# SECTION 238229 - RADIATORS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section includes flat-pipe steel radiators.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Indicate location and size of each field connection.
4. Indicate location and arrangement of piping valves and specialties.
5. Indicate location and arrangement of integral controls and other accessories.

C. Samples: For each exposed product and for each color and texture specified.

D. Color Samples for Initial Selection: For radiators with factory-applied color finishes.

E. Color Samples for Verification: For each type of exposed finish.

### 1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members, including wall construction, to which radiators will be attached.
2. Method of attaching radiators to building structure.
3. Penetrations of fire-rated wall and floor assemblies.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 FLAT-PIPE STEEL RADIATORS

A. Heating Elements: Steel, welded and formed into flat, square, steel header with minimum thickness of 0.109 inch (2.76 mm). Include threaded piping and air-vent connections.

B. FPR-1,2&3: Model Type RF by Runtal North America, Inc or equal.

1. Working Pressure: 56 psig (386 kPa); 0.048 inch (1.22 mm).
2. Tube Height: 2-3/4" **inches**.
3. Tube Depth: 1-5/8" **inches**.
4. Tube Length: FPR- 1 (16 FT); FPR- 2 (10 FT), FPR- 3 (7 FT)
5. Number of Tubes High: FPR- 1&2 : 5 Tubes; FPR- 3 : 8 Tubes
6. Number of Tubes Deep: 1.
7. Room Air Temperature: **65 deg F (18 deg C)**
8. Heat Output: FPR- 1 (20,000 **Btu/h**); FPR- 2 (12,000 Btu/h); FPR- 3 (8,000 **Btu/h**)
9. Average Water Temperature: **180 deg F (82 deg C)**.
10. Temperature Drop: **20 deg F (11.1 deg C)**.
11. Pressure Loss: <.7 psi **feet wg (kPa)**>.

C. Piping connections shall be 1/2" NPT taper threaded sockets, located in either side, or vertical positions as shown on drawings. Air vent connections shall be 1/8" NPT taper threaded sockets.

D. Radiators shall be manufactured of cold rolled low carbon steel, fully welded and consisting of header pipes at each end, connected by flat oval water tubes.

E. Tube thickness:
1. Standard Pressure - 0.048" min wall thickness

F. Three working pressures shall be available:
1. Standard Pressure - 56 psi max (Tested at 74 psi)

G. Radiator expansion does not exceed 0.016 inch per linear foot at 215°F. Expansion compensation to be provided in the piping as required, by contractor.

H. Radiators shall be cleaned and phosphatized in preparation for the powder coat finish.

I. Radiators shall be painted with a gloss powder coat finish, for a total paint thickness of 2 to 3 mils (0.002"-0.003").

J. Color of the finish paint shall be selected from available standard or optional colors prior to ordering.

K. Wall mounting brackets shall be provided with radiators.

L. Necessary wall support blocking for proper radiator mounting shall be by contractor.

M. Radiators shall be manufactured in the USA to the sizes, capacities, and quantities as shown on the plans and schedules.

N. Mounting: **Wall brackets** with maximum spacing of 36 inches (914 mm).

O. Finish: Baked-enamel finish in manufacturer's **standard** color as selected by Architect.

P. Warranty:
1. All Runtal radiators shall be covered by a 5-Year Limited Warranty.

Q. Accessories:

1. Ribbed pipe cover trims, finished to match the radiators shall be provided with the radiation.

2. The radiation manufacturer shall provide combination shutoff valve/union fitting of less than two inches in width for the supply and return to each panel radiator, to be field installed by contractor.

3. Self-Contained Thermostatic Control Valves – ½" Runtal Control-REV or equal. Provide Runtal Sensor Control Heads Remote-Sen or equal.

4. Runtal-Flex connectors shall be HF-470 or equal, used where appropriate to provide expansion compensation for the radiators.

a. Length: **14 inches**.
b. Minimum Diameter: Equal to connection size.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine areas to receive radiators for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for hydronic-piping connections to verify actual locations before installation of radiators.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

A. Install units level and plumb.

B. Install expansion compensation hoses.

C. Install piping covers.

## 3.3 CONNECTIONS

A. Piping installation requirements are specified in Section 232113 "Hydronic Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect radiators and components to piping according to Section 232113 "Hydronic Piping."

1. Install shutoff valves on inlet and outlet, and balancing valve on outlet.

C. Install control valves as required by Section 230900 "Instrumentation and Control for HVAC."

D. Install piping adjacent to radiators to allow service and maintenance.

## 3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

B. Units will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 238229