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Revision of the Commission Regulation (EU) No 1253/2014 Proposal for specific heat recovery efficiency and SFP_{int_limit} requirements for Non-Residential Ventilation Units

1. Background

The European Commission Regulation (EU) No 1253/2014 (Ventilation Units) is under review and Eurovent Product Group 'Air Handlings Units' had this issue on the agenda. This paper includes the latest findings out of actual information and knowledge.

Dr Christoph Kaup (Trier University) has made several suggestions for improving the minimum requirements for heat recovery efficiency and $SFP_{int\text{-}limit}$ and relate them to the climate, operating time and indoor temperature. Eurovent appreciates this approach and welcomes the inclusion of climate. However, we believe that the revised Regulation should retain its purpose a Product Regulation, and the influence of operation mode (operating time and indoor temperature) should not be considered.

Eurovent finds that the suggestions is technical neutral and have focus on minimise the usage of energy. Anyway, there is a need in the market for run-around HRS and they must have reasonable opportunities to exist.

Thus, the presented below Eurovent proposal, despite being based on Dr Kaup's approach, presumes fixed operating time and indoor temperature (Respectively, annual operating time 4000h and indoor temperature 22°C).

In addition, it was developed based on the following assumptions:

- Required efficiency at the lowest outdoor temperature (-14°C or less) is no higher than proposed in the previous Eurovent Position Paper, respectively 68% for run-around HRS, 73% for other HRS without moisture recovery, and 75% for HRS with moisture recovery at summer cooling conditions.
- SFP_{int_limit} value in is approx. 6% (tier 1) and 11% (tier 2) lower compared to the current Regulation limits (at the lowest outdoor temperature)

2. Proposal for new definitions

'thermal efficiency (η_{t_nrvu}) for means the ratio between supply air temperature gain and extract air temperature minus outdoor air temperature, measured under dry reference conditions, with balanced mass flow, an indoor-outdoor air temperature difference of 20 K, excluding thermal heat gain from fan motors and from internal leakage.

'moisture HRS' is a heat recovery exchanger that can transfer moisture at summer conditions.

'latent efficiency (η_{x_nrvu})' for summer conditions means the ratio between supply air moisture content loss and the outdoor air moisture content minus extract air moisture content, measured at extract air 25°C DB/18°C WB and outdoor air 35°C DB / 25°C WB, with balanced mass flow.

'energy recovery efficiency (η_{e_nrvu})' is the thermal efficiency added with the product of the latent efficiency multiplied by 0.08.

'design outdoor temperature' (t_{ODA}) in °C, means the design outdoor temperature, winter, related to the place of installation and used for selecting the thermal components in the BVU in winter condition, it is normally the same temperature as for the heating system in a building.

Remark: Definition on thermal efficiency is already present in existing regulation. Other symbols used in this document but not explained in this section, come from the existing regulation.

3. Proposal for new requirements

3.1 Required temperature efficiency depending on outdoor design temperature

The base BVU energy recovery efficiency η_{e_base} requirements are

for outdoor design temperatures t_{ODA} below and up to -14 °C

73 %

for outdoor design temperatures t_{ODA} between -14 and 2.5 °C

$-1.02 * t_{ODA} - 0.058 * t_{ODA}^2 - 0.00134 * t_{ODA}^3 + 66.44$ %

for outdoor design temperatures t_{ODA} from and above 2.5 °C

63.5 %

Minimum requirements for different HRS types are

for BVU with run-around HRS the temperature efficiency η_{e_nrvu} is

η_{e_base} - 5 %-point

for BVU with moisture HRS the calculated energy efficiency η_{e_nrvu} is

η_{e_base} + 2 %-points

for BVU with other HRS the temperature efficiency η_{e_nrvu} is

η_{e_base} %

3.2 Required maximum internal specific fan power

The basic specific fan power of a HRS (SFP_{HRS_base}) is

for outdoor design temperatures t_{ODA} below and up to -14 °C

388

for outdoor design temperatures t_{ODA} between -14 and 2.5 °C

$-15.42 * t_{ODA} - 0.907 * t_{ODA}^2 - 0.0323 * t_{ODA}^3 + 261$

for outdoor design temperatures t_{ODA} from and above 2.5 °C

216

The required value for the BVU consists SFP_{HRS_base} , a bonus factor based on the required efficiency (E), an additional fixed value which is proposed to be altered for different tiers and the additional amounts for the filters.

Requirements for different HRS types in the calculation of the correction factor (E) are

for BVU with run-around HRS the reference efficiency η_{e_ref} is

η_{e_base} - 5 %-points

for BVU with BVU moisture and other HRS the reference efficiency η_{e_ref} is

η_{e_base} %

$E = \eta_{e\_act} /(1 - \eta_{e\_act}) * 1/ \eta_{e\_ref} * (1 – \eta_{e\_ref})$

η_{e_act} is the energy efficiency that is built in the specific ventilation unit.

F_{Exh} is the allowable F factor of the first filter stage in the exhaust air stream

F_{Sup} is the sum of F factor of the first and second filtration stage (if applicable) in the supply air stream

Proposed maximum internal specific fan power for the HRS (SFP_{HRS}) in W/(m³/s) for different HRS types for **tier 1** are

for BVU with run-around HRS

- $770 – 140 * q_{nom} + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} < 2$ m³/s and
- $490 + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} \geq 2$ m³/s

for BVU with other HRS the additional value $SFP_{int, HRS, add}$ is

- $305 – 140 * q_{nom} + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} < 2$ m³/s and
- $25 + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} \geq 2$ m³/s

Proposed maximum internal specific fan power for the HRS (SFP_{HRS}) in W/(m³/s) for different HRS types for **tier 2** are

for BVU with run-around HRS

- $695 – 135 * q_{nom} + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} < 2$ m³/s and
- $425 + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} \geq 2$ m³/s

for BVU with other HRS the additional value is

- $255 – 135 * q_{nom} + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} < 2$ m³/s and
- $-15 + E * SFP_{HRS\_base} + F_{sup} + F_{exh}$ if $q_{nom} \geq 2$ m³/s

Remark: The constant includes provisions for BVU connections

3.3 Requirements for UVUs

For Unidirectional Non-Residential VUs it is proposed to set the following minimum requirements:

UVU with a filter

SPF_{int_limit} = F + 30

F is the constant due to air filters and use the same table as for BVU.

UVU without a filter

UVU without a filter is proposed to be deleted from this regulation and just kept in the fan regulation. If it will be retained in this regulation, Eurovent propose to retain the values of the current regulation:

The minimum fan efficiency ($\eta\nu_u$)

— 6,2 % * ln(P) + 42,0 % if $P \leq 30$ kW and

— 63,1 % if $P > 30$ kW

4. Proposal for new information requirements

For Bidirectional Non-Residential VUs it is proposed to set the following minimum information requirements:

- place of installation
- design outdoor temperature, winter

If the actual design outdoor temperature, winter, and working point is not known – tables with nominal flowrates, SFP_{int}, face velocity and $\Delta P_{s,int}$ must be specified for design outdoor temperatures, winter, of interest for the BVU concerned.

Eurovent and transparency

When assessing position papers, are you aware whom you are dealing with?

Eurovent's structure rests upon democratic decision-making procedures between its members and their representatives. The more than 1.000 organisations within the Eurovent network count on us to represent their needs in a fair and transparent manner. Accordingly, we can answer policy makers' questions regarding our representativeness and decisions-making processes as follows:

1. Who receives which number of votes? At Eurovent, the number of votes is never determined by organisation sizes, country sizes, or membership fee levels. SMEs and large multinationals receive the same number of votes within our technical working groups: 2 votes if belonging to a national Member Association, 1 vote if not. In our General Assembly and Eurovent Commission ('steering committee'), our national Member Associations receive two votes per country.	**2. Who has the final decision-making power?** The Eurovent Commission acts as the association's 'steering committee'. It defines the overall association roadmap, makes decisions on horizontal topics, and mediates in case manufacturers cannot agree within technical working groups. The Commission consists of national Member Associations, receiving two votes per country independent from its size or economic weight.
3. How European is the association? More than 90 per cent of manufacturers within Eurovent manufacture in and come from Europe. They employ around 150.000 people in Europe largely within the secondary sector. Our structure as an umbrella enables us to consolidate manufacturers' positions across the industry, ensuring a broad and credible representation.	**4. How representative is the organisation?** Eurovent represents more than 1.000 companies of all sizes spread widely across 20+ European countries, which are treated equally. As each country receives the same number of votes, there is no 'leading' country. Our national Member Associations ensure a wide-ranging national outreach also to remote locations.

Check on us in the European Union Transparency Register under identification no. 89424237848-89.

We are Europe's Industry Association for Indoor Climate (HVAC), Process Cooling, and Food Cold Chain Technologies – thinking 'Beyond HVACR'

Eurovent is Europe's Industry Association for Indoor Climate (HVAC), Process Cooling, and Food Cold Chain Technologies. Its members from throughout Europe represent more than 1.000 companies, the majority small and medium-sized manufacturers. Based on objective and verifiable data, these account for a combined annual turnover of more than 30bn EUR, employing around 150.000 people within the association's geographic area. This makes Eurovent one of the largest cross-regional industry committees of its kind. The organisation's activities are based on highly valued democratic decision-making principles, ensuring a level playing field for the entire industry independent from organisation sizes or membership fees.

Eurovent's roots date back to 1958. Over the years, the Brussels-based organisation has become a well-respected and known stakeholder that builds bridges between the manufacturers it represents, associations, legislators and standardisation bodies on a national, regional and international level. While Eurovent strongly supports energy efficient and sustainable technologies, it advocates a holistic approach that also integrates health, life and work quality as well as safety aspects. Eurovent holds in-depth relations with partner associations around the globe. It is a founding member of the ICARHMA network, supporter of REHVA, and contributor to various EU and UN initiatives.

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