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Eurovent call for an exemption of cooling towers from the revised 'EU Fan Regulation' 327/2011

Background

Commission Regulation (EU) No 327/2011 sets Ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW (hereinafter referred to as 'EU Fan Regulation'). The requirements apply to both standalone fans, but also fans incorporated into products such as air conditioners, fan coil units or cooling towers. Reaching the fourth year after its 2011 implementation, the Regulation has recently entered the legally demanded revision process, with VHK, a Netherlands-based consultancy firm, currently drafting the study. This revision process allows for improving the Regulation both in terms of efficiencies, but also by adapting it to industrial realities based on the experiences made in its first years after coming into force.

During the 'first stakeholder meeting' on the revision of the 'EU Fan Regulation' at the European Commission on 1 October 2014, the Eurovent Product Group 'Cooling Towers' had indicated to elaborate on the difficulties cooling tower manufacturers face concerning the current Regulation 327/2011. The results are being outlined below following a working definition.

Working definition

Within this position paper, the term 'cooling towers' refers to both closed and open-circuit cooling towers as well as evaporative condensers and evaporative fluid coolers. Yet, the term 'cooling towers' does not include dry coolers, which usually make use of ready-made fan packages, whose efficiencies can be tested in a comparatively simple manner.

Key position

While Eurovent appreciates the overall nature of the Regulation and favours a reduction of loopholes and increase of fan-efficiency levels whenever feasible, **we strongly encourage the European Commission and VHK to exempt cooling towers from the revised regulation.** Following an in-depth consultation process among our members across Europe and the large majority of the European cooling tower industry represented through the respective Eurovent Product Group, this call is based on the following reasoning.

There are dimensional problems when measuring fan efficiencies

The majority of cooling towers contain axial fans with very large dimensions (e.g. large impeller diameters range from 3.96 meter to over 10 meter diameter). **No test facilities in Europe are capable to measure fan efficiencies for such diameters.** AMCA International, for instance, has a test facility for fans up to 2.4 meter diameters. Yet, this facility is located in the USA, making cost-efficient tests unfeasible.

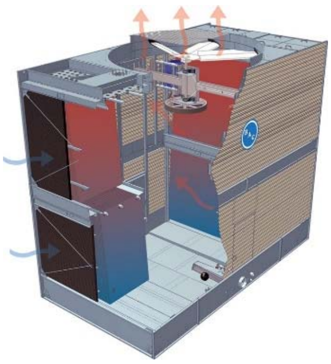
Setting up a test facility for all cooling towers requires a significant investment by the cooling tower market, and this still does not mean that all cooling towers would be testable – which implies, for example, field erected cooling towers that can only be tested on site.

Further elaboration through a practical example

Measuring air flow, static pressure and motor input power on the cooling tower itself requires a built up with a 20 ton lifting crane and full entanglement of all connections to an external pump station. All the motors need to be wired to the mains and require large electrical cabinets. The setup of and execution of a test are very labour intensive. Making the measurements on the unit demands additional scaffolding. This eventually increases the cost of the test facility, not least because of the above-mentioned large dimensions.

The required measurements to retrieve the fan efficiency are impossible to measure in a representative and reproducible method. The air flow can only be derived from air speed measurement at the outlet of the cooling tower with a high fault margin due to high air speeds and turbulent airstream at the outlet (this is the reason why wind tunnels are being used). Measuring the static pressure within the cooling tower with turbulent air around is not feasible. All measurements are executed outside, where ambient conditions influence the results due to different air densities.

The fan system cannot feasibly be separated to make fan efficiency measurements



Critical parts of the fan system tested to define the fan efficiencies according to the 'EU Fan Regulation' are always incorporated into the physical structure of the cooling tower (see picture on the left) and **it is impossible to separate the fan system from the cooling tower to make fan efficiency measurements.** This includes fan cowls, drive systems, and mechanical equipment. The specific structure of the product does not allow for an effective, independent testing of fan efficiencies. A test facility needs to be adjusted for each specific cooling tower product, because of the different design setups. As already stated, such an adaptive test facility demands huge investments.

This is different from other markets such as air conditioners, in which case an entire fan package is usually purchased from a catalogue, and is incorporated into the product, which allows for a separate testing of the fan. The limited dimensions of these fans make setting up a test rig feasible.

Other entire centrifugal fan systems (see picture on the right) cannot be separated from the cooling tower to make fan efficiency measurements, because they also constitute the supporting structure. These centrifugal fans are, for example, used on forced draft cooling towers, which can handle higher pressures due to different accessories requested by the customer to reduce the sound level or to prevent a freeze up or plume formation.

Cooling towers are not off-the-shelve, standardised products

Each cooling tower is being designed for very specific customer needs suiting, for example, dedicated design requirements. It is not an off-the-shelve, standardised product. A majority of cooling towers have uniquely designed fan systems (based on a motor and pitch), which makes it extremely costly to measure each fan system. **The usual product ranges of manufacturers are so diverse that many models are rarely sold over the lifespan of a product line, which further prevents cooling tower manufacturers from effectively testing each fan system.**

Additionally, the heat exchanger is often a part of the fan housing and can have many possible arrangements – leading to a wide variation of fan entrance and exit conditions. A structural blockage may be necessary to make the product function properly and comply with other standards (e.g. regarding wind and seismic resistance). This product class is also frequently limited in configuration by shipping width. Fan diameters tend to maximise at allowable shipping width increments. Thus, the fan design and selection is often incompatible with a pure efficiency focus.

An exemption is not going to lead to lower energy efficiencies of cooling towers

The market of cooling towers is significantly driven by energy efficiency and sustainability. Achieving the best cooling efficiency and the highest heat rejection for lowest power consumption is a primary goal of cooling tower manufacturers. Air movement is a means for our primary goal, evaporative heat transfer, which manufacturers' R&D centres constantly aim to improve. Thus, efficient heat rejection technologies, motors and fans are continuously being developed and implemented.

For most applications, the energy required to run the cooling tower fan is substantially less than the energy required for the system which they serve. The change to less efficient heat rejection technologies will result in higher system energy consumption, which is not desirable.

Placing on the market of cooling towers

Cooling tower manufacturers as integrators of fans/impellers place a different product on market than a fan. While the primary purpose of a fan is to provide an airflow on a certain pressure, the primary purpose of a Cooling Tower is to cool a process. Manufacturers are only allowed to use conform impellers and fans for integration into their products if the final product is aimed to be placed on the EU Common Market. The same applies to installed electrical motors and pumps - which also need to comply with their respective Ecodesign directives.

Speed and noise requirements

Cooling towers are being selected for design summer day duty, resulting in the equipment being oversized for ambient temperatures. Subsequently, **fans are typically operated at reduced speed for much of the year in most climates, significantly reducing the energy used by the fans while further reducing the need for specific fan efficiencies.** Low noise applications are also common, requiring the use of low sound axial fan designs with higher fan solidity (i.e. more and/or wider chord fan blades) to move the same amount of air through the unit with a slower fan speed. By design, these fans have lower fan efficiency, but are often required to meet local sound codes.

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Proposal

Based on the low volume of energy savings, the applicability of other more relevant metrics, the potential for unintended increases in fan energy use, and the design challenges detailed above, Eurovent and its members recommend that fans used in cooling towers to be exempted from the 'EU Fan Regulation'.

It remains to be mentioned that in the US, a similar request was made by AHRI, the American Air Conditioning, Heating and Refrigeration Institute. American manufacturers face similar issues with regard to the Rulemaking on Commercial and Industrial Fans and Blowers (US Department of Energy, DOE).

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 companies, the majority small and medium-sized. In 2013, these accounted for a combined annual turnover of around 21 billion 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.

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