

**SECTION 13 21 29
CONSTANT TEMPERATURE ROOMS**

SPEC WRITER NOTE: Delete text between // // not applicable to project. Edit remaining text to suit project.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Laboratory controlled temperature rooms.

1.2 RELATED REQUIREMENTS

SPEC WRITER NOTE: Update and retain references only when specified elsewhere in this section.

- A. Section 01 00 00, GENERAL REQUIREMENTS: Operating Instructions.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES: Submittal Procedures.
- C. Section 09 06 00, SCHEDULE FOR FINISHES: Finish and Color.
- D. Section 11 41 21, WALK-IN COOLERS AND FREEZERS: Walk-in Refrigerators and Freezers.
- E. Section 23 23 00, REFRIGERANT PIPING: Refrigerant Piping.
- F. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Controls.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- 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):
 - 15-2013.....Safety Standard for Refrigeration Systems (Packaged with 34-2013) and Designation and Classification of Refrigerants.
- D. UL LLC (UL):
 - Online Certifications Directory.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.

- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Illustrations and descriptions of controlled temperature rooms and factory-installed devices.
 - 3. Catalog or model numbers for each item incorporated into work.
 - 4. Assembly instructions.
 - 5. Diagrams and details of piping, wiring, and controls.
 - 6. Operating-test data.
 - 7. Installation instructions.
- D. Test reports: Certify // each product complies // products comply // with specifications.
 - 1. Performance Test Reports: Indicate dates and times of tests.
- E. Certificates: Certify // each product complies // products comply // with specifications.
- F. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer // with project experience list //.
 - 2. Installer // with project experience list //.
- G. Operation and Maintenance Data:
 - 1. Operating Instructions: Comply with requirements in Section 01 00 00, GENERAL REQUIREMENTS.
 - 2. Care instructions for each exposed finish product.
 - 3. Start-up, maintenance, troubleshooting, emergency, and shut-down instructions for each operational product.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Regularly manufactures controlled temperature rooms.
 - 2. Manufactured controlled temperature rooms with satisfactory service on five similar installations for minimum five years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects. //
- B. Installer Qualifications: // Manufacturer authorized installer. //
 - 1. Regularly installs controlled temperature rooms.
 - 2. Installed controlled temperature rooms with satisfactory service on five similar installations for minimum five years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects. //
- C. Safety Standard: ASHRAE 15 requirements for factory testing and nameplate.

D. Electrical Components and Devices: UL listed and labeled for intended use.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, // color, // production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight // conditioned // facility.
- B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

- A. Environment:
 - 1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
 - 2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
 - 3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.
- B. Field Measurements: Verify field conditions affecting controlled temperature room fabrication and installation. Show field measurements on Submittal Drawings.
 - 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.9 WARRANTY

SPEC WRITER NOTE: Always retain construction warranty. FAR includes Contractor's one year labor and material warranty.

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

SPEC WRITER NOTE: Specify extended manufacturer's warranties for materials only.

- B. Manufacturer's Warranty: Warrant controlled temperature room against material and manufacturing defects.

SPEC WRITER NOTE: Specify customarily available warranty period for specified products.

- 1. Warranty Period: ten years.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Prefabricated, sectional, all-metal clad, modular, controlled temperature rooms for field assembly.

2.2 SYSTEM PERFORMANCE

- A. Incubator Units: Temperature range, 5 to 45 degree C (41 to 113 degrees F).
- B. Refrigerator Units: Minimum temperature 35 degrees C (95 degrees F) with controls as required for system operation.
- C. Freezer Units: Temperature below - 18 degrees C (0 degrees F).

2.3 MATERIALS

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide controlled temperature room from one manufacturer // and from one production run //.
 - 1. Provide each product exposed to view from one production run.

2.4 WALK-IN CONTROLLED TEMPERATURE ROOM

SPEC WRITER NOTE: Show room dimensions on drawings.

- A. Case: Modular panels for walls, floor, ceiling, and doors.
 - 1. Panel Construction: Double-wall construction, prewired, insulated and vapor-sealed sections, mechanically locked in place from interior without the use of special tools.
 - a. Passes through 1829 mm (6 feet) wide corridor and 813 by 2032 mm (32 by 80 inch) doorway.
 - 2. Door: Match panel construction with multipane glass observation panels, 305 mm (12 inches) square.
 - a. Minimum 864 mm (34 inches) wide by 1905 mm (75 inches) high.
 - b. Handle and latch with safety release.
 - c. Equip door jambs to attain a temperature of 4 degrees C (39 degrees F) or colder.
 - 3. Finishes:

- a. Interior Walls and Ceiling: Chemical-resistant nontoxic odorless epoxy, minimum 0.0254 mm (1 mil) thick.
 - b. Exterior: Baked enamel or matching interior.
- B. 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.
 - 3. Pressure Switches: Automatic-reset low-pressure switch, and automatic- or manual-reset high-pressure cutout.
- C. 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 to 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.
- D. Air Circulation System: Positive-pressure ceiling plenum, floor-level air returns, blower, ducts, and diffusion devices.
- 1. Replaceable filter for air intake and exhaust.
 - 2. Lifetime-lubricated blower.
- SPEC WRITER NOTE: Delete heating system when not required.
- E. Heating System: Low watt density (black heat) nichrome wire heaters.
- SPEC WRITER NOTE: Delete refrigeration system when not required.

- F. Refrigeration System: Provide hermetically sealed refrigeration system for continuous operation in ambient temperature of 35 degrees C (95 degrees F), capable of maintaining lowest temperature for controlled temperature rooms operating below ambient temperature.
1. Defrost: Cycle maximum 15 minutes' duration. Temperature of room will not rise more than 1 degree C (1.8 degrees F) during defrost.
 2. Insulate refrigerant lines to prevent formation of condensate, and protect exposed lines with stainless-steel cover.
 3. 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.

- G. Humidification System: Equip with electrical vaporizing system to provide 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.
1. Recording Method: Digital, local and remote.
- H. Dehumidification System: Equip with fully automatic mechanical or regenerating chemical dehumidification system capable of attaining condition required below to ambient.

Constant Temperature in degrees C (degrees F)	Percent Relative Humidity
15 (59)	50
20 (68)	35
25 (77)	30
37.7 (100) and greater	20

- I. 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).
- J. Interior Equipment:

1. Lighting: Rapid start, vapor proof fluorescent lighting, minimum 753 lux (70 fc) at 1016 mm (40 inches) above floor. Externally mount ballasts and other heat-producing components, except lamps.
2. Electrical Receptacles: 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: Removable, adjustable shelving at perimeter of room, except where other equipment is indicated. Fabricate removable shelving without the use of special tools.
4. Floor Mat: Removable 5 mm (3/16 inch) thick, neoprene floor mat with nonskid tread.

2.5 FINISHES

A. Steel Paint Finish:

1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of the following:
 - a. One coat primer.
 - b. One coat thermosetting topcoat.
 - c. Dry-film Thickness: 0.05 mm (2 mils) minimum.
 - d. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.

2.6 ACCESSORIES

- A. Access Ports: Equip units with PVC or neoprene sleeves or gaskets for service entrances and vapor seal access ports at interior and exterior of panels.
- B. Pressure Relief Port: Equip freezers to 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 freezer to equalize with air pressure on the exterior.
- C. Galvanizing Repair Paint: MPI No. 18.
- D. Touch-Up Paint: Match shop finish.

2.7 SOURCE QUALITY CONTROL

- A. Special Inspections and Tests:
- B. Shop Inspections:
- C. Shop Tests:

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect existing construction and completed work from damage.
- B. Remove existing // _____ // to permit new installation.
 1. Retain existing // _____ // for reuse.

2. Dispose of // other // removed materials.

3.2 INSTALLATION

- A. Assemble walk-in units and install refrigeration equipment according to manufacturer's instructions. Make panel joints tight and seal panel penetrations to prevent condensation or frosting.
 - 1. Mount pipe, conduit, and instrumentation on the exterior of rooms; pass connections to service 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.

3.3 FIELD QUALITY CONTROL

- A. Special Inspections and Tests:
- B. Field Inspections:

SPEC WRITER NOTE: Section 01 45 29, TESTING LABORATORY SERVICES includes VA provided testing for large projects and contractor provided testing for small projects. Coordinate testing responsibility.

- C. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.

3.4 DEMONSTRATION AND TRAINING

- A. Submit training plan and trainer qualifications. See Section 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS.
- B. Acceptance Condition: After completing work, operate controlled temperature rooms 15 consecutive calendar days without breakdown.
- C. Instruct personnel and transmit operating instructions according to requirements in Section 01 00 00, GENERAL REQUIREMENTS.
- D. 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.
- E. 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 (pound).
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.

3.5 PROTECTION

- A. Remove protective materials immediately before acceptance.
- B. Repair damage.
- C. Clean exposed // wall // and // ceiling // surfaces. Remove contaminants and stains.
- D. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- E. At the completion of work, clean equipment as required to produce ready-for-use condition.

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