Minimum Efficiency Reporting Value (MERV)

MERV is a measure used to describe the efficiency with which particulate filters remove particles of a specified size from an air stream.54 The higher the MERV designation, the better the efficiency of removal, particularly for smaller particles (Table 1). MERV levels 1 through 16 are determined using the ANSI/ASHRAE Standard 52.2-2007 test method by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE).54 Standard 52.2-2007 does not address high efficiency particulate air (HEPA) filters or ultra low penetration air (ULPA) filters (MERV 17 – 20). HEPA/ULPA filters are assigned MERVs based on their performance in accordance with standards published by the Institute of Environmental Sciences and Technology (IEST).51

Table 1: MERV Parameters

	Composite Average Particle Size Removal Efficiency (%) in Size Range (µm) - ANSI/ASHRAE Standard 52.2-2007			Contaminants Typically Controlled	Typical Applications
MERV	**0.3–1.0**	**1.0–3.0**	**3.0–10.0**		
1	—	—	<20	Particles >10.0 µm: pollens, dust mites, textile/carpet fibers	Minimum filtration; residential buildings
2	—	—	<20		
3	—	—	<20		
4	—	—	<20		
5	—	—	20–35	Particles 3 - 10.0 µm: mold, spores, cement dust	Most commercial and better residential buildings
6*	—	—	35–50		
7	—	—	50–70		
8	—	—	>70		
9	—	<50	>85	Particles 1.0 - 3.0 µm: Legionella, lead dust, coal dust, auto emmissons	Superior residential and better commercial buildings
10	—	50–65	>85		
11	—	65–80	>85		
12	—	>80	>90		
13	<75	>90	>90	Particles 0.3 - 1.0 µm: all bacteria, most tobacco smoke, droplet nuclei, most smoke	Hospital inpatient and general surgery; superior commercial buildings
14	75–85	>90	>90		
15	85–95	>90	>90		
16	>95	>95	>95		
IEST Standards					
17	>99.97 on 0.30 µm particles, IEST Type A			Particles <0.3 µm (viruses, radon progeny, carbon dust)	Cleanrooms and pharmaceutical manufacturing
18	>99.99 on 0.30 µm particles, IEST Type C				
19	>99.999 on 0.30 µm particles, IEST Type D				
20	>99.9999 on 0.10–0.20 µm particles, IEST Type F				

* Mimimum requirement under ASHRAE standard 62.1 (Ventilation for Acceptable Indoor Air Quality)

Source: Adapted with permission from *ANSI/ASHRAE Standard 52.2-2007: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.* Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineeers, Inc. 2007 © American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., www.ashrae.org

For more information see:

- *Guidance for Filtration and Air-Cleaning Systems to Protect Building Environments from Airborne Chemical, Biological, or Radiological Attacks* (April 2003)
- *Risk Management Guidance for Health, Safety and Environmental Security under Extraordinary Incidents*. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (January 2003)
- Kowalski, W, Bahnfleth, W. Airborne-microbe filtration in indoor environments. *HPAC Engineering* 74(1); 2002: 57-69.