SLOVENSKI STANDARD
oSIST prEN 15316-3:2014

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Ogrevalni sistemi v stavbah - Metoda za preračun energijskih zahtev in učinkovitosti sistema - 3. del: Sistemi za ogrevanje in hlajenje prostora

Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3: Space distribution systems (DHW, heating and cooling)

Heizungsanlagen und wasserbasierte Kühlanlagen in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 3: Wärmeverteilungssysteme (Trinkwarmwasser, Heizung und Kühlung)

Systèmes de chauffage et systèmes de refroidissement à eau dans les bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 3: Systèmes de distribution des locaux (eau chaude sanitaire, chauffage et refroidissement)

Ta slovenski standard je istoveten z: **prEN 15316-3**

ICS:

91.140.10	Sistemi centralnega ogrevanja	Central heating systems

oSIST prEN 15316-3:2014 **en,fr,de**

EUROPEAN STANDARD
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ICS 91.140.10; 91.140.30; 91.140.65

Will supersede EN 15316-2-3:2007, EN 15316-3-2:2007

English Version

Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3: Space distribution systems (DHW, heating and cooling)

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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 228.

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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Ref. No. prEN 15316-3:2014 E

Contents

Foreword

This document (prEN 15316-3:2014) has been prepared by Technical Committee CEN/TC 228 “Heating systems and water based cooling systems in buildings”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15316-2-3:2007 and EN 15316-3-2:2007.

The main changes compared to EN 15316-2-3:2007 and EN 15316-3-2:2007 are:

a) Space cooling systems were added;

b) unique calculation methods for the water-based distribution systems for the heat flux as well as for the auxiliary energy of pumps introduced;

c) the standard was updated to cover hourly/monthly/yearly time-step.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

Introduction

This standard is part of a set of standards developed to support EPBD[1)] implementation, hereafter called "EPB standards".

EPB standards deal with energy performance calculation and other related aspects (like system sizing) to provide the building services considered in the EPBD.

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.

Figure 1 shows the relative position of this standard within the EPB standards.

1) Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast)

Overarching			Building (as such)		Technical Building Systems										
	Descriptions			Descriptions		Descriptions	Heating	Cooling	Ventilation	Humidification	Dehumidification	Domestic Hot water	Lighting	Building automation & control	Electricity production
sub 1		M1	sub1	M2	sub 1		M3	M4	M5	M6	M7	M8	M9	M10	M11
1	General		1	General	1	General	15316-1					15316-1			
2	Common terms and definitions; symbols, units and subscripts		2	Building Energy Needs	2	Needs						12831-3 ?			
3	Applications		3	(Free) Indoor Conditions without Systems	3	Maximum Load and Power	12831-1					12831-3			
4	Ways to Express Energy Performance		4	Ways to Express Energy Performance	4	Ways to Express Energy Performance	15316-1					15316-1			
5	Building Functions and Building Boundaries		5	Heat Transfer by Transmission	5	Emission & control	15316-2	15316-2							
6	Building Occupancy and Operating Conditions		6	Heat Transfer by Infiltration and Ventilation	6	Distribution & control	**15316-3**	**15316-3**				**15316-3**			
7	Aggregation of Energy Services and Energy Carriers		7	Internal Heat Gains	7	Storage & control	15316-5					15316-5 15316-4-3			
8	Building Partitioning		8	Solar Heat Gains	8	Generation									
					8-1	Combustion boilers	15316-4-1					15316-4-1			
					8-2	Heat pumps	15316-4-2	15316-4-2				15316-4-2			
					8-3	Thermal solar Photovoltaics	15316-4-3					15316-4-3			15316-4-3
					8-4	On-site cogeneration	15316-4-4					15316-4-4			15316-4-4
					8-5	District heating and cooling	15316-4-5	15316-4-5				15316-4-5			15316-4-5
					8-6	Direct electrical heater	15316-4-6					15316-4-6			
					8-7	Wind turbines									15316-4-7
					8-8	Radiant heating, stoves	15316-4-8								
9	Calculated Energy Performance		9	Building Dynamics (thermal mass)	9	Load dispatching and operating conditions									
10	Measured Energy Performance		10	Measured Energy Performance	10	Measured Energy Performance	15378-3					15378-3			
11	Inspection		11	Inspection	11	Inspection	15378-1					15378-1			
12	Ways to Express Indoor Comfort		12	--	12	BMS									
13	External Environment Conditions														
14	Economic Calculation	15459-1													

Figure 1 — Position of EN 15316-3 within the modular structure

1 Scope

This standard covers energy performance calculation of water based distribution systems for space heating, space cooling and domestic hot water.

This standard deals with the heat flux from the distributed water to the space and the auxiliary energy of the related pumps.

The heat flux and the auxiliary energy for pumps can be calculated at any time-step (hour, month and year). The input and output data are mean values of the time step.

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.

prEN 15316-1:2014, *Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 1: General and Energy performance expression*

prEN 15603:2013, *Energy performance of buildings — Overarching standard EPBD*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345:1995, prEN 15603:2013, and the following specific definitions apply.

3.1
tapping profile
depending on the definition in M8-3

3.2
setback
Operation Mode for pumps at the end of scheduled usage time

3.3
boost
Operation Mode for pumps before the begin of scheduled usage time

4 Symbols and abbreviations

4.1 Symbols

For the purposes of this European Standard, the symbols given in prEN 15603:2013 and the specific symbols listed in Table 1 apply

Table 1 — Symbols and units

Symbol	Name of quantity	Unit
η_{Tap}	Tapping profile	1/h
∂	Mean part load in a time step	-
ε	Expenditure energy factor	-
ε_P	Primary energy related expenditure factor	-

4.2 Subscripts

For the purposes of this European Standard, the subscripts given in prEN 15603:2013, and the specific subscripts listed in Table 2 apply.

Table 2 — Subscripts

boost	Boost heating				
setb	Setback mode				
nom	nominal heat loss				
stub	open circuited stubs				

5 Description of the methods

5.1 Output of the method

This method covers the calculation of:

— thermal loss of the distribution system for space heating, space cooling and domestic hot water in the zone;

— recoverable thermal loss for space heating, space cooling and domestic hot water in the zone;

— auxiliary energy demand of distribution systems;

— recoverable auxiliary energy in the zone for space heating, space cooling and domestic hot water in the zone;

— recovered auxiliary energy in the zone for space heating, space cooling and domestic hot water in the zone.

The time step of the output can be according to the time-step of the input values:

— hourly;

— monthly;

— yearly.

All input and output values are mean values in the corresponding time step.

6 Calculation of heat losses and auxiliary energy of distribution systems

6.1 Output data

The output data of this method are listed in Table 3:

Table 3 — Output data of this method (1 of 2)

Description	Symbol	Unit	Validity interval	Intended destination module	Varying
Thermal loss of the distribution system for heating in the zone	$Q_{H,dis,ls}$	kWh	0⋯∞	M3-1	Yes
Thermal loss of the distribution system for cooling in the zone	$Q_{C,dis,ls}$	kWh	0⋯∞	M4-1	Yes
Thermal loss of the distribution system for DHW in the zone	$Q_{W,dis,ls}$	kWh	0⋯∞	M8-1	Yes
Recoverable thermal loss of the distribution system for heating in the zone	$Q_{H,dis,rbl}$	kWh	0⋯∞	M3-1	Yes
Recoverable thermal loss of the distribution system for cooling in the zone	$Q_{C,dis,rbl}$	kWh	0⋯∞	M4-4	Yes
Recoverable thermal loss of the distribution system for DHW in the zone	$Q_{W,dis,rbl}$	kWh	0⋯∞	M8-1	Yes
Auxiliary energy for distribution system heating in the zone	$W_{H,dis,aux}$	kWh	0⋯∞	M3-1	Yes
Auxiliary energy for distribution system cooling in the zone	$W_{C,dis,aux}$	kWh	0⋯∞	M4-1	Yes
Auxiliary energy for distribution system DHW in the zone	$W_{W,dis,aux}$	kWh	0⋯∞	M8-1	Yes
Recoverable auxiliary energy for distribution system heating in the zone	$Q_{H,dis,rbl}$	kWh	0⋯∞	M3-1	Yes
Recoverable auxiliary energy for distribution system cooling in the zone	$Q_{C,dis,rbl}$	kWh	0⋯∞	M4-1	Yes
Recoverable auxiliary energy for distribution system DHW in the zone	$Q_{W,dis,rbl}$	kWh	0⋯∞	M8-1	Yes
Recovered auxiliary energy for distribution system heating in the zone	$Q_{H,dis,rvd}$	kWh	0⋯∞	M3-1	Yes
Recovered auxiliary energy for distribution system cooling in the zone	$Q_{C,dis,rvd}$	kWh	0⋯∞	M4-1	Yes
Recovered auxiliary energy for distribution system DHW in the zone	$Q_{W,dis,rvd}$	kWh	0⋯∞	M8-1	Yes
Input temperature for distribution system heating	$\theta_{H,dis,in}$	°C	0⋯∞	M3-7 M3-8	Yes
Output temperature for distribution system heating	$\theta_{H,dis,out}$	°C	0⋯∞	M3-7 M3-8	Yes
Input temperature for distribution system cooling	$\theta_{C,dis,in}$	°C	0⋯∞	M4-7 M4-8	Yes
Output temperature for distribution system cooling	$\theta_{C,dis,out}$	°C	0⋯∞	M4-7 M4-8	Yes

Table 3 — Output data of this method (2 of 2)

Description	Symbol	Unit	Validity interval	Intended destination module	Varying
Input temperature for distribution system DHW	$\theta_{W,dis,in}$	°C	0…∞	M8-7 M84-8	Yes
Output temperature for distribution system DHW	$\theta_{W,dis,out}$	°C	0…∞	M8-7 M8-8	Yes
Input energy of space heating distribution system	$Q_{H,dis,in}$	kW	0…∞	M3-7 M3-8	Yes
Input energy of space cooling distribution system	$Q_{C,dis,in}$	kW	0…∞	M4-7 M4-8	Yes
Input energy of DHW distribution system	$Q_{W,dis,in}$	kW	0…∞	M8-7 M8-8	Yes
Thermal expenditure energy factor for distribution system heating	$\varepsilon_{H,dis}$	-	0…∞	M3-1	Yes
Thermal expenditure energy factor for distribution system cooling	$\varepsilon_{C,dis}$	-	0…∞	M4-1	Yes
Thermal expenditure energy factor for distribution system DHW	$\varepsilon_{W,dis}$	-	0…∞	M8-1	Yes
Primary related expenditure energy factor for distribution system heating	$\varepsilon_{P,H,dis}$	-	0…∞	M3-1	Yes
Primary related expenditure energy factor for distribution system cooling	$\varepsilon_{P,C,dis}$	-	0…∞	M4-1	Yes
Primary related expenditure energy factor for distribution system DHW	$\varepsilon_{P,W,dis}$	-	0…∞	M8-1	Yes

The input and output temperatures for the distribution system must be calculated in the general part – depending on the heat loss of the distribution system and the heating curve.

6.2 Calculation time steps

The methods described in clause 6 are suitable for the following calculation time steps:

— hourly;

— monthly;

— yearly.

For this method, the output time step is the same as the input time-step. This method does not take into account any dynamic effect. This method can be used within a dynamic calculation scheme.

6.3 Input data

6.3.1 Source of data

Not relevant.

6.3.2 Product data

6.3.2.1 Product description data (qualitative)

Not relevant.