SLOVENSKI STANDARD
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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: **prEN 1434-6**

ICS:

17.200.20	Instrumenti za merjenje temperature	Temperature-measuring instruments

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

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

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 176.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 1434-6:2020) has been prepared by Technical Committee CEN/TC 176 “Thermal energy meters”, the secretariat of which is held by SIS.

This document is currently submitted to the CEN Enquiry.

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

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

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

— wording “heat meter” was partly and where applicable changed into “thermal energy meter” within the whole document.

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).

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

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

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.

Electrical safety requirements are not covered by this document.

Pressure safety requirements are not covered by this document.

Surface mounted temperature sensors are not covered by this document.

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

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.

prEN 1434-1:2020, *Thermal energy meters — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 1434-1:2020 and the following apply.

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

— IEC Electropedia: available at http://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 suppliers 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.

For q_p 6 m³/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 prEN 1434-4, 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 shall 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)?

— 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)?

Where called for, 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 shall 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 Annex A, 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.