SLOVENSKI STANDARD
SIST EN 1434-6:2022

01-november-2022

Nadomešča:
SIST EN 1434-6:2016+A1:2019

Merilniki toplote - 6. del: Vgradnja, zagon, nadzor in vzdrževanje

Thermal energy meters - Part 6: Installation, commissioning, operational monitoring and maintenance

Thermische Energiemessgeräte - Teil 6: Einbau, Inbetriebnahme, Überwachung und Wartung

Compteurs d'énergie thermique - Partie 6 : Installation, mise en service, surveillance et maintenance

Ta slovenski standard je istoveten z: **EN 1434-6:2022**

ICS:

17.200.20	Instrumenti za merjenje temperature	Temperature-measuring instruments

SIST EN 1434-6:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1434-6

September 2022

ICS 17.200.20

Supersedes EN 1434-6:2015+A1:2019

English Version

Thermal energy meters - Part 6: Installation, commissioning, operational monitoring and maintenance

Compteurs d'énergie thermique - Partie 6 : Installation, mise en service, surveillance et maintenance

Thermische Energiemessgeräte - Teil 6: Einbau, Inbetriebnahme, Überwachung und Wartung

This European Standard was approved by CEN on 17 July 2022.

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.

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 CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 1434-6:2022 E

Contents

Page

European foreword 3
1 Scope 5
2 Normative references 5
3 Terms and definitions 5
4 Requirements 6
4.1 Design requirements 6
4.2 Installation requirements 8
4.3 Thermal energy meter commissioning 8
4.3.1 General 8
4.3.2 Certification check 9
4.3.3 Installation check 9
4.3.4 Thermal energy meter security 9
4.4 Operating requirements with heat-conveying liquids other than water 10
Annex A (informative) Thermal energy meter installation 11
A.1 General 11
A.2 Criteria for the selection of a thermal energy meter 11
A.3 Quality of the heat conveying liquid 12
A.3.1 General 12
A.3.2 Primary water quality 12
A.3.3 Secondary water quality 12
A.3.4 Monitoring heat conveying liquids other than water 12
A.4 Thermal energy meter flow circuit design 14
A.5 Additional recommendations for cooling application 15
A.6 Examples for the installation of thermal energy meters 15
A.7 Additional recommendations for large pipes > DN 250 21
Annex B (informative) Thermal energy meter operational monitoring and maintenance 23
B.1 Introduction 23
B.2 Thermal energy meter service life 23
B.3 Thermal energy meter monitoring procedures 23
B.4 Maintenance check list 24
B.5 Replacement of failed thermal energy meters 24
Annex C (informative) Suggested gauge for checking the dimensions of installed temperature sensor pockets 26
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/32/EU aimed to be covered 27
Bibliography 28

European foreword

This document (EN 1434-6:2022) 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 March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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 supersedes EN 1434-6:2015+A1:2019.

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

— *Part 1: General requirements*;

— *Part 2: Constructional requirements*;

— *Part 3: Data exchange and interfaces*[1];

— *Part 4: Pattern approval tests*;

— *Part 5: Initial verification tests*;

— *Part 6: Installation, commissioning, operational monitoring and maintenance*.

In comparison with EN 1434-6:2015+A1:2019, the following changes have been made:

— the title of this standard has been changed into “Thermal energy meters”;

— Annex ZA has been adjusted to the new Directive 2014/32/EU (MID);

— wording “heat meter” has been partly and where applicable changed into “thermal energy meter” within the whole document;

— new clauses have been inserted: 4.1.4, 4.1.5, 4.4, A.3.4, 3.7.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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,

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

Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document specifies commissioning, operational monitoring and maintenance and applies to thermal energy meters. Thermal energy meters 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 thermal energy meter indicates the quantity of thermal energy in legal units.

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

This document is not applicable to:

— electrical safety requirements;

— pressure safety requirements; and

— surface mounted temperature sensors.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1434-1:2022, *Thermal energy meters — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1434-1:2022 and the following apply.

ISO and IEC maintain terminological 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
thermal energy system
heating or cooling installations of the dwelling or premises, including the exchange circuit, the thermal energy meter, the associated fittings and the electrical equipment

Note 1 to entry: The heating or cooling systems typically commences and finishes at the two connections to the heat or cooling mains.

3.2
thermal energy mains
heat or cooling supplier's distribution pipes to which the consumer's installation is connected

3.3
inlet and outlet limbs
pipes connecting the heating or cooling system to the thermal energy mains

3.4
primary circuit
circuit hydraulically connected to the thermal energy mains

3.5
secondary circuit
circuit hydraulically separated from the primary circuit

3.6
competent authority
persons or organizations charged with the responsibility for the thermal energy meter and/or its installation

3.7
cooling system
cooling installation of an apartment or building, including cooling exchanger circuit, cooling meter, accessories and electrical equipment

Note 1 to entry: The cooling system usually starts and ends at the two connections to the cooling distribution network.

4 Requirements

4.1 Design requirements

4.1.1 When designing the heating and cooling system, the thermal energy meter's manufacturer specification and installation instructions shall be followed. The design shall make monitoring and maintenance possible. An example is given in Annex B.

For q_p 6 m^3/h and less, it is recommended to use direct short sensors. To achieve good temperature sensitivity, direct sensors should be installed without temperature pockets. Temperature pockets should only be used when required for safety reasons.

These installation points shall be insulated in accordance with the applicable legal regulations or other technical measures shall be taken to reduce dissipation errors.

4.1.2 To avoid systematic measurement errors, the temperature sensors in the supply and return pipes shall be used at almost identical pressure conditions.

For typical systematic negative error as a function of differential pressure and temperature difference, see Table 1. Table 1 is only applicable to the medium water.

Table 1 — Typical systematic negative error as a function of differential pressure and temperature difference

Diff pressure in bar	Temperature difference in K							
	3	**5**	**10**	**20**	**30**	**40**	**50**	**60**
0,5	0,2	0,2	0,1	0,1	0,1	0	0	0
1	*0,5*	*0,4*	0,3	0,2	0,1	0,1	0,1	0,1
2	*0,9*	*0,7*	*0,5*	0,3	0,2	0,2	0,1	0,1
3	*1,4*	*1,1*	*0,8*	*0,5*	0,3	0,2	0,2	0,2
4	*1,8*	*1,5*	*1,0*	*0,6*	*0,4*	0,3	0,3	0,2
5	*2,3*	*1,9*	*1,3*	*0,8*	*0,5*	*0,4*	0,3	0,3
6	*2,7*	*2,2*	*1,5*	*0,9*	*0,6*	*0,5*	*0,4*	0,3
7	*3,2*	*2,6*	*1,9*	*1,1*	*0,7*	*0,6*	*0,5*	*0,4*
8	*3,6*	*3,0*	*2,0*	*1,2*	*0,9*	*0,7*	*0,5*	*0,4*
9	*4,1*	*3,3*	*2,3*	*1,4*	*1,0*	*0,7*	*0,6*	*0,5*
10	*4,5*	*4,0*	*2,5*	*1,5*	*1,1*	*0,8*	*0,7*	*0,5*

The values are shown as fraction of the maximum permissible error for the calculator. The values below the marked line are higher than 1/3rd of the maximum permissible error for the thermal energy calculator. If the resulting error is higher than 1/3rd of the maximum permissible error, it is recommended to change the installation to have smaller differential pressure.

NOTE In cases where flows from two different loads with different temperatures (e.g. for space heating and domestic warm water) are merged together just before the temperature sensor, the optimum position for the sensor is after the flow sensor.

4.1.3 For bifunctional meters for change-over systems between heating and cooling additional requirements are necessary to ensure the correct switching over function between the heating and cooling register. These requirements are:

— the lowest operating temperature in the inlet pipe at heating conditions shall be at least 3 °C higher than any specified optional switching over temperature θ_{hc};

— the highest operating temperature in the inlet pipe at cooling conditions shall be at least 3 °C lower than any specified optional switching over temperature θ_{hc};

— the minimum temperature difference in heating and cooling application shall be more than 3 K.

NOTE The above-mentioned temperature range of at least 3 °C covers the maximum accepted uncertainty in measured temperature and the cable resistance.

A temperature sensor with smaller tolerances than 2 °C for measuring of the measured temperature is recommended.

4.1.4 In the heating or cooling system there shall be at least one tapping point for the check according to 4.4 “Operating requirements”.

4.1.5 Temperature sensors for fast response meters shall be direct mounted probes, type DS or type DL. Pocket mounted probes are not suitable for fast response meters.

4.2 Installation requirements

The thermal energy meter shall be installed in accordance with the manufacturer's instructions.

Before installation, the circuit into which the flow sensor is to be installed shall be thoroughly flushed to remove debris. The strainer, where fitted, shall be cleaned.

The thermal energy meter shall be protected from the risk of damage by shock and vibration induced by the surroundings at the place of installation.

The thermal energy meter shall not be subjected to undue stresses caused by pipes and fittings.

The pipelines of the heating system up and downstream of the thermal energy meter shall be adequately anchored.

Thermal energy meters designed to operate from an AC mains supply shall be wired in accordance with wiring regulations applicable.

The AC mains power supply shall be secured against accidental interruption. However, circuit protection shall be incorporated according to the state of the art, to safely disconnect the device when electrical problems occur.

Measurement signal leads shall not be laid directly alongside other leads such as mains supply cables, low voltage supply cables and data communication cables and shall be independently supported. The separation between those groups shall not be less than 50 mm. Unless the calculator under installation was type tested according to the latest version of EN 1434-4:2022, it is recommended to install cables and calculators with a distance of at least 60 cm to strong electromagnetic fields, e.g. frequency controlled pumps and similar high energy mains cables.

Mains and external signal cables longer than 10 m shall in areas where lightning is frequent be protected with an external lightning surge protection at the cable entrance to the building.

Each signal lead between temperature sensors and calculator shall be one continuous length without joints except 4-wire connection solutions which are approved.

Signal circuits between parts of a thermal energy meter shall be so installed as to deter unauthorized interference and disconnection.

Precautions shall be taken to prevent damage to the thermal energy meter by unfavourable hydraulic conditions (cavitation, surging, water hammer).

When the installation of the thermal energy meters is complete, it shall be inspected and approved by representatives of the competent authority in accordance with established procedures and the inspection shall be documented.

Installation should be done according to national legislation on legal metrology.

4.3 Thermal energy meter commissioning

4.3.1 General

The responsibility for the carrying out of each of the inspection phases is not necessarily restricted to one person or one authority depending on the national legislation on legal metrology, but however arranged, the following points shall be addressed and responsibilities defined.

4.3.2 Certification check

Before commissioning commences it shall be ascertained firstly that the correct thermal energy meter has been installed by comparing the thermal energy meter manufacturer's type and size designation against the system specification. Secondly, it shall be checked that the thermal energy meter, if a complete instrument, bears the correct pattern approval mark and, if a combined instrument, that each of the meters sub-assemblies bear the pattern approval marks stipulated in the pattern approval document for the thermal energy meter installed.

4.3.3 Installation check

At least the following points shall be checked:

— Is the flow sensor mounted in the correct position and with the correct flow direction?

— Does the temperature sensor fit correctly into the pocket (pockets shall be marked “EN 1434” or dimensions checked)? Instructions on how to check this can be found in Annex C.

— Are the temperature sensors correctly installed?

— Is the thermal energy meter installed at a safe distance from sources of electromagnetic interference (switchgear, electric motors, fluorescent lights)?

— If applicable, has the thermal energy meter been correctly earthed?

— The specified protection class (IP) has to be ensured: Is every cable diameter within the minimum and maximum diameter as specified by the manufacturer?

— Are the gaskets dedicated to the application (e.g. temperature range, pressure, durability, medium)?

— Are the accessories correctly installed according to the installation instructions of the manufacturer and operator?

— Is the thermal energy meter seen to be functioning when the heating or cooling system starts operating?

4.3.4 Thermal energy meter security

At the completion of commissioning, the thermal energy meter's protective devices shall be sealed by representatives of the competent authority. For any further adjustment of the meter or for replacement of sub-assemblies, batteries, etc., it will thus be necessary to break one or more seals.

If a seal has to be broken, then the renewal should be conducted in conformity with the national legislation of legal metrology.

4.4 Operating requirements with heat-conveying liquids other than water

Damage to the liquid due to overheating and oxygen influence shall be prevented by suitable design and operational management of the system. If the liquid has been damaged, the liquid in the system shall be exchanged.

The concentration of the heat conveying liquid other than water shall be monitored. Tapping should be performed through the filling/draining point. Any dead volumes of stagnant liquid shall be drained before sampling. The concentration shall be determined and documented based on a density measurement or the refractive index (see A.3.4) when the system is initiated. If it can be demonstrated that the same accuracy can be achieved by another method, this method may also be used. In addition, the determined concentration of the filled mixture shall be compared with the initial concentration of the liquid. If the concentration deviates by more than ± 1,0 % compared to the initial concentration, it shall be brought to the initial concentration of the system filling (e.g. initiated by dilution or segregation). When refilling, the concentration of the initial fluid shall be maintained. Another option is that the meter has the functionality to self-adapt to the new physical properties of the liquid.

It shall then be checked at least every 12 months. The results of the test shall be officially documented including following information: name of investigator, date of investigation, instrumentation used, result. If the concentration deviates by more than ± 1,0 % compared to the initial concentration, it shall be brought to the initial concentration of the system filling, or the meter needs the functionality to self-adapt to the physical properties of the liquid. The concentration shall be determined at a reference temperature. This is particularly necessary because the density is highly temperature dependent.

The meter shall only be approved for liquids that have been traceably tested for their thermophysical properties, considering a permissible density fluctuation of ± 0,001 g/cm^3.

The composition of the heat conveying liquid and its concentration shall be indicated on the type plate of the heating or cooling system.