# SLOVENSKI STANDARD
# SIST-TS CLC/TS 50640:2015

**01-junij-2015**

---

**Pralni stroji za komercialno uporabo - Metode za merjenje funkcionalnosti**

Clothes washing machines for commercial use - Methods for measuring the performance

Waschmaschinen für den gewerblichen Gebrauch - Verfahren zur Messung der Gebrauchseigenschaften



**Ta slovenski standard je istoveten z:** **CLC/TS 50640:2015**



---

**ICS:**

97.060 Aparati za nego perila Laundry appliances

**SIST-TS CLC/TS 50640:2015** **en**

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

# CLC/TS 50640

April 2015

ICS 97.060

English Version

# Clothes washing machines for commercial use - Methods for measuring the performance

Waschmaschinen für den gewerblichen Gebrauch - Verfahren zur Messung der Gebrauchseigenschaften

This Technical Specification was approved by CENELEC on 2015-01-26.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

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.



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. CLC/TS 50640:2015 E

## Contents

Page

# Foreword

This document (CLC/TS 50640:2015) has been prepared by CLC/TC 59X "Performance of household and similar electrical appliances".

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

This is a new Technical Specification, but it is based on portions from EN 60456:2011.

This Technical Specification is the main body of a forthcoming European Standard for measuring the performance of non-household washing machines. The content of this Technical Specification will be added with the Annex ZZ when the details regarding Ecodesign regulations are defined.

The procedures described in this Technical Specification are modified substantially compared to the procedures described in EN 60456. Therefore, results of tests according to this Technical Specification cannot and are bound not to be compared to results of similar procedures of EN 60456.

Significant technical differences from EN 60456 are:



a) test procedures for washing machines of any size on the market;

b) the method includes procedures for measuring steam heated and gas heated washing machines;



c) the introduction of a new type of base load;

d) a new reference programme.

NOTE CLC/TS 50640:2015 is planned to be a European Standard for the energy measurement of gas heated laundry equipment.

A bilingual version of this publication may be issued at a later date.

# 1 Scope

This Technical Specification specifies methods for measuring the performance of clothes **washing machines** for **commercial** use utilizing cold and/or hot water supply and without heating or with heating devices for electricity, steam or gas. It also deals with appliances for both washing and drying textiles (**washer-dryers**) with respect to their washing related functions. This Technical Specification covers top, front and side loaded non household **washing machines** with horizontal or vertical axis and with one or more wash compartments.

NOTE 1 Non household tumble dryer performance is assessed to CLC/TS 50594.

The object is to state and define the principal performance characteristics of non-household **washing machines** and to describe the test methods for measuring these characteristics.

NOTE 2 This Technical Specification does not apply to continuous batch **washing machines** (e.g. tunnel washers) or **washing machines** only possible to operate with automatic loading and unloading.

NOTE 3 This Technical Specification does not specify safety requirements for **non-household washing machines**. Safety requirements are specified in EN 50571 and the EN ISO 10472 series.

# 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.



EN 12127, *Textiles — Fabrics — Determination of mass per unit area using small samples*

EN 12953-10, *Shell boilers — Part 10 : Requirements for feedwater and boiler water quality*



EN 50571, *Household and similar electrical appliances — Safety — Particular requirements for commercial electric washing machines*

EN 60734, *Household electrical appliances — Performance — Water for testing (IEC 60734)*

EN ISO 2060, *Textiles — Yarn from packages — Determination of linear density (mass per unit length) by the skein method (ISO 2060)*

EN ISO 2061, *Textiles — Determination of twist in yarns — Direct counting method (ISO 2061)*

EN ISO 3759, *Textiles — Preparation, marking and measuring of fabric specimens and garments in tests for determination of dimensional change (ISO 3759)*

EN ISO 11664-2, *Colorimetry — Part 2: CIE standard illuminants (ISO 11664-2)*

EN ISO 80000-1:2013, *Quantities and units — Part 1: General (ISO 80000-1:2009 + Cor 1:2011)*

IEC 60456, *Clothes washing machines for household use — Methods for measuring the performance*

DIN 53923, *Testing of textiles; determination of water absorption of textile fabrics*

CIE 015:2004[1)], *Colorimetry (3rd edition)*

---

1) Address (International Commission on Illumination):
The CIE Central Bureau
Kegelgasse 27, A-1030 Vienna, Austria
Tel: +43 (01) 714 31 87
Fax: +43 (01) 713 0838
E-mail: ciecb@ping.at
http://www.cie.co.at/favicon.ico

IAPWS-IF97, *IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam* [International Association for the Properties of Water and Steam]

# 3 Terms, definitions and symbols

## 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1.1**
**washing machine**
appliance for cleaning and rinsing of textiles using water which may also have a means of extracting excess water from the textiles

**3.1.2**
**test washing machine**
**washing machine** that is subjected to part or all of the requirements in this Technical Specification in order to determine its performance

Note 1 to entry: **Test washing machine** may include **washing machines** according to 3.1.6, 3.1.7.

**3.1.3**
**reference machine**
specially constructed **washing machine** of known performance which is used to increase repeatability and reproducibility of results



Note 1 to entry: It may be used to provide a known performance level within a laboratory against which to compare selected performance parameters on **test washing machines** as defined in this Technical Specification – refer to 5.5.2.



**3.1.4**
**washer-dryer**
**washing machine** which includes both a **spin extraction** function and also a means for drying the textiles, usually by heating and tumbling

Note 1 to entry: This Technical Specification only covers the **operations** which relate to the **washing machine** function – see Clause 1.

**3.1.5**
**spin extractor**
separate water-extracting appliance in which water is removed from textiles by centrifugal action (**spin extraction**)

**3.1.6**
**vertical axis washing machine**
**washing machine** in which the load is placed in a drum which rotates around an axis which is vertical or close to vertical.

Note 1 to entry: For the purposes of this Technical Specification, vertical axis is where the angle of the axis of rotation is more than 45 ° to horizontal. Where the drum does not rotate, the **washing machine** will be classified as a **vertical axis washing machine**.

Note 2 to entry: The classification of vertical axis or horizontal axis in this Technical Specification is only used to define the placement of the load into the drum.

**3.1.7**
**horizontal axis washing machine**
**washing machine** in which the load is placed in a drum which rotates around an axis which is horizontal or close to horizontal

Note 1 to entry: For the purposes of this Technical Specification, horizontal axis is where the angle of the axis is less than or equal to 45° to horizontal.

Note 2 to entry: The classification of vertical axis or horizontal axis in this Technical Specification is only used to define the placement of the load into the drum.

**3.1.8**
**automatic machine**
**washing machine** where the load is fully treated by the machine without the need for user intervention at any point during the **programme** prior to its completion

**3.1.9**
**top loaded machine**
**washing machine** where the load is placed in the wash compartment from the top, and which may be of a horizontal or vertical axis type

**3.1.10**
**side loaded machine**
**washing machine** where the load is placed in the wash compartment from the side, and which is of a horizontal axis type

**3.1.11**
**pullman machine**
**washing machine** where the wash compartment is divided in two compartments



**3.1.12**
**Y-pocket machine**
**washing machine** where the wash compartment is divided in three compartments



**3.1.13**
**test run**
single performance assessment as specified in Clause 8 of this Technical Specification



**3.1.14**
**test series**
group of **test runs** on a **test washing machine** which, collectively, are used to assess the performance of a **washing machine**

**3.1.15**
**operation**
each performance of a function that occurs during the **washing machine programme** such as pre-wash, washing, rinsing, draining or spinning

**3.1.16**
**programme**
series of **operations** which are pre-defined within the **washing machine** and which are declared by the manufacturer as suitable for washing certain textile types

**3.1.17**
**cycle**
complete washing process, as defined by the **programme** selected, consisting of a series of **operations** (wash, rinse, spin, etc.) and including any **operations** that occur after the completion of the **programme**

Note 1 to entry: Examples of **operations** that may occur after the completion of the **programme** are pumping, monitoring and anti-creasing (where applicable).

**3.1.18**
**spin extraction**
water-extracting function by which water is removed from textiles by centrifugal action, which is included as a function (built in **operation**) of an **automatic washing machine** but may also be performed in a **spin extractor**

**3.1.19**
**spin speed**
rotational frequency of a drum during **spin extraction**

Note 1 to entry: A method for determination of **spin speed** is not defined in this Technical Specification.

**3.1.20**
**base load**
unsoiled textiles used for testing



**3.1.21**
**test load**
**base load** used for testing plus stain test strips



**3.1.22**
**test load mass**
actual mass of the **base load** including stain test strips

**3.1.23**
**nominal test load mass**
mass of dry textiles of a particular type for which the performance of the **test washing machine** shall be tested (**rated capacity** or part load)

Note 1 to entry: Target value for the conditioned **test load mass**.

**3.1.24**
**rated capacity**
maximum mass in kilograms of dry textiles of a particular type which the manufacturer declares can be treated in the **washing machine** on the selected **programme**

**3.1.25**
**programme time**
time from the initiation of the **programme** (excluding any user programmed delay) until the completion of the **programme**. If the **end of programme** is not indicated, the **programme time** is equal to the **cycle time**

**3.1.26**
**end of programme**
completion of the **programme**, i.e. when the **washing 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 to 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 state condition and is not performing any function.

Note 2 to entry: An indication of the end of the **programme** may be in the form of a light (on or off), a sound, an indicator shown on a display or the release of a door or latch. In some **washing machines** there may be a short delay from an **end of programme** indicator until the load is accessible by the user.

**3.1.27**
**cycle time**
time from the initiation of the **programme** (excluding any user programmed delay) until all activity ceases, which is considered to be the case when the power consumption reverts to a steady state condition that persists indefinitely without user intervention

Note 1 to entry: If there is no activity after the end of the **programme**, the **cycle time** is equal to the **programme time**.

Note 2 to entry: **Cycle time** includes any activity that may occur after the **programme** is completed. This could include any electronic activity or any additional mechanical activity that occurs for a limited period after any **end of programme** indicator. Any cyclic event that occurs indefinitely is considered to be steady-state.

**3.1.28**
**main wash duration**
time from the commencement of the initial water intake for the main wash until the commencement of the initial water intake for the first rinse

Note 1 to entry: Variations in the laboratory water supply pressure may affect the **main wash duration**. This definition is only applicable to **test washing machines**. The **reference machine** wash time used for calibration of the **reference machine** is defined differently. Refer to Table E.1.



**3.1.29**
**remaining moisture content**



measure of the additional amount of moisture that is contained in the **base load** in relation to the equilibrium condition for **base load** items which have been conditioned in a controlled space (refer to 6.4.5.2)



Note 1 to entry: This equilibrium condition is defined as 0 % **remaining moisture content** in this Technical Specification. Hence it is possible for a **base load** or load items to have a negative **remaining moisture content** when treated with a tumble drier. Refer also to Annex F.

**3.1.30**
**rated voltage**
voltage assigned to the appliance by the manufacturer

**3.1.31**
**programme energy**
energy consumed during the programme time in one test run

## 3.2 Symbols

### 3.2.1 Symbols relating to 9.2 – washing performance

| | |
|---|---|
| $C_k$ | the sum of the average reflectance values (Y-values) for each **test run** |
| $\overline{C}$ | the average sum of the reflectance values (Y-values) for each of the five types of soils, for all valid **test runs** |
| $C_{k\ \mathrm{test}}$ | the sum of the reflectance values in each **test run** of the **test washing machine** |
| $\overline{C}_{\mathrm{test}}$ | the average sum of the reflectance values of the **test washing machine** |
| $\overline{C}_{\mathrm{ref}}$ | the average sum of the reflectance values in each **test run** of the **reference machine** |
| $m$ | the number of soil types per stain test strip |
| $n$ | the number of stain test strips in each **test run** |

$p$ confidence interval for $q$

$q$ ratio between the **test washing machine**, $\overline{C}_{test}$, and the **reference machine**, $\overline{C}_{ref}$

$s_q$ standard deviation of the ratio $q$

$s_C$ the standard deviation of $C_k$

$s_i$ the standard deviation of the reflectance values for each soil type within a given **test run**

$t_{w-1, 0,05}$ the "Student T" factor for ($w$-1) degrees of freedom for a confidence of 95 % (i.e. 2,776 for five **test runs** equals four degrees of freedom, two sided test)

$w$ the number of **test runs** in the **test series**

$\overline{x}_i$ the average reflectance values for each soil type

$x_{ij}$ the average reflectance value of the 4 individual readings for each of the 5 soil types on a stain test strip

### 3.2.2 Symbols relating to 9.3 – water extraction (spinning)

*RMC* **remaining moisture content**

$M$ the mass of the conditioned **base load** (g)

$M_r$ the mass of **base load** at the end of the **test run** (g)



### 3.2.3 Symbols relating to 9.4 – energy, water and time



$T_c$ the measured average cold water inlet temperature (°C)

$T_h$ the measured average hot water inlet temperature (°C)



$V_c$ the volume of the cold water used during an **operation** (l)



$V_h$ the volume of external hot water used during **operation** (l)

$W_c$ the cold water energy correction for the **operation** (kWh)

$W_{ct}$ the total cold water energy correction determined during the test (kWh)

$W_{et}$ the total electrical energy metered during the test (kWh)

$W_{gt}$ the total gas energy metered during the **operation** (kWh)

$W_h$ the calculated hot water energy for the **operation** (kWh)

$W_{ht}$ the calculated total hot water energy determined during the test (kWh)

$W_{st}$ the total steam energy metered during the **operation** (kWh)

$W_{total}$ total energy (kWh)

### 3.2.4 Symbols relating to Annex F

$M_{bd}$ the mass of **base load** at the end of the bone dry run (g)

### 3.2.5 Symbols relating to Annex G

$M_T$ the desired total load mass (kg)

$M_S$ the mass of a small sheet

$M_M$ the mass of a medium sheet

$M_L$ the mass of a large sheet

$M_{ST}$ the mass of a stain test strip .

$M_{M+ST}$ the mass of a medium sheet with a stain test strip attached

$X_S$ the number of small sheets

$X_M$ the number of medium sheets

$X_L$ the number of large sheets

$X_{M+ST}$ the number of medium sheets with stain test strips attached

# 4 Requirements

## 4.1 General

This Technical Specification describes test methods for the measurement of the following performance parameters:

— washing performance;

— rinsing performance (under consideration);

— water extraction performance;

— water consumption;

— energy consumption;

— wash bath temperature;

— cycle time.



Any claims of performance referring to this Technical Specification for these parameters shall be measured in accordance with the requirements of this Technical Specification (refer to Clause 8 for details).

This Technical Specification does not specify minimum performance requirements for clothes **washing machines**.

## 4.2 Rated Capacity

Either the manufacturer or supplier shall declare the **rated capacity** at 0,5 kg intervals for each relevant textile type. For **washing machines** with a capacity above 10 kg the **rated capacity** shall be declared at 1 kg intervals. Relevant textile types are cotton and synthetic/blends.

NOTE For different textile types the **rated capacity** of a **washing machine** is usually different.

The **rated capacity** shall not exceed the maximum mass of dry laundry, in kilograms, to be used in the **test washing machine** in accordance with EN 50571.

When the manufacturer or supplier gives a range of values for the **rated capacity** for a particular textile type, the highest value shall be used.

Where information on the **rated capacity** is not available, the **test load mass** shall be determined according to Annex K.

If the **rated capacity** for a synthetics/blends **programme** is not specified by the manufacturer or supplier, the **test load** shall be 40 % of that for a cotton programme.