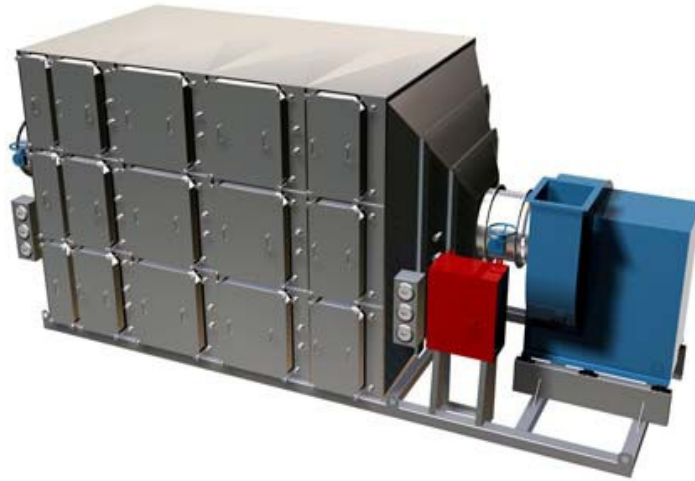


## OVERVIEW

The Bag In/Bag Out side access high efficiency air filter housing is a permanent housing designed to hold either gasket or gel seal filters. It is an all welded product designed for critical clean air applications.



Inside each unit's door(s), a ribbed inlet collar provides for a PVC bag attachment. The PVC bag creates a barrier seal between service personnel and the contaminated filters. With this design, filter-servicing personnel are not in direct contact with any threatening particulate. An initial bag kit is included with each order.

Depending on end user requirements, a variety of prefilter, adsorber, and/or HEPA filter sections are incorporated into the unit. Housings may be joined in series or parallel. Test sections in series may also be incorporated with the housing. Specific fan filter combinations are also available for isolation room systems. These systems encompass blowers with inverters/starters and/or (PLC) programmable logic controller to provide constant system airflow as the filters load.

A removable access door for each type filter section allows for individual filter/adsorber change out. A locking mechanism is incorporated for each individual HEPA and or carbon adsorber section. Filter removal trays can be provided as an option. Each housing is custom manufactured to meet specific end user requirements.

The unit allows an unencumbered airflow through the upstream and downstream openings. All Bag In/Bag Out housings are factory pressure decay tested in accordance with ANSI/ASME-N510-1995 reaffirmed up to +/- 10" W.G. Further, all units are manufactured in accordance to the quality criteria listed in ASMEAG-1. Complete component traceability is provided upon request.

## APPLICATION

This Bag In/Bag Out side access filter housing is designed for and not limited to the following applications:

- Radiological Contamination
- Pharmaceutical and Biotechnological Clean Rooms
- Medical Device Clean Rooms
- Microelectronics
- Nanotechnology
- Hospital Suites
- Isolation Areas
- CBR Applications

## PERFORMANCE

The Bag In/Bag Out side access filter housing accommodates different HEPA and Ashrae filter efficiencies. Standard housings accommodate 24" X 24" X 1 1/2" deep HEPA filters. Pre-filter sections are available in 2", 4" and/or 6" depths. See filter manufacturer's individual filter efficiency requirements.

## GASKET SEAL

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 affect the seal, the bolt-activated top and bottom hand operated crank locking mechanisms secure the filter(s) against the housing's perimeter mounting surface, compressing the gasket.



### FLUID SEAL

The filter to housing gel seal is effected by means of a continuous perimeter knife-edge on the interior of the housing, which mates into the gel filled perimeter channel on the face of the filter to. The hand operated locking mechanism guides and secures the filter into the knife-edge penetrating the gel and forming a positive seal on the filter face.



Hand torqued door latches provide a positive pressure door to housing seal as well as ease filter servicing. When the housing is fully loaded and door sealed properly, the housing efficiency is equal to that of the filter rating.

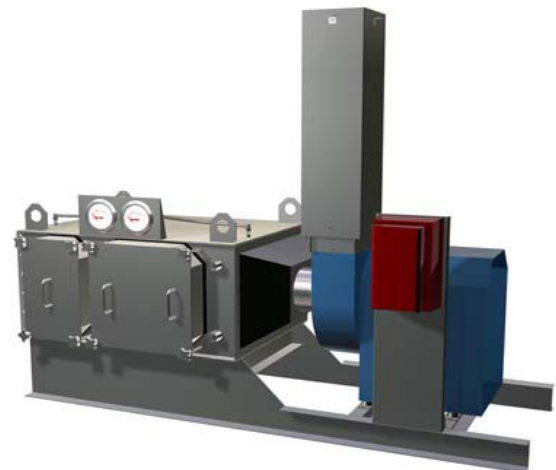
### ROUND BAG IN/BAG OUT

This round housing is specially designed for high pressure and low air volume applications. Connections to the unit are typically through a round-flanged inlet and outlet. Access to the filter is through the top of the unit. For further information, please contact the factory.



### SELF CONTAINED ISOLATION UNITS

The fan powered filtration unit incorporates the filter housing and a blower for specific exhaust air applications. Multiple configurations can be incorporated using (VFD) variable frequency drives, starters, (PLC) programmable logic controllers and airflow monitoring devices. Please contact the factory for end user specific applications.



## INSTALLATION

A factory installed flange is suitable for connection to either ductwork or air handling system.

## CONSTRUCTION

- The housing is made from either T304 12 & 14-gauge stainless steel or optional T316 12 & 14-gauge stainless steel. L grade is available as well.
- All stainless steel parts have a #2B finish
- The locking trays are made from T304 12-gauge stainless steel or optional T316 12-gauge stainless steel.
- Retrieval rods ease the removal of filters.
- Seam welding reinforces strength and prevents leakage.
- Door(s) have perimeter gasket in order to ensure a positive seal.
- Door knobs are cast aluminum.

## ADDERS

- Additional Bag Kits
- Vertical Flow
- Double Wall Insulation
- Static Port(s)
- Magnehelic Gage
- High Temperature Gasket
- Isolation Dampers
- Transitions
- Swivel Door Latches
- Custom and Drilled Flanges
- Weather Cover
- Bottom Access
- DOP Port
- Photohelic Gage
- Lifting Lugs
- Breather Filter Port
- Aluminized Steel Construction
- Nitronic 60 hex nuts  
(Locking tray)

## GENERAL CONSTRUCTION

The basis of design shall be a gasket seal bag-in / bag-out filter. All housing components shall be factory assembled and tested in accordance with accepted requirements and approved by the owner or its representative.

The housing shall be constructed from 14 gauge and 12-gauge type T304 stainless steel (as standard) with a #2B finish. The construction method shall provide adequate reinforcement to withstand a negative or positive pressure of at least 20" water gage (W.G.) or the owner's specified and scheduled operating system pressure, whichever is higher. The housing shall be side servicing for filter installation and removal. Housing design shall allow air to enter and exit the housing without changing direction. The housing shall accommodate standard sized filters that do not require any special attachments or devices to function properly during or after installation. Prior to leaving the factory, each filter housing module as well as the entire assembly shall be tested to insure its integrity in accordance with ERDA 76-21, paragraph 6.2.2 housing construction. "Nuclear Air Cleaning Handbook", Table 4-2 for filter fit, mechanical function, for filter sealing surface flatness, and tested under system operating pressure by means of pressure decay test.

## WELDING AND CLEANING

All pressure retaining welded joints and seams shall be continuously welded. All manufacturing scratches and weld heat discoloration shall be removed by a wire brush. Housing shall be free of all burrs and sharp edges. All weld joints and any portion of any gasket setting surface shall be ground smooth and flush to base metals. All welding personnel are qualified in accordance with ASME Boiler and Pressure Vessel Code Section IX. All welds shall be visually inspected by qualified factory personnel in accordance with the American Society of Mechanical Engineers (ASME) section V. As a minimum, all welded joints shall be visually inspected and be free of cracks, under fill, incomplete fusion, overlaps, surface porosity, crevices, crater pits and depression.

## HOUSING HARDWARE

All hardware used in the manufacture and assembly of the filter housing shall be a minimum of 300 series stainless steel (i.e. nuts, bolts, washers, springs, etc.), except for the brass nuts used for filter clamping device and the aluminum hand knobs used for filter access door retaining. (Aluminum hand knobs are used to protect against galling of stainless steel threaded parts).

## REMOVABLE GASKET SEAL FILTER CLAMPING MECHANISM

The filter clamping device (locking tray) shall be operated by means of a standard wrench and from outside of the housing front and be an integral part of the filter housing. The filter clamping mechanism shall be located on the clean air side of the filter / adsorber (i.e. downstream side of the filter), leaving the filter sealing mechanism to be located in clean air. If isokinetic scan sections are incorporated in the system, the sealing mechanism may be located on the upstream side of the filter.

The sealing mechanism shall be self-aligning and adjustable by means of springs used in a dual compression bar assembly. The filter clamping device shall produce a minimum of fourteen hundred (1,400) pounds of pressure per filter element to insure a proper and uniform filter to frame seal along its gasketed surface. The filter-clamping device is driven by a type T-304 stainless steel (3) piece locking tray. The filter clamping device will seal each filter individually with maximum of ten (10) foot-pounds of torque. A single brass hex nut is incorporated into each individual locking tray to prevent the galling of the stainless steel drive components under pressure. To facilitate filter removal and installation, the filter clamping device must have a minimum of 5/8" from full open to full close position.



### FILTER ACCESS DOORS

Each filtration element location shall be provided with an access door to remove the filtration element and replace it with another. Access doors are single-wall type. A minimum of one handle is provide per door. The filter access door is sealed to the housing front by means of a neoprene gasket (standard) or skinned silicone closed cell sponge gasket. Silicone gasketing shall not have a memory during prolonged compression, (i.e. it will never lose its shape or composition during compression) and is replaceable. Each access door is rigid and provided with at least four tie-down latches. The access door is designed such that, when removed, no sharp projections remain.

### FILTER ACCESS PORTS

Each filter access port has a bag-clamping ring (also called a bagging ring). The bagging ring has a smooth hemmed edge to insure safe installation and removal of the filter change out bag. The bagging ring is seal welded to the housing front around the filter access port. It is designed with two (2) raised ridges to stretch the shock cord of the filter change out bag elastic mouth around the bagging ring. The bagging ring and filter change out bag is concealed behind the removable filter access door when in the installed position. The filter access door is clamped in place with the use of 2" aluminum hand (star shaped) knobs which do not require tools to furnish the necessary torque required to specified tightness.

### FILTER REMOVAL ROD

All filter housings is equipped with a filter removal rod assembly. The rod is operated by hand. The filter removal rod can be operated within the glove of the PVC filter bag.

## ACCESS ORIENTATION

Filter access handedness shall be by the side (right hand, left hand or both) of the housing where the filters are to be accessed. The filter access shall be determined as if a person were standing inside of the housing and is facing in the downstream direction of the air stream (i.e. the air is hitting the person in the back). From this position if the door is on the right, it is a right hand door. If it is on the person's left side, it is a left hand door. For vertical airflow applications, the filter-clamping device shall be located as so the filter is sealed in the vertical up position as to prevent damage to the gasket on the filter.

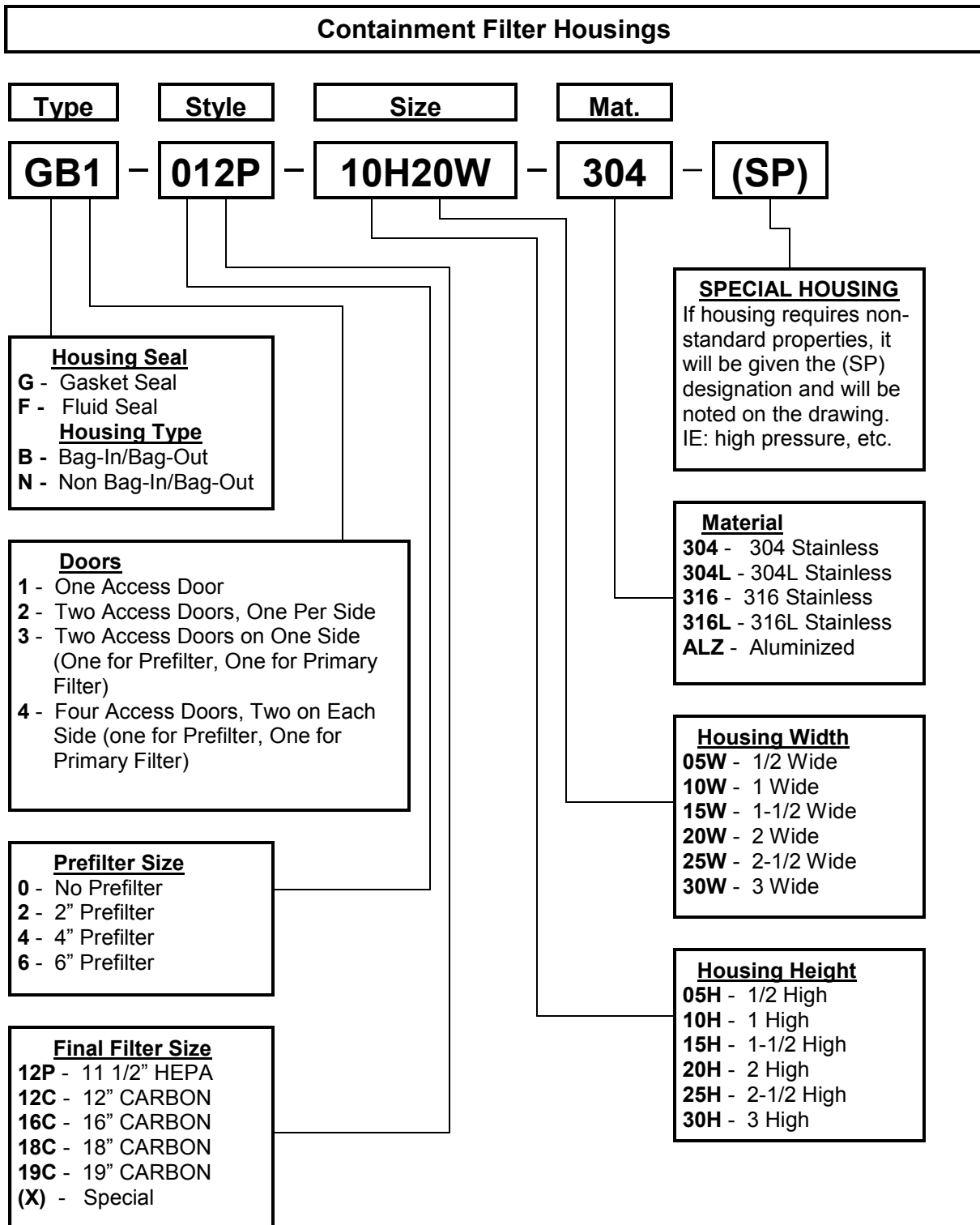
## FILTER CHANGE-OUT BAG

The filter change out bag shall be constructed of 8 mil thick LP-375C Class 2 PVC flexible material and shall be yellow in color. The filter bag shall be matted on one side to reduce static and shall be semi-transparent. The filter bag shall have a clean portion at the mouth for visual purposes and two (2) glove posts for filter manipulation and for the removal of the bag stub after the initial change out. The filter change out bag is retained to the bagging ring by means of a safety strap for an air tight and secure seal. (All system straps and change out bags shall be furnished and shipped boxed inside system). There is also a (3) glove bag option.

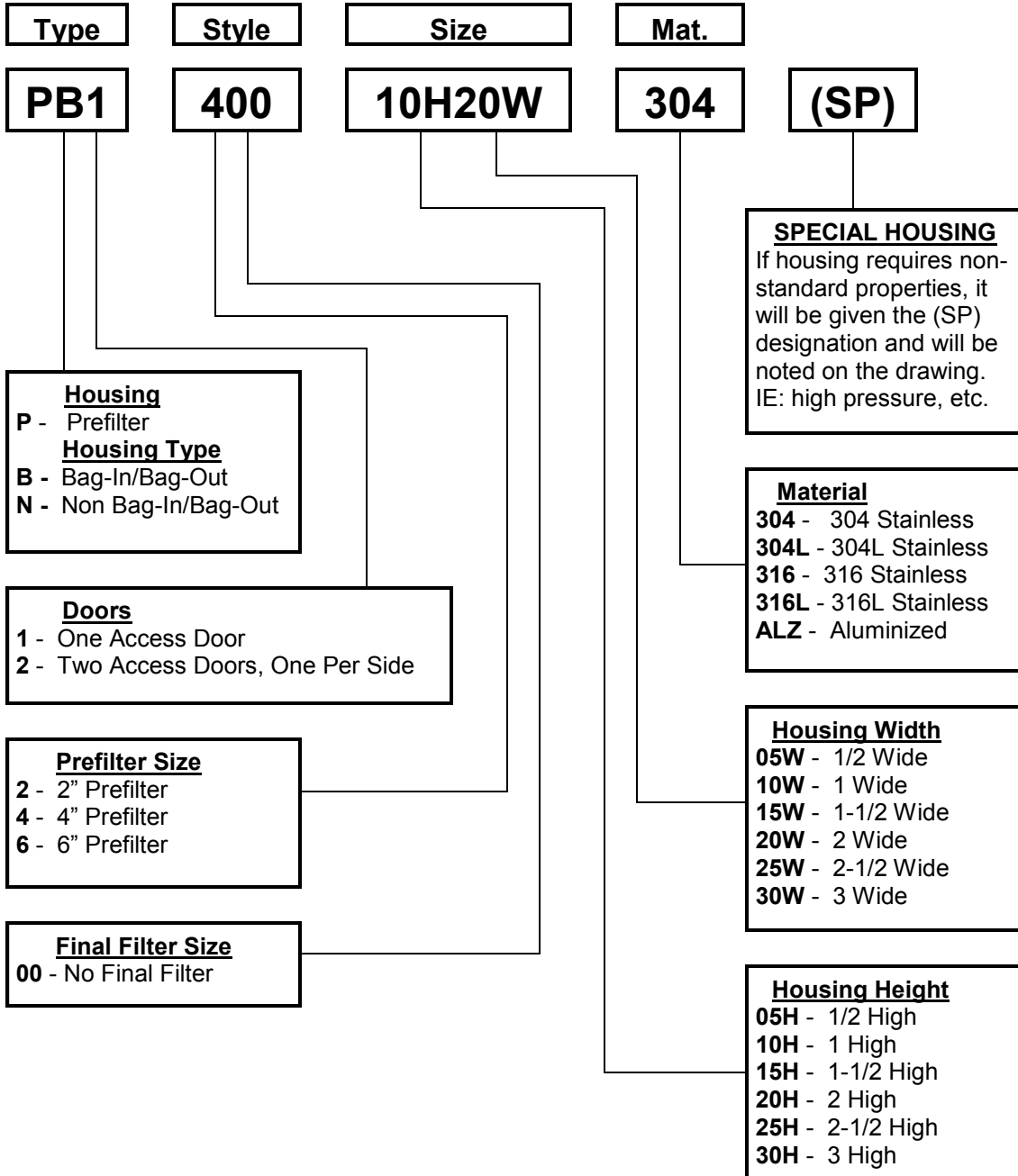
## FACTORY TESTED AND QUALITY ASSURANCE

The filter housing shall be manufactured under a manufacturing quality assurance program that addresses the workmanship requirements of ASME NQA-1 "Quality Assurance Requirements for Nuclear Facilities". All production welds shall be visually inspected per standard procedure which incorporates workmanship acceptance criteria. The filter housing shall be tested for filter fit, filter sealing, and surface flatness. Each housing module and the complete pressure boundary shall be leak pressure tested by the "Pressure Decay Method" in accordance with ASME N510-1998, "Testing of Nuclear Air Cleaning Systems," paragraphs 6 & 7 (both filter sealing surface and overall housing are tested). Systems are available that can operate at high temperature and high pressure (higher than 20" w.g.). Consult the sales department about this option / requirement.

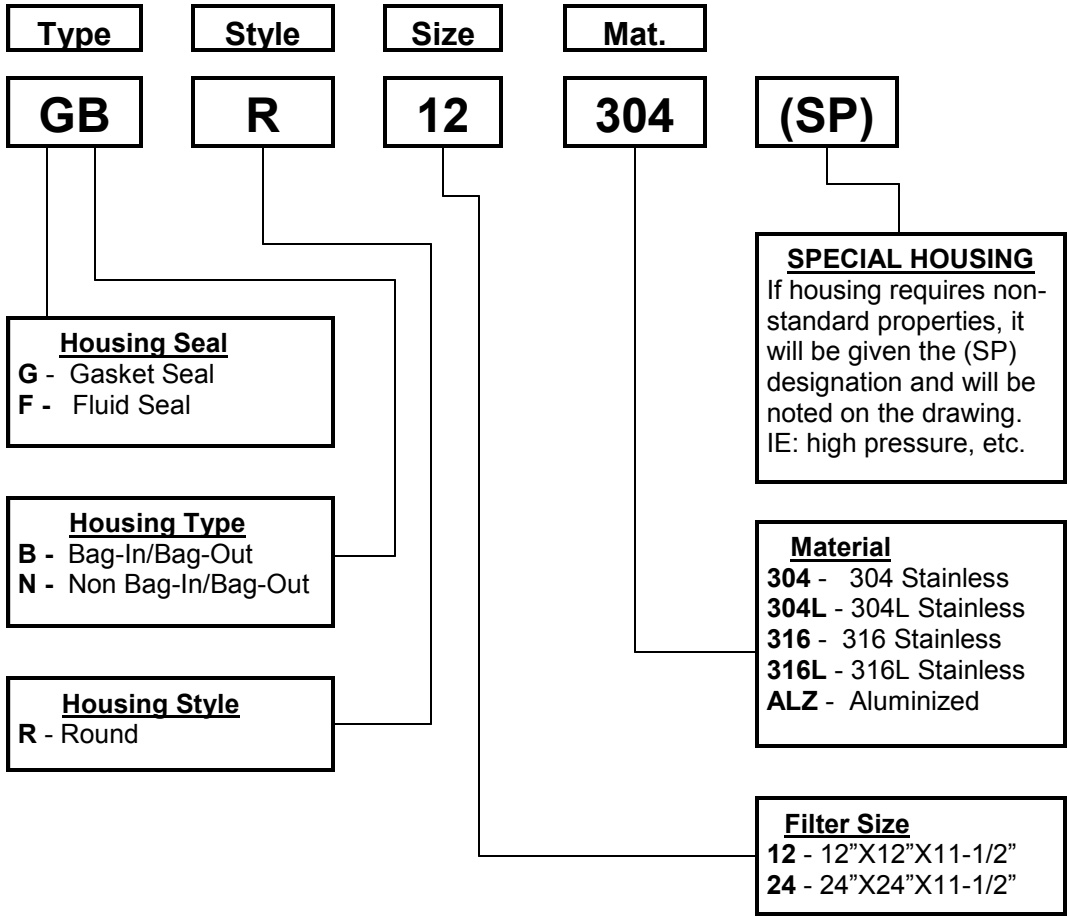




**Prefilter Containment Housings**



**Round Containment Housings**



BAG IN/BAG OUT HEPA FILTER SECTION ONLY

HEIGHT CODE	OVERALL HEIGHT (INCHES)	FILTERS WEIGHT LBS	WIDTH CODE							
			OVERALL WIDTH (INCHES)							
			15	27	39	51	63	75	87	102
			05W	10W	15W	20W	25W	30W	35W	40W
05H	17-3/4	Filters Weight	1D 176	1C 185	1C, 1D	2C	2C, 1D	3C	3C, 1D	4C
10H	29-3/4	Filters Weight	1B 170	1A 204	1A, 1B 257	2A 309	2A, 1B 358	3A 407	3A, 1B 566	4A 618
15H	47-1/2	Filters Weight	1B, 1D	1A, 1C 389	1A, 1B, 1C, 1D 426	2A, 2C 464	2A, 1B, 2C, 1D 537	3A, 3C 611	3A, 1B, 3C, 1D 890	4A, 4C 928
20H	59-1/2	Filters Weight	2B	2A 362	2A, 2B 545	4A 618	4A, 2B 716	6A 814	6A, 2B 1,163	8A 1,236
25H	77-1/2	Filters Weight	2B, 1D	2A, 1C 487	2A, 2B, 1C, 1D 630	4A, 2C 773	4A, 2B, 2C, 1D 896	6A, 3C 1,018	6A, 2B, 3C, 1D 1,403	8A, 4C 1,546
30H	89-1/4	Filters Weight	3B	3A 612	3A, 3B 770	6A 927	6A, 3B 1,074	9A 1,221	9A, 3B 1,697	12A 1,854
35H	107	Filters Weight	3B, 1D	3A, 1C 714	3A, 3B, 1C, 1D 898	6A, 2B 1,082	6A, 3B, 2C, 1D 1,253	9A, 3C 1,425	9A, 3B, 3C, 1D 1,980	12A, 4C 2,164
40H	119	Filters Weight	4B	4A 816	4A, 4B 1,026	8A 1,236	8A, 4B 1,432	12A 1,628	12A, 4B 2,262	16A 2,472

A = 24 X 24" Actual Sized Filter  
B = 24 X 12" Actual Sized Filter  
C = 12 X 24" Actual Sized Filter  
D = 12 X 12" Actual Sized Filter

BAG IN/BAG OUT PREFILTER & HEPA FILTER SECTION

HEIGHT CODE	OVERALL HEIGHT (INCHES)	FILTERS WEIGHT LBS	WIDTH CODE							
			OVERALL WIDTH (INCHES)							
			15	27	39	51	63	75	87	102
			05W	10W	15W	20W	25W	30W	35W	40W
05H	17-3/4	Filters Weight	1D 215	1C 248	1C, 1D	2C	2C, 1D	3C	3C, 1D	4C
10H	29-3/4	Filters Weight	1B 248	1A 292	1A, 1B 364	2A 436	2A, 1B 504	3A 572	3A, 1B 722	4A 872
15H	47-1/2	Filters Weight	1B, 1D	1A, 1C 338	1A, 1B, 1C, 1D 496	2A, 2C 654	2A, 1B, 2C, 1D 756	3A, 3C 858	3A, 1B, 3C, 1D 1,083	4A, 4C 1,308
20H	59-1/2	Filters Weight	2B	2A 584	2A, 2B 728	4A 872	4A, 2B 1,008	6A 1,144	6A, 2B 1,444	8A 1,744
25H	77-1/2	Filters Weight	2B, 1D	2A, 1C 730	2A, 2B, 1C, 1D 910	4A, 2C 1,090	4A, 2B, 2C, 1D 1,260	6A, 3C 1,430	6A, 2B, 3C, 1D 1,805	8A, 4C 2,180
30H	89-1/4	Filters Weight	3B	3A 876	3A, 3B 1,092	6A 1,308	6A, 3B 1,512	9A 1,716	9A, 3B 2,166	12A 2,616
35H	107	Filters Weight	3B, 1D	3A, 1C 1,022	3A, 3B, 1C, 1D 1,274	6A, 2B 1,526	6A, 3B, 2C, 1D 1,764	9A, 3C 2,002	9A, 3B, 3C, 1D 2,527	12A, 4C 3,052
40H	119	Filters Weight	4B	4A 1,168	4A, 4B 1,456	8A 1,744	8A, 4B 2,016	12A 2,288	12A, 4B 2,888	16A 3,488

A = 24 X 24" Actual Sized Filter  
B = 24 X 12" Actual Sized Filter  
C = 12 X 24" Actual Sized Filter  
D = 12 X 12" Actual Sized Filter

1. Units over 3H require flat bed trucking
2. Units over 3W may require flat bed trucking

## OVERVIEW

The test section housings are permanent housings designed to work in conjunction with manufactured containment housings. These units are designed to validate individual filter efficiency. Test sections are an all welded product designed for critical clean air applications.



Depending on end user requirements, a variety of prefilter, test inlet/outlet and isokinetic can sections are incorporated into the filter train. Housings may be joined in series or parallel. The all stainless steel units allow an unencumbered airflow through the upstream and downstream openings.

### UPSTREAM TEST SECTION WITH AND WITHOUT SWING AWAY DIFFUSER

The upstream test section is used when individual filter efficiency testing is required versus the overall system. The upstream test section is used to inject an aerosol challenge via spider nozzles upstream of the specific HEPA filter and/or carbon adsorber. The aerosol challenge is then uniformly dispersed through a diffuser, which is either fixed or swings away when not in use per the end user's operating criteria. Samples of the aerosol are taken upstream of the HEPA filter and penetration levels are determined. The test section can be incorporated with and without prefilter sections. Please contact the factory for any technical information required.

### ISOKINETIC SCAN SECTION

The isokinetic scan section is used to scan HEPA filters and is located directly downstream of the HEPA filter. The in-place test is conducted by removing the door of the housing and manipulating the isokinetic probe through a clear PVC bag. The probe travels along a grid as so samples can be taken of each segment of the filter to pinpoint any filter leakage. Upon finding the precise location of the filter leak, the end user has the option of either repairing the filter or replacing it.



### TEST OUTLET SECTION

The test outlet section is located downstream of the HEPA filter or carbon adsorber. The test section samples the aerosol challenge injected upstream and is able to determine whether the filter passes the in-place efficiency test.

### APPLICATION

This test section filter housing is designed for and not limited to the following applications:

- Radiological Contamination
- Pharmaceutical and Biotechnological Clean Rooms
- Medical Device Clean Rooms
- Microelectronics
- Nanotechnology
- Hospital Suites
- Isolation Areas
- Nuclear





**Test Sections**

