Proposal regarding ecodesign requirements on air handling units

- Lot 6: Air conditioning and ventilation systems

According to the preparatory study the ecodesign requirements (scenario 2 and 3) are based on power input classes (defined in EN13053). By applying such a requirement the electricity consumption of the fans is limited and the overall efficiency of the unit is guaranteed by stipulating maximum (minimum) values for the face velocity at the front filter surface.

As commented before, several Nordic stakeholders would prefer the SFP requirement for CHRV & AHUs instead for the following reasons:

- SFP promotes both efficient fans **and** lower internal pressure drops. The P class only promotes efficient fans
- SFP results in a number that easily can be translated into energy efficiency of the unit. By using the P class only, it is not possible to get any information about the overall efficiency of the unit.
- SFP is already today in use for requirements on **system** level. By implementing a SFP requirement on **component** level (i.e. for the air handling unit) a buyer or user can easily see which unit corresponds to the system requirements.
- The proposed SFP requirement is judged to result in the same or more energy saving compared to the Policy scenarios based on P classes, since it would not only promote the use of energy efficient fans but also lower pressure drops of the units.

Proposal for ecodesign requirements

Requirements for all products

Definition: As in Policy scenario 2 and 3

Minimum efficiency requirements for the fans in unit: As in policy scenario 2 (or 3)

Minimum speed control requirements for fan drivers: As in Policy scenario 2 and 3

CEXH: Same requirements as in Policy scenario 2.

CHRV & AHUs

Definition: As in policy scenario 2 and 3.

Heat recovery requirement: As in Policy scenario 2 or 3.

Minimum electric efficiency requirements for the unit: Replaced by requirements for maximum SFP values according to below.

Minimum efficiency requirement heat recovery: As in Policy scenario 2 or 3.

Minimum face velocity requirements for the unit: Replaced by requirements for maximum SFP values according to below.

Filter mounting requirements: As in Policy scenario 2 or 3.

Filter change warning: As in Policy scenario 2 or 3.

Maximum leakage requirements: As in Policy scenario 2 or 3.

SFP requirements:

We propose that the following components should be included in the SFP definition:

- Supply air filter class F7*
- Extract air filter class G5*
- Heat recovery unit**
- Fans for supply and extract air

* It is not stipulated that the units must be equipped with these filter, but the SPF values should be declared with this type of filter mounted in the units.

** Minimum efficiency for the heat recovery unit according to policy scenario (2 or 3)

The unit should be evaluated according to its reference working point, defined by the manufacturer, depending on the CHRV & AHUS design provisions. If the unit is not designed for a single specific working point, the reference working point is defined in one of the following ways.

1. *General reference working point*
   For CHRV & AHUS not designed for a specific working point, the reference working point is defined as 70 % of the maximum airflow. If not stated, the maximum airflow is defined as the airflow at maximum CHRV & AHUS speed and 100 Pa** external pressure drop. SFP is defined as the operating pressure at the reference working point recommended by the manufacturer.
   **) If the CHRV & AHUS is not designed for pressures ≥100 Pa, its maximum design pressure applies.

2. *Specific reference working point*
   For CHRV & AHUS designed for one or more specific working points, the reference working point is the working point at which the CHRV & AHUS will mainly be used.

The SFP requirements should be a mathematical function that allows for higher SFP values for higher external pressures and air flows.

Tier 1

The mathematical function for the SFP requirement, i.e. the SFP target values, is derived according to below.

The function is based on a reference case where the internal static pressure is 350 Pa, 150 Pa for the heat recovery unit, 50 Pa for the casing and 150 Pa for the filters.

$$SFP_{target} = \frac{P_{e.fan,supply} + P_{e.fan,exhaust}}{q_v} = \frac{\left(350 + \Delta p_{stat,ext,tot}\right) \cdot 2}{\eta_{P1}\left(350 + \Delta p_{stat,ext,tot}\right)}$$

$$\eta_{P1} = \frac{\left(\Delta p_{stat,fan} \cdot q_v\right)}{\left(0{,}9 \cdot P_{mref}\left(\Delta p_{stat,fan}, q_v\right)\right)} = \frac{\left(\Delta p_{stat,fan} \cdot q_v\right)}{\left(0{,}9 \cdot \left(\frac{\Delta p_{stat,fan}}{450}\right)^{0{,}925} \cdot (q_v + 0{,}08)^{0.95}\right)}$$

$$= \frac{\left(\left(\Delta p_{stat,ext,tot} + 350\right) \cdot q_v\right)}{\left(0{,}9 \cdot \left(\frac{\left(\Delta p_{stat,ext,tot} + 350\right)}{450}\right)^{0{,}925} \cdot (q_v + 0{,}08)^{0.95}\right)}$$

$$SFP_{target} = \frac{\left(350 + \Delta p_{stat,ext,tot}\right) \cdot 2}{\frac{\left(\left(\Delta p_{stat,ext,tot} + 350\right) \cdot q_v\right)}{\left(0{,}9 \cdot \left(\frac{\left(\Delta p_{stat,ext,tot} + 350\right)}{450}\right)^{0{,}925} \cdot (q_v + 0{,}08)^{0.95}\right)}}$$

$$= \frac{2 \cdot \left(0{,}9 \cdot \left(\frac{\left(\Delta p_{stat,ext,tot} + 350\right)}{450}\right)^{0{,}925} \cdot (q_v + 0{,}08)^{0.95}\right)}{q_v}$$

Tier 2

As in **Tier 1**, but with SFP_{target} corresponding to the P2 class requirement.