



UL 60335-2-89

STANDARD FOR SAFETY

Household and Similar Electrical Appliances –
Safety – Part 2-89: Particular Requirements for
Commercial Refrigerating Appliances with an
Incorporated or Remote Refrigerant Unit or
Compressor

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UL Standard for Safety for Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor, UL 60335-2-89

First Edition, Dated September 29, 2017

Summary of Topics

This First edition of ANSI/UL 60335-2-89, the harmonized Standard for Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor, is based off of Edition 2 of IEC 60335-2-89 and its Amendment No. 1.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL and CSA are committed to updating this harmonized standard jointly.

The requirements are substantially in accordance with Proposal(s) on this subject dated February 24, 2017 and June 16, 2017.

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CSA Group
CAN/CSA-C22.2 No. 60335-2-89:17
First Edition
(IEC 60335-2-89:2010+A1:2012, MOD)



Underwriters Laboratories Inc.
UL 60335-2-89
First Edition

Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor

September 29, 2017

This national standard is based on IEC 60335-2-89, edition 2.1 (2012), which is based on the second edition (2010) and its amendment 1 (2012).



ANSI/UL 60335-2-89-2017

Approved by



Standards Council of Canada
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Commitment for Amendments

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This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquires@csagroup.org and include “Proposal for change” in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the First Edition. The most recent designation of ANSI/UL 60335-2-89 as an American National Standard (ANSI) occurred on September 29, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

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PREFACE

This is the harmonized CSA Group and UL standard for particular requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor. It is the first edition of CAN/CSA-C22.2 No. 60335-2-89, and the first edition of UL 60335-2-89.

This harmonized standard is based on IEC Publication 60335-2-89: Edition 2.1, Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor, issued July 2012. IEC 60335-2-89 is copyrighted by the IEC.

This harmonized Standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the commercial refrigerating appliance manufacturing industry are gratefully acknowledged.

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

This Standard was reviewed by the CSA Subcommittee on Household Appliances for Refrigeration, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This Standard was also reviewed and approved by UL's Standards Technical Panel for Commercial Refrigerators and Freezers, STP 471.

This Standard has been approved as a National Standard of Canada by the Standards Council of Canada (SCC) and approved by the American National Standards Institute (ANSI) for publication as an American National Standard.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: 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.

CAN/CSA-C22.2 No. 60335-2-89 is to be used in conjunction with the second edition of CAN/CSA-C22.2 No. 60335-1:16. The requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor are contained in this Part 2 Standard and CAN/CSA-C22.2 No. 60335-1:16. Requirements of this Part 2 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 60335-1:16. Where a particular subclause of CAN/CSA-C22.2 No. 60335-1:16 is not mentioned in CAN/CSA-C22.2 No. 60335-2-89, the CAN/CSA-C22.2 No. 60335-1:16 subclause applies.

UL 60335-2-89 is to be used in conjunction with the sixth edition of UL 60335-1. The requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor are contained in this Part 2 Standard and UL 60335-1. Requirements of this Part 2 Standard, where stated, amend the requirements of UL 60335-1. Where a particular subclause of UL 60335-1 is not mentioned in UL 60335-2-89, the UL 60335-1 subclause applies.

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Level of Harmonization

This standard adopts the IEC text with national differences. This standard is published as an equivalent standard for CSA and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows:

- a) Technical national differences are allowed for national differences resulting from conflicts in codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate.
- b) Presentation is word for word except for editorial changes that do not alter the technical content of the standard. Examples of editorial changes include:
 - 1) different font sizes, figure sizes, and table sizes;
 - 2) minor variations in format, such as indentation and pagination;
 - 3) font appearance (including the use of italic or bold text or uppercase or lowercase letters);
 - 4) the use of a symbol (e.g., A or %) rather than the word (Ampere or percent), or the word rather than the symbol;
 - 5) inclusion of inch-pound units for informational purposes;
 - 6) corrections of misprints or typographical errors;
 - 7) bilingual column headings or figure captions on a common table or figure in a bilingual edition;
 - 8) change from first-angle to third-angle drawing;
 - 9) addition of a statement: "This is a first-angle drawing"; and
 - 10) substitution of a point (.) for a comma (,) as the decimal marker.

All national differences from the IEC text are included in the CSA Group and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for Differences From IEC

Differences from the IEC are being added in order to address safety and regulatory situations present in the US and Canada.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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NATIONAL DIFFERENCES

GENERAL

In the CSA Group and UL publications of this standard, National Differences from the text of International Electrotechnical Commission (IEC) Publication 60335-2-89, Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor, copyright 2012, are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – Part 2-89: Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant unit or compressor

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

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6) All users should ensure that they have the latest edition of this publication.

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of IEC 60335-2-89 consists of the second edition (2010) [documents 61C/460/FDIS and 61C/462/RVD] and its amendment 1 (2012) [documents 61C/507/FDIS and 61C/510/RVD]. It bears the edition number 2.1.

This part of International Standard IEC 60335 has been prepared by subcommittee 61C: Household appliances for refrigeration, of IEC technical committee 61: Safety of household and similar electrical appliances.

The principal changes in this edition as compared with the first edition of IEC 60335-2-89 are as follows (minor changes are not listed):

- aligns the text with IEC 60335-1, and its Amendments 1 and 2;
- introduces requirements for appliances using transcritical refrigerant systems (3.107, 3.108, 3.109, 3.110, 3.111, 7.1, 7.6, 7.12.1, 22.103, 24.1.4, 24.102)
- introduces an enhanced flexing test (23.3)

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for commercial refrigerating appliances with an incorporated or remote refrigerant unit or compressor.

Where a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. Where this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The following differences exist in the countries indicated below.

– 22.101: E12 and E17 lamp holders are checked as specified for E14 and B15 lamp holders. E26 lamp holder is checked as specified for E27 and B22 lamp holders (Japan).

– 22.109: For unsealed glass tube heaters, the temperature requirements are different (Japan).

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under “<http://webstore.iec.ch>” in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

101DV D2 Replacement of the 5th paragraph after item 9) of the IEC Foreword and Note 1 with the following:

This Part 2-89 is intended to be used in conjunction with the CSA/UL harmonized standard of the second edition of CAN/CSA-C22.2 No. 60335-1:16 and the sixth edition of UL 60335-1 dated October 31, 2016. This harmonized standard is an adoption of IEC 60335-1, Safety Standard for Household and Similar Electrical Appliances, Part 1: General Requirements, (Edition 5.1, Issued by the IEC April 2014.) All references in this standard to IEC 60335-1 shall be replaced by reference to this CSA/UL harmonized standard.

102DV DE Modify the paragraph following Note 3 in the IEC Foreword by replacing it with the following:

Words in SMALL ROMAN CAPS in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in SMALL ROMAN CAPS.

103DV DE Modification by adding the following text at the end of the IEC Foreword:

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

It has been assumed in the drafting of this International standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features which impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-89: Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant unit or compressor

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard specifies safety requirements for electrically operated commercial refrigerating appliances that have an incorporated compressor or that are supplied in two units for assembly as a single appliance in accordance with the manufacturer's instructions (split system).

1DV.1 D2 Modification to replace the second paragraph in Clause 1 with the following:

This Standard specifies safety requirements for electrically operated commercial refrigerating appliances that have an incorporated compressor or that are supplied in two units for assembly as a single appliance in accordance with the manufacturer's instructions (split system) and intended for use in accordance with:

- **CSA C22.1, Canadian Electrical Code (CE Code) Part I, in Canada;**
- **NFPA 70, National Electrical Code (NEC), in the United States.**

NOTE 101 Examples of appliances that are within the scope of this standard are

- REFRIGERATED DISPLAY and STORAGE CABINETS;
- refrigerated trolley cabinets;
- service counters and self-service counters;
- blast chillers and blast freezers.

As far as is practicable, this standard deals with the common hazards presented by these types of appliances.

It does not cover those features of construction and operation of refrigerating appliances which are dealt with in ISO standards.

NOTE 102 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
- in many countries, additional requirements are specified by national authorities.

NOTE 103 This standard does not apply to

- domestic refrigerating appliances (IEC 60335-2-24)

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- industrial refrigerating systems;
- motor-compressors (IEC 60335-2-34);
- commercial dispensing appliances and vending machines (IEC 60335-2-75);
- commercial ice-cream appliances;
- commercial ice makers;
- cold temperature rooms;
- multiple refrigerated chambers with a remote compressor.

NOTE 104 Appliances with a charge of more than 150 g of FLAMMABLE REFRIGERANT in each separate refrigerant circuit are not covered by this standard. For appliances with a charge greater than 150 g of FLAMMABLE REFRIGERANT in each refrigerant circuit and for the installation, ISO 5149 may be applied. Consequently, such appliances cannot be assessed for safety using this part 2.

1DV.2 D2 Modification to add the following after the second paragraph:

This standard also contains the requirements for:

- **commercial refrigerators and freezers for use in fuel dispensing facilities (Annex 101.DVD);**
- **factory assembled walk in coolers (Annex 101.DVE);**
- **refrigerating units (Annex 101.DVF);**
- **PARTIAL UNITS (Annex 101.DVG); and**
- **dispensing units (Annex 101.DVH).**

2 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

IEC 60079-4, *Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperature*

IEC 60079-4A, *Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperatures – First supplement*

IEC 60079-15:2010, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC/TR 60079-20, *Electrical apparatus for explosive gas atmospheres – Part 20: Data for flammable gases and vapours, relating to the use of electrical apparatus*

IEC 60335-2-5, *Household and similar electrical appliances – Safety – Part 2-5: Particular requirements for dishwashers*

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IEC 60335-2-34:2002, *Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors*, Amendment 1 (2004), Amendment 2 (2008)¹⁾

¹⁾ There exists a consolidated edition 4.2 (2009) that includes Edition 4 and its Amendment 1 and Amendment 2.

ISO 817, *Refrigerants – Designation system*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs in workplaces and public areas*

ISO 4126-2:2003, *Safety devices for protection against excessive pressure – Bursting disc safety devices*

ISO 5149, *Mechanical refrigerating systems used for cooling and heating – Safety requirements*

ISO 7010:2011, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

2DV DR Modification of Clause 2 to add the following normative references:

Any reference to International Standards that have been adopted as National Standards of Canada and/or the USA, or are adopted subsequent to the publication of this standard, shall be replaced by the relevant National Standard of Canada and/or the USA.

Where reference is made to CSA Group or UL publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition. This Standard refers to the following publications, and the years shown indicate the latest editions available at the time of printing:

CSA Group

CSA B51,
Boiler, Pressure Vessel, and Pressure Piping Code

CSA B52,
Mechanical Refrigeration Code

CSA C22.1,
Canadian Electrical Code, Part I

CSA C22.2 No. 94.2,
Enclosures for electrical equipment, environmental considerations

CSA C22.2 No. 120,
Refrigeration Equipment

CSA C22.2 No. 140.3,
Refrigerant-containing components for use in electrical equipment

CAN/CSA-C22.2 No. 60335-1,
Safety of Household and Similar Appliances – Part 1: General Requirements

CAN/CSA-C22.2 No. 60335-2-34,
Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motorcompressors

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UL

UL 50E

Enclosures for Electrical Equipment, Environmental Considerations

UL 207

Refrigerant-Containing Components and Accessories, Nonelectrical

UL 471

Commercial Refrigerators and Freezers

UL 60335-1

Household and Similar Electrical Appliances – Safety – Part 1: General Requirements

UL 60335-2-34

Household and Similar Electrical Appliances – Safety – Part 2-34: Particular Requirements for Motorcompressors

ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers)

ANSI/ASHRAE 15,

Safety Standard for Refrigeration Systems

ANSI/ASHRAE 34,

Designation and Safety Classification of Refrigerants

ANSI/NFPA (American National Standards Institute/National Fire Prevention Association)

ANSI/NFPA 30A,

Code for Motor Fuel Dispensing Facilities and Repair Garages

ANSI/NFPA 70,

National Electrical Code

ASME (American Society of Engineers)

ASME, Unfired Pressure Vessel Code

IEC (International Electrotechnical Commission)

IEC 60068-2-52

Environmental testing Part 2: Tests – Test Kb: Salt mist, cyclic (sodium, chloride solution)

IEC 60335-2-75

Household and similar electrical appliances – Safety – Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

IEC 60695-11-20

Fire hazard testing – Part 11-20: Test flames – 500 W flame test methods

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ISO (International Organization for Standardization)

ISO 7010

Graphical symbols – Safety colours and safety signs – Registered safety signs

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9

Replacement:

NORMAL OPERATION

operation of the appliance under the following conditions:

Refrigerating appliances are operated at an ambient temperature in accordance with 5.7, empty, with doors or lids closed, or roller blinds closed or open, whichever is the more unfavourable. User adjustable temperature control devices are short-circuited or otherwise rendered inoperative. Devices which are switched, by dew-point controls or clocks, are switched on or off, whichever is the more unfavourable.

For appliances connected to a water supply, the water other than cooling water, is at a temperature of $15\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. The cooling water is at the maximum temperature specified in the instruction.

For appliances with a separate REFRIGERANT UNIT, the REFRIGERANT UNIT is connected to the cabinet in accordance with the manufacturer's instructions.

3.101

REFRIGERATED DISPLAY AND STORAGE CABINET

enclosed cabinet which displays or stores beverages or chilled or frozen foodstuff placed therein and which is cooled by a REFRIGERANT UNIT

3.102

ANCILLARY HEATING ELEMENT

ancillary heating element heating device which performs an auxiliary function, such as a defrost heater, door heater or anti-condensation heater

3.103

SKILLED PERSON

person having the appropriate technical training and experience necessary to be aware of hazards to which he or she is exposed in performing a task and of measures necessary to minimize the danger to his or herself or other persons

3.104

REFRIGERANT UNIT

factory assembled unit for performing part of the refrigeration cycle (compressing gas, condensation or gas cooling) comprising of one or more refrigerant compressors with motors, condensers or GAS COOLERS, liquid receivers, interconnection pipe work and ancillary equipment, all mounted on a common base

3.104DV DE Modification by adding the following notes:

NOTE 1DV: In North America, the above described refrigerant unit is referred to as a CONDENSING UNIT. (See Annex 101.DVG).

NOTE 2DV: The term **REFRIGERANT UNIT** should not be confused with a **REFRIGERATING UNIT** as described in 3.113DV and Annex 101.DVF.

3.105

FLAMMABLE REFRIGERANT

refrigerant with a flammability classification of group 2 or 3 in accordance with ISO 5149

NOTE For refrigerant blends which have more than one flammability classification, the most unfavourable classification is taken for the purposes of this definition.

3.106

FREE SPACE

space with a volume exceeding 60 l in which a child can be entrapped and which is accessible after opening any door, lid or drawer and removing any DETACHABLE INTERNAL PART, including shelves, containers or removable drawers which are themselves only accessible after opening any door or lid. In calculating the volume, a space with any single dimension not exceeding 150 mm or any two orthogonal dimensions each of which do not exceed 200 mm is ignored

3.107

TRANSCRITICAL REFRIGERATION SYSTEM

refrigeration system where the pressure in the high pressure side is above the pressure where the vapour and liquid states of the refrigerant can coexist in thermodynamic equilibrium

3.108

GAS COOLER

heat exchanger in which, after compression the refrigerant is cooled down, by transferring heat to an external cooling medium, without changing state

NOTE A gas cooler is normally used in TRANSCRITICAL REFRIGERATION SYSTEMS.

3.109

DESIGN PRESSURE

gauge pressure that has been assigned to the high pressure side of a TRANSCRITICAL REFRIGERATION SYSTEM

3.110

BURSTING DISC

disc or foil which bursts at a predetermined pressure to reduce a pressure in a refrigeration system

3.111

PRESSURE RELIEF DEVICE

pressure sensing device, intended to reduce pressure automatically when pressures within the refrigeration system exceed the setting pressure of the device

3.112DV DR Add the following definition to Clause 3 of the Part 2:

PARTIAL UNITS – a remote condensing (or condenser) unit or remote evaporator (or evaporating) unit which is part of a total connected assembly of a commercial refrigeration system where not all assemblies that create the complete refrigeration system are specified by the manufacturer.

NOTE: Partial units are defined and evaluated for safety as stand-alone assemblies per the requirements of Annex 101.DVG.

3.113DV DR Add the following definition to Clause 3 of the Part 2:

REFRIGERATING UNIT — factory assembled unit for performing the complete refrigeration cycle (compressing gas, condensation or gas cooling, and evaporation) comprising refrigerant compressor(s) with motors, condensers or GAS COOLERS, liquid receivers, interconnection pipe work, and ancillary equipment, all mounted on a common base with a single enclosure. A REFRIGERATING UNIT is a packaged system that is mounted on the enclosure to be cooled, such as a factory assembled walk in cooler.

NOTE: The term REFRIGERANT UNIT (3.104) should not be confused with a REFRIGERATING UNIT as described in this clause and Annex 101.DVF.

3.114DV DR Add the following definition to Clause 3 of the Part 2:

LCDI (LEAKAGE CURRENT DETECTION INTERRUPTER) — a device provided in a power supply cord that senses leakage current flowing between or from the integral cord conductors and interrupts the circuit at a predetermined level of leakage current.

3.115DV DR Add the following definition to Clause 3 of the Part 2:

CASCADE SYSTEM — a refrigeration system that incorporates two or more independent vapor-compressor refrigeration cycles in series. This is done to acquire low temperatures that might not be readily achieved with a single refrigeration cycle.

3.116DV DR Add the following definition to Clause 3 of the Part 2:

PRESSURE REGULATING RELIEF VALVE — similar to a pressure relief valve, except specifically intended for use with refrigeration systems utilizing carbon dioxide (R744) as the refrigerant in a secondary loop or CASCADE SYSTEM. The pressure relief setting of this valve is always lower than the relief setting of a pressure relief valve. This valve can open and re-close many times during the life of the system.

3.117DV DR Add the following definition to Clause 3 of the Part 2:

START TO DISCHARGE PRESSURE — the pressure at which a relief valve begins to discharge; typically, the pressure where the first bubbles can be seen when a valve is immersed in water.

3.118DV DR Add the following definition to Clause 3 of the Part 2:

PRESSURE VESSEL — a closed vessel, used for containing, storing, distributing, transferring, distilling, processing, or otherwise handling any gas, vapour, or liquid under pressure and as further defined in CSA B52 and ANSI/ASHRAE 15.

3.119DV DR Add the following definition to Clause 3 of the Part 2:

MOTOR FUEL DISPENSING FACILITY — that portion of a property where motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles or marine craft or into containers, including all equipment used in connection therewith. The area surrounding a fuel dispenser in an outdoor motor fuel dispensing facility extending up 450 mm (18 in) above grade level and 6 m (20 ft) horizontally in all directions from the dispenser enclosure is considered to be a location where flammable or combustible gas and/or liquids can be present in combustible concentrations as noted in NFPA 30A.

3.120DV DR Add the following definition to Clause 3 of the Part 2:

FACTORY ASSEMBLED WALK-IN COOLER — an enclosed walk-in cabinet that is cooled by a REFRIGERATING UNIT or integral refrigerating system that is completely assembled and shipped from the factory as one assembly.

3.121DV DR Add the following definition to Clause 3 of the Part 2:

INTEGRAL REFRIGERATING SYSTEM — the necessary equipment for performing the complete refrigeration cycle (compressing gas, condensation or gas cooling, and evaporation) comprising refrigerant compressor(s) with motors, condensers or GAS COOLERS, liquid receivers, interconnection pipe work, and ancillary equipment. The components needed to perform these functions are incorporated into the design on the walk-in cooler and need not be mounted on a single base plate or within a single enclosure.

3.122DV DR Add the following definition to Clause 3 of the Part 2:

BEVERAGE DISPENSERS — equipment comprising means for performing one or more of the functions of cooling, mixing, carbonating, and dispensing of beverages, and intended to be used in commercial establishments.

4 General requirement

This clause of Part 1 is applicable except as follows.

Addition:

NOTE 101 The use of FLAMMABLE REFRIGERANTS involves some additional hazards which are not associated with appliances which use non-FLAMMABLE REFRIGERANTS.

This standard addresses the hazard due to ignition of leaked FLAMMABLE REFRIGERANT by potential ignition sources associated with the appliance.

The hazard due to ignition of leaked FLAMMABLE REFRIGERANT by an external potential ignition source associated with the environment in which the appliance is installed is compensated for by the low probability of ignition.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 Addition:

At least one additional specially prepared sample is required for the tests of 22.107.

NOTE 101 Unless the motor-compressor complies with IEC 60335-2-34, at least one additional specially prepared sample may be required for the test of 19.1.

NOTE 102 At least one additional sample of the fan motor, thermal motor protector combination may be required for the test of 19.1.

NOTE 103 The test of 22.7 may be performed on separate samples.

NOTE 104 Due to the potentially hazardous nature of the tests of 22.107, 22.108 and 22.109, special precautions may need to be taken when performing the tests.

5.3 Addition:

Before starting the tests, the appliance shall be operated at RATED VOLTAGE for at least 24 h, then switched off and left to stand for at least 12 h.

5.7 Addition:

Tests in accordance with Clauses 10, 11 and 13 are performed at an ambient temperature of

- 32 °C ± 2 °C on appliances of climatic class 0, 1, 2, 3, 4, 6 or 8;*
- 43 °C ± 2 °C on appliances of climatic class 5 or 7.*

Before starting the tests specified in 10, 11 and 13, the appliance, with the doors or lids open, is brought to the ambient specified temperature ± 2 K.

Other tests are performed at an ambient temperature of 20 °C ± 5 °C.

Appliances classified for several climatic classes are tested at the ambient temperature relevant to the highest climatic class.

NOTE 101 Steady conditions are considered to be established when three successive readings of the temperature, taken at approximately 60 min intervals, at the same point of any operating cycle, do not differ by more than 1 K.

5.10 Addition:

For the tests of 22.107, 22.108 and 22.109, the appliance is empty and installed as follows.

BUILT-IN APPLIANCES are installed in accordance with the instructions for installation.

Other appliances are placed in a test enclosure, the walls of which enclose the appliance as closely as possible to all its sides and top surface, unless the manufacturer indicates in the instructions for installation that a free distance shall be observed from the walls or the ceiling, in which case this distance is observed during the test.

5.101 Appliances which use FLAMMABLE REFRIGERANTS and which, according to the instructions, may be used with other electrical appliances inside a food storage compartment, are tested with such recommended appliances incorporated and in operation as they would be in normal use.

NOTE Examples of such electrical appliances are ice-cream makers and deodorizers.

6 Classification

This clause of Part 1 is applicable except as follows.

6.101 REFRIGERATED DISPLAY AND STORAGE CABINETS shall be at least one of the following climatic classes:

- appliance of class 0;
- appliance of class 1;
- appliance of class 2;
- appliance of class 3;
- appliance of class 4;
- appliance of class 5;
- appliance of class 6;
- appliance of class 7;
- appliance of class 8.

Compliance is checked by inspection.

NOTE The climatic classes are specified in ISO 23953-2.

6.2DV D1 Modification by adding the following to Clause 6.2 of the Part 1:

Appliances or parts of appliances intended for outdoor use shall be at least IPX4.

NOTE 1DV: Additionally, other standards, CSA C22.2 No. 94.2/UL 50E, may be used for outdoor use as determined by the AHJ.

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7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Modification:

Replace the third dash by:

– RATED CURRENT, in amperes;

Addition:

- the power input, in watts, of heating systems, if greater than 100 W;
- the defrosting power input, in watts, if the current corresponding to the defrosting power input is greater than the RATED CURRENT of the appliance;
- one or more of the numerals; 0, 1, 2, 3, 4, 5, 6, 7 or 8, indicating the climatic class of the appliance;
- for incandescent lamps, the maximum rated wattage of the lamp, in watts;
- for discharge lamps, the rated wattage of the lamp, in watts;
- the total mass of refrigerant for each separate refrigerant circuit;
- for a single component refrigerant, at least one of the following:
 - the chemical name,
 - the chemical formula,
 - the refrigerant number;
- for a blended refrigerant, at least one of the following:
 - the chemical name and nominal proportion of each of its components,
 - the chemical formula and nominal proportion of each of its components,
 - the refrigerant number and nominal proportion of each of its components,
 - the refrigerant number of the refrigerant blend.
- the chemical name or refrigerant number of the principal component of the insulation blowing gas.

Refrigerant numbers shall be quoted in accordance with ISO 817.

NOTE 101 Pipe insulation or small items of insulation are not required to be marked.

Appliances which use FLAMMABLE REFRIGERANTS shall be marked with the symbol “Caution: risk of fire”.

Appliances employing R-744 in a TRANSCRITICAL REFRIGERATION SYSTEM shall be marked with the substance of the following:

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WARNING: System contains refrigerant under high pressure. Do not tamper with the system. It must be serviced by qualified persons only.

Appliances employing R-744 in a TRANSCRITICAL REFRIGERATION SYSTEM shall be marked with symbol ISO 7000-1701 (2004-01).

Appliances without automatic liquid-level control and which are intended to be connected to the water supply mains or to be filled with liquid by the user shall be marked with the maximum liquid level.

7.1DV.1 DR Modification of the Part 2 to add the following dashed items after the first dashed item after “Addition”:

- total input current (cord connected appliances)
- manufacturing date or date code and location if the product is produced in more than one location
- refrigerant number in accordance with ANSI/ASHRAE 34 [ISO 817]
- markings for permanently connected appliances:
 - motor ratings (FLA)
 - minimum circuit ampacity (MCA)
 - motor compressor ratings (RLA and LRA)
 - rating of over current protective device
 - branch circuit selection current (BCSC) (if RLA exceeds 64% of MCC)
 - all other individual loads marked in amps

7.1DV.2 DE Modification of the Part 2 by adding the following below the dashed items following “Addition”:

Load markings may be in watts or amps.

See Annex 101.DVB for examples of marking calculations.

“Suitable for Outdoor Use” if required by the AHJ.

7.1DV.3 DR Modification of the Part 2 by adding the following:

The markings as outlined in 7.1ADV.1 to 7.1ADV.4, or the equivalent, shall be in letters no less than 6.4 mm (1/4 inch) high and shall be permanently marked on the refrigerator in the indicated locations when a flammable refrigerant is used.

7.1ADV DR Add Clauses 7.1ADV.1 to 7.1ADV.6 to Clause 7 of the Part 2:

7.1ADV.1 “DANGER – Risk Of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing”. This marking shall be provided on or near any evaporators that can be contacted by the user.

7.1ADV.2 For a refrigerator freezer with an incorporated refrigerant unit, the following markings shall be located near the machine compartment. For a remote refrigerator or freezer, the following markings shall be located by the inter-connecting refrigerant tubing connections and by the nameplate:

a) **“DANGER – Risk Of Fire Or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing”.**

b) **“CAUTION – Risk Of Fire Or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner’s Guide Before Attempting To Install or Service This Product. All Safety Precautions Must be Followed”.**

7.1ADV.3 **“CAUTION – Risk Of Fire Or Explosion. Dispose Of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.”** This marking shall be provided on the exterior of the refrigerator.

7.1ADV.4 **“CAUTION – Risk Of Fire Or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used”.** This marking shall be provided near all exposed refrigerant tubing.

7.1ADV.5 Refrigeration tubing or other devices through which the refrigerant is intended to be serviced shall be painted or colored red, Pantone® Matching System (PMS) No. 185. This color shall be present at all places where service puncturing or otherwise creating an opening in the refrigerant circuit might be expected. In the case of a process tube on a compressor, the color mark shall extend at least 2.5 cm (1 inch) from the compressor.

7.1ADV.6 The marking specified in 7.1ADV.2(a) shall also contain the Flammable Material Warning symbol (Fire in a triangle). The color and format of this sign shall be as shown in Symbol W021 in ISO 7010. The perpendicular height of the triangle containing the “Caution, risk of fire” sign shall be at least 15 mm (9/16 in).

7.2DV *DR Modification by replacing Clause 7.2 of the Part 1 with the following:*

7.2DV.1 STATIONARY APPLIANCES for multiple supplies shall be marked with the substance of the following placed on each point of supply entry:

“Warning: more than one source of electrical supply. Disconnect all sources before servicing.”

Compliance is checked by inspection.

7.2DV.2 A refrigerator intended to utilize carbon dioxide (R744) in a secondary loop, cascade, or a transcritical evaporator and evaporating unit shall be provided with markings which indicate:

a) That the refrigerator is for use with R744 (carbon dioxide) system components where the design pressure of the refrigerator is not less than the design pressure of the associated components; and

b) If such a refrigerator contains a pressure vessel within the R744 loop or system but is not provided with any pressure relief or pressure regulating relief valves, a marking shall be located where visible to the installer indicating that the

refrigerator is not provided with any pressure relief or pressure regulating relief valves and that a sufficient number of valves having capacity deemed adequate shall be field-installed on the system. The marking should refer to the installation instructions provided by the equipment manufacturer.

7.6 Addition:



Symbol ISO 7010 W021

Warning; Risk of fire / flammable materials



Symbol ISO 7000 - 1701 (2004-01)

Pressure

su2185

NOTE The rules for warning signs in ISO 3864-1 apply to the colour and shape of the symbol Caution: risk of fire.

7.12 Modification:

The instructions concerning persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge and children playing with the appliance are not required.

Addition:

The instructions shall contain information regarding the maximum loading of each type of shelf.

The instructions shall state the substance of the following.

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