SLOVENSKI STANDARD
SIST EN 61121:2013

01-april-2013

Gospodinjski sušilni stroji - Metode za merjenje funkcionalnosti (IEC 61121:2012, spremenjen)

Tumble dryers for household use - Methods for measuring the performance (IEC 61121:2012, modified)

Wäschetrockner für den Hausgebrauch - Verfahren zur Messung der Gebrauchseigenschaften (IEC 61121:2012, modifiziert)

Sèche-linge à tambour à usage domestique - Méthodes de mesure de l'aptitude à la fonction (CEI 61121:2012, modifiée)

Ta slovenski standard je istoveten z: **EN 61121:2013**

ICS:

97.060	Aparati za nego perila	Laundry appliances

SIST EN 61121:2013 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61121

February 2013

ICS 97.060

Supersedes EN 61121:2005

English version

Tumble dryers for household use - Methods for measuring the performance
(IEC 61121:2012, modified)

Sèche-linge à tambour à usage domestique - Méthodes de mesure de l'aptitude à la fonction
(CEI 61121:2012, modifiée)

Wäschetrockner für den Hausgebrauch - Verfahren zur Messung der Gebrauchseigenschaften
(IEC 61121:2012, modifiziert)

This European Standard was approved by CENELEC on 2012-12-31. 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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61121:2013 E

Foreword

This document (EN 61121:2013) consists of the text of IEC 61121:2012 prepared by IEC/SC 59D "Home laundry appliances" of IEC/TC 59 "Performance of household and similar electrical appliances", together with the common modifications prepared by CLC/TC 59X "Performance 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)	2013-12-31
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2015-12-31

This document supersedes EN 61121:2005.

EN 61121:2013 includes the following significant technical changes with respect to EN 61121:2005:

a) a test procedure for a combined test sequence of full and **partial load** was introduced;

b) a test procedure for measuring power consumption in low power modes is introduced;

c) a formula to calculate the energy consumption of **tumble dryers** including low power modes was added;

d) control procedures for checking measured values in comparison to values declared by the manufacturer under consideration of permitted tolerances are updated.

Clauses, subclauses, notes, tables and figures which are additional to those in IEC 61121:2012 are prefixed "Z".

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

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).

This European Standard specifies, as far as necessary, the test methods which shall be applied in accordance with the COMMISSION DELEGATED REGULATION (EU) No 392/2012 implementing Directive 2010/30/EU the European Parliament and of the Council with regard to energy labelling of household **tumble dryers** and in accordance with the COMMISSION REGULATION (EU) No 932/2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household **tumble dryers**.

The procedures described in this European Standard were modified substantially compared to the previous version, e.g. with regard to **partial load**. Therefore, results of tests according to this standard cannot and shall not be directly compared to results of similar procedures of previous versions. In addition, results based on a specific reference **programme** shall not be compared to results based on other reference programs.

Annex ZA sets out the procedure to be applied for testing according to Commission Regulations with regard to energy labelling and ecodesign and provides all necessary links to all relevant clauses of this European Standard.

Annex ZB provides control procedures for checking measured values in comparison to values declared by the manufacturer under consideration of permitted tolerances.

Annex ZC lists normative references.

Endorsement notice

The text of the International Standard IEC 61121:2012 was approved by CENELEC as a European Standard with agreed common modifications

COMMON MODIFICATIONS

1 Scope

Add the following note:

NOTE Z1 The methods of measuring the performance of tumble dryers which use gas as a heating source are covered by EN 1458-2.

2 Normative references

Add the following references:

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

EN 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 60704-2-6)*

EN 60704-3, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 3: Procedure for determining and verifying declared noise emission values (IEC 60704-3)*

3 Terms, definitions and symbols

3.1 Terms and definitions

Replace definition 3.1.4 by the following

3.1.4
automatic tumble dryer
tumble dryer which has at least one programme which switches off the drying process when a certain moisture content of the load is reached

Note 1 to entry: This may include systems that use conductivity or temperature sensing.

Add the following definitions:

3.1.Z1
full load
rated capacity for cotton textiles

3.1.Z2
partial load
half of the **rated capacity** for cotton textiles

NOTE See Annex ZA for additional requirements.

3.1.Z3
treatment
combination of **test load** and **programme** to be used for a **test run** within a combined **test series** as defined in Annex ZA

3.1.Z4
treatment full
test run using **cotton dry programme** with **full load**

3.1.Z5
treatment half
test run using **cotton dry programme** with **partial load**

3.1.Z6
unstable left on mode
condition persisting after completion of the **programme** and unloading of the machine and where the power consumption may change without any intervention by the end-user

3.1.Z7
post programme phases
phases after the **end of programme** defined to be used for the measurement of **left on mode**

3.1.Z8
post programme phase LU
phase after the **end of programme** defined to be used for the measurement of the unstable left on mode

3.1.Z9
post programme phase LO
phase after the **end of programme** defined to be used for the measurement of the left on mode

3.1.Z10
left on mode duration
time to revert automatically the machine to ‘off-mode’ after the **end of the programme** if the **tumble dryer** is equipped with a power management system

3.1.Z11
power management system
system within the **test tumble dryer** which reverts it automatically to **off mode**

3.1.Z12
frequency of cleaning
number of cycles after which the heat exchanger or filters shall be cleaned

3.2 Symbols

Replace the 1st paragraph by:

The symbols are listed in Table 1 and Table Z1.

Add the following new table after Table 1:

Table Z1 – Symbols relating to Annex ZA

Symbol	Units	Definition
[ ]		rounding up/down to full integer values (no decimal places) as described in EN ISO 80000-1
⌊ ⌋		always rounding up to full integer values (no decimal places)
⌈ ⌉		always rounding down to full integer values (no decimal places)
AE_C		Annual Energy Consumption
c	kg	**Rated capacity** to calculate the Standard Annual Energy Consumption of **tumble dryer**
CI		Two sided confidence interval per **test series**
EEI		Energy Efficiency Index of a **tumble dryer**
$\overline{E_{dry}}$	kWh	Average energy consumption for **treatment full**
$\overline{E_{dry1/2}}$	kWh	Average energy consumption for **treatment half**
E_t	kWh	Average total energy consumption for the combined **test series**
$E_{LU,}$	Wh	Energy consumption during **post programme phase LU** per **treatment full**
$E_{LO,}$	Wh	Energy consumption during **post programme phase LO** per **treatment full**
$E_{O,}$	Wh	Energy consumption in off mode per **treatment full**
$\overline{C_{dry}}$	%	Condensation Efficiency Index for the **treatment full**
$\overline{C_{dry1/2}}$	%	Condensation Efficiency Index for the **treatment half**
C_t	%	Condensation Efficiency Index for the combined **test series**
$\overline{L_{dry}}$	l	Average value for the total water consumption for the **treatment full**
$\overline{L_{dry1/2}}$	l	Average water consumption for **treatment half**
L_t	l	Average value for the total water consumption for the combined **test series**
$W_{n,part}$	g	Nominal partial **test load mass**
n_{SH}		Number of sheets at rated **test load mass**
n_{PC}		Number of pillowcases at rated **test load mass**
n_T		Number of towels at rated **test load mass**
$n_{A,SH}$		Number of sheets in part A

Symbol	Units	Definition
$n_{A,PC}$		Number of pillowcases in part A
$n_{A,T}$		Number of towels in part A
$n_{B,SH}$		Number of sheets in part B
$n_{B,PC}$		Number of pillowcases in part B
$n_{B,T}$		Number of towels in part B
n		Number of **test runs** per **treatment**
p		**Treatment** type
part		**Partial load** identifier (part = A,B)
P_O	W	Off mode power for **treatment full**
P_{LU}	W	Power during **post programme phase LU**
P_{LO}	W	Power during **post programme phase LO**
r_{dry}		Residual per **treatment full**
$r_{dry1/2}$		Residual per **treatment half**
RMS		Root mean square error per **test series**
SAE_C		Standard Annual Energy Consumption
Std_p		Pooled standard deviation per **test series**
s_x		Standard deviation per **treatment**
t_{mLU}	min	Time for **post programme phase LU**
t_{mLO}	min	Time for **post programme phase LO**
$\overline{t_{dry}}$	min	Average programme time for **treatment full**
$\overline{t_{dry1/2}}$	min	Average programme time for **treatment half**
t_{LU}	min	Left on duration
t_t	min	Average value for the programme time for the combined **test series**
t_{mO}	min	Measurement time for off mode power in **treatment full**
$t_{5,0.05}$		“Student T” factor for 5 degrees of freedom for a confidence level of 95 %
V		Value per **test series**
X		Post **programme** phase (X = U, O)

Symbol	Units	Definition
$\bar{x}$		Average value per **treatment**
X_j		Value for each **test run**
$\overline{x_{dry,dry1/2}}$		Average value per **treatment**

4 Requirements

4.1 General

Replace the first paragraph by:

This European Standard does not specify minimum performance requirements for **tumble dryers**. However, **tumble dryers** have to be able to achieve valid **test runs** and valid **test series** with **final moisture content** values that are in the allowable ranges as set out on Table 6. This European Standard does however set methods for the measurement of following performance parameters:

5 Test conditions, materials, equipment and instrumentation

5.2.1 Electricity supply

Replace the first two paragraphs by:

The supply voltage shall be maintained throughout the test at 230 V ± 1 % or at 400 V ± 1 % as defined by the manufacturer's installation guide. If more than one option for installation is available and no clear indication for testing is given, the supply voltage shall be 230 V ± 1 %. The supply voltage measured during the tests shall be recorded.

NOTE In case of a fixed cable, the plug (or the end of the cable) is the reference point to maintain the voltage.

The supply frequency shall be maintained at 50 Hz ± 1 %.

5.2.2.4 Water hardness

Replace by:

Hard water with a total hardness of (2,5 ± 0,2) mmol/l according to EN 60734 shall be used. If available, naturally occurring water of the correct total hardness and, if applicable, the correct pH, alkalinity and conductivity may be used. Alternatively, water of the correct total hardness shall be prepared according to EN 60734.

The total hardness of the water used shall be reported.

The pH, alkalinity and conductivity of the water used to wet the load shall be reported.

6 Preparation for testing

6.3 Preparation of the tumble dryer for a test series

Add a second paragraph:

Before each **test series** the filters, heat exchangers and ducts intended to be serviced by the consumer shall be cleaned according to the manufacturer's instructions.

6.4 Preparation of the tumble dryer for a test run

Replace the first paragraph by:

Before each **test run** the filters, heat exchangers and ducts intended to be serviced by the consumer shall be cleaned according to the manufacturer's instructions.

The manufacturer's specification for the **frequency of cleaning** of the heat exchanger and related filters shall be followed. If no specification is given regarding frequency, or the specified frequency is greater than six cycles then the heat exchanger and its related filters shall not be cleaned between test runs within a test series. In this context, the manufacturer's specification for cleaning the heat exchanger and its related filters means the specification that is directed towards the user. Specifications that are given specifically for use by test laboratories shall be ignored.

6.5.3.2 Average age requirements for cotton test load items

Add a third paragraph:

The weighted average age limitations for the **test load** apply only for **full load** and not for **partial load**.

6.5.6.1 Cotton test load composition

Add a third paragraph:

Table 3 applies to define the **full load** for a **test series**. Refer to ZA.2 regarding the splitting of the **full load** for the tests with **partial load** and for the number of sheets, pillowcases and towels to be used for part A and part B of the **partial loads**.

7 Performance measurements – General requirements

Add the following paragraphs at the end of the clause:

For the combined test series according to Annex ZA, the following parameters shall be selected:

- The load type shall be cotton.
- The **initial moisture content** shall be according to column B in Table 5.

For the combined test series according to Annex ZA, the following parameters shall be measured for the **tumble dryer** using a common single **test series** consisting of 7 runs and using two load sizes (**full load** and **partial load**) as set out in Annex ZA:

– condensation efficiency;

– **programme time;**

– energy consumption;

– energy consumption in low power modes.

The evaluation of these parameters for the **tumble dryer** is specified in Annex ZA.

Programmes to be tested on the **tumble dryer** for the combined test series according to Annex ZA:

A 'dry cotton' **programme** for achieving a **final moisture content** according Table 6 shall be used in accordance with the manufacturers' instruction. For **automatic dryers,** exactly the same **programme** setting for the 'dry cotton' **programme** shall be used for the tests with **full load** and for the tests with **partial load**. For **non-automatic dryers,** the same settings except the drying duration shall be used for the tests with **full load** and for the tests with **partial load**.

8 Tests for performance

8.1 General

Add a second paragraph:

For the combined **test series** according to Annex ZA, additional requirements for the test procedure of the **tumble dryer** are included in Annex ZA.

8.2.2 Programme

Replace 2nd and 3rd paragraph by:

For **automatic tumble dryers** and for **non-automatic tumble dryers,** those **programme** settings are selected which aim to achieve final moisture values that are close as possible to the nominal **final moisture content** given in Table 6, but no greater than the values given in Table 6.

Add the following after the last paragraph:

For **automatic tumble dryers**, the same programme setting shall be used for tests with both full loads and partial loads. For **non-automatic tumble dryers,** the time settings shall be evaluated separately for **full load** and **partial load**.

8.2.3 Test load

Add the following note at the end of the subclause:

NOTE For a **test series,** several different **test loads** of the capacity under test may be used in accordance with ZA.2.

8.2.5 Validity of a test run

Replace the first and second paragraphs by:

For the combined test series according to Annex ZA, the **test run** shall be declared valid, if the measured value of the **final moisture content** of that **test run** is below the upper limit given in Table 6.

8.2.6 Validity of a test series

Replace the first four paragraphs by:

For the combined test series according to Annex ZA, a complete **test series** consists of three valid tests in **treatment full** and four valid tests in **treatment half**.

If one of the in total seven tests of the series is declared invalid, this single test may be repeated using the same **programme** settings as used for the previous tests and the same nominal initial moisture content as all the previous tests runs in the test series. The invalid test run shall be eliminated completely from any subsequent evaluation.

If more than one single test of the series is invalid, the whole **test series** shall be declared invalid.

If the average **final moisture content** for a **test series** of seven valid **test runs** is below the limit in Table 6, then the **test series** shall be declared valid and the results are evaluated according to Clause 9. Otherwise, the **test series** shall be invalid.

If a **test series** of 7 valid **test runs** is invalid, it shall not be made valid by substituting one of the **test runs** with an eighth **test run**.

8.3.2 Procedure

Replace the last paragraph by:

Evaluation shall be made on all valid **test runs** of a valid **test series** for the selected **programme**.

8.4.1 General

Add a paragraph at the end of the subclause:

Evaluation shall be made on all valid **test runs** of a valid **test series** for the selected **programme**.

8.4.2 Procedure

Replace the last paragraph by:

Measurements shall be made on all valid **test runs** of a valid **test series** for the selected **programme**.

9 Assessment of performance

9.1 General

Add a paragraph at the end of the subclause:

For the combined **test series** according to Annex ZA, additional requirements for evaluation for the **tumble dryers** are included in Annex ZA.

9.3 Corrected electrical energy consumption

Replace the first paragraph by:

If the **final moisture content** of a valid **test run** is within the target range given in Table 6, then the corrected electrical energy consumption shall be evaluated as shown below using the measurements determined in 8.3.

Otherwise, no correction shall be made on the energy consumption and the measured energy consumption shall be declared as the corrected energy consumption.

Add a paragraph at the end of the subclause:

Additional steps of evaluation for the **tumble dryer** are specified in Annex ZA.

9.4 Corrected water consumption

Replace the first paragraph by:

If the **final moisture content** of a valid **test run** is within the target range given in Table 6, then the corrected water consumption shall be evaluated as shown below using the measurements determined in 8.3.

Otherwise, no correction shall be made on the water consumption and the measured water consumption shall be declared as the corrected water consumption.

Add a paragraph at the end of the subclause:

Additional steps of evaluation for the **tumble dryer** are specified in Annex ZA.

9.5 Corrected programme time

Replace the first paragraph by:

If the **final moisture content** of a valid **test run** is within the target range given in Table 6, then the corrected **programme time** shall be evaluated as shown below using the measurements determined in 8.3.

Otherwise, no correction shall be made on the **programme time** and the measured **programme time** shall be declared as the corrected **programme time**.

Add a paragraph at the end of the subclause:

Additional steps of evaluation for the **tumble dryer** are specified in Annex ZA.

9.6 Condensation efficiency

Replace the third paragraph by:

The average condensation efficiency C shall be calculated from the condensation efficiencies of all valid **test runs** expressed as a percentage:

Add a paragraph at the end of the subclause:

Additional steps of evaluation for the **tumble dryer** are specified in Annex ZA.

10 Data to be reported

Add second paragraph (at the end of the clause):

For a test series according to Annex ZA data to be reported for the **tumble dryer** are specified in Annex ZA.

Annexes

A.1 Reference detergent

Replace by:

See EN 60456:2011 , Annex B.

A.2 Specification of test load

Replace by:

See EN 60456:2011 , Annex C.

A.3 The bone dry method of conditioning

Replace by:

See EN 60456:2011 , Annex G.

A.4 Calculation of weighted average age of the cotton test load

Replace by:

See EN 60456:2011, Annex I, but replace the term ‘washing **operation**’ with the term ‘drying **operation**’ and replace the term ‘base load’ with the term ’**test load**’.

NOTE Annex I applies only for **full load** and not for **partial load**.

A.5 Measurements of energy consumption in low power modes

Replace by:

See EN 60456:2011 , Annex L.

The above paragraph is informative.

A.6 Uncertainty of measurement

Replace by:

See EN 60456:2011 , Annex Q

A.7 Environmental aspects of tumble dryer use determined in IEC 61121

Replace by:

See EN 60456:2011 , Annex R