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**Ogrevalni sistemi in sistemi za hlajenje z vodo v stavbah - Metoda za izračun energetskega zahtev in učinkovitosti sistema - 1. del: Splošno in izražanje energetske učinkovitosti**

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

Heizungsanlagen und wasserbasierte Kühlanlagen in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 1: Allgemeines und Darstellung der Energieeffizienz

Systèmes de chauffage et systèmes de refroidissement à eau dans les bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 1: Généralités

**Ta slovenski standard je istoveten z: prEN 15316-1**

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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

Systèmes de chauffage et systèmes de refroidissement à  
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Gebäuden - Verfahren zur Berechnung der  
Energieanforderungen und Nutzungsgrade der Anlagen -  
Teil 1: Allgemeines

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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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (prEN 15316-1:2014) has been prepared by Technical Committee CEN/TC 228 "Heating systems and water based cooling systems", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15316-1:2007.

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

The main changes compared to EN 15316-1:2007 are:

- a) reference and coordination of all other modules;
- b) inclusion of general topics such as operating conditions calculation and load dispatching.

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## Introduction

This standard is part of a package developed to support EPBD<sup>1)</sup> directive 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 directive.

CEN/TC 228 deals with heating systems and water based cooling systems in buildings. Subjects covered by TC 228 are:

- energy performance calculation;
- inspection;
- design of systems;
- installation and commissioning.

This standard was developed during the first EPBD mandate and the first version was published in 2008.

The revision for inclusion in the second mandate package was performed in 2014.

Figure 1 shows the relative position of this standard within the EPB package of standards and the position of all the other EPB standards under the responsibility of CEN/TC 228.

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

## prEN 15316-1:2014 (E)

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 15316-1 within the EPB set of standards



Table 1 associates the title of the EN EPB standards to the numbers and modules. It also remembers the replaced standards.

**Table 1 — List of EN EPB standards related the calculation of space heating and domestic hot water systems**

No.	Module	New EPBD numbering	Old standards replaced	Title of the new EPBD standard
1	M1-14	EN 15459-1	EN 15459	Heating systems and water based cooling systems in buildings - Energy performance of buildings - Part 1: Economic evaluation procedure for energy systems in buildings
		TR 15459-2	New	Accompanying TR to EN 15459-1 (Economic evaluation procedure for energy systems in buildings)
2	M3-11 M8-11	EN 15378-1	EN 15378	Heating systems and water based cooling systems in buildings - Heating systems and DHW in buildings - Part 1: Inspection of boilers, heating systems and DHW
		TR 15378-2	New	Accompanying TR to EN 15378-1 (Inspection of boilers, heating systems and DHW)
3	M3-10 M8-10	EN 15378-3	New	Heating systems and water based cooling systems in buildings - Heating systems and DHW in buildings - Part 3: Measured energy performance
		TR 15378-4	New	Accompanying TR to EN 15378-3 (Measured energy performance)
4	M3-3	EN 12831-1	EN 12831	Heating systems and water based cooling systems in buildings - Method for calculation of the design heat load - Part 1: Space heating load
		TR 12831-2	New	Accompanying TR for EN 12831-1 (Space heating load)
5	M8-3	EN 12831-3	EN 15316-3-1	Heating systems and water based cooling systems in buildings - Method for calculation of the design heat load - Part 3: Domestic hot water systems heat load and characterisation of needs
		TR 12831-4	New	Accompanying TR to EN 12831-3 (Domestic hot water systems heat load and characterisation of needs)
6	M3-1 M8-1 M3-4 M8-4	EN 15316-1	EN 15316-1	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
		TR 15316-6-1	New	Accompanying TR to EN 15316-1 (General and Energy performance expression)
7	M3-5 M4-5	EN 15316-2	EN 15316-2-1	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 2: Space emission systems (heating and cooling)
		TR 15316-6-2	New	Accompanying TR to EN 15316-2 (Space emission systems (heating and cooling))
8	M3-6 M4-6 M8-6	EN 15316-3	EN 15316-2-3 EN 15316-3-2	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)
		TR 15316-6-3	New	Accompanying TR to EN 15316-3 (Space distribution systems (DHW, heating and cooling))
9	M3-8-1 M8-8-1	EN 15316-4-1	EN 15316-4-1 EN 15316-3-3 EN 15316-4-7	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-1: Space heating and DHW generation systems, combustion systems (boilers, biomass)
		TR 15316-6-4	New	Accompanying TR to EN 15316-4-1 (Space heating and DHW generation systems, combustion systems (boilers, biomass))
10	M3-8-2 M4-8-2 M8-8-2	EN 15316-4-2	EN 15316-4-2	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-2: Space heating generation systems, heat pump systems
		TR 15316-6-5	New	Accompanying TR to EN 15316-4-2 (Space heating generation systems, heat pump systems)
11	M3-8-3 M8-8-3 M11-8-3	EN 15316-4-3	EN 15316-4-3 EN 15316-4-6	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-3: Heat generation systems, thermal solar and photovoltaic systems
		TR 15316-6-6	New	Accompanying TR to EN 15316-4-3 (Heat generation systems, thermal solar and photovoltaic systems)
12	M3-8-4 M8-8-4 M11-8-4 M3-7 / M8-7	EN 15316-4-4	EN 15316-4-4	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-4: Heat generation systems, building-integrated cogeneration systems
		TR 15316-6-7	New	Accompanying TR to EN 15316-4-4 (Heat generation systems, building-integrated cogeneration systems)

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13	M3-8-5 M4-8-5 M8-8-5 M11-8-5	EN 15316-4-5	EN 15316-4-5	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-5: District heating and cooling
		TR 15316-6-8	New	Accompanying TR to EN 15316-4-5 (District heating and cooling)
14	M3-8-8	EN 15316-4-8	EN 15316-4-8	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-8: Space heating generation systems, air heating and overhead radiant heating systems, including stoves (local)
		TR 15316-6-9	New	Accompanying TR to EN 15316-4-8 (Space heating generation systems, air heating and overhead radiant heating systems, including stoves (local))
15	M3-7 M8-7	EN 15316-5	New	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)
		TR 15316-6-10	New	Accompanying TR to EN 15316-5 (Space heating and DHW storage systems (not cooling))
16	M3-8-6 M8-8-6	EN 15316-4-9	New	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-9: Direct electric generation systems  (not covered by EPBD mandate M/480)
17	M11-8-7	EN 15316-4-10	New	Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-10: Wind power generation systems  (not covered by EPBD mandate M/480)

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## 1 Scope

This standard is the general frame for the calculation of the energy performance of heating and domestic hot water systems. It specifies how to perform the calculation of the entire system using the calculation modules defined in the respective standards. It deals with common issues like operating conditions calculation and energy performance indicators.

This standard specifies the structure for the calculation of energy requirements of space heating and domestic hot water systems in buildings.

It standardises the required inputs and outputs in order to achieve a common European calculation method.

It allows the energy analysis of the different heating and Domestic hot water sub-systems including control (emission, distribution, storage, generation) by comparing the system losses and by defining system performance factors.

The performance analysis allows the comparison between sub-systems and make possible to monitor the impact of each sub-system on the energy performance of a building.

The calculation of the system losses of each part of the heating sub-systems is defined in subsequent standards

Ventilation systems are not included in this standard (e. g. balanced systems with heat recovery), but if the air is preheated or an air heating system is installed, the systems providing the heat to the AHU (Air Handling Unit) are covered by this standard.

## 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.

prCEN/TS 16629, *Energy Performance of Buildings — Detailed technical rules for the set of EPBD standards*

prEN ISO 13790, *Energy performance of buildings — Calculation of energy use for space heating and cooling*

prEN 15603:2013, *Energy performance of buildings — Overall energy use and definition of energy ratings*

prEN 15316-2, *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)*

prEN 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)*

prEN 15316-4-x, *Heating systems in buildings — Generation systems*

EN 15316-5, *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)*

prEN 15232:2014, *Energy performance of buildings — Impact of Building Automation, Controls and Building Management*

### 3 Terms and definitions

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

- 3.1**  
**feeding circuit (sources)**  
all circuits providing the node with energy
- 3.2**  
**load circuit**  
all circuits that draw energy from the node and distribute it to the demand side (e.g. emitters)
- 3.3**  
**node**  
connection point between one or several sources (feeding circuits) and one or more load circuits (e.g. distribution circuits). The total load is dispatched among the sources (e.g. generators) at the node.

### 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 2 apply.

**Table 2 — Symbols and units**

Symbol	Name of quantity	Unit
GEN_FUEL	Fuel type	-
HEAT_XXXX_XXXX_XXX	BAC function identifier	-
V' <sub>x</sub>	mass flow rate	kg/h

#### 4.2 Subscripts

For the purposes of this European Standard, the subscripts given in prEN 15603:2013 and the specific subscripts listed in Table 3 apply.

**Table 3 — Subscripts**

nod	node
flw	Flow (supply)
ret	return

### 5 Description of the methods

#### 5.1 Output of the method

This method covers the calculation of delivered energy, auxiliary energy, recoverable losses and specific performance indicators of heating and/or domestic hot water systems.

The time step of the output can be:

- Yearly