**CTC Bag-in/Bag-out (BIBO) Filter Systems**

**Suggested B2 Gasket Engr. Specs.**

***IAS Bulletin #111-01-05***



***HOUSING SPECIFICATIONS, B2-Series, Gasket-seal Type:***

**Housing:** The housing shall be Bag-In/Bag-Out Isolation Housing, constructed from *14-gauge & 11-gauge Type 304 Stainless Steel* and have a minimum operating pressure rating of +/- 10” w.g. The housing shall be manufactured under a quality assurance program that meets all the requirements of ASME NQA-1. The B2-series housing shall accommodate standard *gasket seal type* HEPA filters utilizing a crank mechanism for a positive seal. All internal parts of the housing shall be constructed of 300 Series stainless steel, except for the brass travel nut used in the clamping mechanism. The housing will have two filter access doors; one door to access the pre-filter(s) and one door to access the HEPA/ULPA Filter(s). The prefilter section allows for filters 2”-6” thick, and the final filter section accepts industry-standard 11.5” deep filters. The design of the housing must allow for pre-filter change-out without loss of containment at the HEPA filter; in other words the pre-filters can be changed without loss of seal at the HEPA filter(s). The housing upstream and downstream flanges shall have a 1-1/2” minimum flange width. The B2-series housing depth will be 35.0” in direction of airflow.

***Housing seal = Gasket Seal***

***Housing Model: B2-412-\_\_\_\_\_\_ (see B2-series brochure for housing aspect ratios and dimensions)***

**Welding:** All pressure boundaries shall be internally seam welded. All pressure retaining weld joints and seams shall be continuously welded with no pores allowed. Welds on flanges or gasket surfaces shall be ground smooth. Welders and weld procedures will meet or exceed the intent of applicable sections of ASME-Boiler and Pressure Vessel Code (BPVC), Section IX.

**Filter Clamping Mechanism:** Two Leaf-Lok™ Clamping Mechanisms shall be provided to clamp the primary (final) filters in place. The clamping mechanism shall operate outside the change-out bag. The access door shall extend over the clamping mechanism operators such that tampering with the clamping mechanism is not possible without intent of changing filters. Positive seal clamping mechanisms shall exert a minimum of 1200 lbs force on each filter. This force shall be supplied by leaf springs, which compensate for any long-term relaxation of the filter gasket, ensuring a tight seal on the gasket over the entire service life of the filter. The HEPA filter seal in the B1-series housing will be on the downstream side of the final filter(s), and the clamping mechanism operators will be on the left-hand side of the housing wall.

**Bagging Collar:** A bagging collar shall be continuously welded around the access port. This collar shall have two (2) continuous ribs to aid in holding the bag during the change-out procedure. Both filter access doors (pre-filter and HEPA filter sections) will be fitted with bagging collars.

**Change-Out Bag:** One PVC change-out bag shall be furnished for each filter access port. Each amber-matted bag shall be 8-mil thick with two gloves. An elastic (shock) cord shall be hemmed into the mouth of the bag so that it fits securely when stretched around the bagging ring. To prevent the bag from sliding off the bagging ring during the change-out process, a nylon security strap shall be provided with each filter access port.

**Filter Removal Rods:** Filter removal rods shall be provided with all multi-wide filter housings (any housing where there are two or more filters in a single row). Removal rods are to be operated from inside the PVC bag.

**Filter Access Door(s):** Access doors are constructed from 14-gauge, *Type 304 Stainless Steel.* The two access doors on the B2-series housings are fitted on the interior with ½” thick PVC gasket to create an airtight seal once the doorknobs are tightened. The doors will have four ¼-20 aluminum knobs, one at each corner. Doorknobs shall remain attached to the access door after removal to eliminate the possibility of loss when the door is removed.

**Static Pressure Taps:** Static pressure taps shall be ¼” IPS pipe half coupling. Standard differential pressure gage tubing shall be aluminum with solid brass fittings, unless specified otherwise. The B2-series housing is fitted with (3) static pressure taps, typically fitted on the top pan of the housing.

**Housing Test:** The Isolation Housings shall be pressure tested to meet or exceed the requirements of ASME-N510. Both the housing body and seal face will be tested using the Pressure Decay Method. Housing will be tested to a minimum of 10” w.g. (2500 pa). There will be a maximum leak rate of 0.0005 CFM per cubic foot of housing volume at 10”wg. Test Reports are to be made available upon owner request.

**Housing Inspection & Clean Up:** All welds shall be chemically cleaned and be free of discoloration. Each housing will be function tested using actual filter elements to verify dimensional tolerances and clamping mechanism operation. A general dimensional checklist shall be completed for all housings and kept on file to be available upon owner request.

***BUBBLE-TIGHT DAMPERS:***

**Bubble-Tight Dampers:** The CCD (round-blade) or RCD (oval-blade) style dampers shall be a positive seal, isolation type damper bubble-tight at a differential pressure of 10” water gage. Damper shall be constructed with a 10 Ga. *T-304 stainless steel* body and 3/16” thick flanges. Flanges on CCD dampers will be 1-1/2” wide x 3/16” thick with standard ANSI bolt pattern with holes located at maximum 4” intervals.

The damper blade shall consist of two 3/16” thick disks with replaceable PVC (or optional silicone) gasket sandwiched between them. The shaft shall be sealed with two replaceable Polypak™ gland seals. The damper interior shall be continuously seam welded. All welds shall be chemically cleaned to remove heat discoloration.  
  
The dampers shall be manufactured under a quality assurance program that meets all the requirements of ASME NQA-1. All welds and welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code Section IX.   
  
The damper blade and shaft seals shall be tested at 10” water gage and tested in accordance with ASME N509-1996 class I. The complete pressure boundary shall be leak tested by the “Pressure Decay Method” in accordance with ASME N510-1995 “reaffirmed”, “Testing of Nuclear Air Treatment Systems”, Paragraphs 6 and 7. There shall be a maximum leak rate of 0.0005 CFM per cubic foot of housing volume at 10 inches water gage.

*Damper Actuators = Manual Actuator, 30:1 ratio worm-gear type with manual handwheel*

***Damper Model = CCD-\_\_\_***

***Damper diameter = \_\_\_” ID round (\_\_\_ sf = \_\_\_ square meter open area)***

***Damper Model = RCD-\_\_\_***

***Damper Inside Dimensions = \_\_\_” H x \_\_\_“W oval (\_\_\_ sf = \_\_\_ square meter open area)***

***Damper Outside Dimensions = \_\_\_” H x \_\_\_“W Rectangular Flange (ADD 3” to Height & 3” to Width)***

***ANCILLARY (OPTIONAL) EQUIPMENT SPECIFICATIONS:***

**Transitions for Inlet/Outlet:** Constructed from *14-gauge Type 304 Stainless Steel* and seam welded per ASME BPVC Section IX. Transitions are to be factory installed and have flanges (or slip collars) to mate up with existing ducting or bubble-tight dampers. If mated to bubble-tight dampers, transitions to have 10-gauge 1-1/2” flange with 3/8” diameter bolt holes with an ERDA bolt-hole pattern. Pattern to have holes at maximum 4” centers per ASME Standard. Prior to bolting to mating dampers, transition will be caulked with silicone caulking compound. Transitions are to be fitted with 1.25” diameter decontamination ball valve ports fabricated from *T304SS*. Ball valves should be fitted with plugs.

**Differential Pressure Gages:** Differential pressure gages are to be supplied for each filter section on the housing to allow for independent monitoring of differential pressure across each filter section. Gage type should be clearly specified as well as the range of the gage. Gages can be factory mounted on the housing/system or shipped loose for remote mounting as per engineering specifications. The B2-series housing will accommodate two filter differential pressure gages; one for the pre-filter and one for the HEPA/ULPA (final) filter section.

*Prefilter Gage = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*HEPA/ULPA filter Gage = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**Change-out Tray:** One removable change-out tray shall be provided to support the filter during change-out procedure. The tray is fabricated entirely from *Type 304 stainless steel*. The tray shall be fastened to the housing using aluminum star knobs that are fastened in place of the filter access door. (NOTE: Change-out trays have very limited use and are only recommended by CTC/IAS for housings that have poor accessibility, such as roof-top or ceiling-hung installations.

**HEPA Filter Certification (Site Testing):** HEPA Filters to be certified for efficiency rating at the site by accredited testing contractor. Test for “Overall Efficiency (Total Penetration)” in accordance with IEST-RP-CC-006.2 Standard. Testing contractor to provide necessary duct penetration (as required) to perform the Total Leakage test. In-situ certification shall be conducted by an accredited contractor.

**Skid Base:** Complete housing and fan assembly is to factory mounted on 4” high channel or tubular steel base. Base to be constructed of 304 series stainless steel. Base to be supplied with lifting lugs at four points.

**System Test:** Complete factory assembled “system” (damper-to-damper inclusive of housing and transitions) shall be pressure tested to meet or exceed the requirements of ASME-N510. The damper-to-damper system will be tested using the Pressure Decay Method. System will be tested to a minimum of 10” w.g. (2500 pa). There will be a maximum leak rate of 0.0005 CFM per cubic foot of system volume at 10”wg. Test Reports are to be made available upon owner request.

**Approved Equipment Suppliers:**

Contamination Technology Corporation (CTC)

Model: **B2**-\_12-\_\_-\_\_

***FILTER SPECIFICATIONS:***

**Pre-filters:** Pre-filters are to be *2” nominal thickness* High Capacity Pleated Panel type with a minimum efficiency of MERV7 (Higher efficiencies also are available up to MERV11 in a *2” thick* pleated panel type). Filters are beverage-board framed with downstream pleat pack supports, with cotton or polyester blended media. Filters should be designed to operate at 500FPM face velocity with low initial pressure drop, and recommended final resistance of 1.00”wg (250Pa).

Prefilter Quantity = (\_\_\_) 24x24x2”

(\_\_\_) 24x12x2”

Prefilter Efficiency: MERV\_\_\_\_ (ASHRAE 52.2 Standard)

Total Capacity: (\_\_\_\_\_) cfm @ \_\_\_\_”wg (clean pressure drop)

**HEPA Filters:** Final filters are to be High Capacity (500 FPM Face Velocity Rated) Type Gasketed HEPA Filters. HEPA Filters should have a minimum efficiency on 0.3 micrometer particles of 99.99% (IEST Acceptance level “C” or better) and all HEPA Filters should be provided with a factory Scan Test report. HEPA Filters must be furnished with Serial Number traceable to the factory bench test. HEPA Filters should have a maximum Initial Pressure Drop (IPD) of no more than 1.50”wg at 2000CFM for a 24x24x11.5” filter.

***HEPA Filter Seal = Gasket seal***

***HEPA Filter Capacity = \_\_\_\_ cfm @ 1.00”wg (clean) maximum pressure drop***

***HEPA Filter Efficiency = 99.99% @ 0.3 microns (with factory scan-test), IEST Acceptance “C”***

***HEPA Filter Quantity = ( ) 24x24x11.5”***

***( ) 24X12X11.5”***

**Total Capacity: \_\_\_\_\_\_ cfm @ 1.00”wg (clean pressure drop)**

**Approved Filter Suppliers:**

Filtration Group

American Air Filter (AAF)