SLOVENSKI STANDARD

SIST EN 15316-3-2:2007

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Grelni sistemi v stavbah - Metoda izraļ una energijskih zahtev in uļ inkovitosti sistema - 3-2. del: Hiģni razvod tople vode

Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3-2: Domestic hot water systems, distribution

Heizsysteme in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 3-2: Trinkwassererwärmung, Verteilung

Systemes de chauffage dans les bâtiments - Méthode de calcul des exigences énergétiques et des rendements du systeme - Partie 3.2 : Systemes d'eau chaude domestique, distribution

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91.140.10	Sistemi centralnega ogrevanja	Central heating systems

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Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3-2: Domestic hot water systems, distribution

Systèmes de chauffage dans les bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 3-2 : Systèmes de production d'eau chaude sanitaire, distribution

Heizungsanlagen in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 3-2: Trinkwassererwärmung, Verteilung

This European Standard was approved by CEN on 18 August 2007.

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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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Page

Foreword

This document (EN 15316-3-2:2007) has been prepared by Technical Committee CEN/TC 228 “Heating systems in buildings”, 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of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/343), and supports essential requirements of EU Directive 2002/91/EC on the energy performance of buildings (EPBD). It forms part of a series of standards aimed at European harmonisation of the methodology for calculation of the energy performance of buildings. An overview of the whole set of standards is given in prCEN/TR 15615.

The subjects covered by CEN/TC 228 are the following:

— design of heating systems (water based, electrical etc.);

— installation of heating systems;

— commissioning of heating systems;

— instructions for operation, maintenance and use of heating systems;

— methods for calculation of the design heat loss and heat loads;

— methods for calculation of the energy performance of heating systems.

Heating systems also include the effect of attached systems such as hot water production systems.

All these standards are systems standards, i.e. they are based on requirements addressed to the system as a whole and not dealing with requirements to the products within the system.

Where possible, reference is made to other European or International Standards, a.o. product standards. However, use of products complying with relevant product standards is no guarantee of compliance with the system requirements.

The requirements are mainly expressed as functional requirements, i.e. requirements dealing with the function of the system and not specifying shape, material, dimensions or the like.

The guidelines describe ways to meet the requirements, but other ways to fulfil the functional requirements might be used if fulfilment can be proved.

Heating systems differ among the member countries due to climate, traditions and national regulations. In some cases requirements are given as classes so national or individual needs may be accommodated.

In cases where the standards contradict with national regulations, the latter should be followed.

EN 15316 *Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies* consists of the following parts:

Part 1: General

Part 2-1: Space heating emission systems

Part 2-3: Space heating distribution systems

Part 3-1: Domestic hot water systems, characterisation of needs (tapping requirements)

Part 3-2: Domestic hot water systems, distribution

Part 3-3: Domestic hot water systems, generation

Part 4-1: Space heating generation systems, combustion systems (boilers)

Part 4-2: Space heating generation systems, heat pump systems

Part 4-3: Heat generation systems, thermal solar systems

Part 4-4: Heat generation systems, building-integrated cogeneration systems

Part 4-5: Space heating generation systems, the performance and quality of district heating and large volume systems

Part 4-6: Heat generation systems, photovoltaic systems

Part 4-7: Space heating generation systems, biomass combustion systems

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

Introduction

This European Standard is one of a number of standards that together describe methods for calculation of system energy requirements and system efficiencies related to domestic hot water systems. In particular this European Standard specifies methods for calculation of the energy losses of the distribution system.

The user needs to refer to other European Standards or to national documents for input data and detailed calculation procedures not provided by this European Standard.

Only the calculation methods are normative. Values necessary to complete the calculations should be given in a national annex.

1 Scope

This European Standard is part of a set of standards covering methods for calculation of system energy requirements and system efficiencies of heating systems in buildings. In particular this European Standard is one of a number of standards dealing with domestic hot water systems.

The scope of this specific part is to standardise the methods for calculation of:

— thermal losses from the domestic hot water distribution system;

— recoverable thermal losses for space heating from the domestic hot water distribution system;

— auxiliary energy of the domestic hot water distribution system.

These values are input data for calculation of the overall energy use according to prEN 15603 and EN 15316-1.

This European Standard specifies the:

— inputs;

— calculation methods;

— outputs.

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.

Not applicable

3 Terms and definitions

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

3.1
auxiliary energy
electrical energy used by technical building systems for heating, cooling, ventilation and/or domestic hot water to support energy transformation to satisfy energy needs

NOTE 1 This includes energy for fans, pumps, electronics etc. Electrical energy input to a ventilation system for air transport and heat recovery is not considered as auxiliary energy, but as energy use for ventilation.

NOTE 2 In EN ISO 9488, the energy used for pumps and valves is called "parasitic energy".

3.2
building
construction as a whole, including its envelope and all technical building systems, for which energy is used to condition the indoor climate, to provide domestic hot water and illumination and other services related to the use of the building

NOTE The term can refer to the building as a whole or to parts thereof that have been designed or altered to be used separately.

3.3
circulation loop
part of the domestic hot water distribution system where the water circulation is maintained by a pump operating continuously or in cycles during a day

NOTE Where there is a circulation loop, there are heat losses from the pipes during the whole period of water circulation and not only related to hot water draw-offs.

3.4
calculation period
period of time over which the calculation is performed

NOTE The calculation period can be divided into a number of calculation steps.

3.5
domestic hot water heating
process of heat supply to raise the temperature of the cold water to the intended delivery temperature

3.6
domestic hot water distribution system
distribution pipes installed between the heat generator or hot water storage vessel (if present) and the user outlet or outlets. The domestic hot water distribution system may include a circulation loop and individual sections

3.7
individual section of the domestic hot water distribution system
part of the domestic hot water distribution system where the circulation of the domestic hot water is not maintained by a pump but only due to the draw offs

NOTE The heat losses occur due to the energy used in heating up the pipes and fittings of the distribution system.

3.8
energy need for domestic hot water
heat to be delivered to the needed amount of domestic hot water to raise its temperature from the cold network temperature to the prefixed delivery temperature at the delivery point, not taking into account the technical building thermal systems

3.9
energy use for space heating or cooling or domestic hot water
energy input to the space heating or cooling system or the domestic hot water system to satisfy the energy need for space heating or cooling (including dehumidification) or domestic hot water, respectively

NOTE If the technical building system serves several purposes (e.g. space heating and domestic hot water), it can be difficult to split the energy use into that used for each purpose. It can be indicated as a combined quantity (e.g. energy need for space heating and domestic hot water).

3.10
heating or cooling season
period of the year during which a significant amount of energy for heating or cooling is needed

NOTE The season lengths are used to determine the operation period of technical systems.

3.11
heat recovery
heat generated by a technical building system or linked to a building use (e.g. domestic hot water) which is utilised directly in the related system to lower the heat input and which would otherwise be wasted (e.g. preheating of the combustion air by flue gas heat exchanger)

3.12
recoverable system thermal loss
part of a system thermal loss which can be recovered to lower either the energy need for heating or cooling or the energy use of the heating or cooling system

NOTE This depends on the calculation approach chosen to calculate the recovered gains and losses (holistic or simplified approach).

3.13
recovered system thermal loss
part of the recoverable system thermal loss which has been recovered to lower either the energy need for heating or cooling or the energy use of the heating or cooling system

3.14
ribbon heating
also called trace heating. Electrical resistance enveloping the pipes (one way) used to compensate the heat loss of the pipes in order to maintain the domestic hot water temperature in the distribution system at a required temperature

3.15
system boundary
boundary that includes within it all areas associated with the building (both inside and outside the building) where energy is consumed or produced

NOTE Inside the system boundary the system losses are taken into account explicitly, outside the system boundary they are taken into account in the conversion factor.

3.16
system thermal loss
thermal loss from a technical building system for heating, cooling, domestic hot water, humidification, dehumidification, or ventilation or lighting that does not contribute to the useful output of the system

NOTE 1 A system loss can become an internal heat gain for the building, if it is recovered.

NOTE 2 Thermal energy recovered directly in the subsystem is not considered as a system thermal loss but as heat recovery and directly treated in the related system standard.

NOTE 3 Heat dissipated by the lighting system or by other services (e.g. appliances of computer equipment) is not part of the system thermal losses, but part of the internal heat gains.

3.17
tapping program
24-hour cycle that defines a number of domestic hot water draw-off requirements: succession of energy needs corresponding to uses of domestic hot water during a day

3.18
technical building system
technical equipment for heating, cooling, ventilation, domestic hot water, lighting and electricity production composed of sub-systems

NOTE 1 A technical building system can refer to one or to several building services (e.g. heating system, space heating and domestic hot water system).

NOTE 2 Electricity production can include cogeneration and photovoltaic systems.

3.19
technical building sub-system
part of a technical building system that performs a specific function (e.g. heat generation, heat distribution, heat emission)

3.20
zone
part of a building for which the energy need for domestic hot water is to be calculated

4 Symbols, units and indices

For the purposes of this document, the following symbols and units (Table 1) and indices (Table 2) apply.

Table 1 — Symbols and units

Symbol	Name of quantity	Unit
A	area	m^2
b	location factor	-
c	specific heat capacity	J/(kg K)
e	system performance coefficient (expenditure factor)	-
D	diameter	m
f	conversion factor	-
h	height	m
L	length	m
m	mass	kg
n	number of operating times	-
t	time, period of time	s
Q	quantity of heat, energy	J
ϕ	thermal power	W
P	electrical power	W
ψ	heat loss coefficient	W/mK
V	volume	m^3
W	auxiliary (electrical) energy	J
α	energy loss factor	-
η	efficiency	-
θ	celsius temperature	°C
λ	heat conductivity	W/mK

Table 2 — Indices

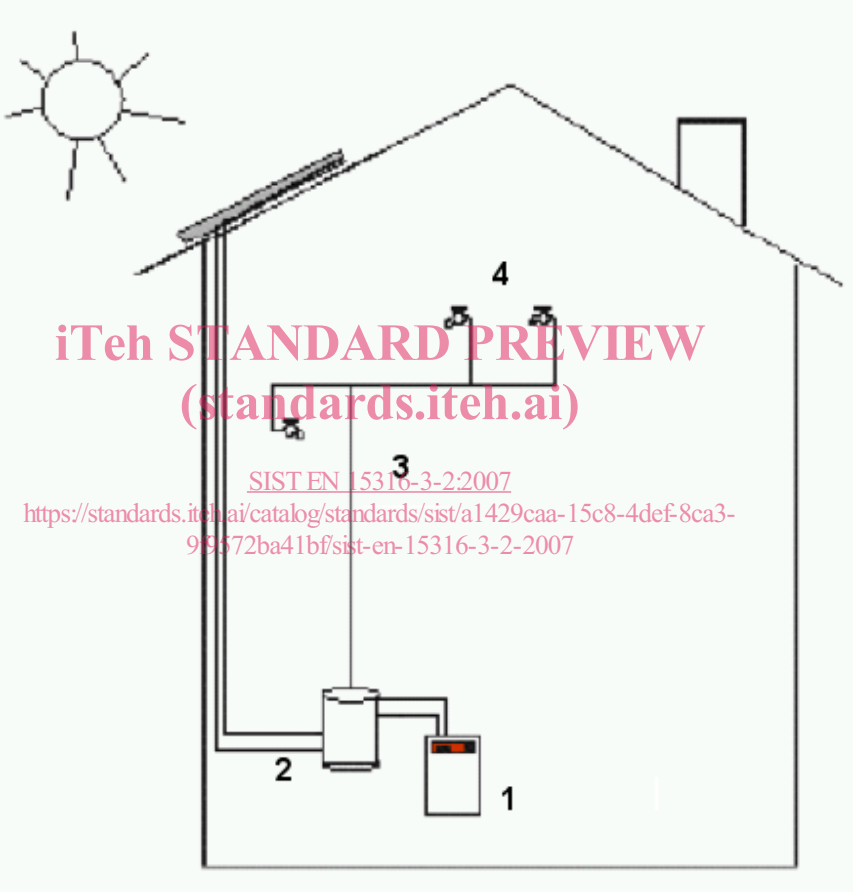
amb	ambient	gen	generation	nom	nominal
avg	average	hs	heated space	on	circulation
B	building	hydr	hydraulic	off	no circulation
col	circulation loop (collective)	in	input to system	out	output from system
dis	distribution	ind	individual	pmp	pump
e	external	int	internal	rib	trace heating
em	emission	ls	losses	tap	deliveries
f	floor	nhs	non heated space	W	domestic hot water

5 Domestic hot water system characteristics

5.1 General

The domestic hot water distribution system is given as one or more pipes installed between the heat generator or hot water storage vessel (if present) and the user outlet or outlets. The domestic hot water distribution system may include a circulation loop.

The most basic system, for which this method is applied, consists of a single distribution pipe connecting a single heat generator, or a storage vessel, and a user outlet (e.g. tap or shower head). This is shown in Figure 1.



Key

1 generation

2 storage

3 distribution

4 emission

Figure 1 — Basic domestic hot water system components

If the building is used for different applications or is divided between different users, the method can be applied to the entire building or to part of the building, as required. The calculation method can also be applied to a building or to part of a building, where there is more than one domestic hot water system installed. For the