Camfil Farr FN Series Housings are designed for use in critical processes where hazardous airborne materials must be prevented from escaping to the atmosphere.

Although the Camfil Farr FN Housing is available in a basic configuration various options specific to the application are available. When matched with Camfil Farr Isolation Dampers, contaminated filters may be decontaminated before filter service.

These housings are typically used in facilities that incorporate hazardous materials in their processes. These contaminants may include biomedical, radiological, carcinogenic or other materials of concern. Some specific applications include:

- Chemical manufacturing facilities
- Food processing
- Genetic research and biotechnology facilities
- Hospital Isolation Suites to prevent the spread of infectious diseases
- Industrial processes exhaust
- Microelectronic and semiconductor facilities
- Nuclear power plants
- Pharmaceutical facilities
- Radioisotope handling facilities
- University research laboratories
- US Department of Energy Facilities
- Veterinary research and animal disease laboratories
- Specific United States Government and military facilities.

1 If the user feels that a control barrier to protect changeout personnel is required the Camfil Farr FB Housing should be selected (see Camfil Farr Bulletin 3401).

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Camfil Farr—clean air solutions
Camfil Farr FN Housings are available in configurations from ½ x ½ (that include the installation of one filter 12” by 12” size) to configurations that are 1 x 3 that allow the service of up to three 24” by 24” filters from a single service door. Units may be stacked or connected in series dependent upon the airflow requirements and contaminants of concern. The housing in Figure 1 shows a stacked unit that is 3 filters high by 2 filters wide and includes 3 stages of air filtration.

The details of each enclosure are clearly identified on a stainless steel label affixed to each door of the housing. The following components assure compliance with these mandates.

Prefiltration

Camfil Farr FN Housings can incorporate a prefilter track to extend the life of the primary filters. Tracks may accommodate 2”, 4", or 6" deep prefilters. Access to prefiltration may be through the same door as the final filter without disturbing final filter integrity. A separate door may also be provided for prefilter access only. Prefiltration efficiency typically ranges from a MERV 7 to a MERV 14 when evaluated under ASHRAE Filter Testing Standard 52.2-1999.

Particulate Filters

Typically the primary filter in a containment system is a high efficiency particulate arrestor (HEPA). Camfil Farr HEPA filters are manufactured under strict quality control guidelines. Every filter is tested to ensure that the particulate efficiency meets or exceeds the requirements of the application. Particulate filters are available from 99.97% on particles 0.3 micron in size to 99.9995% on particles 0.12 micron in size. All Camfil Farr fluid seal filter housings ensure a leak free seal between the housing filter mount and filter thereby ensuring that all of the air moving through the housing is treated by the air filter for removal of harmful contaminants.

Molecular Filtration

Hazardous gases may be removed from the airstream through the application of various configurations of adsorbers. Adsorbers should be selected for their affinity to the hazardous gas contaminant of concern or combination of gases involved. In some
cases multiple stages of adsorbers should be applied, and in all cases adsorbers should be prefiltered. An additional stage of prefiltration may be required downstream of the adsorber to capture any particulate that may be generated by the adsorber.

Test Sections

Most installations will require an in-place filter efficiency evaluation to ensure that the system is performing to specifications. Applications that should incorporate test sections include any system where access to upstream and downstream ductwork may be restricted. In-place test sections minimize system train distance requirements that are typical for proper mixing of challenge aerosol. In most cases the entire bank of air filters is evaluated for overall efficiency. Scan test sections are also available that allow individual filter scanning for leaks. Consult Camfil Bulletin 3407.

CBR Systems (Special)

A CBR system is a single filter system designed to control chemical, biological and radiological contaminants that may be generated by wartime, terrorist or industrial accident. The system usually includes prefiltration, HEPA filters, gaseous adsorbers and post filters for particulate removal in one certified leak free module. Contact factory for assistance with CBR units.

Standard Component Construction

Stainless Steel Construction

Camfil Farr FN Housings are completely factory assembled and constructed of 304 stainless steel sheet metal. There are no painted surfaces, nor cross-contamination from the use of carbon/mild steel materials. Each housing is warranted to withstand 15” w.g. positive or negative pressure without failure of the housing to ambient air seal or compromise of the overall housing integrity. Each housing is tested to this level and test reports are available on request. Camfil Farr has the ability to custom design housing integrity to most operating conditions.

Access Door (s)

Access doors, of the same construction materials as the housing, include a high-memory silicone gasket that recreates a positive housing to ambient seal after each filter change. Convenient permanent door handles are optimally placed so the doors have a natural balance during filter change.

Replaceable Star-Style Door Knobs

Each door is secured through the use of four threaded studs with replaceable star knobs. After filter change the knobs are tightened in an alternating pattern to ensure an even and secure housing seal. (Optional swivel door latch shown).

Filter-Sealing Assembly

Camfil Farr FN Housings incorporate a linkage clamping mechanism that is applied through the use of a locking arm from inside of the filter housing.

The housing includes a penetrating knife edge which inserts into a fluid filled perimeter channel located on the face of the air filter. By engaging the filter sealing mechanism, the filter is moved to a position where the knife edge uniformly penetrates the filter’s fluid channel creating a leak free seal. Disengaging the filter sealing mechanism removes the filter free of the penetrating knife edge, enabling filters to be removed.

Optional Components

(see last page for standard specifications on these items)

Construction Materials

Alternate materials of construction are available. As an example, the units are available in various grades of stainless steel
sheet metal. Please consult the factory if your application requires non-listed components of construction.

**Dampers**

Dampers allow isolation of components during filter change or decontamination processes. Camfil Farr manufacturers low-leakage and bubble-tight designs. Consult Camfil Bulletins 3440R or 3440S.

**Decontamination Ports**

Camfil Farr can provide decontamination ports for the injection of materials designed to force neutralization of contaminants. This photo shows plug sitting on top of the port assembly. Plug type is ring-seal positive.

**DOP/Freon Test Ports**

To facilitate in-place filter evaluation Camfil Farr can supply integral tests ports for the sampling of the challenge aerosol. Commonly referred to as DOP/Freon test ports, they are also applicable to today’s modern technology of alternate test challenges.

**Drilled Flanges**

Camfil Farr can provide pre-drilled duct connection flanges. Holes are typically 7/16” in diameter with spacing not to exceed 4” (per DOE-HDBK-1169-2003 “Nuclear Air Cleaning Handbook”). For a bolt hole drawing of your housing model please consult factory.

**Filter Change-out Tray**

A filter change-out tray provides support for the filters during the service process. Connecting conveniently to the door latches it can support filters and other components up to 300-lbs. Filter change-out trays are highly recommended for housing applications where ladders may be required for service or housings are in a difficult-to-reach location, or where heavy carbon adsorbers may be applied. Consult Camfil Bulletin 3410.

**Lifting Lugs**

Camfil Farr can provide lifting lugs for unit transport and support during installation. The lugs are of 1/4” thick 304 stainless steel and have an 1-1/2” hole. Common lifting lug locations include the top or side of the housing.

**Plenums & Transitions**

Camfil Farr can manufacture all components required for complete system integrity. Matching plenums of the same construction as the housing are available to mate with existing equipment or ductwork. Transitions are also available to mate to equipment offsets.

**Prefilter Housings**

Consult factory for prefilter housing options.

**Pressure Gages**

Camfil Farr can provide factory-mounted differential pressure gages to evaluate resistance across individual filters or any combination of internal components. Gage connections include copper tubing and brass fittings. Stainless steel tubing and fittings are also available.

**Pressure Taps (static)**

Static pressure taps are available to facilitate the connection of gages or other ancillary equipment. For on-site application of gages, taps include a removable brass plug.

**Swivel Door Latches**

Camfil Farr housings are available with swivel door latches to allow the latches to swing away from the filter change opening. Door latch components are captive as a
precaution against dropping or losing them. Swivel door latches are highly recommended for housing applications where ladders may be required for service, or housings that are in a difficult-to-reach location.

**Test Sections (in-place)**

Test sections allow evaluation of filters without the on-site inline space penalties associated with the proper mixing of aerosol challenges. Standard test sections allow evaluation of an entire bank of filters. Scan test sections allow evaluation of individual filters to ensure that an individual filter does not have any leaks. All testing is accomplished without exposing the service personnel to contaminants contained by the housing. Consult Camfil Farr Bulletin 3407-0902 for standard test sections and scan test sections.

**Weather Caps**

Although Camfil Farr housings are weatherproof, an optional weather cap of the same construction materials as the housing, may be included to prevent water accumulation on the top of the housing. Standard weather caps are attached and sealed against weather intrusion. If pre-drilled flanges are required the weather cap is bolted to the housing to allow access to mounting flanges.

**Additional Options**

(requiere factory consultation)

**Casters**

Camfil Farr Safety & Protection Housings may be mobilized with casters to allow use of the units in alternate locations.

**Certified Weld Inspection (CWI)**

Visual weld inspection can be performed by a certified weld inspector qualified to Section 6.1 of the American Welding Society.

**Standards For Qualification and Certification of Welding Inspections, QC1-96.** The inspections will be performed under the guidelines of AWS D9.1M/D9.1:2000.

**Flanges**

Quarter-inch thick stainless steel plate flanges are available. The flanges can be furnished with 7/16" diameter holes no more than 4" on center as recommended in DOE-HDBK-1169-2003 “Nuclear Air Cleaning Handbook” or to mate-up with standard pipe flange bolt hole patterns. Standard raised-face, slip-on, stainless steel flanges per ASA B16.5 are also available.

**Deformation Testing**

Non-destructive deformation testing is available. This test confirms systems will not deform at higher pressures.

**Dye Penetrate Testing**

Dye penetrate testing is available to evaluate for weld defects.

**Electric Heaters**

Electric heaters with pre-wired connection boxes are available.

**High/Low Pressure Options**

Camfil Farr can assemble components to meet the pressure requirements of most applications.

**High-Temperature Construction**

Camfil Farr housings are available with construction components that can accommodate process air to 450° F (232°C).

**Humidifiers**

Humidifiers are available to meet specific application needs.

**Insulation**

Housings may be insulated. All insulation incorporates double-wall housing construction.
Low Leak Testing

Low-leak testing to lower than standard leak rates is available.

Metal Door Pocket

A metal door pocket to store Operations & Maintenance Manual (O & M) during system operation is available.

Moisture Removal Drains & Valves

Moisture removal drains and valves are available. These are typically applied in installations that have concerns with regard to condensation, or if moisture separators are used in the system.

Moisture Separators

Moisture separators applied as prefiltration are available. Camfil Farr Moisture Separators have an efficiency of 98% on 5-micron size droplets. Other variations of moisture separators are available (consult factory).

Mounting Bases

Custom mounting bases are available. These are applied for seismic security or to match a roof curb.

Mounted Fans/Controls

Camfil Farr will assemble complete trains of containment that can include particulate filtration, gaseous filtration and ancillary components such as fans and controls.

Seismic Qualification

Camfil Farr FN Housings can be qualified in accordance with the criteria of the Uniform Building Code (1994 & 1997). Multiple module systems consisting of filter housings, test sections, dampers, etc. can be qualified per application to meet most levels of severe seismic requirements. Additional information to provide assurance of seismic qualification requires factory consultation.

The Complete System

Camfil Farr manufactures all of the components that may be required in a containment train of housings. From the filter, to the bag, to the dampers that isolate the system, quality is assured through unparalleled component compatibility. Performance and protection from one source, Camfil Farr, a worldwide leader in air filtration technology and production.

Quality Assurance

Any Industry that has processes of concern that may include possibly hazardous exhaust components (gases and/or particulates) has a vested interest in the well-being, and health and safety of employees or others that may have proximity to the process. Additionally, cognizant authorities including the United States Government, State bodies and engineering societies have defined minimum standards of care with respect to many hazardous containment applications. At the bare minimum, equipment assembled for these processes must be manufactured to exacting quality control procedures.

Camfil Farr has in place, various quality control initiatives that ensure that our products meet or exceed these standards. These programs are inclusive of raw materials acquisition, procedures of transport and storage, preparation and assembly of these materials to a final product form, and the testing and qualification to ensure the finished product meets or exceeds the letter of the Standards. Camfil Farr Safety and Protection product facilities have been audited by various entities and found to be acceptable. These procedures are part of a living doctrine that is updated based upon improved technologies and the increased needs of the applications. Camfil Farr containment products are manufactured under a Camfil Farr Quality Assurance program, including the basic requirements of ASME-NQA-1 when specified.

Camfil Farr Absolute filters and ASHRAE grade filters that may be used in containment applications are manufactured in ISO 9001:2000 facilities.

Additional quality assurance procedures are in place to meet the needs of specific end users. These procedures are available for review and modification by end users, our authorized representatives, and Camfil Farr.
CF-3X3-412 P-3FN-SS

Number of Filters High
(height of housing)
½ = One (1) filter high (half size)
1 = One (1) filter high
2 = Two (2) filters high
3 = Three (3) filters high
4 = Four (4) filters high
5 = Five (5) filters high
6 = Six (6) filters high

Number of Filters Wide
½ = One (1) filter wide (half size)
1 = One (1) filter wide
2 = Two (2) filters wide
3 = Three (3) filters wide
4 = Four (4) filters wide
5 = Five (5) filters wide
6 = Six (6) filters wide

Prefilter Size
(depth of prefilter)
(health and width to match
nominal dimensions)
0 = No prefilter
2 = 2” Deep prefilter
4 = 4” Deep prefilter
6 = 6” Deep prefilter

Primary Filter Size
(depth of primary filter)
12 = 11½” Actual filter depth
16 = 16” Actual filter depth
18 = 18” Actual filter depth
CF-1X1-012P-1FN-SS will require a filter with actual dimensions of 24” X 24” X 11½”

Sealing Edge (Typical)

Typical door arrangement 1 with a single primary filter. Designed to accommodate primary filter(s) through one door opening. Actual primary filter depth may be 11½”, 16” or 18”.

Typical door arrangement 1 with prefilter and primary filter. Designed to accommodate prefilter(s) and primary filter(s) through one door opening. Prefilter depth limited to 2”. Primary filter depth may be 11½”, 16” or 18”.

Typical door arrangement 3 with dual access doors. Designed to accommodate prefilter(s) and primary filter(s) through separate access doors. Prefilter depth may be 2”, 4”, or 6”. Primary filter depth may be 11½”, 16” or 18”.

Above arrangements show upstream, downstream and upstream primary filter seals respectively. Arrangements 1 and 3 are also available with downstream primary filter seal when in-place scan testing is required.

Housing Dimensions
A = Height
B = Width
C = Depth

Access Door Arrangement
1* = One (1) access door on one side of housing
2 = Two (2) access doors, one access door on each side of housing
3 = Two (2) access doors on one side of housing, one door for prefilter, one door for primary filter
4 = Four (4) access doors, two on each side of housing, one for prefilter access, one for primary filter access

* Housing can only accommodate 2” deep prefilter and primary filter

Filter Type
P = Particulate
C = Carbon adsorber (HEGA)

Housing Sheet Metal Type
SS = T-304 Stainless steel (standard)
AS = Aluminized steel
304L = T-304L Stainless steel
316 = T-316 Stainless steel
316L = T-316L Stainless steel

Housing Type/Series
GB = Gasket seal bag-in/bag-out
GN = Gasket seal non-bag-in/bag-out
(Camfil Farr Bulletin 3405-0902)
FB = Fluid seal bag-in/bag-out
(Camfil Farr Bulletin 3401-0902)
FN = Fluid seal non-bag-in/bag-out
(Camfil Farr Bulletin 3404-0902)
Camfil Farr housings feature smooth surface construction. Pocket areas, that would allow contaminant build-up are minimized. All pressure retaining joints on the interior of the housing are continuously welded.

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<th>Prefilter Depth (inches)</th>
<th>Primary Filter Depth (inches)</th>
<th>Door Arrangement</th>
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Standard Specification for Camfil Farr FN Containment Housing

1.0 – General

1.1 - Housing shall be Camfil Farr non bag-in/bag-out FN-series side-access, fluid seal housing. The housing shall be adequately reinforced to withstand a negative or positive pressure of 15" water gage. Housing design and filter arrangement shall allow air to enter and exit housing without changing direction. The housing shall accommodate standard size filters that do not require any special attachments or devices to function properly in the housing. The housing shall accommodate fluid seal filters which require a penetrating knife edge installed on all filter sealing surfaces. The knife edge shall insert into the fluid filled perimeter channel located on the face of the filter. By engaging the filter seal/release mechanism the filter shall move (push) the fluid filled channel to the sealed position. For removal of the air filters the filter seal/release mechanism shall remove (pull) the filter free of the blade type knife edge.

1.2 – Sizes shall be noted on enclosed drawings or other supporting materials.

2.0 – Construction

2.1 – Housing shall be constructed of 14 gauge and 11 gauge T-304 stainless steel metal. All pressure retaining joints and seams shall be continuously welded with no porosities. Joints and seams requiring intermittent welds, such as reinforcement members, shall be intermittently welded. Housing shall be free of burrs and sharp edges. All weld joints and seams that are a portion of any gasket setting surface, and duct connection flanges, shall be ground smooth and flush with adjacent base metals. All welded joints and seams shall be wire brushed to remove heat discoloration. The housing shall be reinforced to withstand a positive or negative pressure of 15" w.g. The upstream and downstream ductwork connections shall have 1 1/2" outward-turned flanges.

2.2 - Each tier of the housing shall have a filter access port that is sealed by a gasketed filter access door. The filter access door gasket shall be silicone and shall be replaceable, if necessary.

2.3 – Ancillary hardware including filter seal/release mechanism, door handles, door studs and labels shall be 300 series stainless steel. Filter access door knobs shall be cast aluminum and designed to prevent galling of threads.

3.0 – Performance

3.1 - All welding procedures, welders, and welder operators shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX. All production welds shall be visually inspected by qualified personnel, per Camfil Farr standard procedure number CFW-10001, Visual Inspection of Welds, which incorporates the workmanship acceptance criteria described in Section 5 & 6 of AWS D9.1-1990, Specification for Welding of Sheet Metal.

3.2 - The filter housing shall be manufactured under a Camfil Farr Quality Assurance Program (see Note 1 below). The filter housing shall be factory tested for filter fit, alignment of filter sealing knife edge and operation of filter clamping mechanism. The filter sealing surface and the complete assembly pressure boundary shall be leak tested by the pressure decay method as defined in ASME N510-1995 Reaffirmed., Testing of Nuclear Air Cleaning Systems, paragraphs 6 and 7. The filter sealing surface shall be tested at +10" water gage and have a maximum leak rate of 0.0005 cfm per cubic foot of housing volume. The overall system pressure boundary shall be leak tested at +15" water gage and have a maximum leak rate of 0.0005 cfm per cubic foot of housing volume.

3.3 – Multi-wide housing shall be equipped with a filter removal rod to pull the filters to the change-out position.

Note 1 (to specifying engineer): Camfil Farr manufacturers all of its containment products using more than one Quality Assurance Program. Our product-wide Quality Assurance Program is a stringent process that ensures the equipment is produced in conformance with our understanding of the intended application. However, this product-wide program does not address all the items specified in ASME-NQA-1. If this product must be manufactured under an ASME NQA-1 Quality Assurance Program, please add the following to this statement “including the basic requirements of ASME NQA-1.”

Please contact the factory if specific clarifications are required.

Optional specification items on next page.
Optional Specification Items

The format of these additional specification items includes a section numbering system consistent with today’s requirements. Items beginning with the numeral 1 relate to general items, numeral 2 for construction components, and 3 for performance criterion. Dependent upon the option there may be an addition to one or more specification sections. Replace the # with a proper sequencing number based upon options selected.

Decontamination Ports

2.# - Housing shall be provided with decontamination ports for injection of materials to neutralize contaminants. (Specify details. Contact factory for assistance).

DOP/Freon Test Port

2.# - Challenge aerosol sampling ports shall be provided upstream and downstream of each primary filter access door. The port shall be 3/8” FIPS and include a hex head brass plug for periods when it is not in use.

Drilled Duct Connection Flanges

2.# - Housing shall include pre-drilled flanges to facilitate attachment to ductwork. Holes shall be 7/16-inch diameter with spacing between holes not to exceed 4” as recommended in DOE-HDBK-1169-2003 “Nuclear Air Cleaning Handbook.

Filter Change-out Tray

2.# - A filter change-out tray of stainless steel welded construction shall be provided. The tray shall be designed for attachment to door studs during filter change. The tray shall be capable of supporting 300 pounds. (Specify quantity required).

Lifting Lugs

2.# - Lifting lugs, constructed of 1/4-inch thick Type 304 stainless steel shall be provided on the (side, top) of the housing. The lugs shall be capable of supporting the housing without housing deflection during transport and installation.

Prefilter Housings

Consult factory.

Factory-Mounted Pressure Gages

2.# - Housing shall include factory mounted pressure gages to measure any combination of pressure drop across prefiltration, final filtration, or combination thereof (specify requirements). Gage increments shall be as noted on enclosed drawings or other supporting materials. Gage tubing shall be copper construction with brass compression fittings.

Pressure Taps (static)

2.# - Static pressure taps with 1/4-inch FIPS threads that allow field installation of static measurement gages or other measurement devices shall be included upstream and downstream of filter stages. Taps shall allow measurement across (prefilter only, prefilter and primary filter system, primary filter only, or overall systems including multiple prefilter and primary filter combinations). (Specify requirements).

Swivel Door Latches

2.# - Housings shall be equipped with swivel door latches that shall completely swing-away from the filter change opening. All latching components shall remain captive during change.

Test Sections

Consult factory for test section options.

Weather Cap

2.# - Housing shall be provided with a weather cap that shall promote moisture run-off and prevent moisture accumulation on the top of the containment housing. The weather cap shall be constructed of the same materials as the housing and shall be (intermittently welded and sealed against weather intrusion, bolted to the housing to allow access to housing mounting flanges).

Items in parenthesis ( ) require selection.
Camfil Farr has a policy of uninterrupted research, development and product improvement. We reserve the right to change designs and specifications without notice.

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