

# INTERNATIONAL STANDARD

**IEC**  
**60335-2-3**

Fifth edition  
2002-03

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## Household and similar electrical appliances – Safety –

### Part 2-3: Particular requirements for electric irons

*Appareils électrodomestiques et analogues –  
Sécurité –*

*Partie 2-3:  
Règles particulières pour les fers à repasser électriques*



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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

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### Part 2-3: Particular requirements for electric irons

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –  
SAFETY –****Part 2-3: Particular requirements for electric irons**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

This part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This fifth edition cancels and replaces the fourth edition published in 1993 and its amendments 1 (1999) and 2 (1999). It constitutes a technical revision.

The text of this part of IEC 60335 is based on the following documents:

FDIS	Report on voting
61/2096/FDIS	61/2127/RVD

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

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for electric irons.

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

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 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 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

The committee has decided that the contents of this publication will remain unchanged until 2003. At this date, the publication will be

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

The following differences exist in the countries indicated below:

- 6.1: Class 0 and Class 0I irons are not allowed (China and Turkey).
- 11.8: The modification to 60 K for polyvinyl chloride insulation does not apply (Japan).
- 11.8: For the test with the iron on the pointed support, all the temperature rise limits apply (USA).
- 19.4: The test is also carried out with the iron on the pointed supports (USA).
- 21.101: The drop test is different (USA).
- 22.105: The endurance test is not carried out (USA).
- 25.7: Polyvinyl chloride cords are not allowed (Canada, Japan and USA).
- 25.14: The flexing test is different (USA).

The contents of the corrigendum of June 2002 have been included in this copy.

## INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice.

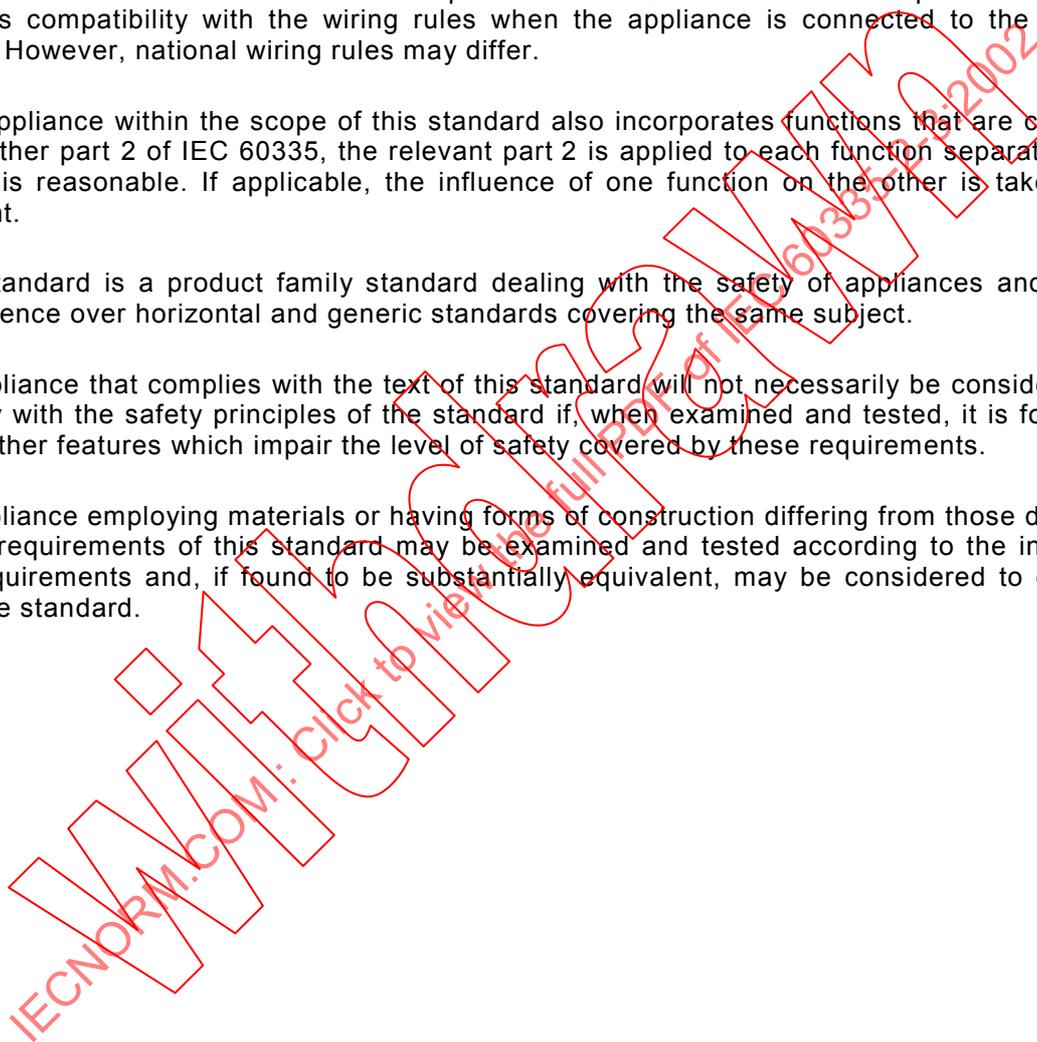
This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

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.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features which impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.



# HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

## Part 2-3: Particular requirements for electric irons

### 1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric dry irons and **steam irons**, including those with a separate water reservoir or boiler having a capacity not exceeding 5 l, for household and similar purposes, their **rated voltage** being not more than 250 V.

Appliances not intended for normal household use, but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

As 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. However, in general, it does not take into account

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

NOTE 101 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;
- in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour and similar authorities;
- additional requirements for pressure vessels may be specified by the national authorities responsible for the safety of pressure vessels.

NOTE 102 This standard does not apply to

- ironers (IEC 60335-2-44);
- appliances designed exclusively for industrial purposes;
- 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).

### 2 Normative references

This clause of Part 1 is applicable.

### 3 Definitions

This clause of Part 1 is applicable except as follows.

### 3.1.9 Replacement:

#### normal operation

operation of the appliance under the following conditions.

The iron is placed on its **stand** and is operated with its **thermostat** at the highest setting.

If the iron does not have a **thermostat**, the surface temperature at the mid-point of the centre line of the **soleplate** is maintained at  $250\text{ °C} \pm 10\text{ °C}$  by switching the supply on and off, or at the highest temperature if it is lower.

**Steam irons** with a separate water reservoir or boiler are operated with the water reservoir or boiler filled with water.

**Pressurized steam irons** incorporating the boiler are operated with or without water, whichever is more unfavourable.

Other **steam irons** are operated empty

### 3.101

#### steam iron

iron having means to produce and supply steam to the textile material during ironing

NOTE **Steam irons** may incorporate a means for blowing steam onto clothes.

### 3.102

#### vented steam iron

**steam iron** in which steam is produced when the water contacts the **soleplate**, the water reservoir being at atmospheric pressure

NOTE The water reservoir may be incorporated in the iron or is connected to the iron by a hose.

### 3.103

#### pressurized steam iron

**steam iron** in which steam is produced in a boiler at a pressure exceeding 50 kPa

NOTE The boiler may be incorporated in the iron or is connected to the iron by a hose.

### 3.104

#### instantaneous steam iron

**steam iron** in which small quantities of water are pumped from the water reservoir and in which steam is produced when the water contacts the walls of the boiler, the water reservoir and the boiler being at atmospheric pressure

NOTE The water reservoir and the boiler are connected to the iron by a hose.

### 3.105

#### cordless iron

iron that is connected to the supply only when placed on its **stand**

NOTE **Cordless irons** may be directly connected to the supply mains during ironing by a **detachable part** to which the **supply cord** is fixed.

### 3.106

#### soleplate

heated part of the iron which is pressed against the textile material while ironing

### 3.107

#### stand

heel of the iron or a separate part provided with the iron, on which the iron is placed when at rest

NOTE The separate water reservoir or boiler may serve as the **stand**.

## 4 General requirement

This clause of Part 1 is applicable.

## 5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

### 5.2 Addition:

NOTE 101 If a **protective device** becomes open circuit during the tests of 21.101, the test is continued on a separate appliance.

NOTE 102 The additional test of 25.14 is carried out on a separate appliance.

### 5.3 Addition:

For irons with a **thermostat**, the test of 21.101 is carried out before the test of Clause 11.

The test of 22.102 is carried out during the test of Clause 11.

**5.101** Irons are tested as **heating appliances** even if they incorporate a motor.

**5.102** If a **cordless iron** can also be directly connected to the supply mains during ironing, the relevant tests are applicable for both modes of operation.

## 6 Classification

This clause of Part 1 is applicable.

## 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**.

*Addition:*

Separate **stands** shall be marked with

- name, trademark or identification mark of the manufacturer or responsible vendor;
- model or type reference of the **stand**.

**Stands** of **cordless irons** shall be marked with their

- **rated voltage** or **rated voltage range**;
- **rated power input**.

### 7.12 Addition:

The instructions shall contain the substance of the following:

- the iron must not be left unattended while it is connected to the supply mains;
- the plug must be removed from the socket-outlet before the water reservoir is filled with water (for **steam irons** and irons incorporating means for spraying water);
- the filling aperture must not be opened during use. Instructions for the safe refilling of the water reservoir shall be given (for **pressurized steam irons**);
- the iron must only be used with the stand provided (for **cordless irons**);
- the iron is not intended for regular use (for travel irons).

### 7.15 Addition:

For **steam irons** with a separate water reservoir or boiler, the total **rated power input** shall be marked on the part containing the supply terminals or **supply cord**.

## 8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

### 8.1.2 Addition:

NOTE 101 Connecting devices in **stands** of **cordless irons** are not considered to be socket-outlets.

## 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.

### 11.2 Replacement:

*Irons are placed on their **stands** on the floor of a test corner and away from the walls. However, the separate water reservoir or boiler of **steam irons** is placed as near to the walls as possible. Dull black painted plywood approximately 20 mm thick is used for the test corner.*

***Vented steam irons** with a separate water reservoir, **pressurized steam irons** and **instantaneous steam irons** are tested with the water reservoir empty and filled but without steam emission.*

*Irons, other than **cordless irons**, are also tested with the **soleplate** in the horizontal position placed on three pointed metallic supports that have a height of at least 100 mm. **Vented steam irons** with a separate water reservoir, **pressurized steam irons** and **instantaneous steam irons** are operated with the water reservoir or boiler filled.*

For appliances provided with an automatic cord reel, one-third of the total length of the cord is unreeled. The temperature rise of the cord sheath is determined as near as possible to the hub of the reel and also between the two outermost layers of the cord on the reel. However, if the cord reel is incorporated in a part that is moved during ironing, the cord is completely unreeled.

For cord storage devices, other than automatic cord reels, that are intended to partially accommodate the **supply cord** while the appliance is in operation, 50 cm of the cord is unwound. However, for cord storage devices on parts that are moved during ironing, the cord is completely unwound. The temperature rise of the stored part of the cord is determined at the most unfavourable place.

#### 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:

Irons are operated until steady conditions are established.

When **vented steam irons** with a separate water reservoir, **pressurized steam irons** and **instantaneous steam irons** are tested with the iron placed on the pointed supports, steam is emitted in cycles, each cycle having a period of 10 s with steam emission and a period of 10 s with the steam emission interrupted.

#### 11.8 Modification:

Instead of the temperature rise limit of 50 K for rubber or polyvinyl chloride insulation of internal and external wiring, including **supply cords** without T-marking, 60 K applies.

#### Addition:

During the test with the iron placed on the pointed supports, only the temperature rises of the insulation of internal wiring and flexible cords are measured. However, the temperature rise limits apply to the water reservoir and the hose of **pressurized steam irons** and **instantaneous steam irons**. The temperature rise of the **accessible surface** of the hose shall comply with the temperature rise limits for handles that are held for short periods only in normal use. 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 and components of electronic circuits, including parts directly influenced by them, may be exceeded when the appliance is operated at 1,15 times **rated power input**.

## 12 Void

## 13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

## 14 Transient overvoltages

This clause of Part 1 is applicable.

## 15 Moisture resistance

This clause of Part 1 is applicable except as follows.

### 15.2 Modification:

*The test for **steam irons**, other than those with a separate water reservoir or boiler, is carried out as follows.*

*The iron is placed in the filling position according to the instructions and filled with water containing approximately 1 % NaCl. A further quantity of 0,1 l is steadily poured into the filling opening over a period of 1 min. The iron is then placed on its **stand** and subjected to the electric strength test of 16.3. The iron is left on its **stand** for 10 min after which the electric strength test is repeated.*

*The iron, while still filled, is operated at **rated power input** for 1 min under **normal operation**. It shall then withstand the electric strength test of 16.3.*

***Cordless irons** are also filled with the saline solution while resting on their **stands**, if the iron can easily be filled in this position.*

## 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.

### 19.1 Modification:

*The tests of 19.2 and 19.3 are not carried out. The test of 19.5 is only carried out on separate boilers of **steam irons**.*

*Addition:*

***Cordless irons** are also subjected to the tests of 19.101.*

#### 19.4 Modification:

The test is carried out at **rated power input**.

Addition:

**Steam irons** are tested with or without water, whichever is more unfavourable.

The test is only carried out with the iron resting on its **stand**.

Any control that limits the pressure during the test of Clause 11 is rendered inoperative.

#### 19.7 Addition:

The test is carried out for 5 min unless the motor is kept switched on by hand.

**19.101 Cordless irons** are operated under **normal operation** at **rated power input** until the **thermostat** operates for the first time. The iron is then placed on its **stand** in the position that most adversely affects the material of the **stand**.

## 20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

### 20.1 Replacement:

Irons shall have adequate stability.

Compliance is checked by the following test.

Irons incorporating a **stand** are placed on their **stand** on a plane inclined at an angle of 10° to the horizontal, the cord resting on the inclined plane in the most unfavourable position. Irons supplied with a separate **stand** are placed on the **stand** on a plane inclined at an angle of 15° to the horizontal.

Appliances intended to be filled with liquid by the user in normal use are tested empty or filled with the most unfavourable quantity of water up to the capacity indicated in the instructions.

NOTE 101 The **stand** may be tapped to overcome static friction between the iron and the **stand**.

NOTE 102 The appliance is not connected to the supply mains.

If the iron overturns or slips off the **stand** in one or more positions, it is tested as specified in Clause 11 in all these positions.

The temperature rise shall not exceed the values specified in Table 9.

## 21 Mechanical strength

This clause of Part 1 is applicable except as follows.

Addition:

Compliance is also checked by the test of 21.101.

**21.101** The iron is operated under **normal operation at rated power input** and, except for **cordless irons**, the **soleplate** temperature is maintained under these conditions throughout the test.

The iron is then suspended by its handle with the **soleplate** in the horizontal position. It is dropped from a height of 40 mm onto a rigidly supported steel plate having a thickness of at least 15 mm and a mass of at least 15 kg. The test is carried out 1 000 times at a rate not exceeding 20 drops per min.

The test is conducted so that the iron rests on the steel plate for approximately 15 % of the time.

NOTE The iron is suspended so that the impact energy is only influenced by its mass.

After the test, the iron shall not be damaged to such an extent that compliance with 8.1, 15.2 and Clause 29, is impaired. In case of doubt, **supplementary insulation and reinforced insulation** is subjected to the electric strength test of 16.3.

## 22 Construction

This clause of Part 1 is applicable except as follows.

### 22.7 Replacement:

**Pressurized steam irons** and **instantaneous steam irons** shall incorporate adequate safeguards against the risk of excessive pressure.

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

Compliance is checked by inspection and by the following test.

For **pressurized steam irons**, the maximum pressure occurring during the test of Clause 11 with the boiler filled but without steam emission, is measured. All pressure-regulating devices that operated during the test are rendered inoperative and the pressure measured again. The pressure shall not increase by more than 200 kPa. Any pressure-limiting **protective device** is then rendered inoperative and the pressure in the boiler is raised hydraulically to five times the pressure measured originally or twice the pressure measured with the pressure-regulating device rendered inoperative, whichever is higher. There shall be no leakage from the water reservoir.

**Pressurized steam irons** in which the device regulating the steam supply is within the boiler are operated as specified in Clause 11 but with all pressure-regulating devices operating during the test of Clause 11 rendered inoperative. All vents in the **soleplate** are sealed and the device regulating the steam supply is opened. There shall be no leakage from the hose except at an intentionally weak place within the enclosure of the boiler. If this occurs, the test is repeated on another appliance that shall also leak in the same way.

All vents in the **soleplate** of **instantaneous steam irons** are sealed and the pressure in the water reservoir is raised hydraulically until the pressure-limiting **protective device** operates. The pressure shall not exceed 50 kPa. The outlet through the **protective device** is then sealed and the pressure is raised to 100 kPa and maintained at this value for 1 min. There shall be no leakage from the water reservoir.

**22.101** Irons shall be provided with a **stand**.

Compliance is checked by inspection.

**22.102 Steam irons** 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 iron is used in accordance with the instructions.

When removing the filling cap of boilers, the pressure shall be relieved in a controlled manner before the cap is removed completely, 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.*

**22.103** The water reservoir of **steam irons** with a separate boiler shall incorporate at least one **non-self-resetting thermal cut-out** that is only accessible by means of a **tool**.

*Compliance is checked by inspection.*

**22.104** Pressure-limiting **protective devices** that 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.

*Compliance is checked by measurement.*

**22.105** The connection contacts of **cordless irons** shall be constructed so that any electrical or mechanical failure occurring in normal use will not give rise to a hazard.

*Compliance is checked by the following test.*

*The two live pins of the iron are connected together and an external resistive load is connected in series with the supply. The external load is such that the current is 1,1 times **rated current** when the iron is supplied at **rated voltage**.*

*The iron is placed on its **stand** and withdrawn 50 000 times, at a rate of 10 times per minute. The test is continued for a further 50 000 times without current flowing.*

*After the test the iron shall be fit for further use and compliance with 8.1, 16.3, 27.5 and Clause 29, shall not be impaired.*

**22.106 Cordless irons** which may be directly connected to the supply mains during ironing shall be constructed so that the force necessary to withdraw the connector from the iron is at least 30 N.

*Compliance is checked by measurement.*

NOTE Any locking device is engaged before carrying out the test.

## **23 Internal wiring**

This clause of Part 1 is applicable.

## 24 Components

This clause of Part 1 is applicable except as follows.

### 24.1.3 Addition:

*Switches that control steam or water emission are subjected to 50 000 cycles of operation.*

### 24.4 Addition:

NOTE 101 This requirement is not applicable to the connection between the iron and the **stand of cordless irons**.

**24.101** Any component incorporated in an iron for compliance with 19.4 shall not be self-resetting and only 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 Z attachment** is allowed for travel irons and **cordless irons**.

NOTE 101 **Type Z attachment** is not allowed for **cordless irons** that may also be directly connected to the supply mains during ironing.

### 25.7 Addition:

Braided cords may be used.

Polyvinyl chloride sheathed cords are only allowed as the supply cords for **stands of cordless irons** and for the separate water reservoirs or boilers of **steam irons**.

NOTE 101 Polyvinyl chloride cords are not allowed for **cordless irons** that may also be directly connected to the supply mains during ironing.

### 25.14 Modification:

*Instead of the load specified for the cord, the cord is loaded with a mass of 2 kg.*

*Instead of the number of flexings specified, the number of flexings is 20 000.*

NOTE 101 The test is not carried out on **cordless irons** unless the iron can also be directly connected to the supply mains during ironing.

### Addition:

*For **steam irons** with a separate water reservoir or boiler, the test is made on the steam hose and the **interconnection cord** together. If they are contained in one sheath or otherwise attached to each other, the assembly is not turned through an angle of 90°.*

The test shall not result in

- loosening of the hose;
- damage to the hose to such an extent that compliance with this standard is impaired;
- leakage from the hose.

Appliances are also subjected to the following test while mounted on an apparatus similar to that of Figure 8. This test is carried out on a separate appliance.

The **supply cord** is suspended vertically from the appliance and loaded so that a force of 10 N is applied. The oscillating member is moved through an angle of 180° and back to the initial position. The number of flexings is 2 000, the rate of flexing being six per minute.

NOTE 102 The appliance is mounted so that the direction of flexing corresponds to that most likely to occur when the **supply cord** is wound around it for storage.

NOTE 103 The test is not carried out if it is unlikely that the cord will be wrapped around the appliance, for example **cordless irons** and irons with a separate water reservoir.

## 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 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

## 30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

### 30.1 Addition:

For irons with **thermostats**, the temperature rises occurring during Clause 19 are not taken into consideration.

### 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

The annexes of Part 1 are applicable.

## Bibliography

The bibliography of Part 1 is applicable except as follows:

*Addition:*

IEC 60335-2-44, *Household and similar electrical appliances – Safety – Part 2-44: Particular requirements for ironers*

IECNORM.COM: Click to view the full PDF of IEC 60335-2-3:2002

Withdrawing