2	Temperature limit test in the condensate collector box	35

Annex A (informative)	— Test enclosures	36
-----------------------	-------------------	----

Annex B (informative)	— Marking translations	38
-----------------------	------------------------	----

Technical Committee on Oil-Burning Appliance Standards

M. Mailvaganam	Toronto, Ontario, Canada <i>Category: General Interest</i>	<i>Chair</i>
R. Sumabat	Technical Standards & Safety Authority (TSSA), Toronto, Ontario, Canada <i>Category: Regulatory Authority</i>	<i>Vice-Chair</i>
R. Alqasrani	Technical and Corporate Services, Alberta Municipal Affairs, Edmonton, Alberta, Canada <i>Category: Regulatory Authority</i>	
C. Baumgartner	Natural Resources Canada, Ottawa, Ontario, Canada <i>Category: General Interest</i>	
M. Bouchard	Granby Industries LP, Cowansville, Québec, Canada	<i>Non-voting</i>
M. Evans	CSA Group, Toronto, Ontario, Canada <i>Category: User Interest</i>	
M. R. Freill	Mark 1 Engineering Limited, Dartmouth, Nova Scotia, Canada <i>Category: General Interest</i>	
S. Hazell	Wilson Fuel Co., Lower Sackville, Nova Scotia, Canada <i>Category: User Interest</i>	
P. Hikspoors	Giant Factories Inc., Montréal, Québec, Canada	<i>Non-voting</i>
P. Legault	Integrated Review Services, Ottawa, Ontario, Canada <i>Category: General Interest</i>	
Y. Legault	Granby Industries LP, Granby, Québec, Canada <i>Category: Producer Interest</i>	

H. Liauw	Weishaupt Corporation, Mississauga, Ontario, Canada <i>Category: Producer Interest</i>	
S. MacNamara	MacNamara Fuels, Newmarket, Ontario, Canada <i>Category: User Interest</i>	
J. Mosseau	Kenstruct Ltd., Pefferlaw, Ontario, Canada	<i>Non-voting</i>
T. Olszewski	R.W. Beckett Corporation, North Ridgeville, Ohio, USA <i>Category: Producer Interest</i>	
A. P. Perrie	APM Heating and Cooling, Durham, Ontario, Canada	<i>Non-voting</i>
B. Serio	Riello Canada Inc., Mississauga, Ontario, Canada <i>Category: Producer Interest</i>	
J. Wade	ULC Standards, Ottawa, Ontario, Canada	<i>Non-voting</i>
D. Jeremic Nikolic	CSA Group, Toronto, Ontario, Canada	<i>Project Manager</i>
N. Shrewsbury-Gee	CSA Group, Toronto, Ontario, Canada	<i>Project Manager</i>

Preface

This is the third edition of CSA B140.7, *Oil-fired steam and hot-water boilers*. It supersedes the previous edition, published in 2005 under title *Oil-burning equipment: Steam and hot-water boilers*. The 2005 edition combined and replaced CSA B140.7.1-1976, *Oil-Fired Steam and Hot-Water Boilers for Residential Use*, and CSA B140.7.2-1967, *Oil-Fired Steam and Hot-Water Boilers for Commercial and Industrial Use*. CSA B140.7.1 and CSA B140.7.2, along with CSA B140.12, *Service Water Heaters for Domestic Hot Water, Space Heating, and Swimming Pools*, replaced the first edition of CSA B140.7, *Oil-Fired Steam and Hot-Water Boilers and Service Water Heaters*, published in 1962.

CSA B140.7 is one of a series of oil-burning equipment Standards providing minimum requirements for the safe operation, acceptable performance, design, construction, manufacture, marking, and testing of oil-burning equipment. It should be read in conjunction with CSA B140.0, *Oil-burning equipment: General requirements*.

The major changes in this edition include the following:

- a) The title has been changed from *Oil-burning equipment: Steam and hot-water boilers* to *Oil-fired steam and hot-water boilers*.
- b) The scope has been changed to include direct vented and condensing boilers (Clause [1.1](#)).
- c) Reference publications have been updated (Clause [2](#)).
- d) All definitions have been deleted, and a reference has been inserted to redirect users to the definitions in CSA B140.0 (Clause [3](#)).
- e) The requirement for electrical features has been removed because it is covered in CSA B140.0.
- f) General requirements have been added for condensing boilers (Clause [4.4](#)).
- g) A new requirement has been added requiring appliances tested for use with biodiesel content in excess of 5% to have the burner and the fuel-delivery system components acceptable to the certification body for the blend specified (Clause [4.7](#)).
- h) The specific requirements for the pressure vessel section of the boiler have been replaced with a general requirement that they need to be acceptable to the certification body in accordance with the applicable codes (Clause [5.1](#)).
- i) The nomenclature for expressing input rate for the boiler has been changed from volume flow per hour to energy input per hour throughout the Standard.
- j) Clarification for the suitability of metal combustion chambers has been provided (Clause [5.11.3](#)).
- k) Guidance has been provided when stating the input rate and other information on markings when acceptable to the certification body for use with biodiesel blends and No. 1 (kerosene) oil (Clause [6.1.2](#)).
- l) Guidance has been provided when stating the input rate and other information in the installation and service manual when acceptable to the certification body for use with biodiesel blends and No. 1 (kerosene) oil (Clause [7.2](#)).
- m) The information required in the installation and service manual has been updated to match the various changes in the Standard (Clause [7.2](#)).
- n) The information required in operating instructions and homeowner instruction has been updated to match the various changes in the Standard (Clause [7.3](#)).
- o) Guidance has been added for testing when the boiler is acceptable to the certification body for use with biodiesel blends (Clauses [8.1](#)).
- p) The maximum smoke limits have been included in this Standard. Previously they were deferred to the applicable installation code (Clause [8.2.1.2](#)).
- q) The maximum flue temperature has been modified to include condensing boilers (Clause [8.2.1.3](#)).
- r) Requirements have been added when testing with biodiesel content in excess of 5% (Clause [8.2.2.7](#)).