1. Purpose

This document provides instruction for the certification of HEPA filter banks.

2. Scope

This procedure shall be followed by personnel performing cleanroom certifications. Additional testing and or deviation from this SOP shall be agreed upon prior to the start of testing.
3. References

1. Institute of Environmental Sciences Contamination Control Division Recommended Practice IES-RP-006.2 “Testing Cleanrooms”
4. Material Safety Data Sheets (MSDS) located immediately outside the cleanroom.

4. Equipment and Materials

Equipment:
1. Aerosol Generator – Laskin nozzle compressed air operated DOP/Emery 3000 generator
2. Aerosol Photometer – sampling flow rate of 1.0 cfm, linear readout.

5. Safety

1. Wear proper cleanroom gowning attire as specified by facility SOP or as instructed by facility point of contact.

2. Avoid lifting heavy equipment. Wait for help from another employee prior to lifting any heavy equipment.

3. Avoid reaching while working on a ladder. Move the ladder to ensure proper access to your concern. Do not step on the top two rungs of a step ladder.

4. Refer to manufacturer’s safety precautions and Material Safety Data Sheet (MSDS) for appropriate protective equipment and safe handling procedures when using chemicals.

6. Responsibility

1. It is the responsibility of the President to maintain this document and oversee these activities.
1. It is the responsibility of the individual(s) performing this task to follow this procedure.

7. Preliminary Operations

1. Collect all materials and equipment necessary to conduct the certification.

2. Ensure all equipment is within calibration prior to the start of use.

3. Wipe down all equipment in accordance with the facility SOP or use a 70% ethanol, 30% water solution unless otherwise instructed by the facility point of contact.

8. Cleanroom Operational Phases

Testing may be performed at different stages as characterized by the completeness of the cleanroom installation and operational modes as defined below.

Stage 1  As-Built-Facility: A cleanroom which is complete and operating with all services connected and functioning, following initial clean down. There is to be no process equipment or operating personnel within the facility.

Stage 2  At-Rest-Facility: A cleanroom with is complete and operating. The room is to be fully populated with process equipment staged in a non-operational mode. There shall be no operating personnel present.

Stage 3  Operating Facility: A cleanroom in normal operation fully populated with functioning process equipment and operating personnel.

NOTE: At times it will be necessary to take exception to strict compliance with the aforementioned testing stages. Deviation or interaction among the stages may be required due to availability or operational status of the process equipment. These situations shall be identified and acknowledged as part of the contractual agreement.
9. TEST PROCEDURES AND ACCEPTANCE CRITERIA

A. HEPA and ULPA Filter Installation Leak Tests

1. Purpose

These tests are performed to confirm that the HEPA or ULPA filter system is properly installed by verifying the absence of bypass leakage in the installation, and that the filters are free of defects and small leaks. The tests are performed by introducing an aerosol challenge upstream of the filters and scanning immediately downstream of the filters and support frame or sampling in a downstream duct.

2. Apparatus

A total scattering aerosol photometer with a linear or expanded logarithmic scale, or equivalent, that is capable of detecting a 100% upstream concentration with an aerosol concentration of 10 ug/L of polydisperse dioctylphthalate (DOP) particles, or an equivalent fluid that produces the same particle size distribution when generated by a Laskin nozzle generator, or equivalent, and is capable of detecting an aerosol concentration of 1 x 10^-3 ug/L of the same particles. The photometer is to have an air sampling rate of 1 cfm +/- 10%. Probe diameter is not to exceed 1 inch.

A Laskin nozzle generator or equivalent. The aerosol is to be diluted with air flowing through the cabinet to a concentration not greater than 100 ug/L nor less than 10 ug/L upstream of the HEPA or ULPA filter undergoing the leak test.

3. Procedure

3.1 Aerosol Challenge and Aerosol Photometer Scan

a) Introduce the aerosol into the air supplied to the filter or filters under test in a manner that will produce a uniform challenge concentration over each filter’s surface.
Where construction permits, means should be provided to challenge and test filters one at a time to minimize exposure of the filters to the challenge aerosol.

Where construction dictates that multiple filters must be exposed to the challenge aerosol simultaneously, the aerosol should be introduced at a location that will provide uniform concentration to all of the filters.

b) Measure the concentration of the challenge aerosol immediately upstream of the filters under test, using a photometer whose sensitivity is adjusted to a baseline of 100 ug/L in accordance with the manufacturer’s instructions or calibration curve. A reading of 10% to 20% (which corresponds to 10 to 20 ug/L of air) on the photometer should be obtained for correct challenge concentration. Adjust the sensitivity, gain, or span for a reading of 100%, or full scale while sampling the upstream aerosol.

c) Scan the entire face of each filter for leaks, using slightly overlapping strokes of the probe. Also scan the perimeter of each filter to locate leaks in the bond between the filter pack and the frame and leaks in the seal between the frame and the grid structure. The probe should be held approximately 1 inch from the filter face during scanning. The scanning rate should not exceed 2 inches per second.

d) If the downstream face of the HEPA filter(s) is not accessible, perform a sample in the downstream plenum as close to the filter(s) possible.

e) Any indication of a leak in excess of 0.01% (0.005% if the downstream side of the filter in not accessible and sampling is performed in the downstream plenum) of the upstream challenge aerosol concentration or the agreed upon limit for the filter being scanned should be cause for sustained residence time of the probe at the leak location. The size and location of the leak are identified by the position of the probe that maintains the maximum sustained reading on the photometer.
f) Report all leaks exceeding 0.01% (0.005% if the downstream side of the filter in not accessible and sampling is performed in the downstream plenum) of the upstream challenge aerosol concentration or as otherwise agreed upon by the customer and ATS. Record the size and location of the leaks on a reflective ceiling layout of the cleanroom or cleanzone.

g) Repairs for HEPA and ULPA filters may be performed providing access to the filters is available and the total size of the repairs do not block or restrict more than 3% of the filters face area and that the lesser dimension of any repair does not exceed 1.5 inches or as otherwise agreed upon by the customer and ATS. Repairs to filter installation leaks will be made in accordance with procedures acceptable to the customer and ATS. After the repair is complete and suitable cure time has been allowed for the patch to set, check for leaks in the vicinity of the repair.

3.2 Acceptance

Acceptance for the air-generated aerosol challenge and aerosol photometer filter scan test shall be in accordance with the facility SOP or as agreed upon by the customer and ATS.

B. Additional Testing

Additional tests may be performed as agreed upon between the customer and ATS. All additional tests are to be in accordance with Reference 1.