

Household and similar electrical appliances — Safety —

**Part 2-40: Particular requirements for
electrical heat pumps, air-conditioners
and dehumidifiers**

ICS 23.120

National foreword

This British Standard is the UK implementation of EN 60335-2-40:2003+A13:2012, incorporating amendments A11:2004 and A12:2005 and corrigenda April 2006, August 2010 and August 2013. It is derived from IEC 60335-2-40:2002, incorporating amendments 1:2005 and 2:2005. It supersedes BS EN 60335-2-40:2003+A2:2009, which will be withdrawn on 11 July 2014.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by **A1** **A1**.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags **C** **C**.

Where a common modification has been introduced by CENELEC amendment, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC amendment A11 are indicated by **C11** **C11**.

Where a common modification to an IEC amendment has been introduced, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC to IEC amendment 1 are indicated by **C1** **C1**.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by CENELEC corrigendum August 2013 is indicated in the text by **AC1** **AC1**.

The UK participation in its preparation was entrusted by Technical Committee CPL/61, Safety of household and similar electrical appliances, to Subcommittee CPL/61/4, Room air-conditioners.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

The publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Amendments/corrigenda issued since publication

Amd. No.	Date	Comments
15303	2 August 2004	Revision of EN foreword and introduction and insertion of Annex ZAA
16399	31 July 2006	See national foreword and correction to EN foreword.
	30 June 2009	Implementation of IEC amendment 2:2005 with CENELEC Modification (CENELEC modification: replacement deleted in 15.1)
	31 October 2010	Implementation of CENELEC corrigendum August 2010. Additional reference added to bibliography.
	30 April 2012	Implementation of CENELEC amendment A13:2012
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English version

**Household and similar electrical appliances -
Safety
Part 2-40: Particular requirements for electrical heat pumps,
air-conditioners and dehumidifiers
(IEC 60335-2-40:2002, modified)**

Appareils électrodomestiques
et analogues -
Sécurité
Partie 2-40: Règles particulières
pour les pompes à chaleur électriques,
les climatiseurs et les déshumidificateurs
(CEI 60335-2-40:2002, modifiée)

Sicherheit elektrischer Geräte für den
Hausgebrauch und ähnliche Zwecke
Teil 2-40: Besondere Anforderungen
für elektrisch betriebene Wärmepumpen,
Klimageräte und Raumluft-Entfeuchter
(IEC 60335-2-40:2002, modifiziert)

This European Standard was approved by CENELEC on 2003-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 61D/116/FDIS, future fourth edition of IEC 60335-2-40, prepared by SC 61D of the IEC Technical Committee 61, was submitted to the IEC-CENELEC parallel vote.

As a result of the Kista meeting of CENELEC TC 61 in May 2002, a draft amendment prAA containing the relevant existing common modifications was submitted to the formal vote.

The texts of the FDIS and the prAA were approved by CENELEC as a new edition of EN 60335-2-40 on 2003-03-01.

This European Standard replaces EN 60335-2-40:1997 + A1:2000.

The following dates are applicable:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2004-03-01
- date on which national standards
conflicting with the EN have to be withdrawn (dow) 2007-03-01

This part 2 has to be used in conjunction with EN 60335-1, Household and similar electrical appliances – Safety – Part 1: General requirements. It was established on the basis of the 2002 edition of that standard. Amendments and revisions of Part 1 have also to be taken into account and the dates when such changes become applicable will be stated in the relevant amendment or revision of Part 1.

This part 2 supplements or modifies the corresponding clauses of EN 60335-1, so as to convert it into the European Standard: Safety requirements for electrical heat pumps, air-conditioners and dehumidifiers.

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 of Part 1 is to be adapted accordingly.

NOTE 1 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.;
- subclauses, notes and annexes that are additional to those in the IEC standard are prefixed with the letter Z.

NOTE 2 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.

There are no special national conditions causing a deviation from this European Standard, other than those listed in Annex ZA to EN 60335-1.

There are no national deviations from this European Standard, other than those listed in Annex ZB to EN 60335-1.

Annex AA is for information only.

Introduction

 The principle objectives of Low Voltage Directive 2006/95/EC, are covered in this standard. The essential safety requirements of the Machinery Directive 2006/42/EC, which can be applicable to some appliances, covered by this part have also been taken into account.

Products within the scope of this standard may incorporate pressurized components for which the Pressure Equipment Directive, 97/23/EC, applies. Further guidance is given in Annex ZAB. 

Endorsement notice

The text of the International Standard IEC 60335-2-40:2002 was approved by CENELEC as a European Standard with agreed common modifications.

Foreword to amendment A11

A proposal to amend EN 60335-2-40, document CLC/TC 61(SEC)1397, was discussed during the Brussels meeting of CENELEC TC 61 in November 2002, when it was decided to submit a draft for an amendment to the Unique Acceptance Procedure.

The draft was circulated in June 2003 and was approved by CENELEC as amendment A11 to EN 60335-2-40:2003 on 2004-03-01.

The following dates are applicable:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2005-03-01
- date on which national standards
conflicting with the amendment have to be withdrawn (dow) 2007-03-01

Foreword to amendment A12

This amendment to the European Standard EN 60335-2-40:2003 was prepared by the Technical Committee CENELEC TC 61, Safety of household and similar electrical appliances.

The text of the draft was submitted to the formal vote and was approved by CENELEC as amendment A12 to EN 60335-2-40:2003 on 2004-11-01.

The following dates are applicable:

- latest date by which the amendment has to be
implemented at national level by publication of
an identical national standard or by endorsement (dop) 2005-11-01
- date on which national standards conflicting
with the amendment have to be withdrawn (dow) 2007-11-01

This amendment supplements or modifies the corresponding clauses of EN 60335-2-40:2003.

There are no special national conditions causing a deviation from this amendment.

There are no national deviations from this amendment.

Foreword to amendment A13

This document (EN 60335-2-40:2003/A13:2012) has been prepared by CLC/TC 61, "Safety of household and similar electrical appliances".

The following dates are fixes:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2012-08-23
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2014-07-11

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This European Standard has been prepared under mandate M/392 given to CENELEC by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive 2006/42/EC.

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Foreword to amendment A1

A proposal to endorse a future amendment to IEC 60335-2-40:2002 based on 61D/125/CDV, document CLC/TC 61(SEC)1471, was discussed during the Balsthal meeting of CENELEC TC 61 in June 2004, when it was decided to submit the corresponding FDIS, document 61D/138/FDIS, to the formal vote together with common modifications prepared by CENELEC TC 61.

The draft was circulated in March 2005 and was approved by CENELEC as Amendment A1 to EN 60335-2-40:2003 on 2005-09-01.

The following dates are applicable:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2006-11-01
- date on which the national standards conflicting
with the amendment have to be withdrawn (dow) 2008-09-01

Endorsement notice

The text of amendment 1:2005 to the International Standard IEC 60335-2-40:2002 was approved by CENELEC as an amendment to the European Standard with agreed common modifications.

Foreword to amendment A2

The text of document 61D/136C/FDIS, future amendment 2 to IEC 60335-2-40:2002, prepared by SC 61D, Appliances for air-conditioning for household and similar purposes, of the IEC TC 61, Safety of household and similar electrical appliances, was submitted to the IEC-CENELEC parallel vote. During the ratification process, CENELEC TC 61 became aware that a modification was needed to align the amendment with the common modifications in EN 60335-2-40:2003. The issue was discussed during the Brughes meeting in June 2005, when it was decided to submit a new draft to the formal vote.

The draft was circulated in June 2008 and was approved by CENELEC as amendment A2 to EN 60335-2-40:2003 on 2009-03-01.

The following dates are applicable:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2010-03-01
- date on which national standards
conflicting with the amendment have to be withdrawn (dow) 2012-03-01

This amendment supplements or modifies the corresponding clauses of EN 60335-2-40:2003.

There are no special national conditions causing a deviation from this amendment.

There are no national deviations from this amendment.

Endorsement notice

The text of amendment 2:2005 to the International Standard IEC 60335-2-40:2002 was approved by CENELEC as an amendment to the European Standard with the agreed common modification.

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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.

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.

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.

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 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers

1 Scope

This clause of Part 1 is replaced by the following.

13 This European Standard deals with the safety of electric **heat pumps**, including **sanitary hot water heat pumps**, **air-conditioners**, and **dehumidifiers** incorporating motor-compressors and hydronic room **fan coils**, their maximum **rated voltages** being not more than 250 V for single phase appliances and 600 V for all other appliances.

Appliances and machines intended to be used in household, commercial applications, in shops, in light industry and on farms, are within the scope of this standard.

Additional requirements for appliances and machines intended for commercial use are given in Annex ZE.

NOTE Z1 Examples of appliance for household environment are appliances for typical housekeeping functions used in the household environment and appliances for typical housekeeping functions used by non expert users

- in shops, offices and other similar working environments,
- in farm houses,
- by clients in hotels, motels and other residential type environments,
- in bed and breakfast type environments.

NOTE Z2 Household environment includes the dwelling and its associated buildings, the garden, etc. **13**

A1 This standard also applies to electric **heat pumps**, **air conditioners** and **dehumidifiers** containing **flammable refrigerant**. **Flammable refrigerants** are defined in 3.120. **A1**

The appliances referenced above may consist of one or more factory made assemblies. If provided in more than one assembly, the separate assemblies are to be used together, and the requirements are based on the use of matched assemblies.

A1 NOTE 101 A definition of “motor-compressor” is given in IEC 60335-2-34, which includes the statement that the term motor-compressor is to be used to designate either a hermetic motor-compressor or semi-hermetic motor-compressor. **A1**

NOTE 102 Requirements for refrigeration safety are covered by ISO 5149, and requirements for containers intended for storage of the heated water included in **sanitary hot water heat pumps** are, in addition, covered by IEC 60335-2-21.

A1 This standard does not take into account chemicals other than group A1, A2, or A3 as defined by 3.121.

13 NOTE 103 This standard specifies particular requirements for the use of flammable refrigerants. **13**

The sections and clauses in ISO 5149 of particular concern to this standard are as follows:

- Section 3: Design and construction of equipment applies to all appliances and systems.
- Section 4: Requirements for utilization applies to appliances and systems which are for “similar electrical appliances”, i.e. commercial and light industrial.
- Section 5: Operating procedures applies to appliances and systems which are for “similar electrical appliances”, i.e. commercial and light industrial. **A1**

Supplementary heaters, or a provision for their separate installation, are within the scope of this standard, but only heaters which are designed as a part of the appliance package, the controls being incorporated in the appliance.

NOTE 104 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;
- for appliances subjected to pressure, additional requirements may be necessary;
- A1 In many countries additional requirements are specified, for example, by the national health authorities responsible for the protection of labour and the national authorities responsible for storage, transportation, building constructions and installations. A1

C13 This standard does not apply to

- humidifiers intended for use with heating and cooling equipment (EN 60335-2-88);
- appliances designed exclusively for industrial processing;
- 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). C13

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-52:1996, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

Ⓐ IEC 60079-14, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*

IEC 60079-15:2001, *Electrical apparatus for explosive atmospheres – Part 15: Type of protection “n”* Ⓐ

IEC 60335-2-34, *Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors*

Ⓐ ISO 817:1974, *Organic refrigerants – number designation*

ISO 3864:1984, *Safety colours and safety signs*¹⁾

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

ISO 7000, *Graphical symbols for use on equipment – Index synopsis*

ANSI/ASHRAE 34:2001, *Designation and safety classification of refrigerants* Ⓐ

Ⓒ ASTM D 4728-01, *Standard Test Method for Random Vibration Testing of Shipping Containers* Ⓒ

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.4 Addition:

NOTE 101 If the appliance comprises electrical accessories, including fans, the **rated power input** is based upon the total maximum **electrical power input** with all accessories energized, when operating continuously under the appropriate environmental conditions. If the **heat pump** can be operated in the heating or cooling mode, the **rated power input** is based upon the input in the heating or in the cooling mode, whichever is the greater.

3.1.9 Replacement: normal operation

conditions that apply when the appliance is mounted as in normal use and is operating under the most severe operating conditions specified by the manufacturer

Ⓐ¹⁾ ISO 3864:1984 has been replaced by ISO 3864-1:2002, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs in workplaces and public areas* and ISO 7010:2003, *Graphical symbols – Safety colours and safety signs – Safety signs used in workplaces and public areas*. However the safety sign referred to here in ISO 3864 (symbol B.3.2, Caution, risk of fire) is no longer contained in either ISO 3864-1 or ISO 7010. Ⓐ

3.101

heat pump

appliance which takes up heat at a certain temperature and releases heat at a higher temperature

NOTE When operated to provide heat (e.g., for space heating or water heating), the appliance is said to operate in the heating mode; when operated to remove heat (for example, for space cooling), it is said to operate in the cooling mode.

3.102

sanitary hot water heat pump

heat pump intended to transfer heat to water suitable for human consumption

3.103

air conditioner

encased assembly or assemblies designed as an appliance to provide delivery of conditioned air to an enclosed space, room or zone. It includes an electrically operated refrigeration system for cooling and possibly dehumidifying the air. It may have means for heating, circulating, cleaning and humidifying the air

3.104

dehumidifier

encased assembly designed to remove moisture from its surrounding atmosphere. It includes an electrically operated refrigeration system and the means to circulate air. It also includes a drain arrangement for collecting and storing and/or disposing of the condensate

3.105

dehumidification – comfort

dehumidification to reduce the humidity within a space to a level to satisfy the requirements of the occupants

3.106

dehumidification – process

dehumidification to reduce the humidity within a space to a level necessary for the process or the storage of goods and/or materials or the drying out of the building fabric

3.107

dehumidification – heat recovery

dehumidification where the latent and sensitive heat removed from the space together with the compressor heat is reused in another application rather than rejected outside to waste

3.108

wet-bulb temperature (WB)

temperature indicated when the temperature-sensitive element in a wetted wick has reached a state of constant temperature (evaporative equilibrium)

3.109

dry-bulb temperature (DB)

temperature indicated by a dry, temperature-sensitive element shielded from the effects of radiation

3.110

evaporator

heat exchanger in which refrigerant liquid is vaporized by absorption of heat

3.111

heat exchanger

device specifically designed to transfer heat between two physically separated fluids

3.112

indoor heat exchanger

heat exchanger designed to transfer heat to the indoor parts of the building or to the indoor hot water supplies (e.g. sanitary water) or to remove heat therefrom

3.113**outdoor heat exchanger**

heat exchanger designed to remove or release heat from the heat source (for example, ground water, outdoor air, exhaust air, water or brine)

3.114**supplementary heater**

electric heater provided as part of the appliance to supplement or replace the output of the refrigerant circuit of the appliance by operation in conjunction with, or instead of, the refrigeration circuit

3.115**pressure-limiting device**

mechanism that automatically responds to a predetermined pressure by stopping the operation of the pressure-imposing element

3.116**pressure-relief device**

pressure actuated valve or rupture member which functions to relieve excessive pressure automatically

3.117**self-contained unit**

complete appliance, in suitable frames or enclosures, that is fabricated and shipped in one or more sections, and has no refrigerant containing parts connected in the field other than by companion or block valves

NOTE 1 A **self-contained unit** in a single frame or enclosure is called a single package unit.

NOTE 2 A **self-contained unit** in more than one frame enclosure is called a split package unit.

3.118**appliances accessible to the general public**

appliances intended to be located in residential buildings or in commercial buildings

3.119**appliances not accessible to the general public**

appliances which are intended to be maintained by qualified service personnel and located either in machine rooms and the like or at a level not less than 2,5 m or in secured rooftop areas

A₂ 3.120**fan coil****air handling unit**

factory-made assembly which provides one or more of the functions of forced circulation of air, heating, cooling, dehumidification and filtering of air, but which does not include the source of cooling or heating

NOTE The device is normally designed for free intake of air from a room and delivery of air into the same room, but may be applied with duct work. This device may be designed for furred-in application or with an enclosure for application within the conditioned space. A₂

A₁ 3.121**flammable refrigerant**

refrigerant with a classification of class A2 or A3 in compliance with ANSI/ASHRAE 34-2001 [ISO 817] classification

3.122**refrigerating system**

combination of interconnected refrigerant containing parts constituting one closed refrigerant circuit in which refrigerant is circulated for the purpose of extracting heat at the low temperature side to reject heat at the high temperature side by changing the state of the refrigerant A₁

A1 3.123**maximum allowable pressure**

a limit to the refrigerating system operating pressure, generally the maximum pressure for which the equipment is designed, as specified by the manufacturer

NOTE Maximum allowable pressure constitutes a limit to the operating pressure whether the equipment is working or not, see Clause 21.

3.124**low-pressure side**

the part(s) of a refrigerating system operating at the evaporator pressure

3.125**high-pressure side**

the part(s) of a refrigerating system operating at the condenser pressure

3.126**service port**

a means to access the refrigerant in a refrigerating system for the purpose of charging or servicing the system, typically a valve, tube extension or entry location **A1**

C1 3.Z101**factory sealed appliance**

appliance in which all refrigerating system parts have been sealed tight by welding, brazing or a similar permanent connection during the manufacturing process

3.Z102**single package unit**

factory assembly of components of refrigeration system fixed on a common mounting to form a discrete unit **C1**

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

A1 5.2 Addition:

*The testing of Clause 21 may be carried out on separate samples. The testing of Clauses 11, 19 and 21 shall require that pressure measurements be made at various points in the **refrigerating system**.*

At least one additional specially prepared sample is required for the tests of Annex FF (Leak simulation tests), if that test option is selected.

The temperatures on the refrigerant piping should be measured during the test of Clause 11.

NOTE Due to the potentially hazardous nature of the tests of Clause 21 and Annexes EE and FF, special precautions need to be taken when carrying out the tests. **A1**

5.6 Addition:

Any controls which regulate the temperature or humidity of the conditioned space are rendered inoperative during the test.

5.7 Replacement:

The tests and test conditions of Clauses 10 and 11 are carried out under the most severe operating conditions within the operating temperature range specified by the manufacturer. Annex AA provides examples of such temperature conditions.

5.10 Addition:

For split-package units, the refrigerant lines shall be installed in accordance with the installation instructions. The refrigerant line length shall be the maximum length stated in the installation instructions or 7,5 m, whichever is the shorter. The thermal insulation of the refrigerant lines shall be applied in accordance with the installation instructions.

5.101 *Motor-compressors are also subjected to the relevant test of Clause 19 of IEC 60335-2-34, unless the motor-compressor complies with that standard, in which case it is not necessary to repeat these tests.*

5.102 *Motor compressors that are tested and comply with IEC 60335-2-34 need not be additionally tested for Clause 21.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Appliance shall be of **class I**, **class II** or **class III**.

6.2 Addition:

Appliances shall be classified according to degree of protection against harmful ingress of water in accordance with IEC 60529:

- appliances or parts of appliances intended for outdoor use shall be at least IPX4;
- appliances intended only for indoor use (excluding laundry rooms) may be IPX0;
- appliances intended to be used in laundry rooms shall be at least IPX1.

6.101 Appliances shall be classified according to the accessibility either as **appliance accessible to the general public** or as **appliance not accessible to the general public**.

Compliance is checked by inspection and the relevant tests.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Modification:

Replace the second dash by:

- symbol for nature of supply including number of phases, unless for single phase operation.

Addition:

- rated frequency;
- the mass of the refrigerant, or of each refrigerant in a blend other than those of the azeotropic type;
- the refrigerant identification:
 - for a single component refrigerant, one of the following:
 - the chemical formula;
 - the refrigerant number;
 - for a blended refrigerant, one of the following:
 - the chemical name of each of the components;
 - the chemical formula for each of the components;
 - the refrigerant numbers of each of the components;
 - the refrigerant number of the refrigerant blend;
- permissible excessive operating pressure for the storage tank (for **sanitary hot water heat pumps**);
- for the refrigerant circuit; should the permissible excessive operating pressure for the suction and discharge side differ, a separate indication is required;
- Ⓐ₂ – the maximum operating pressure for the **heat exchanger** for hydronic **fan coil/air handling units**; Ⓐ₂
- IP number according to degree of protection against ingress of water, other than IPX0.

Appliances shall be marked with all of the designations and the rated inputs of the **supplementary heaters** for which they are intended to be used, and shall have provision for identifying the actual heater that is field installed.

Unless it is evident from the design, the enclosure of the appliance shall be marked, by words or by symbols, with the direction of the fluid flow.

Ⓐ₁ The flame symbol and the instruction manual symbol of 7.6 shall be visible when a **flammable refrigerant** is employed and the following conditions exist:

- accessing parts expected to be subjected to maintenance or repair;
- observing the appliance under sale or installed conditions;
- observing the appliance packaging, if the appliance is charged with refrigerant.

If a flammable refrigerant is used, the symbols for reading the user manual, the repair manual and the installation manual (symbols 3084, 3038 and 1785 of ISO 7000) shall be placed on the appliance in a location visible to the persons required to know the information. The perpendicular height shall be at least 10 mm. Ⓐ₁

 An additional warning symbol (flame symbol: B.3.2 of ISO 3864) shall be placed on the nameplate of the unit near the declaration of the refrigerant type and charge information. The perpendicular height shall be at least 10 mm, and the symbol need not be in colour.

NOTE 101 When installed, the marking should be visible after removing a **detachable** part.

The following warning shall also be applied to the appliance when a **flammable refrigerant** is employed.

WARNING

Appliance shall be installed, operated and stored in a room with a floor area larger than 'X' m² (only applies to **appliances** that are not **fixed appliances**).

For **appliances**, which are not **fixed appliances**, the minimum room size X shall be specified on the appliance. The X in the marking shall be determined in m² by the procedure described in paragraph 2 of Annex GG for unventilated areas and the X in the marking shall be 4 if the refrigerant charge of the appliance is less than m₁ (see Annex GG, paragraph 1.1).

The maximum allowable pressure for the low-pressure side and the high-pressure side shall be marked on the product.

NOTE 102 For the **refrigerating system**; if the **maximum allowable pressure** of the **low-pressure side** and the **high-pressure side** is the same, a single indication is permitted.

If not already visible when accessing a **service port** and if a **service port** is provided, the **service port** shall be marked to identify the type of refrigerant. If the refrigerant is flammable, symbol B.3.2 of ISO 3864, shall be included, without specifying the colour.

7.6 Addition:

When a **flammable refrigerant** is employed, a warning symbol B.3.2 of ISO 3864, including colour and format, shall be permanently placed on the appliance. The perpendicular height of the triangle containing the "Caution, risk of fire" symbol shall be at least 30 mm.

When a **flammable refrigerant** is employed, a symbol requiring reference to the manual [B.3.2 of ISO 3864], including colour and format, shall be permanently placed on the appliance. 

7.12 Addition:

For **appliances not accessible to the general public**, the classification according to 6.101 shall be included.

 For **appliances** using **flammable refrigerants**, an installation, service and operation manual, either separate or combined manuals, shall be provided and include the information given in Annex DD. 

7.12.1 Addition:

In particular, the following information shall be supplied:

- that the appliance shall be installed in accordance with national wiring regulations;
- the dimensions of the space necessary for correct installation of the appliance including the minimum permissible distances to adjacent structures;
- for appliances with **supplementary heaters**, the minimum clearance from the appliance to combustible surfaces;
- a wiring diagram with a clear indication of the connections and wiring to external control devices and **supply cord**;
- the range of external static pressures at which the appliance was tested (add-on **heat pumps**, and appliances with **supplementary heaters**, only);
- the method of connection of the appliance to the electrical supply and interconnection of separate components;
- indication of which parts of the appliance are suitable for outdoor use, if applicable;
- details of type and rating of fuses;
- details of supplementary heating elements that may be used in conjunction with the appliance, including fitting instructions either with the appliance or with the **supplementary heater**;
- maximum and minimum water or brine operating temperatures;
- maximum and minimum water or brine operating pressures.

Open storage tanks of **heat pumps** for water heating shall be accompanied by an instruction sheet which shall state that the vent shall not be obstructed.

Ⓒ The installation instructions for appliances that are intended to be permanently connected to fixed wiring, and have a leakage current that may exceed 10 mA, shall state that the installation of a residual current device (RCD) having a rated residual operating current not exceeding 30 mA is advisable. Ⓒ

Ⓒ₁₂ For **appliances not accessible to the general public** and which are intended to be permanently connected to fixed wiring and which may have leakage currents exceeding 10 mA, the installation instructions shall specify the rating of the residual current device (RCD) to be installed. Ⓒ₁₂

7.15 Addition:

A marking may be located on a panel that can be removed for installation or service, providing that the panel shall be in place for the intended operation of the appliance.

7.101 A marking shall be provided for a replaceable fuse or a replaceable overload **protective device** provided as a part of a product or remote control assembly. It shall be visible when the cover or door of the compartment is open. This marking shall specify

- the rating of the fuse in amperes, the type and voltage rating, or
- the manufacturer and model designation of the replaceable overload **protective device**.

Compliance is checked by inspection.

7.102 If the product is intended for permanent connection to fixed wiring with aluminium wires, the marking shall so state.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable.

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.

11 Heating

This clause of Part 1 is replaced by the following.

11.1 Appliances and their surroundings shall not attain excessive temperatures in normal use.

Compliance is checked by determining the temperatures of the various parts under the conditions specified in 11.2 to 11.7. Nevertheless, if the temperature of the motor winding exceeds the value specified in Table 3 or if there is doubt with regard to the classification of the insulation system employed in a motor, compliance is checked by the tests of Annex C.

11.2 Appliances are installed in a test room in accordance with the manufacturer's installation instructions. In particular

- clearances to adjacent surfaces specified by the manufacturer shall be maintained;
- flow rates for liquid source or sink equipment shall be the minimum specified in the manufacturer's instructions; ^(A2) ...except for **fan coils** where the flow rates and liquid temperatures shall be the maximum specified in the manufacturer's instructions; ^(A2)
- the outlet duct connected to the appliance shall be subjected to the maximum static pressure given in the manufacturer's instructions;
- for appliances provided with means of adjusting the flow, the flow for the tests shall be the minimum obtainable;
- adjustable limit controls are set at the maximum cutout setting and the minimum differential permitted by the control adjusting means.

*For appliances provided with **supplementary heaters**, an additional test casing as described in 11.9 is used.*

11.2.1 *For heating tests of appliances with **supplementary heaters**, an inlet duct is connected to the inlet air opening of the appliance (assuming that the appliance is intended to be so applied). The duct shall be the same size as the flanges, if flanges are provided. If flanges are not provided, the duct is the same size as the inlet opening.*

The inlet duct is provided with an adjustable restricting means by which the airflow can be reduced.

The restriction should be uniform across the duct's cross sectional area, so that the full heating coil surface will be exposed to the airflow except when the restriction is closed.

11.2.2 *An appliance which does not include **supplementary heaters** is fitted with an outlet duct sized to fit the casing flanges, or opening without flanges, or locations marked for flanges, and arranged to discharge away from the return air inlet.*

*An appliance that includes or has provision for **supplementary heaters** is fitted with a metal outlet duct in accordance with Figure 101a) or Figure 101b), depending on the direction of the airflow.*

The outlet duct is provided with a restricting means to obtain the maximum static pressure given in the manufacturer's instructions.

11.3 *Temperatures other than those of windings are determined by means of fine-wire thermocouples so chosen and positioned that they have the minimum effect on the temperature of the part under test.*

NOTE 101 Thermocouples having wires with a diameter not exceeding 0,3 mm are considered to be fine-wire thermocouples.

Thermocouples used for determining the temperatures of the surface of walls, ceiling and floor are embedded in the surface or attached to the back of small blackened disks of copper or brass, 15 mm in diameter and 1 mm thick, which are flush with the surface.

So far as is possible, the appliance is positioned so that parts likely to attain the highest temperatures touch the disks.

In determining the temperatures of handles, knobs, grips and the like, consideration is given to all parts which are gripped in normal use and, if of insulating material, to parts in contact with hot metal.

*The temperature of electrical insulation, other than that of windings, is determined on the surface of the insulation, at places where failure could cause a short circuit, contact between **live parts** and **accessible metal parts**, bridging of insulation or reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

Temperatures of windings are determined by the resistance method unless the windings are non-uniform or severe complications are involved in order to make the necessary connections, in which case the temperatures are determined by means of thermocouples.

The temperatures in the duct are to be measured by means of a thermocouple grid consisting of nine thermocouples of identical length, wired in parallel to form a grid with a thermocouple located centrally in each of nine equal duct areas in a plane perpendicular to the axis of the airflow.

11.4 *Appliances are operated under **normal operation** at a supply voltage between 0,94 times the lowest **rated voltage** and 1,06 times the highest **rated voltage**, the voltage chosen being that which gives the most unfavourable result. Heating elements shall be energized at a voltage which gives an electrical input of 1,15 times the maximum **rated power input**.*

11.5 *Where appliance can be operated in the cooling mode as well as the heating mode, a test is conducted in each mode.*

*For appliances with **supplementary heaters** or provision for **supplementary heaters**, an additional test is conducted with all the heating elements operative by short circuiting **thermostats** or by reducing, if necessary, the air temperature to a value which causes all the elements to switch on.*

11.6 *Appliances with defrost facilities, are additionally submitted for a defrost test in the most unfavourable conditions.*

11.7 *All appliances are operated continuously until steady conditions are achieved except for defrost tests.*

11.8 *During the test the temperatures are monitored continuously and shall not exceed the values shown in Table 3, **protective devices** shall not operate and sealing compound shall not flow out.*

The temperature of the air in the outlet duct shall not exceed 90 °C.

NOTE 101 The value of the temperature of a winding is calculated from the formula:

$$T = \frac{R_2}{R_1} (k + T_1) - k$$

where:

T is the temperature of the copper winding at the end of the test

R_1 is the resistance at the beginning of the test

R_2 is the resistance at the end of the test

T_1 is the ambient temperature at the beginning of the test

k is equal to 234,5 for copper windings and 225 for aluminium windings.

At the beginning of the test, the windings shall be at ambient temperature.

It is recommended that the resistance of windings at the end of the test be determined by taking resistance measurements as soon as possible after switching off, and then at short intervals so that a curve of resistance against time can be plotted for ascertaining the resistance at the instant of switching off.

Table 3 – Temperature limits

Parts	Temperature °C
Windings of sealed motor-compressors ^a	
– with synthetic insulation.....	140
– with other insulation	130
[A₂] External enclosure of appliances with or without supplementary heaters	85 [A₂]
Windings ^b if the winding insulation is (other than motor-compressors):	
– of class A material ^c	100 (90)
– of class E material ^c	115 (105)
– of class B material ^c	120 (110)
– of class F material ^c	140
– of class H material ^c	165
– of class 200 material ^c	185
– of class 220 material ^c	205
– of class 250 material ^c	235
Terminals, including earthing terminals, for external conductors of stationary appliances , unless they are provided with a supply cord	85
Ambient of switches, and thermostats and temperature limiters ^d	
– without T marking.....	55
– with T marking	T
Rubber or polyvinyl chloride insulation of internal and external wiring, including supply cord :	
– without temperature rating ^e	75
– with temperature rating (T)	T
Cord sheaths used as supplementary insulation	60
Rubber, other than synthetic, used for gaskets or other parts, the deterioration of which could affect safety:	
– when used as supplementary insulation or reinforced insulation	65
– in other cases	75
Lampholders with T-marking ^j	
– B15 and B22 marked T1	165
– B15 and B22 marked T2	210
– other lampholders	T
Lampholders without T-marking ^j	
– E14 and B15	135
– B22, E26 NS E27	165
– other lampholders and starter holders for fluorescent lamps	80
Material used as insulation other than that specified for wires and windings:	
– impregnated or varnished textile, paper or press board	95
– laminated bonded with:	
• melamine-formaldehyde, phenol-formaldehyde or phenol-furfural resins	110
• urea-formaldehyde resin.....	90
– printed circuit boards bonded with epoxy resin.....	145
– moulding of:	
• phenol-formaldehyde with cellulose fillers	110
• phenol-formaldehyde with mineral fillers	90
• melamine-formaldehyde	110
• urea-formaldehyde	90

* See notes next page