

**OPERATION & MAINTENANCE
MANUAL
FOR
LOW-PROFILE HEPA-VENT
DIFFUSERS
WITH ROOM-SIDE REPLACEABLE
HEPA FILTERS**



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Manufacturer's Recommended Procedure for Installation of HEPA-Vent Diffusers with Room-Side Replaceable HEPA Filters

Step 1: Install supply ductwork prior to erecting ceiling.

Step 2: Connect supply ductwork to top inlet collar as required by project specifications if connection has not been made prior to suspending the diffuser from above.

Step 3: Preparation for HEPA Filter Installation

Note: *If Precision Air factory supervision for the HEPA filter installation has been purchased, all of the following steps should be completed before Precision Air Products factory personnel arrive on site.*

The following equipment & tools will be required for HEPA filter installation:

- | | |
|-----------------------------------|---|
| (2) 8 ft. ladders | (1) 25 ft. extension cord or spare battery pack |
| (1) Box of latex or nitril gloves | Clean towels |
| (1) Slot type screwdriver | (1) 7/16" deep well socket with drill |
| (1) Power drill | attachment |

For new diffusers:

- Open the faceplate on each diffuser by turning the quarter turn fasteners counterclockwise until they drop down and detaching one of the safety cables. Make sure to hold the faceplate in place while you release the last few fasteners.
- Since new ductwork must be blown down to remove any dust or debris left from construction, run the air handler on high for several minutes.
- Clean and dry the inside of each diffuser with a towel and a non-abrasive cleaner.
- Clean and dry the top and bottom of each diffuser faceplate with a towel and a non-abrasive cleaner.

For existing diffusers with filters which are to be replaced:

- Open the faceplate on each diffuser by turning the quarter turn fasteners counterclockwise until they drop down and detaching one of the safety cables. Make sure to hold the faceplate in place while you release the last few fasteners.
- Remove the old HEPA filters by loosening the nuts that hold the retaining clips using a 7/16" deep well socket attached to a drill.
- Run the nuts to the end of the bolts but don't remove them. Turn the retaining clips sideways to allow the filter to fit between them.
- Working with a partner, both on ladders and protective wearing gloves, remove the old filters by pulling on each corner until they release from the knife-edge.

WARNING: DIRTY HEPA FILTERS ARE A POTENTIAL BIOHAZARD AND SHOULD BE DISPOSED IN ACCORDANCE WITH ESTABLISHED HOSPITAL PROTOCOL.



- e. Old filters should be disposed of before new filters are brought into room to avoid cross-contamination.
- f. Clean and dry the top and bottom of each diffuser faceplate with a towel and a non-abrasive cleaner.

Step 4: Installation of Terminal HEPA Filters

- a. Inspect that the entire framing system is gasketed to assure an airtight interface between the framing and diffuser (and any blank-off/fill-in panels or fluorescent light fixtures also installed in the framing system).
- b. Confirm that air-handling system has been blown down in order to eliminate dirt and debris that may have accumulated in the ductwork during the construction process. All work that requires sanding and cutting should be completed prior to filter installation. Precision Air Products strongly recommends that a thorough construction cleaning be completed before attempting to install final HEPA filters.

Note: Air handler should remain on at all times during filter installation and it is strongly recommended that it remain on until the rooms are ready to be turned over to the owner. This will assure that filters remain pressurized and the face (or room side) of the HEPA filter will be kept free of dust and other airborne particulates.

- c. As a final check, visually inspect the diffuser's supply duct connection prior to installing the filter.
- d. Drop the perforated faceplates on diffusers by loosening all ¼-turn fasteners located on the perimeter of faceplate by turning fastener counterclockwise with slot screwdriver. Carefully disconnect the single safety cable and allow the faceplate to hang freely by two of the safety cables on the opposite side.

Note: Each diffuser has three safety cables that connect the faceplate to the plenum to prevent accidental dropping, two cables on one side and one on the opposite side. Simply disconnect the single cable and then re-hook after the filter is installed.

- e. With a soft, damp non-shedding cloth, wipe down the “knife edge” of the diffuser's frame and allow to completely dry. This is the edge of the interior of the diffuser that will be clamped into the filter's gasket or gel channel.
- f. The HEPA filter will be retained in the diffuser with several “clips” which are held in a channel with a nut and bolt. Each retaining clip shall consist of a stainless steel nut and bolt and an angle clip with a hole. Precision Air recommends assembling the clip and bolt assemblies in accordance with Figure 2 on the following page before beginning installation of the filters.



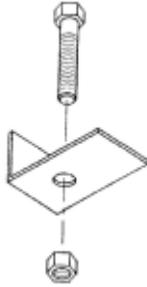


Figure 2. Assembly of filter retaining clip

- g. Properly position these retaining clips and bolts within extrusion's channel. The head of the bolt should be placed in the channel and slid into approximate position, evenly spacing the clips around the frame and approximately 6" from the corners. See Figure 3 for reference. Turn all clips out such that the gasket flange or gel channel will easily protrude into the knife-edge.

Note: For a 2'x4' diffuser, two (2) clips will be located on the short sides and four (4) clips on each long side

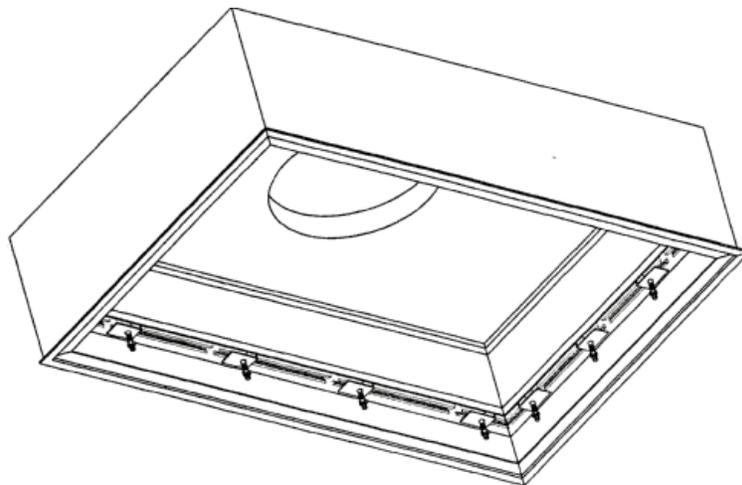


Figure 3. Retaining clip positioning prior to filter installation with "knife edge" of diffuser ready to mate with filter's gasket or gel seal.

- h. Visually inspect carton of filters for any shipping damage. Carefully remove filter from carton and slip out of protective cardboard sleeve. Next, remove filter from polybag packaging and visually inspect the filter for any type of media damage, i.e. small tears, fingernail scratches, any indication that crushing of the media has occurred, etc. If any areas of slight damage are found, a small silicone patch will be required. Patching method is as follows: Lay filter flat with damaged area face up and apply Dow Corning #734 flowable silicone (or equal) to damaged area's surface and surrounding 1/2-3/4" area (between pleats too if the damage extends down into

the media). Let set approximately 7-10 minutes to allow the silicone to set and then install the filter.

- i. Inspect the filter's gel channel or gasket applied to filter's flange. For gel seal type filter, the gel must be continuous and fill the entire channel. For gasket seal type filter, verify that the gasket is continuous and has been installed without tears or deformation in the gasket.
- j. Determine the filter's installation position by noting reference arrow on the filter. Install filter with reference arrow pointing in direction which air will flow through the filter.

Note: Installation of HEPA filters is strongly recommended as a two-person job, due to the extreme care that needs to be taken in handling of the filters. It is very difficult for a single person to accomplish installation.

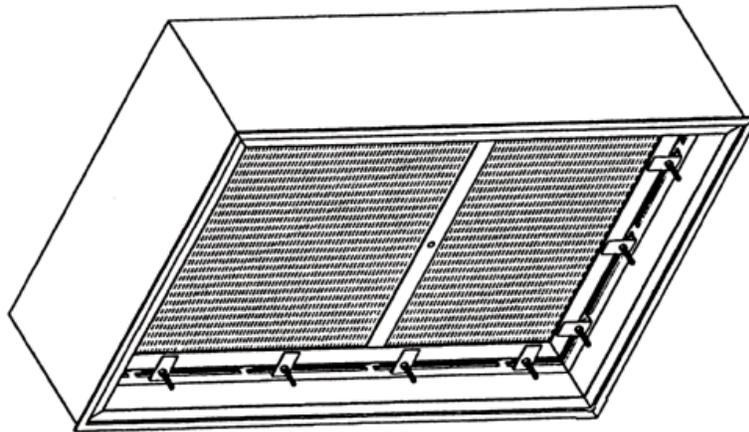


Figure 4A. Installed filter with retaining clips in place, putting pressure against filter's gasket or gel seal.

- k. Carefully lift the filter up to the diffuser, taking caution to handle the filter by its flange and frame only, and not to touch the filter's media, as the media is very delicate. Installer may also use the filter's aluminum centerboard as another place to hold the filter (if required). Push the filter's gasketed flange or gel seal into the diffuser's "knife edge". Secure the filter and create an airtight seal of the interface by turning the angle clips perpendicular to the filter's flange to hold filter in place. The second installer should use a screw gun with a 7/16" hex-head deep well socket to tighten the nuts on the retaining bolts such that the clip begins to deform slightly. It is recommended that the end clips be tightened first, followed by the side clips. See a filter which has been correctly installed in Figures 4A & 4B.

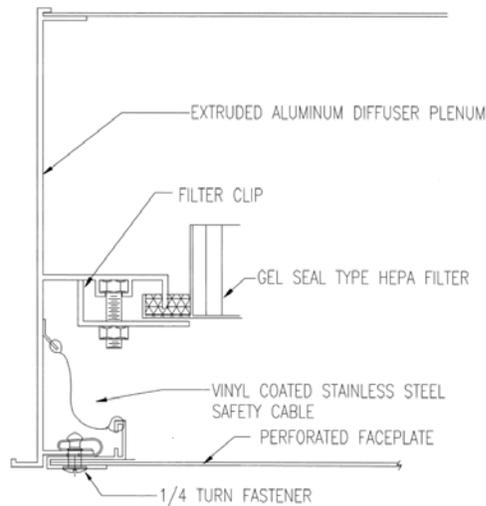


Figure 4B: Section view of installed filter with gasket seal filter.

- l. If filter is supplied with centerboard with port or multiple ports, check that well nut(s) are tight and secure.
- m. If any type of final air balancing is required on diffusers with a top inlet with a cone type balancing valve, access to the valve is accomplished by removing the well nut in the filter's centerboard. An 8"-10" long straight blade screwdriver can be used to turn the valve's adjustment screw. After balancing is completed, replace and tighten the well nut. If balancing a unit with a side or end inlet, the adjustment screw is located directly above a rubber plug located along the perimeter of the diffuser frame on the side or end, just below the side or end inlet.
- n. If required, wipe down the surfaces of the diffuser's perforated faceplate with a soft, damp cloth.
- o. Reattach the single stainless steel safety cable to the faceplate and tuck the safety cables up into the diffuser and reattach the faceplate by tightening the ¼- turn fasteners clockwise.
- p. Precision Air Products recommends that the filters be in place for at least 12 hours prior to any type of clean room certification testing which may be required. If a cleanroom certification test is not required by specifications, Precision Air strongly recommends that a field leakage test with a particle counter be performed to scan each filter's media and the entire perimeter of the filter flange.

General Notes:

- 1. *Precision Air Products Co. does not warrant filters damaged during installation, unless installation is performed under factory supervision. For a quote for damaged filters call Precision Air Products Co. at 1-800-404-0931.*



2. *The life expectancy of a HEPA filter is dependent upon the working environment in which they are used (i.e. frequency of pre-filter replacement, general facility housekeeping procedures). This manufacturer will not be responsible for recommending replacement frequency, although industry standard for replacement is approximately 2 times the initial clean filter pressure drop. So, it is therefore recommended that the owner should have the air balancer obtain an initial filter pressure drop reading across a diffuser of every size in each room. Also, see local and/or state requirements for replacement frequency of HEPA filters as a function of the application (i.e. FDA regulations).*
3. *Replacement filters can be purchased from Precision Air Products. Please indicate the overall filter dimensions that are available on the record drawings, the efficiency of the HEPA filter (i.e. 99.97% or 99.99%) and also the filters' sealing type, either gasket or gel seal.*

Step 5: Balancing

The Low Profile HEPA-Vent module design does not allow for adjustment of airflow from the room side of the diffuser. All damper mechanisms must be installed in the duct immediately following the air inlet on the diffusers. Please follow the outlined procedure below for proper balancing of an entire system of diffusers based on the location of the damper mechanisms in the units being supplied.

- a. Prior to any adjustment, check each individual diffuser for total CFM output with a flow hood.
- b. If air volume for diffuser is specified on mechanical drawings, balance accordingly. If air volume is not indicated and total system air volume is known, diffuser air volume must be calculated. To determine individual diffuser volume, first determine the CFM per square foot of active diffuser area by dividing the total CFM required in the room by the total square foot of diffuser area, then multiply that value by the nominal sq. ft. of active diffuser area (i.e. 8 sq. ft. for a 2'x4' diffuser).
- c. With a flow hood, balance for correct CFM per diffuser by first adjusting the highest volume diffusers' metering dampers to specified airflow.

Care & Maintenance of HEPA Filters

The following handling procedures should be followed to maximize life of filter:

1. Store filters in an environmentally controlled room or warehouse. Avoid severe temperature conditions, below 0 degrees, or above 120 degrees F. The filters should not be exposed to ozone depleting sources.

Note: *Do not allow units to get wet or be stored in damp area under any circumstances.*

If these and the following parameters and the following storage requirements are maintained, the filter shelf life should be 3 years from gasket cure date or 3 years from manufacturing date for fluid (gel) seal filters.

2. Store cartons on a level area according to "This Side Up" orientation in their original cartons in order to avoid exposure to ultraviolet rays and possible damage to the filter media.
3. HEPA filters should be oriented vertically with their pleats vertical, and be stacked no more than three cartons (slightly over 6 ft.) high unless intermediate bracing or flooring is provided to prevent the weight from the upper tier from bearing on the lower tier.
4. Unless there is obvious damage to the cartons, HEPA filters should not be opened prior to use or removed from shipping skids until immediately ready for installation.
5. While in storage, items should be checked periodically to ensure that they are not exposed to detrimental conditions.
6. Storage areas should be uncluttered and permit easy access to items without the necessity of moving other items to get to them. Materials and components should be moved a minimum number of times (receipt inspection, storage and release for installation only) and handled in a manner that does not damage the item or its packaging. If wrappings or cartons are removed for receiving inspection, they should be replaced and positively sealed immediately upon completion of the inspection.
7. Receiving and storage personnel should be informed of the necessity of proper handling of the filters.
8. Rotate stock. Boxed filters can have the media turn yellow and media can dry out and crack if not used within 5-8 years.
9. Change pre-filters in return air grilles every 30-45 days minimum frequency or as recommended by hospital protocol in order to extend the life of the final HEPA filters.

The life expectancy of a HEPA filter is dependent upon the working environment in which they are used (i.e. frequency of pre-filter replacement, general housekeeping procedures). This manufacturer shall not be responsible for recommending replacement frequency. See local or state requirements for replacement frequency of HEPA filters as a function of the application. (i.e. FDA regulations).

