AIR FILTRATION

DESIGN GUIDELINES

1. Summary
    a. This section is for the design of Pleated Panel Filters, V-bank cell filters, Rigid cell filters, Front- and rear-access filter frames, Side-access filter housings and Filter gages for AHU's, Fan Coils, etc.
2. All Filters and filtration design shall comply with ASHRAE:
    a. ASHRAE 62.1
        - Section 4 - "Outdoor Air Quality"
        - Section 5 - "Systems and Equipment"
        - Section 7 - "Construction and Startup"
    b. ASHRAE 52.1 for arrestance.
    c. ASHRAE 52.2 for MERV ratings and testing methods.
3. Provide a Filter Schedule on the contract drawings that:
    a. Notes the application of each type of filter.
    b. Specifies the static pressure drop through the filters at clean and recommended replacement conditions.
    c. Is designed in accordance to the following:
        - General Purpose Air Handling Applications and Heat Recovery Coils on exhaust systems:
            1. Prefilter: None
            2. Final Filter: Pleated Panel Filters, MERV 8.
            3. Location: Upstream of all coils and fans in units.
        - Laboratory Air Handling Applications:
            1. Prefilter: Pleated Panel Filters, MERV 8
            2. Final Filter: V-Cell or Rigid-Cell, MERV 13
            3. Location: Upstream of all coils and fans in units.
        - Medical Air Handling Applications (Procedures, Treatment, or Operating Rooms):
            1. Prefilter: Pleated Panel Filters, MERV 8
            2. Final Filter: V Cell or Rigid-Cell, HEPA filters 99.7%
            3. Location: Prefilter to be upstream of all coils and fans in unit. Final filter to be downstream of all coils and fans in unit.
    d. Shall be discussed and coordination with the Project Manager and applicable Codes.
4. Filter Pressure Drops:

   a. Estimate the fan static pressure by using the manufacturer's published static pressure drop at the recommended condition and not at the clean condition.
   b. 500 fpm face velocity.

5. Design the positions of each Filter Unit, Filter Bank, etc. with clearances for normal service and maintenance.
6. Filter Sizes
   a. AHU filters shall be standard sizes of 24"x24".
   b. Filter sizes shall be coordinated with facilities if other than standard 24"x24".
7. Filter gages
   a. Provide filter gages at each filter bank with separate static-pressure taps upstream and downstream from filters.
   b. Filter gages to be mounted on the outside of filter housing or filter plenums in an accessible position.
8. Construction Documents to call for the Contractor to:
   a. Provide product shop drawings for each type of filter.
   b. Anchor filter housing frames to substrate.
   c. Not operate fan system(s) until filters (temporary or permanent) are in place.
   d. Replace temporary filters used during construction and testing with new, clean filters.
   e. Coordinate filter Installations with duct and air-handling-unit Installations.
   f. During construction, provide filtration to protect all mechanical duct and equipment (AHUs, FCUs, VFDs).
   g. Replace construction filtration media as required to maintain existing duct and equipment in original condition.
   h. Clean the filter housings after completing system installation and testing, adjusting, and balancing of air handling and air-distribution systems.
   i. Replace the filters at the end of construction.
   j. Provide (1) extra set of filters.
   k. Provide design of equipment and low velocities to eliminate possibility of rain entrainment into any filters at outside air intakes.
9. Related sections
   a. Air Handling Units
   b. Fan Coil Units
   c. HVAC Fans – Laboratory
   d. HVAC Fans – General
   e. Heat Exchangers – Air Side
   f. Environmental Health & Safety (EH&S)

EQUIPMENT AND PRODUCT REQUIREMENTS

1. Filter Gauges
    a. Manufacturers
        - Dwyer Instruments, Inc.
    b. Diaphragm-type gage with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.
        - Diameter. 4-1/21nches.
        - Scale Range for Filter Media Having a Recommended Final Resistance of 3.0- to 4.0-lnch wg or less: 0- to 4.0-lnch w.g.

          Note: Scale range to be verified with piece of equipment. The pressure range may need to be decreased in order to have larger increments and easier to read.
    c. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.
2. Filter Manufacturers: The housings, frames and filters shall be by the same manufacturer:
    a. AAF International
    b. Camfil Farr
    c. Flanders-Precision aire (Grainger)
    d. Koch Filter Corporation
3. Pleated Panel Filters
    a. Description: Factory-fabricated, self-supported, extended-surface, pleated, panel-type, disposable air filters with holding frames.
    b. Filter Unit Class: UL 900, Class 2.
    c. Media: Cotton and synthetic fibers:
        - Separators shall be bonded to the media to maintain pleat configuration.
        - Welded wire grid shall be on downstream side to maintain pleat.
        - Media shall be bonded to frame to prevent air bypass.
        - Support members on upstream and downstream sides to maintain pleat spacing.
    d. Filter-Media Frame: Cardboard frame with perforated metal retainer sealed or bonded to the media.
    e. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
    f. Capacities and Characteristics:
        - Thickness or Depth: 2 inches.
        - Maximum or Rated Face Velocity: 500 FPM.
        - Efficiency: 90 percent on particles 20 micrometers and larger at 500 fpm.
        - Initial Resistance: .28 inches w.g.at 500 fpm.

- Recommended Final Resistance: 1.0 Inch w.g.
- MERV 8

4. V-Bank Cell Filters
    a. Description: Factory-fabricated, disposable, packaged air filters with media angled to airflow, and with holding frames.
    b. Filter Unit Class: UL 900, Class 2.
    c. Media: Fibrous material constructed so individual pleats are maintained In tapered form under rated-airflow conditions by flexible Internal supports.
    d. Filter-Media Frames: Hard polyurethane foam.
    e. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
    f. Capacities and Characteristics:
        - Thickness or Depth: 12”.
        - Maximum or Rated Face Velocity: 500 FPM.
        - Arrestance of 98%.
        - Initial Resistance: 0.27inch w.g.
        - Recommended Final Resistance: 0.60 inch w.g.
        - MERV 13 or 14.
5. Rigid Cell Box Filters
    a. Description: Factory-fabricated, disposable, packaged air filters with media perpendicular to airflow, and with holding frames.
    b. Filter Unit Class: UL900, Class 2.
    c. Media: Fibrous material constructed so individual pleats are maintained in tapered form under rated-airflow conditions by flexible internal supports.
    d. Filter-Media Frames: Galvanized steel.
    e. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
    f. Capacities and Characteristics:
        - Thickness or Depth: 12”.
        - Maximum or Rated Face Velocity: 500 fpm.
        - Arrestanceof 98%.
        - Initial Resistance: 0.53 Inch w.g.
        - Recommended Final Resistance: 1.0 Inch w.g.
        - MERV 13 or 14.
6. Front and Rear Access Filter Frames

a. Description: Filter frames for use in built-up or field erected custom air handling units.

b. Framing System: Aluminum framing members with access for either upstream (front) or downstream (rear) filter servicing, cut to size and pre-punched for assembly into modules. Vertically support filters to prevent deflection of horizontal members without Interfering with either filter Installation or operation.

c. Prefilters: Incorporate a separate track with spring clips, removable from front or back.

d. Sealing: Factory-Installed, positive-sealing device for each row of filters, to ensure seal between gasketed filter elements and to prevent bypass of unfiltered air.

7. Two Stage Side Service Housings

a. Description: Factory-assembled, side-service weatherproof housings, constructed of galvanized steel or aluminum with flanges to connect to duct or casing system.

b. Integral aluminum tracks shall accommodate 2-inch-deep pre-filter, and either 12-Inch deep rigid filter or pocket filter with header.

c. Dual Access Doors: Hinged, with continuous gaskets on perimeter and positive· locking devices, and arranged so filter cartridges can be loaded from either access door.

d. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames and to prevent bypass of unfiltered air.

e. Housing shall include pneumatic fittings to allow installation of static pressure gauge to evaluate pressure drop across a single filter or any combination of installed filters.

END OF SECTION

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