HOONETE ENERGIATÕHUSUS. SÜSTEEMIDE ENERGIAKASUTUSE JA KASUTEGURITE ARVUTUSMEETOD. OSA 4-3: KÜTTESÜSTEEMIDE SOOJUSALLIKAD, PÄIKESEKÜTTESÜSTEEMID JA PÄIKESEELEKTRISÜSTEEMID, MOODUL M3-8-3, M8-8-3, M11-8-3

Energy performance of buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-3: Heat generation systems, thermal solar and photovoltaic systems, Module M3-8-3, M8-8-3, M11-8-3

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 15316-4-3:2017 sisaldab Euroopa standardi EN 15316-4-3:2017 ingliskeelset teksti.	This Estonian standard EVS-EN 15316-4-3:2017 consists of the English text of the European standard EN 15316-4-3:2017.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 03.05.2017.	Date of Availability of the European standard is 03.05.2017.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 27.160, 91.140.10

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15316-4-3

May 2017

ICS 27.160; 91.140.10

Supersedes EN 15316-4-3:2007, EN 15316-4-6:2007

English Version

Energy performance of buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-3: Heat generation systems, thermal solar and photovoltaic systems, Module M3-8-3, M8-8-3, M11-8-3

Performance énergétique des bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 4-3 : Systèmes de génération de chaleur, systèmes solaires thermiques et systèmes photovoltaïques, Module M3-8-3, M8-8-3, M11-8-3

Energetische Bewertung von Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 4-3: Wärmeerzeugungssysteme, thermische Solaranlagen und Photovoltaikanlagen, Modul M3-8-3, M8-8-3, M11-8-3

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

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Ref. No. EN 15316-4-3:2017 E

Contents

Page

European foreword

This document (EN 15316-4-3:2017) 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 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 November 2017, and conflicting national standards shall be withdrawn at the latest by November 2017.

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

This document supersedes EN 15316-4-3:2007 and EN 15316-4-6:2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives 2010/30/EU and 2009/125/EC.

For relationship with EU Directives, see informative Annexes ZA, ZB, and ZC, which are integral parts of this document.

The main changes compared to EN 15316-4-3:2007 and EN 15316-4-6:2007 are:

a) extensions to the former Method B, e.g. full support of solar systems with integrated back-up heating and extension with the effect of the heat storage heat losses;

b) method 3 is added to broaden the applicability of the solar thermal methods to calculations with an hourly time step;

c) the revision brings the method in conformity with the methods used in Ecodesign and the energy labelling (CEN mandate 495);

d) addition of a new method to support input with an hourly time step; and

e) editorial changes.

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, 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 set of standards developed to support the 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.

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.

— Where appropriate, the method(s) in each of the EPB standards may provide simplified procedures and/or default values as alternative options. Without further specification, these simplified procedures and/or default values may be used without restricting criteria.

NOTE 1 For instance because these are conservative procedures or values.

The term 'default values' should not be confused with 'informative values'. If the values are given in the normative part of the standard, they are normative values. See also next options.

— In other cases, these simplified procedures and/or default values may be intended to be used only for situations where there is limited information. This may be the case in existing buildings with limited possibilities to acquire all input data. In particular when the EPB set of standards is used in the context of national or regional building regulations, specific criteria when the simplified method and/or default data are allowed, may be given at national or regional level, following the template in Annex A. Annex B provides (informative) default choices.

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 2 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.

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

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 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 (prCEN/TR 15616-6-6, under preparation).

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. 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.

This standard (EN 15316-4-3) gives six methods to take into account the energy performance of solar systems for heating of domestic hot water, space heating and electricity production.

The methods 1 to 3 address solar thermal applications.

— Method 1 is valid for the generation of heat for domestic hot water production, using system performance data in conformity with product standards.

— Method 2 is valid for the generation of heat for domestic hot water production and/or space heating with a time step of one month, using component data in conformity with product standards.

— Method 3 is valid for the generation of heat for domestic hot water production and/or space heating with a time step of one hour, using component data in conformity with product standards.

The methods 4 to 6 address photovoltaic systems.

— Method 4 is valid for calculation of the electricity production of photovoltaic systems, with a time step of one year, using component data in conformity with product standards.

  Only the calculation method and the accompanying input parameters are normative. All values required to parameter the calculation method should be given in a national annex, containing appropriate national values corresponding to the tables given in Annex C.

— Method 5 is valid for calculation of the electricity production of photovoltaic systems, with a time step of one month, using component data in conformity with product standards. It represents the translation of the yearly method 4 to a monthly base.

— Method 6 is valid for calculation of the electricity production of photovoltaic systems, with a time step of one hour.

1 Scope

This European Standard specifies the:

— required inputs;

— calculation method;

— required and resulting outputs,

for heat generation systems, thermal solar systems (for space heating, domestic hot water production and the combination of both) and for photovoltaic systems applied in buildings.

Within this standard, 6 methods are specified each method has its own range of applicability.

— Method 1,

  is applicable for solar domestic hot water systems characterized by the EN 12976 series (factory made) or EN 12977-2 (custom built).

  The main output of the method is the solar heat and back up heat contribution to the requested heat use.

— Method 2,

  is applicable for systems for domestic hot water and / or space heating with components characterized by EN ISO 9806 and EN 12977-3 or EN 12977-4 with a monthly calculation time step.

  The main output of the method is the solar heat and back up heat contribution to the requested heat use.

— Method 3,

  is applicable for systems for domestic hot water and / or space heating with components characterized by EN ISO 9806 with an hourly calculation time step.

  The main output of the method is collector loop heat supplied to the heat storage.

— Method 4,

  is applicable for photovoltaic systems with components characterized by standards and with an annual calculation time step.

  The output of the method is the produced electricity.

— Method 5,

  is applicable for photovoltaic systems with components characterized by standards and with a monthly calculation time step.

  The output of the method is the produced electricity.

— Method 6,

  is applicable for photovoltaic systems with components characterized by standards and with a calculation time step.

The output of the method is the produced electricity.

These three last calculation methods do not take into account:

— electrical storage;

— PV/thermal photovoltaic systems.

Primary energy savings and CO_2 savings, which can be achieved by photovoltaic systems compared to other systems, are calculated according to EN ISO 52000-1.

NOTE 1 Standards linked to the methods are listed in Annex E.

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 2 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 3 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.

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

Overarching			Building (as such)		Technical Building Systems										
	Descriptions			Descriptions		Descriptions	Heating	Cooling	Ventilation	Humidification	Dehumidification	Domestic Hot water	Lighting	Building automation and control	Electricity production
sub 1		M1	sub1	M2	sub1		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 and control	15316–2	15316–2							
6	Building Occupancy and Operating Conditions		6	Heat Transfer by Infiltration and Ventilation	6	Distribution and control	15316–3	15316–3				15316–3			
7	Aggregation of Energy Services and Energy Carriers		7	Internal Heat Gains	7	Storage and 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
					8–6	Direct electrical heater	15316–4-9					15316–4-9			
					8–7	Wind turbines									15316–4-10
					8–8	Radiant heating, stoves	15316–4-8								
9	Calculated Energy Performance		9	Building Dynamics (thermal mass)	9	Load dispatching and operating conditions	15316–1								
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													

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

EN ISO 7345, *Thermal insulation — Physical quantities and definitions (ISO 7345)*

3 Terms and definitions

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

3.1 Thermal solar systems

3.1.1
reference area
<in relation to a collector area> aperture area or gross area

Note 1 to entry: Depending on the availability of collector test results according to the former EN 12975-2 (aperture area) or the current EN ISO 9806 (gross area) the corresponding definition of the collector area is used.

Note 1 to entry: For all references to a collector efficiency parameter (η_o, a_1, a_2 and $K_{hem}(50°)$) in this standard, the values matching the type of definition of the collector area is to be used.

3.1.2
aperture area
solar collector maximum projected area through which un-concentrated solar radiation enters the collector

3.1.3
gross area
maximum projected area of a complete solar collector excluding any integral means of mounting and connecting fluid pipework

3.1.4
collector module
solar collector that builds up a collector array

3.1.5
back up energy
source of heat, other than solar, used to supplement the output provided by the thermal solar system

Note 1 to entry: In EN ISO 9488, the back-up energy is called auxiliary energy.

3.1.6
collector loop
circuit, including collectors, pump or fan, pipework and heat exchanger (if present), which is used to transfer heat from the collectors to the heat storage device