

SLOVENSKI STANDARD

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Energijske lastnosti stavb - Metoda za izračun energijskih zahtev in učinkovitosti sistema - 4-8. del: Sistemi za pridobivanje toplote za ogrevanje, toplozračni in sevalni sistemi, vključno z lokalnimi pečmi - Modul M3-8-8

Energy performance of 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), Module M3-8-8

Energetische Bewertung von Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 4-8: Wärmeerzeugung von Warmluft- und Strahlungsheizsystemen, einschließlich Öfen (lokal), Modul M3-8-8

Performance énergétique des bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 4-8 : Systèmes de génération de chauffage des locaux, systèmes de chauffage par air chaud et par rayonnement, y compris les poêles (local), Module M3-8-8

Ta slovenski standard je istoveten z: EN 15316-4-8:2017

ICS:

91.140.10	Sistemi centralnega ogrevanja	Central heating systems
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EUROPEAN STANDARD
NORME EUROPÉENNE
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English Version

**Energy performance of 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), Module M3-8-8**

Performance énergétique des bâtiments - Méthode de
calcul des besoins énergétiques et des rendements des
systèmes - Partie 4-8 : Systèmes de génération de
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Energetische Bewertung von Gebäuden - Verfahren zur
Berechnung des Endenergiebedarfs und des
Nutzungsgrades von Anlagen - Teil 4-8:
Wärmeerzeugung von Warmluft- und
Strahlungsheizsystemen, Modul M3-8-8

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This European Standard was approved by CEN on 27 February 2017.

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EN 15316-4-8:2017 (E)**European foreword**

This document (EN 15316-4-8:2017) 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 supersedes EN 15316-4-8:2011.

The main changes compared to EN 15316-4-8:2011 are:

- a) Support of hourly methods;
- b) Compliance with specifications given by CEN/TS 16629;
- c) Scope extended to stoves and local heaters included in lot 20 of Ecodesign.

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 October 2017, and conflicting national standards shall be withdrawn at the latest by October 2017.

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

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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

Introduction

This European Standard is part of a series of standards aiming at international harmonization of the methodology for the assessment of the energy performance of buildings, called "set of EPB standards".

All EPB standards follow specific rules to ensure overall consistency, unambiguity and transparency.

All EPB standards provide a certain flexibility with regard to the methods, the required input data and references to other EPB standards, by the introduction of a normative template in Annex A and Annex B with informative default choices.

For the correct use of this standard, a normative template is given in Annex A to specify these choices. Informative default choices are provided in Annex B.

The main target group of this standard are all the users of the set of EPB standards (e.g. architects, engineers, regulators, product manufacturers and suppliers, software developers, etc.).

Use by or for regulators: In case the standard is used in the context of national or regional legal requirements, mandatory choices may be given at national or regional level for such specific applications. These choices (either the informative default choices from Annex B or choices adapted to national / regional needs, but in any case following the template of this Annex A) can be made available as national annex or as separate (e.g. legal) document (national data sheet).

NOTE 1 So in this case:

- the regulators will specify the choices;
- the individual user will apply the standard to assess the energy performance of a building, and thereby use the choices made by the regulators,.

Topics addressed in this standard can be subject to public regulation. Public regulation on the same topics can override the default values in Annex B of this standard. Public regulation on the same topics can even, for certain applications, override the use of this standard. Legal requirements and choices are in general not published in standards but in legal documents. In order to avoid double publications and difficult updating of double documents, a national annex may refer to the legal texts where national choices have been made by public authorities. Different national annexes or national data sheets are possible, for different applications.

It is expected, if the default values, choices and references to other EPB standards in Annex B are not followed due to national regulations, policy or traditions, that:

- national or regional authorities prepare data sheets containing the choices and national or regional values, according to the model in Annex A. In this case the national annex (e.g. NA) refers to this text;
- or, by default, the national standards body will consider the possibility to add or include a national annex in agreement with the template of Annex A, in accordance to the legal documents that give national or regional values and choices.

Further target groups are users of the voluntary common European Union certification scheme for the energy performance of non-residential buildings (EPBD art.11.9) and any other Pan EU parties wanting to motivate their assumptions by classifying the building energy performance for a dedicated building stock

More information is provided in the Technical Report accompanying this standard (CEN/TR 15316-6-9).

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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.

This standard presents methods to take into account the energy performance of heat generation systems based on local air heaters, radiant heaters and stoves. The calculation is based on the performance characteristics of the products given in product standards and on other characteristics required to evaluate the performance of the products as included in the system.

This standard covers only the heat generation function of air heaters even though air heaters, as devices, also emit heat and include devices for space heating control. The emission and control function and the related losses are covered by module M3-5.

This standard is meant to be used as a module within the EN EPB package of standards. Specification of the connection of this standard with other calculation modules are given in module M3-1 and EN ISO 52000-1.

Default references to EPB standards other than EN ISO 52000-1 are identified by the EPB module code number and given in Annex A (normative template) and Annex B (informative default choice).

NOTE 2 Example of EPB module code number: M5-5, or M5-5.1 (if module M5-5 is subdivided), or M5-5/1 (if reference to a specific clause of the standard covering M5-5).

1 Scope

This European Standard is part of a series of standards on the method for calculation of system energy requirements and system efficiencies.

The scope of this specific part is to standardize the:

- required inputs;
- calculation method;
- resulting outputs,

for space heating generation by:

- air heating systems, including control;
- overhead radiant heating systems for non-domestic use, including control; and
- stoves and local heaters for residential use.

This standard does not apply to heating systems that utilize water as a heat transfer medium.

Other heat generation systems such as boilers, heat pumps and others are covered in other sub modules of M3-8.

Table 1 shows the relative position of this standard within the set of EPB standards in the context of the modular structure as set out in EN ISO 52000-1.

NOTE 1 In CEN ISO/TR 52000-2 the same table can be found, with, for each module, the numbers of the relevant EPB standards and accompanying technical reports that are published or in preparation.

NOTE 2 The modules represent EPB standards, although one EPB standard may cover more than one module and one module may be covered by more than one EPB standard, for instance a simplified and a detailed method respectively. See also Clause 2 and Tables A.1 and B.1.

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Table 1 — Position of this standard, within the modular structure of the set of EPB standards

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

^a The shaded modules are not applicable

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.

EN ISO 7345:1995, *Thermal insulation - Physical quantities and definitions (ISO 7345:1987)*

EN ISO 52000-1:2017, *Energy performance of buildings - Overarching EPB assessment - Part 1: General framework and procedures (ISO 52000-1:2017)*

EN 416 (all parts), *Single burner gas-fired overhead radiant tube heaters for non-domestic use*

EN 419 (all parts), *Non-domestic gas-fired overhead luminous radiant heaters*

EN 1020, *Non-domestic forced convection gas-fired air heaters for space heating not exceeding a net heat input of 300 kW incorporating a fan to assist transportation of combustion air or combustion products*

EN 13410, *Gas-fired overhead radiant heaters - Ventilation requirements for non-domestic premises*

EN 13240, *Roomheaters fired by solid fuel - Requirements and test methods*

EN 13229, *Inset appliances including open fires fired by solid fuels - Requirements and test methods*

EN 14785, *Residential space heating appliances fired by wood pellets - Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345:1995, EN ISO 52000-1 and the following definitions apply.

NOTE The terms of EN ISO 52000-1 that are indispensable for the understanding of the underlying standard are repeated here.

3.1

air heating system

heating system composed of one or more individual forced convection air heating appliances

3.2

thermal input

product of the fuel flow rate and the net caloric value of the fuel

3.3

condensing air heater

air heater designed to make use of the latent heat released by condensation of water vapour in the combustion flue products, which is to allow the condensate to leave the heat exchanger in liquid form by way of a condensate drain

3.4

forced convection air heater

appliance designed to provide space heating from a central source by distributing heated air, by means of an air moving device, either through ducting or directly into the heated space

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3.5

flued heater

heating appliance of type B or C, connected to a flue or a device for evacuating the products of combustion to the outside of the room in which the appliance is installed

3.6

high-low appliance

appliance capable of operating either at its nominal fuel heat input or at a fixed reduced heat input

3.7

load factor

ratio between the time the burner is on and the total time the generation system is available to supply heat as demanded by system controls

3.8

modulating appliance

appliance capable of varying its heat input in a continuous manner between the nominal fuel heat input and a minimum value, whilst maintaining continuous burner firing

3.9

multi-burner overhead radiant tube system

radiant tube heater system which employs two or more burner units with each unit incorporating independent flame monitoring

Note 1 to entry: The units may be located in one or more sections of tubing. One or more fans may be used to assist in the evacuation of products of combustion or the supply of combustion air.

3.10

on/off appliance

appliance without the capability to vary the fuel burning rate whilst maintaining continuous burner firing. This includes appliances with alternative burning rates set once only at the time of installation, referred to as range rating

3.11

overhead radiant heating system

heating system composed of one or more individual overhead radiant heating appliances

3.12

overhead radiant luminous heater

appliance intended for installation at a height above head level which is designed to heat the space beneath by radiation and in which the heat is produced by means of burning the fuel at or near the outer surface of a material such as a ceramic plaque or gauze, or by means of an atmospheric burner heating a gauze or similar material

3.13

overhead radiant tube heater

appliance intended for installation above head level which is designed to heat the space beneath by radiation by means of a tube or tubes, heated by the internal passage of combustion products

3.14

stove

appliance designed to provide heating in the installation through combustion of a fuel and direct emission of heat to surrounding air

3.15**type A appliance**

appliance not intended for connection to a flue or to a device for evacuation the products of combustion directly to the outside of the room in which the appliance is installed

3.16**unflued heater**

heating appliance of type A, not connected to a flue

3.17**local heater**

appliance that generates heat through a combustion process and emits heat by direct heat transfer to the surrounding air or by direct heat transfer to the surrounding air in combination with heat transfer to a fluid

3.18**direct heat output**

heat output of a local space heater by radiation and convection of heat, as emitted by or from the local space heater itself to air, excluding the heat output of the local space heater to a heat transfer fluid

3.19**indirect heat output**

heat output of a local space heater to a heat transfer fluid by the same heat generation process that provides the direct heat output of the local space heater

4 Symbols and subscripts**4.1 Symbols**

[SIST EN 15316-4-8:2018](https://standards.iteh.ai/catalog/standards/sist/fa97417c-c260-4c5a-b762-389561281116/sist-en-15316-4-8:2018)

[https://standards.iteh.ai/catalog/standards/sist/fa97417c-c260-4c5a-b762-](https://standards.iteh.ai/catalog/standards/sist/fa97417c-c260-4c5a-b762-389561281116/sist-en-15316-4-8:2018)

For the purposes of this document, the symbols given in EN ISO 52000-1:2017, Clause 4 and Annex C and the specific symbols listed in Table 2 apply.

Table 2 — Symbols and units

Symbol	Name of quantity	Unit
α	Heat loss factor	%
β	Load factor, power factor	-
c	Correlation parameter	various
k	Factor, part of recoverable auxiliary energy, part of envelope losses	-
n	Exponent	
$\nabla\theta$	Temperature gradient	K/m
m'	Mass flow rate	
H	Height	m

4.2 Subscripts

For the purposes of this document, the subscripts given in EN ISO 52000-1:2017, Clause 4 and Annex C and the specific subscripts listed in Table 3 apply.

Table 3 — Subscripts

air	air	gen	generator	rad	radiant
blw	blower	h	height	s	gross (calorific value)
br	burner	i	net (calorific value)	test	test conditions
ch	chimney	lrh	local or radiant heater	w	heating system water
cmb	combustion	mass	mass, specific weight	vent	ventilation
con d	condensation	mod	modulating		
corr	corrected	plt	pilot flame		
env	envelope	Pn	at nominal load		
exh	exiting the building	Pmax	at maximum power		
fuel	fuel	Pmin	at minimum power		

5 Description of the methods

5.1 Output of the method

The following output data are calculated by this standard for each calculation interval:

- maximum heat output during the calculation interval, $Q_{H;gen;out;max}$;
- actual heat output during the calculation interval $Q_{H;gen;out}$;
- fuel input to the heater or stove, $E_{H;gen;in}$;
- recoverable generation heat losses, $Q_{H;gen;ls;rbl}$;

- auxiliary energy use, $W_{H;gen;aux}$;

For stoves and local space heaters with a connection to a water based heating system, the following additional data are calculated:

- actual output to a connected water based heating system $Q_{H;gen;out;w}$.

The calculation interval of the output data can be:

- yearly;
- monthly;
- hourly;
- bin;

and is the same as the input data calculation interval.

5.2 Alternative methods

The following calculation procedures are given in this standard:

- on/off heaters: see Clause 6;
- high-low or modulating heaters: see Clause 7;
- stoves and local space heaters with or without connection to a water based heating system: see additional specifications in Clause 8.

Which procedure to apply depends on

- the power control type, according to the identifier LRH_CTRL_POW.
- the availability of heat for a water based connection, according to the identifier LRH_WCONN.

Depending on the heater type, a different data set may be available.

The default selection criteria are given in Table B.21 and B.22.

5.3 Connection with building needs and zoning

The space heated by the heater or stove shall be determined as follows:

- if the heater or stove is the only heating appliance in a room, the entire room heating energy demand;
- if there are several heaters in a room, consider for each heater a fraction of the load proportional to the rated power of each individual heater (distribution rule);
- a heater or stove cannot supply heat to another room unless there is a dedicated system to transfer heat to neighbouring rooms. This can be taken into account only if the connection covers the capacity for the additional room.

EXAMPLE fireplace with dedicated air ducts and fan.