

INTERNATIONAL STANDARD

**Household and similar electrical appliances – Safety –
Part 2-43: Particular requirements for clothes dryers and towel rails**





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INTERNATIONAL STANDARD

**Household and similar electrical appliances – Safety –
Part 2-43: Particular requirements for clothes dryers and towel rails**

INTERNATIONAL
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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 General requirement.....	7
5 General conditions for the tests	7
6 Classification.....	7
7 Marking and instructions.....	8
8 Protection against access to live parts.....	8
9 Starting of motor-operated appliances	8
10 Power input and current.....	8
11 Heating.....	8
12 Void.....	9
13 Leakage current and electric strength at operating temperature.....	9
14 Transient overvoltages	9
15 Moisture resistance	9
16 Leakage current and electric strength.....	10
17 Overload protection of transformers and associated circuits	10
18 Endurance.....	10
19 Abnormal operation	10
20 Stability and mechanical hazards.....	12
21 Mechanical strength	12
22 Construction	12
23 Internal wiring.....	13
24 Components	13
25 Supply connection and external flexible cords	13
26 Terminals for external conductors.....	13
27 Provision for earthing	13
28 Screws and connections	13
29 Clearances, creepage distances and solid insulation	13
30 Resistance to heat and fire	13
31 Resistance to rusting	14
32 Radiation, toxicity and similar hazards.....	14
Annexes	15
Bibliography.....	16

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-43: Particular requirements for
clothes dryers and towel rails**

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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International Standard IEC 60335-2-43 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 2002 including its Amendment 1 (2005) and its Amendment 2 (2008). This edition constitutes a technical revision.

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

- requirements for clothes dryers intended for drying footwear or gloves have been introduced (1, 3.1.9, 6.2, 11.8, 19.1, 19.13, 19.101, 19.102, 22.40, 23.3).

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

CDV	Report on voting
61/5290/CDV	61/5376A/RVC

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.

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 latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) 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 clothes dryers and towel rails.

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 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.

A bilingual version of this publication may be issued at a later date.

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.

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 that 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 2-43: Particular requirements for clothes dryers and towel rails

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric clothes dryers for drying textiles on racks located in a warm airflow, **clothes dryers** intended for drying footwear or gloves and to electric **towel rails**, for household and similar purposes, their **rated voltage** being not more than 250 V.

NOTE 101 The clothes racks can be fixed or free-standing in a cabinet. The air circulation can be natural or forced.

Appliances not intended for normal household use but that 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 that 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 knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

NOTE 102 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.

NOTE 103 This standard does not apply to

- spin extractors (IEC 60335-2-4);
- tumble dryers (IEC 60335-2-11);
- 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).

2 Normative references

This clause of Part 1 is applicable.

3 Terms and 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

Textiles positioned over the racks or rails in accordance with the instructions. The textiles are pre-washed, double-hemmed cotton sheets having dimensions approximately 700 mm × 700 mm and a specific mass between 140 g/m² and 175 g/m² in the dry condition.

Four layers of textiles are used for appliances having a heated surface supporting the textiles. One layer is used for appliances in which the textiles are dried by a warm airflow.

Note 101 to entry: In case of doubt, the cotton sheets are conditioned for at least 24 h at a temperature of 20 °C ± 5 °C and a relative humidity of (60 ± 5) %.

For **clothes dryers** intended for drying footwear or gloves, having loads that cover all of the air outlets, if any, the air outlets are blocked with a number of layers of textile material that results in the most unfavourable condition without operation of a **protective device**.

3.5 Additional definitions:

3.5.101

clothes dryer

appliance that does not have a mechanical action such as tumbling or spinning that is intended to dry clothes by air flow

Note 1 to entry: These appliances may also be suitable to dry footwear, gloves and the like.

3.5.102

towel rail

appliance to hold, warm and dry towels

Note 1 to entry: These appliances may also be suitable to dry swimwear, bath robes or the like.

3.6 Additional definition:

3.6.101

free space

space with a volume exceeding 60 l where a child can be entrapped and which is accessible after opening any door or lid and removing any **detachable internal part**, including shelves and containers

Note 1 to entry: In calculating the volume, a space with any single dimension not exceeding 150 mm or any two orthogonal dimensions, each of which do not exceed 200 mm, is ignored.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows.

6.2 Addition:

Clothes dryers intended for drying footwear or gloves that when in use have electrical components located below or inserted inside the footwear or gloves shall be at least IPX2. All other appliances shall be at least IPX1.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.12 Addition:

The instructions for **clothes dryers** shall include the substance of the following:

WARNING: This appliance is intended only for drying textiles washed in water.

7.12.1 Addition:

The installation instructions for **fixed towel rails** shall include the substance of the following:

WARNING: In order to avoid a hazard for very young children, this appliance should be installed so that the lowest heated rail is at least 600 mm above the floor.

The instructions for **fixed towel rails** likely to be used in a bathroom shall state that the **towel rail** is to be installed so that switches and other controls cannot be touched by a person in the bath or shower. This instruction is not necessary if the **towel rail** is at least IPX4.

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.

11.1 Addition:

Towel rails are also subjected to the test of 11.101.

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**.*

11.6 Addition:

Combined appliances are operated as **heating appliances**.

11.7 Replacement:

Appliances are operated until steady conditions are established.

If drying action is controlled by a timer, clothes dryers are operated for two cycles with the timer set to the maximum time.

11.8 Addition:

The temperature rise of the textiles shall not exceed 75 K.

*The temperature rise at the air outlet of **clothes dryers** intended for drying footwear or gloves shall not exceed the limits of Table 3 for handles held for short periods only.*

*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**.*

For oil-filled appliances, the temperature rise of parts in contact with oil is not measured.

11.101 Towel rails are operated at **rated power input** but without textiles.

The temperature rises of the surface shall not exceed the following values:

- | | |
|---|------|
| – metal and painted metal | 60 K |
| – vitreous enamelled metal | 65 K |
| – glass and ceramic surfaces | 70 K |
| – plastic having a thickness exceeding 0,3 mm | 85 K |

The temperature rise limit of 85 K also applies for plastic material having a metal finish of thickness less than 0,1 mm.

NOTE When the thickness of the plastic coating does not exceed 0,3 mm, the temperature rise limits of the supporting material apply.

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 Replacement:

Clothes dryers, in which electrical components are located below the textiles, shall be constructed so that dripping water does not affect their electrical insulation.

Compliance is checked by the following test.

Clothes dryers with type X attachment, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cord of the smallest cross-sectional area specified in Table 13.

Water containing approximately 1 % NaCl is dripped at a rate of 12 ml/min from a height just above the top rail. It is uniformly distributed over the usable area, 3 l of solution being used for each cubic metre of usable volume.

NOTE 101 The following dimensions are used to calculate the usable volume:

- height, maximum distance between the top of the uppermost rail and the top surface of the heating unit;
- width, length of the longest rail;
- depth, overall horizontal distance between the outer rails.

*The appliance shall then withstand the electric strength test of 16.3 and inspection shall show that there is no trace of water on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

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 Addition:

For each of the tests, new textiles are used.

Clothes dryers intended for drying footwear or gloves are subjected to the tests of 19.101 and 19.102.

19.2 Addition:

For appliances having a heated surface that supports the textiles, eight layers of textiles are used. For appliances in which the textiles are dried by a warm airflow, two layers of textiles are placed on the heating element guard or over the air inlet if the heating unit is located above the textiles.

The test is carried out with the textiles completely covering the guard or air inlet and then with the textiles covering 80 % of the area of the guard or air inlet, taking into account different positions of the textiles in order to find the most unfavourable condition.

Appliances incorporating a fan are also tested without the motor operating, the guard or air inlet being uncovered.

Appliances in which the heating unit is located above the textiles are also tested with two layers of textiles placed over the rails. The rails are raised by 50 mm above their normal position or through the maximum distance allowed by the construction, whichever is less.

Wall-mounted appliances that are folded when stored are also tested in the folded position without textiles.

19.9 *Addition:*

Clothes dryers intended for drying footwear or gloves are considered to be operated continuously.

19.10 *Addition:*

The test is carried out with the heating elements disconnected or switched off.

19.13 *Addition:*

The temperature rise of the textiles shall not exceed 150 K.

*For **clothes dryers** intended for drying footwear or gloves, the temperature rise of the textiles shall not exceed 75 K.*

The textiles shall not be significantly scorched.

19.101 Clothes dryers intended for drying footwear or gloves are operated as specified in Clause 11 until steady conditions are established. The voltage at the terminals of the motor is then reduced until the running speed of the motor is just sufficient to prevent the **thermal cut-out** from operating, the power input to the heating element being maintained at 1,15 times **rated power input**.

The voltage is decreased at

- 1 V per minute, for motors having a **working voltage** not exceeding 30 V;*
- 5 V per minute, for motors having a **working voltage** exceeding 30 V.*

The appliance is then operated until steady conditions are established.

*The test is repeated with the heat setting switch, if any, placed in each position. The voltage to the heating element switch being maintained at the value that gives 1,15 times **rated power** input with the switch at the highest heat setting position.*

19.102 Portable clothes dryers intended for drying footwear or gloves are operated under **normal operation** at 1,15 times **rated power input**.

A rectangular sheet of paper is held against air inlets, without additional pressure. The paper has an area sufficient to cover the surface where air inlets are situated and is moved in any direction in order to restrict the airflow so that the most unfavourable conditions are established.

The paper has a specific mass of $80 \text{ g/m}^2 \pm 16 \text{ g/m}^2$.

*The test is carried out with the paper sheet positioned so that the **thermal cut-out** is prevented from operating.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.101 Wall-mounted **clothes dryers** of the folding type shall withstand the forces likely to occur in normal use.

Compliance is checked by the following test.

*The appliance is loaded as specified for **normal operation** or without textiles, whichever is more unfavourable. A force of 50 N is applied to each critical part of the supporting mechanism in turn.*

The appliance shall not collapse.

20.102 The doors of **clothes dryers** that contains a **free space** shall be capable of being opened from the inside.

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

A force is applied to a point, equivalent to an accessible inside point, of each appropriate door of the appliance, at the midpoint of the edge farthest from the hinge axis in the direction perpendicular to the plane of the door.

The force shall be applied at a rate not exceeding 15 N/s and the door shall open before the force exceeds 70 N.

20.103 Appliances with horizontally hinged doors shall have adequate stability when the open door is subjected to a load.

Compliance is checked by the following test.

The empty appliance is placed on a horizontal surface and a mass of 23 kg applied to the centre of the open door.

The appliance shall not tilt.

NOTE Damage and deformation of doors and hinges are neglected.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows:

22.40 *Addition:*

For **clothes dryers** intended for drying footwear or gloves, the switch in the **off-position** shall disconnect **electronic circuits**, unless compliance with Clause 19 does not depend on the operation of a **self-resetting thermal cut-out**.

23 Internal wiring

This clause of Part 1 is applicable except as follows:

23.3 Addition:

*The number of flexings for conductors of **portable clothes dryers** intended for drying footwear or gloves that are only flexed when the appliance is stored is 5 000.*

24 Components

This clause of Part 1 is applicable except as follows.

24.101 Thermal cut-outs incorporated in appliances for compliance with 19.4 shall not be self-resetting.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 Modification:

Appliances shall not incorporate an appliance inlet.

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.

30.2.2 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 60335-2-4, *Household and similar electrical appliances – Safety – Part 2-4: Particular requirements for spin extractors*

IEC 60335-2-11, *Household and similar electrical appliances – Safety – Part 2-11: Particular requirements for tumble dryers*

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