BRITISH STANDARD

BS EN
1434-6:2007

Heat meters —

Part 6: Installation, commissioning, operational monitoring and maintenance

The European Standard EN 1434-6:2007 has the status of a British Standard

ICS 17.200.10

BSI
British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 1434-6:2007. It supersedes BS EN 1434-6:1997 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee CPI/30, Measurement of fluid flow in closed conduits, to Subcommittee CPI/30/7, Volume flow-rate methods.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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

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

Wärmezähler - Teil 6: Einbau, Inbetriebnahme, Überwachung und Wartung

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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Contents

Page

Foreword

This document (EN 1434-6:2007) has been prepared by Technical Committee CEN/TC 176 “Heat Meters”, the secretariat of which is held by DS.

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of an identical text or by endorsement, at the latest by August 2007, and conflicting national standards shall be withdrawn at the latest by August 2007.

This document supersedes EN 1434-6:1997.

The other parts are:

Part 1 - General requirements

Part 2 - Constructional requirements

Part 3 - Data exchange and interfaces

Part 4 - Pattern approval tests

Part 5 - Initial verification tests

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1 Scope

This European Standard specifies installation, commissioning, operational monitoring and maintenance and applies to heat meters, that is to instruments intended for measuring the heat which, in a heat-exchange circuit, is absorbed (cooling) or given up (heating) by a liquid called the heat-conveying liquid. The heat meter 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.

2 Normative references

The following referenced documents are indispensable for the application 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 1434-1:2007, *Heat meters — Part 1: General requirements*

3 Terms and definitions

For the purpose of this document, the terms, definitions and symbols given in Clause 4 of EN 1434-1:2007 and the following apply.

3.1
heating system
heating installation of the dwelling or premises, including the exchange circuit, the heat meter, the associated fittings and the electrical equipment

NOTE The heating system typically commences and finishes at the two connections to the heat mains.

3.2
heat mains
heat suppliers distribution pipes to which the consumer's installation is connected

3.3
flow and return limbs
pipes connecting the heating system to the heat mains

3.4
primary circuit
circuit hydraulically connected to the heat 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 heat meter and/or its installation

4 Requirements

4.1 Design requirements

When designing the heating system, the heat meter supplier's installation instructions shall be followed.

NOTE For DN 25 and smaller, it is possible to use short probes. To achieve good temperature sensitivity, probes should be installed without temperature pockets. Temperature pockets should only be used when required for safety reasons.

4.2 Installation requirements

The heat meter shall be installed in accordance with the supplier'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 heat meter shall be protected from the risk of damage by shock and vibration induced by the surroundings at the place of installation.

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

The pipe lines of the heating system up and downstream of the heat meter shall be adequately anchored.

Heat 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.

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.

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

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

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

4.3 Heat 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, 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 heat meter has been installed by comparing the heat meter supplier's type and size designation against the system specification. Secondly, it shall be checked that the heat 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 heat meter installed.

4.3.3 Installation check

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 shorter than 140 mm shall be marked "EN 1434" or dimensions checked)?
- Are the temperature sensors correctly installed?
- Is the heat meter installed at a safe distance from sources of electromagnetic interference (switchgear, electric motors, fluorescent lights)?
- Where called for, has the heat meter been correctly earthed?
- Are the accessories correctly installed according to the installation instructions of the supplier and operator?
- Is the heat meter seen to be functioning when the heating system starts operating?

4.3.4 Heat meter security

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

Seals shall be renewed in accordance with appropriate regulations.

Annex A
(informative)

Heat meter installation

A.1 Introduction

This annex gives recommendations for the installation of heat meters into the heating system of which they form a component.

It includes reference to the quality of the heat conveying liquid and contains recommendations of direct concern to the distributor of heat, the building owner and the final consumer.

A.2 Criteria for the selection of a heat meter

The type, size, accuracy and environmental class of a heat meter is determined according to the operating and environmental conditions of the installation, taking into account particularly the following:

a) pressure of the heat conveying liquid;

b) physical and chemical characteristics of the heat conveying liquid;

c) acceptable pressure loss across the heat meter;

d) accuracy requirements;

e) temperature ranges in flow and return limbs to the heating system and the system temperature difference;

f) expected maximum and minimum flow rate of the heat conveying liquid;

g) required thermal power of the heating system;

h) nature of the flow rate through the heat meter, whether constant, variable or intermittent;

i) requirements concerning the electrical supply to the heat meter;

j) special requirements of the space around the heat meter for ease of reading, security installation and servicing of the meter;

k) requirements for connections, i.e. flanges, fittings and meter dimensions.

A.3 Quality of the heat conveying liquid

A.3.1 General

Heat meters in general are constructed to withstand variations in the chemical constituents and the acidity or alkalinity of the heat conveying liquid. However, the presence of solids in suspension and their deposition onto the surfaces of the passages of the heat meter or their effect on the moving parts of a mechanical flow sensor causes degradation of the performance with time.

Solids may be present as products of corrosion from the materials of which the heating system and the supply mains are constructed. They may also be created, in the case of hot water systems, within the circuit by the action of heat on the chemicals contained in the water.

A.3.2 Primary water quality

The quality of the water in primary circuits, experience shows, is necessarily high and closely controlled because of its boiler origin. Hence heat meters in primary circuits tend to function in a satisfactory environment.

A.3.3 Secondary water quality

Heat meters functioning in secondary circuits, experience shows, are more prone to problems arising from the water quality. Secondary water quality is normally the responsibility of the building owner.

When purchasing or specifying heat meters the owner of the meter should consult with the meter supplier to determine any particular water requirements.

A.4 Heat meter flow circuit design

Circuit design should be arranged/modified to ensure efficiency of meter operation and should take account of individual installation requirements.

Typical circuit design layouts are indicated in Figures A.1 to A.3.

It is also recommended that arrangements are made to permit in-situ checking of heat meters, for example, a double set of temperature measuring points.

Thermal comfort in smaller dwellings will normally require the use of automatic control devices if optimum energy performance of the installation is to be obtained.

The flow and return temperature sensors are installed in the same circuit. Where possible, the pipes should have identical dimensions and similar velocity profiles. The two temperature sensors should be mounted in an identical manner.

For temperature measurement, long probes are given preference.

Evaluating small circuits therefore could involve consideration of the following aspects:

- heat consumption above the upper limit of flow rate q_s;
- heat consumption below the lower limit of flow rate q_i;
- dynamic stability considerations.

As a general rule heat meters are specified and tested under steady state conditions within the maximum and minimum limits specified by the supplier.

When setting up requirements for small circuits the foregoing effects should be considered from a technical and economic viewpoint.

To minimize problems arising from these phenomena the following actions can be taken:

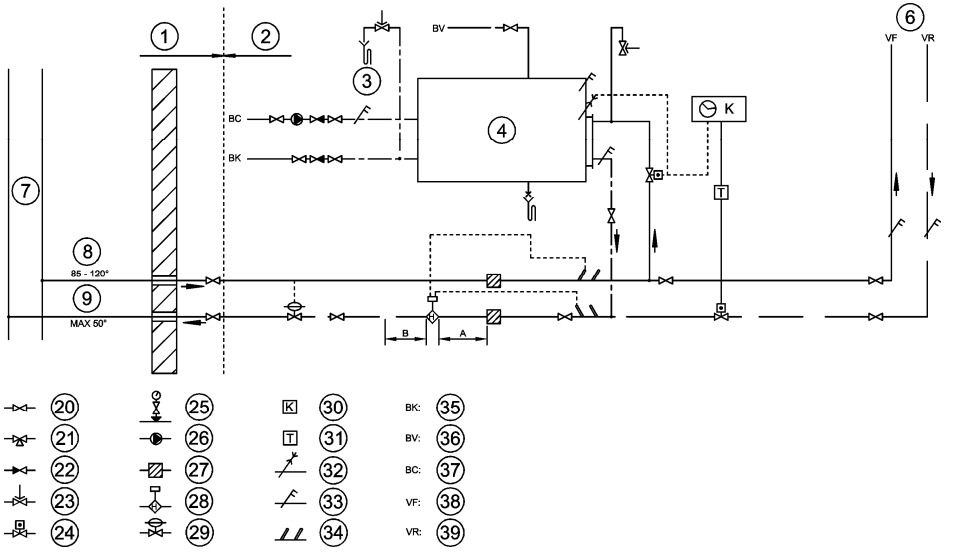
- installation of flow and temperature limiters when q_s may be exceeded;
- employment of heat meters with a large measuring range (1:100) when very low flow rates are expected;

- employment of heat meters with a high sampling rate when the heat consumption fluctuates.

In the case of heat meters operated by battery, the life time of the battery should be considered.

A.5 Additional recommendations for cooling application

- Install flow sensor at high temperature line to reduce condensation, and to improve meter performance, due to temperature dependence.
- As cooling meters very often operate with a very low temperature difference, maximum care should be taken at temperature sensor selection and installation. Symmetrical installation and insulation of the sensors are very important factors.
- Balanced adjustment of temperature measurement, inside the calculator of a hybrid instrument, at the specific flow temperature, will improve performance.
- To avoid the accumulation of condensation, install pockets with opening downwards.



Key

A distance $\geq 10 \times$ DN

B distance $\geq 8 \times$ DN

1 supplied by the district heating company

2 owner

3 drain

4 hot water cylinder

6 heating circuit

7 heat-mains

8 flow limb

9 return limb

20 isolating valve

21 three-way valve

22 non return valve

23 safety valve

24 control valve

25 pressure gauge

26 pump

27 strainer

28 heat meter

29 pressure differential valve

30 programmer

31 room thermostat

32 thermostat

33 thermometer

34 double set of temperature pockets

35 sanitary water - cold

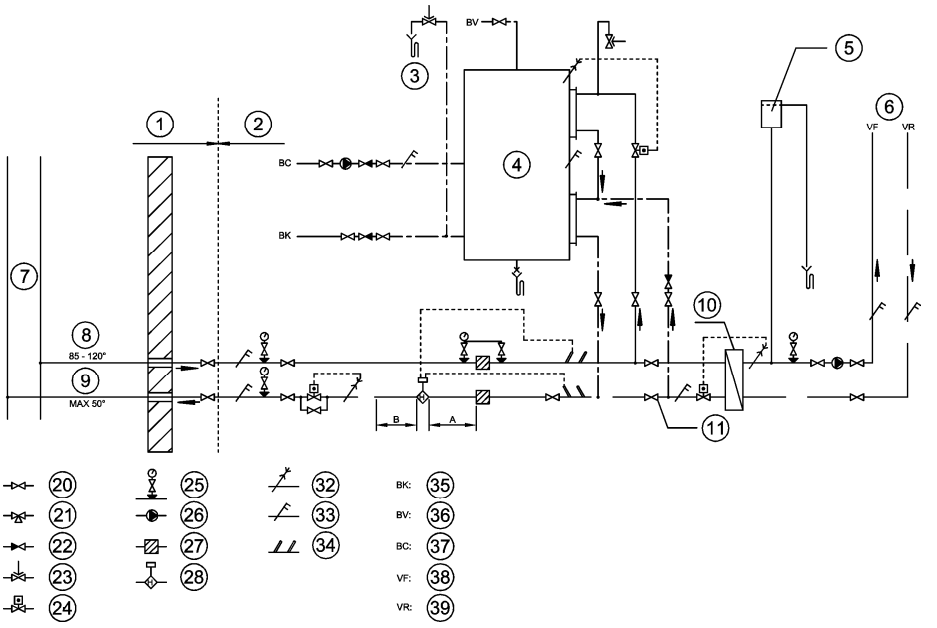
36 sanitary water - warm

37 sanitary water - circulated

38 heating circuit - flow

39 heating circuit – return

Figure A.1 — Typical domestic heating circuit – direct type



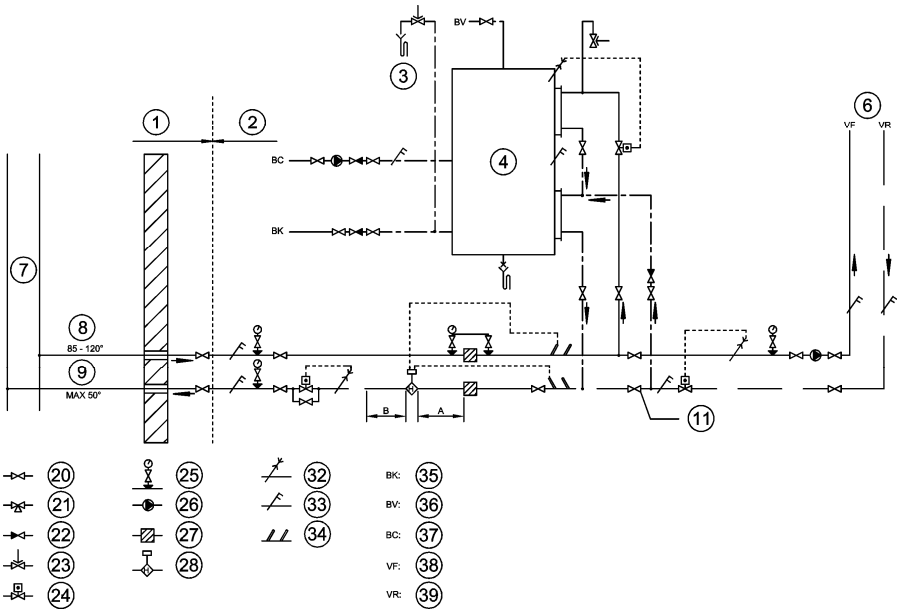
Key

A distance $\geq 10 \times$ DN

B distance $\geq 8 \times$ DN

1 supplied by the district heating company
2 owner
3 drain
4 hot water cylinder
5 expansion
6 heating circuit
7 heat-mains
8 flow limb
9 return limb
10 heat exchanger
11 normally closed isolating valve
20 isolating valve
21 three-way valve
22 non return valve
23 safety valve
24 control valve
25 pressure gauge
26 pump
27 strainer
28 heat meter
32 thermostat
33 thermometer
34 double set of temperature pockets
35 sanitary water - cold
36 sanitary water - warm
37 sanitary water - circulated
38 heating circuit - flow
39 heating circuit - return

Figure A.2 — Heating system with heat exchanger



Key

A distance $\geq 10 \times$ DN

B distance $\geq 8 \times$ DN

1 supplied by the district heating company
2 owner
3 drain
4 hot water cylinder
6 heating circuit
7 heat-mains
8 flow limb
9 return limb
11 normally closed isolating valve

20 isolating valve
21 three-way valve
22 non return valve
23 safety valve
24 control valve
25 pressure gauge
26 pump
27 strainer
28 heat meter

32: thermostat
33 thermometer
34 double set of temperature pockets
35 sanitary water - cold
36 sanitary water - warm
37 sanitary water - circulated
38 heating circuit - flow
39 heating circuit – return

Figure A.3 — Heating system – direct type

Annex B
(informative)

Heat meter operational monitoring and maintenance

B.1 Introduction

This annex includes recommendations for the operational monitoring and maintenance of new and replacement heat meters. It refers to heat meter life, describes monitoring procedures and includes a recommended maintenance check list. These recommendations are of direct concern to the distributor of heat, the building owner and the final consumer.

B.2 Heat meter service life

The competent authority may specify the length of time or a procedure for determining the length of time for which the initial verification certificate of the heat meter is valid. At the end of this period the heat meter would normally be replaced. Any heat meter operational, or maintenance check, should commence by checking that where an operational life has been stipulated, this has not been exceeded.

B.3 Heat meter monitoring procedures

In the operation and management of metered heating installations, it is important to monitor the efficiency of the heat meter operation. This involves inspection visits to each meter and the institution of monitoring procedures within the organization to check that the indication of consumption is what might be expected for that meter.

Without recalibrating the heat meter in-situ, or removing it and recalibrating it in the laboratory, the object of monitoring, as distinct from inspection, is to be able to form an educated opinion as to whether the meter's indications are correct. This may result from knowledge of the heat meter's duty, past history, the season's weather etc.

Routines have to be developed to achieve an acceptable balance between the cost of monitoring and inspection and the economic consequences of defective meters.

By comparing the climatic data for previous years and the past heat consumption recorded for a particular meter with the climatic data for the present heating season, it is possible to arrive at an estimated consumption for that heat meter, or to identify abnormalities in its reading.

For obvious reasons, it is desirable to read heat meters at frequent intervals, but this may prove expensive and uneconomic. For large heat meters, it is recommended that heat meters should be read at least four times a year.

B.4 Maintenance check list

The Service and Repair Manual recommendations should be followed, including as a minimum, the following list (see also Figure B.1).

- Check that the security seals are intact and undamaged.

- Check that the meter is functioning.

- Check that the local indication of consumption agrees with the remote indication of consumption and that the security wiring and codes are operational.

- Check that the heat meter's isolating valves are fully open, that they can be closed and that they are not leaking.

- Check for signs of leaks from the meter, associated fittings and connections.

- Check for water penetration at the meter site leading to water dripping onto or flooding the meter.

- Check that all meter cables are firmly connected and that the cables are undamaged and unaffected by ambient heat or other action.

- Check earth continuity, where applicable.

- Check that the heat meter support brackets, clamps etc. are properly fitted, functional and in good order.

- Check and, if required, clean or replace filter elements.

- Check that the ambient temperature is within the range specified for the meter.

- Record the heat meter reading.

B.5 Replacement of failed heat meters

The reason for failure of a heat meter should be investigated at the installation site, since defects may not be recognized once the heat meter has been removed.

Check the following points:

- Are there signs of illegal tampering with the meter?

- Are seals broken?

- Has the heat meter been installed correctly, according to the supplier's instructions etc.?

The replacement of a failed meter by a new or reconditioned unit is governed by exactly the same procedures as those governing new installations as given in Annexes A and B.

In ascertaining the cause of failure, the interests and privacy of the consumer should at all times be respected.

INSTALLATION ADDRESS:

VISUAL CONTROL:		
SEALINGS	INTACT	
	BROKEN	
TEMPERATURE SENSORS	PROPER PLACED	
	DISMANTLED	
ELECTRICAL CONNECTIONS	INTACT	
	DISCONNECTED	
	BATTERY FAILURE	
FILTER	CLEAN	
	DIRTY	
	CHOKED	
SIGNS OF PHYSICAL DAMAGE		

DATE OF OPERATION:		
	OLD HEAT METER	NEW HEAT METER
SERIAL NUMBER		
HOUR COUNTER		
m^3-COUNTER		
kWh-COUNTER		
CUSTOMERS SIGNATURE:		
OPERATORS SIGNATURE:		

INSTRUCTION: IMMEDIATELY AFTER DISMANTLING, THE FLOW METER SHALL BE PLUGGED AND CAREFULLY PLACED IN THE TRANSPORT BOX.

THE HEAT METER MAY NOT BE DISASSEMBLED, CLEANED OR SUBJECTED TO PHYSICAL OVERLOAD OR FROST.

THE HEAT METER AND PRESENT REPORT SHALL BE DELIVERED TO THE CALIBRATION LABORATORY ON DAY OF OPERATION.

Figure B.1 — Maintenance report (example)

Annex C
(informative)

Suggested gauge for checking the dimensions of installed temperature sensor pockets

In 4.3.3 (Installation check) it is prescribed that for sensors shorter than 140 mm it is important to check that the dimensions of the temperature sensor pockets is correct for the intended temperature sensors.

The marking ”EN 1434” proves that the critical internal diameter is correct for a sensor according to this European Standard. If this marking is missing the tool specified below can be used to verify the correct internal diameter.

1) One end of the tool shall fit fully down into bottom of the pocket

2) The other end of the tool is not allowed to fit into the pocket

Dimensions in millimetres

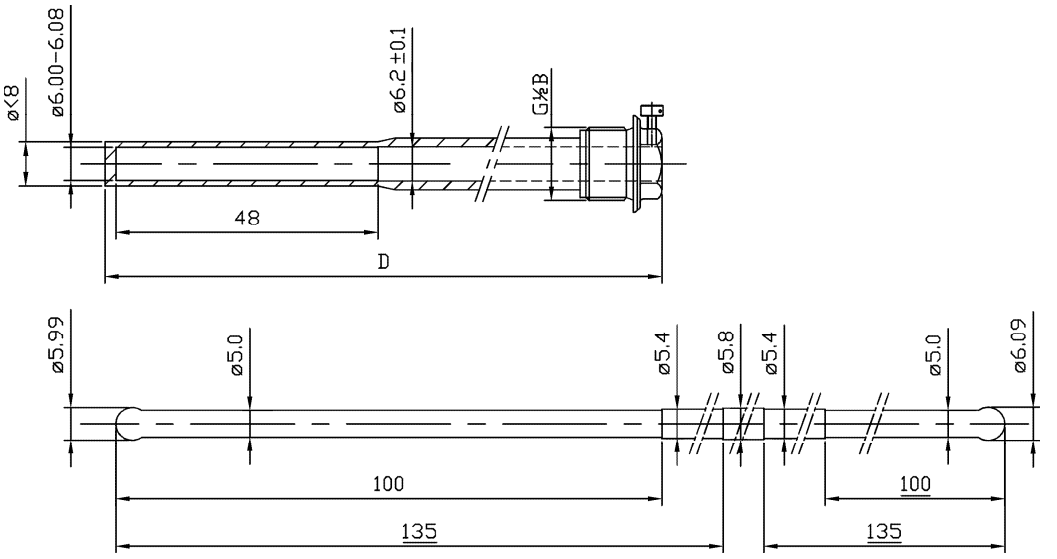


Figure C.1 — Suggested dimensions of gauge shown together with a pocket

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