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Suggested Specification for Wet Radiant Space Heating System

Section 15550

2.4. RADIANT FLOOR SPACE HEATING SYSTEM

- A. Furnish all labor, materials, tools, equipment, appliances and services necessary and required to deliver and install a complete operating radiant floor space heating system.
- B. Provide design and analysis information from manufacturer of tubing system specifically for the design conditions of this project. Provide design information with submittals for engineer's evaluation and approval.
- C. Coordinate layout and installation of radiant heating piping and manifolds with building and structural components. Coordinate size and location of access panels to allow access to manifolds concealed in ceilings, walls, or floors as indicated on the plans.
- D. Provide tubing layout drawings from system supplier for installers use in installation and for as-builts. Drawings shall clearly identify routing, length, and identity of each loop to be installed.
- E. Piping installed in the slab shall be Comfort Pro Systems PEX-A (or engineer approved equal) cross-linked piping with protective Oxygen Diffusion barrier. Alternates shall be considered if equal or exceed base manufacturer in all aspects. Tubing shall have cross-linked molecular structure using the Engel method of cross-linking with a minimum diameter of ½" nominal for indoor radiant floor heating, or as scheduled on the contract documents. Tubing shall have ratings of 200 °F at 80 psig, 180 °F at 100 psig, and 73.4 °F at 160 psig operating temperature and operating pressures respectively. Tubing shall be cross-linked polyethylene manufactured to ASTM F876 standard specifications. Both ASTM and DIN approvals shall be clearly marked on all tubing.
- F. Tubing shall be provided with a manufacturers twenty-five year (25) warranty. For first ten years (10), tubing manufacturer shall provide a consequential damage warranty that shall cover all cost for replacing tubing as needed. Provide evidence of warranty within system submittals. Products that provide replacement tubing only shall not be considered equal for Owners protection.
- G. Distribution Manifolds shall be manufactured by tubing manufacturer and supplied as a complete system. Distribution Manifolds shall be stainless steel design with isolation shut off and flow balancing indicators for each loop. Each manifold shall be equipped with supply and return thermometers and main isolation ball valves. Fittings to connect PEX tubing to manifold shall be brass compression, removable and adjustable, with triple ring protection.
- H. Identification Tags: Manifold tags shall identify room served and loop number. If more than one loop serves a room, provide identification on manifolds to identify rooms served.
- I. Radiant Heating Control Sequence: Refer to section 15950. Controls and tubing system shall be supplied from one source for compatibility and design integration.
- J. Install piping in floor from manifolds without any joints. No loop length is to exceed the design parameters on the plans or as approved by the engineer. Tubing shall be marked every 3' for installation measurements. Maximum length shall be determined by design documents or tubing diameter. One-half in (1/2") tubing loops shall not exceed 300 feet. Five-eighths (5/8") tubing shall not exceed 380 feet per loop. Design shall use tubing diameter specified by contract documents.
- K. Secure piping in concrete floors over 4" by attaching tubing to concrete steel re-bar or webbing reinforcement using plastic tie straps. No metal wiring shall be used. Spacing shall be as shown on design plans or as approved by engineer within submittals. For floor sections of 4" or less, provide manufacturers plastic tracking strips for positive spacing and securing of tubing before pour.

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- L. Where tubing passes through an expansion joint within the concrete floor, install a sleeve of rubber foam-type insulation around tubing and extending for a minimum of 6 inches on each side of the slab penetration to prevent shearing.
- M. Install manifolds in accessible locations. Refer to plan view drawings. Install manifolds with all parts accessible for maintenance and replacement in the future as may be necessary.
- N. Before any part of the tubing is covered for any reason, entire manifold and tubing system shall be pressure-tested as required by the manufacture for warranty protection. In the absence of manufacturers instruction, pressurize the entire radiant system with compressed air. Fit manifold connections with a suitable pressure gauge and charging connection. If manifold location is not permanent, properly support manifold on uni-strut frame in the intended and designated permanent location. Charge system to a pressure of not less than 80 psig or more than 100 psig. Pressure test shall last for 24 hours with not less than a 2 psig drop. With system air charged, soap test all joint on and within the manifolds.
- O. After hydrostatic test pressure has been applied, examine piping, joints and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components and repeat hydrostatic test until there are no leaks. Prepare a written report of testing. Any portion of tubing layout that rise as a result of being pressurized shall be re-secured to be at the proper level within the slab structure when poured.
- P. Entire radiant system shall be left pressurized with monitoring pressure gauge throughout pour of floor materials. Continually monitor pressure on system to make certain tubing system remains intact with no leaks or punctures.
- Q. Prior to final system fill and commissioning the PEX tubing system and manifolds shall be chemically cleaned as prescribed by the tubing manufacturer. Supply all tools, connections, labor, and accessories necessary to properly remove all foreign material, chemical, and residue within the tubing system before permanently charging system and placing into operation.
- R. After system has been properly cleaned and flushed, fill system with clean water to proper cold fill pressure. Purge each individual loop to eliminate air pockets in the system. After purging install automatic vent on the manifold return to maintain good flow and eliminate air.
- S. Operate system with all balance valves in the full open position. Balance system by return water temperature of each loop across manifold to be certain of even flow. Adjust individual loop balance valves as needed. After system balancing has been done, mark balancing valves to permanently indicate final balanced position.
- T. Perform the following adjustments before operating the system:
 - 1. Set temperature controls so all zones call for full flow, driving automatic control valves to fully open position.
 - 2. Operate system to ensure flow through all loops in all manifolds simultaneously.
 - 3. Reset temperature controls to normal space temp (70-72F) to allow valves to close. Check operation of automatic valves.
- U. Radiant manufacturer shall provide an extended service agreement on the entire radiant system for the protection of the Owner for a period of not less than 10 years. This policy shall be provided through a third party nationally recognized agency. A certificate of coverage and coverage details shall be provided to the Owner through the Engineer with final system signoff documentation.
- V. Provide the services of a factory authorized local representative to supervise initial startup of the radiant system at the jobsite. Contractor shall submit a letter of compliance with all manufacturers installation recommendations from the manufacturers representative with final operating and instruction manuals.