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INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety – Part 2-4: Particular requirements for spin extractors

IEC 60335-2-4:2021-03 RLV(en)

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INTERNATIONAL
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COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-4: Particular requirements for spin extractors

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60335-2-4:2008+AMD1:2012+AMD2:2017 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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International Standard IEC 60335-2-4 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This seventh edition cancels and replaces the sixth edition published in 2008, Amendment 1:2012 and Amendment 2:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

– aligns the text with IEC 60335-1, Ed 5, and its Amendments 1 and 2;
– replacement of the term definition of accessible part to include test probe 18;
– addition of test probe 18 for accessibility of live parts.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
61/6128/FDIS	61/6179/RVD

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

The language used for the development of this International Standard is English.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

This part 2 is to be used in conjunction with the fifth edition of IEC 60335-1:2010 and its amendments.

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: Particular requirements for spin extractors.

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.

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The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

NOTE 4 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.

The following differences exist in the countries indicated below.

– 3.1.9: Different sizes of test fabric material are used (USA).

– 6.2: IPX0 appliances are allowed (USA).

– 15.2: The test is different (USA).

– 18: The test for braking mechanisms is carried out for 6 000 cycles (USA).

– 19.7: This subclause is applicable (USA).

– 20.101: The test is not carried out (USA).

– 20.103: The requirement is different (USA).

– 20.104: The requirement is different (USA).

– 21.101: There are constructional requirements for metal lids and the tests are different for thermoplastic lids (USA)

– 21.102: There are constructional requirements for metal lids and the tests are different for thermoplastic lids (USA).

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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 and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

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.

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.

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.

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-4: Particular requirements for spin extractors

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of

– stand-alone electric spin extractors, and
– spin extractors incorporated in washing machines that have separate containers for washing and spin extraction

for household and similar purposes that have a capacity not exceeding 10 kg of dry cloth and a drum peripheral speed not exceeding 50 m/s, their **rated voltages** being not more than 250 V for single-phase appliances and 480 V for other appliances.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as spin extractors intended to be used by laymen in shops, in light industry and on farms, and spin extractors for communal use in blocks of flats or in launderettes, 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

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance.

~~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~~ can be necessary;
– in many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

~~NOTE 102~~ This standard does not apply to

– appliances intended 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).

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2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60730-2-12:~~2005~~2015, *Automatic electrical controls ~~for household and similar use~~ – Part 2-12: Particular requirements for electrically operated door locks*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Replacement:*

normal operation
operation of the appliance under the following conditions

The drum is filled with textile material having a mass in the dry condition equal to the maximum mass specified in the instructions. The textile material consists of pre-washed double hemmed cotton sheets having dimensions of approximately 700 mm × 700 mm and a specific mass between 140 g/m^2 and 175 g/m^2 in the dry condition. It is saturated with water before being evenly distributed in the drum.

3.6 Definitions relating to parts of an appliance

3.6.3 *Replacement:*

accessible part
part or surface that can be touched by means of test probe B and test probe 18 of IEC 61032:1997, and if the part or surface is metal, any conductive part connected to it

Note 1 to entry: **Accessible non-metallic parts** with conductive coatings are considered to be **accessible metal parts**.

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:*

The tests of 21.101, 21.102 and 22.101 shall be carried out on the same appliance as that used for the test of Clause 18.

5.3 *Addition:*

The tests of 21.101 and 21.102 are carried out before the test of Clause 18. The test of 22.101 is carried out after the test of Clause 18.

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6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification*:

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

6.2 *Addition:*

Appliances shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.10 *Addition:*

If the **off position** is only indicated by letters, the word "off" shall be used.

7.12 *Addition:*

The instructions shall specify the maximum mass of dry cloth in kilograms, to be used in the appliance.

7.12.1 *Addition:*

If the label specified in 7.101 is supplied with the appliance, the installation instructions shall state that it has to be permanently fixed to the wall close to the appliance.

For appliances intended for communal use in blocks of flats, and having an interlock system that has to be energized in order to release the lid, the installation instructions shall state that a device for switching off the appliance automatically is not to be installed in the supply circuit.

7.101 Appliances intended for communal use in blocks of flats, and having an interlock system that has to be energized in order to release the lid, shall be supplied with a label that states the substance of the following, unless the instruction is marked on the appliance:

This spin extractor has to be connected to the supply mains before the lid can be opened. Do not force it open.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

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8.1.1 *Addition:*

Test probe 18 of IEC 61032:1997 is applied with a force not exceeding 1 N, the appliance being in every possible position, except that appliances normally used on the floor and having a mass exceeding 40 kg are not tilted. Through openings, the test probe is applied to any depth that the probe will permit and is rotated or angled before, during and after insertion to any position. If the opening does not allow the entry of the probe, the force on the probe in the straight position is increased to 10 N. If the probe then enters the opening, the test is repeated with the probe in the angled position. The appliance shall be fully assembled as in normal use without removing any parts that are intended to be removed for ***user maintenance****.*

8.1.5 *Addition:*

Test probe 18 as specified in 8.1.1 is not used.

8.2 *Addition*:

Compliance is also checked by applying test probe 18 of IEC 61032:1997 in accordance with the conditions specified in 8.1.1. The test probe is applied to ***built-in appliances*** *and* ***fixed appliances*** *only after installation.*

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.

11.7 *Replacement:*

Appliances are operated for five periods of water extraction, the periods being separated by a rest period. Each rest period, which includes the braking time, has a duration of 1 min for each kilogram of dry textile material or 4 min, whichever is longer. During the rest period, the textile material is re-saturated with water.

For appliances incorporating a programmer or timer, the water extraction period is the maximum allowed by the control.

For other appliances, the water extraction period has a duration of

– *15 min for continuous-flow rinsing appliances;*

– *5 min for other appliances.*

If a longer period is indicated in the instructions, this period applies instead.

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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 *Addition:*

*The inlet to the discharge pump or to the gravity drain is blocked. The drum is filled as specified for **normal operation**, the mass of water being twice the mass of the dry textile material. Any water remaining after the saturation process is poured into the appliance, which is supplied at **rated voltage** and operated for 1 min or the maximum period allowed by the programmer or timer, whichever is shorter.*

*In addition, continuous-flow rinsing appliances having a vertical axis are completely filled with saturated textile material and 10 l of water is poured in over a period of 20 s. The appliance is then operated while supplied at **rated voltage**.*

For all appliances, 0,5 l of the solution is poured rapidly over the top of the appliance in the most unfavourable way so that the spillage solution also flows over the surface of the appliance that incorporates controls and other places where it may penetrate the appliance enclosure, the controls being placed in the most unfavourable position. The controls are then operated through their working range, this operation being repeated after 5 min.

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 replaced by the following.

Appliances having lids that can be opened while the drum is rotating shall be constructed so that braking mechanisms and lid interlocks withstand the stresses to which they may be exposed in normal use.

Compliance is checked by the following test.

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*The appliance is supplied at 1,06 times **rated voltage** and operated under **normal operation** until the motor has reached its maximum speed.*

The lid is then fully opened. The test is repeated after the drum has been at rest for a period long enough to ensure that the appliance does not attain an excessive temperature.

The test is carried out

– *for braking mechanisms:*
  - *3 500 times for separate spin extractors;*
  - *1 000 times for spin extractors incorporated in washing machines;*
– *for lid interlocks, 6 000 times.*

The textile material is re-saturated with water at least every 250 times.

After the test, the appliance shall be fit for further use and compliance with this standard shall not be impaired.

NOTE 101 Forced cooling ~~may~~ can be used to prevent excessive temperatures and to shorten the test.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.7 Not applicable.

19.9 Not applicable.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

*The drum is empty, or filled as specified for **normal operation**, whichever is more unfavourable.*

20.101 Appliances shall not be adversely affected by an unbalanced load.

Compliance is checked by the following test.

The appliance is placed on a horizontal support and a load having a mass of 0,2 kg or 10 % of the maximum mass of textile material specified in the instructions, whichever is higher, is fixed to the inside wall of the drum half-way along its length.

*The appliance is supplied at **rated voltage** and operated for 5 min or the maximum period allowed by a programmer or timer, whichever is shorter.*

The test is carried out four times, the load being moved each time through an angle of 90° around the wall of the drum.

*If compliance relies on the operation of an **electronic circuit**, the test is repeated with the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**.*

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The appliance shall not overturn and the drum shall not hit other parts except the enclosure.

After the test, the appliance shall be fit for further use.

20.102 The lid or door shall be interlocked so that the appliance can only be operated when the lid or door is in the closed position.

Compliance is checked by inspection, by manual test and by the following test.

Test probe B of IEC 61032:1997 is applied in order to try and release any interlock that is needed to comply with the requirement. The interlock shall not release.

20.103 For appliances having a drum with a rotational kinetic energy exceeding 1 500 J, or

– for appliances having a single lid, a maximum peripheral speed exceeding 20 m/s,
– for appliances incorporating two lids, a maximum peripheral speed exceeding 25 m/s,

it shall not be possible to open the lid while the drum is in motion.

Compliance is checked by inspection, by measurement of the maximum peripheral speed, by calculation of the rotational kinetic energy and by the following test.

*The appliance is supplied at **rated voltage** and operated empty. The force determined during the test of 22.101 with the lid interlocked is applied to the lid in an attempt to open it.*

*If compliance relies on the operation of an **electronic circuit**, the test is repeated under the following conditions applied separately:*

– *the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;*
– *the electromagnetic phenomena tests of 19.11.4.1 to 19.11.4.6 applied to the appliance.*

In an appliance containing lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that the following conditions are fulfilled:

– *the lid or door does not move automatically to an open position when the interlock is released; and*
– *the appliance will not restart after the cycle in which the interlock was released.*

It shall not be possible to open the lid while the drum is in motion.

If the drum is not cylindrical, the peripheral speed is the mean peripheral speed.

NOTE The rotational kinetic energy is calculated from the following formula:

$$E = \frac{mv^2}{4}$$

where

E is the rotational kinetic energy, in J;

m is the mass of the cloth specified in the instructions for use, in kg;

v is the maximum peripheral speed of the drum, in m/s.

*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.*

20.104 For appliances having a drum with a rotational kinetic energy not exceeding 1 500 J and

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– for appliances having a single lid, a maximum peripheral speed not exceeding 20 m/s,

– for appliances incorporating two lids, a maximum peripheral speed not exceeding 25 m/s,

moving parts shall not be accessible while the motor is energized or when the drum speed exceeds 60 r/min.

The braking system shall not be affected by the penetration of water.

Compliance is checked by measurement of the maximum peripheral speed, by calculation of the rotational kinetic energy and by the following test, which is carried out after repeating the spillage test of 15.2.

NOTE The rotational kinetic energy is calculated in accordance with the formula in 20.103.

*The appliance is supplied at **rated voltage** and operated empty. For appliances having a single lid and for appliances incorporating two lids where the second lid does not open independently of the first lid, the lid or first lid as appropriate is gradually opened and*

– *with an opening of 4 mm to 10 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with the test probe 12 of IEC 61032:1997;*

– *with an opening greater than 10 mm, but not more than 12 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with a test rod 3 mm in diameter and 120 mm long. In addition, the test probe B of IEC 61032:1997 is applied and shall not come within a distance of 20 mm from the rotating parts;*

– *with an opening greater than 12 mm, the motor shall be disconnected from the supply and within 7 s, the drum speed shall not exceed 60 r/min.*

For appliances incorporating two lids where the second lid opens independently of the first lid, the first lid is gradually opened and with an opening greater than 50 mm, the motor shall be disconnected from the supply and within 2 s the drum speed shall not exceed 20 m/s.

The second lid is gradually opened and

– *with an opening of 4 mm to 10 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with the test probe 12 of IEC 61032:1997;*

– *with an opening greater than 10 mm, but not more than 12 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with a test rod 3 mm in diameter and 120 mm long. In addition, the test probe B of IEC 61032:1997 is applied and shall not come within a distance of 20 mm from the rotating parts;*

– *with an opening greater than 12 mm and within 7 s, the drum speed shall not exceed 60 r/min.*

*If compliance relies on the operation of an **electronic circuit**, the test is repeated under the following conditions applied separately:*

– *the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**;*

– *the electromagnetic phenomena tests of 19.11.4.2 and 19.11.4.5 applied in turn to the appliance.*

In an appliance containing lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that the following conditions are fulfilled:

– *the lid or door does not move automatically to an open position when the interlock is released; and*

– *the appliance will not restart after the cycle in which the interlock was released.*

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*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.*

20.105 **Protective devices** fitted in the upper part of spin extractors having a vertical axis shall be positioned or protected so that the device is not likely to be damaged by textile material that may escape from the drum in normal use.

Compliance is checked by inspection.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.101 Lids of appliances shall have adequate mechanical strength.

Compliance is checked by the following test.

A rubber hemisphere having a diameter of 70 mm and a hardness between 40 IRHD and 50 IRHD is fixed to a cylinder having a mass of 20 kg and dropped from a height of 100 mm onto the centre of the lid.

The test is carried out three times, after which the lid shall not be damaged to the extent that it is possible to touch moving parts ~~become accessible~~ with test probe B and test probe 18.

21.102 Lids and their hinges shall have adequate resistance to distortion.

Compliance is checked by the following test.

A force of 50 N is applied to the open lid in the most unfavourable direction and position.

The test is carried out three times, after which the hinges shall not have worked loose and the appliance shall not be damaged or deformed to such an extent that compliance with the appropriate requirements of 20.102 to 20.104 is impaired.

22 Construction

This clause of Part 1 is applicable except as follows.

22.101 Interlocks shall be constructed so that lids or doors are unlikely to be forced open in normal use.

Compliance is checked by the following test.

The lid or door is opened manually as in normal use, the force applied being measured. The lid or door is closed and interlocked. An attempt is then made to open the lid or door in the same way.

It shall not be possible to force open the lid or door with a force less than 10 times the value originally measured, with a minimum of 50 N.

NOTE The test is not carried out if the interlock is not required for compliance with Clause 20.

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23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.4 *Modification:*

The number of cycles of operation for timers is increased to 10 000.

Addition:

For lid interlocks, the number of cycles of operation declared for Subclauses 6.10 and 6.11 of IEC 60730-2-12:2015 shall not be less than 6 000.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable.

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.

30.2.3 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

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32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

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