

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60379:2004 sisaldab Euroopa standardi EN 60379:2004 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 22.06.2004 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 19.02.2004.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60379:2004 consists of the English text of the European standard EN 60379:2004.

This standard is ratified with the order of Estonian Centre for Standardisation dated 22.06.2004 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

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The standard is available from Estonian standardisation organisation.

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Võtmesõnad:

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Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

English version

**Methods for measuring the performance
of electric storage water-heaters for household purposes**
(IEC 60379:1987, modified)

Méthodes de mesure de l'aptitude
à la fonction des chauffe-eau électriques
à accumulation pour usages domestiques
(CEI 60379:1987, modifiée)

Verfahren zum Messen der
Gebrauchseigenschaften von elektrischen
Warmwasserspeichern für den
Hausgebrauch
(IEC 60379:1987, modifiziert)

This European Standard was approved by CENELEC on 2003-11-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 60379:1987, prepared by SC 59C, Heating appliances, of IEC TC 59, Performance of household electrical appliances, together with the common modifications prepared by the Technical Committee CENELEC TC 59X, Consumer information related to household electrical appliances, was submitted to the formal vote and was approved by CENELEC as EN 60379 on 2003-11-01.

This European Standard supersedes HD 500 S1:1988. It only modifies some clauses for clarification, for better reproducibility and for better information to the consumer.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2004-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-11-01

This European Standard, based on HD 500 S1:1988, has been prepared by the Technical Committee CENELEC TC 59X due to the draft implementing Directive of the European Commission and the European Free Trade Association on the indication of the energy consumption of electric storage water heaters. According to this draft implementing Directive the energy consumption to be declared in kWh/year refers only to standing loss without water withdrawal and the classification of the energy efficiency is derived from this standing loss.

Clauses and subclauses which are additional to those in IEC 60379 are prefixed "Z".

Technical differences to HD 500 S1:1988 are

- a) definition of the rated capacity (in order to clarify the term "storage temperature" used in the draft implementing Directive),
- b) general conditions for measurement,
- c) verification of the rated capacity,
- d) standing loss at 24 h,
- e) tolerances and control procedures,
- f) no declaration to provide,
- g) accuracy of instrumentation,
- h) tolerances,
- i) mixed water quantity at 40 °C.

Endorsement notice

The text of the International Standard IEC 60379:1987 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

1 Scope

Add a new paragraph:

The common modifications supplement, as far as necessary, test methods which shall be applied in accordance with a Commission's Directive, which is based on standing loss only, implementing Council Directive 92/75/EEC with regard to energy labelling of household electric storage water heaters. Clauses defining permitted tolerances to values declared by the manufacturer and control procedures for checking these declared values are added.

5 Terms relating to characteristics of appliances

5.1 Rated capacity

Change headline to "**Capacity**".

Change the content of this subclause to:

5.1.Z1 Rated capacity

The storage capacity assigned to the water heater by the manufacturer and marked on it.

5.1.Z2 Actual capacity

The water capacity determined by measurement.

Add a new subclause after 5.4:

5.Z1 Mixed water quantity at 40 °C

Quantity of water at 40 °C, which has the same heat content (enthalpy) as the hot water which is delivered above 40 °C at the output of the water heater.

6 Symbols

Add the following symbols

C_R	= rated capacity	5.1.Z1
C_A	= actual capacity	5.1.Z2
t_{Ai}	= cut-out time	15
t_{Ei}	= cut-in time	15
D	= duration period for the tests	15
θ_{A1}	= switching-off temperature of the thermostat at the beginning of the test	15
θ_{An}	= switching-off temperature of the thermostat at the end of the test.....	15
C_m	= mixed water output at 40 °C	17

7 List of measurements

Add the following dash:

- stored water temperature Clause 10

8 General conditions for measurements

Replace the paragraph after the second dash by:

The ambient temperature is calculated from measurements at a single point in front of the centre of the water heater halfway between the water heater and the wall, and at half the height of the water heater.

Delete the fourth dash and its subsequent paragraph.

Delete the fifth dash.

Add two new dashes:

- the supply voltage shall be maintained at 230 V with a relative tolerance of 1 %.
- the supply frequency shall be 50 Hz with a relative tolerance of 1 %.

Add a new clause after Clause 12:

Z1 Accuracy of instrumentation

Instruments having the following or better accuracy shall be used for the tests:

Mass

Instruments shall be accurate to ± 1 %.

Ambient temperature

Instruments shall be accurate to ± 1 K.

Water temperature

Instruments shall have a resolution of at least 0,2 K and an accuracy of ± 1 K including non-linearity error, at the nominal temperature measured.

Water volume

Instruments shall be accurate to ± 1 %.

Water flow rate

Instruments shall be accurate to ± 5 %.

Electrical power

Instruments shall have less than 10 W zero point inaccuracy, and provide less than 2 % inaccuracy at the highest nominal value according to rated input power data specified by the manufacturer.

Time

Instruments shall be accurate to ± 1 %.

13 Verification of the rated capacity

Change headline to “Verification of the actual capacity”.

Replace the first sentence of the first paragraph by the following two sentences:

The heating of the storage water heater is switched off. Then the storage water heater is filled with cold water in accordance with the manufacturer's instruction and the water supply is cut off.

14 Standing loss per 24 h

Replace the second formula by:

$$\Theta_M = \frac{1}{D} \sum_i \frac{\Theta_{Ai} + \Theta_{Ei}}{2} (t_{Ai} - t_{Ei})$$

Delete the sentence after the second formula.

Replace the last formula by:

$$Q_{pr} = \frac{45}{\Theta_M - \Theta_{amb}} \cdot E + \frac{1,16 \cdot C_{A1} \cdot (\Theta_{A1} - \Theta_{An})}{1\,000}$$

Replace the last sentence by the following two sentences:

Q_{pr} is expressed in kWh per 24 h related to a temperature rise of 45 K.

It shall be given with two decimals for values below 1 kWh per 24 h and with one decimal for values equal or exceeding 1 kWh per 24 h.

17 Mixing factor

Change headline to “Mixing factor, mixed water output at 40 °C”.

Add at the end of Clause 17:

The mixed water output at 40 °C is calculated as follows:

$$C_m = C_R \cdot \frac{\Theta_P - 15}{25}$$

Add a new clause after Clause 19:

Z2 Tolerances and control procedure

Z2.1 Rated capacity

The value measured according to Clause 13 shall not be less than the rated capacity.

Z2.2 Standing loss

The measurement may be performed with a specific regulation in order to obtain a temperature rise of (45 ± 3) K.

The standing loss measured according to Clause 14 shall not be greater than the value declared by the manufacturer plus 15 %.

If the result of the test carried out on the first appliance is greater than the declared value plus 15 % the test shall be carried out on a further three appliances.

The arithmetic mean of the values of these three appliances shall not be greater than the declared value plus 10 %.

Z2.3 Hot water output

The value measured according to Clause 15 shall not be lower than the hot water output declared by the manufacturer.

Figures

Figure 2: Delete Figure 2.

Figure 4: The marking of Θ_{A1} to be shifted one curve-peak to the left (just before Θ_{E1}) where main curve cuts the first dotted line.

Replace " F_m (Clause 18)" by " F_m, C_m (Clause 17)".

**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC**

60379

Troisième édition
Third edition
1987-09

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

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



Numéro de référence
Reference number
CEI/IEC 60379: 1987

Numéros des publications

Depuis le 1^{er} janvier 1997, les publications de la CEI sont numérotées à partir de 60000.

Publications consolidées

Les versions consolidées de certaines publications de la CEI incorporant les amendements sont disponibles. Par exemple, les numéros d'édition 1.0, 1.1 et 1.2 indiquent respectivement la publication de base, la publication de base incorporant l'amendement 1, et la publication de base incorporant les amendements 1 et 2.

Validité de la présente publication

Le contenu technique des publications de la CEI est constamment revu par la CEI afin qu'il reflète l'état actuel de la technique.

Des renseignements relatifs à la date de reconfirmation de la publication sont disponibles dans le Catalogue de la CEI.

Les renseignements relatifs à des questions à l'étude et des travaux en cours entrepris par le comité technique qui a établi cette publication, ainsi que la liste des publications établies, se trouvent dans les documents ci-dessous:

- «Site web» de la CEI*
- **Catalogue des publications de la CEI**
Publié annuellement et mis à jour régulièrement
(Catalogue en ligne)*
- **Bulletin de la CEI**
Disponible à la fois au «site web» de la CEI* et comme périodique imprimé

Terminologie, symboles graphiques et littéraux

En ce qui concerne la terminologie générale, le lecteur se reportera à la CEI 60050: *Vocabulaire Electrotechnique International* (VEI).

Pour les symboles graphiques, les symboles littéraux et les signes d'usage général approuvés par la CEI, le lecteur consultera la CEI 60027: *Symboles littéraux à utiliser en électrotechnique*, la CEI 60417: *Symboles graphiques utilisables sur le matériel. Index, relevé et compilation des feuilles individuelles*, et la CEI 60617: *Symboles graphiques pour schémas*.

* Voir adresse «site web» sur la page de titre.

Numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series.

Consolidated publications

Consolidated versions of some IEC publications including amendments are available. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Validity of this publication

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology.

Information relating to the date of the reconfirmation of the publication is available in the IEC catalogue.

Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is to be found at the following IEC sources:

- **IEC web site***
- **Catalogue of IEC publications**
Published yearly with regular updates

(On-line catalogue)*
- **IEC Bulletin**
Available both at the IEC web site* and as a printed periodical

Terminology, graphical and letter symbols

For general terminology, readers are referred to IEC 60050: *International Electrotechnical Vocabulary* (IEV).

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

* See web site address on title page.

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Troisième édition
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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**MÉTHODES DE MESURE DE L'APTITUDE À LA FONCTION
DES CHAUFFE-EAU ÉLECTRIQUES À ACCUMULATION
POUR USAGES DOMESTIQUES**

PRÉAMBULE

- 1) Les décisions ou accords officiels de la CEI en ce qui concerne les questions techniques, préparés par des Comités d'Etudes où sont représentés tous les Comités nationaux s'intéressant à ces questions, expriment dans la plus grande mesure possible un accord international sur les sujets examinés.
- 2) Ces décisions constituent des recommandations internationales et sont agréées comme telles par les Comités nationaux.
- 3) Dans le but d'encourager l'unification internationale, la CEI exprime le vœu que tous les Comités nationaux adoptent dans leurs règles nationales le texte de la recommandation de la CEI, dans la mesure où les conditions nationales le permettent. Toute divergence entre la recommandation de la CEI et la règle nationale correspondante doit, dans la mesure du possible, être indiquée en termes clairs dans cette dernière.

PRÉFACE

La présente norme a été établie par le Sous-Comité 59C: Appareils de chauffage, du Comité d'Etudes n° 59 de la CEI: Aptitude à la fonction des appareils électrodomestiques.

Elle constitue la troisième édition de la Publication 379 de la CEI et remplace la deuxième édition (1982).

Le texte de cette troisième édition est issu de la deuxième édition et des documents suivants:

Règle des Six Mois	Rapport de vote	Règle des Deux Mois	Rapport de vote
59C(BC)31 59C(BC)33	59C(BC)34 59C(BC)37	59C(BC)35	59C(BC)36

Les rapports de vote indiqués dans le tableau ci-dessus donnent toutes informations sur les votes ayant abouti à l'approbation de cette norme.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by Sub-Committee 59C: Heating appliances, of IEC Technical Committee No. 59: Performance of household electrical appliances.

It forms the third edition of IEC Publication 379 and replaces the second edition (1982).

The text of this third edition is based on the second edition and the following documents:

Six Months' Rule	Report on Voting	Two Months' Rule	Report on Voting
59C(CO)31 59C(CO)33	59C(CO)34 59C(CO)37	59C(CO)35	59C(CO)36

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

MÉTHODES DE MESURE DE L'APTITUDE À LA FONCTION DES CHAUFFE-EAU ÉLECTRIQUES À ACCUMULATION POUR USAGES DOMESTIQUES

SECTION UN — GÉNÉRALITÉS

1. Domaine d'application

La présente norme est applicable aux chauffe-eau électriques à accumulation pour usages domestiques.

Cette norme ne s'applique pas:

- aux chauffe-eau utilisant d'autres sources d'énergie (par exemple l'énergie solaire);
- aux chauffe-eau ayant plus d'un volume chauffé;
- aux chauffe-eau sans isolation thermique.

2. Objet

La présente norme a pour objet d'énumérer et de définir les principales caractéristiques d'aptitude à la fonction des chauffe-eau électriques à accumulation intéressant le consommateur et de décrire les méthodes normalisées pour la vérification de ces caractéristiques.

La présente norme ne traite pas des prescriptions de sécurité ni des valeurs exigées pour les caractéristiques d'aptitude à la fonction.

SECTION DEUX — DÉFINITIONS ET SYMBOLES LITTÉRAUX

Pour les besoins de la présente norme, les définitions et les symboles littéraux suivants s'appliquent.

3. Termes servant à désigner les appareils

3.1 *Chauffe-eau à accumulation*

Appareil destiné à chauffer de l'eau dans une cuve thermiquement bien isolée et à la conserver longtemps chaude, et muni d'un dispositif qui commande la température de l'eau.

4. Termes servant à classer les appareils*

4.1 *Chauffe-eau fermé*

Chauffe-eau prévu pour supporter la pression de la distribution d'eau, l'écoulement de l'eau étant commandé par un ou plusieurs robinets placés sur le circuit de sortie.

* Voir figure 1, page 20.

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

SECTION ONE — GENERAL

1. Scope

This standard applies to electric storage water-heaters for household purposes.

This standard does not apply to:

- water-heaters using other sources of energy (e.g. solar energy);
- water-heaters with more than one heated volume;
- water-heaters without thermal insulation.

2. Object

The purpose of this standard is to state and define the principal performance characteristics of electric storage water-heaters which are of interest to the user and to describe the standard methods for measuring these characteristics.

This standard is concerned neither with safety nor with performance requirements.

SECTION TWO — DEFINITIONS AND LETTER SYMBOLS

For the purpose of this standard, the following definitions and letter symbols apply.

3. Terms used to designate appliances

3.1 *Storage water-heater*

An appliance intended for heating water in a thermally well-insulated container, for the long-term storage of the heated water, and provided with a device to control the water temperature.

4. Terms used to classify appliances*

4.1 *Unvented water-heater*

A water-heater designed to work under the pressure of the water supply mains, the flow of water being controlled by one or more valves in the outlet system.

* See Figure 1, page 20.