Design and Construction Standards

 Technical Specification

SECTION 23 41 00

Particulate Air Filtration

All renovation and new construction activities on The University of Texas at Austin campuses are required to meet the UT Austin Design and Construction Standards (DCS). This includes the very first planning and design stages through actual construction and facilities maintenance and management. They reflect the planning, design, construction, maintenance, and other facilities asset expertise of University personnel. These documents are to be used as a guideline on all UT Austin projects, and are not to be used for bidding, permitting, construction or any other purpose. Any deviations must be approved by the respective Division Champion, and will be submitted in writing by the Project Manager. The Design and Construction Standards are controlled by Project Management and Construction Services, The University of Texas at Austin. This document is the property of UT Austin, and use of this document, in part or in whole, for any purpose other than for a UT Austin project may not be done without written permission of the University.

For any comments or questions related to UT Austin Design and Construction Standards, please contact the Project Management and Construction Services Planning group at: campus\_standards@austin.utexas.edu or by phone at (512) 471-0665.

The issuance and revision history of this Section is tabulated below. Please destroy any previous copy in your possession.

| Rev Date | Pages | Remarks | Documents Referenced |
| --- | --- | --- | --- |
| 3/15/2018 | All | New technical specification created. | 23.40.00 HVAC Air Cleaning Devices |
| 5/31/2018 | All | New technical specification published. |  |
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SECTION 23 41 00 - PARTICULATE AIR FILTRATION

1. GENERAL
	1. RELATED DOCUMENTS
		1. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
		2. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.
	2. SUMMARY
		1. Perform all Work required to provide and install filters, housings and frames, and filter gauges necessary for proper installation in air handling unit and fan coil unit systems.
	3. REFERENCE STANDARDS
		1. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
		2. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
		3. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

AMCA 99 ‑ Standards Handbook.

ARI 850 - Commercial and Industrial Air Filter Equipment.

ASHRAE 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

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

ASHRAE 62 - Ventilation for Acceptable Indoor Air Quality.

IEST RP-CC001 - HEPA and ULPA Filters.

NFPA 70 ‑ National Electrical Code.

SMACNA ‑ HVAC Duct Construction Standards ‑ Metal and Flexible.

UL 586 - High Efficiency, Particulate Air Filter Units.

ASTM F1471 – Standard Method for Air Cleaning Performance of a High-Efficiency Particulate Air Filter System

UL 900 ‑ Air Filter Units.

* 1. definitions
		1. IEST: Institute of Environmental Sciences and Technology.
		2. HEPA: High Efficiency Particulate Air.
		3. MERV: Minimum Efficiency Reporting Value.
		4. ULPA: Ultra-Low Penetration Air.
	2. QUALITY ASSURANCE
		1. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience, who issues complete catalog data on total product. Performance characteristics shall be published in the manufacturer’s literature.
		2. Where installation instructions are not included in the Contract Documents, the manufacturer’s instructions shall be followed. All equipment affected by altitude shall be rated to operate at the altitude where it is installed.
		3. Comply with ARI 850.
		4. Comply with ASHRAE 52.1 and ASHRAE 52.2 for method of testing and rating air-filter units.
		5. Comply with NFPA 90A and NFPA 90B.
	3. SUBMITTALS
		1. Product Data:
			1. Submit Dimensions, product data and installation instructions, rated flow capacity, pressure drop at initial and final loading, MERV rating and test method, fire classification, furnished specialties, and accessories for each unit indicated.
		2. Shop Drawings: Include plans, elevations, sections, and details to illustrate component assemblies and attachments.
			1. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
			2. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.
			3. Include wiring diagrams.
		3. Operation and Maintenance Data:
			1. Submit manufacturer's operation and maintenance data.
	4. DELIVERY, STORAGE, AND HANDLING
		1. Deliver, store, protect, and handle products to site in accordance with Section 23 00 10, Mechanical General Provisions.
		2. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
		3. Store in clean, dry space and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
		4. Ship equipment to jobsite with not less than a prime coat of paint or as specified.
	5. PROJECT CONDITIONS
		1. Environmental Requirements: Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fans have been test run under observation.
	6. MAINTENANCE
		1. Extra Materials: Provide two complete sets of filters for each unit. Tag to identify associated unit.
1. PRODUCTS
	1. MANUFACTURERS
		1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
			1. AAF International / Flanders
			2. Cambridge
			3. Camfil
			4. Columbus Industries
			5. Koch Filter
	2. FILTERS
		1. Filters shall be listed as Class 2 in accordance with UL 900 and shall be tested and reported in accordance with ASHRAE Test Standards 52.1 and 52.2. Dust spot efficiencies listed are results when tested by ASHRAE Standard 52.1. MERV and MERV-A values listed are results when tested by ASHRAE Standard 52.2 and ASHRAE Standard 52.2 Appendix J.
		2. Medium Efficiency Pleated/Panel Filter (Disposable, Dry Type):
			1. MERV 8 Filters:
				1. Media: 0.18-inch nonwoven cotton and synthetic blend media, formed into a uniform radial pleat. Provide industry standard sizes as required for installation. The minimum media area shall be 11.8 square feet for a 24X24 filter.
				2. Frame: Provide filter media in permanent removable frames with corrosion resistant welded wire grid bonded to the downstream side of the media. Media shall be fully bonded to frame to prevent air leakage.
				3. Rating: Initial resistance no greater than 0.31-inches w.g. at 500 FPM face velocity. Minimum Efficiency Reporting Value shall be MERV 8, dust spot efficiency of 25-30 percent.
				4. Thickness: 2-inches unless otherwise noted on the Drawings or Specifications.
			2. MERV 11 Filters:
				1. Media: Synthetic fibers in a uniform lofted media blanket. Provide industry standard sizes as required for installation. The minimum media area shall be 17.3 square feet for a 4-inch 24X24 filter.
				2. Frame: Provide filter media in biodegradable Kraft board frame with corrosion resistant welded wire grid bonded to the downstream side of the media. Media shall be fully bonded to frame to prevent air leakage.
				3. Rating: Initial resistance no greater than 0.25-inches w.g. at 500 FPM face velocity for a 4-inch filter. Minimum Efficiency Reporting Value shall be MERV 11.
				4. Thickness: 4-inches unless otherwise noted on the Drawings or Specifications.
			3. MERV 13 Filters:
				1. Media: Synthetic fibers in a uniform lofted media blanket, formed into a uniform radial. Provide industry standard sizes as required for installation. The minimum media area shall be 27.7 square feet for a 4-inch 24X24 filter.
				2. Frame: Provide filter media in biodegradable Kraft board frame with corrosion resistant welded wire grid bonded to the downstream side of the media. Media shall be fully bonded to frame to prevent air leakage.
				3. Rating: Initial resistance no greater than 0.35-inches w.g. at 500 FPM face velocity for a 4-inch filter. Minimum Efficiency Reporting Value shall be MERV 13.
				4. Thickness: 4-inches unless otherwise noted on the Drawings or Specifications.
		3. High Efficiency Filter V-Bank/Box Filter (Disposable, Dry Type):
			1. MERV 11 Filters:
				1. Media: Media: Microfine glass laminated to a reinforcing backing formed into a lofted media blanket with a uniform radial pleat. Pleats media packs shall be assembled into a V-bank configuration with sufficient total media area to meet airflow requirements. Provide industry standard sizes as required for installation. The filter minimum media area shall be 197 square feet for a 24X24X12 size filter.
				2. Frame: Frame: The media packs shall be bonded to the inside periphery of an ABS enclosing frame with a polyurethane sealant. The enclosing frame shall include top and bottom molded tracks as in integral part of the frame to ensure a proper seal. Rigid plastic end caps shall be mechanically fastened to the top and bottom of the media pack enclosing structure to ensure a rigid and durable filter.
				3. Rating: Initial resistance no greater than 0.26 inch w.g. at 500 FPM face velocity. Minimum Efficiency Reporting Value shall be MERV 11, dust spot efficiency of 60-65 percent. Thickness: 12 inch thick (nominal) frame.
			2. MERV 13 Filters:
				1. Media: Microfine glass laminated to a reinforcing backing formed into a lofted media blanket with a uniform radial pleat. Pleats media packs shall be assembled into a V-bank configuration with sufficient total media area to meet airflow requirements. Provide industry standard sizes as required for installation. The filter minimum media area shall be 197 square feet for a 24X24X12 size filter.
				2. Frame: The media packs shall be bonded to the inside periphery of an ABS enclosing frame with a polyurethane sealant. The enclosing frame shall include top and bottom molded tracks as in integral part of the frame to ensure a proper seal. Rigid plastic end caps shall be mechanically fastened to the top and bottom of the media pack enclosing structure to ensure a rigid and durable filter.
				3. Rating: Initial resistance no greater than 0.34-inches w.g. at 500 FPM face velocity. Minimum Efficiency Reporting Value shall be MERV 13, dust spot efficiency of 80-85 percent. Thickness: 12-inch thick (nominal) frame.
			3. MERV 14 Filters:
				1. Media: Microfine glass laminated to a reinforcing backing formed into a lofted media blanket with a uniform radial pleat. Pleats media packs shall be assembled into a V-bank configuration with sufficient total media area to meet airflow requirements. Provide industry standard sizes as required for installation. The filter minimum media area shall be 197 square feet for a 24X24X12 size filter.
				2. Frame: The media packs shall be bonded to the inside periphery of an ABS enclosing frame with a polyurethane sealant. The enclosing frame shall include top and bottom molded tracks as in integral part of the frame to ensure a proper seal. Rigid plastic end caps shall be mechanically fastened to the top and bottom of the media pack enclosing structure to ensure a rigid and durable filter.
				3. Rating: Initial resistance no greater than 0.34-inches w.g. at 500 FPM face velocity. Minimum Efficiency Reporting Value shall be MERV 14, dust spot efficiency of 80-85 percent. Thickness: 12-inch thick (nominal) frame.
		4. HEPA 99.99% Filters: Disposable, dry type, high efficiency, supported media filter.
			1. Media: Microfine glass laminated to a reinforcing backing formed into a lofted media blanket with a uniform radial pleat. Provide industry standard sizes as required for installation. The filter minimum media area shall be 390 square inches for a 24X24X12 size filter.
			2. Frame: Provide filter media in permanent removable frames with corrosion resistant welded wire grid bonded to the downstream side of the media. Media shall be fully bonded to frame to prevent air leakage. Frame shall be steel alloy with media support stabilizers mechanically fastened to diagonal support members. Filter shall be capable of withstanding 10-inch w.g. pressure
			3. Rating: Initial resistance no greater than 1.0-inches w.g. at 500 FPM face velocity. Minimum Efficiency Reporting Value shall be 99.99% efficiency at 0.3 micro-meters. Thickness: 12-inch depth (nominal) frame.
	3. FILTER GAUGES
		1. Manufacturers:
			1. Dwyer Instruments, Inc.
			2. Approved Equal
		2. Direct Reading Dial:
			1. 3-1/2 inch diameter diaphragm actuated dial in metal case.
			2. Provide vent valves, black figures on white background, front calibration adjustment.
			3. The range of the scale shall be no greater than 1" w.g. above the filter manufacturer’s recommended final resistance for the type of filter to which the gauge is being applied, 2% of full-scale accuracy.
			4. Provide with adjustable signal flag.
		3. Accessories:
			1. Static pressure tips with integral compression fittings, 1/4‑inch aluminum or polymer tubing.
2. INSTALLATION
	* 1. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.
		2. Install filters in position to prevent passage of unfiltered air.
		3. Coordinate filter installations with duct and air-handling unit installations.

END OF SECTION 23 41 00