Preparing Activity: NASA Superseding
UFGS-23 41 13.00 40 (February 2016)
UFGS-23 41 13 (August 2008)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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PANEL FILTERS

02/23

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SECTION 23 41 13.00 40

PANEL FILTERS
02/23

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NOTE: This guide specification covers the requirements for basic types of filters for use with air handling equipment.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
****

PART 1 GENERAL

****
NOTE: Specify any required extra media, filters, and adhesive. Indicate overall physical features, dimensions, ratings, service requirements, and equipment weights on drawings.
****

****
NOTE: If Section 23 30 00 HVAC AIR DISTRIBUTION is not included in the project specification, insert applicable requirements therefrom and delete the first paragraph.
****

[Section 23 30 00 HVAC AIR DISTRIBUTION applies to work specified in this

section.

] Provide panel filter[s] [system] complete with all components and accessory equipment as specified in this section.

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 52.2	(2012) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY (IEST)

IEST RP-CC-001	(2016; Rev 6) HEPA and ULPA Filters

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Sep 2022) UL Standard for Safety High-Efficiency Particulate, Air Filter Units
UL 900	(2015; Reprint Aug 2022) UL Standard for SafetyStandard for Air Filter Units

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals

required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation Drawings

SD-03 Product Data

Air Filters; G[, [____]]

Filter Gauges; G[, [____]]

SD-06 Test Reports

Test Reports

SD-07 Certificates

Air Filters

Filter Gauges

PART 2 PRODUCTS

****

NOTE: Select filters based on the functional needs of the area served, including indoor air quality. The combination of the extended surface pleated panel filters and the extended surface nonsupported pocked filters or the cartridge filter of the same efficiency are intended to fulfill the filtration requirements in UFC 3-410-01, Heating, Ventilating, and Air-Conditioning Systems for areas where indoor air quality is of primary concern. Consider limiting the variety of filter sizes required to minimize inventory requirements for system maintenance.

In the event the retention of efficiency values in the specification becomes too cumbersome, revise the requirements by referring to the efficiencies indicated on the drawings, to show for each air handling unit or system the efficiency of the air filters is required, and the maximum initial resistance.

****

2.1 FILTERS

Submit manufacturer's catalog data, including physical characteristics and performance data for panel filter[s] [system].

Submit physical characteristics information and performance data for air filters consisting of use life, system functional flows, safety features, and mechanical automated details. Submit curves indicating tested and certified equipment responses and performance characteristics.

Provide air filters with a net effective filtering area and a face area to provide the required airflow at the indicated initial pressure-drop.

Provide sufficient clearance for maintenance and operation in and around filter assembly.

List air filters according to requirements of UL 900, except list high efficiency particulate air filters of 99.97 and 99.99 percent efficiency by the DOP Test method under the Label Service to meet the requirements of UL 586.

2.1.1 Extended Surface Pleated Panel Filters

Provide 50 mm 2-inch depth, sectional, disposable type filters of the size indicated with a MERV of 8 when tested according to ASHRAE 52.2. Provide initial resistance at 2.54 m/s 500 fpm that does not exceed 0.09 kPa 0.36-inches wg. Provide nonwoven cotton and synthetic fiber mat media. Attach a wire support grid bonded to the media to a moisture resistant fiberboard frame. Bond all four edges of the filter media to the inside of the frame to prevent air bypass and increase rigidity.

2.1.2 Non-Fiberglass Type Panel Filters

Provide 50 mm 2-inch depth, sectional, disposable type filters of the size

indicated with a MERV of 8 when tested according to ASHRAE 52.2. Provide initial resistance at 2.54 m/s 500 fpm that does not exceed 0.09 kPa 0.40-inches wg. Provide four plys of progressively structured media, with internal wire support. Provide 100 percent non-fiberglass organic synthetic fibers resin bonded with special adhesive tackifier Media.

2.1.3 Extended Surface Nonsupported Pocket Filters

Provide [750][_____] mm [30][_____] inch depth, sectional, replaceable dry media type filters of the size indicated with a MERV of 13 when tested according to ASHRAE 52.2. Provide initial resistance at [2.54][_____] m/s [500][_____] fpm that does not exceed [0.1125][_____] kPa [0.45][_____] inches water gauge. Provide fibrous glass media, supported in the air stream by a wire or non-woven synthetic backing and secured to a galvanized steel metal header. Provide pockets that do not sag or flap at anticipated air flows. Install each filter [with an extended surface pleated panel filter as a prefilter] in a factory preassembled, side access housing or a factory-made sectional frame bank, as indicated.

2.1.4 Cartridge Type Filters

Provide 305 mm 12 inch depth, sectional, replaceable dry media type filters of the size indicated with a MERV of 13 when tested according to ASHRAE 52.2. Provide initial resistance at [2.54][_____] m/s [500][_____] fpm that does not exceed [0.14][_____] kPa [0.56][_____] inches, water gauge. Provide pleated microglass paper media with corrugated aluminum separators, sealed inside the filter cell to form a totally rigid filter assembly. Fluctuations in filter face velocity or turbulent airflow have no effect on filter integrity or performance. Install each filter [with an extended surface pleated media panel filter as a prefilter] in a factory preassembled side access housing, or a factory-made sectional frame bank, as indicated.

2.1.5 Sectional Cleanable Filters

****
NOTE: Delete washing and charging racks when not required.
****

Provide [25][50] mm [1][2] inch thick cleanable filters. Provide viscous adhesive in 20 L five gallon containers in sufficient quantity for 12 cleaning operations and not less than one L one quart for each filter section. Provide one washing and charging tank for every 100 filter sections or fraction thereof; with each washing and charging unit consisting of a tank and [single][double] drain rack mounted on legs and drain rack with dividers and partitions to properly support the filters in the draining position.

2.1.6 Replaceable Media Filters

Provide the [dry-media][viscous adhesive] type replaceable media filters, of the size required to suit the application. Provide filtering media that is not less than 50 mm 2-inches thick fibrous glass media pad supported by a structural wire grid or woven wire mesh. Enclose pad in a holding frame of not less than 1.6 mm 16 gauge galvanized steel, equipped with quick-opening mechanism for changing filter media. Base the air flow capacity of the filter on net filter face velocity not exceeding [1.5][_____] m/s [300][_____] fpm, with initial resistance of [32][_____]

Pa [0.13][_____] inches water gauge. Provide MERV that is not less than [_____] when tested according to ASHRAE 52.2.

2.1.7 Automatic Renewable Media Filters

Provide the following:

2.1.7.1 Filters

Automatic, renewable media filters consisting of a horizontal or vertical traveling curtain of adhesive-coated bonded fibrous glass supplied in convenient roll form, and filter that does not require water supply, sewer connections, adhesive reservoir, or sprinkler equipment as part of the operation and maintenance requirements.

Each filter complete with initial loading of filter media drive motor adequate to handle the number of sections involved, and [painted steel] [stainless steel] control box containing a warning light to indicate media runout, a runout switch, and a Hand-Off-Auto selector switch.

2.1.7.1.1 Horizontal Type

The horizontal type automatic renewable media filters, when used in conjunction with factory fabricated air handling units, that are dimensionally compatible with the connecting air handling units, and horizontal type filter housings with all exposed surfaces factory insulated internally with 25 mm 1-inch, 24 kg/cubic meter 1-1/2 pound density neoprene coated fibrous glass with thermal conductivity not greater than 0.04 W/m-K 0.27 Btu/hour/degree F/square foot/inch of thickness.

2.1.7.2 Frame

Basic frame that is fabricated of not less than two mm 14 gauge galvanized steel, and sectional design filters with each section of each filter fully factory assembled, requiring no field assembly other than setting in place next to any adjacent sections and the installation of media in roll form.

2.1.7.3 Media

Media feed across the filter face in[full-face increments][increments] automatically controlled as determined by[filter pressure differential][time interval control][time interval control with pressure override][photo electric control] to provide substantially constant operating resistance to airflow and varying not more than plus or minus 10 percent. Roll or enclose media in such a way that collected particulates cannot re-entrain.

Rolls of clean media, no less than 19.8 m 65 feet long, rerolled on disposable spools in the rewind section of the filter after the media has accumulated its design dirt load. Equip rewind section with a compression panel to tightly rewind used media for ease of handling. Provide media made of continuous, bonded fibrous glass material that does not compress more than six mm 1/4 inch when subjected to air flow at 2.54 m/s 500 fpm. Factory charge media with an odorless and flame retardant adhesive which does not flow while in storage nor when subjected to temperatures up to 79.4 degrees C 175 degrees F. Support media on both the leaving and entering air faces. Clean media must have initial resistance that does not exceed 45 Pa 0.18 inch water gauge at its rated velocity of 2.54 m/s 500

fpm. Set control so that the resistance to air flow is between 100 and 125 Pa 0.40-and 0.50 inch water gauge unless otherwise indicated.

2.1.7.4 Dust Holding Capacity

80 percent average arrestance under these operating conditions, when operating at a steady state with an upper operating resistance of 125 Pa 0.50 inch water gauge, that is at least 592 55 grams of ASHRAE Standard Test Dust per square meter foot of media area, when tested according to the dynamic testing provisions of ASHRAE 52.2.

2.1.8 Electrostatic Filters

Provide the following:

2.1.8.1 Filters

The combination dry agglomerator/extended surface, nonsupported pocket electrostatic filters or the combination dry agglomerator/automatic renewable, media (roll) type electrostatic filters, as indicated (except as modified). Supply each dry agglomerator electrostatic air filter with the correct quantity of fully housed power packs and equip with silicon rectifiers, manual reset circuit breakers, low voltage safety cutout, relays for field wiring to remote indication of primary and secondary voltages, with lamps mounted in the cover to indicate these functions locally. Equip power pack enclosure with external mounting brackets, and low and high voltage terminals fully exposed with access cover removed for ease of installation. Furnish interlock safety switches for each access door and access panel that permits access to either side of the filter, so that the filter is de-energized if a door or panel is opened.

A dry agglomerator/extended surface nonsupported pocket filter section combination with initial air flow resistance, after installation of clean filters, that does not exceed 162 Pa 0.65 inch water gauge at 2.54 m/s 500 fpm face velocity, with a MERV of the combination not less than 16 when tested according to ASHRAE 52.2. Furnish front access filters with full height air distribution baffles and upper and lower mounting tracks to permit the baffles to be moved for agglomerator cell inspection and service. When used in conjunction with factory fabricated air handling units, supply side access housings which have dimensional compatibility.

2.1.8.2 Ozone Generation

Ozone generation within the filter that does not exceed five parts per one hundred million parts of air. Locate high voltage insulators in a serviceable location outside the moving air stream or on the clean air side of the unit. Fully expose ionizer wire supports and furnish ionizer wires precut to size and with formed loops at each end to facilitate ionizer wire replacement.

2.1.8.3 Agglomerator Cell Plates

Agglomerator cell plates that allow proper air stream entrainment of agglomerates and prevent excessive residual dust build-up, with cells that are open at the top and bottom to prevent accumulation of agglomerates which settle by gravity. Where the dry agglomerator electrostatic filter is indicated to be the automatic renewable media type, provide a storage section that utilizes a horizontal or vertical traveling curtain of adhesive-coated bonded fibrous glass for dry agglomerator storage section

service supplied in 19.8 m 65 foot lengths in convenient roll form. Otherwise, provide section construction and roll media characteristics as specified for automatic renewable media filters. Include a dry agglomerator/renewable media combination with an initial air flow resistance, after installation of clean media, that does not exceed 62.3 Pa 0.25 inch water gauge at 2.54 m/s 500 fpm face velocity.

2.1.8.4 Filter Efficiency

A MERV of the combination that is not less than 15 when tested according to ASHRAE 52.2 at an average operating resistance of 125 Pa 0.50 inch water gauge. Where the dry agglomerator electrostatic filter is indicated to be of the extended surface nonsupported pocket filter type, provide a storage section as specified for extended surface nonsupported pocket filters, with sectional holding frames or side access housings as indicated.

2.1.9 High-Efficiency Particulate Air (HEPA) Filters

****

NOTE: Use high-efficiency particulate air filters in CLEAN ROOMS (White Rooms or Dust Controlled Facilities), clean work stations, and for critical areas of hospitals. Show the efficiency of the prefilter on the drawings. Provide efficiency that is sufficient for the anticipated contamination load and the degree of prefiltration required. Reference ASME AG-1 either all or in part when extreme temperature or humidity requirements exist. Ensure that requirements added to text from ASME AG-1 are essential to customer's needs to prevent unnecessary expenses from being added to the project, as this standard is not intended for routine commercial applications. When used, add ASME AG-1 to paragraph REFERENCES.

****

Provide HEPA filters that meet the requirements of IEST RP-CC-001 and are individually tested and certified to have an efficiency of not less than[95][99.97][99.99] percent, and an initial resistance at [_____] m/s fpm that does not exceed [_____] Pa inches water gauge. Provide filters that are constructed by pleating a continuous sheet of filter medium into closely spaced pleats separated by corrugated aluminum or mineral-fiber inserts, strips of filter medium, or by honeycomb construction of the pleated filter medium. Provide interlocking, dovetailed, molded neoprene rubber gaskets of 5-10 durometer that are cemented to the perimeter of the[upstream][downstream] face of the filter cell sides. Provide self-extinguishing rubber-base type adhesive or other materials conforming to fire hazard classification specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

Provide filter cell sides that are[19 mm 3/4 inch thick exterior grade fire-retardant plywood][cadmium plated steel][galvanized steel] assembled in a rigid manner. Provide overall cell side dimensions that are correct to 2 mm 1/16 inch, and squareness that is maintained to within 3.2 mm 1/8 inch. Provide holding frames that use spring loaded fasteners or other devices to seal the filter tightly within it and that prevent any bypass leakage around the filter during its installed life. Provide air capacity and the nominal depth of the filter as indicated. Install each

filter in a factory preassembled side access housing or a factory-made sectional supporting frame as indicated. Provide prefilters of the type, construction and efficiency indicated.

2.2 HOLDING FRAMES

Fabricate frames from not lighter than 1.6 mm 16 gauge sheet steel with rust-inhibitor coating. Equip each holding frame with suitable filter holding devices. Provide gasketed holding frame seats. Make all joints airtight.

2.3 FILTER GAUGES

Provide dial type filter gauges, diaphragm actuated draft for all filter stations, including those filters which are furnished as integral parts of factory fabricated air handling units. Provide gauges that are at least 98 mm 3-7/8 inches in diameter, with white dials with black figures, and[graduations][graduated in 0.0025 kPa 0.01 inch of water,] with a minimum range of 0.25 kPa 1-inch of water beyond the specified final resistance for the filter bank on which each gauge is applied. Provide each gauge with a screw operated zero adjustment and two static pressure tips with integral compression fittings, two molded plastic vent valves, two 1.5 m five foot minimum lengths of 6.35 mm 1/4 inch diameter[aluminum][vinyl] tubing, and all hardware and accessories for gauge mounting.

PART 3 EXECUTION

3.1 INSTALLATION

Coordinate filter supports and retention elements to provide a substantial, structurally sound, leakproof installation.

3.1.1 Holding Frame Installation

Provide installation drawings in accordance with referenced standards in this section.

Install gasket [to holding frames on perimeter][caulked to each other][to supplementary steel][to closures with elastomeric compounds recommended by the filter manufacturer]. Prepare substrate in accordance with the elastomer manufacturer's instructions, including the priming of surfaces in areas where the elastomer is not confined.

3.2 FIELD QUALITY CONTROL

Submit test reports in accordance with ASHRAE 52.2.

-- End of Section --