

## Spotlight on three of the top level standards

### Introduction

In this report we briefly introduce three of the top level standards, because they play a central role in the set of CEN standards to support the EPBD.

### EN 15217: “Energy performance of buildings — Methods for expressing energy performance and for energy certification of buildings”

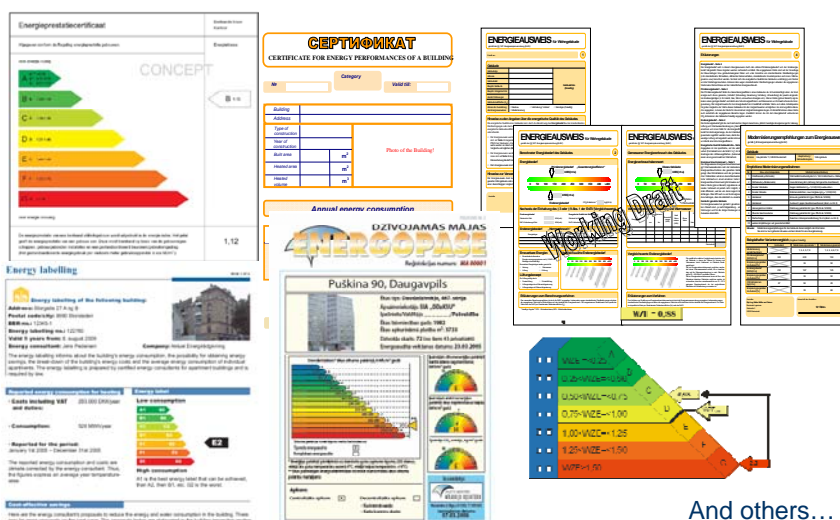
This is the standard that clarifies the different possible approaches for certification.

This standard defines:

- Global indicators to express the energy performance of whole buildings, including heating, ventilation, air conditioning, domestic hot water and lighting systems. This includes the different possible indicators as well as a method to normalize them.
- Ways to express energy requirements for the design of new buildings or renovation of existing buildings.
- Procedures to define reference values and benchmark.
- Ways to design energy certification schemes.

The choice of the relevant options must be made by each Member State.

Figure 1 shows the kaleidoscope of different ways to display the energy performance rating and classification in the Member States.



**Figure 1 — Illustration of the differences in energy performance certificates being implemented in the EU Member States, based on EN 15217**

See Information Paper P03 for an extensive introduction to this standard and P27 on examples of national application.

The main reason for the variety is that most Member States have not yet or little practical experience with energy certification of buildings. The certificate has to fulfil various quality aspects, some of which are contradictory (see also P26 on the issue of quality aspects).

It is expected that in the coming years, feedback from early experience will lead to a basis for further harmonisation.

EN 15603: Energy performance of buildings - Overall energy use and definition of ratings

This standard specifies a general framework for:

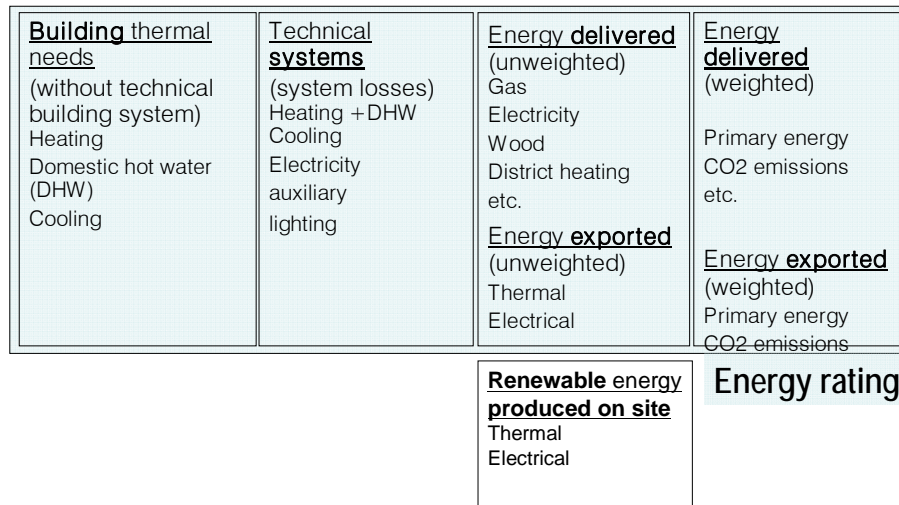
- the assessment of overall energy use of a building;
- the calculation of overall energy ratings (primary energy, CO<sub>2</sub> emissions, energy costs).

The standard collates results from other standards that specify calculation of energy consumption within a building. It accounts for energy generated in the building, some of which may be exported for use elsewhere. It presents a summary in tabular form of the overall energy use of the building and defines the uses of energy to be taken into account for setting energy performance ratings for new and existing buildings.

It provides:

- A method to compute the **standard calculated rating**, a standard energy use that does not depend on occupant behaviour, actual weather and other actual (environment or input) conditions.
- A method to assess the **measured energy rating**, based on delivered and exported energy.
- A methodology to improve confidence in the building calculation model by comparison with actual energy consumption.
- A method to assess the energy effectiveness of possible improvements.

Figure 2 gives a brief overview of the aggregation process described in full detail in EN 15603.



**Figure 2 — Schematic overview of the aggregation of the results from the lower level standards according to EN 15603.**

EN ISO 13790 Thermal performance of buildings - Calculation of energy use for space heating and cooling

## EPBD

The EPBD explicitly states that the European Commission intends further to develop standards such as EN ISO 13790, also including consideration of air-conditioning systems and lighting.

## History

In the early '90's of the previous century, the European standard EN 832 was developed: "*Thermal performance of buildings - Calculation of energy use for heating - Residential buildings*" Its follow up was the above quoted EN ISO 13790:2004, including also non-residential buildings.

As part of the Mandate 343 to CEN to support the EPBD, the 2004 version of this international standard has been expanded with the calculation of the energy use for space cooling and additional features.

## New version

In short, the new EN ISO 13790:2008, gives calculation methods for the assessment of the annual energy use for space heating and cooling of a residential or a non-residential building, or a part of it.

It includes:

- the partition of the building into different zones for calculation;
- the calculation of heat transfer by transmission and ventilation of the building when heated or cooled to constant internal temperature;
- the contribution of internal and solar heat sources to the building heat balance, including recoverable thermal losses from technical building systems such as heating, hot water or cooling systems;
- the effect of thermal inertia (building thermal capacity) and intermittent heating or cooling;

- the annual energy needs for heating and cooling;
- the annual energy required by the heating and cooling systems of the building for space heating and cooling;
- the additional annual energy required by a ventilation system.

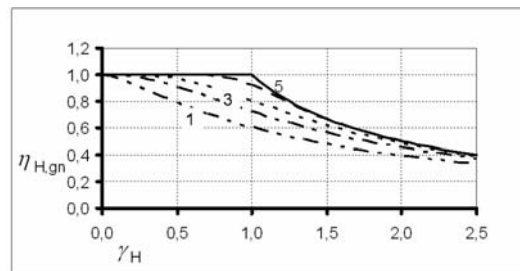
Each of these items requires input from other standards, on building components and on technical building systems.

In addition to the **monthly** (and seasonal) method for cooling, also a **simple hourly** method for heating and cooling has been added, to facilitate direct introduction of hourly, daily or weekly patterns (e.g. controls, user behaviour).

Common rules for the boundary conditions and physical input data have been added, also applying to the use of dynamic simulation methods. This creates a **level playing field** irrespective of the chosen calculation approach (see Figure 5).

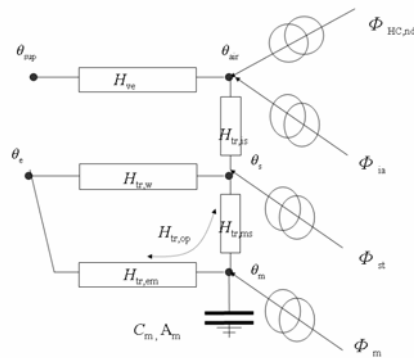
Special attention has been given to the suitability for use within the context of national or regional **building regulations**. For such applications, it is important that the calculation procedures are unambiguous, repeatable and verifiable. To accommodate the application for these and other situations, this standard offers different choices. It is up to national bodies whether or not to choose a specific option for mandatory use, e.g. depending on the region in the country, the type of building and its use, and on the purpose of the assessment.

The monthly calculation method is one of the options in the new EN ISO 13790. The next figure shows the well-known "gain utilization factor" as function of the heat balance and building inertia. A similar approach, with a "loss utilization factor", has been introduced for space cooling.



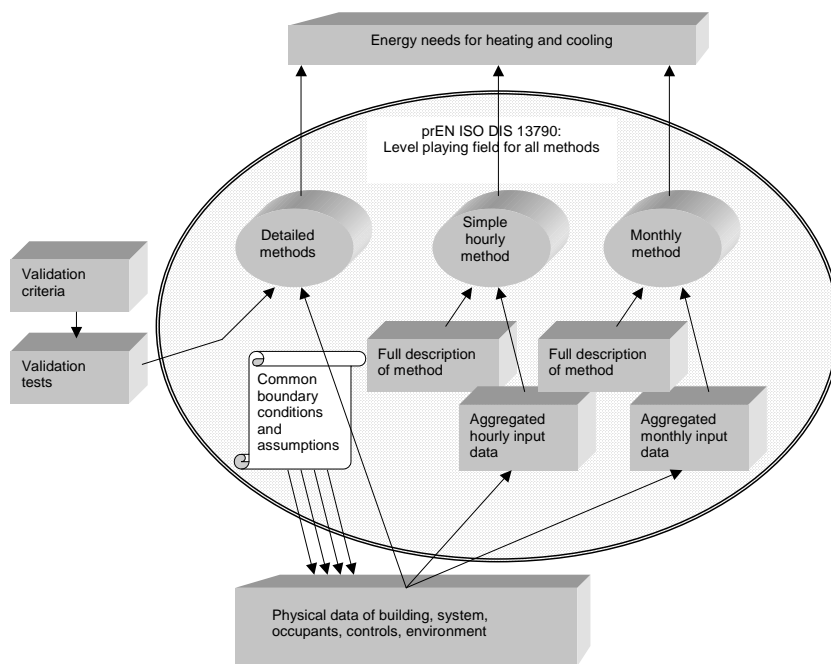
**Figure 3 — Gain utilization factor curves for the monthly method; similar curves, for the loss utilization factor, are given for space cooling**

The simple hourly calculation method is a new option in the new EN ISO 13790. The next figure shows the model, represented as an 'RC-network'.



**Figure 4 — The simple hourly method, represented as an 'RC-network'**

The following figure illustrates the level playing field for the different calculation methods provided in EN ISO 13790.



**Figure 5 — EN ISO 13790: Level playing field for different methods to calculate the energy use for heating and cooling**

More details on these and other CEN standards can be found in Buildings Platform and CENSE Information Papers, which can be downloaded from the website ([www.iee-cense.eu](http://www.iee-cense.eu)).