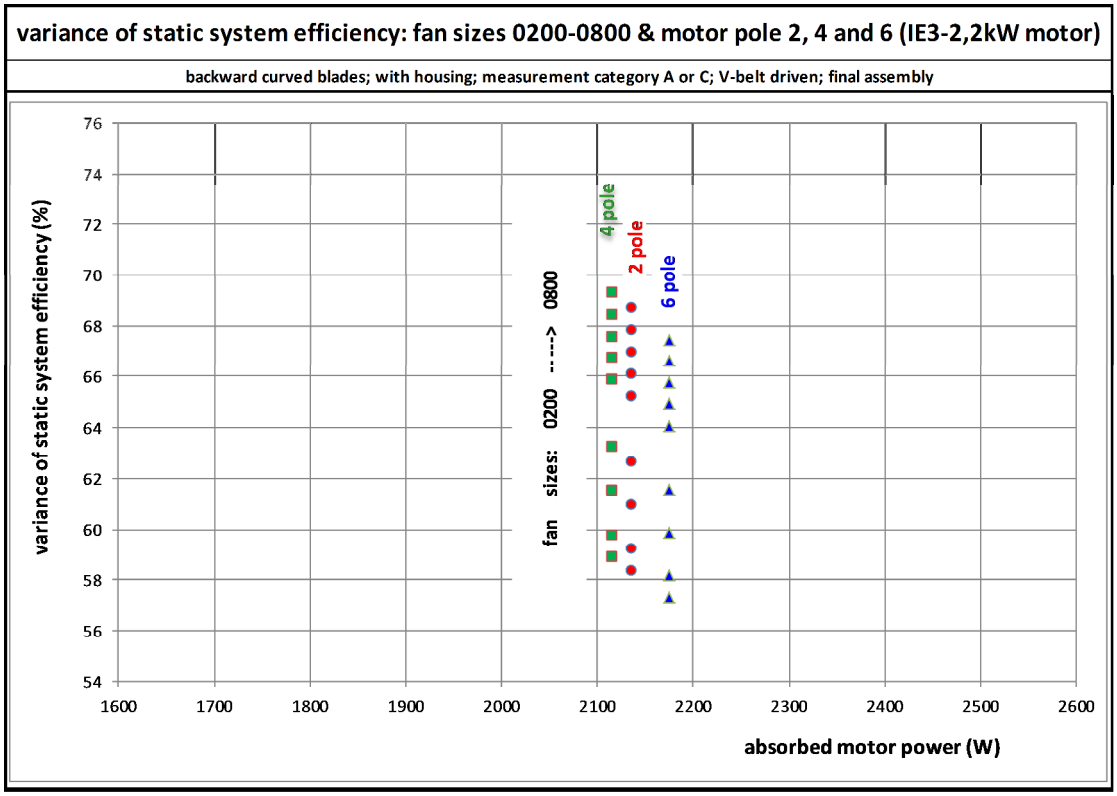
The indicative benchmark levels in the current regulation are wrong and do not clearly represent what is possible. A fundamental problem of the indicative benchmarks is that they do not consider the fan speed, size, the duty point, or specific volume characteristic – (static to total pressure ratio). For one input power there is a range of indicative benchmarks efficiency points depending on these variables.

The following examples show the inconsistency of not taking into account relevant parameters on achievable efficiencies. For a nominal motor power of 2,2 kW for instance, IE3 efficiency levels, the fan system efficiencies vary due to different motor efficiencies depending on pole number resp. speed, and the impact of the fan size due to Reynolds Number effects, for examples of geometrical similar high performing fans, for nearly identical input power,

for backward curved fans with housing from 57% up to 69%,

for forward curved fans from 37% to 49%,

for backward curved without housing from 61% to 67%.



Backward curved with housing

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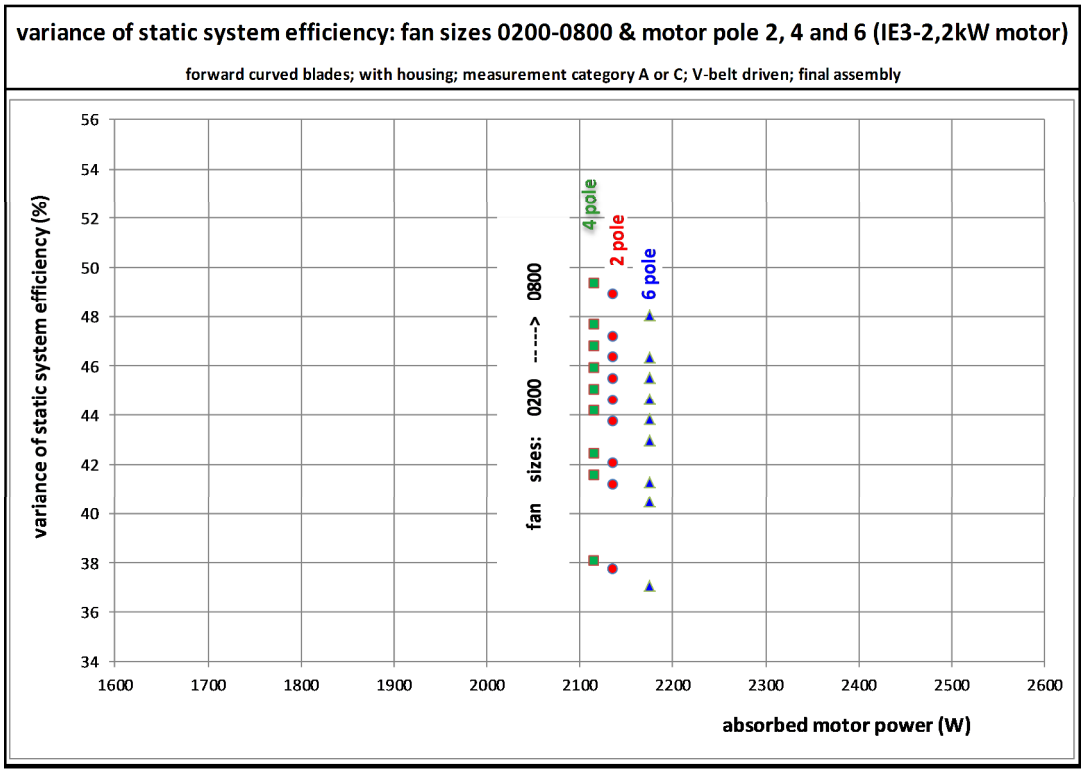
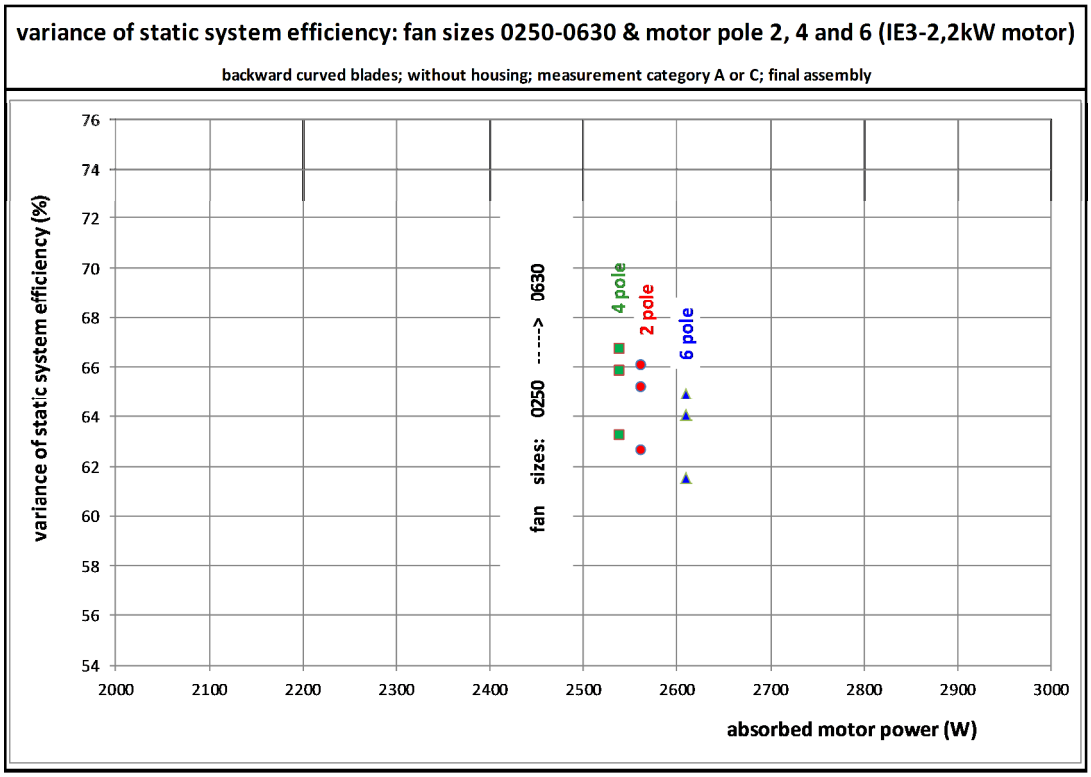


Forward curved with housing



Backward curved without housing

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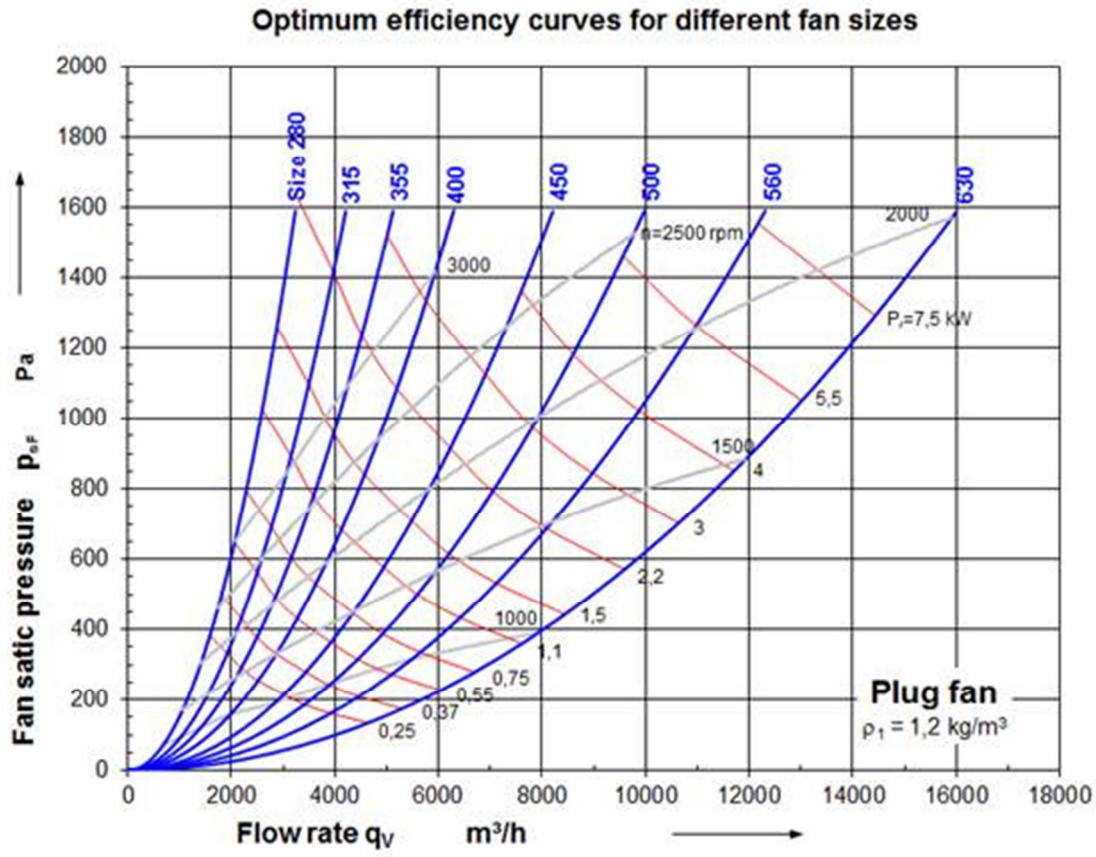
These variances arise in any case generally for every power consumption for the best aerodynamic fan applying required and specified IE3 or other corresponding motor efficiencies. It shows that a simplification of a minimum efficiency requirement for fans according the regulation 327 is inadequate with regard to physical effects not taken into account in the definition of one single minimum efficiency requirement.

Different fan sizes and consequently different speed and pole numbers of motors are necessary for fan selections in best duty operation. The following diagram shows how the best duty point moves depending on pressure / volume ratio from size to size.



Best efficiency curves of fans follow different parabolic lines depending on the size of a fan. Assuming that the best aerodynamic fan is applied, the possibility to select a fan in the best efficiency point requires a possible selection of the appropriate size and speed of a certain fan type.

This explains why the definition of minimum requirements of fan efficiencies only based on power consumption is not taking into account essential physical effects, and it seems inappropriate to present indicative benchmarks just as one sole minimum efficiency level for each power.

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