

# The set EPB-CEN standards related to the calculation of heating and DHW systems a chance for the heating system professionals to be up taken

The energy performance of buildings is assessed as a whole, taking into account the building envelope and the technical building systems. Therefore, it is essential for the heating professionals to be able to show the positive contribution of the heating and DHW systems to lower the overall building energy consumption. The set of heating and DHW standards related to EPBD provides a consistent, detailed and reliable methodology linking product testing (ErP) and the overall building energy performance (EPBD).

The main challenge is now to bring this set of heating and DHW standards into application.



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## Which standards in the CEN EPBD package are related the calculation of heating and DHW systems?

**Table 1** provides an overview of the heating and DHW standards. In this tables, only the standards related to the calculation of heating and DHW systems are considered. There are also other standards dealing with inspection and measured energy related to heating systems but these are not considered in this article.

**Table 1** shows that there are three families of calculation standards related to:

- Economic evaluation procedure (EN 15459 series);
- Design heat load and characterisation of needs (EN 12831 series);
- Energy performance (EN 15316 series). The energy performance calculation is structured according to emission, distribution, storage and generation following the physical structure of a heating and DHW system.

The calculation standards address three main topics related to the evaluation and design of heating systems:

- the costs;
- the sizing;
- the energy performance.

The Energy performance of Building Directive (EPBD) addresses also these three topics.

Having a consistent set of standards allowing to develop integrated tools where the input data can be used to calculate three different but connected results is a big

step towards easy heating product integration (e.g. emitters, boilers, heat pumps) in a common holistic calculation and towards user-friendly and high quality tools for the heating system professionals.

## What has been achieved within this second set of heating and DHW standards?

With this set of EPB-standards a consistent methodology with the following advantages has been worked out:

- A methodology based on international standards

There are already several methodologies for the sizing and energy performance calculation for heating systems at regional or national level. There are dynamic calculation methods or simplified tabulated tools.

The added value of the CEN EPB package is that it is based on international standards. Standards are recognised worldwide as the “state of art”. Standards provide accessibility and transparency and create a level playing field which is the basis for a fair competition between products and technical neutral solutions. CEN Standards are the result of international cooperation, shared knowledge and best practise.

- A methodology linking product testing (ErP) and system integration (EPBD)

Assessing Energy Performance of Buildings as required by the EPBD, heating products are contributing to reach an overall yearly energy consumption of a building expressed in primary energy per useful floor area (e.g. 50 kWh/m<sup>2</sup>). In the Energy related Product

**Table 1.** Overview of heating and DHW standards related to the EPBD.

EN ISO 52000-1 Modular structure	Standards number	Standard title
<i>Economic evaluation procedure</i>		
M1-14	EN 15459-1	Economic evaluation procedure for energy systems in buildings
<i>Design heat load and characterisation of needs</i>		
M3-3	EN 12831-1	Heating systems in buildings — Method for calculation of the design heat load
M8-2	EN 12831-3	Domestic hot water systems heat load and characterisation of needs
<i>General and Energy performance expression</i>		
M3-1	EN 15316-1	Energy performance of buildings — Modules M3-1, M8-1 — Heating and DHW systems in buildings – Part 1: General and Energy performance expression
<b>Space emission systems</b>		
M3-5	EN 15316-2	Energy performance of buildings, modules M3-5, M4-5 – Space emission systems (heating and cooling)
<b>Distribution systems (DHW, heating and cooling)</b>		
M3-6	EN 15316-3	Energy performance of buildings, Modules M3-6, M4-6, M8-6 – Distribution systems (DHW, heating and cooling)
<b>Storage systems for heating and domestic hot water</b>		
M3-7	EN 15316-5	Energy Performance of Buildings – Modules M3-7; M8-7 –: Storage systems for heating and domestic hot water
<b>Heating and DHW generation systems</b>		
M3-8	EN 15316-4-1	Energy performance of buildings, modules M3-8-1, M8-8-1 – Heating and DHW generation systems, combustion systems (boilers, biomass)
	EN 15316-4-2	Energy performance of buildings – Module M3-8:1 - Heating systems – Part 4.2.1: Generation and control – Heat pumps systems
	EN 15316-4-3	Energy performance of buildings, modules 3-8-3, 8-8-3, 11-8-3 – Heat generation systems, thermal solar and photovoltaic systems
	EN 15316-4-4	Energy performance of buildings – Modules M3-8-4, M8-8-4, M11-8-4 – Heat generation systems, building integrated cogenerations systems
	EN 15316-4-5	Energy performance of buildings, Modules M3-8-5; M4-8-5; M8-8-5; M11-8-5 – District heating and cooling
	EN 15316-4-8	Energy performance of buildings – Heating systems and water based cooling systems in buildings - Module M3-8-8 – Space heating generation, air heating and overhead radiant heating systems, stoves (local)

Directive (ErP) the heating products are characterised via a seasonal performance factor (or efficiency) based on product testing (e.g. Lot 1, Lot 2).

In this set of heating and DHW EPB-standards the results of ErP product testing are used as input data to calculate the contribution of the heating systems to the overall energy use of a building. This direct link is also a huge advantage for data collection because common and coherent databases can be set up.

It is likely that the heating systems industrial stakeholders will ask the Member States authorities that these data are to be taken into account in the existing national methodologies for the EPBD calculation. The CEN EPB standards will then be a precious help for the Member States to review their national methodologies or to simply use this set of EPB standards.

➤ A methodology with a modular structure allowing easy integration of new elements

In this set of heating and DHW EPB standards the modular structure has been improved to increase the consistency of the holistic approach. For the heating standards, the cooperation with CEN/TC247 related to controls should be underlined. In the general standard on heating and DHW water systems (EN 15316-1) the control functions and the related input, output data are now well identified as modules (e.g. control module for the space heating

distribution, load dispatch module for the heat generators). For example, the distribution control module determines the set point water temperature for the heat distribution according to the type of control (e.g. depending on the outdoor temperature) and the running conditions. This approach provides the possibility for product testing of control units and to differentiate the products.

The definition of input / output of the different modules give flexibility (step by step integration of modules) and allows independent module development. For example, the standard dealing with storage (EN 15316-5) provides the possibility to use it either alone (as Electric Water Storage) or integrated in larger systems (solar systems).

## Resume

This set of heating and DHW standards related to the EPBD provides a coherent set of standards dealing with costs, sizing and energy performance as requested by the Directive.

Building energy requirements, e.g. to get the building permit and energy performance certificates are related to the building as a whole. Therefore, it is essential for the heating professionals to show the positive contribution of energy-efficient heating and DHW systems to lower the building energy consumption. There is also a need to calculate the performance of heating systems in a more and more detailed way as the energy need of the building get lower and lower. The interaction between the buildings envelop and the heating systems, multi-generation using renewable energy source should be taken into account. Control becomes more and more important. The results of the calculation must be trustworthy, transparent and technological neutral.

This set of EPB heating standards addresses these aspects by linking the product testing and the holistic approach, by focusing more on the control functions and by developing more detailed calculation. This methodology is the basis for software tools to show the positives contribution of the heating systems in the overall approach of buildings. The main challenge is now to bring this set of heating and DHW EPB standards into application. ■