

1.1. REFERENCE STANDARDS

1.1.1. Filter products shall be built, tested, and installed in compliance with the following quality assurance standards; latest editions, unless noted otherwise.

1.1.1.1. AHRI 850-Commercial and Industrial Air Filter Equipment.

1.1.1.2. ASHRAE 52.1-Gravimetric and dust-spot procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

1.1.1.3. ASHRAE 52.2 (including Appendix J) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

1.1.1.4. MIL-STD-282-Filter Units, Protective Clothing, Gas-Mask Components, and Related Products; Performance-Test Methods; current edition.

1.1.1.5. UL 586-Test Performance of High Efficiency Particulate, Air Filter Units.

1.1.1.6. UL 900-Test Performance of Air Filter Units.

1.1.1.7. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

1.1.1.8. IES-RP-CC-001 HEPA and ULPA Filters.

1.2. GENERAL

1.2.1. Base filters and filter rack design on the use of 600mm x 600mm (24-inch by 24-inch) or 300mm x 600mm (12-inch by 24-inch) filters whenever possible. If size modules noted are not possible, use industry standard filter sizes for basis of design.

1.2.2. Filters and filter holding frames shall be by the same manufacturer.

1.3. HOLDING FRAMES

1.3.1. Provide grid type holding frames factory fabricated of a minimum of 16 gauge galvanized steel, capable of normal operation at twice the maximum filter drop without deformation and equipped with gaskets and 4 spring type positive sealing fasteners. Fasteners shall be capable of being attached or removed without deforming the gaskets and without the use of tools. Frames shall be capable of supporting filters of different efficiencies and depths by change of fasteners.

1.3.2. Provide grid type (face loading) frame in air handling units.

1.3.3. Holding frames shall, at minimum, withstand double the scheduled dirty filter pressure drop without deformation or air bypass.

1.3.4. Design frames so that the housing can be stacked on top of the other without deformation.

1.3.5. Completely safe off filter frame to eliminate air from bypassing filters.



1.3.6. Filters shall be inserted and seal from the upstream side of the frame.

1.3.7. Filter frame maximum allowable leakage rate 0.5 percent at 150 Pa (6 inches wc).

1.4. FILTERS

1.4.1. MERV 8 Pleated Filters (30 percent).

1.4.1.1. Filters: 50mm (2-inch), medium efficiency, pleated, disposable. Each filter shall consist of a non-woven fabric media, support grid and enclosing frame. The filter shall be UL listed as Class I or Class II.

1.4.1.2. Filter media: cotton and synthetic blend.

1.4.1.3. Average dust-spot efficiency of 30 percent to 35 percent and an average arrestance of 90 percent to 92 percent in accordance with ASHRAE 52-1.

1.4.1.4. Minimum MERV 8 per ASHRAE 52.2 and a MERV-A rating of 8 when tested per Appendix J of ASHRAE 52.2.

1.4.1.5. Effective filter media shall be at least 0.65m² (7.0 sq.ft. media) per 0.93m² (1.0 sq.ft.) filter face area and shall contain at least 33 pleats per linear meter (11 pleats per linear foot). Initial resistance at 2.5 m/s (500 fpm) face velocity shall not exceed 8 Pa (0.30 inch wg).

1.4.1.6. Media support shall be a welded wire grid or expanded metal with an effective open area of at least 96 percent. Bond the welded wire grid to the filter media to eliminate the possibility of media oscillation and media pull-away. Form the media support grid in a manner that it affects radial pleat design, allowing total use of filter media.

1.4.1.7. Construct the enclosing frame of a rigid, heavy duty, high wet strength beverage board, with diagonal support members bonded to the air entering and exiting side of each pleat to ensure pleat stability. Bond the inside periphery of the enclosing frame to the filter pack, thus, eliminating the possibility of air bypass.

1.4.2. MERV 11 Bag Filters (65 percent)

1.4.2.1. Filter: 550 mm (22 inches) deep, high performance, totally disposable, bag type. Filter UL listed as Class I or Class II.

1.4.2.2. Filter media: High-density, microfine glass fibers.

1.4.2.3. Average dust-spot efficiency of 60 percent to 65 percent and an average arrestance greater than 95 percent per ASHRAE 52-1.



- 1.4.2.4. Minimum MERV 11 rating per ASHRAE 52.2 and a MERV-A rating of 11 when tested per Appendix J of ASHRAE 52.2.
- 1.4.2.5. Filter shall have a minimum of 400 support points per m² (40 support points per sq.ft).
- 1.4.2.6. Filter shall have 10 pockets. The initial resistance at 2.5 m/s (500 fpm) face velocity shall not exceed 6 Pa (0.25 inch wg).
- 1.4.2.7. Form filter pockets by a linear sewing process to maintain the pocket configuration when in use. Seal all stitching points completely with a positive leak-free sealant. Chemically adhere the pockets around the periphery of the galvanized steel retainers. Retainers shall have rolled edges for enhanced pocket support.
- 1.4.2.8. Filter headers: Constructed of a deep grooved "J" retainer channel of galvanized steel. Closure corner shall be riveted, with mitered joints sealed against air leakage. Filters shall have minimum 7/8 inch headers.
- 1.4.3. MERV 14 Bag Filters (95 percent)
 - 1.4.3.1. Filter: 750mm (30-inch) deep, high performance, totally disposable, bag type. The filter shall be UL listed as Class I or Class II.
 - 1.4.3.2. Filter media: High-density, microfine glass fibers.
 - 1.4.3.3. Average dust spot efficiency of 90 percent to 95 percent and an average arrestance greater than 98 percent per ASHRAE 52-1.
 - 1.4.3.4. Minimum MERV 14 rating per ASHRAE 52.2 and a MERV-A rating of 14 when tested per Appendix J of ASHRAE 52.2.
 - 1.4.3.5. Filter shall have a minimum of 400 support points per m² (40 support points per sq.ft).
 - 1.4.3.6. Filter shall have 10 pockets and the initial resistance at 500 fpm face velocity shall not exceed 12.5 Pa (0.50 inch wg).
 - 1.4.3.7. Form filter pockets by a linear sewing process to maintain the pocket configuration when in use. Completely seal all stitching points with a positive leak-free sealant. Chemically adhere the pockets around the periphery of the galvanized steel retainers. Retainers shall have rolled edges for enhanced pocket support.



- 1.4.3.8. Construct filter headers of a deep grooved "J" retainer channel of galvanized steel. Closure corner shall be riveted, with mitered joints sealed against air leakage. Filters shall have minimum 7/8 inch headers.

- 1.4.4. FILTER GAUGES

- 1.4.4.1. Provide 1 filter gauge for each filter bank. Select the scale so it allows for 25 Pa (1 inch wc) greater than the final filter resistance.
 - 1.4.4.2. Locate static pressure taps in the airstream as recommended by the manufacturer and connect to gauges located on air handling unit casings, or on walls for in-duct filter, as indicated, with 6 mm (¼ inch) aluminum or copper tubing.

