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Modular Radiant Panel

DESCRIPTION
Modular panels are an easily installed type of radiant heating panel. The modular panel is typically supported by an exposed grid acoustic ceiling system. Modular panels are manufactured to suit either metric or imperial ceiling grids with standard or tegular edges. Modular panels supported by an acoustic ceiling grid system are often silk-screened to simulate adjacent acoustic tiles. However, panels in gyproc ceilings are provided in a standard white finish. Panels can be provided with aluminum or steel frames for recess or surface mounting in areas other than acoustic ceiling grids. The panel comprises a serpentine copper coil mechanically attached to either an aluminum or steel tray. The active or radiating surface of the panel can also be perforated for reduced sound or noise transmission when used in a total ceiling arrangement.

ADVANTAGES
The modular format of the panel allows for zone or spot heating in an integrated building system. Panels are easily removed if dividing walls are moved and relocated.

APPLICATIONS
Modular panels are ideal for hospitals, nursing homes, daycare, commercial office developments, schools, museums, security facilities, airports, churches, banks, condominiums, laboratories, swimming pools, factories and workshops.
GENERAL SPECIFICATIONS

Material Specification
Modular panels are a system of standard sized radiant panels which can be integrated into a suspended ceiling to provide overhead radiant heating.

The system can be used with hot water at various temperatures; insulation blankets with a heat reflecting foil backing are utilized to maintain heating efficiency.

The panels are fabricated from either 18 gauge aluminum sheet or 24 gauge steel sheet to which a heating coil is mechanically fastened. Thermal contact between the coil and panel is maintained by an aluminum heat saddle fastened with welded aluminum or steel studs. The coil is clipped to the heat saddle using cadmium plated steel clips where heat transfer paste is used at the interface between the aluminum heat saddle and both the face of the panel and the tubing.

Dimensions and Weight
Modular panels are available in the following sizes:
  Imperial: 24" x 24", 24" x 48", 48" x 48", 24" x 60"

The working weight for the aluminum panels is approximately 1.5 lb/ft²
The working weight for the steel panels is approximately 2.2 lb/ft²

Materials of Construction
 Pipework: Each panel has its own serpentine pipe coil of 5/8” O.D. tubing.
 Panels: 0.040” aluminum or 0.027” steel sheet with standard square edges or tegular edge detail.
 Paint finish: Standard finish is off-white or silk-screen printed to simulate adjacent acoustic ceiling tiles.
 Contact strips: Aluminum heat saddle bolted to the back of the panel using steel or aluminum studs which are welded to the panel.
 Insulation: As specified by consultant’s specification, usually a minimum of 1” thick foil back batt insulation.
OPERATION AND MAINTENANCE

Modular panels are incorporated into a building's heating/cooling system and will remain trouble free provided the following procedures are followed and inspections performed during start up and maintenance.

Operation
Heating mains should be flushed prior to connection to the radiant panels. After connection, the hydronic system should be flushed again and then dry pressure tested to isolate any leaks. Any remaining air should be vented from the system and boiler temperature should be brought up gradually.

Maintenance
Apart from cleaning any strainers, little maintenance should be required on the pipework system. Any descaling of pipework should be carried out in the same way as for other hydronic heating systems. The panels are robust and should resist damage. If for some reason a panel has been damaged the pipework should be inspected to ensure that the aluminum studs, pipe saddles or pipe clips have not been displaced or dislodged.

Cleaning
The surface of modular panels is best cleaned using an industrial vacuum cleaner to remove dust. However, if the panels become soiled they can be cleaned using a damp cloth and mild detergent.
SYSTEM DESIGN

Radiant panel system design is fundamentally similar to that of other perimeter heating systems. The design procedure is as follows:

1. Perimeter heat losses for the space are calculated using standard ASHRAE methods and good engineering practice.

2. Water temperature drop across the panel system is calculated based on flow rate, hot water supply temperature and required heat output:

   \[ ?T = \frac{\text{Heat Loss}}{\text{Flow Rate} \times \text{Heat Capacity}} \]

   Where:
   
   - \( ? \) is in °F
   - Heat Loss is in BTUH
   - Flow Rate is in gpm
   - Heat Capacity is in Btu/lb ·°F

3. Mean water temperature is determined by subtracting half of the temperature drop from the hot water supply temperature.

   \[ t = \text{hot water temp.} - (0.5 \times \ ?T) \]

4. Use the mean water temperature value (t) calculated in step 3 and the table on page M-5 to determine the heat output of the panel in BTUH per linear foot.

5. Determine the required panel width based on the output/panel determined in step 4.

6. Determine panel configuration to suit the room floorplan. The following rules of thumb should be considered:
   - try to supply 50 % of the total perimeter heat required (as calculated in step 1) within 39" of the perimeter wall.
   - design piping configuration such that the "hottest" water is always supplied closest to the perimeter wall.

We provide a design consulting service. For assistance with non standard applications or for in-depth information regarding radiant panel system design please contact our engineering department.
SYSTEM DESIGN

Radiant panel system design is fundamentally similar to that of other perimeter heating systems. The design procedure is as follows:

1. Perimeter heat losses for the space are calculated using standard ASHRAE methods and good engineering practice.
2. Water temperature drop across the panel system is calculated based on flow rate, hot water supply temperature and required heat output:

\[
?T = \frac{\text{Heat Loss}}{\text{Flow Rate} \times \text{Heat Capacity}}
\]

Where:
- \(?T\) is in °C
- Heat Loss is in Watts
- Flow Rate is in kg/second
- Heat Capacity is in J/(kg °C)

3. Mean water temperature is determined by subtracting half of the temperature drop from the hot water supply temperature.

\[
t = \text{hot water temp.} - (0.5 \times ?T)
\]

4. Use the mean water temperature value (t) calculated in step 3 and the table on page M-5 to determine the heat output of the panel in watts per linear metre.
5. Determine the required panel width based on the output/panel determined in step 4.
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   - try to supply 50% of the total perimeter heat required (as calculated in step 1) within 39" of the perimeter wall.
   - design piping configuration such that the "hottest" water is always supplied closest to the perimeter wall.

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**Modular Radiant Panel**

**PANEL OUTPUTS (IMPERIAL)**

**MODULAR PANEL IMPERIAL OUTPUTS**

<table>
<thead>
<tr>
<th>PANEL DIM'S [feet]</th>
<th>Passes</th>
<th>6</th>
<th>6</th>
<th>10</th>
<th>5</th>
<th>5</th>
<th>5</th>
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</thead>
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<tr>
<td></td>
<td>2x2</td>
<td>2x4</td>
<td>4x4</td>
<td>2x2</td>
<td>2x4</td>
<td>2x5</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>320</td>
<td>640</td>
<td>1280</td>
<td>270</td>
<td>540</td>
<td>870</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>380</td>
<td>760</td>
<td>1520</td>
<td>290</td>
<td>580</td>
<td>970</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>440</td>
<td>880</td>
<td>1760</td>
<td>320</td>
<td>640</td>
<td>1060</td>
<td></td>
</tr>
<tr>
<td>135</td>
<td>470</td>
<td>940</td>
<td>1880</td>
<td>350</td>
<td>700</td>
<td>1160</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>500</td>
<td>1000</td>
<td>2000</td>
<td>380</td>
<td>760</td>
<td>1250</td>
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</tr>
<tr>
<td>145</td>
<td>540</td>
<td>1080</td>
<td>2160</td>
<td>410</td>
<td>820</td>
<td>1350</td>
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</tr>
<tr>
<td>150</td>
<td>580</td>
<td>1160</td>
<td>2320</td>
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<td>880</td>
<td>1450</td>
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<td>960</td>
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<td>1740</td>
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<td>4640</td>
<td>960</td>
<td>1920</td>
<td>2810</td>
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</tbody>
</table>

Outputs expressed in BTUH/Panel, based on 70 °F room temperature.
## PANEL OUTPUTS (METRIC)

<table>
<thead>
<tr>
<th>PANEL DIM'S [mm]</th>
<th>PANEL OUTPUTS (METRIC)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>600X1200</td>
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<tr>
<td>M PASSES</td>
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<tr>
<td>48.9</td>
<td>94</td>
</tr>
<tr>
<td>51.7</td>
<td>111</td>
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<tr>
<td>54.4</td>
<td>129</td>
</tr>
<tr>
<td>57.2</td>
<td>138</td>
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<tr>
<td>60.0</td>
<td>147</td>
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<td>62.8</td>
<td>158</td>
</tr>
<tr>
<td>65.6</td>
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<td>68.3</td>
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<td>71.1</td>
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<td>73.9</td>
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<tr>
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<td>87.8</td>
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<td>90.6</td>
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<td>93.3</td>
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<tr>
<td>96.1</td>
<td>323</td>
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<tr>
<td>98.9</td>
<td>340</td>
</tr>
</tbody>
</table>

Outputs expressed in WATTS/Panel, based on 21°C room temperature.
Modular Radiant Panel

6 PASS PANELS

2' x 4' 6 PASS

VIEW B-B

2' x 2' 6 PASS

VIEW B-B

PIPE HOLDOWN CLIP

TEGULAR EDGE

ALUMINUM OR STEEL STUD

THERMAL HEAT PASTE

SECTION A-A

3/16" PUSH-ON NUT

ALUMINUM PIPE SADDLE
MODULAR - 5 & 10 PASS PANELS

- Aluminum Saddle
- 5/8" Tubing
- Pipe Holdown Clip
- Aluminum or Steel Stud
- 3/16" Push-on Nut
- Thermal Heat Paste
- Aluminum Pipe Saddle

View B-B

- 2' x 2' 5 PASS

Section A-A

- 2' x 4' 5 PASS
PIPING DETAILS FOR MODULAR PANELS

SOFT COPPER CONNECTION BY MECHANICAL CONTRACTOR REFER TO DETAIL A

DETAIL A

SOFT COPPER

DETAIL B

U-BEND. \( \frac{5}{8} \) O.D. TUBING

DETAIL B
MODULAR PANEL AT PERIMETER WALL IN T-BAR CEILING

PERIMETER WALL

T - BAR CEILING

MODULAR PANEL

INSULATION BY MECHANICAL CONTRACTOR

ANGLES BY OTHERS

THERMAL HEAT PASTE

T-BAR BY OTHERS
MODULAR PANEL IN T-BAR CEILING
Modular Radiant Panel

TEGULAR MODULAR PANEL IN T-BAR CEILING

T-BAR CEILING

TEGULAR MODULAR PANEL

INSULATION BY OTHERS

THERMAL HEAT PASTE

T-BAR BY OTHERS
FRAMED MODULAR PANEL IN GYPROC CEILING

ONE PIECE EXTRUDED ALUMINUM T SECTION FRAME WITH WELDED CORNERS BY THE MANUFACTURER

INSULATION BY MECHANICAL CONTRACTOR

RADIANT PANEL
Modular Radiant Panel

FRAMED MODULAR PANEL IN GYPROC CEILING

NOTE: IF SPACE ABOVE PANEL NOT ACCESSIBLE, REMOTE ACCESS PANEL REQUIRED FOR PANEL CONNECTION.
FRAMED MODULAR PANEL IN GYPROC CEILING

NOTE: IF SPACE ABOVE PANEL NOT ACCESSIBLE, REMOTE ACCESS PANEL REQUIRED FOR PANEL CONNECTION.
SURFACE MOUNTED MODULAR PANEL

- Modular Radiant Panel

- GYPROC CEILING

- RADIANT PANEL

- Fastened to structure above by mechanical contractors

- Insulation by mechanical contractor

- Extruded framing material by the manufacturer

- Non-hardening heat paste between tubing and aluminum

- Factory supplied painted screw to match radiant panel

- Note: Piping connection also possible through side of panel

- 3 1/2"
FREE HANGING MODULAR PANEL

CONCRETE CEILING

RADIANT PANEL

NOTE: PIPING CONNECTION ALSO POSSIBLE THROUGH SIDE OF PANEL.

HANGING DEVICE BY OTHERS

20 GAUGE SATIN COAT PAINTED TO MATCH RADIANT PANEL

INSULATION BY MECHANICAL CONTRACTOR

POP RIVETED ON SITE BY MECHANICAL CONTRACTOR
SUPPLY, RETURN CONNECTION AND EXPANSION DETAILS

HOT WATER SUPPLY AT OUTSIDE WALL

SOFT COPPER BY MECHANICAL CONTRACTOR

FACE OF OUTSIDE WALL

ANGLE MOULDING BY OTHERS

STANDARD T-BAR OPENING IS REQUIRED FOR MODULAR DESIGN 24" x 48"

EXPANSION GAP DETAIL

RADIANT PANEL

2/4" FOR EXPANSION

1/4" FOR EXPANSION
INSTALLATION INSTRUCTIONS

MODULAR RADIANT HEATING PANELS ARE FINISHED WITH ELECTROSTATIC POLYESTER POWDER PAINT. HOWEVER, THE PANEL SURFACE MUST NOT COME IN CONTACT WITH THE BARE SKIN. PERSPIRATION OR GREASE FROM AN UNGLOVED HAND CAN POTENTIALLY LEAVE A MARK ON THE PANEL.

INSTALLATION PERSONNEL MUST WEAR CLEAN WHITE GLOVES WHEN HANDLING THE RADIANT PANELS.

USE A HEAT PAD BETWEEN RADIANT PANEL AND COPPER PIPE WHEN MAKING SOLDER CONNECTION. EXCESSIVE HEAT CAN DAMAGE THE PAINT FINISH.