

**SECTION 15886  
HEPA FILTER  
BAG-IN / BAG-OUT HOUSING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

**1.2 SUMMARY**

- A. This Section includes filter assembly provisions for the following Process Exhaust Air systems:
1. Hot Off-Gas (HOG) exhaust systems; Rated for – 60 inches of WG static pressure.
  2. Primary Confinement Exhaust (PCE) systems: Rated for – 60 inches of WG.
  3. Secondary Confinement Exhaust (SCE) systems: Rated for – 15 inches of WG.
  4. Beam dump Confinement Exhaust (BDCE): Rated for –15 inches of WG.

The HEPA filter assembly shall include:

- a. HEPA Filter Housing.
  - b. Filter assembly accessories.
  - c. Bubble-tight Isolation Valves used as Damper(s) with manual gear operator.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 15, Section 15100, "Valves."
  2. Division 15, Section 15885, "High Efficiency Particulate Air (HEPA) Filters, Fire Resistant."
  3. Division 18, Section 18100A, "General Welding Requirements for Target building Systems"

**1.3 REFERENCES**

- A. American National Standards Institute (ANSI):
1. ANSI / AWS D9.1-1990, Sheet Metal Welding Code X.
  2. ANSI B16.5-1988, Steel Pipe Flanges and Flanged Fittings.
  3. ANSI N509-1989, Nuclear Power Plant Air-Cleaning Units and Components.
  4. ANSI N510-1989, Testing of Nuclear Air-Cleaning Systems.
  5. SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing.
- B. American Society of Mechanical Engineers (ASME):
1. ASME NQA-1.
  2. ASME N510-1989.
  3. ASME Boiler and Pressure Vessel Code Section IX.
- C. American Society for Testing and Materials (ASTM):
1. ASTM A 126 – (1995) Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
  2. ASTM A 262 – (1991) Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels.
  3. ASTM A 480/ A 480M – (1991) General Requirements for Flat Rolled Stainless Steel and Heat-Resisting Steel Plate Sheet and Strip.
  4. ASTM A 240 – (1991) Specification for Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

5. ASTM A 276 – (1990) Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
- D. Department of Energy (DOE) / Energy Research and Development Agency (ERDA):
  1. ERDA 76-21, Nuclear Air Cleaning Handbook.
  2. ERDA 76-21-1976 Nuclear Air Cleaning Handbook.
- E. National Fire Protection Association (NFPA):
  1. NFPA 70 – (1999) National Electrical Code.
- F. Sheet Metal & Air Conditioning Contractors' National Association, Inc. (SMACNA):
  1. SMACNA DCS – (1995; Addendum 1997).
- G. Underwriters Laboratories Inc. (UL):
  1. UL 486A & B – (1994).
  2. UL 555S – (1996) Leakage Rated Dampers for Use in Smoke Control Systems.
  3. UL 900 (1994) "UL Standard for Safety Air Filter Units".
- H. Uniform Building Code (UBC), 1997.

#### 1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the conditions of the Contract and General and Supplementary Conditions.
- B. Submit with offers:
  1. Weld Procedure Specifications (for information only).
  2. Weld Procedure Qualification Records (for information only).
  3. Welder Certification Records (for information only).
  4. Proposed fabrication, test and delivery schedule.
- C. Product Data for each filter assembly specified, including the following:
  1. Electric Damper Motor ratings and characteristics.
  2. Material gages and finishes.
  3. Filters (all filters within the assembly) with size and performance characteristics.
  4. Dampers, including housings, and linkages.
- D. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, field assembly instructions, components locations and size of each field connection.
- E. Structural calculations establishing that the design of filter housing supports and anchors meet the 1997 UBC requirements for the design of PC-2 equipment.
- F. Wiring diagrams detailing wiring for power and control systems, control interface differentiating between manufacturer-installed and field-installed wiring.
- G. Submit for approval:
  1. Weld Inspector Qualification Record
  2. Dimensional Drawings Indicating Joint Design and Material Identification
  3. Mill Test Reports for Sheets and Shapes
  4. Visual Weld Inspection Procedure
  5. ASTM A-262 Laboratory Results
  6. Delivery Schedule
  7. Dye Penetrant Test Procedure

8. Seismic Load Calculations
  9. Housing and Sealing Surface Leak Test Procedures
  10. Drawings of HEPA filter clamping device
  11. Weld Procedure Specifications
  12. Weld Procedure Qualification Records
  13. Welder Certification Records including updates
- H. Certified Data. Copies of the following certified data, mailed under separate cover, shall be shipped with order.
1. Dye Penetrant Reports
  2. All Welding and Repair Documents
  3. Test and Inspection Reports
  4. Equipment Drawings with certified stamp
  5. Copies of Non-Conformance/Deviation Reports
  6. Installation/Assembly Procedures, Parts list and Maintenance Instructions
  7. Electrode and Filler Material Certified Material Test Reports
  8. Letter of Confirmation Identifying the Absence of Delamination in the Materials
- Certified drawings shall be provided three weeks after the seller receives approval from the Subcontractor on the submittal drawings.
- I. Welding and Inspection Reports – All welding and inspection reports shall be submitted in accordance with Section 18100A, “General Welding Requirements for Target Building Systems”.
- J. Manufacturer's shop test reports.

#### 1.5 QUALITY ASSURANCE

- A. A copy of the manufacturer's quality assurance plan shall be included with the proposal. Filter housings shall be manufactured under a quality assurance program that meets the requirements of ASME NQA-1.
- B. Control of Non-conformances:
1. The seller shall develop and implement procedures to control items that do not conform to contract requirements. The procedures shall provide for prompt identification, documentation, segregation, technical review, and disposition of nonconforming items. Nonconformances that cannot be reworked to conform to requirements shall receive a technical review, and resultant decisions to accept, repair, or modify shall be submitted to the Construction Manager for review and approval. Significant nonconformances are those, which affect safety, cost, schedule, performance, reliability, or maintainability. Records shall be kept of all cases submitted for action and shall reflect identification, evaluation, approval disposition and accomplishment of disposition actions.
  2. If the recommended disposition is “use as is”, a Request for Waiver including minimum information shown on Construction Manager furnished forms shall be submitted with any nonconformance report. These documents must be approved prior to implementation of the repair or shipment of the “use as is” material.
  3. Nonconforming products shall not be submitted to the Construction Manager without Construction Manager authorization. Requests for such authorizations prior to manufacturing (Request for Deviation) or during or after manufacturing (Request for Waiver) shall be submitted to the Construction Manager.
- C. Material Handling, Storage, & Identification for 304L Stainless Steel Requiring Heat Number Traceability:
1. All material shall be controlled to prevent contact with carbon steel (including other material & any tools which come in contact with the material).

2. All material shall be segregated from other material including 304L SS not requiring heat number Traceability.
  3. Traceability of heat numbers shall be such that, given a specific heat number, it can be traced to the Seller and from the Seller to the supplier's certification heat run number of the parent material.
  4. Provisions shall be in place requiring electro-etching of the heat number prior to separation from the parent part/material.
  5. Each part shall contain an electro-etched heat number and shall be traceable in accordance with previously stated requirements.
- D. Calibration of Measurement & Test Equipment (M&TE):
1. All equipment used for inspection and/or tests shall be calibrated to approved written procedures and all standards shall be traceable to national standards. All M&TE and calibration standards shall be periodically re-calibrated at pre-determined intervals. All calibration standards shall be periodically re-certified by an independent certified calibration laboratory.
  2. Each piece of M&TE shall have a unique equipment/identification number. Each piece of M&TE shall have a calibration record readily available stating, at a minimum, equipment number, date calibrated, calibration procedure, calibration results, due date for next calibration and identification of calibrating personnel.
  3. Each piece of M&TE shall have the calibration status clearly indicated on the equipment. Any M&TE which fails calibration shall be removed and/or identified as requiring further evaluation.
- E. Identification of Operating Status – All equipment and/or components requiring inspections and/or tests shall have a checklist or equivalent identifying, as a minimum, the following information.
1. Job Title
  2. Date inspected/tested
  3. Unique number identifying the item being tested
  4. Specific test performed, procedure designation, and acceptable criteria
  5. Test Results
  6. Signature of the person performing the inspection, test or examination and the signature of the witness, as applicable
  7. Status of the test – accepted or rejected
  8. Unique number of measuring and test equipment
  9. Actions taken as a result of any developments noted during test/inspection
  10. Unique test report number
- After completion of all inspections and/or tests the Quality Representative shall sign verifying that all required inspections/tests have been performed and all related results were acceptable.
- F. Material Testing Requirements
1. Aspects of quality assurance related to material testing are addressed in Section 2.1 of this specification. The Contractor Manager reserves the right to select random material pieces for retesting to verify test results. Failure of these tests will require a re-testing of the entire lot.
- G. NFPA Compliance: Air-handling equipments and components shall be designed, fabricated, and installed in compliance with NFPA.
- H. Comply with NFPA 70 for electrical components devices and accessories installation.
- I. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code (NEC), Article 100.
  2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulations 1910.7.
- J. Coordination: Coordinate layout and installation of filter housing assemblies with piping and ductwork and with other installations.

## 1.6 SHIPPING AND STORAGE

- A. Housing shall be shipped to the site in factory-fabricated protective containers, with factory-installed shipping skids. Shipping containers shall prevent damage to the housings during shipment and handling. Damaged housings shall be repaired or replaced by the Seller at no cost to the Subcontractor. Housings shall be stored in a clean dry place and protected from weather and construction traffic. Housings shall be handled carefully to avoid contact with carbon steel and damage to components, enclosures and finish.

## 1.7 EXTRA MATERIALS / SPARE PARTS

- A. Provide one extra sets of filters for each unit. Prefilters shall meet UL 900, Class 1 requirements.

## 1.8 SEQUENCING AND SCHEDULING

- A. Coordinate size and location of housekeeping bases. Cast anchor-bolt inserts as required into base.
- B. Coordinate size and location of structural-steel support members.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Sheet material and shapes: All welded Stainless Steel sheets and shapes exposed to the process air flow or welded to the housing shall be mill certified, 304L Stainless Steel, and shall have a maximum carbon content of 0.030% Ladle Analysis. Each sheet shall be continuously line marked with the heat run number along one edge. Shapes shall be tagged and color-coded on the ends. Marking and material test report and certification shall be in accordance with ASTM A 480/A 480M (General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip).
1. Sheet material shall be 304L SS in accordance with ASTM A-240, with 2B finish per ASTM A480.
  2. Structural shapes shall be 304L SS in accordance with ASTM A-276.
- B. All welded Stainless Steel sheets and shapes exposed to the process air flow or welded to the housing shall be tested in accordance with ASTM A262 as follows:
1. Two random specimens shall be tested from each material lot.
  2. Each specimen shall undergo sensitizing heat treatment for one hour at  $1,225 \pm 25^{\circ}\text{F}$ .
  3. Each specimen shall then be subjected to the oxalic acid etch test (ASTM A262 Practice A.) Acceptable etch structure classifications (as defined in ASTM A262, Table 4) shall be required to pass this test and qualify the material. Specimens, which pass this test, shall qualify the lot from which they are taken.
  4. Test results shall be reported and documented by independent laboratory test report or the certified material test report from the mill. The reporting document shall indicate that the oxalic acid etch test resulted in an acceptable etch structure

classification as defined in Table 4 of ASTM A262. Specimens, which pass this test, shall qualify the lot from which they are taken. Specimens, which fail this test, shall be subjected to practice C of ASTM A262. Acceptable weight loss shall be 0.002 in./month. Specimens, which fail this test, shall be rejected.

5. Both specimens must pass to qualify the lot from which they are taken.

- C. Welding requirements for HEPA Filter Housings shall be in accordance with Section 18100A, "General Welding Requirements for Target Building Systems".

2.2 HEPA FILTER/PRE FILTER HOUSINGS/TEST SECTIONS – Filter housings shall be positive seal side access bag-in/bag-out type housings. Test sections shall be upstream, middle stream and downstream types. Refer to the design drawings for test section configurations.

2.3 FABRICATION - Filter Housings shall be constructed of 304L Stainless Steel and fitted for installation in interior locations. Housings shall be all welded construction. Housing sides, top and bottom shall be constructed from a single sheet of material. The filter housings shall be designed and fabricated to meet the performance requirements of ASME N509-89.

- A. HEPA filter housings shall be all welded construction.

1. Cracks and crevices in the interior of the housing pressure boundary weld joints shall be eliminated by continuously welding all joints. Other welded joints on the interior of the housing shall be continuously welded to eliminate cracks and crevices in the weld joint.
2. Housings shall be provided with lifting lugs sufficient to lift the entire filter train when assembled.
3. Housings shall be provided with 125 lb Stainless Steel Slip On Flat Face flanges unless otherwise noted on the attached sketches. Bolt pattern shall comply with ANSI B16.5. Flange boltholes shall straddle major centerlines.
4. Removable fasteners shall not penetrate the process airflow. All fasteners shall be stainless steel.
5. Mounting frame and filter sealing mechanism shall be fabricated per ANSI N509-89, Section 5.6.3, HEPA filters which employ gaskets. Filter sealing surface shall be machined in accordance with Table 4.2 or ERDA 76-21.
6. Full Face ¼" thick Hypalon rubber gaskets shall be provided for the flanged connections. Gaskets shall have a durometer Shore A reading of  $60 \pm 5$ . Gaskets shall be dimensioned in accordance with ANSI B16.5.
7. Housing structural design shall be in accordance with ERDA 76.21 Section 6.2.2.
8. Housings and anchors shall be designed to meet the 1997 UBC requirements for the design of PC-2 equipment using an importance factor (Ip) of 1.5 and a Seismic Coefficient (Ca) of 0.21 g. The manufacturer shall provide anchor bolts with the filter housings.
9. Transitions and/or plenums shall be constructed of 304L Stainless Steel meeting the requirements of Paragraph 2.1, Materials. Transitions and/or plenums shall be designed with reinforcement to withstand the maximum design pressure, leak test pressure, and structural capability pressure. They shall be attached to the filter train by continuous seal welding.
10. Care shall be taken to prevent any material delamination. Delaminated materials shall be rejected and replaced at the expense of the seller.

- B. Each housing shall be provided with clips or skirts, welded to the housing, to permit bolting the housing to a support frame-by others.

## 2.4 HOUSING CONSTRUCTION

- A. Configuration

1. Filter housings shall be constructed according to the configurations and dimensions shown on the drawings.
- B. Filter Arrangement
1. All filter housings shall be positive seal, side access, Bag-in / Bag-out type.
  2. All filters shall have the following efficiencies:
    - a. For High Efficiency Particulate Air (HEPA) Filters the Efficiency shall be, 99.97% Minimum rated at 0.3 micron particle size.
    - b. Pre-Filters shall be 90-95% ASHRAE, Class 1 filters.
    - c. Stainless Steel Moisture separator (otherwise referred to as a "Fire Screen" upstream of pre-filters shall be 98% Efficient on 20 micron moisture or fire-ash droplets at 500 FPM (2.54m/sec) air face velocity.
- C. Filter-banks for each air handling functions shall be assembled from the following size of filters:
1. HEPA filter size 24" x 24" x 11 ½" deep
  2. Pre-Filter size 24" x 24" x 11 ½" deep
  3. Moisture separator size 24" X 24" X 4" deep
- D. Filter Differential pressure (airflow-resistance):
1. 99.97% Eff. HEPA Filters Clean: 1.0" WG. at 1,000 SCFM  
Dirty: 4.0" WG. at 1,000 SCFM
  2. 90-95% Eff. Pre-Filters Clean: 0.60" WG at 2,000 SCFM  
Dirty: 1.0" WG. at 2,000 SCFM
  3. Moisture separator Clean: 0.25" WG. (0.06 kPa) at 500 FPM
- E. Filter Housing Design Pressures
1. PCE and HOG Exhaust Systems
    - a. Operating Pressure -32" WG
    - b. Leak Test Pressure -48" WG
    - c. Maximum Design Pressure -60" WG
    - d. Structural Capability Pressure -75" WG
  2. SCE Exhaust System
    - a. Operating Pressure -8" WG
    - b. Leak Test Pressure -12" WG
    - c. Maximum Design Pressure -15" WG
    - d. Structural Capability Pressure -20" WG

## 2.5 FILTER HOUSING PORTS

- A. Static Pressure Ports
1. One ½ inch half coupling with brass plug shall be provided for each location identified to monitor pressure drop for each filter housing unit in the filter train.
- B. Drain Ports
1. Provide ¾ inch half coupling with brass plug on each filter housing. All drain ports shall be supplied with a drain valve corresponding to the following specifications:
    - a. Material: Minimum Acceptable Rating  
Body: Stainless Steel Primary: 150 psi at 375°F.  
Ball: Type 303, 304, 304L Nons shock: 600 psi at 100°F  
Stem: 316 or 316L
    - b. Characteristics:  
Ends: AISI Type 304L or 316L, ¾" FNPT  
Type: Ball, 3 piece Stainless Steel  
Seat: Ring Type  
Disc: Ball Type

Operation: Hand Lever, 90° Travel with Stop  
Stem to Ball: Slot  
Seals: Adjustable, for self compensating for temperature variance of 300°F through 1000°F close, open, close operating cycles. Nut below handle to maintain stem seal.

- c. All Threaded Parts:  
ANSI Type 300 Series-Nongalling Stainless
- d. External Parts  
Manufacturer's standard with Hex Body Bolting
- e. Seats, Body Seals, Gaskets & Stem Seal  
"Ultra High Molecular Weight Polyethylene (UHMWPE)". All seats, body seals, stem, and ball to be removable without removing pipe ends from the line.
- f. Wetted Parts  
Pickled and passivated
- g. All drain valves shall be supplied with a brass plug

C. DOP Test Ports

- 1. DOP test sections shall be fabricated as an integral part of the filter housing train and shall incorporate the proper apparatus to meet the intent of ANSI N510 – 1989. Each upstream and combination test section shall contain an injector assembly, sample assembly, and hinged diffusers. The upstream injection test section shall include one injection port and one sampling port. The down stream combination test section shall include one injection port and two sample ports. The outlet test section shall include a hinged diffuser and one sample port.

D. Filter Access Ports (Doors)

- 1. Ports shall be fabricated in accordance with Drawing No. BAG RING-101 (which is part of this specification). Doors shall be a minimum of 14 gauge, 304L series stainless steel. Door fittings shall be pressure clamp type for a leak proof fit of door to housing. Door latch shall be fabricated of non-galling material. Door latch assembly shall not deform. One door shall be provided for each filter. The access door opening shall permit storage of one change out bag within each filter module when the access door is closed. Each door shall be double wall construction with 2" of 6 lb/ft<sup>3</sup> fiberglass board insulation sandwiched between the walls.

## 2.6 FILTER SEALING MECHANISM AND SHAFT SEAL

A. HEPA Filter and Pre-Filter Sealing Mechanism

- 1. HEPA filter and pre-filter sealing mechanism shall be fabricated per ASME N509-89, Section 5.6.3, filters which employ gaskets. Filter sealing surface shall be machined in accordance with Table 4.2 or ERDA 76-21.
- 2. A minimum 5/8 inch shall be provided between filter and full release position.
- 3. Sealing mechanism shall be located downstream of the HEPA filter it retains.
- 4. Sealing mechanism operator shall be located on the access port side of housing and shall be operable with the access port in place.
- 5. Sealing mechanism shall be replaceable.
- 6. Threaded adjustment block for sealing mechanism shall be Nitronic 60 series material. The drive nut assembly shall be coated with antiseize compound in order to prevent galling.
- 7. The sealing mechanism shall be located downstream of the filters with the filter gasket located upstream of the filters.
- 8. A drive mechanism that utilizes the ACME thread design for power screw service shall be provided.

B. Shaft Seal

1. Sealing mechanism shaft seal shall be replaceable from the exterior of the housing. Shaft seal material shall be silicone rubber.

## 2.7 BAGGING RING

- A. Bagging ring shall be constructed per Drawing No. BAG-RING – 101. The maximum roughness for all surfaces in contact with the PVC change-out bag shall be 64 RMS finish.

## 2.8 CHANGEOUT BAG

- A. The changeout bag shall be a textured, non-self sticking, 8 mil. Thick polyvinyl chloride bag with at least two glove sleeves, one bag sleeve, and a ¼ inch diameter elastic cord hemmed into the bag mouth. One changeout bag and one nylon/neoprene laminated security strap shall be provided with each bagging ring.

## 2.9 ISOLATION VALVES (USED AS DAMPERS)

- A. Provide wafer type butterfly isolation valves at filter housing inlets and outlets. Valves shall be valve code V-6489 as specified in Section 15100, "Valves" with manual gear operator.

## 2.10 HOUSING IDENTIFICATION

- A. A clearly visible, stainless steel, name plate shall be welded to each housing in the filter train. The following information shall be electro-etched or engraved on the name plate, as applicable.
  1. Filter size, dust spot efficiency and quantity for HEPA and prefilters
  2. Air flow direction
  3. Specification 15886
  4. Seller's model number, serial number, ID number and name
  5. Design airflow SCFM
  6. Stores stock number
  7. Filter change differential pressure HEPA, prefilter

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. All material removed from the mill certified parent material, and used in fabricating the housing, shall be permanently marked with the heat run number via the electro-etching process before removal from the parent material so that the mill certification number of the parent material (heat run number) can be traced to that separated piece of material. Documentation shall be provided that allows traceability of the mill certification heat run number to each separate piece of material used in fabrication.

### 3.2 WELDING SPECIFICATION

- A. Welding requirements for HEPA Filter Housings shall be in accordance with Attachment H, of Section 18100A, "General Welding Requirements for Target Building Systems".

### 3.3 WELD INSPECTION

- A. Welding inspection requirements for HEPA Filter Housings shall be in accordance with Attachment H, of Section 18100A, "General Welding Requirements for Target Building Systems".

### 3.4 INSPECTION AND ACCEPTANCE CRITERIA

- A. The manufacturer shall notify the company ten (10) days prior to the actual fabrication start date.
- B. The Construction Manager shall have the option to inspect fabrication prior to, during and upon completion of fabrication and to witness any and all tests and inspections.
- C. Each fully assembled filter housing shall pass a structural capability test identified in paragraph 2.4E prior to performing a housing leak test.
- D. Each filter housing shall be visually inspected. The manufacturer(s) shall document visual inspection of the following applicable items as listed in Section 5.5.1 of ASME N510-89. A checklist shall be prepared for the following specific items.
  - 1. Items c, d, e, g, l, n, o, p, u and v of Section 5.5.1.1
  - 2. Items a and b of Section 5.5.1.2
  - 3. All items of Section 5.5.1.4
  - 4. All items of Section 5.5.1.5
  - 5. All items of Section 5.5.1.12
- E. The Construction Manager will, at its option, witness all tests and has the right to inspect and approve all equipment prior to shipping to site. A two-week notice shall be provided to the Construction Manager for all off-site testing. The Construction Manager, at its option, will select at random a representative sample of completed test reports and witness, at the manufacturer(s) facility, the actual procedure on the units in question. The purpose will be to verify the accuracy of the test results documented in the reports. Housings shipped prior to approval of the test reports will be returned to the manufacturer(s) at the manufacturer(s) expense. Unit(s) that fails the pressure test shall fail the entire lot.
- F. The Construction Manager shall be provided a three week approval period for all submittals that require a Construction Manager response. This approval period shall be included in the manufacturer(s) proposed delivery schedule.

### 3.5 LEAK TESTING

- A. Housing leak tests shall be performed in accordance with ANSI N510-89 Section 6.5.3, using the "pressure decay method". The maximum permissible leak rate shall be 0.1% housing volume per hour. Housing leak tests results shall be reported in accordance with ANSI N510-1989 Section 6. In the event of a failure, detection of leaks shall be performed in accordance with Section 6.5.4 (Bubble Leak Method). Gaskets that leak as a result of a crack or crevice in the gasket material shall be replaced, not repaired. The fully assembled housing shall be certified in writing to have passed the LEAK TEST for a leak test pressure of positive and negative 48 in. WG for the PCE and HOG system filter housings and positive and negative 12 in. WG for the SCE system filter housing.
- B. The filter mounting frame shall be leak tested in accordance with Section 7.0 of ANSI N510 utilizing the Pressure Decay Method (Section 6.5.3). Maximum leak rate shall not exceed 0.1% of test volume per hour. Test shall be conducted with a pressure difference of positive and negative 20 in. w.g. across the filter sealing surface. Sealing surface leak tests shall be reported in accordance with ANSI N510-89, Section 7.7.

### 3.6 TEST SECTION QUALIFICATION TESTING

- A. Test sections shall achieve the acceptance criteria for the air-aerosol mixing uniformity test per ASME N510-89, Section 9.

### 3.7 ATTACHMENT

#### PRE - FILTER

##### DESCRIPTION

Pre-Filter  
ASHRAE, Class 1

##### PERFORMANCE

Air Volume	2000 scfm
Initial Resistance	0.65 in. w.g.
ASHRAE 52.1 Average Atmospheric Dust Spot Efficiency	90-95% (65% DOP method)
Dust-Holding Capacity at 0.8-in.-w.g. Resistance	1588 g
Dust Type	Atmospheric
Air Temperature	300°F
UL 900 Classification	1

##### PHYSICAL

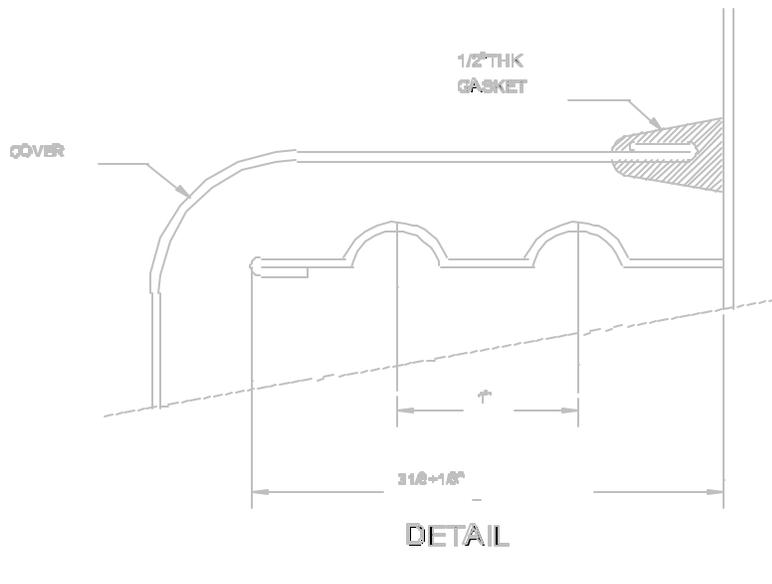
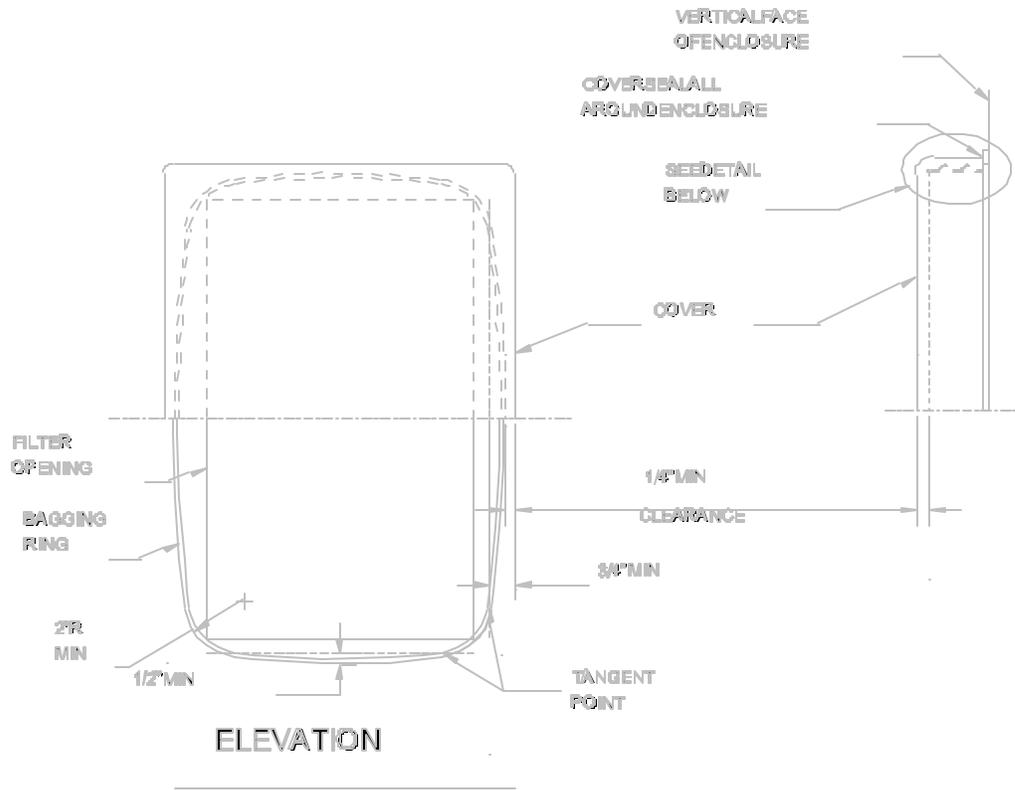
Element Size (Nominal)	Width:	24 in.
	Height:	24 in.
	Depth:	11 5/8 in.
Media Depth in Frame		10 3/4 in.
Media Area		160 ft <sup>2</sup>
Media Thickness		0.03 in.
Gasket Size		3/4 in. X 1/4 in.

##### MATERIAL

Media	Fiberglass
Frame	Metal, Galvanized Steel
Dividers	Corrugated Aluminum
Adhesive	Rubber Base
Gaskets	Neoprene On Air Entering Side

##### NOTES:

1. Element shall have 23 ga. galvanized steel hardware cloth face-guards on both faces.
2. Hardware cloth shall be spot welded on four sides with header installed over the edges of the mesh.
3. Element shall withstand 10-in.-w.g. pressure drop without effect on structural integrity.



NOTE: DIMENSIONS SHOWN ARE FOR 24\"/>

## BAGRING-101

END OF SECTION 15886