

SLOVENSKI STANDARD

SIST EN 60335-2-40:2003/A1:2006

01-julij-2006

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Household and similar electrical appliances - Safety -- Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers

Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke -- Teil 2-40: Besondere Anforderungen für elektrisch betriebene Wärmepumpen, Klimageräte und Raumluft-Entfeuchter

Appareils électrodomestiques et analogues - Sécurité -- Partie 2-40: Règles particulières pour les pompes à chaleur électriques, les climatiseurs et les déshumidificateurs

Ta slovenski standard je istoveten z: EN 60335-2-40:2003/A1:2006

ICS:

| | | |
|--------|-------------------------------------|-------------------------------------|
| 23.120 | Z!æ } ä äX^d } ä äS ä æ\^ } æ!æ^ | Ventilators. Fans. Air-conditioners |
| 27.080 | V[] q ^Á!] æ\^ | Heat pumps |

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**Household and similar electrical appliances -
Safety
Part 2-40: Particular requirements for electrical heat pumps,
air-conditioners and dehumidifiers
(IEC 60335-2-40:2002/A1:2005, 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/A1:2005, 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/A1:2005, modifiziert)

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This amendment A1 modifies the European Standard EN 60335-2-40:2003; it was approved by CENELEC on 2005-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

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

p NOTE In this document, p is used in the margin to indicate instructions for preparing the printed version.

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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 as given below.

COMMON MODIFICATIONS

2 Normative references

p Add:

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

3 Definitions

p Add:

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

Annex GG

[SIST EN 60335-2-40:2003/A1:2006
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p **GG.2** Replace the first three lines by:

This clause is applicable to appliances with a charge amount $m_1 < M \leq m_2$ and to **non fixed factory sealed single package units** with a charge amount of $m_1 < M \leq 2 \times m_1$.

Reference Figure GG.1.

For **non fixed factory sealed single package units** with a charge amount of $m_1 < M \leq 2 \times m_1$ the requirements of GG.Z1 apply.

For other appliances with a charge amount of $m_1 < M \leq m_2$:

p Add after GG.7:

GG.Z1 Non fixed factory sealed single package units with a charge amount of $m_1 < M \leq 2 \times m_1$

GG.Z1.1 For **non fixed factory sealed single package units** (i.e. one functional unit in one enclosure) with a charge amount of $m_1 < M \leq 2 \times m_1$, the maximum charge in a room shall be in accordance with the following:

$$m_{\max} = 0,25 \times A \times \text{LFL} \times 2,2$$

or the required minimum floor area, A_{\min} , to install an appliance with refrigerant charge M shall be in accordance with the following:

$$A_{\min} = M / (0,25 \times \text{LFL} \times 2,2)$$

where:

m_{\max} = allowable maximum charge in a room in kg

M = refrigerant charge amount in the appliance in kg

A_{\min} = required minimum room area in m^2

A = room area in m^2

LFL = Lower Flammability Limit (LFL) in kg/m^3 , as referred in Annex BB

NOTE The appliance can be placed at any height above the floor.

When the appliance is switched on, a fan shall operate continuously supplying a minimum airflow as under normal steady state conditions, even when the compressor is switched off by the thermostat.

Compliance is checked by inspection.

GG.Z1.2 The appliance shall withstand the effects of dropping and vibration during transport and normal use without leaking refrigerant.

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The appliance is subjected to the tests of GG.Z1.2.1 to GG.Z1.2.4. There shall be no refrigerant leakage.

SIST EN 60335-2-40:2003/A1:2006

Compliance is checked by the following:

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- *the power input of the appliance measured after at least 1 h shall not differ by more than 10 % from the value measured under the same conditions before the tests;*

or

- *the use of detection equipment having an equivalent sensitivity of 3 g/year of refrigerant shall reveal no leaks.*

NOTE 1 The tests of GG.Z1.2.1, GG.Z1.2.2 and GG.Z1.2.3 may be carried out on the appliance charged with a non-flammable refrigerant or a non-hazardous gas.

NOTE 2 Damage of parts other than the refrigerating circuit is allowed.

GG.Z1.2.1 *The appliance is tested in its final packaging for transport and shall withstand a random vibration test for 180 min according to ASTM D 4728-01 with the following power spectral densities:*

| Frequency Hz | Power spectral density level g ² /Hz |
|-----------------|--|
| 1 | 0,00 005 |
| 4 | 0,01 |
| 16 | 0,01 |
| 40 | 0,001 |
| 80 | 0,001 |
| 200 | 0,00 001 |
| Overall, g rms | 0,52 |

GG.Z1.2.2 The appliance is tested in its final packaging for transport and shall withstand the following number of drops on a horizontal hardwood board 20 mm thick placed on a concrete or similar hard surface:

- one with the appliance held upright;
- one for each of the four edges of the bottom side, with the bottom side forming an angle of about 30° to the horizontal.

The drop height depends on the weight of the appliance according to the following table:

| Appliance weight kg | Drop height cm |
|------------------------|-------------------|
| < 10 | 80 |
| ≥ 10 and < 20 | 60 |
| ≥ 20 and < 30 | 50 |
| ≥ 30 and < 40 | 40 |
| ≥ 40 and < 50 | 30 |
| ≥ 50 | 20 |

GG.Z1.2.3 The tests of GG.Z1.2.2 are repeated on the appliance without its packaging and with the drop height according to the following table:

| Appliance weight kg | Drop height cm |
|------------------------|-------------------|
| < 10 | 20 |
| ≥ 10 and < 20 | 17 |
| ≥ 20 and < 30 | 15 |
| ≥ 30 and < 40 | 12 |
| ≥ 40 | 10 |

GG.Z1.2.4 The appliance is installed in accordance with the installation instructions. It is supplied at **rated voltage** or at the upper limit of the **rated voltage range** and operated at ambient temperature.

The appliance is operated in cycles for 10 days (240 h), each cycle consisting of the compressor running for 10 min followed by a rest period of 5 min.

This test may be made on a separate sample.

GG.Z1.3 The appliance shall be constructed so that its operation does not cause resonance points in the piping connected to the compressor.

Compliance is checked by the following test:

*The appliance is installed in accordance with the installation instructions. It is supplied at **rated voltage** or at the upper limit of the **rated voltage range** and operated at ambient temperature.*

*The supply frequency is increased in steps of 1 Hz between 0,8 times and 1,2 times the **rated frequency**.*

The vibration amplitude is measured at critical points in the piping. There shall be no sudden increase of the amplitude when increasing the supply frequency within the specified range.

NOTE 1 The vibration amplitude can be measured, for example, by sliding an arrow gauge along the piping. The arrow gauge is an isosceles triangle with a height equal to 10 times the base (see Figure GG.Z1) and is held against the piping with the arrow axis perpendicular to the direction of the vibration to be measured. The amplitude is the value of A (see Figure GG.Z2) divided by 10.

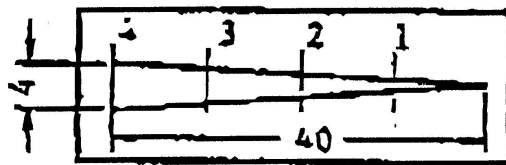


Figure GG.Z1 – Isosceles triangle arrow test gauge
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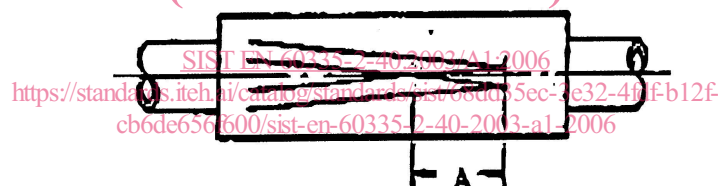


Figure GG.Z2 – Measurement of vibration amplitude

NOTE 2 Critical points are those with a bigger vibration amplitude.

This test may be made on a separate sample.

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AMENDEMENT 1
AMENDMENT 1
2005-03

Amendement 1

**Appareils électrodomestiques et analogues –
Sécurité –**

**Partie 2-40:
Règles particulières pour les pompes
à chaleur électriques, les climatiseurs
et les déshumidificateurs**

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Amendment 1

**Household and similar electrical appliances –
Safety –**

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

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CODE PRIX
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*Pour prix, voir catalogue en vigueur
For price, see current catalogue*

FOREWORD

This amendment has been prepared by subcommittee 61D: Appliances for air-conditioning for household and similar purposes, of IEC technical committee 61: Safety of household and similar electrical appliances.

This bilingual version (2006-05) replaces the English version.

The text of this amendment is based on the following documents:

| | |
|--------------|------------------|
| FDIS | Report on voting |
| 61D/138/FDIS | 61D/140/RVD |

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the maintenance result 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

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

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CONTENTS

Add the titles of new Annexes BB to GG as follows:

Annex BB (normative) Selected information about refrigerants

Annex CC (informative) Transportation, marking and storage for units that employ flammable refrigerants

Annex DD (normative) Service operations

Annex EE (normative) Pressure tests

Annex FF (normative) Leak simulation tests

Annex GG (normative) Charge limits, ventilation requirements and requirements for secondary circuits

1 Scope

Delete the word "sealed" from the first paragraph.

Add, after the second paragraph, the following new paragraph:

This standard also applies to electric **heat pumps, air conditioners and dehumidifiers** containing **flammable refrigerant**. **Flammable refrigerants** are defined in 3.121.

Replace the existing Note 101 by the following:

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

Add, after Note 102, the following new paragraph:

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

Replace the existing Note 103 by the following:

NOTE 103 This standard specifies particular requirements for the use of flammable refrigerants. Unless specifications are covered by this standard, including the annexes, requirements for refrigerating safety are covered by ISO 5149.

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.

Replace, in Note 4, the last dashed item by the following:

- 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.

2 Normative references

The clause of Part 1 is applicable except as follows.

Add to the existing list the titles of the following standards:

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"*

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*

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 Definitions

Add the following new definitions:

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

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

5 General conditions for the tests

Add the following subclause:

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.

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

7 Marking and instructions

7.1 Modification:

Add the following paragraphs to the existing addition:

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 “read operator’s manual”, “operator’s manual; operating instructions” and “service indicator; read technical manual” (symbols 0790, 1641 and 1659 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.

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.

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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 Annex GG.2 for unventilated areas and the X in the marking shall be 4 if the refrigerant charge of the appliance is less than m_1 (see GG.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.