

from experience

HVAC Filter Selection: The Impact of MERV

Proper filter selection requires an understanding of several factors: the type and size of particle/contaminant to be removed, expected filter service life, pressure drop of the filter, the environment where the filter will be used, design airflow, and the amount of space available for the filters. To help plant personnel and engineers select the right HVAC filter for an application, the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) publishes Standard 52.2-2017. This test method standard helps compare air cleaners regardless of application, determine a consistent performance level under normal operating conditions, and identify filter efficiencies for a specific situation. Standard 52.2 adds the Minimum Efficiency Reporting Value (MERV) rating system for filters. MERV classifies filters by a range of particle sizes captured and a composite minimum efficiency expressed as the Particle Size Efficiency (PSE) for each particle size range.

The table below summarizes the characteristics of three typically specified filters by Hixson:

MERV Rating	Filter Type	Particle Size Range (Microns)	Particle Size Efficiency Percentage (E)	Applications, Comments
8	Prefilter	1.0 to 3.0 3.0 to 10.0	E2 ≥ 20 E3 ≥ 70	-Captures dust, fibers, mold upstream of coils -Initial cleaner before high-efficiency filters
14	Final	0.3 to 1.0 1.0 to 3.0 3.0 to 10.0	E1 ≥ 75 E2 ≥ 90 E3 ≥ 95	-Captures fine dust, smoke, bacteria -Pre-filter to HEPA
19	HEPA	0.3 to 1.0	E1 ≥ 99.999	-Standard for clean room and toxic particulate applications -Captures smoke, fumes -Pre-filters may increase life up to 80%

Note that the higher the MERV rating, the greater the ability of a filter to capture smaller sized particles. However, a higher MERV rating or HEPA filters may not be the best choice in all circumstances. Check with your engineer or filter manufacturer to determine the proper filter for a particular application. Also, Standard 52.2 provides seven airflow rates for testing filters. The MERV rating of a particular filter is valid for the airflow rate at which the filter was tested.

experience in brief

Rules of Thumb:

- 250-500 fpm design airflow at the filter face.
- Provide gauges to determine air filter pressure drop.
- Confirm with manufacturer initial and final filter pressure drops, which vary greatly depending on the filter.
- Match filter housing.

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