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Merilniki toplote - 1. del: Splošne zahteve (vključno z dopolnilom A1)

Thermal energy meters - Part 1: General requirements

Thermische Energiemessgeräte - Teil 1: Allgemeine Anforderungen

Compteurs d'énergie thermique - Partie 1 : Prescriptions générales

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ICS:

17.200.10 Toplota. Kalorimetrija Heat. Calorimetry

SIST EN 1434-1:2016+A1:2019 **en,fr,de**

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EUROPEAN STANDARD

EN 1434-1:2015+A1

NORME EUROPÉENNE

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Thermal energy meters - Part 1: General requirements

Compteurs d'énergie thermique - Partie 1 :
Prescriptions générales

Wärmezähler - Teil 1: Allgemeine Anforderungen

This European Standard was approved by CEN on 5 September 2015 and includes Amendment 1 approved by CEN on 18 July 2018.

CEN 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 CEN member.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 1434-1:2015+A1:2018 (E)

European foreword

This document (EN 1434-1:2015+A1:2018) has been prepared by Technical Committee CEN/TC 176 “Thermal energy meters”, the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2019, and conflicting national standards shall be withdrawn at the latest by May 2019.

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

This document includes Amendment 1, approved by CEN on 2018-07-18.

This document supersedes A1 EN 1434-1:2015 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

EN 1434, A1 *Thermal energy meters* A1 consists of the following parts:

- *Part 1: General requirements* SIST EN 1434-1:2016+A1:2019
<https://standards.iteh.ai/catalog/standards/sist/6163cafa-4225-48c1-8920-dbd226716f2c/sist-en-1434-1-2016a1-2019>
- *Part 2: Constructional requirements*
- *Part 3: Data exchange and interfaces¹⁾*
- *Part 4: Pattern approval tests*
- *Part 5: Initial verification tests*
- *Part 6: Installation, commissioning, operational monitoring and maintenance*

In comparison to EN 1434-1:2007, the following changes have been made:

- special cases for combined A1 bifunctional thermal energy meters A1 are added;
- additional functionality for smart metering applications are added;
- metrological requirements for smart metering applications are added;
- definitions and requirements for the cooling meter are added;
- tariff meters are added;

¹⁾ EN 1434-3 is maintained by CEN/TC 294.

- terms and definitions, requirements for registration devices and cooling meters are added;
- requirements for fast response meters are added (informative Annex C).

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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1 Scope

This European Standard specifies the general requirements for \square_{A1} thermal energy meters \square_{A1} . \square_{A1} Thermal energy meters \square_{A1} are instruments intended for measuring the energy which in a heat-exchange circuit is absorbed (cooling) or given up (heating) by a liquid called the heat-conveying liquid. The \square_{A1} thermal energy meter \square_{A1} indicates the quantity of heat in legal units.

Electrical safety requirements are not covered by this European Standard.

Pressure safety requirements are not covered by this European Standard.

Surface mounted temperature sensors are not covered by this European Standard.

This standard covers meters for closed systems only, where the differential pressure over the thermal load is limited.

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.

\square_{A1} EN 1434-2:2015+A1:2018, *Thermal energy meters — Part 2: Constructional requirements* \square_{A1}

\square_{A1} EN 1434-4:2015+A1:2018, *Thermal energy meters — Part 4: Pattern approval test* \square_{A1}

EN 60751, *Industrial platinum resistance thermometers and platinum temperature sensors (IEC 60751)*

EN 61010-1, *Safety requirements for electrical equipment for measurement, control and laboratory use — Part 1: General requirements (IEC 61010-1)*

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3 Terms and definitions

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

3.1
response time
 $\tau_{0,5}$
time interval between the instant when flow or temperature difference is subjected to a specified abrupt change and the instant when the response reaches 50 % of the step value

3.2
fast response meter
meter suitable for heat exchanging circuits with rapid dynamic variations in the exchanged heat

Note 1 to entry: See also Annex C.

3.3
rated voltage
 U_n
voltage of the external power supply required to operate the \square_{A1} thermal energy meter \square_{A1} , conventionally the voltage of the AC mains supply

3.4
rated operating conditions
conditions of use, giving the range of values of influence quantities, for which the metrological characteristics of the instrument are within the specified maximum permissible errors

3.5**reference conditions**

set of specified values of influence factors, fixed to ensure valid inter-comparison of results of measurements

3.6**influence quantity**

quantity, which is not the subject of the measurement, but which influences the value of the measurement and or the indication of the measuring instrument

3.7**influence factors**

influence quantity having a value within the rated operating conditions

3.8**disturbance**

influence quantity having a value outside the rated operating conditions

3.9**Types of errors****3.9.1****error (of indication)**

indication of the measuring instrument minus the conventional true value of the measurand

3.9.2**intrinsic error**

error of a measuring instrument determined under reference conditions

3.9.3**initial intrinsic error**

error of a measuring instrument as determined once prior to performance tests and durability tests

3.9.4**durability error**

difference between the intrinsic error after a period of use and the initial intrinsic error

3.9.5**maximum permissible error****MPE**

highest values of the error (positive or negative) permitted

3.10**Types of faults****3.10.1****fault**

difference between the error of indication and the intrinsic error of the instrument

3.10.2**transitory fault**

momentary variations in the indication, which cannot be interpreted, memorized or transmitted as measurements

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3.10.3

significant fault

fault greater than the absolute value of the MPE and not being a transitory fault

Note 1 to entry: If the MPE is $\pm 2\%$ then the significant fault is a fault larger than $\pm 2\%$.

3.11

reference values of the measurand**RVM**

specified value of the flow rate, the outlet temperature and the temperature difference, fixed to ensure valid intercomparison of the results of measurements

3.12

conventional true value

quantity value attributed by agreement to a quantity for a given purpose

Note 1 to entry: A conventional true value is, in general, regarded as sufficiently close to the true value for the difference to be insignificant for the given purpose.

EXAMPLE A true value is the heat coefficient according to Annex A.

3.13

meter model

different sizes of A_1 thermal energy meters A_1 or sub-assemblies having a family similarity in the principles of operation, construction and materials

3.14

electronic device

device employing electronic elements and performing a specific function

3.15

electronic element

smallest physical entity in an electronic device which uses electron hole conduction in semi-conductors, or electron conduction in gases or in a vacuum

3.16

qualifying immersion depth of a temperature sensor

immersion depth over which the sensor measures with an accurate temperature value

Note 1 to entry: The conditions to define the qualified immersion depth are written in A_1 EN 1434-4:2015+A1:2018, 7.4.4.1 A_1 .

3.17

self-heating effect

increase in temperature signal that is obtained by subjecting each temperature sensor of a pair to a continuous power dissipation of 5 mW when immersed to the qualifying immersion depth in a water bath, having a mean water velocity of 0,1 m/s

3.18

 A_1 thermal energy meters A_1

instrument intended for measuring the energy which in a heat-exchange circuit is absorbed (cooling) or given up (heating) by a liquid called the heat-conveying liquid

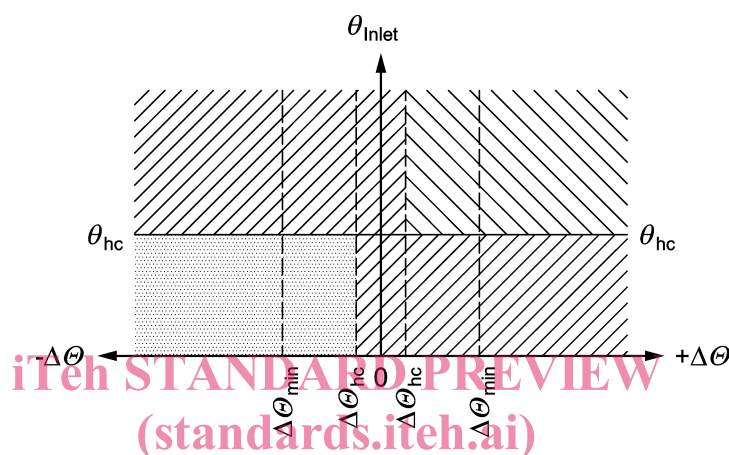
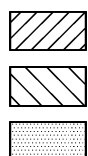
3.19**meters other than for heating****3.19.1****cooling meter**

▣ thermal energy meter (▣) designed for cooling applications at low temperatures, normally covering the temperature range 2 °C to 30 °C and $\Delta\theta$ up to 20 K

3.19.2**bifunctional meters for change-over systems between heating and cooling**

instrument measuring heating and cooling energy in two separate registers

Note 1 to entry: In other directives and requirements, bifunctional meters are called combined meters.

**Key**

No energy recording [SIST EN 1434-1:2016+A1:2019](https://standards.iteh.ai/catalog/standards/sist/6163cafa-4225-48c1-8920-dbd226716f2c/sist-en-1434-1-2016a1-2019)
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Heating

Cooling

Figure 1 — Example for function of heating and cooling register

3.20**flow direction**

direction of the liquid going through the system from inlet to outlet

Note 1 to entry: The inlet is for the heating case the hot side and for the cooling case the cold side.

Note 2 to entry: In the literature the word “flow” is also being used for “inlet”, and the word “return” is also being used for “outlet”.

Note 3 to entry: Different temperature values for θ_{hc} for heating and cooling applications may also occur.

3.21**electrical pulse**

electrical signal (voltage, current or change in resistance), that departs from an initial level for a limited duration of time and ultimately returns to the original level

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3.22

pulse output and input devices

3.22.1

pulse output device

functional part of flow sensor, calculator or auxiliary devices

EXAMPLE Remote displays or input devices of control systems.

3.22.2

pulse input device

functional part of flow sensor, calculator or auxiliary devices

EXAMPLE Remote displays or input devices of control systems.

3.23

maximum admissible temperature

maximum temperature of the heat conveying liquid the meter can withstand in combination with the maximum admissible working pressure and the permanent flow rate for short periods of time (< 1 h / day; < 200 h / year) without a significant fault after the exposure to this maximum admissible temperature

3.24

durability

characteristic of a measuring instrument to keep the metrological characteristics over time (e.g. to fulfil the double of MPE), provided that it is properly installed, maintained and used within the permissible environmental conditions

3.25

long life flow sensor

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flow sensor designed to have a longer lifetime than a normal flow sensor, which typically has a durability of 5 years under the specified operating conditions

3.26

user interface

interface forming part of the instrument that enables information to be passed between a human user and the measuring instrument or its components (e.g. display)

3.27

communication interface

electronic, optical, radio or other technical interface that enables information via correct transceiving of at least thermal energy to be passed between measuring instruments, sub-assemblies or external devices

3.28

A1 meter for smart metering

thermal energy meter with the capability of data communication and support of smart metering functionalities

Note 1 to entry: Data could be transmitted via user interface and/ or communication interface in fixed time intervals and/or on request.

Note 2 to entry: For more information on smart meters, see standard series EN 13757 and CEN/CLC/ETSI/TR 50572. A1

3.29**registration device**

an optional additional device fitted to the meter as an integral part or separate device, in order to register the amount of thermal energy accumulated in additional registers during periods, depending on conditions, e. g. flow rate, inlet or outlet temperatures, temperature differences or time points

3.30**register**

component of a registration device which contains accumulated or actual values e. g. thermal energy, volume, maximum flow rate, power or temperature

3.31**interval register**

register which contains frequently accumulated or copied values used for registration of billing purposes and/ or for controlling processes

Note 1 to entry: During consecutive time intervals values could be achieved by copying from an accumulating main register which contains actual values of e.g. thermal energy or volume.

Note 2 to entry: During consecutive time intervals the measured process values of flow rate and/or temperature could be additionally stored.

3.32**maximum flow**

highest rate of flow which is expected at operating conditions

Note 1 to entry: For the limits of flow rates, see 5.3.

4 Types of instruments

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4.1 General

For the purposes of this European Standard, $\boxed{A_1}$ thermal energy meters $\langle A_1 \rangle$ are defined either as complete instruments or as combined instruments.

4.2 Complete instrument

A $\boxed{A_1}$ thermal energy meter $\langle A_1 \rangle$, which does not have separable sub-assemblies as defined in 4.5.

4.3 Combined instrument

A $\boxed{A_1}$ thermal energy meter $\langle A_1 \rangle$, which has separable sub-assemblies as defined in 4.5.

4.4 Hybrid instrument

A $\boxed{A_1}$ thermal energy meter $\langle A_1 \rangle$, which for the purpose of pattern approval and verification can be treated as a combined instrument as defined in 4.3 or combinations between sub-assemblies. However, after verification, its sub-assemblies shall be treated as inseparable.

NOTE Hybrid instruments are often called “compact instruments”.

4.5 Sub-assemblies of a $\boxed{A_1}$ thermal energy meter $\langle A_1 \rangle$, which is a combined instrument**4.5.1 General**

The flow sensor, the temperature sensor pair and the calculator or a combination of these.