# Is the Eco-design Directive compatible with the Energy Performance Buildings Directive?

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This short article describes a few examples, all related to ventilation and air-conditioning systems, the needs to link EPBD standards and product standards together in a systematic way.

In energy performance calculations, performance data of technical building systems are needed. The systems consist of a number of products, so reliable product data is needed to estimate the system performance. However, product data is very often obtained through testing a "standalone" product in conditions which are more or less "ideal". How to achieve the real product data will be a major issue, as our knowledge is still not sufficient to take properly into account all system aspects. The examples below do not yet give full answers, but some indications for the revision process.

Extract from the author's article "Regulations Based on the Eco-design of Energy Related Products Directive":

*"EPBD concentrates on buildings as a whole, deals the systems to some extent. Eco-design deals with products and is taking the first steps towards systems. But the picture is still fragmented. The links between products, systems and buildings are weak – and the "Lots" are not necessarily covering all essential products in the system."*

**Example 1: Fans**

The question about fan performance in "real world versus test facility (ISO 5801)" came up in a series of field tests. A study in early 1980's in Finland revealed that a typical overall efficiency (including all possible losses due to the motor, controls, casing, drive etc.) was around 20% and just slightly better for large fans, while ISO 5801 tests could end up in figures between 80 and 90%. Similar studies – but somewhat more from the system point of view – were done in Sweden also in 1980's. As a result, the term Specific Fan Power (SFP) was launched in some guidelines. From those days both the fan efficiencies and SFP values have improved a lot, but still the difference is a major issue.

The SFP is one major step towards full system consideration, but also other system aspects exist. More about this issue can be read from EN 13779 (Annex D).

**Example 2: Heat recovery – temperature ratio vs. yearly efficiency**

The question of the energy performance of heat recovery may first look trivial: The heat recovery device is tested according to European Standard EN 308, and the measured "efficiency" is enough to calculate the energy savings from heat recovery, using the weather data of the actual building location. This approach has been taken as the basis also in some national standards and building regulations.

The real world is, however, much more complicated – the "yearly efficiency" issue has just recently been taken up in European discussions. It is no surprise that initiatives to this came up from Nordic countries, where frosting can occur in wintertime and cut the energy savings drastically. For example in typical residential buildings in Finland, a plate heat exchanger with 75% temperature ratio (according to EN 308), will have a yearly efficiency between 55 and 60%. In warmer climates this difference is not so significant, but in certain regions a clear difference still exists (in Munich the corresponding figure is approximately 65% with the same unit).

More about this complicated issue is described in REHVA Journal 1/2010, in an article which actually concentrates on the "Finnish approach" only. The same question has also been dealt with elsewhere, including the amendment of EN 13053 (currently in voting process in CEN).

### Example 3: Ducts, ductwork components and air handling units - leakage

This kind of system effect is actually taken into account in two of the EPBD standards, namely EN 15241 and EN 15242. The current standards give a rough but pragmatic approach how to take the leakages into account in energy calculation, plus formulas for a more accurate calculation. In the next revision, hopefully, a reliable but practicable method will be developed to calculate both the heating and/or cooling energy wasted because of the leakages, and the addition to electrical energy consumption of fans due to the same leakage.

The energy waste due to leakages has been estimated in a study done in the ASIEPI project, ending up in somewhat surprising figures on European scale. Therefore this issue must not be ignored – at least all ducts and air handling units to be installed will achieve the best tightness classes.

### Example 4: Filters

To optimize air filtration in a ventilation or air-conditioning system is probably a much more complicated issue than the other products taken up here. Efforts towards a kind of energy rating system of filters are going on at least among Eurovent. The difficulty is, in simple words: "the higher filtration efficiency, the higher pressure drop and the higher energy consumption". The truth is not that simple. The question is: how to decrease energy losses due to filtration without affecting negatively to the main function of the filter i.e. removal of particles and other impurities from the air? In the new REHVA Guidebook 11, also energy questions have been taken up. Certain recommendations for filter selection have been presented in EN 13779 (Annex A).

### References


- *EN 308 Heat exchangers. Test procedures for establishing performance of air to air and flue gases heat recovery devices*
- *EN 13053. Ventilation for buildings - Air handling units - Rating and performance for units, components and sections*
- *EN 13779. Ventilation for non-residential buildings - Performance requirements for ventilation and room-conditioning systems*
- *EN 15241, Ventilation for buildings - Calculation methods for energy losses due to ventilation and infiltration in commercial buildings*
- *EN 15242, Ventilation for buildings - Calculation methods for the determination of air flow rates in buildings including infiltration*
- *ISO 5801. Industrial fans - Performance testing using standardized airways*
- *Railio, J. & Airaksinen, M., Heat recovery – yearly efficiency. REHVA Journal 1/2010*
- *Schild, P. and Railio, J., Duct System Air Leakage - How Scandinavia tackled the problem. ASIEPI information paper 187. www.asiepi.eu*
- *Gustavsson, J. et al, Air filtration in HVAC systems. REHVA Guidebook 11.*