



**CSA
Group**

C22.2 No. 120-13
(reaffirmed 2018)

Refrigeration equipment

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, 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 print or PDF 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

C22.2 No. 120-13
March 2013

Title: *Refrigeration equipment*

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

- go to shop.csa.ca
- click on **CSA Update Service**

The **List ID** that you will need to register for updates to this publication is **242214**

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

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

C22.2 No. 120-13
Refrigeration equipment



™A trade-mark of the Canadian Standards Association, operating as "CSA Group"

*Published in March 2013 by CSA Group
A not-for-profit private sector organization
5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6*

*To purchase standards and related publications, visit our Online Store at shop.csa.ca
or call toll-free 1-800-463-6727 or 416-747-4044.*

ISBN 978-1-77139-050-7

© 2013 CSA Group

All rights reserved. No part of this publication may be reproduced to any form whatsoever without the prior permission of the publisher.

Contents

Technical Committee on Consumer and Commercial Products	5
Subcommittee on Household Appliances for Refrigeration	7
Preface	9
1 Scope	10
2 Reference publications	11
3 Definitions	15
4 Construction	19
4.1 General	19
4.2 Mechanical strength	19
4.2.1 Enclosures	19
4.2.2 Enclosure impact test	19
4.2.3 Cabinet	19
4.2.4 Glass assemblies	20
4.3 Protection from fire hazard	20
4.3.1 Polymeric material	20
4.3.2 Electrical components	21
4.3.3 Separation from combustible material	21
4.4 Protection from shock hazard	22
4.5 Doors and covers of enclosures	23
4.6 Protection from mechanical hazards	24
4.7 Mechanical assembly	26
4.8 Safety of refrigerating system	29
4.9 Determination of maximum working pressures	29
4.9.1 Normal	29
4.9.2 Abnormal	30
4.9.3 Marking	30
4.10 Protection against excessive pressure	30
4.11 Pressure limiting devices	32
4.12 Water heating tanks	32
4.13 Pressurized product systems	33
4.14 Freezing chambers under pressure	33
4.15 Supply connections	33
4.15.1 General	33
4.15.2 Cord-connected equipment	34
4.15.3 Permanently connected equipment	35
4.16 Field wiring terminals	35
4.17 Current-carrying parts	36
4.18 Strain relief (supply cord)	37
4.19 Bushings	37
4.20 Electrically operated valves and solenoids	37

4.22	Internal wiring	37
4.22.1	General	37
4.23	Types of wiring	38
4.23.1	General	38
4.23.2	Wiring means	39
4.23.3	Parallel-conductor appliance wiring material	39
4.23.4	Extra-low voltage Class 2 circuit wiring	39
4.23.5	Wiring for panels of walk-in coolers	39
4.23.6	Wiring to external accessories	39
4.23.7	Resistance type heater wire	40
4.23.8	Wiring subjected to periodic movement	40
4.23.9	Conductor size	40
4.23.10	Control circuits	40
4.24	Electrical insulation	42
4.25	Motors	42
4.25.1	General	42
4.25.2	Motor overheating and overload protection	42
4.25.3	Short circuit protection	44
4.26	Transformers and power supplies	45
4.27	Lighting equipment	45
4.27.1	Incandescent and electric discharge lighting equipment	45
4.27.2	LED lighting equipment	46
4.27.3	Incandescent lighting circuits	46
4.27.4	Electric-discharge lighting circuits	46
4.27.5	Ballasts	47
4.27.6	LED lighting	48
4.28	Capacitors	48
4.29	Switches and controls	49
4.30	Protection of water heaters	50
4.31	Heater elements	50
4.32	Electric defrost heaters	50
4.33	Electric ice cutting grid heaters	51
4.34	Electric crankcase heaters	51
4.35	Spacings	52
4.36	Separation of circuits	54
4.37	Grounding and bonding	55
4.38	Receptacles	55
4.39	Plumbing requirements	56
4.40	Refrigerant liquid pumps	56

5 Marking 57

6 Tests 61

6.1	General	61
6.1.1	Number of samples	61
6.1.2	Test voltage	61
6.1.3	Test frequency	61
6.1.4	Installation clearances	62
6.2	Conditions for normal load tests	62

6.2.1	Non-refrigerated equipment	62
6.2.2	Refrigerated equipment	62
6.2.3	Drinking water coolers and beverage dispensers	63
6.2.4	Freezer dispensers for food and beverage products	65
6.2.5	Ice making machines	65
6.2.6	Milk coolers	65
6.2.7	Absorption-type refrigerators	66
6.3	Rating	66
6.4	Temperature (normal load)	67
6.5	Temperature (ballasts and wiring)	68
6.6	Temperature (condensation wiring)	68
6.7	Temperature (defrost)	68
6.8	Insulation resistance (defrost heaters)	69
6.9	Leakage current	69
6.10	Dielectric strength	71
6.11	Temperature (abnormal operation)	71
6.11.1	Condenser fan failure	71
6.11.2	Condenser water failure	71
6.11.3	Manual-reset pressure control	71
6.11.4	Test criteria	72
6.11.5	Test compliance	72
6.11.6	Electric air heater burnout test	72
6.11.7	Burnout test—Other components	73
6.12	Control equipment	73
6.12.1	Overload	73
6.12.2	Endurance	74
6.13	Starting	75
6.14	Flexing	75
6.15	Cabinet strength	76
6.16	Impact test (enclosures)	77
6.17	Impact test (glass assemblies)	77
6.18	Rain test	78
6.19	Accelerated aging tests	79
6.19.1	Gaskets	79
6.20	Moisture absorption resistance	80
6.21	Printed circuit boards (abnormal)	81
6.22	Door latch release	81
6.23	Overflow	82
6.24	Strain relief (supply cord)	82
6.25	Pressure test for water heater tanks	83
6.25.1	Test requirements	83
6.25.2	Test procedure	83
6.26	Pressure tests	84
6.26.1	Pressurized product systems	84
6.26.2	Refrigerant-containing components	84
6.27	Limited short circuit (motor protective devices)	84
6.28	Short-circuit test for wiring	85
6.29	Stability test	85
6.30	Spill test	86

6.31	Shelf strength test	87
6.31.6	Custom shelving	88
6.32	Component restraint test	89

Annex A (Informative)	— Minimum design pressures	110
Annex B (Informative)	— Manufacturing and production tests	113
Annex C (Informative)	— Determination of minimum circuit ampacity (See Clause 5.5.2)	114
Annex D (Informative)	— Refrigerant flammability parameters	115
Annex E (Normative)	— Requirements for refrigerators and freezers employing a flammable refrigerant in the refrigerating system	116

Technical Committee on Consumer and Commercial Products

A. Milne	21st Olympiad Sales, Burlington, Ontario <i>Representing General Interests</i>	<i>Chair</i>
D. Mascarenhas	Brampton, Ontario <i>Representing General Interests</i>	<i>Vice-Chair</i>
L. Letea	CSA Group, Mississauga, Ontario	<i>Project Manager</i>

Representing General Interests

R. Cleary	The Home Depot Canada Inc., Toronto, Ontario
R.L. Hicks	Mississauga, Ontario
M.K. Timmings	Oakville, Ontario
A.Z. Tsisserev	Stantec Consulting Ltd., Vancouver, British Columbia

Representing Manufacturers

J.E. Evans	Evans Regulatory Certification Consulting, Wasper, Ontario
W. Hansen	Trane Ingersoll Rand, La Crosse, Wisconsin, USA
S. Lawrence	Cisco Systems Video Technology Canada, Inc., Scarborough, Ontario
G. Gundy	IBM Canada Limited, Markham, Ontario
R. Martel	Electro-Federation Canada, Toronto, Ontario

S. Michaud Thomas & Betts Fabrication Inc. / Thomas & Betts
Manufacturing Inc.,
Dorval, Quebec

Representing Regulatory Authorities

D.P. Badry Government of Yukon,
Whitehorse, Yukon Territory

N.J. Breton Electrical Safety Authority,
Mississauga, Ontario

D.G. Roy Health Canada,
Ottawa, Ontario

Subcommittee on Household Appliances for Refrigeration

C.J. Chany II	Thermo Fisher Scientific (Asheville) LLC, Asheville, North Carolina, USA	<i>Chair</i>
M. Tepic	Minus Forty Technologies Corp., Georgetown, Ontario	<i>Vice-Chair</i>
K. Ban	PSC International Division of 1019051 Ontario Limited, Richmond Hill, Ontario	
K.W. Bartholomaus	Paul Mueller Company, Springfield, Missouri, USA	
S. Daley	GEA Farm Technologies, Inc., Galesville, Wisconsin, USA	
D.V. Grandin	Bureau Veritas Consumer Products Services, Buffalo, New York, USA	
M. Hamilton	Greenway Home Products, Guelph, Ontario	
J. Jakob	CSA Group, Toronto, Ontario	
M. Korpál	AGA Marvel, Greenville, Michigan, USA	
H. Lee	LG Electronics Inc, Changwon, Gyeongnam, South Korea	
R. Martel	Electro-Federation Canada, Toronto, Ontario	
M. Mongeau	Dectron Incorporated, Montréal, Quebec	

P. Narula	PSC International Division of 1019051 Ontario Limited, Richmond Hill, Ontario	
B.L. Rebel	Association of Home Appliance Manufacturers Canada (AHAM), Ottawa, Ontario	
H. Ricketts	Mile High Equipment Company, Denver, Colorado, USA	
S. Schaefer	Hoshizaki America, Incorporated, Peachtree City, Georgia, USA	
R. Shebik	Hussmann Corporation, Bridgeton, Missouri, USA	
R.J. Sherlock	Habco Beverage Systems Inc., Toronto, Ontario	
K. Woods	QBD Cooling Systems Inc., Brampton, Ontario	
G.M. Yui	Electrotemp Technologies China Inc., Beilun, China	
W. Hendricks	CSA Group, Mississauga, Ontario	<i>Project Manager</i>

Preface

This is the fourth edition of CSA C22.2 No. 120, *Refrigeration equipment*, one of a series of Standards issued by CSA Group under Part II of the *Canadian Electrical Code*. It supersedes the previous edition published in 1991.

For general information on the Standards of the *Canadian Electrical Code, Part II*, see the Preface of the latest edition of CAN/CSA-C22.2 No. 0, *General Requirements — Canadian Electrical Code, Part II*.

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

This Standard was prepared by the Subcommittee on Household Appliances for Refrigeration, under the jurisdiction of the Technical Committee on Consumer and Commercial Products and the Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the Technical Committee.

Interpretations: The Strategic Steering Committee on Requirements for Electrical Safety 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's procedures for interpretation shall be followed to determine the intended safety principle.”

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 periodic review, and 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.*

C22.2 No. 120-13

Refrigeration equipment

1 Scope

1.1

This Standard applies to self-contained and remote refrigeration equipment, designed to be installed and used in accordance with the *Canadian Electrical Code, Part I*, for use in non-hazardous locations indoors or outdoors in commercial and business establishments.

1.2

This Standard also applies to self-contained, cord-connected equipment rated at not more than 250V with branch circuit protection rated at not more than 60A, and equipment intended for permanent connection rated at 600V and less, single-phase or three-phase.

1.3

This Standard applies to refrigerated equipment used in commercial and business establishments that include refrigeration systems other than those that employ refrigerant motor-compressors and air- and water-cooled condensers, such as thermo-electric or absorption systems.

1.4

This Standard applies to

- a) refrigerated equipment such as display cases, meat, dairy, or frozen food cases, reach-in cabinets, and bottle type beverage coolers;
- b) self-service or illuminated refrigerators, freezers, and ice cream cabinets;
- c) walk-in coolers;
- d) equipment designed to be field-installed as part of a refrigeration system, such as remote display cases and unit coolers;
- e) equipment designed to produce some degree of freezing of food or beverage mixtures and to dispense them at will from the equipment at the time of sale, such as ice cream makers;
- f) water coolers, pressure, bottle, or point-of-use type, free-standing or wall-mounted, having added features such as a means for heating water, or a refrigerated space;
- g) refrigerated beverage dispensers for use in commercial establishments, designed for free-standing use or for building into fixtures;
- h) coolers for raw milk intended for farm use, permanently-connected, of the bulk direct expansion ice bank type, having either a self-contained or remote condensing unit;
- i) ice makers that manufacture and harvest ice in cube, flake, or other readily usable form and that may or may not incorporate ice storage means;
Note: *This Standard does not apply to automatic ice-makers that are accessory components in household refrigerators and freezers.*
- j) refrigeration units;
- k) refrigerant recovery and recycling equipment intended for use with refrigeration systems;
- l) refrigerant liquid pumps;
- m) door and frame assemblies used as part of a refrigerated room or cabinet; and

- n) other equipment used in conjunction with refrigerated equipment, such as carbonators (for use with beverage dispensers), ice dispensers (for use with ice making machines), and non-refrigerated display cases.

1.5

This Standard includes requirements for the electrical features of equipment, with consideration given to the effects of sanitation procedures that may be required by authorities having jurisdiction, as well as the functional operation of the equipment, and requirements for the mechanical safety of refrigerating systems, water heating means, carbonating equipment, dispensing equipment, and door frame assemblies.

1.6

This Standard does not apply to compressor units, condensing units, and other equipment that is within the scope of CSA C22.2 No. 236 or CAN/CSA-C22.2 No. 60335-2-40.

1.7

General requirements applicable to this Standard are specified in CAN/CSA-C22.2 No. 0, *General requirements—Canadian Electrical Code, Part II*.

1.8

In CSA Group Standards, “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; “may” is used to express an option or that which is permissible within the limits of the standard; and “can” is used to express possibility or capability. 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.

1.9

The values given throughout this publication in SI (metric) units are the standard. The values given in parentheses are for information only.

2 Reference publications

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below.

CSA Group

CAN/CSA-B45 Series-02 (R2008)
Plumbing fixtures

B51-09
Boiler, pressure vessel, and pressure piping code

B52-05
Mechanical Refrigeration Code