EN 15316-2: Energy calculation method of emission systems in rooms

The new EN 15316-2, which supersedes the EN 15316-2-1:2007 is currently out for formal vote. Based on the enquiry results of the draft standard prEN 15316-2:2014 the main focus of the work was to create a consistently mathematical approach which is based only on temperature differences.

JOACHIM SEIFERT
Dr.-Ing. habil.
Technical University of Dresden,
Faculty of Mechanical Engineering
Taskleader prEN 15316-2
joachim.seifert@tu-dresden.de

MARTIN KNORR
Dr.-Ing.,
Technical University of Dresden,
Faculty of Mechanical Engineering
Expert prEN 15316-2
martin.knorr@tu-dresden.de

The influences of various phenomena are taken into account in the new EN15316-2 by the calculation of the additional energy use due to often called emission (emitter[1]) losses. Although these are sometimes not real losses but additional energy use, it is a convention to speak of "emission losses". These losses are related to physic phenomena like:

- Embedded emission in the building structure (e.g. floor heating);
- Radiation (e.g. meaning air temperature can be lowered due to radiation effects);
- The stratification (higher air temperatures in the near of the ceiling for convective dominated systems);
- Intermittency.

Some other effects, also based on physics are additional influenced by the behavior of the user related to the quality of the building automation and control, the hydraulic balance and the building management systems (BMS). It is observed that if the quality of control is low, the user will compensate by increasing the set point temperature in order to obtain the desired comfort. This is modeled by acting on the set point temperature. The standard proposes to represent all these phenomena by the temperature difference in order to get an unique performance indicator for the classification of the products. The temperature variation based on all influencing factors can be calculated with equation 1. For some cases (e.g. for $\Delta\theta_{roomaut}$) also negative values of the temperature variations are possible.

$$\Delta\theta_{int;inc}=\Delta\theta_{str}+\Delta\theta_{ctr}+\Delta\theta_{emb}+\Delta\theta_{rad}+\Delta\theta_{im}+\Delta\theta_{hydr}+\Delta\theta_{roomaut} \quad (1)$$

The calculation of the thermal input for the cooling/heating emission system can be performed on a monthly or on an hourly basis. In the monthly method, the emission losses are calculated as follows (equation 2).

$$Q_{em;ls}=Q_{em;out}\cdot\left(\frac{\Delta\theta_{int;inc}}{\theta_{int;inc}-\theta_{e;comb}}\right) \quad (2)$$

The first achievement of this new version of this standard is, that now a consistent mathematical approach is available.

The second advantage is, that the calculation method is based on temperature differences which can be easily be measured in practice.

The third advantage is that temperature differences have a strong connection to the assessment of the thermal comfort which allows the user of the standard to indicate information on the comfort levels in the rooms. ■

[1] On overarching EPB level, in EN-ISO 52000-1 the term emission is replaced by the more correct term emitter.