PD CEN/TS 16629:2014

BSI Standards Publication

# Energy Performance of Buildings — Detailed Technical Rules for the set of EPB-standards

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## National foreword

This Published Document is the UK implementation of CEN/TS 16629:2014.

The UK participation in its preparation was entrusted by Technical Committee B/540, Energy performance of materials components and buildings, to Subcommittee B/540/2, Building performance - Energy.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.


Published by BSI Standards Limited 2014

ISBN 978 0 580 82983 3
ICS 91.140.99

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 August 2014.

### Amendments/corrigenda issued since publication

| Date | Text affected |
|---|---|

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

# CEN/TS 16629

July 2014

ICS 91.140.99

English Version

# Energy Performance of Buildings - Detailed Technical Rules for the set of EPB-standards

Performance énergétique des bâtiments - Règles techniques détaillées pour la série de normes sur la performance énergétique des bâtiments

Energieeffizienz von Gebäuden - Detaillierte technische Regeln für das EPB-Normenpaket

This Technical Specification (CEN/TS) was approved by CEN on 10 May 2014 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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

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Ref. No. CEN/TS 16629:2014 E

# Contents

Page

# Foreword

This document (CEN/TS 16629:2014) has been prepared by Technical Committee CEN/TC 371 “Energy Performance of Buildings Project Group”, the secretariat of which is held by NEN.

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 (Mandate M/480, [2]).

This document supports requirements of EU Directive 2010/31/EC on the energy performance of buildings (EPBD). It forms part of a series of standards aimed at European harmonization of the methodology for the calculation of the energy performance of buildings.

Directive 2010/31/EU recasting the Directive 2002/91/EC on energy performance of buildings (EPBD) [1] promotes the improvement of the energy performance of buildings within the European Union, taking into account all types of energy uses (heating, lighting, cooling, air conditioning, ventilation) and outdoor climatic and local conditions, as well as indoor climate requirements and cost effectiveness (Article 1).

The Directive requires Member States to adopt measures and tools to achieve the prudent and rational use of energy resources. In order to achieve those goals, the EPBD requires increasing energy efficiency and the enhanced use of renewable energies in both new and existing buildings. One tool for this is the application by Member States of minimum requirements on the energy performance of new buildings and for existing buildings that are subject to major renovation, as well as for minimum performance requirements for the building envelope if energy-relevant parts are replaced or retrofitted. Other tools are energy certification of buildings, inspection of boilers and air-conditioning systems.

NOTE The use of European Standards increases the accessibility, transparency and objectivity of the energy performance assessment in the Member States facilitating the comparison of best practices and supporting the internal market for construction products. The use of EPB-standards for calculating energy performance, as well as for energy performance certification and the inspection of heating systems and boilers, ventilation and air-conditioning systems will reduce costs compared to developing different standards at national level.

The first mandate to CEN to develop a set of standards to support the EPBD (M/343) resulted in the successful publication of several EPBD related CEN standards in 2007-2008. The second mandate to CEN (M/480, [2]) was issued to review the Mandate M/343 as the recast of the EPBD raises the need to revisit the standards and reformulate and add standards so that they become on the one hand unambiguous and compatible, and on the other hand a clear and explicit overview of the choices, boundary conditions and input data that need to be defined at national or regional level. Such national or regional choices remain necessary, due to differences in climate, culture and building tradition, policy and legal frameworks. Consequently, the current set of EPBD related standards had to be improved and expanded on the basis of the recast of the EPBD. EPB-standards should be flexible enough to allow for necessary national and regional differentiation and facilitate Member States implementation and the setting of requirements by the Member States.

The set of EBP-standards should consist of a comprehensive package of Technical Specifications and European Standards that are manageable and user-friendly for regulators, product Technical Specification drafters, drafters of European Technical Approval Guidelines/Common Understanding Assessment Procedures (ETAGs/CUAPs), producers, notified bodies and users.

The set-up of a coherent set EPB-standards under Mandate M/480 was split into two phases:

— the development of (and agreement on) the underlying basic principles and detailed technical rules for drafting EPB-standards providing a coherent modular structure and an overarching EPB-standard following these rules and principles;

— on the basis of the results of phase 1: the preparation/revision of the complete set of EPB- standards.

The basic principles and technical rules were developed to ensure the necessary overall consistency in terminology, approach, input/output relations and formats in all EPB-standards In these rules and specifications requirements from competent national legal authorities of EU and EFTA Member States (aggregated by the CAP-EDMC liaison committee) were taken into account.

It is anticipated that during phase 2 additions or modifications of the overarching EPB-standard and/or basic principles and detailed technical rules might be needed.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

# Introduction

This Technical Specification has been developed to guide the revisions under M/480 phase 2 as well as all future work on EPB-standards. In order to facilitate coordination, consistency and coherence of EPB-standards, the following tools are available:

a) a Technical Specification on the basic principles to be followed in drafting EPB-standards;

b) a Technical Specification on the detailed technical rules to be followed in drafting EPB-standards (this document);

c) in addition, the following TC/371 documents are available;

   1) a template for the EPB-standards, including reminders of applicable rules in the relevant clauses;

   2) a template for the EPB Technical Reports that shall accompany each EPB standard;

   3) a spread sheet template to be used to demonstrate the correctness of the standardized calculation procedures.

All work on (intended) EPB-standards will follow the basic principles and the detailed technical rules and relate to the overarching EPB-standard, (FprEN 15603).

# 1 Scope

This Technical Specification provides guidance in the form of detailed technical rules based on the basic principles, both for the overarching standard and for each standard within the set of EPB-standards.

These detailed technical rules give practical rules on the following subjects for EPB-standards:

— the standardization process, including collaborations and consultations;

— the application range of the standards;

— common general organization of each standard and the national implementation;

— the overarching structure for the energy performance assessment;

— common model(s) and editorial rules for each standard;

— common quality aspects for each 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.

FprEN 15603:2014, *Energy Performance of Buildings – Overarching standard EPB*

CEN/TS 16628, *Energy Performance of Buildings – Basic Principles for the set of EPB-standards*

# 3 Terms and definitions

For the purposes of this document, the terms and definitions given in FprEN 15603:2014 and the following apply.

**3.1**
**EPB-standard**
standard being part of a set of standards providing a coherent methodology for assessing the energy performance of buildings using a holistic approach

Note 1 to entry: EPB-standards are developed and/or revised in accordance with and have to comply with the basic principles and detailed technical rules developed by CEN/TC 371 under Mandate M/480 following the Energy Performance of Buildings Directive (2010/31/EU, EPBD recast). The term EPB-standard may apply to either EN standards or to EN ISO standards.

Note 2 to entry: EPB-standards are drafted on the basis of relevant existing International, European and National standards and the work of the CEN-CENELEC Product TCs. They have to take into account EU Directives (other than the EPBD), such as the Construction Products Directive (89/106/EEC), the revised Labelling Directive 2010/30/EU, the Energy related Products Directive 2009/125/EC, the Energy End Use Efficiency and Energy Services Directive (2006/32/EC), the INSPIRE Directive (2007/2/EC) and Mandate M324 and the Boiler Efficiency Directive(92/42/EC).

# 4 Symbols, units and subscripts

For the purposes of this document, all symbols, units and subscripts provided in the overarching EPB-standard FprEN 15603:2014 apply.

NOTE No specific symbols are used in this Technical Specification.

# 5 General

Any standard which is intended to be part of the set of EPB-standards shall comply with CEN drafting rules and with the additional requirements given in the Technical Specification.

Each EPB-standard shall be accompanied by:

— a Technical Report in accordance with 10.2;

— a spreadsheet complying with requirements given in 10.3.

There shall be a clear distinction between normative text and informative text:

— the text of any assessment related CEN EPB-standard shall contain only the assessment procedures and all related provisions (i.e. source of data, calculation options);

— all explanations, informative text, validation results and examples shall be given in the accompanying Technical Report.

The checklist given in Annex A shall be used to give evidence of the fulfilment of the requirements given in this CEN Technical Specification.

This CEN Technical Specification includes both editorial rules and technical rules about the contents of each standard in the CEN EPB package.

The detailed rules specified in this document apply to both new EPB-standards and the revision of already existing standards to be included into the set of EPB-standards.

# 6 Standardization process

## 6.1 General

NOTE CEN/TS 16628:2014, 6.1, gives an overview of the coordination process to safeguard coherence when developing EPB-standards.

This Technical Specification deals with aspects of the standardization process that are specific for EPB-standards.

All EPB-standards shall be developed following the common standardization procedures, comply with CEN/CENELEC and ISO/IEC drafting rules [6] [7] and the additional requirements set by CEN/TS 16628 and stated in this Technical Specification (CEN/TS 16629).

For each work item, the responsible Working Group shall deliver a package consisting of:

— the specific standard to be included in the EPB-standards package;

— an accompanying Technical Report with informative text essential for the correct understanding and application of the standard;

— the accompanying spread sheet;

— the checklist given in Annex A, completed to give evidence of implementation of CEN/TS 16628 and CEN/TS 16629 rules.

## 6.2 Coordination of EPB-standards

### 6.2.1 General

EPB-standards are required for technologies specified in the Technical Report accompanying FprEN 15603. These standards have to be set up/maintained by respective competent TCs.

The modular structure defined in the overarching EPB-standard (FprEN 15603) shall be used to identify these standards. Each individual EPB-standard may cover one module, part of it or a number of modules defined in FprEN 15603:2014, Clause 6.

In order to maintain coherence between EPB-standards, coordination considering the use of terms, symbols, and time steps is essential. For this, standard developers should contact CEN/TC 371 prior to publishing the draft EPB-standard for public enquiry. CEN/TC 371 is the horizontal TC responsible for the coherence of EPB-standards. In order to safeguard whether the terms for accepting a standard within the EPB-standard package, checking by CEN/TC 371 is essential.

In order to safeguard the coherence between EPB-standards, coordination between the competent TC(s) and CEN/TC 371 is required if one of the calculation procedures in the set of EPB-standards requires one of the following:

— data that is not defined by a product standard;

— data for which no standardized measurement procedure is available;

— data that is not consistent with requirements from related EU Directives [1)].

### 6.2.2 Coordination with product standards

In defining calculation procedures, product data already defined in the relevant CEN/TC shall be used whenever appropriate. Each WG shall check the availability of appropriate input data in the relevant EN product standards.

### 6.2.3 Coordination between CEN and ISO

NOTE 1 See CEN/TS 16628 for the basic principles for developing EN ISO EPB standards.

Having different CEN and ISO standards would harm both CEN and ISO as well as the users of the standards. Therefore, the utmost will have to be done to solve problems and difficulties that might be at hand, instead of taking the easy way out and going separate ways.

Practical solutions for taking into account divergences between ISO and CEN (if unavoidable) within one combined EN ISO standard are for instance:

— Where necessary, different options can be given in a standard, such as an option required by “Europe” and an option required by another country or region. In the annex intended to specify the options chosen by national or regional authorities, the CEN option can be prescribed for use within the CEN area.

NOTE 2 However, it is likely that the majority of such choices will be needed to satisfy different needs within Europe and maybe not many extra options will be needed to satisfy different needs between Europe and the rest of the world.

[1)] Such as the Construction Products Directive (89/106/EEC), the revised Labelling Directive 2010/30/EU, the Energy related Products Directive 2009/125/EC, the Energy End Use Efficiency & Energy Services Directive (2006/32/EC), the INSPIRE Directive (2007/2/EC) and the Boiler Efficiency Directive(92/42/EC).

— In case of a combined EN ISO standard, there may be a need for specific parallel routes in referring to other EN and respectively ISO standards, in order to take into account existing European and legal environments while maintaining global relevance. For this purpose, a normative annex can be provided with a tabulated list of the references for the “CEN area”, containing references to specific CEN standards and a parallel list of references applicable outside the “CEN area”, containing references to ISO standards (if different from CEN), or to national standards where ISO standards are not (yet) available.

NOTE 3 EN ISO 13790:2008, Annex A, already contains such a normative annex.

NOTE 4 CEN/TS 16628:2014, Annex A, contains an outline for such a normative annex.

#### 6.2.4 Dynamic interaction with national authorities

NOTE See CEN/TS 16628:2014, 6.2.

It is expected that during phase 2 of the preparation of the EPB-standards, adjustments of the overarching standard and basic principles and technical rules might be necessary as result of the experiences with the preparation of the individual standards. This may again affect the Member States expectations.

A regular information exchange will be maintained between the CEN/TC 371 team and representatives from the EU and EFTA Member States.

## 7 Application range

### 7.1 General

NOTE The application range provided below follows the requirements set by the EPBD recast.

Each standard shall include specifications on the intended application range of the described methods.

Each standard shall include specifications on optional procedures and/or data set according to the application range.

The type of data required (i.e. rated by manufacturer, average, maximum, minimum, worst case, …) as an input or given as an output shall be specified according to the intended application range.

The following application range shall be taken into account when drafting EPB-standards:

— energy performance check;

— energy certification;

— inspection;

— recommendations and energy auditing;

— system design and optimization (using tailored rating), including sizing.

Further details about application range are given in CEN/TS 16628:2014, Clause 7

### 7.2 Energy performance requirements

NOTE See CEN/TS 16628:2014, 7.3.

The standard shall not include any explicit or implicit energy performance requirements.

Numerical indicators intended to be referenced by regulations to set legal requirements shall be clearly identified in a dedicated chapter or normative annex of each standard.

The standard shall define boundary conditions, required data, application options and possible reduced procedure required for the practical use of the identified values as a stand-alone legal requirement.

The accompanying Technical Report shall include explanations on the reason for the options and on the effect of the possible choices.

Indicators and options already used by EU Member States shall be considered.

### 7.3 Energy certification

NOTE See CEN/TS 16628:2014, 7.3.

An evaluation of the time and expertise required to collect the necessary data and to perform the energy performance calculation shall be included in the accompanying Technical Report.

Each EPB-standard shall include an annex with a list of items that shall be inspected on site to provide data for energy performance assessment.

### 7.4 System inspection

NOTE See CEN/TS 16628:2014, 7.7.2.2.

Inspection standards and calculation options for inspection purpose shall consider the availability and the time needed to acquire and/or measure required data.

Each inspection EPB-standard shall include an annex with a list of items that shall be inspected on site to provide data for energy performance calculation.

Each inspection EPB-standard shall include the method and information to produce lists of default values for repetitive items, to be adapted on a national basis.

An evaluation of the time and expertise required to get the necessary data during inspection shall be included in the Technical Report.

### 7.5 Recommendations and energy auditing

Where appropriate, EPB-standards shall include the option of using available actual data (measured or determined on site) to support energy recommendations and energy auditing (tailored rating options).

### 7.6 System sizing

Specific data set to be used for sizing purpose shall be clearly separated from other data set used for energy performance calculation.

### 7.7 Different levels of complexities

NOTE See CEN/TS 16628:2014, 7.6.

In writing the standards, the specification of the applicability of the individual methods and data set shall take into account building complexity and type. The reason for the choices shall be stated in the accompanying Technical Report.

### 7.8 Flexibility

NOTE See CEN/TS 16628:2014, 7.7.

Any set of methods to cover a module (i.e. generation, *U*-values) shall include an alternative consisting of a simple correlation between inputs and outputs (such as constants and/or linear functions).

EXAMPLE A technical system standard may be described by either losses or auxiliary energy needs proportional to the required energy output.

The use of this option (i.e. “dummy modules”) shall be restricted to verification of the complete calculation model (i.e. entire set of EPB-standards) or to the “equivalent calculation” for new technologies, unless it is explicitly stated as one of the appropriate calculation options with defined boundary conditions.

The use of this alternative as an “equivalent method” shall be justified in a dedicated TS until an appropriate specific standard has been developed.

Fast delivery of an “equivalent method” TS and/or of a dedicated standard to be inserted in the modular structure should be the task and interest of the new technology developers.

Where applicable, provision for the inclusion of equivalent solutions shall be stated.

## 8 National implementation and adaptation

### 8.1 General

NOTE CEN/TS 16628:2014, 8.1, provides the basic principles for including national choices to be given in National Annexes. See also the note in CEN/TS 16628:2014, 8.1, concerning the definition and description of a National Annex.

Each standard shall include provisions for national adaptations. National choices shall be implemented through National Annexes to the EPB-standard. National annexes shall comply with rules given in 8.4.

National adaptation includes the possibility to:

a) nationally adapt selection criteria of alternative methods for choosing between different options;

b) define default or specific national data set.

National options shall not allow for changes of the calculation procedure but only the selection between already defined alternatives within EPB-standards.

EPB-standards may be set up taking into account foreseeable reasonable national adaptation in very specific circumstances only (e.g. when a common, harmonized method is not yet feasible). The accompanying Technical Report shall indicate the rationale of the provisions for national adaptation.

This is not to say that any existing national method shall be accommodated in EPB-standards but that WG members shall be aware of already existing national methods and specific conditions so that the EPB-standards include and reuse, as far as reasonably possible, already existing methods instead of defining new ones.

The reasons for using methods deviating from the provided options shall be documented in an accompanying Technical Report (or informative annex).

### 8.2 Presenting national options

EPB-standards shall identify available alternative methods, their relations and their boundary conditions.

NOTE Boundary conditions may be related to calculation objective (i.e. sizing, energy performance calculation, etc.), building/system type, building/system size, building/system complexity, data availability.

The standard may specify different options for the required input data, including national values.

Where correlations are given to provide default data, the correlations should be designed to encompass all intended national options by tabulated values.

EXAMPLE A general correlation formula may include parameters that can be set to neutral values (such as +0 or x1) if an option is to be nationally excluded.

Whenever national options and input data are required, this shall be introduced explicitly in the core text of the standard by one of the following statements, or similar statements, as appropriate to the situation:

— values for the parameter X can be found in Table x / Annex Nx;

— the selection criteria between option A and option B is given in Table x / Table Nx.

The rationale of different options given in the standards shall be explained in the accompanying Technical Report.

## 8.3 Split between common part and national/regional choices and input data

The core text of the EPB-standard shall be normative.

A set of default data/criteria options shall be included in normative annexes to each EPB-standard. This annex with preferred options serves as the format for the set of identical national annexes. Deviating national choices with respect to given options for alternative data and method selection boundaries are allowed only by national annexes (Nx numbering) following that format.

## 8.4 National annexes

### 8.4.1 General

It is not permitted to alter normative provisions through a national annex; statements like “the National Annex may vary the above clause…” are not permitted.

National annexes shall not define additional methods to replace methods given by EPB-standards.

### 8.4.2 Content of National implementing standards

The National Standards implementing EPB-standards shall include:

— the full text of the CEN EPB-standard, including any annex as published by CEN;

— an optional National title page and National foreword;

— optional National Annexes, to be numbered NA, NB, ….

The National Annexes may only contain information on those data and options which are defined in the EPB-standard for national choice, such as:

— normative annex with country specific data (geographical, climatic, etc.) in the format specified by EPB-standard;

— normative annex with data and/or parameter values where alternatives are given in the EPB-standard;

— normative annex with specific boundary conditions where alternative procedures are given in the EPB-standard;

— informative annexes with complementary information to assist the user to adapt the EPB-standard to national specific conditions.

# 9 Modular structure

## 9.1 General

NOTE See FprEN 15603:2014, Clause 6.

An EPB-standard shall be positioned within the modular structure defined in FprEN 15603. The modular structure and numbering code shall be used to identify each individual standard within the EN-EPB package.

The positioning of an EPB-standard in the modular structure shall be:

— included in the standard title as shown in 10.1.2;

— identified in the scope of an EPB-standard as shown in 10.1.4.

## 9.2 Terms, definitions and symbols

Any EBP-standards shall use definitions, symbols and subscripts given by EPB-standard FprEN 15603 and from any TC level standard. In order to preserve coherence between all EPB-standards, no new definition or symbol or index shall be used without prior consultation with CEN/TC 371.

EXAMPLE 1 Consult CEN/TC371 for proposed symbols, definitions and units to be used for a heat quantity from AHU (TC 156) to heating system (TC 228).

EXAMPLE 2 A heat quantity from solar generation system (TC 228) to back-up boiler (TC 228) will be agreed involving CEN TC 228 core team.

Subscripts for quantities that are common input from or output to other EPB-standards shall follow the general rules set-out in overarching FprEN 15603.

For each individual EPB-standard, a unique prefix for subscripts shall be agreed upon in consultation with CEN/TC 371. It shall be used as a prefix for all subscripts of quantities that are not relevant for other standards or modules within the EPBD set.

EXAMPLE 3 “hp” for heat pump.

NOTE This is to avoid possible duplicate symbols within the set of EPB-standards.

A list of common symbols and definitions may be organized within each TC. If so, it shall not duplicate or alter terms, definitions, symbols and subscripts already defined in FprEN 15603.

## 9.3 Matching time steps

NOTE See CEN/TS 16628:2014, 9.7.

When data can be accepted from another calculation module with a different time step, an explicit rule shall be set-out for the adaptation of such data.

## 9.4 Input values and assumptions

Qualify input values according to the principles given in CEN/TS 16628:2014, 9.8.

Indicate if proposed values in the annexes are:

— best practice values;

— average values (common practice);

— conservative values;

— penalty values.

The choices (i.e. why such type of values has been included) shall be documented in the accompanying Technical Report.

For this, coordination with CEN/TC 371 is essential to ensure a maximum of consistency of choices over different technologies, to create a level playing field.

# 10 Common models and editorial rules

## 10.1 Common structure of an EPB-standard

### 10.1.1 General

NOTE 1 See CEN/TS 16628:2014, 10.1.

NOTE 2 Several of the instructions in this Clause 10 apply specifically to EPB calculation standards. For other types of standards the instructions may need to be adapted.

Each EPB-standard shall be organized in the following way:

a) regulated introductory clauses (scope, normative references, terms and definitions, symbols) drafted according to CEN/CENELEC and ISO/IEC drafting rules [6] [7] and the additional requirements given by the CEN/TS 16628 stated in this Technical Specification (CEN/TS 16629);

b) a general description of the module, including specification of the intended output, options, applicable time-steps, and other general items;

c) a description of each individual method, covering outputs, inputs and their source, the chain of equations and the required sub-procedures;

d) quality control specification;

e) compliance check;

f) other chapters;

g) an annex (Annex A) about the detailed definition of input data;

h) an annex (Annex B) about method selection criteria;

i) an annex (Annex C) about simplified data input correlations.

### 10.1.2 Title of the EPB-standard

The title of every EPB-standard shall consist of the following elements:

*Energy performance of buildings, module Mx-y-z –*

The 'x' refers to the main module (Building, Heating, Ventilation, …), 'y' to the sub-module according to the modular structure defined in FprEN 15603. The second modular sub level 'z' may be used for refining the modular structure.

FprEN 15603:2014, Clause 6 defines per main module (Overarching, Building, Heating, Ventilation, ...) one sub-level only (General, Needs, …, Storage, …, Generation, …, Inspection, …).

If considered essential for positioning EPB-standards within a specific sub-module, a second sub level may be approved by CEN/TC 371. Such second level sub-modules have to be defined in the EPB-standard(s) covering the general aspects of the main module concerned.

Several modules may apply to one EPB-standard.

- first level identifier;
- second level identifier;
- optional third level identifier.

EXAMPLE 1 EN(ISO) aaaaa, *Energy performance of buildings, module M3–8-3 – Heating systems in buildings — Thermal solar generation systems*.

EXAMPLE 2 EN(ISO) bbbbb, *Energy performance of buildings, modules M5–6, M5–8, M6–5, M7–5 – Ventilation in buildings – Calculation methods for energy requirements of ventilation systems*.

### 10.1.3 Introduction of the EPB-standard

The Introduction shall be structured as follows:

— common introduction for all EPB package standards;

— specific part by TC or group of standards;

— specific part of the introduction for the individual standard

A short summary of the standard development history shall be included at the end of the Introduction.

### 10.1.4 Scope of the EPB-standard

The Scope shall state what is covered by the standard and, where relevant, what is excluded from the Scope.

The Scope of EPB-standards shall include FprEN 15603:2014, Figure 6.1, with the specific standard indicated in the following way:

“This document is part of a series coherent EPB-standards; Figure 1 shows the relative position of this document within the modular structure of the EPB-standards.”

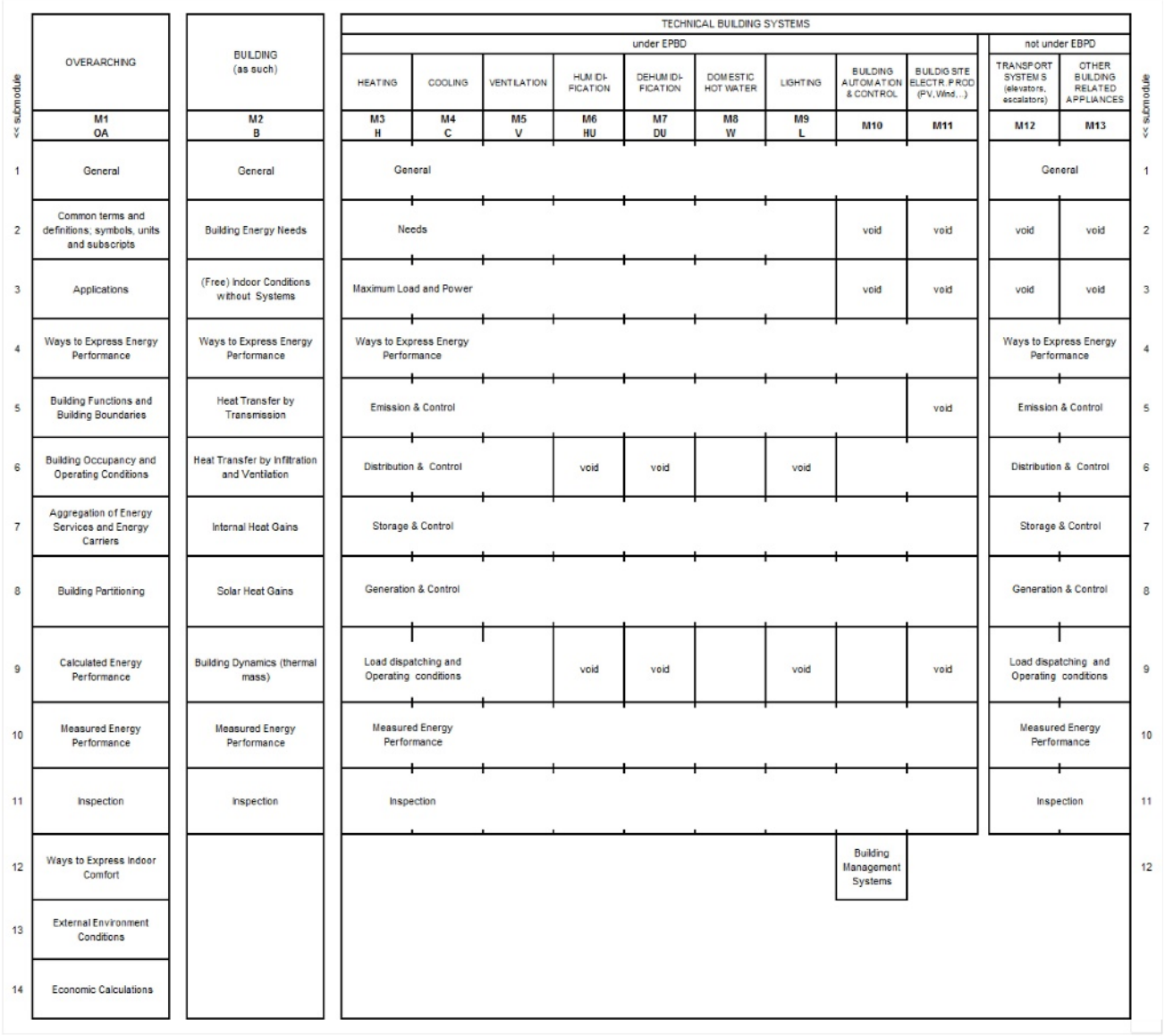


**Figure 1 – Position of this document within the modular structure of EPB-standards**

NOTE As an example, in Figure 1 the position a standard under module M3–8 Heating – Generation and Control, is indicated.

### 10.1.5 Normative references within an EPB-standard

Possible related standards to be considered when drafting:

— the overarching EPB-standard (FprEN 15603);

— standards with which values are exchanged (input/output);

— product standards as a source of input data;

— other similar standards, as an example of possible methodologies.

### 10.1.6 Definitions and symbols within an EPB-standard

Use of definitions, symbols and subscripts already defined the overarching FprEN 15603 is mandatory. A reference has to be made to definitions in FprEN 15603. Definitions given in FprEN 15603 shall not be repeated in the individual standard. Only specific definitions for the individual EPB-standard shall be listed.

Symbols, indexes and units that are already defined in FprEN 15603 shall not be repeated in the individual EPB-standards. They shall be only referenced, as for definitions. Only specific symbols and indexes for the individual EPB-standard shall be listed.

#### 10.1.7 Description of the methods, presenting alternative methods provided by an EPB-standard

This paragraph shall give an overview of the methods defined by the standard, including time-steps and options.

The standard shall include the selection criteria and detailed boundary conditions that enable decisions regarding which option to select in any specific calculation.

Method selection criteria shall be defined through a table in a normative annex to allow national adaptation through a national annex.

The accompanying Technical Report shall include:

— the rationale of the alternative methods;

— any known assumption, limitation in use, of the described methods;

— the reasons for the indicated selection criteria between alternative options;

— any other detailed explanation;

— examples of selection.

#### 10.1.8 Time step used within an EPB-standard

Each standard shall consider the appropriateness, with respect to the time step required for the output required within the modular structure, at least the following options:

— yearly or seasonal;

— monthly;

— hourly;

— bin;

— dynamic.

The time step of each output and/or input variable shall be stated for each method provided within the standard.

NOTE The time step of the standard output may differ from that of the input, e.g.:

— hourly data processing may supply a correct daily or monthly result while hourly intermediate results are not reliable;

— hourly heat transmission through a building element may be based on annual values derived from the thermal conductivity of the (insulation) materials of that element.

If the output data essential for the use of the standard within the modular structure is not available with the time step requested at the overarching level, and/or common calculation procedures of the standard do not use the time steps used in EPB-standards using the output provided, rules to combine or split time steps shall be indicated in the standard.

The time step may be different for alternative options provided for applications distinguished in the standard. In the standard, different options may be required according to the requested time step for the output variable(s).

State in the accompanying Technical Report:

— the reasons for any time-step exclusion and/or the reasons why (and limitations if any) dynamic effects can be neglected;

— the rationale of the rules to adapt input data available with a different time step.

#### 10.1.9 Individual method descriptions provided by an EPB-standard

##### 10.1.9.1 General

Each alternative method to be included in the standard shall be dedicated a main clause.

Each main clause shall include specification of application, output data, input data, calculation procedures.

##### 10.1.9.2 Output data

Each output data shall be identified in a table giving:

— the description;

— the symbol;

— the unit;

— the intended destination module(s) where the output will be used.

The same output data shall be found in the “Method output” sheet in the accompanying spread sheet.

Clearly identify output that is meant to be used for regulatory purpose such as building elements properties.

##### 10.1.9.3 Input data

###### 10.1.9.3.1 General

Input data shall be organized into the following categories:

— product data;

  — product description (qualitative, standardized selection properties);

  — product technical data (quantitative, standardized technical properties);

— system design data (application case properties);

  — process design data;

  — control type;

— operating conditions;

— constants;

— other data (if any).

Input data shall be only listed in the core of the standard, using tables including:

— characteristic name;

— symbol;

— unit;

— validity interval (range of acceptable values);

— reference to the annex paragraph where data are fully described and defined;

— module where the data are calculated (for data coming from other modules) or “local”.

The same input data table shall be found in the “method input” sheet of the accompanying spread sheet.

The complete description of all input data, including any correlation and table with default value shall be included in a normative annex.

Whenever national data may be required, use the following text:

“Default values for X can be found in Annex Y / Annex Nx”.

#### 10.1.9.3.2 Product data

##### 10.1.9.3.2.1 Product description data

This includes descriptive data that implies choices on the calculation method or on the data input.

Qualitative characteristics can be linked to two issues:

— which methodology to apply (therefore asking for a different quantitative data set);

— identifying typical input data values.

EXAMPLE 1 The choice condensing/low temperature/standard boiler is linked to test condition temperatures and to a switch in the calculation method (return temperature/average temperature used to calculate losses).

EXAMPLE 2 The choice of the fuel determines the selection of the primary energy factors.

EXAMPLE 3 The association standard boiler / forced draught / gas may lead to default data.

Qualitative characteristics linked to calculation method decision and alternatives shall be all identified and listed. Any calculation switch (typically “if … then”) shall be based on qualitative characteristics.

The identification of the qualitative characteristics shall be done by identifiers. Whenever possible the identifiers shall be in line with the symbols and subscripts used in the overarching standard FprEN 15603.

Each identifier shall be a maximum of four letters and each level shall be separated by an underscore. All identifiers within a standard module should start with a common unique prefix.

EXAMPLE 4 BLR for boiler,

followed by the considered item: TYPE, FUEL, …

… and by the case identifier

CO for condensing …

Complete case identifier: BLR_TYPE = BLR_TYPE_CO/BLR_TYPE_LT/ BLR_TYPE_ST

#### 10.1.9.3.2.2 Product technical data

Product technical data are quantitative data, generally linked to the testing of the product. If so, the test standard shall be mentioned.

In drafting the method, available standardized product data (EN, ISO, …) shall be used as far as possible.

If a method requires other product values (not yet covered by a test standard), the request for this data shall be communicated to the competent product TC.

NOTE Up until now, products were not tested to provide data for energy performance calculation but to rate them for market purpose.

Default values and/or any correlation shall be given in a normative annex.

#### 10.1.9.3.3 System design data

These data deal with the integration of a product in the system and with control strategy options.

EXAMPLE 1 Localization, service, hydraulic circuit type, domestic hot water priority, …

Identifiers shall follow the same rules set out for product description data.

EXAMPLE 2 BLR for boiler

… followed by the considered item …

LOC for location

… and the case identifier

INT for internal …

Complete identifier: BLR_LOC = BLR_LOC_INT/BLR_LOC_EXT/BLR_ LOC_BLR/ …

Detailed values for the identifiers shall be included in the relevant normative annex.

#### 10.1.9.3.4 Operating conditions data

Operating conditions data define the actual operating conditions within a time step.

These data are:

— quantitative;

— varying with the calculation step;

— coming from other modules.

EXAMPLE Required energy output, power, temperatures, etc.

The originating module shall be identified in the data listing table, see 10.1.9.3.1.

#### 10.1.9.3.5 Simplified data input

Simplified data input, if any, shall consist of correlations that provide the detailed input.

### 10.1.9.4 Calculation procedure(s)

Each calculation procedure shall be described step-by-step.

Each step shall consist of:

— the definition of the calculated value;

— the calculation formula;

— details about all input values to the formula, except those previously defined.

Each input value shall be defined only once in the standard.

Calculation flow decision shall be expressed according to case identifiers or quantity values.

Calculation steps may be organized using common logical structure.

Proper indenting shall ensure clear marking of the end of the logical structure.

NOTE Compare equivalent descriptions in programming language, such as:

IF…THEN…ELSE,

DO…LOOP

FOR…NEXT

If nested structures are required, output data, input data and calculation (sub)procedure shall be individually defined in a dedicated clause.

Each step shall be individually implemented in the accompanying spread sheet.

Each formula shall be copied to the accompanying spread sheet and implemented individually.

Decisions for calculation routing shall be based on numerical conditions or case identifiers. This shall be reflected in the accompanying spread sheet as well.

A flow-chart for the calculation procedure shall be included in the accompanying Technical Report.

## 10.1.10 Quality control

Every EPB-standard should include a clause on quality control stating criteria to evaluate if the standard has been correctly applied, i.e. that the calculation procedure have been applied in a correct and credible way.

Relevant intermediate results to be included in the report shall be stated here.

#### 10.1.11 Compliance check

Every EPB-standard should include a clause on compliance checking stating rules, checklists and/or methods used to establish that the standard has been correctly applied in a specific situation.

#### 10.1.12 Annexes

##### 10.1.12.1 General

Each standard shall include the following annexes:

a normative annex with the detailed description of all input data;

— a normative annex with the selection criteria if there are alternative methods;

— a normative annex with any correlation for simplified input, if any;

These correlations provide the required detailed input based on a reduced number of parameters.

— an informative annex with the history of the standard development.

The purpose of this annex is to explain the main changes compared to the previous version (including prEN→EN).

##### 10.1.12.2 Input data annex

The detailed description of all input data shall include tables and correlation to determine default data.

National options shall be indicated through tables with different values (including additional rows, provided this is consistent with the table use) in a national annex. The national annex shall only provide data in the format of the original equation (AX) included in this annex. Therefore, formulas for input data shall be designed to accommodate foreseeable needs for national implementation. Options left open to possible implementation shall be neutralised via special values.

EXAMPLE 1 additional term set to 0.

EXAMPLE 2 multiplying factor set to 1.

The table included in the national annex can be empty and include the following sentence: “no default value is given at national level. Data shall be obtained by the manufacturer or another calculation method shall be applied”.

The type of data in respect of the evaluation type such as worst case, average, best technology, minimum legal requirement, shall be stated.

### 10.2 Common structure and contents of a Technical Report accompanying an EPB-standard

NOTE See CEN/TS 16628:2014, 10.4

An accompanying Technical Report shall include at least the following information and shall be organized in the following way:

— regulated clauses (scope, normative references, terms and definitions, symbols) drafted according to CEN rules [6] and the additional requirements given by the CEN/TS 16628 stated in this Technical Specification (CEN/TS 16629);

— information about alternative options;

— information on each method, including rationale, qualification for outputs, inputs and their source;

— the reason why existing methods have not been reused;

— information on the rationale for the selection between alternative methods and options, including the effect on energy performance calculation;

— information on provisions to support national adaptation, including rationale and intended use of correlations for input data;

— evaluation of the time and expertise required to collect the required data and to perform the calculation, including any inspection;

— calculation procedure flow-chart;

— worked out examples to demonstrate the procedure;

— information on the accompanying spread sheet;

— validation test results;

— an example of national annex;

— other information.

## 10.3 Accompanying electronic spread sheet

NOTE See also 10.1.9.4.

An accompanying spread sheet to each EPB-standard shall be prepared to test and validate the standardized calculation procedure.

The spread sheet shall be compiled using the template available for EPB-standard authors.

The following sheets shall be compiled:

— method input;

— method calculation;

— method output.

The compiled sheet shall cover at least once all allowed optional calculation paths.

Input data correlations shall be demonstrated using additional sheets.

The spread sheet shall be used to generate the validation calculations required by Clause 11.1.

The “Method calculation” sheet shall demonstrate the procedure:

— with a one to one representation of the equation chain of the standard;

— using in the cells only data from the same sheet or from the “method input” sheet.

Other optional sheets can be used for complex simulations.

Additional instruction is included in the spread sheet.

## 10.4 Editorial rules

### 10.4.1 General

In addition to the CEN/CENELEC Internal Regulations [6], the additional editing and formatting rules provided in this document apply to EPB-standards. These additional drafting rules intend to further reduce ambiguity. Unambiguity is essential considering EPB-standards are used for:

— developing software to facilitate calculation procedures from EPB-standards;

— implementing the standards on a national level, e.g. drafting National Annexes;

— compliance checking.

### 10.4.2 Neutrality

EPB-standards shall be drafted in strictly neutral terms. They shall state how to calculate energy flows and energy performance indicators and assessment procedures for relevant input parameters. EPB-standards shall not set any requirement on who has to perform the calculation and/or which are the legally acceptable values. Responsibility and requirements are a matter for legal provisions and commercial contracts.

Consequently one shall avoid the use of expressions like “the designer shall…”, “the efficiency shall be higher than …” and similar.

### 10.4.3 Numerical values

The comma shall be used as decimal sign.

For values less than 1 in decimal form, the decimal sign shall be preceded by zero.

EXAMPLE 1 0,037

Numbers comprising more than three digits before or after the decimal sign shall be separated by a space from preceding or following digits, except for years.

EXAMPLE 2 1 234,56 and 9,876 54 (but 1994).

### 10.4.4 Symbols and Equations style and equation numbering

All symbols for variable quantities (symbols) shall be written in italics Times New Roman font type.

NOTE 1 The Times New Roman font type is to be used to avoid confusion between the letters I (uppercase i) and l (lowercase L).

All subscripts are written in Arial, upright type, unless they represent symbols for variable quantities (in which case, they are written in italics.

All mathematical expressions (equations, conditions, or pure formulae) given in a standard shall be numbered in a single series in Arabic numbers between parentheses, beginning with (1). The numbering shall be placed on the right side.

A separate numbering series shall be used in each annex, with the annex letter as a prefix followed by a dot.

All multiplications of parameters and of compound units shall be indicated by a half-high dot “•”.

EXAMPLE 1 $U = I \cdot R$

$$\mathrm{W/(m \cdot K)}$$

All multiplications with or between numbers shall be indicated by a multiplication cross "×"

EXAMPLE 2 $\ell = 2{,}5 \times 10^3$ m

$$A = 80\ \mathrm{mm} \times 25\ \mathrm{mm}$$

$$z = 2{,}781 \times \frac{a \cdot b}{c}$$

The symbols used in each mathematical expression / formula should be defined, either in the text above or immediately below the formula.

Considering the definition of symbols used for variables in the formulae, this clause states "… the meanings of which are explained in connection to the formulae, unless they appear in a 'Symbols and abbreviated terms' clause.

NOTE 2 This implies that the definition of symbols used below a formula is not required when these definitions are given in a previous clause or superseding document.

When defining custom subscripts within an individual standard, respect the relevant common rules for symbols and subscripts given in the overarching FprEN 15603 and the following:

— The first subscripts shall be common to all subscripts within a standard, except for quantities exchanged with other standards (these fall under the common rules laid out in FprEN 15603).

EXAMPLE 3 All subscripts in the heat pump standard could start with "hp"; e.g. $\theta_{\mathrm{hp,out,max}}$ for a maximum output temperature.

— The language to select subscripts shall be British English.

— The order of subscripts shall be from general to details.

— No capital letters are allowed in the subscripts. This is reserved for service identifiers (H, W, C, …) and some explicit exceptions.

NOTE 3 Exceptional capital subscripts are: ON, OFF, etc.

NOTE 4 According to Annex I of [6], it is not allowed to modify symbol units by adding subscripts, therefore constructions such as $EP$ = 123,45 $\mathrm{kg_{CO2}/(m^2.a)}$ are not allowed and are written instead as $EP_{\mathrm{CO2}}$ = 123,45 $\mathrm{kg/(m^2.a)}$.

Symbols and subscripts shall never be translated or altered in the national implementation.

Multiple subscripts to a symbol shall be used in the following way:

— multiple subscripts to a symbol are separated by a semicolon (;);

— multiple subscripts are presented in order of highest to lowest detail;

— enumerators of subscripts and/or subscripts identifying variable quantities are separated from the subscript using a comma (,);

EXAMPLE 4

$$D_{\mathrm{subscr},j,i} = f_{j,i} \cdot E_{\mathrm{sub1},j;\mathrm{sub2},i}$$

— multiple enumerators shall be presented in order of highest to lowest detail and/or representing the way elements are aggregated:

EXAMPLE 5

$$E_{\text{sub;tot}} = \sum_{k=0}^{c\text{tot}} \left( f_{\text{c},k} \cdot \sum_{j=0}^{b\text{tot}} \left( f_{\text{b},j} \cdot \sum_{i=0}^{a\text{tot}} \left( f_{\text{a},i} \cdot F_{\text{sub1},k;\text{sub2},j;\text{sub3},i} \right) \right) \right)$$

Examples of correct formatting are given in FprEN 15603.

### 10.4.5 Table style and numbering

All tables given in a main clause shall be numbered in a single series with the main clause number as a prefix followed by a dash.

A separate numbering series shall be used in each annex, with the annex letter as a prefix followed by a dash.

The title shall be above the table.

Examples of correct table formatting are given in FprEN 15603.

### 10.4.6 Figures

All figures given in a main clause shall be numbered in a single series with the main clause number as a prefix followed by a dot.

A separate numbering series shall be used in each annex, with the annex letter as a prefix followed by a dash.

The title shall be below the figure.

No text, except for symbols, shall be used within a figure. A key-list below the figure and above the figure title shall be used instead.

Examples of correct figure formatting are given in FprEN 15603.

### 10.4.7 Verbal forms, use of modal auxiliary verbs

Verbal forms for the expressions of provisions are given in the normative Annex H of the CEN/CENELEC Internal Regulations [6].

Requirements that shall be adhered to with no permitted alternatives shall be indicated with “shall”.

“Should” shall not be used in the normative text because it does not imply a requirement. It may be used in the informative annexes only. For this reason, “may” shall not be used in normative text, unless for statements/clauses that provides permissible options.

For possibilities “can” shall be used.

Normative text shall avoid any unambiguity.

In order to precise the meaning of a list for requirements, such lists should be preceded by wording like:

— …”provided that all the following conditions are satisfied” to indicate a logical and;

— …“by any of the following conditions” to indicate a logical or.

The use of both “and” and “or” in a sentence shall be avoided to prevent ambiguities.

Some ambiguities to avoid are listed in the following table.

**Table 1**

| Ambiguous term | Preferred option | Examples |
|---|---|---|
| Only if, only when | Unless | |
| (If, when) possible | Practicable | |
| To consider | To take account of, to take into account | |
| In case of | If (i.e. in the event of) or for (i.e. in case of) | |
| Provided | Provided that | |
| Possibly, sometimes | Where appropriate | |
| Safe-sided, cautious, on the side of safety | Conservative | |
| Often | Generally, normally, in most cases<br>NOTE A subsequent sentence (or paragraph) should cover the alternative case(s) | |
| Global | Worldwide, mondial<br>2) Rough, broad, tentative | Worldwide relevance<br>Rough indication |

#### 10.4.8 References in the normative text

The normative text of standards shall include only normative references to standards and references to normative annexes. Standards referred to in a normative way shall be included in Clause 2 Normative references (see 10.1.5); standards referred to in an informative way shall be included in the Bibliography.

References to informative annexes should be made only in a NOTE to the normative text.

No normative references are allowed in a Technical Report.

References to already defined calculation procedures shall be used instead of their repetition. If more modules share the same calculation sub-procedure, it shall be removed from all specific calculation and defined separately in a dedicated clause.

EXAMPLE Linear thermal transmittance of a pipe may be required both by heating and domestic hot water distribution modules but only needs to be defined once.

Reference to specific standards, clauses, tables, figures, equations of another standard shall be dated. A reference may be given undated only if it is accepted that it will be possible to use all future changes of the clause referred to for the purpose of the referring clause. This implies that an undated reference shall intend to include and accept all subsequent amendments and revisions of the quoted clause.

## 11 Quality aspects

### 11.1 Validation and demonstration

Each calculation procedure shall be validated at least by testing the calculation procedure in all of the following conditions:

— sample normal cases (i.e. with average input values having average);

— sample extreme cases (i.e. with input values near to the minimum or maximum expected).

The set of sample cases shall cover all possible optional calculation paths.

Validation calculations and results shall be included in the Technical Report accompanying the EPB-standard.

Validation includes proof that:

— the calculation chain is correct;

— the risk of generating errors is avoided (e.g. demonstration that division by zero cannot occur);

— the calculation provides the expected results on known test cases according to the defined inputs.

The accompanying spread sheet shall be used to support validation.

## 11.2 Relevance, sensitivity and balanced accuracy

NOTE See CEN/TS 16628:2014, 11.3 and 11.4 for basic principles on relevance, sensitivity and accuracy.

### 11.2.1 Relevance

The procedure shall take into account all relevant factors that can be included in the procedure with reasonable effort.

The reason for inclusion or exclusion of factors shall be documented in the Technical Report accompanying the EPB-standard.

### 11.2.2 Reproducibility

The Technical Report accompanying the EPB-standard shall include a reproducibility evaluation for the proposed calculation procedure.

### 11.2.3 Balance between accuracy and required effort

The Technical Report accompanying the EPB-standard shall include a cost / benefit estimation supporting the selection between alternative procedures or options for the calculation methods. This estimation shall take into account:

— time and expertise needed the for data input;

— complexity of the input;

— data availability;

— accuracy improvement;

— sensitivity improvement;

— technologies coverage;

— calculation application (building permit, certificate, inspection, etc.).

Subclause 11.5 introduces the use of a set of common example cases to deal with issues such as listed above in a more or less 'measurable' way.

NOTE See also CEN/TS 16628:2014, Clauses 5 and 11.

## 11.3 Software proof

### 11.3.1 General

NOTE See CEN/TS 16628:2014, 10.6

No ambiguity is allowed otherwise software editor (or anybody performing the calculation) will resolve it individually.

### 11.3.2 Naming

A unique name shall be defined for all indexes and case identifiers: no duplicate index or identifier shall occur within the entire set of EPB-standards.

### 11.3.3 Options

When an option is provided, a clear decision on which to choose shall always be possible.

### 11.3.4 Correlations

Correlations shall be given as mathematical formulae.

If the source of data are a graph, a suitable mathematical correlation equation shall be designed and the application range of this equation shall be stated.

### 11.3.5 Iterations

Iterations shall be limited to a minimum.

If an iteration is required:

— the convergence criteria shall be stated;

— stability of the calculation procedure shall be tested. If the need for damping factors is recognized, the damping factors use shall be explicitly included in the procedure.

Nested iterations shall be avoided as far as possible, unless a small, fixed number of iterations is proven acceptable.

The Technical Report accompanying the EPB-standard shall provide information on convergence stability, number of iterations required and the use of damping factors.

NOTE Iterations may be generated at overarching level because of multiple connections between modules.

### 11.3.6 Structuring of the method

The calculation procedure shall be fully structured.

### 11.3.7 Specifying all input/output variables

Input and intended output values for each equation shall be clearly identified.

The standard shall include detailed information for each input variable.

## 11.4 Calculation options

### 11.4.1 Different levels of complexities

CEN EPB-standards shall be based on well-accepted and proven/established current practice ("State of the Art").

### 11.4.2 Hierarchy in simplified versus detailed procedures

Simplified procedure shall consist of correlations that provide the detailed input for the basic procedure.

## 11.5 Quality control of the calculation

NOTE See also 10.1.10.

The complete set shall define a calculation report for each intended calculation procedure. The calculation report shall include the input data, the desired results and relevant intermediate results.

Each standard shall include a specification of intermediate results that shall be included in the calculation report. The values to be reported shall be selected to support checking the correct application of the standard. Any relevant plausibility range shall be included.

The results of any correlation used to determine a detailed input based on a simplified set of data shall be included in the calculation report.

## 11.6 Compliance check

NOTE See also 10.1.11.

Identify in a dedicated clause items to be checked on site to verify that the correct calculation procedure and the correct input data have been used for any individual energy performance calculation.

This shall be done in the form of a checklist or a table.

EXAMPLE The list may contain all variables defining the calculation options.

## 11.7 Common example cases

NOTE See 11.2 and see CEN/TS 16628:2014, 11.5.

The aim of the set of common example cases is to analyse and evaluate the usability of the standards, which will make the quality of the standards explicit and provide the right mindset during the development.

Consequently, the example cases need to comply with the following:

— they should be realistic cases for new and existing buildings containing both residential and non-residential buildings;

— it is recommended to position the cases in various climatic conditions; presumably three climates will do (cold, mild, warm);

— probably it will be sufficient to define as *base cases* two residential building types (single family house, apartment building) and two non-residential building types (office building and an educational building);

— to evaluate the practical usability of the standards it is necessary to provide per example case:

- a reference being a detailed description of the building that is assumed to be the actual presentation of the building;

- the building as it is perceived in reality by designers or inspectors encountered with an existing building. This description will not just be a list with physical input data, but also (or just?) a description of the appearance of the building with some physical characteristics and deviation in perception by assessors. This goes for the existing building (available real data) as well as for the new design (available design data).

- The buildings should (eventually) include a realistic and quite extensive range of building elements and technical building systems.

The expectation is that it is possible to define a suitable set of probably about 8-10 basic examples (**base cases**) that can be applied in various climate regions.

At various steps and levels of the energy assessment procedures variations on these base cases will be required (**added specific examples**), to test or demonstrate specific procedures and their impact. However, these added specific examples normally will not need all details of the base cases, because the focus is on specific aspects only.

EXAMPLE When zooming in on the assessment boundaries or on the categorization of special spaces, the precise details of the construction and system elements are irrelevant. A simplified representation for those elements will be sufficient.

The selection and use of the common example cases will be done in close cooperation between the coordinating experts in CEN/TC 371 and the experts dealing with specific modules.

# Annex A
(normative)

# Technical rules application checklist

## A.1 General

This is a checklist to verify that all relevant technical rules have been applied when drafting standards in the EPBD package. There are two intended users of the checklist:

— CEN/TC 371 to assist preparation of the revision program of the entire package;

— individual standard writers, to ensure they have taken into consideration all applicable technical rules.

One checklist shall be compiled for every standard.

## A.2 Checklist fields description

### A.2.1 Technical rule

Paragraph number and title in this CEN/TS 16629 (or CEN/TS 16628).

NOTE This field will be already implemented.

### A.2.2 Application

YES: the rule is relevant and has been applied.

NO: the rule is relevant but it was not applied.

N/A: the technical rule is not applicable to this standard.

### A.2.3 Details

If the rule applied (YES), optional contents: number of the relevant paragraph(s) in the standard where the rule is implemented, “all” if relevant for the whole document and/or information on its implementation (how the technical was fulfilled and why). This information is optional.

If the rule is relevant but it was not applied (NO), mandatory contents: why the rule was not applied (conflicting needs, special subject, …).

If the rule is not relevant (N/A), mandatory contents: why is the rule not relevant.

**Table A.1 - Technical rules application checklist**

| Clause | Technical rule | Application | Details |
|---|---|---|---|
| 5 | Accompanying spread sheet delivered | YES NO N/A<br>□ □ □ | |
| 5 | Accompanying Technical Report delivered | YES NO N/A<br>□ □ □ | |
| 5 | Core text only normative (check 10.4) | YES NO N/A<br>□ □ □ | |

| Clause | Technical rule | Application | Details |
|---|---|---|---|
| 6.2 | First draft to CEN/TC 371 for coherence check | YES NO N/A<br>□ □ □ | |
| 6.2 | Copy of draft for public enquiry to CEN/TC 371 for coherence check | YES NO N/A<br>□ □ □ | |
| 6.2 | Comments from CEN/TC before public enquiry have been discussed | YES NO N/A<br>□ □ □ | |
| 6.2 | Draft for formal vote to CEN/TC 371 for coherence check | YES NO N/A<br>□ □ □ | |
| 6.2 | Comments from CEN/TC 371 before formal vote have been addressed | YES NO N/A<br>□ □ □ | |
| 7.2 | No explicit or implicit requirement in the text | YES NO N/A<br>□ □ □ | |
| 7.2 | Possible energy performance indicators indicated and documented in the accompanying Technical Report | YES NO N/A<br>□ □ □ | |
| 7.3 … 7.4 | Time and expertise for data collection and calculation documented in the accompanying Technical Report | YES NO N/A<br>□ □ □ | |
| 7.6 | Data for specific applications clearly identified | YES NO N/A<br>□ □ □ | |
| 8 | All data and options that may be nationally adapted given through tables in annexes | YES NO N/A<br>□ □ □ | |
| 8 | Correlations provided for foreseeable national adaptation | YES NO N/A<br>□ □ □ | |
| 9.1<br>10.1.4 | Module identified and included in the title and scope of the standard | | |
| 9.2 | Symbols and definition of FprEN 15603:2014 reused. No duplicate definition or symbol | YES NO N/A<br>□ □ □ | |
| 9.2 | Common prefix obtained for local data subscripts | YES NO N/A<br>□ □ □ | |
| 9.2 | All new symbols and subscripts compliant with FprEN 15603:2014 rules | YES NO N/A<br>□ □ □ | |
| 9.3 | Time step checked | YES NO N/A<br>□ □ □ | |
| 9.4 | Input values qualified | YES NO N/A<br>□ □ □ | |
| 10.1.2 | Standard title structure correct | YES NO N/A<br>□ □ □ | |
| 10.1.7 | Boundary conditions for alternative methods and/or options defined and explained in the accompanying Technical Report | YES NO N/A<br>□ □ □ | |

| | | | |
|---|---|---|---|
| 10.1.8 | All time steps investigated; required conversion methods supplied | YES NO N/A<br>□ □ □ | |
| 10.1.9.2 | Output data identified and listed in front of each procedure and/or sub-procedure | YES NO N/A<br>□ □ □ | |
| 10.1.9.3 | Input data listing complete | YES NO N/A<br>□ □ □ | |
| 10.1.9.3.2.2 | Communication with relevant TC about product data performed for all data listed under product data | YES NO N/A<br>□ □ □ | |
| 10.1.9.3.3 | System design data indicated through case identifiers | YES NO N/A<br>□ □ □ | |
| 10.1.9.4 | Calculation described step by step, in parallel with accompanying spread sheet | YES NO N/A<br>□ □ □ | |
| 10.4.2 | No requirement on who shall perform calculations and on acceptable values | YES NO N/A<br>□ □ □ | |
| 10.4.4 | Equation style and numbering correct. All equations numbered | YES NO N/A<br>□ □ □ | |
| 10.4.5 | Table style and numbering correct. | YES NO N/A<br>□ □ □ | |
| 10.4.6 | Figures style and numbering correct | YES NO N/A<br>□ □ □ | |
| 10.4.6 | No text in the figures. Key provided below figures | YES NO N/A<br>□ □ □ | |
| 10.4.7 | No should in the normative text | YES NO N/A<br>□ □ □ | |
| 10.4.7 | No ambiguous phrasing of text | YES NO N/A<br>□ □ □ | |
| 11.1 | Normal cases tested and documented | YES NO N/A<br>□ □ □ | |
| 11.1 | Extreme cases tested and documented | YES NO N/A<br>□ □ □ | |
| 11.1 | Checked for possible mathematical error generation (division by 0, …) | YES NO N/A<br>□ □ □ | |

| | | | |
|---|---|---|---|
| 11.3.2 | No duplicate name with other standards for subscripts or case identifiers | YES NO N/A □ □ □ | |
| 11.3.3 | Option selection criteria clearly defined and documented | YES NO N/A □ □ □ | |
| 11.3.4 | No correlation given as graph, all as equations | YES NO N/A □ □ □ | |
| 11.3.5 | Convergence criteria for iterations identified and documented | YES NO N/A □ □ □ | |
| 11.5 | Relevant intermediate results identified and documented together with plausible range | YES NO N/A □ □ □ | |
| 11.6 | Compliance check item list provided | YES NO N/A □ □ □ | |
| 10.3 | All input data listed and characterized in the “Method input” sheet | YES NO N/A □ □ □ | |
| 10.3 | All output data listed and characterized in the “Method output” sheet | YES NO N/A □ □ □ | |
| 10.3 | Calculation procedure in “calculation method” sheet aligned with description in the text | YES NO N/A □ □ □ | |
| 10.3 | All cells in the “calculation method” sheet call for values in the same sheet or the “method input” sheet | YES NO N/A □ □ □ | |

| Clause | Accompanying technical report | Application | Details |
|---|---|---|---|
| 10.2 | Methods documented in the accompanying Technical Report | YES NO N/A<br>□ □ □ | |
| 10.2 | Alternative options documented in the accompanying Technical Report | YES NO N/A<br>□ □ □ | |
| 10.2 | Calculation flow-chart included in the accompanying Technical Report | YES NO N/A<br>□ □ □ | |
| 10.2 | Worked out examples in the accompanying Technical Report cover at least once all possible paths | YES NO N/A<br>□ □ □ | |
| 11.2.3 | Cost / benefit estimation available | YES NO N/A<br>□ □ □ | |
| | **Compiled by** | | **Date** |

# Bibliography

[1] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast), OJ 153, 18.6.2010

[2] Mandate M/480: Mandate to CEN, CENELEC and ETSI for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and promoting the energy efficiency of buildings, in accordance with the terms set in the recast of the Directive on the energy performance of buildings (2010/31/EU), December 14, 2010

[3] CEN/TC 250/N 250 G Rev2, *Policy Guidelines and Procedures, (Eurocodes)*, March 20, 2006

[4] CEN/TC 250/N600rev1, *Guidelines for Preparing EN Eurocode Parts,* Dec. 3, 2004

[5] CENSE WP6.1_N05rev02: *Set of recommendations: Towards a second generation of CEN standards related to the Energy Performance of Buildings Directive (EPBD),* May 27, 2010

[6] CEN/CENELEC *Internal Regulations Part 3: Rules for the structure and drafting of CEN-CENELEC Publications* (ISO/IEC Directives – Part 2, modified) 2011-12

[7] ISO/IEC Directives Part 2, *Rules for the structure and drafting of International Standards*, Sixth edition, 2011

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