

Section IV. Description of Test

The factory test is designed to demonstrate the Safety of the unit and the performance at the minimum required pressure (Class III) and rated flow.

4.1 Filter Media and Seal Leak Tests

When preparing your cabinet for use after shipment, and then at prescribed intervals throughout its working life, you will need to verify that the HEPA filters have maintained their integrity. This is done by scan-testing the filter faces and seals.

The following procedures are intended to be performed by a qualified certifier who understands Biological Safety & HEPA filter technology.

Equipment needed will be:

- An aerosol photometer. The instrument should sample air at a flow rate of 1.0 CFM.
- DOP generator with Laskin nozzle(s).
- Liquid Dioctylphthalate (DOP), Ploy alpha Olefin (PAO) or comparable substance aerosolized by flowing air through the nozzle(s). When generated with Laskin type nozzle(s), the mean droplet size of the aerosol is 99 percent less than 3.0 microns.
- Auxiliary blower housing assembly

A. Procedure for Supply Filter Leak Test: (See Illustration Sheet 16 of 26)

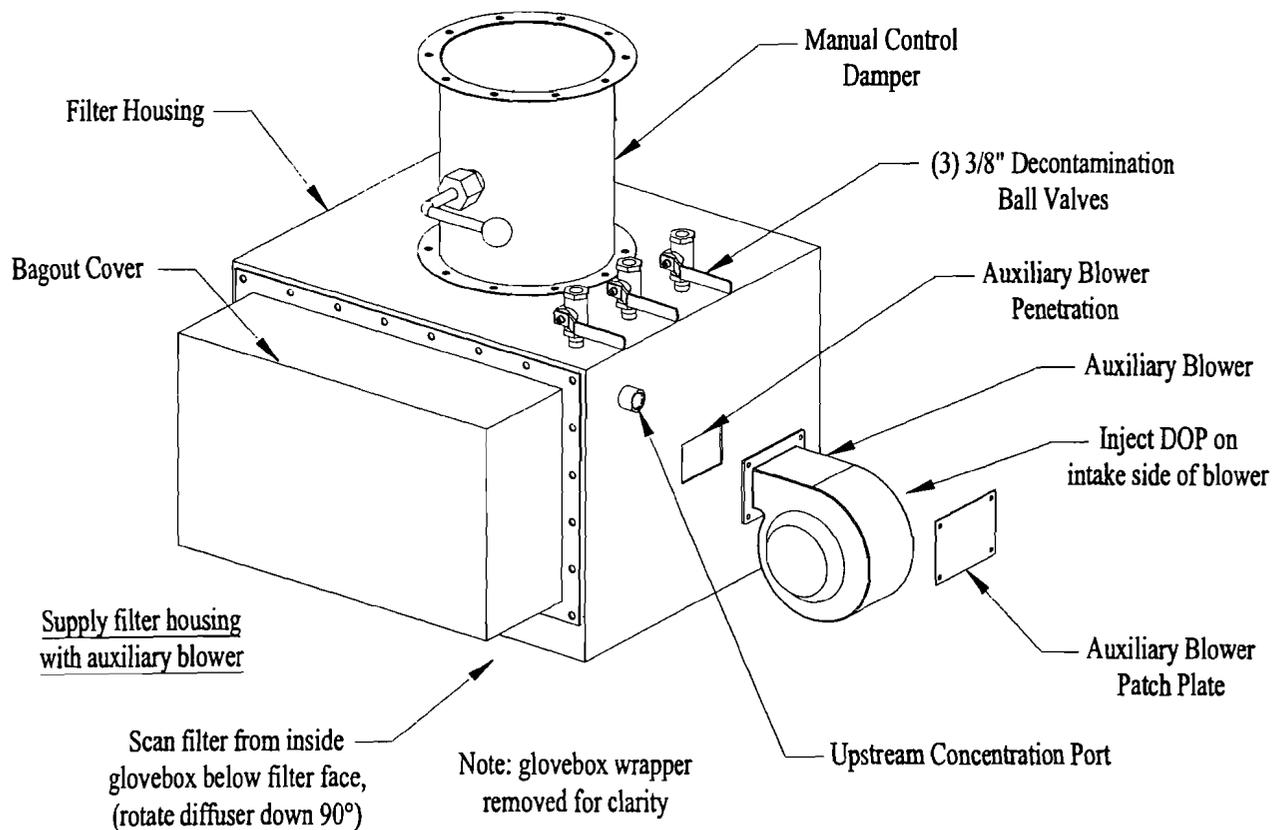
This test requires exposure to the interior of the Glovebox. It is necessary to decontaminate and/or thoroughly clean the inside the Glovebox following the recommendations of your Safety Officer.

This test is performed by challenging the supply filters with aerosol from the top of the unit and scanning the downstream face of the filter (i.e. the side of the filter that is exposed to the work area environment). This test can be performed through gloveports. One or more gloves may have to be removed to use the scanning equipment.

The procedure for leak testing the supply filters is as follows:

1. Close the supply damper.
2. Remove the rectangle patch plate from the side of the filter plenum. Remove the auxiliary blower from its housing assembly and attach the blower to side of supply filter plenum so as to push air through the hole into the supply filter.
3. Remove the 1/2" NPT plug from the side of the supply filter plenum and thread in an adapter piece that will allow for the photometer to measure the upstream concentration of aerosol challenge of the filter.

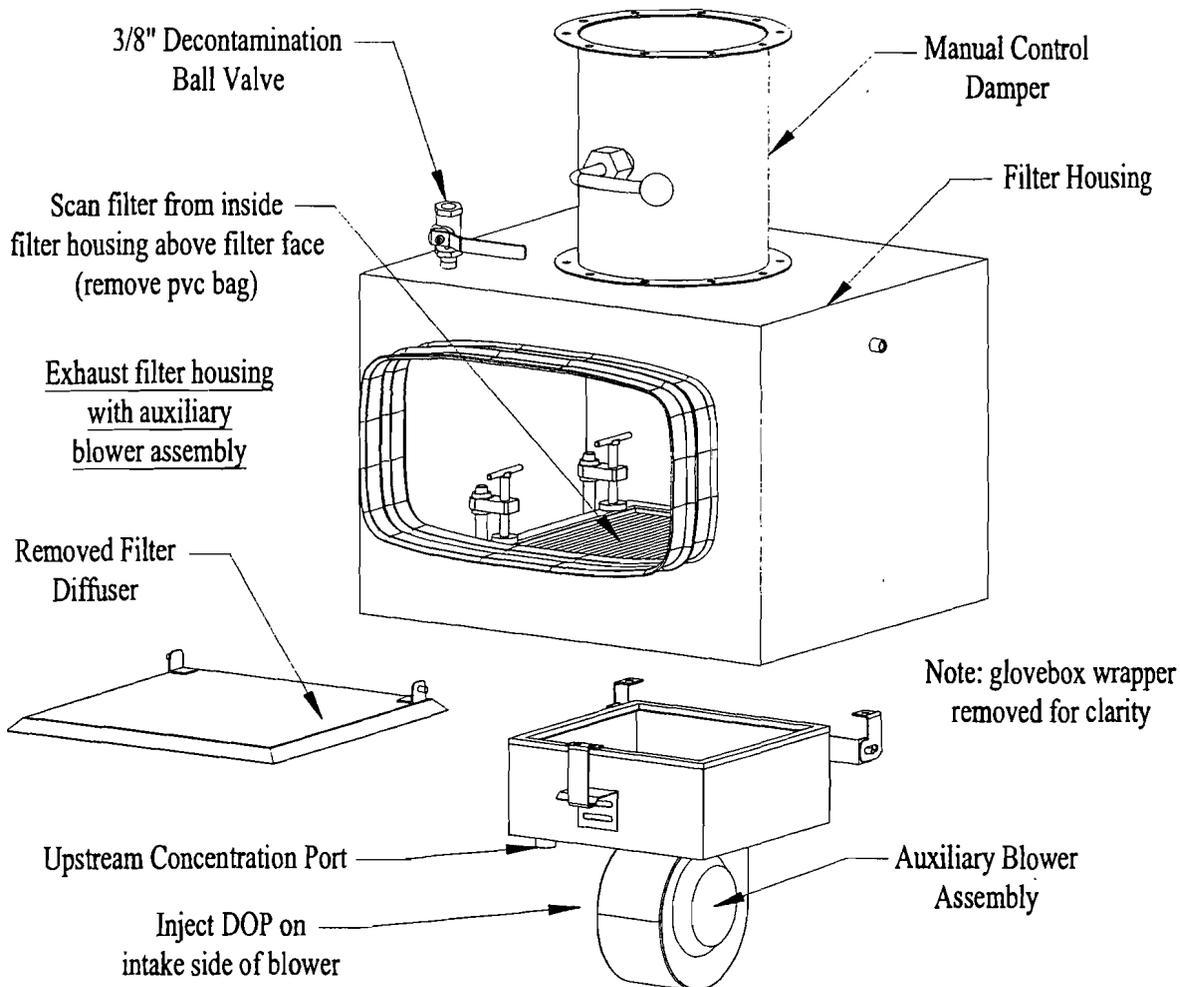
4. Turn on the aerosol photometer and standardize according to the manufacturer's instructions.
5. Position the DOP generator to introduce the challenge into the auxiliary blower air intake.
6. Measure the upstream concentration of DOP.
7. From the inside of the unit release the supply air diffuser from the front holding clip (push it up and back) and swing it down until it rests on the rear wall.
8. Scan the down stream side of the filter by holding the photometer probe about one inch from the filter face. Scan in overlapping strokes at a rate of approx. 2" per second.
9. Also check the seal between the filter gasket and the glovebox.
10. If you find leaks, repair the HEPA filter media with silicone RTV sealant.
11. A HEPA filter is considered acceptable when there are no leaks greater than 0.01% of upstream concentration.



B. Procedure for Exhaust Filter Leak Test: (See Illustration Sheet 18 of 25)

This test will be performed by introducing aerosol into auxiliary blower housing located on the diffuser hanger clips and scanning the outside of the filter through the bagport opening in front of the exhaust filter plenum. This will require removing the bagout cover and PVC bag.

1. Temporarily remove the stainless steel filter diffuser.
2. Mount the auxiliary blower on to the housing assembly if it was removed. Then attach the auxiliary blower housing to the exhaust diffuser clips.
3. Remove the bagport access cover from the front of the exhaust filter plenum.
4. Remove the 1/2" NPT plug from the side of the auxiliary blower housing and thread in an adapter piece that will allow for the photometer to measure the upstream concentration of aerosol challenge of the filter
5. Turn on the aerosol photometer and calibrate according to the manufacturer instructions.
6. Measure the upstream concentration of aerosol.
7. Scan the down stream side of the filter by holding the photometer probe about one inch from the filter face. Scan in overlapping strokes at a rate of approx. 2" per second
8. Also check the seal between the filter gasket and the glovebox.
9. If you find leaks, repair the HEPA filter media with silicone RTV sealant.
10. Again a HEPA filter is considered acceptable when there are no leaks greater than 0.01% of upstream concentration.



4.2 Pressure Decay Test

The Pressure decay tests shall be conducted for the Main Chamber and then for Receiving Chamber. Using a compressed air line perform a gross seal integrity test with the unit completely sealed (doors closed and locked, all valve closed, and air tight dampers closed,). Refer to your test report to repeat the pressure decay test.

Use the drain valve connection on the bottom of the unit to pressurize the unit. Attach an auxiliary pressure monitor to the hose barb under the console cover by removing the tubing from the unit's pressure monitor.

Avoid over pressurizing the unit as it may crack the glass viewscreens. Limit pressure to 3.5" W.C. maximum.

4.3 Mass Spectrometer Leak Testing

The Mass Spectrometer Leak test (MSL) is required on a class III glovebox and should be performed in addition to pressure decay. In conducting the MSL always test the Main Chamber first to check the door seal between the Main Chamber and the Receiving Chamber, then test the Receiving Chamber either separately or with the inner door opened.

A. Using Sulfur-Hexa-Fluoride Gas

Using the drain valve conduct the seal test using sulfa-hexa-fluoride gas (SF₆). Allow the pressurized gas to bring the Glovebox pressure to +3" W.G. Use a dedicated SF₆ leak meter (Ion Track Inc. or equivalent) to sniff for leaks.

In testing for a leak, the nozzle of the probe shall be held at the surface of the unit being tested in such a manner as not to jar the instrument and should be moved at a rate of 2" per second. Readings at all points must not exceed 5×10^{-7} cc/sec.

Take care not to allow SF₆ to escape into the room as that may result in a false positive reading; it should be exhausted to the outdoors. Flush the SF₆ from the box to the outdoors (not the room) using either the floor mounted drain or the rear wall mounted 1/2" NPT coupling.

B. Using Helium Gas

The following description is required to allow enough helium (15%) into the primary Chamber in order to perform a Class III MSL.

Required for helium leak test:

- One 4' diameter Balloon. This test is performed using a balloon to achieve a 15% concentration of helium in the glovebox.
 - Helium leak detector.
 - Compressed air source
 - Helium gas
 - Fittings for 3/8" & 1/2" NPT (as required).
1. Place balloon on fitting. To opposite end attach a compressed air fitting.
 2. Attach line from the helium bottle to the 1/2" coupling at the rear of the unit.
 3. Open unit's exhaust damper. Inflate the balloon to a 26" dia. for Main Chamber, 22.25" dia. for Receiving Chamber.

4. Close damper. Let the air escape from the balloon into the room while an equal amount of helium is let in. When the balloon is deflated the pressure should be 3.0" W.G.
5. With the helium leak detector set to alarm at 1.1×10^{-5} cc/sec. and scan all gasketed seams.

4.4 Airflow Testing

You will need to measure and record the flow volume or down flow velocity of the unit. The rated air flow for your glovebox is 100 CFM min. There are several methods of measuring the flow volume of the unit. The best way will depend on your application. Some suggestions are as follows:

- Perform a velocity traverse at the end of an exhaust duct.
- Using an anemometer make a number of velocity readings directly under the supply filter with the diffuser removed. *Do not allow the instrument to touch the media pack!*

To check for the direction of air movements through doors and over the work surface use a smoke generator or smoke stick. Observe that the smoke is moving in the proper direction for safety conditions as described by your safety officer.

4.5 Electrical Test

Using a volt-ohmmeter set it to read in excess of 100 ohms. Touch the two leads together and see that the display reads "0.1-0.0". Touch one lead to the ground lug on the cabinet power cord while touching the other lead to bare metal on the unit where the user would be likely to touch the enclosure. If the display reads "0.1-0.0" ohms, the unit passes the test.