SECTION 13 21 29
CONSTANT TEMPERATURE ROOMS

SPEC WRITER NOTE:
1. Delete between // ____ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.

PART 1 - GENERAL
1.1 DESCRIPTION
This section specifies laboratory controlled temperature rooms.

1.2 RELATED WORK
A. Walk-in Refrigerators and Freezers: Section 11 41 21, WALK-IN COOLERS AND FREEZERS.
B. Refrigerant Piping: Section 23 23 00, REFRIGERANT PIPING.
C. Controls: Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

1.3 QUALITY CONTROL
A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures prefabricated controlled temperature rooms.
B. Safety Standard: Units comply with ASHRAE 15 requirements for factory testing and nameplate.
C. Electrical Components and Devices: UL listed and labeled for intended use.

1.4 SUBMITTALS
A. Furnish submittals in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Manufacturer's Literature and Data: Include the following:
   1. Illustrations and descriptions of prefabricated controlled temperature rooms and factory-installed devices.
   2. Catalog or model numbers for each item incorporated into the work.
   3. Assembly instructions.
   4. Diagrams and details of piping, wiring, and controls.
   5. Operating-test data.
C. Performance Testing Reports: Indicate dates and times of tests and certify test results.
D. Operating Instructions: Comply with requirements in Section 01 00 00, GENERAL REQUIREMENTS.
1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA):
   WD 6-2002(R2008) ........ Wiring Devices--Dimensional Requirements

C. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
   15-2010 ............... Safety Code for Mechanical Refrigeration

PART 2 - PRODUCTS

2.1 WALK-IN CONTROLLED TEMPERATURE ROOM

SPEC WRITER NOTE: Show room dimensions on drawings.

A. General: Furnish and install prefabricated, sectional, all-metal clad, modular, controlled temperature rooms that are designed for field assembly, to establish temperature specified within two hours, and to maintain that temperature without further attention.

B. Case: Include modular panels for walls, floor, ceiling, and door(s).
   1. Panel Construction: Double-wall construction, prewired, and insulated and vapor-sealed sections mechanically locked in place from interior of room without the use of special tools. Each panel passes through a 1829 mm (6 feet) wide corridor and 813 by 2032 mm (32 by 80 inch) doorway. Panel construction does not incorporate wood.
   2. Door:
      a. Not less than 864 mm (34 inches) wide by 1905 mm (75 inches) high; construction matching that of panels; with observation panel of sealed multipane glass not less than 305 mm (12 inches) square.
      b. Door handle and latch permits exterior locking with safety release to allow door to be opened from inside when locked on outside. Safety release will not disturb vapor seal when operated nor require tools to reactivate.
      c. Equip door jambs of rooms capable of attaining a temperature of 4 degrees C (39 degrees F) or colder with concealed heater to prevent frost formation or condensation.
3. Access Ports: Equip units with PVC or neoprene sleeves or gaskets for service entrances. Vapor seal access ports at interior and exterior of panels.

4. Finishes:
   a. Interior Walls and Ceiling: Chemical-resistant nontoxic odorless epoxy, not less than 0.0254 mm (1 mil) thick.
   b. Exterior: Baked enamel or matching interior.

5. Pressure Relief Port: Equip freezers that will operate at minus 18 degrees C (0 degrees F), or lower with 2-way type ports that allow for an increase or decrease of air pressure on the interior of the freezer to equalize with air pressure on the exterior.

C. Condensing Units:
   1. // Air-cooled // Water-cooled // Combination air-/water-cooled // type. Do not locate compressors on top of refrigerator or freezers.
   2. Provide positive oil lubrication and oil-level indicating device for each compressor. Equip water-cooled units with water regulating valve.

D. Controls:
   1. Mount regulating and indicating devices in console or panel adjacent to and no higher than door. Calibrate controls, thermometer, and recorder in increments of 1 degree C (1.8 degrees F).
   2. Operating Temperature Control: Self-contained remote bulb, liquid filled, reverse acting, adjustable, and sealed mercury-bulb-type thermostat, with three-degree differential. //Rooms specified to maintain single temperature do not have temperature selection adjustable by operator.//
      //3. Humidity: Electric control capable of maintaining selected relative humidity within plus or minus 5 percent.//
   4. Alarm and Override Temperature Control: Equip with sensing devices and circuits that take over control, initiate corrective action, and activate an audible signal device in event of temperature variation in room of more than 3 degrees C (5 degrees F) from set temperature. Signal automatically resets on return of room to set operating temperature.
E. Air Circulation System: Consisting of positive-pressure ceiling plenum, floor-level air returns, blower, ducts, and diffusion devices, and provides means of regulating fresh air drawn into room.
1. Equip air intake and exhaust with a replaceable filter.
2. Air recirculated continuously by lifetime-lubricated blower(s).
   SPEC WRITER NOTE: Delete heating system when not required.

F. Heating System: Equip controlled temperature rooms specified for operation above ambient temperature with low watt density (black heat) nichrome wire heaters, located for uniform distribution and shielded from workspace.
   SPEC WRITER NOTE: Delete refrigeration system when not required.

G. Refrigeration System: Equip controlled temperature rooms specified for operation below ambient temperature with hermetically sealed refrigeration system designed for continuous operation in ambient temperature of 35 degrees C (95 degrees F) that is capable of maintaining lowest temperature specified.
1. Defrost: Cycle not more than 15 minutes' duration. Temperature of room will not rise more than 1 degree C (1.8 degrees F) during defrost.
2. Install components to enable access for servicing.
3. Insulate refrigerant lines to prevent formation of condensate, and protect exposed lines with stainless-steel cover.
4. Equip with refrigerant vapor detectors and two monitor and alarm devices. Locate one monitor and alarm device local to the equipment and one in the electrical communication closet servicing the equipment.
   SPEC WRITER NOTE: Delete humidification system when not required.

H. Humidification System: Equip with electrical vaporizing system to furnish steam for humidification from ambient to 95 percent relative humidity under temperature conditions that room is capable of attaining. Equip system with constant water level device and thermostatic cut-off activated in event of failure of water supply.

I. Dehumidification System: Equip with fully automatic mechanical or regenerating chemical dehumidification system capable of attaining condition required below to ambient.
<table>
<thead>
<tr>
<th>CONSTANT TEMPERATURE IN DEGREES C (DEGREES F)</th>
<th>PERCENT RELATIVE HUMIDITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 (59)</td>
<td>50</td>
</tr>
<tr>
<td>20 (68)</td>
<td>35</td>
</tr>
<tr>
<td>25 (77)</td>
<td>30</td>
</tr>
<tr>
<td>37.7 (100) and above</td>
<td>20</td>
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</tbody>
</table>

J. Temperature Control:
1. Refrigerator/Freezers: Variable temperature within the range of // 0 to 4 degrees C (32 to 39 degrees F) // minus 15 to minus 20 degrees C (plus 5 to minus 4 degrees F) //.
   a. Control Point: 2.0 degrees C (3.6 degrees F), plus or minus.
   b. Uniformity: 1.0 degree C (1.8 degrees F).
2. Incubator: Constant temperature of 37 degrees C (99 degrees F).

K. Interior Equipment: Install fastening and hanging devices for equipment specified in other sections of the specification.
1. Lighting: Rapid start, vaporproof fluorescent lighting to produce not less than 753 lux (70 fc) at 1016 mm (40 inches) above floor. Mount externally ballasts and other heat-producing components, except lamps.
2. Electrical Receptacles: Equip with two ANSI/NEMA WD 6 Configuration 5-200R duplex, one Configuration 6-30R duplex, and one Configuration 6-30R watertight receptacle, mounted 1143 mm (45 inches) above floor.
3. Shelving: Equip with removable, adjustable shelving at perimeter of room, except where other equipment is indicated. Fabricate shelving to be removable without the use of special tools.
4. Floor Mat: Equip with removable 5 mm (3/16 inch) thick, neoprene floor mat with nonskid tread that covers area of floor not occupied by shelving or other equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Assemble walk-in units and install refrigeration equipment according to manufacturer's written instructions. Make panel joints tight and seal panel penetrations to prevent condensation or frosting.
1. To the greatest extent possible, mount pipe, conduit, and instrumentation on the exterior of rooms; pass connections to serviced devices through drilled penetrations.

B. Piping, Pipe Insulation, and Refrigerant: Comply with requirements in Section 23 23 00, REFRIGERANT PIPING.

C. Controls: Comply with requirements in Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

3.2 REFRIGERATOR/FREEZER STARTUP AND PERFORMANCE TESTING

A. Startup Temperature Reduction: On startup, reset the room thermostats daily for a maximum temperature drop of 8 degrees C (15 degrees F) per day down to 2 degrees C (36 degrees F), and a maximum of 6 degrees C (10 degrees F) per day between 2 degrees C (36 degrees F) and operating temperature.

B. Performance Testing: Perform test to comply with Section 01 00 00, GENERAL REQUIREMENTS. Operate each system and record conditions hourly for eight hours. Submit the following information:
   1. Station, building and system identification, Contractor, and date and time.
   2. Compressor Nameplate Data: Make, model, horsepower, RPM, refrigerant, and charge in kg (lb).
   3. Compressor Operation: Approximate percentage of running time, pressure gage readings, actual amps (starting and running), condenser-water temperature in and out, or condenser entering-air temperature.
   4. Room temperatures.
   5. Defrost and drain functions of unit coolers. Demonstrate alarm functions.

3.3 PROTECTING AND CLEANING

A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.

B. At the completion of work, clean equipment as required to produce ready-for-use condition.

3.4 INSTRUCTIONS

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

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