

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electric clothes washer-dryers for household use – Methods for measuring the performance

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Lavantes-séchantes électriques à usage domestique – Méthodes de mesure de l'aptitude à la fonction

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ELECTRIC CLOTHES WASHER-DRYERS FOR HOUSEHOLD USE – METHODS FOR MEASURING THE PERFORMANCE

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International standard IEC 62512 has been prepared by subcommittee 59D: Home laundry appliances, of IEC Technical Committee 59: Performance of household and similar electrical appliances.

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

FDIS	Report on voting
59D/403/FDIS	59D/407/RVD

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

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

Words in **bold** in the text are specifically defined in Clause 3.

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

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INTRODUCTION

This first edition has been developed to provide a globally applicable and agreed method to test the washing and drying function of washer-dryers.

Although this standard is based on IEC 61121:2012 on tumble dryers and IEC 60456:2010 on clothes washers, it specifies the conditions needed to test the combined function of washing and drying.

The main elements of this standard are:

- the definition of the loads to be tested in continuous and interrupted operation cycles;
- the method for testing automatic and not automatic operation of the drying cycles;
- the way to handle the load for interrupted operation cycles;
- the correction to be applied to test results for continuous and interrupted operation cycles.

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ELECTRIC CLOTHES WASHER-DRYERS FOR HOUSEHOLD USE – METHODS FOR MEASURING THE PERFORMANCE

1 Scope

This International Standard specifies the test methods for the testing of household combined washer-dryers in their function to wash and dry textiles. This International Standard does not apply for testing individual washing or drying functions.

The object is to state and define the principal performance characteristics of household electric washer-dryers of interest to users and to describe standard methods for measuring these characteristics.

NOTE Washer-dryers for communal use in blocks of flats or in launderettes are also included within the scope of this standard. It does not apply to washer-dryers for commercial laundries.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60456:2010, *Clothes washing machines for household use – Methods for measuring the performance*

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IEC 60704-2-4, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise - Part 2-4: Particular requirements for washing machines and spin extractors*

IEC 60704-2-6, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-6: Particular requirements for tumble dryers*

IEC 61121:2012, *Tumble dryers for household use – Methods for measuring the performance*

ISO 80000-1:2009, *Quantities and units – Part 1: General*

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions given in IEC 60456:2010, as well as the following apply.

3.1 Terms and definitions

3.1.1

rated washing capacity

maximum mass of conditioned textiles, in kg, which the manufacturer declares can be treated in one complete **washing cycle**

3.1.2

rated drying capacity

maximum mass of conditioned textiles, in kg, which the manufacturer declares can be treated in one complete **drying cycle**

3.1.3**rated washing-drying capacity**

maximum mass of conditioned textiles, in kg, which the manufacturer declares can be treated in one **continuous operation cycle**

3.1.4**complete operation cycle**

washing and drying process, consisting of a **washing** and a **drying cycle**

3.1.5**continuous operation cycle**

complete operation cycle without interruption of the process or additional action by an operator

3.1.6**interrupted operation cycle**

complete operation cycle where operators action is required to continue the process

3.1.7**washing cycle**

complete washing process, as defined by the required programme, consisting of a series of different operations (wash, rinse, spin, etc.)

3.1.8**drying cycle**

complete drying process, as defined by the required programme, consisting of a series of different operations (heat, cool down, etc.) and comprising drying of the partial load with the **rated drying capacity**

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3.1.9**automatic drying**

drying process which automatically switches off when a certain moisture content of the load is reached

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3.1.10**end of programme**

the programme is complete when the machine indicates the end of the programme and the load is accessible to the user

Note 1 to entry: Where there is no **end of programme** indicator and the door is locked during operation, the programme is complete when the load is accessible for the user. Where there is no **end of programme** indicator and the door is not locked during operation, the programme is complete when the power consumption of the appliance drops to some steady condition and is not performing any function.

Note 2 to entry: Accessing the load may need additional operation.

[SOURCE: IEC 60456:2010, 3.1.24]

3.2 Symbols

The symbols are listed in Table 1.

Table 1 – List of symbols

Symbol	Unit	Definition
<i>L</i>	l	Water consumption
<i>E</i>	kWh	Energy consumption
<i>t</i>	min	Programme duration
<i>W</i>	g	Mass of load
<i>μ</i>	%	Moisture content
Indices		Definition
w		Washing cycle
d		Drying cycle
c		Continuous operation cycle
wd		Complete operation cycle
i		Initial value
f		Final value
0		Conditioned
p		First partial load of the base load
m		Measured value

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4 Requirements

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The requirements shall be in accordance with Clause 4 of IEC 60456:2010 and Clause 4 of IEC 61121:2012 as appropriate.

5 Test conditions, materials, equipment and instrumentation

5.1 General

Test conditions, materials, equipment and instrumentation shall be in accordance with Clause 5 of IEC 60456:2010. However, 5.2.3 of IEC 60456:2010 is modified as indicated in 5.2:

5.2 Ambient temperature and humidity

The ambient conditions shall be in accordance with 5.2.3 of IEC 61121:2012.

6 Preparation for testing

The preparation for testing shall be in accordance with Clause 6 of IEC 60456:2010 and with 6.1 to 6.4 of IEC 61121:2012.

In some cases the normative load for the **rated washing capacity** includes a lower number of a specific type of item than the normative load for the **rated drying capacity**. In this case the procedure described in Annex A shall be followed. If the test is carried out at the **rated washing capacity**, this amount of test load shall be washed and dried. If the **rated drying capacity** of the machine under test is lower than the **rated washing capacity**, the base load is split after the **washing cycle** into a first partial load p whose weight is equal to the weight

of the **rated drying capacity** and a second partial load of the remaining items. This causes an **interrupted operation cycle** as the test load has to be split between washing and drying operation. Stain test strips have to be removed at the end of the washing process. The items used in the first partial load have to be identified in advance of a test series in using their conditioned weight forming a test load as defined in Table 3 of IEC 61121:2012 at the required **rated drying capacity**.

The remaining items shall be dried to a final moisture content of $(0 \pm 3) \%$ in a tumble dryer before being reused. Follow Annex A.

If the test is carried out at the **rated washing-drying capacity** a test load according to IEC 60456:2010 shall be used and washed and dried in a **continuous operation cycle**. Stain test strips are removed at the end of the drying process.

7 Performance measurements – General requirements

The performance measurements shall be in accordance with Clause 7 of IEC 60456:2010.

8 Tests for performance

8.1 Determination of the washing performance

Washing performance shall be measured in accordance with Clause 8 of IEC 60456:2010 with regard to the cotton test load and 8.3 of this standard.

NOTE The use of other types of textiles is under consideration.

8.2 Determination of the water extraction performance and rinsing performance

The water extraction measurement for **interrupted operation cycles** shall be done in accordance with 8.4 of IEC 60456:2010. It does not apply to **continuous operation cycles**.

The rinsing performance measurement does not apply to this International Standard.

8.3 Determination of the water and energy consumption and programme time

8.3.1 General

This clause specifies the procedure and evaluation for the determination of water and energy consumption and programme time during washing, spin extraction and drying. It also specifies the method for the determination of the duration of these cycles and of the **complete operating cycle**.

NOTE The tests in this clause may be combined with the tests in 9.1 and 9.2.

8.3.2 Washing cycle

The measurement shall be carried out in accordance with IEC 60456:2010.

8.3.3 Drying cycle

8.3.3.1 General

The mass of the conditioned base load is recorded as W_0 .

A **washing cycle** shall be performed according to 8.1.

The base loads shall be dried to a nominal target final moisture content value of 0 % in accordance with IEC 61121:2012, Table 6, unless otherwise specified.

The measurements shall be carried out in accordance with 8.2.2 of IEC 61121:2012 and in conformity with the manufacturer's instructions.

For washer-dryers with **automatic drying** (continuous and interrupted) the programme shall be selected which gives the target final moisture content value. For washer-dryers without **automatic drying** (continuous and interrupted) the timer shall be set to obtain the target final moisture content value given above. The time required for this shall be determined by monitoring the drying process. This can be done by pre-testing.

8.2.5 of IEC 60456:2010 and 8.2.5 of IEC 61121:2012 using the final moisture content μ_f as defined in Equation (2) shall be applied accordingly to identify valid test runs. No criterion on the validity of the average final moisture content of a test series is applied.

There should be no change of setting or control of final humidity (automatic or non-automatic) for a single test series, except that time controlled drying programmes may be added when the final moisture content is not achieved.

If at the **end of programme** the final moisture content is not below the upper limit of the range of allowable moisture contents a time dependent programme may be added with the shortest possible time, but not less than 20 min. The additional use of time controlled programmes shall be reported.

The time this programme takes (including cool-down of this programme) and the energy, and water used during this time shall be added to the consumption values.

8.3.3.2 Procedure for interrupted operation cycle

Immediately after the **washing cycle** is finished the strips are removed from the test load and the test load shall be divided into two parts. The load shall be kept in a plastic bag between the **washing cycle** and the **drying cycle**.

In this case all the items of the base load shall be marked before starting the **washing cycle**, in order to identify to which partial load each item belongs. The partial loads shall consist of the same items throughout the test series.

The initial mass of the first partial load p is recorded as W_{ip} .

$$\mu_{ip} = \frac{W_{ip} - W_{0p}}{W_{0p}} \times 100 \quad (1)$$

where

μ_{ip} is the actual initial moisture content of the first partial load p of the base load after the **washing cycle** in %

W_{ip} is the actual initial mass of the first partial load p of the base load after the **washing cycle**

W_{0p} is the total conditioned mass of the first partial load p of the base load.

(30 ± 5) min after finishing the **washing cycle** the load shall be put into the machine, the door closed and the **drying cycle** started immediately. The washer-dryer shall be loaded for drying by shaking every single item before laying them into the drum.

NOTE The described procedure is considered to reflect consumer behaviour.