



UL 60335-2-24

STANDARD FOR SAFETY

Household and Similar Electrical Appliances –
Safety – Part 2-24: Particular Requirements for
Refrigerating Appliances, Ice-Cream Appliances
and Ice-Makers

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UL Standard for Safety for Household and Similar Electrical Appliances – Safety – Part 2-24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers, UL 60335-2-24

Second Edition, Dated April 28, 2017

Summary of Topics

This new edition of ANSI/UL 60335-2-24, the harmonized Standard for Household and Similar Electrical Appliances – Safety – Part 2-24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers, UL 60335-2-24, is based off of Edition 7.1 of IEC 60335-2-24.

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 March 18, 2016 and December 23, 2016.

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CSA Group
CAN/CSA-C22.2 No. 60335-2-24:17
Second Edition
(IEC 60335-2-24:2010+A1:2012, MOD)



Underwriters Laboratories Inc.
UL 60335-2-24
Second Edition

Household and Similar Electrical Appliances – Safety – Part 2-24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers

April 28, 2017

This national standard is based on IEC 60335-2-24, edition 7.1 (2012), which is based on the seventh edition (2010) and its amendment 1 (2012).



ANSI/UL 60335-2-24-2017

Approved by



Standards Council of Canada
Conseil canadien des normes



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Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as “CSA Group”) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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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 Second Edition. The most recent designation of ANSI/UL 60335-2-24 as an American National Standard (ANSI) occurred on April 28, 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 refrigerating appliances, ice-cream appliances and ice makers. It is the second edition of CAN/CSA-C22.2 No. 60335-2-24, and the second edition of UL 60335-2-24. This edition of CAN/CSA-C22.2 No. 60335-2-24 supersedes the previous edition published on August 21, 2006 and replaces CSA C22.2 No. 63-93, *Household Refrigerators and Freezers*. This edition of UL 60335-2-24 supersedes the previous edition published on August 21, 2006.

This harmonized standard is based on IEC Publication 60335-2-24: Edition 7.1, Household and Similar Electrical Appliances – Safety – Part 2-24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers, issued May 2012. IEC 60335-2-24 is copyrighted by the IEC.

This harmonized Standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the 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 Household Refrigerators and Freezers, STP 250.

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. 60335-2-24 is to be used in conjunction with the first edition of CAN/CSA-C22.2 No. 60335-1:11. The requirements for refrigerating appliances, ice-cream appliances and ice makers are contained in this Part 2 Standard and CAN/CSA-C22.2 No. 60335-1:11. Requirements of this Part 2 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 60335-1:11. Where a particular subclause of CAN/CSA-C22.2 No. 60335-1:11 is not mentioned in CAN/CSA-C22.2 No. 60335-2-24, the CAN/CSA-C22.2 No. 60335-1:11 subclause applies.

UL 60335-2-24 is to be used in conjunction with the fifth edition of UL 60335-1. The requirements for refrigerating appliances, ice-cream appliances and ice makers 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 60335-2-24, 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

In the CSA Group and UL publications of this standard, National Differences from the text of International Electrotechnical Commission (IEC) Publication 60335-2-24, Household and Similar Electrical Appliances – Safety – Part 2-24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers, 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: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers

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 co-operation 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 nongovernmental 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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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 60335-2-24 consists of the seventh edition (2010) [documents 61C/459/FDIS and 61C/461/RVD] and its amendment 1 (2012) [documents 61C/506/FDIS and 61C/509/RVD]. It bears the edition number 7.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

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.

This seventh edition cancels and replaces the sixth edition published in 2002 including its Amendment 1 (2005) and Amendment 2 (2007). It constitutes a technical revision.

The principal changes in this edition as compared with the previous edition of IEC 60335-2-24 are as follows (minor changes are not listed):

- aligns the text with IEC 60335-1, and its Amendments 1 and 2;
- clarifies the term “household and similar use” (1, 7.12);
- updates marking requirements for supply terminals of battery operated appliances (7.6, 7.101);
- introduces requirements for appliances using transcritical refrigerant systems (3.112, 3.113, 3.114, 3.115, 3.116, 7.1, 7.6, 7.12.1, 22.103, 24.1.4, 24.102);
- introduces an enhanced flexing test (23.3);
- introduces requirements for ACCESSIBLE glass panels (22.116);
- clarifies tests for appliances using flammable refrigerants (22.107, Annex DD)

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 electric refrigerating appliances, ice-cream appliances and ICE-MAKERS.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When 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 smaller roman bold 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.

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.

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

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.

101DV DE Modification of NOTE 2 by adding the following item:

- 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.

102DV DE Modification of NOTE 3 by replacing the second to last sentence with the following:

Words in **SMALL CAPITALS** in the text are defined in Clause 3.

103DV DE Modification to add the following to the IEC Foreword:

For this Standard, all references to "Part 1" refer to CAN/CSA-C22.2 No. 60335-1, and UL 60335-1.

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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 that 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 2-24: Particular requirements for refrigerating appliances, ice-cream appliances and ice-makers

1 Scope

This clause of part 1 is replaced by the following:

This International Standard deals with the safety of the following appliances, their RATED VOLTAGE being not more than 250 V for single-phase appliances, 480 V for other appliances and 24 V d.c. for appliances when battery operated:

- REFRIGERATING APPLIANCES for household and similar use;
- ICE-MAKERS incorporating a motor-compressor and ICE-MAKERS intended to be incorporated in frozen food storage compartments;
- REFRIGERATING APPLIANCES and ICE-MAKERS for use in camping, touring caravans and boats for leisure purposes.

These appliances may be operated from the mains, from a separate battery or operated either from the mains or from a separate battery.

This standard also deals with the safety of ICE-CREAM APPLIANCES intended for household use, their RATED VOLTAGE being not more than 250 V for single-phase appliances and 480 V for other appliances.

It also deals with COMPRESSION-TYPE APPLIANCES for household and similar use, which use FLAMMABLE REFRIGERANTS.

This standard does not cover features of the construction and operation of those REFRIGERATING APPLIANCES which are dealt with in other IEC standards.

Refrigerating appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as

- REFRIGERATING APPLIANCES used in staff kitchen areas in shops, offices and other working environments,
- REFRIGERATING APPLIANCES used in farm houses and by clients in hotels, motels and other residential type environments,
- REFRIGERATING APPLIANCES used in bed and breakfast type environments, and
- REFRIGERATING APPLIANCES used in catering and similar non-retail applications

are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

- persons (including children) whose

- physical, sensory or mental capabilities or
- lack of experience and knowledge

prevents them from using the appliance safely without supervision or instruction;

– children playing with the appliance.

NOTE 1 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 health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

NOTE 2 This standard does not apply to

- appliances intended to be used in the open air;
- appliances designed exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- appliances incorporating a battery intended as a power supply for the refrigerating function;
- appliances assembled on site by the installer;
- appliances with remote motor-compressors;
- motor-compressors (IEC 60335-2-34);
- commercial dispensing appliances and vending appliances (IEC 60335-2-75);
- commercial refrigerators and freezers used for the display of food products, including beverages, for retail sale (IEC 60335-2-89);
- commercial ice-cream appliances.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-11, *Environmental testing – Part 2 Tests. Tests Ka: Salt mist*

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

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

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

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IEC60335-2-5:2002, *Household and similar electrical appliances – Safety – Part 2-5: Particular requirements for dishwashers*

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 (2002) that includes edition 4 and its Amendment 1 and Amendment 2.

ISO 209, *Aluminium and aluminium alloys - Chemical composition*

ISO 817, *Refrigerants – Designation system*

ISO 4126-2:2013, *Safety devices for protection against excessive pressure – Bursting disc safety devices*

ISO 5149:1993, *Mechanical refrigerating systems used for cooling and heating – Safety requirements*

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

2DV.1 DC Modification to add the following to Clause 2 of the Part 2:

16 CFR Part 1500

Hazardous Substances and Articles; Administration and Enforcement Regulations

ANSI Z97.1

Safety Glazing Materials Used In Buildings – Safety Performance Specifications and Methods of Test

ASHRAE 15

Safety Standard for Refrigeration Systems

ASHRAE 34

Designation and Safety Classification of Refrigerants

ASTM B344

Standard Specification for Drawn or Rolled Nickel-Chromium and Nickel-Chromium-Iron Alloys for Electrical Heating Elements

ASTM E162

Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

CSA B52

Mechanical Refrigeration Code

CSA C22.2 No. 0.3

Test Methods for Electrical Wires and Cables

IEC 60695-11-20

Fire Hazard Testing – Part 11-20: Test Flames – 500 W Flame Test Method

UL 94

Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

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UL 1441
Coated Electrical Sleeving

UL 1581
Electrical Wire, Cables, and Flexible Cords

UL 1694
Tests for Flammability of Small Polymeric Component Materials

2DV.2 DC Modification to add the following to Clause 2 of the Part 2 (US only):

16 CFR Part 1750
Devices to Permit the Opening of Household Refrigerator Doors from the Inside

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

3.1.9.101 NORMAL OPERATION OF A REFRIGERATING APPLIANCE: operation at an ambient temperature in accordance with 5.7, empty, with the doors and lids closed. User-adjustable temperature control devices which control the operation of the motor-compressor in COMPRESSION-TYPE APPLIANCES are short-circuited or otherwise rendered inoperative

3.1.9.102 NORMAL OPERATION OF AN ICE-MAKER: operation at an ambient temperature in accordance with 5.7, with the supply water at a temperature of $15\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

3.1.9.103 NORMAL OPERATION OF AN INCORPORATED ICE-MAKER: operation at the normal temperature of the frozen food storage compartment, with the supply water at a temperature of $15\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

3.1.9.104 NORMAL OPERATION OF AN ICE-CREAM APPLIANCE: operation of the appliance using the maximum quantity of the mixture of ingredients indicated in the instructions; the mixture used being that which gives the most unfavourable results, the mixture being at an initial temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

3.101 REFRIGERATING APPLIANCE: enclosed thermally insulated appliance of suitable volume for household use, cooled by an incorporated device and having one or more compartments intended for the preservation of foodstuffs including cooling of beverages

3.102 COMPRESSION-TYPE APPLIANCE: appliance in which refrigeration is effected by the vaporization at low pressure in a heat exchanger (EVAPORATOR) of a liquid refrigerant, the vapour thus formed being restored to the original state by mechanical compression at a higher pressure and subsequent cooling in another heat exchanger (CONDENSER)

3.103 ICE-MAKER: appliance in which ice is made by freezing water by a device consuming electrical energy and having a compartment for storing the ice

3.104 INCORPORATED ICE-MAKER: ICE-MAKER specially designed to be incorporated into a frozen food storage compartment and without independent means for freezing water

3.105 HEATING SYSTEM: heating element with associated components such as timers, switches, THERMOSTATS and other controls

3.106 ABSORPTION-TYPE APPLIANCE: appliance in which refrigeration is effected by the evaporation in a heat exchanger (EVAPORATOR) of a liquid refrigerant, in the liquid state, the resulting vapour being then absorbed by an absorbent medium from which it is subsequently expelled at a higher partial vapour pressure by heating and liquefied by cooling in another heat exchanger (CONDENSER)

3.107 CONDENSER: heat exchanger in which, after compression, vaporized refrigerant is liquefied by losing heat to an external cooling medium

3.108 EVAPORATOR: heat exchanger in which, after pressure reduction, the liquid refrigerant is vaporized by absorbing heat from the medium to be refrigerated

3.109 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.

3.109DV DR Modification of Clause 3.109 of the Part 2 as follows:

Replace "ISO 5149" with "ASHRAE 34 or CSA B52".

3.110 ICE-CREAM APPLIANCE: COMPRESSION TYPE APPLIANCE which is used to make ice-cream.

3.111 FREE SPACE: space with a volume exceeding 60 l where 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

NOTE 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.

3.111DV DR Modification of Clause 3.111 of the Part 2 as follows:

Replace "60 l" with "56,6 l (2 ft³)".

3.112 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

3.113 **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.

3.114 **DESIGN PRESSURE (DP):** gauge pressure that has been assigned to the high pressure side of a TRANSCRITICAL REFRIGERATION SYSTEM

3.115 **BURSTING DISC:** disc or foil which bursts at a predetermined pressure to reduce a pressure in a refrigeration system

3.116 **PRESSURE RELIEF DEVICE:** pressure sensing device, intended to reduce pressure automatically when pressures within the refrigeration system exceed the setting pressure of the device

3.117DV DE Add the following definition to Clause 3 of the Part 2 as follows:

ACCESSORY: An optional electrical device, such as an INCORPORATED ICE-MAKER, intended for installation in or connection to a refrigerator for the purpose of modifying or supplementing the functions of the refrigerator. It can be factory installed or intended for installation by the user or service personnel.

3.118DV DE Add the following definition to Clause 3 of the Part 2 as follows:

ELECTRICAL CONNECTION: The physical interface between two points in a circuit such as spade terminals, pin terminals, micro switch contacts, relay contacts, timer contacts, crimped connections, and connections that are welded or soldered.

3.119DV DE Add the following definition to Clause 3 of the Part 2 as follows:

ICE DISPENSING SYSTEM: The parts of a refrigerator used in moving ice, including the motor, auger, ice bucket, ICE-MAKER (where a broken part could be dispensed), and mechanical parts used to move or modify ice.

4 General requirement

This clause of Part 1 is applicable except as follows.

Addition:

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

This standard addresses the hazards 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 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 conforms to IEC 60335-2-34, at least one additional specialty prepared sample may be required for the test of 19.1.

NOTE 102 At least one additional sample of the fan motor and its thermal motor protector 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,

– ICE-CREAM APPLIANCES are operated empty at RATED VOLTAGE for 1 h, or the maximum setting of an incorporated timer, whichever is shorter;

– other COMPRESSION-TYPE APPLIANCES shall be operated at RATED VOLTAGE for at least 24 h, then switched off and left to stand for at least 12 h.

The test of 11.102 is carried out immediately after the tests of Clause 13.

The test of 15.105 is carried out immediately after the test of 11.102.

The tests of 15.102, 15.103 and 15.104 are carried out immediately after the test of 15.2.

5.4 Replacement:

Tests are carried out using each source of energy (electricity, gas or other fuel) in turn. Gas appliances are supplied at the appropriate rated pressure.

Tests are additionally carried out with all combinations of energy sources supplied simultaneously unless this is prevented by interlocking devices.

5.7 Addition:

For ICE-CREAM APPLIANCES, tests specified in Clauses 10, 11 and 13 are carried out at an ambient temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

For other appliances, tests specified in Clauses 10, 11, 13 and subclause 19.103 are carried out at an ambient temperature of

$32\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ on appliances of extended temperate (SN) and temperate (N) classes;

$38\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ on appliances of subtropical (ST) class;

$43\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ on appliances of tropical (T) class.

Before starting these tests, the appliance with the doors or lids open is brought to within 2 K of the ambient temperature specified.

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

Other tests are carried out at an ambient temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

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.

5.7DV D1 Modification of Clause 5.7 of the Part 2 by replacing the second paragraph and three temperatures for the various climatic classes as follows:

For other appliances, tests specified in Clauses 10, 11, 13 and Clause 19.103 are carried out at an ambient temperature of $43\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ($109,4\text{ }^{\circ}\text{F} \pm 1,8\text{ }^{\circ}\text{F}$).

5.8.1 Addition:

Appliances which can be battery operated are tested at the more unfavourable polarity when the supply terminals or terminations for the connection of the battery have no indication for polarity.

5.9 Addition:

Appliances incorporating an ICE-MAKER are tested with the ICE-MAKER operating to give the most unfavourable results.

5.10 Addition:

For the tests of 22.107, 22.108 and 22.109, the appliance is empty and installed as outlined below:

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

Other appliances are placed in a test enclosure, the walls enclosing the appliance as near to all its sides and the top of the appliance as possible, 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.

NOTE 101 Commonly available fixing hardware, such as screws and bolts, need not be delivered with a FIXED APPLIANCE.

5.101 *Appliances which are constructed so that an ICE-MAKER may be incorporated are tested with the intended ICE-MAKER.*

5.102 *COMPRESSION-TYPE APPLIANCES with HEATING-SYSTEMS and Peltier-type appliances are tested as COMBINED APPLIANCES.*

5.103 *COMPRESSION-TYPE 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 being operated as 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.

6.1DV.1 D1 Modification to replace Clause 6.1DV.1 of the Part 1 with the following:

Class 0 and Class 0I appliances are not allowed.

6.101 Appliances, other than ICE-CREAM APPLIANCES, shall be of one or more of the following climatic classes:

- appliances of extended temperate class (SN);
- appliances of temperate class (N);
- appliances of subtropical class (ST);
- appliances of tropical class (T).

Compliance is checked by inspection.

NOTE The climatic classes are specified in IEC 62552.

6.101DV D2 Deletion of Clause 6.101 of the Part 2:

This clause of the Part 2 is not applicable.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Appliances shall also be marked with

- the power input, in watts, of HEATING SYSTEMS, if greater than 100 W;
- the defrosting input, in watts, if greater than the input corresponding to the RATED POWER INPUT;
- RATED POWER INPUT in watts or RATED CURRENT in amperes, except that COMPRESSION-TYPE APPLIANCES, other than ICE-CREAM APPLIANCES, shall be marked only with the RATED CURRENT in amperes;
- the letters SN, N, ST or T indicating the climatic class of the appliance;
- the maximum rated wattage of lamps, in watts (not applicable if the lamps can only be replaced by the manufacturer, together with a part of the appliance);
- the total mass of the refrigerant;

NOTE 101 For ABSORPTION-TYPE APPLIANCES using ammonia, the total mass of the refrigerant is considered to be the mass of ammonia used.

- 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 the components;
 - the chemical formula and nominal proportion of each of the components;
 - the refrigerant number and nominal proportion of each of the 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 are given in ISO 817.

For COMPRESSION-TYPE APPLIANCES, the defrosting power input in watts shall be marked separately if the current corresponding to the defrosting power input is greater than the RATED CURRENT of the appliance.

Appliances which can be mains and battery operated shall be marked with the battery voltage.

Appliances which can be battery operated shall be marked with the type of battery, distinguishing between rechargeable and non-rechargeable batteries, if necessary, unless the type is irrelevant for the operation of the appliance.

The means provided for connection of any additional electrical supply shall be marked with the voltage and nature of the supply.

Appliances having provision for an INCORPORATED ICE-MAKER shall be marked with the maximum power input for an INCORPORATED ICE-MAKER, if greater than 100 W.

ICE-MAKERS without automatic water level control shall be marked with the maximum permissible water level.

Appliances shall be marked with details of the source of supply other than electrical, if any.

For COMPRESSION-TYPE REFRIGERATING SYSTEMS, the appliance shall also be marked with the mass of the refrigerant for each separate refrigerant circuit.

COMPRESSION-TYPE 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:

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).

7.1DV.1 D2 Modification of Clause 7.1 of the Part 2 as follows:

Delete the fourth dashed item of the first paragraph.

7.1DV.2 D2 Modification of Clause 7.1 of the Part 2 by adding the following (US only):

Appliances shall also be marked with the date of manufacture that will enable the product to be identified as being manufactured within a consecutive 3-month period. This information may be in code and shall be located on or near the nameplate. A date code marking shall be such that it does not repeat in less than 10 years.

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7.1DV.3 D2 Modification of Clause 7.1 of the Part 2 by adding the following:

If a manufacturer produces appliances at more than one factory, each unit shall have a permanent distinctive marking to identify it as the product of a particular factory.

7.1DV.4 DR Modification of Clause 7.1 of the Part 2 by adding the following:

7.1DV.4.1 The following markings, or the equivalent, shall be provided and shall be permanent when a FLAMMABLE REFRIGERANT is used:

- a) "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 located on or near any EVAPORATORS that can be contacted by the user.
- b) "DANGER – Risk Of Fire Or Explosion. FLAMMABLE REFRIGERANT Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing." This marking shall be located near the machine compartment.
- c) "CAUTION – Risk Of Fire Or Explosion. FLAMMABLE REFRIGERANT Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must be Followed." This marking shall be located near the machine compartment.
- d) "CAUTION – Risk Of Fire Or Explosion. Dispose Of Properly In Accordance With The Applicable Federal Or Local Regulations. FLAMMABLE REFRIGERANT Used." This marking shall be located on the exterior of the refrigerator.
- e) "CAUTION – Risk Of Fire Or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. FLAMMABLE REFRIGERANT Used." This marking shall be located near all exposed refrigerant tubing.

NOTE Wherever the word "CAUTION" is required, it may be substituted with the word "WARNING."

7.1DV.4.2 In the US, the markings of Clause 7.1DV.4.1 shall be in letters no less than 6,4-mm (1/4-in) high.

7.1DV.4.3 In Canada, the markings of Clause 7.1DV.4.1 shall be in letters no less than 3,2-mm (1/8-in) high.

7.1DV.4.4 For COMPRESSION-TYPE APPLIANCES which use FLAMMABLE REFRIGERANTS, the 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 in) from the compressor.

7.1DV.5 DR Modification of Clause 7.1 of the Part 2 by adding the following:

Permanently connected equipment shall be marked with the individual electrical loads, the minimum circuit ampacity, and the maximum current rating of the supply circuit overcurrent protection. The minimum circuit ampacity is equal to 125% of the highest motor, heater, or compressor current rating plus the sum of all other current ratings of

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concurrent loads. The maximum overcurrent protection is equal to 225% of the highest motor or compressor current rating plus the sum of all other current ratings of concurrent loads.

7.1DV.6 D2 Modification of Clause 7.1 of the Part 2 as follows:

Replace the “symbol “Caution: risk of fire”” with “symbol ISO 7010 W021”

7.6 Addition:



Symbol IEC 60417-5005 (2002-10)

Plus; positive polarity



Symbol IEC 60417-5006 (2002-10)

Minus; negative polarity



Symbol ISO 7010 W021

Warning; Risk of fire/flammable materials



Symbol ISO 7000-1701 (2004-01)

Pressure

su2198a

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

7.10 Addition:

NOTE 101 As an alternative, temperature values in degrees Celsius may be indicated on a control scale.

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7.12 Addition:

The instructions for REFRIGERATING APPLIANCES and ICE-MAKERS for camping or similar use shall include the substance of the following:

- suitable for camping use;
- the appliance may be connected to more than one source of energy;

NOTE 101 This item is not applicable to appliances which are intended to be supplied by electricity only.

- the appliance shall not be exposed to rain

NOTE 102 This item is not applicable to appliances with a degree of protection against harmful ingress of water of at least IPX4.

The instructions for ICE-MAKERS not intended to be connected to the water supply shall state the substance of the following warning:

WARNING: fill with potable water only.

For COMPRESSION-TYPE APPLIANCES which use FLAMMABLE REFRIGERANTS, the instructions shall include information pertaining to the installation, handling, servicing and disposal of the appliance.

The instructions for COMPRESSION-TYPE APPLIANCES that use FLAMMABLE REFRIGERANTS shall additionally include the substance of the warnings listed below:

- **WARNING:** Keep ventilation openings, in the appliance enclosure or in the built-in structure, clear of obstruction.
- **WARNING:** Do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer.
- **WARNING:** Do not damage the refrigerant circuit.

NOTE 103 This warning is only applicable to appliances with refrigerating circuits which are ACCESSIBLE to the user.

- **WARNING:** Do not use electrical appliances inside the food storage compartments of the appliance, unless they are of the type recommended by the manufacturer.

For appliances which use flammable insulation blowing gases, the instructions shall include information regarding disposal of the appliance.

The instructions for ICE-CREAM APPLIANCES shall include the ingredients and maximum quantity of mixtures that can be used in the appliance.

The instructions shall state the substance of the following.

Do not store explosive substances such as aerosol cans with a flammable propellant in this appliance.

If symbol ISO 7000-1701 (2004-01) is used, its meaning shall be explained.

The instructions shall include the substance of the following:

This appliance is intended to be used in household and similar applications such as

- staff kitchen areas in shops, offices and other working environments;
- farm houses and by clients in hotels, motels and other residential type environments;
- bed and breakfast type environments;
- catering and similar non-retail applications.

NOTE 104 If the manufacturer wants to limit the use of the appliance to less than the above, this has to be clearly stated in the instructions.

7.12.1 Addition:

Instructions shall include the method for replacing illuminating lamps, if the lamps can be replaced by the user.

For appliances designed for incorporating ICE-MAKERS, the instructions shall include the types of ICE-MAKERS which can be incorporated.

The instructions shall include information on the installation of INCORPORATED ICE-MAKERS which are available as optional accessories and intended to be installed by the user. If it is intended that INCORPORATED ICE-MAKERS are to be installed only by the manufacturer or its service agent, this shall be stated.

The instructions for ICE-MAKERS intended to be connected to the water supply shall state the substance of the following warning:

WARNING: Connect to potable water supply only.

The instructions for FIXED APPLIANCES shall include the substance of the following warning:

WARNING: To avoid a hazard due to instability of the appliance, it must be fixed in accordance with the instructions.

In appliances employing R-744 in a TRANSCRITICAL REFRIGERATION SYSTEM the instructions shall include the substance of the following:

WARNING: The refrigeration system is under high pressure. Do not tamper with it. Contact qualified service personal before disposal.

7.12.4 *Modification:*

This subclause is also applicable to FIXED APPLIANCES.

7.14 *Addition:*

The height of the triangle in the symbol "Caution: risk of fire" shall be at least 15 mm.

The height of the letters used for the marking of the type of flammable insulation blowing gas shall be at least 40 mm.

7.15 *Addition:*

The marking of the maximum rated wattage of illuminating lamps that can be replaced by the user shall be easily discernible while the lamp is being replaced.

For COMPRESSION-TYPE APPLIANCES the marking of the type of FLAMMABLE REFRIGERANT and of the flammable insulation blowing gas, as well as the symbol "Caution: risk of fire", shall be visible when gaining access to the motor-compressors.

For other appliances the marking of the type of flammable insulation blowing gas shall be on the external enclosure.

7.101 For appliances which can be battery operated, the supply terminals or terminations for connections to the battery shall be clearly indicated by symbols.

The positive terminal shall be indicated by symbol IEC 60417-5005 (2002-10) and the negative terminal by symbol IEC 60417-5006 (2002-10).

Compliance is checked by inspection.

7.102DV D1 Addition of Clauses 7.102DV.1 and 7.102DV.2 to the Part 2:

7.102DV.1 A lock key shall be permanently marked with the word "CAUTION" and with the following or equivalent statement: "To Prevent A Child From Being Entrapped, Keep Out Of Reach Of Children And Not In The Vicinity Of Freezer (Or Refrigerator)."

7.102DV.2 A marking calling attention to the notice of Clause 7.102DV.1 shall be placed over the key slot of the lock or immediately adjacent to it. This marking may be removable.

7.103DV D1 Addition of the following to the Part 2:

A child entrapment warning statement shall be included in either the operating instructions or in a use and care manual provided with each refrigerator and shall include the following or equivalent wording:

DANGER: Risk of child entrapment. Before you throw away your old refrigerator or freezer:

*** Take off the doors.**

*** Leave the shelves in place so that children may not easily climb inside.**

7.104DV D2 Addition of the following to the Part 2:

The appliance shall be visibly marked for proper operating CLEARANCES. This marking is not required when the unit has been evaluated and tested with zero CLEARANCES.

8 Protection against access to LIVE PARTS

This clause of Part 1 is applicable except as follows:

8.1.1 Modification:

Replace the second paragraph of the test specification by the following:

Lamps are not removed, provided that the appliance can be isolated from the supply by means of a plug or an all-pole switch. However, during the insertion or removal of lamps, protection against contact with LIVE PARTS of the lamp cap shall be ensured.

9 Starting of MOTOR-OPERATED APPLIANCES

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 Modification:

Replace the third dashed item of the first paragraph of the test specification by the following:

– the appliance being operated under NORMAL-OPERATION except that user adjustable temperature controls are set to give the lowest temperature.

Addition:

The power input is considered to be stabilized when steady conditions are established or when any incorporated timer operates, whichever occurs first.

A representative period is one between the making and the breaking of the temperature control, or between the highest and lowest values of power input measured, excluding starting power input but including the power input of the INCORPORATED ICE-MAKER, if any.

NOTE 101 The power input of a defrosting system which is separately marked on the appliance is not taken into consideration during the test.