

Flammable natural refrigerants in heat pumps

Fans meet the challenge

Climate protection is one of the global challenges of our time. The EU is pursuing climate protection objectives with the *"Fit-For-55" package of measures*. The F-Gas Regulation is intended to gradually reduce emissions of fluorinated greenhouse gases (F-gases) in the EU by 70 million metric tons to 35 million metric tons of CO₂ equivalent by 2030. It is therefore essential to switch to natural, combustible refrigerants with a low global warming potential (GWP).

Options for fans

As a result, all components installed in heat pumps and fans, for example, have to satisfy standards for flammable refrigerants. For fans that provide the necessary air flow in heat pumps through the evaporator, this means that their electronics must not become an ignition source, even if a fault occurs. One complex method involves, for example, heat-proof housings that prevent electronics and flammable atmospheres from coming into contact with one another. Another option is using an additional, smaller ATEX fan, which ensures reliable ventilation of the unit.

Drive design in accordance with EN 60335-2-40

However, most manufacturers of air-to-water heat pumps prefer to use components that are approved for use with flammable refrigerants. Motor and fan specialist ebm-papst therefore offers an alternative specially designed for use in air-to-water heat pumps. For EC fan drives in size 55, 74 and 84, the electronics circuits have been modified such that they correspond to EN 60335-2-40 for heat pumps with flammable refrigerants. This means that, in the event of a fault, the maximum surface temperature must be at least 100 Kelvin below the ignition temperature of the refrigerant used. Propane, which is very well suited to new buildings and building renovations due to its good heat transfer capacity and its low GWP value, has an ignition temperature of 470 °C. The electronic assemblies, which have been tested and certified accordingly, ensure that their maximum surface temperature always remains below 370 °C, even if a fault occurs, and as a result they do not become an ignition source.

High energy efficiency and low noise emissions

Energy efficiency and noise characteristics also play an important role when selecting fans for heat pumps. The driving force behind the fans are modern EC motors that have a high efficiency and can be controlled as required thanks to their integrated electronics. For example, if the speed at night is reduced by just 100 rpm, it is possible to reduce the noise by more than half. To reduce the noise level, the fans can usually be combined with the FlowGrid guide vanes.

The fans approved for use with A3 refrigerants in accordance with EN 60335-2-40 with maximum fill quantities of up to 1 kg or 5 kg (depending on the installation site) are available in many axial and centrifugal variants, covering the widest variety of applications for air-to-water heat pumps for outdoor and indoor use.

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Fig. 1: The fans approved for use with A3 refrigerants in accordance with EN 60335-2-40 are available in various axial and centrifugal variants.

Fig. 1 ebm-papst
Characters approx. 3,000, including headings and sub-headings
Tags Heat pump, F-gas, refrigerant, ATEX, energy efficiency, noise,
 night-time reduction, EC technology
Link www.ebmpapst.com/heatpump

About ebm-papst

The ebm-papst Group, a family-run company headquartered in Mulfingen/Germany, is the world's leading manufacturer of fans and drives. Since the technology company was founded in 1963, it has continuously set the global industry standard with its core competences in motor technology, electronics, digitization and aerodynamics. With over 20,000 products in its portfolio, ebm-papst provides the best energy-efficient, intelligent solution for virtually every ventilation or drive-engineering task.

In fiscal year 2020/21, the "hidden champion" generated revenues of € 2.129 billion. The group employs roughly 15,000 people at 29 production sites (in Germany, China and the USA, to name but a few) and in 51 sales offices worldwide. ebm-papst sets the benchmark with their fan and drive solutions which are used in almost all industries, such as ventilation, air conditioning and refrigeration, heating, automotive, information technology, mechanical engineering, household appliances, intralogistics and medical engineering.

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