



SLOVENSKI STANDARD
SIST EN IEC 60379:2023

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Metode za merjenje električnih lastnosti akumulacijskih grelnikov vode za uporabo v gospodinjstvu (IEC 60379:2023)

Methods for measuring the performance of electric storage water-heaters for household purposes (IEC 60379:2023)

Verfahren zum Messen der Gebrauchseigenschaften von elektrischen Warmwasserspeichern für den Hausgebrauch (IEC 60379:2023)

Méthodes de mesure de l'aptitude à la fonction des chauffe-eau électriques à accumulation pour usages domestiques (IEC 60379:2023)

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Methods for measuring the performance of electric storage water
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(IEC 60379:2023)

Méthodes de mesure de l'aptitude à la fonction des chauffe-
eau électriques à accumulation à usages domestiques
(IEC 60379:2023)

Verfahren zur Messung der Gebrauchseigenschaften von
elektrischen Warmwasserspeichern für den Hausgebrauch
(IEC 60379:2023)

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European Committee for Electrotechnical Standardization
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EN IEC 60379:2023 (E)**European foreword**

The text of document 59C/282/FDIS, future edition 4 of IEC 60379, prepared by SC 59C "Electrical heating appliances for household and similar purposes" of IEC/TC 59 "Performance of household and similar electrical appliances" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60379:2023.

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Methods for measuring the performance of electric storage water heaters for household purposes

Méthodes de mesure de l'aptitude à la fonction des chauffe-eau électriques à accumulation à usages domestiques

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**METHODS FOR MEASURING THE PERFORMANCE
OF ELECTRIC STORAGE WATER HEATERS
FOR HOUSEHOLD PURPOSES****FOREWORD**

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IEC 60379 has been prepared by subcommittee SC59C: Electrical heating appliances for household and similar purposes, of IEC technical committee 59: Performance of household and similar electrical appliances. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 1987. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) sustainable development aspects of EU legislation are taken into account, including features such as smart control, V_{40} modification and measuring procedures for multi-tank appliances.

The text of this International Standard is based on the following documents:

Draft	Report on voting
59C/282/FDIS	59C/285/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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METHODS FOR MEASURING THE PERFORMANCE OF ELECTRIC STORAGE WATER HEATERS FOR HOUSEHOLD PURPOSES

1 Scope

This document specifies methods for measuring the performance of electric storage water heaters to produce domestic potable or non-potable hot water for household and similar use.

The object is to state and define the principal performance characteristics of electric storage water heaters and to describe the test methods for measuring these characteristics.

NOTE 1 This document does not apply to:

- storage water heaters that use electricity as a secondary source of heating the water;
- storage water heaters that do not use a tank to store hot water;
- electric storage water heaters that do not meet the minimum (or maximum) output performance of the smallest (or biggest) load profile, as defined in Table 3;
- water-heaters without thermal insulation.

NOTE 2 This document does not specify safety requirements. For safety requirements, see IEC 60335-1 in conjunction with IEC 60335-2-21.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

storage water heater

water heater that uses electric heating elements as the means of heating water for long-term storage in a thermally insulated container and provided with a device to control the water temperature

3.2

primary function

production of hot water for household and similar needs

3.3

energized storage water heater

storage water heater that is designed to supply hot water and be energized for 24 h per day

3.4

off-peak storage water heater

storage water heater that is designed to supply hot water and configured or installed, whilst only being supplied with electrical energy at off-peak/low-tariff periods

Note 1 to entry: The off-peak storage water heater is required to fulfil the requirements of the tapping pattern between 7:00 h and 22:00 h without external energy supply, e.g. to enable operation at off-peak/low-tariff periods and/or to operate in conditions of insecurity of energy supply. A product qualifies as "off-peak" if it is only energized for a maximum of 8 consecutive hours anywhere between 22:00 h and 7:00 h during the test with the 24h load profile.

3.5

load profile

output performance (in terms of flowrates, temperatures, tapping pattern, etc.) of a storage water heater when fulfilling its primary function under specific ambient conditions (see Table 2 and Table 3), as declared by the manufacturer

3.6

energy efficiency

ratio between the delivered energy in the domestic potable or non-potable hot water for its load profile and the consumed electrical energy

3.7

storage volume

rated quantity of water stored in the appliance

3.8

smart control

device that automatically adapts the water heating process to individual usage conditions with the aim of reducing energy consumption

3.9

out-of-the-box mode

standard operating condition, setting or mode set by the manufacturer at factory level, to be active immediately after the appliance's installation, suitable for normal use by the end-user according to the water tapping pattern for which the product has been designed and placed on the market

3.10

closed water heater

unvented storage water heater intended to operate at the pressure of the water system, the flow of water being controlled by one or more valves in the outlet system

3.11

cistern-fed water heater

water heater supplied from a cistern in which the flow of water is controlled by one or more valves in the outlet system, and which is provided with a vent open to the atmosphere and so arranged that the expanded water can return to the feed cistern

3.12

open outlet water heater

water heater in which the flow of water is controlled by a valve in the inlet pipe and so arranged that the expanded water can overflow through the outlet pipe

3.13

vented water heater

water heater open to the atmosphere, so that under no condition of use can the pressure at the surface of the water be other than atmospheric

3.14**cistern-type water heater**

cistern-fed water heater which has a feed cistern as an integral part of the appliance

3.15**multi-tank water heater**

water heater with two or more hydraulic connected containers, designed to have the possibility to work independently in terms of working temperature and/or pressure condition

Note 1 to entry: A multi-tank product has to be defined as directly measurable if it is possible to measure the temperature (immersed or welded sensors) of all the dome tanks without compromising the product's performances, otherwise the product has to be classified as not directly measurable. Based on that definition for the dome tanks' temperature measurement, the multi-tank products are defined as:

- directly measurable, or
- not directly measurable.

3.16**rated capacity**

assigned water capacity of the water heater, and marked on it, by the manufacturer

3.17**standing loss per 24 h**

energy-consumption of a filled water-heater, after steady-state conditions have been reached, when connected to the electrical supply, during any 24 h duration when no water is withdrawn

3.18**rated voltage**

voltage (for three phase-supply, the voltage between phases) assigned to the appliance by the manufacturer

3.19 **$V_{40\text{Ref}}$**

mixed water quantity delivered at 40 °C with 65 °C storage temperature and 15 °C cold water inlet temperature

3.20 **$V_{40\text{max}}$**

mixed water quantity delivered at 40 °C with maximum storage temperature setting and 15 °C cold water inlet temperature with heating elements powered on

Note 1 to entry: Maximum rated power of the appliance.

3.21 **V_{40}**

mixed water quantity delivered at 40 °C with out-of-the-box mode temperature setting and 10 °C cold water inlet temperature

3.22**smart control factor****SCF**

factor describing the water heating energy efficiency gain due to smart control

Note 1 to entry: The value is between SCF = 0 and SCF = 1.

3.23**energy-related product****ErP**

product that uses energy, or that does not use energy, but has an impact on energy consumption

3.24**conversion coefficient****CC**

factor to indicate how much primary energy is used to generate a unit of electricity

3.25**declared load profile**

load profile declared by the manufacturer for the appliance

4 Symbols and units

Symbol	Unit	Description
η_{elecwh}	[%]	Electric energy efficiency of a storage water heater.
Q_{ref}	[kWh]	Reference energy for the 24 h tapping pattern for the load profile of the water heater.
Q_{elec}	[kWh]	Electricity consumption with the relevant 24 h tapping pattern.
θ_{amb}	[°C]	Ambient temperature during the tests
θ'_{p}	[°C]	Mean water temperature for the determination of θ_{p} , measured at the outlet
θ_{M}	[°C]	Mean water temperature without withdraw from the tank
f	[l/min]	Minimum flow rate at which hot water is contributing to the reference energy as specified in Table 3.
T_{m}	[°C]	Water temperature at which hot water starts contributing to the reference energy as specified in Table 3
T_{p}	[°C]	Minimum water temperature to be achieved during water draw off as specified in Table 3
T_{set}	[°C]	Set-point temperature
$t_{\text{R},50}$	[s]	Reheating time for a water temperature rise of 50 K
Q_{testelec}	[kWh]	Measured electricity consumption over 24 h test (step 4 of Figure 1 and Figure 2).
$Q_{\text{H}_2\text{O}}$	[kWh]	Useful energy content of the hot water of n draw-offs
$V_{\text{full-drawing water}}$	[l]	Sum of quantity of hot water totally delivered during the tapping period.
V_{40_exp}	[l]	Measured volume delivered at the mean water temperature.
V_{40}	[l]	Mixed water quantity delivered at 40 °C.
$V_{40\text{Ref}}$	[l]	mixed water quantity delivered at 40 °C with 65 °C storage temperature and 15°C cold water inlet temperature
$V_{40\text{max}}$	[l]	Mixed water quantity delivered at 40 °C with maximum temperature setting and heating elements powered on
C_{R}	[l]	Rated capacity of water heater (given by manufacturer)
C_{act}	[l]	Actual capacity of water heater
m_{act}	[kg]	Actual weight of water contained inside the tank of the Water Heater
m		Number of tanks (containers) of the appliance
$\theta_{\text{A}1\text{tanks}}$	[°C]	Mean water temperature calculated as average of the j -tank for the first thermostat cut-out
$\theta_{\text{A}n\text{tanks}}$	[°C]	Mean water temperature calculated as average of j -tank for the last (n) thermostat cut-out
$\theta_{\text{M}j}$	[°C]	Mean water temperature without withdraw of the j -tank
$\theta_{\text{M_mt}}$	[°C]	Mean water temperature without withdraw of all the tanks
$\theta_{\text{A}ij}$	[°C]	Measured water temperature after a thermostat cut-out for the j -tank