

INTERNATIONAL STANDARD

IEC 60335-2-7

2002

AMENDMENT 1
2004-01

Amendment 1

**Household and similar electrical appliances –
Safety –**

**Part 2-7:
Particular requirements for washing machines**

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Международная Электротехническая Комиссия

PRICE CODE

G

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FOREWORD

This amendment has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

The text of this amendment is based on the following documents:

FDIS	Report on voting
61/2534/FDIS	61/2578/RVD

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2005. At this date, the publication will be

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- withdrawn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

INTRODUCTION

Replace the second sentence of the second paragraph by the following:

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.

1 Scope

Add the following items to Note 103:

- for appliances having a separate spin container for water extraction, IEC 60335-2-4 is also applicable;
- for appliance having a drying function, IEC 60335-2-11 is also applicable.

2 Normative references

Add the following:

IEC 60730-2-12:1993, *Automatic electrical controls for household and similar use – Part 2: Particular requirements for electrically operated door locks*

5 General conditions for the tests

Add the following subclause:

5.2 Addition:

The relevant tests of 21.101, 21.102 and 22.104 shall be carried out on the same appliance as that used for the test of Clause 18.

5.3 Add the following:

The relevant tests of 21.101 and 21.102 are carried out before the test of Clause 18. The test of 22.104 is carried out after the test of Clause 18.

7 Marking and instructions

7.6 Delete the addition.

7.12 Delete the last paragraph.

7.12.1 Replace the text of the addition by the following:

For washing machines having ventilation openings in the base, the installation instructions shall state that the openings must not be obstructed by a carpet.

7.14 Delete the addition.

7.101 Delete the subclause.

15 Moisture resistance

15.1 Delete the addition.

18 Endurance

Replace the existing text by the following:

This clause of Part 1 is replaced by the following.

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.

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 10 000 cycles of opening and closing. For the first 6 000 cycles, the appliance is supplied at **rated voltage** and operated so that the interlock mechanism is energized and de-energized each cycle. For the last 4 000 cycles, the appliance is not connected to the supply mains. For appliances having a drying function, the total number of cycles is increased to 13 000, the first 9 000 cycles being carried out with the interlock mechanism energized and de-energized each cycle.*

NOTE 1 If the interlock complies with IEC 60730-2-12, the appliance is not connected to the supply mains during this test.

NOTE 2 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° and doors by 90°, 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.

After the tests, compliance with the relevant requirements of 20.103 to 20.105 shall not be impaired.

18.102 The braking mechanism of appliances having a lid that can be opened during the water extraction period shall withstand the stresses to which they may be exposed in normal use.

Compliance is checked by the following test.

*The appliance is supplied at 1,06 times **rated voltage** and operated under **normal operation** until the motor has reached its highest speed. The lid is then fully opened. The test is repeated after the drum has been at rest for a period long enough to ensure that the appliance does not attain an excessive temperature.*

The test is carried out 1 000 times, the textile material being re-saturated with water at least every 250 times.

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

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

19 Abnormal operation

19.13 Add the following:

The appliance shall comply with the appropriate requirements of 20.103 to 20.105 if it can still be operated.

19.101 Replace the fifth dashed item of Note 1 by the following:

- failure or blocking the mechanical parts of a water-level switch. This fault condition is not applied if
 - the cross-sectional area of the tube supplying the air chamber is greater than 5 cm² with a minimum dimension of 10 mm,
 - the outlet of the chamber is at least 20 mm above the highest water level, and
 - the tube connecting the air chamber to the water-level switch is fixed so that there is no likelihood of bending or pinching;

20 Stability and mechanical hazards

20.102 Replace the existing text by the following:

Appliances shall not be adversely affected by an unbalanced load.

Compliance is checked by the following test.

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

*The appliance is supplied at **rated voltage** and operated during the water extraction period.*

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

The appliance shall not overturn and the drum shall not hit other parts except the enclosure. After the test, the appliance shall be fit for further use.

20.103 *Renumber this subclause as 20.106.*

Add the following new subclauses:

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

Compliance is checked by inspection and by manual test.

NOTE Interlocks that can be released by means of test probe B of IEC 61032 do not meet this requirement.

20.104 It shall not be possible to open the lid or door of the appliance while the drum speed exceeds 60 r/min if the drum has a rotational kinetic energy exceeding 1 500 J, or a maximum peripheral speed exceeding

- 20 m/s, for drums that rotate about the horizontal axis,
- 40 m/s, for drums that rotate about the vertical axis.

Compliance is checked by the following test.

The appliance is supplied at rated voltage and operated empty. The force determined during the test of 22.104 with the lid interlocked is applied to the lid or door in an attempt to open it.

It shall not be possible to open the lid or door while the drum speed exceeds 60 r/min. If the appliance is loaded from the front and the door can be opened, the motor shall be de-energized before the opening exceeds 50 mm.

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

$$E = mv^2/4$$

where

E is the rotational kinetic energy, in J;

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

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

20.105 Appliances shall have an automatic means for switching off the motor, or for reducing the drum speed to 60 r/min, when the lid or door is opened if the drum has a rotational kinetic energy not exceeding 1 500 J and a peripheral speed not exceeding

- 20 m/s, for drums that rotate about the horizontal axis,
- 40 m/s, for drums that rotate about the vertical axis.

Compliance is checked by the following test.

The appliance is supplied at rated voltage and operated empty. A force not exceeding 50 N is applied to the lid or door in an attempt to open it, as in normal use. If the lid or door opens, the drum speed shall be no higher than 60 r/min within 7 s of opening the lid or door by 50 mm. In addition, if the appliance is loaded from the front, the motor shall become de-energized.

NOTE The rotational kinetic energy is measured in accordance with the formula in 20.104.

21 Mechanical strength

Replace the existing text by the following:

This clause of Part 1 is applicable except as follows.

21.101 Lids and doors shall have adequate mechanical strength.

Compliance is checked by the test of 21.101.1 for lids and 21.101.2 for doors.

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

The test is carried out three times, after which the lid shall not be damaged to such an extent that moving parts become accessible.

21.101.2 *A vertically downwards force of 150 N is applied in the most unfavourable position to the door while it is open at an angle of $90^\circ \pm 5^\circ$. The force is maintained for 1 min.*

After the test, the appliance shall not be damaged or deformed to such an extent that compliance with 20.103 to 20.105 is impaired.

21.102 Lids shall have adequate resistance to distortion.

Compliance is checked by the following test.

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

The test is carried out three times, after which the hinges shall not have worked loose and the appliance shall not be damaged or deformed to such an extent that compliance with 20.103 to 20.105 is impaired.

22 Construction

22.101 *Replace the existing text by the following:*

Appliances shall be constructed so that when the water level is above the lower edge of the door opening, it shall not be possible to open the door by a simple action while the appliance is operating.

Compliance is checked by inspection and by manual test.

NOTE Interlocked doors and doors that are opened by means of a key or by two separate actions, such as pushing and turning, meet this requirement.

Add the following subclause:

22.104 Lid and door interlocks shall be constructed so that they are unlikely to be forced open in normal use.

Compliance is checked by the following test.

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 lid and door is closed. The appliance is supplied at **rated voltage** and operated for a sufficient period for the interlock to be energized. An attempt is then made to open the lid or*

door as in normal use. The force applied is gradually increased to five times the measured opening force, with a minimum of 50 N and a maximum of 200 N, over a period of 5 s.

The test is carried out 300 times at a rate of approximately six times per minute.

The force is then increased to 10 times the measured opening force, with a minimum of 50 N. It shall not be possible to open the lid or door.

NOTE 1 The test is only carried out if the interlock is required for compliance with Clause 20.

NOTE 2 Damage to handles is ignored.

24 Components

24.1.4 Addition:

*For lid or door interlocks, the number of cycles of operation declared for subclauses 6.10 and 6.11 of IEC 60730-2-12 shall not be less than 6 000. For appliances that include a drying function, the minimum number of cycles of operation is increased to 9 000. If the interlock operates more than once during **normal operation**, the minimum number of cycles of operation is increased accordingly.*

Bibliography

Add the following:

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

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

