



BS 3456 : Part 102 : Section 102.7 : 1988

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British Standard Specification for **Safety of household and similar electrical appliances**

Part 102. Particular requirements
Section 102.7 Washing machines

(Implementation of CENELEC HD 256 S2)

Sécurité des appareils électrodomestiques et analogues
Partie 102. Règles particulières
Section 102.7 Lave-linge

Sicherheit von Elektrogeräten für den Haushalt und ähnliche Zwecke
Teil 102. Besondere Anforderungen
Abschnitt 102.7 Waschmaschinen

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Foreword

This Section of BS 3456 : Part 102 has been prepared under the direction of the Light Electrical Engineering Standards Committee. It is aligned with the CENELEC* Harmonization Document for washing machines, HD 256 S2, which in turn is based on IEC† Publication 335-2-7 (1979 — Second edition). Its number is directly related to the number of the equivalent Section of the IEC publication.

It is a revision of BS 3456 : Section 2.11 : 1970 and BS 3456 : Section 3 2 : 1979 which are withdrawn in accordance with the CENELEC Internal Regulations.

It gives the particular requirements for spin extractors and is to be read in conjunction with BS 3456 : Part 101 : 1987 'General requirements' which it supplements or modifies. The many references to Part 1 should be read as references to BS 3456 : Part 101 which is the implementation of the CENELEC Harmonization Document for the general requirements, HD 251 S3. In the original IEC text of the particular requirements the precise line numbers in the IEC Part 1 are given. The lines in Part 101 of BS 3456 are not numbered but sufficient information has been included in these particular requirements for the relevant matter in Part 101 to be identified. For ease of production the text of the IEC standard has been used, but it has been modified as described below.

The CENELEC modifications that appear in HD 256 S2 have been included in the text in the appropriate position and are indicated by a single side line in the margin of the page. References are included to items of the original IEC text which are given in appendix X together with the justifications in the CENELEC Harmonization Document for the modifications.

A complete list of all national deviations to the CENELEC Harmonization Document is given in appendix Y.

* CENELEC = European Committee for Electrotechnical Standardization

† IEC = International Electrotechnical Commission

In this British Standard the following print types are used to differentiate between requirements, test specifications and explanatory matter.

Requirements: in roman type

Test specifications: in italic type

Explanatory matter: in small roman type

The CENELEC Harmonization Document was approved by the CENELEC Technical Board on 11 September 1984.

Cross-references

International standards	Corresponding British Standards
IEC 335-1 : 1976 HD 251 S3 : 1982	BS 3456 Specification for safety of household and similar electrical appliances Part 101 : 1987 General requirements (Technically equivalent)
IEC 335-2-4 : 1977	Section 102.4 : 1987 Spin extractors (Technically equivalent)
IEC 335-2-11 : 1979	Section 102.11 : 1988 Tumbler dryers (Technically equivalent)
ISO 48-1979	BS 903 Methods of testing vulcanized rubber Part A26 : 1969 Determination of hardness (Technically equivalent)
ISO 471-1983	Part A35 : 1985 Temperatures, humidities and times for conditioning and testing of test pieces (Identical)
ISO 1817-1985	Part A16 : 1971 The resistance of vulcanized rubber to liquids (Technically equivalent)
ISO 4046-1978	BS 3203 : 1979 Glossary of paper, board, pulp and related terms (Identical)
HD 274 S1-1982	BS 6614 : 1985 Specification for safety devices and water supply connections for washing machines and dishwashers connected to the water supply mains (Technically equivalent)

The Technical Committee has reviewed the specific requirements of IEC 252 to which reference is made in 19.1 and 19.6 and has decided that they are acceptable for use in conjunction with this standard. A related British Standard for IEC 252 is BS 5267 : 1976 'Capacitors for single phase a.c. motors'.

The Technical Committee has reviewed the specific requirements for water level switches of IEC 328 to which reference is made in 24.1 and has decided that they are acceptable for use in conjunction with this standard. A related British Standard for IEC 328 is BS 3955 : 1986 'Specification for electrical controls for household and similar general purposes'.

The Technical Committee has reviewed the specific requirements for flat quick-disconnect terminations of IEC 760 to which reference is made in appendix Y and has decided that they are acceptable for use in conjunction with this standard. A related British Standard for IEC 760 is BS 5057 : 1973 'Specification for snap-on connectors'.

The Technical Committee has reviewed the specific requirements for crimp connections of CEE Recommendation 6 to which reference is made in 28.3 and has decided that they are acceptable for use in conjunction with this standard. A related British Standard for CEE Recommendation 6 is BS 5057 : 1973 'Specification for snap-on connectors'.

The Technical Committee has reviewed the specific requirements of CEE Publication 15 to which reference is made in appendix X and has decided that they are acceptable for use in conjunction with this standard. A related British Standard for CEE Publication 15 is BS 3535 : 1962 'Specification for safety isolating transformers for industrial and domestic purposes'.

Product approval. Attention is drawn to the fact that products conforming to this British Standard may be approved by the British Electrotechnical Approvals Board for the purposes of participation in the CENELEC Certification Agreement and in the CB Scheme of the IECCE. (Details of the BEAB approval mark scheme are given on the inside back cover.)

Compliance with a British Standard does not of itself confer immunity from legal obligations.

British Standard Specification for

Safety of household and similar electrical appliances

Part 102. Particular requirements

Section 102.7 Washing machines

1. Scope

This clause of Part 1 is applicable except as follows:

1.1 *Replacement:*

This standard applies to electric washing machines intended for washing textile material, with or without means for water heating, water extraction or drying.

Washing machines with a spin extractor incorporated must also comply with IEC Publication 335-2-4, Particular requirements for spin extractors.

Washing machines with a tumbler dryer incorporated must also comply with IEC Publication 335-2-11, Particular requirements for tumbler dryers.

Washing machines not intended for normal household use, but which nevertheless may be a source of danger to the public, such as washing machines for communal use in blocks of flats or in laundrettes, are within the scope of this standard.

The electrical part of washing machines supplied with energy other than electricity is also within the scope of this standard.

This standard does not take into account the special hazards which exist in places where there are young children or aged or infirm persons without supervision; in such cases, additional requirements may be necessary.

This standard does not apply to:

washing machines designed exclusively for industrial or commercial purposes;

washing machines 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 washing machines intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary.

For washing machines intended to be used in tropical countries, special requirements may be necessary.

Attention is drawn to the fact that in many countries additional requirements are specified by the national authorities responsible for health and water supplies, and for the protection of labour.

2. Definitions

This clause of Part 1 is applicable except as follows:

2.2.30 *Replacement:*

Normal load denotes the load obtained when the washing machine is subjected to the sequence of operation described in Sub-clause 11.7, the washing machine being filled with the maximum quantity of water for which it is designed and with a quantity of textile material having a mass in the dry condition equal to the maximum mass specified by the manufacturer.

The textile material is in the form of pre-washed double-hemmed cotton sheets, having dimensions of approximately 70 cm × 70 cm and a mass between 140 and 175 g/m² in the dry condition.

If, for washing machines of the continuously rotating impeller type, the textile material is not moving properly during operation, the quantity of textile material is reduced until the maximum motor input is attained.

For washing machines with a spin extractor or with a tumbler dryer incorporated, the normal load for the washing function is as described above; for the other function, the normal load is as described in the relevant standard.

As an alternative to the textile material specified, pieces of cloth having an area between 4800 and 5000 cm², with one side of at least 55 cm, may be used for the tests.

3. General requirement

This clause of Part 1 is applicable.

4. General notes on tests

This clause of Part 1 is applicable except as follows:

4.3 Paragraph 1.

Replacement:

The tests are carried out in the order of the clauses of Part 1, except that the test of Sub-clause 15.101 is made before that of Sub-clause 15.4.

4.4 Addition:

When testing the electrical part of washing machines supplied with energy other than electricity, any influence of the non-electrical part of the washing machine has to be taken into account.

4.5 Replacement:

If the test results are influenced by the temperature of the ambient air, the room temperature is, in general, maintained at 20 ± 5 °C. If, however, the temperature attained by any part of the washing machine is influenced to any appreciable extent by the temperature of the water or by a temperature sensitive device, the test is repeated at a room temperature of 23 ± 2 °C, but only if all three of the following conditions are applicable:

- the temperature of the water is within 6 deg C (6 K) of the boiling point, or the temperature of the water or any part of the washing machine is limited by a thermal control;*
- the room temperature during the test is less than 21 °C; and*
- the difference between the temperature rise of that part and the limit specified does not exceed 25 deg C (25 K) minus the room temperature.*

4.12 Not applicable.

5. Rating

This clause of Part 1 is applicable.

6. Classification

This clause of Part 1 is applicable.

See Sub-clauses 22.1 and 22.2.

7. Marking

This clause of Part 1 is applicable except as follows:

7.1 Paragraph 1, item (h). Not applicable.

Paragraph 1, after item (j).

Addition:

- (k) the maximum mass in the dry condition, in kilogrammes, of textile material for which the washing machine is designed, unless this is indicated in the instruction sheet;
- (l) the maximum permissible water level, for washing machines without automatic water-level control;
- (m) the maximum permissible inlet water pressure, in pascals, bars or newtons per square centimetre, for washing machines intended to be connected to the water supply mains, unless this is indicated in the instruction sheet;
- (n) the minimum permissible inlet water pressure, in pascals, bars or newtons per square centimetre, if to be observed for the correct operation of the washing machine, unless this is indicated in the instruction sheet.

On or near the safety release mechanism of power-driven wringers, there shall be a marking to indicate its purpose and method of operation, unless its operating means must be continuously actuated by the user.

Addition:

Washing machines must be marked with the symbol for splash-proof construction.

NOTE. For information see X.2.

Further details with regard to the marking for the safety release mechanism of power-driven wringers are under consideration.

7.2 Not applicable.

7.10 The common modification "The 'off' position shall not be indicated by words only" specified in HD 251 S3 is not applicable.

NOTE. For information see X.3.

Addition:

If the "off" position is indicated only by a word, this word shall be "off" in the official language(s) of the country in which the washing machine is to be sold.

7.12 Paragraph 1, and paragraph 2 up to and including the word 'not'.

Replacement:

Washing machines shall be accompanied by an instruction sheet which gives instructions for installation, operation and care of the washing machine. It shall also give instructions for the installation of the components necessary for the connection of the washing machine to the water supply mains. If a stationary washing machine is not

NOTE. For information see X.4.

After paragraph 2.

Addition:

For washing machines with a power-driven wringer, the instruction sheet shall include a warning drawing attention to the potential hazards involved in the operation of the wringer; it shall also include warnings stating that the wringer must be disengaged or switched off when not in use and that the washing machine must not be operated by children.

8. Protection against electric shock

This clause of Part 1 is applicable except as follows:

8.2, 8.3 and 8.7 Not applicable.

9. Starting of motor-operated appliances

This clause of Part 1 is applicable.

10. Input and current

This clause of Part 1 is applicable except as follows:

10.1 Test. Paragraph 1, second sentence, from the word 'means' to the end of the sentence.

Replacement:

means of a watt-hour meter, and is determined as the mean value of the input occurring during the period with the highest total input.

10.2 *Addition:*

During the measurement of the current, starting surges are neglected.

11. Heating

This clause of Part 1 is applicable except as follows:

11.2 Paragraph 1, and paragraph 3, item (c). Not applicable.

Addition:

Washing machines not intended for building-in are tested away from the walls of the test corner, unless a heater is provided for drying.

Washing machines without heating elements and without wringer are filled with hot water, the water temperature, immediately before the textile material is added, being $80 \pm 5^\circ\text{C}$.

Washing machines without heating elements and provided with a wringer are filled with hot water, the water temperature, immediately before the textile material is added, being $65 \pm 5^\circ\text{C}$ or that indicated in the instruction sheet, whichever is the higher.

For washing machines without a programme controller, but provided with means for heating water from cold, the water is heated, before starting the first washing period, from an initial temperature of $15 \pm 5^\circ\text{C}$ to $90 \pm 5^\circ\text{C}$ or, if this condition cannot be reached, until steady conditions are established.

11.6 *Addition:*

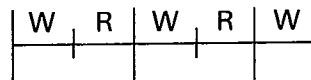
However, washing machines provided with a programme controller or a timer are operated at the voltage specified for motor-operated appliances.

11.7 *Replacement:*

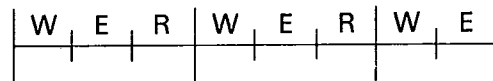
Washing machines provided with a programme controller are operated for three complete cycles with the programme which gives the highest temperature rises. A rest period of 4 min is inserted between the cycles.

Other washing machines are operated according to the following sequence of operation, in which *W* stands for washing, *R* for rest, *E* for water extraction and *Wr* for wringing:

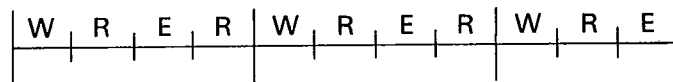
– for washing machines without means for water extraction:



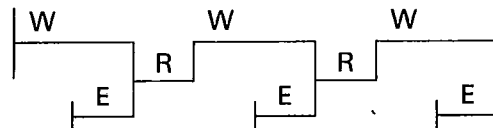
– for washing machines having a single container for washing and water extraction:



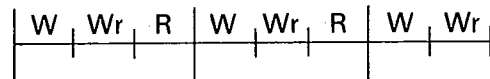
– for washing machines having separate containers for washing and water extraction, which cannot be used simultaneously:



– for washing machines having separate containers for washing and water extraction, which can be used simultaneously:



– for washing machines having a power-driven wringer:



For washing machines provided with a timer, the washing period and the water extraction period have each a duration equal to the maximum time that can be provided by the timer.

For washing machines without a timer:

– each washing period has a duration of:

- 6 min for machines of the continuously rotating impeller type,
- 18 min for machines of the agitator type,
- 25 min for machines of the drum type,

unless a longer time is marked on the machine or indicated in the instruction sheet, in which case the longer time applies;

– each water extraction period has a duration of 5 min, the container being filled with a saturated load having the same mass, in the dry condition, as the load used for washing.

For power-driven wringers, the duration of each wringing period is 8 min. The wringer is loaded by means of a test board which is passed through the rollers once every minute, the roller pressure, if adjustable by the user, being adjusted to the maximum value. The test board has a thickness of 20 mm and a length of 80 cm, its width being at least equal to three quarters of the effective length of the rollers; the test board is uniformly tapered at each end down to a thickness of approximately 3 mm, over a distance of 20 cm.

Each rest period, which includes the braking time, if any, has a duration of 4 min.

At the conclusion of the specified sequence of operation, emptying pumps which are operated by a separate motor and switched on and off manually, are subjected to three operating periods, the operating periods being separated by a rest period of 4 min; the duration of each operating period is equal to 1.5 times the period necessary for emptying the washing machine when filled to the maximum normal water level, the level of the water discharge being 90 cm above the floor.

NOTE. For information see X.5.

Washing machines having hand-operated wringers are tested as machines without means for water extraction.

12. Operation under overload conditions of appliances with heating elements

This clause of Part 1 is not applicable.

13. Electrical insulation and leakage current at operating temperature

This clause of Part 1 is applicable except as follows:

13.1 Test. Paragraph 2. Not applicable.

13.2 Paragraph 8, (A), items (3) and (4).

Replacement:

- *for stationary Class I washing machines... 3.5 mA or 1 mA per kW rated input, whichever is the greater, with a maximum of 5 mA*

14. Radio and television interference suppression

This clause of Part 1 is applicable.

15. Moisture resistance

This clause of Part 1 is applicable except as follows:

15.3 Replacement:

Appliances subject to spillage of liquid in normal use shall be so constructed that such spillage does not affect their electrical insulation, even should an inlet valve fail to close.

Compliance is checked by the following tests.

Appliances provided with an appliance inlet are fitted with an appropriate connector and flexible cable or cord, appliances with Type X attachment are fitted with the lightest permissible type of flexible cable or cord of the smallest cross-sectional area specified in Sub-clause 26.2 and other appliances are tested as delivered.

Washing machines intended to be filled with water by the user are completely filled with water containing approximately 1% NaCl, and a further quantity, equal to 15% of the capacity of the washing machine or 0.25 l, whichever is the greater, is then poured in steadily over a period of 1 min.

Other washing machines are operated until the maximum normal water level is reached, and a detergent as specified in Appendix BB is then added, the concentration being 5 g per litre of water in the washing machine. The inlet valve is held open and the filling continued for 15 min after first evidence of overflow, or until a further protective system operates to stop the inflow.

Deletions:

NOTE. For information see X.6.

Immediately after this treatment, the appliance shall withstand an electric strength test as specified in Sub-clause 16.4 and inspection shall show that water which may have entered the appliance does not impair compliance with this standard; in particular, there shall be no trace of water on insulation for which creepage distances are specified in Sub-clause 29.1.

Immediately after this, the test of Sub-clause 15.101 is made.

15.4 Replacement:

Appliances shall be proof against humid conditions which may occur in normal use.

Compliance is checked by the humidity treatment described in this sub-clause, followed immediately by the tests of Clause 16.

Cable entries, if any, are left open; if knock-outs are provided, one of them is opened.

Electrical components, including detachable heating elements, covers and other parts which can be removed without the aid of a tool, are removed and subjected, if necessary, to the humidity treatment with the main part.

The humidity treatment is carried out in a humidity cabinet containing air with a relative humidity of $93 \pm 2\%$. The temperature of the air, at all places where samples can be located, is maintained within 1 deg C (1 K) of any convenient value t between 20 °C and 30 °C.

Before being placed in the humidity cabinet, the sample is brought to a temperature between t and $t + 4$ °C.

The sample is kept in the cabinet for:

- 2 days (48 h) for ordinary appliances;
- 7 days (168 h) for drip-proof, splash-proof and watertight appliances.

In most cases, the sample may be brought to the specified temperature by keeping it at this temperature for at least 4 h before the humidity treatment.

A relative humidity of $93 \pm 2\%$ can be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate (Na_2SO_4) or potassium nitrate (KNO_3) in water, having a sufficiently large contact surface with the air.

In order to achieve the specified conditions within the cabinet, it is necessary to ensure constant circulation of the air within and, in general, to use a cabinet which is thermally insulated.

After this treatment, the appliance shall show no damage within the meaning of this standard.

For washing machines other than ordinary, heating elements are subjected to the tests of Clause 16 after the machine has been kept for 2 days (48 h) in the humidity cabinet. The washing machine is then put back in the cabinet for the remaining 5 days (120 h), after which the other parts of the machine are tested.

Additional sub-clause:

15.101 Washing machines shall be so constructed that foaming does not affect their electrical insulation.

Compliance is checked by the foaming test described in Appendix CC.

After this test, the washing machine is allowed to stand in normal test-room atmosphere for 24 h before being subjected to the test of Sub-clause 15.4.

A revision of the test is under consideration.

16. Insulation resistance and electric strength

This clause of Part 1 is applicable.