

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety –
Part 2-11: Particular requirements for tumble dryers
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Appareils électrodomestiques et analogues – Sécurité –
Partie 2-11: Exigences particulières pour les sèche-linge à tambour

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Part 2-11: Particular requirements for tumble dryers

Appareils électrodomestiques et analogues – Sécurité –
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –**Part 2-11: Particular requirements for tumble dryers**

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 60335-2-11 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This eighth edition cancels and replaces the seventh edition published in 2008, Amendment 1:2012 and Amendment 2:2015. This edition constitutes a technical revision.

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

- aligns the text with IEC 60335-1, Ed 5, and its Amendments 1 and 2;
- some notes have been converted to normative text (7.12, 7.12.1, 11.3, 19.101, AA.5.2);
- more detailed test specifications have been given in 11.3 and 15.2;
- specific requirements have been added in 3.1.9, 3.6.101, 7.12, 11.7, 19.1, and Clause 22 to cover appliances with steam generators;

- specific requirements have been added in 22.108 to cover programmable electronic circuits;
- Annex AA has been deleted, because it is covered by Part 1 and the remaining annexes have been renumbered.

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

FDIS	Report on voting
61/5786/FDIS	61/5803/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.

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 tumble dryers.

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.

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: The textile material has different dimensions (USA).
- 6.2: Tumble dryers are not required to be IPX4 (USA).
- 7.12: Actual articles of clothing can be specified instead and warnings are required to be marked on the appliance regarding the use of chemicals for cleaning (USA).
- 11.2: The test condition is different (USA).
- 11.7: This test is continued until steady conditions are established and different criteria are used to determine when steady conditions are reached (USA).
- 19.4: The test is different (USA).
- 19.9: A running overload test is carried out on automatically controlled tumble dryers (USA).
- 20.102: When considering accessibility to rotating drums, the maximum drum volume is 60 dm³ and the maximum door opening is 200 mm (USA).
- 20.103: This test is different (USA).
- 22.104: The test is different (USA).
- 27.1: Earthing terminals and contacts are allowed to be electrically connected to the neutral conductor of a tumble dryer (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.

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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.

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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.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-11: Particular requirements for tumble dryers

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric **tumble dryers** intended for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

NOTE 101 This standard applies to the drying function of washing machines having a drying cycle.

This standard also deals with the safety of **tumble dryers** that use a refrigerating system, incorporating sealed motor-compressors, for drying textile material. These appliances may use **flammable refrigerants**. Additional requirements for these appliances are given in Annex AA.

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.

NOTE 102 Examples of such appliances are **tumble dryers** for communal use in blocks of flats or in laundrettes.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons.

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 103 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, the national water supply authorities,

NOTE 104 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);
- appliances incorporating steam generating devices in which steam is produced at a pressure exceeding 50 kPa.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

Replacement:

3.1.9

normal operation

operation of the appliance under the following conditions:

The appliance is operated filled with textile material having a mass in the dry condition equal to the maximum load stated in the instructions.

The textile material consists of pre-washed double-hemmed cotton sheets having dimensions approximately 70 cm × 70 cm and a specific mass between 140 g/m² and 175 g/m² in the dry condition. The textile material is soaked with water having a temperature of 25 °C ± 5 °C and a mass equal to that of the textile material.

If the drying function can automatically follow the washing function in a washing machine, the appliance is not separately loaded. The appliance is operated with the maximum quantity of textile material stated in the instructions for the combined washing-drying cycle.

Note 101 to entry: Cotton having a water content not exceeding 10 % is considered to be in the dry condition. Cotton conditioned for 24 h in still air, having a temperature of 20 °C ± 2 °C, a relative humidity between 60 % and 70 % and a pressure between 860 mbar and 1 060 mbar, will contain approximately 7 % water.

A **steam generator** intended to be filled by hand is filled according to the instructions, water being added to maintain the steam generation.

A **steam generator** intended to be filled automatically is connected to the water mains.

3.5 Definitions relating to types of appliances

3.5.101

tumble dryer

appliance in which textile material is dried by tumbling in a rotating drum through which heated air is blown

3.5.102

condensation-type tumble dryer

tumble dryer in which the air used for the drying process is dehumidified by cooling

3.6 Definitions relating to parts of an appliance

3.6.101

steam generator

device in which steam is produced at a pressure not exceeding 50 kPa and in which the pressure drops to atmospheric pressure when the steam is not supplied

3.8 Definitions relating to miscellaneous matters

3.8.101

cool down period

final part of the **tumble dryer** cycle where the drum is continuously rotated with reduced power to the heating element and with air circulation in order to reduce the possibility of spontaneous combustion of the clothes load

Note 1 to entry: Continuous rotation does not mean rotation in same direction if the intended operation is to reverse direction in normal use.

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:

Appliances shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

The appliance shall be marked with symbol ISO 7000-0790 (2004-01) or with the substance of the following:

Read the instructions

7.10 Addition:

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

7.12 Addition:

The instructions shall state

- the maximum mass of dry textile material in kilograms to be used in the appliance;
- that the tumble dryer is not to be used if industrial chemicals have been used for cleaning;
- that the lint trap has to be cleaned frequently, if applicable;
- that lint must not to be allowed to accumulate around the tumble dryer (not applicable for appliances intended to be vented to the exterior of the building);
- that adequate ventilation has to be provided to avoid the back flow of gases into the room from appliances burning other fuels, including open fires (this instruction is not required if the **tumble dryer** discharges the air into the room).

If symbol ISO 7000-0790 (2004-01) is used, its meaning shall be explained.

The instructions shall include the substance of the following.

- Do not dry unwashed items in the tumble dryer.

- Items that have been soiled with substances such as cooking oil, acetone, alcohol, petrol, kerosene, spot removers, turpentine, waxes and wax removers should be washed in hot water with an extra amount of detergent before being dried in the tumble dryer.
- Items such as foam rubber (latex foam), shower caps, waterproof textiles, rubber backed articles and clothes or pillows fitted with foam rubber pads should not be dried in the tumble dryer.
- Fabric softeners, or similar products, should be used as specified by the fabric softener instructions.
- Remove all objects from pockets such as lighters and matches.
- Fill steam generators only with liquids specified by the manufacturer.

The instructions shall include the substance of the following warning:

WARNING: Never stop a tumble dryer before the end of the drying cycle unless all items are quickly removed and spread out so that the heat is dissipated.

The instructions for appliances for which the air temperature exceeds 55 °C during the drying cycle, shall include the substance of the following warning:

WARNING: The appliance must not be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly switched on and off by a utility.

7.12.1 Addition: iTeh STANDARD PREVIEW

The instructions shall state that (standards.iteh.ai)

- for appliances with ventilation openings in the base, a carpet must not obstruct the openings;
- exhaust air must not be discharged into a flue that is used for exhausting fumes from appliances burning gas or other fuels (this instruction is not required if the **tumble dryer** discharges the air into the room);
- the appliance must not be installed behind a lockable door, a sliding door or a door with a hinge on the opposite side to that of the tumble dryer, in such a way that a full opening of the tumble dryer door is restricted.

If the instructions state that the **tumble dryer** can be placed on top of a washing machine, they shall state which washing machines are suitable. Instructions shall be given for the assembly of the **tumble dryer** and washing machine. The instructions shall state how to obtain any fixing attachments required, unless they are supplied with the appliance.

7.14 Addition:

The height of symbol ISO 7000-0790 (2004-01) shall be at least 15 mm.

7.15 Addition:

Symbol ISO 7000-0790 (2004-01), or the marking “Read the instructions”, shall be readily visible when the appliance is installed as in normal use.

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.

11.2 Addition:

Lint traps are cleaned and then 50 % of the area of the filter is blocked.

11.3 Addition:

*Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101. The probe is applied with a force of $4\text{ N} \pm 1\text{ N}$ to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.*

The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used.

11.7 Replacement:

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Appliances incorporating a timer, a humidity sensing control or other time-limiting control are operated in cycles. Each cycle comprises an operating period having a duration equal to the maximum time that can be provided by the control and a rest period of 4 min during which the appliance is reloaded.

The test may be ended if the temperature rise of any part does not exceed the value determined during the preceding cycle by more than 8 K.

Appliances having a combined washing-drying cycle are operated with the drying programme resulting in the highest temperature rise.

*Appliances with a **steam generator** are operated with that steam mode resulting in the highest temperature rise.*

Other appliances are operated continuously until steady conditions are established.

11.8 Addition:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101.

Table 101 – Maximum temperature rises for accessible external surfaces under normal operating conditions with the door closed

Surface ^c	Temperature rise ^e K		
	Surfaces of appliances situated not more than 850 mm above the floor after installation		Surfaces situated more than 850 mm above the floor after installation ^d
	Front surfaces	Other surfaces ^d	
Bare metal	38	42	42
Coated metal ^a	42	49	49
Glass and ceramic	51	56	56
Plastic and plastic coating > 0,4 mm ^b	58	62	62

^a Metal is considered coated when a coating having a minimum thickness of 90 µm made by enamel or non-substantially plastic coating is used.

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

^c When the thickness of plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal or glass and ceramic apply.

^d If these values are exceeded, the test is allowed to be repeated with the appliance moved away from the test corner side wall. The test is repeated for 1 cycle.

^e Temperature rises are not measured on

- the underside of appliances intended to be used on a working surface or floor where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end applied with a force not exceeding 1 N;
- the rear surface of appliances where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end applied with a force not exceeding 1 N.

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The temperature rises are measured with the door closed.

The exhaust temperature of the air from the drum, measured at the first lint filter after the air passes the clothes load, shall be measured for the purposes of 22.105.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 Modification:

For **stationary class I appliances**, the leakage current shall not exceed 3,5 mA, or 1 mA/kW rated power input with a limit of 5 mA, whichever is higher.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.