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Standards

Irish Standard Recommendation
S.R. CEN/TR 15316-6-1:2017

Energy performance of buildings- Method for calculation of system energy requirements and system efficiencies - Part 6-1: Explanation and justification of EN 15316-1, Module M3-1, M3-4, M3-9, M8-1, M8-4

S.R. CEN/TR 15316-6-1:2017

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National Foreword

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TECHNICAL REPORT

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Energy performance of buildings- Method for calculation of system energy requirements and system efficiencies - Part 6-1: Explanation and justification of EN 15316-1, Module M3-1, M3-4, M3-9, M8-1, M8-4

Performance énergétique des bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 1 : Explication et justification de l'EN 15316-1, Module M3-1, M3-4, M3-9, M8-1, M8-4

Heizungsanlagen und Wasserbasierte Kühlanlagen in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 6-1: Begleitende TR zur EN 15316-1 (Allgemeines und Darstellung der Energieeffizienz)

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European foreword

This document (CEN/TR 15316-6-1:2017) 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.

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

Introduction

The CENSE project, the discussions between CEN and the Concerted action highlighted the high page count of the entire package due to a lot of "textbook" information. This resulted in flooding and confusing the normative text.

In order to facilitate the necessary overall consistency and coherence, in terminology, approach, input/output relations and formats, for the whole set of EPB-standards, the following documents and tools are available:

a) a document with basic principles to be followed in drafting EPB-standards: CEN/TS 16628:2014, Energy Performance of Buildings - Basic Principles for the set of EPB standards [1];

b) a document with detailed technical rules to be followed in drafting EPB-standards; CEN/TS 16629:2014, Energy Performance of Buildings - Detailed Technical Rules for the set of EPB-standards [2];

c) the detailed technical rules are the basis for the following tools:

   1) a common template for each EPB-standard, including specific drafting instructions for the relevant clauses;

   2) a common template for each technical report that accompanies an EPB standard or a cluster of EPB standards, including specific drafting instructions for the relevant clauses;

   3) a common template for the spreadsheet that accompanies each EPB standard, to demonstrate the correctness of the EPB calculation procedures.

Each EPB-standards follows the basic principles and the detailed technical rules and relates to the overarching EPB-standard, prEN ISO 52000-1:2015.

One of the main purposes of the revision of the EPB-standards is to enable that laws and regulations directly refer to the EPB-standards and make compliance with them compulsory. This requires that the set of EPB-standards consists of a systematic, clear, comprehensive and unambiguous set of energy performance procedures. The number of options provided is kept as low as possible, taking into account national and regional differences in climate, culture and building tradition, policy and legal frameworks (subsidiarity principle). For each option, an informative default option is provided (Annex B).

Rationale behind the EPB technical reports

There is a risk that the purpose and limitations of the EPB standards will be misunderstood, unless the background and context to their contents – and the thinking behind them – is explained in some detail to readers of the standards. Consequently, various types of informative contents are recorded and made available for users to properly understand, apply and nationally or regionally implement the EPB standards.

If this explanation would have been attempted in the standards themselves, the result is likely to be confusing and cumbersome, especially if the standards are implemented or referenced in national or regional building codes.

Therefore each EPB standard is accompanied by an informative technical report, like this one, where all informative content is collected, to ensure a clear separation between normative and informative contents (see CEN/TS 16629):

- to avoid flooding and confusing the actual normative part with informative content,

- to reduce the page count of the actual standard, and
- to facilitate understanding of the set of EPB standards.

This was also one of the main recommendations from the European CENSE project [1] that laid the foundation for the preparation of the set of EPB standards.

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

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**
sub1		**M1**	**sub 1**	**M2**	**sub1**		**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**
1	General		**1**	General	**1**	General	**EN 15316–1**					**EN 15316–1**			
2	Common terms and definitions; symbols, units and subscripts		**2**	Building Energy Needs	**2**	Needs						EN 12831–3			
3	Applications		**3**	(Free) Indoor Conditions without Systems	**3**	Maximum Load and Power	EN 12831–1					EN 12831–3			
4	Ways to Express Energy Performance		**4**	Ways to Express Energy Performance	**4**	Ways to Express Energy Performance	**EN 15316–1**					**EN 15316–1**			
5	Building Functions and Building Boundaries		**5**	Heat Transfer by Transmission	**5**	Emission and control	EN 15316–2	EN 15316–2							
6	Building Occupancy and Operating Conditions		**6**	Heat Transfer by Infiltration and Ventilation	**6**	Distribution and control	EN 15316–3	EN 15316–3				EN 15316–3			
7	Aggregation of Energy Services and Energy Carriers		**7**	Internal Heat Gains	**7**	Storage and control	EN 15316–5					EN 15316–5 EN 15316–4–3			

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
sub1		M1	sub 1	M2	sub1		M3	M4	M5	M6	M7	M8	M9	M10	M11
8	Building Partitioning		**8**	Solar Heat Gains	**8**	Generation									
					8–1	Combustion boilers	EN 15316–4–1					EN 15316–4–1			
					8–2	Heat pumps	EN 15316–4–2	EN 15316–4–2				EN 15316–4–2			
					8–3	Thermal solar Photovoltaics	EN 15316–4–3					EN 15316–4–3			EN 15316–4–3
					8–4	On-site cogeneration	EN 15316–4–4					EN 15316–4–4			EN 15316–4–4
					8–5	District heating and cooling	EN 15316–4–5	EN 15316–4–5				EN 15316–4–5			EN 15316–4–5
					8–6	Direct electrical heater	EN 15316–4–9					EN 15316–4–9			
					8–7	Wind turbines									EN 15316–4–10
					8–8	Radiant heating, stoves	EN 15316–4–8								

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
sub1		M1	sub 1	M2	sub1		M3	M4	M5	M6	M7	M8	M9	M10	M11
9	Calculated Energy Performance		9	Building Dynamics (thermal mass)	9	Load dispatching and operating conditions	EN 15316–1								
10	Measured Energy Performance		10	Measured Energy Performance	10	Measured Energy Performance	EN 15378–3					EN 15378–3			
11	Inspection		11	Inspection	11	Inspection	EN 15378–1					EN 15378–1			
12	Ways to Express Indoor Comfort		12	–	12	BMS									
13	External Environment Conditions														
14	Economic Calculation	EN 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 to 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 characterization of needs
		TR 12831–4	New	Accompanying TR to EN 12831–3 (Domestic hot water systems heat load and characterization of needs)
6	M3–1 M8–1 M3–4 M8–4 M3–9 M8–9	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

No.	Module	New EPBD numbering	Old standards replaced	Title of the new EPBD standard
		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)
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
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

1 Scope

This Technical Report refers to standard EN 15316-1:2017, modules M3-1, M8-1, M3-4, M8-4, M3-9, M8-9.

It contains information to support the correct understanding, use and national adaptation of standard EN 15316-1:2017.

This Technical Report does not contain any normative provision.

The related standard EN 15316-1:2017 is the general frame for the calculation of the energy use and the energy performance of heating and domestic hot water systems. This standards is only dealing with the heat, provided by water based systems, needed for heating, domestic hot water and cooling (e.g. absorption chiller).

It specifies how to perform the calculation of the entire installation using the calculation modules (see Figure 1) corresponding to the methods defined in the respective standards.

It deals with common issues like operating conditions calculation and energy performance indicators.

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

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

The performance analysis allows the comparison between systems and sub-systems and makes possible to evaluate 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.

EN 12831-3:2017, *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*

EN 15316-2:2017, *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)*

EN 15316-3:2017, *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 15316-5:2017, *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)*