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English Version

**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**

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

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)

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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.

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

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 load 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.
- $\nabla\theta$ has been used for the vertical temperature gradient.

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