Press Release

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More important than ever: ‘Indoor Environment Quality’ to be a top theme at ISH digital 2021

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The leading world trade fair for water, heating and air conditioning will take place from 22 to 26 March 2021 and will be wholly digital. The show will highlight a host of interesting and relevant issues, including ‘Indoor Environment Quality’. This theme covers thermal comfort and indoor air-quality hygiene.

Be it offices, administration buildings and event locations, restaurants, cinemas, theatres, department stores, shops, supermarkets, leisure facilities or industrial sites: wherever people spend longer amounts of time, the operation of ventilation and air-conditioning installations ensures that constantly pleasant indoor temperatures and humidity levels, adjusted to suit requirements at the time, are maintained, and that the air quality is healthy and feels fresh. Technical regulations, standards and guidelines talk of ‘thermal comfort’ and the IEQ (Indoor Environment Quality), which involves several parameters.

Thermal comfort in interior spaces - in other words, people’s subjective satisfaction with the conditions in a given space - is, in large measure, dependent on the temperature in the room, the humidity level and the movement of air. The following values are considered appropriate for good IEQ and are the figures usually applied in the planning of most ventilation and air-conditioning installations in buildings and indoor communal areas:

- Room temperature: between about 20 °C in winter and 26 °C in summer
- Humidity level: between about 40 % in winter and 60 % in summer
- Air movement: less than about 0.2 m/s in places where people congregate in order to rule out any possible danger of draughts.

Depending on the type of activity occupants are involved in (heavy physical activity, high levels of concentration) and how lightly or warmly the occupants are dressed, the actual “target values” for comfort levels at a given time can vary slightly from the prescribed figures.

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In addition, there is the question of ensuring desired levels of air quality. Indoor air is constantly being polluted by unpleasant odours and contaminants emanating from ceilings, walls and floors, as well as from furniture and furnishings, not to mention the pollutants released through the operation of equipment and the CO_2 that people breathe out. The indicator and baseline level for credibly healthy and acceptable air quality, laid down in many standards and guidelines, is generally taken to be a CO_2 content of 1,000 ppm in room air – as, for instance, in DIN EN 16798, “Indoor environmental input parameters for design and assessment of energy performance of buildings, addressing indoor air quality, thermal environment, lighting and acoustics”, as well as in the German workplace regulations ASR 3.6 ‘Ventilation’. Where CO_2 concentrations reach levels of more than 2,000 ppm, the ASR 3.6 regulations stipulate that for such, by then excessively contaminated rooms, further measures must be put in place to upgrade the ventilation system.

Like DIN EN 16798, recent technical regulations adopt this guideline figure for CO_2 levels of 1,000 ppm. To provide good indoor air quality, they recommend that, in the planning of ventilation and air-conditioning systems, provision is made for an airflow of between around 30 to 50 m^3/h per person, representing one to two changes of room air, depending on the use to which the room is put. This airflow is then well filtered in the ventilation unit (to remove dust and, where necessary, pollutant gases), brought to the required temperature (heated or cooled), humidified or dehumidified and returned to the room via the ventilation system. As an equivalent volume of exhaust air is removed from the room, the continuous change of air establishes good air quality that is both hygienic and perceived as pleasant by the occupants.

Adequate air quality can also be achieved, at least intermittently, by opening the windows. But there are significant limitations to this approach and possible negative impact on comfort and air quality. Rooms overheat as a result of the ingress of warm air in summer, whilst in winter, the external air cools them down. At the same time, the room air becomes extremely dry, which impacts on the body’s mucus membranes and increases the risk of infection from bacteria and viruses. And there are other factors, too, such as the ingress of dust and street noise, as well as potentially inadequate flow of external air through the room. None of these problems arise with a ventilation system that ducts constantly filtered, warmed or cooled air to the occupied spaces and, at the same time, removes contaminated air. It follows, therefore, that all-year-round good indoor air quality can be achieved only through the use of a mechanical ventilation unit.

Alongside temperature considerations, enduring satisfactory indoor air quality also requires adherence to the VDI 6022 standards outlining ‘Hygiene requirements for ventilation and air-conditioning systems’ and produced by the Association of German Engineers (VDI). According to these guidelines “ventilation and air-conditioning systems conforming to current standards should be planned, installed, operated and maintained so as to avoid negative impact on health, mental wellbeing

or thermal comfort, as well as avoiding unpleasant odours." In order that the requirement of VDI 6022 that "supply air should make a positive contribution to health" may be met, the guidelines contain extensive tables and lists of tests and inspections that should be regularly performed on all ventilation components and equipment by registered, suitably qualified persons.

As many worldwide studies have shown, thermal comfort and indoor air quality have a considerable impact on general wellbeing, as well as on people's levels of concentration and efficiency, not least in offices. These studies have demonstrated that, for instance, where temperatures or humidity levels are too high or too low, and considered to be uncomfortable, or if the air quality is inadequate, performance and concentration levels can quickly dip by 5 to 10 percent.

As from the beginning of 2016, the efficient operation of ventilation units has been prescribed by the implementation of EU Regulation 1253/2014 on the "ecodesign requirements for ventilation units". This regulation specifies, for example, the use of heat-recovery systems and air filters, which entail maximum permissible electricity consumption for the fans used. All companies in the EU, that manufacture or supply ventilation systems, must observe and document these requirements.

Experts agree that the Covid pandemic, which has persisted since the spring of 2020, and the need to protect people from being infected by the coronavirus in enclosed spaces is going to have a major impact on ventilation and air-conditioning technology. Ventilation units play an important role here, as constant flushing of indoor spaces with large volumes of clean external air will significantly reduce the concentration of Covid aerosols in room air and thus greatly limit the risk of infection. In effect, the more external air that is used, the better the effect. And if the existing ventilation system is not powerful enough to provide an exchange of air from the outside sufficient to provide a significant reduction in Covid aerosols, two further measures are recommended:

Firstly: windows should be opened at regular intervals to provide ventilation.
Secondly: supplementary air-purifying units should be set up and operated. These plug-in devices continually suck in the room air, filter out any viruses that it may contain using high-efficiency, particulate filters (HEPA) and / or UV-C irradiation and then return the purified air into the room. Efficiency levels of over 99 percent can be achieved. Such devices, which are also recommended by virologists as a sensible additional measure to complement the introduction of external airflow are now available from many manufacturers, with a variety of designs and airflow levels. They are suitable to provide effective supplementary protection from coronavirus infection in, for example, classrooms, open-plan offices and conference rooms, as well as in doctors' surgeries, fitness rooms and other similar applications.

At the same time, we can assume that the coronavirus epidemic and the need for personal protection will, in future, be given greater consideration in the planning and installation of ventilation and

air-conditioning systems – with, for example, higher airflow volumes and the use of high-efficiency air filtration systems.

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