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INTERNATIONAL STANDARD

AMENDMENT 2

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

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FOREWORD

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

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

FDIS	Report on voting
61C/431/FDIS	61C/435/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 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

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- withdrawn,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

NOTE 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.

INTRODUCTION

Replace the second sentence of the second paragraph by the following:

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.

Replace the fifth paragraph by the following:

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.

1 Scope

Replace Note 105 with the following:

NOTE 105 If **motor-compressors** for refrigerant R744 used in appliances with a **transcritical refrigeration system** are equipped with **pressure relief devices**, compliance with the requirements for these devices is checked during the tests on the final appliance.

3 Definitions

3.104 *Replace* "electronic protection system" *by* "**protective electronic circuit**".

3.105 *Delete the first two dashed items.*

Add the following new definitions:

3.108
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

3.109
design pressure (DP)
gauge pressure that has been assigned to a **transcritical refrigeration system**

It is specified for the high pressure side of a refrigeration system.

3 110
pressure relief device
pressure sensing device, intended to reduce pressure automatically when pressures within the refrigeration system exceed the preset pressure of the device

NOTE This device has no provisions for setting by the end user.

5 General conditions for the tests

5.2 *At the end of the first paragraph of the addition, add "or are needed".*

5.10 *In the addition, add the following dashed item:*

- *for **motor-compressors** intended for appliances with a **transcritical refrigeration system**, the test pressure for the high pressure side if higher than the minimum test pressure.*

6 Classification

6.101 *Add the following:*

Motor-compressors using refrigerant R744 shall not be classified as being tested with Annex AA.

Add the following new subclause:

6.103 Motor-compressors are classified as being protected by **protective electronic circuits** or not being protected by **protective electronic circuits**.

NOTE This does not preclude the **protective electronic circuits** being provided in the end product.

Compliance is checked by inspection and by the relevant tests.

19 Abnormal operation

19.11.2 *Replace the text of the modification by the following:*

If the tests of this subclause have to be carried out, they shall be carried out in the end product application.

NOTE 101 The application of these tests in this part 2 is not mandatory.

Add the following two subclauses:

19.11.3 *Replacement:*

*If the **motor-compressor** is classified as being protected by a **protective electronic circuit** and if this **protective electronic circuit** operates to ensure compliance with Clause 19 and Annex AA, the tests of 19.101, 19.102, 19.103 and Annex AA are repeated with a single fault simulated, as indicated in a) to g) of 19.11.2.*

*However, the test of Annex AA is not repeated if during the test of Annex AA, for **motor-compressors** classified as being tested with Annex AA, the **motor-compressor protection system** did not operate. The test of Annex AA is also not repeated on **motor-compressors** that are classified as being tested without Annex AA.*

19.11.4 *Addition:*

If the tests of this subclause have to be carried out, they must be carried out in the end product application.

NOTE 101 The application of these tests in this part 2 is not mandatory.

19.102 *Replace Note 3 by the following:*

NOTE 3 This test may be performed on separate samples.

19.104 *Replace the first line of the second paragraph by the following:*

At the conclusion of the tests of 19.101, 19.103 and the test of 19.102 that is carried out with start and run capacitors open-circuited

Add the following paragraphs:

If the test of 19.102 is carried out with start and run capacitors short-circuited one at a time, then at the conclusion of this test

– *enclosures shall not have deformed to such an extent as to impair compliance with Clause 29;*

– *the **motor-compressor** shall withstand*

- *the leakage current test as specified in 16.2, the test voltage being applied between the windings and the **housing**;*
- *the electric strength test of 13.3 of Part 1;*

– *the **motor-compressor protection system** shall be able to operate or it shall remain permanently open-circuited.*

*If the **motor-compressor protection system** remains permanently open-circuited, the test of 19.102 with start and run capacitors short-circuited shall be repeated on three additional samples and all three additional samples shall remain permanently open-circuited at the conclusion of the test.*

NOTE The test may be repeated on three new **motor-compressors** or by replacing, in the **motor-compressor** originally tested, the **motor-compressor protection system** with one of the same type.

22 Construction

22.7 *Replace the text of the replacement by the following:*

Housings shall withstand the pressure expected in normal use.

Compliance is checked by the following tests.

*A **housing** which is exposed to high side pressure shall be subjected to a pressure equal to:*

- *for non **transcritical refrigeration systems**, a minimum of 3,5 times the saturated vapour pressure of the refrigerant at 70 °C, rounded up to the next 0,5 MPa (5 bar).*

NOTE 101 Example of test pressure calculation for R-22 (subcritical):

Saturated vapour pressure at 70 °C = 2,89 MPa (28,9 bar)

Test pressure = 3,5 × 2,89 MPa (28,9 bar)

= 10,1 MPa (101 bar)

= 10,5 MPa (105 bar) when rounded up to the next 0,5 MPa (5 bar).

- *for **transcritical refrigeration systems**, 3 times the **design pressure** but not less than the minimum test pressure as required in Table 101.*

NOTE 102 The test values for some refrigerants are given in Table 101. The values may, however, not be high enough for some applications.

Table 101 – Minimum high side test pressures

Refrigerant		Test pressure	
		MPa	(bar)
Non-transcritical			
CCl_2F_2	R-12	6,0	(60)
CF_3CH_2F	R-134a	6,5	(65)
$CHCl_2F_2$	R-22	10,5	(105)
by weight 73,8 % R-12 + 26,2 % R-152a	R-500	10,0	(100)
by weight 48,8 % R-22 + 51,2 % R-115	R-502	10,5	(105)
by weight 44 % R-125 + 52 % R-143a + 4 % R-134a	R-404A	10,0	(100)
by weight 50 % R-125 + 50 % R-143a	R-507	11,0	(110)
by weight 25 % R-125 + 52 % R-134a + 23 % R-32	R-407C	10,5	(105)
by weight 50 % R-125 + 50 % R-32	R-410A	15,0	(150)
Transcritical			
CO_2	R-744	42	(420)

*A **housing** which is exposed only to low side pressure shall, for both subcritical and transcritical applications, be subjected to a pressure equal to 5 times the saturated vapour pressure of the refrigerant at 20 °C or equal to 2,5 MPa (25 bar) whichever is higher, rounded up to the next 0,2 MPa (2 bar).*

NOTE 103 Example of test pressure calculation for R-22 (subcritical):

Saturated vapour pressure at 20 °C = 0,81 MPa (8,1 bar)

Test pressure = 5 × 0,81 MPa (8,1 bar)

= 4,05 MPa (40,5 bar)

= 4,2 MPa (42 bar) when rounded up to the next 0,2 MPa (2 bar).

NOTE 104 The test values for some refrigerants are given in Table 102. The values may, however, not be high enough for some applications.

Table 102 – Minimum low side test pressures

Refrigerant		Test pressure	
		MPa	(bar)
Non-transcritical			
CCl_2F_2	R-12	2,5	(25)
CF_3CH_2F	R-134a	2,5	(25)
$CHCl_2F_2$	R-22	4,2	(42)
by weight 73,8 % R-12 + 26,2 % R-152a	R-500	2,9	(29)
by weight 48,8 % R-22 + 51,2 % R-115	R-502	4,5	(45)
by weight 44 % R-125 + 52 % R-143a + 4 % R-134a	R-404A	5,0	(50)
by weight 50 % R-125 + 50 % R-143a	R-507	5,5	(55)
by weight 25 % R-125 + 52 % R-134a + 23 % R-32	R-407C	4,0	(40)
by weight 50 % R-125 + 50 % R-32	R-410A	7,0	(70)
Transcritical			
CO_2	R-744	28,6	(286)

NOTE 105 Further information relating to refrigerant number designations may be obtained from ANSI/ASHRAE 34.

For refrigerant blends, the saturated vapour pressure is taken as the pressure at the dew point temperature.

*For two stage **motor-compressors** with direct discharge from the second stage, the **housing** is considered to be exposed to low side pressure.*

*For two stage **motor-compressors** without direct discharge from the second stage, the **housing** is considered to be exposed to high side pressure.*

The test shall be carried out on two samples. The test samples are filled with a liquid, such as water, to exclude air and are connected in a hydraulic pump system. The pressure is raised gradually until the required test pressure is reached. This pressure is maintained for 1 min during which time the sample shall not leak except as indicated below.

*Where gaskets are employed for sealing the **housing** of a **semi-hermetic motor-compressor**, leakage at gaskets is not considered as a failure, provided the leakage occurs at a pressure greater than 40 % of the required test pressure.*

If a leakage occurs, the test has to be repeated on a sample specially prepared by the manufacturer to avoid leakage at the gasket.

*For a **semi-hermetic motor-compressor** employing a bypass valve which relieves high side pressure into the low side at a predetermined pressure differential, the **housing** shall be capable of withstanding the required test pressure even though leakage occurs at gaskets.*

NOTE 106 All pressures are gauge pressure.