SECTION 13039
LABORATORY CONTROLLED TEMPERATURE ROOMS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. Laboratory controlled temperature room (constant temperature room), refrigeration equipment, heating elements and related equipment and utilities.

B. Related Sections:
   1. Division 15 sections - Mechanical and plumbing connections.
   2. Division 16 sections - Electrical work and final connections.

1.2 SUBMITTALS:

A. Product Data:
   1. Submit manufacturer's specifications and technical product data for each type of equipment and accessories required for operation.

B. Shop Drawings:
   1. Submit shop drawings indicating the walk-in room locations and dimension drawings to fully indicate all information required for installation. Indicate specifications, sizes, and locations of mechanical and electrical equipment necessary for the environmental room's performance in accordance with manufacturer's requirements. Include coordination drawings to document all ceiling plenum conditions with mechanical, fire protection, and electrical work. Coordinate and show location of refrigeration units (over room, within ceiling plenum) for approval.

C. Operation and Maintenance Data:
   1. Submit operation and maintenance manual as specified in Section 01730.

1.3 QUALITY ASSURANCE:

A. Standards:
   1. All equipment, including doors, shall be UL listed.

   2. Environmental rooms shall have NSF seal of approval and flame spread rating of 25 or less, smoke developed of 450 or less.
B. Manufacturer:

1. Manufacturer is required to have an established organization and production facility that has been specializing in the type of equipment and environmental rooms for a minimum of 3 years. Manufacturer is required to have extensive parts inventory and certified local technician within 50 miles of the project.

C. Performance Testing:

2. Pre-wire, prefabricate and test all major components of the rooms at manufacturer's facility.

3. Submit test reports documenting results of temperature control system testing in the following manner:
   a. Temperature shall be measured on a horizontal plane 40" above the finished floor within 6" of perimeter walls throughout the entire room. Measure utilizing a minimum of twenty-four thermocouples during a continuous 24 hour test period.
   b. Concurrently, temperature shall be measured on a vertical plane centered along the long axis of the room within 6" of the floor, wall, and ceiling. Measure utilizing a minimum of twenty-four thermocouples during a continuous 24 hour test period.
   c. The range between the highest and lowest temperature (gradient) shall not exceed 2° C. (among all these twenty-four thermocouples) for an overall room uniformity of ±1° C.
   d. At the end of the test for temperature range, the door will be opened long enough to permit an increase of 5° C. in the average temperature of the room. The door will then be closed and the time required for the room to recover to the original temperature shall not exceed 5 minutes.
   e. Test results in the form of a graph shall be submitted for approval.

C. Coordination:

1. Coordinate size and location of compressors mounted on top of units in ceiling plenum with mechanical, fire protection, and electrical systems shown to be present or which will be present in the area prior to fabrication or installation.

2. Coordinate locations of heat exchangers and fans inside the rooms with interior room elevations. Indicate locations on shop drawings for Owner and Architect approval. Provide units which will achieve the greatest headroom with a minimum height from finish floor to bottom of fan unit of 6'-8".

3. Coordinate recesses in concrete slabs for units with insulated floors to eliminate the need for ramps where possible.

1.4 PROJECT/SITE CONDITIONS:
A. Installer will visit and inspect the project site before manufacturing the walk-in rooms to ensure no existing site conditions will adversely effect the installation and performance of the room.

B. Verify all dimensions in the field and advise of any discrepancy before performing work.

1.5 WARRANTY:

A. Equipment furnished shall be guaranteed for a period of one year from the date of acceptance thereof against defective materials, design and workmanship. All hermetically sealed motors shall be covered by a 5 year warranty. All prefabricated panels installed in the walk-in rooms shall carry a 10 year warranty. All walk-in rooms will be covered by a 90 day labor warranty effective from the date of acceptance by the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Environmental Growth Chambers.

B. Harris Environmental Systems, Inc. (508-475-0104).

C. Approved substitute.

2.2 GENERAL:

A. Provide constant temperature room as shown on the drawings using modular panel construction. Use no structural metal, wood or fiberglass between interior and exterior skins. Furnish room with floor and stationary internal ramp if required.

2.3 CONSTRUCTION:

B. Panel Design:

1. Walk-in rooms to consist of precision constructed modular rigid urethane foamed-in-place interchangeable panels. The panels shall be designed for easy installation.

C. Insulation:

1. Insulation shall be rigid urethane foamed-in-place with 2.0 lbs. per cubic feet design density, "K" factor no more than 0.114, "R" factor a minimum of 30.00, insulation 95% closed cell structure and be a self-extinguishing type.

D. Panel Construction:
1. Panels shall consist of 100% urethane insulation bonded by adhesive to the interior and exterior metal panel skins and heat cured, tongue and groove edges, and a positive seal between panels. Cam-action latches shall be precisely located and foamed into place for perfect alignment of panels when connected together. The cam-action latches shall be actuated from the interior of the walk-in room. Provide special lock wrench and lock wrench hole covers. Panel gasket shall be foamed-in-place, continuous one piece construction.

E. Door Construction:

1. Furnish a 36" x 78" door mounted in a 48" wide panel, flush mounted infitting type. Construct door to incorporate a heavy duty molded ABS breaker strip permanently foamed-in-place. Equip cam lift hinges with posi-close door hardware consisting of magnetic gasket, positive door closer, recessed door handle with cylinder lock and inside safety release.

2. Furnish door jamb fully coved with extruded continuous load-bearing member designed for easy cleaning. Breaker strip shall be heavy duty molded PVC permanently foamed-in-place.

3. Provide a dual wattage heater wire around the entire perimeter (including the threshold) of the opening with enough heat to prevent condensation and provide more heat to the threshold than jambs. The heater wire shall be easily replaceable without the need of clips or special tools.

4. Attach all hardware to extra thick tapping plates. Each door panel shall have wiring in rigid conduit concealed inside the door section and terminated at a junction box on the ceiling of the rooms.

5. Fit doors with gasket on sides and top, incorporating magnetic strips on the latching side and top. Gasket to be easily replaceable. Seal bottom of door with a "dual seal" adjustable sweep gasket, designed to provide a complete seal between door, threshold and door jamb.

F. Ceiling Construction:

1. Of similar construction to wall panels.

G. Floor Construction:

1. Furnish floor panels of similar construction to wall panels, except they shall be made to withstand uniformly distributed floor loads of 600 lbs. per sq. ft. The floor finish shall be 14 gage smooth galvanized steel.

H. Controls:

1. Provide rooms with a control accuracy of ± 0.5 degree C. and a room accuracy of ± 0.5 degree C., an electronic solid state control with adjustable deviation alarms and fixed hi-low limit shutdown with alarms, a ni-cad battery for emergency alarm power, a built-in test capability for operational system check out and 2 semi-conductor sensors. Provide terminals for hook up to remote alarm.
I. Refrigeration:

1. Provide remote refrigeration systems cooled by process chilled water consisting of semi-hermetic sealed compressors by Copeland and low-profile evaporators with copper tubing, solid copper fins and housing by a reputable manufacturer. Do not paint solid metal tubing or fins with materials subject to corrosion by vapors of trichloroacetic or other acids. The prewired systems shall include sight glass, control, expansion valve, drier, condensing unit rack, hand valve, suction line vibrasorber, all weather hood, low ambient controls, etc. All components shall be UL approved.

2. Design system to operate continuously with a solenoid bypass system to accurately maintain temperatures specified and defrost evaporator coils without need of timers or defrost heaters.

3. Refrigeration System Provide "Quick Pak" refrigeration system for prefabricated room ceiling mounting or for wall mounting. Completely factory assemble and pre-charge ready for field installation using quick connect refrigerant line fittings and interconnecting wiring harness for single point electrical connection. Include an evaporator mounting kit, sight glass, expansion valve, liquid line filter drier and control. Provide low ambient controls factory installed as required for outdoor system.

4. Unit Coolers Bohn Trim-Aire units.

J. Heaters:

1. Low watt density, nichrome, tubular heaters should be used. Open wire heaters will not be acceptable.

K. Recessed Control Panels:

1. Provide recessed control panels with installation flange, key locking door, acrylic viewing panel, colored indicator lights to show mode of operation, and of proper size to enclose all controls, alarms, breakers, digital thermometer/high-low alarm as indicated below, etc.

   a. Digital Thermometer/High-Low Alarm Shall be combined into one instrument and be recessed into wall panel with no exposed wiring. To be fully calibrated, electronic solid state thermometer with LED displays for product temperatures in Centigrade (Fahrenheit) scale. Thermometer must have high/low audible and visual alarms for product temperature, limits adjustable by the user, with a 30 minute alarm silencer and auxiliary contacts for a remote alarm hook-up. Locate thermometer adjacent to Prefabricated Room door handle at eye level height.

2. The recessed control panels shall be fabricated to provide a "Single Point" electrical connection for room distribution of electrical power. Connect to building DDC system for tracking temperatures.

L. Lighting:
1. Provide ceiling mounted fluorescent fixtures that provide 70 FC of light at a counter height of 40". Lighting shall be warm white, rapid start, high output type, with low temperature ballasts in the cold rooms, enclosed in a vaporproof fixture UL approved. Heat output must be compensated for in the design of the room.

M. Light Switches:

1. Control lights by pilot light on-off switch. Division 16 Installer shall install and wire the switch as detailed on the drawings.

N. Fused Disconnects for Condensers:

1. Division 16 Installer shall furnish individual circuit breaker type disconnects for each condensing unit.

O. Closure Panels and Trim Strips:

1. Provide closure panels and trim to meet specific needs and paint to match surrounding color.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General:

1. Coordinate sequence of Work with mechanical and electrical trades.

B. Installation:

1. Includes erection of room and door panels, installation and refrigeration connection of the remote water cooled condensers and in room evaporators, installation only, of light fixtures, alarms, door thresholds, closure panels, trim strips and all else as specified or indicated.

C. Refrigeration Piping:

1. Install straight and true with required pitch and without sag or offsets in the horizontal piping and without obstruction of other construction. Install piping without forcing or springing.

D. Refrigerant Charge:

1. Provide a complete system refrigerant charge with R-22 refrigerant recommended by the manufacturer (R-12 is not acceptable), and during the warranty period, promptly make up any loss caused by defective workmanship, materials or equipment.

E. Compressor Oil Charge:
1. Provide sufficient compressor lubricating oil to start up and run each compressor.

F. Thermal Insulation:

1. Insulate all refrigerant lines or electrical conduits that are subject to sweating and/or temperature conduction with a high grade commercial insulation wrapping.

3.2 REFRIGERATION SYSTEMS PERFORMANCE AND OPERATION:

A. Each system shall be tested, adjusted and balanced to produce system performance and environmental space condition in accordance with the requirements specified.

B. Rooms shall recover preset operating temperature within four minutes after door has been opened to 75 degrees F. ambient for a period of one full minute.

3.3 SYSTEMS OPERATION DEMONSTRATION:

A. Upon installation completion and prior to acceptance of the work, perform pre-operational checkout, calibration and adjustment of all room components to ensure optimum performance and demonstrate operation to Owner.

END OF SECTION 13039