



CSA B140.0:22
National Standard of Canada



Oil-burning equipment: General requirements



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 B140.0:22

July 2022

Title: *Oil-burning equipment: General requirements*

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 **24257.0**

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



La 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 B140.0:22
**Oil-burning equipment:
General requirements**



*®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 27.060.10
ISBN 978-1-4883-1870-2*

*© 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 12

Preface 14

1 Scope 17

- 1.1 Application 17
- 1.2 Intended use 17
- 1.3 Correlation with the CSA B140 series of Standards 17
- 1.4 Units of measurement 17
- 1.5 Terminology 17

2 Reference publications 18

3 Definitions 20

4 Basic general requirements 24

- 4.1 General 24
 - 4.1.1 Application 24
 - 4.1.2 Precedence of requirements 24
 - 4.1.3 Design and construction 24
- 4.2 Basis of examination 25
- 4.3 Electrical features 25
- 4.4 Equipment for combination fuels 25
 - 4.4.1 General 25
 - 4.4.2 Fuel changeover 26
 - 4.4.3 Simultaneous dual-fuel firing 26
- 4.5 Methods of assembly and shipment 25
 - 4.5.1 Component parts 26
 - 4.5.2 Equipment arrangement 26
 - 4.5.3 Two or more subassemblies 26
 - 4.5.4 Equipment construction 26
 - 4.5.5 Equipment for field assembly/field wiring 26

5 General construction requirements 27

- 5.1 General 27
 - 5.1.1 Application 27
 - 5.1.2 Safety 27
 - 5.1.3 Operating instructions 27
 - 5.1.4 Access 27
- 5.2 Materials 27
 - 5.2.1 Performance 27
 - 5.2.1.1 Chemical resistance 27
 - 5.2.1.2 Operating conditions 27
 - 5.2.2 Metallic materials 27
 - 5.2.3 Exposure to temperatures above room ambient 28
 - 5.2.4 Nonmetallic materials 28

5.2.7	Exposure to fuel oil	28
5.2.8	Glass	28
5.2.9	Abrasion and corrosion resistance	28
5.2.10	Zinc	28
5.2.11	Brass	28
5.2.12	Suitability	28
5.2.13	Sheet metal	28
5.3	Quality of labour	29
5.3.1	Uniformity	29
5.3.2	Specifications	29
5.4	Component parts	29
5.4.1	Intended use	29
5.4.2	Field installation	29
5.4.3	Marking	29
5.5	Accessibility	29
5.5.1	Design	29
5.5.2	Unsafe operation	29
5.5.3	Cleaning	29
5.5.4	Removable parts	30
5.5.5	Normal servicing	30
5.5.6	Actuating means	30
5.5.7	Assembly parts	30
5.6	Rigidity	30
5.7	Means for support	30
5.7.2	Stability	30
5.8	Joining	30
5.8.1	General	30
5.8.2	Joints in heating surfaces	30
5.8.3	Lock-seam joints	31
5.8.4	Fuel-handling parts	31
5.9	Fuel conveying system	31
5.9.1	Air pockets	31
5.9.2	Shut-off valve	31
5.9.3	Cleanout and drain openings	31
5.10	Fuel drains	32
5.11	Valves	32
5.11.1	Inlet and outlet openings	32
5.11.2	Clearance	32
5.11.3	Threaded pipes and fittings	32
5.11.4	Valve tops	32
5.11.5	Valve stem design	32
5.11.6	Fuel leakage	32
5.11.7	Compliance	32
5.11.8	Valve bodies	32
5.11.9	Suitability of materials	32
5.11.10	Nonmetallic materials	32
5.11.11	Special investigation	33
5.11.12	Metallic valve stems	33
5.11.13	Joints	33

5.11.14	Manual control	33
5.11.15	Petcocks	33
5.12	Fuel piping and tubing	33
5.12.1	General	33
5.12.2	Fuel piping	34
5.12.3	Fuel tubing	35
5.12.4	Flexible hose	36
5.13	Application of safety controls	36
5.13.1	General	36
5.13.2	Design	36
5.13.3	Regular equipment operation	36
5.13.4	Primary safety control	36
5.13.5	Oil-burner assemblies	36
5.13.6	Pressure-relief safety valve	36
5.13.7	Domestic water heaters	36
5.13.8	Steam heating boilers	37
5.13.9	Obstructions	37
5.13.10	Fuel shut-off	37
5.13.11	Shut-off device characteristics	37
5.13.12	Shut-off valves	37
5.13.13	Unsafe operation	37
5.13.14	Power supplies	37
5.13.15	Additional safety controls	37
5.13.16	Safety controls incorporated at installation	37
5.13.17	Safe operation	38
5.13.18	Design, construction, and testing	38
5.13.19	Burner mounted on a hinged door	38
5.14	Application of fuel oil filters	38
5.14.1	Primary filter	38
5.14.2	Anti-flooding devices	38
5.14.3	Fuel-atomizing nozzles	38
5.14.4	Auxiliary filters	38
5.14.5	Passage of particles	38
5.14.6	Pressure drop	39
5.14.7	Two primary filters installed in series	39
5.14.8	Trapped air	39
5.14.9	Head pressure	39
5.14.10	Design, construction, and testing	39
5.15	Application of draft regulators	39
5.16	Application of dampers	39
5.17	Pressure-relief ports	39
5.18	Electrical features	39
6	General marking requirements	40
6.1	Methods of providing the basic markings	40
6.1.1	Permanence	40
6.1.2	Visibility	40
6.1.3	Location	40
6.1.4	Caution markings	40

6.2	Details of the basic markings	40
6.3	Supplementary markings	41
7	General instruction requirements	41
7.1	General	41
7.1.1	Specifications	41
7.1.2	Certification body acceptance	41
7.1.3	Acceptance mark (logo)	41
7.1.4	Location of instructions during shipping	41
7.2	Operating instructions	41
7.2.1	General	41
7.2.2	Minimum requirements	42
7.2.3	Instructions on portable or mobile equipment	42
7.2.4	Tampering	42
7.3	Installation instructions and service manuals	42
7.3.1	General	42
7.3.2	Installation or servicing procedures	42
7.3.3	Safe installation	42
7.3.4	Certification body	42
7.3.5	Specifications	42
7.4	Instructions for separate components, accessories, and sub-assemblies	43
8	General test requirements	43
8.1	General performance tests	43
8.1.1	Compliance	43
8.1.2	Application	43
8.1.3	Performance	43
8.1.4	Abnormal conditions	44
8.1.5	Defects	44
8.1.6	Fuel oil	44
8.1.7	Component assemblies	44
8.1.8	Installation	45
8.1.9	Heating surfaces and vent connections	45
8.1.10	Instrumentation	45
8.2	Combustion tests	45
8.2.1	Stability	45
8.2.2	Analysis of flue gases	45
8.2.3	Compliance	45
8.3	Procedures for analysis and instrumentation	45
8.3.1	General	45
8.3.2	Smoke density	46
8.3.3	Flue-gas temperature	46
8.3.4	Carbon dioxide, oxygen, and carbon monoxide	46
8.3.5	Chimney draft and over-fire pressure	47
8.4	Simulated life test	47
8.4.1	Test requirement	47
8.4.2	Test procedure	47
8.5	Simulated endurance test	48
8.6	Control performance tests	48

8.6.1	Safety controls	48
8.6.2	Operating controls	48
8.6.3	Gas pilot ignition controls	48
8.7	Temperature tests	49
8.7.1	General	49
8.7.2	Maximum temperature limits	49
8.7.3	Clearances and installation	49
8.8	Continuity of operation	49
8.9	Pressure tests	49
8.9.1	Fuel oil piping, fittings, and valves	49
8.9.2	Pressure vessels	49
8.9.3	Gas piping and fittings	49
8.10	Component tests	49
8.11	Electrical tests	50

9 Construction and test of safety controls 50

9.1	General	50
9.1.1	Compliance	50
9.1.2	Tampering	50
9.1.3	Mechanical linkage	50
9.1.4	Special investigation	50
9.1.5	Electrical features	50
9.1.6	Insufficient power supply	50
9.1.7	Electrical power circuits	51
9.1.8	Mounting	51
9.1.9	Hazardous operation	51
9.1.10	Installation instructions	51
9.2	Safety limit controls	51
9.2.1	Limits	51
9.2.2	Compliance	51
9.2.3	Adjustability	51
9.3	Primary safety controls	51
9.4	Pressure-relief safety valve	51
9.5	Blocked vent shut-off system	51
9.5.1	General	51
9.5.2	Construction	51
9.5.3	Performance	52
9.5.4	Test procedure	52

10 Construction and test of fuel oil filters 54

10.1	General	54
10.1.1	Compliance	54
10.1.2	Fuel oil filters	55
10.1.3	Distortion	55
10.1.4	Acceptability	55
10.1.5	Instructions	55
10.1.6	Markings	55
10.2	Filter elements	55
10.2.1	Screen-type filter element	55

10.2.2	Fixed opening size	56
10.2.3	Fuel flow rate (Type 1 fuel oil or lighter)	56
10.2.4	Fuel flow rate (Type 2 fuel oil)	56
10.2.5	Fuels flow rate (Fuel oils heavier than Type 2)	56
10.2.6	Other than screen-type filter elements	56
10.2.7	Metallic filter elements	56
10.2.8	Nonmetallic filter elements	57
10.3	Filter housings	57
10.3.1	Rated gauge pressure	57
10.3.2	Leakproofness	57
10.3.3	Threaded openings	57
10.4	Test procedures	57
11	Construction and test of draft regulators	57
11.1	General requirements	57
11.1.1	General	57
11.1.2	Marking	57
11.1.3	Instructions	58
11.2	Construction requirements	58
11.2.1	Automatic draft regulators	58
11.2.2	Constant draft	58
11.2.3	Durability	58
11.2.4	Corrosion resistance	58
11.2.5	Suitability of materials	58
11.2.6	Mounting stub or collar	58
11.2.7	Sizing	58
11.2.8	Field adjustment	58
11.3	Test requirements and procedure	59
11.3.1	General	59
11.3.2	Regulation of the draft	59
11.3.3	Leakage test	60
12	Flue pipe mounted heat reclaimers intended for residential use	60
12.1	Construction	60
12.1.1	Compliance	60
12.1.2	Joints	61
12.1.3	Flue-gas passages	61
12.1.4	Accessibility	61
12.1.5	Means of support	61
12.1.6	Gravity flow of lubricant	61
12.1.7	Electrical features	61
12.2	Tests	61
12.3	Marking	61
12.4	Instructions	62
12.4.1	General	62
12.4.2	Limitations	62
12.4.3	Installation procedure	62
12.4.4	Other required data	62
12.4.5	Compliance	62

- 12.4.6 Installation and adjustment of the draft regulator 62
- 12.4.7 Cleaning 62
- 12.4.8 Required statements 62

13 General procedures for analysis 63

- 13.1 General 63
- 13.2 Supplementary procedures and methods 63
- 13.3 Additional details 63
- 13.4 Fuel-oil properties 63
- 13.5 Flue-gas properties 63
 - 13.5.1 General 63
 - 13.5.2 Carbon dioxide and oxygen 64
 - 13.5.3 Carbon monoxide 64
 - 13.5.4 Smoke 64
 - 13.5.5 Flue-gas temperature 64
- 13.6 Instrumentation and measurement 64
 - 13.6.1 General 64
 - 13.6.2 Electrical 65
 - 13.6.3 Speed 65
 - 13.6.4 Air velocity and standard air volume flow rate 65
 - 13.6.5 Temperature 66
 - 13.6.6 Gas pressure 66
 - 13.6.7 Liquid pressure 66
 - 13.6.8 Barometric pressure 66
 - 13.6.9 Rating of electric motors 66
 - 13.6.10 Flow rates 66

14 Maximum allowable temperatures 67

- 14.1 General 67
- 14.2 Relationship with other requirements 67
- 14.3 Operating temperatures 67
- 14.4 Operating conditions 71
 - 14.4.1 Operating condition A (normal conditions) 71
 - 14.4.2 Operating condition B (abnormal conditions) 71
- 14.5 Temperature rise and ambient temperatures 72
 - 14.5.1 Ambient temperature range 72
 - 14.5.2 Confined enclosure 72
- 14.6 Temperature measurement 72
 - 14.6.1 Thermocouple junctions 72
 - 14.6.2 Metal surfaces 72
 - 14.6.3 Wood and similar materials 72
 - 14.6.4 Thermocouple types 72
 - 14.6.5 Wire gauges 72
 - 14.6.6 Temperature rise of windings 73
 - 14.6.7 Difficult surface temperatures 73
 - 14.6.8 Water temperatures 73
 - 14.6.9 Room air and inlet air temperatures 73
 - 14.6.10 Flue-gas temperature 74
 - 14.6.11 Additional information 74

15 Flue-gas temperature, chimney draft, and flue-gas analysis 74

- 15.1 General 74
 - 15.1.1 Nominal diameter 74
 - 15.1.2 Readings 74
 - 15.1.3 Draft regulator 75
- 15.2 Flue-gas temperature 76
 - 15.2.1 Measurement points 76
 - 15.2.2 Thermocouple requirements 76
 - 15.2.3 Shielded thermocouple assembly 77
 - 15.2.4 Maximum and minimum flue-gas temperatures 77
- 15.3 Chimney draft 77
- 15.4 Flue-gas analysis 78
 - 15.4.1 Smoke density 78
 - 15.4.2 Determination of CO₂, O₂, and CO 78

16 Determination of smoke density 78

- 16.1 Outline of the method 78
- 16.2 Procedures 80
 - 16.2.1 Sampling location 80
 - 16.2.2 Sampling conditions 80
 - 16.2.3 Smoke spot number 80
 - 16.2.4 Unburned oil 81

17 Determination of heat input 81

- 17.1 General 81
- 17.2 Method of calculation 81
 - 17.2.1 Higher heating value 81
 - 17.2.2 Relative density 82
 - 17.2.3 Observed fuel input rate 83
 - 17.2.4 Determination of observed fuel input 83
 - 17.2.5 Heat input 83
 - 17.2.6 Altitude correction factor 84
 - 17.2.7 Heat input calculation 84

18 Determination of flue-gas loss 85

- 18.1 General 85
- 18.2 Method of calculation 85
 - 18.2.1 Flue-gas temperature 85
 - 18.2.2 Unburned fuel gases 85
 - 18.2.3 Flue-gas loss 85

19 Determination of casing (jacket) loss 88

- 19.1 Surface temperature 88
- 19.2 Temperature differential 88
- 19.3 Forced-air central furnaces 88
- 19.4 Units with ventilation air openings 88
- 19.5 Smoke pencil test 88
- 19.6 Surface thermocouples 88
- 19.7 Downflow furnaces 88

19.8	Louvred burner door	88
19.9	Jacket surface temperatures around air-circulating blower	88
19.10	Casing (jacket) with panels	88
19.11	Exposed flue collector or flue outlet	89
19.12	Oil burners	89
19.13	Average ambient temperature	89
19.14	Convective heat transfer coefficient	89
19.15	Coefficient of radiation	89
19.16	Emissivity	91
19.17	Coefficient of radiation for a surface	91
19.18	Hourly heat loss through casing (jacket)	91
19.19	Percentage casing (jacket) loss	91

20 Through-the-wall venting systems 91

20.1	General	91
20.2	Description	91
20.3	Construction	92
20.3.1	Components	92
20.3.2	Compliance	92
20.3.3	Mechanical flue-gas exhauster	92
20.3.4	Draft proving device	92
20.3.5	Electrical features	92
20.3.6	Electrical supply	92
20.3.7	Venting system	92
20.3.8	Non-simultaneous operation	92
20.3.9	Means for attachment	92
20.3.10	Exterior vent terminal	92
20.3.11	Assembly	93
20.3.12	Sheet metals	93
20.3.13	Galvanic action	93
20.3.14	Corrosion resistance — Exterior vent components	93
20.3.15	Corrosion resistance — Flue gases below 93 °C (200 °F)	93
20.3.16	Aluminum alloys	93
20.3.17	Joints	93
20.3.18	Thermal insulation	93
20.3.19	Guard or shield on vent terminal	94
20.4	Marking	94
20.4.1	Components	94
20.4.2	Oil-burning appliances	94
20.5	Installation instructions	94
20.5.1	General	94
20.5.2	Limitations	95
20.5.3	External surface temperature	95
20.6	Normal tests	95
20.6.1	Temperature	95
20.7	Simulated rain test procedure	99
20.8	Insulation resistance test	99
20.9	Dielectric strength test	99
20.10	Simulated wind test procedure	100

20.11	Abnormal tests	100
20.12	Load test	102
20.13	Impact test	102
21	Direct connection of combustion air	103
21.1	General	103
21.2	Description	103
21.3	Construction	103
21.3.1	General	103
21.3.2	Components	103
21.3.3	Compliance	103
21.3.4	Draft proving device	103
21.3.5	Electrical features	103
21.3.6	Electrical supply	103
21.3.7	Combustion air system	103
21.3.8	Simultaneous operation	104
21.3.9	Means for attachment	104
21.3.10	Assembly	104
21.3.11	Nonmetal combustion air systems	104
21.3.12	Sheet metals	104
21.3.13	Galvanic action	104
21.3.14	Corrosion resistance	104
21.4	Normal tests	104
21.4.1	Draft	104
21.4.2	Draft proving device	104
21.4.3	Pulsation	105
21.4.4	Combustion tests	105
21.4.5	Simulated rain test	105
21.4.6	Simulated wind test	105
21.5	Abnormal tests	105
21.5.1	Combustion air system obstruction	105
21.5.2	Stop and start tests	106
21.5.3	Abnormal voltage	106
21.5.4	Power failure	106
22	Gas passageway leakage test	106
22.1	Heat exchanger leakage test	106
22.2	Vent system leakage test	107
22.3	Leakage	107
23	Used-oil-burning appliances and equipment	107
23.1	General	107
23.1.1	Vapourizing- or atomizing-type oil burner	107
23.1.2	Installation in commercial or industrial premises	107
23.1.3	Used oil generated on the premises	108
23.1.4	Fuel input rate	108
23.2	Marking	108
23.2.1	General	108
23.2.2	Details required	108

23.2.3	Used-oil-burning appliances with a vapourizing-type oil burner	109
23.3	Instructions	109
23.3.1	General	109
23.3.2	Installation instructions	109
23.3.3	Service instructions	110
23.3.4	Operating instructions	111
23.4	Tests — Normal operation	111
23.4.1	General	111
23.4.2	Test oil	112
23.4.3	Combustion	112
23.4.4	Ignition	113
23.4.5	Temperature	113
23.4.6	Continuity of operation	113
23.4.7	Flue-gas analysis	114
23.5	Tests — Abnormal operation	114

Annex A (informative)	— Thickness of sheet metal	115
-----------------------	----------------------------	-----

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 fourth edition of CSA B140.0, *Oil-burning equipment: General requirements*. It supersedes the previous editions, published in 2003, 1987, and 1972.

The major changes to this edition include the following:

- a) added a clause specifying Standard requirements applicability (Clause [1.2](#));
- b) replaced ASTM B154 with ANSI/CAN/UL/ULC 125 as a method of stress-cracking test (Clause [5.2.11](#));
- c) revised values in this Standard for precision and consistency;
- d) added a requirement that the combustion be stable and complete under abnormal voltages, abnormal oil feed pressures and abnormal drafts (Clause [8.2.1](#));
- e) added a requirement that a heating appliance equipment be subjected to a simulated life test without evidence of failure of the combustion chamber where the design of the through-the-wall venting system is unproven;
- f) deleted clauses specifying safety limit controls used with a warm air furnace, a hot water heating boiler, a hot water heater, and a steam heating boiler because specific requirements are given in individual appliance Standards;
- g) modified performance test procedures to require the time for the burner to be shut off by the blocked vent system not to exceed 5 min (Clause [9.5.4](#));
- h) added a requirement for instruction specifications for draft regulators (Clause [11.1.3](#));
- i) added a note on permission of using galvanized or aluminized steel in the construction of draft regulators (Clause [11.2.4](#));
- j) modified details for heat reclaimer marking requirements and instructions (Clauses [12.3](#) and [12.4](#));
- k) clarified procedure for CO₂ and O₂ measurement calculations (Clause [13.5.2](#));
- l) modified instructions on traverse air velocity pressure measurement (Clause [13.6.4](#));
- m) replaced reference to a base temperature of 25 °C with a reference to ambient temperature with a specified range between 18 and 30 °C (Clause [14.5](#));
- n) modified temperature rise and ambient temperature requirements and tabulated maximum allowable temperatures for general construction materials per changes to base temperature (Clause [14.5](#) and Table [3](#));
- o) clarified thermocouple twisting and securing methods, as well as wire gauges for temperature measurement details (Clause [14.6](#));
- p) clarified requirements related to condensing venting systems (Clauses [15.2.4](#) and [18.1](#));
- q) modified smoke test pump method description to reference the use of an applicable field smoke test pump (Clause [16.1](#));
- r) clarified that the smoke density test measurement be taken at the operating fuel input ;
- s) added a requirement for carbon monoxide in unburned fuel gases not to exceed 400 ppm air-free at any time of testing (Clause [18.2.2](#)), and removed all clauses contradicting this requirement;
- t) deleted requirements specifying casing (jacket) loss for units intended to be installed outdoors or in an unheated space because they contradicted other Standards in the CSA B140 series;
- u) removed a requirement stating that venting systems need to be supplied by the appliance manufacturer (Clause [20.2](#));
- v) modified the description of a through-the-wall venting system (Clause [20.2](#));
- w) modified the requirement for means preventing the operation of the burner in the event of a venting system blockage or a combustion air system blockage to include a mechanical device (such as a pressure switch or sail switch), and to prohibit use of burner flame detection (Clauses [20.3.7](#) and [21.3.7](#));

- x) added tables of maximum allowable temperatures for
 - i) electrical wiring materials (Table 7); and
 - ii) electrical components and electrical insulations (Table 8);
- y) added a requirement that in cases where the smoke density of the vented flue gas rises above Number 2 (except at start-up), the oil burner shuts down (Clause 20.11.2.1.2);
- z) clarified that during steady-state operation of the oil-burning appliance, the vent is slowly blocked by 10% increments from the fully open position (Clause 20.11.2.2.1);
- aa) limited the requirement that operation of the appliance and its venting system be initiated from a cold start over the range of flue-outlet pressures (Clause 21.5.2);
- ab) clarified that the complete combustion air system (with the exception of standard combustion air connector pipe or duct) meet the requirements of the appliance manufacturer's installation instructions, and not necessarily be manufactured by the furnace or boiler manufacturer (Clause 21.3.10);
- ac) clarified that the requirement for flue-outlet pressure to be set as indicated in the normal combustion test in the CSA B140 series of Standards applies to appliances designed for operation with a draft regulator (Clause 21.4.1);
- ad) clarified that during continuity condition operation of the appliance, the combustion air intake terminal be slowly blocked by 10% increments from the fully open position (Clause 21.5.1.1);
- ae) removed allowance of 2% leakage of the products of combustion from the heat exchanger (Clause 22.1) and the venting system (Clause 22.2) when operated under positive internal pressure;
- af) added a requirement that direct vent system leakage tests be performed with the flue terminal exit and the air intake opening being sealed (Clause 22.2); and
- ag) added French translations of caution statements.

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

This Standard was prepared by the Technical Committee on Oil-Burning Appliance Standards, under the jurisdiction of the Strategic Steering Committee on Fuels and Appliances, and has been formally approved by the Technical Committee.

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) *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 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.

- 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.*

CSA B140.0:22

Oil-burning equipment: General requirements

1 Scope

1.1 Application

This Standard provides minimum requirements for oil-burning equipment, including

- a) fuel oil filters;
- b) draft regulators;
- c) flue pipe mounted heat reclaimers;
- d) through-the-wall venting systems;
- e) systems that supply outside combustion air; and
- f) used-oil-burning equipment.

1.2 Intended use

This Standard is to be used in conjunction with the other Standards in the CSA B140 series, as applicable, to form a complete Standard for a particular type of oil-burning appliance or equipment.

1.3 Correlation with the CSA B140 series of Standards

Each of the other Standards in the CSA B140 series covers construction requirements, marking, instructions, and detailed testing procedures for a single classification or a closely related group of oil-burning equipment.

1.4 Units of measurement

The values given in SI (metric) units are the units of record for the purpose of this Standard. The values given in parentheses are for information and comparison only.

1.5 Terminology

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the Standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.