**Radiant Ceiling Panels - Heating and Cooling**

Section 23 82 43

### **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. **Definitions**
	1. Low voltage: as defined in NFPA 70 for circuits and equipment operating at less than 50V or for remote control, signaling and power limited circuits.
		1. **Submittals**
			1. Product data: includes rated capacities, specialties and accessories for each product indicated.
			2. Shop drawings: 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 model designation, size, room location and accessories furnished.
6. Coordination drawings: reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
7. Suspended ceiling components
8. Method of attaching hanging systems to building structure.
9. Size and location of initial access modules for acoustical tile.
10. Items penetrating finished ceiling, including the following:
	1. Lighting fixtures
	2. Air outlets and inlets
	3. Speakers
	4. Sprinklers
	5. Access panels
11. Perimeter moldings
12. **Quality assurance**
	1. Product Options: Drawings indicating size, profiles, and dimensional requirements of radiant ceiling panels.
	2. Radiant ceiling manufacturer to supply 5 year warranty from date of shipment.
	3. Panels to be manufactured in a certified ISO9001:2015 facility.
	4. Radiant ceiling panels and accessories shall be rated and tested for pressures as shown on drawings and manufacturers technical documentation.
13. **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 Rittling
		2. Alternates: Approved equals or alternates are acceptable if and only if a mock-up and witness test is performed to demonstrate that the substitution meets the design criteria.
2. **Hydronic Radiant Heating and Cooling Ceiling Panels**
3. Material:
4. Radiant ceiling panels to be constructed of galvanized sheet steel with clip profiling.
5. Folded side flanges and galvanized box-section crossbars shall provide rigidity for panel and mounting for suspension.
6. Tubing shall consist of four 15mm (5/8‘‘) O.D. precision steel tubes.
7. Factory installed insulation shall consist of ½‘‘ fiberglass insulation with foil backing <fiber backing or wrapped in LDPE foil>.
8. Headers shall consist of round tubing with diameter of 1-1/4‘‘ and shall include a vent/drain. Header shall be shipped loose for field installation.
9. Header and collector shall be pass through design allowing easy installation of panels in series. <Header and collector shall be of superimposed header design>.
10. Headers shall be secured to the panel tubing using 15mm (5/8‘‘) galvanized clamp-ring coupling.
11. Radiant panels in series shall be connected using threaded couplings <crimp fittings> and provided with lower cover plate to hide any exposed connecting piping.
12. Radiant ceiling panel surface to be coated with highly emissive powder coat paint for optimal radiative properties.
13. Panels are protected against corrosion in accordance with DIN 50017 ‘‘Condensation Water Test Atmosphere“.
14. Panels shall be supplied with ball guards tested in accordance with DIN 18032 for ball impact resistance.
15. High moisture radiant ceiling panels shall be supplied with upper back plate and mold resistant insulation. Panel enclosure shall be completely sealed.
16. Panels shall be suitable for operating temperatures up to 203°F and maximum operating pressure of 73 psig.
17. Stainless steel flexible hoses to be supplied with panels for connections to surrounding panels and distribution system. Hose connections to consist of 1‘‘ threaded connectors. Panel connections by means by brazing or press is not acceptable.
18. Factory supplied mounting and hanging hardware for ceiling panels.
19. Factory supplied surface mounting brackets to include rubber grommets.
20. Radiant ceiling panels shall be crated, shipping via boxes is not accepted.
21. Radiant panel performance and output as measured in BTU/hr
22. Nominal panel size as scheduled
23. Heating Performance:
	* + 1. Radiant panel capacity shall be tested and certified by manufacturer in accordance with DIN 14037 or ASHRAE 138.
24. Cooling Performance:
	* + 1. Radiant panel capacity shall be tested and certified by manufacturer in accordance with DIN 14240 or ASHRAE 138.

**PART 3 – EXECUTION**

 **3.1 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.

 **3.2 Installation – General**

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

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

1. Removal of protective film coating before system startup.

2. Verify that controls respond to inputs as specified.

3. Verify that controls and control enclosure are accessible.

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

5. Verify that any identification tags are visible.

**3.3 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.

**3.4 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.

**3.5 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.