

# Comments to proposed new slopes for the review of EU directive 327-2011

## Background

In preparation to the EU directive 327 the fan industry developed ISO 12759 "Efficiency classification of fans". This was a collaborative effort by the whole world (including the Americans!). In the standard the known motor efficiency curves were incorporated in order to come up with combined Fan and Motor Efficiencies Grades (FMEG). The curves were the combined worldwide understanding of the increase in efficiency of the combined fan & motor efficiencies as a function of motor sizes (and ultimately of fan sizes).

In the motor efficiency standards IEC 60034-30/31 the motor industry has set efficiency classes for motors starting with IE1 and adding the classes IE2, IE3 and IE 4. This standard forms the basis for not only the EU's motor efficiency regulations and but also the regulations and specifications we meet around the whole world. It should be noted that all IE efficiency curve basically have the same shape. The main difference is that the overall levels are increased and that small motors must improve slightly more than large motors. That is based on physics.

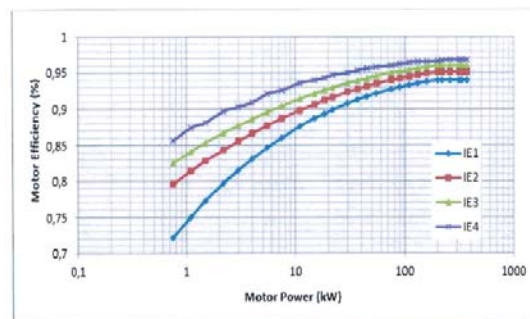


Figure 1 IE1, IE2 and IE3 efficiency levels in the IEC 60034-30 standard for 4 poled motors [6] and the new IE4 proposed in the IEC 60034-31 standard [12].

In figure 2 & 3 are shown in grey some of the Fan Motor Efficiency curves for different efficiency grades from ISO 12759. As is to be expected they also increase with size of the motor (and the fan). This is partly due to the better motor efficiencies shown in figure one, but also reflects the fact that losses decrease with the size of fan.

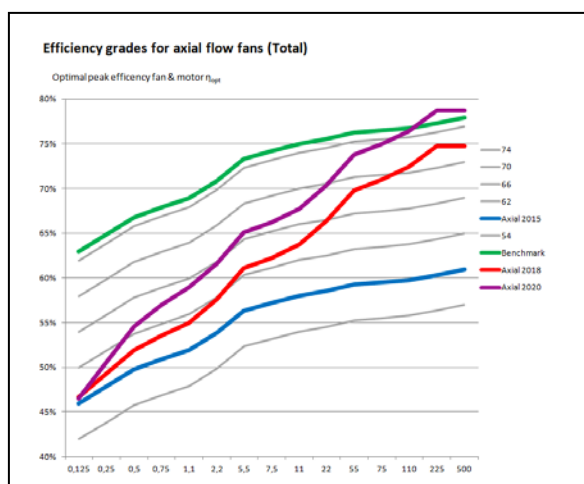


Figure 2: Axial flow fan Fan/Motor total efficiency

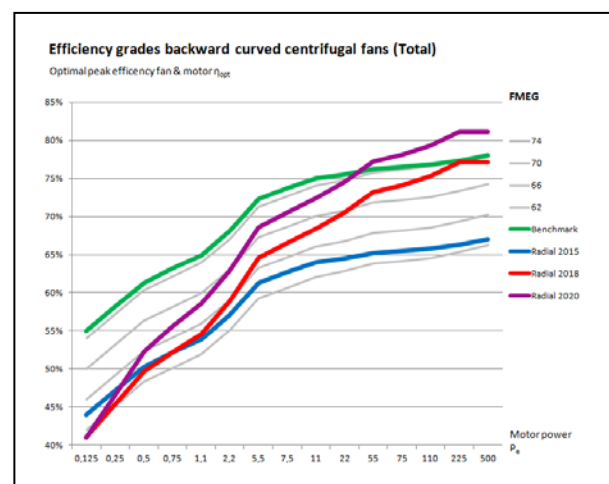


Figure 3: Radial fan Fan/Motor total efficiency

The EU directive used the same formulas and slopes proposed in the ISO 12759 for its fan regulation. The directive set the efficiency grades valid 1.1.2015 e.g. for axial flow fans at **58** and for radial fans at **64** (shown in blue in figures 2 & 3) for total efficiency.

Logically, since the efficiency grades reflected the relationship between motor size and expected efficiency, the directive also defined the benchmark efficiencies using an efficiency grade, which was found to be **75**. (Shown in green in figures 2 & 3 for total efficiency).

### **Problems with proposed revision**

In the proposed change of slopes this principle is to be abandoned. Instead completely new slopes are proposed, which have quite low requirements for small fans with small motors. Instead large fans are supposed to be very much more efficient, even more efficient for very large fans, when compared to the original benchmarks written in the EU directive for 2011.

This is a very problematic proposal:

- The change in slopes does not reflect the industry consensus as to the expected correlation between sizes and efficiency as laid down in ISO 12759. Although there may be no clear correlation between efficiency and fan size, there certainly is consensus, based on facts, that for fans between 1 and 500 kW the difference in efficiency, for the same design, is a couple of percentage points, no more.
- The change deviates from the approach taken in the underlying motor directive. Fans can't be better than the motors they use. It is good to correct the mistake of limits for very small fans which had been set too high, but larger motors will only improve little.
- Instead of being a logical continuation of the previous directive it takes a completely new approach, so the change make the direction of EU legislation seem unpredictable. Since fan development typically takes a couple of years industry needs predictability of policy.
- The whole word is adopting ISO 12759 (except maybe the Americans) as the basis of the fan efficiency legislation. In a global industry we need level playing fields globally and should not insist on "Exceptionalism" such as the ....
- The change would have profound impact on structure of the European fan industry. Only large companies have not only the financial, but also the personnel resources to implement the proposed change to the directive. To be able to cover the whole fan range competitively, 3-4 different fan types would have to be developed. With typically 1-2 R&D engineers SME's cannot develop the fans in time and would have to focus on a partial segments leading to a major loss of their business with most certainly with terminal consequences for many!

### **Recommendation**

As Witt & Sohn AG we will not give a specific suggestion as to what efficiency grades should be used. Not only do we not have the necessary data from the European fan industry, but this clearly is a political decision as to what percentage of currently sold fans the European Union wants eliminated from the market.

However, we want to very strongly urge not to adopt a set of slopes which have no basis in the physical reality of making fans and destroy an industry that is world class.