

- 1) Acceptable Manufacturers
 - a) AAF Flanders
 - b) Other Approved Manufacturer 99.97%/99.99%

- 2) Quality and Environmental Management Systems
 - a) The manufacturer shall have an ISO 9001 or ASME NQA-1 quality based system at the manufacturing facility. The manufacturer shall make available documentation showing independent third party certification or acceptable audit approvals and adherence to these systems.

 - b) If requested, manufacturer shall make available a copy of their Corporate Quality Manual and references from clients of similar sized projects or scope within the last 5 years.

- 3) HEPA/ULPA Filters
 - a) Filters construction shall be 16 ga. type 304 stainless steel or 0.063 inch thick mill finish aluminum for use in clean air delivery devices such as ovens and depyrogeneration tunnels, high temperature exhaust or others. Frame style will be determined by filter application. The term "HEPA" shall be used generically to describe all high-efficiency filters that meet the following specifications. If possible, the filter and housing shall be from the same manufacturer to ensure form, fit, and function are maximized.

 - b) Construction Criteria;
 - i) The filter shall be constructed in accordance with the recommended construction requirements of IEST-RP-CC001, latest version.

 - ii) The media shall be borosilicate microfiber type with manufacturer QC data to ensure quality requirements and traceability are maintained. The pleats shall be equally spaced and supported with 0.0125 inch thick corrugated aluminum separators. Actual filter depth shall be 11.5 or 5.875 inches.

 - iii) The media pack shall be affixed permanently to the filter frame assembly by means of a room temperature vulcanizing (RTV) silicone capable of 500°F continuous operation silicone bond between the filter pack and filter frame.

 - iv) Filter frame shall be designed for use in Gasket Seal systems.

 - v) Gasket system filters shall have factory installed ¼" thick by ¾" wide dovetailed, close celled silicone affixed to the filter frame sealing surface.

 - vi) Each filter shall have a unique label indicating filter size, unique serial number, model number, tested efficiency, pressure drop at volumetric test airflow, and UL compliance.

- 4) Shipping, Storage and Handling of HEPA Filters
 - a) Filter Assemblies are to be packaged discretely in double wall corrugated carton of sufficient strength.
 - i) Manufacturer shall characterize packaging against industry standards for:
 - (1) Drop
 - (2) Compression (i.e. stacking of cartons)
 - (3) Vibration



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- b) The carton shall be labeled with the manufacturer’s part number, serial number, and test performance data.
 - c) Palletized cartons shall be protected with corner posts and retained via stretch wrap.
 - d) Filter Assemblies shall be shipped in fully enclosed trailers and in original, unopened packaging.
 - e) Appropriate care must be exercised in handling cartons to avoid dropping, vibration, and rough handling to prevent potential for damage.
 - f) HEPA filter Assemblies shall be stored per manufacturer’s instructions for proper orientation, stacking configuration and limitations, and must remain in unopened cartons to prevent damage and exposure to potential contaminants.
 - g) Cartons stored longer than one week shall remain unopened and in a climate controlled environment of 60-80F and 30-70%RH.
 - h) Filter Assemblies shall remain in the sealed, unopened carton until inspection, testing and installation.
- 5) Filter Performance Criteria/Factory testing:
- a) Factory Efficiency and Resistance Test:

- i) The filter shall have a minimum overall efficiency of 99.97%, 99.99% on 0.3 micron particles and shall be tested and constructed in accordance with IEST-RP-CC001, latest version.
 - (1) The filter efficiency will be determined using a thermal condensation aerosol generator and photometer which will measure gross downstream penetration as compared to the upstream concentration.
- ii) Each Filter shall be tested for initial (clean) pressure drop at rated flow.
 - (1) All cleanroom style filters are tested at airflows based on the net filter media area (excludes frame, center partitions, etc.). The nominal initial pressure drop, pressure drop and overall efficiency rating is as follows:

Filter Size (in)	Efficiency (on 0.3µm)	Rated Airflow (CFM)	Max. initial ΔP (in w.g.)
24 x 24 x 5.875	99.97%/99.99%	500	1.0
24 x 24 x 11.5	99.97%/99.99%	1,000	1.0
24 x 24 x 11.5 (HCX)	99.97%/99.99%	2,000	1.4

- a. Factory Scan Test:
 - i. Filters, 99.99% and higher, shall be factory scanned in accordance with IEST-RP-CC034 latest version.
 - ii. The scanning shall be accomplished by passing the probe with overlapping strokes so the entire filter face area is sampled.

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- iii. The challenge aerosol for factory scan testing is 4 cSt PAO (Poly Alpha Olefin). The two acceptable aerosol generation techniques are either the use of a Laskin nozzle generator or thermal condensation aerosol generator. Oil thread testing for local leaks using polyfunctional alcohol is an acceptable alternative.
- b. Underwriters' Laboratories (UL):
 - i. Filter Assemblies shall be UL Standard 900 classified.
- c. Labeling and Reporting:
 - i. Each filter shall have a unique labeling indicating filter size, unique serial number, model number, tested efficiency, pressure drop at volumetric test airflow, and UL compliance.
 - ii. A test certificate shall be provided for each filter indicating filter specific test data including the lot and serial number along with the pressure drop and efficiency. A test certificate at a minimum should contain filter size, the filter's unique serial number, model number, tested efficiency, tested pressure drop at volumetric test airflow, and scan test results.