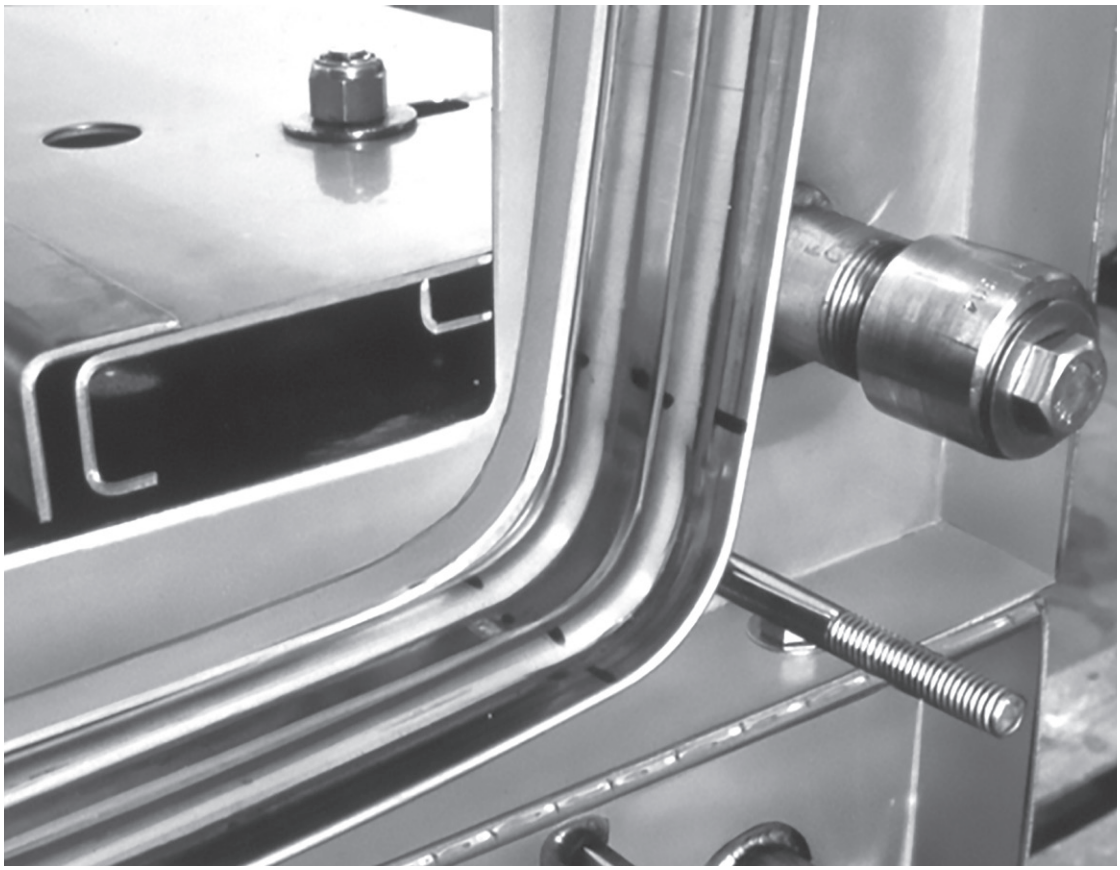
AAF | Flanders®

Bringing clean air to life.®

OPERATION AND
MAINTENANCE MANUAL



Bag-In/Bag-Out Filter Housings

(BF, BG, and G-Series)

Table of Contents

IMPORTANT MESSAGE

CAUTION – Review this and all safety procedures with your safety officer.

The AAF Flanders Containment Products, filter housings, and filters are designed to protect facility personnel and the general public from dangerous materials by filtering those materials.

The filters that you are to change contain the filtered material. In order for you to be protected as fully as possible, you must follow these instructions as amended by your safety officer. The bagging method of changing a filter is not foolproof, but it is the safest practical method available for changing a contaminated filter.

We realize that all types of housing designs and configurations cannot be addressed by a single manual, so we are offering the concepts of installing a new filter(s) into a new system, and replacing dirty filters in systems that are already in operation. Once the concept is understood, both maintenance personnel and safety personnel can adapt the most suitable method to use considering the housing, locations, type of filter, and any other items that can affect safety.

Remember: Carbon filters are heavy.

Carefully study this manual and the safety officer's amendments so that you have the entire procedure in mind before attempting filter changeout.

Be sure to have all tools and equipment on hand prior to actually beginning work.

In this manual, we describe the AAF Flanders banding method of sealing the bag.

The important thing to remember is to use this manual, your safety officer's instructions, and your own reasoning ability to prevent yourself and the immediate environment from being contaminated with the material that is captured on the dirty filter. Refer to the product drawing submitted for the order as necessary.

Quality Assurance Program

AAF Flanders established the Quality Assurance program to address address the 18 criteria structure of ASME NQA-1 (formally N45.2), "Quality Assurance Requirements for Nuclear Facility Applications." As suppliers of High Efficiency Air Filtration products and services, there are three standards that govern the majority of AAF Flanders' activities.

1. ASME N509-1989 (reaffirmed 1996) "Nuclear Power Plant Air-cleaning Units and Components"
2. ASME N510-1989 (reaffirmed 1995) "Testing of Nuclear Air Treatment Systems"
3. ASME AG-1- latest revision "Code on Nuclear Air and Gas Treatment"

These standards and our customer's specifications invoke many other standards and codes the AAF Flanders' Quality Assurance program incorporates as standard practice.

There are a variety of Quality Assurance programs that manufacturers implement to ensure product and service quality, two such systems are ISO-9001 and ASME NQA-1.

Abstracts of these programs include:

ISO 9001:2000 specifies requirements for a Quality Management System where an organization

1. Needs to demonstrate its ability to consistently provide product that meets customer and applicable regulatory requirements, and
2. Aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system, and the assurance of conformity to customer and applicable regulatory requirements.

All requirements of this international standard are generic and are intended to be applicable to all organizations, regardless of type, size, and product provided.[1]

ASME NQA-1:
This Standard sets forth requirements for the establishment and execution of quality assurance programs for the siting, design, construction, operation, and decommissioning of nuclear facilities. Nonmandatory guidance is provided in the Appendices. NQA-1 establishes 18 criteria covering all aspects of quality, from purchase of raw materials to design and testing.[2]

Because ASME NQA-1 applies to the Nuclear Industry where containment and safety are of paramount concern, it is generally seen to establish more checks and balances. Containment air filtration started out as a critical requirement in the Nuclear industry to protect workers, the public, and the environment. Today, containment air filtration is a critical issue in a variety of industries and applications, from pharmaceutical, health care, military, and the original nuclear applications among others. Because of the critical safety requirements of the nuclear industry, ASME N509, ASME N510, and ASME AG-1 are recognized as the standards for design and testing of containment air filtration systems. Each of these standards requires a Quality Assurance program that meets the requirements of ASME NQA-1.

AAF Flanders maintains a full scope Quality Assurance program that meets the requirements of ASME NQA-1, 10 CFR 50 Appendix B, and DOE O 414 1A. Customers that require the stringent application of quality principles that only a mature and developed program can offer routinely audit this Quality Assurance program.

AAF Flanders has evaluated the possibility of certification to ISO-9001 and determined that an ASME NQA-1 program better meets the critical needs of our customers. Although the two programs are comparable, an ASME study indicates that a ISO-9001 Quality Assurance program will not meet the requirements of ASME NQA-1 without substantial modification.[3]

Sources:
1. ISO.org
2. ASME.org
3. Comparison NQA 1 and ISO 9001 Technical Report, available from ASME.org

Introduction

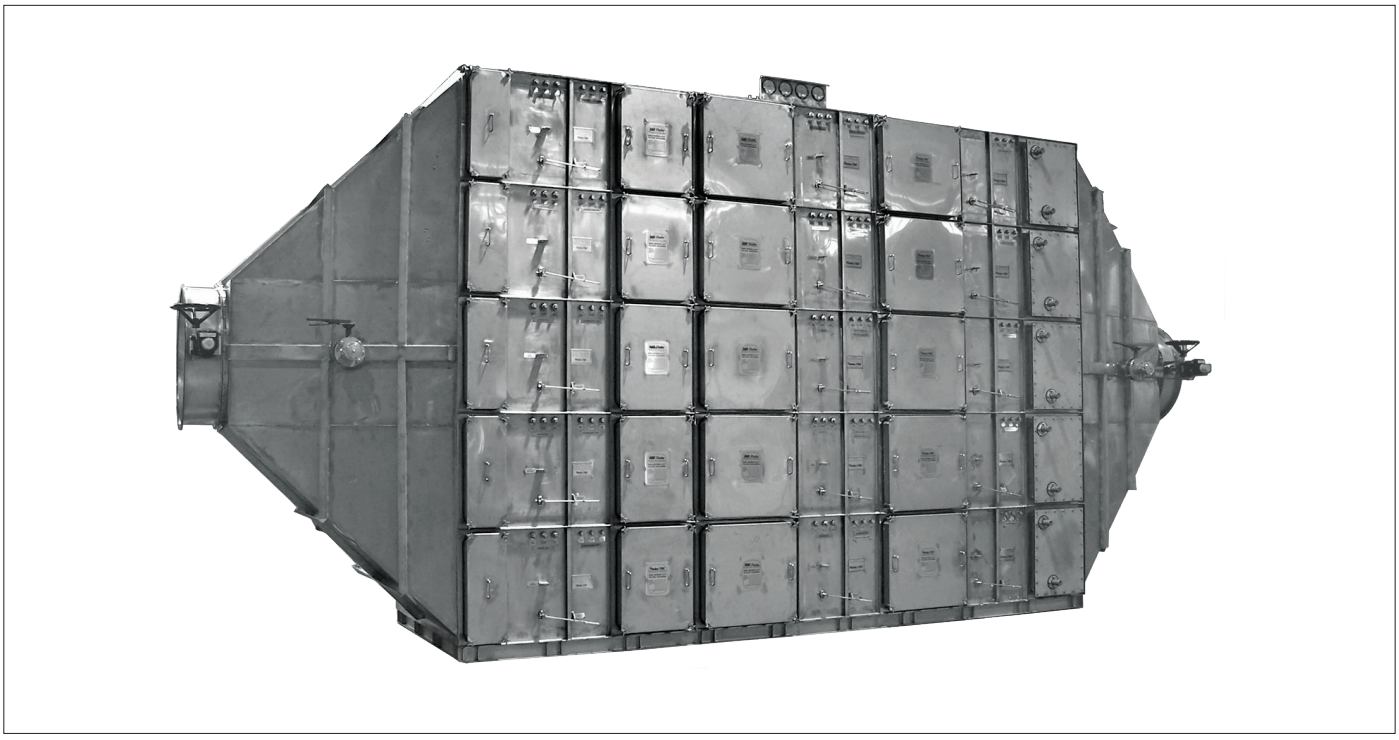
AAF Flanders' line of bag-In/bag-out filter housings, for gel or gasket seal primary filters, are side-loading filter housings that have been designed to meet the air filtration needs of industries and research facilities that handle dangerous or toxic biological, radiological, or carcinogenic material. To minimize exposure to this harmful contamination while replacing and handling dirty filters, the housing incorporates a ribbed bag-in/bag-out ring, over which a heavy duty plastic bag is attached.

Once the initial filters are installed and the first bag attached, all filters, both dirty and new, are handled through the bag using the procedures described in detail throughout this manual, hence the name Bag-In/Bag-Out.

Depending upon the user's requirements, the housing may have an assortment of filter arrangements, including the prefilters, HEPA filters, and/or carbon adsorbers. No matter what type of filters are contained within the housing, the filter changeout procedure is the same.

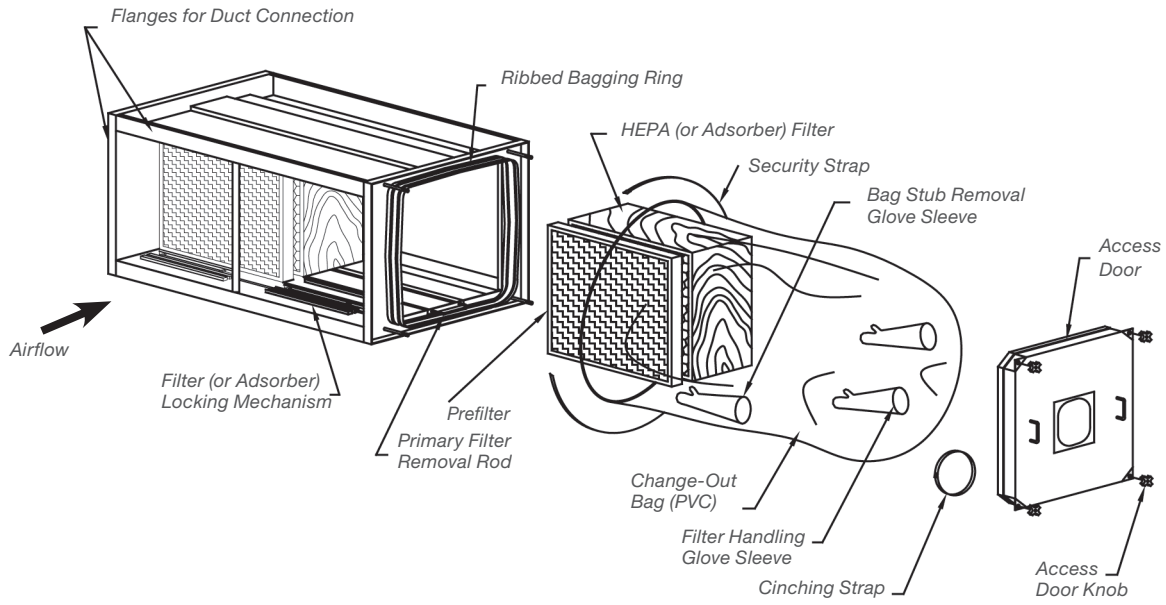
Remember:
A filter changeout is not complete until the new filters have been sealed to the housing frame, and an in-place leak test has been performed.

Typical 1 high, 1 wide filter housing module for a single primary filter.



BF-1 Series 5H6W filter train, complete with mounting base, transitions, isolation damper, in-place test sections, and gages.

Illustration of Bag-In/Bag-Out Components



The plan view illustrations below are the basic steps involved in changing contaminated filters in a Bag-In/Bag-Out containment housing. A complete step-by-step changeout instruction manual is furnished with each housing or system.

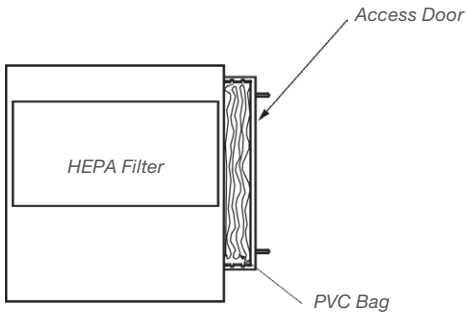


Figure 1

- Remove access door.

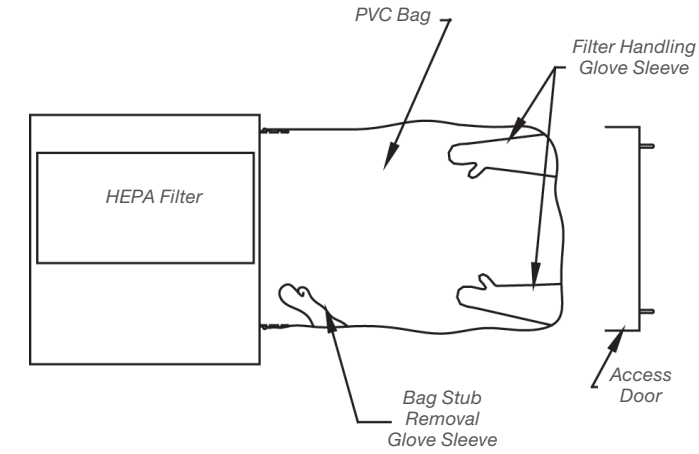


Figure 2

- Extend bag and place arms in filter handling glove sleeves of bag.

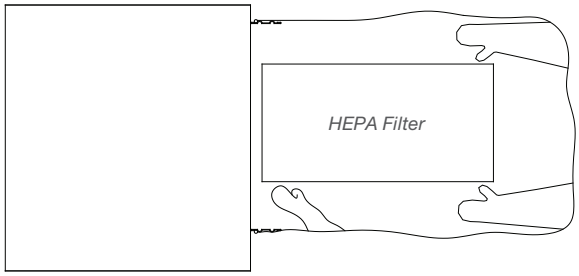


Figure 3

- Release filter locking mechanism.
- Carefully draw contaminated filter into bag and place filter (in bag) on stand or table.
- Remove arms from bag.

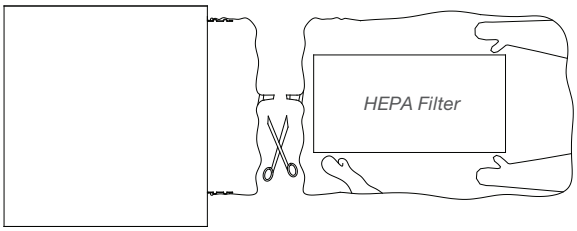


Figure 4

- Seal bag between access ring and filter (see banding kit instruction manual).
- Sever bag, leaving bag stub attached to access ring.

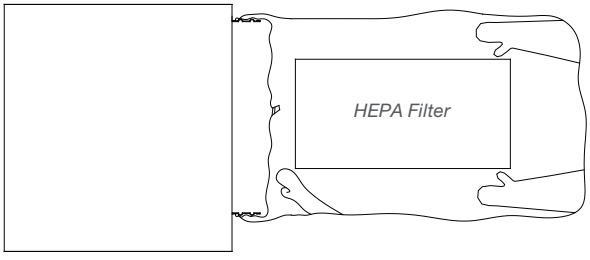


Figure 5

- Place new filter into a new bag.
- Place new bag over bag stub attached to access ring.

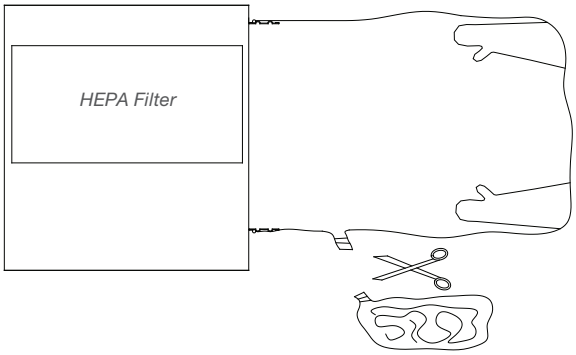


Figure 6

- Remove bag stub using bag stub removal glove sleeve of the new bag.
- Draw stub into sleeve by turning sleeve inside out.
- Install new filter using glove sleeves.
- Seal and detach bag stub/glove sleeve.

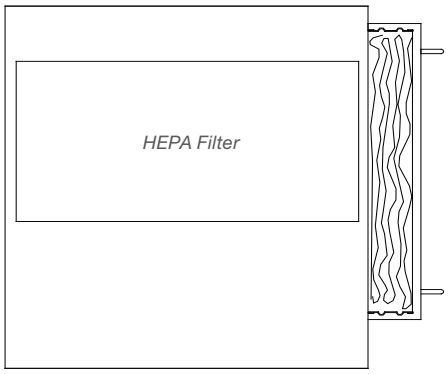
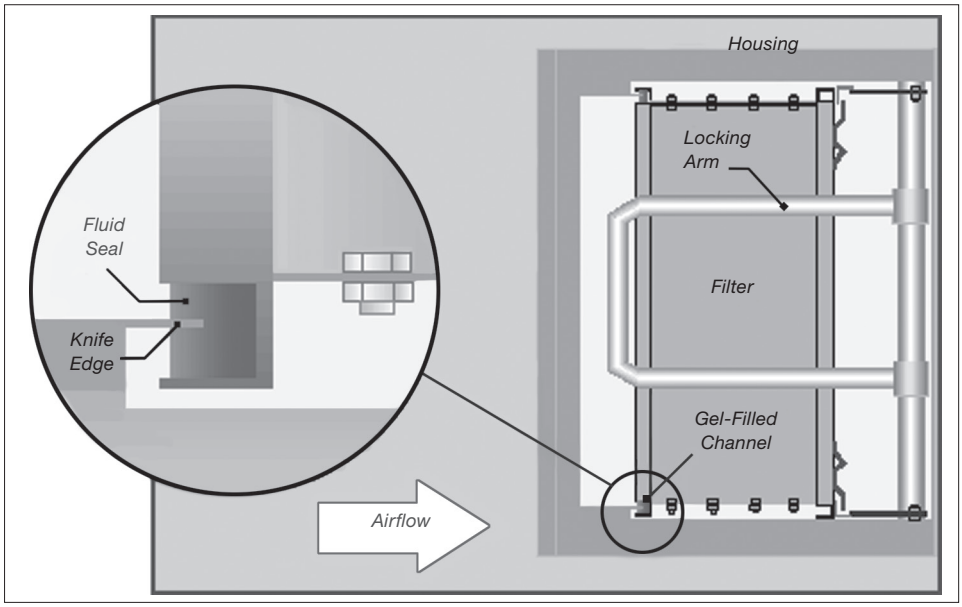


Figure 7

- Fold new bag inside bag-in/bag-out ring and replace access door.

Fluid Seal Design Concept

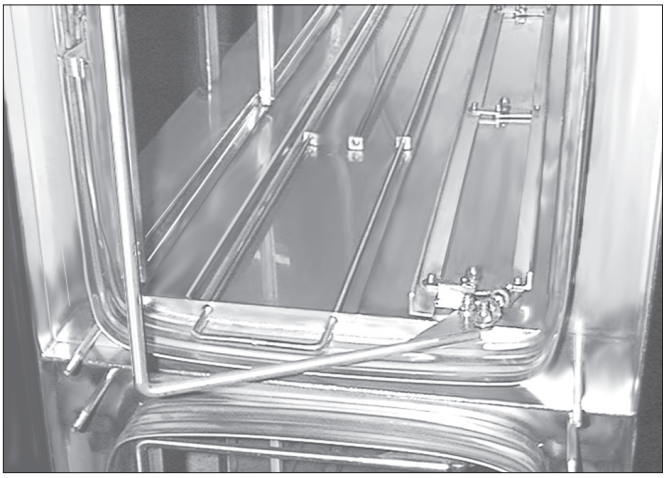
The filter-to-housing fluid seal is effected by means of a continuous knife edge on the interior of the housing, which mates into the gel-filled perimeter channel on the face of the filter. To effect the seal, the locking mechanism forces the filter against the knife edge. The knife edge penetrates the gel and a uniform seal is produced on the filter face.



The standard locking mechanism is manufactured of Type 300 Series stainless steel.

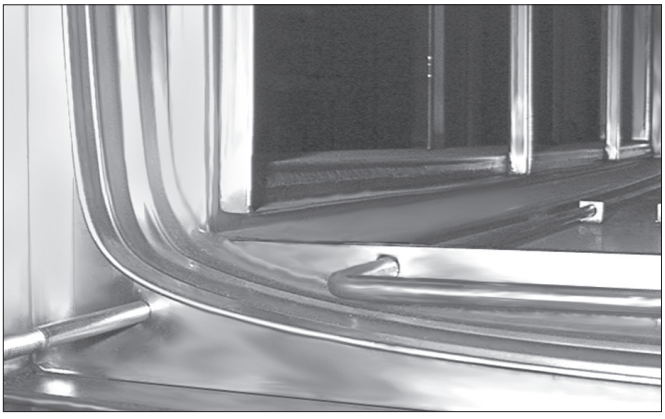
Description of the BF-Series Filter Locking System

The BF-Series housing has a filter locking arm in each tier to operate the replaceable filter locking mechanism. By operating the internal filter locking arm inside the PVC bag and access door, the filter is engaged on, or disengaged from, the housing knife edge (internal sealing frame). The filter locking arm and the access door interface in such a manner that minimizes the possibility of the door being closed until the filters are correctly sealed in the housing, and sealed to the mounting frame.



3W BF-Series Housing showing locking mechanism and filter removal rod.

Housing knife edge front and top.

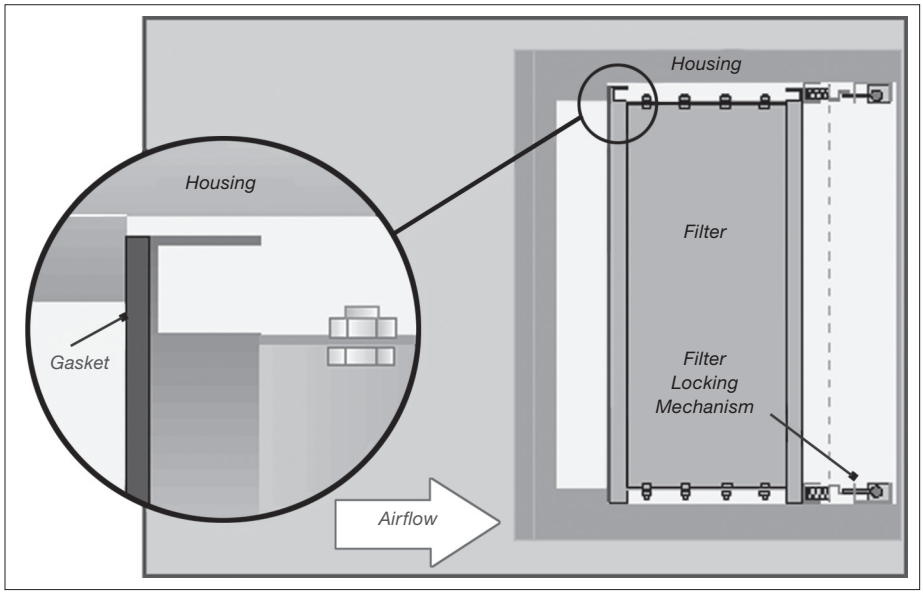


Housing knife edge front and bottom.

The BG-Series Gasket Seal Design Concept

The filter to housing gasket seal is effected by means of a continuous flat mounting surface on the interior of the housing, which mates to a perimeter gasket on the filter.

To effect the seal, the locking mechanism forces the filter against the mounting surface.



The standard locking mechanism is manufactured of Type 300 Series stainless steel and brass.

BG-Series Gasket Seal Housing inside view showing the filter locking mechanism. Note the exterior drive bolts and spring-loaded mechanism.

The BG-Series Gasket Seal Description

By turning a drive bolt located at the front exterior of the BG-Series housing, the independent pressure bars with pre-loaded springs, located in the filter locking mechanism, force the filter against the interior mounting frame. Pre-loaded springs on each pressure bar, for each filter element, apply consistent pressure to maintain filter seal. The applied force has a minimum clamping load of 1,400 pounds per full width filter or 1,050 pounds per half width filter. This force is applied as an even, uniform load along the top and bottom of each filter frame. The standard locking mechanism is manufactured of Type 300 Series stainless steel with brass pivot blocks.

The G-Series Housing Design Concept

In addition to the BF-Series side load Bag-In/Bag-Out housing, AAF Flanders offers round filter housing for in-line applications. The G-Series housing is designed for single filter replacement from the top of the unit. The housing can be installed for side access, but AAF Flanders does not recommend that the unit be supported by the inlet and outlet connections. Instead, a mounting stand or some other means of support should be used.

There is no specific diameter for inlet and outlet connections for the G-Series housing, since requirements vary. The purchaser must specify the required pipe sizes and lengths.

The G-Series inlet and outlet connection can be a standard rolled stainless steel sheet metal nipple or optional stainless steel piping or tubing.

Fluid seal filters used in the round housing do not require filter clips.

The G-Series housings have a different locking mechanism from the standard BF or BG-Series housing.

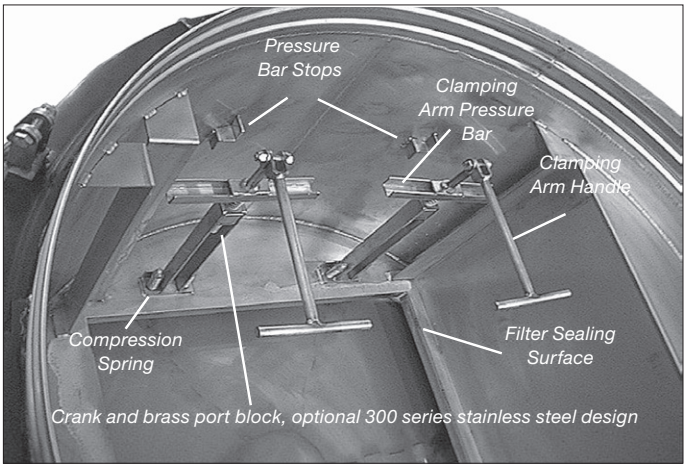
In a G-Series round housing, the filter is held in place by with spring loaded clamps for the G1F fluid seal or pressure bars; for the G1G gasket seal one (1), two (2) or four (4) compression points are used, depending upon the filter size.

G-Series Round Housing for in-line applications.

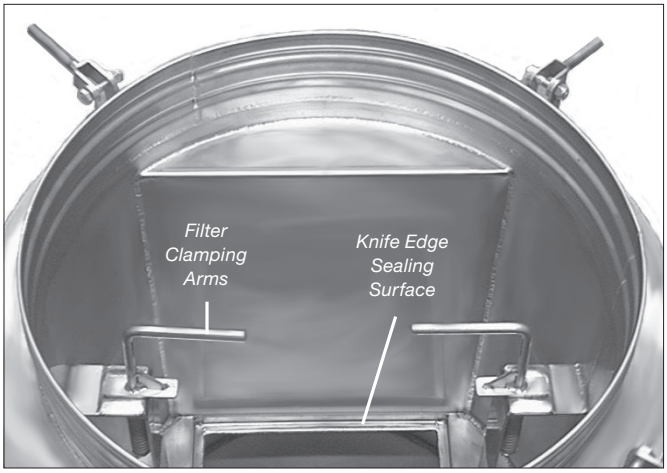
Filter Clamping Arm Pressure Bars

Filter clamping arm pressure bars secure the filter during operation. Filter elements that are 12" x 12" require two clamps, and filter elements that are 24" x 24" require four clamps.

The clamps are spring loaded and have a “T” handle that is turned 90° by the operator to lock the filter in the sealed position.



Gasket seal locking mechanism for a G1G Housing.



Fluid seal clamping arms for a G1F housing.

Handling and Storage of Filter Elements Prior to Installation

Particulate Filters

Particulate filters include a wide range of filter types, sizes, and performance capabilities. Particulate filters are designed to remove airborne particulates from an airstream while carbon adsorbers (see below) remove contaminate gas molecules from an airstream. Particulate filters can be small, disposable, 30% efficient by ASHRAE “Prefilters” or expensive HEPA (High Efficiency Particulate Air) filters with an efficiency of 99.97% by DOP or better.

Generally, all types of particulate filters are very fragile and should be handled with a great deal of care. The following precautions should be observed:

- Store in a clean, dry environment.
- Store filters in correct orientation (check marking arrows on cartons).
- Store filters with tagging information easily visible.
- Store away from heavy traffic areas.
- Do not stack HEPA filters more than three filters high during storage and handling.
- Store filters in factory-packed carton and do not remove from carton until just prior to installation into the filter housing.
- Do not move stored filters from place to place. Moving filters can cause damage to the filters.

Carbon Adsorbers

Adequate care should be provided for packaged adsorber cells to assure optimum initial performance. It is important to minimize the exposure of the adsorbers to moisture, since moisture adversely affects the carbon and the special impregnates (if carbon is impregnated). It is important to store adsorbers in a temperature-controlled environment (0°–120°F). The following precautions should be observed:

- Store in a clean, dry environment.
- Store adsorbers in correct orientation (check marking arrows on cartons).
- Store filters with tagging information easily visible.
- Store away from heavy traffic areas.
- Store filters in factory-packed carton, and do not remove from carton until just prior to installation into the filter housing.
- Immediately prior to installation of the adsorbers into the filter housing, ensure that filter housing and ductwork is free of loose construction debris. AAF Flanders recommends operating the system for approximately two (2) hours with prefilters (and HEPA filters, if used) in place before installing adsorbers.
- If the adsorbers are exposed to paint fumes or other solvents, the carbon in the adsorbers will be poisoned, and the life of the carbon is shortened. Make sure adequate paint drying time is allowed (usually 24–48 hours) before exposing the adsorbers to the paint fumes.

Shelf Life Information

AAF Flanders recommends that every filter be stored in its original shipping carton to prevent it from being exposed to ultraviolet rays, moisture, and possible damage to the filter media. The filter should be stored in a controlled area (0°–120°F), and it should not be exposed to ozone-depleting sources. If these parameters are satisfied and storage requirements as detailed are maintained, the filter shelf life should be three (3) years from gasket cure date, or three (3) years from manufacturing date for gel seal filters.

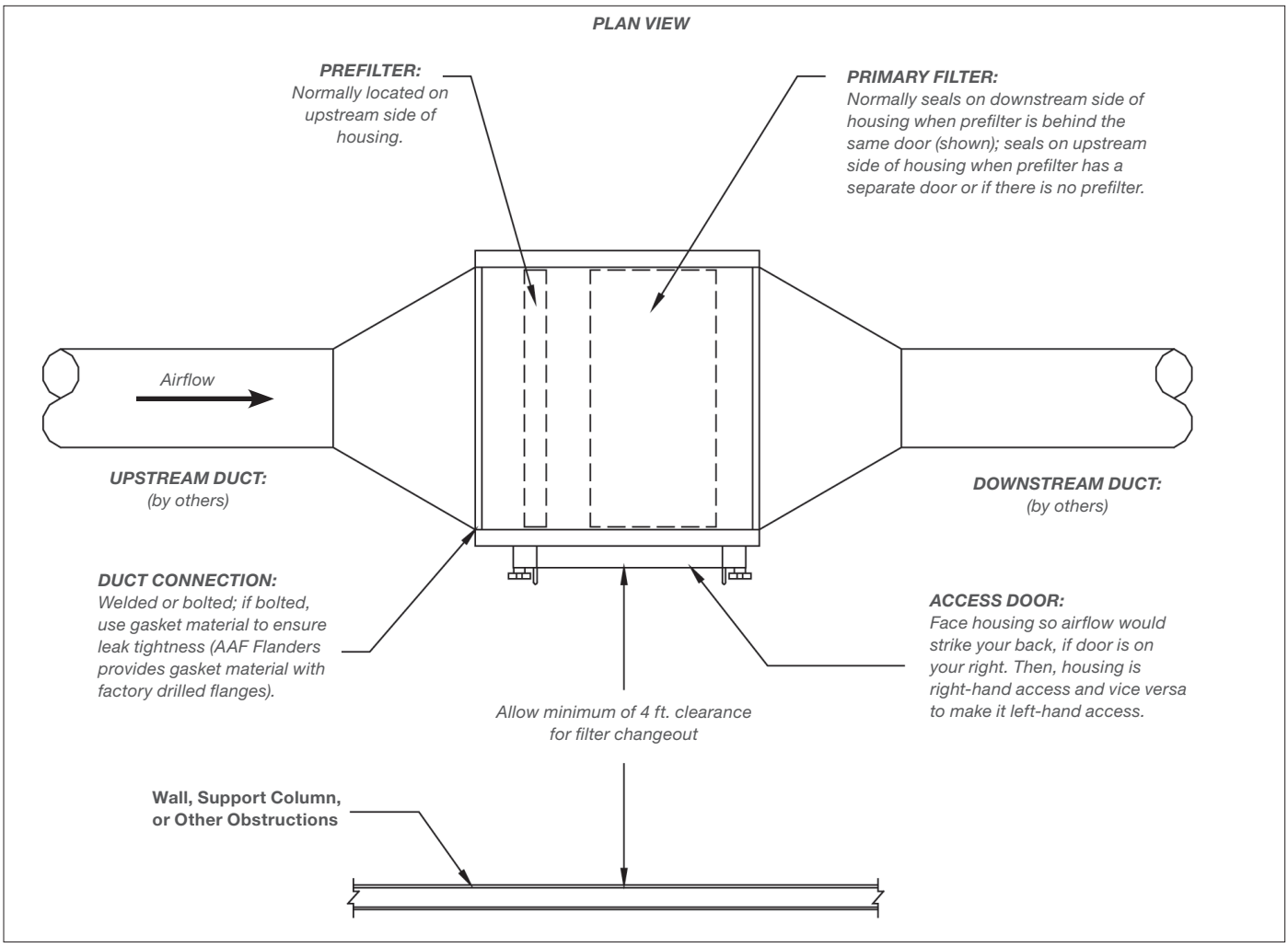
Installation of New Housings

BF-Series and BG-Series Housings

1. Be sure position of housing access door(s) and direction of airflow is correct prior to connecting ductwork.
2. The housing should be permanently connected to the ductwork by by gasketing and bolting or by welding before installation of the filters.

CAUTION: RTV caulking compounds may deteriorate in service. They are not recommended for permanent installations (check your site specifications).

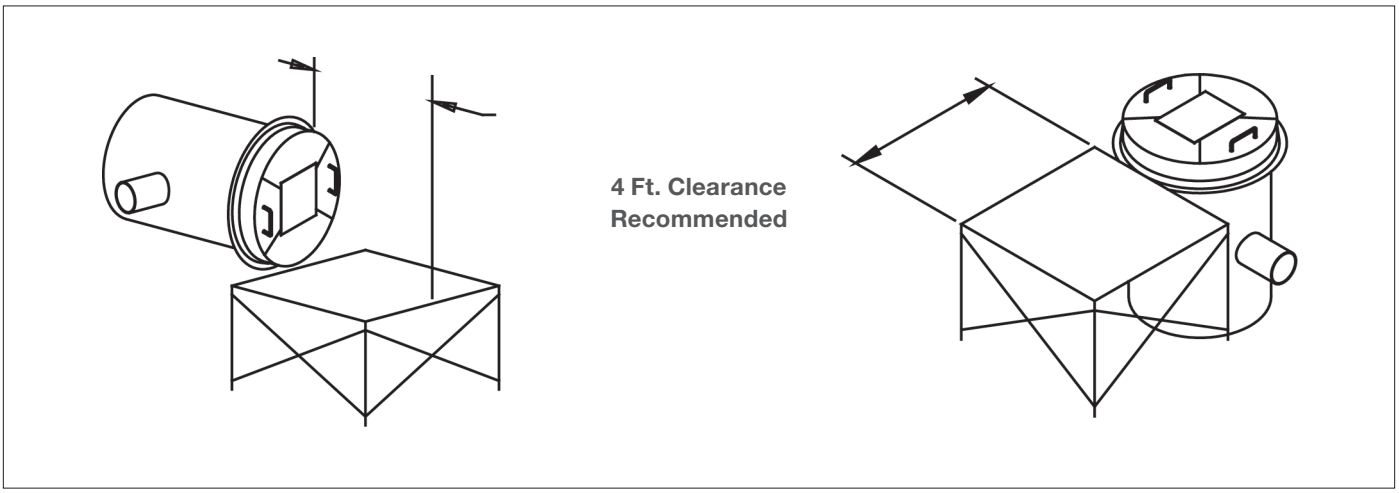
3. Following installation of the housing(s), the system should be cleaned to remove construction dust, etc., before installing any of the filters.



Installation of New Filter Housings

G-Series Filter Housings

1. Be sure the position of housing access door(s) and direction of airflow is correct prior to connecting ductwork.
2. The housing should be permanently connected to the ductwork before the filters are installed. G-Series housings are frequently supplied without flanges for butt welding of piping in the field, but may be supplied with separate flanges for installation in the field.
3. If flanges are supplied, they are usually bolted when the housing is properly aligned to mating flanges in the field (construction plans should be consulted for details).
4. Following installation of the housing(s), the system should be cleaned to remove construction dust, etc., before installing the filters.



Allow a minimum of 4 ft. clearance to remove filters from the housing.

Provide Stand or Bag-Out Shelf

Provide a suitable stand or support shelf for filter change. The shelf should be strong enough to support a fully-loaded HEPA filter or carbon adsorber. If the access door is on the side of the housing, locate the stand just outside of, and a few inches beneath, the bottom of the door. If the access door is located on the top of the housing, place the stand alongside and level with the top of the door.

Note: A filter removal tray is available from AAF Flanders for convenient filter changeout. See spare parts list on pg. 46.

Start-Up Procedures

Filter Housing

Following is a list of procedures in sequence that needs to be addressed prior to filter/adsorber installation and start-up of filter housing:

> **Note:** This procedure list is generalized and may not meet all of your actual site requirements. Review of this procedure should be made by all concerned parties prior to performing work.

1. The filter housing must be permanently installed and/or connected to the supply and exhaust ductwork. Fan systems and dampers need to be in place and operable. All work shall be completed and filter housing ready for “in use” operation.

   The filter housing should be securely mounted to a curb, base, structural support, etc.
2. Remove all items that may have been stored inside of the filter housing.
3. Bags, straps, filters, etc., should be inventoried and stored in a controlled environment. Care must be taken to protect these items from damage.
4. Remove all construction debris from filter housing and all connecting ductwork. Any water found inside of filter housing or ductwork must be drained and/or removed. All accessible interior surfaces need to be wiped down to remove dirt and dust.
5. It is recommended that a complete set of prefilters (HEPAs, if prefilters are not used) be installed into the housings for collection of construction dust, metal shavings, debris, tools, etc., that may be in the airstream when the fan is initially started.
6. Visually inspect housings to verify that items addressed have been completed, along with safety inspection of housing, prior to fan start-up.
7. Replace doors, caps, plugs, etc., and close any valves prior to starting fan.
8. Start-up of fans should be performed by qualified individuals.

> **Note:** The permanent set of filters and/or carbon adsorbers, generally, are not in place during this step. For this reason, the initial static will not be experienced, which could cause fan motor damage. Dampers will be required to be partially closed, or other means applied, to simulate operating static.

9. Allow fan to run approximately thirty (30) minutes to allow any construction debris and dust to become dislodged.

> **Note:** The prefilters (HEPAs, if used) are to be thrown away upon installation of the permanent set of filters.

10. Upon completion of the above, the interior of the housing needs to again be inspected for any additional debris. Also, pay careful attention to the areas that could affect the filter to housing seal.
11. A final wipe down of the filter housing is recommended.
12. Proceed to installation of new filter elements.

Installation of New Filter Elements

IMPORTANT: Read This Note Before Starting

The basic bag-in/bag-out procedure is the same for all the different housing models shown in this owner's manual. There are minor changes, due to the type of filter locking mechanism used in each housing. These changes are shown in this owner's manual. Housings can be installed in different positions (i.e. with horizontal or vertical airflows). However, the general concept for filter installation or replacement is the same.

This manual provides step-by-step procedures for the initial (clean) installation of filters and replacing dirty filters. Beside each step you will find the correct housing model listed for that step (i.e. BF, BG, or G). If the type of housing you are working on is not identified at that step, then go to the next step until the correct housing model is listed.

New Filters in New (Uncontaminated) Housings

Materials and Tools Required:

All bag-in/bag-out housings

- New filters or adsorbers (check for correct quantity, type, size, and model number).
- New plastic changeout bags (check for correct quantity, type, size, and model number).
- One (1) security strap per access door.
- One (1) cinching strap per access door.

BF-Series and G-Series Gel Seal Housings

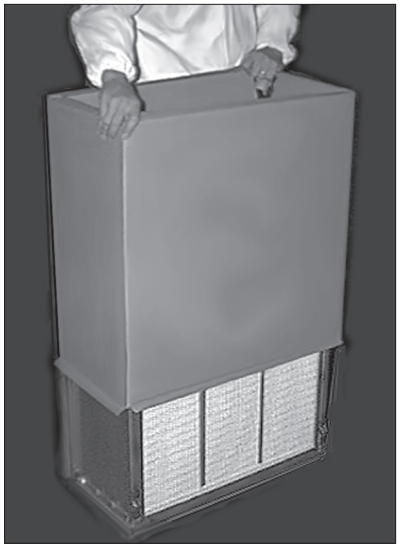
- No tools are required.

BG-Series Gasket Seal Housings

- Standard ratchet with short extension and ¾" socket.
- Filter release agent (silicone grease).

Turn filter over.

Rest filter on floor while removing carton.



Remove packing materials.

STEP 1: BF-Series, BG-Series, and G-Series

Remove the housing access door by the following method:

- Remove the four (4) aluminum knobs.
- Grasp handles on the front of the door.
- Pull the door straight forward, toward yourself.

CAUTION: Avoid contacting door gasket with door bolts as door is removed to prevent damage to gasket material. Also, the door must be positioned in a way to prevent the gasket from being damaged.

Note: The access door on the G-Series is round; however, it is removed in the same manner.

Remove aluminum knobs.

Pull door forward.

Door Latches on BF-Series and BG-Series

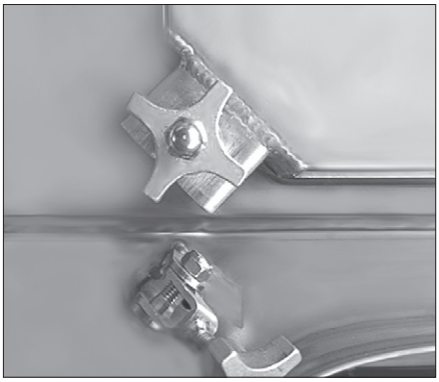
Standard latches are threaded studs with removable knobs.

The studs align with the retainers provided at each corner of the door and are secured with hand knobs, as shown.

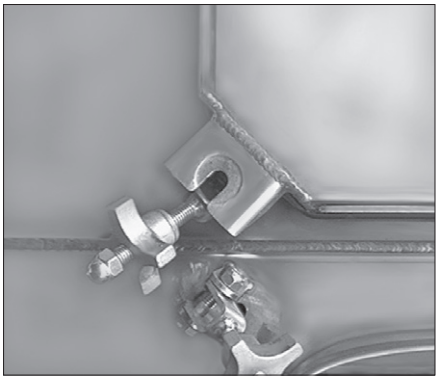
Swivel Door Latch (Standard on G-Series, optional on BF-Series and BG-Series)

Swivel latches swing away from the door to facilitate its removal during the bag-in/bag-out procedure. The hand knobs are held captive on the swivel latch assembly as a precaution against dropping or losing them.

Note: A minimum 2½" between the bottom of housing and surface it sits upon is required to allow swivel latches full range of motion.



Swivel latch in closed position.



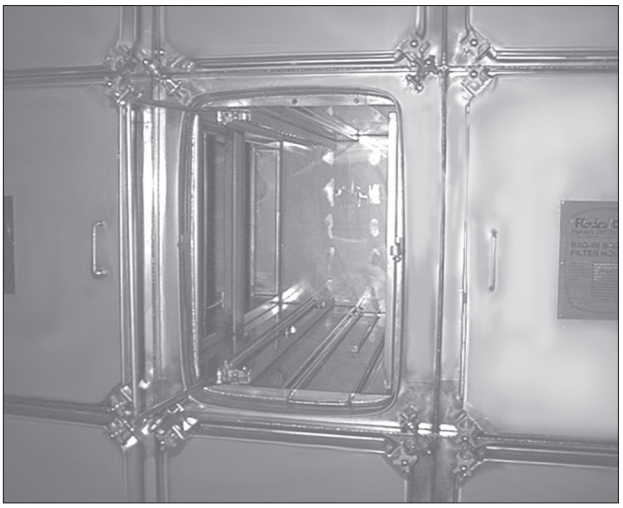
Swivel latch in swing-away position.

Installation of New Filter Elements

STEP 2: BF-Series

- Release primary filter locking mechanism handle from handle latch.
- Swing handle to full open position.

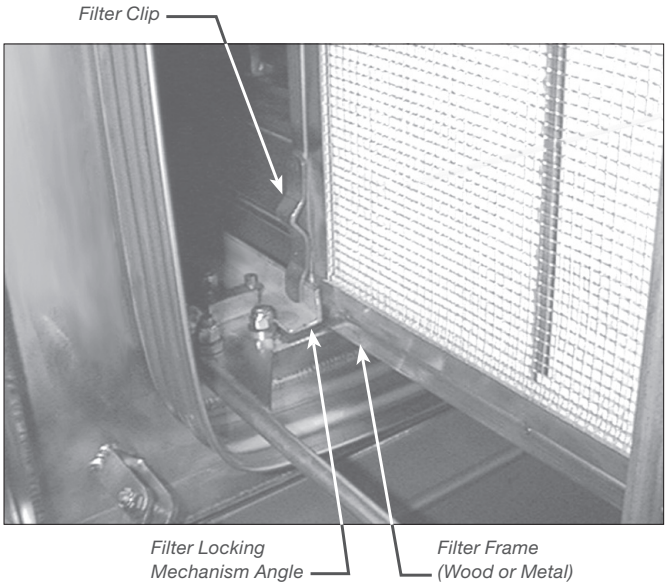
Release filter locking arm from handle latch.



Filter locking arm in full open position.

STEP 3: BF-Series

- Ensure that filter clips are aligned properly on the mechanism angle *(refer to the filter manufacturer's instructions if clips have not been factory installed).*
- Filter clips must interface with filter locking mechanism angle at top and bottom of filter, as shown:



Filter clip to mechanism angle detail.

STEP 4: BF-Series

Load filter(s) into housing ensuring the filter(s) is/are installed in the correct position.

- When airflow is horizontal, separators—or pleats—of prefilter(s) and HEPA filter(s) must run vertically, and carbon beds of carbon adsorbers must run horizontally.
- When sliding the filter(s) in the housing, use the locking mechanism angles as guides by aligning filter clips over mechanism angles and gently, but firmly, pushing the filter(s) until it touches the back of the housing or as far as can be reached.
- On multi-wide filter housings, repeat procedure for each filter until all filters are installed.
- On three-wide filter housings, it may be necessary to use the second filter to push the filter all the way to the back of the housing.

Note: Airflow arrows on filters normally indicate the direction of airflow during the manufacturer's factory testing. When installed in a system (filter housing), air may flow through a HEPA filter or adsorber from both directions. It is important that the filter sealing gel-filled channel is in contact with the filter housing's knife edge sealing surface.

Install HEPA filters with pleats in vertical position.

Install adsorbers with beds in horizontal position.

STEP 5: BF-Series

Lock filter(s) in place to the housing's filter sealing knife-edge by swinging the locking mechanism handle to the closed position (towards handle latch).

Note: The locking mechanism handle is designed to provide tension against the handle latch with filters installed. Apply the required pressure to the handle with one hand, and swing the handle latch over the handle with the other hand.

Locking mechanism latched with filters installed.

Installation of New Filter Elements

STEP 6: BG-Series

- Be sure the filter locking mechanism is completely open by turning each mechanism counterclockwise with the standard ratchet until you feel it bottom out.

Operator cranking bottom locking mechanism.

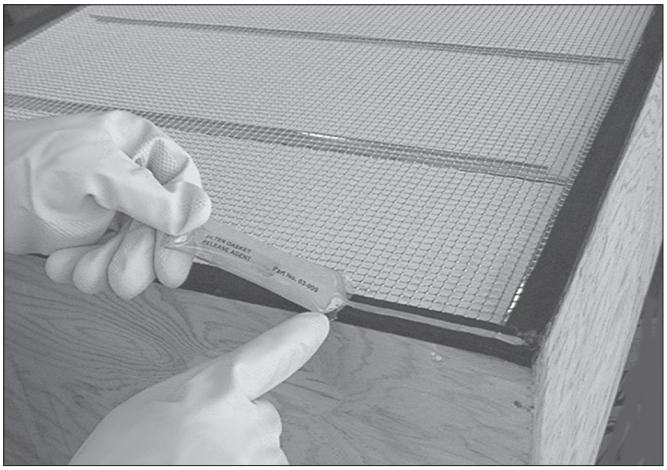
Operator cranking top locking mechanism.

ATTENTION: Optional Step for BG and G1G

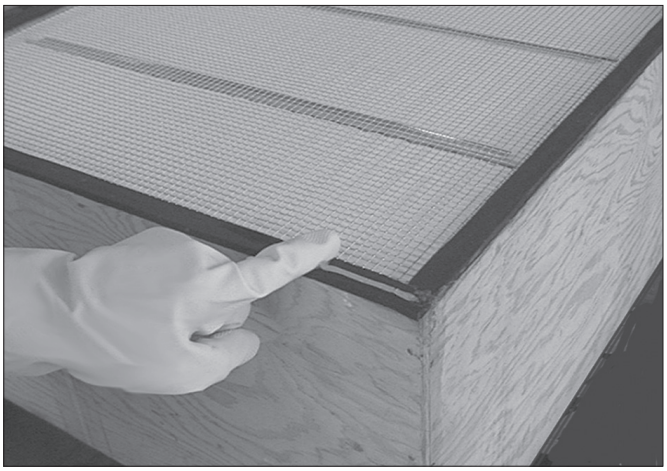
To help prevent filter gasket from sticking to the housing sealing surface after being compressed for an extended period, the entire face of each new filter gasket can be coated with an optional silicone grease (AAF Flanders Part Number 109403351) before being installed. A $^{1}/_{8}$–$^{3}/_{16}$" diameter bead of silicone grease may be applied to the middle of the entire ¾" wide filter gasket.

The grease if used should then be spread evenly across the entire gasket face. This thin coating of silicone grease acts as a release agent, and will also help achieve and maintain a good filter-to-housing seal.

Caution: Do not use RTV (Room Temperature Vulcanizing). RTV would stick filter to housing, thereby causing potential problems of filter removal.



Optional bead of grease on center of gasket strips.



Evenly spread grease over entire gasket.

STEP 7: BG-Series

Load filter(s) into housing ensuring the filter(s) is/are installed in the correct position.

- When airflow is horizontal, separators—or pleats—of prefilter(s) and HEPA filter(s) must run vertically, and carbon beds of carbon adsorbers must run horizontally.
- When sliding the filter(s) in the housing, it is helpful to use the pressure bars on the locking mechanism as guides by butting the non-gasket side of the filter(s) to the bars and gently, but firmly, pushing the filter(s) until it touches the back of the housing, or as far as can be reached.
- On multi-wide filter housings, repeat procedure for each filter until all filters are installed.
- On three-wide filter housings, it may be necessary to use the second filter to push the filter all the way to the back of the housing.

Note: Airflow arrows on filters normally indicate the direction of airflow during the manufacturer's factory testing. When installed in a system (filter housing), air may flow through a HEPA filter or adsorber from either direction. It is important that the filter sealing gasket is in contact with the filter housing's sealing surface.

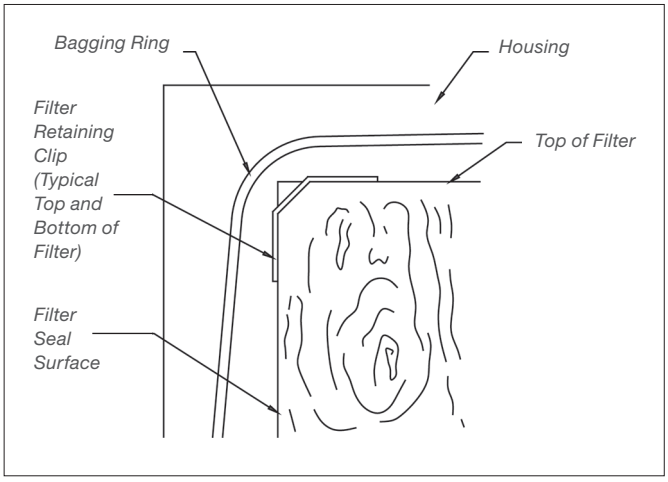
Install HEPA filters with pleats in vertical position.

Install adsorbers with beds in horizontal position.

Caution for Seismic BF and BG-Series Housing Designs Only

One of the features unique to some of AAF Flanders generic seismic qualified filter housing designs is the filter retaining clips. These clips are required on housings with specific seismic loads. The retaining clips are required to keep the filters stable and functioning during a seismic event.

During installation or changeout of filters, care should be taken to avoid contact between clips and filters.



Installation of New Filter Elements

STEP 8: BG-Series

Lock filter(s) in place to the housing sealing surface by alternating from top locking mechanism to bottom locking mechanism.

- First, turn top locking mechanism clockwise with ratchet until filter(s) is snug, not completely tightened.
- Second, turn bottom locking mechanism until filter is completely tightened. There are factory-installed stops to determine when the filter is sealed.
- Third, completely tighten the top locking mechanism. There are factory-installed stops to determine when the filter is sealed.
- The filter(s) is now sealed.

Note: Refer to chart below for maximum recommended torque for locking mechanism of various size housings.

Filter Locking Mechanism Torque Requirements		
Housing Filter Width	Normal Torque Required to Seal Filter(s)	Maximum Torque* Limit
One (1) filter wide	11–13 ft. lbs.	18 ft. lbs.
Two (2) filters wide	22–23 ft. lbs.	28 ft. lbs.
Three (3) filters wide	32–38 ft. lbs.	43 ft. lbs.

**Exceeding these limits could damage mechanism*

STEP 9: G1F and G1G Series

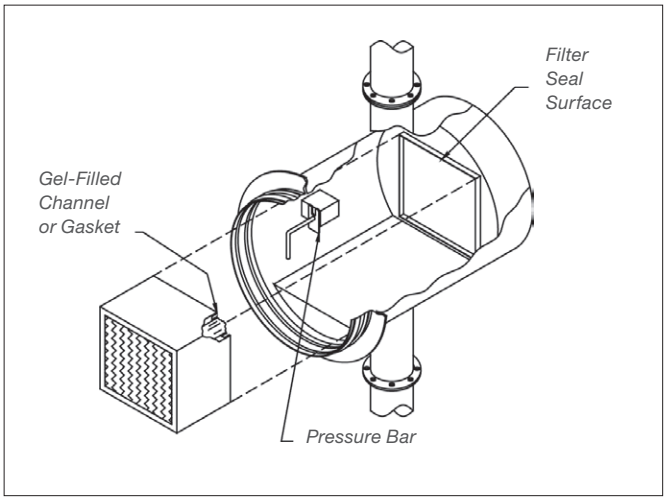
- If the clamp arm handles are pointing toward the center of the housing, they will not permit filter installation.

  Pull the handles and turn 90° to one side (*stops will permit turning in one direction only*).

STEP 10: G1F and G1G Series

Pick up the filter by the frame, taking care not to touch the filter element. If the door is on the side of the housing, turn the filter so that the pleats in the medium are vertical. The filter sealing surface must face toward the housing seal surface. Take care not to hit the clamp arm handles with the filter. The clamp arms will help guide the filter onto the knife edge. When the filter in G1F housings meets the knife edge, there will be some resistance; however, push the filter frame firmly until it will go no further. This mates the knife edge into the gel-filled channel. For G1G housing see Step 6 to help prevent filter gasket from sticking to the housing.

Filter clamping mechanism for G-Series.



STEP 11: G1F and G1G Series

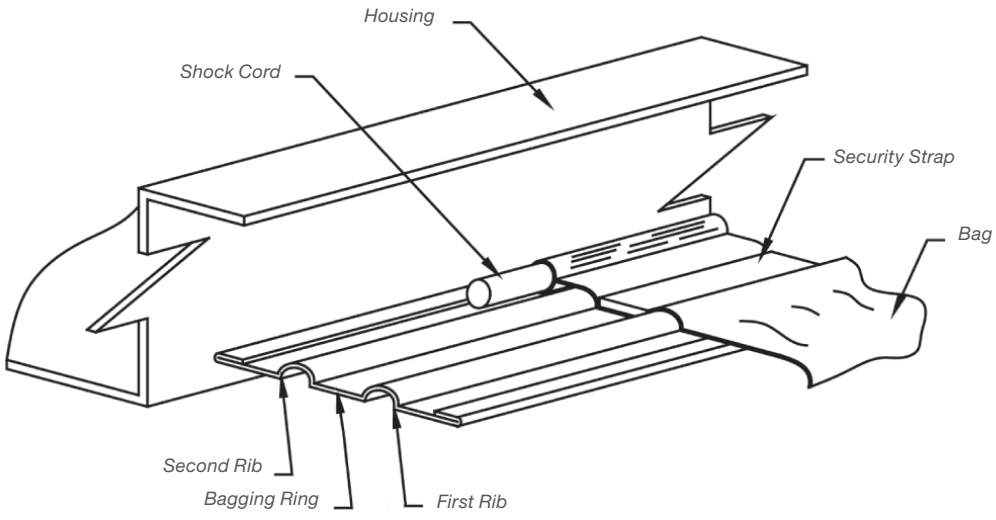
- Turn the clamp arm handles 90° toward the filter. Each handle will snap into place, indicating that the clamping mechanism is locked, holding the filter onto the knife edge of the G1F housing.
- Turn the “T” handles on the clamping arm until the clamping arm pressure bar bottoms out on the pressure bar stops for the G1G housing.

Filter locked into place on G-Series housing.

STEP 12: BF-Series, BG-Series, and G-Series

- Place plastic bag over bag-in/bag-out ring. Shock cord of plastic bag is to be located between second rib of bag-in/bag-out ring and the housing frame.

It is easier to work bag from bottom to top of bag-in/bag-out ring. Locate seam of bag at top of ring, so gloves in bag are in the correct position.



Installation of New Filter Elements

STEP 13: BF-Series, BG-Series, and G-Series

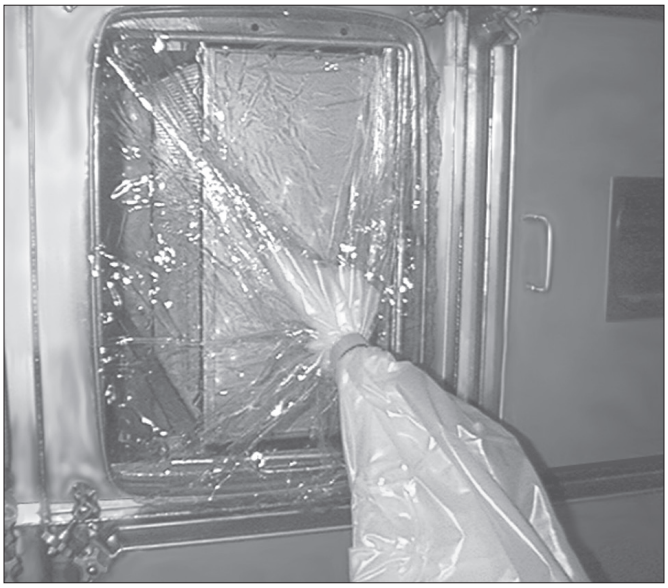
- Locate security strap between first and second ribs of the bag-in/bag-out ring.
- Loop the end of the security strap through the D-ring.
- Tighten security strap and secure any excess strap so it won't interfere with the door seal when it is replaced.

Locate D-Ring on strap at top of bag-in/bag-out ring before tightening.

Pull strap until it is tight around the bag-in/bag-out ring. Press Velcro together. Secure excess strap so it will not interfere with the door seal.

STEP 14: BF-Series, BG-Series, and G-Series

- Gather bag at a point near the lip of the bag-in/bag-out ring, drawing the bag taut (being careful not to pull the bag off the bag-in/bag-out ring). Allow the slack to fall off to the side.
- Place the cinching strap around bag and pull taut.



The nylon cinching strap helps minimize the possibility of the bag being drawn into the housing during operation.

STEP 15: BF-Series, BG-Series, and G-Series

- With security strap in place, extend bag out completely.
- Fold end of bag so corners are together, then fold bag towards housing using a folding or rolling motion, as shown in the illustration below.
- Squeeze trapped air out of folded portion of bag after each fold. Continue folding bag until slack in bag is neatly tucked within bag-in/bag-out ring, and the bag window (clear portion) is taut and evenly distributed around the bag-in/bag-out ring.

STEP 16: BF-Series, BG-Series, and G-Series

- With bag folded and tucked neatly inside of bag-in/bag-out ring, replace access door.
- Alternate tightening the aluminum knobs until door is sealed securely *(follow door tightening instructions on next page).*

Filter access door tightening sequence.

Installation of New Filter Elements

Door Tightening Instructions

a. Put the door in place, being careful not to disturb the gasket.

b. If swivel door latches are used, you may have to adjust the door position to assure all four (4) latches line up and fit properly.

c. Hand tighten all retaining knobs.

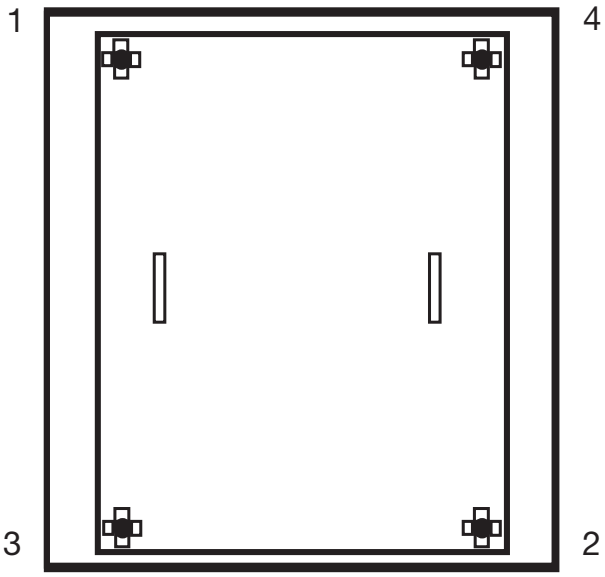
d. Torque any knob to 10 foot-pounds (120 inch-pounds).

e. Repeat the torquing of the knob on that door diagonal.

f. Repeat ***c*** and ***d*** for all remaining knobs.

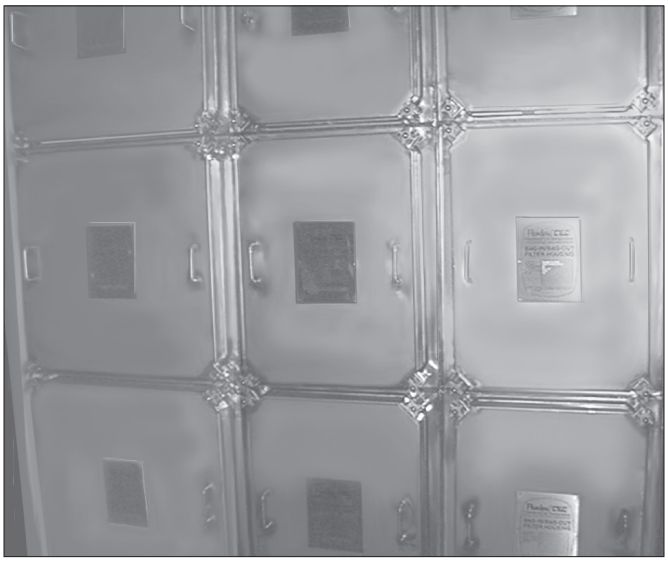
g. Visually check the door seal by observing the interface between the gasket and the gasket sealing surface. Adequate compression is achieved when the gasket flattens at the interface. Another indication of adequate compression is when the visible surface of the gasket becomes creased due to compression.

h. If steps ***a*** – ***f*** do not create an acceptable seal, increase the torque in the sequence indicated until a maximum of 20 foot-pounds (240 inch-pounds) of torque is applied.



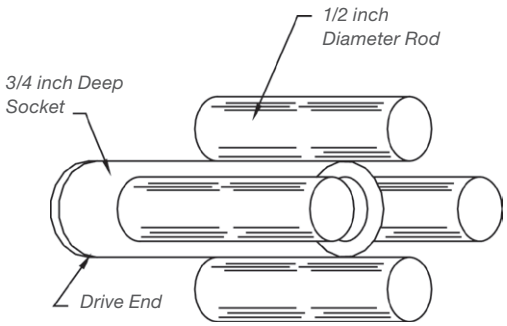
Filter access door tightening sequence.

Alternate tightening knobs for best door seal.



System ready for operation.

Optional Door Knob Drive Assembly



Note: See spare parts list on pg. 46

Note: Whenever aluminum door knobs are threaded over the stainless steel door mounting bolts, aluminum shavings may deposit in the threads of the door bolts.

Shavings must be removed from the bolt threads to ensure the effectiveness of the required door knob torque.

Replacing Dirty Filters

Materials and Tools Required:

All bag-in/bag-out housings

- New filters or adsorbers
  (check for correct quantity, type, size, and model number)
- New plastic changeout bags
  (check for correct quantity, type, size, and model number)
- One (1) plastic changeout bag
  (already in place)
- One (1) security strap per access door
  (already in place)
- One (1) cinching strap per access door
  (already in place)
- AAF Flanders' optional filter removal tray or support stand for filters or adsorbers
- AAF Flanders' optional banding kit or other bag sealing device
- Grey duct tape or a good-adhering electrical tape
- Scissors or knife capable of cutting the bag

BF-Series and G-Series Fluid Seal Housings

- No tools are required

BG-Series, Gasket Seal Housings

- Standard ratchet with short extension and ¾″ socket
- Filter release agent (silicone grease)
- Torque wrench

Preface

To accomplish a filter changeout, provisions must first be made to stop or bypass the airflow through the housing. The simplest method is to shut down the system, but at times operation will not permit a complete shut down. To perform a filter changeout on an individual housing without disrupting the entire system, a set of airtight dampers (one upstream and one downstream of the housing), and a breather with a small HEPA filter is incorporated to equalize the pressure.

For the purpose of this manual we will describe the more complex bypass method. However, if you choose to shut down, please ignore the points in the procedure pertaining to the bypass method.

Note: To minimize possible contamination, shut-off dampers should be closed (if available), even if airflow is completely shut down. Another point that you may want to discuss with your safety officer before beginning is the method of sealing the contaminated filter inside the bag. In the procedure that follows, we have described the banding method of sealing the bag, which minimizes exposure of personnel and the surrounding area to contamination. *(See AAF Flanders' Banding Kit Bulletin for details.)*

An alternative to the banding method is the twist-and-tape, or heat-sealing method. Sealing filters by the twist-and-tape method involves tightly twisting an 8- to 10-inch section of the bag, taping the twisted section and severing the section in the middle. While the two ends are held tightly to prevent them from unraveling, a second person quickly tapes the exposed ends to seal off contamination.

We leave the method that best suits the application to the discretion of the user.

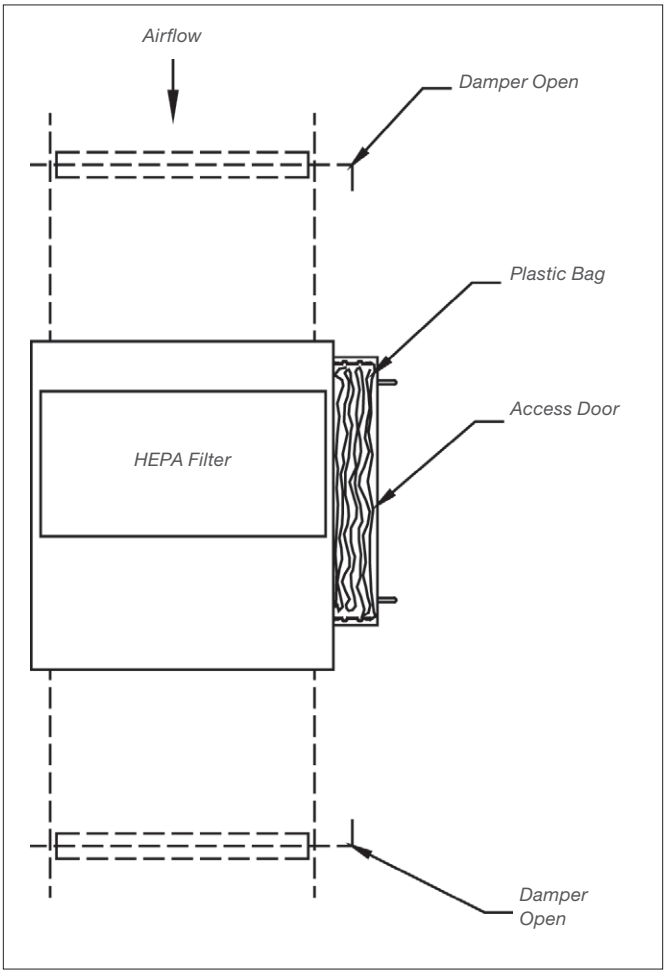
Note: As an extra measure of safety to maintenance personnel, it is recommended that protective clothing, gloves, and respirators be worn when changing filters contaminated with dangerous materials. Consult your safety officer.

Replacing Dirty Filters

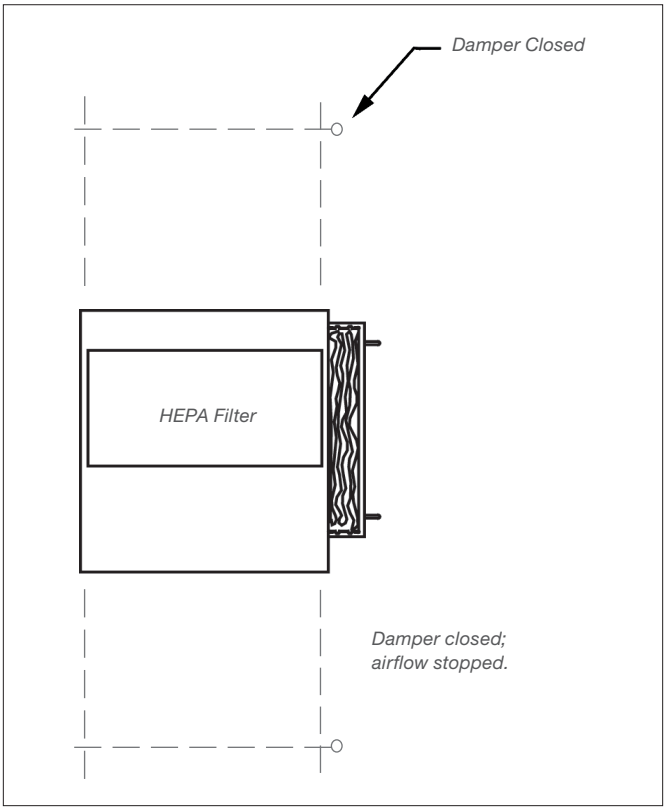
STEP 1: BF-Series, BG-Series, and G-Series

Note: The following filter changeout and banding procedure is intended as a guide and may not comply with your on-site safety regulations. Because there is a possibility that a contaminant might become trapped between the two stainless steel bands, this procedure, as well as all others relating to the bag-in/bag-out process, should be reviewed and approved by the user's safety officer.

For maximum safety, proper clothing should be worn before starting the process of filter changeout. It is recommended that two (2) persons do the changeout of prefilters and HEPA filters. Three (3) persons may be needed for carbon adsorbers.



System operating in normal position: filter in place, door on, dampers open, air flowing.



CAUTION!

For Extreme Operating Temperatures

If the bag-in/bag-out filtration system has an operating temperature above 130°F or below 0°F, consideration should be given to the PVC filter changeout bag inside the access door.

Under extreme high or low operating temperatures, the filter changeout bag may become brittle and unworkable.

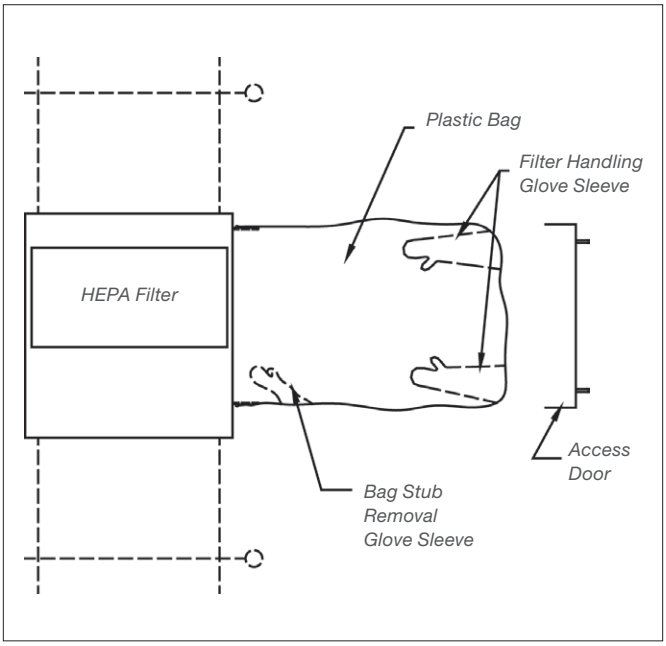
After removing the door and before unfolding the bag, carefully check the bag's flexibility to determine if a changeout can be conducted using the bag. If the bag is unworkable, remove the security strap and place a new bag over the old bag.

Pull the old bag into the new bag. The old bag may now be removed with the dirty filter, using a new bag, by following the changeout procedure.

STEP 2: BF-Series, BG-Series, and G-Series

- Remove housing access door.
- If purchased, secure optional filter removal shelf.

Remove door.



STEP 3: BF-Series, BG-Series, and G-Series

- Unfold and inspect bag.
- Remove the 12" cinching strap; however, leave the safety strap on the bag-out ring.

Extend bag and inspect carefully to ensure that the bag has incurred no damage.

STEP 3A: BF-Series

- Release locking mechanism handle from handle latch *(push on handle to release tension on latch, if needed).*
- Swing locking mechanism handle to the fully open position to clear filter(s) from sealing knife-edge.

STEP 3B: BG-Series

- Unlock the filter(s) or adsorber(s) by turning both locking mechanisms counterclockwise with a ratchet.

STEP 3C: G-Series

- Turn the clamp arm handles 90° away from filter or adsorber.

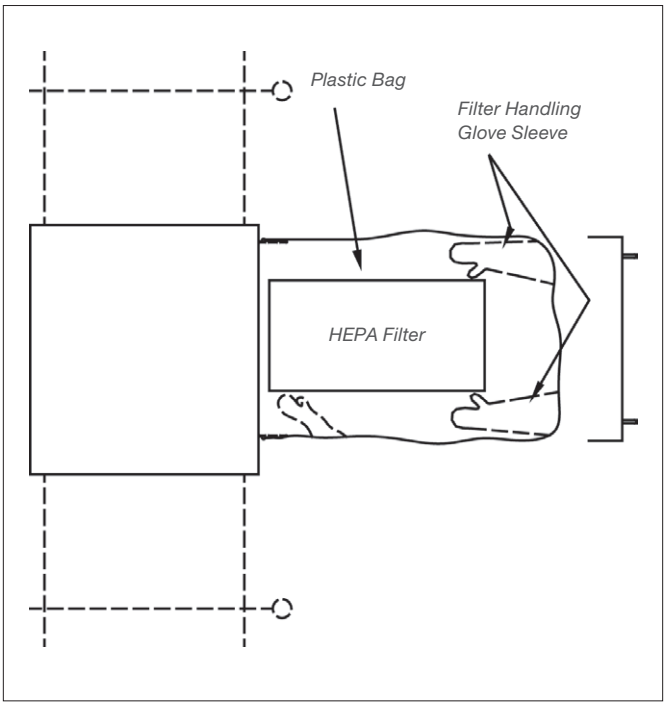
Replacing Dirty Filters

STEP 4: BF-Series, BG-Series, and G-Series

Place hands and arms in filter removal glove sleeves.

Place filter on sturdy table, stand, shelf, or floor. Remove arms from bag, leaving glove sleeves inside.

Slowly and carefully remove filter from housing; hold filter at top and bottom of frame.



- Remove dirty filter from housing into bag.
- If possible, inspect the filter sealing surface of the housing to ensure that no foreign matter will interfere with the new filter to be installed.

Note: After disengaging the BG-Series gasket seal filter locking mechanism, it may be necessary to wait a few minutes to allow the filter releasing agent (silicone grease) to release the filter gasket from the housing's filter sealing surface.

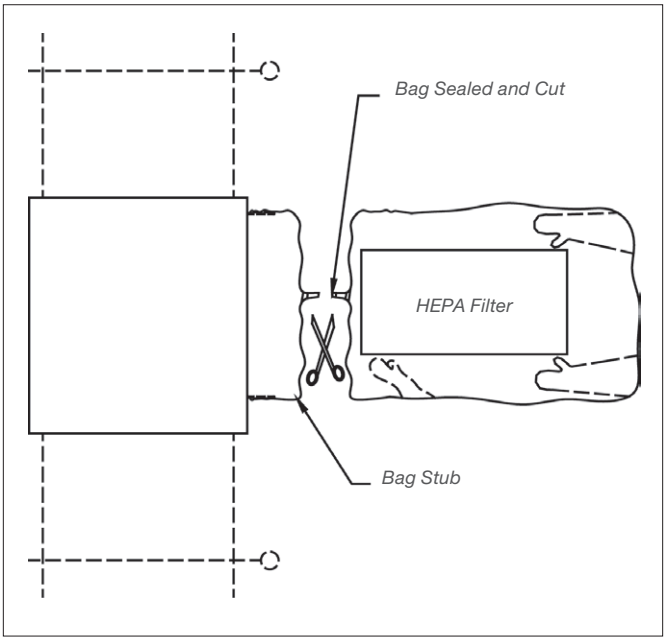
STEP 5A: BF-Series, BG-Series, and G-Series

- Seal the dirty filter into the bag with the two stainless steel bands ¼" apart.
- Separate dirty filter from system by cutting between the bands.

Note: If the twist-and-tape method is used, then tightly twist and tape approximately 8 inches of the section of bag between the bag window and the dirty filter. Cut in middle of taped section. Tape over stubs where bag was cut. If the unit is a single-filter system, proceed to Step 6. If the unit is a two-filter system, see Step 5B.

Using the AAF Flanders optional Banding Kit, cinch with metal bands.

Place tape over cut bag end.



Remove dirty filter.

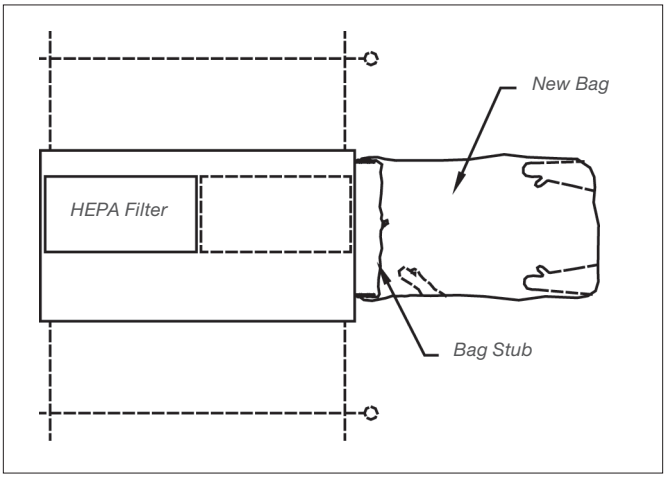
Note: Disposal must be in accordance with your site's procedures.

Replacing Dirty Filters

STEP 5B: BF-Series, BG-Series, and G-Series

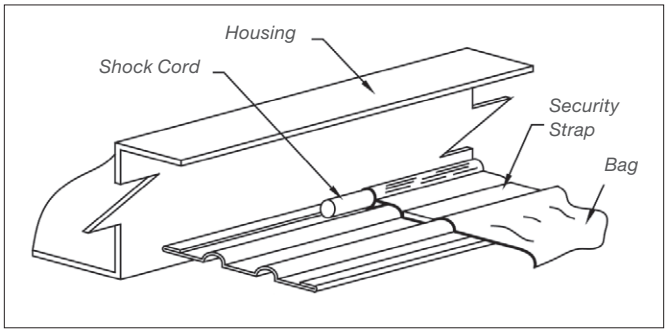
- Remove security strap and maneuver shock cord of the bag stub (remainder of bag used on first filter) so it is between the two ribs of the bagging ring and place a new, empty bag around the bagging ring past the second rib, as shown in diagram at right.
- Place arm in the *Bag Stub Removal Glove Sleeve*.
- Carefully remove the bag stub from the bagging ring without pulling the new bag off of the bagging ring. Second operator assists by ensuring new bag does not come off ring with bag stub.

Note: If there are contaminated filters still in the housing (a multi-wide), the bag stub does not have to be drawn into the Bag Stub Removal Glove Sleeve at this time. This bag stub can be worked to the back of the new bag, and bagged-out with the second dirty filter.



- Place arms in the *Filter Handling Glove Sleeves*.
- Draw the second dirty filter to the access ring by pulling the filter removal rod *(refer to the illustration on page 5)*.

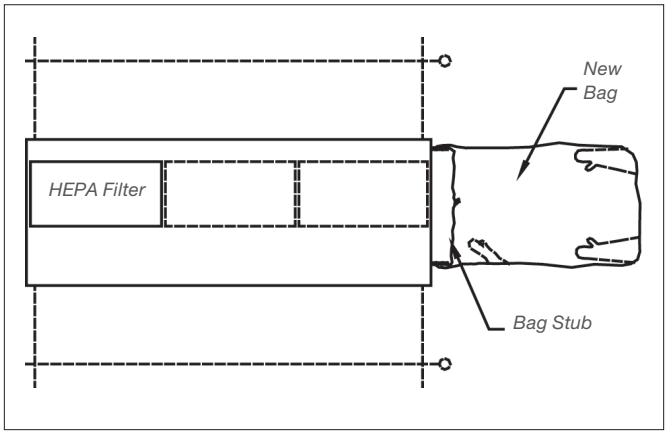
Note: Once the second dirty filter is in the place of the first dirty filter, slide the removal rod back and changeout the second dirty filter by repeating steps 3 and 4. If all filters have now been removed, proceed to Step 6. If the unit is a three (3) filter wide system and one dirty filter remains, go to Step 5C.



Location of Security Strap.

STEP 5C: BF-Series, BG-Series, and G-Series

- Maneuver shock cord of bag stub (remainder of bag used on second filter) so it is between the two ribs of the bagging ring and place a new empty bag around the bagging ring as shown in the diagram below.

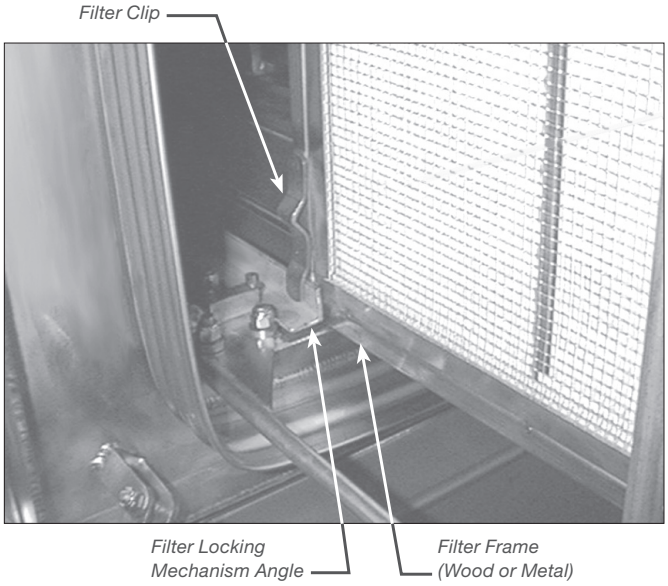


- Remove bag stub and third dirty filter as described in step 5A.
- All dirty filters have now been removed. Proceed to step 6.

STEP 6: BF-Series

- Ensure filter clips are properly installed.
  (Refer to filter manufacturer's instructions if clips have not been factory installed.)

Note: *Filter clips must interface with filter locking mechanism angle at top and bottom of filter as shown in diagram.*



Filter clip to mechanism angle detail.

ATTENTION: Optional Step for BG and G1G

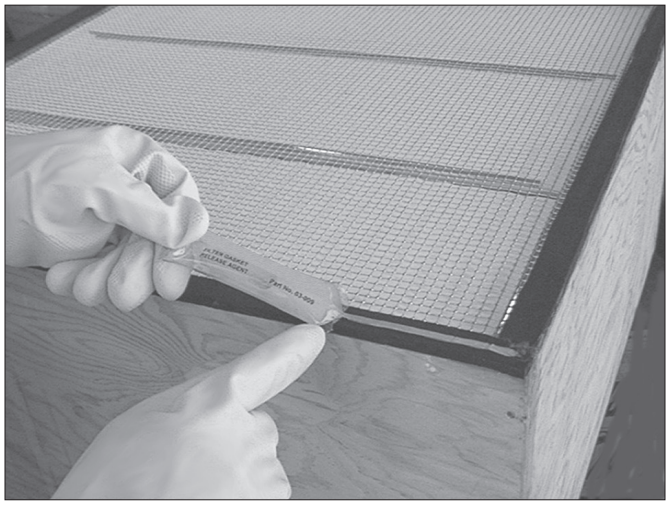
Step 7: BG and G1G Series Optional

- Optional: Coat each new filter gasket with a silicone grease (AAF Flanders' Part Number 03-009) before installation. This will help prevent the filter gasket from sticking to the housing sealing surface after being compressed for an extended period.
- Apply a $\frac{1}{8}$–$\frac{3}{16}$" diameter bead of this silicone grease to the middle of the entire ¾" wide gasket.
- Spread the grease evenly across the entire gasket face.

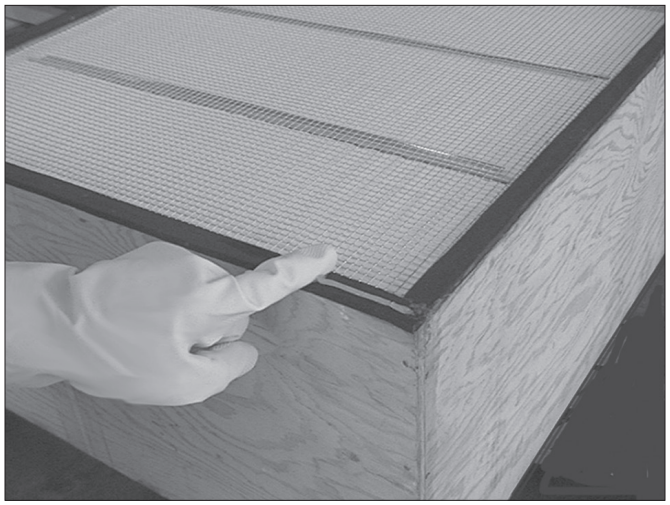
Note: This thin coating of silicone grease acts as a release agent, and will also help achieve and maintain a good filter-to-housing seal.

CAUTION: Do not use RTV (room temperature vulcanizing). RTV would stick filter to housing, thereby causing potential problems of filter removal.

BG-Series Optional Step



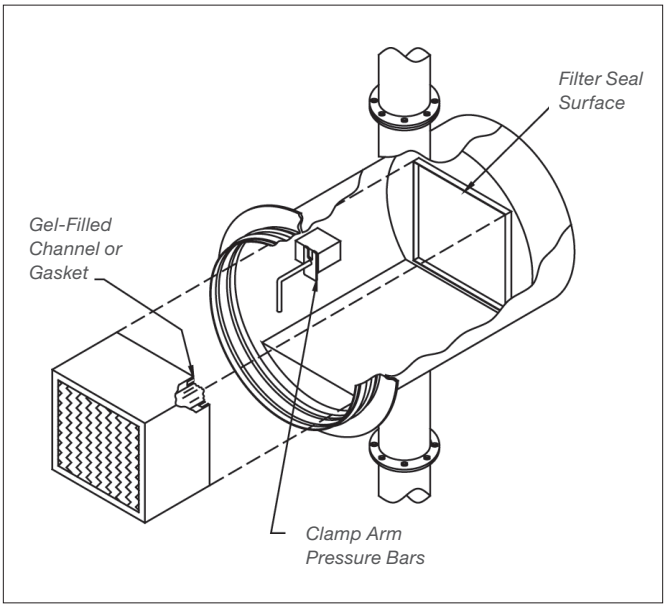
Optional: Apply grease to gasket strips.



Spread grease.

- Optional: Apply a band of grease on the center of the gasket strips.
- Evenly spread the grease over the entire gasket.

STEP 8: G-Series



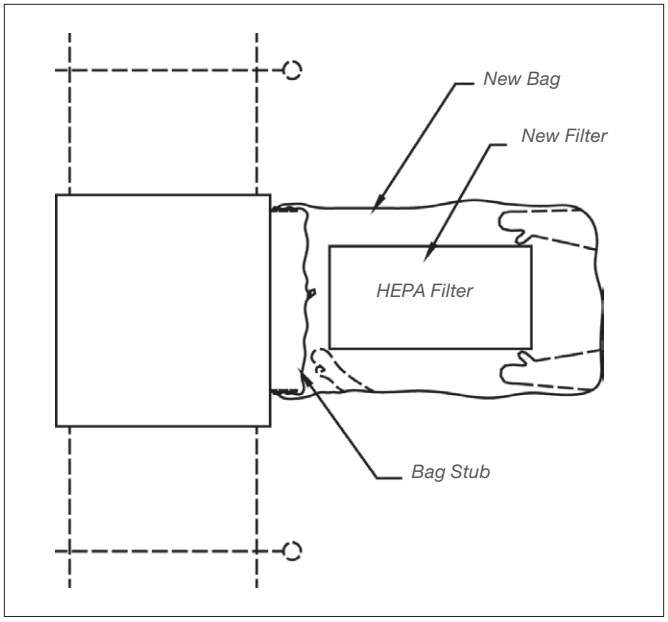
- Pick up the filter by the frame, taking care not to touch the filter element. If the door is on the side of the housing, turn the filter so that the pleats in the medium are vertical (see diagram above). The filter sealing surface must face toward the housing seal surface. Take care not to hit the clamp arm handles with the filter. The clamp arms will help guide the filter onto the knife edge.

Note: If the clamp arm handles are pointing toward the center of the housing, they will not permit filter installation. Pull the handles and turn 90° to one side *(stops will permit turning in one direction only).*

When the filter in G1F housings meets the knife edge there will be some resistance, but continue to push the filter frame firmly until it will go no further. This mates the knife edge into the gel-filled channel. For G1G housing see Step 7 to help prevent filter gasket from sticking to the housings.

STEP 8A: BF-Series and BG-Series

- Place a new filter inside a new bag.
- Position the filter deep enough inside the bag so that the filter is past the *Bag Stub Removal Glove Sleeve*.
- Remove security strap, proceeding very cautiously until the strap is back in place.



Carefully pull shock cord of bag to bottom of filter.

- Move old bag stub back to the first rib of the bagging.
- Install new bag with new filter inside the bag.
- Position new bag over the bag stub up to the second rib of the bagging ring.
- Locate security strap between first and second rib of the bagging ring.

Pull remainder of bag down over filter.

Pull bag down until filter is at back of bag.

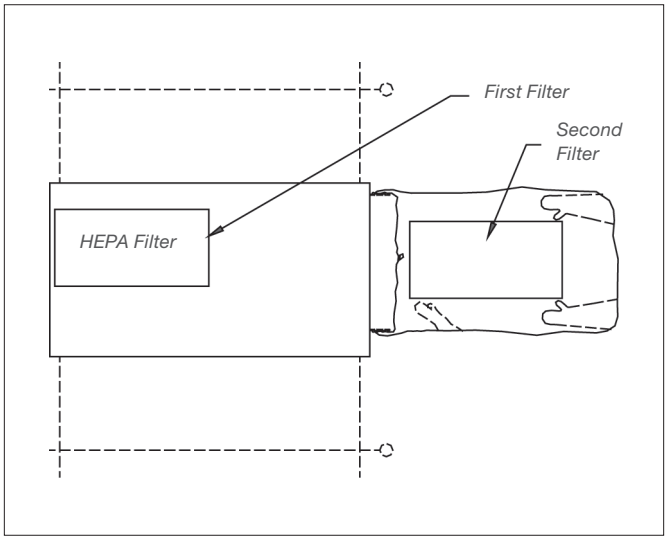
Fully extend bag.

STEP 8B: BF-Series, BG-Series Two (2) Wide Housing

- With the first filter now installed, use the AAF Flanders Banding Kit, or twist and tape the bag attached to the housing to make a stub.

Note: Band, or twist and tape, the bag at a point between the Bag Stub Removal Glove Sleeve and the bagging ring so that the previous bag stub will be removed along with the excess of the new bag.

- Place a new filter (the second to be installed) in a new bag (*see diagram at right*).
- Repeat Step 8A to install the second filter. If the filter is now completely full, proceed to Step 9. If the housing requires one more filter, go to Step 8C.



Place new bag on ring over the old bag stub.

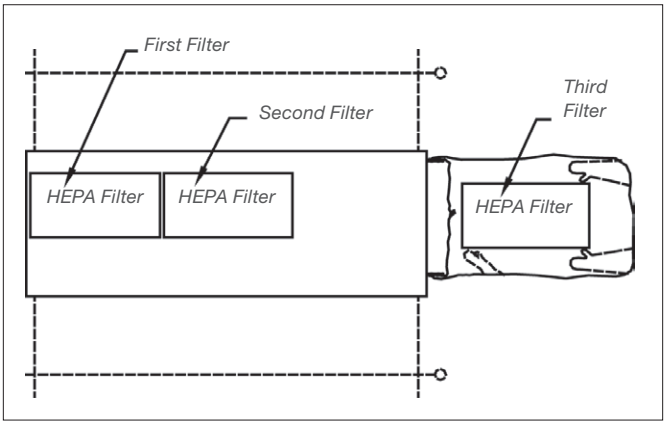
Note: Be careful not to cut the bag with the stainless steel band, which is exposed on the stub.

Remove old bag stub using new bag glove sleeve.

Note: Be careful not to pull the new bag off the ring.

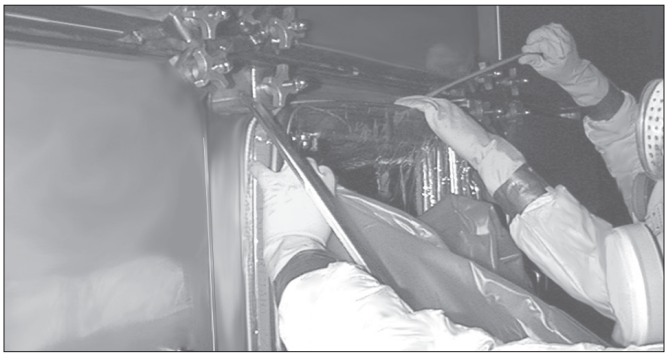
STEP 8C: BF-Series, BG-Series Three (3) Wide Housing

- With the second filter now installed, band or twist-and-tape the bag attached to the housing, to make a stub.
- Place a new filter (the third to be installed) in a new bag. (*See diagram at right.*)
- Repeat step 8A to install the third filter. With all filters now in place, proceed to step 9.

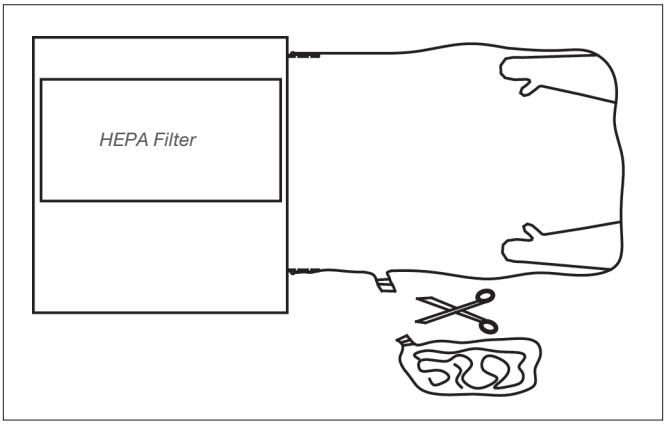


STEP 9: BF-Series, BG-Series, and G-Series

- Install security strap before removing bag stub (*see page 22*).



Security strap installation.



STEP 10: BF-Series, BG-Series, and G-Series (Optional)

- With the final new filter installed, ensure that the remaining bag stub is packed tightly inside the Bag Stub Removal Glove Sleeve.
- Remove arms from the Filter Handling Glove Sleeves, leaving the glove sleeves inside the bag.
- Separate the contaminated bag stub from the new bag by either the banding process, using AAF Flanders's Banding Kit, or by the twist-and-tape method.

Note: If the user prefers, and the bulk of the bag stub will not interfere with the access door seal, the bag stub can remain in the new bag.

Grip bag while turning glove sleeve inside out.

Replacing Dirty Filters

STEP 11: BF-Series

- Seal filter(s) or adsorber(s) to housing sealing knife edge by swinging locking mechanism arm toward handle latch.

STEP 12: BG-Series

- Seal filter(s) or adsorber(s) to housing sealing surface by turning locking mechanism clockwise with a ratchet.

STEP 13: G-Series

- Turn clamp arm handles 90° toward filter. Each handle will snap into place.

STEP 14: BF-Series, BG-Series, and G-Series

- Install cinching strap, as described in Installation of New Filters, step 14, page 22.

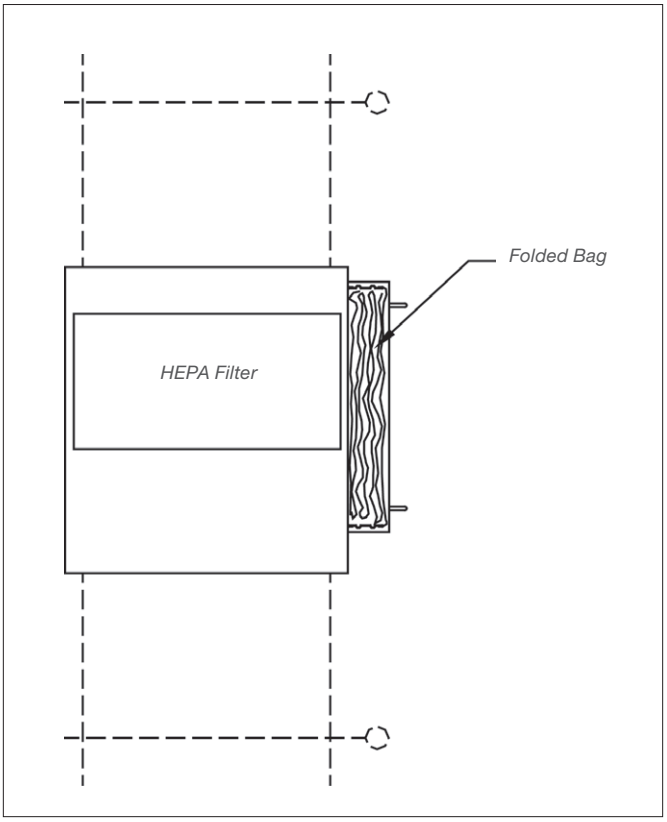
Cinching strap installation.

STEP 15: BF-Series, BG-Series, and G-Series

- Neatly fold bag so it will not interfere with door seal; store inside access ring.

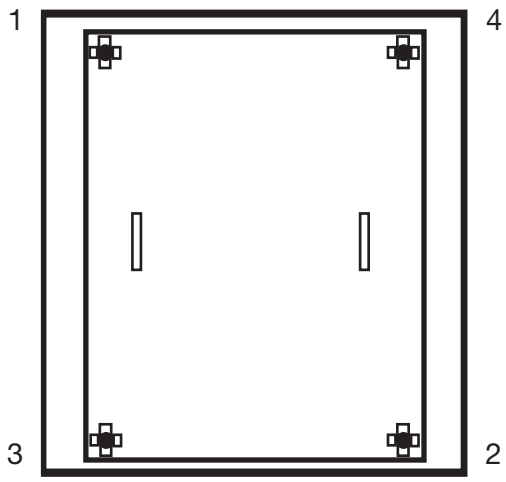
Fold bag towards door.

Neatly store bag inside bag-in/bag-out ring.



STEP 16: BF-Series, BG-Series, and G-Series

- Replace access door and make certain that aluminum knobs are tightened so there is evenly distributed pressure around bag-out ring.



Filter access door tightening sequence.

Door Tightening Instructions

A. Put the door in place, being careful not to disturb the gasket.

B. If swivel door latches are used, you may have to adjust the door position to assure all four (4) latches line up and fit properly.

C. Hand tighten all retaining knobs.

D. Torque any knob to 10 foot-pounds (120"–pounds).

E. Repeat the torquing of the knob on that door diagonal.

F. Repeat ***C*** and ***D*** for all remaining knobs.

G. Visually check the door seal by observing the interface between the gasket and the gasket-sealing surface. Adequate compression is achieved when the gasket flattens at the interface. Another indication of adequate compression is when the visible surface of the gasket becomes creased due to compression.

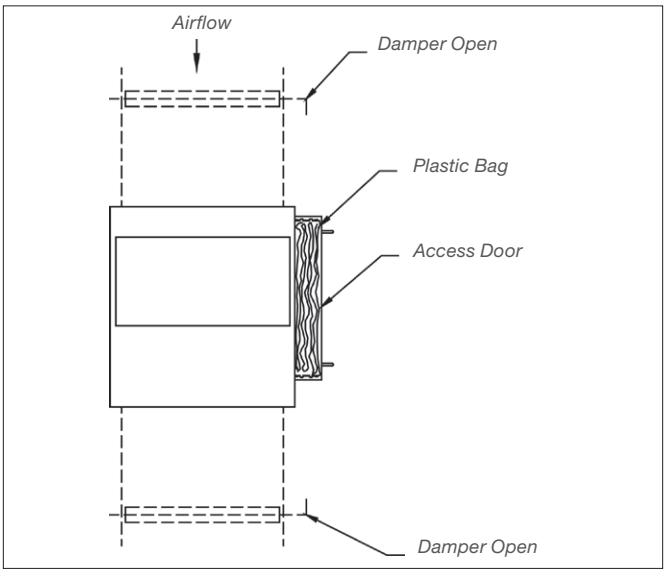
H. If Steps ***A*** – ***F*** do not create an acceptable seal, increase the torque in the sequence indicated until a maximum of 20 foot-pounds (240 inch–pounds) of torque is applied.

Alternately tighten knobs.

STEP 17: BF-Series, BG-Series, and G-Series

- Open damper to allow air through the system. The filter changeout is now complete.

Housing ready for operation.



System operating in normal position: filter in place, door on, dampers open, air flowing.

System Maintenance

Proper maintenance of the containment filter housing(s) is essential for proper operation. In this regard, there are at least two important considerations, as follows:

1. **Components** – The components may be particulate filters, gas adsorbers, or both.

   A. Particulate filters are no longer functioning properly when any one the following occurs:
      i. The pressure drop across the filter exceeds system design.
      ii. The HEPA filter in-place leak test shows an unacceptable penetration of challenge aerosol.

   B. Gas adsorbers are no longer functioning properly when any one of the following occurs:
      i. An analysis of the system effluent shows unacceptable levels of the gas or vapor the system was designed to remove.
      ii. The in-place adsorber leak test shows an unacceptable penetration of challenge vapor.

2. **The System Envelope** – The system envelope is the containment structure built by AAF Flanders. This structure may be a single housing or a complete filter train, depending upon the scope of the contract. The envelope is no longer functioning properly when any of the following occurs:

   A. A periodic visual inspection reveals gaps between gaskets, broken welds, stripped threads on doors or locks, or any other indication that the system's ability to contain the process airstream has been compromised.

   B. Other planned surveillance testing reveals flaws not visible.

Note: Items 1 and 2 indicate that the owner must commit to the following, in order to keep the AAF Flanders system at peak operating efficiency:

1. A systematic approach to component maintenance, which includes having qualified in-place testing personnel perform periodic tests and inspections on the components and systems.
2. A systematic approach to maintaining the filter housing, which will include as a minimum, periodic inspections and a prompt and sufficient program of needed repairs.

Instructions for Replacement of Filter Access Door Gaskets

Materials and Tools Required:

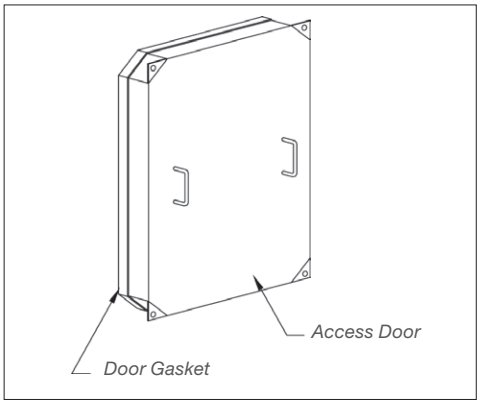
1. **Replacement gasket** (AAF Flanders Part No.109902101 [standard neoprene] or Part No. 100001531 [optional soft silicone]) cut to customer's requested length, extruded, close cell, gasket). For each door, one continuous piece equal in length to the door perimeter is required.
2. **Adhesive** (AAF Flanders Part No. 100000909) glue or equal for standard neoprene door gasket. If optional silicone door gasket is used, AAF Flanders Part No. 101707903 RTV adhesive or equal should be used.
3. **Caulking gun** for adhesive application, or a squeeze bottle for glue.
4. **Cutting tool** – sharp knife, utility blade, or scissors for cutting gasket.
5. **Cleaning solvent** for removal of old adhesive *(suggestion: MEK – Methylethylketone – or equivalent).*

STEP 1: Removal of Old Door Gasket

A. Remove filter access door from filtration system in accordance with filter housing's operation and maintenance manual and all applicable site safety procedures.

B. Remove old door gasket from the door by cutting, pulling, or scraping until all extruded gasket is removed.

C. Scrape or peel all adhesive off the hemmed edge of the door. Thoroughly wipe clean with a cleaning solvent to remove all adhesive, grease, oils, and dirt.



ASME N509, N510, and ASME AG-1 (all available from ASME, 345 East 47th St., New York, N.Y. 10017) can provide ample information regarding testing and maintaining filter housings and components. AAF Flanders is available to answer any questions regarding the systems and components provided by us. ***Call AAF Flanders at 1-800-800-2210.***

STEP 2: Fitting (Sizing) New Gasket Strip

A. Study the section views of the extruded gasket and hemmed edge of the door (shown in the diagram to the right). Note the shape of the extruded gasket as it is designed to fit snugly over the door's hemmed edge. *(This is the only correct way to position the gasket over the door's hemmed edge.)*

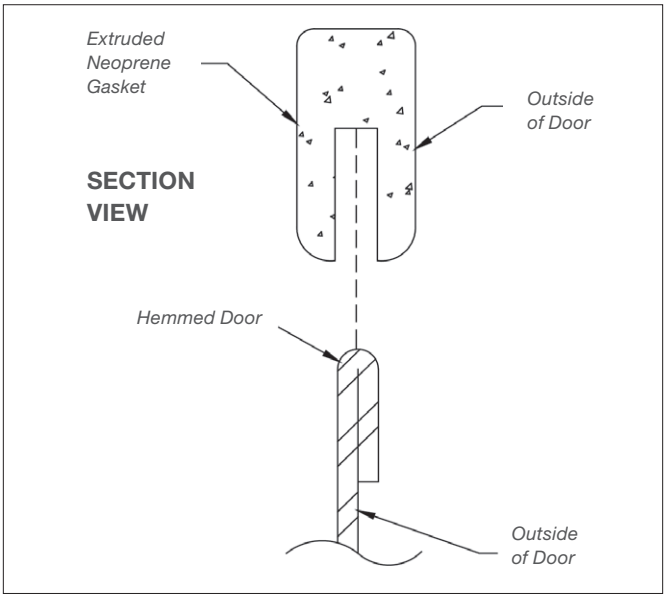
B. Locate replacement gasket roll. Examine end of gasket roll to ensure cut edge is smooth, clean-cut, and that it is square with sealing face of extruded gasket. There will be one joint in the door gasket, and it is extremely important to make the cuts on the ends of the gasket strip as neat and square as possible. If the end of the gasket roll does not have the desired square cut, then cut off a small piece of gasket so the end will be square.

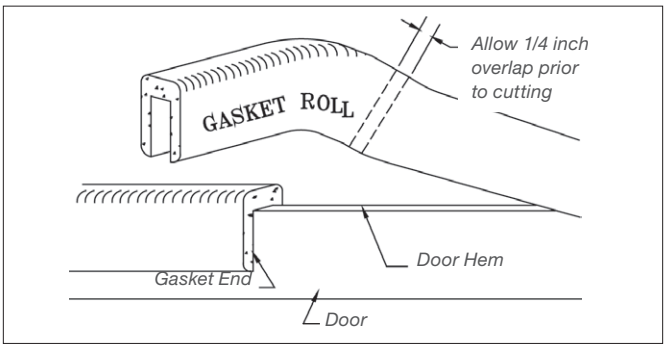
C. Position the door on the work table so the hemmed edge is up. Place extruded gasket over the door edge. Start with the end of the gasket roll in the approximate center of one of the four door sides. One of the long sides usually works best. Ensure the hemmed door edge bottoms-out inside the extruded gasket as you work the gasket around the perimeter of the door. Continue around the door until you return to the starting point.

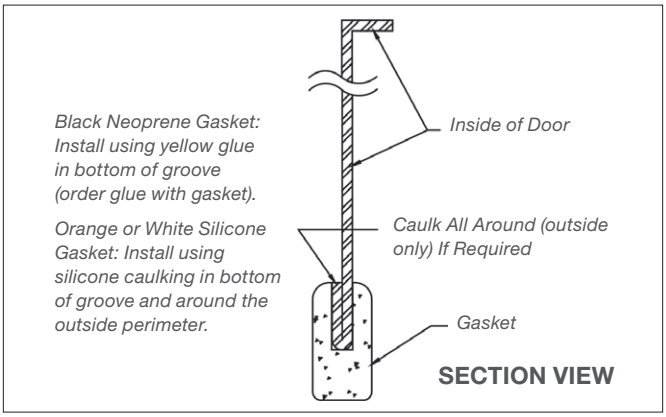
D. Locate gasket cutting tool. Allow approximately ¼" overlap of gasket roll over the starting end of the gasket. Cut the gasket at this mark, ensuring cut is square and smooth.

Note: Allowing ¼"overlap permits the ends of the gasket strip to compress against one another while the adhesive dries.

E. Inspect newly cut gasket strip on edge door. Gasket should fit snugly all around the door with unglued ends in full contact with one another. The gasket strip should not be overly stretched, or have a tendency to bow or pucker up. If the new gasket strip appears to fit properly, remove it from the door.







STEP 3: Installing New Gasket Strip

A. Locate the correct sealant and caulking gun or squeeze bottle (see materials and tools required, Item No. 2, page 39). Cut tip off nozzle on tube of RTV sealant so that a bead of sealant approximately ⅛" – 3⁄16" diameter will be produced. Insert the tube into the caulking gun.

B. Insert nozzle of sealant tube into channel of extruded gasket. Deposit a continuous bead ⅛" – 3⁄16" of adhesive at the bottom of the extruded gasket channel.

C. Set caulking gun/squeeze bottle aside. With thumb and finger of one hand, gently pinch the extruded gasket together while pulling the gasket strip with the other hand until the entire length of the gasket strip has the bead of adhesive evenly displaced inside the channel.

D. Apply an even layer of adhesive (not too thick) over the entire face area of both ends of the gasket strip.

(continued next page)

Installing New Gasket Strip (continued)

E. Carefully replace the new gasket strip over the hemmed edge of the door as it was when fitted in Step B. Ensure that the edge of the door bottoms out inside the gasket channel, and that the ends of the strip are aligned at the joint.

F. Carefully lift and turn the door over. Gently place the door on a table with the gasket edge down.

G. The adhesive requires approximately 24 hours to fully cure (dry). The door should be placed on a relatively flat surface (i.e., dry, clean floor or table) with the gasket side down during the drying time. (Do not place any weight on top of the door during the drying time.)

H. Check all around the outside edge of the gasket for proper adhesion to the door. An optional bead of adhesive may be added all around the outside only.

I. After the adhesive has fully cured, the door gasket replacement is complete, and the door may return to service.

Notes:

Replacement of the Old BF-Series Fluid-Seal Locking Mechanism

This is a difficult task, and there is a high possibility of loss of containment due to the increased chances of tearing or cutting the PVC changeout bag while handling the metal replacement parts. It is highly recommended that the filter housing be brought to a safe condition (e.g., decontaminated) so that replacement of the locking mechanism can be accomplished without the use or need of PVC changeout bags. This is especially true on multi-wide housings that require access to the back of the housing.

Materials and Tools Required:

- Replacement locking mechanism
- New PVC changeout bags *(check for correct quantity, type, size, and model number)*
- New 3⁄8" – 16 UNC hex nuts
- Standard ratchet with a short extension and 9⁄16" socket
- 9⁄16" open end wrench
- Torque wrench

Note: Referenced item numbers are found on page 41.

STEP 1: Shutdown Airflow through System

If available, close isolation dampers on each side of filter bank.

STEP 2: Remove Filters

Follow instructions, beginning on page 25 of this manual, for the removal of existing filter(s) or adsorber(s). Do not install new filters at this time.

STEP 3: Position Ratchet

- Place a ratchet with a short extension, 9⁄16" socket and 9⁄16" open end wrench in a new bag.
- Position the new bag's shock cord around the bagging ring and over the old bag stub as shown on page 34 of this manual.
- Remove the old bag stub inside the new bag.
- Replace and tighten the security strap around the new bag.

STEP 4: Remove the Old Locking Mechanism

- Using the ratchet, remove the two (2) retaining hex nuts (*see Item No. 5*) from the locking arm plate at both top and bottom locations.
- Using the open end wrench, remove the hex nut (*see Item Number 4*) at the top and bottom from the adjustment stud locations.
- Pry the locking arm plate over the studs at the top and bottom. The locking arm assembly should now be loose and capable of being laid to the side inside the housing.
- Next, with the ratchet and socket, remove each hex nut that retains the locking mechanism trays, both top and bottom (*see Item Number 5*). The trays should now be loose and capable of being pulled into the bag. Also pull the locking arm assembly into the bag at this time. This will permit easier handling through the bag.
- Pull the locking mechanism components into the bag as far as possible.
- Remove from the housing in the same manner as a dirty filter, as shown on page 25 of this manual.

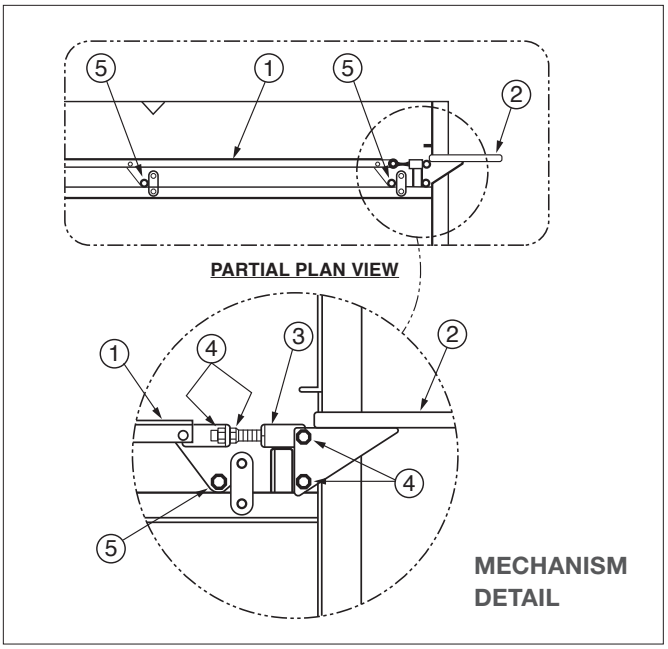
  DO NOT remove the ratchet or mounting hex nuts from the housing at this time.

STEP 5: Inspect Inside of the Housing

Ensure the threads of the existing locking mechanism mounting bolts and mounting surface are clean so the new locking mechanism trays will sit flush in the housing.

STEP 6: Discard the Damaged Locking Mechanism

Dispose of the damaged locking mechanisms according to your site regulations. Check with your health physics or safety officer for proper handling and disposal.



Removable Locking Mechanism

1. Locking Mechanism
2. Locking Mechanism Handle
3. Adjustment Link Tab
4. ⅜" – 16 Hex Nut with Nylon Insert
5. Locking Mechanism Retaining Nut

Kit Replaceable Fluid Seal Locking Mechanism:

Part Number: 97-2950 Kit Replaceable Fluid Seal Locking Mechanism 1/2 Wide (set)
Part Number: 97-2951 Kit Replaceable Fluid Seal Locking Mechanism 1 Wide (set)
Part Number: 97-2952 Kit Replaceable Fluid Seal Locking Mechanism 2 Wide (set)
Part Number: 97-2953 Kit Replaceable Fluid Seal Locking Mechanism 3 Wide (set)

Kit Replaceable Gasket Seal Locking Mechanism:

Part Number: 97-2954 Kit Replaceable Gasket Seal Locking Mechanism 1/2 Wide (set)
Part Number: 97-2955 Kit Replaceable Gasket Seal Locking Mechanism 1 Wide (set)
Part Number: 97-2956 Kit Replaceable Gasket Seal Locking Mechanism 2 Wide (set)
Part Number: 97-2957 Kit Replaceable Gasket Seal Locking Mechanism 3 Wide (set)

Installation of the New BF-Series Gel Seal Locking Mechanism

Note: Referenced items are found on page 41.

STEP 1: Install New Locking Mechanism

- Remove the security strap and position the shock cord of the bag stub between the ribs of the bagging ring.
- Place the new locking mechanism in the new bag and position the new bag's shock cord around the bagging ring and over the old bag stub, as shown on page 34 of this manual.
- Remove the old bag stub inside the new bag. Replace and tighten security strap around the new bag.

STEP 2: Position New Locking Mechanism

- Position the new locking mechanism trays on mounting studs.
- Install ⅜" lock nuts on each stud to fasten the locking mechanism trays at top and bottom locations. Leave all hex nuts loose so locking trays are not completely fastened.
- Next, work the locking handle assembly into place and onto the studs on the top and bottom. It is important to make sure the stud on the adjustment link tab is inserted into the holes, both top and bottom *(see Item Number 3).*
- Install the hex nuts on the studs on the top and bottom locking mechanism using the socket and ratchet *(see Item Number 5).*
- Install the hex nut on the adjustment stud using the open end wrench.
- Torque the hex nuts to approximately 8 foot-pounds (96 inch-pounds).
- Swing the locking arm closed to open and open to closed. If binding occurs, loosen all hex nuts ¼ turn.

STEP 3: Move Tools

Move the tools to a location within the housing where they will not be in the way of installing the filters. Make sure they are moved to a side where you can retrieve them after the filters have been reinstalled. Adjustments to the locking mechanism may be required after the filters are installed.

STEP 4: Install Filters

- Follow instructions, beginning on page 25 of this manual.
- With filter(s) installed and properly aligned, swing the locking arm closed. The locking arm should swing freely until it is 6"–8" from the locking arm catch. This is normal.
- Apply more pressure to the locking arm to engage the catch. If this is not possible, loosen the hex nuts on the adjustment studs at the top and bottom 1/4 turn at a time until locking arm can be engaged in the catch. There should be tension on the locking arm when engaged in the catch.

STEP 5: Remove Tools

- Bag out the old bag stub and tools.
- Follow instructions, beginning on page 22 of this manual.

STEP 6: Start Airflow Through System

Open any isolation dampers that may have been closed on each side of the filter bank.

STEP 7: Test Filters in Place

In-place testing of the installed filters is suggested. Check with your health physics or safety officer.

Notes:

Replacement of the Old BG-Series Gasket Seal Locking Mechanism

The filter clamping mechanism of a standard BG-Series filter housing is welded inside the filter housing frame. This is the method of installing the clamping mechanism, since the necessity to replace the mechanism due to failure is extremely remote.

Contact the AAF Flanders factory before attempting to replace any mechanism welded inside the housing.

Some AAF Flanders customers must replace their filter clamping mechanisms frequently for reasons other than mechanical failure, such as highly corrosive airstreams or decontamination. If your filtration system has these optional replacement filter clamping mechanisms (bolted to housing frame instead of welded), please continue for replacement instructions. This is a difficult task, and there is a high possibility of loss of containment due to the increased chances of tearing or cutting the PVC changeout bag while handling the metal replacement parts. It is highly recommended that the filter housing be brought to a safe condition (e.g., decontaminated) so that replacement of the locking mechanism can be accomplished without the use or need of PVC changeout bags. This is especially true on multi-wide housings that require access to the back of the housing.

Materials and Tools Required for Removal and Installation:

- Replacement locking mechanism
- New PVC changeout bags (check for correct quantity, type, size, and model number)
- New ⅜" – 16 UNC hex nuts
- Standard ratchet with a short and 9⁄16" socket
- 5⁄32" allen wrench

Note: Referenced items are found on page 44.

STEP 1: Shutdown Airflow Through System

If available, close isolation dampers on each side of the filter bank.

STEP 2: Remove Filters

Follow instructions, beginning on page 25 of this manual, for the removal of existing filter(s) or adsorber(s). Do not install new filters at this time.

STEP 3: Position Ratchet and Allen Wrench

- Place a ratchet with a short extension, 9⁄16" socket and 5⁄32" allen wrench in a new bag.
- Position the new bag's shock cord around the bagging ring and over the old bag stub, as shown on page 34 of this manual.
- Remove the old bag stub inside the new bag.
- Replace and tighten the security strap around the new bag.

STEP 4: Remove Set Screw

Using the 5⁄32" allen wrench, remove the socket-type headless set screw *(see Item Number 8 on page 44)* located in the crankshaft coupling *(see Item Number 7 on page 44)*.

STEP 5: Remove Crankshaft from Crankshaft Coupling

Slide the clamping mechanism crankshaft *(see Item Number 12 on page 44)* out of the crankshaft coupling *(see Item Number 7 on page 44)*.

CAUTION: Do not pull the crankshaft out of the shaft seal O-ring *(see Item Number 9 on page 44)*. Complete removal of the crankshaft causes loss of containment.

Note: O-ring replacement in the shaft seal is suggested after reinstallation of the locking mechanism *(see page 45)*.

STEP 6: Remove Old Locking Mechanism

Using the 9⁄16" socket and ratchet, remove the hex nuts and washers *(see Item Numbers 5 and 6 on page 44)* in each clamping mechanism tray. There are hex nuts and washers in each tray, and there are two trays, one at the top and one at the bottom, for each filter.

Pull the locking mechanism's components, the top and bottom assemblies, into the bag as far as possible.

Remove from the housing in the same manner as a dirty filter, as shown on page 25 of this manual.

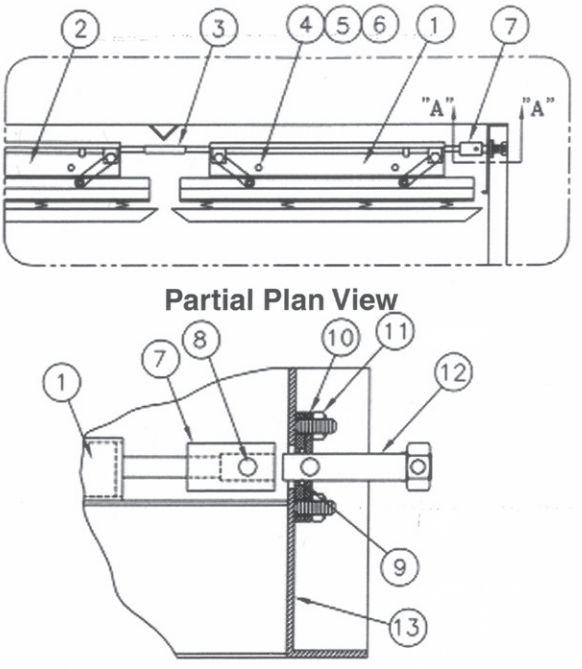
DO NOT remove the ratchet, allen wrench, or mounting hex nuts from the housing at this time.

STEP 7: Inspect the Inside of the Housing

Ensure the threads of the existing locking mechanism mounting bolts and mounting surface are clean so the new locking mechanism trays will sit flush in the housing.

STEP 8: Discard Damaged Locking Mechanism

Dispose of the damaged locking mechanisms according to your site regulations. Check with your health physics or safety officer for proper handling and disposal.



Section "A - A"

Crankshaft Detail for Removable Locking Mechanism

1. First Filter Tray
2. Second Filter Tray
3. Shaft Coupling
4. ⅜" – 16 Stud
5. ⅜" – 16 Hex Nut
6. ⅜" Lock Washer
7. Crankshaft Coupling
8. 5⁄16" – 18 Set Screw
9. O-Ring
10. Seal Plate
11. ¼" – 20 Hex Nut with Nylon Insert
12. Crankshaft Rod
13. Front of Housing

Installation of the New BG-Series Gasket Seal Locking Mechanism

Note: Referenced item numbers are found on in diagram on the left.

STEP 1: Install New Locking Mechanism

- Remove the security strap and position shock cord of bag stub between ribs of the bagging ring.
- Place new locking mechanism in the new bag and position the new bag's shock cord around the bagging ring and over the old bag stub, as shown on page 34 of this manual.
- Remove the old bag stub inside the new bag.
- Replace and tighten the security strap around the new bag.

STEP 2: Position New Locking Mechanism

- Position the new locking mechanism on mounting studs (see Item Number 4). There is a top and bottom tray to each assembly. The trays can only be installed one way with the crankshaft coupling (see Item Number 7) towards the front pan (see Item Number 13). Finger-tighten the hex nuts and washers (see Item Numbers 5 and 6) until the crankshaft is in place.
- Afterwards, torque the hex nuts to approximately 8 foot-pounds (96 inch-pounds).
- Using the ratchet with a 9⁄16" socket and short extension already in the housing, securely tighten all the retaining hex nuts.

STEP 3: Attach Crankshaft Rod to Crankshaft Coupling

- Slide the crankshaft rod *(see Item Number 12)* into the crankshaft coupling *(see Item Number 7)*. Using a 5⁄32" allen wrench, attach the socket-type headless set screw in the crankshaft coupling.

CAUTION: Do not pull the crankshaft rod out of the shaft O-ring seal *(see Item Number 9)*. Complete removal of the crank shaft causes loss of containment.

Note: O-ring replacement in the shaft seal is suggested after reinstallation of the locking mechanism (see steps for replacement of O-ring shaft seal on page 45).

STEP 4: Remove Tools

- Bag out the old bag stub, ratchet and allen wrench. Follow instructions, beginning on page 25 of this manual. Replacement of the locking mechanism is complete.
- Continue with the remaining steps before starting the system.

STEP 5: Install Filters

Follow instructions, beginning on page 30 of this manual.

STEP 6: Start Airflow Through System

Open any isolation dampers that may have been closed on each side of the filter bank.

STEP 7: Test Filters in Place

In-place testing of the installed filters is suggested. Check with your health physics or safety officer.

Replacement of O-Ring Shaft Seal

This is a difficult task, and there is a high possibility of loss of containment while replacing the O-ring. It is highly recommended that the filter housing be brought to a safe condition (e.g., decontaminated) so that replacement of the O-ring can be accomplished without the risk of contamination.

Materials and Tools Required for Removal and Installation:

- Replacement silicone O-ring, AAF Flanders Part Number 100001532
- New ¼" – 20 UNC hex nuts
- Standard ratchet with a short extension and 7⁄16" socket

STEP 1: Remove Dowel Pin and Crankshaft Nut

Remove dowel pin *(see Item Number 9)* and crankshaft nut *(see Item Number 7)*.

STEP 2: Remove Hex Nuts and Seal

Remove the two (2) ¼" – 20 hex nuts *(see Item Number 6)* and the seal plate *(see Item Number 5)*.

STEP 3: Remove O-Ring

Slide the silicon O-ring *(see Item Number 4)* off of the crankshaft rod.

> **Note:** The silicone O-ring has been exposed to the internal airstream of the containment filtration system. Check with your health physics or safety officer for proper handling and disposal.

STEP 4: Lubricate the O-Ring

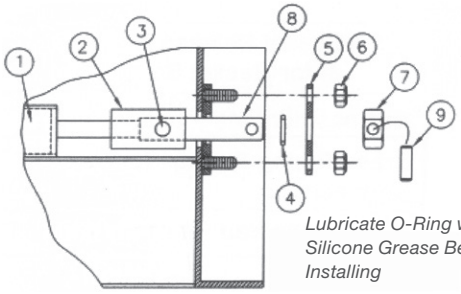
Lubricate the new O-ring with silicone grease, AAF Flanders Part Number 100000899 Novagard 5 oz. tube or equal, and slide onto the crankshaft rod *(see Item Number 8)*.

STEP 5: Replace the Seal Plate

Replace the seal plate and secure with hex nuts *(see Item Number 6)*.

STEP 6: Replace the Crankshaft Nut

Replace the crankshaft nut *(see Item Number 7)* onto the crankshaft rod *(see Item Number 8)* and secure with the dowel pin *(see Item Number 9)*.



O-Ring Removal Detail

1. First Filter Tray
2. Crankshaft Coupling
3. 5⁄16" – 18 UNC Set Screw
4. Silicone O-Ring
5. Seal Plate
6. ¼" – 20 Hex Nut with Nylon Insert
7. Crankshaft Nut
8. Crankshaft Rod
9. Dowel Pin

Spare Parts

Aluminum Access Door Knobs	AAF Flanders Part No. 100000913
Prefilter, HEPA Filters, Adsorbers	See label on door of housing for size, etc. of filter(s) required for replacement or spares.
Security Straps and Cinching Straps	Each security strap and cinching strap is marked with its AAF Flanders part number. Contact AAF Flanders and give part number of strap if a replacement is required.
Filter Changeout Bags	See door label for bag size required to change out the filter(s) in that housing. Bags are constructed of 8 mil. thick, yellow translucent, non-sticking poly-vinylchloride with a ⅜" diameter shock cord hemmed into mouth of bag.
Replaceable Filter Clamping Mechanisms	Give filter housing Model No. & AAF Flanders Control Job No. when ordering.
Optional Filter Gasket Release Agent (Silicone Grease) for Gasket Seal Filters	AAF Flanders Part No. 100000899 Novagard 5 oz. tube: One tube contains enough grease for one 24" x 24" filter.
Replacement Differential Pressure Gages	Specify gage range and AAF Flanders Control Job No.
Brass Tubing Fittings for Gage Connections	Number when ordering. Specify 90° elbow, straight, or tee.
Brass Hex Head Plugs for Rings	Specify size plug: ⅜ or ½".
O-Ring Seal	Silicone O-Ring: AAF Flanders Part No. 100001532.
Optional Door Knob Drive Assembly	AAF Flanders Part No. 97-2958
Replacement Gasket (Standard Neoprene)	AAF Flanders Part No. 109902101
Replacement Gasket (Optional Soft Silicone)	AAF Flanders Part No. 100001531
Adhesive (For Standard Neoprene Gasket)	AAF Flanders Part No. 100000909
RTV Adhesive (For Silicone Gasket)	AAF Flanders Part No. 101707903
Kit Replaceable Fluid Seal Locking Mechanism 1/2 Wide (set)	AAF Flanders Part No. 97-2950
Kit Replaceable Fluid Seal Locking Mechanism 1 Wide (set)	AAF Flanders Part No. 97-2951
Kit Replaceable Fluid Seal Locking Mechanism 2 Wide (set)	AAF Flanders Part No. 97-2952
Kit Replaceable Fluid Seal Locking Mechanism 3 Wide (set)	AAF Flanders Part No. 97-2953
Kit Replaceable Gasket Seal Locking Mechanism 1/2 Wide (set)	AAF Flanders Part No. 97-2954
Kit Replaceable Gasket Seal Locking Mechanism 1 Wide (set)	AAF Flanders Part No. 97-2955
Kit Replaceable Gasket Seal Locking Mechanism 2 Wide (set)	AAF Flanders Part No. 97-2956
Kit Replaceable Gasket Seal Locking Mechanism 3 Wide (set)	AAF Flanders Part No. 97-2957

General Note:

When ordering any replacement part for AAF Flanders manufactured equipment, please provide the original AAF Flanders Control Job Number and Housing Model Number located on the filter housing access door label.

Access Door Label:

Housing Model Number
Filter Model Numbers
Bag Size
AAF Flanders Control Number

Notes:

Important Notice

For best results in the application of AAF Flanders products, it is recommended that the buyer supply complete information about the operating conditions of the ventilation system to AAF Flanders for prior evaluation.

AAF Flanders does not guarantee that its equipment will operate at the performance levels given on the identification labels, or in the catalog specifications under all conditions of installation and use, nor does AAF Flanders guarantee that suitability of its product for the particular end use that may be contemplated by the buyer. When the system components are supplied to the buyer or an agent for final installation and assembly in the field, it should be under the supervision of factory-trained personnel who are equipped to test the installation and certify its performance and conformance to industry-accepted specifications. Failure to follow these procedures may result in a compromised installation.

AAF Flanders®
Bringing clean air to life.®

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AAF Flanders has a policy of continuous product research and improvement. We reserve the right to change design and specifications without notice.

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