**Radiant Ceiling Panels - Heating and Cooling**

Section 23

### **Part 1 - General**

1. **Related documents**
2. Drawings and general provisions of the contract, including general and supplementary conditions and division 1 specification sections, apply to this section.
3. **Summary**
	1. This section includes the following:
		1. Hydronic radiant heating and cooling ceiling panels
4. **Submittals**
	* + 1. Product data: includes rated capacities, specialties and accessories for each product indicated.
			2. Submit certification by independent agency of panel performance curves and capacity ratings.
			3. Shop drawings to be completed prior to release. Include plans, elevations, sections, details and attachments to other work. Indicate dimensions, weights, loads, required clearances, method of field assembly, components and location and size of each field connection.
5. Include schedule showing panel circuiting, model designation, size, room location and accessories furnished.
6. IOM
7. **System Description**
8. Contractor shall provide complete radiant ceiling system including ceiling suspension system, wall mounting trims and non-radiant panels if required.
9. Contractor shall include mock up room for each panel designation and type for architect and engineers approval prior to release of product. Mock up shall include devices such as lights, fire suppression and AV.
10. **Quality**
	1. Manufacturer of the radiant heating and cooling ceiling system shall have a minimum of 5 years of similar installations.
	2. Radiant ceiling panels shall be shipped with an adhesive film protective coating on each individual element on the visual side.
	3. Radiant ceiling manufacturer to supply 5 year warranty from date of shipment.
	4. Panels to be manufactured US and in a certified ISO9001:2015 facility.
	5. Radiant ceiling panels and accessories shall be rated and tested for pressures as shown on drawings and manufacturers technical documentation.
	6. Use same brand of Manufacturer throughout, unless otherwise specified.
11. **Coordination**
	1. Coordinate layout and installation of radiant panels and suspension components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire suppression system and partition assemblies.

### **Part 2 – Products**

1. **Manufacturers**
	1. Manufacturers: subject to compliance with requirements, provide products by one of the following:
		1. Zehnder
2. **Testing Requirements**
3. Heating performance capacity shall be tested accordance with DIN 14037 or ASHRAE 138-2013
4. Cooling performance capacity shall be tested in accordance with DIN 14240 or ASHRAE 138-2013.
5. **Hydronic Radiant Heating and Cooling Ceiling Panels**
6. Material:
7. Radiant ceiling panels to be constructed from 0.04‘‘ aluminum material. Extruded aluminum with interlocking tongue and groove not acceptable.
8. Radiant panel edges shall be supplied as shown on drawings and available for lay in grid or free hanging applications.
9. Activation of ceiling panel to include graphite activation with ½‘‘ copper tubing embedded in the sandwich. Cooper tubing shall be single continuous tube and factory pressure tested prior to shipment. Soldered on ubends are not acceptable.
10. Panels to have perforation pattern as standard. Perforated panels to be supplied with an acoustical absorbing fleece for sound attenuation. The fleece shall be non-flammable and meet the requirements of building material standards DIN 4102/B1 and BS 476/ASTM E84.
11. Sound absortion data (NRC) shall be tested in accordance with ASTM C423 or DIN EN ISO 354.
12. Radiant ceiling panel surface to be coated with highly emissive powder coat paint for optimal radiative properties. Color to be selected by architect.
13. Radiant panels shall be 2-pipe.
14. Flexible hoses to be suppled for connections to surrounding panels and distribution system. Hoses shall be flexible PE corrugated with EVOH 02 barrier. Panel connection by means by brazing or pro-press is not acceptable.
15. Flexible hoses shall have max operating pressure of 435 psi and burst pressure of 1,600 psi.
16. Radiant panels shall ship with protective film.

**PART 3 – EXECUTION**

 **3.01 Pre-Design Services**

A. Bid shall include the costs to complete final selections and coordination with the Engineer at the Engineers office. Allow for a minimum of three (3) days.

 **3.02 Installation – General**

A. Install radiant panel level and plumb. Maintain sufficient clearance for normal services, maintenance, or in accordance with construction drawings.

B. To ensure proper installation and handling of the radiant panels, a complete IOM shall be supplied and reviewed before installation has begun.

C. Complete installation and startup checks according to manufacturer’s written instructions and perform the following:

1. Verify that controls and control enclosure are accessible.

2. Verify that control connections are complete to control valves as needed.

3. Verify that any identification tags are visible.

4. Verify that controls respond to inputs as specified.

5. Removal of protective film coating before system startup.

6. Release of stabilization profiles on panel edges.

**3.03 Connections**

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicated general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to radiant panels to allow for service and maintenance.

C. In addition to Division 23 Section “Hydronic Piping”, connect copper tubing to supply with shut-off valve, strainer, control valve, and union or flange, and to return with balancing valve and union or flange.

**3.04 Field Quality Control**

A. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, fill water tubes and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to conform to proper unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

**3.05 Cleaning and Protection**

A. Remove protective film coating before startup of the system.

B. Clean all visible surfaces of equipment; touch up as required.

C. Protect all units before, during and after installation. Damaged materials due to improper protection shall be cause for rejection.