



SECTION 23 83 16

RADIANT HEATING AND COOLING PANELS

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Radiant heating and Cooling Panels. Modular, ceiling-mounted radiant hydronic panels capable of bidirectional heating and cooling.

1.2 RELATED SECTIONS

- A. Section 23 05 00 - Common Work Results for HVAC.
- B. Section 23 05 19 - Meters and Gauges for HVAC Piping.
- C. Section 09 29 00 - Gypsum Board (for drywall finish).
- D. Section 23 09 00 - Instrumentation and Control for HVAC.
- E. Section 23 72 00 - Air-to-Air Energy Recovery Equipment.
- F. Section 23 81 00 - Unitary HVAC Equipment (as applicable for heat pump/chiller integration).

1.3 REFERENCES

- A. ICC Evaluation Service (ICC-ES) PMG Product Certificate PMG-1788 for Therma-HEXX ThermaPANEL Modular Hydronic Radiant Heating and Cooling Panel System (includes ASTM E84 compliance for surface burning characteristics in finished assemblies).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

- C. Manufacturer's installation and engineering guidelines.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data:
 - 1. Manufacturer's technical data sheets, performance ratings; heating/cooling capacity per panel or sq ft, material descriptions, and dimensions on each product to be used.
 - 2. ICC-ES PMG-1788 compliance. including ASTM E84 for finished assembly, and integration details.
 - 3. Preparation instructions and recommendations.
 - 4. Storage and handling requirements and recommendations.
 - 5. Typical installation methods.
- C. Shop Drawings: Details of materials, construction, and finish. Include relationship with adjacent construction.
 - 1. Detailed panel layout, zoning, tubing, and piping connections.
 - 2. Mounting: ThermaTRAK or grid.
 - 3. Coordination with ceiling penetrations i.e., lights, sprinklers, diffusers, and drywall attachment/finishing.
- D. Control Sequences: Description of operative temperature control, dew-point interlocks, dehumidifier/ERV coordination, and zoning logic.
- E. Certificates: Manufacturer's certification of compliance with performance requirements, ICC-ES PMG-1788, including ASTM E84.
- F. Warranty: Copy of Manufacturer Warranty and Owner-Responsibility Guidelines.
- G. Operation and Maintenance Manuals: Startup, testing, adjustment, troubleshooting, and maintenance procedures.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of ten years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
 - 1. Trained by Manufacturer if required.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
- D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
 - 1. The intent of a mock-up is to demonstrate quality of workmanship and visual appearance.
 - 2. If the mock-up is not acceptable, rebuild the mock-up until satisfactory results are achieved.
 - 3. Retain mock-up during construction as a standard for comparison with completed work.
 - 4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 PRE-INSTALLATION CONFERENCE

- A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items, and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9 WARRANTY

- A. Manufacturer's written warranty covering radiant panels against defects in materials and workmanship for minimum twenty-five (25) years from date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Therma-HEXX Corporation, which is located at:
199 Constitution Ave., Suite 7
Portsmouth, NH 03801
Tel: 603-319-8815
Email: [request info \(contact@therma-hexx.com\)](mailto:request info (contact@therma-hexx.com)); Web: <https://therma-hexx.com>
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with the provisions of Section 01 60 00.
 - 1. Approved Substitutions: Must provide equivalent modular, integrated, thermoformed, hydronic panel design with comparable or superior performance of minimum 60 Btu/hr/sq ft (18.91 W per sq m) (e.g., heat transfer efficiency, bidirectional heating/cooling capability, and condensation prevention). Tube-and-aluminum-plate systems (or similar non-thermoformed designs) are not acceptable due to performance limitations in heat transfer uniformity, efficiency, and system integration.

2.2 SYSTEM DESCRIPTION

- A. A ceiling-mounted, modular radiant hydronic heating and cooling panel system providing space heating and cooling, independent of ventilation and humidity control.
- B. The panel system is to work in parallel with a dedicated Energy Recovery Ventilator (ERV) and dehumidification system for latent load (humidity) control and fresh air ventilation.
- C. System is to support heat recovery from dehumidification equipment through a hydronic heat exchanger connected to the hydronic manifold where applicable.

2.3 PERFORMANCE REQUIREMENTS

- A. Sensible Temperature Control: Radiant heating and cooling via ceiling panels.
 - 1. No forced air distribution required.
- B. Panel Surface Condensation: Prevent during cooling mode through active dew-point monitoring and control via 3 way mixing valve and fluid temperature control.
 - 1. System Fluid Temperature: Maintained minimum 4 degrees F (-15.5 degrees C) above room air dew point.
- C. Operation:
 - 1. Low-Temperature Heating Supply Water: up to 130 degrees F (up to 54.4 degrees C) typical for heat pump compatibility)
 - 2. High Temperature Cooling Supply Water: 45 to 80 degrees F (7.2 to 26.6 degrees C) chilled water, adjusted above dew point.
- D. Heat Transfer Capability: 60 Btu/hr/sq ft (18.91 W per sq m) via integrated micro-channels and turbulent flow in PE-RT panels.
- E. Support zoning for multiple spaces or areas within a space.
 - 1. Finished Ceiling Assembly: Incorporating 5/8 inch (16 mm) Type X gypsum board or equal.
 - a. Per ICC-ES PMG-1788.
 - b. ASTM E84 Class A compliance for surface burning characteristics.
 - 1) Flame Spread Index: 25 or less.
 - 2) Smoke Developed Index: 450 or less.

2.4 RADIANT HEATING AND COOLING PANEL SYSTEM

- A. Radiant Panels: Modular, ceiling-mounted radiant hydronic panels capable of bidirectional heating and cooling.
- B. Construction: Thermoformed panels.
 - 1. Material: Dow Hypertherm PE-RT, a bimodal polyethylene of raised temperature resin. A blend of LLDPE and HDPE.
 - a. Engineered for high-temperature hydronic fluids.
 - b. Rigid with low crack propagation.
 - c. Integrated channels for even, turbulent hydronic fluid distribution/
 - d. Insulating EPS foam backing minimizes heat loss upward.
 - e. Profile: Thin. 1.4 to 1.5 inches (35.5 to 38 mm) installed depth including insulation.
- C. Mounting: Compatible with standard ceiling grid systems or direct mount to joists/framing or suspended with all thread rod via patented aluminum ThermaTRAK snap-together strut/track system.
 - 1. The modular design allows flexibility around lights, sprinklers, diffusers, and other fixtures.
 - 2. Supports direct screw attachment of 5/8 inch (16 mm) Type X gypsum board (drywall) finish for ASTM E84 compliance and finished ceiling appearance.
- D. Finish: Conductive surface suitable for direct exposure or integration with ceiling finishes.
 - 1. Where exposed or in occupied spaces, finish with minimum 5/8 inch (16 mm) Type X gypsum board secured to ThermaTRAK system to achieve ASTM E84 Class A surface burning characteristics per ICC-ES PMG-1788.
- E. Fluid: Compatible with water or inhibited propylene glycol solutions, per

manufacturer recommendations for freeze protection and corrosion inhibition).

2.5 CONTROLS

- A. Control Strategy: Loxone air and humidity temperature-based control for occupant comfort in each space. 3-way valve control for dew point control. Proportional zone valves at manifold for individual room or circuit control.
- B. Safety Features: Dew-point sensors / monitors with automatic 3-way valve to maintain supply water temperatures a minimum of 4 degrees F (-15 degrees C) above room dew point.
 - 1. Coordination with dehumidifier / ERV to maintain indoor humidity levels suitable for radiant cooling; 45 to 60 percent Relative Humidity. 3-way valve is to close on fail.
- C. Integration: Interface with building automation system (BAS) or dedicated controls.
 - 1. Compatible with systems such as Loxone or Chiltrix for zoning, scheduling, and fault monitoring.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until the substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's detailed instructions, custom engineering drawings, approved shop drawings, and ICC-ES PMG-1788 requirements.
- B. Coordinate with other ceiling trades including but not limited to lighting, sprinklers, diffusers, and grid systems. Ensure proper panel placement, support, and access.
- C. Mount panels securely using ThermaTRAK aluminum strut system or approved method; connect hydronic tubing/piping with manufacturer-recommended fusion-welded or compatible copper crimp fittings.
- D. Where required for fire performance or finished appearance, install 5/8 inch (16 mm) Type X gypsum board directly to ThermaTRAK system per manufacturer guidelines and ASTM E84.
 - 1. Assembly Compliance: Tape, mud, and finish drywall is to be in accordance with Section 09 29 00. Other surfaces must be approved by Therma-HEXX.
- E. Insulate exterior piping to heat pumps and piping outside of humidity-controlled spaces as required to prevent condensation and energy loss.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.
- C. Hydronic Circuits Pressure Test: Per manufacturer requirements and ICC-ES PMG-1788.
 - 1. Hydrostatically test to 50 psi (345 kpa) and hold for a minimum duration as specified by manufacturer.
 - 2. No leakage or pressure loss permitted.
 - 3. Test is to be performed after manifold connections and prior to system flushing and charging.
- D. Flush and clean system wye and spin down filters prior to final commissioning.

3.5 COMMISSIONING

- A. Hydronic balance and flow verification.
- B. Verify controls, safeties including dew-point shutdown, and integration with dehumidifier and ERV.
- C. Demonstrate system performance in both heating and cooling modes; adjust as needed for even surface temperatures and no condensation risk.
- D. Ensure proper operation after each control software update.

3.6 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturer's recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION