



IEC 60335-2-34

Edition 5.0 2016-11

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

AMENDMENT 2

AMENDEMENT 2

Household and similar electrical appliances – Safety –  
Part 2-34: Particular requirements for motor-compressors  
[ITEH STANDARD PREVIEW  
\(standards.iteh.ai\)](https://standards.iteh.ai)

Appareils électrodomestiques et analogues – Sécurité –  
Partie 2-34: Exigences particulières pour les motocompresseurs  
[IEC 60335-2-34:2012/AMD2:2016](https://standards.iteh.ai/catalog/standards/issref52e8542-5add-4baa-ba2a-5b3a2866db70/iec-60335-2-34-2012-amd2-2016)

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## FOREWORD

This amendment has been prepared by sub-committee 61C: Safety of refrigeration appliances for household and commercial use, 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/686/FDIS	61C/691/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 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- withdrawn,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.

## The STANDARD PREVIEW (standards.iteh.ai)

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.  
<https://standards.iteh.ai/catalog/standards/SSC/32865/2-34-2012-002-002>

5b3a2866db70/iec-60335-2-34-2012-amd2-2016

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 contents of the corrigendum of June 2017 have been included in this copy.

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## 1 Scope

*In the second paragraph, replace “480” by “600”.*

## 6 Classification

**6.101** *In the first paragraph of the requirement, replace “not incorporating an” by “without an incorporated or associated”.*

*In the second paragraph of the requirement replace “incorporating an” by “with an incorporated or associated”.*

## 13 Leakage current and electric strength at operating temperature

*Add the following new subclause:*

### 13.3 Addition:

In Table 4, add the following to table footnote a:

The test voltage for 600 V multi-phase appliances is that specified for a **working voltage** > 250 V where U is taken as the **rated voltage**.

## 16 Leakage current and electric strength

Replace the text by the following:

This clause of Part 1 is applicable except as follows.

### 16.3 In Table 7 add the following to table footnote a:

The test voltage for 600 V multi-phase appliances is that specified for a **working voltage** > 250 V where U is taken as the **rated voltage**.

## 19 Abnormal operation

### 19.11.2 Replace the text of the addition by the following:

For simulation of the fault conditions, a **motor-compressor** with its incorporated or associated **electronic circuit** is connected to the substitute refrigeration circuit of Figure AA.1 and operated under the conditions given in Clause AA.5. The conditions applied are the step prior to that which caused the **protective device** to operate or the **motor-compressor** to stall during the tests of Clause AA.5.

## 22 Construction

[IEC 60335-2-34:2012/AMD2:2016](#)

<https://standards.iteh.ai/catalog/standards/sist/e32e8542-5add-4baa-ba2a-5b3a2866db70/iec-60335-2-34-2012-amd2-2016>

### 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, including those in a **motor-compressor** incorporating a bypass valve, shall be subjected to a test pressure equal to:

- for subcritical refrigeration systems other than those using R-744, 3,5 times the saturated vapour pressure of the refrigerant at 70 °C, the test pressure being rounded up to the next 0,5 MPa (5 bar);
- for R-744 subcritical refrigeration systems, 3,5 times the saturated vapour pressure of the refrigerant at 27 °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 (gauge with respect to atmospheric pressure at STP) = 2,89 MPa (28,9 bar)

$$\begin{aligned}\text{Test pressure} &= 3,5 \times 2,89 \text{ MPa (28,9 bar)} \\ &= 10,1 \text{ MPa (101 bar)} \\ &= 10,5 \text{ MPa (105 bar) when rounded up to the next 0,5 MPa (5 bar).}\end{aligned}$$

- for transcritical refrigeration systems, the highest of
  - 3 times the **design pressure**; or
  - the test pressure declared by the manufacturer; or
  - the test pressure specified in Table 101.

The test values for some refrigerants are given in Table 101. For refrigerants not mentioned, the saturated vapour pressure at the temperatures detailed is obtained from refrigerant vapour pressure curves supplied by the refrigerant manufacture.

**Table 101 – Minimum high side test pressures**

Refrigerant formulae	Refrigerant number	Test pressure MPa (bar)	
Subcritical			
CCl <sub>2</sub> F <sub>2</sub>	R-12	6,5	(65)
CF <sub>3</sub> CH <sub>2</sub> F	R-134a	7,5	(75)
CHClF <sub>2</sub>	R-22	10,5	(105)
CH <sub>2</sub> F <sub>2</sub>	R-32	17,0	(170)
CH <sub>3</sub> CH <sub>2</sub> CH <sub>3</sub>	R-290	9,0	(90)
CF <sub>3</sub> CF=CH <sub>2</sub>	R-1234yf	7,0	(70)
CF <sub>3</sub> CH=CHF	R-1234ze	5,5	(55)
CH(CH <sub>3</sub> ) <sub>3</sub>	R-600a	3,5	(35)
CO <sub>2</sub>	R-744	23,5	(235)
by weight 73,8 % R-12 + 26,2 % R-152a	R-500	7,5	(75)
by weight 48,8 % R-22 + 51,2 % R-115	R-502	11,0	(110)
by weight 44 % R-125 + 52 % R-143a + 4 % R-134a	R-404A	12,5	(125)
by weight 50 % R-125 + 50 % R-143a	R-507A	12,5	(125)
by weight 25 % R-125 + 52 % R-134a + 23 % R-32	R-407C	11,0	(110)
by weight 50 % R-125 + 50 % R-32	R-410A	16,5	(165)
Transcritical			
CO <sub>2</sub>	R-744	42	(420)

NOTE The refrigerant test pressure data is based on NIST Reference Fluid Thermodynamic and Transport Properties Database (REFPROP): Version 9.1.

In subcritical applications, a housing which is exposed only to low side pressure, including those in a **motor-compressor** incorporating a bypass valve, shall be subjected to a test pressure equal to

- for subcritical applications, other than those using R-744, the higher of
  - 5 times the saturated vapour pressure of the refrigerant at 20 °C rounded up to the next 0,2 MPa (2 bar); or
  - 2,5 MPa (25 bar);
- for subcritical applications using R-744, 5 times the saturated vapour pressure of the refrigerant at -6,5 °C rounded up to the next 0,2 MPa (2 bar).

In **transcritical refrigeration systems**, a **housing** which is exposed only to low side pressure shall be subjected to a test pressure that is equal to the highest of

- 5 times the **design pressure**; or
- 5 times the saturated vapour pressure of the refrigerant at 20 °C rounded up to the next 0,2 MPa (2 bar); or
- 2,5 MPa (25 bar); or
- the test pressure specified in Table 102.

The test values for some refrigerants are given in Table 102. For refrigerants not mentioned, the saturated vapour pressure at the temperatures detailed is obtained from refrigerant vapour pressure curves supplied by the refrigerant manufacturer.

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NOTE 102 Example of test pressure calculation for R-22 (subcritical):

(standards.iteh.ai)

Saturated vapour pressure at 20 °C (gauge with respect to atmospheric pressure at STP) = 0,81 MPa (8,1 bar)

Test pressure      =  $5 \times 0,81 \text{ MPa (8,1 bar)}$   
<https://standards.iteh.ai/catalog/standards/sist/e32e8542-5add-4baa-ba2a-4035bar366db70/iec-60335-2-34-2012-amd2-2016>  
= 4,05 MPa (40,5 bar)  
= 4,2 MPa (42 bar) when rounded up to the next 0,2 MPa (2 bar).

**Table 102 – Minimum low side test pressures**

Refrigerant formulae	Refrigerant number	Test pressure	
		MPa	(bar)
Subcritical			
CCl <sub>2</sub> F <sub>2</sub>	R-12	2,5	(24)
CF <sub>3</sub> CH <sub>2</sub> F	R-134a	2,5	(24)
CHClF <sub>2</sub>	R-22	4,2	(42)
CH <sub>2</sub> F <sub>2</sub>	R-32	7,0	(70)
CH <sub>3</sub> CH <sub>2</sub> CH <sub>3</sub>	R-290	3,8	(38)
CF <sub>3</sub> CF=CH <sub>2</sub>	R-1234yf	2,6	(26)
CF <sub>3</sub> CH=CHF	R-1234ze	2,5	(18)
CH(CH <sub>3</sub> ) <sub>3</sub>	R-600a	2,5	(10)
CO <sub>2</sub>	R-744	14,2	(142)
by weight 73,8 % R-12 + 26,2 % R-152a	R-500	3,0	(30)
by weight 48,8 % R-22 + 51,2 % R-115	R-502	4,6	(46)
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-507A	5,2	(52)
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	6,8	(68)
Transcritical			
CO <sub>2</sub>	R-744	28,2	(282)
NOTE The refrigerant test/pressure data is based on NIST Reference Fluid Thermodynamic and Transport Properties Database (REFPROP) Version 9.10/iec-60335-2-34-2012-amd2-2016			

NOTE 103 Further information relating to refrigerant number designations can be obtained from ISO 817.

For refrigerant blends, the saturated vapour pressure is taken as the pressure at the dew point temperature of 20 °C and 70 °C for low side and high side respectively.

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 104 All pressures are gauge pressures.

## 29 Clearances, creepage distances and solid insulation

### 29.1 Add the following to the addition:

For a **rated voltage** > 300 V and ≤ 346 V the rated impulse voltage is for

- overvoltage category I: 2 500 V;
- overvoltage category II: 4 000 V;
- overvoltage category III: 6 000 V.

Add the following new subclause:

#### 29.3.4 Addition:

For a **rated voltage** > 300 V and ≤ 346 V the minimum thickness for accessible parts of **reinforced insulation** consisting of a single layer is for

- overvoltage category I: 0,6 mm;
- overvoltage category II: 1,2 mm;
- overvoltage category III: 1,5 mm.

NOTE 101 For multi-phase appliances, the line to neutral or line to earth voltage is used for **rated voltage**.  
<https://standards.iteh.ai/catalog/standards/sist/e32e8542-5add-4baa-ba2a-5b3a2866db70/iec-60335-2-34-2012-amd2-2016>

**Annex AA – Running overload tests for motor-compressors classified as tested with Annex AA**

**AA.4** Replace the first paragraph by the following:

*The motor-compressor including the motor-compressor protection system and motor-compressor control system, if any, is connected to the substitute refrigeration circuit of Figure AA.1 and operated under the appropriate conditions given in Table AA.2. However, for R-744 refrigerant intended for use in a transcritical refrigeration system, for all tests the operating discharge pressure is 12 MPa and for test 4 the return gas temperature is +25 °C. The tests are continued until steady conditions are reached.*

Replace Table AA.2 including its title by the following:

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**Table AA.2 – Substitute refrigeration circuit conditions for operating under maximum load conditions**

Test number	Applied voltage	Back pressure application category	Evaporation temperature °C	Condensation temperature °C	Motor-compressor ambient temperature °C	Return gas temperature °C
4	<b>Rated voltage</b>	Low back pressure (LBP) – max. load – max. cooling	-15	+65	+43	+43
5	<b>Rated voltage</b>	Low back pressure (LBP) – min. load – max. cooling	-35	+49	+43	+25
4	<b>Rated voltage</b>	Medium back pressure (MBP) – max. load – max. cooling	-34	+65	+43	+25
5	<b>Rated voltage</b>	Medium back pressure (MBP) – min. load – max. cooling	-20	+55	+43	+25
4	<b>Rated voltage</b>	High back pressure (HBP) – max. load – max. cooling	+15	+65	+43	+25
5	<b>Rated voltage</b>	High back pressure (HBP) – min. load – max. cooling	-5	+55	+43	+25