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

### HEPA-Filtered Diffusers with Room-Side Replaceable HEPA filters

1. Diffuser shall be ASHRAE Group E, non-aspirating laminar flow type in accordance with ASHRAE Standard 170 for Operating Rooms.
2. The upper plenum, or pressure chamber, shall be constructed of 0.063” aluminum with all mating surfaces continuously welded and internally sealed. The upper plenum shall form a knife edge seal with the filter’s gel. Manufacturer shall provide four (4) aluminum support lugs on the sides of diffuser plenum for support from above (independent of the ceiling grid).
3. Top inlet collar with air balancing mechanism shall be internal and room-side adjustable. Internal or external opposed blade or butterfly dampers are not allowed.
4. The face frame assembly shall be constructed of extruded aluminum with mitered continuously welded and internally-sealed corners. Face frame assembly shall align with upper plenum’s knife edge to form a dual knife edge seal with the filter’s gel to ensure an airtight seal, 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. 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.
5. Assembly shall allow HEPA filter installation and service from room side of diffuser. Diffuser design must allow 2.25” min. clearance between filter media and faceplate in order to minimize risk of room-side filter contamination.
6. Perforated faceplate shall be .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.
7. All exposed surfaces including border trim shall have finish of white baked enamel of suitable quality to withstand typical cleaning solutions and normal scrubbing commonly used in hospital operating rooms. *OPTIONAL FINISH:* 204-R1 clear anodized aluminum.
8. Inlet collar and faceplate shall be covered with removable self-adhesive protective film to prevent construction dust from entering diffuser prior to installation.
9. HEPA Filters
10. 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.
11. Filter media shall be pleated to 53mm pack thickness for model HEP-DS-A and HEP-DS-B series diffusers (100 mm pack thickness for HEP-DS-C series diffusers). The pressure drop across the filter shall not exceed 0.45" w.g. at a filter face velocity of 100 ft/min (0.32" w.g. at filter face velocity of 100 ft/min for 100mm pack filters). The anodized extruded aluminum filter frame shall be 3.55 inches deep for filters for HEP-DS-A and HEP-DS-B series diffusers (4.875” deep for filters for HEP-DS-C series diffusers. All materials used shall be in accordance with UL900 classification
12. 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.
13. Diffuser manufacturer shall provide HEPA filters in order to guarantee fit to plenum body and laminar flow performance of diffuser.
14. 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. If MRI Rooms, ALUMINUM self-tapping wafer head screws shall be utilized.
        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.
15. Acceptable model and manufacturer: HEPA-Vent DS 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 ($):*

1. 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 ($):*

M. 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. 24VDC power supply required shall be furnished and connected by others.

*OR, optional PORTS FOR ACCEPTANCE OF A PRESSURE TRANSDUCER WIRED TO BAS, ADD ($):*

N. 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 Division 26 Low-Voltage Controls Contractor.

*OPTIONAL DIFFUSERS WITH SIDE (or end) oval inletS ($), replace PARA. 2.1, C. WITH.:*

C. Air shall be admitted through an oval inlet collar located on side (or end) of the upper plenum.

*SPECIFIER/DESIGNER NOTE:* This side/end inlet option does not allow space within diffuser for internal volume adjustment valve. Elongated oval inlet reduces inlet area. Contact manufacturer for assistance with sizing flexible duct according to project-specific air volumes so as to avoid neck velocities which exceed 750 fpm based on oval inlet area.

*OPTIONAL NON-FERROUS UNITS FOR MRI ROOMS ($), INSERT ADDITIONAL PARAGRAPH BELOW 2.1 D.:*

E. Diffusers for MRI Room(s) only shall be entirely NON-FERROUS, assembled with aluminum or non-ferrous hardware including but not limited to aluminum captive screws, plastic safety cables, aluminum nuts and non-ferrous filter clips. Aluminum bolts shall be permanently welded into diffuser’s extruded frame for means of attaching filter clip assemblies to diffuser.

*FUTURE HEPA FILTER OPTION (NO FILTERS REQUIRED WITH INITIAL PURCHASE) DELETE section 2.1 I. AND REPLAce 2.1, para. E. WITH:*

1. 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 2.25” 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.

***optional stainless steel faceplate, replace 2.1. F. with the following:***

1. 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 for 40 or less CFM per square ft. of module, 23% open area for 45-65 CFM per square ft. of module, or 33% open area for higher velocities. Manufacturer shall provide vinyl-coated stainless steel cable safety retainers on two opposite sides to prevent accidental dropping of faceplate. No diffusion component may be affixed to the back side of the faceplate frame. The back side of faceplate shall be easily accessible for ease of cleaning.
2. EXECUTION

#### Inspection/Examination

1. Inspect diffuser and filter packaging for shipment damage upon receipt. Notify manufacturer immediately of damage.

#### 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. Install diffusers per manufacturer’s IOM Manual instructions.
2. 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 in strict accordance with manufacturer’s IOM Manual instructions.

END