The new EN 15316-2:

The standard for calculating the additional energy use of emitter systems

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The actual European standard EN 15316-2.1 "Heating systems and water based cooling systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 2: Space emission systems (heating and cooling)" from 2007 includes two methods for the calculation of the additional energy use for heat emission systems. To have two methods in a standard is sometimes difficult, because the user can choose between a calculation method based on temperatures and based on efficiency values. During the revision of the prEN 15316-2:2014 this situation was resolved in the way that the new calculation method works only with one mathematical approach. The influences of various phenomena are taken into account in the FprEN 15316-2:2016 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 a 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 Temperature variation based on room automation $\Delta\theta_{roomaut}$) 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).

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

For heating systems $\Delta\theta_{e;comb}$ is the average external temperature during the calculation period. For cooling systems, the fictive external temperature is corrected. In the hourly calculation method, the user behavior related to the set point temperature can be represented as such. In this case, the additional losses are determined by applying the hourly energy needs calculation of EN ISO 52016-1 with the corresponding modified set point temperature. The new standard FprEN 15316-2:2016 gives a lot of default values as input parameters for different systems. As an alternative to these default values products parameters can be used based on the European product standards. ■

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