SLOVENSKI STANDARD
SIST-TP CEN/TR 15316-6-9:2018

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Energijske lastnosti stavb - Metoda za izračun energijskih zahtev in učinkovitosti sistema - 6-9. del: Razlaga in utemeljitev EN 15316-4-8 - Modul M3-8-8

Energy performance of buildings - Method for calculation of system energy requirements and system efficiencies - Part 6-9: Explanation and justification of EN 15316-4-8, Module M3-8-8

Heizungsanlagen und Wasserbasierte Kühlanlagen in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 6-9: Begleitender TR zur EN 15316-4-8 (Wärmeerzeugung von Warmluft- und Strahlungsheizsystemen)

Performance énergétique des bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 6-9: Explication et justification de l'EN 15316-4-8, Module M3-8-8

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (CEN/TR 15316-6-9:2017) 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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Introduction

The set of EPB standards, technical reports and supporting tools:

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, *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, *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, EN ISO 52000-1:2017.

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 [2]):

- 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 [4] that laid the foundation for the preparation of the set of EPB standards.

1 Scope

This Technical Report refers to EN 15316-4-8:2017, module M3-8.8.

It contains information to support the correct understanding, use and national adaptation of EN 15316-4-8:2017.

This Technical Report does not contain any normative provision.

The scope of EN 15316-4-8:2017 includes three categories of products:

- air heating systems means a system with one or more warm air generators for heating purpose. The hot air may be diffused in the installation space from the generator or distributed via a ductwork.

- overhead radiant heating systems, means systems using gas and designed to provide heat into the installation room. Radiation may be generated directly by the flame (overhead radiant luminous heaters) or by circulation of flue gas in a ductwork installed near the ceiling (overhead radiant tube heaters).

- stoves and local heaters means local devices that provide heat by transferring the heat generated by combustion into the surrounding environment.

The typical devices are shown in Figures 1 to 4.

Figure 1 — Warm air generator for an air heating system

Figure 2 — Overhead radiant luminous heater

Figure 3 — Overhead radiant tube heater

a) **b)**

Figure 4 — Examples of local space heater: pellet stove and inset

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 15316-1, *Energy performance of buildings — Method for calculation of system energy requirements and system efficiencies — Part 1: General and Energy performance expression, Module M3-1, M3-4, M3-9, M8-1, M8-4*

EN 15316-4-8:2017, *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*

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)*

NOTE References in the text of the standard are given as module codes that are detailed in the annex. This enables flexible references (e.g. to national documents where necessary for local application) and use outside the CEN environment.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345:1995, EN ISO 52000-1:2017 and EN 15316-4-8:2017 apply.

NOTE 1 No new definition is given in this Technical Report.

NOTE 2 During public enquiry, it was commented that the term “stove” is not appropriate. The correct term, which is used in the product standard is “local heaters”, meaning a heater which is not attached to any distribution system. The term “stove” survived in the title, as a synonym of “local heater” because the title of a standard cannot be changed during the drafting process.

4 Symbols and subscripts

4.1 Symbols

For the purposes of this document some special symbols are defined in EN 15316-4-8:2017:

— α is used for losses factors. They are expressed as a percentage, so the usual range is 0 to 100. Some negative values or values beyond 100 are expected when dealing with condensing heaters.

— β is used for loaf factors. They are expressed in per unit, so the usual range is 0 to 1. Typically β is a value that changes at each calculation interval depending on load.

— *$\nabla\vartheta$ has been used for the vertical temperature gradient.*

NOTE: $\nabla\vartheta$ is not a temperature difference but a temperature gradient, e.g. a temperature difference per unit length expressed in °C/m.

4.2 Subscripts

The subscript “lrh” (“Local Radiant Heaters”) has been used to identify all symbols that are exclusive to this standard.

5 Information on the methods

5.1 Output of the method

The output of this method is the same as any heat generation sub-system and the same time-step of the output. If necessary, it is possible to combine different calculation intervals for the input and the output. This is specified in EN 15316-4-8:2017, 6.2.

No significant dynamic effect is taken into account. There is no difference in the calculation for any calculation interval from hourly to seasonal.

A more detailed analysis could be required in future for independent heaters with a high heat capacity (slow release heat stoves).

The heater seasonal efficiency or expenditure factor could be used as a legal requirement. It should be clear if this indicator has to include or not the effect of auxiliaries and, if so, which weighting factors shall be used. More information about extracting specific indicators is available in EN 15316-1.

The calculated performance of the heater takes into account:

— type and characteristics of the radiant heater;

— heater settings;

— type of the heater control;

— location of the heater (e.g. indoor/outdoor);

— operating conditions;

— heat requirement.

5.2 Alternative methods

A separate method is given for:

— on-off heaters (EN 15316-4-8:2017, Clause 6);

— multi-stage and modulating heaters (EN 15316-4-8:2017, Clause 7).

No distinction is made between multi-stage and modulating heaters. A linear behaviour is assumed between minimum and maximum power continuous operation.

An on/off heater is characterized by 2 possible states:

1) burner off (tON);

2) burner on at maximum power (tOFF).

and the calculation procedure determines the duration of $t_{lrh;ON}$ (or the load factor $\beta_{lrh;cmb}$)

A multistage or modulating generator is characterized by 3 states:

3) burner off;

4) burner on at minimum power;

5) burner on at maximum power.

It is assumed that only two situations are possible:

6) the burner is operating intermittently as a single stage burner at minimum power;

7) the burner is operating at a constant average power between minimum and maximum power.

A separate complementary procedure is given for heaters that include a heat exchanger to provide heat to a water based heating system (8.3).

5.3 Connection with building needs and zoning

Since there is no distribution system, a radiant heater or a stove may contribute only to the heating of the spaces where it is installed.

It is relevant to limit the possibility of the heater to supply heat to the building especially in the case of wood stoves and other heaters running with biomass to avoid unreal advantages.

This implies that thermal zones are set up so to isolate the part of the building that might be heated by a local heater. As an alternative, the potential contribution of the local heater or stove to the thermal zone should be limited to a quota given by the ratio between the area or volume heated and the thermal zone area or volume.

5.4 Application data

No application data are specified in the normative part of EN 15316-4-8:2017.

EN 15316-4-8:2017, Annex A provides a template to specify the required application data.

EN 15316-4-8:2017, Annex B includes informative default application data for immediate use of the standard. Other application data can be specified by national standards and regulations, depending on the purpose of the calculation.

See also EN 15316-4-8:2017, A.1 and B.1.

5.5 Using net and gross calorific values

The method described in EN 15316-4-8 is based on the net calorific value, which is the most common reference in the legislation, also for safety issues.

If the input data are given with reference to gross calorific values it shall be converted.

If the output data are desired with reference to gross calorific values it shall be converted.

Net and gross calorific values are given by reference to EN ISO 52000-1:2017. A different (e.g. national) reference can be specified via a specific table complying with EN 15316-4-8:2017, Table A.1.