

B-100 Cath Lab Renovation and Hybrid OR

Project No. 640-13-134

SECTION 13 042

HOSPITAL OPERATING ROOM MODULAR FILTERED DIFFUSER SYSTEM

PART 1 - GENERAL

1.1. WORK INCLUDED

- A. The purpose of this specification is to provide a modular filtered diffuser system with integral flush lighting, sprinkler system, and integral structural support that has the capability of accepting operating room boom loads directly. The system will be installed by the Contractor in accordance with the manufacturer's instructions as outlined in the manufacturer's installation manual. Testing and certification of diffuser system shall be conducted by an independent testing agency. Supplier of this modular diffuser system shall be responsible for all costs associated with the engineering, manufacturing, and project coordination of lights, sprinklers, structural boom and equipment supports (whether integral or not) included within the boundary of this modular system. These costs shall include the supply of the air delivery system, lighting system, sprinkler system and structural support system as identified above along with the layout and engineering for all electrical wiring, piping, mechanical and support structures within the system. These costs also include a set of fully executed and stamped structural engineering calculations on the entire modular system, including all components mentioned above, for the state in which this project will be installed. The structural calculation package shall be delivered to the project team after a "For Record" approval of submittal documents has been signed and returned by an authorized administrator of the project team.

1.2. SYSTEM DESCRIPTION

- A. The operating room filtered diffuser system shall be modular construction consisting of a continuous ceiling grid with ~~anti-microbial powder coated extruded aluminum~~ stainless steel grid channel, integrated lighting, integrated boom mounts, integrated sprinkler system, and bottom load HEPA filters. The ceiling grid is required to be completely sealed off from the air delivery to the room. The ceiling grid is required to have knife edges for sealing to the gel in the filters. Gasketed seals between filter and grid for positively pressurized diffuser systems are not allowed. The diffuser system shall also include a steel air delivery duct that is an integral part of the ceiling grid. The steel duct shall have an anti-microbial powder coating to ensure all exterior and interior surfaces are protected. The system shall be capable of accepting operating room boom

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loads directly as part of an engineered and structurally stamped system. Modules shall be capable of being fed with air from remote air that attach to the system. The system shall be provided with a PLC based control system for control and monitoring of the air flow functions.

1.3. QUALITY ASSURANCE

A. Owner's Factory Inspection:

1. The owner or owner's representative shall maintain the right to tour the operating room filtered diffuser system at manufacturer's plants any time that fabrication is being performed on components intended for this project.
2. The manufacturer shall notify the owner when production is finished on the first component. Anytime after that date, the owner may exercise the option, giving 24-hour advance notice minimum, to tour the plant and inspect for component assembly, painting, cleaning, or packaging to ensure that quality control is being maintained.

1.4. SUBMITTAL

- A. Submittal shall be by the manufacturer.
- B. Required with the Bid: Detailed information on structural, mechanical, electrical, and other services necessary to evaluate installation requirements.
- C. Required after execution of Contract: Shop drawings shall be submitted within two weeks of purchase order acceptance, and they shall include: complete specifications, descriptive drawings, catalog cuts, and descriptive literature on all components used in the diffuser system, with make, model, dimensions, capacity, weight, and electrical schematics. Manufacturer's information for HEPA filters shall be included.

1.5. MANUFACTURER CONTACTS

- A. Contact manufacturer directly if additional information is required, such as product or material descriptions, layouts, or installation requirements. Manufacturer is required to have a full scale Surgical Suite mock-up showing the Modular Diffuser system similar to the product available for demonstration.

PART 2 - PRODUCTS

2.1. FILTERED DIFFUSER GRID SYSTEM

- A. The grid system shall utilize a Bottom-Load ~~Extruded Aluminum~~ stainless steel Gel-Seal Flush Ceiling Grid. The grid will have a downward facing knife-edge that will accept pre-gelled filters. Filters and blank pans

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shall be capable of being loaded from the bottom without tipping or rotating of the filters into the grid opening. The ~~powder coated extruded aluminum~~stainless steel grid shall have threaded studs for filter retention clips.

- B. Grid members shall be welded together into modules. Grid shall be caulked with an appropriate sealant as necessary. The ceiling support grid shall be structurally constructed so as to remain dimensionally stable.
- C. The grid system shall have integrated flush lighting within the grid channel that is capable of 100% filter coverage of the entire ceiling. Light fixtures, such as teardrop lights, are not permitted. Light fixtures that negate the possibility of having 100% filter coverage, such as recessed light troffers, are not permitted.
 - 1. The complete lighting system consisting of lamps, lamp-holders, wireway, lenses, wiring, and ballasts shall be an integral part of the ceiling grid. The grid shall be UL listed and so marked.
 - 2. The ballast shall be housed within the grid channel and separated from the low voltage area with a listed wireway cover. Ballasts shall be instant start electronic ballast with a UL listing and marking.
 - 3. Wiring within the grid for the lighting circuit shall be contained within and protected by the wireway cover. The raceway system integral to the grid shall have the ability to handle normal and emergency wiring circuits. The raceway system integral to the grid shall have the ability to handle high and low voltage wiring circuits. Lamps shall be linear fluorescent cool white T5 with a protective shatter sleeve. The light lens shall sit flush with the bottom of the grid channel. Light lens covers shall be clear acrylic ribbed diffusers that snap flush to the grid channel without external fasteners.
- D. The grid system shall incorporate a screen that is flush with the light lens and has perimeter slots on all sides of the screen to jet air underneath the lens so as to wash the area below the lens of particles. The screen shall provide laminar flow 4 inches below the grid surface. Screen shall be made from ~~powder coated aluminum~~ [stainless steel]. This screen is to be a minimum of 1.5" from filter face and shall not contact the filter media.
- E. The grid system shall be capable of forming a continuous Gel-Link™ gel seal between module joints.
- F. The installing contractor shall furnish and install the all thread rod from the leveling turnbuckle to and including the connection components at the

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building structure.

- G. The grid system shall be capable of attaching clips for hanging patient lifts, equipment supports, and other components.
- H. The flush grid shall have an integrated fire protection sprinkler system.
 - 1. The grid system shall have the ability to place fire protection piping through the grid channel itself. Provide sprinkler port penetrations in the ceiling grid channel at all sprinkler head locations, as indicated on the drawings.
 - 2. Fire sprinkler piping within the module will be factory-installed, sealed, and powder-coated. The piping shall be run internally and stub out on the roof or side of the module. The ceiling grid channel shall be capable of accepting a true flush sprinkler head within the width of the extrusion.
- I. All surfaces that are scratched shall be painted and touched up by the contractor after installation. Paint color to match wall panels or as approved by the engineer or owner.
- J. Filler Blank Panels: Solid filler panels shall be constructed of powder coated steel with welded corners, designed to affect an airtight seal in the channel grid. The finish of the panel is to match the ceiling grid finish. Hold-down clips shall be furnished as necessary to keep the components in place.
- K. Furnish dampers on top of the filters to provide a means of balancing the filters. These dampers shall have a gear mechanism that can be actuated through a port in the center bar of the filter from the room side.
- L. Care should be used in selection of materials that are resistant to cleaning agents used by the owner.
- M. Furnish open-top panel style filters with gel in upward facing troughs with the gel poured at the filter manufacturer's facility.

2.2.AIR SUPPLY INTEGRATED TO CEILING GRID

- A. Provide an air delivery duct attached to the ceiling grid as an integral part of the ceiling grid diffuser system. Positively pressurized modules shall only be used with gelled filters (never with gasketed filters). Modules shall be supplied completely pre-assembled with the grid and duct as one piece.
- B. The ceiling grid modules shall be capable of being suspended from the building structure on an 8'x8' hanger array or an 8'x12' hanger array. In the case of self-supported modules with structural legs off the floor, the modules shall be capable of free-spanning between columns.

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- C. Modules will be welded style construction using formed steel roof panels welded to formed steel side panels. Side and top panel thickness shall be sized so as to meet structural load requirements. The roof panels shall be formed such that the panel brakes are towards the outside of the module so as to form a smooth inside surface. The side panels shall be riveted to the flush light grid system. Holes will be provided at the perimeter of the module roof for suspension. The entire ceiling grid module shall be coated with a baked on powder coating.
- D. Units shall be manufactured to dimensional tolerance of +/- 1/8" on width and length and diagonal dimensions or squareness of +/-1/8".
- E. Provide pre-drilled bolt holes in the sides of modules for field connection of one module to another where applicable.
- F. The modules shall be capable of accepting operating room boom loads directly as part of an engineered and structurally stamped system.

2.3.AIR MOVING METHODS

- A. Provide air handling units with a VFD to serve modules.
- B. Provide a PLC based control system for control and monitoring of the air flow functions including airflow settings of Off/Fault/Setback/Normal/Ultra; fan alarm from current sensors on each motor; VFD fault alarm from each VFD; flow self-regulation mode option; make-up AHU status; HEPA pressure drop alarm; room pressurization display; temperature sensor display; humidity sensor display; lights.

PART 3 - EXECUTION

3.1.INSTALLATION - GENERAL

- A. Install in accordance with the manufacturer's installation manual. The installing contractor shall be responsible for the complete installation of the operating room ceiling system. Certification testing will be by others after installation following specifications issued under separate cover. The installing contractor and/or filter manufacturer will be responsible for the removal, replacement, and re-testing of all HEPA filters failed during the certification tests. All repairs and re-testing cost of the repairs and other related tests that would have to be repeated as a result of repairs done to the system shall be the installing contractor's responsibility.

3.2.MODULE INSTALLATION

- A. It is the intent that the modules be installed to line and true level, symmetrical to rooms and spaces, and with due regard to appearance and structural stability. The ceiling shall be level throughout within 1/8

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inch.

- B. All suspended ceiling system work shall be done in accordance with the procedures endorsed by the Ceiling and Interior Systems Contractor's Association (CISCA), except where specified otherwise.
- C. Lay out modules as shown on shop drawings. Coordinate with mechanical and electrical equipment in framing and cutting around ceiling penetrations.
- D. Hang level as shown on the drawings in accordance with ASTM C636 and the manufacturer's current printed instructions for the type of installation used.
- E. Modules shall be supported per structural specifications. Modules are butted side to side and end to end and bolted together. A sealant is required at all joints. All field assembly and materials by contractor unless noted.
- F. Install hanging hardware at specified locations and per manufacturer's instructions.
- G. Install seals per manufacturer's instructions.
- H. Blank pans and associated hold-down clips are to be installed per manufacturer's instructions.
- I. Lighting fixtures are to be installed per the ceiling plans. Wiring shall be installed by electrical contractor to meet all local codes.

3.3. FILTER INSTALLATION

- A. Follow filter manufacturer's instructions. Filters and units shall be carefully removed from cartons and other packaging material.
- B. The filters shall be installed in the support frames by personnel instructed in the proper method of installation and aware of the need for special handling precautions. The contractor will be responsible for repairing or replacing filters beyond the amount of expected filters with leaks during certification.

3.4. MATERIAL PREPARATION, CLEANING, AND FINAL CLEANUP

- A. The general cleanliness requirements shall be that all hardware exposed to the operating room interior or in the airstream, regardless of size or complexity, must be visibly free of oil, grease, particles, chips, fibers, dirt, etc., prior to installation in the operating room area.
- B. The general cleaning sequence for the units shall be as follows: Visual inspection per above; vacuum removal of particles; solvent wipe cleaning; drying; visual inspection per above.

3.5. CEILING CERTIFICATION

- A. At the completion of the ceiling installation, with all components

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installed and wall system in place, an independent certifier under a separate contract shall conduct a series of tests to ensure that the operating room complies with owner's specifications.