



SLOVENSKI STANDARD
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Ogrevalni sistemi v stavbah - Metoda za preračun energijskih zahtev in učinkovitosti sistema - 5. del: Ogrevanje prostora in DHW-skladiščni sistemi (brez hlajenja)

Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 5: Space heating and DHW storage systems (not cooling)

Heizungsanlagen und wasserbasierte Kühlanlagen in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 5: Raumheizung und Trinkwarmwasserspeicher

Systèmes de chauffage et systèmes de refroidissement à eau dans les bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 5: Systèmes de stockage pour le chauffage et l'eau chaude sanitaire

Ta slovenski standard je istoveten z: prEN 15316-5

ICS:

91.140.10	Sistemi centralnega ogrevanja	Central heating systems
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**Heating systems and water based cooling systems in buildings -
Method for calculation of system energy requirements and
system efficiencies - Part 5: Space heating and DHW storage
systems (not cooling)**

Systèmes de chauffage et systèmes de refroidissement à
eau dans les bâtiments - Méthode de calcul des besoins
énergétiques et des rendements des systèmes - Partie 5:
Systèmes de stockage pour le chauffage et l'eau chaude
sanitaire

Heizungsanlagen und wasserbasierte Kühlanlagen in
Gebäuden - Verfahren zur Berechnung der
Energieanforderungen und Nutzungsgrade der Anlagen -
Teil 5: Raumheizung und Trinkwarmwasserspeicher

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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prEN 15316-5:2014 (E)

Foreword

This document (prEN 15316-5:2014) 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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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Introduction

This standard is part of a package developed to support EPBD¹⁾ 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.

This standard specifies two methods to take into account the energy performance of storage systems for heating of domestic hot water coupled to generation system(s) producing hot water or using independent energy input to the storage unit. This standard presents two methods applicable to the different technologies of water based storage system and related controls systems

- method A applies when the hot water contained in the storage unit(s) is thermally homogeneous
- method B applies when the hot water is thermally stratified

The standard covers typically hourly time-step but can be adapted to different time steps accordingly with the scenarios used for energy use and energy delivered.

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.

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

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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.

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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 15316-5 within the modular structure

prEN 15316-5:2014 (E)

1 Scope

This standard covers energy performance calculation of water based storage sub-systems used for heating, for domestic hot water or for combination of these.

This standard does not cover sizing or inspection of such storage systems.

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

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*

EN 15316-3, *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)*

EN 60379, *Electric storage water heaters.*

prEN 50440, *Electric storage water heaters.*

EN 15332, *Heating boilers — Energy assessment of hot water storage systems.*

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

electric storage water heater (ESWH)

storage water heater used for domestic hot water energy use

3.2

double service storage water heater (SWHHW)

storage water heater used for both heating and domestic hot water energy use

3.3

heat exchanger storage water heater (HESWH)

storage water heater using internal heat exchanger to store the energy provided by an external generation system (solar, boiler, heat pump,...)

3.4

multi energy storage water heater (MESWH)

storage water heater using different energy source to store the energy

3.5

thermodynamic storage water heater (TSWH)

storage water heater using attached heat pump system to produce and store hot water

4 Symbols and abbreviations

4.1 Symbols

For the purposes of this document, the symbols given in prEN 15603:2013 apply

4.2 Subscripts

For the purposes of this document, the subscripts given in prEN 15603:2013 apply.

5 Description of the methods

5.1 Output of the method

This method covers the calculation of energy delivered to the storage system, energy delivered from the storage systems to the domestic and hot water distribution system, auxiliary energy and thermal losses (recoverable or not) of storage systems used for heating and/or domestic hot water.

The time step of the output can be

- hourly (preferred);
- yearly;
- monthly,

according with the scenarios used to determine the thermal load.

5.2 Extension of the method

The method which is presented in the standard can be extended to storage systems with multiple storage units.

The adaptation depends of the hydraulic schema used for the design of the storage system:

- serial mounting – the storage units are hydraulically linked as the output of the storage unit 'n' become the input of the storage unit 'n+1'. The equations as identical as the calculation procedure will consider a loop for all storage unit to calculate the total energy stored, the energy used and delivered and the corresponding volume of hot water delivered to the system;
- parallel mounting – the regulation systems sets the priority for the storage units that are considered independently.

5.3 Technologies covered and schematisation of the hot water storage system

The following storage units and control systems are covered:

Storage units (with or without primary circuit)

Control system of the output water:

- based on availability of energy delivered to the storage unit(s);
- priority given to domestic hot water, then heating (default);
- type of power unit (direct, heat exchanger, ...) and position in the storage unit