

# INTERNATIONAL STANDARD

# IEC 60335-2-54

1995

AMENDMENT 1  
1999-05

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Amendment 1

**Safety of household and similar electrical  
appliances –**

**Part 2-54:  
Particular requirements for surface-cleaning  
appliances employing liquids**

*Amendement 1*

*Sécurité des appareils électrodomestiques et analogues –*

*Partie 2-54:  
Règles particulières pour les appareils de nettoyage  
des surfaces, utilisant des liquides*

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International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

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*For price, see current catalogue*

## FOREWORD

This amendment has been prepared by 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 |
| 61/1564/FDIS | 61/1607/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.

## FOREWORD

*In note 2 add "and figures" after "subclauses".*

*Add after the last line:*

- 22.104: Smaller sizes are acceptable based on additional tests (USA).

### Title

*Replace the title by:*

## **Particular requirements for surface-cleaning appliances for household use employing liquids or steam**

### 1 Scope

*Add in the last line of the first paragraph:*

"or steam" after "cleansing agents"

*Replace the third dashed item of note 3 by:*

- cleaning appliances covered by IEC 60335-2-79, namely those having a
  - pressure exceeding 2,5 MPa;
  - liquid temperature exceeding 160 °C;
  - **rated power input** exceeding 3 500 W;
  - pressurized volume over 5 l.

*Add the following dashed item to note 3:*

- fabric steamers (IEC 60335-2-85).

## 2 Definitions

### 2.2.9 Add:

For steam cleaners, a vertical pane of stainless steel is used instead of glass, without additional wetting. However, if the steam outlet is not intended to be pressed against a surface, the appliance is operated with the outlet in free air pointing downwards under 45°.

## 4 General conditions for the tests

Replace the text by:

This clause of part 1 is applicable, except as follows:

### 4.2 Addition:

A new hose is used for each of the tests of 21.101 to 21.104.

Add the following subclause:

**4.101** Appliances incorporating heating elements are tested as **heating appliances** even if they incorporate motors.

## 6 Classification

### 6.2 Replace the text by:

**Hand-held appliances** dispensing liquids shall be at least IPX7. Other appliances shall be at least IPX4. This does not apply to appliances of **class III construction** not exceeding 24 V.

## 7 Marking and instructions

Add:

### 7.1 Modification:

Appliances shall be marked with their **rated power input** in watts.

Replace the second paragraph by:

Steam cleaners and appliances dispensing liquids having a temperature exceeding 50 °C shall be marked with symbol 5598 of IEC 60417, the rules for a warning sign specified in ISO 3864 being applicable, or the substance of the following warning:

WARNING – Danger of scalding

If a symbol is used, its meaning is to be explained in the instructions for use.

Add:

Appliance outlets for accessories shall be marked with the maximum load, in watts.

NOTE – This marking may be on the appliance close to the appliance outlet.

The sum of the **rated power input** and the maximum load of the appliance outlet shall also be marked on the appliance.

Add:

#### 7.12 Addition:

The instructions for use shall state that the liquid or steam must not be directed towards equipment containing electrical components, such as the interior of ovens.

For steam cleaners having a pressurized container, the instructions shall state that the filling aperture must not be opened during use. Instructions for the safe refilling of the water container shall be given.

## 11 Heating

Add:

#### 11.4 Addition:

*If the temperature rise limits are exceeded in appliances incorporating motors, transformers or **electronic circuits** and the power input is lower than the **rated power input**, the test is repeated with the appliance supplied at 1,06 times **rated voltage**.*

#### 11.7 Add:

Addition:

NOTE – Water is added as necessary to maintain the emission of liquid or steam.

*Steam cleaners are also operated without emission of steam.*

*Appliances incorporating an automatic cord reel are operated with one-third of the total length of the cord unreeled for 30 min, after which the cord is completely unreeled.*

Add:

#### 11.8 Addition:

*The temperature rises of the **accessible surface** of hoses which supply steam to parts held in the hand shall comply with the temperature rise limits for handles which in normal use are held for short periods only. However, if a non-metallic hose is covered by textile material, the temperature rise of the surface of the textile material shall not exceed 80 K.*

*The temperature rise limits of motors, transformers, components of **electronic circuits** and parts directly influenced by them may be exceeded when the appliance is operated at 1,15 times **rated power input**.*

NOTE – The pressure in appliances having a pressurized container is measured so that the test of 22.7 can be carried out.

## 15 Moisture resistance

Add:

### 15.1.1 Addition:

Parts of liquid dispensing appliances which are held in the hand during normal use and which incorporate electrical components are subjected to the test specified for IPX7 appliances, unless they are of **class III construction** not exceeding 24 V.

## 19 Abnormal operation

Add:

### 19.4 Addition:

For steam cleaners, any control which limits the pressure during the test of clause 11 is rendered inoperative.

## 21 Mechanical strength

Add the following subclauses:

**21.101** Current-carrying hoses containing **live parts** shall be resistant to crushing.

Compliance is checked by the following test.

The hose is placed between two parallel steel plates each having a length of 100 mm, a width of 50 mm and the edges of the longer sides rounded with a radius of 1 mm. The axis of the hose is positioned at right angles to the longer sides of the plates. The plates are placed at a distance of approximately 350 mm from one end of the hose. The steel plates are pressed together at a rate of 50 mm/min  $\pm$  5 mm/min until the applied force is 1,5 kN.

The force is then released. The hose is filled with water containing approximately 1 % NaCl and the crushed section immersed in the saline solution. The electric strength test of 16.3 is carried out between the conductors and the saline solution, the test voltage however being 2 500 V.

**21.102** Current-carrying hoses containing **live parts** shall be resistant to abrasion.

Compliance is checked by the following test.

One end of the hose is attached to the connecting rod of the crank mechanism shown in figure 101. The crank rotates at 30 rev/min which results in the end of the hose moving horizontally backwards and forwards over a distance of 300 mm. The hose is supported by a rotating smooth roller over which a belt of abrasive cloth moves at a speed of 0,1 m/min. The abrasive is corundum grit, size P 100 as specified in ISO FDIS 6344-2. A mass of 1 kg is suspended from the other end of the hose which is guided to avoid rotation. In the lowest position, the mass has a maximum distance of 600 mm from the centre of the roller.

The test is carried out for 100 revolutions of the crank.

After the test, **basic insulation** shall not be exposed. The hose is immersed in water containing approximately 1 % NaCl. The electric strength test of 16.3 is carried out between the conductors and the saline solution, the test voltage however being 1 250 V.

**21.103** Current-carrying hoses containing **live parts** shall be resistant to flexing.

Compliance is checked by the following test.

The end of the hose intended to be connected to the part held in the hand is attached to the pivoting arm of the test equipment shown in figure 102. The distance between the pivot axis of the arm and the point where the hose enters the rigid part is  $300 \text{ mm} \pm 5 \text{ mm}$ . The arm can be raised from the horizontal position by an angle of  $40^\circ \pm 1^\circ$ . A mass of 5 kg is suspended from the other end of the hose or from a convenient point along the hose so that when the arm is in horizontal position the mass is supported and there is no tension on the hose.

NOTE 1 – It may be necessary to reposition the mass during the test.

The mass slides against an inclined plate so that the maximum deflection of the hose is  $3^\circ$ .

The arm is raised and lowered by means of a crank which rotates at a speed of 10 rev/min  $\pm 1$  rev/min.

The test is carried out for 1 250 revolutions of the crank after which the fixed end of the hose is turned through  $90^\circ$  and the test continued for a further 1 250 revolutions. The test is repeated in each of the other two  $90^\circ$  positions.

NOTE 2 – If the hose ruptures before 5 000 revolutions of the crank, the flexing is terminated.

After the test, the hose is immersed in water containing approximately 1 % NaCl. The electric strength test of 16.3 is carried out between the conductors and the saline solution.

**21.104** Current-carrying hoses containing **live parts** shall be resistant to torsion.

Compliance is checked by the following test.

One end of the hose is held in a horizontal position with the remainder of the hose freely suspended. This end is rotated in cycles, each cycle consisting of five turns in one direction and five turns in the opposite direction, at a rate of 10 turns per minute.

The test is carried out for 1 000 cycles.

After the test, the hose shall not be damaged to such an extent that compliance with this standard is impaired. It is immersed in water containing approximately 1 % NaCl and the electric strength test of 16.3 is carried out between the conductors and the saline solution.

## 22 Construction

Add:

### 22.6 Addition:

Drain holes shall be at least 5 mm in diameter or  $20 \text{ mm}^2$  in area with a minimum dimension of at least 3 mm.

Add:

### 22.7 Replacement:

Appliances having a pressurized container shall incorporate adequate safeguards against the risk of excessive pressure.

If jets of steam or liquids are emitted through **protective devices**, the electrical insulation shall not be affected and the user shall not be exposed to a hazard.

*Compliance is checked by inspection and by the following tests.*

*The test of clause 11 is repeated but all pressure regulating devices which operated during the original test rendered inoperative. The pressure is measured and shall not have increased by more than 200 kPa.*

*Any pressure limiting **protective device** is then rendered inoperative and the pressure in the container is raised hydraulically to five times the pressure measured during the test of clause 11 or twice the pressure measured with the pressure regulating device rendered inoperative, whichever is higher. There shall be no leakage from the container.*

*Steam cleaners incorporating hoses and in which the device regulating the steam supply is within the container are operated as specified in clause 11 but with all pressure regulating devices which operated during the original test rendered inoperative. The steam outlet is sealed and the device regulating the steam supply opened. There shall be no leakage from the hose except at an intentionally weak place within the enclosure of the container. If this occurs, the test is repeated on another appliance which shall also leak in the same way.*

*For instantaneous steam cleaners, the steam outlet is sealed and the pressure in the water container is raised hydraulically until the pressure is relieved. The pressure shall not exceed 200 kPa. The outlet of the pressure relief device is then sealed and the pressure is further raised to twice the previous value. There shall be no leakage from the container.*

NOTE – An instantaneous steam cleaner is an appliance in which small quantities of water are pumped from the water container, the steam being produced when the water contacts the heated surface of the steam chamber. The water container and the steam chamber are at atmospheric pressure.

*Add the following subclauses:*

**22.103** Steam cleaners shall be constructed so that there is no spillage of water or sudden jets of steam or hot water likely to expose the user to a hazard when the appliance is used in accordance with the instructions for use. Steam emission shall stop when the switch actuator is released.

*The pressure shall be relieved in a controlled manner before the filling cap of a pressurized container is completely removed in order to avoid the emission of jets of steam or hot water in a manner likely to expose the user to a hazard.*

*Compliance is checked by inspection during the test of clause 11 and by removing the filling cap at the end of the test.*

**22.104** Pressure limiting **protective devices** which operate during the tests of 19.4 and 22.7 shall have an inlet aperture at least 5 mm in diameter or 20 mm<sup>2</sup> in area and a width of at least 3 mm. The area of the aperture at the outlet shall not be less than that of the aperture at the inlet.

NOTE – The requirement is not applicable to instantaneous steam cleaners.

*Compliance is checked by measurement.*

**22.105** Current-carrying hoses containing **live parts** shall be resistant to low temperatures.

*Compliance is checked by the following test.*

*A 600 mm length of hose is bent as shown in figure 103 and the ends are tied together over a length of 25 mm. The hose is then placed for 2 h in a cabinet having a temperature of  $-15\text{ °C} \pm 2\text{ °C}$ . Immediately after the hose is removed from the cabinet it is flexed three times, as shown in figure 104 at a rate of one flexing per second.*

*The test is carried out three times.*

*There shall be no cracks or breaks in the hose. The hose is immersed in water containing approximately 1 % NaCl and the electric strength test of 16.3 is carried out between the conductors and the saline solution.*

NOTE – Any discolouration is neglected.

## **24 Components**

*Replace the text by:*

This clause of part 1 is applicable, except as follows.

**24.101** Any device incorporated in an appliance in order to comply with 19.4 shall be non-self resetting and shall only be accessible by means of a **tool**.

*Compliance is checked by inspection.*

## **25 Supply connection and external flexible cords**

*Add:*

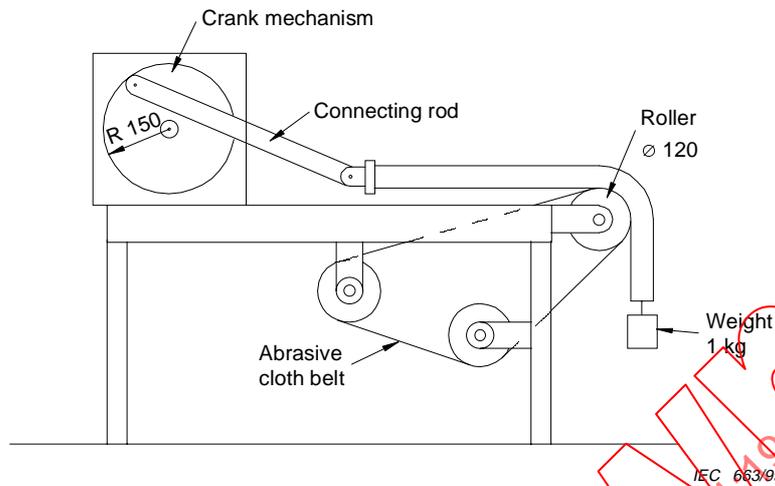
**25.23** *Addition.*

Live conductors in a flexible hose shall have an insulation and sheath thickness at least equivalent to that specified in IEC 60227 for a cord of  $2 \times 0,75\text{ mm}^2$  having a code designation 60227-IEC-53.

NOTE – The conductors may consist of copper-plated steel wires.

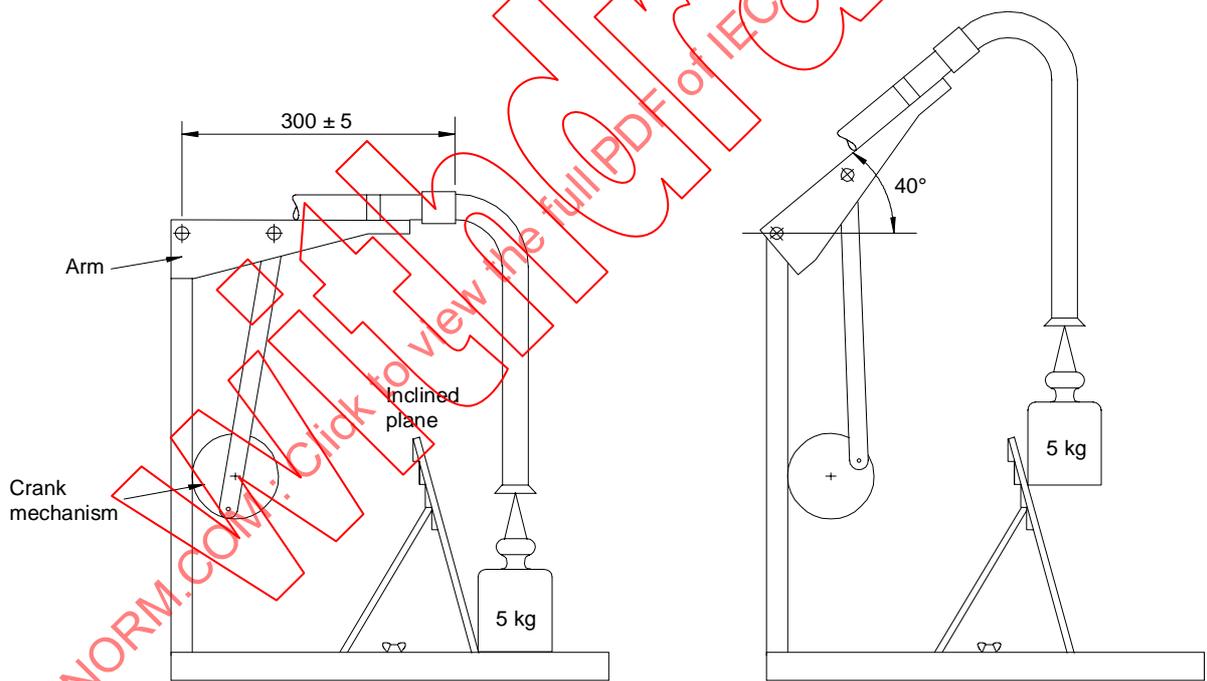
## **Figures**

*Add the following figures.*



*Dimensions in millimetres*

**Figure 101 – Apparatus for testing the abrasion resistance of current-carrying hoses (21.102)**



*IEC 664/99  
Dimensions in millimetres*

**Figure 102 – Apparatus for testing the resistance to flexing of current-carrying hoses (21.103)**