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BEYOND MERV

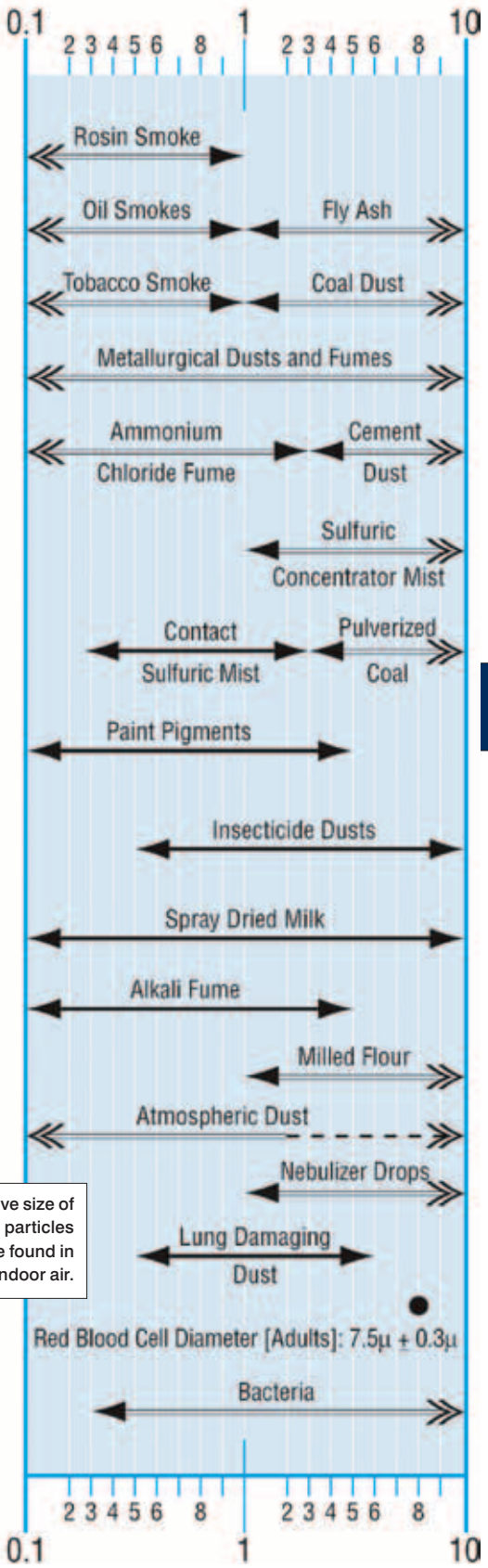
Selecting air filters for optimal IAQ, performance

By Tony Fedel

Ideally, illness triggers such as microorganisms, dust and allergens should be eliminated or significantly reduced by the facility's HVAC system. The key component to reducing these triggers is effective air filtration, which provides the primary defense against air pollutants generated within a building as well as pollutants from air drawn into the building by its HVAC system.

Indeed, the HVAC industry's pre-eminent technical organization, ASHRAE, has stated that airborne infectious disease transmission can be reduced via air filtration. But while air filters remove microorganisms, they can also harbor them, especially if proper maintenance procedures are not followed, including regularly scheduled filter change-outs.

Decreased performance of healthcare facility HVAC systems, filter inefficiencies, improper installation and poor maintenance practices — including removal of used filters — contribute to the spread of airborne healthcare-associated infections. For example, gaps in and around filter banks and heavy soil and debris upstream of poorly maintained filters have been implicated in outbreaks of aspergillosis, especially when accompanied by construction activities at



The relative size of dangerous particles that can be found in indoor air.

the facility. Other pathogens found in air filters in healthcare settings include Mucorales (Rhizopus spp), Penicillium spp, Acremonium spp and Cladosporium spp.

SELECTING THE RIGHT AIR FILTER

Most of the respirable dust, particles and microorganisms people breathe in is approximately 7 microns or smaller — a fraction of the size of a grain of sand. A filter's efficiency will indicate how well the filter cleans indoor air by removing these respirable airborne particles.

When evaluating filtration efficiency, most professionals turn to Minimum Efficiency Reporting Value, which is assigned to filters based on the ASHRAE 52.2 Standard. A MERV 1 is considered least efficient, while a MERV 16 is most efficient. (Note that HEPA and ULPA filters are not tested according to ASHRAE 52.2 and therefore do not have MERVs). In most healthcare facilities (not including operating rooms, labs, isolation wards or intensive care units), the best filter choice — per ASHRAE and the American Institute of Architects — is a MERV 14-16 filter with a MERV 8 pre-filter to remove coarse particles and extend the useful life of the higher efficiency final filter.

While evaluating results of the ASHRAE 52.2 test, it is wise to review the Fractional Particle Size vs. Particle Diameter Curve that is included with the test report. The curve will provide the efficiency of the filter for the specific particle size of interest. Keep in mind, for example, that lung-damaging dust can be as small as 0.5 micrometers, while some bacteria can be as small as 0.3 micrometers. This means that high E1 and E2 efficiencies are critical to providing good IAQ.

However, not all MERV 8 filters perform the same, as seen by the results of an ASHRAE 52.2 test, which provides the efficiency of the filter over three particle size ranges: E1 (very fine particles in the 0.3 to 1.0 micrometer range), E2 (fine particles in the 1.0 to 3.0 micrometer range) and E3 (coarse particles in the 3.0 to 10.0 micrometer range). The E1, E2 and E3 efficiencies represent the true measure of filter performance and give users a more complete picture of what the filter will actually do.

E1 and E2 efficiencies can vary greatly based on the type of filter media used rated MERV 8 or below. In healthcare settings, this could prove important when choosing that MERV 8 filter. To avoid confusion, ask to see ASHRAE 52.2 test reports as well as an energy cost analysis of the filters under consideration. Do not rely solely on the non-standard MERV-A test, which subjects filters in the test to extreme particle loads of very fine particles — many times what the filter would be exposed to over its lifetime in real-world applications.

BALANCED EFFICIENCY

When selecting filters, consider those with media that have a good balance of mechanical efficiency and electret efficiency (via an electrostatic charge). These filters will almost always outperform a filter that relies solely on mechanical efficiency. The best mechano-electret filters have a depth-loading media with a gradient density structure. A well-designed charged filter media can be manufactured to provide high-initial and high-sustained filtration efficiency over its filter lifecycle.

HAIs are expensive. In addition to the direct medical costs, there are costs relating to reduced productivity among patients and staff as well as intangible costs related to diminished quality of life. When evaluating and selecting air filters for HVAC systems, go beyond MERV and choose a filter with media technology that does the most to enhance HAI-prevention initiatives.

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