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Descriptors: Household electrical appliances, cleaning appliances, safety requirements, protection against electric shock, fire protection, protection against mechanical hazard

English version

Safety of household and similar electrical appliances
Part 2: Particular requirements for surface-cleaning appliances
for household use employing liquids or steam
(includes amendments A11 : 1998 and A1 : 1999)
(IEC 60335-2-54 : 1995 + A1 : 1999)

Sécurité des appareils électrodomestiques et analogues
Partie 2: Règles particulières pour les appareils de nettoyage des surfaces à usage domestique, utilisant des liquides ou de la vapeur
(inclut les amendements A11 : 1998 et A1 : 1999)
(CEI 60335-2-54:1995 + A1 : 1999)

Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke
Teil 2: Besondere Anforderungen für Geräte zur Oberflächenreinigung mit Flüssigkeiten oder Dampf
(enthält Änderungen A11 : 1998 und A1 : 1999)
(IEC 60335-2-54 : 1995 + A1 : 1999)

This European Standard was approved by CENELEC on 1997-03-11. Amendment A1 was approved by CENELEC on 1999-08-01. 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.

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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

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Ref. No. EN 60335-2-54 : 1997 +A11 : 1998 +A1:1999 E

Foreword

The proposal to endorse IEC 335-2-54: 1995, document CLC/TC 61 (SEC) 1035, was circulated under the enquiry procedure in July 1995. This proposal was discussed during the Copenhagen meeting in May 1996, when it was decided to submit a draft for EN 60335-2-54 to the formal vote.

The draft was circulated in September 1996 and was ratified by CENELEC as EN 60335-2-54 on 1997-03-11.

This European standard has been prepared by the secretariat of CENELEC Technical Committee TC 61.

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) 1997-12-01
- date on which national standards conflicting with the EN have to be withdrawn (dow) 1999-12-01

For products which have complied with EN 60335-2-54:1991 before 1999-12-01, as shown by the manufacturer or by a certification body, these previous standards may continue to apply for production until 2004-12-01.

This standard has to be used in conjunction with EN 60335-1, Safety of household and similar electrical appliances, Part 1: General requirements. It was established on the 1994 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 electric surface-cleaning appliances employing liquids.

Where a particular subclause of part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. Where this standard states "addition", "modification" or "replacement", the relevant text of part 1 is to be adapted accordingly.

Subclauses and figures which are additional to those in part 1 are numbered starting with 101.

Special national conditions causing a deviation from this European Standard, are listed in annex ZA and are in addition to those in EN 60335-1.

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

Note 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 2. When a definition of part 1 concerns an adjective, the adjective and the associated noun are also in bold.

Endorsement notice

The text of the International Standard IEC 335-2-54:1995 was approved by CENELEC as an European Standard without any modification.

Foreword to amendment A11

At the request of the Dutch electrotechnical committee, a draft for an amendment to EN 60335-2-54:1997 was submitted to the CENELEC members for acceptance in April 1998.

The text of the draft was accepted by CENELEC as amendment A11 to EN 60335-2-54:1997 on 1998-06-30.

The following dates were fixed:

- latest date by which the existence of the amendment has to be announced at national level (doa) 1998-09-30
- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-12-30

NOTE Amendment numbers commencing A1 refer to the endorsement of IEC amendments while those commencing with A11 originate in CENELEC.

Foreword to amendment A1

The text of document 61/1564/FDIS, future amendment to IEC 60335-2-54:1995 prepared by the IEC Technical Committee 61, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as Amendment A1 to EN 60335-2-54 on 1999-08-01.

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) 2000-05-01
- date on which national standards conflicting with the amendment have to be withdrawn (dow) 2002-08-01

This amendment supplements or modifies the corresponding clauses of EN 60335-2-54:1997.

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

There are no deviations from this amendment.

Introduction

An investigation by CENELEC TC 61 has shown that all risks from products within the scope of this standard are fully covered by the Low Voltage Directive, 73/23/EEC. If the product has mechanical moving parts, a risk assessment in accordance with the Machinery Directive, 89/392/EEC, has shown that the risks are mainly of electrical origin and consequently this directive is not applicable. However, the relevant essential safety requirements of the Machinery Directive are covered by this standard together with the principal objectives of the Low Voltage Directive.

Endorsement notice

The text of amendment 1:1999 to the International Standard IEC 60335-2-54:1995 was approved by CENELEC as an amendment to the European Standard without any modification.

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SAFETY OF HOUSEHOLD AND SIMILAR
ELECTRICAL APPLIANCES

**Part 2: Particular requirements for surface-cleaning appliances
for household use employing liquids or steam**

1 Scope

This clause of part 1 is replaced by:

This standard deals with the safety of electric cleaning appliances for household use which are intended for cleaning surfaces such as windows, walls and empty swimming pools by using liquid cleansing agents or steam, their rated voltage being not more than 250 V.

NOTE 1 Appliances may incorporate heating elements or means for pressuring the liquid container.

So far as is practicable, this standard deals with the common hazards presented by appliances which are encountered by all persons in and around the home.

This standard does not in general take into account

- the use of appliances by young children or infirm persons without supervision;
- playing with the appliance by young children.

NOTE 2 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 intended to be used in tropical countries, special requirements may be necessary;
- in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, and similar authorities.

NOTE 3 This standard does not apply to

- floor treatment and wet scrubbing machines (IEC 60335-2-10);
- cleaning appliances which are permanently fixed to a building;
- 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.
- cleaning appliances intended for commercial or industrial use;
- 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).
- fabric steamers (IEC 60335-2-85).

2 Definitions

This clause of part 1 is applicable except as follows:

2.2.9 Replacement:

normal operation: The appliance is operated under the most unfavourable conditions specified in the instructions for use. The cleaning head is pressed with a force of 30 N against a vertical pane of plain glass and moved over a length of 1 m at a rate of 15 up and down strokes per min. The pane is continuously wetted with water at a temperature of $20\text{ °C} \pm 5\text{ °C}$ so that a film of water is maintained on the pane.

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° .

3 General requirement

This clause of part 1 is applicable.

4 General conditions for the tests

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.

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

5 Void

6 Classification

This clause of part 1 is applicable except as follows:

6.1 Addition:

Appliances shall be of class I, class II or class III.

6.2 Addition:

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

This clause of part 1 is applicable except as follows:

7.1 Modification:

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

7.1 Addition:

- maximum permissible water pressure in MPa (bar), for appliances intended to be connected to the water mains.

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.

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.

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.

7.12.1 Addition:

The instructions for use shall state that the appliance has to be unplugged after use and before cleaning or user maintenance of the appliance.

The instructions for use for appliances intended to clean swimming pools shall include the substance of the following:

Do not use in swimming pools containing water.

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 applicable except as follows:

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 Replacement:

Appliances are operated until steady conditions are established.

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.

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.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of part 1 is applicable.

14 Void

15 Moisture resistance

This clause of part 1 is applicable except as follows:

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.

15.2 Addition:

Liquid containers in their normal filling position, are filled with water containing approximately 1 % NaCl. If the container is in a hand-held part, the part is placed in the most unfavourable position. Other parts having containers are placed on a horizontal surface and overturned to the most unfavourable stable position. After 5 min the part is returned to its normal position.

NOTE This test is not carried out on parts classified as IPX7.

16 Leakage current and electric strength

This clause of part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of part 1 is applicable.

18 Endurance

This clause of part 1 is not applicable.

19 Abnormal operation

This clause of part 1 is applicable except as follows:

19.2 Addition:

Appliances are not connected to the water mains and are are operated with containers empty.

19.4 Addition:

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

20 Stability and mechanical hazards

This clause of part 1 is applicable except as follows:

20.2 Addition:

NOTE The requirement regarding moving parts does not apply to brushes and similar devices.

20.101 Appliances shall be constructed so that inadvertent operation is unlikely.

Compliance is checked by inspection and by applying a cylindrical rod having a diameter of 40 mm and a hemispherical end, to the switch.

The appliance shall not operate.

NOTE The requirement is considered to be met if a biased-off switch is used.

21 Mechanical strength

This clause of part 1 is applicable except as follows:

Addition:

Compliance is also checked by holding hand-held appliances in the most unfavourable position at a height of 2 m and dropping them onto a hardwood floor.

The test is carried out three times.

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

Compliance is checked by the following test.

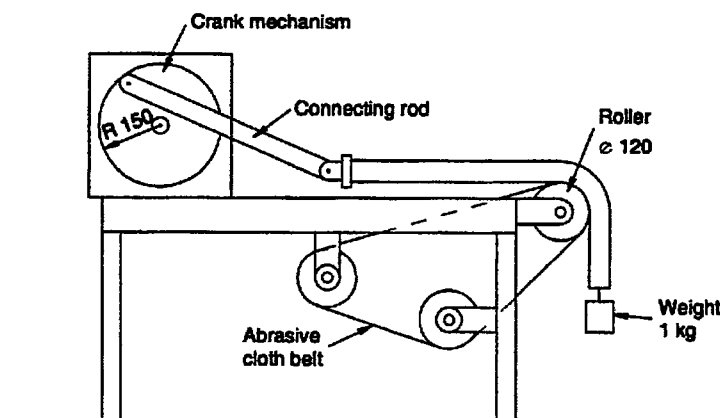
The hose is placed between two parallel steel plates each having a length of 100 mm, a width of 50 mm and the edges of the longer sides rounded with a radius of 1 mm. The axis of the hose is positioned at right angles to the longer sides of the plates. The plates are placed at a distance of approximately 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.



IEC 663/89

Dimensions in millimetres

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

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.

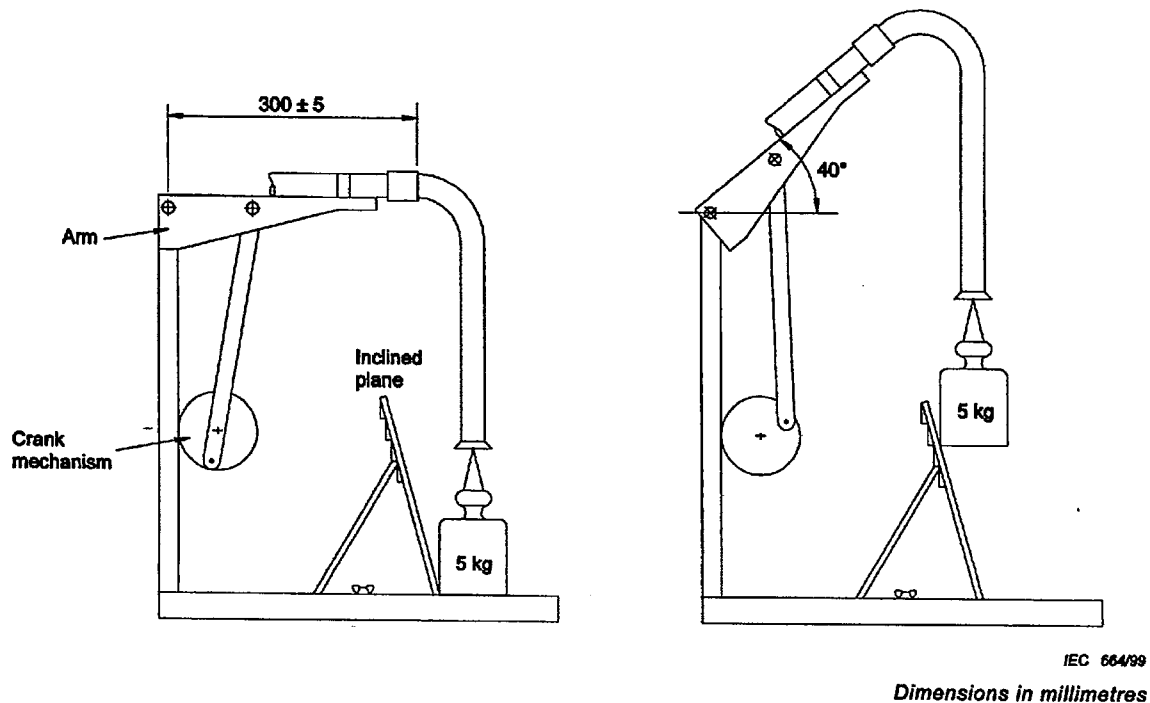


Figure 102 – Apparatus for testing the resistance to flexing of current-carrying hoses (21.103)

The mass slides against an inclined plate so that the maximum deflection of the hose is 3° .

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

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

This clause of part 1 is applicable except as follows:

22.6 Addition:

Drain holes shall be at least 5 mm in diameter or 20 mm² in area with a minimum dimension of at least 3 mm.

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.

22.40 Addition:

The switch shall provide **all-pole disconnection**.

22.101 Rotating parts shall be secured against loosening.

Compliance is checked by inspection.

NOTE This requirement may be met by using a counter-rotating thread.

22.102 Appliances intended to be connected to the water mains shall withstand the water pressure expected in normal use.

Compliance is checked by connecting the appliance to a water supply having a static pressure equal to twice the maximum permissible pressure or 1,2 MPa, whichever is higher, for a period of 5 min.

There shall be no leakage of water.

NOTE Leakage from the inlet-water hose is ignored.

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 mm² 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.

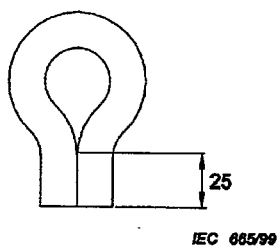
NOTE The requirement is not applicable to instantaneous steam cleaners.

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 $-15\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. 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.



Dimensions in millimetres

Figure 103 – Configuration of the hose for the freezing treatment (22.105)

Intermediate position



Position of the hose at start
 and finish of each flexing

IEC 60599

Figure 104 – Flexing positions for the hose after removal from the freezing cabinet (22.105)

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.

23 Internal wiring

This clause of part 1 is applicable.

24 Components

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

This clause of part 1 is applicable except as follows:

25.5 Addition:

Type X attachments are not allowed for appliances classified as IPX7.

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.

26 Terminals for external conductors

This clause of part 1 is applicable.

27 Provision for earthing

This clause of part 1 is applicable.

28 Screws and connections

This clause of part 1 is applicable.

29 Creepage distances, clearances and distances through insulation

This clause of part 1 is applicable.

30 Resistance to heat, fire and tracking

This clause of part 1 is applicable except as follows:

30.2.3 Not applicable.

31 Resistance to rusting

This clause of part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of part 1 is applicable.

Annexes

Replace the text by:

The annexes of part 1 are applicable, except as follows:

Annex A (normative)

Normative references

Addition:

ISO standards:

3864:1984, *Safety colours and safety signs*

FDIS 6344-2: *Coated abrasives – Grain size analysis – Part 2: Determination of grain size distribution of macrogrits, P12 to P220*

Annex ZA (normative)

Special national conditions

Addition:

<u>Clause</u>	<u>Special national condition</u>
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6.1	Netherlands and Sweden
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Hand-held cleaning appliances shall be class II or class III.
