1. Acceptable Manufacturers
   1. AAF
   2. Other Approved Manufacturer
2. Quality and Environmental Management Systems
   1. 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.
   2. 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
   1. Filters construction shall be 18 ga. galvanized steel, 16 ga. type 304 stainless steel or 0.063 inch thick mill finish aluminum for use in clean air delivery devises such as Air Handler Units( AHU), Make-Up Handlers (MAH) 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.
   2. Construction Criteria;
      1. The filter shall be constructed in accordance with the recommended construction requirements of IEST-RP-CC001, latest version.
      2. The media shall be of eFRM (FluoroResin) technology and shall be produced by the filter manufacturer to ensure quality requirements and traceability are maintained. eFRM media shall consist of two membrane layers supported on each side with spun bonded synthetic scrim to eliminate media damage. Media shall be hydrophobic to mitigate potential performance issues. Known hydrophilic materials that absorb water or polar solvents (e.g. nylon) are not allowed. The pleats shall be equally spaced and supported with 0.0125 inch thick corrugated aluminum separators. eFRM media shall be compatible with industry standard testing methodologies using 4cS PAO and shall have equal or better tolerance for PAO compared to conventional fiberglass HEPA media.
      3. The media pack shall be affixed permanently to the filter frame assembly by means of a solid, continuous, fire retardant, phosphorous free polyurethane sealant, forming a leak free bond between the filter pack and filter frame. The sealant will be uniform off-white in color; will not exhibit any form of leaching, and no more than ¼” of wicking into the media. The sealant will be qualified at incoming inspection as well as point of dispensing to ensure homogenization and adequate curing and adhesion properties.
      4. Filter frame shall be designed for use in Gasket Seal or Fluid Seal systems. The filter frame shall have tight corners. Corners must contain no cracks or uneven areas.
      5. Gasket system filters shall have:
         1. Factory installed ¼” thick by ¾” wide dovetailed, urethane, close celled neoprene or EPDM gasket affixed to the filter frame sealing surface.
         2. Filter Frame sealing surface to have a flatness tolerance of +/-1/32”
      6. Fluid Seal system filters shall have:  
         1. A continuous trough around the perimeter of the filter. The fluid seal trough shall be filled at the factory.
         2. Filter fluid seal must be comprised of a two component high molecular weight, polysiloxane elastomeric sealant and be self-leveling.
            1. Fluid seal material shall be characterized for all salient mechanical, physical, and chemical properties such as Hardness/Penetration, Tack, and Migration of free silicone (i.e. Blot Plot testing).
            2. Fluid seal material shall be characterized for chemical resistance to known industry accepted decontamination agents, cleaning agents, and filter testing reagents.
            3. Fluid seal material shall be tested for chemical compatibility to all materials in contact during manufacturing including gloves, tools, mixing equipment, dispensing equipment, and packaging materials, as well as potential airborne contaminants & poisons.
            4. Fluid seal material shall demonstrate resistance to accelerated life cycle testing.
            5. Fluid Seal shall withstand knife edge insertion to partial depth without complete depth cutting or full-length splitting.
      7. 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/ULPA Filters
   1. Filter Assemblies are to be packaged discretely in sealed polyethylene bag and double wall corrugated carton of sufficient strength.
      1. Manufacturer shall characterize packaging against industry standards for:
         1. Drop
         2. Compression (i.e. stacking of cartons)
         3. Vibration
   2. The carton shall be labeled with the manufacturer’s part number, serial number, and test performance data.
   3. Palletized cartons shall be protected with corner posts and retained via stretch wrap.
   4. Filter Assemblies shall be shipped in fully enclosed trailers and in original, unopened packaging.
   5. Appropriate care must be exercised in handling cartons to avoid dropping, vibration, and rough handling to prevent potential for damage.
   6. 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.
   7. Cartons stored longer than one week shall remain unopened and in a climate controlled environment of 60-80F and 30-70%RH.
   8. Filter Assemblies shall remain in the sealed, unopened carton until inspection, testing and installation.
5. Filter Performance Criteria/Factory testing:
   1. Factory Efficiency and Resistance Test:
      1. The filter shall have a minimum overall efficiency of 99.99% on 0.3 micron particles or 99.995% on 0.12 µm PSL (solid polystyrene microspheres) 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. PSL is an acceptable alternate test aerosol.
      2. Each Filter shall be tested for initial (clean) pressure drop at rated flow.  
         1. All cleanroom style filters are tested at airflows and are based on the net filter media area (excludes frame, center partitions, etc.). The nominal initial pressure drop per overall efficiency rating is as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Filter Size (in) | Efficiency | Rated Airflow (CFM) | Nom. Initial ΔP (in w.g.) |
| 24 x 24 x 11.5 | 99.99% on 0.3µm | 2,000 | 0.75 |
| 24 x 24 x 11.5 | 99.995% on 0.12µm | 2,000 | 1.0 |

* 1. Factory Scan Test:
     1. Filters shall be factory scanned in accordance with IEST-RP-CC034 latest version, to either 0.010% maximum penetration for a Type C/J, or 0.008% for a Type K over the entire filter face including glue lines and frame joints.
     2. The scanning shall be accomplished by passing the probe with overlapping strokes so the entire filter face area is sampled. Scanning shall be performed in accordance with IES-RP-CC034, latest revision.
     3. 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 polyfuntional alcohol is an acceptable alternative.
  2. Underwriters’ Laboratories (UL):
     1. Filter Assemblies shall be UL Standard 900 classified.
  3. Labeling and Reporting:
     1. 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.
     2. 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.