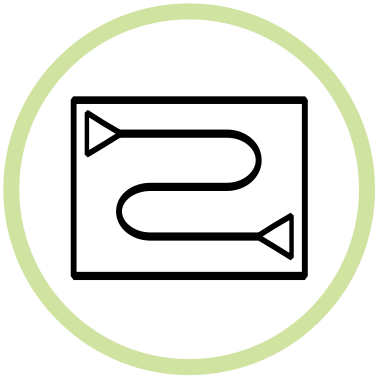
RADIANT CEILING PANELS



SLC / SMC

TECHNICAL CATALOG

SIGMA CORPORATION

MANUFACTURERS OF HYDRONIC HEATING AND COOLING
COMMERCIAL & INDUSTRIAL

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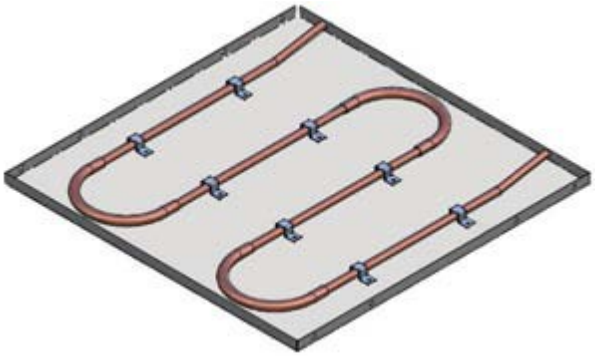
PRODUCT OVERVIEW

With an abundance of styles and configurations, a Sigma Radiant Panel selection is sure to meet both the design needs of architects and performance needs of the mechanical engineer. Performance data for radiant hydronic heating panels has been verified by independent testing at the University of Waterloo in Ontario, Canada. Standard finish is textured white to match angle/tee mouldings normally used for acoustic ceiling tile type installations. Custom finishes are available, and modular panels can also be silkscreened to simulate acoustic ceiling tile patterns.

SLC | Sigma Linear Ceiling Panels

Linear aluminum extruded panels with a castellated smooth face profile are available in a variety of widths and lengths to accommodate the perimeter planning of any building ceiling, including acoustic ceiling tile, drywall, or bulkhead ceiling types. Panel widths are manufactured to fit into standard T-bar systems, and are also available with extruded T-frames for mounting into drywall or bulkhead ceiling applications.



SMC | Sigma Modular Ceiling Panels

Modular drop-in panels are available in standard 2’ x 2’ and 2’ x 4’ sizes, as well as custom sizes, for easy mounting into new or existing ceiling grids.

BASIC PRINCIPLES

Like the sun, radiant panels transfer energy directly to any surface the panel “sees”, much the same way that the sunshine illuminates a room. The uniformity of temperatures comes from the natural absorption and re-radiation of energy between all interior surfaces.

Radiant heat travels in straight lines until it reaches a solid object. The heat warms that object and is re-radiated to nearby colder objects. Unlike convective heat which is actually a current of warm air, radiant heat does not rise. The floor is kept as warm as all other absorbing surfaces. Through this silent, non-mechanical process, radiant heating panels create a thermal barrier at the perimeter of the building providing a uniform draftless wall of warmth. This system provides an excellent integrated building heating/cooling design. The entire ceiling and all surfaces exposed to the radiant panels become part of the heating/cooling system by absorbing and re-radiating heat, providing a comfortable environment.

PRODUCT OVERVIEW

Unlike conventional HVAC systems, radiant heating panels do not rely on room temperature. The critical design parameter is the difference between the mean panel temperature and the average unheated temperature of all surfaces within the space. If the average unheated surface temperature (AUST) and the temperature of the air in a room equals the mean panel temperature (MPT), there will be no net heat transfer. When the AUST falls below the MPT, the panels radiate energy into the room. The energy radiated does not directly warm the air, but rather warms the glass/walls/ furniture/floors and people inside of the room. These objects in turn warm the air.

The mean radiant temperature within a space is one of the most important factors influencing occupant comfort. Sigma Radiant Panels affect the mean radiant temperature directly by raising the surface temperatures in the space, and thereby providing occupants with superior control of ambient conditions.

DESIGN CONSIDERATIONS

Radiant heating design is similar to that of conventional hydronic heating systems. Zone thermostats supply hot water to panels that respond instantaneously to give the space the necessary heating. Piping is located in the ceiling plenum which is usually readily accessible.

As the panels raise the Mean Radiant Temperature in the space, they make occupants more comfortable at ambient temperatures lower than those required of convective systems. Consequently, Sigma recommends an inside dry bulb temperature 3 to 4 Deg F below that normally used with convective systems.

Room loads should be calculated in the normal manner, using the ASHRAE guide. Calculations based on excessive factor of safety room loads should not be used, because such assumptions result in excessive panel width being specified. Using too wide a panel for the application reduces both effectiveness and efficiency of the system.

Sigma utilizes 5/8" OD (1⁄2" nominal) copper tube, allowing for the use of standard plumbing fittings. All U-bends and spiral panel interconnectors (to connect multi -panel circuits together) are expanded so that no couplers are required. Access panels are easy to specify, and are essentially separate, removable, radiant panels with no copper. This provides the installer and owner a means to access the hot water supply and hot water return connections in drywall or bulkhead ceiling configurations. To properly access a given ceiling, Sigma recommends that access panels be at least 12 inches long. Note that designers should account for heating capacity reduction due to access panel insertion into a building design. For example, if the wall to wall dimension of a room is 10 feet, and an 18" long access panel is used, then the maximum active copper length is reduced from 10 Feet to 8.5 Feet. If the room requires 4000 Btuh of heat, then the panel must supply 4000 Btuh/8.5 feet = 471 Btuh/lineal feet. For the room with an acoustic ceiling tile-type ceiling, and no access panel, only 400 Btuh/lineal feet is required. Once the Btuh/ lineal feet is correctly established, use the capacity charts to ascertain the specific Sigma radiant panel that works for you.

DESIGN EXAMPLE

(A) Determine the heat loss

Calculate the realistic heat loss of the perimeter using standard ASHRAE methods. As explained above, do not use excessive safety factors. In this design example we shall use a heat loss of 8500 Btuh.

(B) Determine the available length of panel per zone

Radiant heating panels should run continuously along the perimeter of a room or area. Sometimes obstructions such as building columns, partition walls, or changes in direction influence the available length of active panel (i.e. panel where copper can be installed). Typical column spacings in buildings are 20 to 30 feet.

Generally, using the longest panel length is most economical and efficient. Bear in mind, however, that while Sigma can produce panels up to 14 feet long, these are extremely awkward to handle (especially for widths over 24"). Both the Sigma factory and, more

PRODUCT OVERVIEW

importantly, the jobsite installation personnel will have issues with bowing and weight. For this reason, Sigma recommends maximum panel lengths of 13 feet.

As an example, assume a building has 24" square columns spaced on 26 foot centres. The available panel length is reduced to 24 feet, and this would typically be supplied as two 12 foot panels.

(C) Determine the available length of panel per zone

Dividing the heat loss from (A) by the available panel length from (B) gives the required capacity in Btuh/ Lineal foot or Watts/Metre. For a given Average Water Temperature , simply choose the panel configuration that meets the required capacity. For example, assume a heat loss of 8,500 Btuh for each 26 foot bay. This gives 8500/24 = 354 Btuh/Lineal Foot.

From the Sigma capacity tables at an assumed Average Water Temperature of 180 deg. F, choose 18-6 pass radiant panel which gives 406 Btuh/Lineal foot. Note that a 6 pass panel requires same end Hot Water Supply/Return connections. If opposite end connections are required, and for simplicity, assuming the Average Water Temperature was 190 deg. F, the 18-3 pass radiant panel with a capacity of 379 Btuh/Lineal Foot would be chosen. Note that the Sigma capacity tables do not show every possible available capacity, and some interpolation is required. For example, 24-6 pass can be interpolated between 24-4 pass and 24-8 pass. Contact your local representative if you require specific calculations.

(D) Calculate design water flow

The water flow rate is calculated from:
USGPM = Heat Loss (Btuh) / (500 x WTD)
Where WTD = Water Temperature Drop in this example, the heat loss is 8500 Btuh and with a desired WTD = 20 deg. F

$$\text{FLOW} = \frac{8500}{(500 \times 20)} = 0.85 \text{ USGPM}$$

(E) Calculate design water temperature drop

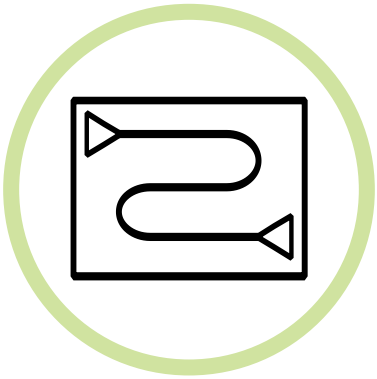
Using 2 of the 18-3 pass panel; each panel is 18 inches wide by 12 feet long. The panels are interconnected using Sigma spiral panel interconnectors.

Each panel is 12 ft. x 3 pass = 36 ft. copper/panel
2 panels: 2 x 36ft = 72ft. straight copper.
3 interconnectors between the 2 panels.
@ 0.85 USGPM, we interpolate from the Pressure Drop Chart in Section 5. E.(Page 15):
Pressure Drop in ft. H_2O/100ft. = 1.4
Interconnector Pressure Drop in ft. H_2O= 0.125

Therefore:

$$\left(\frac{72 \times 1.4}{100}\right) + (3 \times 0.125) = 1.383 \text{ ft. } H_2O = 4.135 \text{ kPa}$$

SLC



LINEAR
RADIANT CEILING PANELS

SLC UNIT SPECIFICATIONS

OVERVIEW

Sigma Linear Radiant Panels are generally used in applications where hydronic heating is required for walls adjacent to building exteriors, also known as perimeter walls. Linear panels have a castellated or smooth face, and Sigma offers, but is not limited to, a variety of standard extrusions. The extrusions can be interchanged to provide an end product that is tailored to the customer requirements, whether this be a simple, flat (2-Dimensional) panel used for T-Bar type ceilings, or more architecturally pleasing designs such as exposed ceilings, nominal panel widths start at 4", and continue in increments of 2" to virtually any width required. As well, Sigma provides 6" extrusions with either 1 or 2 copper saddles allowing the density of copper to double for a given panel width. This allows for an increase in heating capacity given a fixed panel width application. As such, Sigma Radiant Panels are a flexible, efficient, and aesthetically pleasing solution for your hydronic heating needs.

CONSTRUCTION

Sigma Linear Radiant Panels are constructed from aluminum-extruded planks in a variety of profiles. Each extrusion type has been designed with the same tongue and groove detail to facilitate interchangeability with all other extrusions. After panel lengths are identified, the necessary extrusions are cut into planks, which simply snap together longitudinally. A small screw is drilled at the plank interfaces, and this, combined with other clips, provides necessary rigidity to the panel. In order to reduce the amount of field work required, all of this construction occurs at the Sigma factory and arrives on site as a completed panel cut to the customer-specified length.

Once the planks are cut and assembled, they are ready for painting. The exposed surface of the panel is painted with a specially formulated polyurethane powder paint to provide a textured low gloss finish, capable of withstanding the requirements inherent with thermal cycling. After painting, a non-hardening Heat Transfer Paste is applied at the interface between the copper and the aluminum saddle, which is an integral part of the extrusion.

The straight copper tubes associated with the specific Radiant panel are placed into aluminum saddles after the heat transfer paste has been applied. As an option Sigma can also pre-solder and pressure test the serpentine copper circuit at this stage. All ends of copper that require site connection, such as Hot Water supplies, Hot Water Returns, or interconnections to other panels on long circuits, are bent up at a slight angle at the factory.

In order to provide a uniform contact area between copper and aluminum, the copper circuit is attached to the aluminum saddles via special clips spaced a maximum of 24" apart. Cross Braces are added onto the Radiant Panel to facilitate site installation via wire hangers or alternate mounting methods. Finally, Sigma places labels onto the panel to indicate the panel orientation (female side of panel facing perimeter wall), as well as to identify the panel as per the Sigma documentation submittal. This same identifying label is affixed onto the product when it is brown-wrapped and ultimately placed vertically onto a skid for shipping to the customer.

SLC UNIT SPECIFICATIONS

MATERIAL SPECIFICATION

PANEL — Extruded Aluminum, various profiles, castellated or smooth on the exposed side, with identical tongue and groove design for interchangeability. Copper Saddle is integral to each extrusion. Contact us for other extrusions not shown in this catalogue.

SIZES — Panel widths from 4" and up, in increments of 2". Bullnose, Channel extrusions available for 3-D applications. Panel Lengths custom cut to customer requirements.

PAINT — Standard is Sigma Radiant Panel White ("RPTXT2" color) Polyurethane-Polyester Formulation in Textured White. Contact us for custom colour options.

COPPER — 5/8" (16 mm) Outside Diameter, tempered. Standard is straight copper pre-bent at customer Hot water Supply/Return locations, and u-bends supplied loose for field installation. Optionally: copper can be pre-soldered and tested at factory. Copper is held down to integral aluminum panel saddle via zinc-plated spring steel clips, with non-hardening heat transfer paste applied between copper and saddle.

SUPPORT — Extruded aluminum channel cross braces spaced every 36" maximum.

SUSPENSION — Mounting frame is not included in standard orders. A custom option is 1" wide x 2" high x 1/16" thick aluminum extruded T-Frame, mechanically clinched by Sigma, used generally for drywall type ceilings with 3" clearance to all walls. As well, Sigma stocks 1' wide x 2" high x 1/16" thick aluminum tee (144" lengths0 and 1" x 1"x 1/16" thick aluminum Angle (126" lengths) for LOOSE framing requests, generally wall to wall applications.

INSULATION — Standard is NO Insulation. Option: 1" or 2" Foil Faced Batt Insulation installed at factory, dependent on Customer Mechanical Specification. Insulation can be foil faced one side only, or completely ENCAPSULATED.

WEIGHT — Dependent on copper tube density. Use a wet weight of 2.5 Lbs/Sq.Ft (12.2 kg/Sq.Mtr) when calculating requirements for suspension of panels to building structure.

SLC CAPACITY DATA

IMPERIAL

NOMINAL Panel Width (inches) - Tube Passes

Mean Water Temperature (Degrees F)	6-1	8-2	12-2	12-4	18-3	18-6	24-4	24-8	30-5	30-10	36-6	36-12
120	54	63	78	87	109	144	163	180	196	222	224	245
125	62	73	93	103	128	165	188	211	225	261	258	287
130	71	85	106	119	148	187	213	244	256	301	292	332
135	79	94	121	136	166	210	238	273	285	338	327	373
140	87	104	134	153	186	231	263	306	315	379	361	418
145	96	114	149	171	205	252	288	338	345	417	394	460
150	104	124	162	187	225	274	313	371	379	458	428	505
155	112	134	177	203	246	297	338	405	406	501	463	552
160	121	145	190	220	263	318	363	433	436	536	497	590
165	129	154	205	236	282	340	389	464	466	574	531	633
170	137	164	218	262	302	362	413	497	494	615	565	678
175	146	175	233	270	320	384	438	527	525	652	599	718
180	154	186	246	289	340	406	463	560	554	692	633	763
185	162	197	261	304	359	428	488	591	585	731	668	806
190	171	207	275	322	379	450	513	624	615	772	702	851
195	179	216	289	338	397	472	538	654	645	808	736	891
200	187	226	303	355	417	494	563	687	675	849	771	936
205	195	236	317	371	436	516	588	718	705	888	805	979
210	204	248	330	389	456	538	613	751	736	929	839	1024
215	212	258	345	406	474	560	638	781	765	965	874	1064

Heating capacities are shown in Btuh/Lineal ft. and are based on 70^{0}F Room temperature. For every 1^{0}F decrease in Room temperature below 70^{0}F, the output increases by 0.9%. For every 1^{0}F increase in Room temperature above 70^{0}F the output decreases by 0.9%

SLC CAPACITY DATA

METRIC

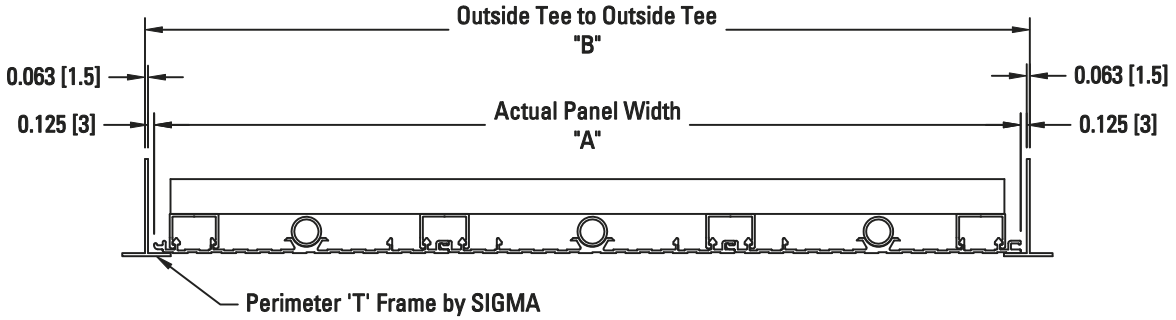
NOMINAL Panel Width (millimetres) - Tube Passes

Mean Water Temperature (Degrees C)	152-1	203-2	305-2	305-4	457-3	457-6	610-4	610-8	762-5	762-10	914-6	914-12
48.9	52	61	75	84	105	138	157	173	188	213	215	236
51.7	60	70	89	100	123	159	181	203	217	251	248	276
54.4	68	82	102	114	142	180	205	235	246	289	281	319
57.2	76	90	116	131	160	202	229	263	274	325	314	359
60.0	84	100	129	147	179	222	253	294	303	364	347	402
62.8	92	110	143	164	197	242	277	325	332	401	379	442
65.6	100	119	156	180	216	263	301	357	361	440	412	486
68.3	108	129	170	195	234	286	325	389	390	482	445	531
71.1	116	139	183	211	253	306	349	416	419	515	478	567
73.9	124	148	197	227	271	327	373	446	448	552	511	609
76.7	132	158	210	252	290	348	397	478	476	591	543	652
79.4	140	168	224	260	308	369	421	507	505	627	576	690
82.2	148	179	237	278	327	390	445	538	534	665	609	734
85.5	156	189	251	292	345	412	469	568	563	703	642	775
87.8	164	199	264	310	364	433	493	600	591	742	675	818
90.6	172	208	278	325	382	454	517	629	620	777	708	857
93.3	180	217	291	341	401	475	541	661	649	816	741	900
96.1	188	227	305	357	419	496	565	690	678	854	774	941
98.9	196	238	318	374	438	517	589	722	707	893	807	985
101.7	204	248	332	390	456	538	613	751	735	928	840	1023

Heating capacities are shown in Watts/Lineal Metre and are based on 21^{0}C Room temperature. For every 1^{0}C decrease in Room temperature below 21^{0}C, the output increases by 2%. For every 1^{0}C increase in Room air temperature above 21^{0}C the output decreases by 2%

SLC DIMENSIONS & WEIGHTS

Unit Model Width-Tubes	NOMINAL Width Inches (mm)	Actual Panel Width Inches (mm) "A"	Ceiling Opening SIGMA T-Frames "B"	Weight (operating) lbs./ft. (kg/m)
6-1 6-2	6" (152.4mm)	6.082" (154.5mm)	6.582" (166.5 mm)	0.7 (1.04 kg/m) 0.9 (1.34 kg/m)
12-2 12-4	12" (304.8 mm)	11.977" (304.2mm)	12.477" (316.2 mm)	1.5 (2.23 kg/m) 1.8 (2.68 kg/m)
18-3 18-6	18" (457.2 mm)	17.872" (453.9 mm)	18.372" (465.9 mm)	2.2 (3.27 kg/m) 2.7 (4.01 kg/m)
24-4 24-8	24" (609.6 mm)	23.767" (603.7 mm)	24.267" (615.7 mm)	2.9 (4.31 kg/m) 3.6 (5.35 kg/m)
30-5 30-10	30" (762 mm)	29.662" (753.4 mm)	30.162" (765.4 mm)	3.6 (5.35 kg/m) 4.5 (6.69 kg/m)
36-6 36-12	36" (914.4 mm)	35.557" (903.1 mm)	36.057" (915.1 mm)	4.4 (6.54 kg/m) 5.4 (8.02 kg/m)



1.Dimensions in Table 1 are sample widths. Nominal panel widths from 4" to 48" are available in 2 inch increments.

2. For panel lengths, allow a minimum of .187"(5 mm) for expansion clearance from end of panels to inside of Tee.

3. Sigma supplied perimeter T-Frames are constructed with T aluminum extrusions. Opening dimensions are for Sigma supplied Frames only.

4. For customer-supplied frames allow min .125"(3mm) width clearance between the edge of the panel and the inner edge of the frame for expansion. Allow minimum .187" (5mm) length clearance between the edge of the panel and the inner edge of the frame.

SLC PRESSURE DROP

IMPERIAL

Flow Rate (GPM)	Velocity (ft/s)	Pressure Drop (ft. H_2O per 100ft of	Interconnector (ft. of water)
0.5	0.58	0.5	0.050
1.0	1.17	2.0	0.168
1.5	1.75	4.4	0.364
2.0	2.34	7.0	0.559
2.5	2.92	10.0	0.823
3.0	3.51	14.0	1.130

METRIC

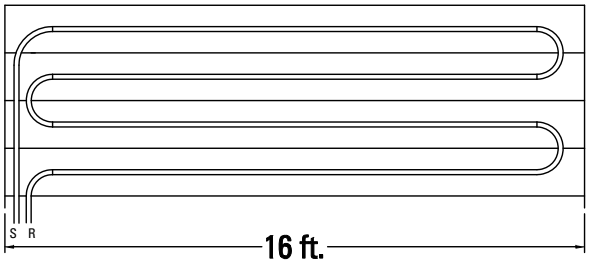
Flow Rate (L/s)	Velocity (m/s)	Pressure Drop (kPa/15m of Straight Copper)	Interconnector (kPa)
0.032	0.18	0.068	0.150
0.063	0.36	0.273	0.502
0.095	0.54	0.601	1.088
0.126	0.72	0.957	1.671
0.157	0.89	1.367	2.461
0.189	1.07	1.914	3.379

SLC | PRESSURE DROP — EXAMPLES

*PDC = from Pressure Drop Chart (Page 15)

Example 1:

@ 1GPM, Single Panel Serpentine.

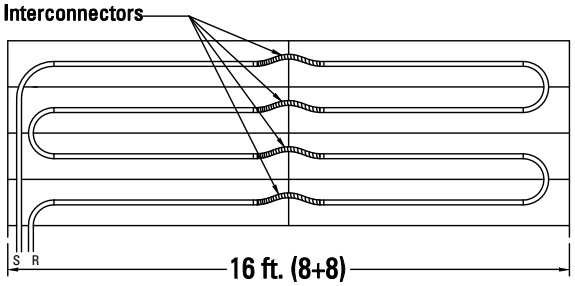


16 ft. x 4 pass
= 64 ft. @ 2 ft. H_2O/100 ft. (PDC)
= 1.28 ft. H_2O = 3.83 kPa

Please note the U-bends are considered negligible when calculating overall pressure drop.

Example 2:

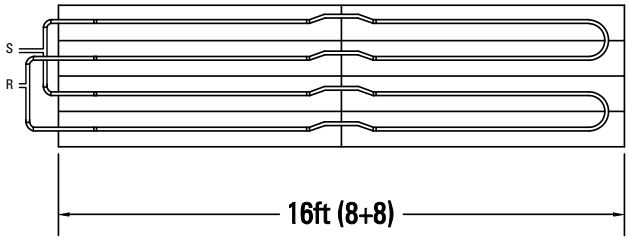
@ 1GPM, Double Panel Serpentine.



16 ft. x 4 pass
= 64 ft. @ 2 ft. H_2O/100 ft. (PDC)
+ 4 Interconnections x 0.168 ft. H_2O (PDC)
= 1.28 ft. H_2O + 0.672 ft. H_2O
=1.95 ft. H_2O = 5.83 kPa

Example 3:

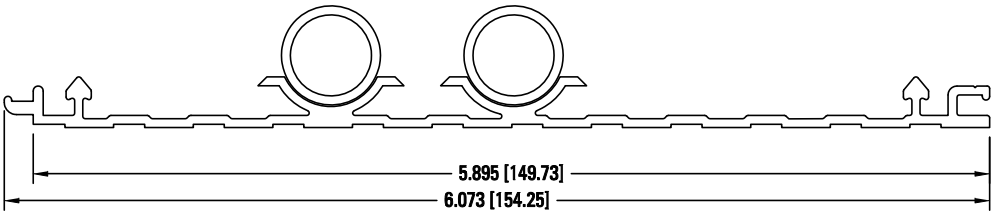
@ 1GPM (or 0.5 GPM/circuit), Double Panel Parallel-flow Serpentine.



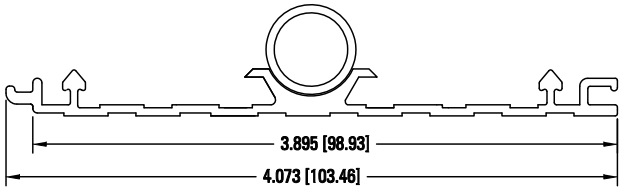
16 ft. x 2 pass/circuit = 32 ft./circuit @ 0.5GPM
-> 0.5 ft. H_2O/100 ft. (PDC)
+ 2 Interconnections x 0.05 ft. H_2O (PDC)
= 0.16 ft. H_2O + 0.1 ft. H_2O
=0.26 ft. H_2O = 0.78 kPa

SLC | STANDARD SHAPES

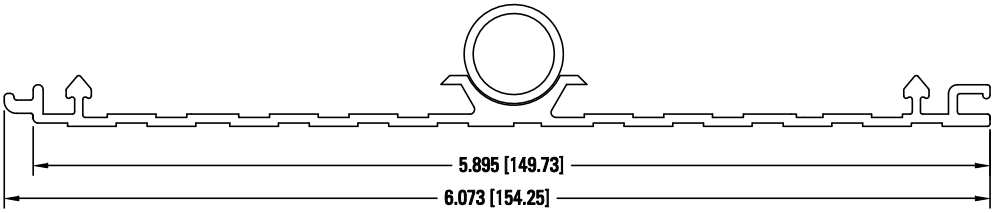
STANDARD FLAT EXTRUSIONS



Type 6-2 (6" Nominal Width; Double Pass)



Type 4-1 (4" Nominal Width; Single Pass)



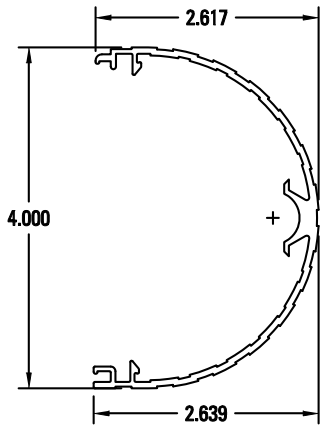
Type 6-1 (6" Nominal Width; Single Pass)

NOTES
Panels can be constructed at any width, in 2" increments, starting at 4".
Dimensions shown in inches (mm)
Castallated finish shown; also available in smooth-face for type 6-2 above.

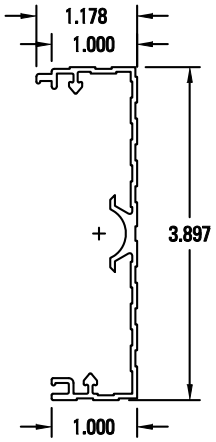
SLC STANDARD SHAPES

STANDARD MISCELLANEOUS EXTRUSIONS

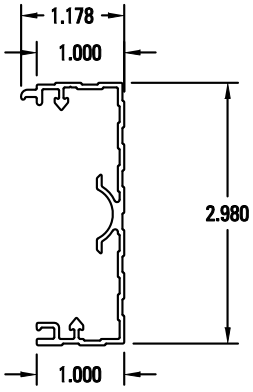
Bullnose Extrusion with Saddle



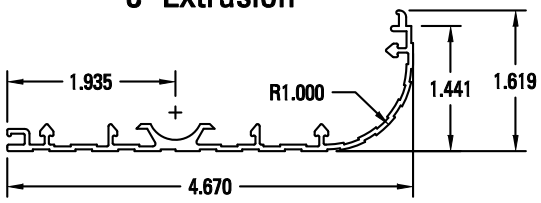
4" Channel Extrusion with Saddle



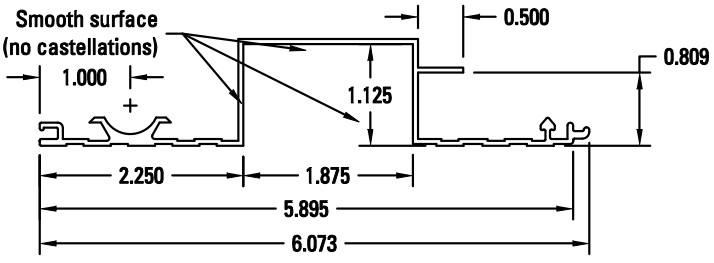
3" Channel Extrusion with Saddle



'J' Extrusion

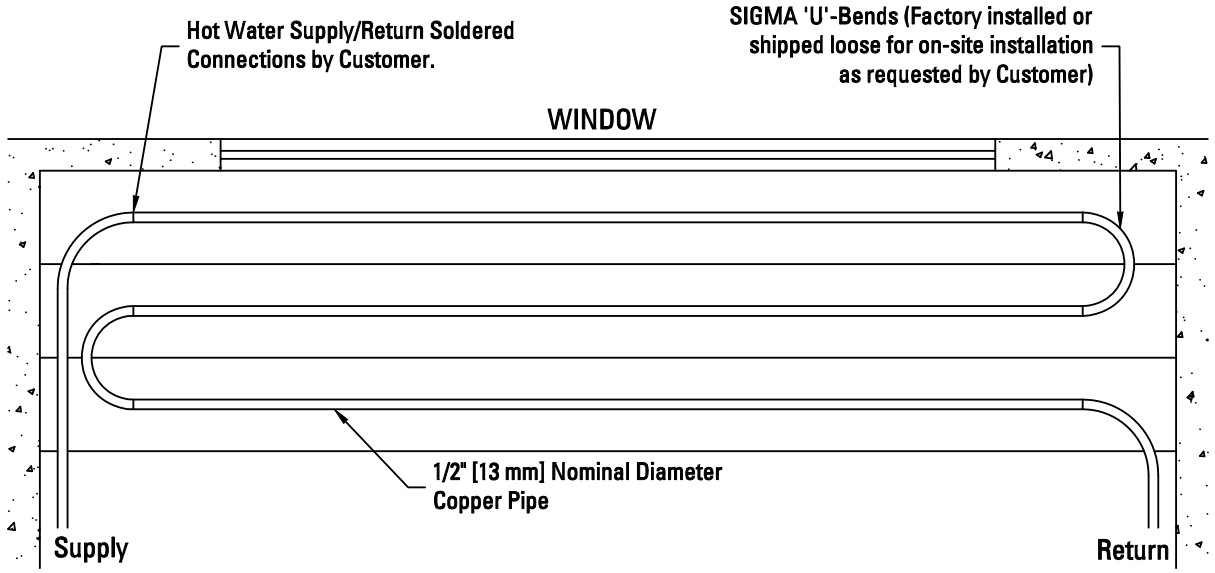


Curtain Track Extrusion

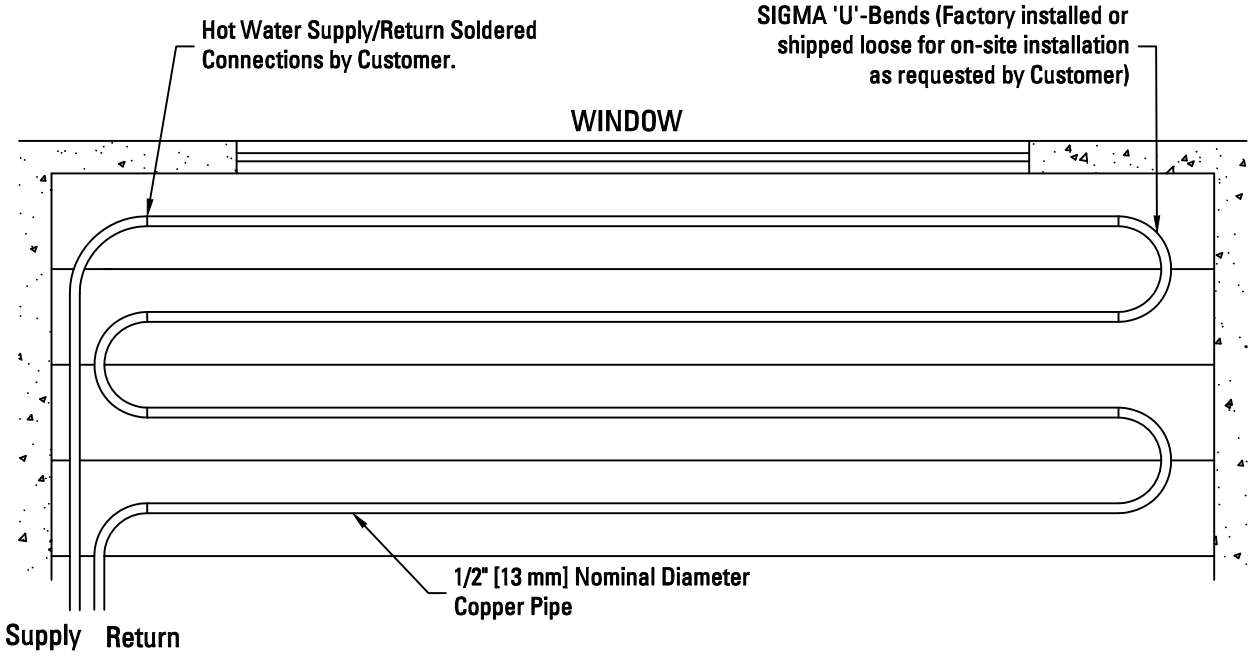


SLC INSTALLATION DETAIL

1. SINGLE PANEL CIRCUITRY



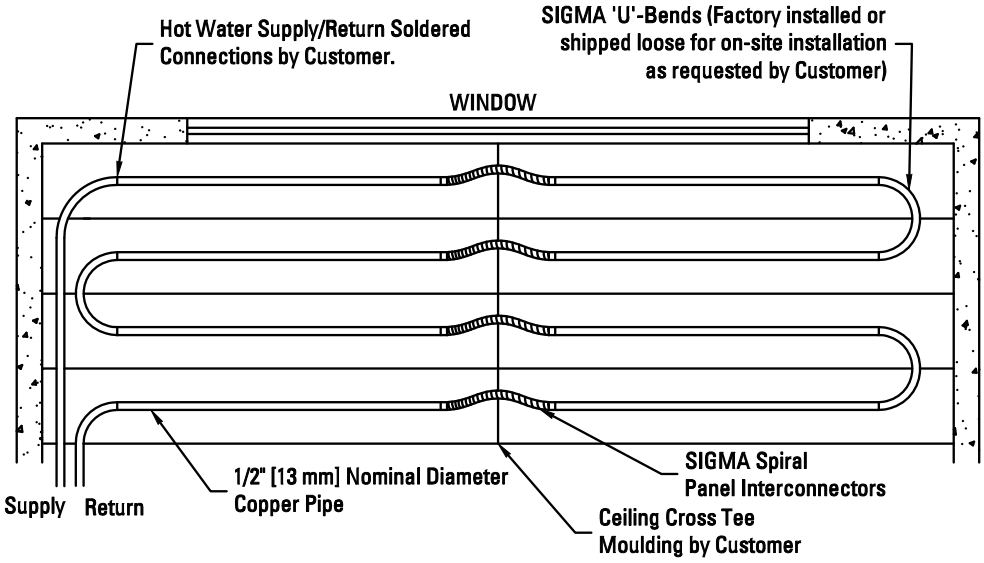
Odd Number Piping Passes (Opposite End Connections)

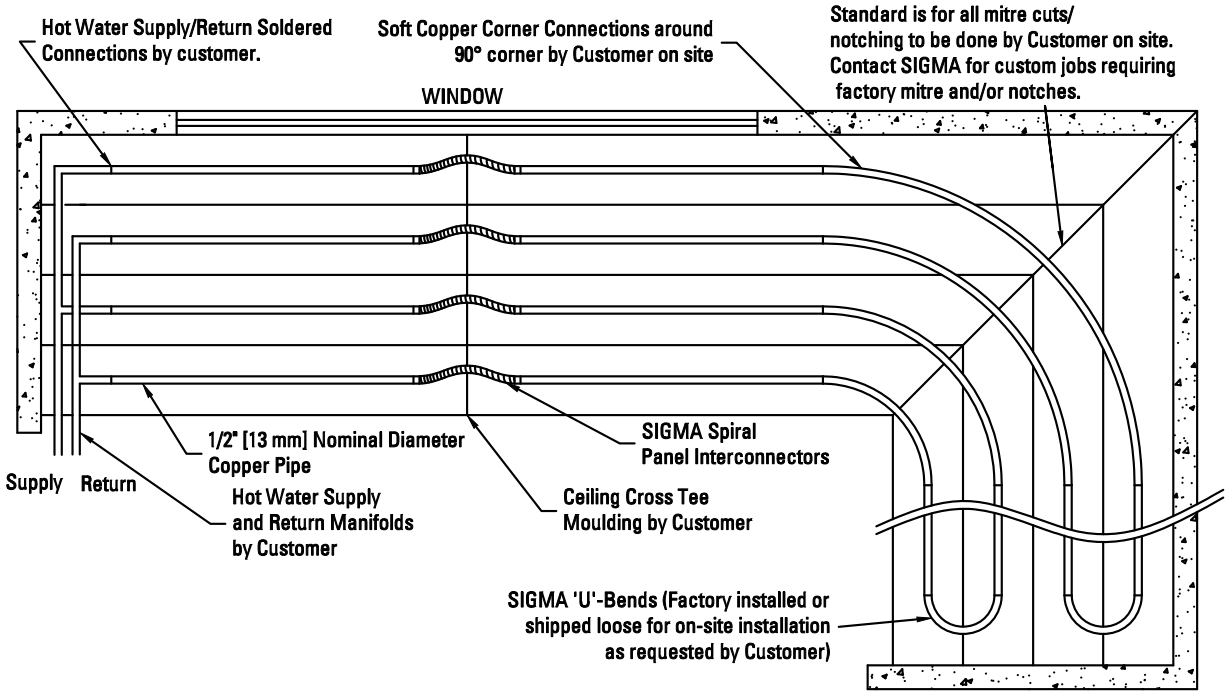


Even Number Piping Passes (Same End Connections)

SLC INSTALLATION DETAIL

2. MULTIPLE PANEL CIRCUITRY

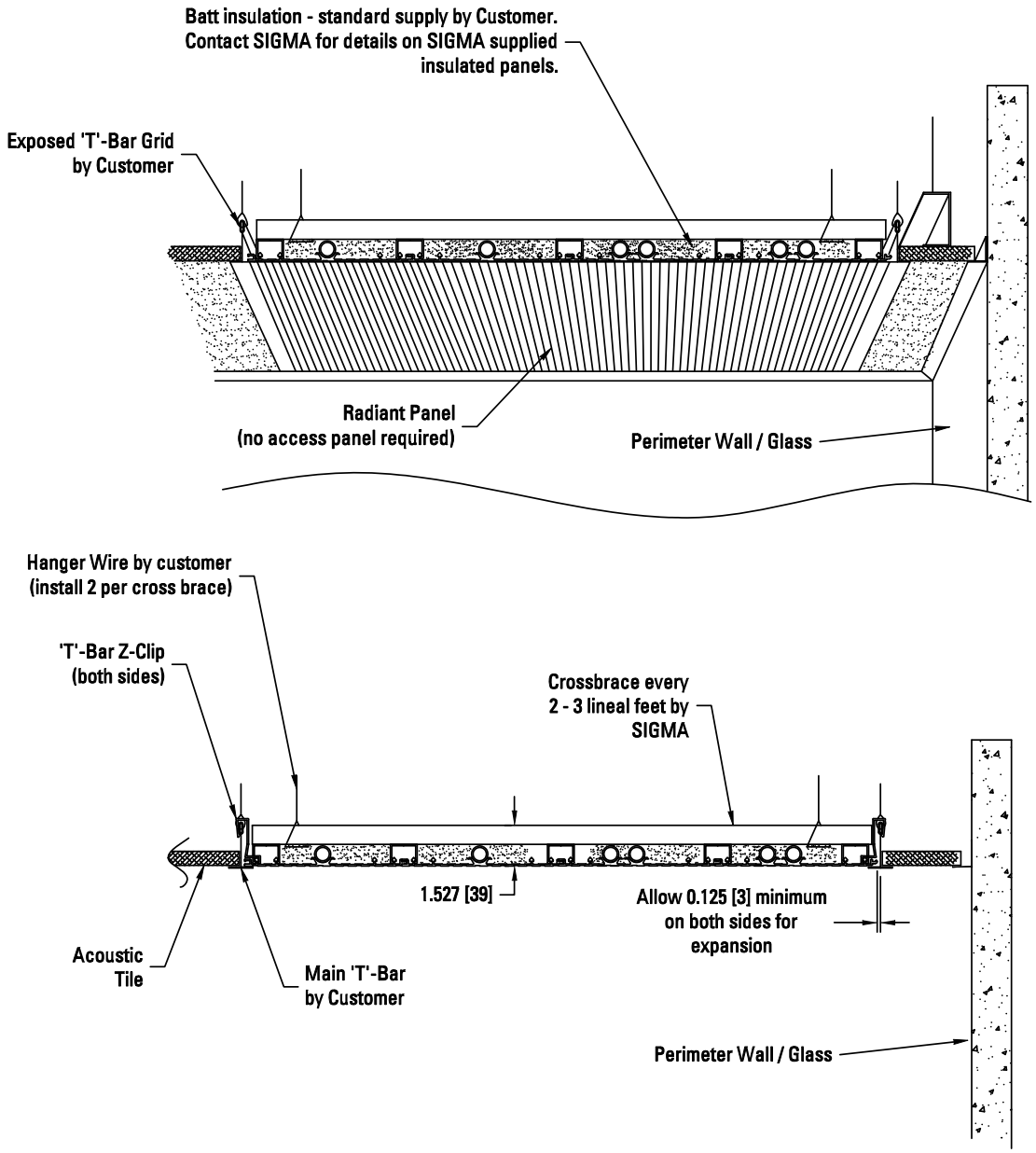




Parallel flow in even pass panels reduce pressure drop for long zones. SIGMA designs for 21 kPa (7 ft. H_2O) maximum pressure drop, unless otherwise noted by customer.

SLC INSTALLATION DETAIL

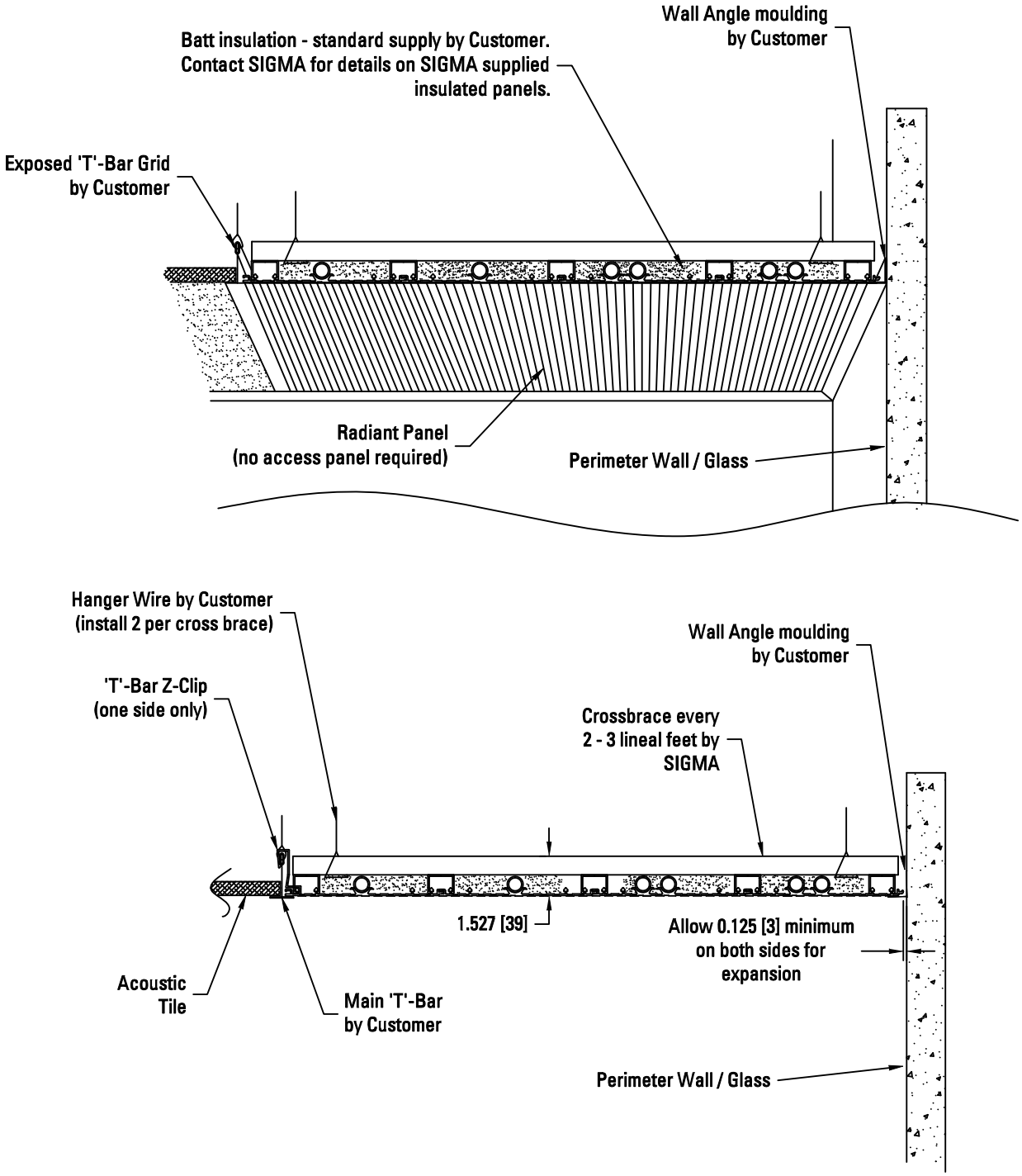
3. FULL T-BAR [FTBAR]



Dimensions shown in inches [mm]

SLC INSTALLATION DETAIL

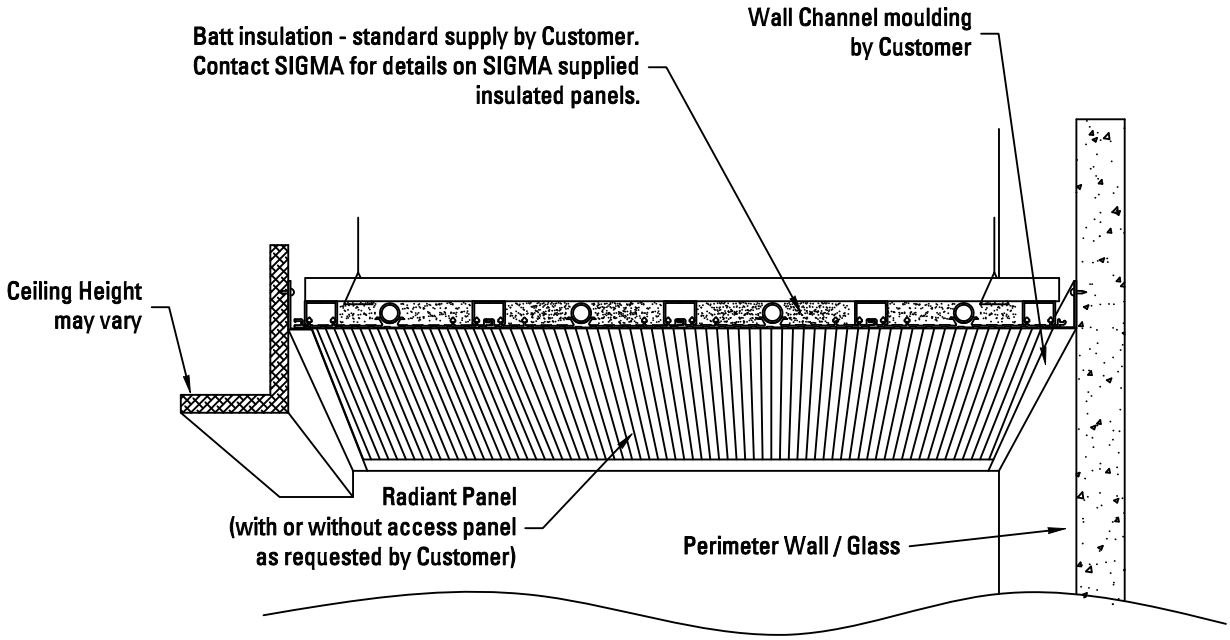
4. PARTIAL T-BAR [PTBAR]

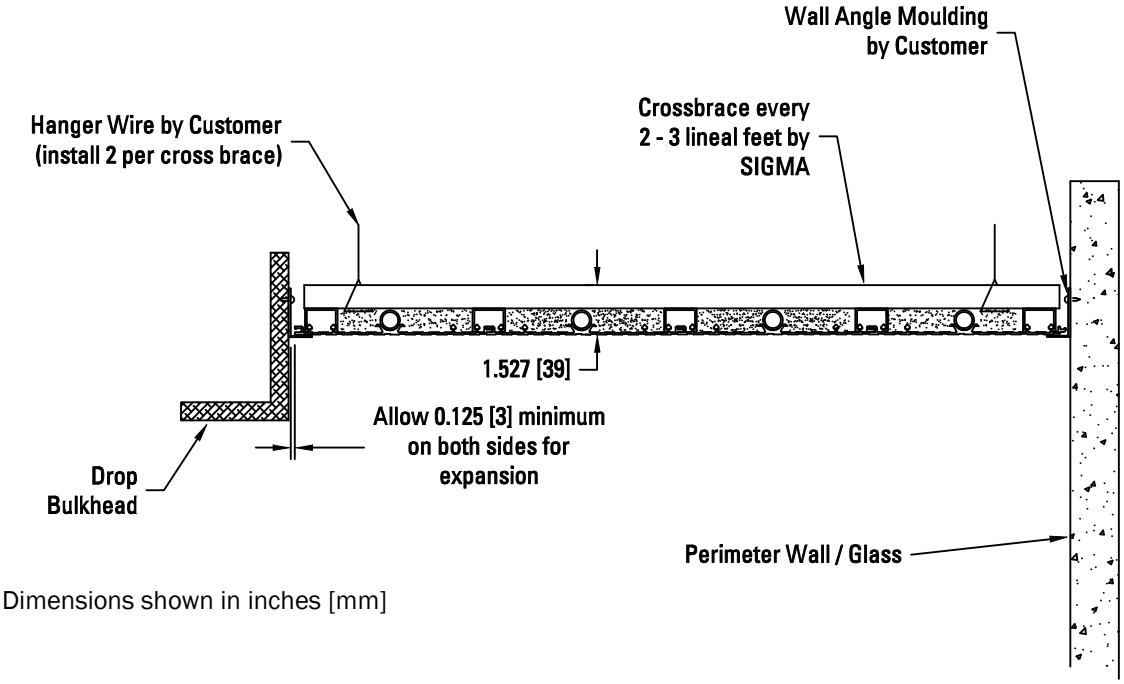


Dimensions shown in inches [mm]

SLC INSTALLATION DETAIL

5. BULKHEAD [BULK]

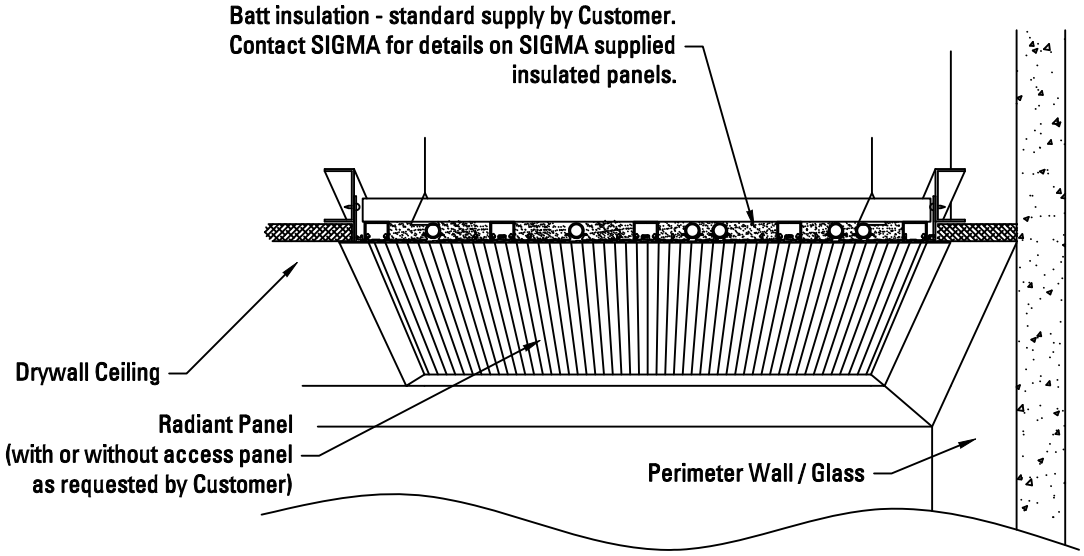


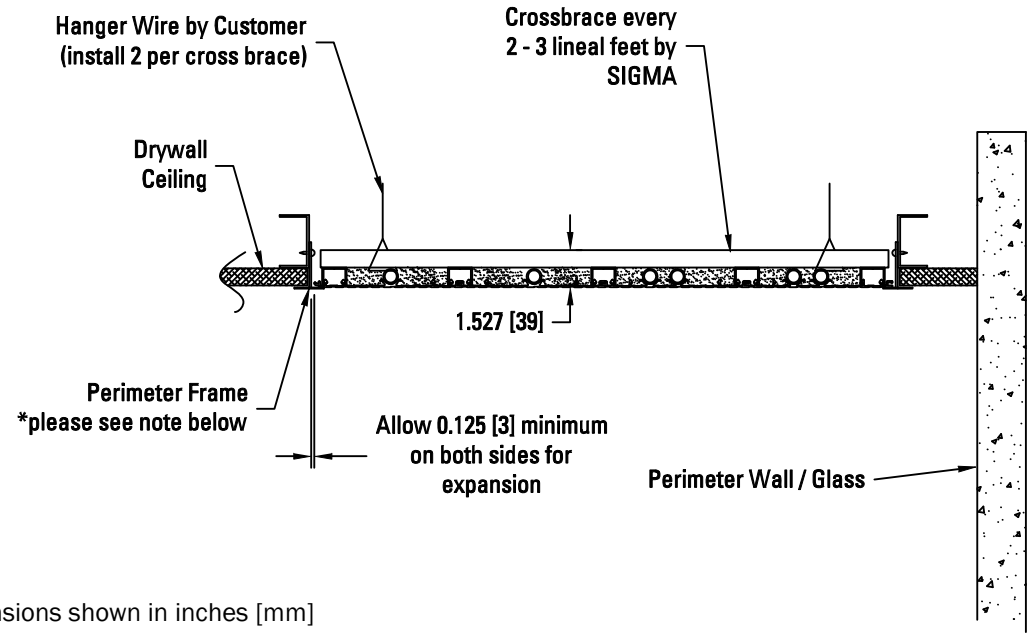


Dimensions shown in inches [mm]

SLC INSTALLATION DETAIL

8. DRYWALL [DWAL]



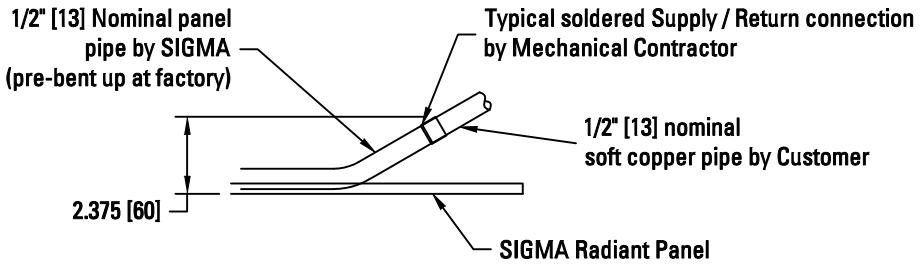


Dimensions shown in inches [mm]

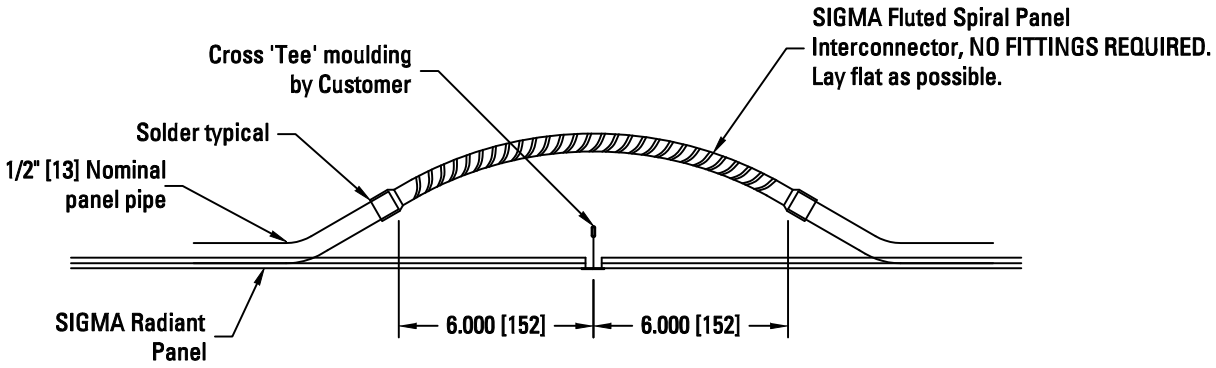
** Customer supplied perimeter frame. Note that SIGMA supplied perimeter frames DO NOT span from wall to wall—refer to page 27.*

SLC INSTALLATION DETAIL

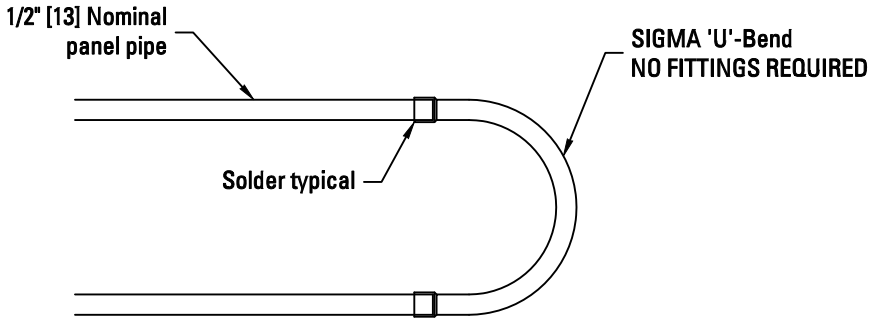
9. COPPER CIRUITRY



Connection to Panel Pipe



SIGMA Spiral Panel Interconnector

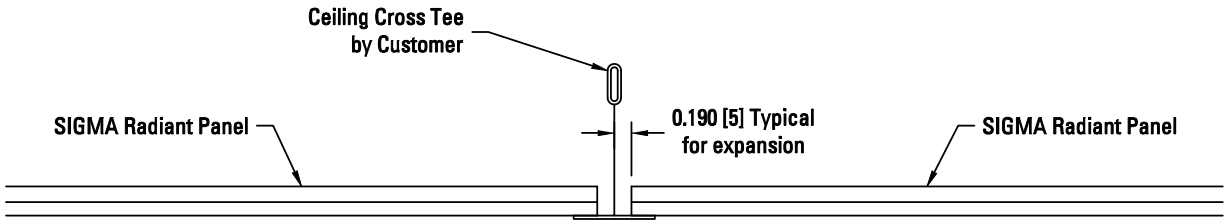


SIGMA 'U'-Bend

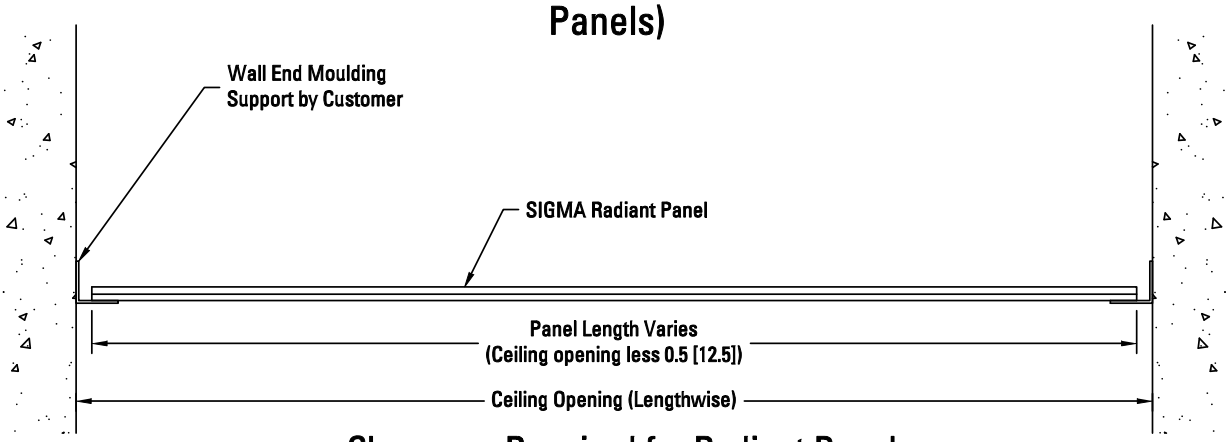
Dimensions shown in inches [mm]

SLC INSTALLATION DETAIL

10. CLEARANCES

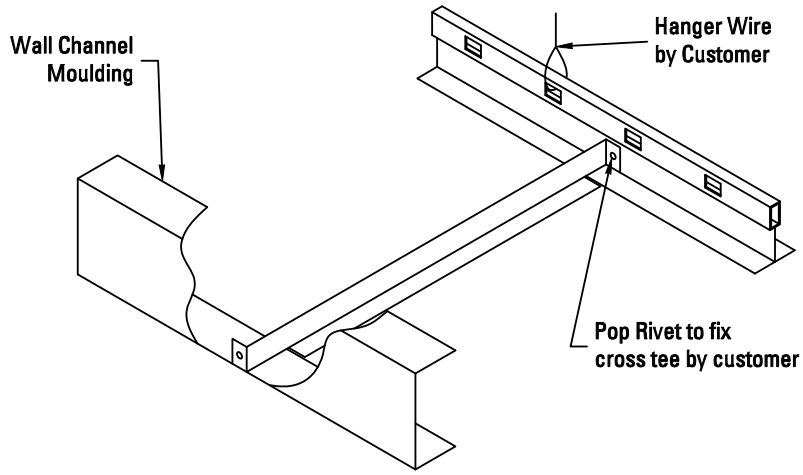


Expansion Gap for Radiant Panel (Adjoining Panels)



Clearance Required for Radiant Panel (Wall / Panel Interface)

Cross Tee between Panel Ends (Panel Width)

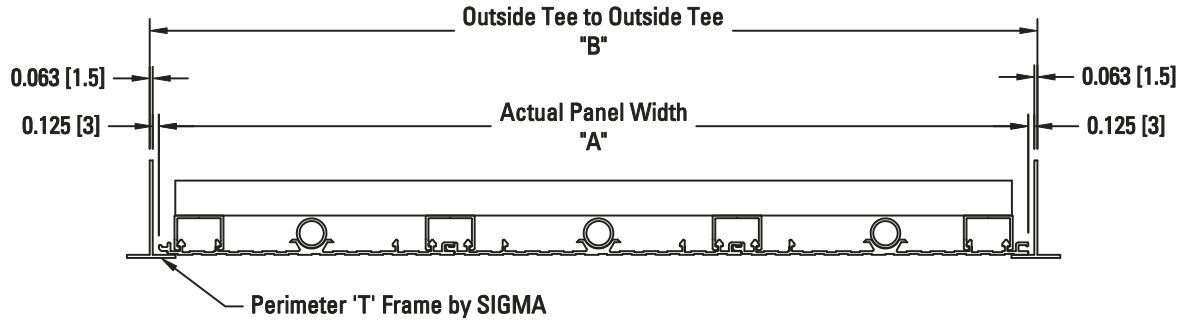


Dimensions shown in inches [mm]

SLC INSTALLATION DETAIL

11. SIGMA FRAME OPENINGS

Number of Panels + width of each panel	NOMINAL Panel Width	Actual Panel Width "A"	Ceiling Opening "B" (Sigma-supplied T-Frame)
Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)
1 @ 6 (152)	6 (152.4)	6.082 (154.5)	6.582 (166.5)
2 @ 4 (203)	8 (203.2)	7.977 (202.6)	8.477 (214.6)
2 @ 6 (304)	12 (304.8)	11.977 (304.2)	12.477 (316.2)
3 @ 6 (457)	18 (457.2)	17.872 (453.9)	18.372 (465.9)
4 @ 6 (610)	24 (609.6)	23.767 (603.7)	24.267 (615.7)
5 @ 6 (762)	30 (762)	29.662 (753.4)	30.162 (765.4)
6 @ 6 (914)	36 (914.4)	35.557 (903.1)	36.057 (915.1)

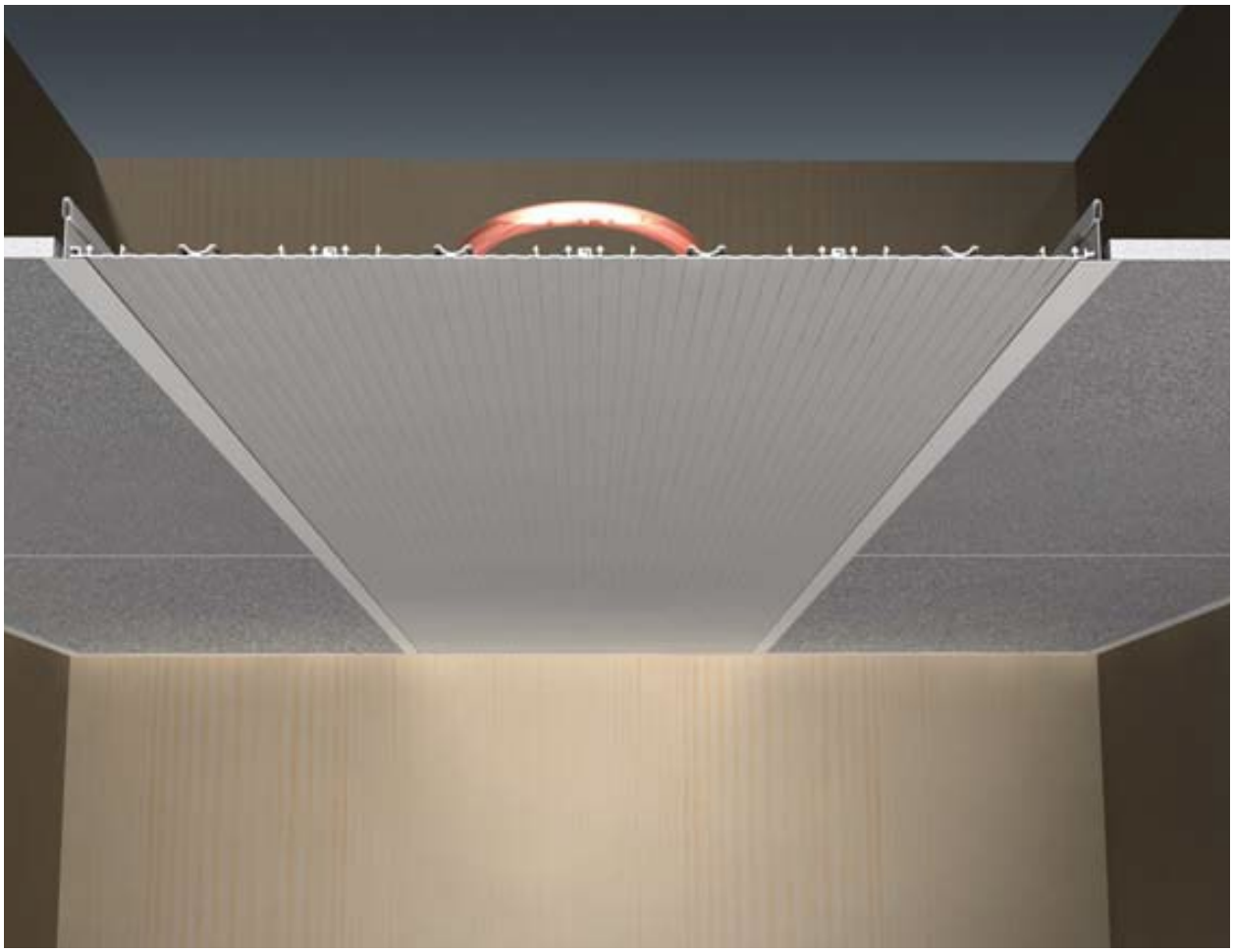


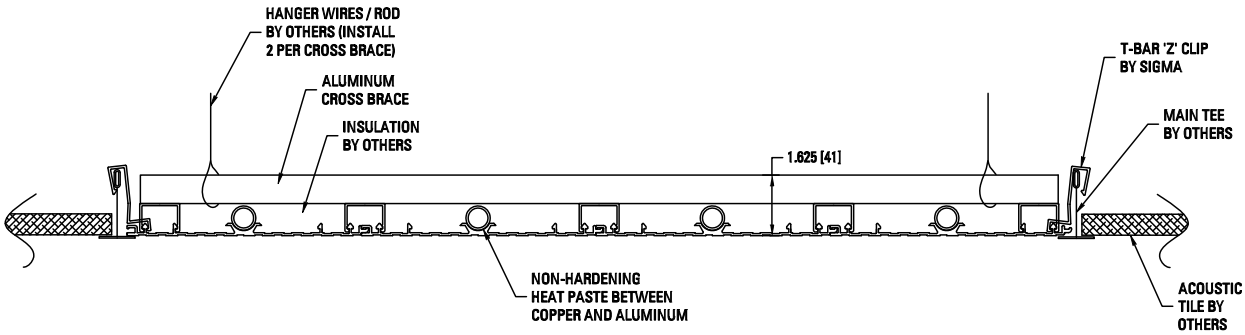
NOTE:

1. Above are sample panel widths. Nominal panel widths starting from 4" are available (in 2" increments).
2. For panel lengths, allow 0.25" (6mm) for clearance from end of panel to inside of tee.
3. Sigma supplied frames are constructed of Type T aluminum extrusions, 2" high x 1" wide x 1/16" thick. Wall-to-Wall Sigma frames are not available—DRYWALL OPENING MUST BE LESS THAN WALL-TO-WALL DIMENSION.
4. For customer supplied frames, all minimum 3mm width clearance from end of panel to frame structure (both sides). Allow minimum 4mm length clearance (both sides).

SLC CONCEPTUAL DETAIL

1. STANDARD PANEL IN ACOUSTIC CEILING TILE

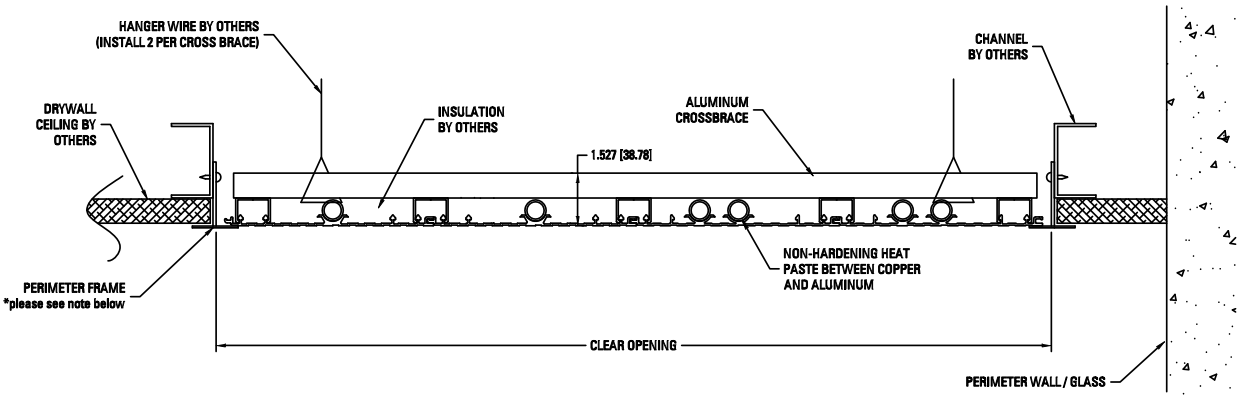




Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

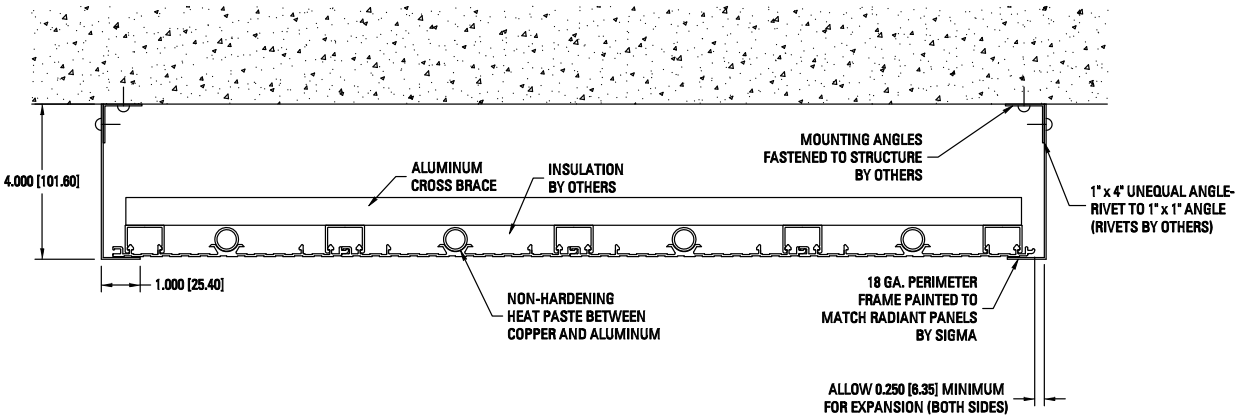
2. RADIANT PANEL IN DRYWELL CEILING



*Perimeter frame by others. Note that SIGMA supplied frames
DO NOT span from Wall to Wall

SLC CONCEPTUAL DETAIL

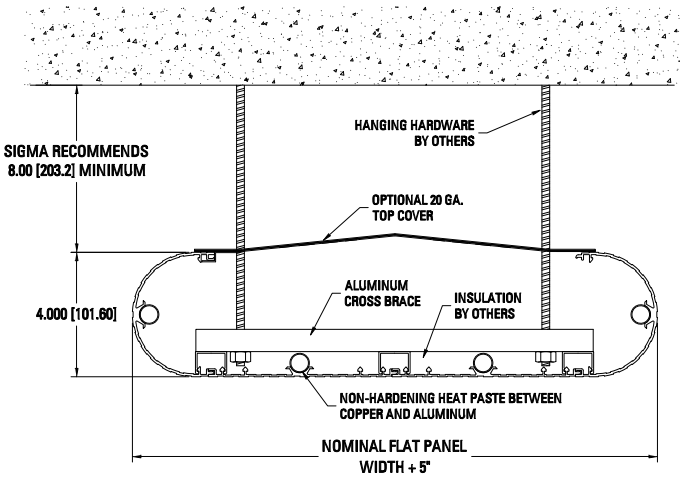
3. RADIANT PANEL CEILING SURFACE MOUNTED



Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

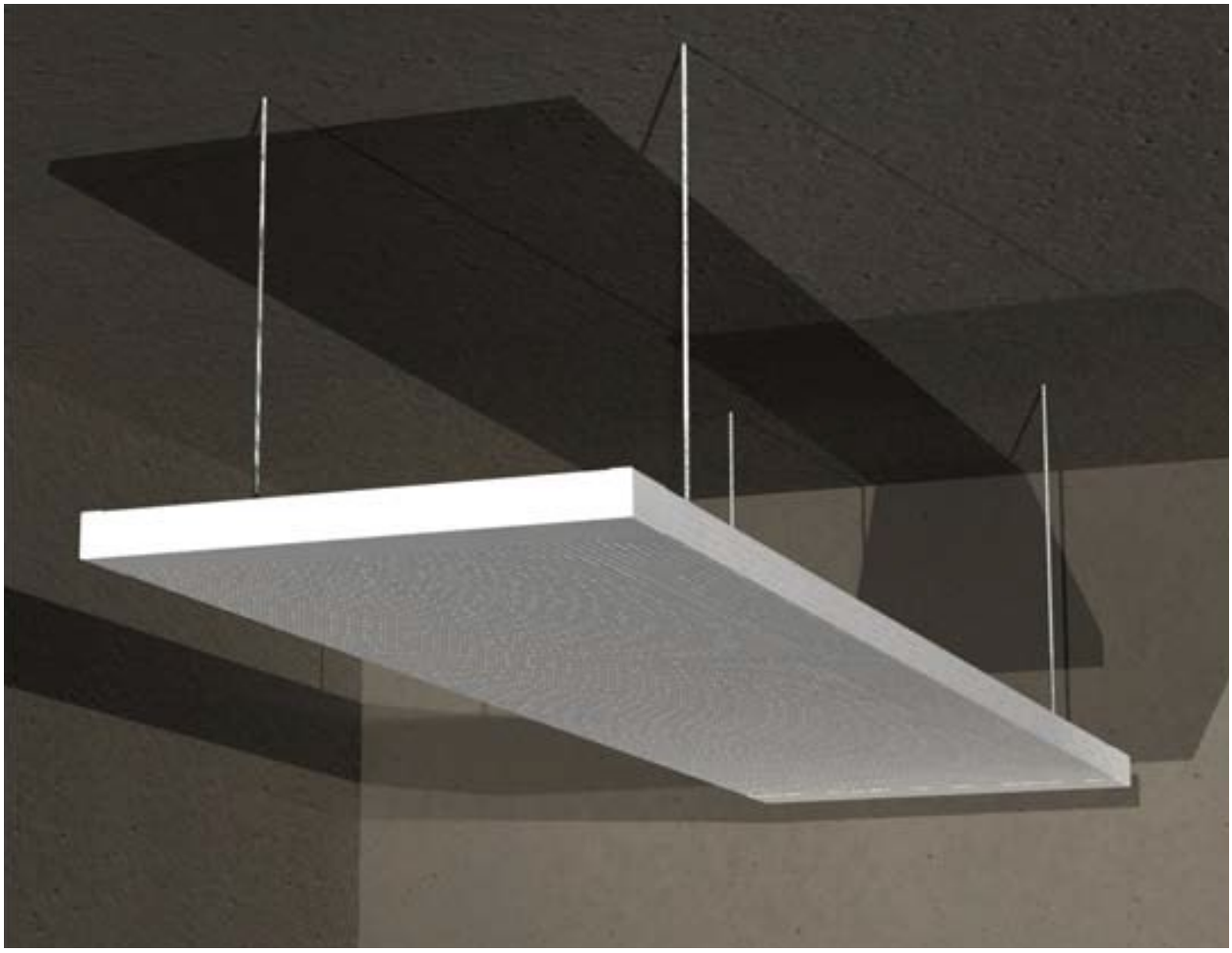
4. HANGING RADIANT PANEL WITH BULLNOSE

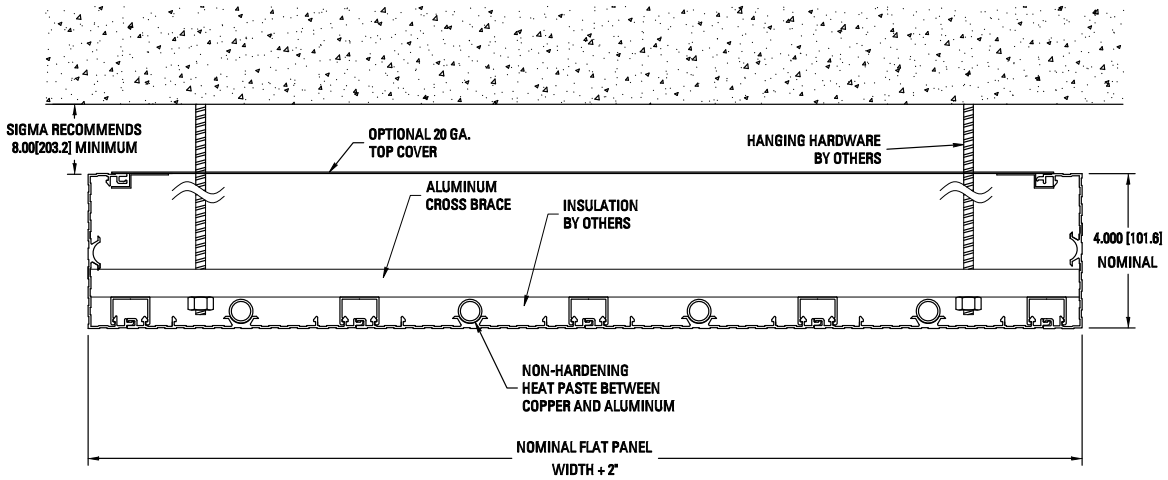


Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

5. EXPOSED HANGING RADIANT PANEL

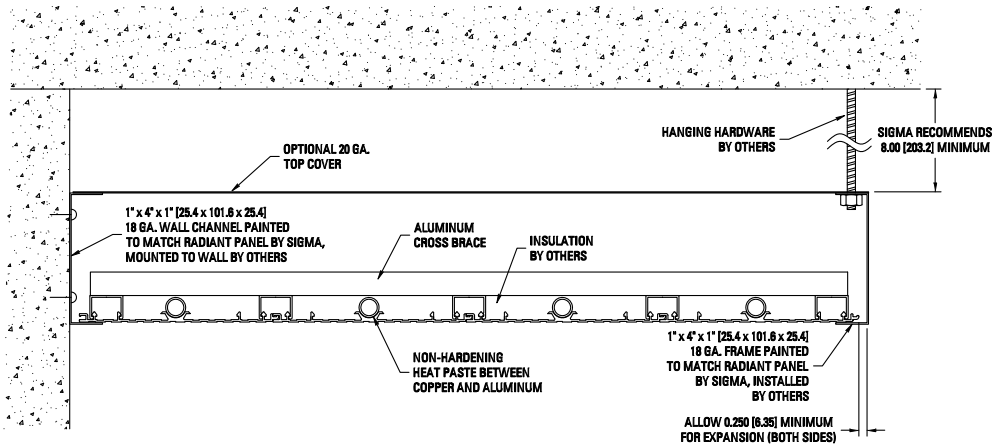




Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

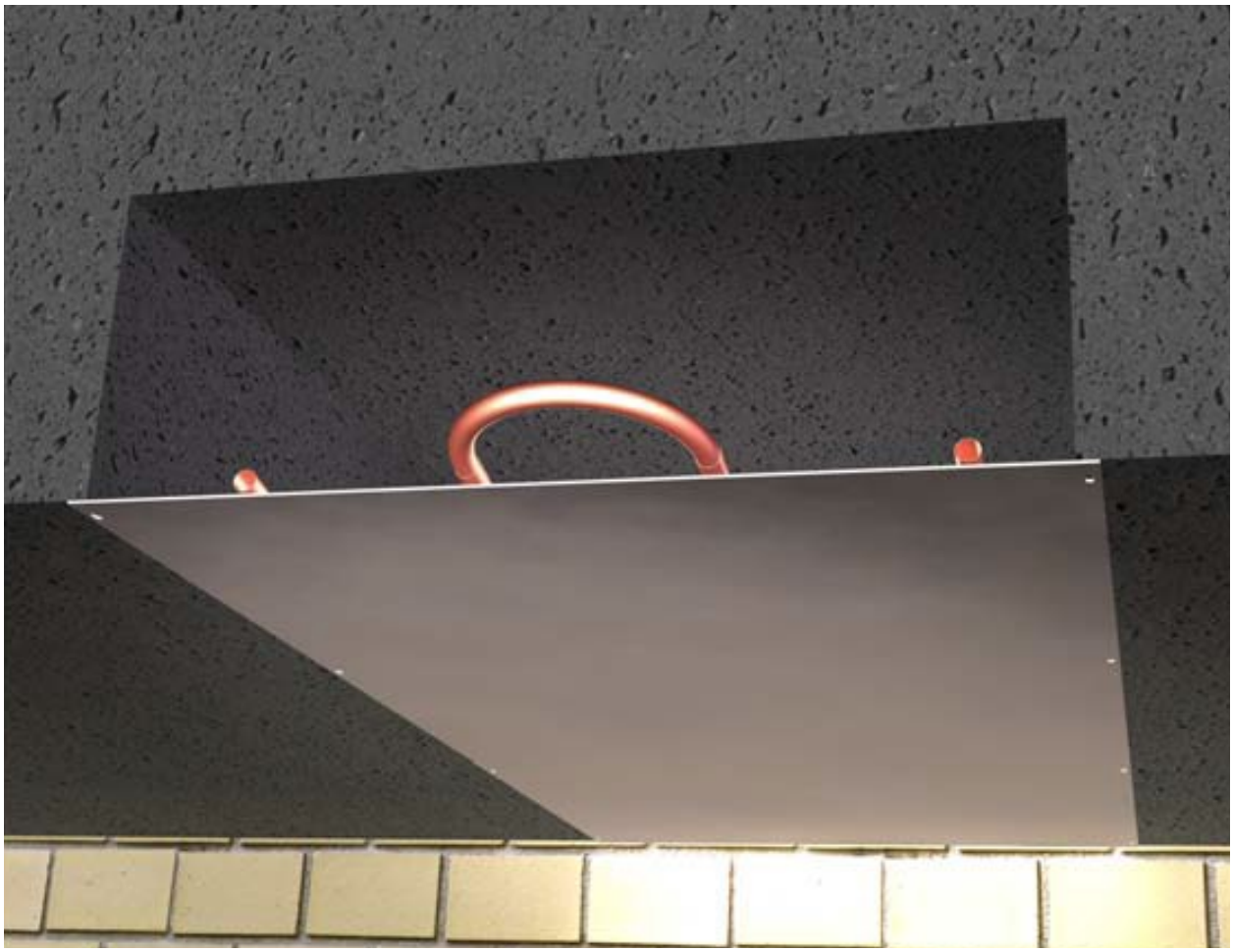
6. EXPOSED HANGING RADIANT PANEL WITH FRAME

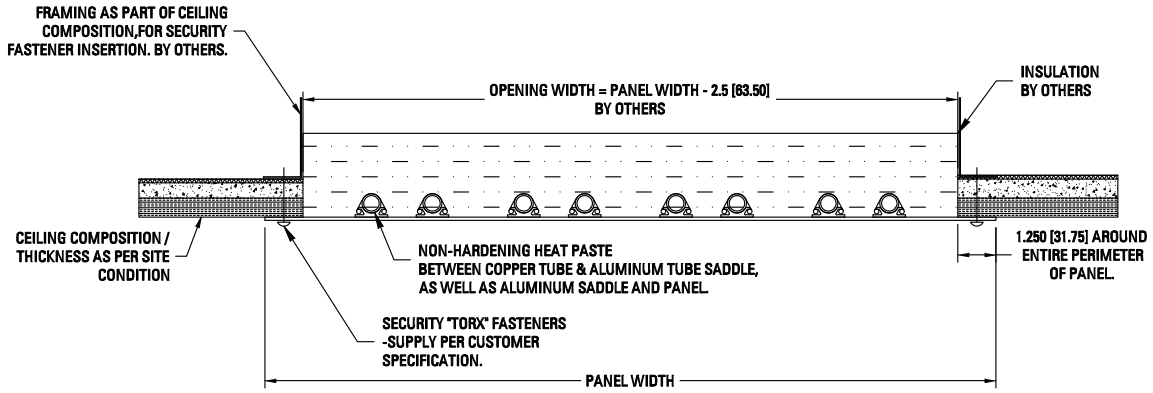


Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

7. SECURITY ENCLOSURE WITH TORX FASTENERS

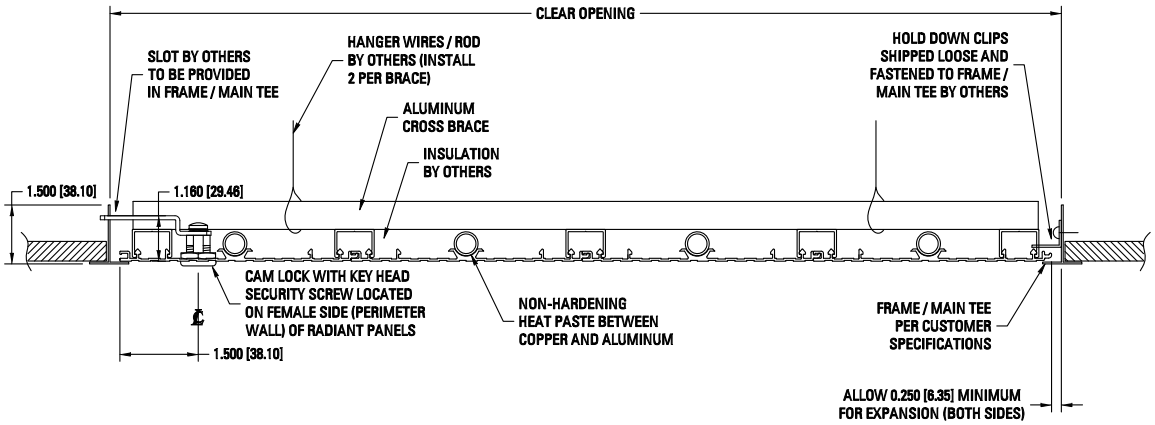




Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

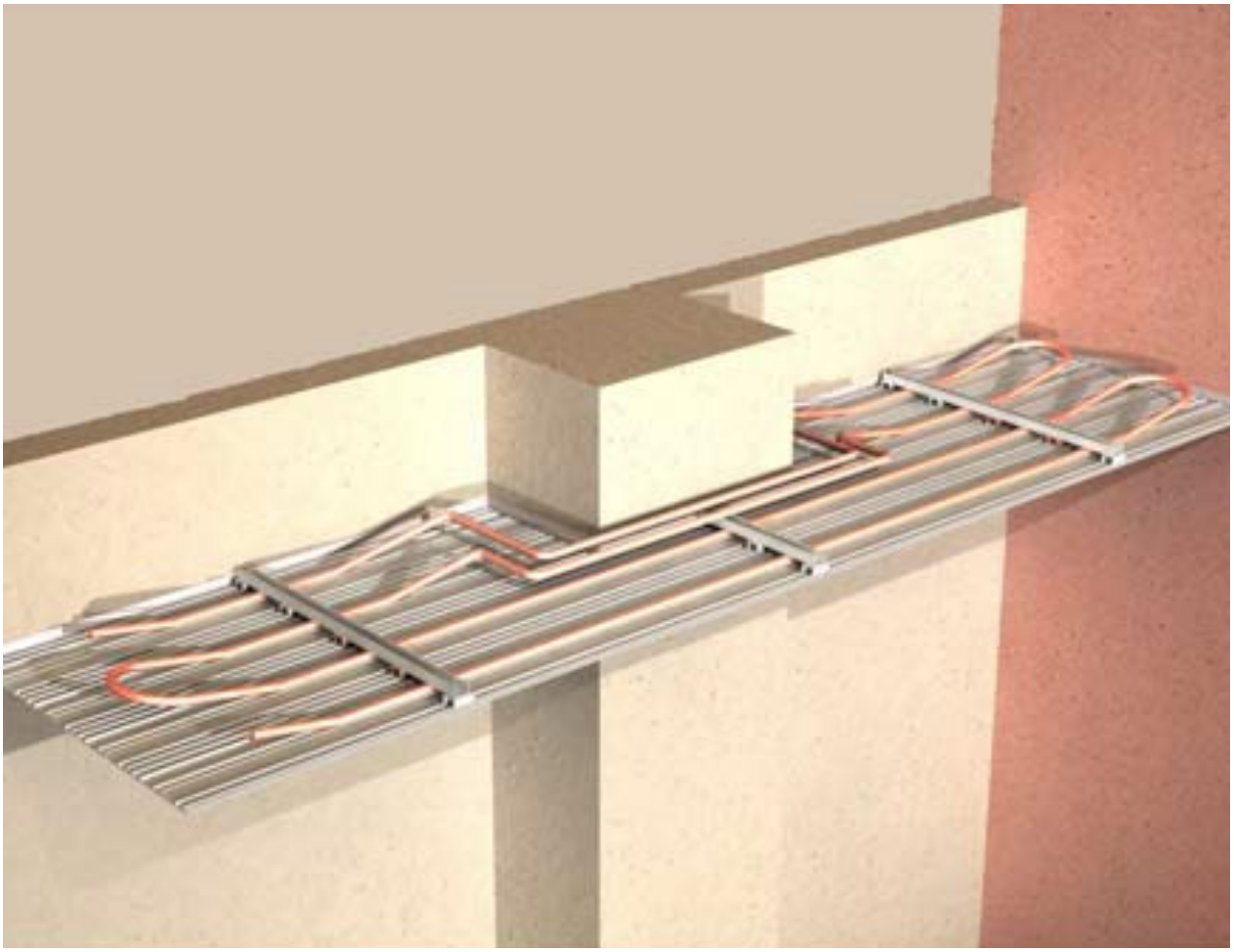
8. SECURITY ENCLOSURE WITH CAM LOCK TO PREVENT PANELS FROM BEING LIFTED

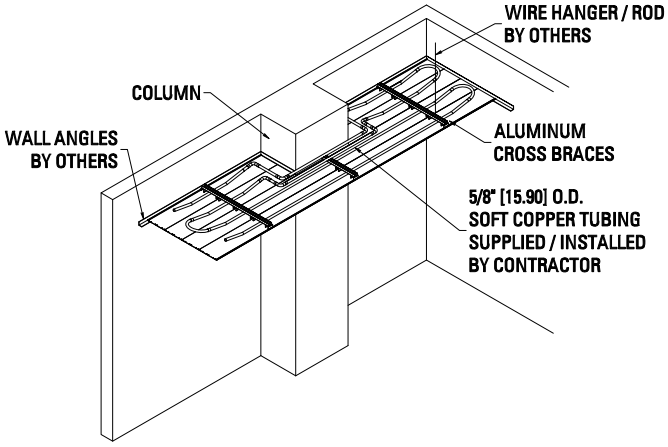


Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

9. RADIANT PANEL (FIELD CUT) TO ACCOMMODATE A COLUMN

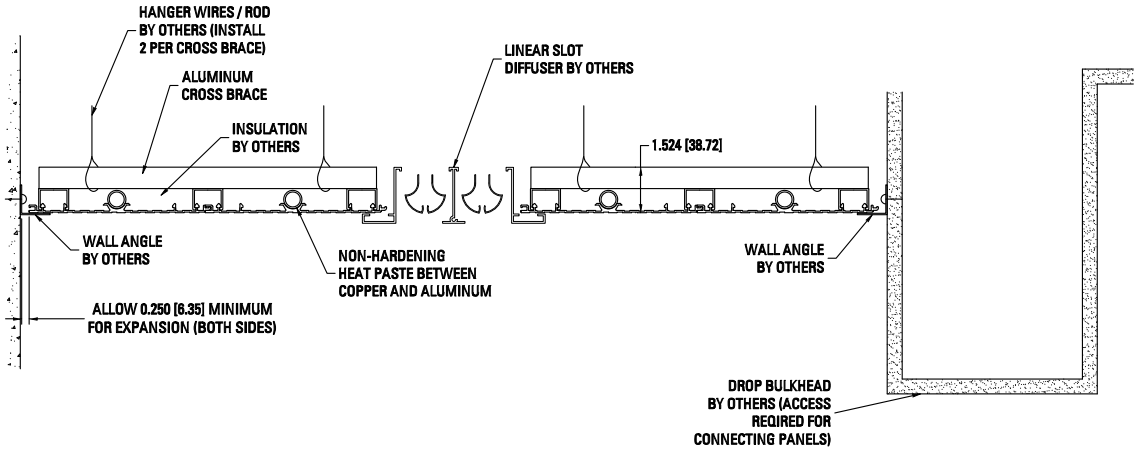




Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

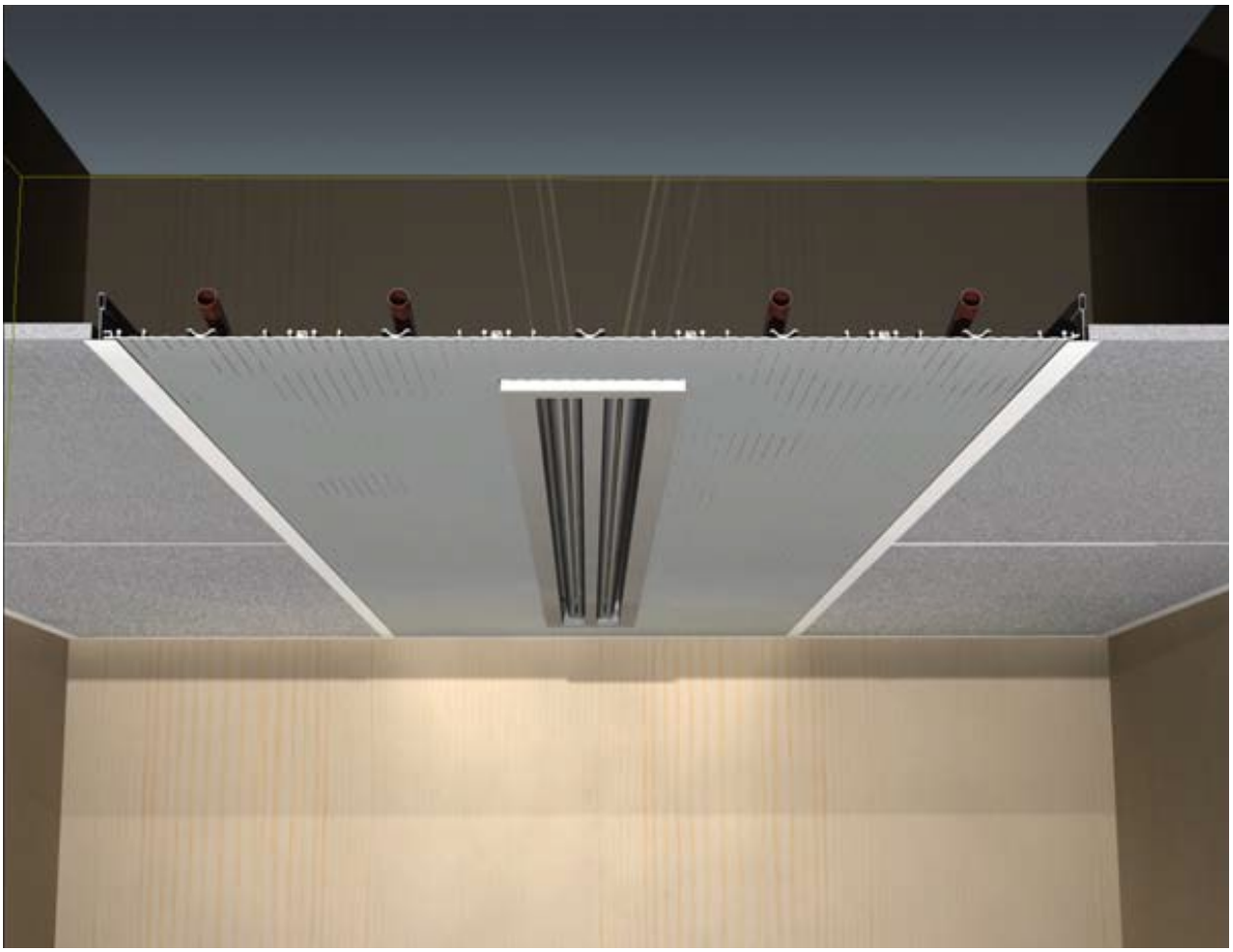
10. RADIANT PANEL (BULKHEAD) WITH LINEAR SLOT DIFFUSER

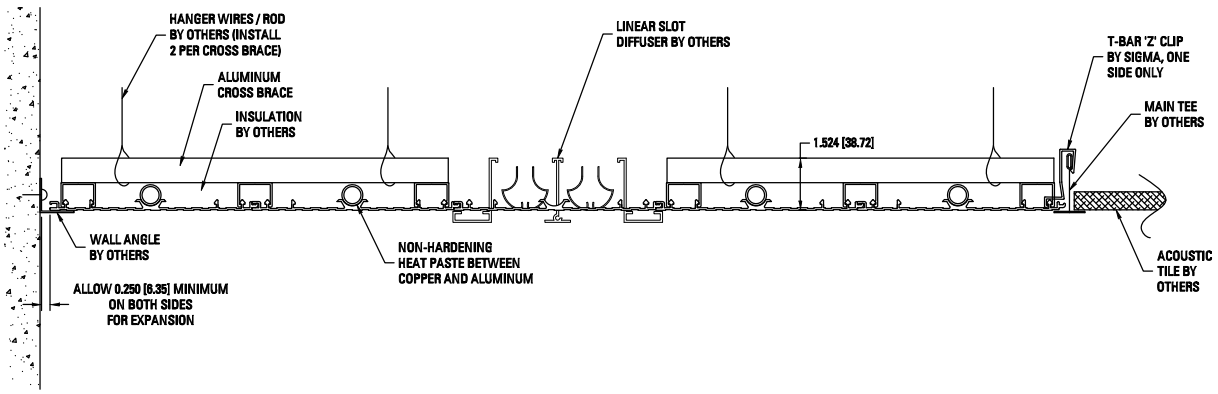


Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

11. RADIANT PANEL (T-BAR) WITH LINEAR SLOT DIFFUSER

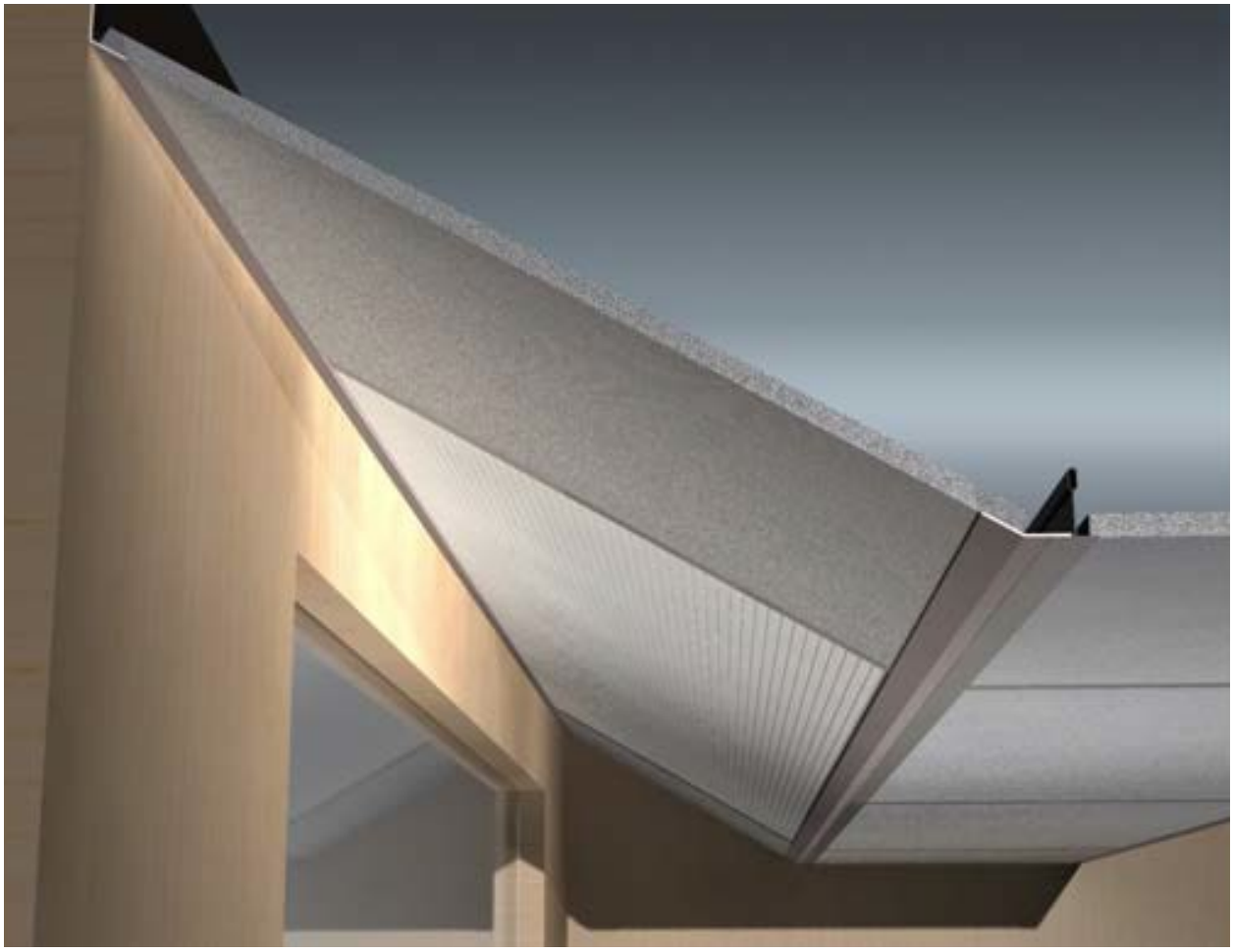


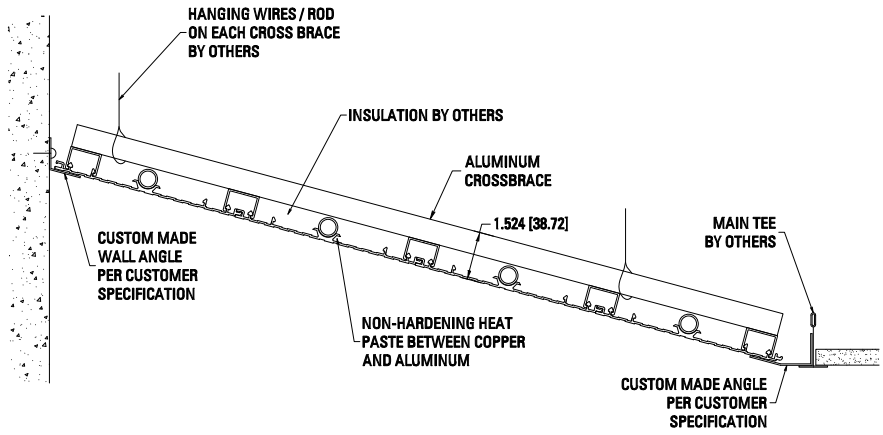


Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

12. SLOPED RADIANT PANEL

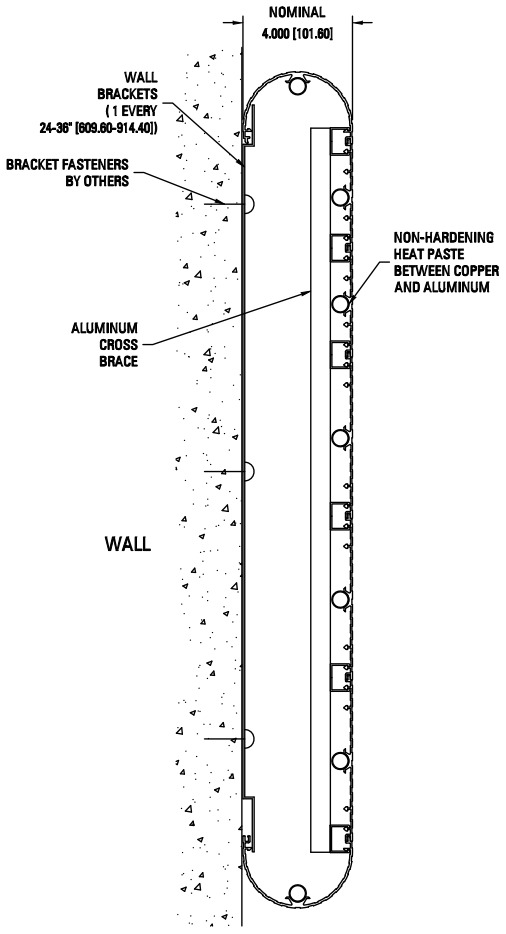




Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

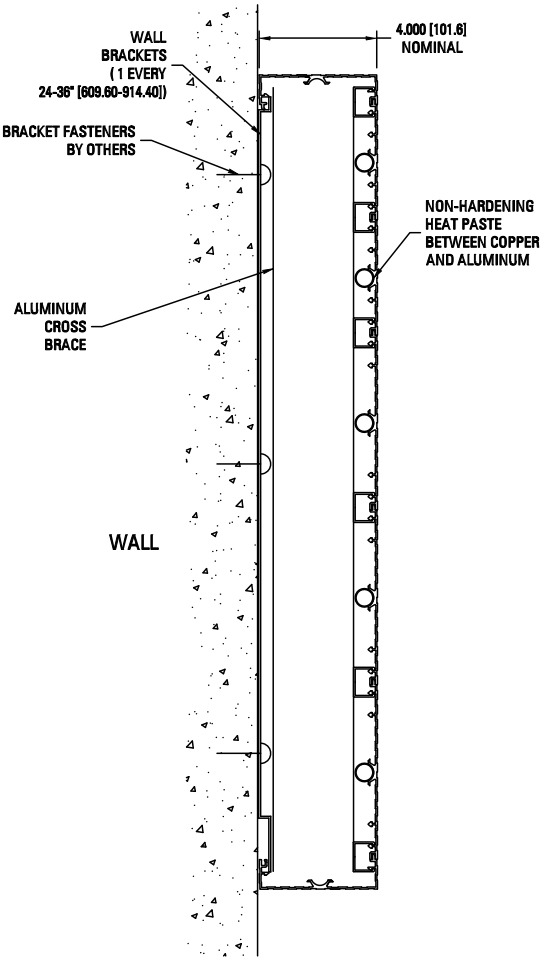
13. WALL-MOUNTED RADIANT PANEL



Dimensions shown in inches [mm]

SLC CONCEPTUAL DETAIL

14. WALL-MOUNTED RADIANT PANEL (SURFACE-MOUNT)



Dimensions shown in inches [mm]

SLC GUIDE SPECIFICATIONS

1.0 GENERAL

1.1 Scope

1.1.1 Linear Radiant Panels

1.2 Quality Assurance

1.2.1 Panels shall be manufactured by a company regularly engaged in the manufacture of Radiant Panels and having certified catalogued performance test data.

1.2.2 Standard of Acceptance: Sigma

1.3 Submittals

1.31 Manufacturer shall provide complete submittals consisting of shop drawings showing Scaled layouts identifying panel type, capacity of each panel, panels length, opening length and panel ID, Installation and Construction details for all panel and ceiling types associated with the project, and Tabular Data sheets indicating Handing, Requested Capacity, Actual Delivered Capacity, Flow Rate and Pressure Drops for all circuits. These drawings shall coordinate with all applicable other trades.

2.0 PRODUCT

2.1 General

2.1.1 Manufacturer shall refer to Architectural Reflected Ceiling Plans and Room Finish Schedules, in addition to Mechanical drawings to determine location, quantity and finish of Radiant Panels.

2.1.2 Refer to Architectural and Mechanical details for installation requirements and panel/ceiling interface details.

2.2 Linear Radiant Ceiling Panels

2.2.1 Radiant Ceiling panels shall be made of extruded aluminum planks custom cut to length by panel manufacturer. The aluminum extrusion shall be castellated (or smooth) on the exposed side to promote Radiant Heat Transfer.

2.2.2 The individual planks shall be combined to make up the specified Radiant Panel widths by the manufacturer at the factory. Site assembly of individual planks will not be accepted. Individual planks shall be assembled through a tongue and groove system that hides the seam between the individual planks. Planks shall be fastened together via clips and screws.

2.2.3 An extruded aluminum channel shall be installed on all panels for Cross Bracing and to allow for site mounting. These channels shall be located 18” from each end of panel, and in spacings of up to 36” in between the ends, dependent on the length of panel.

2.2.4 Panels shall utilize 5/8” (16mm) Outside Diameter Tempered copper. Copper tubes shall be installed on the opposite side of the panel surface, onto aluminum saddles which must be an integral part of the aluminum extrusion. Copper saddles separate from the base aluminum extrusion, and/or stud welds will not be accepted.

2.2.5 The copper tubes shall be retained to the integral aluminum saddle via zinc-coated steel spring clips. Maximum spacing between spring clips shall be 24” for any given copper tube. Spring clips shall be located within 6” to the end of any straight copper tube. All (open) copper tubes requiring connection by site contractor shall be bent up at the manufacturers’ plant to facilitate quick site installation.

2.2.6 A non-hardening heat transfer paste shall be applied between the tube surface and the concave saddle to ensure maximum heat transfer.

2.2.7 The finishing of the panels shall go through a 3 stage pre-wash and degreasing section, followed by a dry off oven. Powder paint shall be applied and baked on the panel to ensure a cohesive surface.

Continued on opposite page

SLC GUIDE SPECIFICATIONS

3.0 EXECUTION & INSTALLATION

3.1.1 Contractor shall cooperate with other trades working within the ceiling space and locate all Hot Water Piping as well as all hangers, clear of other work.

3.1.2 All interconnections between Radiant Panels forming “long” circuits shall utilize fluted Spiral Panel interconnectors. These interconnectors shall be expanded on both ends and supplied by the Radiant Panel Manufacturer. Site Contractor to install by laying the interconnector as flat as possible.

3.1.3 Hanger wires shall be used to suspend the Radiant Panel to the building structure, and shall be installed at each panel Cross Brace. For panels that are 24” wide or more, 2 Hangers shall be used for each Cross Brace. Support of panels by Angle molding and/or Main Tee framing shall not be permitted.

3.1.4 Cross Tees (for multiple panel circuits) shall be fastened to wall mouldings and Main Tee framing where applicable. All such Cross Tees shall be flush with the associated moulding on the exposed side.

3.1.5In order to facilitate the best aesthetic appearance of finished installation, all notching (around building structural columns/pot lights/drain lines etc…) and miter cutting (at change-ofdirection locations) of panels shall be done on site by contractor.

3.1.6 Panels shall be installed by personnel wearing clean white gloves supplied by Radiant Panel manufacturer.

3.1.7 All active Radiant Panels shall be insulated on the ceiling side with fiber-glass batt insulation of a thickness specified on the mechanical documentation or schedule. Panel manufacturer should have ability to insulate panels at factory for fast track projects.

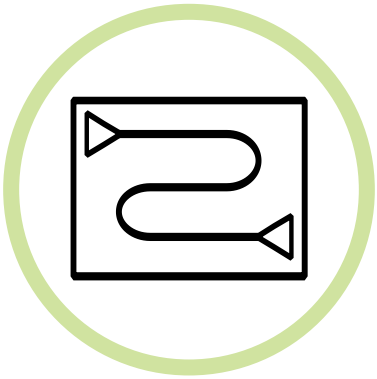
3.1.8 Site contractor to install all valving on supply and return lines as per mechanical documentation.

3.1.9 All panels shall be extended to walls or structure with inactive panel sections. Access panels shall be provided by Radiant Panel Manufacturer for Drywall or “Hard” ceilings.

3.1.10 Where time permits, all panel dimensions shall be field-measured prior to release for production by Radiant Panel Manufacturer. For fast-track projects, oversizing of panel lengths by approximately 6” over the hand scaled/electronically measured lengths shall be acceptable. In this case, site contractor shall field-trim aluminum extrusion only.

These guide specifications are available on our website in PDF and MS Word

SMC



MODULAR
RADIANT CEILING PANELS

SMC UNIT SPECIFICATIONS

OVERVIEW

Sigma supplies Modular Panels for applications where localized heating is required in an Acoustic Ceiling Tile environment. Modular panels come in standard sizes designed to fit into typical Ceiling Grid Systems of 2'x2', 2'x4', and 2'x6' Nominal Tee dimensions, although other sizes can be accommodated at Customer request. Unlike Linear Radiant Panels, Modular Panels are designed to utilize flat, 1-piece construction, with a minimum of individual parts. Combining a simple and portable installation, with the advantages of Radiant Heat, Modular Panels are an excellent Hydronic Heating solution.

CONSTRUCTION

Sigma Modular Panels are constructed from Aluminum sheet and bent up by 3/4" on all 4 sides. Holes are punched in these sides to accommodate site mounting into the Ceiling Grid. The exposed surface is flat, with a Standard White Electrostatic Polyester Powder paint coating. The Standard Sigma paint color is designed to match Standard Acoustic Ceiling Tile Angle Moulding and Tee color. In order to simulate the look of existing Acoustic Ceiling Tiles, Modular Panels can also be silkscreened at customer request.

The copper heating coil is mechanically fastened to the panel by the use of studs welded onto the aluminum sheet prior to painting. Lying between the copper and the Aluminum sheet is an Aluminum Extruded saddle which effectively distributes the heat of the copper to the Aluminum sheet. Steel Retaining Clips hold down the copper to the panel utilizing the welded studs. A non-hardening Heat Transfer Paste is applied both at the copper-saddle and saddle-panel interfaces.

The copper serpentine circuit associated with the specific Modular Panel type is pre-soldered, tested, and installed on the panel as per above. The Hot Water Supply and Return ends of the copper circuit are bent up slightly to minimize site responsibilities – simply solder the Building Supply and Return onto the Modular Panel copper ends.

MATERIAL SPECIFICATION

PANEL — Standard is Aluminum sheet 0.036" thick, all sides bent up and holes punched for field mounting. Option: Steel Panel for higher Security applications.

SIZES — Standard sizes to accommodate 2'x2', 2'x4' and 2'x6' Nominal Ceiling Grids. Option: Metric equivalents and other Imperial sizes.

PAINT — Standard is Sigma Radiant Panel Textured White "RPTXTZ" color, Powder Coated paint application. Option: Silkscreen finish to simulate the Acoustic Ceiling Tile pattern and color of any specific project.

COPPER — 5/8" Outside Diameter, tempered. Serpentine coils pre-soldered and tested at factory. Standard Number of passes for all above sizes is 4, 5, or 6 tubes.

CONTACT — Copper and Aluminum Heat Saddle retained to panel using studs welded onto the Aluminum sheet and heat transfer paste at all Material Interfaces – copper to saddle, and saddle to panel.

INSULATION — Standard is NO Insulation. Option: 1"or 2" foil faced batt Insulation installed at factory, dependent on customer mechanical specification.

WEIGHT — Standard Aluminum sheet Modular panel is approximately 1.7 Lbs. per Square Foot with water.

SMC CAPACITY DATA

IMPERIAL

NOMINAL Panel Size (Feet) - Tube Passes

Mean Water Temperature (Degrees F)	2 x 2 - 6 Pass	2 x 4 - 6 Pass
120	319	639
125	378	759
130	441	881
135	469	942
140	501	998
145	541	1082
150	578	1159
155	622	1238
160	659	1322
165	701	1401
170	742	1482
175	781	1559
180	842	1678
185	878	1762
190	919	1839
195	981	1961
200	1042	2078
205	1098	2199
210	1159	2321

Heating capacities are shown in Btuh/Panel and are based on 70^{0}F Room temperature. For every 1^{0}F decrease in Room temperature below 70^{0}F, the output increases by 0.9%. For every 1^{0}F increase in Room temperature above 70^{0}F the output decreases by 0.9%

SMC CAPACITY DATA

METRIC

NOMINAL Panel Size (mm) - Tube Passes

Mean Water Temperature (Degrees C)	600 x 600 - 6	600 x 1200 - 6
48.9	94	188
51.7	111	223
54.4	130	259
57.2	138	277
60.0	147	293
62.8	159	317
65.6	170	340
68.3	183	363
71.1	194	388
73.9	206	411
76.7	218	435
79.4	229	457
82.2	247	492
85.5	258	517
87.8	270	539
90.6	288	575
93.3	306	609
96.1	322	645
98.9	340	681

Heating capacities are shown in Watts/Panel and are based on 21^{0}C Room temperature. For every 1^{0}C decrease in Room temperature below 21^{0}C, the output increases by 2%. For every 1^{0}C increase in Room temperature above 21^{0}C the output decreases by 2%

SMC DIMENSIONS & WEIGHTS

Weight:

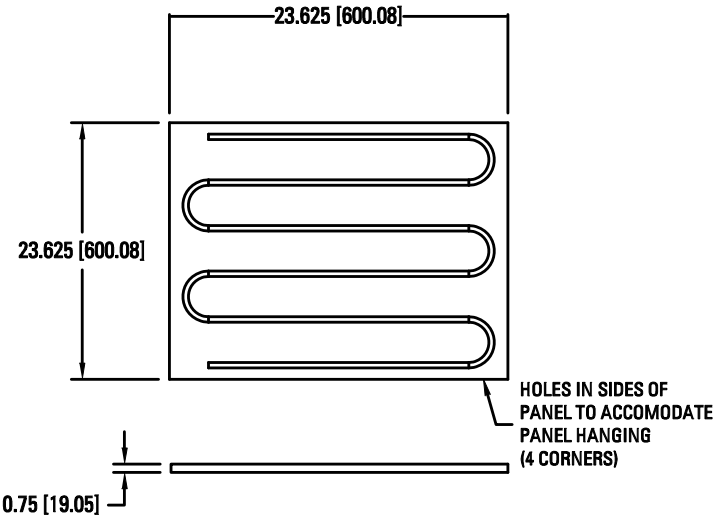
Standard Aluminum sheet Modular Panel is approximately 1.7 lbs. per Square Foot with water.

Panel Material: Aluminum 0.036" thick

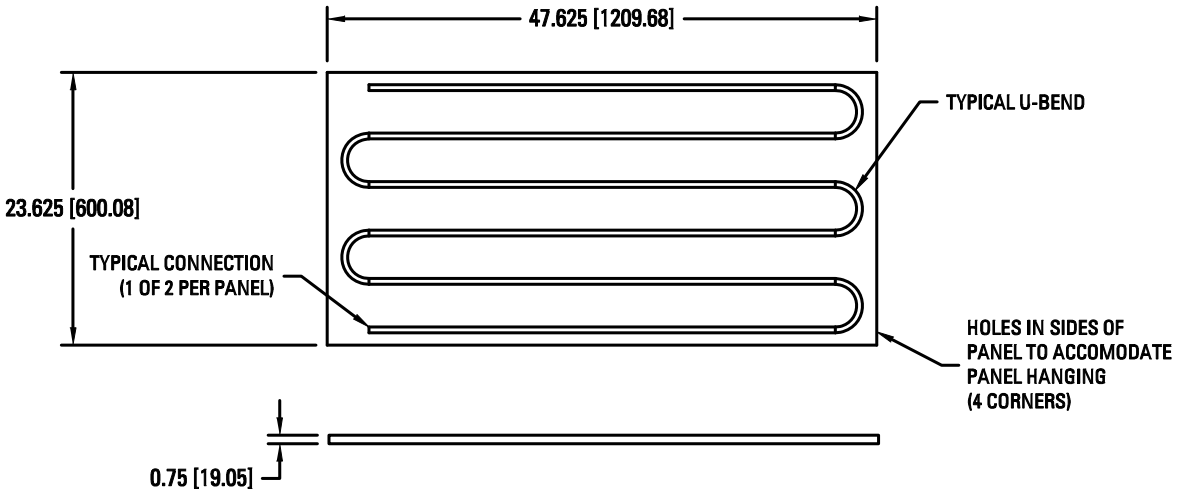
Panel Finish: Baked Flat White Paint

Tube: Copper 1/2" Nominal Diameter

24 x 24"
Modular Panel



24 x 48"
Modular Panel



Note: 6 pass modular panels are shown on this page. Panel dimensions for 4 pass and 5 pass are the same as 6 pass.

Dimensions shown in inches [mm]

SMC GUIDE SPECIFICATIONS

1.0 GENERAL

1.1 Scope

1.1.1 Modular Radiant Panels

1.2 Quality Assurance

1.2.1 Panels shall be manufactured by a company regularly engaged in the manufacture of Radiant Panels and having certified catalogued performance test data.

1.2.2 Standard of Acceptance: Sigma

1.3 Submittals

1.31 Manufacturer shall provide complete submittals consisting of shop drawings showing Scaled layouts identifying panel type, capacity of each panel, panels length, opening length and panel ID, Installation and Construction details. These drawings shall coordinate with all applicable other trades

2.0 PRODUCT

2.1 General

2.1.1 Manufacturer shall refer to Architectural Reflected Ceiling Plans and Room Finish Schedules, in addition to Mechanical drawings to determine location, quantity and finish of radiant panels.

2.1.2 Refer to Architectural and Mechanical details for installation requirements and panel/ceiling interface details.

2.2 Modular Radiant Ceiling Panels

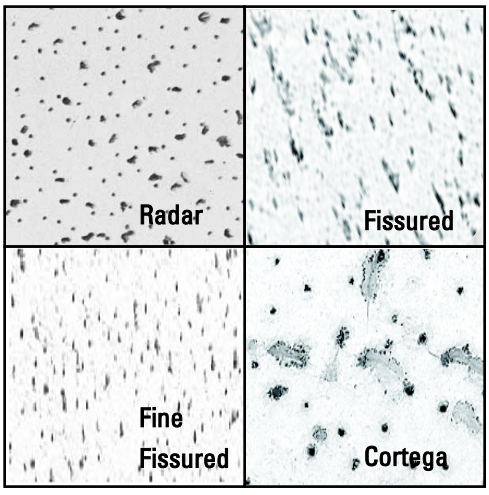
2.2.1 Modular Ceiling panels shall be made of flat aluminum sheet bent up on all 4 sides. Holes shall be punched in the sides to facilitate independent suspension of panel to underside of ceiling.

2.2.2 Modular Ceiling panels shall be nominal 2'x2', 2'x4' or 2'x6' dimensions. Actual dimensions of panel must conform to associated standard acoustic ceiling tile grid dimensions. Manufacturer to supply all actual dimensions prior to release into production to coordinate with actual site conditions.

2.2.3 Panels shall utilize 5/8" (16mm) Outside Diameter Tempered copper. All copper circuitry shall be pre-soldered and tested at manufacturer plant. Number of passes shall be 4, 5 or 6 as per mechanical engineer drawings/schedule.

2.2.4 The copper circuitry shall be attached to the aluminum flat panel via studs pre-welded onto the aluminum. An extruded aluminum saddle shall be placed between the copper and the flat panel, and non-hardening heat transfer paste applied at both the copper-saddle and saddle-panel interfaces to maximize heat transfer. Steel retaining clips shall be used to fasten the copper/saddle to the panel.

2.2.5 The finishing of the panels shall go through a 3 stage pre-wash and degreasing section, followed by a dry off oven. Powder paint shall be applied and baked on the panel to ensure a cohesive surface. For projects requiring matching to an existing acoustic ceiling tile pattern, panels shall be silkscreened as per mechanical engineer drawings/schedule, or taken from standard panel manufacturer silkscreen patterns. Sigma produces four standard silkscreen patterns, shown below. Sigma can also produce any other silkscreen patter as a custom product. Customer to advise specific acoustic ceiling tile manufacture identification. Note that any ceiling tile chosen by customer can be produced, but there should be a unique/distinctive pattern associated with the tile to ensure marked distinction between the pattern and the base paint.



SMC GUIDE SPECIFICATIONS

3.0 EXECUTION & INSTALLATION

3.3.1 Contractor shall cooperate with other trades working within the ceiling space and locate all Hot Water Piping as well as all hangers, clear of other work.

3.3.2 Where individual Modular Panels are connected in series all with one (1) Hot Water Supply/Return, Contractor shall supply and install all soft copper between these panels.

3.3.3 Hanger wires shall be used to suspend the Modular Panel to the building structure, and shall be installed at each panel corner via factory-drilled holes in the sides of the panels. This suspension shall be totally independent of any panel framing. Final Support of panels by panel frame exclusively, (Angle moulding, Main Tee, or Extruded Tee shall not be permitted.)

3.3.4 Panels shall be installed by personnel wearing clean white gloves.

3.3.5 All Modular Panels shall be insulated on the ceiling side with fibre glass batt insulation of a thickness specified on the mechanical documentation or schedule. Panel manufacturer should have ability to insulate panels at factory for fast track projects.

3.3.6 Site contractor to install all valving on supply and return lines as per mechanical documentation.