



SECTION _____

INTERIOR HYDRONIC RADIANT HEATING AND COOLING SYSTEMS, SNOW-MELTING SYSTEMS, EXTERIOR COOLING SYSTEMS AND GEOTHERMAL SYSTEMS

PART 1 GENERAL

1.1 DESIGN / PERFORMANCE REQUIREMENTS

- A. 23.5" x 23.5" x 1.5" (full panel) or 11.5" x 23.5" x 1.5" (half panel) modular heat exchange units (Panels) shall be manufactured from a bimodal copolymer of LLDPE and HDPE with UV and chlorine resistant properties.
- B. Panels and interconnecting tubing do not contain an oxygen barrier.
- C. Panel Inlet and outlet interconnects shall be made with Therma-HEXX ThermaTUBE and shall be .625" OD (1/2" CTS) SDR-9. The tube shall be shall be manufactured from a bimodal copolymer of LLDPE and HDPE with UV and chlorine resistant properties and comply with ASTM F2623, ASTM F1807, ASTM F2159, ASTM D2683.
- D. Panels shall have a fluid capacity of .26 gallons (Imperial) (+/- 10%).
- E. Panels shall weigh approximately 1.6 lbs. per square foot including fluid and 1 lb. density EPS insulation. Load bearing panels will have 3 lb density EPS with 60 psi compressive strength.
- F. Panels shall have a 1" thickness of rigid EPS foam insulation attached to the underside of the Panels.
- G. Panels will be connected to each other with tubing of similar material to that of the Panels using socket fusion welding technology.
- H. Maximum panel pressure shall not exceed 37 PSI.
- I. Maximum panel supply temperature shall not exceed 140°F.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: The ThermaPANEL system layout shall be submitted as a shop drawing. Final drawing shall be based upon as-built dimensions of the covered area. The installing contractor or the General Contractor shall be responsible to provide the as-built measurements to Therma-HEXX in a timely manner.
- C. Operation and Maintenance Data: (per project requirement)

1.3 QUALITY ASSURANCE

- A. Single Source Requirements: To the greatest extent possible, provide hydronic modular heat exchange systems and ancillary products specified in this section from a single manufacturer.
- B. Installer Qualifications: Installing contractor shall have the appropriate licensing and training for the installation of radiant hydronic systems. Installer must be certified in the installation and welding of socket fusion welded pipe systems or receive manufacturer guidance with the installation if socket fusion fittings are utilized. Socket fusion fittings are only used on systems that are encased in concrete. Installer must be qualified in the installation, system balancing, startup and maintenance of Panel systems, or receive manufacturer guidance on these procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging with labels intact until ready for installation and protect from wet weather and direct sunlight.
- B. Prevent dirt or foreign materials from entering distribution piping or Panels
- C. Protect modular Panels and connected tubing from objects that are capable of piercing, abrading, bending, impacting the panels and tubing. Prolonged direct exposure to sunlight for more than 15 days shall be prevented.

1.5 SEQUENCING

- A. Ensure that the system layout and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
- C. Ensure that the affected trades are in possession of the proper equipment required for the installation of the entire system to prevent interruption of construction progress.

1.6 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 absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Therma-HEXX Corporation, which is located at:
199 Constitution Ave.; Unit 7; Portsmouth, NH 03801; Tel. (603) 319-8815; Email: contact@therma-hexx.com; Web: www.therma-hexx.com

- B. Substitutions: None permitted.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Clean substrate surfaces thoroughly prior to installation to eliminate any objects that could interfere with the Panel system or puncture the panel system.
- 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 instructions and approved shop drawings.
- B. For all systems, the recommended sequence of installation for the Panel system is to locate and install the manifolds and the supply and return piping to the manifolds from the mechanical area, close off the circuit valves on the manifolds. Once a manifold is installed and connected to the main supply and return piping, isolate the expansion tank by closing the shut off valve to it, and pressure test the

manifold and main piping system to at least 37 psi with compressed air or to the pipe and manifold manufacturers specifications prior to the installation of the heat exchange panels. Pressure test the expansion tank to make sure that it is sealed and set to the static pressure for the system, typically 10-15 psi or per the panel manufacturers specifications.

Once the main send and return system passes the pressure test, close off the main supply and return valves at the manifolds, set the compressor pressure to the maximum pressure marked on the heat exchange Panels, typically 37 psi max. As each row of Panels is installed, it should be hooked up to the manifold and pressurized. While the next row of panels is prepared, the installer shall prepare the next area for the panel installation, be it pedestals, ground mount or track mount. As each zone is completed, move to the next manifold and follow the same procedure until all Panels are installed. For exterior installations, the finish surface should be installed as soon after pressurization as possible to reduce exposure to UV degradation. Whenever possible, keep Panels pressurized during installation of finish surfaces. When pressurizing with air, some fluctuation of pressure (approximately +/- 10%) is normal as the Panels will expand when placed under pressure and can change with ambient temperature changes.

C. Installation training videos are available at www.therma-hexx.com. Onsite training is also an option when ordering a Therma-HEXX system.

D. In weather that is above freezing, fill the system with water, pressure test to the stated maximum pressure as marked on the Panels and purge before immediately filling with glycol mixture. **Make sure that the expansion tank is NOT isolated from the system. After successfully testing with water, blow the water out of system with compressed air and replace with the appropriate glycol mixture.**

E. **Never keep the system isolated from the expansion tank when fluids are in the system. Over expansion of the Panels and bursting can occur on warm days when the fluid will expand in the system.**

F. For ground mounted systems, apply 1 inch of bedding sand or stone dust to the top of the modular heat exchange panels making sure to fill the gaps between the Panels with sand, screed the sand to the appropriate thickness and level, apply the paver or stone surface and tamp the units to provide an even surface to within .125 inch between the paver units. Apply polymeric sand to manufacturer specifications using a plate vibrator / compactor using a sheet of plywood between the plate compactor and the paver surface to protect the paver surface from marring.

For pedestal mounted systems, layout the first two rows of pedestals at the appropriate spacing, plumb and level the pedestals, lay out the appropriate row of panels onto the pedestals, immediately place the paver or stone on to the panels, check for level and correct any rocking or out of level issues, make sure that the pavers are tight up against the spacer tabs on the spacer disk or pedestal tabs, make sure that all edge units are secured with spacer tabs. Layout the subsequent rows and place the pedestals at you work your way down the row. As each row is placed, the supply and return lines shall be run and connected to the manifolds as indicated on the plans supplied with the system. Open the supply circuit valve to test for leaks.

For interior applications, layout the mounting tracks as indicated on the manufacturers supplied plans with the supplied track clips at 4' on center or as indicated on the plans. Lift the panel rows into the tracks using a sheet rock lift with long wood supports that are the length of the rows. Place one panel clip onto the center rail between the panel rows per side by side pair of panels. Connect supply and returns as described previously and test. Carefully apply surface material to the tracks with self-tapping screws as shown on the manufacturers shop drawings, being careful not penetrate the fluid holding portions of the panels.

G. Route piping in an orderly manner, as designated by the manufacturer or architect / engineer on approved shop drawings. Changes to routing as specified on shop drawings must be approved by the manufacturer. The installing contractor shall document the as built installation.

H. When called out on Drawings, trimmable Panels may be trimmed or cut as required only in the area of the Panel as indicated with warning markings. Panels may be cut with any jigsaw, table saw or hand-held power saw, using cutting blades appropriate for plastic, wood or metal. Do not cut Panels that are not clearly marked as trimmable. Complexity of the required cut will dictate the appropriate cutting tool.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

J. Where Panels are installed over roof drains, manifolds or other objects that require access or inspection, the installing contractor shall provide a minimum of a 4 foot loop of ½" PE-RT connecting tubes between Panels, on the inlet and outlet of the Panel, located directly above the roof drain to allow for the temporary displacement of the panel to allow for future maintenance of the roof drains without the need to disconnect the Panels. Connecting loops can be connected with the appropriate connection fittings.

K. Maintain clearance for access to valves and fittings.

L. Air elimination is essential for proper operation of the Panel system. Installer shall be responsible to ensure proper installation of air elimination devices. Coalescing type air separation units are recommended.

M. Verify pumps / circulators operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

N. Install a line size wye filter on the inlet side of each manifold. Each manifold shall be supplied with a 50 psi pressure relief valve which shall be attached to a spare port on the supply side of each manifold to prevent accidental over pressurization of the panel circuit. After initial commissioning, clean out the wye filters and remove the fine mesh filter from the coarse cage filter for normal operation.

O. Install unions downstream of valves and at equipment or apparatus connections.

- P. Install electrical devices furnished loose for field mounting.
- Q. Install control wiring between control panel and field mounted control devices.
- R. System control concept. By others or as specified on the manufacturers shop drawings.
- S. Exterior system control sequencing. By others or as specified on the manufacturers shop drawings.
- T. Interior system control sequencing. By others or as specified on the manufacturers shop drawings.
- U. Connect the system to power source as specified in Section 16150.
- V. Once the entire system is piped and deemed leak-free, fill and purge the system as needed for normal operation. Fill each Panel row separately to ensure complete removal of air as well as completely filling with mixed antifreeze solution.
- W. Install an automatic glycol injection and pressurization system set to a maximum of 14psi with a minimum of a 17 gallon tank capacity or appropriate size for the size of system to allow for over pressurization outflow collection and system pressurization maintenance. A low pressure shut off switch set to 5 psi shall be installed to shut down the pump(s) should the glycol feeder run out fluid and cease to pressurize the system. The system may require a circulating fluid that contains antifreeze. Installer shall be responsible for determining exact concentration required, depending upon location and operating conditions. Follow the recommendations of the antifreeze manufacturer and consider operating conditions, health and safety requirements before choosing and installing antifreeze. It is recommended that the solution be premixed prior to installation to ensure proper mixing and concentration level. Installer shall be responsible to check final concentration following installation. Antifreeze concentration diminishes over time. Follow the manufacturer's recommendations for testing and monitoring of concentration levels.
- X. Install an adequate sized air elimination unit and expansion tank. Note that each Panel and its interconnecting tubes hold 0.26 - .36 gallons of fluid.
- Y. For snow melting applications, a control system shall be designed with one or more zones capable of both moisture and temperature sensing. Locate sensors to monitor the most critical pedestrian areas under control. All zones shall be operated simultaneously when prompted by the control system. Warm weather operation is intended to remove excess heat from pavers and redistribute this heat into a suitable source of water such as a pool. Seasonal operation shall be controlled by a manually operated three-way valve and temperature differential control as specified in the manufacturers shop drawings. Building maintenance staff shall be instructed on the recommended process for seasonal change-over and for ongoing temperature monitoring by the installing contractor.
- Z. Provide acceptance testing of all components and maintain a written record of the results of all acceptance tests.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Repair or replace damaged products before Substantial Completion. Retain any failed Panels for return to manufacturer for testing and evaluation.

END OF SECTION