IEC 60335-2-11

Edition 7.1 2012-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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

Appareils électrodomestiques et analogues – Sécurité – Partie 2-11: Règles particulières pour les sèche-linge à tambour

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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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This consolidated version of IEC 60335-2-11 consists of the seventh edition (2008) [documents 61/3646/FDIS and 61/3686/RVD] and its amendment 1 (2012) [documents 61/4434/FDIS and 61/4493/RVD]. It bears the edition number 7.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

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

The principal changes in this edition as compared with the sixth edition of IEC 60335-2-11 are as follows (minor changes are not listed):

– aligns the text with IEC 60335-1, Ed 4, and its Amendments 1 and 2;
– some notes have been converted to normative text (7.101, 11.8, 20.102, 20.103 and Annex AA).

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

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 tumble dryers.

NOTE 2 The following annexes contain provisions suitably modified from other IEC standards:

Annex AA	Rinsing agent	IEC 60436
Annex BB	Tumble dryers that use a refrigerating system incorporating sealed motor-compressors for carrying out the drying process	IEC 60068-2-6 and IEC 60079-15
Annex CC	~~Non-sparking “n” electrical apparatus~~ Equipment protection by type of protection "n"	IEC 60079-15

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 3 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 4 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.

NOTE 5 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).
– 7.1: An instruction concerning cleaning the lint trap is to be marked on the dryer in letters not less than 8 mm high and is to be conspicuous when the dryer door is open (Australia, New Zealand).

– 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).

– 20.101: The requirement is applicable to door openings with a dimension exceeding 200 mm (Norway).

– 20.102: When considering accessibility to rotating drums, the maximum drum volume is 60 dm^3 and the maximum door opening is 200 mm (USA).

– 20.103: This test is not carried out (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)

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

NOTE 6 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 the amendment 1 be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

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.

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 BB.

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 launderettes.

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 knowledge

  prevents 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, the national authorities responsible for transportation and the national authorities for buildings.

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).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs in workplaces and public areas*

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:

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/m^2 and 175 g/m^2 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 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.

3.101
tumble dryer
appliance in which textile material is dried by tumbling in a rotating drum through which heated air is blown

3.102
condensation-type tumble dryer
tumble dryer in which the air used for the drying process is dehumidified by cooling

3.103
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 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

7.6 Addition:

 [symbol IEC 60417-5041 (2002-10)] caution, hot surface

7.10 *Addition:*

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

7.12 *Addition:*

The instructions for use 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.

NOTE 101 This instruction is not required if the **tumble dryer** discharges the air into the room.

If symbols IEC 60417-5041 (2002-10) or ISO 7000-0790 (2004-01) are used, their 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.

– ~~The final part of a tumble dryer cycle occurs without heat (cool down cycle) to ensure that the items are left at a temperature that ensures that the items will not be damaged.~~

– Remove all objects from pockets such as lighters and matches.

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.

7.12.1 *Addition:*

The installation instructions shall state

– for appliances with ventilation openings in the base, that a carpet must not obstruct the openings;

– that exhaust air must not be discharged into a flue which is used for exhausting fumes from appliances burning gas or other fuels.

NOTE 101 This instruction is not required if the **tumble dryer** discharges the air into the room.

– that 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 installation 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 symbols IEC 60417-5041 (2002-10) and ISO 7000-0790 (2004-01) shall be at least 15 mm.

Compliance is checked by measurement.

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.

7.101 The rear surface, other than that of **fixed appliances**, shall be marked with symbol IEC 60417-5041 (2002-10) if its temperature rise exceeds the limits specified in 11.8 for **accessible front surfaces**.

The layout of symbol IEC 60417-5041 (2002-10) shall be in accordance with the rules for a warning sign in ISO 3864-1.

Compliance is checked by inspection.

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:*

Temperature rises of the ***accessible front surface*** *are measured using the probe of Figure 101. The probe is applied with a force of 4 N ± 1 N to the surface in such a way that the best possible contact between the probe and the surface is ensured.*

NOTE 101 Any measuring instrument giving the same results as the probe may be used.

11.7 *Replacement:*

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.

Other appliances are operated continuously until steady conditions are established.