1. Acceptable Manufacturers
   1. AAF Flanders
   2. Other Approved Manufacturer
2. Quality and Environmental Management Systems
   1. The manufacturer shall have an ISO 9000 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. AstroHood S-III Terminal Filter Modules Testing
   * + 1. Terminal Ducted Air Filter Modules shall be individually factory-tested and certified.
       2. Each hood shall have a serial number allowing for full traceability. Each hood shall be individually serialized and traceable to the specified leak test procedure.
       3. Certification of each HEPA filter in accordance with applicable IEST Standard(s) and specifications indicated below. Each filter shall have permanent label indicating filter type, model number and size designator, unique serial number allowing for full traceability, air resistance, airflow, target efficiency, target pressure drop and test date, average penetration and probe test certification.
4. AstroHood S-III Construction
   1. Ducted Terminal disposable filters shall be constructed of extruded anodized aluminum. The extrusion is available in two different tee grid configurations, Gasket seal grid or a 3/4” deep gel grid.
   2. Housing shall have round duct connection fully formed into the hood top, size and type as shown on the drawings or data schedules/data sheets. Intermittently welded and caulked in place inlet collars are not acceptable.
   3. If required, the entire housing shall be insulated at the factory with two inch thick, foil-backed, fiberglass insulation. Insulation shall comply with requirements of ASTM E84, NFPA 255 and UL 723. Tape seams with aluminum foil backed tape. Insulation coverage options include top only installation or top and side installation.
   4. The filter shall be constructed in accordance with the recommended construction requirements of IEST-RP-CC001, latest version.
   5. The HEPA or ULPA filter media pack shall be constructed of a pleated single and continuous layer of fire resistant borosilicate micro-fiberglass. Pleats are to be equally spaced using media separators. Nominal media pack depth shall be 2” or 4” deep.
   6. 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.
   7. The terminal hood frame shall be of minimum of 0.060” thick webbing anodized extruded aluminum Filter Frame shall be designed for use in Gasket Seal grid systems. The filter frame shall have a perpendicularity specification of no more than 1% to ensure tight miter corners and a leak free design. Corners must contain no cracks or uneven areas.
   8. Gasket system filters shall have:
      * 1. Filter Frame sealing surface to have a flatness tolerance of +/-1/32”
   9. Each filter shall have a unique label indicating filter size, lot number, unique serial number, model number, tested efficiency, pressure drop at volumetric test airflow, and UL compliance.
   10. Each filter shall have an integral expanded CRS grille painted white that is potted in with the filter media pack. 40% Perforated Anodized Aluminum and 316L stainless steel is available as an option.
   11. Manufacturing shall take place in an ISO 7 cleanroom as determined by ISO 14644. Packaging shall be in a minimum ISO 6 cleanroom as determined by ISO 14644.
5. 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.
6. 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 microns or 0.12 microns on filters 99.9995% and higher, Filter shall be tested and constructed in accordance with IEST-RP-CC001, latest version.
         1. The filter efficiency, as determined as the lower efficiency when tested for particle size ranges of 0.10-0.20 µm and 0.20-0.30 µm, shall be accomplished using a thermal condensation aerosol generator or Q107 Penetrometer and particle counter which will measure gross downstream penetration as compared to the upstream concentration.
      2. Each Filter shall be tested for initial (clean) pressure drop at rated flow.  
         1. All cleanroom style filters are tested at 100 FPM, +/- 10% 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:

|  |  |  |  |
| --- | --- | --- | --- |
| **Overall Efficiency** | **2” Max. initial ΔP** | **3” Max. initial ΔP** | **4” Max. initial ΔP** |
| 99.99% | 0.52 ”w.g. | 0.44 “w.g. | 0.35 “w.g. |
| 99.9995% | 0.63 “w.g. | 0.52 “w.g. | 0.40 “w.g. |

* 1. Factory Scan Test:
     1. Filters with rated overall efficiency of 99.99% or higher 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. The maximum useable face velocity shall be 125 FPM.
     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 section 6.2.2 “Discrete-particle counter filter scan test method”. A separate laser particle counter shall continuously monitor the upstream challenge concentration.
     3. The particle counting equipment shall have a detection limit of 0.10 micron or smaller at a sample flow rate of one (1) cubic foot per minute. The particle counting equipment should be calibrated and within its recommended calibration cycle.
     4. The challenge aerosol for factory scan testing is 4cST PAO (Poly Alpha Olefin). The two acceptable aerosol generation techniques are either the use of a laskin nozzle generator or an ATI, thermal condensation aerosol generator. The challenge aerosol concentration shall be a minimum of 1x108 particles per cubic foot.
     5. An acceptable alternative to the above method is a manual scan in accordance with IEST-RP-CC034.1 with the exception that the thermal condensation aerosol generator be utilized and the penetration limit is set to 0.008%. In this case the minimum aerosol concentration should be 10µg/L.
  2. Underwriters’ Laboratories (UL):
     1. Filter Assemblies shall be UL Standard 900 classified.
     2. Filter Assemblies shall be UL Standard 586 classified as required
  3. Labeling and Reporting:
     1. Each filter shall have a unique labeling indicating filter size, lot number, 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, lot number, the filter’s unique serial number, model number, tested efficiency, tested pressure drop at volumetric test airflow, and scan test results. The challenge aerosol for both the efficiency and scan test must be outlined
     3. Each AstroHood S-III shall contain a label affixed to the unit with a stamped area ensuring pressure testing pass/fail criteria. Test reports should be provided.