EUROVENT
THE EUROPEAN COMMITTEE OF HVAC&R MANUFACTURERS

Position Paper for Member State Representatives of the Ecodesign Consultation Forum

Contact person	Phone	Email	Date
Morten Schmelzer	+32 (0)471 71 52 61	morten.schmelzer@eurovent-association.eu	2015-05-23

Evaporative cooling equipment and the 'EU Fan Regulation': Clarifying summary concerning the exemption request following the Ecodesign Consultation Forum on 30 April 2015

Background

During the Consultation Forum on the revision of the 'EU Fan Regulation' 327/2011 in Brussels on 30 April, Eurovent had reinforced its call for an exemption of evaporative cooling equipment from the future Regulation, which was supported by several Member State Representatives. Subsequently within the meeting, the Commission has asked VHK to further elaborate on this issue and on how an exemption can be implemented without creating loopholes.

To date, Eurovent and its members have published the following Position Papers that provide in-depth arguments on why we call for an exemption. They also provide for a proposal of a clear exemption phrase that would cover solely evaporative cooling equipment:

- PP - 2014-11-18 - Eurovent call for an exemption of cooling towers from the revised EU Fan Regulation
- PP - 2014-12-11 - Extended Eurovent Position on cooling towers and the EU Fan Regulation
- PP - 2015-02-13 - Proposed Eurovent amendment concerning cooling towers and the EU Fan Regulation
- PP - 2015-04-14 - Input for the Consultation Forum on the fan review from evaporative cooling equipment manufacturers
- PP - 2015-04-21 - Additional input concerning Eurovent Position Paper on evaporative cooling equipment from 2015-04-14

With the following **Clarifying Summary,** we further elaborate on our requests based on results of the Consultation Forum. We aim to resolve all doubts concerning the possible opening of a loophole.

Clarifying summary

Specific properties and facts of centrifugal fans used in cooling towers

- Centrifugal fans installed with the outlet opening above the centreline of the fan-wheel require an outlet extension (rain hood) inside the outlet plenum that is a constructive part of the fan. This extension is sloped downward towards the water basin and constructed to serve as a protection against migration of cooling tower water into the fan-housing. The extension is necessary as it imposes additional resistance and, as such, is counterproductive with regards to fan efficiency.

- Centrifugal fans installed with the outlet opening above the centreline of the fan-wheel require drain holes to allow condensed cooling tower water but also induced rain water to drain out from the inside of the fan housing. This drain is an undesired aerodynamic leak that compromises fan efficiency but it is also a constructive necessity for cooling towers.[1]

[1] http://www.wittfan.de/files/Know-how-Center/Ventilatorgrundlagen/4_Blowers_for_Humid_Air.pdf

- Centrifugal fans installed with the outlet opening under the centreline of the fan-wheel (see picture below) are typically designed to allow water inside the fan housing. This is not beneficial regarding fan efficiency, but beneficial for matching building layout restrictions while maintaining optimised thermal performance - the primal goal of cooling towers.

- Centrifugal fans installed in a cooling tower serve as a supporting structure for the heat exchanger installed on top of the fan structure (see picture on the right). The heat exchanger, when charged with the cooling tower water or refrigerant, represents the heaviest section of the cooling tower. The stator must be custom-designed in size and construction to support the weight in a structurally safe manner. This principle can neither be compromised nor replaced by an off-the-shelve product, which, as such, is not available on the market. The centrifugal fan is an integrated part of the cooling tower construction.

- Centrifugal fans installed in a cooling tower must be designed for heavy duty application with increased vibration levels. The effect of condensation of the circulating cooling tower water in the inside of the fan is undesired but inevitable during low cooling load operation. Ice formation as a result of cooling water condensation is a critical consideration for the correct design of the cooling tower fan system and imposes specific design parameters related to strength and stability of the entire construction.

Specific properties and facts of axial fans used in cooling towers

- The hot, moisture saturated environment at the axial fan is corrosive to most fan materials. This can be complicated by the chemicals used for water treatment necessary for hygienic operation and mandatory disinfection of the cooling system. Only a limited variety of axial fan types can be used in what is commonly considered to be severe service for fans on cooling towers and many are specifically designed for this purpose by a limited number of manufacturers. Some specific cooling tower applications use water in close proximity to the fan with a ph value that can reach 3 or 9,5.[2] These values commonly result from customer water analysis, as is shown in the attached example of a customer request.[3]

- The constant operation in a saturated environment leads to water build-up in the hollow blades which are typical for the fan designs used in cooling towers. Supplemental drain holes in the fan tip are necessary. This is counterproductive with regard to fan efficiency.

- The larger fans on outdoor cooling tower equipment are subject to issues with non-uniform solar heating of the fan housing. Thermal expansion will make them no longer round under those conditions. High wind speeds typical for roof installation will also cause deformation in fan housing shapes that make them no longer round. Both of these situations have led to the need for, and typical use of larger than ideal tip clearance between fans wheels and housings to prevent structural damage to either the fans or the housings. These limits the peak fan

[2] This could relate to Art. 1/3.g of the Draft Regulation
[3] See PP - 2015-05-23 Attachment - Example of a Technical Specification sheet

efficiency design. Typical tip clearance of ventilation fans is about 4mm for a fan diameter of 914 mm. The attached document offers an example of the described tip clearance requirements.[4]

- The large axial fans of cooling towers are typically indirectly driven with a transmission ratio optimised for the correct electrical power and lowest tip speed for noise control. The transmission and the heavy duty support structure clearly obstructs the airstream and thus significantly reduces the fan efficiency. However, this structure is necessary to carry the transmission located directly under the fan in the suction airstream. Using direct-driven fans would make the support structure heavier due to the location of the heavier motor directly under the fan, further reducing the overall fan efficiency. Transmissions using gear boxes typically penetrate the fan cowl and position the motor on top of the fan deck. Both of these structural elements are necessary but counterproductive for the fan efficiency.
  They also cause the impossibility to reconstruct the configuration for lab testing without building an entire fan section in full size.

General considerations

- The basic physical principle of evaporative cooling is latent heat rejection. Latent heat rejection guarantees a top efficient heat transfer from the process to the atmosphere. This is the primal goal of all evaporative cooling equipment. A focus on fan efficiency increase will be counterproductive to the main goal of general energy efficiency as described in many of our previously published Position Papers mentioned above and attached to this document.

- During the Ecodesign Consultation Forum on 30 April, Witt&Sohn has indicated that small industrial manufacturers are underrepresented in the entire process and see their business being compromised by general legislation that was initially not intended for their market. The European cooling tower manufacturers consider themselves as one of these small industrial manufacturers with a limited quantity of fans put on the market.

- The Eurovent Position Paper from 14 April 2015 states:

  As we would like to prevent any loophole resulting from an exemption, Eurovent proposes to add the following definition of evaporative cooling equipment to Art. 1, paragraph 3:

  'This regulation shall not apply to fans which are specified to exclusively transport gases consisting of a mixture of liquid water and air having a relative humidity consistently larger than 90%.'

  Loopholes are avoided by using
  - The 'mixture of liquid water and air' = adiabatic saturated air handling equipment is not exempted, neither are humidifiers
  - 'consistently larger than 90%' = weather influences for outdoor equipment are not exempted

We hope that with the paper, we are able to further clarify our positions. Our Team remains at your disposal for any further questions.

[4] See PP - 2015-05-23 Attachment - Hudson tip clearance example - page 15 - figure 6 for a concrete example

Eurovent - The European Committee of HVAC&R Manufacturers
AISBL / IVZW / INPA

Diamant Building
80 Bd. A. Reyers LN
1030 Brussels
BELGIUM

Phone: +32 (0)2 70 67 962
Fax: +32 (0)2 70 67 966
info@eurovent-association.eu
Find us on LinkedIn!

Fortis Bank
IBAN: BE 31 210043999555
BIC: GEBABEBB
VAT: not applicable

About Eurovent

Eurovent, the European Committee of HVAC&R Manufacturers, is the representative of Europe's major national associations in the industry of heating, ventilation, air conditioning and refrigeration. Based on objective and verifiable data, its 24 members from 18 European states represent more than 1000 companies, the majority small and medium-sized. In 2013, these accounted for a combined annual turnover of around 25bn euros and employed more than 120.000 people – making Eurovent one of the largest industry committees of its kind.

Eurovent's roots date back to 1958. Over the years, the Brussels-based umbrella association has become a well-respected and known stakeholder that builds bridges between companies it represents, legislators and standardisation bodies on a EU and international level. The association favours a level-playing field for the entire industry and strongly supports energy-efficient and environmental-friendly solutions. 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 the EU's BUILD UP initiative.

Eurovent possesses two subunits. With Eurovent Certita Certification (ECC), it majority owns an independent certification company, which holds the ISO 45011 (17065) accreditation – fulfilling highest independency, reliability and integrity standards. Open to any company, it is known for its globally-recognised brand 'Eurovent Certified Performance'. Activities are complemented by Eurovent Market Intelligence (EMI), the association's second independent unit. Its Europe-wide data sets are frequently being used to support the development of EU regulation.

Members of Eurovent

Europe's major, national HVAC&R associations and their more than 1000 manufacturers

Eurovent - The European Committee of HVAC&R Manufacturers
AISBL / IVZW / INPA

Diamant Building
80 Bd. A. Reyers LN
1030 Brussels
BELGIUM

Phone: +32 (0)2 70 67 962
Fax: +32 (0)2 70 67 966
info@eurovent-association.eu
Find us on LinkedIn!

Fortis Bank
IBAN: BE 31 210043999555
BIC: GEBABEBB
VAT: not applicable

Corresponding Members

Manufacturers in European countries with no national HVAC&R association representing them

Independent Subunits

Organisations with own structures that guarantee a full independency from the Eurovent association

Enclosed:

Files linked within this documents can be found within the 'Attachment' section of Adobe Acrobat.

Eurovent - The European Committee of HVAC&R Manufacturers
AISBL / IVZW / INPA

Diamant Building
80 Bd. A. Reyers LN
1030 Brussels
BELGIUM

Phone: +32 (0)2 70 67 962
Fax: +32 (0)2 70 67 966
info@eurovent-association.eu
Find us on LinkedIn!

Fortis Bank
IBAN: BE 31 210043999555
BIC: GEBABEBB
VAT: not applicable