BS EN 50570:2013

BSI Standards Publication

Household and similar electrical appliances — Safety —

Particular requirements for commercial electric tumble dryers

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 50570:2013.

The UK participation in its preparation was entrusted to Technical Committee CPL/61, Safety of household and similar electrical appliances.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2013

ISBN 978 0 580 75928 4
ICS 97.060

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2013.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50570

November 2013

ICS 97.060

English version

Household and similar electrical appliances - Safety - Particular requirements for commercial electric tumble dryers

Appareils électrodomestiques et analogues - Sécurité - Règles particulières pour les sèche-linge à tambour à usage collectif

Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke - Besondere Anforderungen für elektrische Trommeltrockner für den gewerblichen Gebrauch

This European Standard was approved by CENELEC on 2013-06-10. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 50570:2013 E

Contents

Figures

Tables

Foreword

This document (EN 50570:2013) has been prepared by CLC/TC 61, "Safety of household and similar electrical appliances".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-06-10
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2016-06-10

EN 50570:2013 is to be read in conjunction with EN 60335-1:2012 and its amendments, which is referred to in this text as “Part 1”. This standard supplements or modifies the corresponding clauses of Part 1 as indicated in the text.

NOTE 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.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

_____

Introduction

This European Standard has been prepared to provide a means of conforming to essential safety requirements of the Machinery Directive 2006/42/EC. Other requirements and other EU Directives may be applicable to the machines within the scope of this standard.

This standard is a product family standard dealing with the safety of commercial electric **tumble dryers** and takes precedence over horizontal and generic standards covering the same subject.

This standard recognises the level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of commercial electric **tumble dryers** when operated as in normal use taking into account the manufacturer's instructions. It also covers any reasonably foreseeable misuse of the machinery and takes into account the way in which electromagnetic phenomena can affect the safe operation of commercial electric **tumble dryers**.

A commercial electric **tumble dryer** 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.

This standard takes into account the requirements of HD 60364-1 as far as possible so that there is compatibility with the wiring rules when the machinery is connected to the supply mains. However, national wiring rules may differ.

1 Scope

Replace this clause of Part 1 by the following:

This European Standard deals with the safety of electrical operated **tumble dryers** intended to be used by trained users in i.e. hotels, hospitals, factories, in light industry and on farms. It also covers **tumble dryers** which are declared for commercial use **in public areas** and operated by lay persons e.g. in laundrettes, communal laundry rooms. The rated voltage shall not be more than 250 V for single phase and 480 V for others.

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

This standard also covers **tumble dryers** making use of other energy sources. It does not cover requirements for these other energy sources. However the influence of these other energy sources on the machines is covered.

This standard deals with the common hazards presented by **tumble dryers** that are encountered by all persons. However, in general, it does not take into account:

a) persons (including children) whose:

   1) physical, sensory or mental capabilities, or

   2) lack of experience and knowledge

   prevents them from using the **tumble dryers** safely without supervision or instruction;

b) children playing with the **tumble dryer**.

Attention is drawn to the fact that:

– for commercial electric **tumble dryers** 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.

This European Standard does not apply to:

c) industrial laundry machinery (EN ISO 10472-4),

d) **tumble dryers** intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

For the purpose of this standard, the term “appliance” as used in Part 1 is to be read as “**tumble dryers** intended for commercial use”.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

EN 60204-1:2006/A1:2009, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005/A1:2008)*

EN 60335-1:2012, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2010, modified)*

EN 60704-1:2010, *Household and similar electrical appliances — Test code for the determination of airborne acoustical noise — Part 1: General requirements (IEC 60704-1:2010)*

EN 60730-2-12:2006, *Automatic electrical controls for household and similar use — Part 2-12: Particular requirements for electrically operated door locks (IEC 60730-2-12:2005, modified)*

EN ISO 3744, *Acoustics — Determination of sound power levels and sound energy levels of noise sources*

using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744)

EN ISO 3746, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746)*

EN ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871)*

EN ISO 9614-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996)*

EN ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201)*

EN ISO 11203, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203)*

EN ISO 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1)*

Replace the reference to EN 62233 by:

EN 62233:2008, *Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure (IEC 62233:2005, modified)*

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.1.9
normal operation

Addition:

The appliance is 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.

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.

Addition:

3.1.101
tumble dryer
appliance in which textile material is dried by tumbling in a rotating drum through which heated air is blown

3.1.102
condensation-type tumble dryer
appliance in which the air used for the drying process is dehumidified by cooling

3.1.103
guard
part of the appliance specifically designed to provide protection by means of a physical barrier

3.1.104
operator
person or persons installing, operating, adjusting, maintaining, cleaning, repairing or moving appliances

3.1.105
workstation
place, as defined in the instructions of the relevant appliance, where the **operator** has to be in attendance to operate, or to adjust, or to control the appliance

Note 1 to entry: Example is the location where the **operator** loads the appliance.

3.1.106
public areas
area in which the general public including children can enter

Note 1 to entry: Examples are laundrettes, communal laundry rooms.

3.1.107
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 except as follows:

Replace the first paragraph with the following:

Appliances shall be constructed so that in normal use they function safely so as to cause no danger to persons or surroundings during normal use, even in the event of carelessness, and during installation, adjusting, maintenance, cleaning, repairing or transportation.

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:*

Appliances shall be marked in addition with:

– business name, and full address of the manufacturer and, where applicable, his authorised representative,

– model or type reference, serial number if any and production year,

NOTE 101 Production year is the year when the production process is completed. The production year can be a part of the serial number.

– designation of the appliance,

NOTE 102 The designation may be a combination of letters and/or numbers and shall enable to identify the appliance as specified in the instructions.

– the water supply pressure or range of pressures, in kilopascals (kPa), for machines intended to be connected to a water supply, unless this is indicated in the instruction sheet,

– the maximum permissible steam supply pressure, in kilopascals (kPa), unless this is indicated in the instruction sheet,

– the maximum permissible water and steam supply temperatures in degrees Celsius, unless this is indicated in the instruction sheet.

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

Read the instructions

When the provisions of footnote [d] to Table 101 apply, the appliance shall be marked with

– the substance of “CAUTION: Hot surface”, or

– symbol IEC 60417-5041(2002-10).

The warning label shall be put on the surface of the appliance having the highest temperature and shall be visible during operation.

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

Add the following text before the second paragraph:

The front cover of the instructions shall include the substance of the following warning:

CAUTION: Read the instructions before using the appliance.

This wording may be replaced by symbols ISO 7000-0434 and ISO 7000-0790.

Replace the first sentence in the requirement of Part 1 with the following

Instructions shall be provided with the appliance so that the appliance can be used safely.

Addition:

If symbols IEC 60417-5041 (2002-10), ISO 7000-0434 and ISO 7000-0790 are used on the appliance or in the instructions, their meaning shall be explained.

The instructions shall contain at least the following information:

– business name and full address of the manufacturer and, where applicable, his authorised representative;

– model or type reference of the appliance as marked on the appliance itself, except for the serial number;

– designation of the appliance together with its explanation in case it is given by a combination of letters and/or numbers; the designation shall enable the identification of the appliance as specified in the instructions;

– general description of the appliance, when needed due to the complexity of the appliance;

– specific precautions if required during installation, operation, adjusting, user maintenance, cleaning, repairing or moving;

– when needed drawings, diagrams, descriptions and explanations necessary for the safe use and user maintenance of the appliance.

– maximum mass of dry textile material in kilograms to be used in the appliance;

– that appliance is not be used if industrial chemicals have been used for cleaning;

– that the lint trap has to be cleaned frequently, if applicable;

– that lint shall not to be allowed to accumulate around the appliance (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 appliance discharges the air into the room.

- possible reasonably foreseeable misuse and, whenever relevant, a warning against the effects it may have on the safe use of the appliance

The instructions shall include the substance of the following:

– do not dry unwashed items in the appliance;

– 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 appliance;

– 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 appliance;

– fabric softeners, or similar products, should be used as specified by the fabric softener instructions;

– the final part of the drying 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 the appliance before the end of the drying cycle unless all items are quickly removed and spread out so that the heat is dissipated.

The manufactures shall declare if the appliance is also intended to be used in **public areas**. If the appliance is not suitable for use in **public areas** the instruction shall include the substance of the following warning:

CAUTION This appliance shall not be installed where the public has access.

The words ‘Original instructions’ shall appear on the language version(s) verified by the manufacturer or by the authorised representative.

When a translation of the original instructions has been provided by a person introducing the appliance on the market; the meaning of the sentence ‘Translation of the original instructions’ has to appear in the relevant instructions delivered with the appliance.

The instructions needed for maintenance/service to be done by specialised personnel, mandated by the manufacturer or the authorised representative, and may be supplied in only one Community language which the specialised personnel understand.

The instructions shall indicate the type and frequency of inspections and maintenance required for safe operation including the preventive maintenance measures.

7.12.1 *Addition:*

The installation instructions shall state

– for appliances with ventilation openings in the base, that a carpet or similar shall not obstruct the openings,

– that exhaust air shall 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 appliance discharges the air into the room.

– that the appliance shall not be installed behind a lockable door, a sliding door or a door with a hinge on the opposite side to that of the appliance, in such a way that a full opening of the appliance door is restricted.

If the installation instructions state that the appliance 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 appliance and washing machine. The instructions shall state how to obtain any fixing attachments required, unless they are supplied with the appliance.

7.12.101 Specific instructions shall be given, when necessary, as follows:

- on use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns, if these operations have consequences on stability of the appliance in order to avoid overturning, falling or uncontrolled movements of the appliance or of its component parts. The instructions needed for the safe transportation of the packed appliance , should be stated on the package or should be delivered together with the package;

- on how to maintain adequate mechanical stability when in use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance;

- on the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to safely unblock the appliance.

Compliance is checked by inspection.

7.12.102 Information shall be given that only authorised spare parts have to be used in the event of failure.

Compliance is checked by inspection.

7.12.103 The instructions shall include a noise emission declaration as indicated in Annex DD.

This includes

- the A-weighted emission sound pressure level at **workstations**, where this exceeds 70 dB(A). If the A-weighted emission sound pressure level is below 70 dB, no value need to be given, but the instructions shall state that the A-weighted emission sound pressure level is below 70 dB,

- the A-weighted sound power level emitted by the appliance, where the A-weighted emission sound pressure level at **workstations** exceeds 80 dB(A).

Compliance is checked by inspection.

7.12.104 The instructions shall give information about particular chemical substances which shall not be used.

Compliance is checked by inspection.

7.12.105 The instructions shall include a warning that the appliance shall be disconnected from its power source during service and when replacing parts and, if that the removal of the plug is foreseen, it shall be clearly indicated that the removal of the plug has to be such that an operator can check from any of the points to which he has access that the plug remains removed.

If this is not possible, due to the construction of the appliance or its installation, a disconnection with a locking system in the isolated position shall be provided.

Compliance is checked by inspection.

7.14 *Addition:*

The height of symbols on the appliance, 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” on the appliance, 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 except as follows:

8.1.1 *For appliances not intended to be installed in **public areas** replace the third paragraph by the following:*

Test probe B of EN 61032 is applied without appreciable force, 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 20 N. If the probe then enters the opening, the test is repeated with the probe in the angled position.

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 flat accessible surfaces are measured using the probe of Figure 101. The probe is applied with a force of 4 N $\pm$ 1 N to the surface in such a way that the best possible contact between the probe and the surface is ensured.

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.

11.8 *Modification:*

*For appliances used in **public areas** in Table 3 replace the row “External enclosure of **motor-operated appliances**, except handles held in normal use” and the relevant temperature value with the following:*

Table 3 — Maximum normal temperature rises

Surface [a]	***Temperature rise*** *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	*40*	*45*	*45*
Coated metal [b]	*45*	*55*	*55*
Glass and ceramic	*55*	*60*	*60*
Plastic and plastic coating > 0,3 mm [c]	*60*	*65*	*65*

[a] When the thickness of plastic coating does not exceed 0,3 mm, the temperature rise limits of coated metal or glass and ceramic apply.

[b] Metal is considered coated when a coating having a minimum thickness of 80 µm made by enamel or non-substantially plastic coating is used.

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

[d] When, due to the construction or dimensional limitations of the appliance, the required values cannot be met, the maximum temperature rise shall not be higher than twice the values indicated. In such cases, a warning shall be marked on the relevant surface of the appliance.

11.101

Temperature rises are not measured:

– on the underside of appliances intended to be used on a floor,

– on the rear surface of the appliance which, according to the instructions, shall be placed against a wall.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 *Modification:*

Instead of the permissible leakage current for **stationary class I appliances**, the following applies:

- *for cord and plug connected appliances* — *1 mA per kW **rated power input** of the appliance with a maximum of 10 mA*
- *for other appliances* — *1 mA per kW **rated power input** of the appliance with no maximum*

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.2 *Modification:*

*The test is carried out with the drum filled with wet textile material as specified for **normal operation**, the mass of the water, however, being approximately 1,5 times the mass of the dry textile material.*

*Appliances intended to be connected to the water mains are operated with the outlet of the condensation circuit blocked. The inlet valve is held open and the filling continued for 1 min after first evidence of overflow or for 5 min after a **protective device** operates to stop the flow. Doors are opened but interlocks are not forced.*

For all appliances, 0,5 l of water containing approximately 1 % NaCl and 0,6 % of rinsing agent, as specified in Annex AA, is poured over the top of the appliance, the controls being placed in the on position. The controls are then operated through their working range, this operation being repeated after a period of 5 min.

*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** or **creepage distances** below the values specified in Clause 29.*

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.2 *Modification:*

Instead of the permissible leakage current for **stationary class I appliances**, the following applies:

– *for cord and plug connected appliances*	*1 mA per kW **rated power input** of the appliance with a maximum of 10 mA*
– *for other* appliances	*1 mA per kW **rated power input** of the appliance with no maximum*

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

18.101 Appliances shall be constructed so that the lid or door interlock withstands the stresses to which it may be exposed in normal use.

Compliance is checked by the following test.

Manually operated lids and doors:

The lid or door is opened as in normal use and the force applied to the handle, or actuating means of the release mechanism, is measured. The force required to close the lid or door is also measured.

The lid or door is then subjected to 50 000 cycles of opening and closing. For the first 30 000 cycles, the appliance *is supplied at **rated voltage** and operated so that the interlock mechanism is energised and de-energised each cycle. For the last 20 000 cycles, the appliance is not connected to the supply mains.*

*If the interlock complies with EN 60730-2-12, the appliance is not connected to the supply mains during this test. If the interlock operates more than once during **normal operation**, it is operated for this number of times during each cycle.*

Lids are opened each time by approximately 45^{o} and doors by 90^{o}, the speed of opening being approximately 1,5 m/s. The force applied to open the lid or door is twice the measured opening force, with a minimum of 50 N and a maximum of 200 N.

Doors are closed at a speed of approximately 1,5 m/s, the force applied being five times the measured closing force, with a minimum of 50 N and a maximum of 200 N. Lids are allowed to close under their own weight but if they fail to latch, a force of five times the measured closing force is applied, with a minimum of 50 N and a maximum of 200 N.

Power driven lids and doors:

*The lid or door is subjected to 50 000 cycles of opening and closing, the appliance is supplied at **rated voltage** and operated so that the interlock mechanism is energised and de-energised each cycle.*

After the tests, compliance with the relevant requirements of 20.101 and 20.102 shall not be impaired.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Modification:*

Instead of being subjected to the tests of 19.2 and 19.3, appliances are subjected to the tests of 19.101 and 19.102, as applicable.

Addition:

If operation without water is a more unfavourable condition for appliances connected to the water mains, the tests are carried out with the water valve closed. This valve is not closed after the appliance has started to operate.

19.4 *Replacement:*

The appliance *is operated under the conditions specified in Clause 11 but with dry textile material. Controls that limit the temperature during the test of Clause 11 and all* ***self-resetting thermal cut-outs*** *that protect the heating elements are short-circuited simultaneously. The test is terminated at the end of the maximum period allowed by a timer.*

For ***condensation-type*** appliances*, the test is repeated, but with 75 % of the air outlet of the condenser blocked. The test is then carried out again with the air outlet fully blocked.*

19.9 Not applicable.

19.11.4.8 *Replace the second sentence in the requirement by:*

The appliance shall continue to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage fluctuation occurred, or a manual operation shall be required to restart it.

19.13 *Addition:*

The textile material shall not ignite and shall show no charring or glowing.

NOTE 101 Light-brown colouring of the textile material or slight emission of smoke is ignored.

Addition:

19.101 *The* appliance *is operated under the conditions specified in Clause 11 but with dry textile material and the drum belt removed. The duration of the test is 90 min or for the maximum period allowed by a timer.*

If air circulation is likely to be prevented due to a fault condition, the test is repeated but with the drum belt in position and with the air circulation stopped.

Care should to be taken to ensure that the textile material is tumbling properly by reducing the load if necessary.

If both of these conditions are likely to occur simultaneously, the tests are combined.

19.102 Appliances *that permit test probe C of EN 61032 to gain access to spaces containing* ***live parts*** *located below holes in the drum are tested for short circuit conditions. The short circuit is applied at the most unfavourable place between* ***live parts*** *and between* ***live parts*** *and other metal parts, if such a short circuit can be made by a pin having a diameter of approximately 1 mm and any length up to 50 mm. The appliance is operated as specified in Clause 11 but with dry textile material.*

19.103 There shall be no risk of fire due to textile material coming into contact with a lamp cover.

Compliance is checked by the following test.

Ten layers of cheesecloth are placed over the lamp cover. The appliance is supplied at ***rated voltage*** *with the door open until steady conditions are established. The temperature rise of the cover shall not exceed 150 K.*

19.104 The appliance is supplied at **rated voltage** and operated under **normal operation**.

Any fault condition or unexpected operation that may be applied in normal use is introduced.

NOTE 1 Examples of fault conditions and unexpected operations are:

– the programmer stopping in any position;

– disconnection and reconnection of one or more phases of the supply during any part of the programme;

– open-circuiting or short-circuiting of components.

NOTE 2 In general, tests are limited to the fault conditions that may be expected to give the most unfavourable results. The simulation of component faults is limited to those that could expose the user to a hazard.

NOTE 3 If the appliance stops at any particular point in the programme, the test with that fault condition is considered to be ended.

NOTE 4 The fault condition with:

– thermal controls short-circuited is covered by 19.4,

– motor capacitors short-circuited or open-circuited is covered by 19.7.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Modification:*

The test with the angle of inclination increased to 15° is not carried out.

20.2 *Modification*:

Dangerous moving transmission parts shall be safeguarded either by design or **guards**. When **guards** are used, they shall be fixed **guards** or interlocking movable **guards**.

NOTE 101 Parts of the enclosure can fulfil the guarding function.

Interlocking movable **guards** (e.g. the door of a tumble dryer) shall be used where frequent access is required.

20.101 It shall not be possible to open the door while the appliance is operating unless an interlock is provided that disconnects the motor before the door opening exceeds 50 mm. It shall not be possible to start the motor of the drum until a separate means which controls the movement of the drum is operated manually.

Compliance is checked by inspection, by measurement and by manual test, the appliance being supplied at ***rated voltage*** *and operating under* ***normal operation****.*

If means to prevent the door opening incorporates a coil or similar component to lock the door in the closed position, the component is energised and de-energised 6 000 times, six times a minute or at the rate imposed by the construction of the appliance if this is lower.

The locking means and its components shall be fit for further use.

NOTE The door is opened and closed during the test if this is necessary for the mechanical operation of the interlock.

20.102 For appliances used in **public areas** which may be operated by lay persons and which have a manually operated door having an opening with a dimension exceeding 200 mm and a drum having a volume exceeding 60 dm^3 or a distances in the centre exceeding 350 mm from the inner surface of the closed door, it shall be possible to open from the inside a closed door not in locked state with a force not exceeding 70 N.

Compliance is checked by inspection, by measurement and by applying a force of 70 N perpendicular to the plane of the closed door (not locked) at a point furthest from the hinges.

If the appliance is supplied with a decorative door, the test is carried out with this door closed.

The force may be applied to the outside of the door.

This requirement is not applicable, if to close the door turning of any knobs or levers is necessary.

20.103 Appliances with horizontally hinged doors shall have adequate stability when the open door is

subjected to a load. This requirement is not applicable to **built-in appliances**.

Compliance is checked by the following test that is carried out with the appliance *placed on a horizontal surface, even if it can be stacked on top of a washing machine.*

The empty appliance is placed on a horizontal surface and a mass of 30 kg applied to the centre of the open door. The appliance shall not tilt and the door and hinges shall not be damaged to such an extent that compliance with this standard is impaired.

20.104 The appliance together with its delivery packaging shall have adequate stability during transportation, assembly, dismantling, scrapping. It shall be constructed in such a way that overturning is prevented; if possible by designing inbuilt stability, i.e. the base point of the centre of gravity shall lie within the polygon of support.

If necessary, appropriate instructions shall be made by the manufacturer.

Compliance is checked by inspection

NOTE EN ISO 4180:2010 gives guidance.

20.105 For appliances not used in public areas and having loading or unloading function where the appliance tilts backwards or forwards the drum speed shall not exceed 60 r/min. If unloading function is activated manually then a two handed operation is required.

Compliance is checked by the following test:

*The appliance is supplied at **rated voltage** and operated empty or filled as specified for **normal operation**, whichever is more unfavourable. The drum speed shall not exceed 60 r/min.*

20.106 For appliances not used in public areas and having automatic loading or unloading function where the appliance tilts backwards or forwards, interlocking **guards** shall be provided to ensure the **operator** is not in the working area of the appliance. The drum speed shall not exceed 60 r/min.

Compliance is checked by the following test:

*The appliance is supplied at **rated voltage** and operated empty or filled as specified for **normal operation**, whichever is more unfavourable. The drum speed shall not exceeds 60 r/min and it shall not be possible for the **operator** to enter the working area while the appliance is operating*

21 Mechanical strength

This clause of Part 1 is applicable except as follows:

21.1 *Replace the requirement with the following*:

Appliances and their components and fittings shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance.

Replace the first paragraph of the compliance by the following:

Compliance is checked by verifying the instruction and by applying blows to the appliance in accordance with test Ehb of EN 60068-2-75, the spring hammer test.

21.101 There shall be no risks of ejecting steam during intended use, i.e. opening of a cover by a single manual operation or a ventilation opening.

Compliance is checked by inspection.

21.102 The appliance shall be constructed from materials suitable for the intended process considering the intended chemical substances.

Compliance is checked by inspection.

21.103 Fluid/gas/steam-containing parts of equipment which in normal use have both of the following characteristics shall not cause a hazard through rupture or leakage:

- a product of pressure and volume greater than 200 kPa x l;
- a pressure above 2 MPa,

NOTE Such equipment includes fluid-pressure-actuated equipment employing flexible bellows, diaphragms, Bourdon tubes, etc. and equipment such as flowmeters that are connected to process pressures rated at or above 2 MPa.

Compliance is checked by inspection and by performing the hydrostatic tests of EN 61010-1:2010, G.2.

22 Construction

This clause of Part 1 is applicable except as follows:

22.101 Heating elements shall be located or guarded so that textile material cannot contact the heating elements.

Compliance is checked by inspection.

22.102 Interlocks shall be constructed so that unexpected operation of the appliance is unlikely to occur while the door is open.

Compliance is checked by inspection and by attempting to release the interlock by means of test probe B of EN 61032.

22.103 If the instructions state that the appliance can be placed on top of a washing machine, this shall be possible without the appliance tilting or falling.

Compliance is checked by inspection and by the following test.

The washing machine and appliance *are assembled together in accordance with the instructions. The combination is placed in the most unfavourable orientation on a surface that is inclined at 5° to the horizontal. Each appliance is supplied at* ***rated voltage*** *and operated under* ***normal operation*** *in turn.*

The appliances shall not tilt and the appliance *shall not fall off the washing machine.*

22.104 The operation of **protective devices** for the heating circuit shall not disable the **cool down period**.

*Compliance is checked by inspection***.**

22.105 Where the weight, size or shape prevents appliance from being moved manually, they shall be fitted with attachments for lifting gear or be designed so they can be fitted with such attachments, or be shaped in such a way that standard lifting gear can easily be used.

Appliances to be moved manually shall be constructed or shall be equipped so that they can be moved easily and safely.

Compliance is checked by inspection.

22.106 In case of remote control (e.g.wireless) the appliance shall automatically stop in a fail safe condition when corrupted signals are received or the communication is interrupted for a longer period of time than defined by the related safety routines.

Compliance is checked by tests according the standards of the used communication technology.

22.107 The fixing systems of fixed **guards** which prevent access to dangerous moving transmission parts shall only be removable with the use of tools.

If such **guards** have to be removed for routine cleaning or maintenance their fixing systems shall remain attached to the fixed **guards** or to the appliance after removal. Where possible, **guards** shall be incapable of remaining in place without their fixings.

The requirement in the above paragraph does not apply if, after removal of the screws, or if the component is incorrectly repositioned, the appliance becomes inoperative.

Movable **guards** shall be interlocked. The interlocking devices shall prevent the start of hazardous appliance functions until the **guards** are fixed in their position, and give a stop command whenever they are no longer closed.

Where it is possible for an **operator** to reach the danger zone before the risk due to hazardous appliance functions has ceased, movable **guards** shall be associated with a **guard** locking device in addition to an interlocking device that

— prevents the start of hazardous appliance functions until the **guard** is closed and locked, and

— keeps the **guard** closed and locked until the risk of injury from the hazardous appliance functions has ceased.

Interlocking movable **guards** shall remain attached to the appliance when open and they shall be designed and constructed in such a way that they can be adjusted only by means of an intentional action.

Compliance is checked by inspection.

Interlocking movable **guards** shall be designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous functions of the appliance.

Compliance is checked by inspection and by the tests of 18.101 and 24.1.4.

After this test any defect that may be expected in normal use is applied to the interlock system, including interruption of the supply, only one defect being simulated at a time.

NOTE 1 Examples of defects are the breakage of a spring or a gravity-operated part failing to drop into position.

NOTE 2 Fault conditions applied during the tests of Clause 19 are not repeated.

After these tests the interlock system shall be fit for further use..

22.108 The appliance shall be designed and constructed in such a way that the build-up of potentially dangerous electrostatic charges is prevented. Parts of the appliance that are easily accessible during intended use and maintenance have to be taken into account.

The insulation resistance between the accessible part and earth shall be sufficiently low so as to avoid a build up of electrostatic charge.

Compliance is checked by measuring the insulation resistance between the drum and the enclosure and between the enclosure and the drive motor rotor shaft, with a d. c. voltage of approximately 500 V applied. The measurement is made 1 min after application of the voltage.

The insulation resistance shall not exceed 1 MΩ.

22.109 The appliance shall be provided with a device to stop the function safely. Such device shall be suitable placed and readily visible. The appliance shall be provided with a device to stop the function safely in a position that allows the opening of the door and the clothes to be removed. Such device shall also be capable of being locked where an **operator** is unable, from any of the points to which he has access, to check that the energy is still cut off.

If the appliance is functionally directly connected with other appliances the stop of each separate part of this assembly shall stop all parts of the assembly.

Compliance is checked by inspection.

22.110 Appliances shall be designed in such a way that incorrect mounting is avoided, if this can lead to an unsafe situation. If this is not possible, information on the correct mounting shall be given directly on the part and/or the enclosure.

Compliance is checked by inspection

22.111 In case of interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply, the appliance shall not restart, however automatic restarting of the operation is allowed if the appliance may continue to operate, without causing any hazard to the **operator**, from the same point in its operating cycle at which the voltage interruption or fluctuation occurred.

Compliance is checked by inspection.

22.112 The operation cycle of appliances shall conclude with a **cool down** cycle of sufficient duration to reduce the temperature of a normal load below 55 °C to avoid the potential for spontaneous combustion of the clothes load.

Compliance is checked by the appliance operated under Clause 11 condition with a normal load, the exhaust temperature from the drum shall be measured, the cool down cycle shall not stop until the drum exhaust temperature has been reduce below 55 °C. The measurement point shall be in the first lint filter after the air passes the cloth in the drum.

NOTE For example this point is the first filter in the door.

22.113 Appliances equipped with an automatic loading or unloading function shall not be used in **public**

areas. They shall have an emergency stop device according to EN 60204-1:2006/A1:2009.

Compliance is checked by inspection.

22.114 Appliances shall be fitted with means to isolate them from all energy sources (e.g. hot water, steam, compressed air). Such isolators shall be clearly identified. They shall be capable of being locked if reconnection could endanger persons.

Such means may be part of the fixed installation external to the appliance.

After the energy source is disconnected, it shall be possible to dissipate any energy remaining or stored in the circuits of the appliances without risk to persons.

Compliance is checked by inspection.

22.115 Controls shall be located in such a way to allow the user of the appliance to have a good view of the appliance and in particular of the door/drum system.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable except as follows:

23.101 The insulation and sheath of internal wiring for the supply of magnetic valves and similar components incorporated in external hoses shall be at least equivalent to light polyvinyl chloride sheathed flexible cord (code designation 60227 IEC 52).

Compliance is checked by inspection.

NOTE The mechanical characteristics specified in IEC 60227 are not checked.

24 Components

This clause of Part 1 is applicable except as follows:

24.1.3 *Addition*:

The number of cycles of operation for the switching device in door interlocks is 50 000.

24.1.4 *Addition:*

The number of cycles of operation for programmers is 10 000.

For lid or door interlocks, the number of cycles of operation declared for 6.10 and 6.11 of EN 60730-2-12:2006 shall not be less than 50 000.

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

Compliance is checked by inspection.

24.102 Switches complying with EN 61058-1 are not short-circuited during the tests of Clause 19 and are not subjected to the fault condition tests of 22.107. The tests of EN 61058-1 are carried out under the conditions occurring in the appliance. Lid or door interlock mechanisms which comply with EN 60730-2-12 are not short-circuited during the tests of Clause 19, and are not subjected to the fault condition tests of 22.107.

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 except as follows:

27.1 *Addition*:

If the permissible leakage current exceeds 10 mA total, the appliance shall have a supplementary equipotential bonding terminal.

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 except as follows.

29.2 *Addition:*

The microenvironment is pollution degree 3, and the insulation shall have a CTI not less than 250, unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance due to

– condensation produced by the appliance,

– chemicals, such as fabric conditioner.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows:

30.2.2 Not applicable.

Addition

30.101 Non-metallic materials in close proximity to heating elements and on which lint could accumulate shall be resistant to spread of fire. This requirement also applies to parts on which burning lint could fall.

Compliance is checked by subjecting non-metallic surfaces located within 75 mm of the heating element to the needle-flame test of Annex E. The test is also applied to surfaces located directly below the heating element. However, parts shielded by a barrier that meets the needle-flame test are not tested.

NOTE It is considered that burning lint will not fall through a barrier with openings having a dimension less than 3 mm.

The needle-flame test is not carried out on

– *material classified as V-0 or V-1 according to EN 60695-11-10, provided that the test sample was no thicker than the relevant part,*

– *rotating parts of fans,*

– *small parts as defined in EN 60695-2-11.*

31 Resistance to rusting

This clause of Part 1 is applicable.

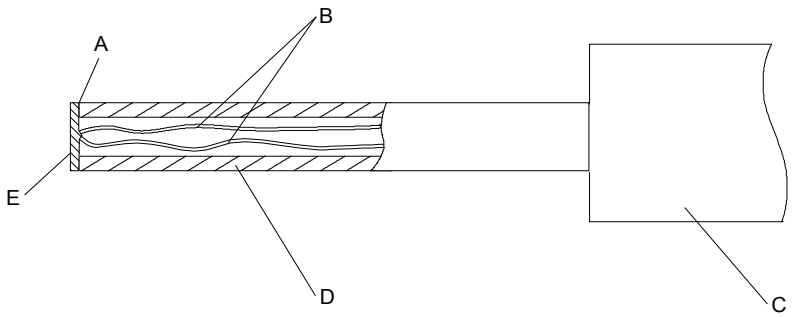
32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable except as follows:

Addition:

For the emissions of electromagnetic fields the limits of EN 62233:2008, Annex B applies.

Compliance is checked by measuring EMF according to EN 62233.



IEC 807/02

Key

A adhesive

B thermocouple wires 0,3 mm diameter to EN 60584-1, Type K (chrome alumel)

C handle arrangement permitting a contact force of 4 N ± 1 N

D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm

E tinned copper disc: 5 mm diameter, 0,5 mm thick

NOTE The contact face of the disc is flat.

Figure 101 — Probe for measuring surface temperatures

Annexes

The annexes of Part 1 are applicable except as follows:

Addition of the following annexes:

Annex AA
(normative)

Rinsing agent

Any commercially available rinsing agent may be used, but if there is any doubt with regards to the test results, the composition of the rinsing agent shall be as follows:

Table AA.1 — Rinsing agent

Substance	Parts by mass %
Plurafac LF 221 [1)]	15,0
Cumene sulfonate (40 % solution)	11,5
Citric acid (anhydrous)	3,0
Deionised water	70,5

The rinsing agent has the following properties:

- viscosity, 17 mPa·s;
- pH, 2,2 (1 % in water).

NOTE The composition of the rinsing agent is extracted from EN 50242/EN 60436:2008.

1) Plurafac LF 221 is the trade name of a product supplied by BASF. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named.

Annex BB
(normative)

Appliances that use a refrigerating system incorporating sealed motor-compressors for carrying out the drying process

The following modifications to this standard are applicable for appliances that use a refrigerating system incorporating sealed motor-compressors.

NOTE Additional subclauses, notes, figures and tables in this annex are numbered starting with 201.

2 Normative references

Addition:

EN 60068-2-6, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal) (IEC 60068-2-6)*

EN 60079-15:2005, *Electrical apparatus for explosive gas atmospheres — Part 15: Construction, test and marking of type of protection "n" electrical apparatus (IEC 60079-15:2005)*

EN 60079-20-1, *Explosive atmospheres — Part 20-1: Material characteristics for gas and vapour classification — Test methods and data (IEC 60079-20-1)*

EN 60335-2-34, *Household and similar electrical appliances — Safety — Part 2-34: Particular requirements for motor-compressors (IEC 60335-2-34)*

IEC 60079-4A, *Electrical apparatus for explosive gas atmospheres — Part 4: Method of test for ignition temperature — First supplement*

ISO 817, *Refrigerants — Designation system*

ISO 5149, *Mechanical refrigerating systems used for cooling and heating — Safety requirements*

3 Terms and definitions

3.201
flammable refrigerant
refrigerant with a flammability classification of group 2 or 3 in accordance with ISO 5149

Note 1 to entry For refrigerant blends that have more than one flammability classification, the most unfavourable classification is taken for the purposes of this definition.

4 General requirement

Addition:

NOTE 201 The use of **flammable refrigerants** involves additional hazards that are not associated with appliances using non-flammable refrigerants.

This standard addresses the hazards due to ignition of **flammable refrigerant** by potential ignition sources associated with the appliance.

The hazard due to ignition of **flammable refrigerant** by an external potential ignition source associated with the environment in which the appliance is installed is compensated by the low probability of ignition.

5 General conditions for the tests

5.2 *Addition:*

At least one additional specially prepared sample is required for the tests of 22.202.

Unless the motor-compressor conforms to EN 60335-2-34, at least one additional specially prepared sample may be required for the test of 19.1.

At least one additional sample of the fan motor and its thermal motor protector may be required for the test of 19.1.

The test of 22.7 may be performed on separate samples.

Due to the potentially hazardous nature of the tests of 22.202 and 22.204, special precautions may need to be taken when performing the tests.

5.7 *Addition:*

The tests specified in Clauses 10, 11 and 13 are carried out at an ambient temperature of 23 °C ± 2 °C.

6 Classification

6.1 *Modification:*

Appliances using flammable refrigerants shall be **Class I**.

7 Marking and instructions

7.1 *Addition:*

Appliances shall also be marked with:

a) the total mass of the refrigerant,

b) for a single component refrigerant, at least one of the following:

   1) the chemical name;

   2) the chemical formula;

   3) the refrigerant number;

c) for a blended refrigerant, at least one of the following:

   1) the chemical name and nominal proportion of each of the components;

   2) the chemical formula and nominal proportion of each of the components;

   3) the refrigerant number and nominal proportion of each of the components;

   4) the refrigerant number of the refrigerant blend.

If refrigerant numbers are used, they shall be as specified in ISO 817.

The appliance shall also be marked with the mass of the refrigerant for each separate refrigerant circuit.

Appliances that use **flammable refrigerants** shall be marked with the symbol ISO 3864-B.3.2 indicating “Caution: risk of fire”.

7.6 *Addition:*


Symbol ISO 3864-B.3.2

Caution: risk of fire

Figure 201 – Symbol: Caution: Risk of fire

7.12 *Addition:*

If the symbol ISO 3864-B.3.2 indicating “Caution: risk of fire” is used, its meaning shall be explained.

For appliances that use **flammable refrigerants**, the instructions shall include information pertaining to the installation, handling, servicing and disposal of the appliance.

The instructions shall also include the substance of the following:

WARNING: In the appliance enclosure or in the built-in structure, keep ventilation openings clear of obstruction.

WARNING: Do not damage the refrigerant circuit.

NOTE 201 This warning is only necessary if parts of the refrigerant circuit are accessible to the user.

7.14 *Addition:*

The perpendicular height of the triangle of the symbol ISO 3864-B.3.2 indicating “Caution: risk of fire”shall be at least 15 mm.

7.15 *Addition:*

The marking of the type of **flammable refrigerant** and the symbol ISO 3864-B.3.2 indicating “Caution: risk of fire” shall be visible when gaining access to the motor-compressors.

11 Heating

11.8 *Addition:*

*During the test, **protective devices** other than self-resetting thermal motor-protectors for motor-compressors shall not operate. When steady conditions are established, self-resetting thermal motor-protectors for motor-compressors shall not operate.*

The temperatures of windings and housing of motor-compressors shall not exceed the values specified in Table 201 and the temperature rise of all other components associated with the motor-compressor shall not exceed the values given in Table 3.

Table 201 — Maximum temperatures for motor-compressors

Part of the motor-compressor	***Temperature °C***
Windings with	
– *synthetic insulation*	*140*
– *cellulose insulation or the like*	*130*
Housing.	*150*

*The entry in Table 3 relating to the temperature rise of the external enclosure of **motor-operated appliances** is applicable to all appliances covered by this standard. However, it is not applicable to those parts of the external enclosure that*

– *for **built-in appliances**, are not accessible after installation in accordance with the instructions for installation,*

– *for other appliances, are on that part of the appliance which according to the instructions for installation, is intended to be placed against a wall with a free distance not exceeding 75 mm.*

19 Abnormal operation

19.1 *Addition:*

Motor-compressors not complying with EN 60335-2-34 are subjected to the tests specified in EN 60335-2-34, 19.101 and 19.102, and shall also comply with 19.104 of that standard.

NOTE 201 For any given type of motor-compressor, this test is performed only once.

19.7 *Addition:*

This test does not apply to motor-compressors.

21 Mechanical strength

21.201 Appliances using **flammable refrigerants** shall withstand the effects of vibration.

The appliance is fastened in its normal position of use to a vibration generator, in accordance with EN 60068-2-6, by means of straps around the enclosure. The type of vibration is sinusoidal, the direction is vertical and the severity is as follows:

– *duration* *30 min*

– *acceleration* *5 m/s^2*

– *frequencies* *100 Hz or 120 Hz depending on the **rated frequency** of the appliance (50 Hz or 60 Hz).*

After the test, the appliance shall show no damage affecting safety; in particular, no connections or parts the loosening of which may impair safety shall have loosened. No leakage shall occur when checked according to 22.7.

22 Construction

22.7 *Addition:*

Appliances, including the motor-compressor, shall withstand:

– a pressure of 3,5 times the saturated vapour pressure of the refrigerant at 70 °C for the relevant refrigerant for parts exposed to high-side pressure,

– a pressure of 5 times the saturated vapour pressure of the refrigerant at 25 °C for parts exposed only to low-side pressure.

However appliances, including the motor-compressor, using **flammable refrigerants** shall withstand

– a pressure of 3,0 times the adjusted value of the **protection device** for parts exposed to high-side pressure,

– a pressure of 5 times the saturated vapour pressure of the refrigerant at 25 °C for parts exposed only to low-side pressure.

NOTE 201 All pressures are gauge pressures.

Compliance is checked by the following test.

The appropriate part of the appliance under test is subjected to a pressure that is gradually increased hydraulically until the required test pressure is reached. This pressure is maintained for 1 min. The part under test shall show no leakage.

22.201 For appliances that use **flammable refrigerants** in their refrigerant system, the mass of refrigerant shall not exceed 150 g in each separate refrigerant circuit.

Compliance is checked by inspection.

22.202 For appliances that use **flammable refrigerants**, any electrical component located inside the appliance, that during **normal operation** or abnormal operation produces sparks or arcs and luminaries, shall be tested and found at least to comply with the requirements in Annex CC for group IIA gases or the refrigerant used.

This requirement does not apply to:

– **non-self-resetting protective devices** necessary for compliance with Clause 19, even if they produce arcs or sparks during operation, nor to

– intentionally weak parts that become permanently open-circuited during the tests of Clause 19, even if they produce arcs or sparks during operation.

Refrigerant leakage into the appliance enclosure shall not result in an explosive atmosphere outside the appliance in areas where electrical components that produce arcs and sparks during **normal operation** or abnormal operation are mounted, when doors or lids remain closed or when opening or closing doors or lids, unless these components have been tested and found at least to comply with the requirements in Annex CC, for group IIA gases or the refrigerant used.

This requirement does not apply to:

– **non-self-resetting protective devices** necessary for compliance with Clause 19, even if they produce arcs or sparks during operation, nor to

– **intentionally weak parts** that become permanently open-circuited during the tests of Clause 19 even if they produce arcs or sparks during operation.

NOTE 1 Separate components, such as **thermostats**, that contain less than 0,5 g of flammable gas, are not considered liable to cause a fire or explosion hazard in the event of a leakage from the component itself.

NOTE 2 Other types of protection for electrical apparatus used in potentially explosive atmospheres covered by the EN 60079 series are also acceptable.

Compliance is checked by inspection, by the appropriate tests of EN 60079-15 and by the following test.

The tests called up by Annex CC may be carried out using the stoichiometric concentration of the refrigerant used. However, apparatus that has been independently tested and found to comply with Annex CC using the gas specified for group IIA need not be tested.

NOTE 3 Irrespective of the requirement given in 5.4 of EN 60079-15:2005, surface temperature limits are specified in 22.203.

The gas bottle is kept at a temperature of:

– *32 °C ± 1 °C for leakage simulation on low-side pressure circuits,*

– *70 °C ± 1 °C for leakage simulation on high-side pressure circuits.*

The quantity of gas injected should preferably be measured by weighing the bottle.

*The test is performed in a draught-free location with the appliance switched off or operated under conditions of **normal operation** at **rated voltage**, whichever gives the more unfavourable result.*

During a test in which the appliance is operated, gas injection is started at the same time as the appliance is first switched on.

The test is carried out twice and is repeated a third time if one of the first tests gives more than 40 % of the lower explosive limit.

Through an appropriate orifice, 80 % of the nominal refrigerant charge ± 1,5 g, in the vapour state, is injected into the appliance enclosure in a time not exceeding 10 min. The orifice is then closed. The injection shall be as close as possible to the most critical points of the appliances.

NOTE 4 Examples are soldered joints.

The test has to be carried out while the door or lid is closed.

For appliances fitted with fan motors, the test is done with the most unfavourable combination of motor operation.

The concentration of leaked refrigerant is measured every 30 s from the beginning of the test, at positions as close as possible to electrical components. However, it is not measured at the positions of:

– ***non-self-resetting protective devices*** *necessary for compliance with Clause 19, even if they produce arcs or sparks during operation,*

– *intentionally weak parts that become permanently open-circuited during the tests of Clause 19, even if they produce arcs or sparks during operation.*

The concentration values are recorded for a period of 15 min after a sustained decrease is observed.

The measured value shall not exceed 75 % of the lower explosive limit of the refrigerant as specified in Table 202, and shall not exceed 50 % of the lower explosive limit of the refrigerant as specified in Table 202 for a period exceeding 5 min.

The above test is repeated, and the door or lid is opened at a uniform rate in a time of between 1 s to 2 s to an angle of 90° or to the maximum possible, whichever is less. The concentration shall be the highest when the door or lid is opened.

22.203 Temperatures on surfaces that may be exposed to leakage of **flammable refrigerants** shall not exceed the ignition temperature of the refrigerant, as specified in Table 202, reduced by 100 K.

Compliance is checked by measuring the appropriate surface temperatures during the tests specified in Clauses 11 and 19.

Table 202 — Refrigerant flammability parameters

Refrigerant number	Refrigerant name	Refrigerant formula	Refrigerant ignition temperature [a c] °C	Refrigerant lower explosive limit [b c d] %V/V
R50	Methane	CH_4	537	4,4
R290	Propane	$CH_3CH_2CH_3$	470	1,7
R600	n-Butane	$CH_3CH_2CH_2CH_3$	372	1,4
R600a	Isobutane	$CH(CH_3)_3$	494	1,8

[a] Values for other **flammable refrigerants** can be obtained from IEC 60079-4A and EN 60079-20-1.
[b] Values for other **flammable refrigerants** can be obtained from EN 60079-20-1 and ISO 5149.
[c] EN 60079-20-1 is the reference standard. ISO 5149 may be used if the required data is not contained in EN 60079-20-1.
[d] Concentration of refrigerant in dry air.

22.204 For appliances that use **flammable refrigerants**, a pressure responsive electrical cut-out is required for expansion valve refrigerant systems.

NOTE A capillary system is considered to be fail safe. In this case, an additional safety device is not required.

The pressure cut-out is allowed to be a self-resetting type. It shall not operate under the conditions of Clause 11. However during the test of 19.4, 75 % of the lint-trap is blocked and under this condition of abnormal use, the pressure cut-out is allowed to operate.

Compliance is checked by inspection during the tests of Clause 11 and 19.4.

22.205 The insulation resistance between the drum and the enclosure and between the enclosure and the drive motor rotor shaft shall be sufficiently low so as to avoid a build-up of electrostatic charge.

Compliance is checked by measuring the insulation resistance between the drum and the enclosure and between the enclosure and the drive motor rotor shaft, with a d.c. voltage of approximately 500 V applied. The measurement is made 1 min after application of the voltage.

The insulation resistance shall not exceed 1 MΩ.

22.206 For appliances that use **flammable refrigerants**, only factory sealed connections shall be used in the refrigerant circuit.

NOTE Factory sealed connections are connections in the refrigerant circuit that have been sealed tight by welding, brazing or similar permanent connection during the manufacturing process.

Compliance is checked by inspection.

24 Components

24.1 *Addition:*

Motor-compressors are not required to be separately tested in accordance with EN 60335-2-34, nor are they required to meet the requirements of EN 60335-2-34, if they meet the requirements of this standard.

24.1.4 *Addition:*

For appliances using a refrigerant system, the number of cycles is as follows:

– ***self-resetting thermal cut-outs*** *that may influence the test results of 19.101 and that are not short-circuited during the test of 19.101;*	*10 000*
– ***thermostats*** *that control the motor-compressor;*	*30 000*
– *motor-compressor starting relays;*	*30 000*
– *automatic thermal motor-protectors for motor-compressors of the hermetic type;*	*2 000*
– *manual reset thermal motor-protectors for motor-compressors of the hermetic type;*	*50*
– *other automatic thermal motor-protectors;*	*2 000*
– *other manual reset thermal motor protectors;*	*30*
– *self-resetting pressure cut-outs (only required on appliances using* ***flammable refrigerant****);*	*1 000*
– *manual reset pressure cut-outs (only required on appliances using* ***flammable refrigerant****).*	*300*

Annex CC
(normative)

Non-sparking “n” electrical apparatus

Where reference is made to EN 60079-15, the following clauses are applicable, as modified below.

26 General supplementary requirements for apparatus producing arcs, sparks or hot surfaces

This clause is applicable.

27 Supplementary requirements for enclosed-break devices and non-incendive components producing arcs, sparks or hot surfaces

This clause is applicable.

28 Supplementary requirements for hermetically sealed devices producing arcs, sparks or hot surfaces

This clause is applicable.

29 Supplementary requirements for sealed devices or encapsulated devices producing arcs, sparks or hot surfaces

This clause is applicable, except as follows.

29.1 Non-metallic materials

Replacement:

Seals are tested using 33.5. However, if the device is tested in the **tumble dryer**, then 33.5.1 and 33.5.2 are not applicable. However, after the tests of Clause 19 in EN 60335-2-11:2010, by inspection, no damage of the encapsulation that could impair the type of protection shall be evident, such as cracks in the resin or exposure of encapsulated parts.

29.8 Type tests

Replacement:

The type tests described in 33.5 shall be performed where relevant.

30 Supplementary requirements for energy-limited apparatus and circuits producing arcs, sparks or hot surfaces

This clause is applicable, except as follows.

Subclauses 30.5, 30.6 and 30.10 are not applicable.

31 Supplementary requirements for restricted-breathing enclosures protecting apparatus producing arcs, sparks or hot surfaces

This clause is applicable, except as follows.

31.6 Maintenance considerations

Replacement:

Restricted-breathing enclosures shall be type tested, including the cable entry devices.

Annex DD
(normative)

Emission of acoustical noise

DD.1 Noise reduction

Noise reduction for appliances is an integral part of the design process and shall be achieved by applying measures to control noise at the source, see for example EN ISO 11688-1.

The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values in relation to other appliances of the same type.

DD.2 Noise test code

DD.2.1 Emission sound pressure level determination

The A-weighted emission sound pressure level shall be measured in accordance with EN 11201 grade 2. The microphone is placed at a distance of 1 m from (middle/centre) of the control board of the appliance at a height of 1,55 m ± 0,075 m.

In cases where the sound power level of tumble dryers is determined, EN ISO 11203 shall be applied for determining the A-weighted emission sound pressure level by following the procedure given in 6.2.3 d) with d=1m.

Measurements shall be done by time averaging over the whole duration of the program sequence selected.

DD.2.2 Sound power level determination

The A-weighted sound power level shall be measured in accordance with EN ISO 3744 or EN ISO 9614-2 grade 2. When applying EN ISO 3744 or EN ISO 9614-2, the parallelepiped measurement surface shall be used. If grade 2 cannot be applied EN ISO 3746 or EN ISO 9614-2 grade 3 shall be used. In this case the test report shall state the reasons why it was not possible to apply the grade 2 method.

Measurements shall be done by time averaging over the whole duration of the program sequence selected.

DD.2.3 Mounting and installation conditions

The tests are carried out with the appliance installed according EN 60704-1:2010, 6.5.1 or 6.5.3 or 6.5.5.

Care shall be taken that any electrical connections, piping or air ducts connected to the appliance do not significantly contribute to the noise emission of the appliance.

The installation conditions of the appliance are the same for determining both the emission sound pressure level and the sound power level.

DD.2.4 Operating conditions

The appliance is supplied at **rated voltage** and operated under **normal operation** as specified in 11.7 for one cycle/programm sequence generating the highest noise emission. The appliance is filled with textile material having a mass in the dry condition equal to the maximum mass stated in the instruction.

The operating conditions are the same for determining both the emission sound pressure level at the specified positions and the sound power level.

The conditions of normal operation are defined in 3.1.9.

The most unfavourable program sequences causing the highest noise emission has to be investigated.

The product under test may have different program sequences if a programmer is used.

NOTE To specify detailed operating conditions is not possible.

DD.2.5 Measurement uncertainties

The total measurement uncertainty of the noise emission values determined according to this standard is depending on the standard deviation σ_{R0} given by the applied noise emission measurement method and the uncertainty associated with the instability of the operating and mounting conditions σ_{omc}. The resulting total uncertainty is then calculated from:

$$\sigma_{tot} = \sqrt{\sigma_{R0}^2 + \sigma_{omc}^2}$$

The upper bound value of σ_{R0} is about 1,5 dB for the grade 2 measurement methods dealing with the determination of the emission sound pressure level or the sound power level.

For appliances with a rather constant noise emission a value of 0,5 dB for σ_{omc} can apply. In other cases, e.g. a large influence of the arrangement of the textile material in the drum which may vary in an unpredictable manner, it is possible that a value of 2 dB may be more appropriate. Methods to determine σ_{omc} are described in the basic measurement standards.

The expanded measurement uncertainty U, in decibels, shall be calculated from U =k σ_{tot}, with k the coverage factor.

NOTE 1 The expanded measurement uncertainty depends on the degree of confidence that is desired. For the purpose of comparing the result with a limit value, it is appropriate to apply the coverage factor for a one-sided normal distribution. In that case, the coverage factor k = 1,6 corresponds to a 95 % confidence level. Further information is given in EN ISO 4871. Please note that the expanded measurement uncertainty U is denoted as K in EN ISO 4871.

NOTE 2 The expanded measurement uncertainty as described in this European Standard does not include the standard deviation of production which is used in EN ISO 4871 for the purpose of making a noise declaration for batches of machines.

DD.2.6 Information to be recorded

The information to be recorded covers all the technical requirements of this noise test code. Any deviations from this noise test code or from the basic standards upon which it is based are to be recorded together with the technical justification for such deviations.

DD.2.7 Information to be reported

The information to be given in the test report shall include:

- the data required by the manufacturer for inclusion in the noise declaration,
- the data required by the user to verify the declared values.

Thus the following information shall be included:

- reference to the noise test code and the basic noise emission standards used;
- description of the installation and operation conditions used;
- location of the work station(s) and other specified positions;
- the noise emission values obtained.

The test report shall state that all requirements of the noise test code have been fulfilled, or, if this is not the case, it shall identify any unfulfilled requirements. Deviations from the requirements shall be stated and a technical justification for these deviations shall be given.

DD.2.8 Declaration and verification of noise emission values

The declaration of the noise emission values shall be made as a dual number noise emission declaration according to EN ISO 4871.

It shall declare the emission sound pressure level L_{pA} and the respective uncertainty K_{pA} and, if required, additionally the sound power level L_{WA} with its uncertainty K_{WA}.

NOTE K_{pA} and K_{WA} are expected to be 2,5 dB for grade 2 and 4 dB for grade 3 measurements.

The noise emission declaration shall state that the noise emission values have been obtained according to this noise test code. Any deviations from this noise test code or from the basic standards upon which it is based shall be clearly indicated.

Additional noise emission values may also be given in the declaration.

If undertaken, verification of the noise emission values shall be conducted according to EN ISO 4871, using the same mounting, installation and operating conditions as those used for the initial determination.

Annex ZE
(informative)

Specific additional requirements for appliances and machines intended for commercial use

This annex of Part 1 is not applicable.

Replace the Annex ZZ of Part 1 by the following new annex:

Annex ZZ
(informative)

Coverage of Essential Requirements of EU Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant essential requirements as given in Annex I of the EU Directive 2006/42/EC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

HD 384 (all parts), *Electrical installations of buildings (IEC 60364, all parts)*

EN 50242/EN 60436:2008, *Electric dishwashers for household use — Methods for measuring the performance (IEC 60436:2004, modified)*

EN 60079 (all parts), *Explosive atmospheres (IEC 60079, all parts)*

EN 60584-1, *Thermocouples — Part 1: Reference tables (IEC 60584-1)*

HD 60364-1, *Low-voltage electrical installations — Part 1: Fundamental principles, assessment of general characteristics, definitions (IEC 60364-1)*

EN ISO 4180:2010, *Packaging — Complete, filled transport packages — General rules for the compilation of performance test schedules (ISO 4180:2009)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 10472-4, *Safety requirements for industrial laundry machinery — Part 4: Air dryers (ISO 10472-4)*

EN ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1)*

ISO 1817:2005, *Rubber, vulcanized — Determination of the effect of liquids*