SECTION 233713 – GRILLES, REGISTERS, DIFFUSERS

1. GENERAL

TO STANDARD PART 1, ADD THE FOLLOWING:

1.X Delivery, Storage and Handling

1. Deliver ceiling components to project site in original, unopened packages and store them in fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.
2. HEPA filters shall be stored in conditions as detailed and specified herein under 3.2 Storage of HEPA Filters.
3. Handle carefully to avoid damaging components in any way.
4. PRODUCTS

### Low-Profile HEPA-Filtered Diffusers with Room-Side Replaceable HEPA Filters

*DESIGNER NOTE: The limited height of this diffuser does not allow space within diffuser for an internal volume adjustment valve. Engineer to utilize external damper within supply ductwork to provide means of balancing.*

1. Diffuser shall be ASHRAE Group E, non-aspirating laminar flow type, located and installed in accordance with ASHRAE Standard 170 for Operating Rooms.
2. The height of the diffuser plenum shall have a height of less than 6-in. Diffuser shall utilize a diffusion basket, equalization chamber and HEPA filter to deliver air to the space.
3. Air shall be admitted to the initial plenum through a top inlet collar. A U-shaped perforated air diffusion device of 51% open area shall be provided to redistribute air into the secondary plenum.
4. The upper plenum, or pressure chamber, shall be constructed of 0.063-in extruded aluminum with mitered continuously back-welded corners and aluminum top plate. All internal joints must be internally factory-sealed.
5. The plenum box shall be constructed on one continuous extrusion for each side of plenum. The “knife edge” shall be part of the one-piece plenum extrusion, allowing no air to bypass around the filter media. A design whereby the “knife edge” is mechanically fastened or otherwise attached to the plenum box is not allowed.
6. Installed filters shall be held firmly in place by means of retention clip assemblies provided by diffuser manufacturer consisting of spring-loaded filter clips, nuts, and bolts.
7. Manufacturer shall provide four (4) aluminum support lugs on the sides of diffuser plenum for independent suspension from above.
8. Assembly shall allow HEPA filter installation and service from room side of diffuser. Diffuser design must allow 1.25” min. clearance between filter and faceplate in order to minimize risk of room-side filter contamination.
9. Perforated faceplate shall be 0.050" aluminum and perforations to be 16% open area. Manufacturer shall provide vinyl-coated stainless-steel cable safety retainers on two opposite sides to prevent accidental dropping of faceplate. The diffuser perforated faceplate shall be installed in an extruded aluminum mounting frame with mitered back-welded corners.

*optional STAINLESS-STEEL faceplate, replace 2.1. I. with the following:*

I. Perforated faceplate shall be 22 ga. 304 stainless steel with No. 4 polished finish and shall extend over and wrap around plate frame on all four sides to assure continuous perforated surface appearance between ceiling tee frames. Perforations to be 16% open area. Manufacturer shall provide vinyl-coated stainless-steel cable safety retainers on two opposite sides to prevent accidental dropping of faceplate.

1. All exposed surfaces including border trim shall have finish of white baked enamel (*OPTIONAL FINISH:* 204-R1 clear anodized aluminum) of suitable quality to withstand typical cleaning solutions and normal scrubbing commonly used in hospital operating rooms.
2. Inlet collar and faceplate shall be covered with removable self-adhesive protective film to prevent construction dust from entering diffuser prior to installation.
3. HEPA Filters
4. HEPA filters shall be individually tested to IEST-P-CC001 “Type J” test requirements meeting minimum efficiency of 99.99% on 0.3-micron size particles and bear a label which includes filter size, lot number, unique serial number, part number, minimum rated and actual efficiency, and target and actual pressure drop. Filter shall also have traceable Certification of Conformance (COC) available upon request.
5. Filter media shall be pleated to 53mm pack thickness and pressure drop across the filter shall not exceed 0.45" w.g. at a filter face velocity of 100 ft/min. All materials used shall be in accordance with UL900 classification
6. Filter frame shall have integral channel filled with cleanroom grade, low outgassing non-flowing urethane gel. Gel shall not shrink, craze, bubble, swell or show significant changes in physical properties when directly exposed to common challenge agents, and common antimicrobial or decontamination agents. Filter shall have a center-board with removable well-nut plug to allow volume adjustment valve access.
7. Diffuser manufacturer shall provide HEPA filters in order to guarantee fit to plenum body and laminar flow performance of diffuser.
8. Diffusers located in rooms with gypsum board ceilings shall be furnished complete with plaster frames or framing sections by diffuser manufacturer to support diffusers located adjacent to one another as shown on plans. Verify exact locations of diffusers with architectural reflected ceiling plans where shown.
	* + 1. The heavy-duty plaster frames or framing sections shall be 1-1/2" wide x 1-7/16" high and angles shall be ¾” wide x 1-7/16” high. Minimum wall thickness of the tees and angles shall be 1/8”.
			2. The suspension system shall be factory-welded in sub-assemblies. Where framing sub-assemblies butt together, the adjoining surfaces shall be gasketed and mechanically-fastened with self-tapping wafer head screws.
			3. All tees and angles shall be pre-punched on 6" centers for independent suspension from above spaced at 2’ max.
			4. ICS manufacturer shall furnish 1/8" thick closed-cell polyethylene gasket tape to be field installed on the frame assembly to provide seal between diffuser/tee grid, or blank-off panel/tee grid interface, and light/tee grid interface.
9. Acceptable model and manufacturer: LOW-A by Precision Air. No exceptions or alternates will be accepted without prior pre-submittal approval by engineer.  Contractors offering manufacturers other than basis of specification, whether listed as acceptable equal or not, shall submit a line item comparison stating specific deviations from specification at time of bid. Contractor shall be responsible for any cost difference to meet above specification even if alternates are approved by engineer.

*OPTIONAL FACTORY INSULATION ($), ADD:*

O. Manufacturer shall insulate the laminar flow diffuser with 1-1/2" duct wrap FSK-backed insulation of 0.75lb/c. ft. density to prevent heat gain and condensation.

*optional FILTER LOAD INDICATOR LIGHT ON DIFFUSER FACEPLATE, ADD:*

P. One diffuser per room shall include a red LED indicator light factory-mounted in corner of perforated faceplate. Indicator light shall be connected to factory-preset pressure switch with project-specific setpoint to be calculated by manufacturer. 24VAC power supply required shall be furnished and connected by others.

*AND/OR, optional PORTS FOR ACCEPTANCE OF A PRESSURE TRANSDUCER WIRED TO BAS, ADD:*

Q. Manufacturer shall factory install (2) ports in diffuser plenum to accept pressure monitoring tubing, one above filter, one below filter. Provide ports in only one diffuser per room. Ports shall be installed in the side of the diffuser plenum and be coordinated with other diffusers and components in the ceiling array to be accessible for ¼” tubing connection in the field. Pressure transducer to be supplied and wired to BAS by Div. 26.

*FUTURE HEPA FILTER OPTION (NO FILTERS REQUIRED WITH INITIAL PURCHASE) DELETE 3.2 AND 3.3 J. AND REPLACE 2.1, PARA. L. 1.-4. with the following:*

L. The diffuser shall be capable of functioning as a laminar flow diffuser with or without a HEPA filter. Manufacturer shall provide removable diffusion baffle within each diffuser in order to guarantee laminar flow performance of diffuser until future HEPA filter is installed. Diffusion components attached to the faceplate are not acceptable. Assembly shall allow future HEPA filter installation and service from room side of diffuser. Diffuser design must allow 1.25” min. clearance between filter media and faceplate in order to minimize risk of room-side filter contamination. No HEPA filters are required at this time.

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1. EXECUTION

#### Inspection/Examination

1. Local manufacturer’s representative shall be available for coordination meetings.
2. Verify balancing dampers are installed on all duct take-off to diffusers, despite whether dampers are specified as part of the diffuser assembly.
3. The installing contractor shall examine all openings, mechanical and electrical work, and adjoining and adjacent construction to receive diffusers and plaster frames prior to commencing this work.
4. The installing contractor shall field verify that the rough hard ceiling opening dimensions are as indicated within manufacturer’s submittals. Hard ceiling conditions shall be plumb and level and ready to receive the plaster frames or framing sections. Openings not acceptable for installation shall be corrected by the appropriate contractor until conditions are satisfactory to installing contractor.
5. The General Contractor shall coordinate corrective/remedial work promptly
6. Proceeding with installation indicates the installing contractor accepts the openings and conditions.

#### Storage of HEPA Filters

1. HEPA filters shall be handled and stored in accordance with manufacturer’s instructions.
2. Storage location for HEPA filters shall be indoors, under roof and enclosed, and absolutely protected from moisture. Storage space be climate controlled such that temperature limits are within range of 32oF (0oC) min. and 150oF (65oC) transient, and 100oF (38oC) steady state, maximum.
3. HEPA filters shall remain in sealed packages until just before they are inspected and installed under direct supervision by manufacturer’s factory personnel.

#### Installation

1. Verify location of all ceiling components to assure conflict-free installation.
2. Where any adjacent welded framing sub-assemblies butt together with half-tees, the adjoining surfaces shall be gasketed and mechanically-fastened with self-tapping wafer head screws, installed per manufacturer’s instructions.
3. Gasket tape provided by manufacturer shall be field installed on the top side of all horizontal ceiling grid surfaces as per manufacturer’s installation instructions. Gasketing to be installed after framing surfaces have been wiped clean, free from any construction dust.
4. Provide inserts, power-driven type anchors, hangers or other Architect / Engineer approved hanger anchoring and suspension system devices and methods.
5. Install suspended ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum not part of supporting structural or ceiling suspension systems. Splay hangers only where required to avoid obstructions and offset resulting horizontal forces by bracing, counter splaying, or other Architect / Engineer approved methods.
6. Where width of ducts, cable trays and other construction within ceiling plenums causes hanger spacing to interfere with the location of hangers required to support suspension system members, install supplemental suspension members and hangers in the form of trapeze or equivalent Architect / Engineer approved devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
7. Secure wire hangers to structure by looping and wire-tying, either directly to structures or to inserts, eye screws, or other devices and fasteners appropriate for the substrates.
8. Hanger wires for framing sections shall be installed a maximum 2’-0” on center in both directions and a maximum 6 inches from framing ends.
9. Hangers shall not penetrate ductwork, ductwork insulation or piping insulation. Frames or framing shall not be suspended from ductwork, conduit, pipes or plumbing equipment. Hangers shall not interfere with heating and ventilating equipment and their maintenance.
10. HEPA filters shall be installed into diffusers after the ducts are cleaned and the room has been thoroughly cleaned and sterilized. HEPA filters shall remain in sealed packages and stored in a controlled environment until they are installed into the diffusers.

END