Eco-design Directive, Energy Label and Ecolabel

– Relationships and compatibility with the Energy Performance Buildings Directive

This short article describes a few examples and some further questions about relationships between different EU regulations. The aim is not to give full answers, but to give some background to discussions. This contribution is an update and continuation to previous articles on the subject, dealing with products related to ventilation and air-conditioning systems and the needs to link EPBD standards and product standards together in a systematic way.

More about the EU legislation and related issues are dealt with in another article, which gives an introduction to REHVA "EU Regulations" webpages, established in spring 2011.

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Figure 1 – also shown on the Eco-design page of REHVA "EU regulations" pages (see www.rehva.eu/en/eco-design) – shows the principle of the relationships between eco-design, energy label and eco-label for a certain product. Eco-design will give minimum requirements for the environmental performance of the product – and products which do not fulfil these minimum requirements will not receive the obligatory CE marking and have no access to the market. The energy labelling includes a product classification A to G. Only products in the best class can receive the eco-label. This is the simple principle and shows the way – the real practice is still different.

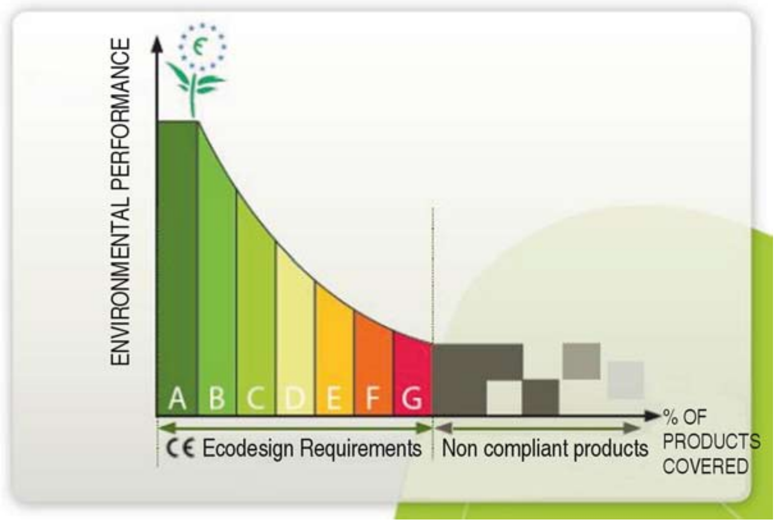


Figure 1. The principle of relationships between eco-design, energy label and eco-label.

The relationships between Eco-design and EPBD have been taken up in the author's previous articles in REHVA Journal in early 2011. The article "Regulations Based on the Eco-design of Energy Related Products Directive", in REHVA Journal 1/2011 as follows:

"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."

The work towards Eco-design regulations always starts with a preparatory study, known as "Lot" – follow the link above for more information about how these regulations are prepared. The following product examples are here to show the complexity of the whole issue.

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, but still the difference is a major issue.

Now the fan performance is subject to many activities and discussions. One very recent study, referred in more detail in this issue by Brelih and Seppänen, reveals that the fan efficiencies in real installations have not improved as much as could have been expected, on average from around 30% to around 30%.

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). The difficulty is that SFP – of a fan or even of an air handling unit (AHU) is not just a product characteristic but also depends on the system and therefore arguments against using SFP as an eco-design criterion can be justified. On the other hand, elimination of the system effects by calculations is possible using different assumptions in a transparent way, ending up into a kind of "default SFP for a product" (fan or AHU). But, fans and AHU's today more and more operate at variable air flows, and this makes the "elimination" issue very complicated and debatable. The discussions are still going on, and we can see probably very soon, whether or not the ongoing "Lot 6" can find a widely acceptable solution in this question. See also Rene Kemna's presentation (http://tinyurl.com/8xhhxgz).

Example 2. Heat recovery – efficiencies, standards

Temperature ratio vs. yearly efficiency: Only fragments of news compared to what was written a year ago. The amendment of EN 13053 has been approved, and Eurovent has been very active in establishing revised rules for AHU certification, based on the amended issues. But the discussion also here goes on. In the meantime, decisions have been made towards revision of EN 308 for heat recovery devices, but it is still somewhat open how this will be organised so that the users of EN 308 can influence properly in the process if CEN/TC 110 will do the revision work. As described in the previous article, the overall efficiency of the heat recovery **system** can be totally different from the measured efficiency of the **heat exchanger**. This issue is indeed also very complicated.

Residential vs. non-residential: The question about possibly non-compatible standards was taken up in Kemna's presentation:

> Heat recovery residential: thermal efficiency (based on temperature differences in/outputs)
>
> Heat recovery non-residential: overall energy efficiency (thermal efficiency minus electricity consumption to overcome the heat exchanger pressure drop)

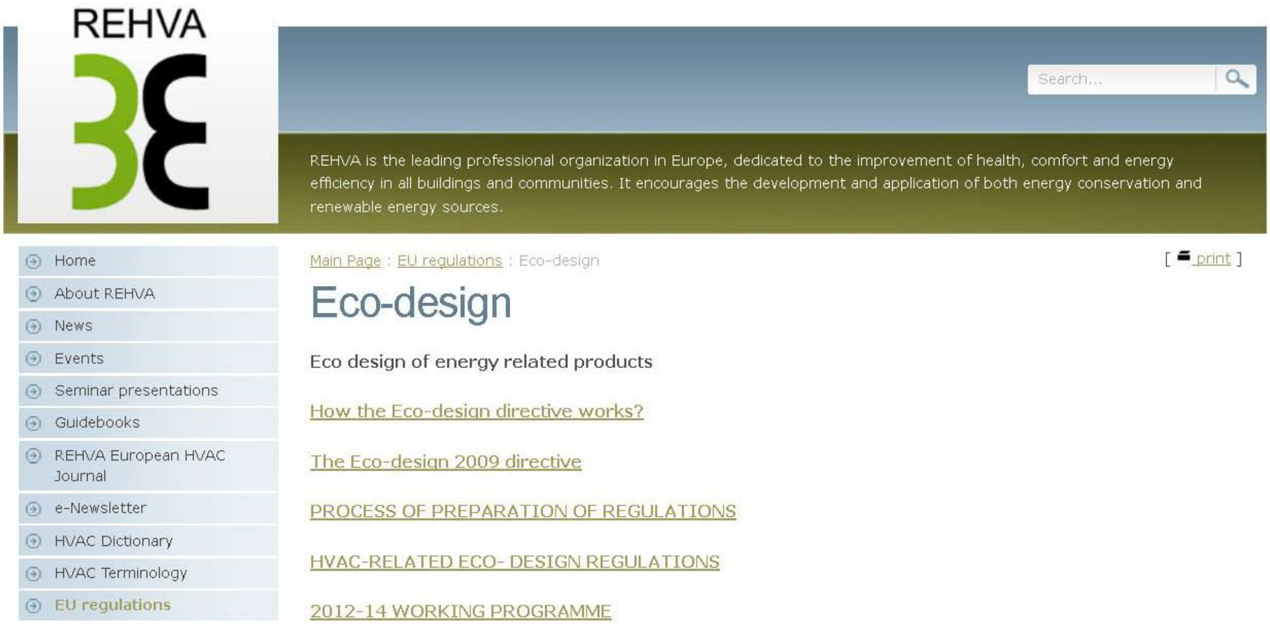
Example 3. Ducts, ductwork components and air handling units - leakage

This kind of system effect is actually taken into account in two of the EPBD standards, 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 (summarized in REHVA Journal 2/2011 by Schild and Railio), ending up in somewhat surprising figures on European scale. Another study, carried out by Fraunhofer Institute in Germany, ending up in a total figure very close to the finding in ASIEPI. But – one of these figures dealt with the heating and cooling energy wasted in leaky ducts, and the other figure dealt with the wasted electrical energy to fans moving the air that leaks away! So, the total wasted energy is actually the sum of the two figures! Therefore this issue must not be ignored – at least all ducts and air handling units to be installed should be quality-controlled and their tightness classes tested and found appropriate.

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 pres-



http://www.rehva.eu/en/eco-design

sure 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), but this also will need revision and possibly new considerations, depending on the final outcome of the still ongoing debate on the vote of the filter standard EN 779.

References

EN 308 Heat exchangers. Test procedures for establishing performance of air to air and flue gases heat recovery devices

EN 779 Air filters for general ventilation.

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

Railio, J., Regulations Based on the Eco-design of Energy Related Products Directive, REHVA Journal 2/2011

Schild, P. and Railio, J., Airtight ductwork, the Scandinavian success story. REHVA Journal 2/2011, p. 26-29.

Gustavsson, J. et al, Air filtration in HVAC systems. REHVA Guidebook 11.

Brelih, N and Seppänen, O., How to improve the efficiency of fans in Air handling units. REHVA Journal 2/2012

Kemna, R, Ventilation products regulations based on Ecodesign directive (http://tinyurl.com/8xhhxgz)