

INTRODUCTION

Radiant ceiling systems are an energy and cost saving heating method that provides comfortable, draft free temperature control. Product is based on the Frenger design. Frenger ceiling panels were the first to be certified and tested in Europe over 40 years ago.

Radiant ceiling systems provide warmth much the same way as the sun warms the earth. This radiant ceiling design is clean, draftless and allows essential wall space free for other uses besides cooling or heating units.

Utilizing water, the panels provide a wide range of heat outputs. The result is a comfortable heating system with design flexibility, low installation costs and ease of maintenance. Sterling's products have been installed in

hundreds of commercial and institutional applications throughout Canada and the U.S.A. Because of the many advantages of ceiling installations, you will find them in hospitals, nursing homes, museums, schools, recreational and institutional facilities as well as the latest condominium and commercial designs. Where required, special security panels are available for a system that is virtually vandal-proof. Radiant panels are shipped assembled. Full design and layout capabilities are available to assist you in the layout and installation of your system.

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 panel system is calculated based on flow rate, hot water supply temperature and required heat output:

$$\Delta T = \frac{\text{BTU}}{\text{GPM} \times 500}$$

Where: ΔT is in °F

Heat loss is in BTU's

Flow rate is in GPM

3. Mean water temperature is determined by subtracting half of the temperature drop from the hot water supply temperature:
 $t = \text{hot water temp.} - (0.5 \times \Delta T)$
4. Use the mean water temperature value (t) found in step 3 and the appropriate rating table to determine the heat output of the panel in BTU's per lineal foot.
5. Determine the required panel width based on the output per panel found 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 3' of the perimeter wall.
 - design piping configuration such that the hottest water is always supplied closest to the perimeter wall.

7. Circuit Design Piping

Circuit layout depends on several factors, such as building layout, supply and return piping location, number of panels in a given area, and desired piping pressure drop.

Using the tables in the specification section of style panel selected and desired circuit flow in GPM (typical flow through any circuit would be limited to a maximum of 3 GPM), it is possible to calculate the BTU load and number of panels on a circuit based on engineer's maximum allowable pressure drop (typically 2' to 7').

For example, for a linear panel project with a desired 2 GPM circuit flow rate, a 20° ΔT , and a maximum pressure drop of 5' per circuit, we can see that either 70' of tubing/max per circuit or:

$$\text{BTU} = \frac{500 \times \Delta T}{\text{GPM}} = \frac{10,000}{2} = 5,000 \text{ BTU}$$

Max. BTUH = 5,000 BTU/circuit

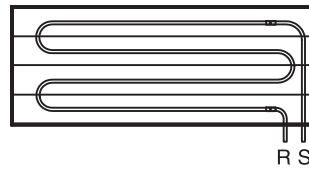
If a room contains 18" panels @ 180° AWT with 30' of panels in two 15' panels:

≈ Max. 23' of 18" panel (340 BTU/lin. ft. and 3' of tube per lin. ft of panel)

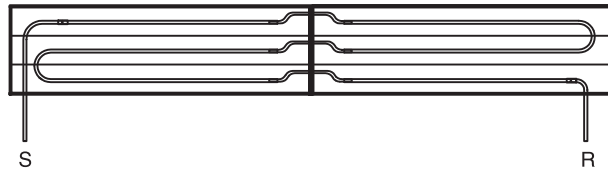
Therefore, each 15' panel contains 45' of tube and 30' of panel (90' ft of tube) implies two circuits. Or, each 15' panel covers 15 x 340 = 5100 BTUs and is good for one circuit.



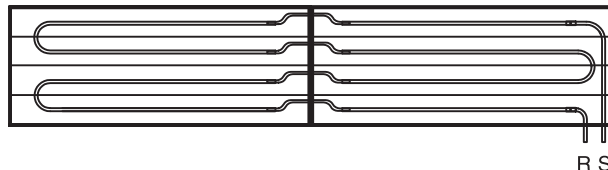
ODD PASS CIRCUITRY



EVEN PASS CIRCUITRY



MULTIPLE PANEL CIRCUITRY ODD PASS



MULTIPLE PANEL CIRCUITRY EVEN PASS

We provide design assistance. For assistance with complex applications or for in-depth information regarding radiant panel system design please contact our technical services department. Job project drawings showing panel layouts and piping are available for each individual project.

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DESCRIPTION

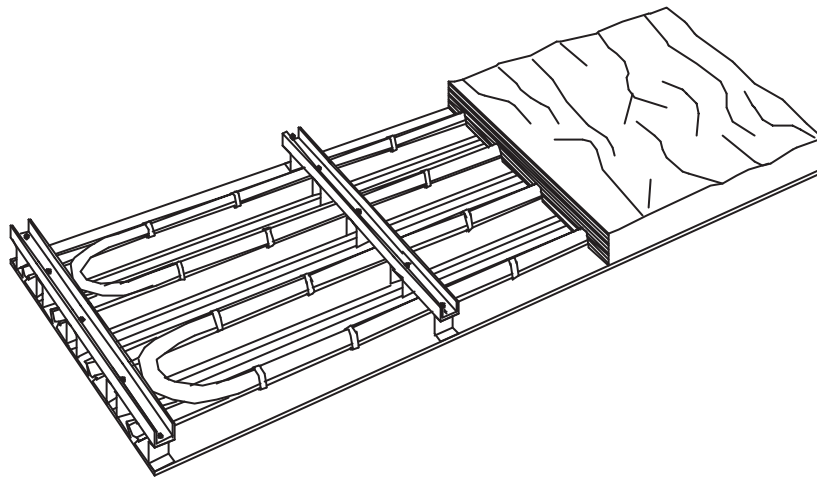
Linear panels are an established approach to radiant heating. The linear panel is an extruded aluminum radiant heating strip that provides exceptionally high heat transfer. Linear panels are available in virtually any width and length up to a maximum of 16'. This product, while offering an up-to-date visual appearance, is suitable for both ceiling or wall mounting. Linear panels are also available with a range of mounting accessories providing flexible setup.

ADVANTAGES

The system, being flexible, is easily designed into any heating scheme with few dimensional constraints. Installation is straightforward and, as found through independent tests, the heat output of linear panels is equal to or better than other radiant heating products.

APPLICATIONS

Linear panels can be used in hospitals, nursing homes, daycares, commercial office developments, schools, museums, security facilities, airports, churches, banks, condominiums, laboratories, swimming pools, factories and workshops.



GENERAL SPECIFICATIONS

Material Specification

Linear panel extrusions combine outstanding aesthetic quality with excellent design flexibility as individual planks can be fastened together to form panels of virtually any width.

The aluminum planks incorporate a tube saddle channel as an integral part of the profile. The tubing is clipped into this channel and held in direct thermal contact with the extrusion. A non-hardening heat paste between the tubing and the aluminum face plate ensures even heat distribution to the active face, providing overall thermal efficiency.

Panel planks are tongue-and-grooved to provide a clean joint longitudinally. They are held together using a special clipping system.

Dimensions and Weight

Linear panels can be provided in a variety of lengths of up to 16' and widths in multiples of 6". An operating weight of 2 lb/ft² should be used when calculating the requirements for clipping and suspension components

Materials of Construction

Pipework:	⁵ / ₈ " O.D. copper tubing.
Panels:	Extruded aluminum planks.
Panel joint clips:	Cadmium or zinc-plated steel springs.
Panel suspension clips:	Cadmium or zinc-plated steel springs.
Pipework clips:	Cadmium or zinc-plated steel springs.
Support channel:	Extruded aluminum 1 1/2" x 3/4" x 1/8" thick.
Paint finish:	White polyester powder coating.
Suspension system:	Standard t-bar or drywall installation, the panels can be suspended with or without a frame for custom applications.
Insulation:	As per consultant's specifications, usually a minimum of 1" thick foil backed batt insulation.

OPERATION AND MAINTENANCE

Linear panels are incorporated into a building's heating/cooling systems 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 no clips have been displaced and that extruded planks are still securely fastened.

Cleaning

The surface of linear 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 (IMPERIAL)

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 panel system (ΔT) is chosen, usually 20°F.
3. Mean water temperature is determined by subtracting ($\Delta T/2$) from the entering water temperature.
4. Determine the linear output required for the space by dividing the total required output by the available panel length.
5. Determine the required panel width and number of passes by consulting the radiant panel linear output charts starting on page L-5i.
6. The required flow rate through the panel is based on the required panel output, the temperature drop across the system (ΔT), and specific heat capacity of water. It can be calculated using the following formula:

$$\text{FLOW RATE} = \frac{\text{PANEL OUTPUT}}{(\Delta T \times \text{HEAT CAPACITY})}$$

(ΔT) is in °F
Panel Output is in BTUH
Heat Capacity is Btu/lb x °F
Flow Rate is in gpm

7. The pressure drop across the panel system is dependent on the length of the panel circuit, the number of flexible interconnectors, and the flow rate of the water through the panel. A table of the pressure drops created by the copper tubing can be found on page L-16, and the pressure drops for the flexible interconnectors can be found on page L-17.

When designing a radiant panel heating job there are a few rules of thumb to keep in mind:

- try to supply 50% of the total perimeter heat required (as calculated in step 1) within 1m of the perimeter wall.
- design piping configuration such that the "hottest" water is always supplied closest to the perimeter wall.
- odd number of passes cannot be supplied and returned at the same end.
- even number of passes cannot be supplied and returned at opposite ends without the use of headers.

We provide a free design/consulting service. For assistance with complex applications or for in-depth information regarding radiant panel system design please contact our engineering department.

SYSTEM DESIGN (METRIC)

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 panel system (ΔT) is chosen, usually 11°C.
3. Mean water temperature is determined by subtracting ($\Delta T/2$) from the entering water temperature.
4. Determine the linear output required for the space by dividing the total required output by the available panel length.
5. Determine the required panel width and number of passes by consulting the radiant panel linear output charts starting on page L-6M.
6. The required flow rate through the panel is based on the required panel output, the temperature drop across the system (ΔT), and specific heat capacity of water. It can be calculated using the following formula:

$$\text{FLOW RATE} = \frac{\text{PANEL OUTPUT}}{(\Delta T \times \text{HEAT CAPACITY})}$$

(ΔT) is in °C

Panel Output is in Watts or (J/s)

Heat Capacity is 4180 Watts/Litres x °C

Flow Rate is in Litres/s

7. The pressure drop across the panel system is dependent on the length of the panel circuit, the number of flexible interconnectors, and the flow rate of the water through the panel. A table of the pressure drops created by the copper tubing can be found on page L-16, and the pressure drops for the flexible interconnectors can be found on page L-17.

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- design piping configuration such that the "hottest" water is always supplied closest to the perimeter wall.
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LINEAR PANEL IMPERIAL OUTPUTS STANDARD NUMBER OF PASSES

PASSES		1	2	2	2	4	3	4	4	5	6
NOMINAL PANEL WIDTHS * (INCHES)		6	8	10	12	16	18	20	24	30	36
MEAN WATER TEMPERATURE (°F)	120	54	63	73	78	94	109	150	163	196	224
	125	62	73	85	93	111	128	169	188	226	258
	130	71	85	99	106	129	148	188	213	256	292
	135	79	94	111	121	147	166	207	238	285	327
	140	87	104	125	134	165	186	227	263	315	361
	145	96	114	137	149	185	205	245	288	345	394
	150	104	124	151	162	202	225	264	313	375	428
	155	112	134	163	177	219	246	282	338	406	463
	160	121	145	177	190	238	263	301	363	436	497
	165	129	154	189	205	255	282	320	389	466	531
	170	137	164	203	218	276	302	340	413	495	565
	175	146	175	215	233	292	320	360	438	525	599
	180	154	186	229	246	312	340	380	463	555	633
	185	162	197	241	261	329	359	404	488	586	668
	190	171	207	255	275	348	379	427	513	615	702
	195	179	216	267	289	365	397	452	538	645	736
200	187	226	281	303	384	417	471	563	675	771	
205	195	236	293	317	401	436	490	588	705	805	
210	204	248	307	330	420	456	509	613	735	839	
215	212	258	319	345	439	474	527	638	764	874	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%.

ANY PANEL WIDTH CAN BE CONSTRUCTED BY COMBINING 4" AND 6" EXTRUSIONS AND INTERPOLATING THE APPROPRIATE OUTPUTS.

* REFER TO PAGE L-7 FOR ACTUAL PANEL WIDTHS AND FINISHED OPENINGS.

LINEAR PANEL IMPERIAL OUTPUTS REFERENCE PAGE STANDARD AND NON-STANDARD NUMBER OF PASSES

6" PANEL			
PASSES	1	2	
MEAN WATER TEMP. (°F)	160	121	145
	165	129	155
	170	137	164
	175	146	175
	180	154	185
	185	162	194
190	171	205	

12" PANEL				
PASSES	2	3	4	
MEAN WATER TEMP. (°F)	160	190	209	228
	165	205	226	246
	170	218	240	262
	175	233	257	280
	180	246	271	295
	185	261	287	313
190	275	303	330	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%.

18" PANEL					
PASSES	3	4	5	6	
MEAN WATER TEMP. (°F)	160	263	281	298	316
	165	282	301	320	338
	170	302	322	342	362
	175	320	341	363	384
	180	340	363	385	408
	185	359	383	407	431
190	379	404	430	455	

24" PANEL						
PASSES	4	5	6	7	8*	
MEAN WATER TEMP. (°F)	160	363	381	399	417	436
	165	389	408	428	447	467
	170	413	434	454	475	496
	175	438	460	482	504	526
	180	463	486	509	532	556
	185	488	512	537	561	586
190	513	539	564	590	616	

* NOTE: Outputs from 30" 5 tubes roughly equivalent to 24" 8 tubes
(Pertains to entire column)

30" PANEL							
PASSES	5*	6	7	8	9	10**	
MEAN WATER TEMP. (°F)	160	436	453	471	488	506	523
	165	466	485	503	522	541	559
	170	495	515	535	554	574	594
	175	525	546	567	588	609	630
	180	555	577	599	622	644	666
	185	586	609	633	656	680	703
190	615	640	664	689	713	738	

** NOTE: Outputs from 36" 8 tubes roughly equivalent to 30" 10 tubes
(Pertains to entire column)

36" PANEL								
PASSES	6	7	8**	9	10	11	12	
MEAN WATER TEMP. (°F)	160	497	513	530	547	563	580	596
	165	531	549	566	584	602	620	637
	170	565	584	603	622	640	659	678
	175	599	619	639	659	679	699	719
	180	633	654	675	696	717	739	760
	185	668	690	713	735	757	779	802
190	702	725	749	772	796	819	842	

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°F)	95	8	9	11	12	13	13	14	15	16
	100	18	21	24	27	29	32	35	37	39
	105	28	33	37	41	45	52	55	59	62
	110	38	45	51	56	61	71	76	80	85
	115	46	55	65	71	78	90	96	102	108
	120	54	65	79	86	94	109	117	124	131
	125	63	75	93	102	111	129	137	146	154
	130	71	85	107	117	128	148	158	168	177
	135	79	95	121	133	145	167	178	189	200
	140	88	105	135	148	162	186	199	211	223
	145	96	115	149	163	178	205	219	233	246
	150	104	125	163	179	195	225	240	255	270
	155	113	135	177	194	212	246	262	279	295
	160	121	145	191	210	229	263	281	298	316
	165	129	155	205	226	246	282	301	320	338
	170	137	164	218	240	262	302	322	342	362
	175	146	175	233	256	280	320	341	363	384
180	154	185	246	271	295	340	363	385	408	
185	162	194	261	287	313	359	383	407	431	
190	171	205	275	303	330	379	404	430	455	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN 50/50 ETHYLENE TEMPERATURE (°F)	95	3	4	7	8	9	11	12	13	14
	100	14	17	21	23	25	30	32	34	36
	105	25	30	35	38	42	49	53	56	59
	110	36	44	49	53	58	68	73	77	82
	115	44	53	62	69	75	87	93	99	104
	120	53	63	76	84	91	106	113	120	127
	125	61	73	90	99	108	125	134	142	150
	130	70	83	104	115	125	145	155	164	174
	135	78	94	119	131	143	164	176	186	197
	140	87	104	133	147	160	184	197	209	221
	145	95	115	148	163	177	204	218	232	245
	150	104	125	163	179	195	225	240	255	270
	155	113	136	177	195	213	247	264	280	297
	160	122	147	193	212	231	266	283	301	319
	165	131	157	208	229	250	286	305	324	343
	170	140	168	222	245	267	308	329	349	370
	175	150	180	239	263	287	328	350	372	394
180	159	190	253	279	304	350	374	397	420	
185	168	201	270	297	324	372	396	421	446	
190	178	213	286	315	343	394	421	447	473	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN 50/50 PROPYLENE TEMPERATURE (°F)	95	2	2	3	4	4	6	7	8	9
	100	12	14	17	19	20	24	26	28	30
	105	22	27	30	33	36	43	46	49	52
	110	33	39	44	48	52	61	65	69	73
	115	41	49	57	63	68	79	85	90	95
	120	49	59	71	78	85	98	105	112	118
	125	57	68	84	93	101	117	125	133	140
	130	65	78	98	108	118	136	145	154	163
	135	74	88	112	123	135	155	166	176	186
	140	82	99	127	139	152	175	187	198	210
	145	91	109	141	155	169	195	208	221	234
	150	100	120	156	172	187	216	230	244	259
	155	109	131	171	188	206	239	255	270	286
	160	119	142	187	205	224	258	275	292	309
	165	128	153	203	223	244	279	298	316	335
	170	137	164	218	240	262	302	322	342	362
	175	147	176	234	258	281	322	343	364	386
180	156	187	248	273	298	343	366	389	412	
185	164	197	265	291	318	364	389	413	437	
190	174	209	281	309	337	387	412	438	464	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°F)	95	36	38	39	39	41	43	45	47
	100	61	65	68	64	68	71	74	77
	105	87	92	98	89	94	98	103	107
	110	112	119	127	114	120	126	131	137
	115	131	140	148	139	146	153	160	167
	120	150	160	170	164	172	180	189	197
	125	169	180	192	189	198	208	217	227
	130	188	201	213	214	225	235	246	257
	135	207	221	235	239	251	263	275	287
	140	227	242	257	264	277	290	303	316
	145	245	261	278	289	303	318	332	346
	150	264	282	299	313	329	344	360	376
	155	282	301	320	338	355	372	389	406
	160	301	321	341	363	381	399	417	436
	165	320	341	363	389	408	428	447	467
	170	340	363	385	413	434	454	475	496
	175	360	384	408	438	460	482	504	526
180	380	405	431	463	486	509	532	556	
185	404	431	458	488	512	537	561	586	
190	427	456	484	513	539	564	590	616	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN 50/50 ETHYLENE TEMPERATURE (°F)	95	32	34	35	36	38	39	41	43
	100	57	61	64	60	63	66	70	73
	105	82	88	93	85	89	94	98	102
	110	107	115	122	110	115	121	126	132
	115	126	135	143	134	141	148	154	161
	120	146	155	165	159	167	175	183	191
	125	165	176	187	184	193	203	212	221
	130	184	197	209	210	220	231	241	252
	135	204	218	231	235	247	259	271	282
	140	225	240	255	261	274	287	300	313
	145	244	260	276	287	302	316	330	345
	150	264	282	299	313	329	344	360	376
	155	283	302	321	340	357	374	391	408
	160	304	324	345	367	385	403	422	440
	165	325	347	368	395	415	434	454	474
	170	347	370	393	421	442	463	484	506
	175	369	394	418	449	471	494	516	539
180	391	418	444	477	501	525	548	572	
185	418	446	474	505	530	556	581	606	
190	444	474	503	534	560	587	614	640	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN 50/50 PROPYLENE TEMPERATURE (°F)	95	24	25	26	26	27	28	29	31
	100	48	51	54	50	52	55	57	60
	105	72	77	81	74	78	81	85	89
	110	96	103	109	98	103	108	113	118
	115	115	123	131	122	129	135	141	147
	120	135	144	153	148	155	162	170	177
	125	154	164	174	172	181	189	198	206
	130	173	185	196	197	207	216	226	236
	135	193	205	218	222	233	244	255	267
	140	213	228	242	248	260	273	285	297
	145	233	248	264	274	288	302	315	329
	150	253	270	287	300	316	331	346	361
	155	274	292	310	328	345	361	378	394
	160	295	315	334	356	374	391	409	427
	165	317	338	359	385	404	424	443	462
	170	340	363	385	413	434	454	475	496
	175	362	386	410	440	462	484	506	528
180	384	410	435	468	491	514	538	561	
185	410	438	465	495	520	545	570	594	
190	436	465	494	523	549	576	602	628	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°F)	95	47	49	51	52	54	56
	100	77	80	83	86	89	92
	105	107	111	115	119	124	128
	110	137	142	147	153	158	164
	115	166	173	180	186	193	200
	120	196	204	212	220	228	236
	125	226	235	244	253	263	272
	130	256	266	277	287	297	307
	135	286	298	309	320	332	343
	140	316	329	341	354	367	379
	145	346	360	374	387	401	415
	150	375	390	405	420	435	450
	155	406	422	438	454	471	487
	160	436	453	471	488	506	523
	165	466	485	503	522	541	559
	170	495	515	535	554	574	594
	175	525	546	567	588	609	630
180	555	577	599	622	644	666	
185	586	609	633	656	680	703	
190	615	640	664	689	713	738	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN 50/50 ETHYLENE TEMPERATURE (°F)	95	42	44	46	48	49	51
	100	72	75	78	81	84	86
	105	102	106	110	114	118	122
	110	131	136	142	147	152	157
	115	161	167	174	180	186	193
	120	191	198	206	213	221	229
	125	221	229	238	247	256	265
	130	251	261	271	281	291	301
	135	282	293	304	316	327	338
	140	313	325	338	350	363	375
	145	344	358	372	386	399	413
	150	375	390	405	420	435	450
	155	408	424	440	457	473	489
	160	440	458	476	493	511	528
	165	473	492	511	530	549	568
	170	505	525	545	565	586	606
	175	538	560	581	603	624	646
180	572	595	617	640	663	686	
185	607	631	655	679	704	728	
190	640	665	691	716	742	768	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN 50/50 PROPYLENE TEMPERATURE (°F)	95	30	31	33	34	35	36
	100	59	62	64	66	69	71
	105	88	92	95	99	103	106
	110	117	122	127	132	136	141
	115	147	152	158	164	170	176
	120	177	184	191	198	205	212
	125	206	214	222	231	239	247
	130	236	245	255	264	273	283
	135	266	277	287	298	309	319
	140	297	309	321	333	345	357
	145	329	342	355	368	381	394
	150	360	374	389	403	418	432
	155	394	409	425	441	457	472
	160	427	444	461	479	496	513
	165	461	480	498	517	535	554
	170	495	515	535	554	574	594
	175	528	549	570	591	612	633
180	561	583	605	628	650	673	
185	595	619	642	666	690	714	
190	627	652	677	703	728	753	

OUTPUTS EXPRESSED IN BTU/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°F)	95	52	54	55	57	59	61	62
	100	86	89	92	95	98	101	103
	105	120	124	128	132	136	141	144
	110	155	160	165	170	175	180	186
	115	189	195	201	208	214	220	227
	120	223	230	238	245	253	260	268
	125	257	266	274	283	291	300	309
	130	291	301	311	321	330	340	350
	135	326	336	347	358	369	380	391
	140	360	372	384	396	408	420	432
	145	394	407	420	433	446	460	473
	150	428	442	457	471	485	500	514
	155	463	478	494	509	525	540	556
	160	497	513	530	546	563	580	596
	165	531	549	567	584	602	620	637
	170	565	584	603	622	640	659	678
	175	599	619	639	659	679	699	719
180	633	654	675	696	717	739	760	
185	668	690	713	735	757	780	802	
190	702	725	749	772	795	819	842	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN 50/50 ETHYLENE TEMPERATURE (°F)	95	47	49	50	52	53	55	57
	100	81	84	86	89	92	94	97
	105	115	118	122	126	130	134	138
	110	148	153	158	163	168	173	178
	115	182	188	194	200	206	213	219
	120	216	223	231	238	245	252	260
	125	251	259	268	276	284	293	301
	130	286	295	305	314	324	333	343
	135	321	331	342	353	363	374	385
	140	356	368	380	392	404	416	427
	145	392	405	418	431	444	457	470
	150	428	442	457	471	485	500	514
	155	465	481	496	512	527	543	558
	160	502	518	535	552	568	585	602
	165	539	557	575	593	611	629	647
	170	576	595	615	634	653	673	692
	175	614	634	655	675	696	717	737
180	652	674	696	717	739	761	782	
185	691	714	738	761	783	807	830	
190	730	754	779	803	827	852	876	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN 50/50 PROPYLENE TEMPERATURE (°F)	95	33	34	36	37	38	39	40
	100	67	69	71	73	75	78	80
	105	100	103	106	110	113	116	120
	110	133	137	142	146	151	155	160
	115	166	172	177	183	188	194	199
	120	201	207	214	221	227	234	241
	125	234	242	250	257	265	273	281
	130	268	277	286	295	304	313	322
	135	303	313	323	333	343	353	363
	140	338	349	361	372	383	395	406
	145	374	387	399	412	424	437	449
	150	411	425	439	452	466	480	493
	155	449	464	479	494	509	524	539
	160	487	503	519	535	551	568	584
	165	526	543	561	578	596	613	631
	170	565	584	603	622	640	659	678
	175	602	622	642	662	682	703	722
180	639	660	682	703	724	746	767	
185	678	700	723	746	768	791	814	
190	716	740	764	788	811	836	859	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°F)	95	8	9	11	12	13	13	14	15	16
	100	18	21	24	27	29	32	35	37	39
	105	28	33	37	41	45	52	55	59	62
	110	38	45	51	56	61	71	76	80	85
	115	46	55	65	71	78	90	96	102	108
	120	54	65	79	86	94	109	117	124	131
	125	63	75	93	102	111	129	137	146	154
	130	71	85	107	117	128	148	158	168	177
	135	79	95	121	133	145	167	178	189	200
	140	88	105	135	148	162	186	199	211	223
	145	96	115	149	163	178	205	219	233	246
	150	104	125	163	179	195	225	240	255	270
	155	113	135	177	194	212	246	262	279	295
	160	121	145	191	210	229	263	281	298	316
	165	129	155	205	226	246	282	301	320	338
	170	137	164	218	240	262	302	322	342	362
	175	146	175	233	256	280	320	341	363	384
	180	154	185	246	271	295	340	363	385	408
185	162	194	261	287	313	359	383	407	431	
190	171	205	275	303	330	379	404	430	455	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°F)	95	3	4	7	8	9	12	13	14	15
	100	14	17	21	24	26	31	33	36	38
	105	26	31	35	39	43	50	54	57	61
	110	37	44	50	55	60	70	74	79	83
	115	45	54	64	70	76	89	95	101	107
	120	54	65	78	86	93	108	116	123	130
	125	62	75	92	101	111	128	137	145	154
	130	71	85	107	117	128	148	158	168	177
	135	80	96	121	133	145	168	179	190	201
	140	88	106	136	150	163	188	201	213	226
	145	97	117	151	166	181	208	222	236	250
	150	106	128	166	182	199	229	244	260	275
	155	115	138	181	199	217	252	269	286	303
	160	125	150	196	216	236	271	289	307	325
	165	134	160	212	233	255	292	311	331	350
	170	142	171	227	249	272	314	335	356	377
	175	153	183	243	268	292	334	357	379	401
	180	162	194	258	284	310	357	381	405	428
185	171	205	275	303	330	379	404	429	454	
190	181	218	292	321	350	402	429	455	482	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°F)	95	2	3	6	7	8	10	11	12	13
	100	13	16	20	22	25	29	31	33	36
	105	25	30	34	38	41	48	52	55	58
	110	36	43	48	53	58	67	72	76	81
	115	44	53	62	68	74	87	92	98	104
	120	53	63	76	84	91	106	113	120	127
	125	61	74	91	100	109	126	134	143	151
	130	70	84	106	116	127	146	156	166	176
	135	79	95	121	133	145	167	178	189	200
	140	88	106	136	150	163	188	201	213	226
	145	98	117	152	167	182	210	224	237	251
	150	107	129	167	184	201	231	247	262	278
	155	117	140	184	202	220	256	273	290	307
	160	127	152	200	220	240	276	295	313	331
	165	137	164	217	239	261	299	319	339	359
	170	147	176	233	257	280	323	345	366	388
	175	158	189	252	277	302	346	369	392	415
	180	168	201	268	295	322	371	395	420	445
185	178	214	287	316	345	395	421	448	474	
190	190	228	305	336	366	421	449	477	505	

OUTPUTS EXPRESSED IN BTU/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°F)	95	36	38	39	39	41	43	45	47
	100	61	65	68	64	68	71	74	77
	105	87	92	98	89	94	98	103	107
	110	112	119	127	114	120	126	131	137
	115	131	140	148	139	146	153	160	167
	120	150	160	170	164	172	180	189	197
	125	169	180	192	189	198	208	217	227
	130	188	201	213	214	225	235	246	257
	135	207	221	235	239	251	263	275	287
	140	227	242	257	264	277	290	303	316
	145	245	261	278	289	303	318	332	346
	150	264	282	299	313	329	344	360	376
	155	282	301	320	338	355	372	389	406
	160	301	321	341	363	381	399	417	436
	165	320	341	363	389	408	428	447	467
	170	340	363	385	413	434	454	475	496
	175	360	384	408	438	460	482	504	526
180	380	405	431	463	486	509	532	556	
185	404	431	458	488	512	537	561	586	
190	427	456	484	513	539	564	590	616	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°F)	95	35	36	38	37	38	40	42	44
	100	60	63	67	62	65	68	71	74
	105	85	90	95	87	91	95	100	104
	110	110	117	124	112	118	123	129	134
	115	129	138	146	137	144	151	158	164
	120	149	158	168	162	171	179	187	195
	125	168	180	191	188	197	207	216	226
	130	188	201	213	214	225	235	246	257
	135	208	222	236	240	252	264	276	288
	140	229	245	260	266	280	293	306	320
	145	249	265	282	293	308	322	337	352
	150	269	287	305	319	335	351	367	383
	155	289	308	328	347	364	382	399	416
	160	310	331	351	374	393	411	430	449
	165	331	353	375	403	423	443	463	483
	170	354	377	401	430	451	472	494	515
	175	376	401	426	458	481	503	526	549
180	399	426	452	486	510	535	559	583	
185	426	455	483	515	541	566	592	618	
190	453	483	513	544	571	598	625	653	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°F)	95	31	33	35	33	35	37	38	40
	100	56	60	63	58	61	64	67	70
	105	81	87	92	83	88	92	96	100
	110	106	113	120	109	114	119	125	130
	115	126	134	142	134	140	147	154	160
	120	146	155	165	159	167	175	183	191
	125	166	177	188	185	194	204	213	222
	130	186	199	211	212	222	233	244	254
	135	207	221	235	239	251	263	275	287
	140	229	245	260	266	280	293	306	320
	145	250	267	283	294	309	324	339	353
	150	272	290	308	322	339	355	371	387
	155	293	313	332	352	370	387	405	422
	160	316	337	358	381	400	419	438	457
	165	339	362	384	412	433	454	474	495
	170	364	388	412	442	464	486	508	530
	175	389	415	441	473	497	520	544	568
180	414	442	469	505	530	555	580	606	
185	444	474	504	537	564	590	617	644	
190	474	506	537	569	598	626	655	683	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°F)	95	47	49	51	52	54	56
	100	77	80	83	86	89	92
	105	107	111	115	119	124	128
	110	137	142	147	153	158	164
	115	166	173	180	186	193	200
	120	196	204	212	220	228	236
	125	226	235	244	253	263	272
	130	256	266	277	287	297	307
	135	286	298	309	320	332	343
	140	316	329	341	354	367	379
	145	346	360	374	387	401	415
	150	375	390	405	420	435	450
	155	406	422	438	454	471	487
	160	436	453	471	488	506	523
	165	466	485	503	522	541	559
	170	495	515	535	554	574	594
175	525	546	567	588	609	630	
180	555	577	599	622	644	666	
185	586	609	633	656	680	703	
190	615	640	664	689	713	738	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°F)	95	43	45	47	49	50	52
	100	73	76	80	83	85	88
	105	104	108	112	116	120	124
	110	134	139	145	150	155	161
	115	164	171	177	184	190	197
	120	194	202	210	218	226	233
	125	225	234	243	252	261	270
	130	256	266	277	287	297	307
	135	288	299	311	322	334	345
	140	319	332	345	358	370	383
	145	351	365	379	393	407	421
	150	383	398	413	428	444	459
	155	416	433	449	466	482	499
	160	449	467	485	503	521	539
	165	482	502	521	540	559	579
	170	515	535	556	577	597	618
175	549	571	593	614	636	658	
180	583	606	629	653	676	699	
185	618	643	668	692	717	742	
190	652	678	704	730	756	782	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°F)	95	39	41	43	44	46	47
	100	70	72	75	78	81	83
	105	100	104	108	112	116	120
	110	130	135	140	145	151	156
	115	160	166	173	179	185	192
	120	191	198	206	213	221	229
	125	222	231	240	248	257	266
	130	254	264	274	284	294	304
	135	286	298	309	320	332	343
	140	319	332	345	358	370	383
	145	353	367	381	395	409	423
	150	386	402	417	433	448	464
	155	422	439	456	473	490	506
	160	458	476	494	513	531	549
	165	494	514	533	553	573	593
	170	530	551	572	593	614	636
175	567	590	612	635	658	680	
180	605	629	653	678	702	726	
185	645	670	696	722	748	774	
190	683	710	737	765	792	819	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°F)	95	52	54	55	57	59	61	62
	100	86	89	92	95	98	101	103
	105	120	124	128	132	136	141	144
	110	155	160	165	170	175	180	186
	115	189	195	201	208	214	220	227
	120	223	230	238	245	253	260	268
	125	257	266	274	283	291	300	309
	130	291	301	311	321	330	340	350
	135	326	336	347	358	369	380	391
	140	360	372	384	396	408	420	432
	145	394	407	420	433	446	460	473
	150	428	442	457	471	485	500	514
	155	463	478	494	509	525	540	556
	160	497	513	530	546	563	580	596
	165	531	549	567	584	602	620	637
	170	565	584	603	622	640	659	678
	175	599	619	639	659	679	699	719
180	633	654	675	696	717	739	760	
185	668	690	713	735	757	780	802	
190	702	725	749	772	795	819	842	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°F)	95	48	50	51	53	55	56	58
	100	83	86	88	91	94	96	99
	105	117	121	125	129	133	137	141
	110	152	157	162	167	172	177	182
	115	186	192	198	205	211	217	223
	120	221	228	236	243	250	258	265
	125	256	264	273	282	290	299	307
	130	291	301	311	321	330	340	350
	135	327	338	349	360	371	382	393
	140	363	375	388	400	412	424	436
	145	400	413	427	440	453	467	480
	150	437	451	466	480	495	510	524
	155	475	490	506	522	538	554	569
	160	511	528	546	563	580	597	614
	165	550	568	586	605	623	641	660
	170	588	607	627	646	666	686	705
	175	626	647	668	689	709	730	751
180	665	687	709	731	753	776	798	
185	705	728	752	775	798	822	846	
190	744	769	794	819	843	868	893	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°F)	95	44	45	47	48	50	51	52
	100	78	81	83	86	89	91	94
	105	112	116	120	124	127	131	135
	110	147	152	157	162	166	171	176
	115	181	187	193	199	205	212	217
	120	216	223	231	238	245	252	260
	125	252	260	269	277	286	294	302
	130	288	298	308	317	327	337	346
	135	326	336	347	358	369	380	391
	140	363	375	388	400	412	424	436
	145	402	415	429	442	455	469	482
	150	441	456	471	485	500	515	529
	155	482	497	514	530	546	562	578
	160	521	539	556	574	591	609	626
	165	563	581	601	619	638	657	675
	170	605	625	645	665	685	706	725
	175	647	668	690	712	733	755	776
180	690	713	736	759	782	805	828	
185	735	759	784	808	833	858	882	
190	779	805	831	857	883	909	935	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°F)	95	8	9	11	12	13	13	14	15	16
	100	18	21	24	27	29	32	35	37	39
	105	28	33	37	41	45	52	55	59	62
	110	38	45	51	56	61	71	76	80	85
	115	46	55	65	71	78	90	96	102	108
	120	54	65	79	86	94	109	117	124	131
	125	63	75	93	102	111	129	137	146	154
	130	71	85	107	117	128	148	158	168	177
	135	79	95	121	133	145	167	178	189	200
	140	88	105	135	148	162	186	199	211	223
	145	96	115	149	163	178	205	219	233	246
	150	104	125	163	179	195	225	240	255	270
	155	113	135	177	194	212	246	262	279	295
	160	121	145	191	210	229	263	281	298	316
	165	129	155	205	226	246	282	301	320	338
	170	137	164	218	240	262	302	322	342	362
	175	146	175	233	256	280	320	341	363	384
	180	154	185	246	271	295	340	363	385	408
185	162	194	261	287	313	359	383	407	431	
190	171	205	275	303	330	379	404	430	455	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°F)	95	5	6	9	10	11	36	37	39	41
	100	16	19	23	25	27	47	50	53	55
	105	27	32	36	40	44	59	62	66	70
	110	37	45	50	55	60	70	75	80	84
	115	46	55	64	71	77	90	96	102	108
	120	54	65	79	86	94	109	117	124	131
	125	63	76	93	102	112	129	138	146	155
	130	72	86	108	118	129	149	159	169	179
	135	80	97	122	135	147	170	181	192	203
	140	89	107	137	151	165	190	203	215	228
	145	98	118	152	168	183	211	225	239	253
	150	107	129	167	184	201	231	247	262	278
	155	116	140	183	201	219	255	272	289	306
	160	126	151	198	218	238	274	292	310	328
	165	135	162	214	236	257	295	314	334	354
	170	144	173	229	252	275	317	338	359	381
	175	154	185	246	270	295	338	360	383	405
	180	163	196	261	287	313	360	385	408	432
185	173	207	278	306	334	382	408	433	459	
190	183	220	294	324	353	406	433	460	487	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°F)	95	3	4	7	8	9	11	12	13	14
	100	14	17	21	23	26	31	33	35	37
	105	26	31	35	39	43	50	53	57	60
	110	37	44	50	55	60	70	74	79	83
	115	46	55	64	70	77	89	95	101	107
	120	54	65	78	86	94	109	116	123	131
	125	63	75	93	102	111	129	137	146	154
	130	71	86	107	118	129	149	158	168	178
	135	80	96	122	134	147	169	180	192	203
	140	89	107	137	151	165	190	203	215	228
	145	99	118	153	168	183	211	225	239	253
	150	108	129	168	185	202	232	248	263	279
	155	118	141	185	203	221	257	274	291	308
	160	128	153	201	221	241	277	296	314	333
	165	137	165	218	240	262	300	320	340	360
	170	147	177	234	258	281	325	346	368	390
	175	158	190	253	278	303	347	370	393	417
	180	169	202	269	296	323	372	397	422	447
185	179	215	289	318	347	398	424	451	477	
190	191	229	307	337	368	423	451	479	507	

OUTPUTS EXPRESSED IN BTU/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°F)	95	36	38	39	39	41	43	45	47
	100	61	65	68	64	68	71	74	77
	105	87	92	98	89	94	98	103	107
	110	112	119	127	114	120	126	131	137
	115	131	140	148	139	146	153	160	167
	120	150	160	170	164	172	180	189	197
	125	169	180	192	189	198	208	217	227
	130	188	201	213	214	225	235	246	257
	135	207	221	235	239	251	263	275	287
	140	227	242	257	264	277	290	303	316
	145	245	261	278	289	303	318	332	346
	150	264	282	299	313	329	344	360	376
	155	282	301	320	338	355	372	389	406
	160	301	321	341	363	381	399	417	436
	165	320	341	363	389	408	428	447	467
	170	340	363	385	413	434	454	475	496
	175	360	384	408	438	460	482	504	526
	180	380	405	431	463	486	509	532	556
185	404	431	458	488	512	537	561	586	
190	427	456	484	513	539	564	590	616	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°F)	95	38	40	42	40	42	44	47	49
	100	62	66	70	65	68	71	74	78
	105	86	92	98	89	93	98	102	107
	110	111	118	126	113	119	124	130	136
	115	130	139	148	138	145	152	159	166
	120	150	160	170	164	172	180	189	197
	125	170	181	193	190	199	209	218	228
	130	190	203	215	216	227	238	248	259
	135	210	224	238	242	255	267	279	291
	140	232	247	262	269	282	296	309	323
	145	251	268	285	296	311	325	340	355
	150	272	290	308	322	339	355	371	387
	155	292	311	331	350	368	385	403	420
	160	313	334	355	378	396	415	434	453
	165	334	357	379	407	427	447	467	488
	170	357	381	405	434	455	477	499	520
	175	380	405	430	462	485	508	531	555
	180	403	430	456	491	515	540	564	589
185	430	459	488	520	546	572	598	624	
190	457	488	518	549	576	604	631	659	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°F)	95	34	35	37	36	37	39	41	43
	100	59	62	66	61	64	67	70	73
	105	84	90	95	86	91	95	99	104
	110	110	117	124	112	118	123	129	134
	115	129	138	147	137	144	151	158	165
	120	149	159	169	163	171	180	188	196
	125	169	180	192	189	198	208	217	227
	130	189	202	214	215	226	236	247	258
	135	210	224	238	242	254	266	278	290
	140	232	247	262	269	282	296	309	323
	145	252	269	285	297	311	326	341	356
	150	273	292	310	324	340	356	373	389
	155	295	314	334	354	371	389	407	424
	160	318	339	360	383	402	421	440	460
	165	341	364	386	414	435	456	476	497
	170	366	390	414	444	466	488	511	533
	175	391	417	443	475	499	523	547	570
	180	416	444	472	507	532	558	583	608
185	447	477	507	540	567	595	622	649	
190	476	508	540	572	601	629	658	686	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°F)	95	47	49	51	52	54	56
	100	77	80	83	86	89	92
	105	107	111	115	119	124	128
	110	137	142	147	153	158	164
	115	166	173	180	186	193	200
	120	196	204	212	220	228	236
	125	226	235	244	253	263	272
	130	256	266	277	287	297	307
	135	286	298	309	320	332	343
	140	316	329	341	354	367	379
	145	346	360	374	387	401	415
	150	375	390	405	420	435	450
	155	406	422	438	454	471	487
	160	436	453	471	488	506	523
	165	466	485	503	522	541	559
	170	495	515	535	554	574	594
175	525	546	567	588	609	630	
180	555	577	599	622	644	666	
185	586	609	633	656	680	703	
190	615	640	664	689	713	738	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°F)	95	48	50	52	54	56	58
	100	77	80	83	86	89	92
	105	106	110	115	119	123	127
	110	135	141	146	151	157	162
	115	166	172	179	186	192	199
	120	196	204	212	220	228	236
	125	227	237	246	255	264	273
	130	259	269	279	290	300	311
	135	290	302	314	325	337	349
	140	322	335	348	361	374	387
	145	355	369	383	397	411	426
	150	386	402	417	433	448	464
	155	420	437	454	470	487	504
	160	453	472	490	508	526	544
	165	487	506	526	545	565	584
	170	520	541	561	582	603	624
175	554	576	598	620	642	665	
180	588	612	635	659	682	706	
185	624	649	674	699	724	749	
190	658	684	711	737	763	790	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°F)	95	42	44	46	47	49	51
	100	73	76	79	81	84	87
	105	103	107	112	116	120	124
	110	134	139	145	150	155	161
	115	164	171	178	184	191	197
	120	195	203	211	219	227	235
	125	226	235	244	253	263	272
	130	258	268	278	288	299	309
	135	290	301	313	324	336	348
	140	322	335	348	361	374	387
	145	355	370	384	398	412	427
	150	388	404	419	435	450	466
	155	424	441	458	475	492	509
	160	460	478	497	515	534	552
	165	496	516	536	556	576	596
	170	532	553	575	596	617	639
175	570	592	615	638	661	684	
180	608	632	656	681	705	729	
185	649	675	701	727	753	779	
190	686	713	741	768	795	823	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°F)	95	52	54	55	57	59	61	62
	100	86	89	92	95	98	101	103
	105	120	124	128	132	136	141	144
	110	155	160	165	170	175	180	186
	115	189	195	201	208	214	220	227
	120	223	230	238	245	253	260	268
	125	257	266	274	283	291	300	309
	130	291	301	311	321	330	340	350
	135	326	336	347	358	369	380	391
	140	360	372	384	396	408	420	432
	145	394	407	420	433	446	460	473
	150	428	442	457	471	485	500	514
	155	463	478	494	509	525	540	556
	160	497	513	530	546	563	580	596
	165	531	549	567	584	602	620	637
	170	565	584	603	622	640	659	678
	175	599	619	639	659	679	699	719
180	633	654	675	696	717	739	760	
185	668	690	713	735	757	780	802	
190	702	725	749	772	795	819	842	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°F)	95	53	55	57	59	60	62	64
	100	87	89	92	95	98	101	104
	105	120	124	128	132	136	140	144
	110	153	158	163	168	173	179	184
	115	188	194	200	207	213	219	225
	120	223	230	238	245	253	260	268
	125	258	267	276	284	293	302	310
	130	294	304	314	324	333	343	353
	135	330	341	353	364	374	386	397
	140	367	379	392	404	416	428	440
	145	404	417	431	444	458	471	485
	150	441	456	471	485	500	515	529
	155	479	495	511	527	543	559	575
	160	516	534	551	568	585	603	620
	165	555	573	592	610	629	648	666
	170	593	613	633	653	672	692	712
	175	632	653	674	695	716	737	758
180	671	693	716	738	760	783	805	
185	711	735	759	783	806	830	854	
190	751	776	801	826	851	877	901	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°F)	95	47	48	50	51	53	55	56
	100	82	84	87	90	93	95	98
	105	117	120	124	128	132	136	140
	110	152	157	162	167	172	177	182
	115	186	193	199	205	211	218	224
	120	222	229	237	244	251	259	266
	125	257	266	274	283	291	300	309
	130	293	303	312	322	332	342	351
	135	330	341	352	363	374	385	396
	140	367	379	392	404	416	428	440
	145	405	418	432	445	459	472	486
	150	443	458	473	488	502	517	532
	155	484	500	516	532	548	565	581
	160	524	541	559	576	594	611	629
	165	566	584	603	622	641	660	679
	170	607	627	648	668	688	709	729
	175	650	671	693	715	736	758	780
180	693	716	740	762	785	809	832	
185	740	764	789	814	838	863	888	
190	783	809	835	861	887	913	939	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°F)	95	8	9	11	12	13	13	14	15	16
	100	18	21	24	27	29	32	35	37	39
	105	28	33	37	41	45	52	55	59	62
	110	38	45	51	56	61	71	76	80	85
	115	46	55	65	71	78	90	96	102	108
	120	54	65	79	86	94	109	117	124	131
	125	63	75	93	102	111	129	137	146	154
	130	71	85	107	117	128	148	158	168	177
	135	79	95	121	133	145	167	178	189	200
	140	88	105	135	148	162	186	199	211	223
	145	96	115	149	163	178	205	219	233	246
	150	104	125	163	179	195	225	240	255	270
	155	113	135	177	194	212	246	262	279	295
	160	121	145	191	210	229	263	281	298	316
	165	129	155	205	226	246	282	301	320	338
	170	137	164	218	240	262	302	322	342	362
	175	146	175	233	256	280	320	341	363	384
	180	154	185	246	271	295	340	363	385	408
185	162	194	261	287	313	359	383	407	431	
190	171	205	275	303	330	379	404	430	455	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°F)	95	3	4	7	8	9	12	13	14	15
	100	15	18	22	24	26	32	34	36	38
	105	26	32	36	40	43	51	55	58	62
	110	38	45	51	56	61	71	76	80	85
	115	46	56	65	71	78	91	97	103	109
	120	55	66	79	87	95	110	118	125	133
	125	64	76	94	103	113	131	139	148	157
	130	72	87	109	120	130	151	161	171	181
	135	81	98	124	136	148	171	183	194	205
	140	90	108	139	153	166	192	205	217	230
	145	99	119	154	169	185	213	227	241	255
	150	108	130	169	186	203	234	249	265	280
	155	118	141	185	203	221	257	274	291	308
	160	127	152	200	220	240	276	295	313	331
	165	136	163	216	238	260	298	317	337	357
	170	145	174	231	254	277	320	342	363	384
	175	155	187	248	273	298	341	364	386	409
	180	165	198	263	290	316	364	388	412	437
185	174	209	281	309	337	386	412	437	463	
190	185	222	297	327	356	409	437	464	491	

PANEL WIDTH		6" PANEL		12" PANEL			18" PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°F)	95	4	5	8	9	10	12	13	14	15
	100	15	19	22	25	27	32	34	36	38
	105	27	32	37	40	44	52	55	59	62
	110	38	46	51	56	61	72	77	81	86
	115	47	56	66	72	79	92	98	104	110
	120	55	67	80	88	96	112	119	126	134
	125	64	77	94	104	113	131	140	149	157
	130	72	87	109	120	130	151	161	171	181
	135	81	98	124	136	148	171	183	194	205
	140	90	108	139	153	166	192	205	217	230
	145	99	119	154	169	185	213	227	241	255
	150	108	130	169	186	203	234	249	265	280
	155	118	142	185	204	223	258	276	293	310
	160	128	154	202	222	242	279	297	316	335
	165	138	166	219	241	263	302	322	342	362
	170	148	178	235	259	283	326	348	370	391
	175	159	191	254	279	305	349	372	395	419
	180	169	203	271	298	325	374	399	424	449
185	181	217	291	320	349	400	427	454	480	
190	192	230	308	339	370	424	453	481	509	

OUTPUTS EXPRESSED IN BTU/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°F)	95	36	38	39	39	41	43	45	47
	100	61	65	68	64	68	71	74	77
	105	87	92	98	89	94	98	103	107
	110	112	119	127	114	120	126	131	137
	115	131	140	148	139	146	153	160	167
	120	150	160	170	164	172	180	189	197
	125	169	180	192	189	198	208	217	227
	130	188	201	213	214	225	235	246	257
	135	207	221	235	239	251	263	275	287
	140	227	242	257	264	277	290	303	316
	145	245	261	278	289	303	318	332	346
	150	264	282	299	313	329	344	360	376
	155	282	301	320	338	355	372	389	406
	160	301	321	341	363	381	399	417	436
	165	320	341	363	389	408	428	447	467
	170	340	363	385	413	434	454	475	496
	175	360	384	408	438	460	482	504	526
180	380	405	431	463	486	509	532	556	
185	404	431	458	488	512	537	561	586	
190	427	456	484	513	539	564	590	616	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°F)	95	35	37	38	37	39	41	43	45
	100	61	64	68	63	66	69	72	76
	105	86	92	97	89	93	97	102	106
	110	112	119	127	114	120	126	131	137
	115	132	140	149	140	147	154	161	168
	120	152	162	172	166	174	182	191	199
	125	172	183	195	192	201	211	221	230
	130	192	205	217	218	229	240	251	262
	135	212	226	240	245	257	269	281	294
	140	234	249	265	272	285	299	312	326
	145	254	271	287	299	314	329	344	358
	150	275	293	311	326	342	358	374	391
	155	295	314	334	354	371	389	407	424
	160	316	337	358	381	400	419	438	457
	165	338	360	383	410	431	451	472	492
	170	360	385	408	438	460	482	503	525
	175	383	409	435	466	490	513	536	560
180	407	434	461	495	520	545	570	594	
185	434	463	492	525	551	577	603	630	
190	461	492	523	554	582	609	637	665	

PANEL WIDTH		20" PANEL			24" PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°F)	95	36	38	40	38	40	42	43	45
	100	62	66	69	64	67	70	73	76
	105	87	93	99	90	94	98	103	107
	110	113	121	128	115	121	127	133	138
	115	133	142	151	141	148	155	162	169
	120	153	163	173	167	176	184	192	201
	125	172	184	195	193	202	212	222	231
	130	192	205	217	218	229	240	251	262
	135	212	226	240	245	257	269	281	294
	140	234	249	265	272	285	299	312	326
	145	254	271	287	299	314	329	344	358
	150	275	293	311	326	342	358	374	391
	155	296	316	336	355	373	391	409	426
	160	319	340	362	385	404	423	442	462
	165	342	365	388	416	437	458	479	499
	170	367	392	416	446	468	491	513	535
	175	392	419	445	477	501	525	549	573
180	418	446	474	509	535	560	586	611	
185	450	481	511	544	571	599	626	653	
190	478	510	542	575	603	632	661	689	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°F)	95	47	49	51	52	54	56
	100	77	80	83	86	89	92
	105	107	111	115	119	124	128
	110	137	142	147	153	158	164
	115	166	173	180	186	193	200
	120	196	204	212	220	228	236
	125	226	235	244	253	263	272
	130	256	266	277	287	297	307
	135	286	298	309	320	332	343
	140	316	329	341	354	367	379
	145	346	360	374	387	401	415
	150	375	390	405	420	435	450
	155	406	422	438	454	471	487
	160	436	453	471	488	506	523
	165	466	485	503	522	541	559
	170	495	515	535	554	574	594
175	525	546	567	588	609	630	
180	555	577	599	622	644	666	
185	586	609	633	656	680	703	
190	615	640	664	689	713	738	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°F)	95	44	46	48	50	51	53
	100	75	78	81	84	87	90
	105	106	110	114	119	123	127
	110	137	142	147	153	158	164
	115	167	174	181	187	194	201
	120	198	206	214	222	230	238
	125	230	239	248	257	266	276
	130	261	272	282	293	303	314
	135	293	305	317	328	340	352
	140	326	339	352	365	378	391
	145	358	372	387	401	415	430
	150	390	406	421	437	452	468
	155	424	441	458	475	492	509
	160	458	476	494	513	531	549
	165	492	511	531	551	570	590
	170	525	546	567	588	609	630
175	559	581	604	626	649	671	
180	594	618	641	665	689	713	
185	630	655	680	706	731	756	
190	664	691	717	744	770	797	

PANEL WIDTH		30" PANEL					
PASSES		5	6	7	8	9	10
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°F)	95	45	47	48	50	52	54
	100	76	79	82	85	88	91
	105	107	111	115	120	124	128
	110	138	143	149	154	160	166
	115	169	176	183	189	196	203
	120	200	208	216	224	232	240
	125	231	240	249	259	268	277
	130	261	272	282	293	303	314
	135	293	305	317	328	340	352
	140	326	339	352	365	378	391
	145	358	372	387	401	415	430
	150	390	406	421	437	452	468
	155	426	443	460	477	494	511
	160	462	481	499	518	536	555
	165	499	519	539	558	578	598
	170	535	556	577	599	620	642
175	572	595	618	641	664	687	
180	611	635	659	684	708	733	
185	653	680	706	732	758	784	
190	689	716	744	771	799	827	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL IMPERIAL OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°F)	95	52	54	55	57	59	61	62
	100	86	89	92	95	98	101	103
	105	120	124	128	132	136	141	144
	110	155	160	165	170	175	180	186
	115	189	195	201	208	214	220	227
	120	223	230	238	245	253	260	268
	125	257	266	274	283	291	300	309
	130	291	301	311	321	330	340	350
	135	326	336	347	358	369	380	391
	140	360	372	384	396	408	420	432
	145	394	407	420	433	446	460	473
	150	428	442	457	471	485	500	514
	155	463	478	494	509	525	540	556
	160	497	513	530	546	563	580	596
	165	531	549	567	584	602	620	637
	170	565	584	603	622	640	659	678
175	599	619	639	659	679	699	719	
180	633	654	675	696	717	739	760	
185	668	690	713	735	757	780	802	
190	702	725	749	772	795	819	842	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°F)	95	49	51	52	54	56	57	59
	100	84	87	90	93	96	98	101
	105	119	123	127	131	135	139	143
	110	155	160	165	170	175	180	186
	115	190	196	202	209	215	221	228
	120	225	233	240	248	255	263	270
	125	261	270	279	287	296	305	313
	130	297	307	317	327	337	347	357
	135	334	345	356	367	378	389	400
	140	371	383	395	408	420	432	445
	145	408	421	435	449	462	476	489
	150	445	460	475	490	505	520	534
	155	484	500	516	532	548	565	581
	160	521	539	556	574	591	609	626
	165	560	579	598	616	635	654	672
	170	599	619	639	659	679	699	719
175	638	659	681	702	723	744	766	
180	677	700	723	745	767	790	813	
185	718	742	766	790	814	838	862	
190	758	783	809	834	859	885	910	

PANEL WIDTH		36" PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°F)	95	50	51	53	55	56	58	60
	100	85	88	91	94	97	99	102
	105	121	125	129	133	137	141	145
	110	156	161	167	172	177	182	187
	115	192	198	204	211	217	224	230
	120	227	235	243	250	258	265	273
	125	262	271	280	289	297	306	315
	130	297	307	317	327	337	347	357
	135	334	345	356	367	378	389	400
	140	371	383	395	408	420	432	445
	145	408	421	435	449	462	476	489
	150	445	460	475	490	505	520	534
	155	486	502	519	535	551	567	583
	160	526	544	562	579	596	614	632
	165	568	587	606	625	644	663	682
	170	610	630	651	671	691	712	732
175	653	674	697	718	740	762	783	
180	696	719	743	766	789	813	836	
185	745	769	795	819	844	869	894	
190	786	812	839	865	891	918	943	

OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%

LINEAR PANEL METRIC OUTPUTS STANDARD NUMBER OF PASSES

PASSES		1	2	2	2	4	3	4	4	5	6
NOMINAL PANEL WIDTHS * (mm)		150	200	250	300	400	450	500	600	750	900
MEAN WATER TEMPERATURE (°C)	48.9	52	61	70	75	90	105	144	157	188	215
	51.7	60	70	82	89	107	123	163	181	217	248
	54.4	68	82	95	102	124	142	181	205	246	281
	57.2	76	90	107	116	141	160	199	229	274	314
	60.0	84	100	120	129	159	179	218	253	303	347
	62.8	92	110	132	143	175	197	236	277	332	379
	65.6	100	119	145	156	194	216	254	301	361	412
	68.3	108	129	157	170	211	234	271	325	390	445
	71.1	116	139	170	183	229	253	289	349	419	478
	73.9	124	148	182	197	245	271	308	373	448	511
	76.7	132	158	195	210	264	290	327	397	476	543
	79.4	140	168	207	224	281	308	346	421	505	576
	82.2	148	179	220	237	300	327	365	445	534	609
	85.5	156	189	232	251	316	345	388	469	563	642
	87.8	164	199	245	264	335	364	411	493	591	675
	90.6	172	208	257	278	351	382	435	517	620	708
93.3	180	217	270	291	369	401	453	541	649	741	
96.1	188	227	282	305	386	419	471	565	678	774	
98.9	196	238	295	318	404	438	489	589	707	807	
101.7	204	248	307	332	422	456	507	613	735	840	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%.

ANY PANEL WIDTH CAN BE CONSTRUCTED BY COMBINING 100mm AND 150mm EXTRUSIONS AND INTERPOLATING THE APPROPRIATE OUTPUTS.

***REFER TO PAGE L-7 FOR ACTUAL PANEL WIDTHS & FINISHED OPENINGS**

LINEAR PANEL METRIC OUTPUTS REFERENCE PAGE STANDARD AND NON-STANDARD NUMBER OF PASSES

150mm PANEL			
PASSES		1	2
MEAN WATER TEMP. (°C)	71.1	116	139
	73.9	124	149
	76.7	132	158
	79.4	140	168
	82.2	148	178
	85.5	156	187
	87.8	164	197

300mm PANEL				
PASSES		2	3	4
MEAN WATER TEMP. (°C)	71.1	183	201	220
	73.9	197	217	236
	76.7	210	231	252
	79.4	224	246	269
	82.2	237	261	284
	85.5	251	276	301
	87.8	264	290	317

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%.

450mm PANEL					
PASSES		3	4	5	6
MEAN WATER TEMP. (°C)	71.1	253	270	286	304
	73.9	271	289	306	325
	76.7	290	309	329	348
	79.4	308	329	349	370
	82.2	327	349	371	392
	85.5	345	368	391	414
	87.8	364	388	413	437

600mm PANEL						
PASSES		4	5	6	7	8*
MEAN WATER TEMP. (°C)	71.1	349	367	385	402	419
	73.9	373	392	411	429	448
	76.7	397	417	437	457	476
	79.4	421	442	463	484	505
	82.2	445	467	490	512	534
	85.5	469	492	516	539	563
	87.8	493	518	542	567	592

* NOTE: Outputs from 750mm 5 tubes equivalent to 600mm 8 tubes
(Pertains to entire column)

750mm PANEL							
PASSES		5*	6	7	8	9	10**
MEAN WATER TEMP. (°C)	71.1	419	436	452	469	486	503
	73.9	448	466	484	502	520	538
	76.7	476	495	514	533	552	571
	79.4	505	525	545	566	586	606
	82.2	534	555	577	598	619	641
	85.5	563	586	608	631	653	676
	87.8	591	615	638	662	686	709

** NOTE: Outputs from 900mm 8 tubes roughly equivalent to 750mm 10 tubes
(Pertains to entire column)

900mm PANEL								
PASSES		6	7	8**	9	10	11	12
MEAN WATER TEMP. (°C)	71.1	478	494	510	526	542	558	574
	73.9	511	528	545	562	579	596	613
	76.7	543	561	579	597	615	634	652
	79.4	576	595	614	634	653	672	691
	82.2	609	629	650	670	690	711	731
	85.5	642	663	685	706	728	749	770
	87.8	675	698	720	743	765	788	810

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°C)	35.0	12	15	8	9	10	13	14	15	15
	37.8	20	25	22	24	26	32	34	36	38
	40.6	29	34	36	39	43	50	54	57	60
	43.3	36	44	49	54	58	68	73	77	82
	46.1	44	53	62	68	75	87	93	98	104
	48.9	52	63	76	83	91	105	112	119	126
	51.7	60	72	89	98	107	124	132	140	148
	54.4	68	82	102	113	123	142	152	161	171
	57.2	76	91	116	128	139	161	171	182	193
	60.0	84	101	129	142	155	179	191	203	215
	62.8	92	111	143	157	171	197	211	224	237
	65.6	100	120	156	172	188	216	230	245	259
	68.3	108	130	170	187	204	237	252	268	284
	71.1	116	140	183	202	220	253	270	287	303
	73.9	124	149	197	217	237	271	289	307	325
	76.7	132	158	210	231	252	290	310	329	348
	79.4	140	168	224	246	269	308	328	349	369
82.2	148	178	237	260	284	327	349	370	392	
85.0	156	187	251	276	301	345	368	391	414	
87.8	164	197	264	291	317	364	389	413	437	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN 50/50 ETHYLENE TEMPERATURE (°C)	35.0	11	13	7	8	8	11	12	13	13
	37.8	19	23	20	22	24	29	31	33	35
	40.6	27	33	34	37	41	48	51	54	57
	43.3	35	42	47	51	56	66	70	74	79
	46.1	43	51	60	66	72	84	89	95	100
	48.9	51	61	73	81	88	102	109	116	122
	51.7	59	71	87	95	104	121	129	137	145
	54.4	67	80	100	110	121	139	149	158	167
	57.2	75	90	114	126	137	158	169	179	190
	60.0	83	100	128	141	154	177	189	201	213
	62.8	92	110	142	156	171	197	210	223	236
	65.6	100	120	156	172	188	216	230	245	259
	68.3	109	130	171	188	205	238	254	269	285
	71.1	118	141	185	204	222	255	273	289	306
	73.9	126	151	200	220	240	275	294	312	330
	76.7	134	161	214	235	257	296	316	336	355
	79.4	144	173	230	253	276	315	337	357	378
82.2	153	183	244	268	292	337	359	382	404	
85.0	161	193	260	286	312	357	381	405	429	
87.8	171	205	275	302	330	379	404	430	455	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN 50/50 PROPYLENE TEMPERATURE (°C)	35.0	8	10	3	4	4	6	6	7	7
	37.8	16	19	16	18	20	24	25	27	28
	40.6	24	28	29	32	35	42	44	47	50
	43.3	31	38	42	46	50	59	63	67	70
	46.1	39	47	55	60	66	76	81	86	92
	48.9	47	56	68	75	82	95	101	107	114
	51.7	55	66	81	89	97	113	120	128	135
	54.4	63	75	94	104	113	131	140	148	157
	57.2	71	85	108	119	129	149	159	169	179
	60.0	79	95	122	134	146	168	180	191	202
	62.8	88	105	136	149	163	188	200	213	225
	65.6	96	115	150	165	180	207	221	235	249
	68.3	105	126	165	181	198	229	245	260	275
	71.1	114	137	180	198	216	248	264	281	297
	73.9	123	147	195	215	234	268	286	304	322
	76.7	132	158	210	231	252	290	310	329	348
	79.4	141	169	225	248	270	309	330	350	371
82.2	150	179	239	263	287	330	352	374	396	
85.0	158	190	255	280	306	350	374	397	420	
87.8	168	201	270	297	324	372	397	421	446	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°C)	35.0	53	56	60	38	40	42	44	46
	37.8	71	76	81	62	65	68	72	75
	40.6	90	96	102	86	91	95	99	104
	43.3	108	115	122	110	115	121	126	132
	46.1	126	134	143	134	140	147	154	161
	48.9	144	154	163	158	166	174	181	189
	51.7	163	173	184	182	191	200	209	218
	54.4	181	193	205	206	216	226	237	247
	57.2	199	212	226	230	241	253	264	276
	60.0	218	233	247	254	266	279	292	304
	62.8	236	251	267	278	291	305	319	333
	65.6	254	271	288	301	316	331	346	361
	68.3	271	289	307	325	342	358	374	391
	71.1	289	309	328	349	366	384	401	419
	73.9	308	328	349	374	393	411	430	449
	76.7	327	349	370	397	417	437	457	477
79.4	346	369	392	421	442	463	484	505	
82.2	365	390	414	445	467	490	512	534	
85.0	388	414	440	469	493	516	540	563	
87.8	411	438	465	493	518	543	567	592	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN 50/50 ETHYLENE TEMPERATURE (°C)	35.0	49	52	55	34	36	38	40	41
	37.8	67	71	76	58	61	64	67	70
	40.6	85	91	97	82	86	91	95	99
	43.3	103	110	117	105	111	116	121	127
	46.1	121	130	138	129	136	142	148	155
	48.9	140	149	159	153	161	168	176	184
	51.7	159	169	180	177	186	195	204	213
	54.4	177	189	201	202	212	222	232	242
	57.2	196	209	222	226	237	249	260	271
	60.0	216	231	245	251	264	276	289	301
	62.8	234	250	266	276	290	304	318	331
	65.6	254	271	288	301	316	331	346	361
	68.3	273	291	309	327	343	360	376	392
	71.1	292	312	331	353	370	388	405	423
	73.9	312	333	354	380	399	418	437	456
	76.7	333	356	378	405	425	446	466	486
79.4	355	379	402	432	453	475	496	518	
82.2	376	402	427	459	481	504	527	550	
85.0	402	429	456	486	510	534	558	583	
87.8	427	456	484	513	539	564	590	616	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN 50/50 PROPYLENE TEMPERATURE (°C)	35.0	38	40	43	25	26	27	28	30
	37.8	56	60	64	48	51	53	55	58
	40.6	75	80	85	72	75	79	83	86
	43.3	93	99	105	94	99	104	109	113
	46.1	111	118	126	118	124	130	135	141
	48.9	130	139	147	142	149	156	163	170
	51.7	148	158	168	165	174	182	190	198
	54.4	166	178	189	189	199	208	218	227
	57.2	185	198	210	214	224	235	246	256
	60.0	205	219	233	238	250	262	274	286
	62.8	224	239	254	264	277	290	303	316
	65.6	244	260	276	289	303	318	332	347
	68.3	263	281	298	316	331	347	363	379
	71.1	284	303	321	342	359	376	393	410
	73.9	305	325	345	370	389	407	426	444
	76.7	327	349	370	397	417	437	457	477
79.4	348	371	394	423	444	466	487	508	
82.2	369	394	418	450	472	495	517	540	
85.0	394	421	447	476	500	524	548	572	
87.8	419	447	475	503	528	553	579	604	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°C)	35.0	45	47	49	50	52	54
	37.8	74	77	80	83	86	89
	40.6	103	107	112	116	120	124
	43.3	131	137	142	147	152	158
	46.1	160	166	173	179	186	192
	48.9	189	196	204	212	219	227
	51.7	218	226	235	244	252	261
	54.4	246	256	266	276	286	296
	57.2	275	286	297	308	319	330
	60.0	304	316	328	340	353	365
	62.8	333	346	359	373	386	399
	65.6	361	375	389	404	418	433
	68.3	390	406	421	437	453	468
	71.1	419	436	453	470	486	503
	73.9	448	466	484	502	520	538
	76.7	476	495	514	533	552	571
79.4	505	525	545	565	586	606	
82.2	534	555	576	598	619	640	
85.0	563	586	609	631	654	676	
87.8	591	615	639	662	686	710	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN 50/50 ETHYLENE TEMPERATURE (°C)	35.0	41	42	44	46	47	49
	37.8	70	72	75	78	81	83
	40.6	98	102	106	110	114	118
	43.3	126	131	136	141	146	151
	46.1	154	161	167	173	179	185
	48.9	183	191	198	205	212	220
	51.7	212	221	229	238	246	255
	54.4	241	251	261	270	280	290
	57.2	271	282	293	304	314	325
	60.0	301	313	325	337	349	361
	62.8	331	344	357	371	384	397
	65.6	361	375	389	404	418	433
	68.3	392	408	424	439	455	471
	71.1	423	440	457	474	491	508
	73.9	455	473	491	509	528	546
	76.7	485	505	524	544	563	583
79.4	517	538	559	580	600	621	
82.2	550	572	594	616	638	660	
85.0	583	606	630	653	676	700	
87.8	615	640	664	689	713	738	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN 50/50 PROPYLENE TEMPERATURE (°C)	35.0	29	30	31	33	34	35
	37.8	57	60	62	64	67	69
	40.6	86	89	93	96	99	103
	43.3	113	117	122	126	131	136
	46.1	141	147	152	158	163	169
	48.9	170	177	184	190	197	204
	51.7	198	206	214	222	230	238
	54.4	227	236	245	254	263	272
	57.2	256	266	276	287	297	307
	60.0	286	297	309	320	331	343
	62.8	316	329	341	354	367	379
	65.6	346	360	374	388	402	415
	68.3	378	394	409	424	439	454
	71.1	411	427	444	460	477	493
	73.9	444	461	479	497	515	532
	76.7	476	495	514	533	552	571
79.4	507	528	548	568	588	609	
82.2	539	561	582	604	625	647	
85.0	572	595	618	641	663	686	
87.8	603	627	651	676	700	724	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°C)	35.0	50	52	53	55	57	58	60
	37.8	83	86	89	92	94	97	100
	40.6	117	120	124	128	132	136	140
	43.3	149	154	159	164	168	173	178
	46.1	182	188	194	200	206	212	218
	48.9	214	221	229	236	243	250	257
	51.7	247	255	264	272	280	289	297
	54.4	280	289	299	308	317	327	336
	57.2	313	323	334	344	355	365	376
	60.0	346	357	369	381	392	404	415
	62.8	379	391	404	417	429	442	455
	65.6	412	425	439	453	466	480	494
	68.3	445	460	475	490	504	520	534
	71.1	477	493	509	525	541	557	573
	73.9	511	527	545	562	578	596	613
	76.7	543	561	580	598	616	634	652
79.4	576	595	615	634	653	672	691	
82.2	609	629	649	670	690	710	730	
85.0	642	663	685	707	728	750	771	
87.8	675	697	720	742	765	788	810	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN 50/50 ETHYLENE TEMPERATURE (°C)	35.0	45	47	48	50	51	53	54
	37.8	78	81	83	86	89	91	94
	40.6	111	115	118	122	126	130	133
	43.3	143	147	152	157	162	167	171
	46.1	175	181	187	193	198	204	210
	48.9	208	215	222	229	236	243	250
	51.7	241	249	257	265	273	281	289
	54.4	275	284	293	302	311	320	329
	57.2	308	319	329	339	349	360	370
	60.0	342	354	365	377	388	400	411
	62.8	377	389	402	415	427	440	452
	65.6	412	425	439	453	466	480	494
	68.3	447	462	477	492	507	522	537
	71.1	482	498	515	530	546	563	579
	73.9	518	535	553	570	587	605	622
	76.7	554	572	591	610	628	647	665
79.4	590	610	630	649	669	689	708	
82.2	627	648	669	690	710	732	752	
85.0	665	687	709	731	753	776	798	
87.8	702	725	749	772	795	819	842	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN 50/50 PROPYLENE TEMPERATURE (°C)	35.0	32	33	34	35	36	37	39
	37.8	64	67	69	71	73	75	77
	40.6	97	100	103	106	110	113	116
	43.3	128	132	136	141	145	149	153
	46.1	160	165	170	176	181	186	192
	48.9	193	199	206	212	219	225	232
	51.7	225	232	240	248	255	263	270
	54.4	258	266	275	284	292	301	309
	57.2	291	301	311	320	330	340	349
	60.0	325	336	347	358	368	380	390
	62.8	360	372	384	396	408	420	432
	65.6	395	408	422	435	448	461	474
	68.3	432	446	461	475	489	504	518
	71.1	468	483	499	515	530	546	562
	73.9	505	522	539	556	573	590	607
	76.7	543	561	580	598	616	634	652
79.4	579	598	618	637	656	675	695	
82.2	615	635	656	676	696	717	738	
85.0	652	673	696	717	739	761	782	
87.8	688	711	735	757	780	803	826	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°C)	35.0	12	15	8	9	10	13	14	15	15
	37.8	20	25	22	24	26	32	34	36	38
	40.6	29	34	36	39	43	50	54	57	60
	43.3	36	44	49	54	58	68	73	77	82
	46.1	44	53	62	68	75	87	93	98	104
	48.9	52	63	76	83	91	105	112	119	126
	51.7	60	72	89	98	107	124	132	140	148
	54.4	68	82	102	113	123	142	152	161	171
	57.2	76	91	116	128	139	161	171	182	193
	60.0	84	101	129	142	155	179	191	203	215
	62.8	92	111	143	157	171	197	211	224	237
	65.6	100	120	156	172	188	216	230	245	259
	68.3	108	130	170	187	204	237	252	268	284
	71.1	116	140	183	202	220	253	270	287	303
	73.9	124	149	197	217	237	271	289	307	325
	76.7	132	158	210	231	252	290	310	329	348
	79.4	140	168	224	246	269	308	328	349	369
82.2	148	178	237	260	284	327	349	370	392	
85.0	156	187	251	276	301	345	368	391	414	
87.8	164	197	264	291	317	364	389	413	437	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	11	14	7	8	9	11	12	13	14
	37.8	20	24	21	23	25	30	32	34	36
	40.6	28	33	35	38	41	49	52	55	59
	43.3	36	43	48	52	57	67	71	76	80
	46.1	44	52	61	67	73	85	91	97	103
	48.9	52	62	75	82	90	104	111	118	125
	51.7	60	72	89	97	106	123	131	139	148
	54.4	68	82	102	113	123	142	152	161	171
	57.2	77	92	117	128	140	161	172	183	194
	60.0	85	102	131	144	157	181	193	205	217
	62.8	94	112	145	160	174	200	214	227	241
	65.6	102	123	159	175	191	220	235	250	264
	68.3	111	133	174	191	209	242	259	275	291
	71.1	120	144	189	208	227	260	278	295	313
	73.9	128	154	204	224	245	281	299	318	337
	76.7	137	164	218	240	262	302	322	342	362
	79.4	147	176	234	258	281	322	343	364	386
82.2	155	187	248	273	298	343	366	389	412	
85.0	164	197	265	291	318	364	389	413	437	
87.8	174	209	280	308	336	386	412	438	464	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	10	13	6	7	7	10	10	11	12
	37.8	19	22	20	22	23	28	30	32	34
	40.6	27	32	33	36	40	47	50	53	56
	43.3	35	41	46	51	55	65	69	73	78
	46.1	43	51	60	66	72	83	89	94	100
	48.9	51	61	73	81	88	102	109	116	122
	51.7	59	71	87	96	105	121	129	137	145
	54.4	68	81	101	112	122	141	150	159	169
	57.2	76	91	116	128	139	161	171	182	193
	60.0	85	102	131	144	157	181	193	205	217
	62.8	94	113	146	160	175	201	215	228	242
	65.6	103	124	161	177	193	222	237	252	267
	68.3	112	135	177	194	212	246	262	279	295
	71.1	122	147	192	212	231	266	283	301	319
	73.9	131	158	209	230	251	287	307	326	345
	76.7	141	169	224	247	269	311	332	352	373
	79.4	152	182	242	266	290	332	355	377	399
82.2	161	194	258	284	309	356	380	404	428	
85.0	171	206	276	304	331	380	405	430	456	
87.8	183	219	294	323	352	405	432	458	485	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°C)	35.0	53	56	60	38	40	42	44	46
	37.8	71	76	81	62	65	68	72	75
	40.6	90	96	102	86	91	95	99	104
	43.3	108	115	122	110	115	121	126	132
	46.1	126	134	143	134	140	147	154	161
	48.9	144	154	163	158	166	174	181	189
	51.7	163	173	184	182	191	200	209	218
	54.4	181	193	205	206	216	226	237	247
	57.2	199	212	226	230	241	253	264	276
	60.0	218	233	247	254	266	279	292	304
	62.8	236	251	267	278	291	305	319	333
	65.6	254	271	288	301	316	331	346	361
	68.3	271	289	307	325	342	358	374	391
	71.1	289	309	328	349	366	384	401	419
	73.9	308	328	349	374	393	411	430	449
	76.7	327	349	370	397	417	437	457	477
	79.4	346	369	392	421	442	463	484	505
82.2	365	390	414	445	467	490	512	534	
85.0	388	414	440	469	493	516	540	563	
87.8	411	438	465	493	518	543	567	592	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	50	53	56	35	37	39	40	42
	37.8	68	73	78	60	63	66	69	72
	40.6	87	93	99	84	88	92	97	101
	43.3	105	112	119	108	113	118	124	129
	46.1	124	132	141	132	138	145	152	158
	48.9	143	152	162	156	164	172	180	187
	51.7	162	173	183	181	190	199	208	217
	54.4	181	193	205	206	216	226	237	247
	57.2	200	213	227	231	242	254	265	277
	60.0	220	235	250	256	269	282	295	307
	62.8	239	255	271	282	296	310	324	338
	65.6	259	276	293	307	322	338	353	368
	68.3	278	297	315	334	350	367	384	400
	71.1	298	318	338	360	377	395	413	431
	73.9	318	340	361	387	406	426	445	465
	76.7	340	363	385	413	434	454	475	496
	79.4	362	386	410	440	462	484	506	528
82.2	384	409	435	467	491	514	538	561	
85.0	410	437	464	495	520	545	569	594	
87.8	435	464	493	523	549	575	601	627	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	46	49	52	32	34	35	37	38
	37.8	65	69	74	56	59	62	65	68
	40.6	84	90	95	81	85	89	93	97
	43.3	102	109	116	104	110	115	120	125
	46.1	121	129	137	128	135	141	148	154
	48.9	140	149	159	153	161	168	176	184
	51.7	159	170	181	178	187	196	205	214
	54.4	179	191	203	204	214	224	234	244
	57.2	199	212	226	230	241	253	264	276
	60.0	220	235	250	256	269	282	295	307
	62.8	240	256	272	283	297	311	326	340
	65.6	261	279	296	310	325	341	356	372
	68.3	282	301	320	338	355	372	389	406
	71.1	304	324	344	366	385	403	421	440
	73.9	326	348	370	396	416	436	456	476
	76.7	350	373	396	425	446	467	489	510
	79.4	374	399	424	455	478	500	523	546
82.2	398	425	451	485	510	534	558	582	
85.0	427	456	484	516	542	568	594	619	
87.8	456	486	516	548	575	602	630	657	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°C)	35.0	45	47	49	50	52	54
	37.8	74	77	80	83	86	89
	40.6	103	107	112	116	120	124
	43.3	131	137	142	147	152	158
	46.1	160	166	173	179	186	192
	48.9	189	196	204	212	219	227
	51.7	218	226	235	244	252	261
	54.4	246	256	266	276	286	296
	57.2	275	286	297	308	319	330
	60.0	304	316	328	340	353	365
	62.8	333	346	359	373	386	399
	65.6	361	375	389	404	418	433
	68.3	390	406	421	437	453	468
	71.1	419	436	453	470	486	503
	73.9	448	466	484	502	520	538
	76.7	476	495	514	533	552	571
79.4	505	525	545	565	586	606	
82.2	534	555	576	598	619	640	
85.0	563	586	609	631	654	676	
87.8	591	615	639	662	686	710	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	42	43	45	47	48	50
	37.8	71	74	77	80	82	85
	40.6	100	104	108	112	116	120
	43.3	129	134	139	144	149	154
	46.1	158	164	170	177	183	189
	48.9	187	194	202	209	217	224
	51.7	217	225	234	242	251	260
	54.4	246	256	266	276	286	296
	57.2	277	288	299	310	321	332
	60.0	307	319	331	344	356	368
	62.8	338	351	365	378	392	405
	65.6	368	382	397	412	427	441
	68.3	400	416	432	448	464	480
	71.1	432	449	466	484	501	518
	73.9	464	482	501	519	538	556
	76.7	495	515	535	554	574	594
79.4	528	549	570	591	612	633	
82.2	560	583	605	628	650	672	
85.0	594	618	642	666	690	713	
87.8	627	652	677	702	727	752	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	38	39	41	43	44	46
	37.8	67	70	73	75	78	81
	40.6	97	100	104	108	112	116
	43.3	125	130	135	140	145	150
	46.1	154	160	166	172	178	184
	48.9	183	191	198	205	212	220
	51.7	213	222	230	239	247	256
	54.4	244	254	263	273	283	293
	57.2	275	286	297	308	319	330
	60.0	307	319	331	344	356	368
	62.8	339	353	366	380	394	407
	65.6	371	386	401	416	431	446
	68.3	406	422	438	454	471	487
	71.1	440	458	475	493	511	528
	73.9	475	494	513	532	551	570
	76.7	509	530	550	570	591	611
79.4	545	567	589	611	632	654	
82.2	582	605	628	651	675	698	
85.0	620	645	669	694	719	744	
87.8	656	683	709	735	761	788	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°C)	35.0	50	52	53	55	57	58	60
	37.8	83	86	89	92	94	97	100
	40.6	117	120	124	128	132	136	140
	43.3	149	154	159	164	168	173	178
	46.1	182	188	194	200	206	212	218
	48.9	214	221	229	236	243	250	257
	51.7	247	255	264	272	280	289	297
	54.4	280	289	299	308	317	327	336
	57.2	313	323	334	344	355	365	376
	60.0	346	357	369	381	392	404	415
	62.8	379	391	404	417	429	442	455
	65.6	412	425	439	453	466	480	494
	68.3	445	460	475	490	504	520	534
	71.1	477	493	509	525	541	557	573
	73.9	511	527	545	562	578	596	613
	76.7	543	561	580	598	616	634	652
	79.4	576	595	615	634	653	672	691
82.2	609	629	649	670	690	710	730	
85.0	642	663	685	707	728	750	771	
87.8	675	697	720	742	765	788	810	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (40% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	46	48	49	51	52	54	56
	37.8	80	82	85	88	90	93	96
	40.6	113	117	121	125	128	132	136
	43.3	146	150	155	160	165	170	175
	46.1	179	185	191	197	203	209	215
	48.9	212	219	226	234	241	248	255
	51.7	246	254	263	271	279	287	295
	54.4	280	289	299	308	317	327	336
	57.2	315	325	336	346	356	367	378
	60.0	349	361	373	384	396	408	419
	62.8	385	397	410	423	436	449	461
	65.6	420	434	448	462	476	490	504
	68.3	456	471	487	502	517	533	548
	71.1	492	508	525	541	557	574	590
	73.9	528	546	564	581	599	617	634
	76.7	565	584	603	621	640	659	678
	79.4	602	622	642	662	682	702	722
82.2	639	660	682	703	724	746	767	
85.0	678	700	723	745	768	791	813	
87.8	715	739	763	787	811	835	859	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (40% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	42	43	45	46	48	49	50
	37.8	76	78	81	83	86	88	91
	40.6	109	113	116	120	123	127	131
	43.3	141	146	151	155	160	165	169
	46.1	174	180	186	192	197	203	209
	48.9	208	215	222	229	236	243	250
	51.7	242	250	259	267	275	283	291
	54.4	277	287	296	305	314	324	333
	57.2	313	323	334	344	355	365	376
	60.0	349	361	373	384	396	408	419
	62.8	386	399	412	425	438	451	464
	65.6	424	438	452	466	480	495	509
	68.3	463	478	494	509	525	540	556
	71.1	501	518	535	551	568	585	602
	73.9	541	559	577	595	613	632	649
	76.7	581	600	620	639	659	678	698
	79.4	622	643	664	684	705	726	746
82.2	663	685	708	730	752	774	796	
85.0	707	730	754	777	800	825	848	
87.8	749	774	799	824	849	874	899	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°C)	35.0	12	15	8	9	10	13	14	15	15
	37.8	20	25	22	24	26	32	34	36	38
	40.6	29	34	36	39	43	50	54	57	60
	43.3	36	44	49	54	58	68	73	77	82
	46.1	44	53	62	68	75	87	93	98	104
	48.9	52	63	76	83	91	105	112	119	126
	51.7	60	72	89	98	107	124	132	140	148
	54.4	68	82	102	113	123	142	152	161	171
	57.2	76	91	116	128	139	161	171	182	193
	60.0	84	101	129	142	155	179	191	203	215
	62.8	92	111	143	157	171	197	211	224	237
	65.6	100	120	156	172	188	216	230	245	259
	68.3	108	130	170	187	204	237	252	268	284
	71.1	116	140	183	202	220	253	270	287	303
	73.9	124	149	197	217	237	271	289	307	325
	76.7	132	158	210	231	252	290	310	329	348
	79.4	140	168	224	246	269	308	328	349	369
82.2	148	178	237	260	284	327	349	370	392	
85.0	156	187	251	276	301	345	368	391	414	
87.8	164	197	264	291	317	364	389	413	437	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	12	14	7	8	9	11	12	13	14
	37.8	20	24	21	23	25	30	32	34	36
	40.6	28	34	35	38	42	49	53	56	59
	43.3	36	43	48	53	58	68	72	77	81
	46.1	44	53	62	68	74	86	92	98	104
	48.9	52	63	76	83	91	105	112	119	126
	51.7	61	73	89	98	107	124	133	141	149
	54.4	69	83	104	114	124	144	153	163	172
	57.2	77	93	118	129	141	163	174	185	196
	60.0	86	103	132	145	158	183	195	207	219
	62.8	95	113	146	161	176	202	216	229	243
	65.6	103	124	161	177	193	222	237	252	267
	68.3	112	134	176	193	211	245	261	277	294
	71.1	121	145	191	210	229	263	281	298	316
	73.9	130	156	206	227	247	283	302	321	340
	76.7	138	166	220	242	264	305	325	346	366
	79.4	148	178	236	260	284	325	346	368	390
82.2	157	188	251	276	301	347	370	393	416	
85.0	166	199	267	294	321	368	392	417	441	
87.8	176	211	283	311	340	390	416	442	468	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	11	13	7	7	8	11	11	12	13
	37.8	19	23	21	22	25	30	32	34	36
	40.6	28	33	34	37	41	49	52	55	58
	43.3	36	43	48	52	57	67	71	76	80
	46.1	44	53	61	67	74	86	91	97	103
	48.9	52	62	75	83	90	105	112	119	126
	51.7	60	72	89	98	107	124	132	140	148
	54.4	69	82	103	113	124	143	152	162	171
	57.2	77	93	117	129	141	163	173	184	195
	60.0	86	103	132	145	158	183	195	207	219
	62.8	95	114	147	161	176	203	217	230	244
	65.6	104	124	162	178	194	224	238	253	268
	68.3	113	136	177	195	213	247	264	280	297
	71.1	123	147	193	213	232	267	285	302	320
	73.9	132	159	210	231	252	289	308	327	347
	76.7	142	170	225	248	270	312	333	354	375
	79.4	152	183	243	267	292	334	356	378	401
82.2	162	195	259	285	311	358	382	406	430	
85.0	173	207	278	306	334	382	408	433	459	
87.8	183	220	295	324	354	406	434	460	488	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°C)	35.0	53	56	60	38	40	42	44	46
	37.8	71	76	81	62	65	68	72	75
	40.6	90	96	102	86	91	95	99	104
	43.3	108	115	122	110	115	121	126	132
	46.1	126	134	143	134	140	147	154	161
	48.9	144	154	163	158	166	174	181	189
	51.7	163	173	184	182	191	200	209	218
	54.4	181	193	205	206	216	226	237	247
	57.2	199	212	226	230	241	253	264	276
	60.0	218	233	247	254	266	279	292	304
	62.8	236	251	267	278	291	305	319	333
	65.6	254	271	288	301	316	331	346	361
	68.3	271	289	307	325	342	358	374	391
	71.1	289	309	328	349	366	384	401	419
	73.9	308	328	349	374	393	411	430	449
	76.7	327	349	370	397	417	437	457	477
	79.4	346	369	392	421	442	463	484	505
82.2	365	390	414	445	467	490	512	534	
85.0	388	414	440	469	493	516	540	563	
87.8	411	438	465	493	518	543	567	592	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	50	53	57	36	37	39	41	43
	37.8	69	74	78	60	63	66	69	72
	40.6	88	94	100	85	89	93	98	102
	43.3	106	114	121	109	114	120	125	130
	46.1	125	134	142	133	140	146	153	160
	48.9	144	154	163	158	166	174	181	189
	51.7	163	174	185	183	192	201	210	219
	54.4	183	195	207	208	218	228	239	249
	57.2	202	216	229	233	245	256	268	280
	60.0	223	238	252	259	272	285	297	310
	62.8	241	258	274	284	299	313	327	341
	65.6	261	279	296	310	325	341	356	372
	68.3	281	299	318	337	354	371	387	404
	71.1	301	321	341	363	381	399	417	436
	73.9	322	343	364	391	410	430	449	469
	76.7	343	366	389	417	438	459	480	500
	79.4	365	390	414	444	467	489	511	533
82.2	387	413	439	472	495	519	543	566	
85.0	414	441	469	500	525	550	575	600	
87.8	439	469	498	528	554	581	607	633	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	49	52	55	34	36	38	39	41
	37.8	68	72	77	59	62	65	68	71
	40.6	87	93	99	84	88	92	96	101
	43.3	105	112	119	108	113	118	124	129
	46.1	124	133	141	132	139	145	152	159
	48.9	144	153	163	157	165	173	181	188
	51.7	163	173	184	182	191	200	209	218
	54.4	182	194	206	207	217	227	238	248
	57.2	202	215	228	232	244	256	267	279
	60.0	223	238	252	259	272	285	297	310
	62.8	242	258	274	285	299	314	328	342
	65.6	263	280	298	311	327	343	358	374
	68.3	283	302	321	340	357	374	391	408
	71.1	305	326	346	368	387	405	423	442
	73.9	328	350	371	398	418	438	458	478
	76.7	351	375	398	427	448	470	491	512
	79.4	376	401	426	457	480	503	525	548
82.2	400	427	453	487	512	536	561	585	
85.0	430	459	488	520	546	572	598	624	
87.8	458	488	519	550	577	605	632	660	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°C)	35.0	45	47	49	50	52	54
	37.8	74	77	80	83	86	89
	40.6	103	107	112	116	120	124
	43.3	131	137	142	147	152	158
	46.1	160	166	173	179	186	192
	48.9	189	196	204	212	219	227
	51.7	218	226	235	244	252	261
	54.4	246	256	266	276	286	296
	57.2	275	286	297	308	319	330
	60.0	304	316	328	340	353	365
	62.8	333	346	359	373	386	399
	65.6	361	375	389	404	418	433
	68.3	390	406	421	437	453	468
	71.1	419	436	453	470	486	503
	73.9	448	466	484	502	520	538
	76.7	476	495	514	533	552	571
79.4	505	525	545	565	586	606	
82.2	534	555	576	598	619	640	
85.0	563	586	609	631	654	676	
87.8	591	615	639	662	686	710	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	42	44	46	47	49	51
	37.8	72	75	78	80	83	86
	40.6	101	105	110	114	118	122
	43.3	130	135	140	146	151	156
	46.1	159	166	172	178	185	191
	48.9	189	196	204	212	219	227
	51.7	219	227	236	245	254	262
	54.4	249	259	269	279	289	299
	57.2	279	290	302	313	324	335
	60.0	310	322	335	347	360	372
	62.8	341	355	368	382	396	409
	65.6	371	386	401	416	431	446
	68.3	404	420	436	452	468	485
	71.1	436	453	471	488	506	523
	73.9	468	487	506	524	543	562
	76.7	500	520	540	560	580	600
79.4	533	554	575	596	618	639	
82.2	566	588	611	634	656	679	
85.0	600	624	648	672	696	720	
87.8	633	658	683	709	734	759	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	41	42	44	45	47	49
	37.8	70	73	76	79	82	84
	40.6	100	104	108	112	116	120
	43.3	129	134	139	144	149	154
	46.1	158	164	171	177	183	190
	48.9	188	195	203	210	218	225
	51.7	218	226	235	244	252	261
	54.4	248	258	267	277	287	297
	57.2	279	290	301	312	323	334
	60.0	310	322	335	347	360	372
	62.8	342	355	369	383	396	410
	65.6	373	388	403	418	433	448
	68.3	408	424	440	457	473	489
	71.1	442	460	478	495	513	531
	73.9	477	496	515	534	554	573
	76.7	512	532	553	573	594	614
79.4	548	570	592	613	635	657	
82.2	584	608	631	654	678	701	
85.0	624	649	674	699	724	749	
87.8	659	686	712	738	765	791	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°C)	35.0	50	52	53	55	57	58	60
	37.8	83	86	89	92	94	97	100
	40.6	117	120	124	128	132	136	140
	43.3	149	154	159	164	168	173	178
	46.1	182	188	194	200	206	212	218
	48.9	214	221	229	236	243	250	257
	51.7	247	255	264	272	280	289	297
	54.4	280	289	299	308	317	327	336
	57.2	313	323	334	344	355	365	376
	60.0	346	357	369	381	392	404	415
	62.8	379	391	404	417	429	442	455
	65.6	412	425	439	453	466	480	494
	68.3	445	460	475	490	504	520	534
	71.1	477	493	509	525	541	557	573
	73.9	511	527	545	562	578	596	613
	76.7	543	561	580	598	616	634	652
	79.4	576	595	615	634	653	672	691
82.2	609	629	649	670	690	710	730	
85.0	642	663	685	707	728	750	771	
87.8	675	697	720	742	765	788	810	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (35% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	47	48	50	51	53	55	56
	37.8	81	83	86	89	91	94	97
	40.6	115	118	122	126	130	134	137
	43.3	147	152	157	162	167	172	177
	46.1	181	187	193	199	205	211	217
	48.9	214	221	229	236	243	250	257
	51.7	249	257	265	273	282	290	298
	54.4	283	292	302	311	321	330	340
	57.2	318	328	339	350	360	371	381
	60.0	353	365	377	388	400	412	423
	62.8	388	401	414	427	440	453	466
	65.6	424	438	452	466	480	495	509
	68.3	461	476	492	507	522	538	553
	71.1	497	513	530	546	563	580	596
	73.9	534	551	569	587	605	623	640
	76.7	570	589	609	627	646	666	685
	79.4	608	628	648	668	688	709	729
82.2	645	666	688	710	731	753	774	
85.0	684	707	730	752	775	798	821	
87.8	722	746	771	794	818	843	867	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (35% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	45	46	48	49	51	52	54
	37.8	79	82	84	87	89	92	95
	40.6	113	117	120	124	128	132	135
	43.3	146	150	155	160	165	170	175
	46.1	179	185	191	197	203	209	215
	48.9	213	220	228	235	242	249	256
	51.7	247	255	264	272	280	289	297
	54.4	282	291	300	310	319	329	338
	57.2	317	327	338	349	359	370	380
	60.0	353	365	377	388	400	412	423
	62.8	389	402	415	428	441	454	467
	65.6	426	440	455	469	483	497	511
	68.3	465	481	496	512	527	543	558
	71.1	504	520	538	554	571	588	605
	73.9	544	562	580	598	616	635	653
	76.7	584	603	623	642	662	682	701
	79.4	625	646	667	687	708	729	750
82.2	666	688	711	733	755	778	800	
85.0	711	735	759	782	806	830	854	
87.8	753	777	803	828	853	878	903	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN WATER TEMPERATURE (°C)	35.0	12	15	8	9	10	13	14	15	15
	37.8	20	25	22	24	26	32	34	36	38
	40.6	29	34	36	39	43	50	54	57	60
	43.3	36	44	49	54	58	68	73	77	82
	46.1	44	53	62	68	75	87	93	98	104
	48.9	52	63	76	83	91	105	112	119	126
	51.7	60	72	89	98	107	124	132	140	148
	54.4	68	82	102	113	123	142	152	161	171
	57.2	76	91	116	128	139	161	171	182	193
	60.0	84	101	129	142	155	179	191	203	215
	62.8	92	111	143	157	171	197	211	224	237
	65.6	100	120	156	172	188	216	230	245	259
	68.3	108	130	170	187	204	237	252	268	284
	71.1	116	140	183	202	220	253	270	287	303
	73.9	124	149	197	217	237	271	289	307	325
	76.7	132	158	210	231	252	290	310	329	348
	79.4	140	168	224	246	269	308	328	349	369
82.2	148	178	237	260	284	327	349	370	392	
85.0	156	187	251	276	301	345	368	391	414	
87.8	164	197	264	291	317	364	389	413	437	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	12	14	7	8	9	12	12	13	14
	37.8	20	24	21	23	26	31	33	35	37
	40.6	28	34	35	39	42	50	53	56	60
	43.3	36	44	49	54	58	68	73	77	82
	46.1	45	53	62	69	75	87	93	99	105
	48.9	53	63	76	84	92	106	113	120	127
	51.7	61	73	90	99	108	126	134	142	151
	54.4	70	84	105	115	125	145	155	164	174
	57.2	78	94	119	131	143	165	176	187	198
	60.0	87	104	133	147	160	184	197	209	221
	62.8	95	115	148	163	177	204	218	232	245
	65.6	104	125	163	179	195	225	240	255	270
	68.3	113	136	177	195	213	247	264	280	297
	71.1	122	147	192	212	231	266	283	301	319
	73.9	131	157	208	229	250	286	305	324	343
	76.7	140	168	222	244	267	308	328	349	369
	79.4	150	179	239	262	286	328	350	371	393
82.2	158	190	253	278	304	350	373	396	420	
85.0	167	201	270	297	324	371	396	421	445	
87.8	178	213	286	314	343	394	420	446	472	

PANEL WIDTH		150mm PANEL		300mm PANEL			450mm PANEL			
PASSES		1	2	2	3	4	3	4	5	6
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	12	14	7	8	9	12	12	13	14
	37.8	20	24	21	24	26	31	33	35	37
	40.6	29	34	36	39	43	50	54	57	60
	43.3	37	44	49	54	59	69	74	78	83
	46.1	45	54	63	69	76	88	94	100	106
	48.9	53	64	77	85	93	107	114	122	129
	51.7	61	74	91	100	109	126	135	143	151
	54.4	70	84	105	115	125	145	155	164	174
	57.2	78	94	119	131	143	165	176	187	198
	60.0	87	104	133	147	160	184	197	209	221
	62.8	95	115	148	163	177	204	218	232	245
	65.6	104	125	163	179	195	225	240	255	270
	68.3	114	136	178	196	214	248	265	281	298
	71.1	123	148	194	214	233	268	286	304	322
	73.9	133	159	211	232	253	290	310	329	348
	76.7	142	171	226	249	272	314	335	355	376
	79.4	153	184	244	269	293	335	358	380	402
82.2	163	195	260	286	312	360	384	408	432	
85.0	174	208	280	308	336	385	411	436	462	
87.8	184	221	296	326	355	408	435	463	490	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN WATER TEMPERATURE (°C)	35.0	53	56	60	38	40	42	44	46
	37.8	71	76	81	62	65	68	72	75
	40.6	90	96	102	86	91	95	99	104
	43.3	108	115	122	110	115	121	126	132
	46.1	126	134	143	134	140	147	154	161
	48.9	144	154	163	158	166	174	181	189
	51.7	163	173	184	182	191	200	209	218
	54.4	181	193	205	206	216	226	237	247
	57.2	199	212	226	230	241	253	264	276
	60.0	218	233	247	254	266	279	292	304
	62.8	236	251	267	278	291	305	319	333
	65.6	254	271	288	301	316	331	346	361
	68.3	271	289	307	325	342	358	374	391
	71.1	289	309	328	349	366	384	401	419
	73.9	308	328	349	374	393	411	430	449
	76.7	327	349	370	397	417	437	457	477
	79.4	346	369	392	421	442	463	484	505
82.2	365	390	414	445	467	490	512	534	
85.0	388	414	440	469	493	516	540	563	
87.8	411	438	465	493	518	543	567	592	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	51	54	57	36	38	40	41	43
	37.8	70	75	79	61	64	67	70	73
	40.6	89	95	101	86	90	94	99	103
	43.3	108	115	122	110	115	121	126	132
	46.1	127	135	143	134	141	148	155	161
	48.9	146	155	165	159	167	175	183	191
	51.7	165	176	187	184	194	203	212	221
	54.4	184	197	209	210	220	231	241	252
	57.2	204	218	231	235	247	259	271	282
	60.0	225	240	255	261	274	287	300	313
	62.8	244	260	276	287	302	316	330	345
	65.6	264	282	299	313	329	344	360	376
	68.3	283	302	321	340	357	374	391	408
	71.1	304	324	344	366	385	403	421	440
	73.9	325	346	368	395	414	434	454	474
	76.7	347	370	393	421	442	463	484	505
	79.4	369	393	418	449	471	493	516	538
82.2	391	417	443	476	500	524	548	572	
85.0	418	446	473	504	530	555	580	605	
87.8	443	473	503	533	559	586	613	639	

PANEL WIDTH		500mm PANEL			600mm PANEL				
PASSES		4	5	6	4	5	6	7	8
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	51	55	58	36	38	40	42	44
	37.8	71	75	80	62	65	68	71	74
	40.6	90	96	102	87	91	95	100	104
	43.3	109	116	123	111	116	122	128	133
	46.1	128	136	145	136	143	149	156	163
	48.9	147	157	167	161	169	177	185	193
	51.7	166	177	188	185	195	204	213	222
	54.4	184	197	209	210	220	231	241	252
	57.2	204	218	231	235	247	259	271	282
	60.0	225	240	255	261	274	287	300	313
	62.8	244	260	276	287	302	316	330	345
	65.6	264	282	299	313	329	344	360	376
	68.3	285	304	323	342	359	376	393	410
	71.1	307	327	348	370	388	407	425	444
	73.9	329	351	373	400	420	440	460	480
	76.7	353	377	400	429	450	472	493	515
	79.4	377	403	428	459	482	505	528	551
82.2	402	429	455	490	514	539	563	588	
85.0	433	462	491	523	549	575	602	628	
87.8	460	491	521	552	580	608	635	663	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN WATER TEMPERATURE (°C)	35.0	45	47	49	50	52	54
	37.8	74	77	80	83	86	89
	40.6	103	107	112	116	120	124
	43.3	131	137	142	147	152	158
	46.1	160	166	173	179	186	192
	48.9	189	196	204	212	219	227
	51.7	218	226	235	244	252	261
	54.4	246	256	266	276	286	296
	57.2	275	286	297	308	319	330
	60.0	304	316	328	340	353	365
	62.8	333	346	359	373	386	399
	65.6	361	375	389	404	418	433
	68.3	390	406	421	437	453	468
	71.1	419	436	453	470	486	503
	73.9	448	466	484	502	520	538
	76.7	476	495	514	533	552	571
79.4	505	525	545	565	586	606	
82.2	534	555	576	598	619	640	
85.0	563	586	609	631	654	676	
87.8	591	615	639	662	686	710	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	43	44	46	48	49	51
	37.8	73	75	78	81	84	87
	40.6	102	107	111	115	119	123
	43.3	131	137	142	147	152	158
	46.1	161	167	174	180	187	193
	48.9	191	198	206	214	221	229
	51.7	221	230	239	247	256	265
	54.4	251	261	271	281	292	302
	57.2	282	293	305	316	327	338
	60.0	313	326	338	351	363	376
	62.8	344	358	372	386	399	413
	65.6	375	390	405	420	435	450
	68.3	408	424	440	457	473	489
	71.1	440	458	475	493	511	528
	73.9	473	492	511	529	548	567
	76.7	505	525	545	565	585	605
79.4	538	559	581	602	624	645	
82.2	571	594	617	640	662	685	
85.0	606	630	654	678	703	727	
87.8	639	664	690	715	741	766	

PANEL WIDTH		750mm PANEL					
PASSES		5	6	7	8	9	10
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	43	45	47	48	50	52
	37.8	73	76	79	82	85	88
	40.6	103	108	112	116	120	124
	43.3	133	138	143	149	154	159
	46.1	162	169	175	182	188	195
	48.9	193	200	208	216	223	231
	51.7	222	231	240	249	257	266
	54.4	251	261	271	281	292	302
	57.2	282	293	305	316	327	338
	60.0	313	326	338	351	363	376
	62.8	344	358	372	386	399	413
	65.6	375	390	405	420	435	450
	68.3	410	426	442	459	475	492
	71.1	444	462	480	498	515	533
	73.9	479	499	518	537	556	575
	76.7	514	535	555	576	596	617
79.4	550	572	594	616	638	660	
82.2	587	610	634	657	681	704	
85.0	628	653	679	704	729	754	
87.8	662	689	715	742	768	795	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%

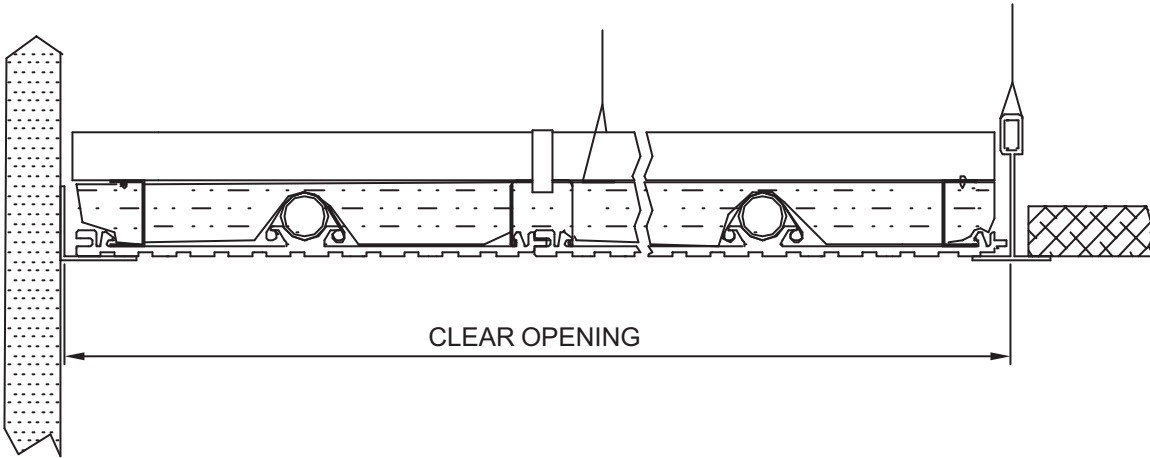
LINEAR PANEL METRIC OUTPUTS STANDARD AND NON-STANDARD NUMBER OF PASSES

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN WATER TEMPERATURE (°C)	35.0	50	52	53	55	57	58	60
	37.8	83	86	89	92	94	97	100
	40.6	117	120	124	128	132	136	140
	43.3	149	154	159	164	168	173	178
	46.1	182	188	194	200	206	212	218
	48.9	214	221	229	236	243	250	257
	51.7	247	255	264	272	280	289	297
	54.4	280	289	299	308	317	327	336
	57.2	313	323	334	344	355	365	376
	60.0	346	357	369	381	392	404	415
	62.8	379	391	404	417	429	442	455
	65.6	412	425	439	453	466	480	494
	68.3	445	460	475	490	504	520	534
	71.1	477	493	509	525	541	557	573
	73.9	511	527	545	562	578	596	613
	76.7	543	561	580	598	616	634	652
	79.4	576	595	615	634	653	672	691
82.2	609	629	649	670	690	710	730	
85.0	642	663	685	707	728	750	771	
87.8	675	697	720	742	765	788	810	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (30% VOLUME) ETHYLENE TEMPERATURE (°C)	35.0	47	49	50	52	54	55	57
	37.8	81	84	87	90	92	95	98
	40.6	116	119	123	127	131	135	139
	43.3	149	154	159	164	168	173	178
	46.1	182	188	195	201	207	213	219
	48.9	217	224	231	238	245	253	260
	51.7	251	259	268	276	284	293	301
	54.4	286	295	305	314	324	334	343
	57.2	321	331	342	353	364	374	385
	60.0	356	368	380	392	404	416	428
	62.8	392	405	418	431	444	458	471
	65.6	428	442	457	471	485	500	514
	68.3	465	481	496	512	527	543	558
	71.1	501	518	535	551	568	585	602
	73.9	539	556	575	593	610	629	646
	76.7	576	595	614	633	652	672	691
	79.4	613	634	654	675	695	716	736
82.2	651	673	695	716	738	760	781	
85.0	690	713	737	760	782	806	829	
87.8	729	753	778	802	826	851	875	

PANEL WIDTH		900mm PANEL						
PASSES		6	7	8	9	10	11	12
MEAN (30% VOLUME) PROPYLENE TEMPERATURE (°C)	35.0	48	49	51	53	54	56	57
	37.8	82	85	88	91	93	96	99
	40.6	117	121	125	129	132	136	140
	43.3	150	155	160	165	170	175	180
	46.1	184	190	197	203	209	215	221
	48.9	219	226	233	241	248	255	262
	51.7	252	261	269	277	286	294	303
	54.4	286	295	305	314	324	334	343
	57.2	321	331	342	353	364	374	385
	60.0	356	368	380	392	404	416	428
	62.8	392	405	418	431	444	458	471
	65.6	428	442	457	471	485	500	514
	68.3	467	483	499	514	530	546	561
	71.1	506	523	540	557	573	591	607
	73.9	546	564	583	601	619	638	656
	76.7	587	606	626	645	665	685	704
	79.4	628	649	670	691	711	733	753
82.2	670	692	714	736	759	781	803	
85.0	716	740	764	788	811	836	859	
87.8	756	781	807	832	857	882	907	

OUTPUTS EXPRESSED IN WATTS/LINEAL METRE OF PANEL AND ARE BASED ON 21°C ROOM TEMPERATURE. FOR EVERY 1°C DECREASE IN ROOM TEMPERATURE BELOW 21°C, THE OUTPUT INCREASES BY 2%. FOR EVERY 1°C INCREASE IN ROOM TEMPERATURE ABOVE 21°C, THE OUTPUT DECREASES BY 2%



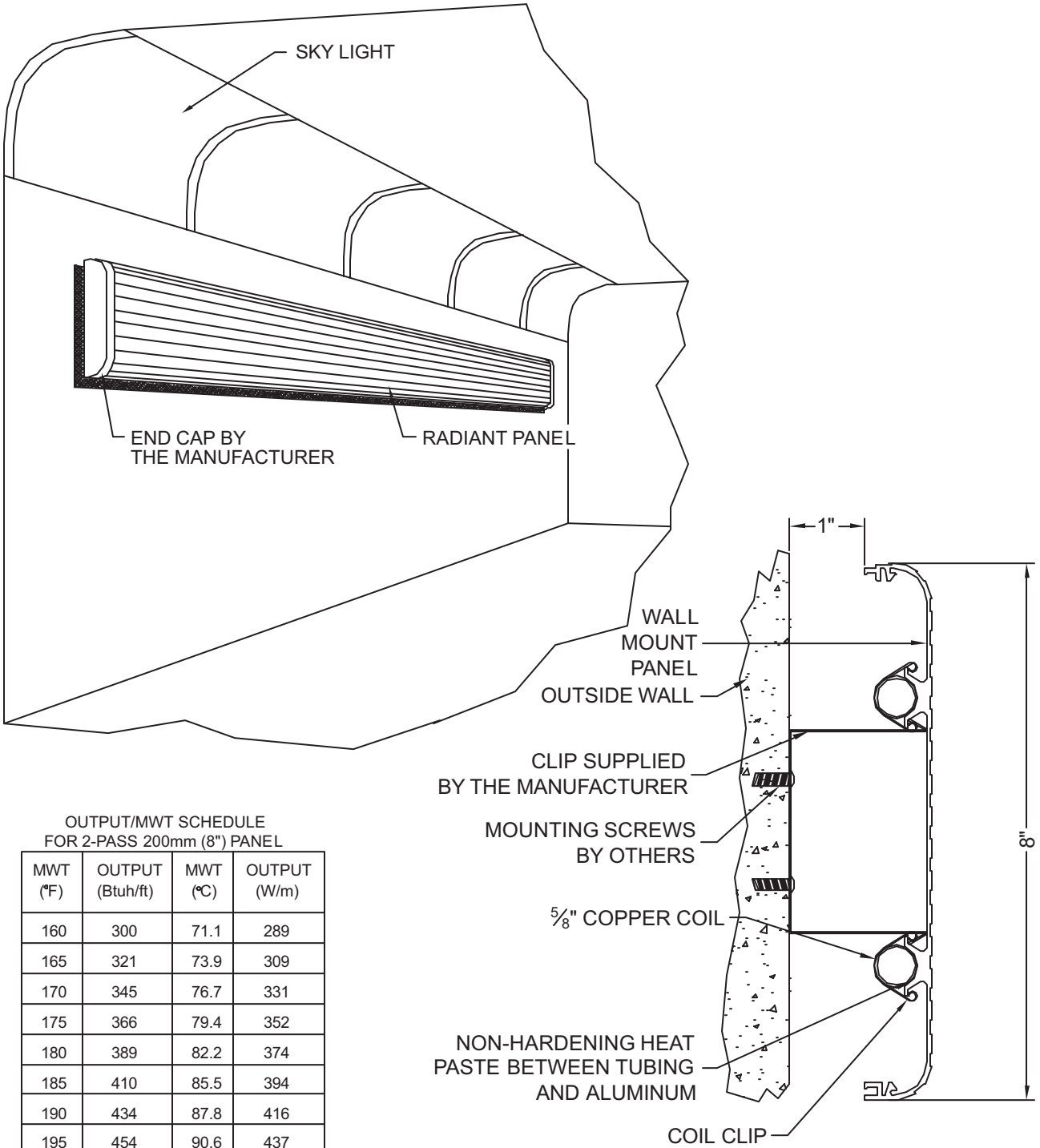
RADIANT PANEL WIDTHS & FINISHED OPENINGS

PANEL WIDTH (IMPERIAL-INCHES)	FINISHED OPENING (IMPERIAL-INCHES)	PANEL WIDTH (METRIC - mm)	FINISHED OPENING (METRIC - mm)
6	6-1/4	154	160
8-1/4	8-1/2	208	214
10	10-1/4	256	262
12	12-1/4	304	310
15	15-1/4	383	389
16-1/8	16-3/8	410	416
17-3/4	18-1/8	454	460
19-7/8	20-1/8	506	512
23-3/4	24	604	610
29-5/8	29-7/8	754	760
35-1/2	35-3/4	902	908

NOTE: FINISHED OPENINGS DO NOT INCLUDE SUPPORT ANGLE THICKNESS.

Linear Radiant Panel

8" WALL MOUNT PANEL

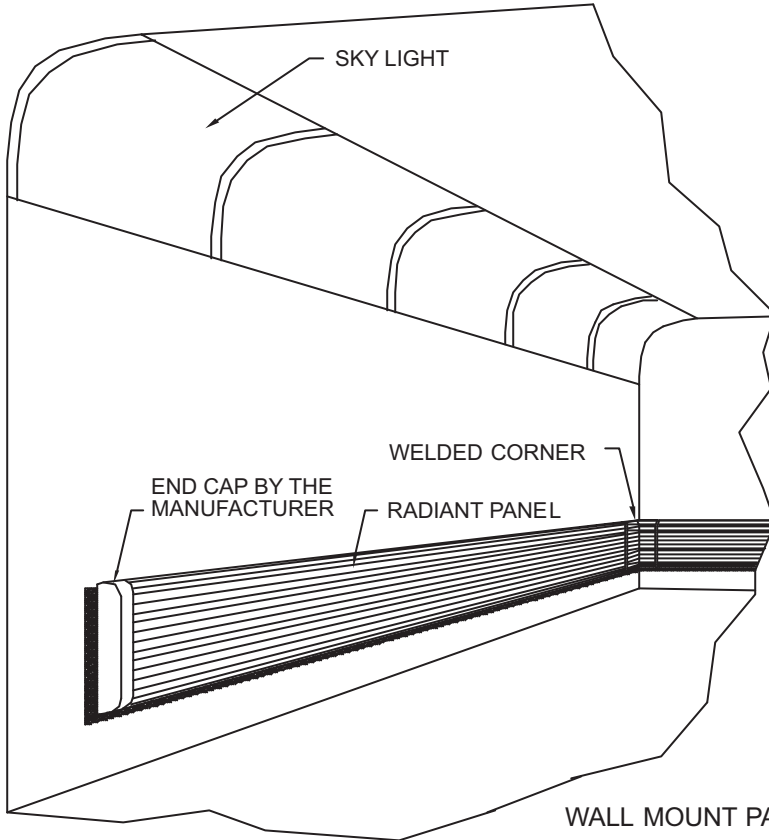


OUTPUT/MWT SCHEDULE
FOR 2-PASS 200mm (8") PANEL

MWT (°F)	OUTPUT (Btuh/ft)	MWT (°C)	OUTPUT (W/m)
160	300	71.1	289
165	321	73.9	309
170	345	76.7	331
175	366	79.4	352
180	389	82.2	374
185	410	85.5	394
190	434	87.8	416
195	454	90.6	437
200	478	93.3	459
205	498	96.1	479

Linear Radiant Panel

8" LOWER WALL MOUNT PANEL



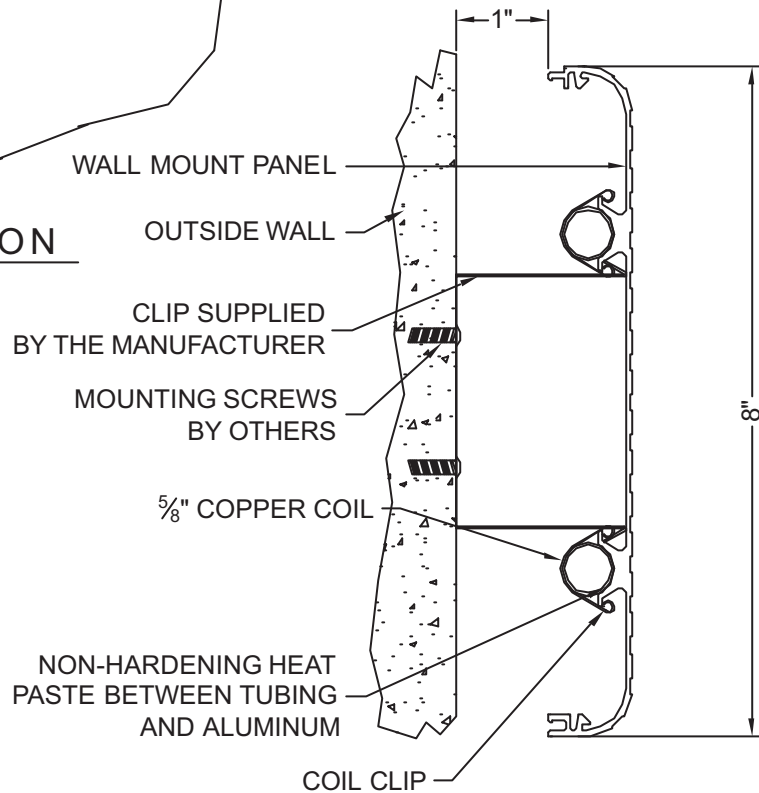
TYPICAL INSTALLATION

NOT TO SCALE

OUTPUT/MWT SCHEDULE
FOR 2-PASS 8" PANEL

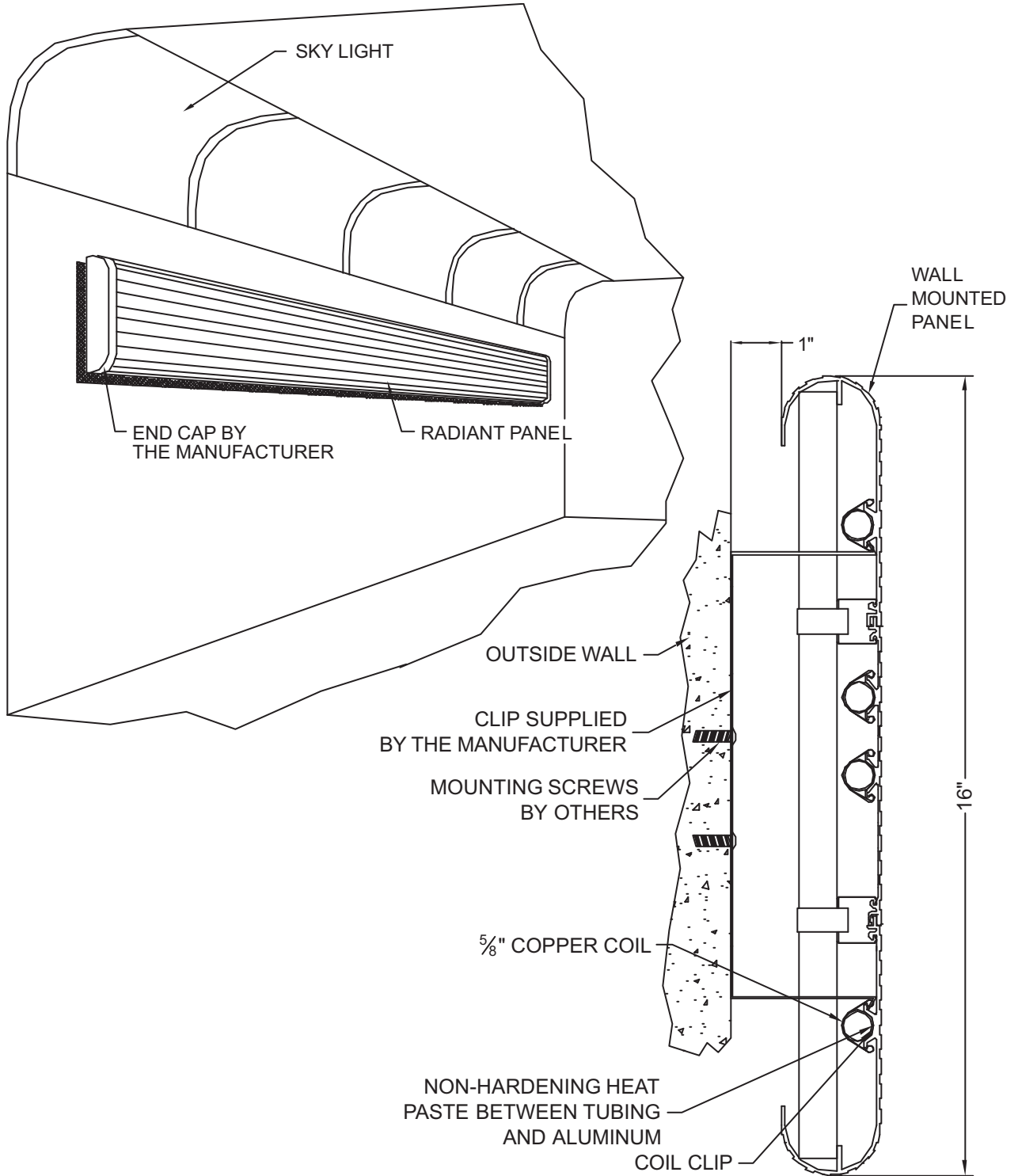
MWT (°F)	OUTPUT (Btuh/ft)
120	124
125	146
130	168
135	190
140	212
145	234
150	256
155	278
160	300

MWT (°F)	OUTPUT (Btuh/ft)
165	321
170	345
175	366
180	389
185	410
190	434
195	454
200	478
205	498



Linear Radiant Panel

16" WALL MOUNT PANEL



STANDARD CASTELLATED LINEAR EXTRUSIONS

4" (102mm) 1 PASS



6" (154mm) 1 PASS



6" (154mm) 2 PASS

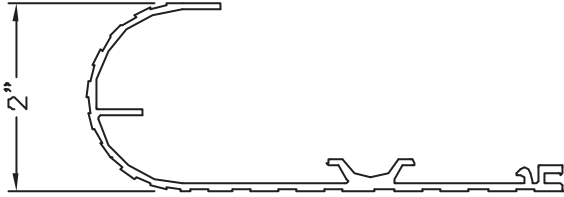


LINEAR CURTAIN TRACK

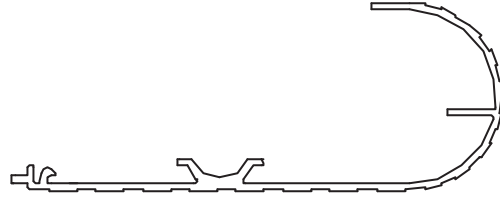


152mm (6") 1-PASS CURTAIN TRACK

MISCELLANEOUS LINEAR EXTRUSIONS



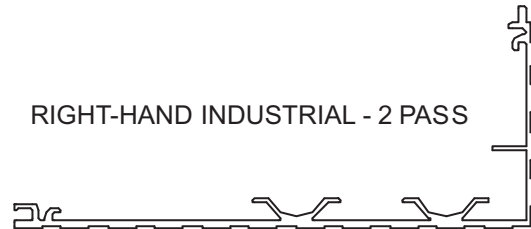
2" BULLNOSE - 1 PASS - LEFT



2" BULLNOSE - 1PASS - RIGHT



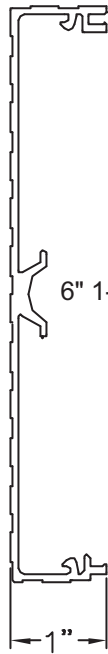
LEFT-HAND INDUSTRIAL - 2 PASS



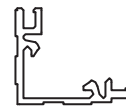
RIGHT-HAND INDUSTRIAL - 2 PASS



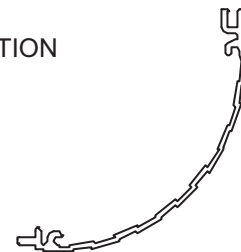
4" 1-PASS
C-SECTION



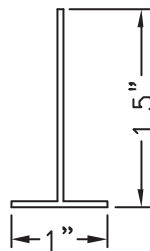
6" 1-PASS C-SECTION



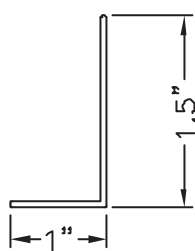
1" CORNER



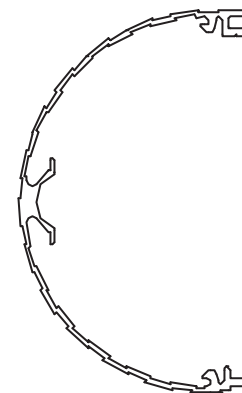
2" J-SECTION



EXTRUDED ALUMINUM
T-ANGLE

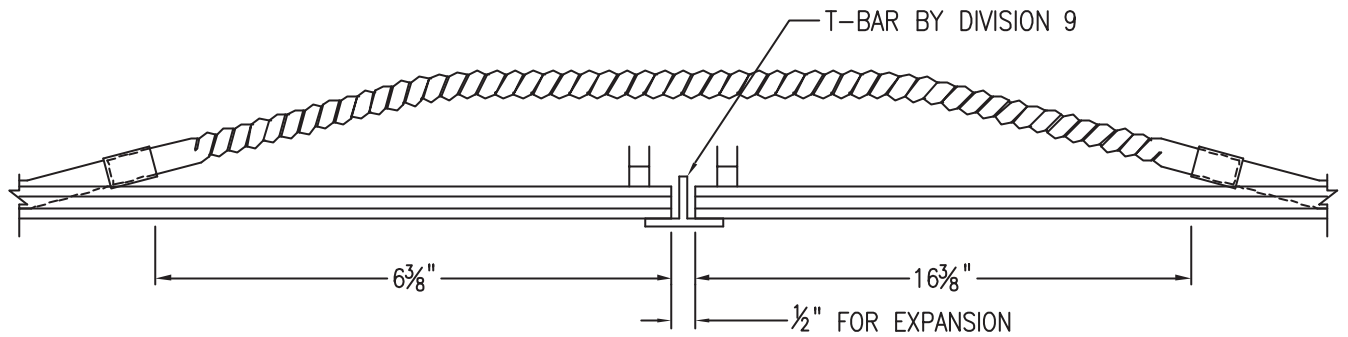
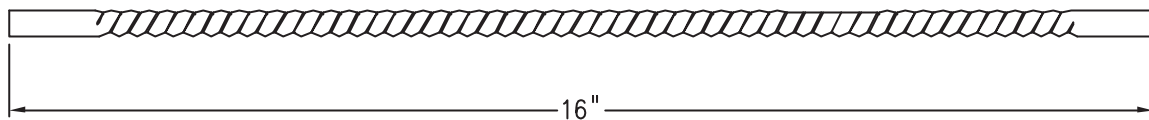
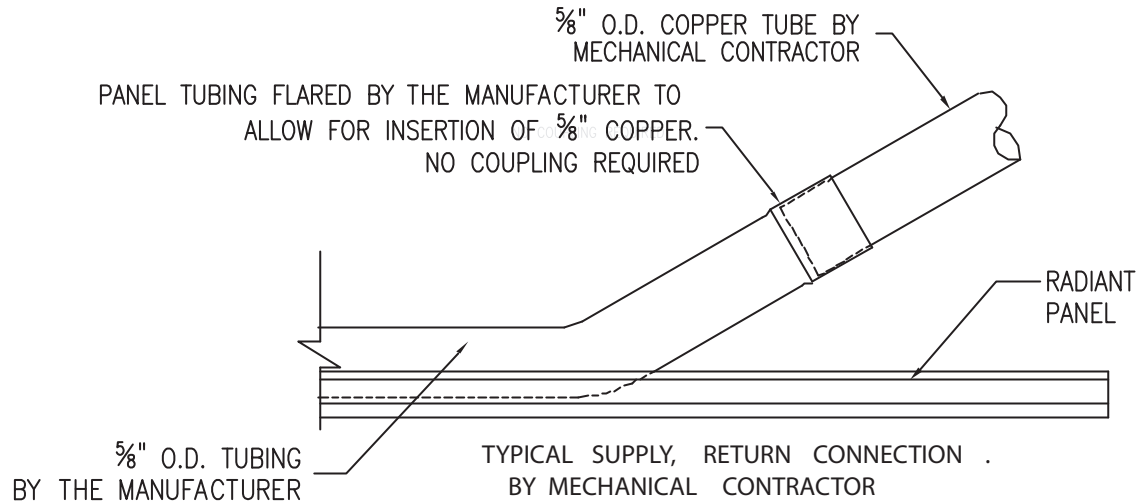


EXTRUDED ALUMINUM
L-ANGLE



4" 1-PASS BULLNOSE

COPPER CONNECTION DETAILS



INTERCONNECTORS
 SUPPLIED BY THE MANUFACTURER WHEN PANELS
 ARE INSTALLED IN SERIES IN THE SAME ROOM

GENERAL NOTES

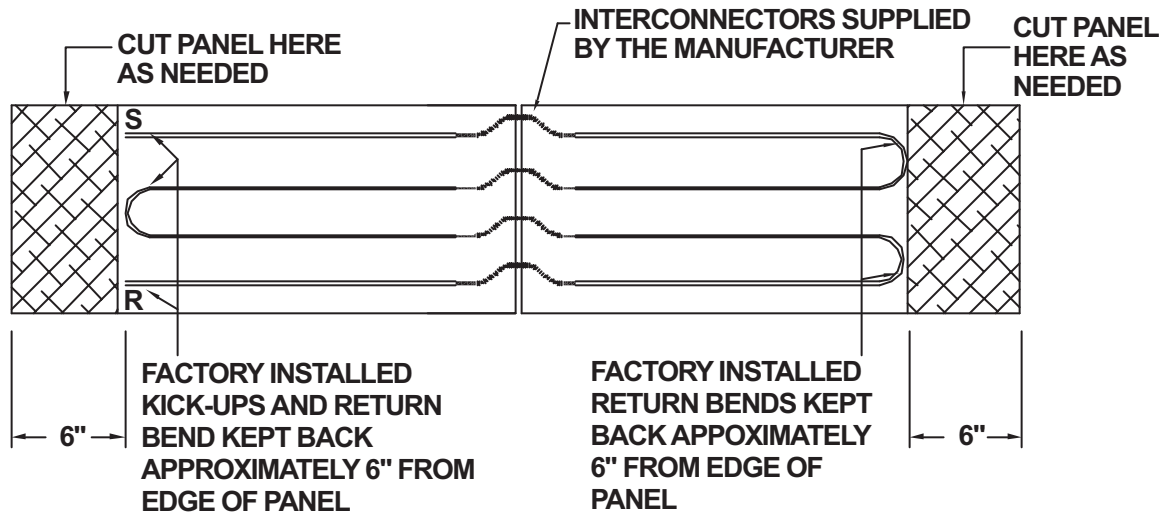
1. SHOP DRAWINGS MUST BE AVAILABLE TO THE INSTALLERS PRIOR TO THE START OF PIPING ROUGH IN. PIPING FOR RADIANT PANEL MUST NOT CHANGE FROM THE MECHANICAL DRAWINGS FOR PROJECT.
2. RADIANT PANEL DRAWING, ARCHITECTURAL DRAWING AND MECHANICAL DRAWINGS MUST BE CONSULTED BEFORE INSTALLATION BEGINS. REFER TO MECHANICAL DRAWINGS FOR PIPE SIZES AND VALVE LOCATIONS. ANY PANEL INSTALLED AGAINST EXTERIOR WALLS SHOULD HAVE THE FIRST TUBE SUPPLIED NEAREST THE WALL.
3. INSTALL RADIANT PANELS WITH FEMALE EDGE TOWARD EXTERIOR WALL. PLEASE NOTE THAT ALL PANELS ARE MADE WITH A RED LABEL INDICATING FEMALE EDGE.

FEMALE EDGE — 

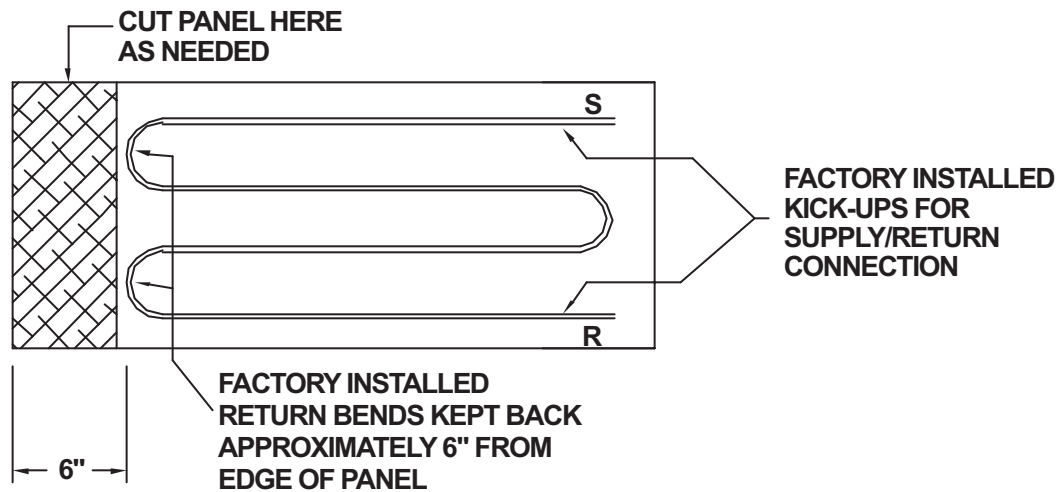
4. ALL RADIANT PANELS MUST HAVE AT LEAST ONE TIE WIRE ON EACH CROSS BRACE.
5. BRACING ON RADIANT PANELS:
 - 2 BRACES - UP TO 5 feet
 - 3 BRACES - 5 feet TO 10 feet
 - 4 BRACES - 10 feet TO 14 feet
 - 5 BRACES - 14 feet TO 16 feet
6. FOR CUTTING OF RADIANT PANELS USE A CIRCULAR SAW WITH A CARBIDE TIPPED BLADE. CUT WITH THE FINISH SURFACE FACING THE SAW. ENSURE YOU PROTECT THE FINISH SURFACE BEFORE CUTTING BEGINS.
7. WHEN PANELS REQUIRE SITE CUTTING, FOLLOW THESE STEPS:
 1. Install all but the last panel, measure length required,
 2. Cut last panel to required length using procedure listed in part 6 above,
 3. Install final panel in ceiling.
8. STERLING IS RESPONSIBLE ONLY FOR THE SUPPLY OF RADIANT PANELS. OTHERS ARE TO SUPPLY AND INSTALL THE FOLLOWING:
 1. Necessary piping between panels (other than interconnectors, as indicated on plan)
 2. Piping from panels to supply and return mains.
 3. Specified insulation and hanger wires.
 4. Suspended ceiling grids and panel support moldings.

CUTTING INSTRUCTIONS

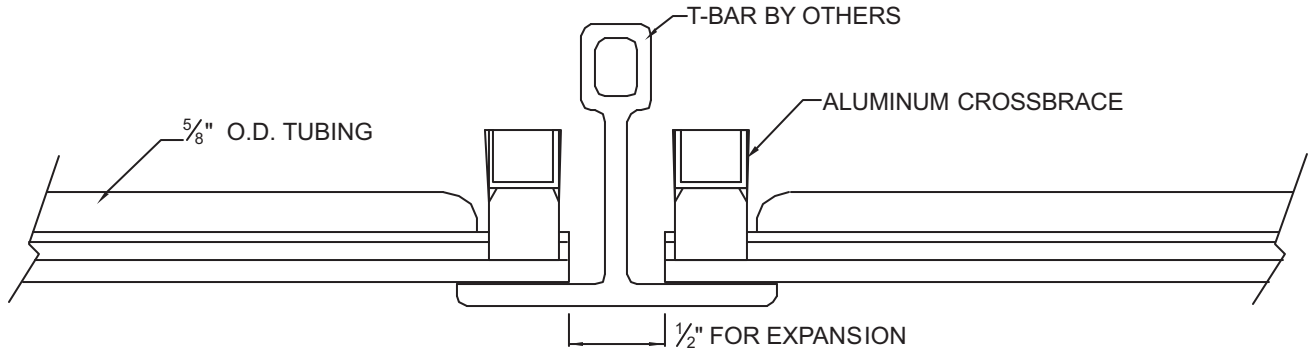
MULTI-PANEL INSTALLATION



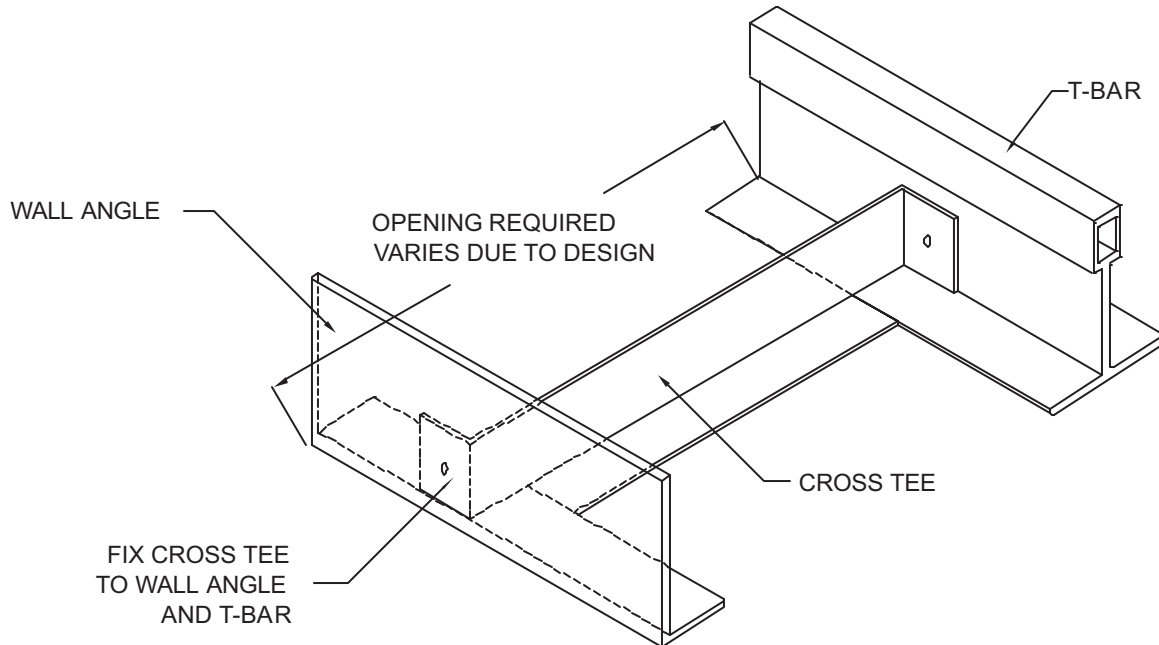
SINGLE PANEL INSTALLATION



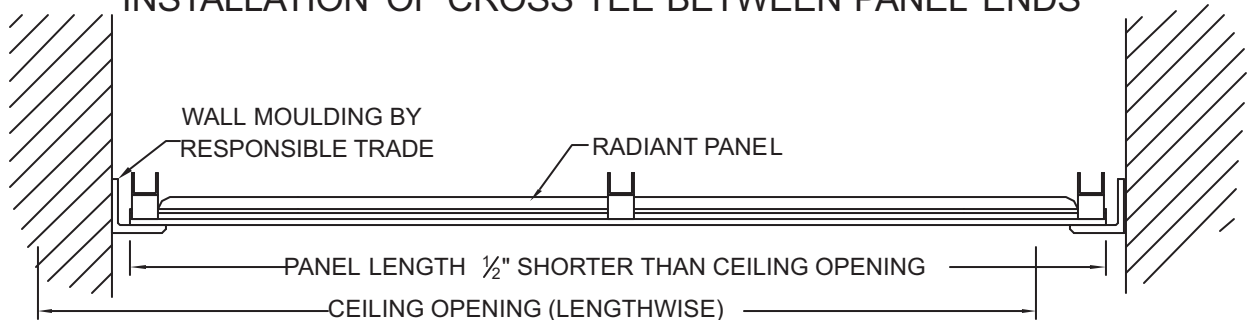
LINEAR PANEL EXPANSION DETAILS



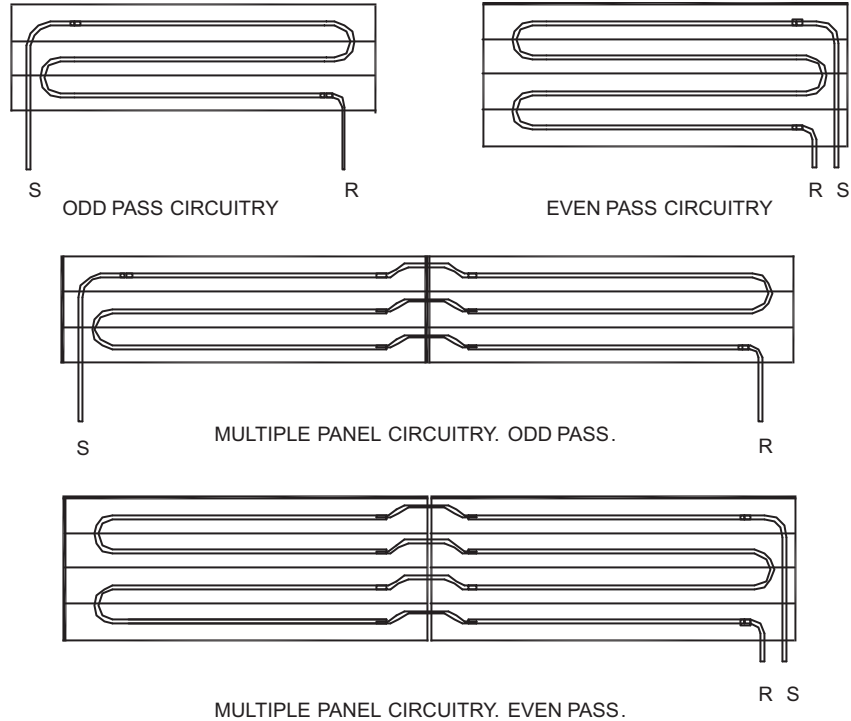
EXPANSION GAP FOR RADIANT PANEL



INSTALLATION OF CROSS TEE BETWEEN PANEL ENDS



LINEAR CIRCUITRY AND PRESSURE DROPS



Single panel length to a maximum of 16 feet

Pressure drop for $\frac{5}{8}$ " O.D. tubing:

at 0.5 GPM is 0.5 foot drop per 100 feet (Flow rate US gal/min)

at 1 GPM is 2 feet drop per 100 feet

at 2 GPM is 7 feet drop per 100 feet

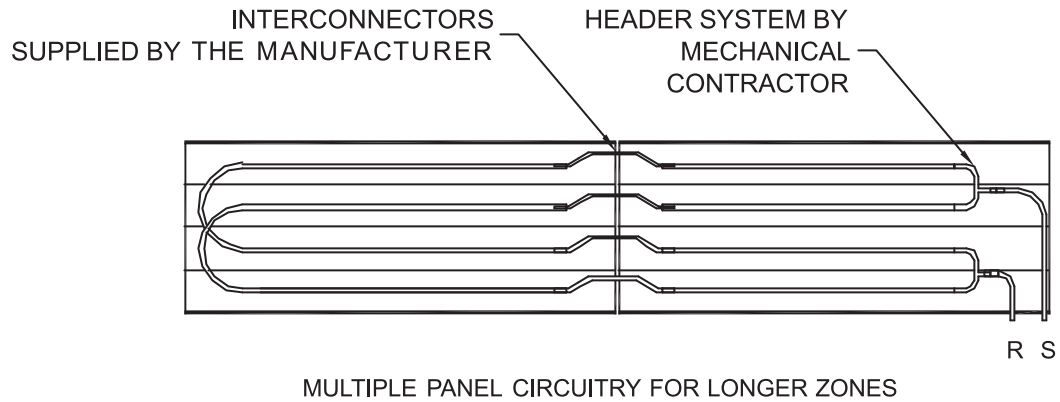
at 2.5 GPM is 10 feet drop per 100 feet

at 3 GPM is 14 feet drop per 100 feet

Refer to L-17 for additional pressure drop info.

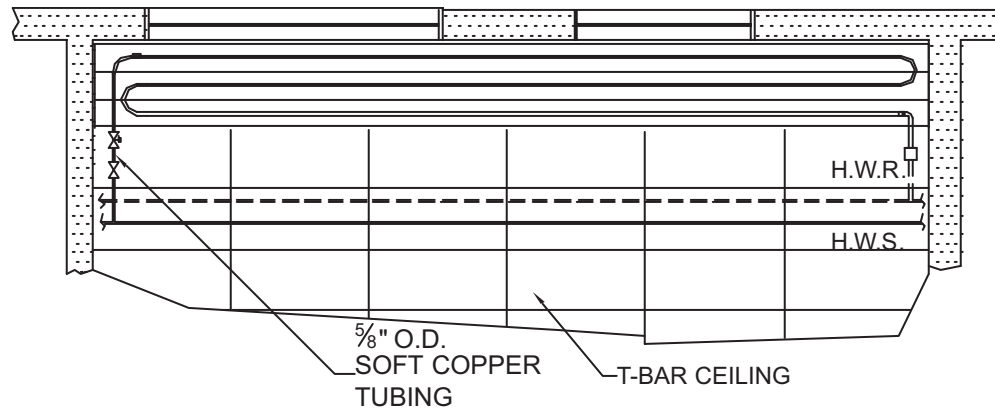
INTERCONNECTOR PRESSURE DROPS

HEADER CIRCUITRY

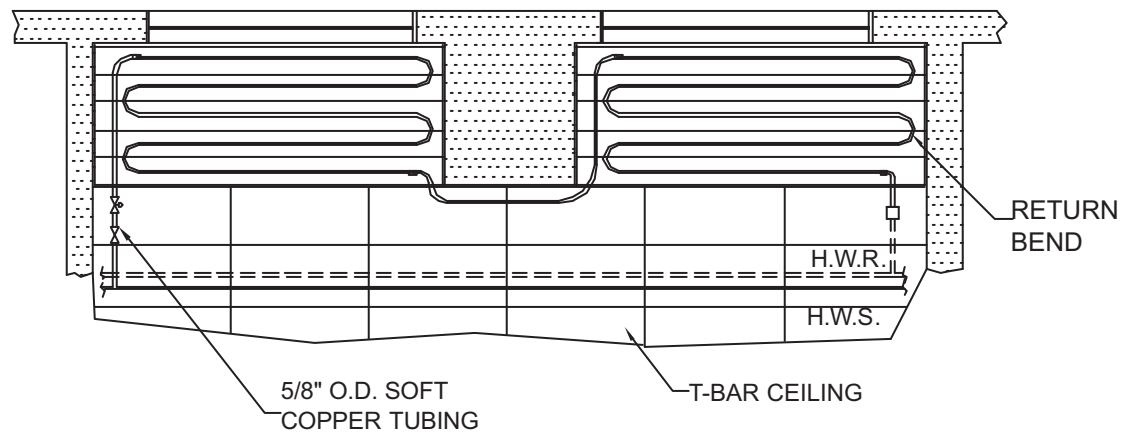


INTERCONNECTORS	
Flow Rate (US gal/min)	Interconnector Pressure Drop (psi)
0.5	0.0505
1.0	0.168
2.0	0.559
2.5	0.823
3.0	1.13

LINEAR PANELS IN T-BAR CEILING

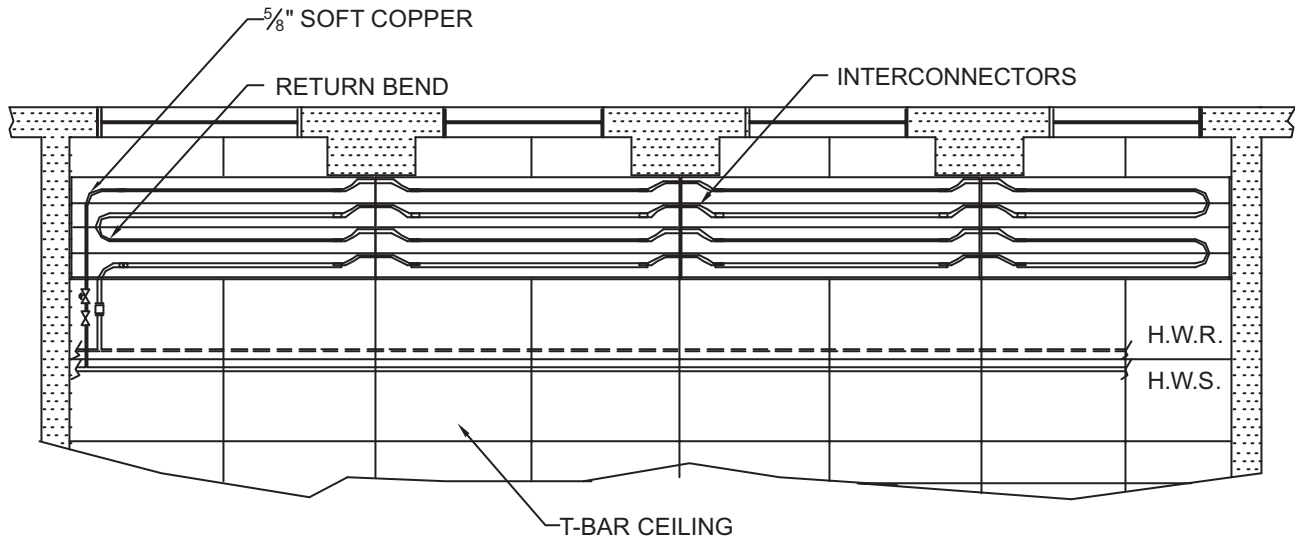


ODD NUMBER OF PASSES SINGLE PANEL,
LENGTH UP TO 16 FEET

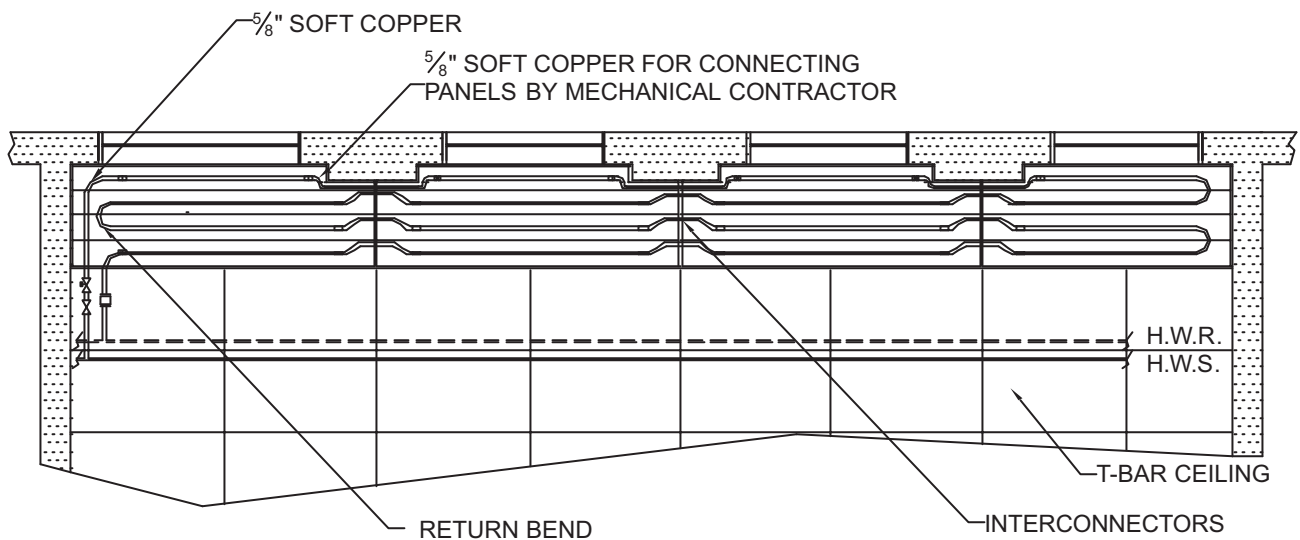


TWO ODD NUMBER PASS PANELS PIPED AROUND COLUMN

PERIMETER PANELS WITH COLUMN INTERFERENCE

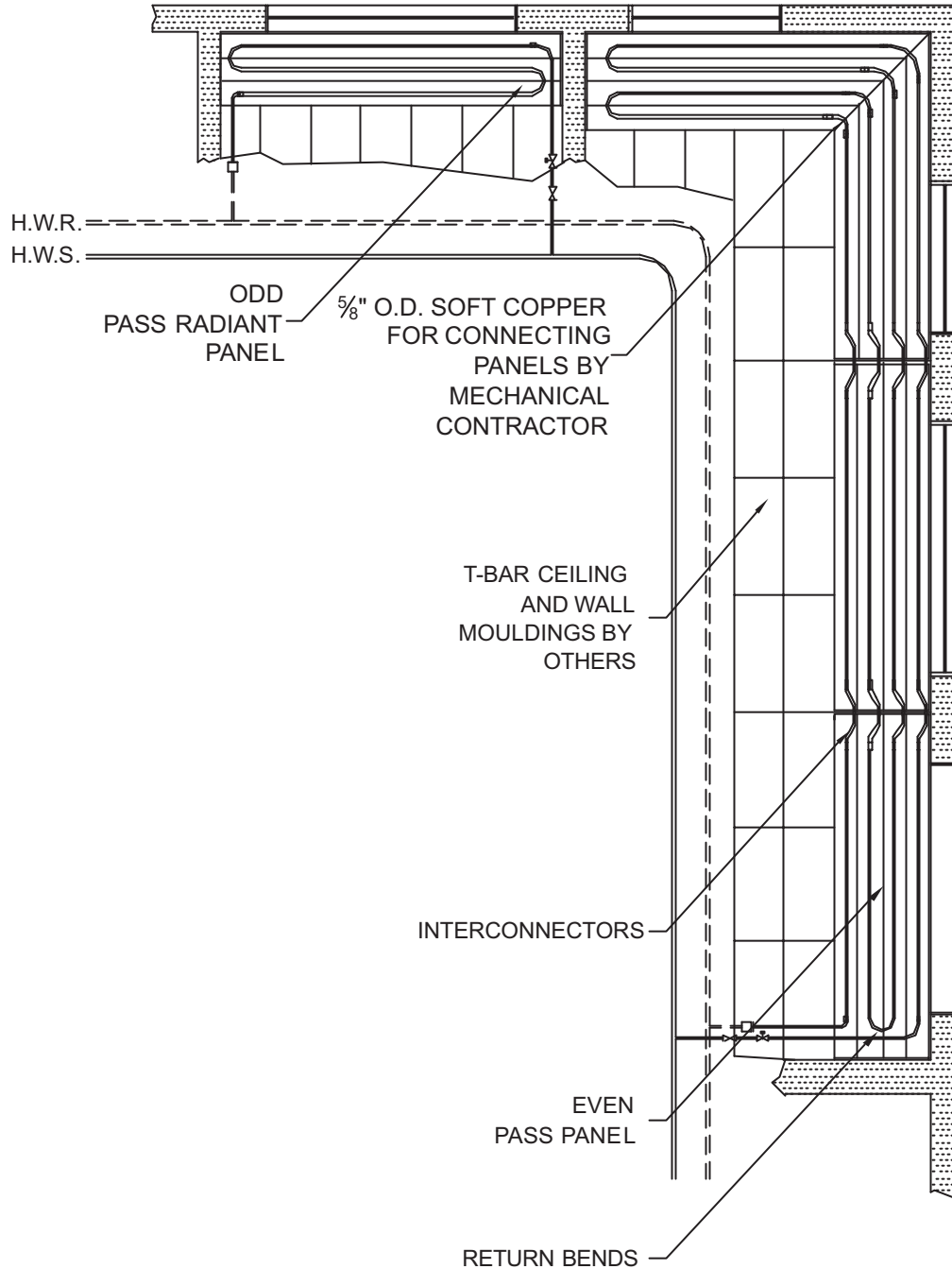


RADIANT PANELS POSITIONED CLEAR OF PERIMETER COLUMNS. EVEN PASS COILING SHOWN

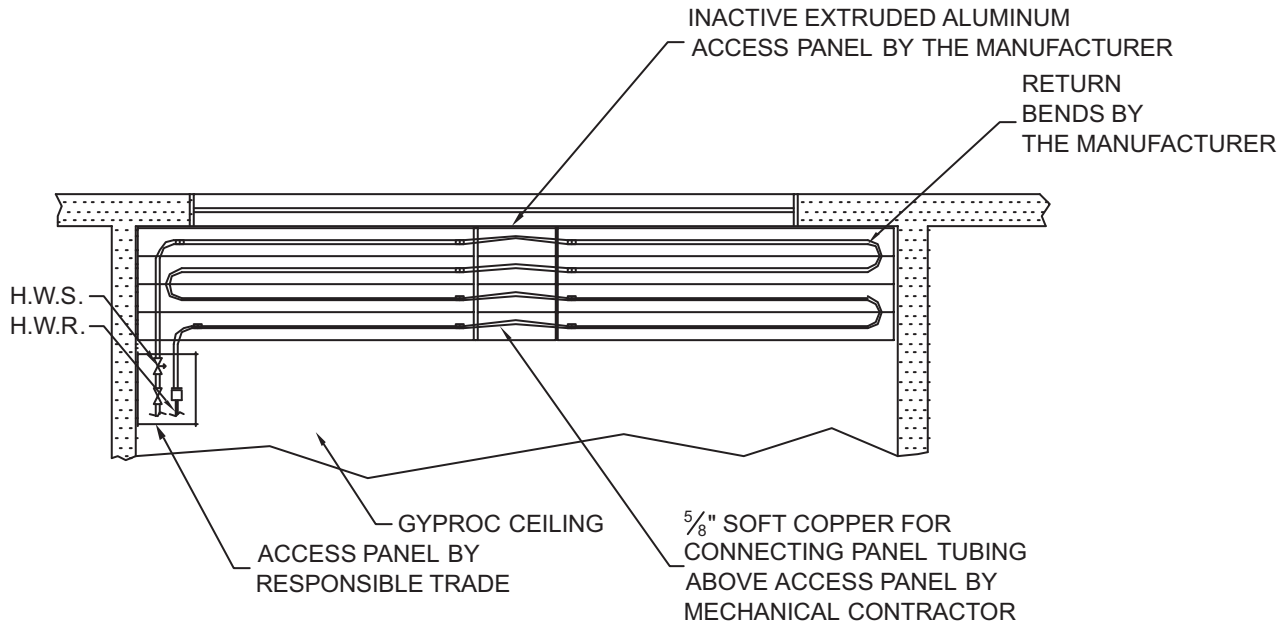


RADIANT PANELS NOTCHED AROUND PERIMETER COLUMNS. EVEN PASS COILING SHOWN

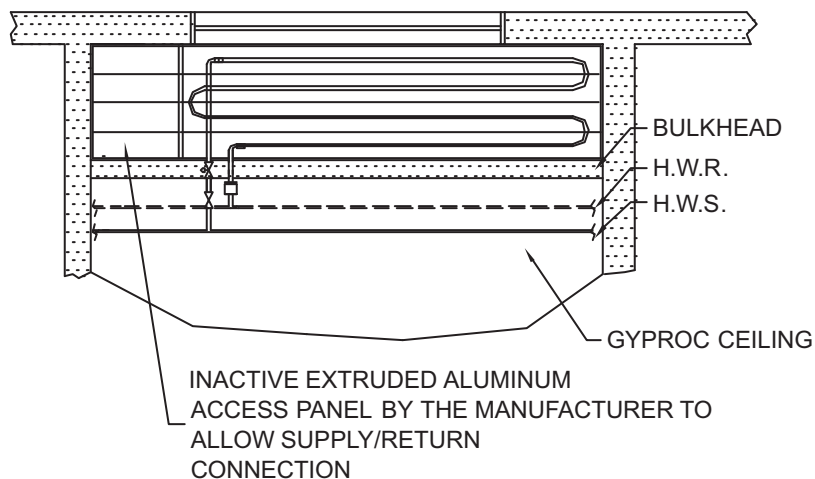
PIPING DETAIL FOR ODD AND EVEN PASS LINEAR PANELS



ACCESS PANELS WHERE ACCESSIBILITY IS REQUIRED

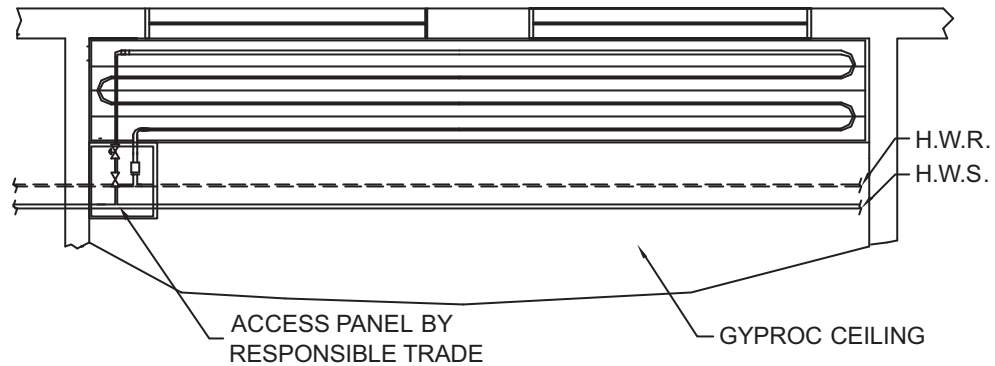


TWO PANEL EVEN PASS CONFIGURATION

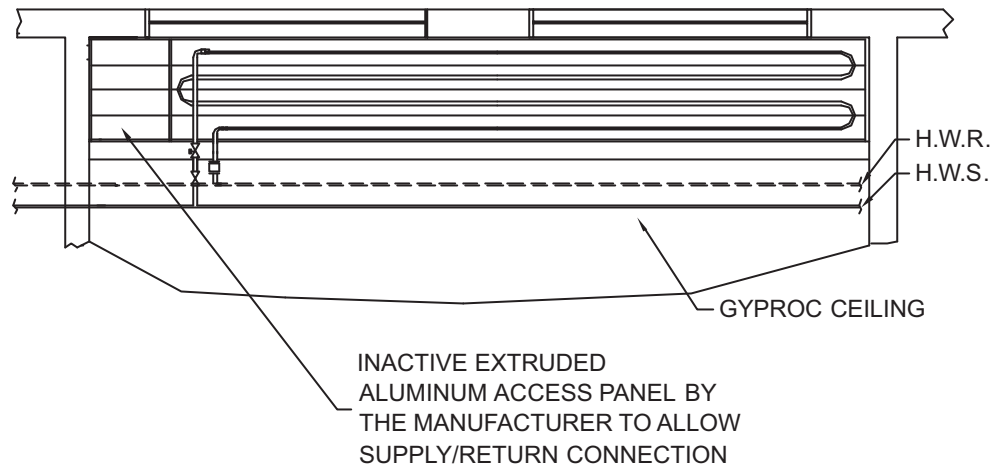


SINGLE PANEL EVEN PASS CONFIGURATION

ACCESS PANELS WHERE ACCESSIBILITY IS REQUIRED

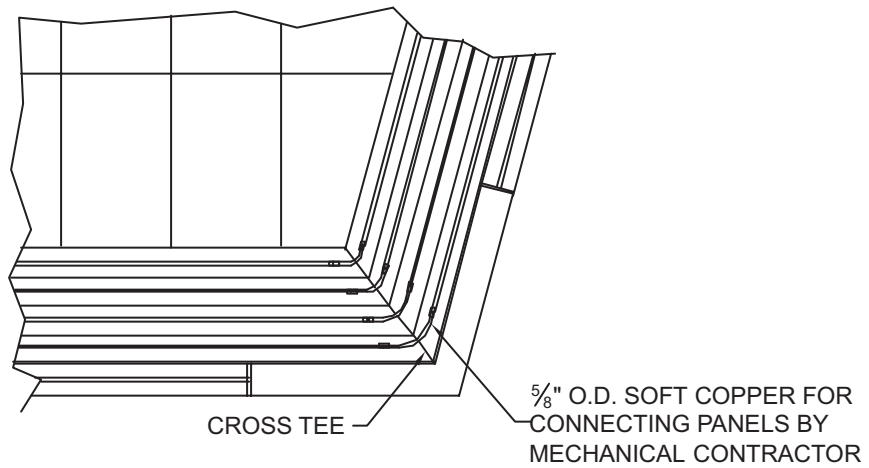
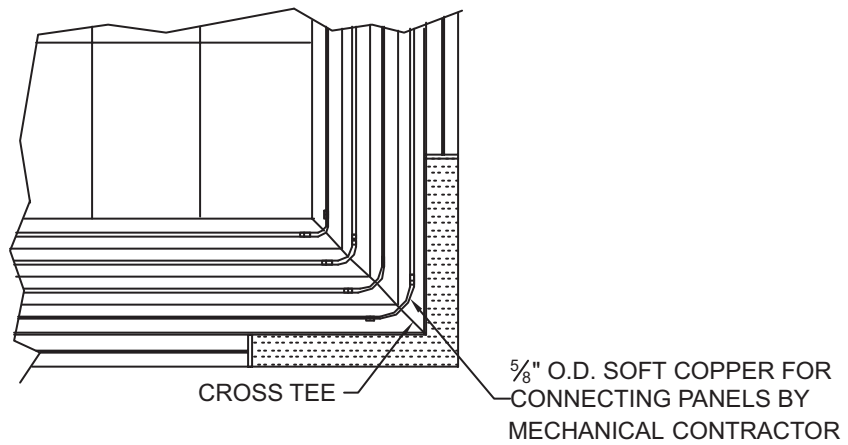
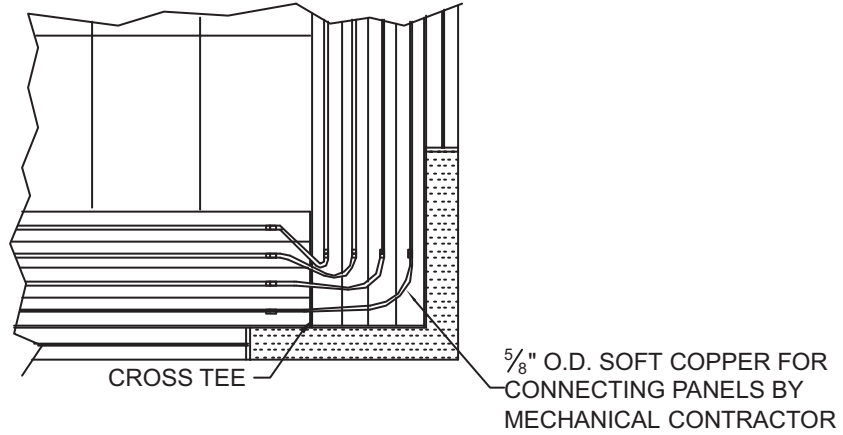


ACCESS PANEL BY OTHERS

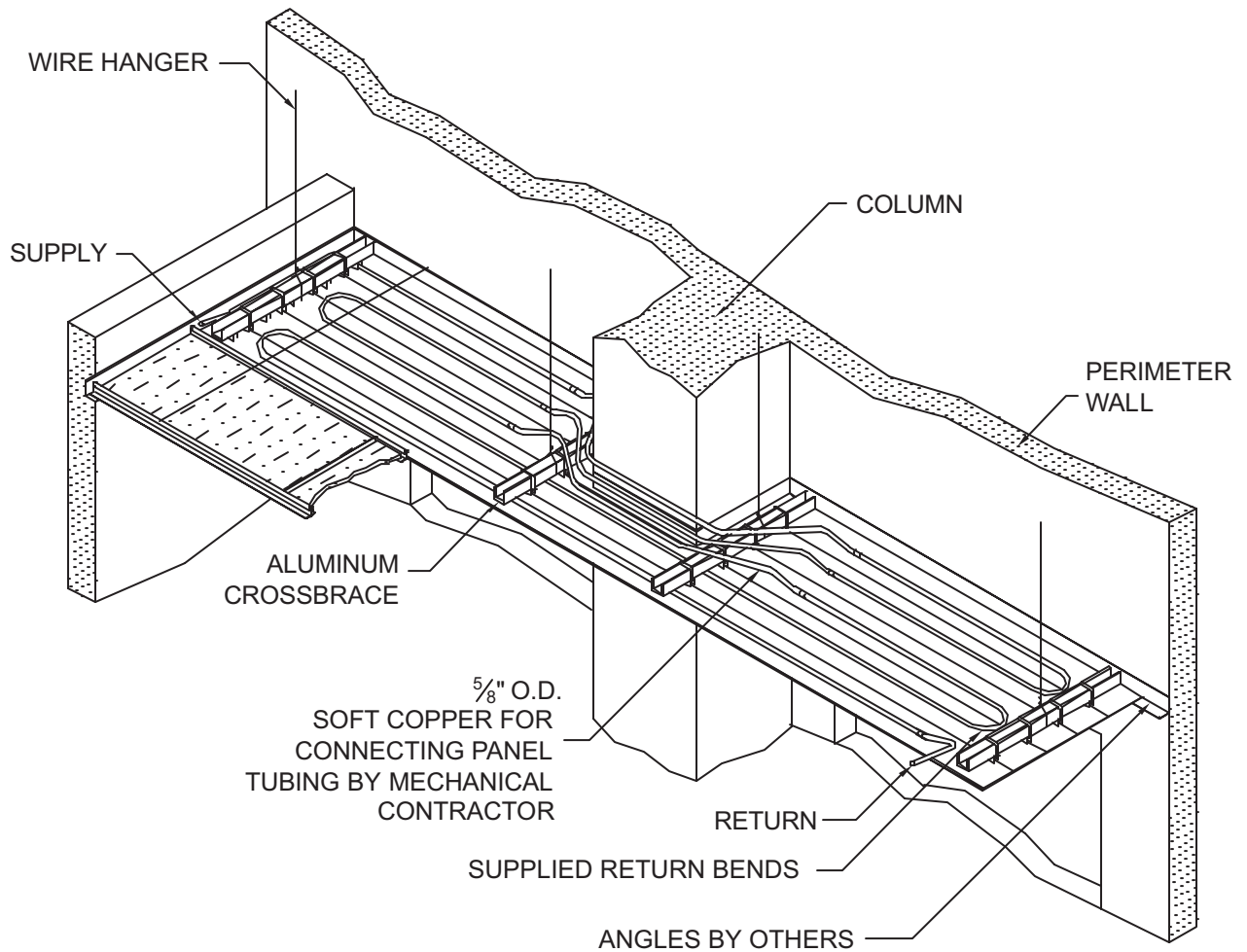


ACCESS PANEL BY THE MANUFACTURER

CORNER DETAILS



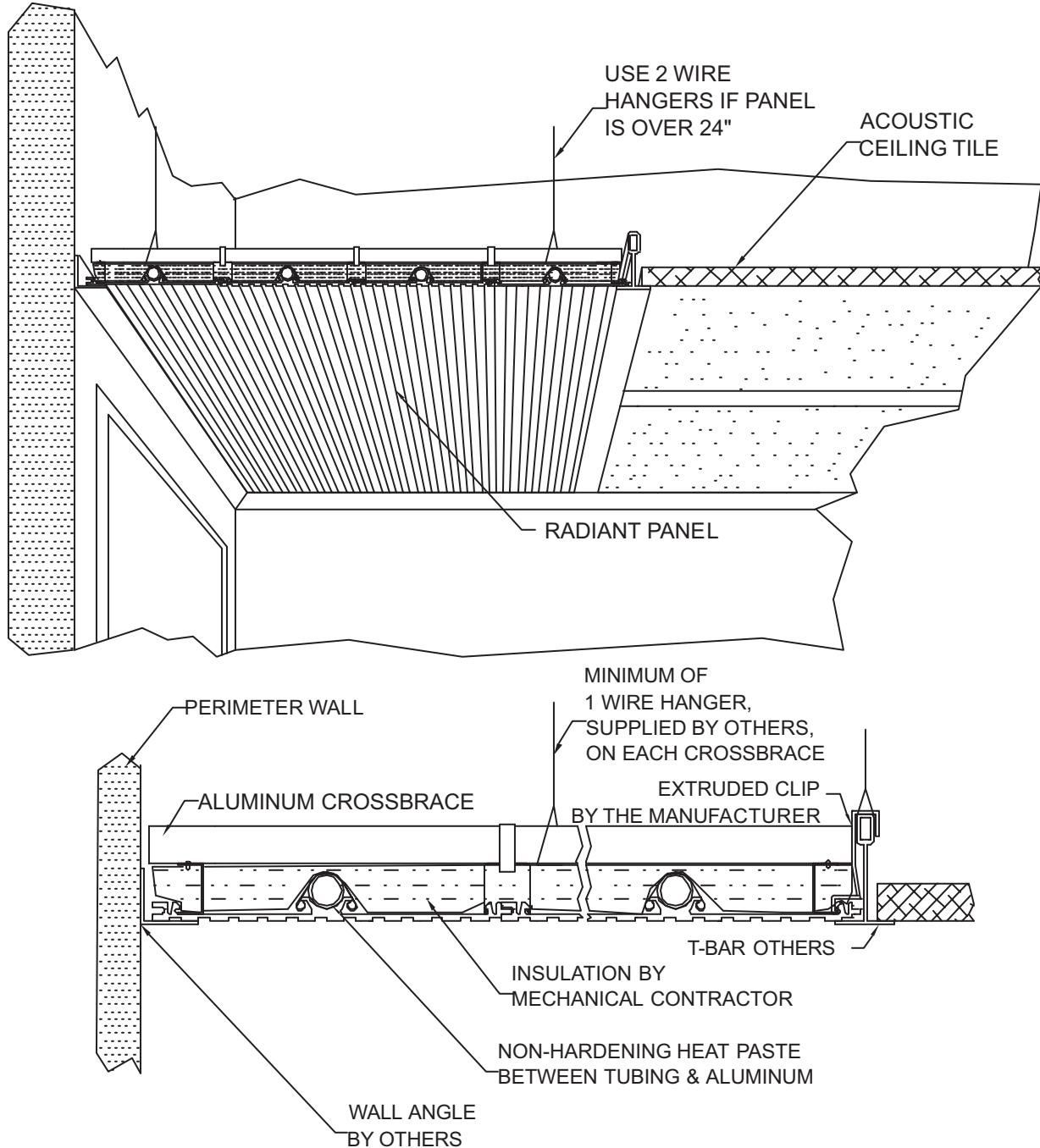
SERPENTINE CIRCUITING AROUND COLUMN



NOTE: PANEL WIDTH VARIES DUE TO DESIGN.

Linear Radiant Panel

INSTALLED IN PERIMETER T-BAR CEILING

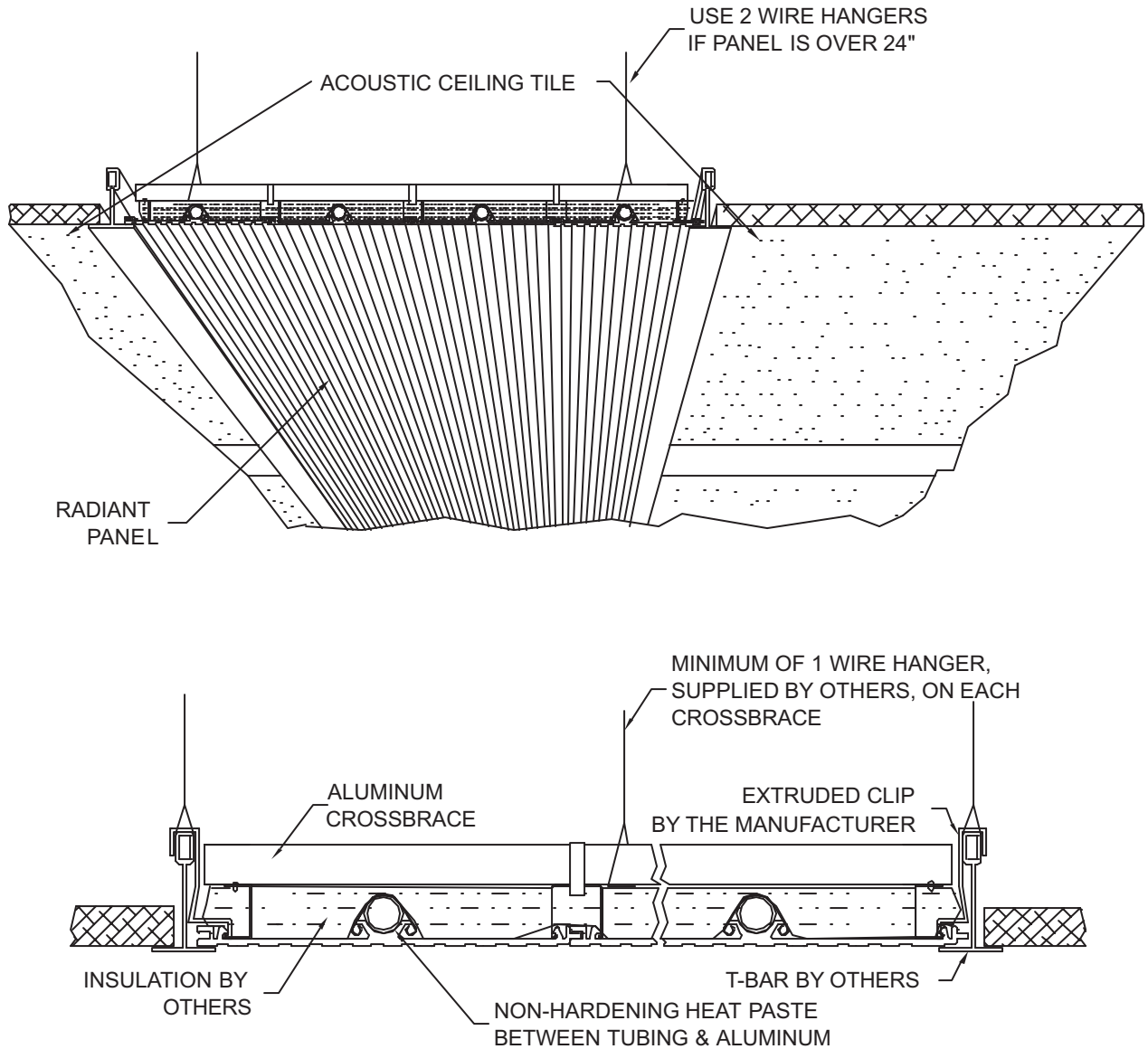


NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

Linear Radiant Panel

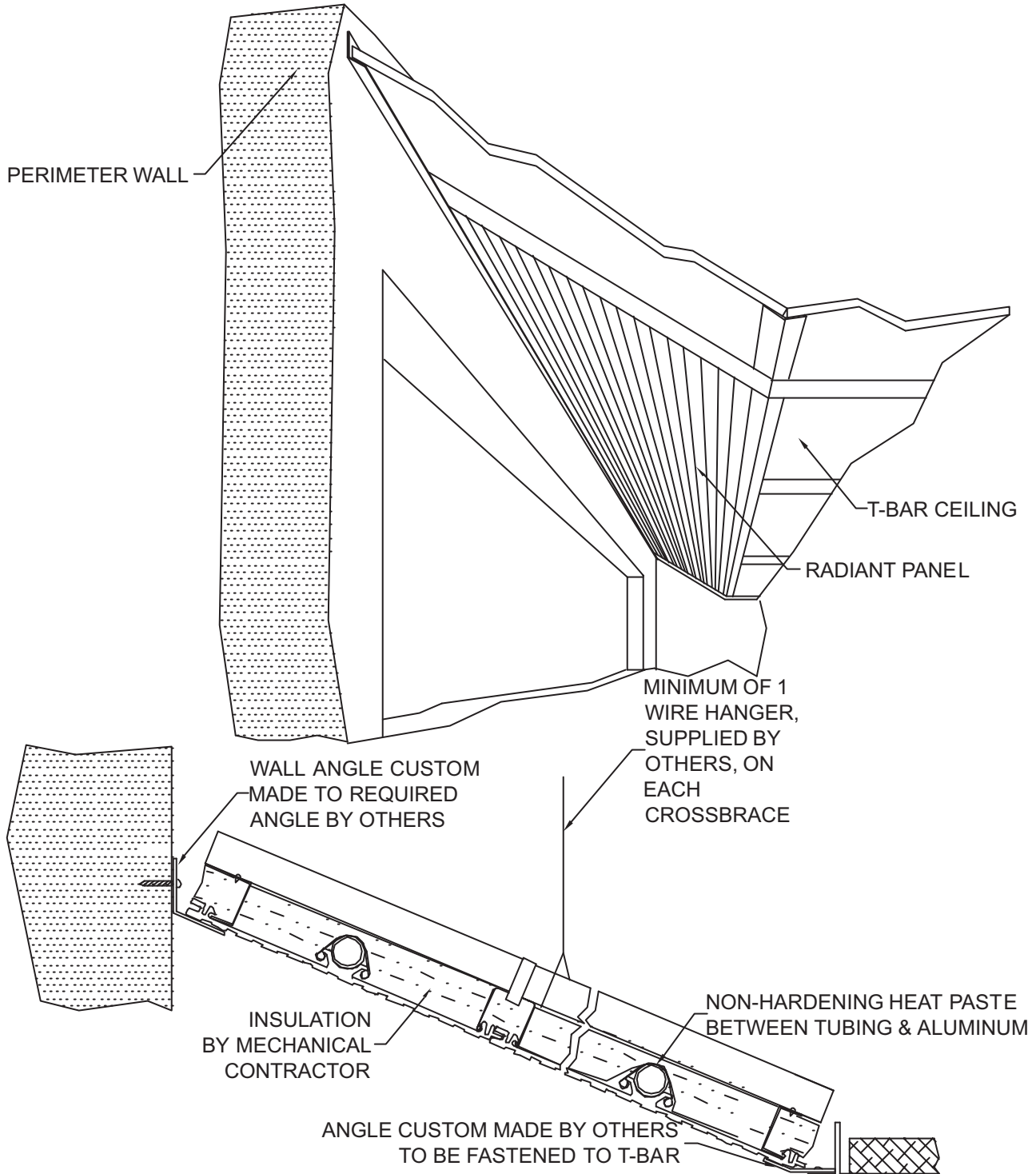


INSTALLED IN INTERIOR T-BAR CEILING



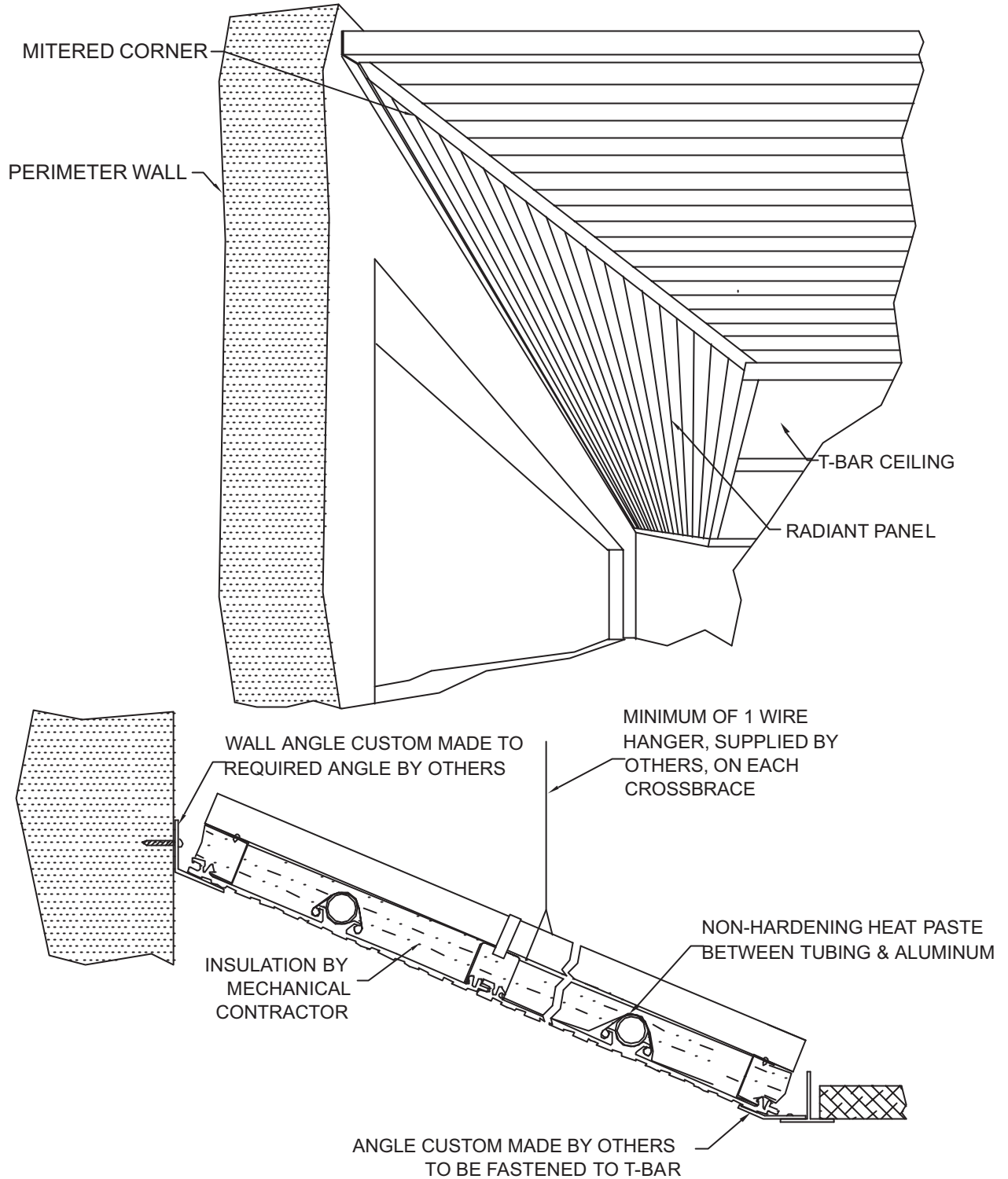
NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

SLOPED LINEAR PANEL IN T-BAR CEILING

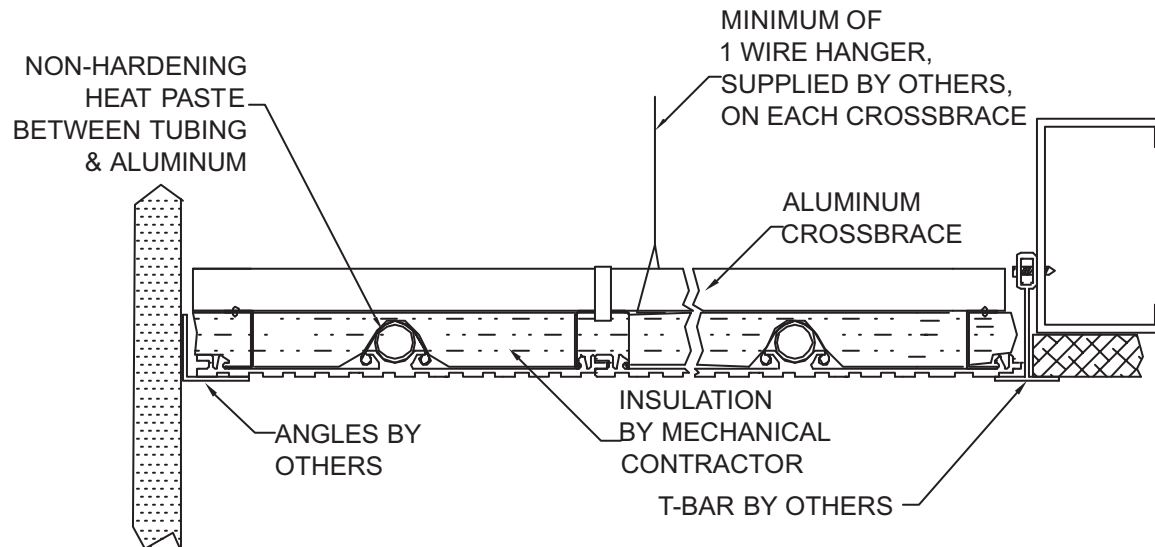
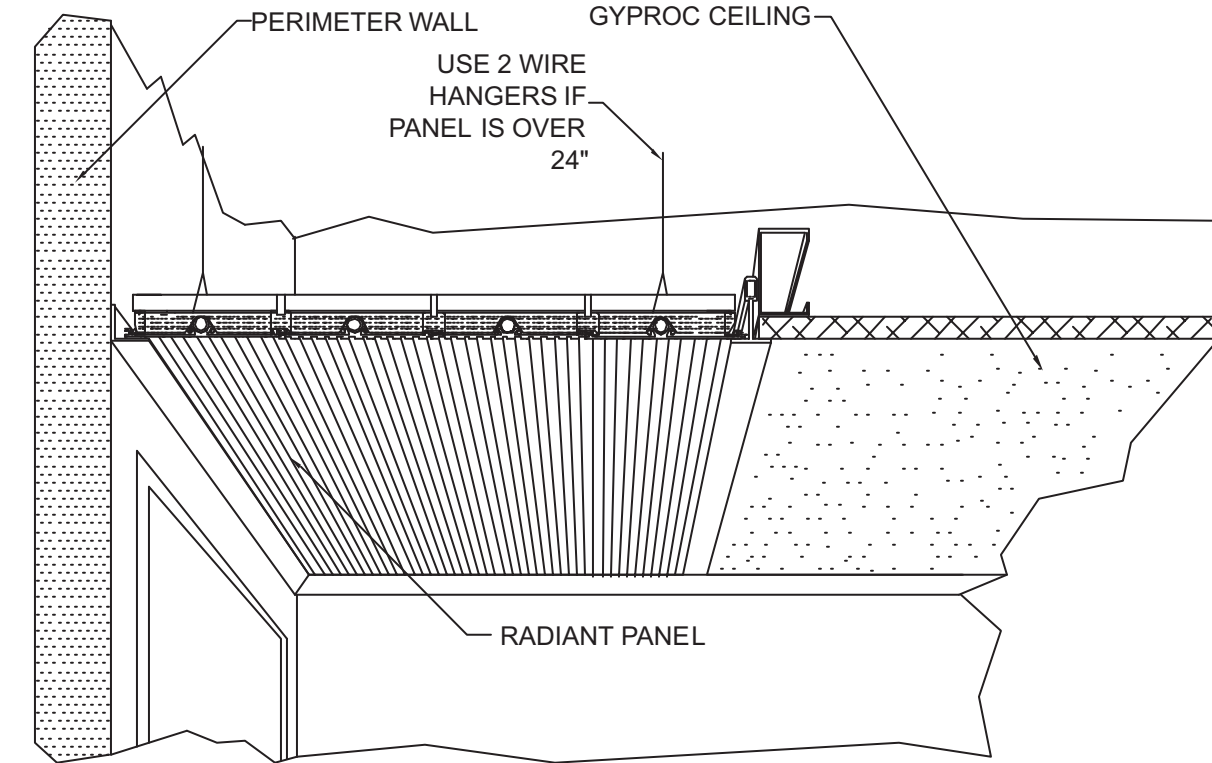


NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

SLOPED LINEAR PANEL IN T-BAR CEILING WITH CORNER

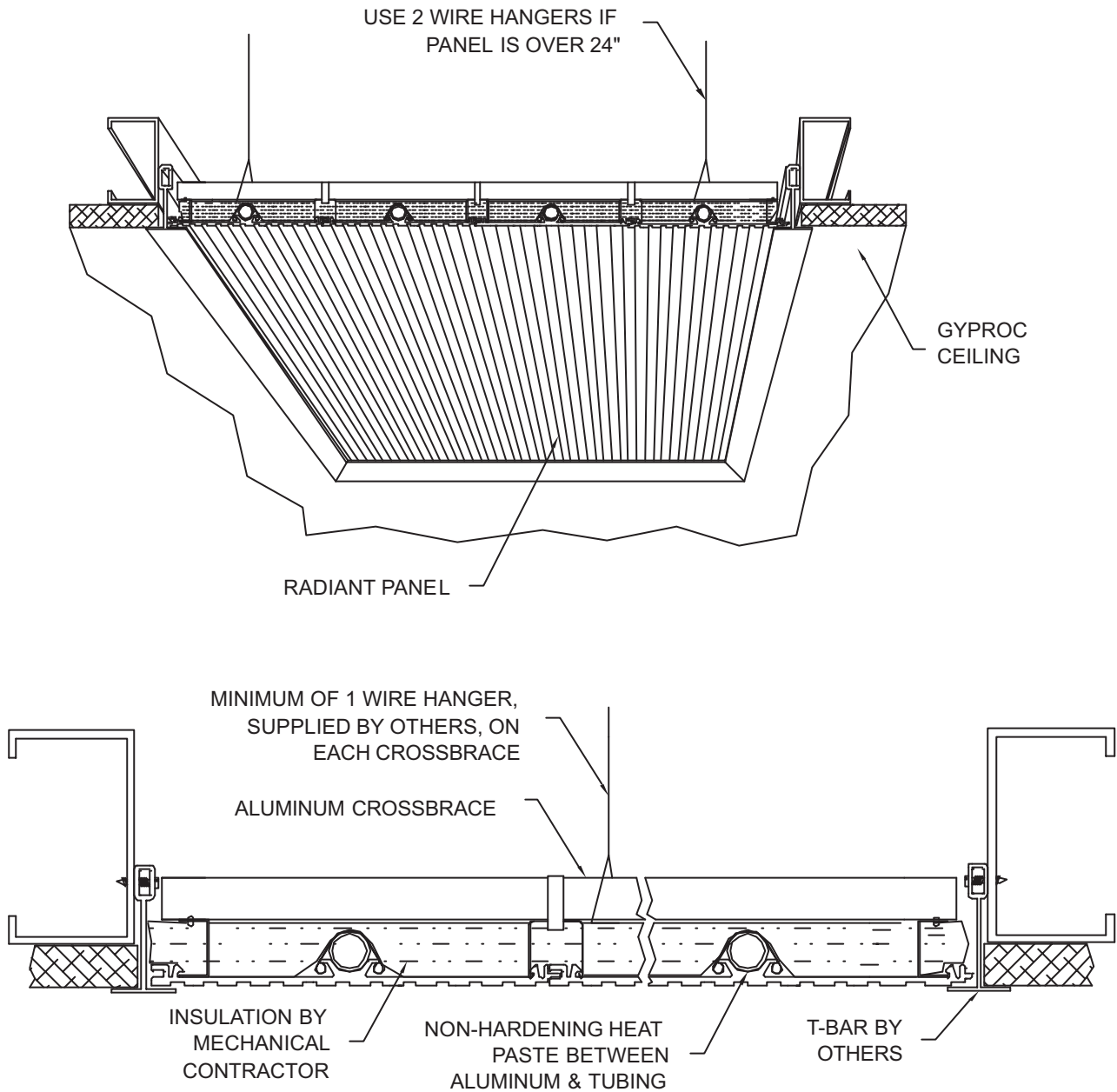


LINEAR PANELS AT PERIMETER WALL IN GYPROC CEILING



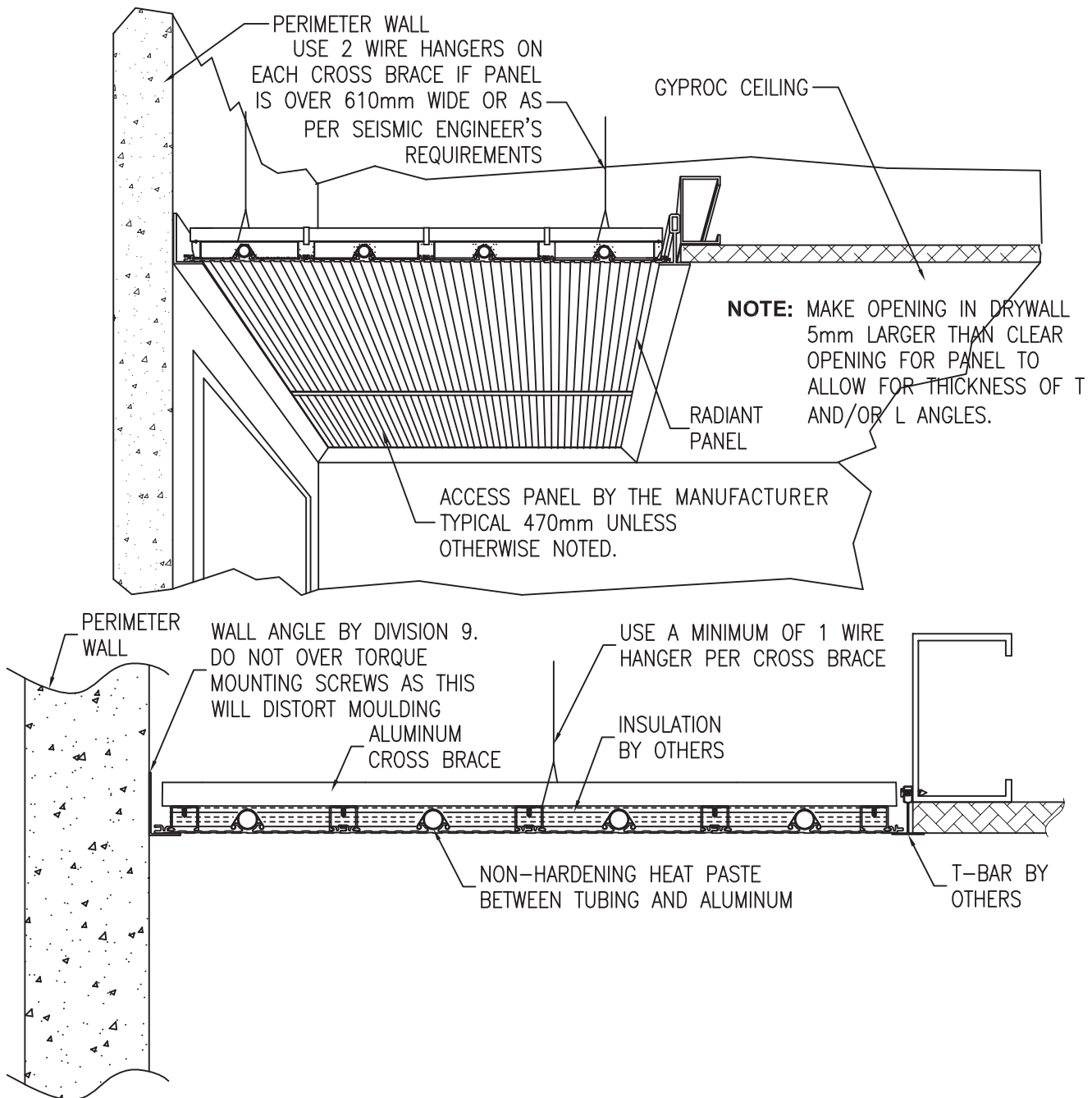
NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7. ACCESS TO SUPPLY, RETURN AND INTERCONNECTION BETWEEN PANELS WILL BE REQUIRED.

LINEAR PANELS IN GYPROC CEILING

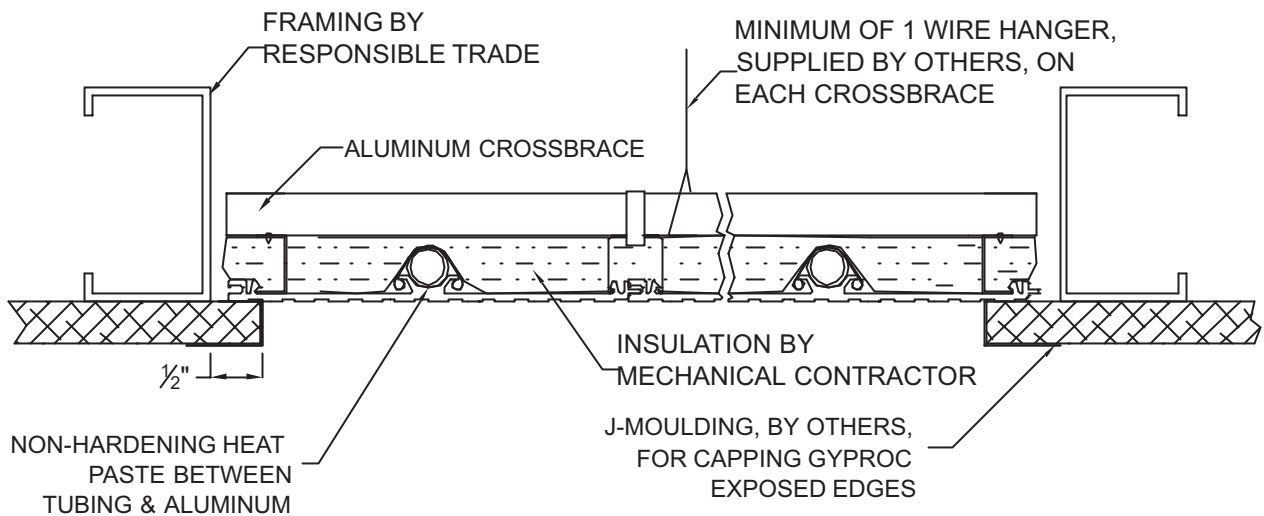
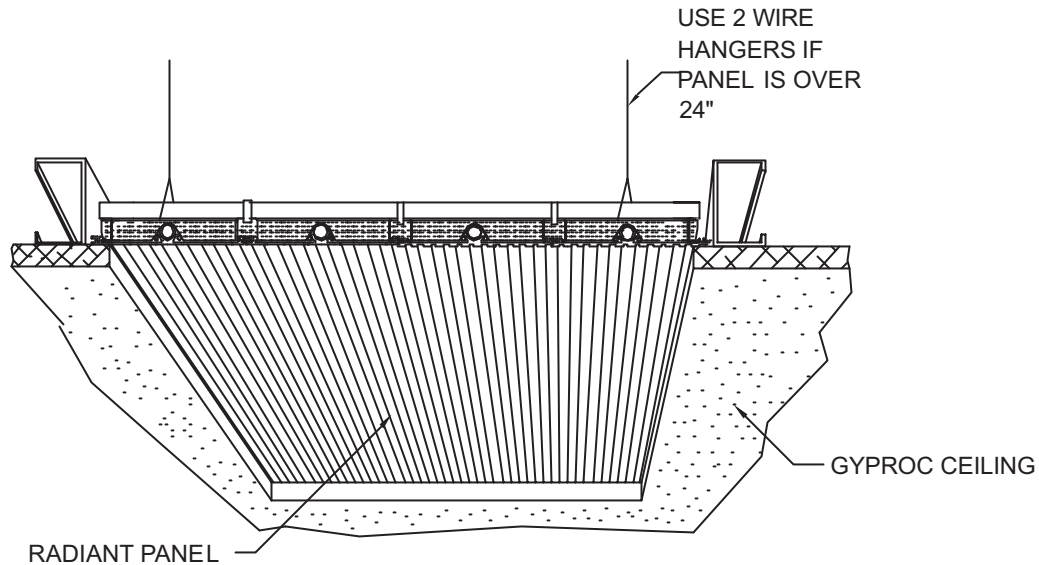


NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7. ACCESS TO SUPPLY, RETURN AND INTERCONNECTION BETWEEN PANELS WILL BE REQUIRED.

LINEAR PANELS AT PERIMETER WALL IN GYPROC CEILING



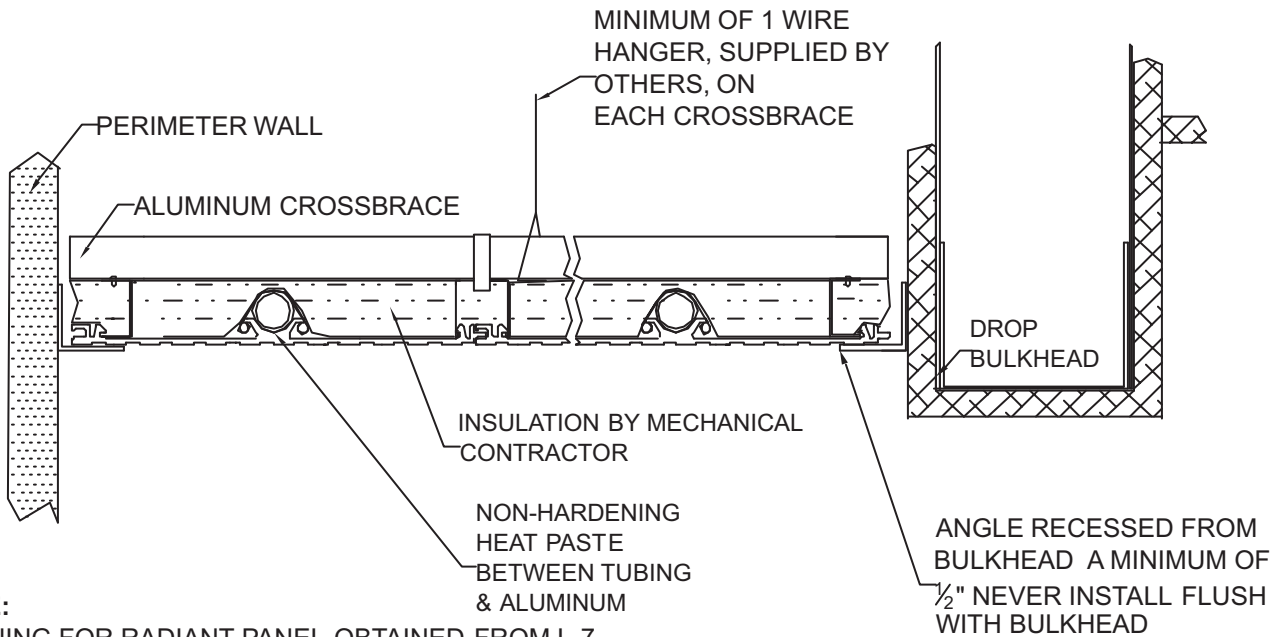
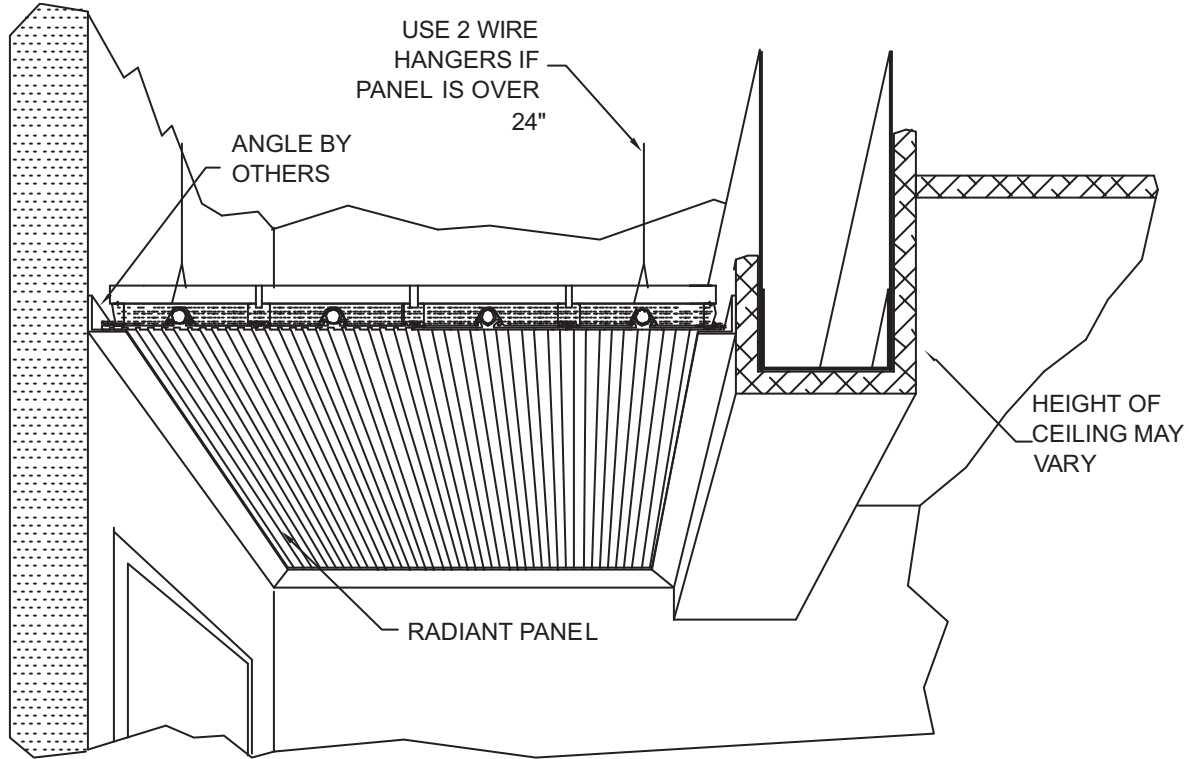
RECESSED LINEAR PANEL IN GYPROC CEILING



NOTE:

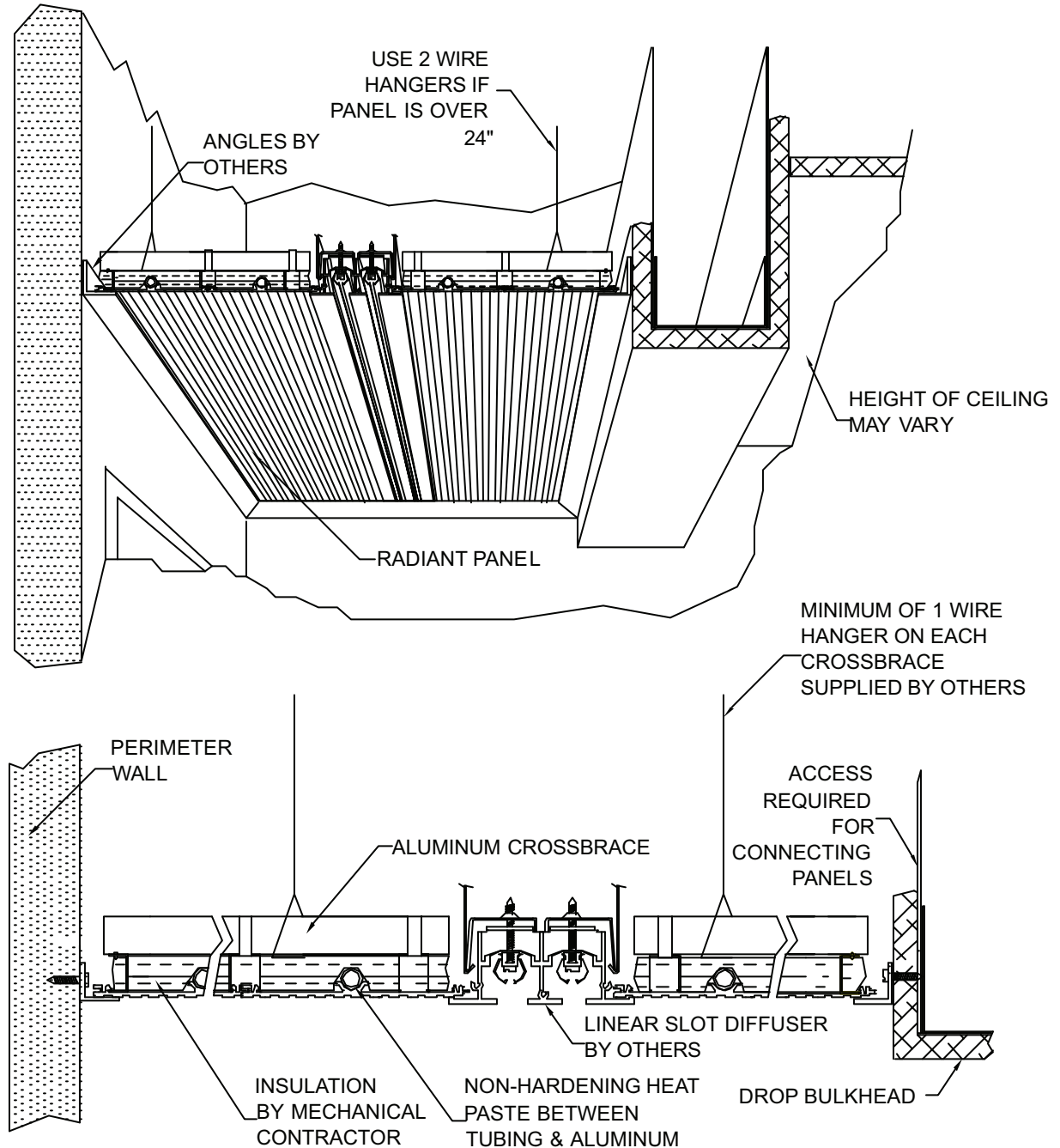
ACCESS TO SUPPLY, RETURN AND INTERCONNECTION BETWEEN PANELS WILL BE REQUIRED. OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

LINEAR PANEL BEHIND BULKHEAD



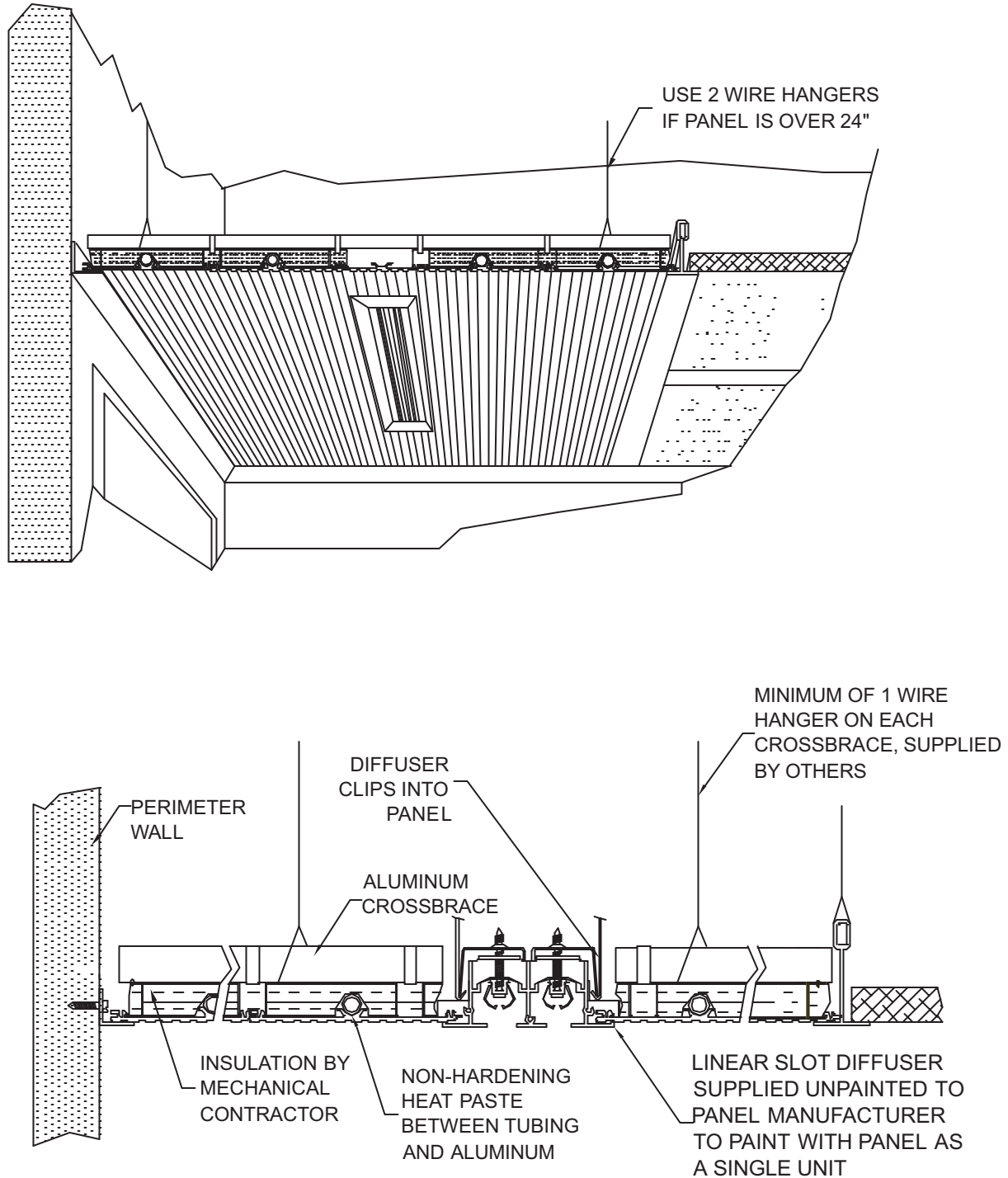
NOTE:
 OPENING FOR RADIANT PANEL OBTAINED FROM L-7.
 ACCESS THROUGH BULKHEAD REQUIRED FOR CONNECTION

SLOT DIFFUSER IN LINEAR PANEL BEHIND BULKHEAD

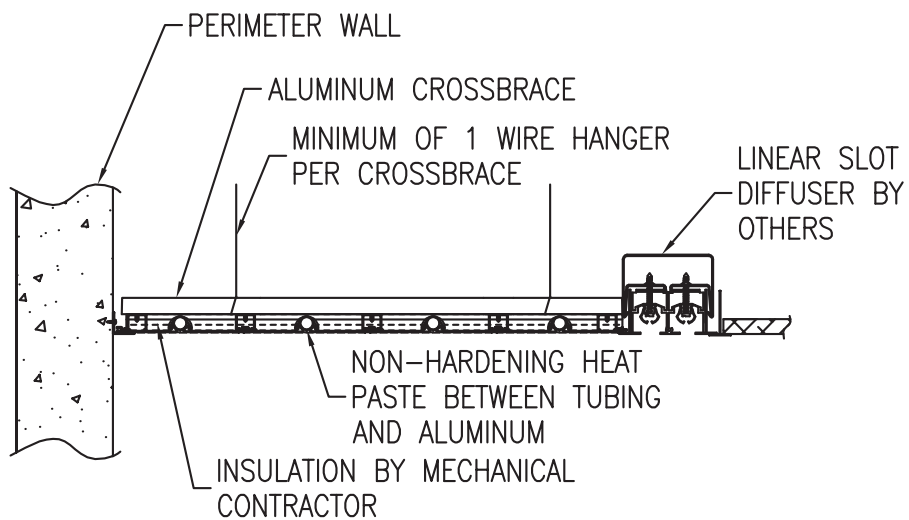
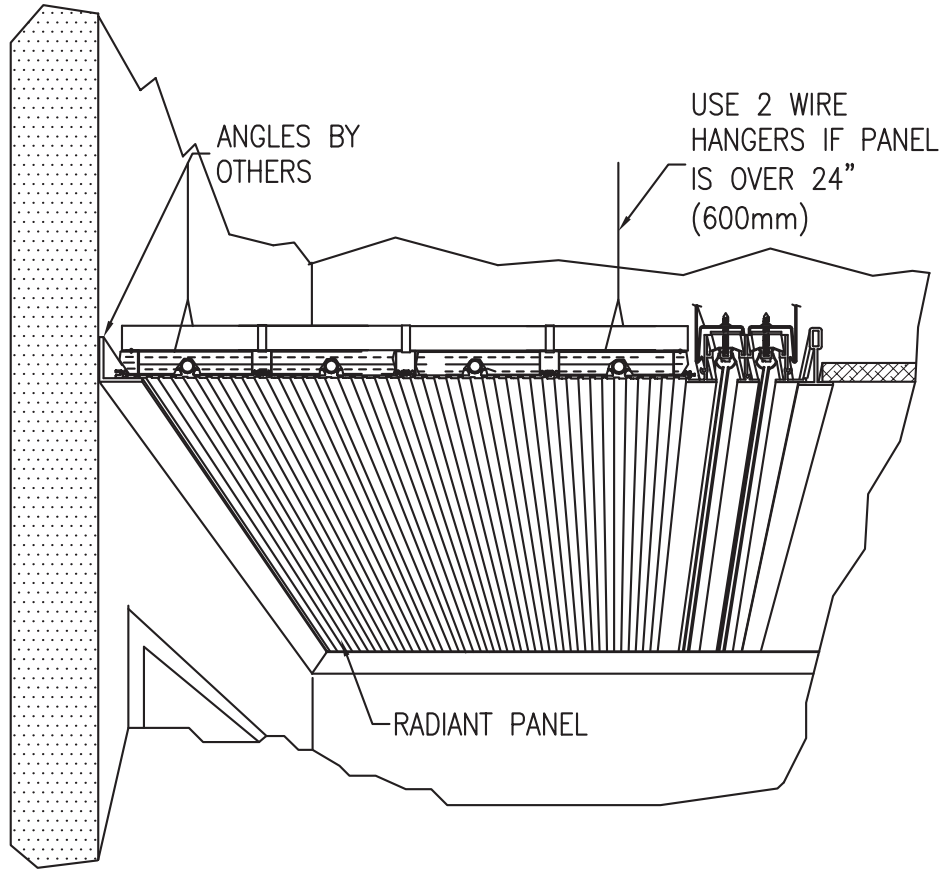


Linear Radiant Panel

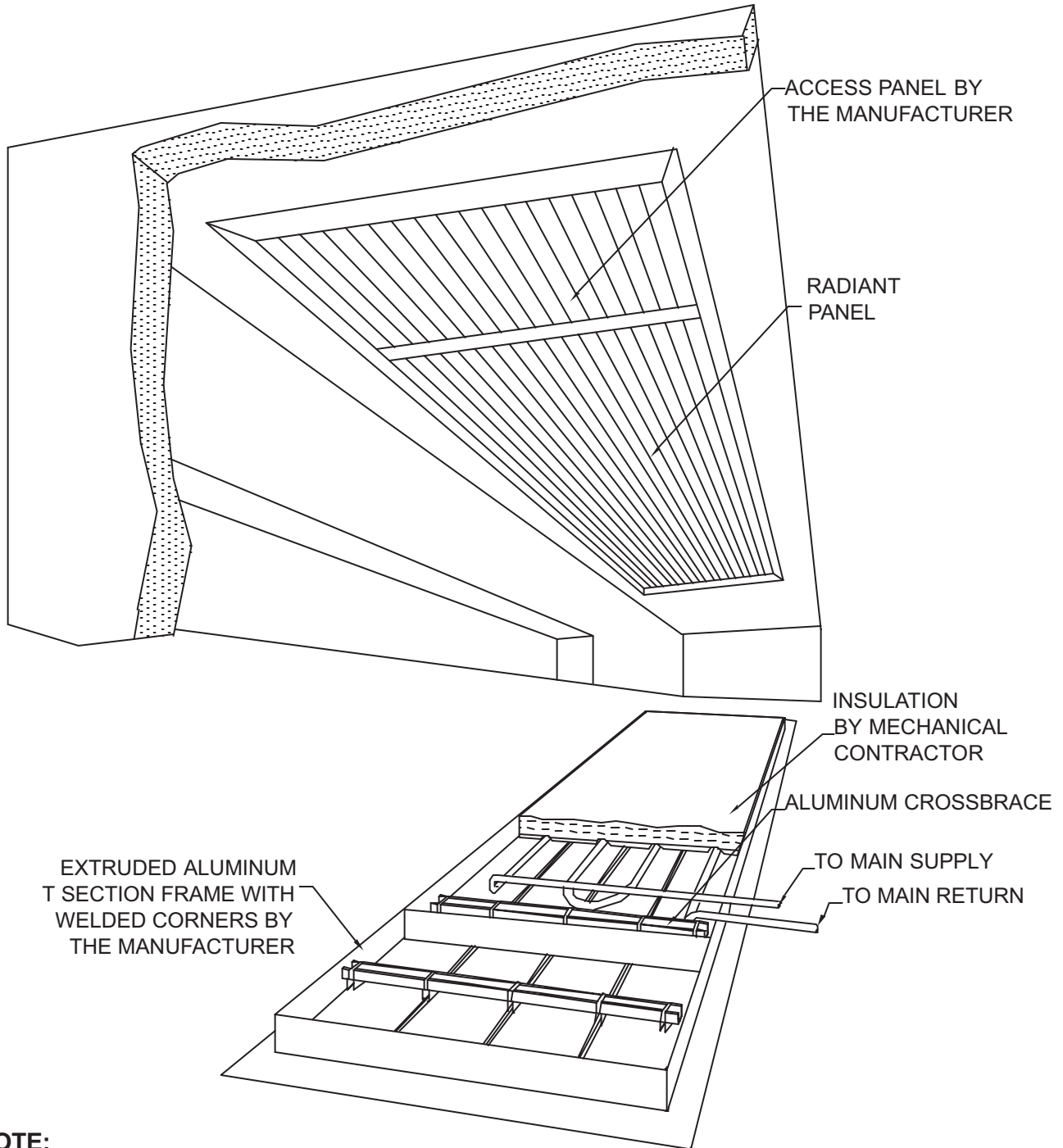
SLOT DIFFUSER IN LINEAR PANEL IN T-BAR



SLOT DIFFUSER IN LINEAR PANEL



FRAMED PANEL WITH ACCESS PANEL IN GYPROC CEILING



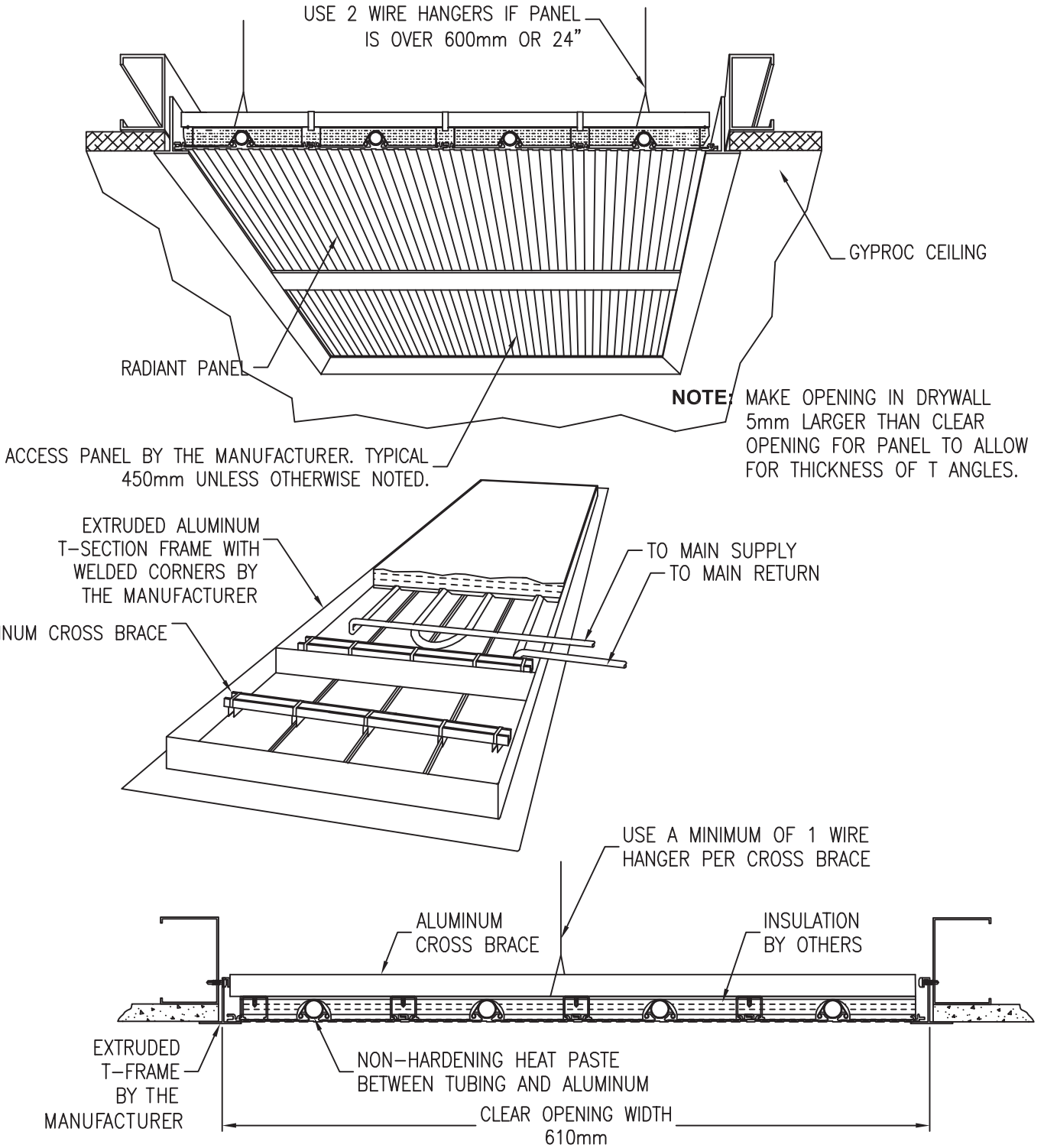
NOTE:

CONNECTIONS TO VALVES DONE ABOVE ACTIVE PANEL TO ALLOW FOR ACCESS PANEL PLACEMENT. OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

Linear Radiant Panel

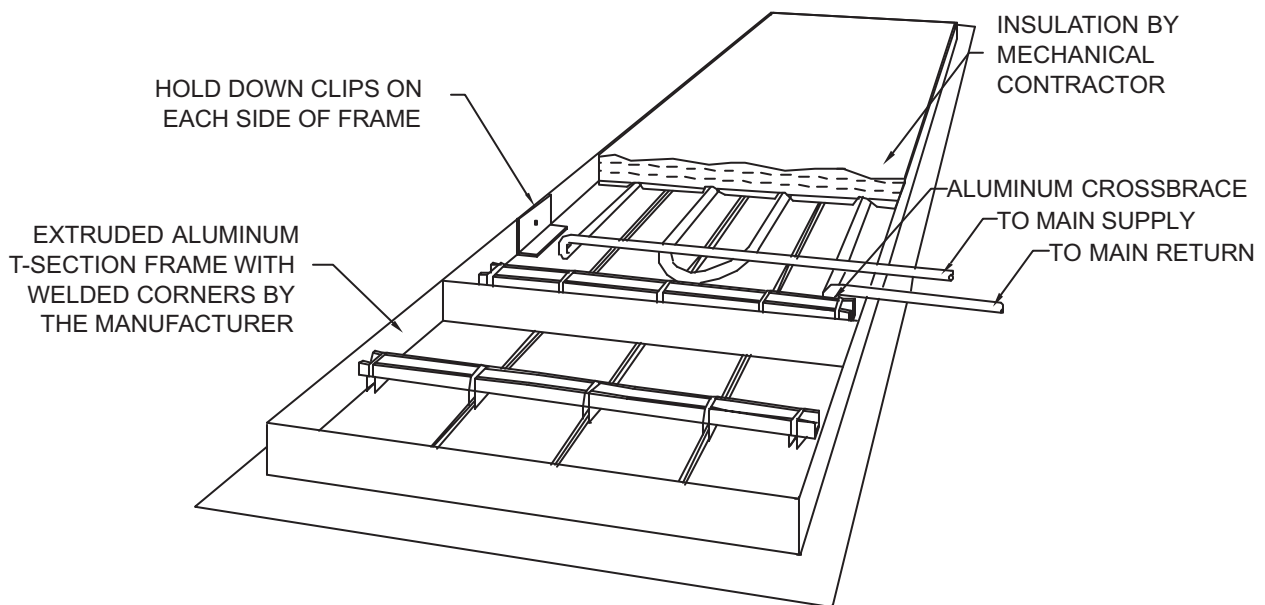
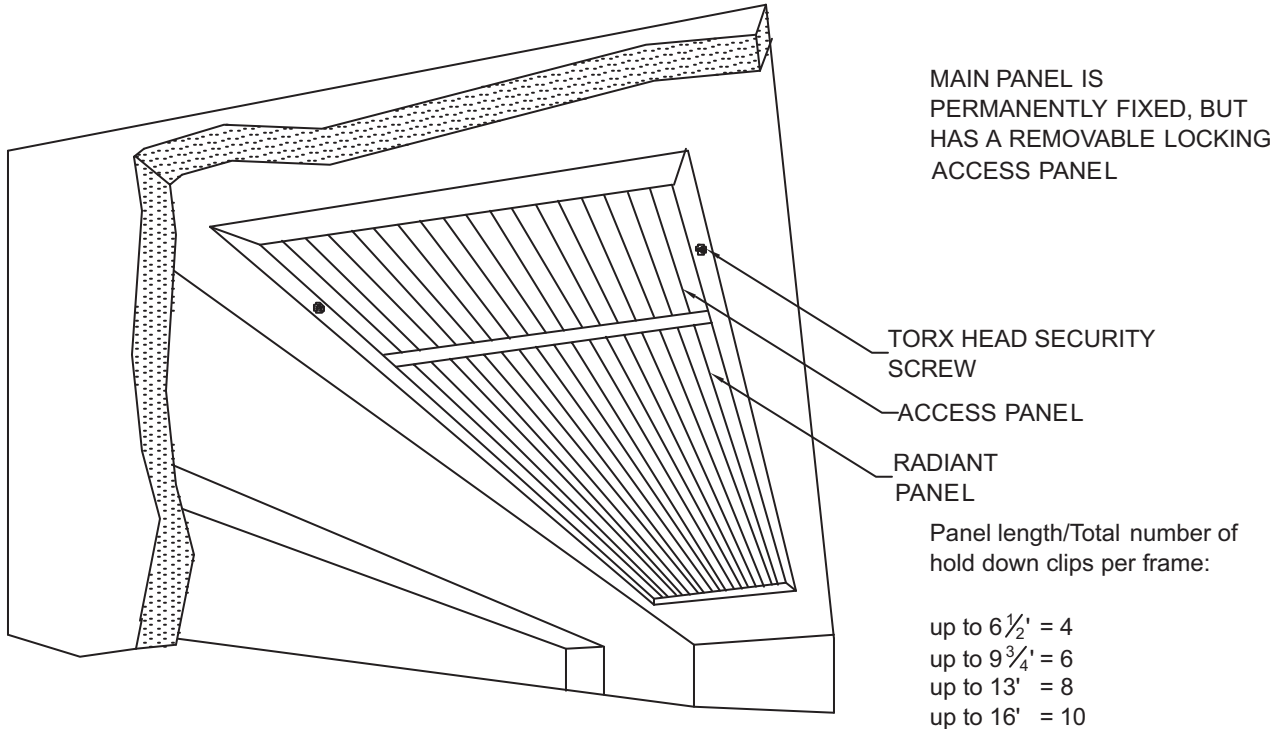


FRAMED LINEAR PANEL IN GYPROC CEILING



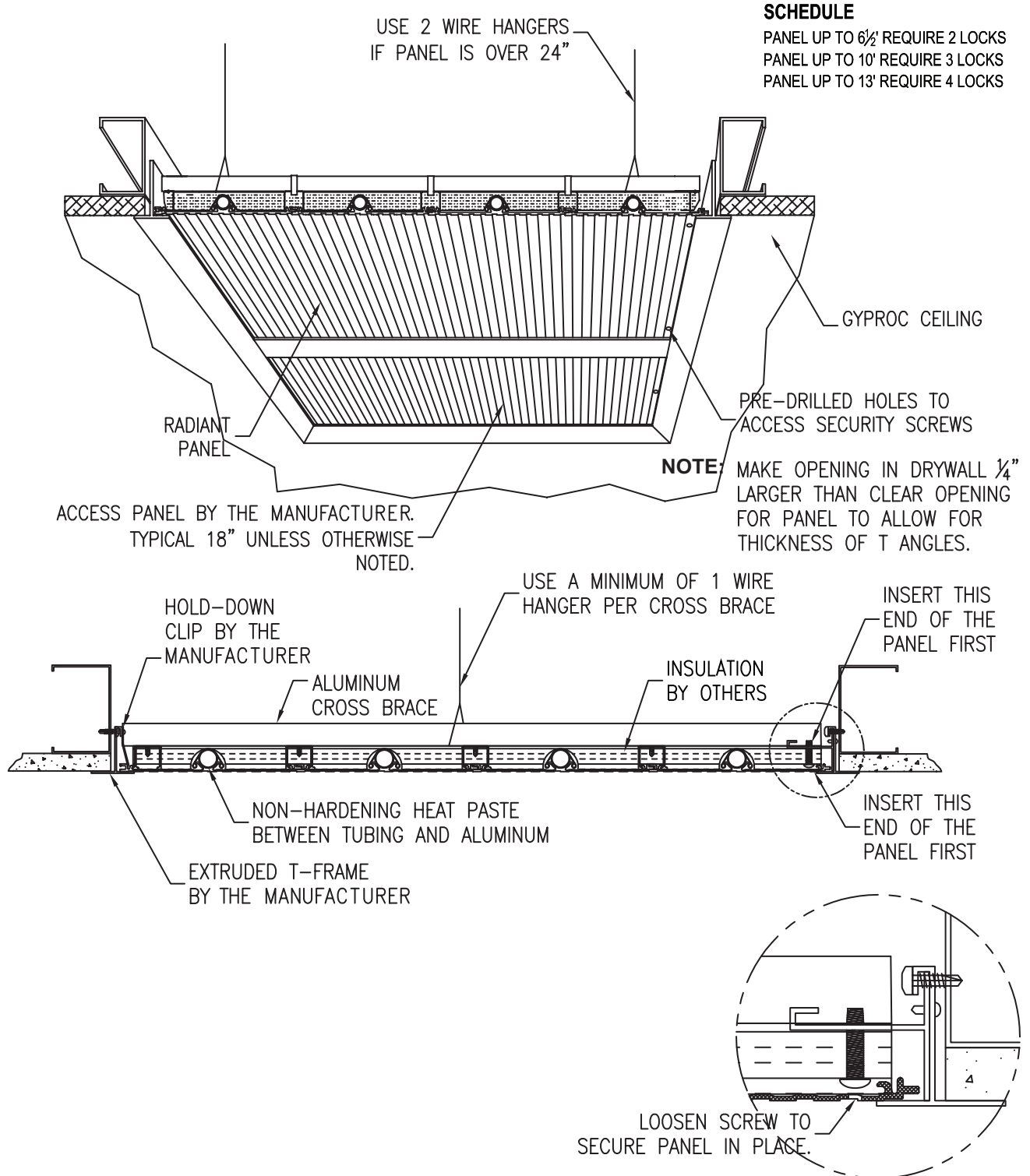
Linear Radiant Panel

FRAMED LINEAR SECURITY PANEL WITH ACCESS PANEL IN GYPROC CEILING

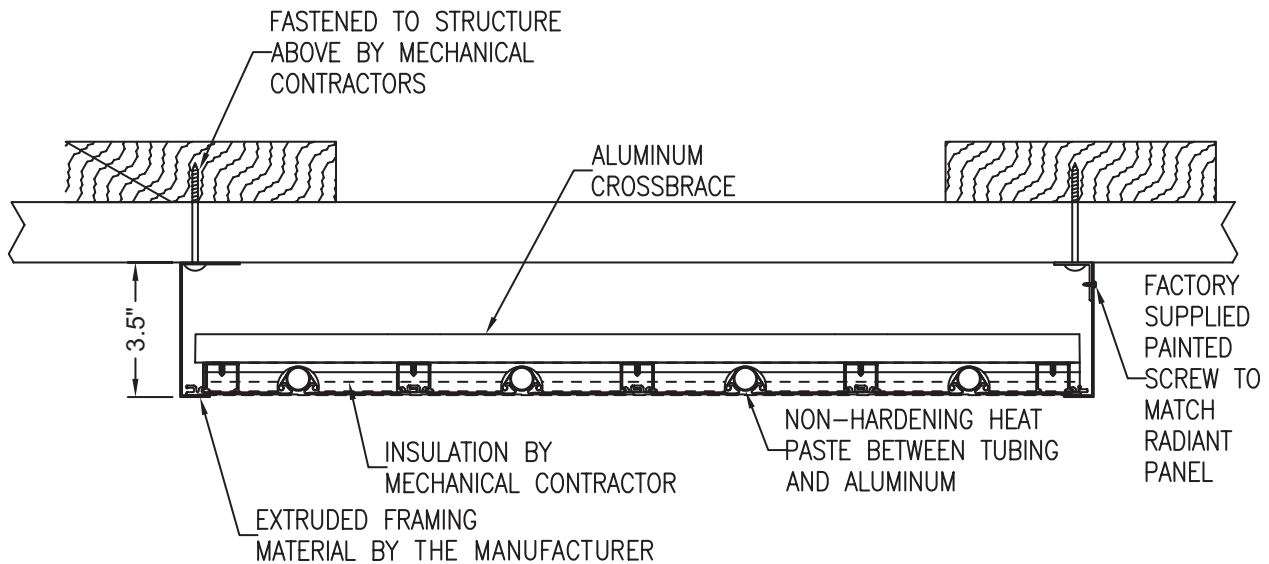
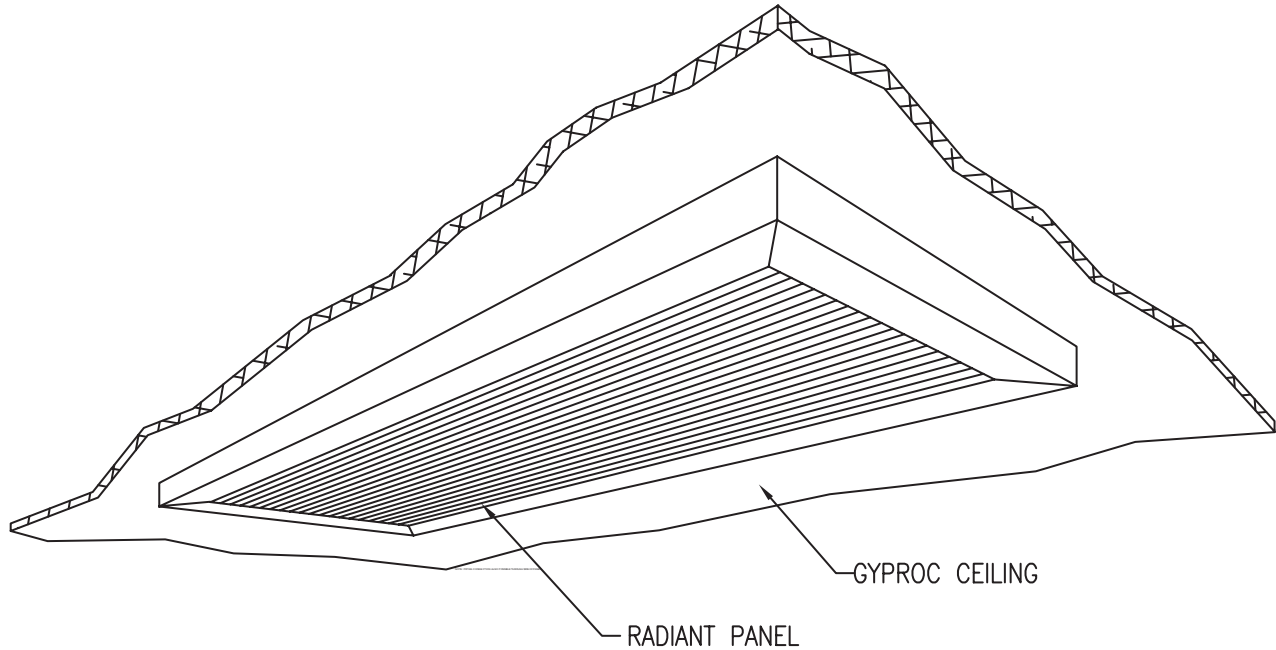


NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7. CONNECTIONS TO VALVES DONE ABOVE ACTIVE PANEL TO ALLOW FOR ACCESS PANEL PLACEMENT

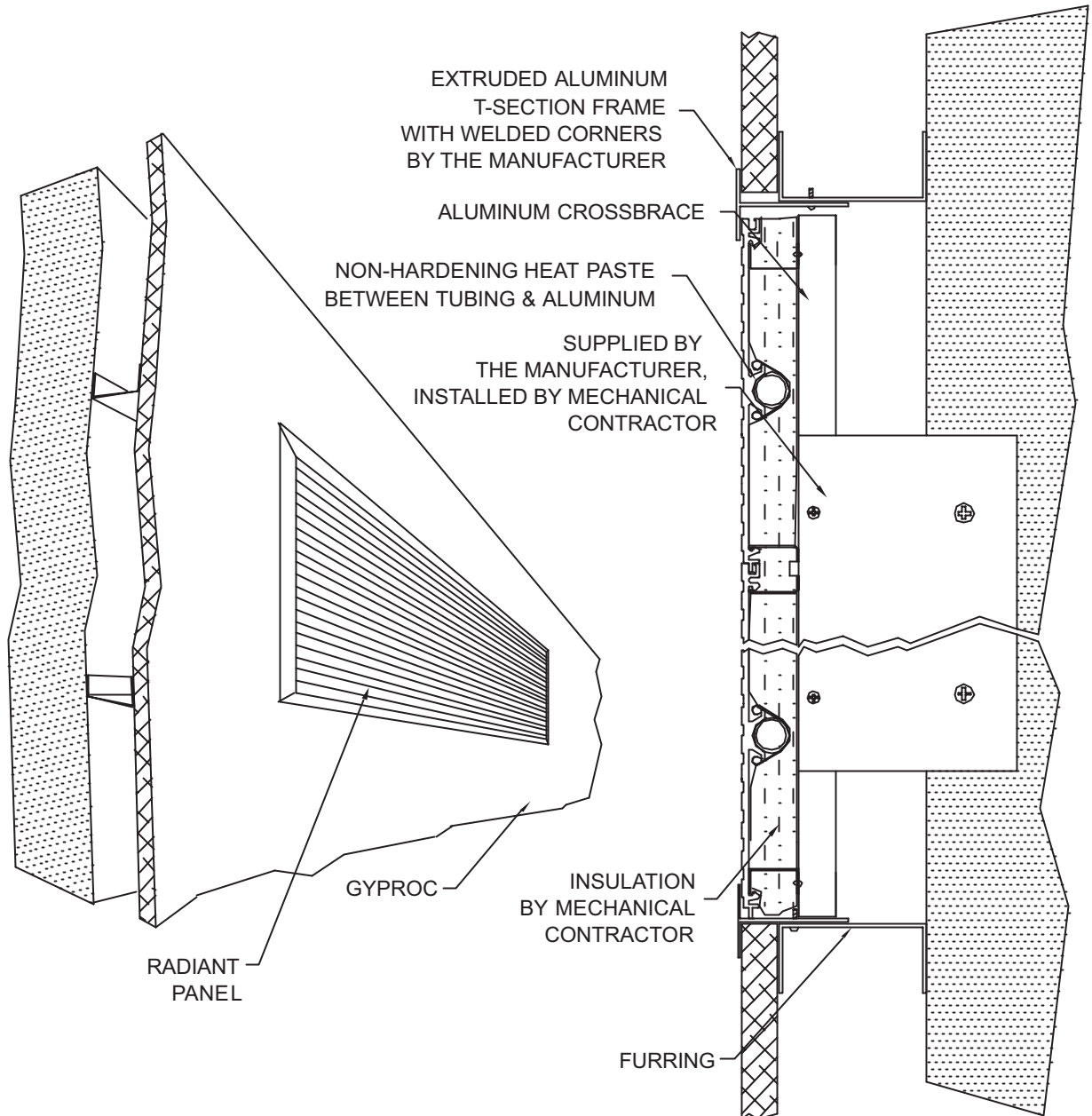
REMOVABLE LOCKING LINEAR PANEL IN GYPROC CEILING



SURFACE MOUNTED LINEAR PANEL



VERTICAL LINEAR PANEL IN GYPROC WALL



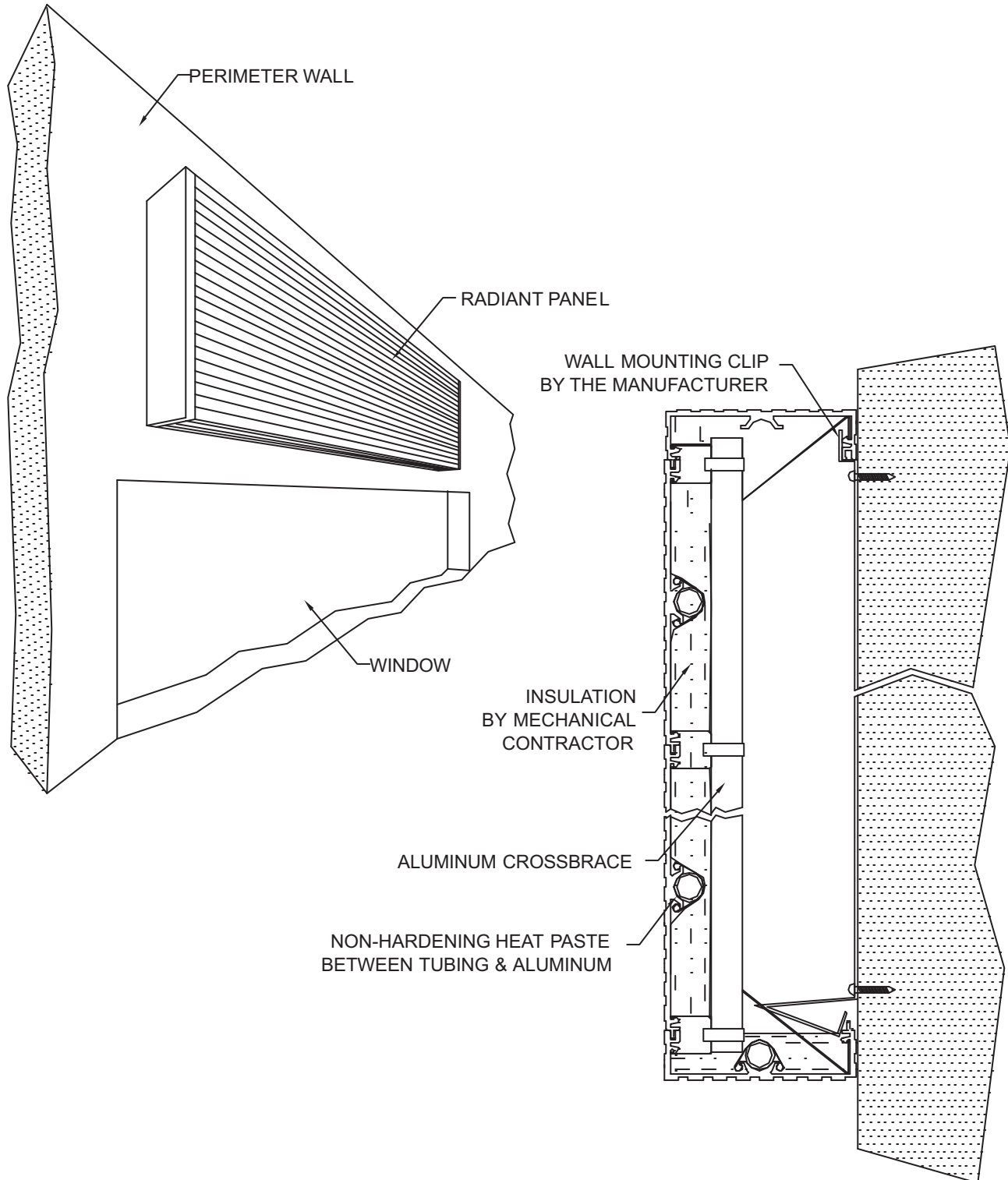
NOTE:

ACCESS REQUIRED TO THE BACK OF RADIANT PANEL TO ALLOW FOR CONNECTION OF PIPING AND HOLDING BRACKET.

OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

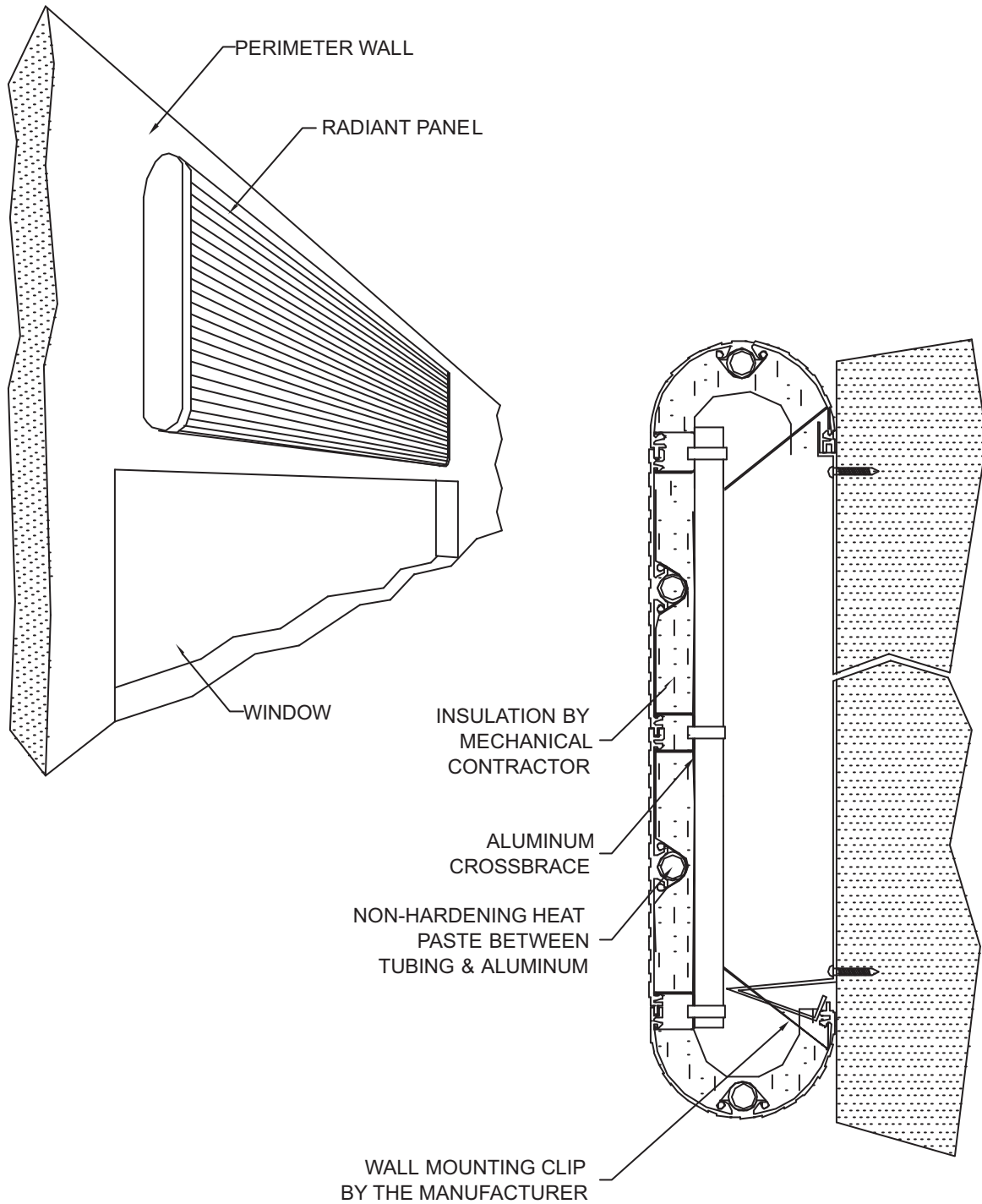
Linear Radiant Panel

SURFACE WALL MOUNTED LINEAR PANEL



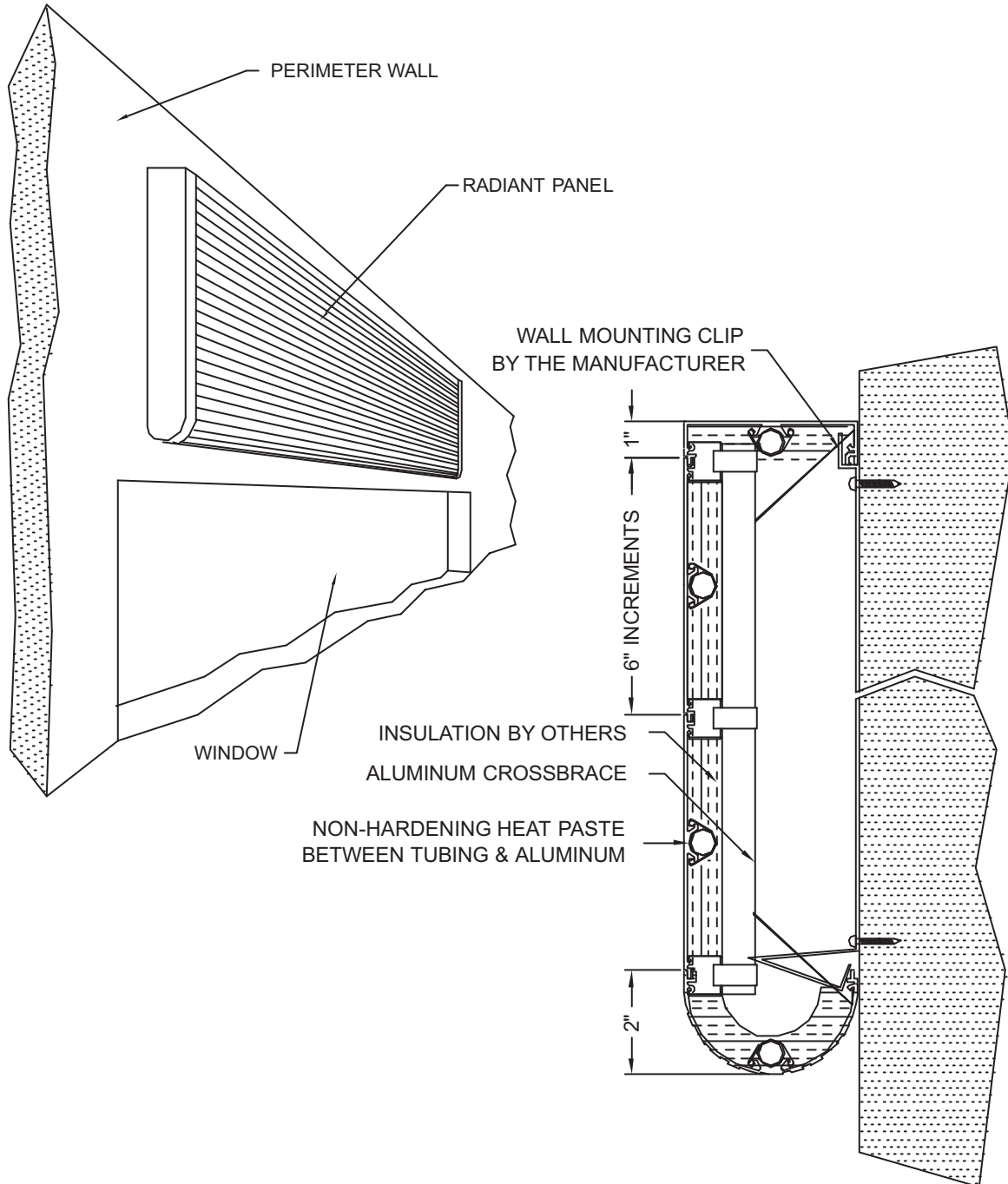
Linear Radiant Panel

SURFACE WALL MOUNTED LINEAR PANEL

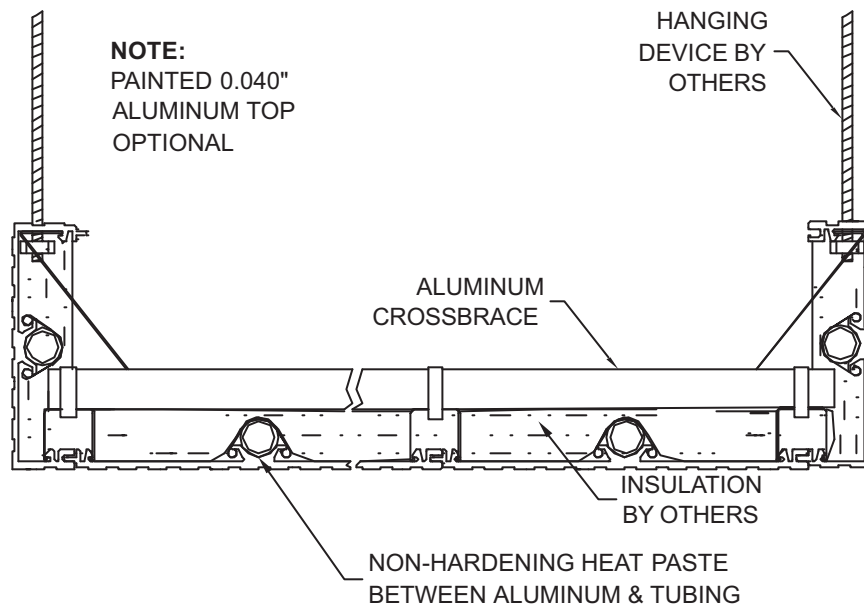
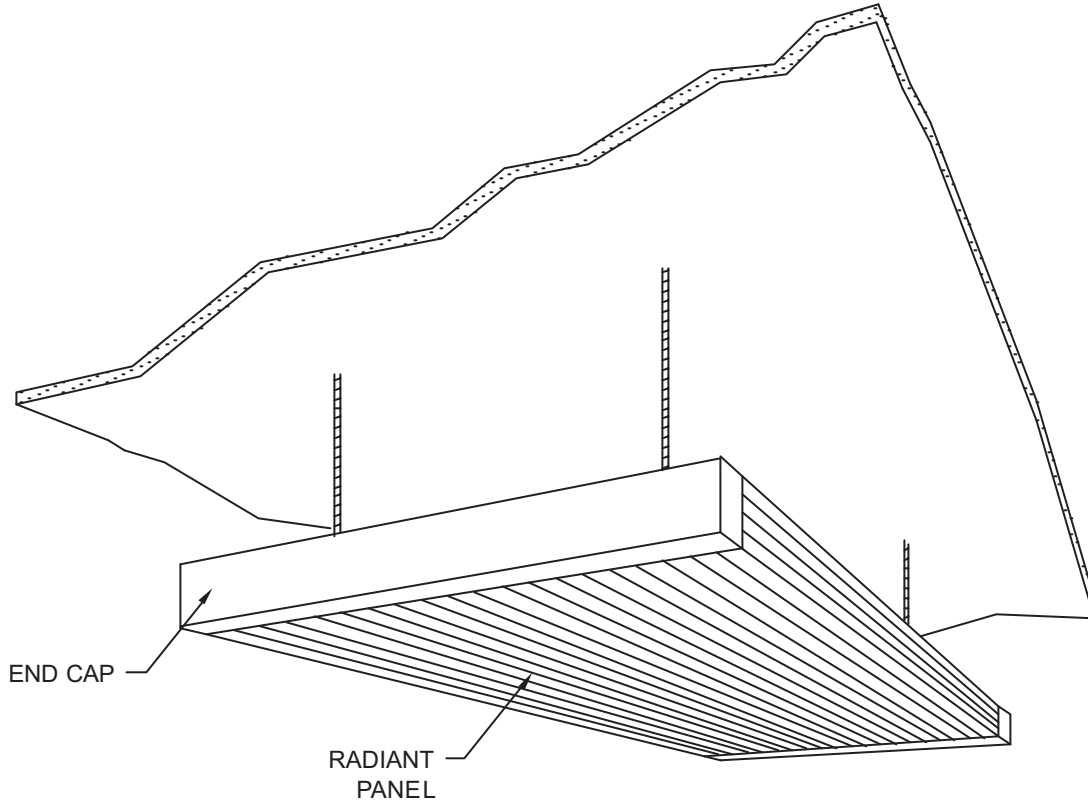


Linear Radiant Panel

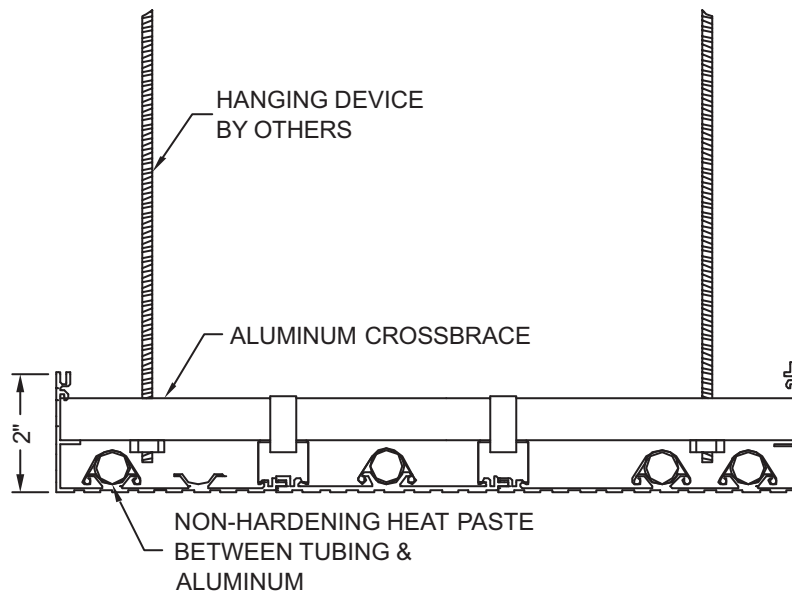
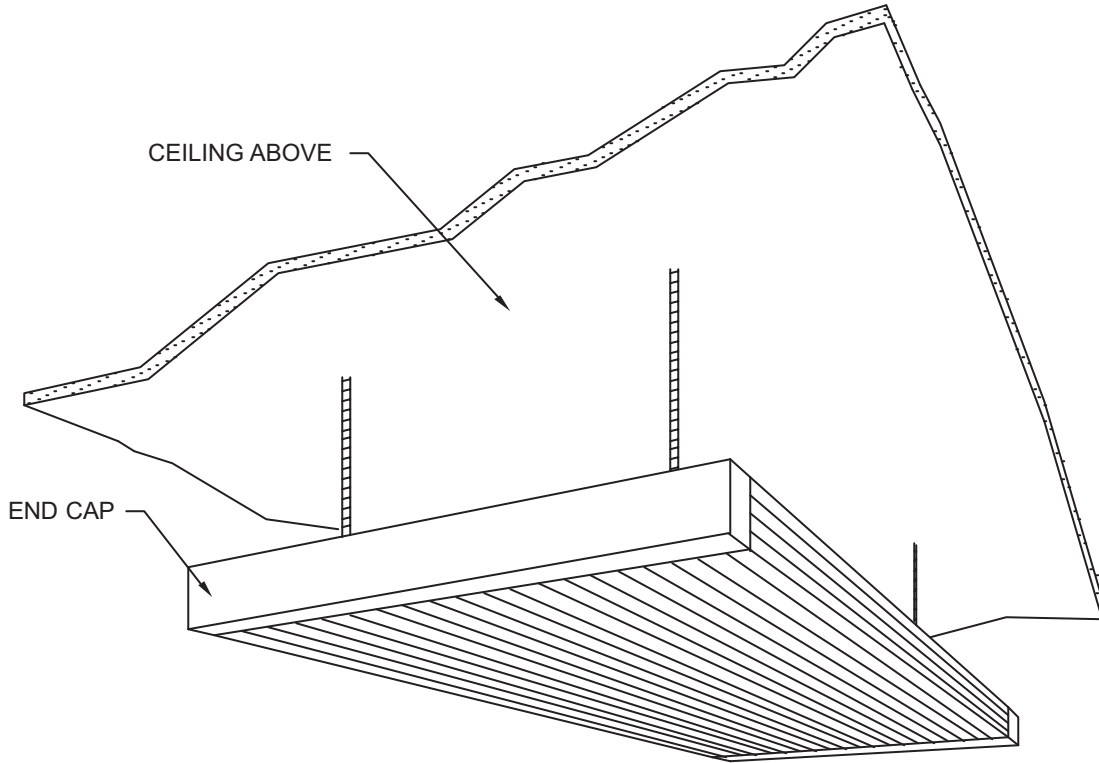
SURFACE WALL MOUNTED LINEAR PANEL



HANGING LINEAR PANEL IN EXPOSED AREA



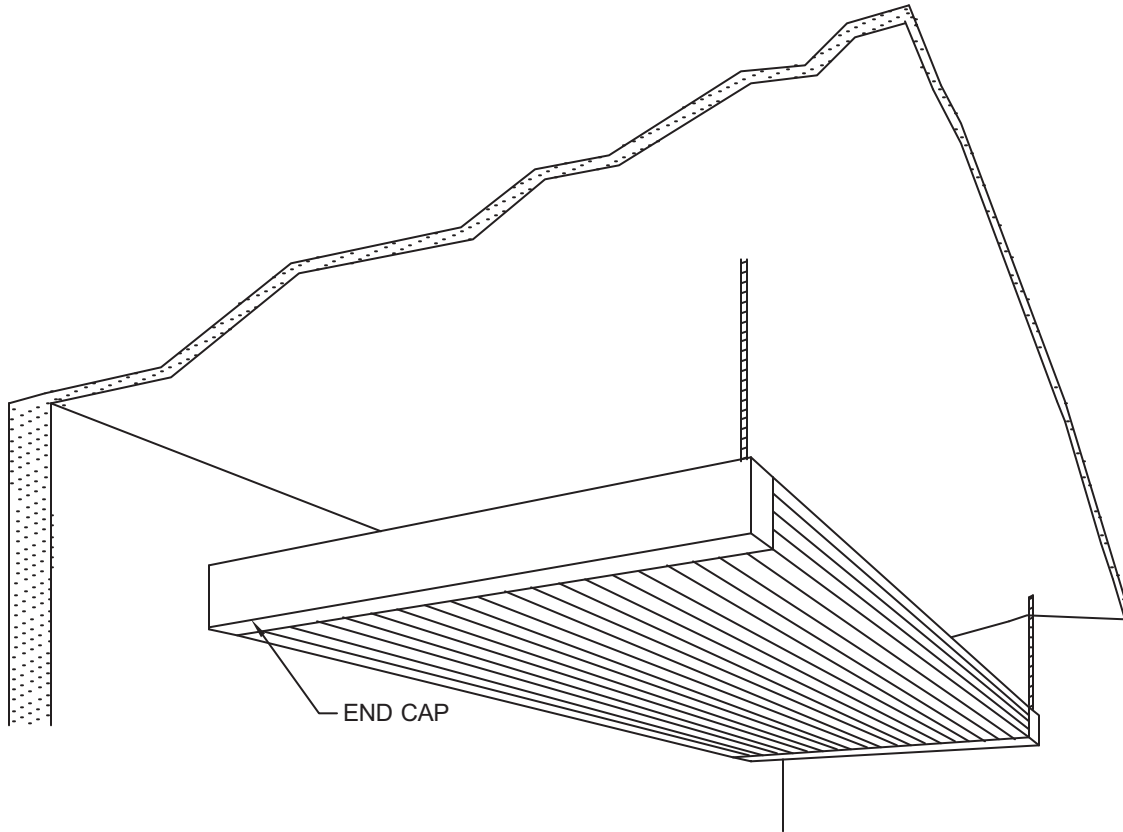
HANGING INDUSTRIAL LINEAR PANEL



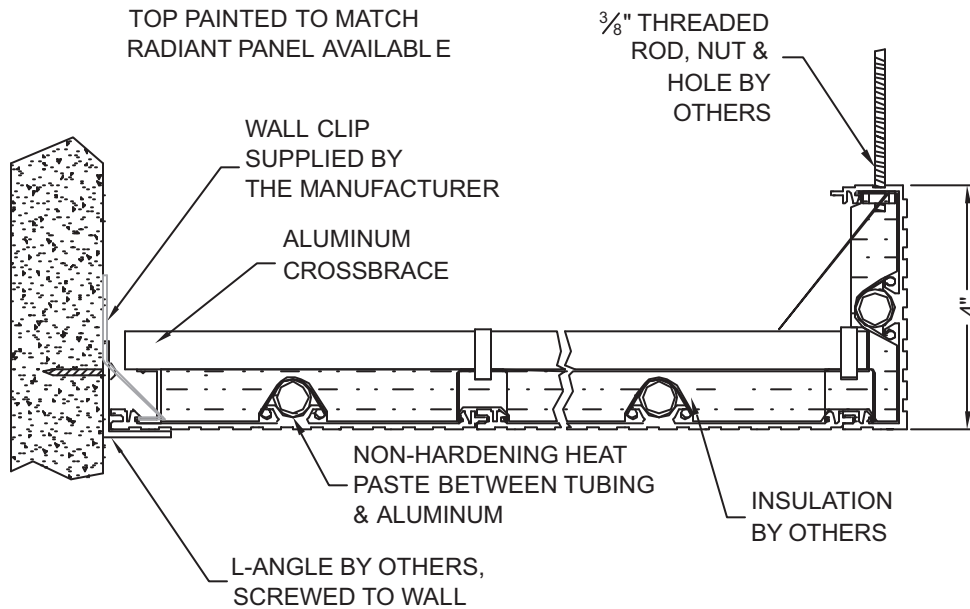
Linear Radiant Panel



HANGING LINEAR PANEL IN EXPOSED AREA

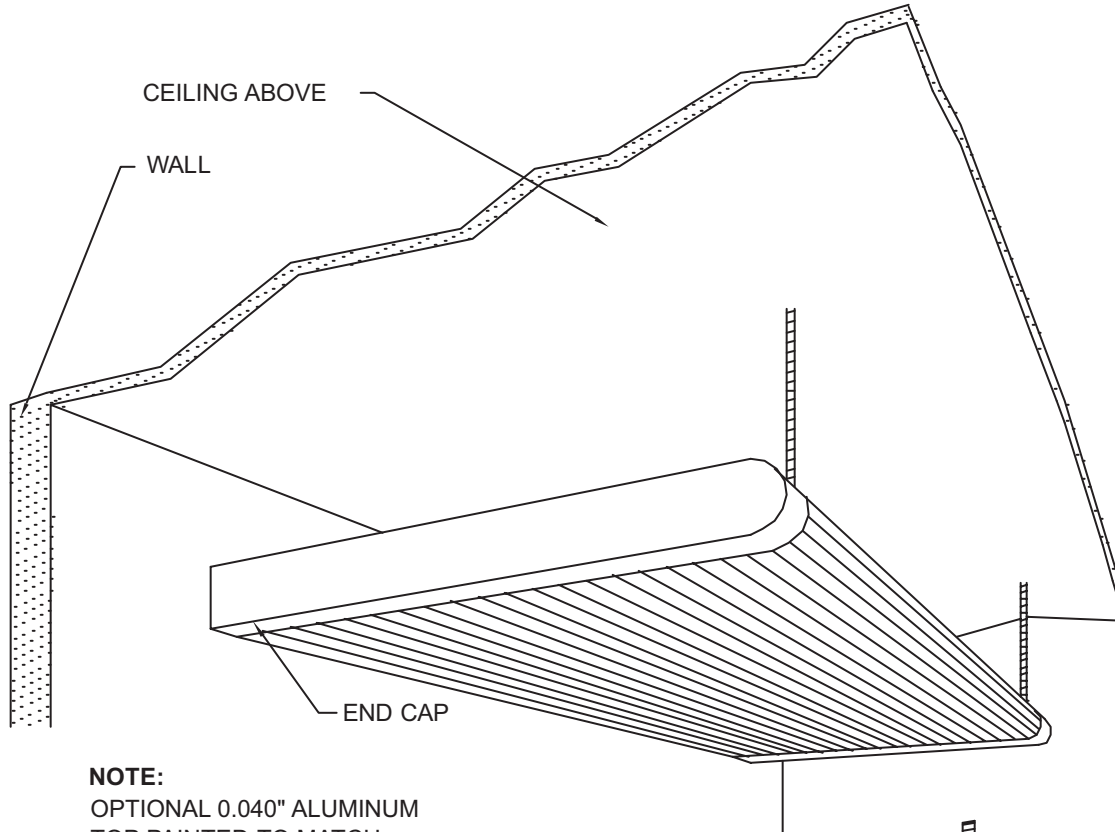


NOTE:
OPTIONAL 0.040" ALUMINUM
TOP PAINTED TO MATCH
RADIANT PANEL AVAILABLE

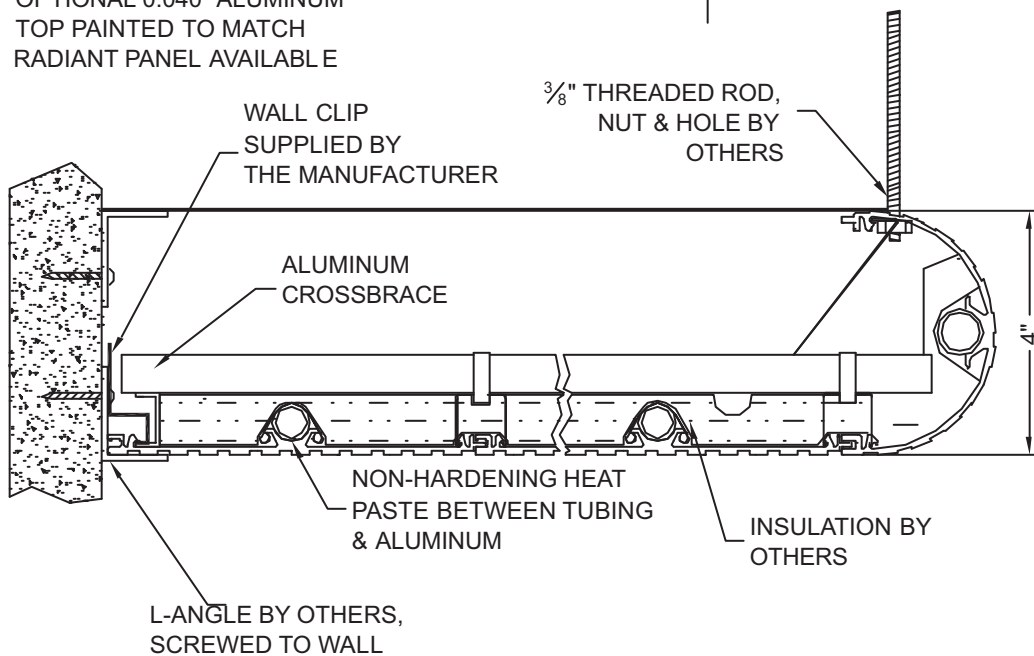


Linear Radiant Panel

HANGING LINEAR PANEL IN EXPOSED AREA



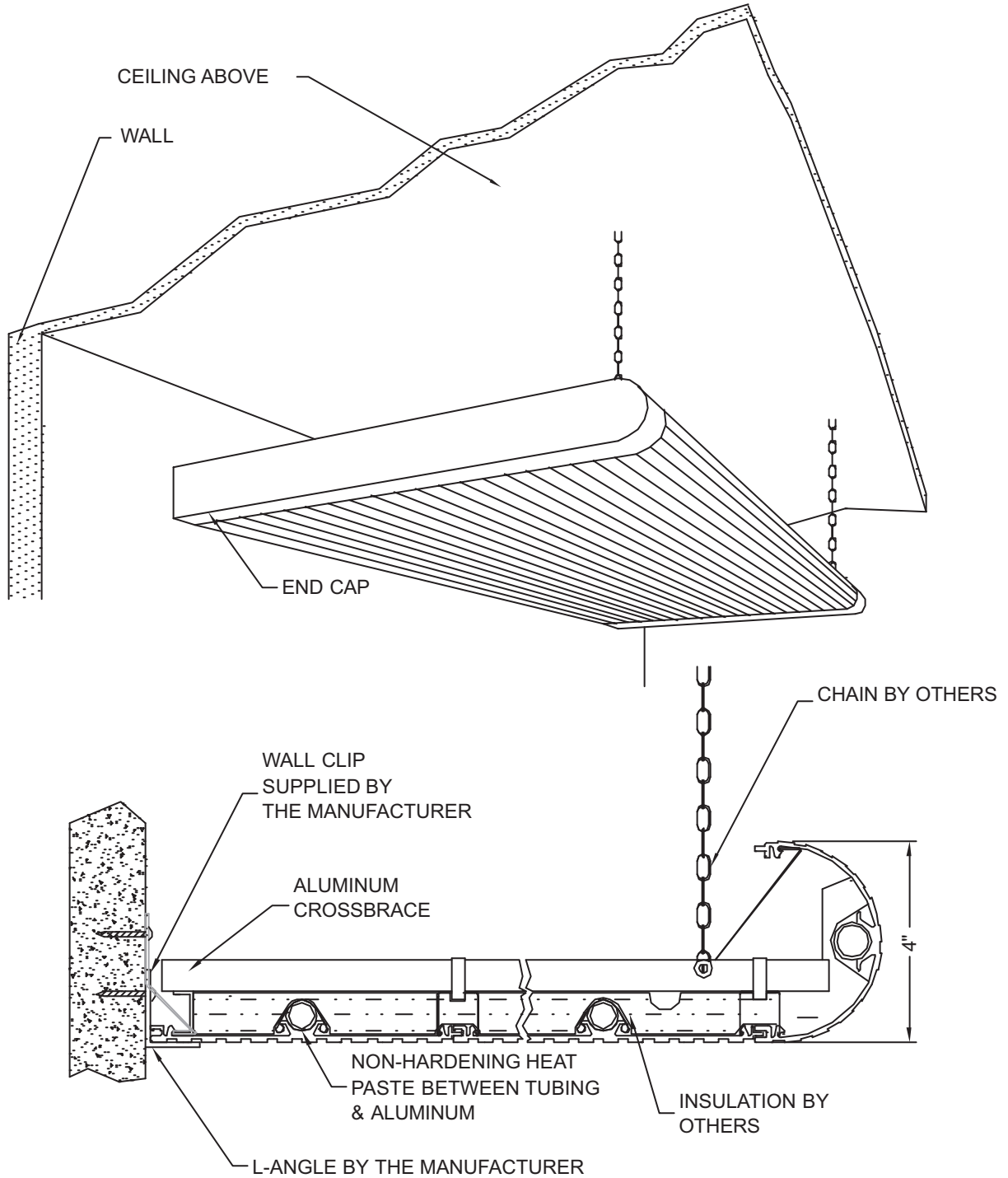
NOTE:
OPTIONAL 0.040" ALUMINUM
TOP PAINTED TO MATCH
RADIANT PANEL AVAILABLE



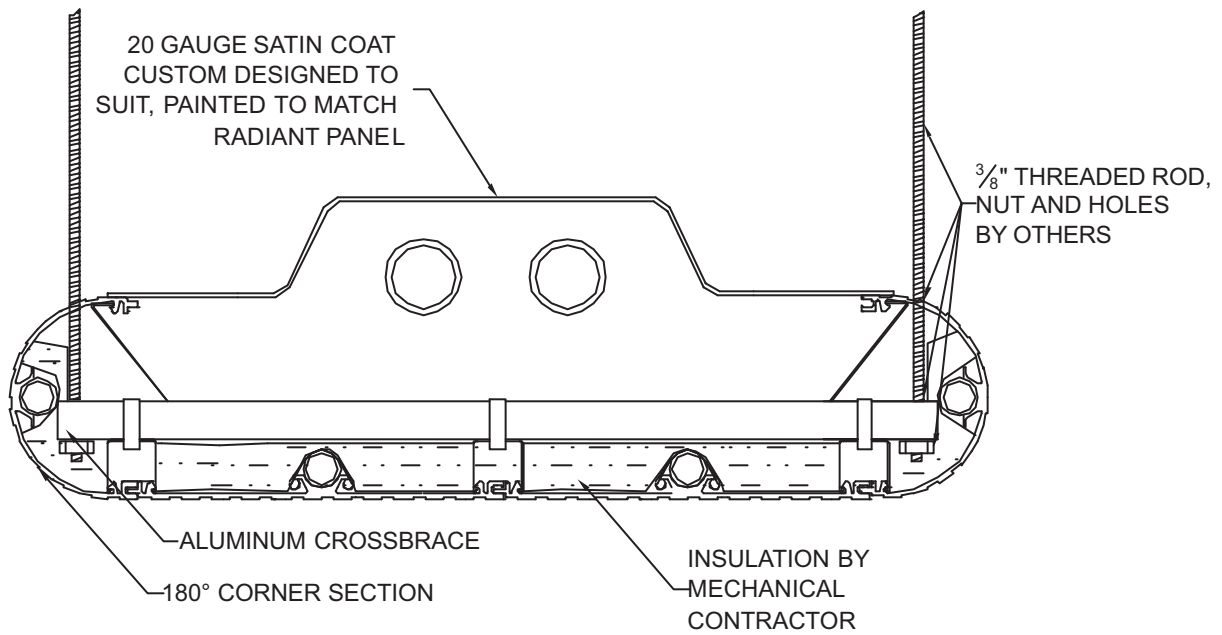
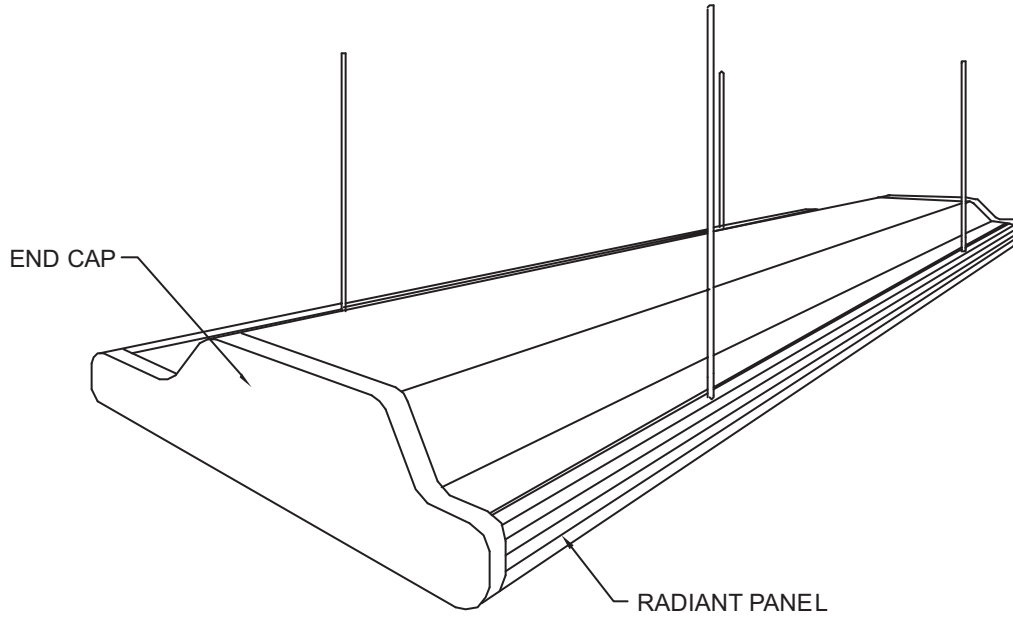
Linear Radiant Panel



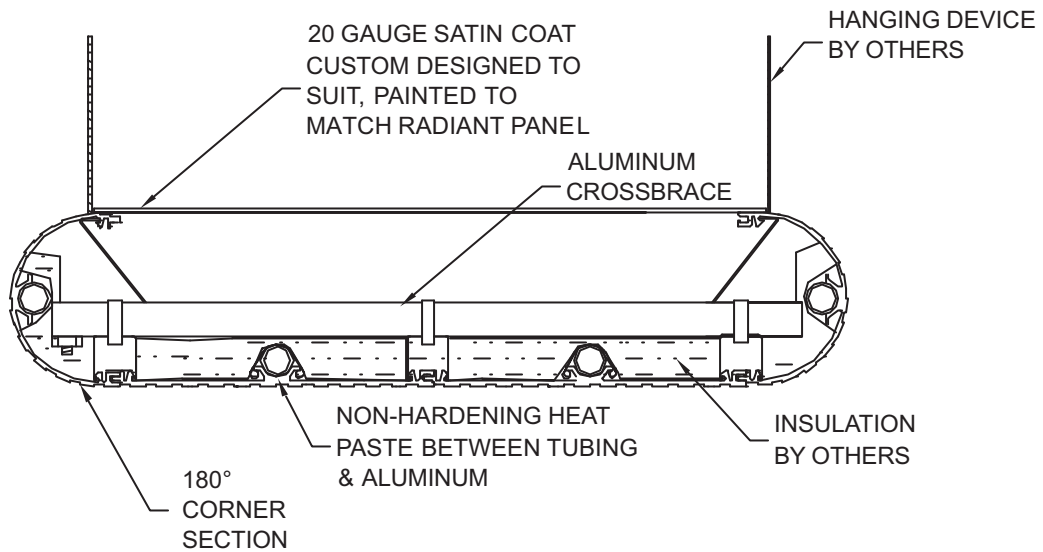
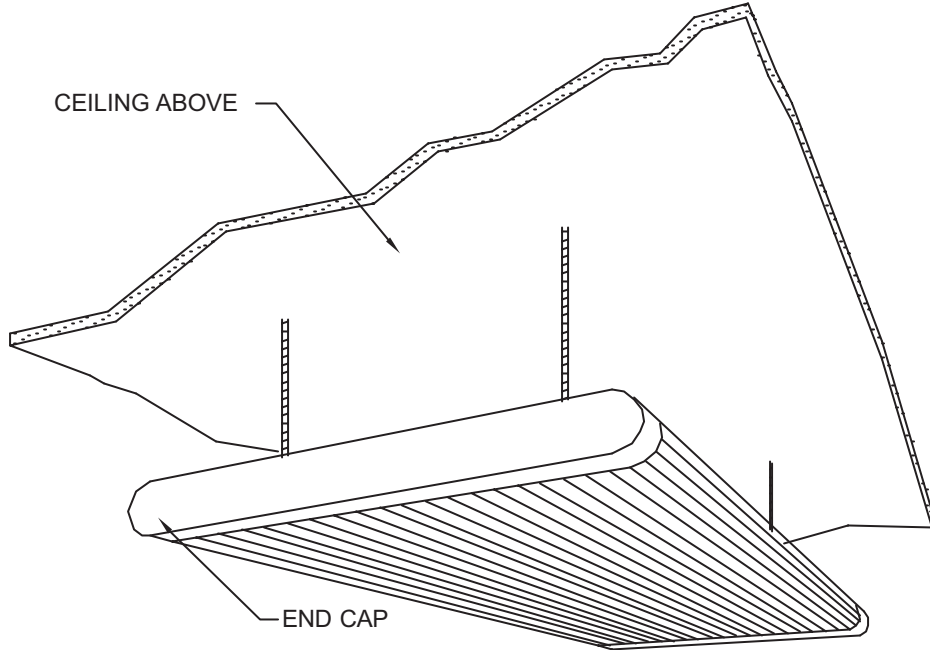
HANGING LINEAR PANEL IN EXPOSED AREA



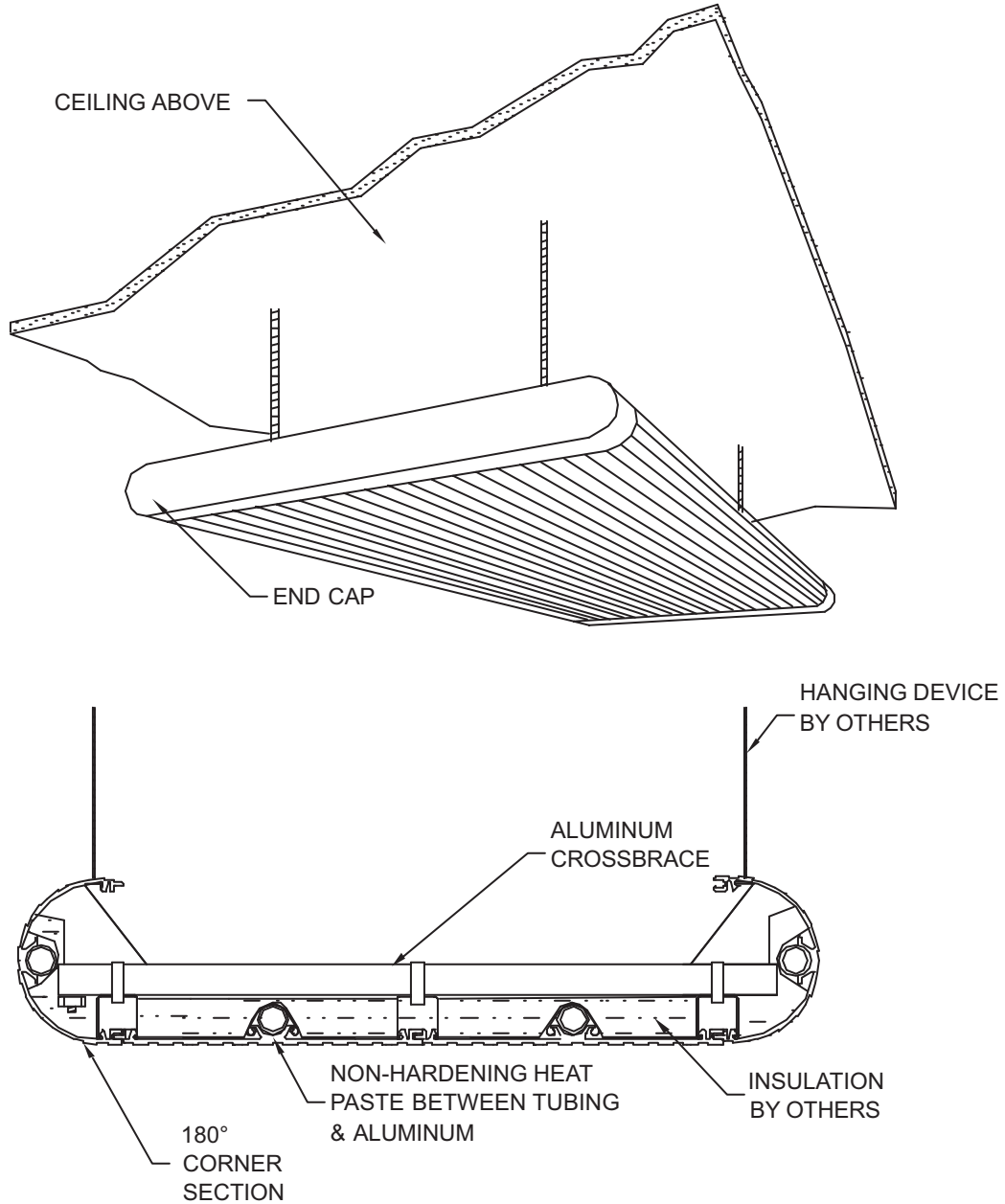
ENCLOSED LINEAR PANEL IN EXPOSED AREA



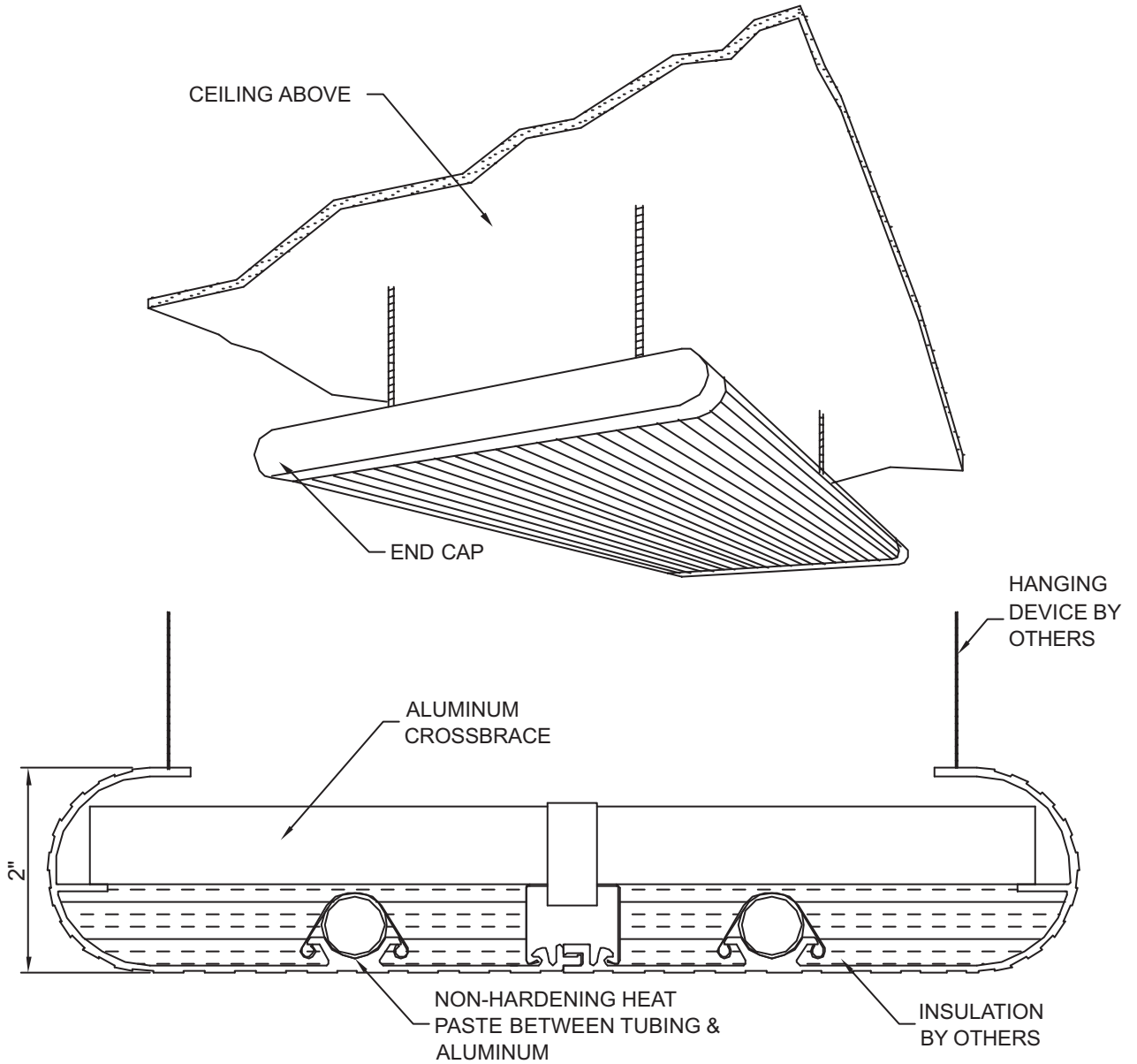
HANGING LINEAR PANEL IN EXPOSED AREA



HANGING LINEAR PANEL IN EXPOSED AREA

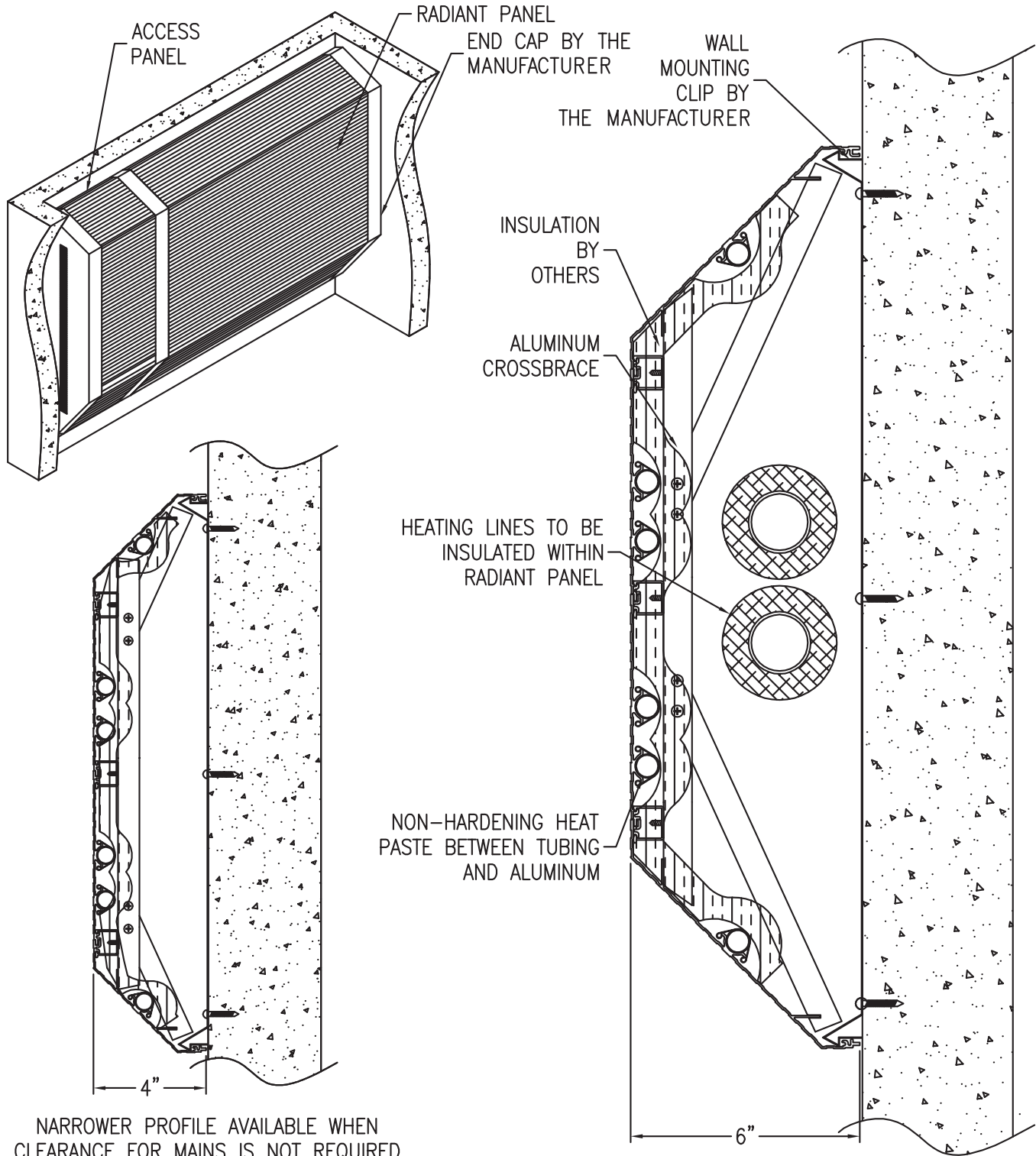


HANGING LINEAR PANEL IN EXPOSED AREA

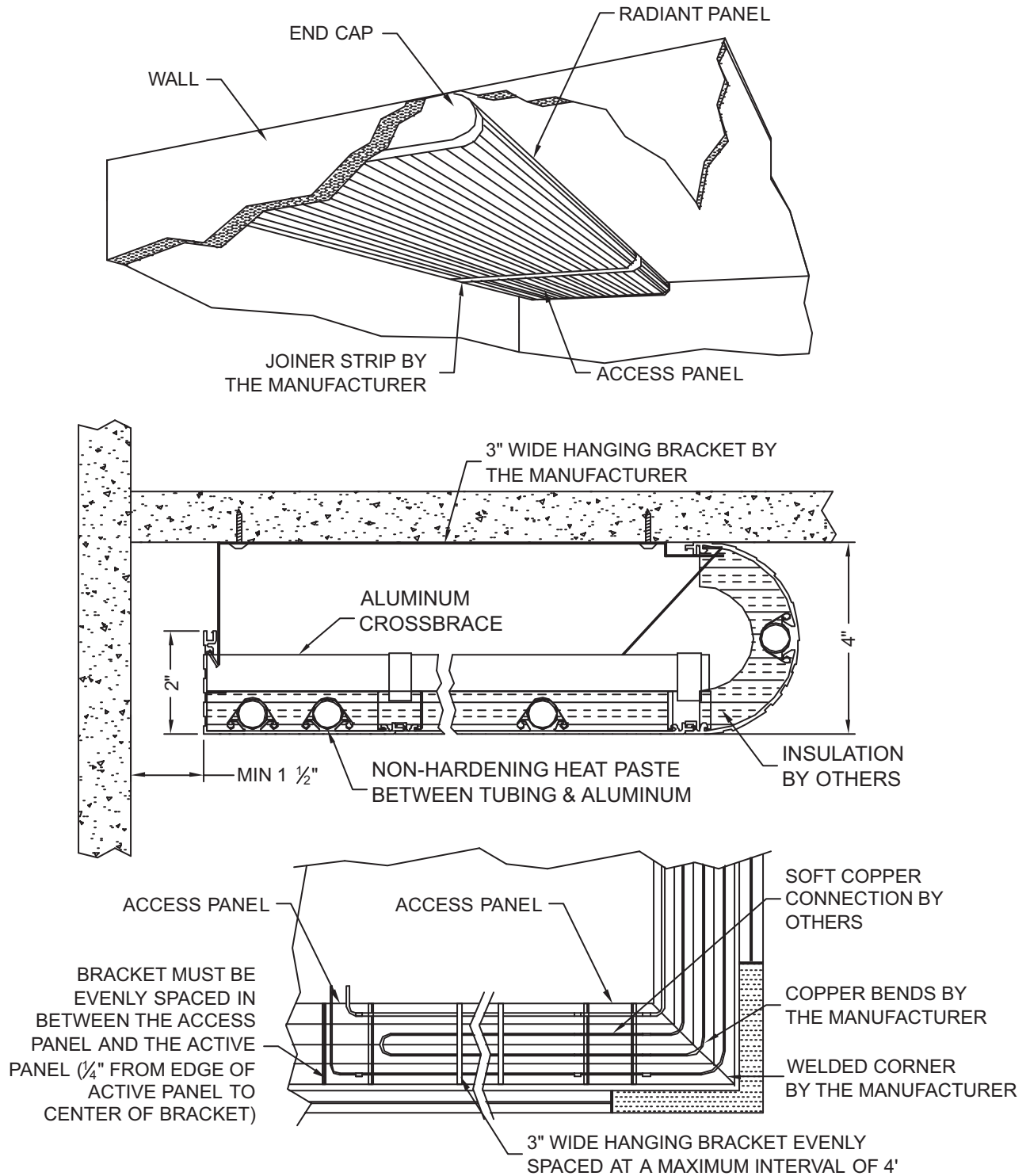


Linear Radiant Panel

WALL MOUNTED LINEAR PANEL FOR GYMNASIUM

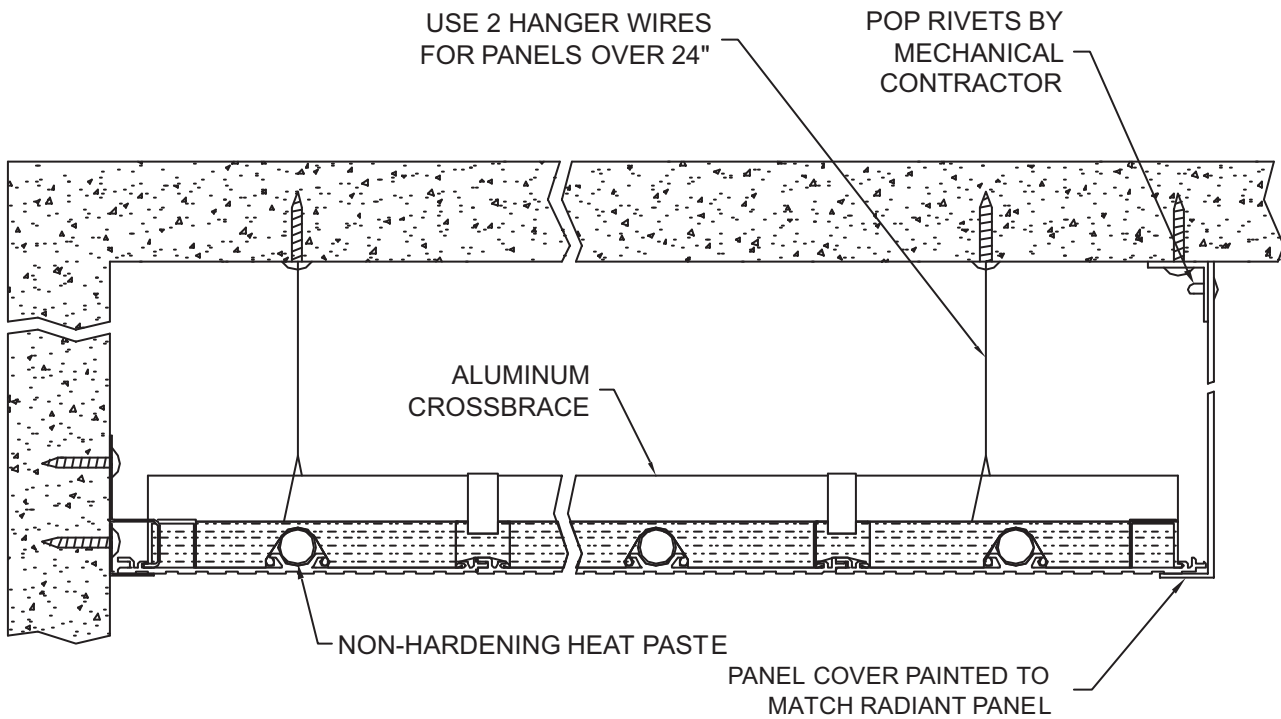
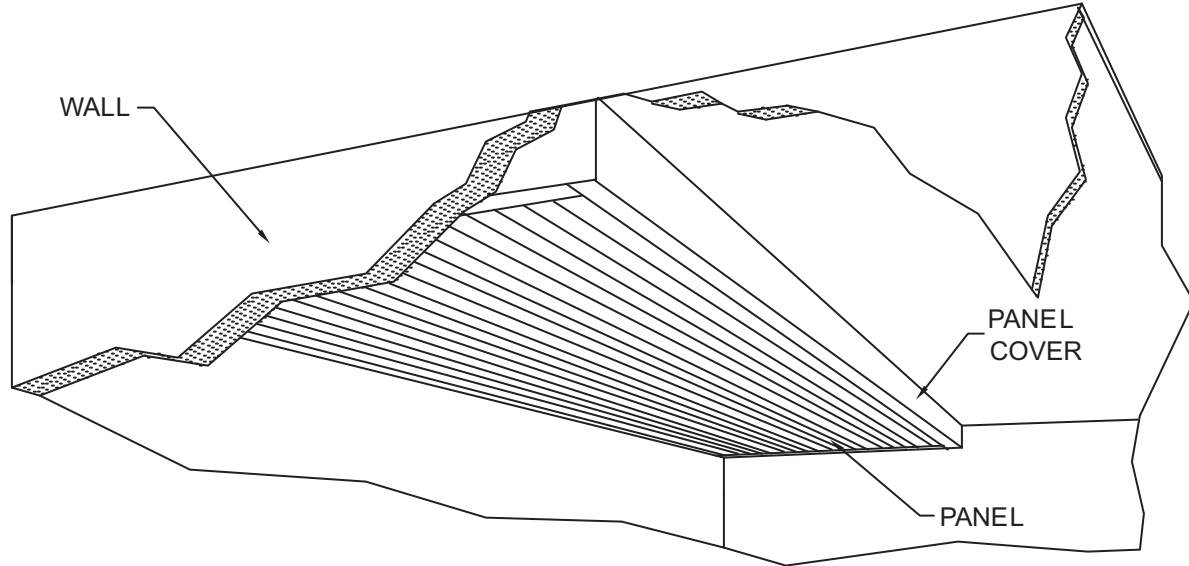


SURFACE MOUNTED LINEAR PANEL

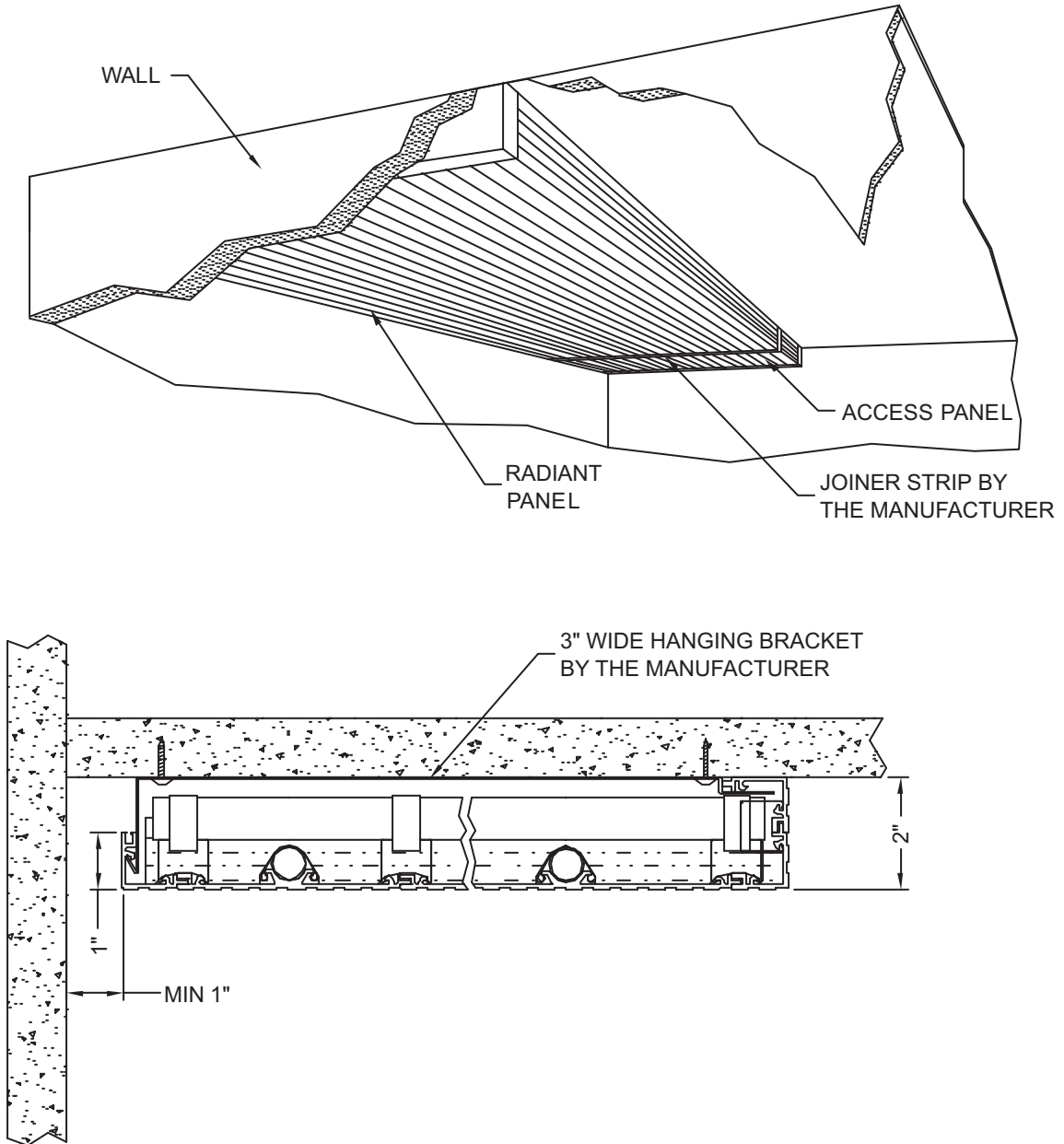


Linear Radiant Panel

SURFACE MOUNTED LINEAR PANEL

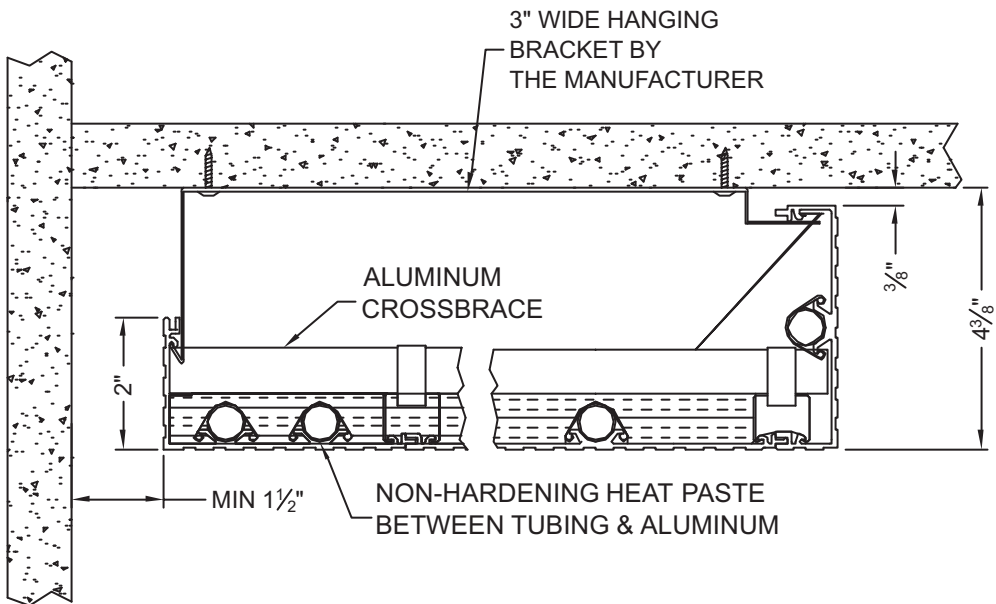
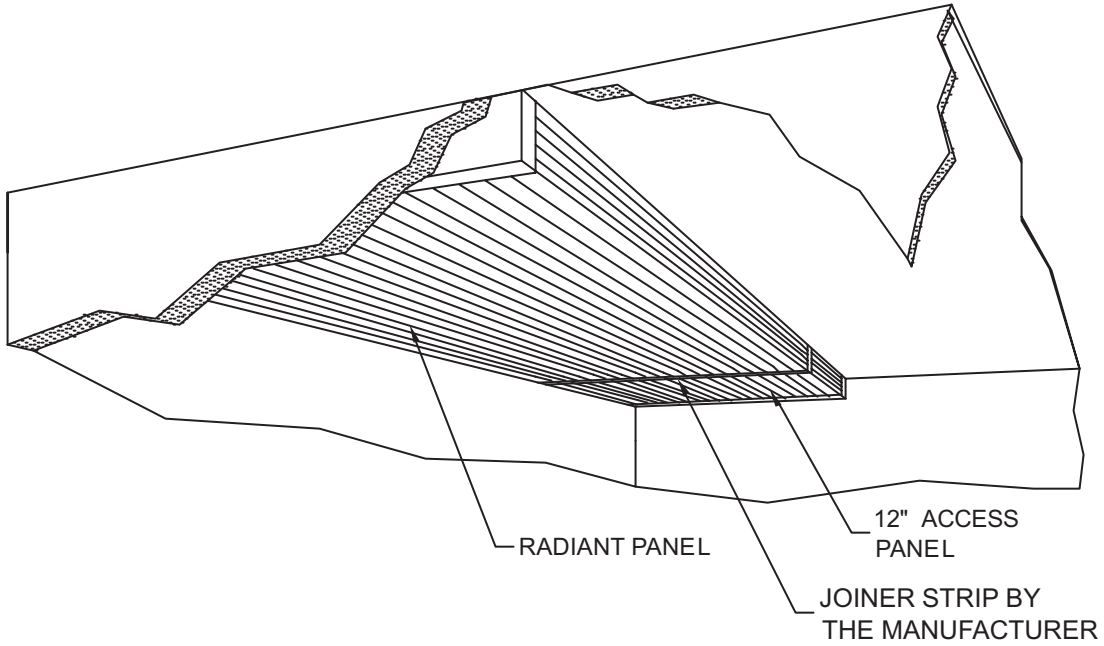


SURFACE MOUNTED LINEAR PANEL



Linear Radiant Panel

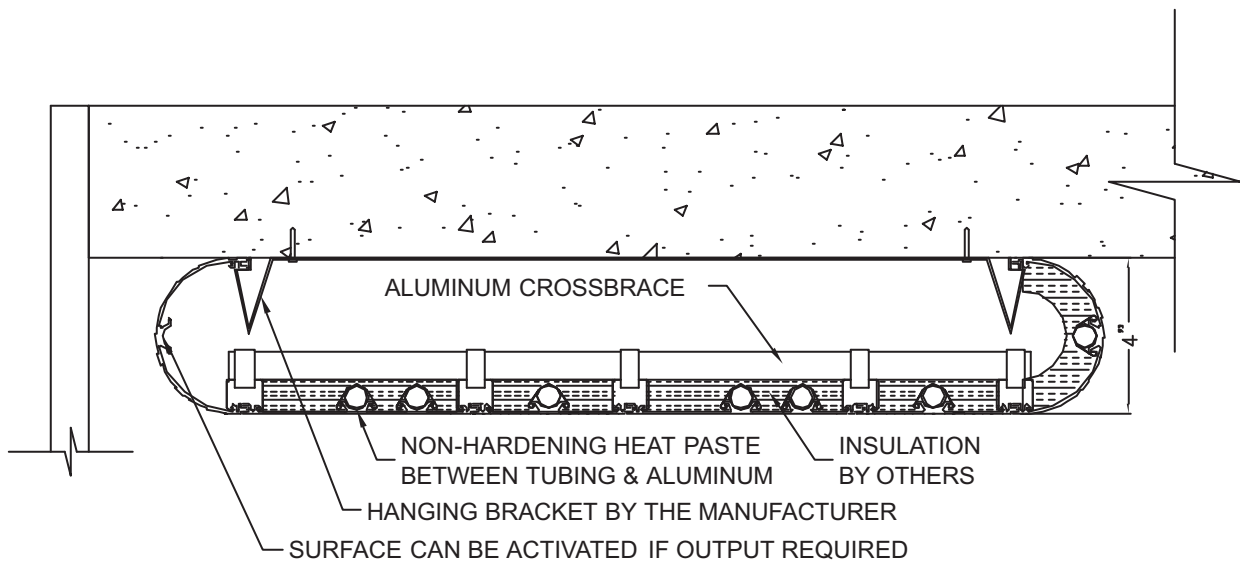
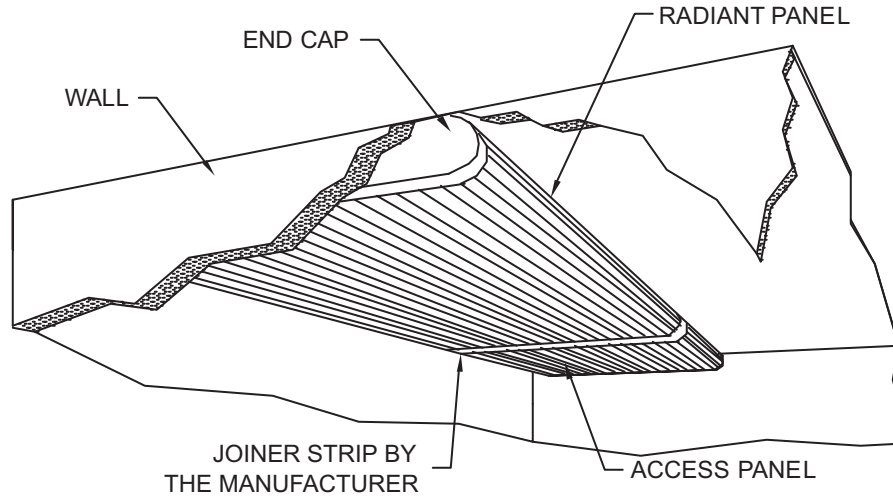
SURFACE MOUNTED LINEAR PANEL



Linear Radiant Panel

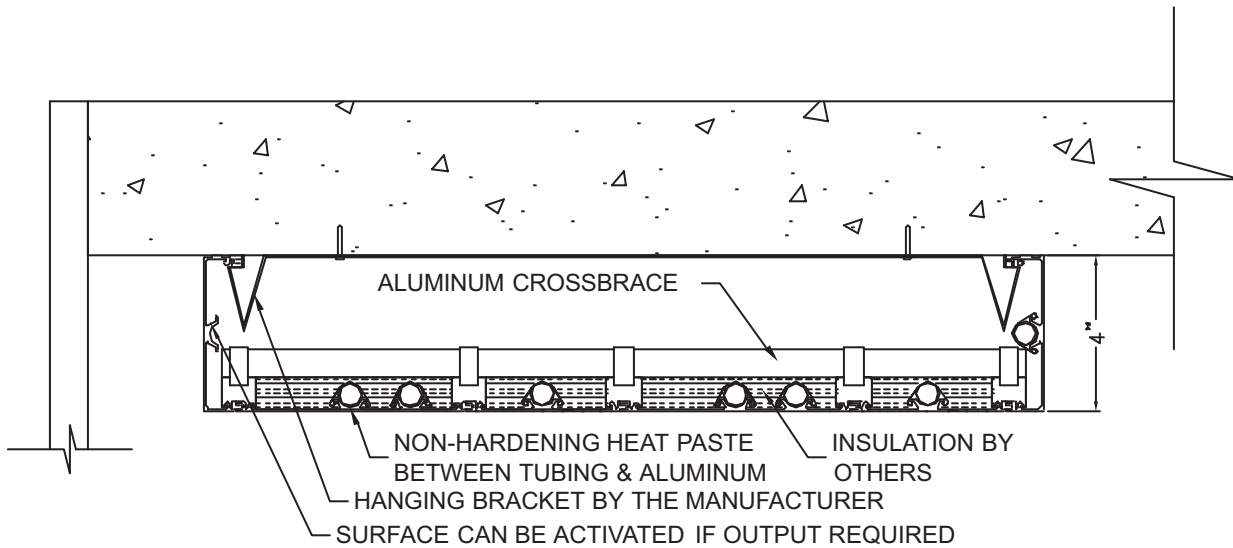
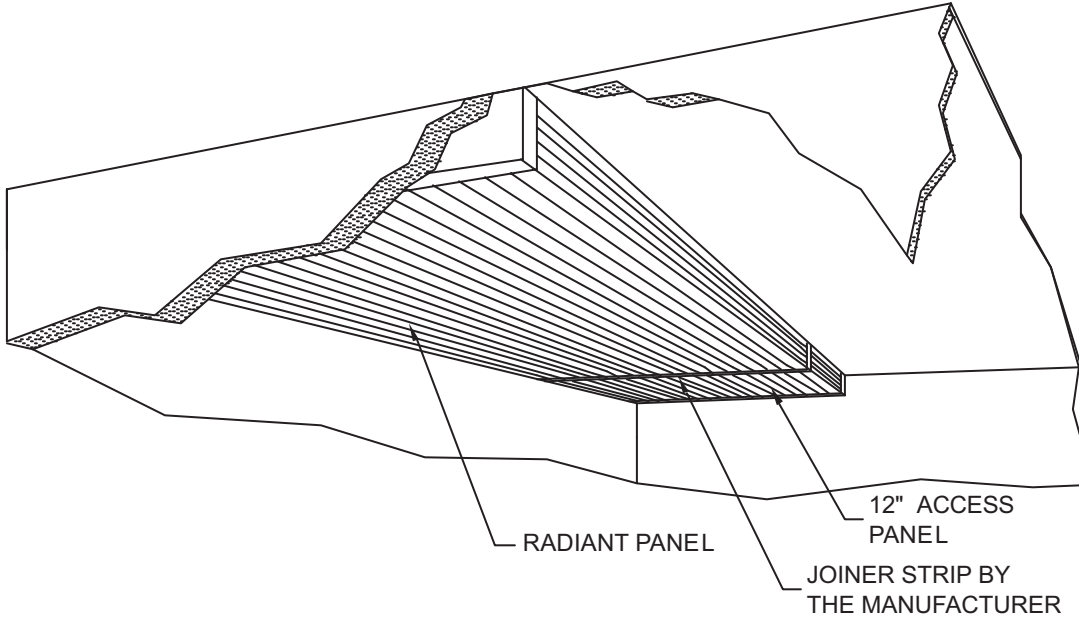


SURFACE MOUNT WITH 4" BULLNOSE

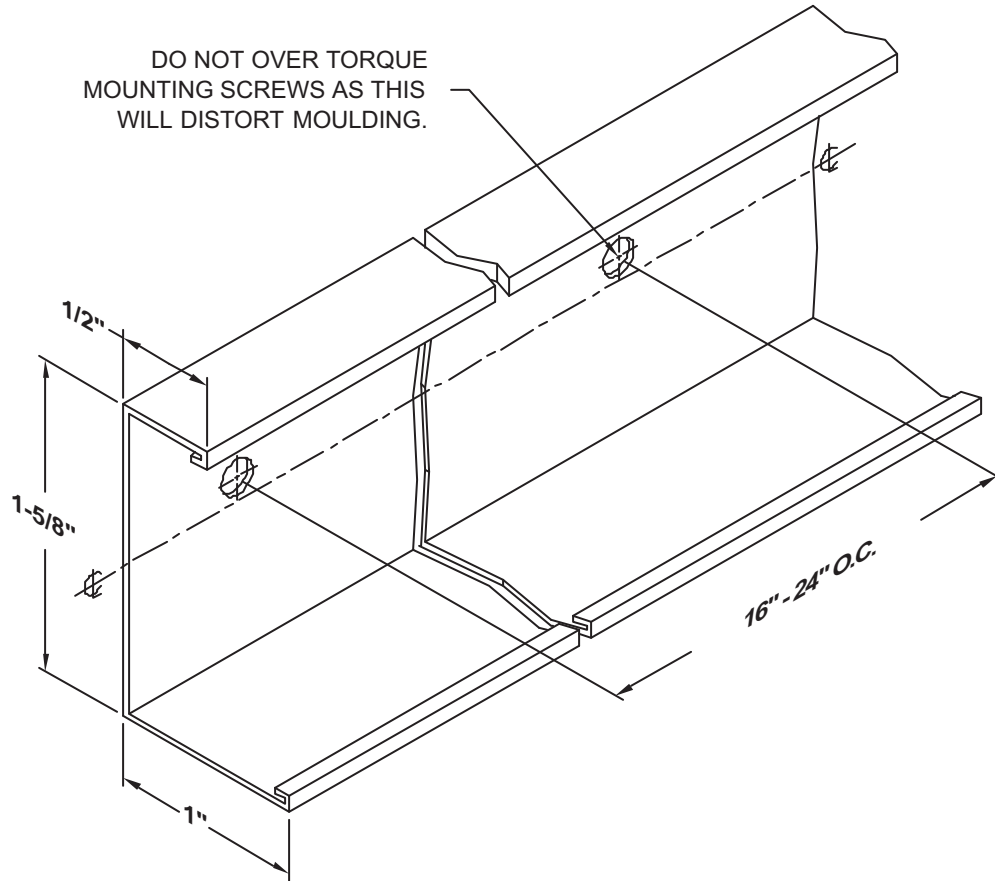


Linear Radiant Panel

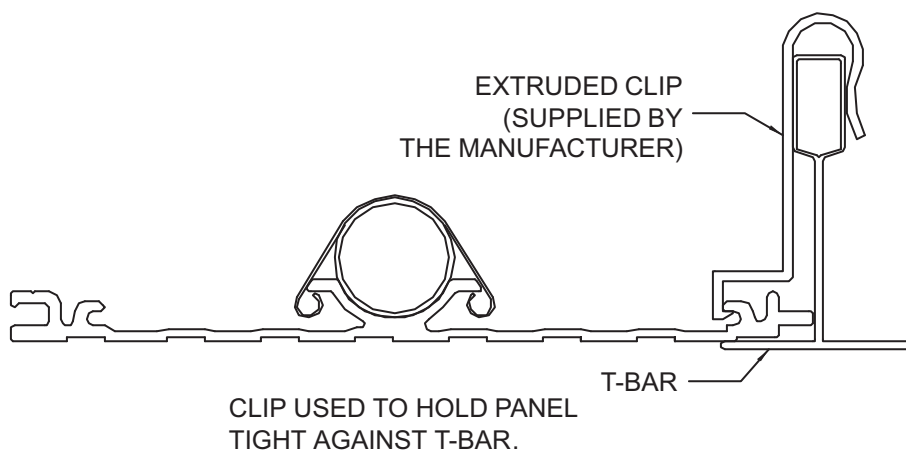
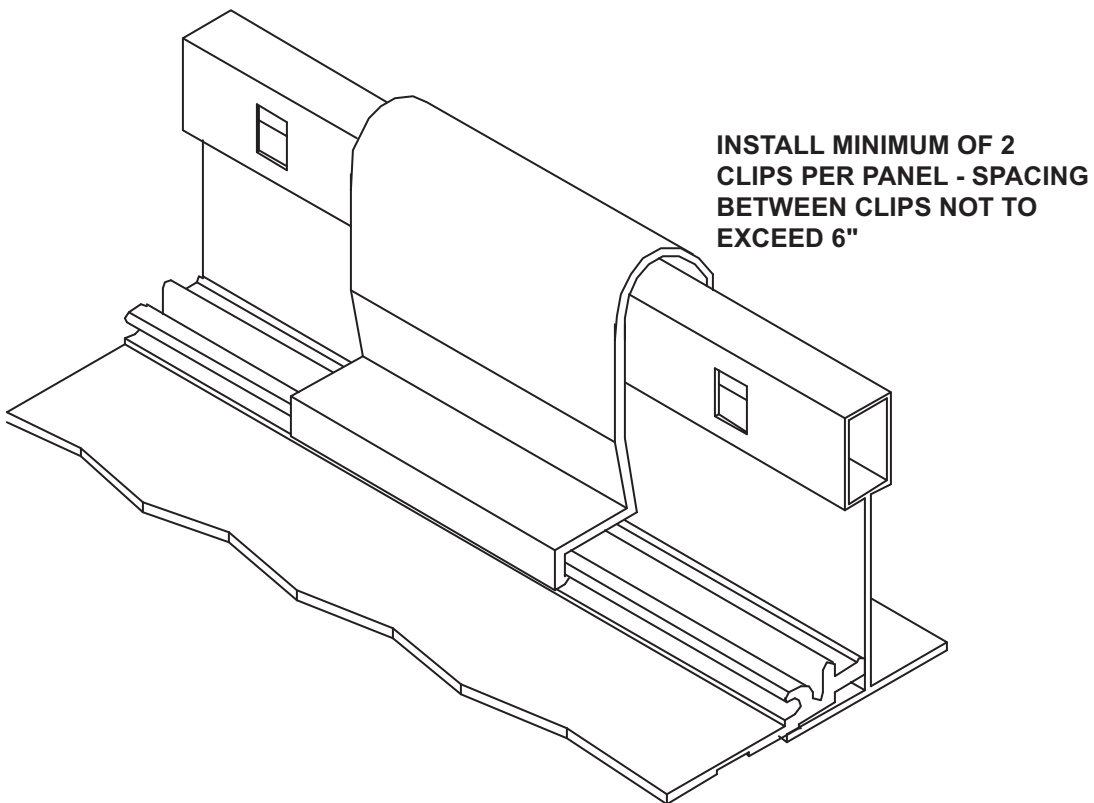
SURFACE MOUNT WITH 4" CORNER



PERIMETER CHANNEL ANGLE



T-BAR CLIP



INSTALLATION INSTRUCTIONS

LINEAR RADIANT HEATING PANELS ARE FINISHED WITH STANDARD WHITE POLYESTER POWDER COATING. 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.

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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 $\frac{5}{8}$ " 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 (IMPERIAL)

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:

$$\Delta T = \frac{\text{Heat Loss}}{\text{Flow Rate} \times \text{Heat Capacity}}$$

Where:

ΔT 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.

$$t = \text{hot water temp.} - (0.5 \times \Delta T)$$

4. Use the mean water temperature value (t) calculated in step 3 and the rating tables 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 (METRIC)

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:

$$\Delta T = \frac{\text{Heat Loss}}{\text{Flow Rate} \times \text{Heat Capacity}}$$

Where:

ΔT 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.

$$t = \text{hot water temp.} - (0.5 \times \Delta T)$$

4. Use the mean water temperature value (t) calculated in step 3 and the rating tables 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.
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.

PANEL OUTPUTS (IMPERIAL)

MODULAR PANEL IMPERIAL OUTPUTS

PASSES		6	6	10	5	5	5
PANEL DIM'S [feet]		2x2	2x4	4x4	2x2	2x4	2x5
M E A N W A T E R T E M P E R A T U R E (°F)	120	320	640	1280	270	540	870
	125	380	760	1520	290	580	970
	130	440	880	1760	320	640	1060
	135	470	940	1880	350	700	1160
	140	500	1000	2000	380	760	1250
	145	540	1080	2160	410	820	1350
	150	580	1160	2320	440	880	1450
	155	620	1240	2480	480	960	1540
	160	660	1320	2640	520	1040	1640
	165	700	1400	2800	560	1120	1740
	170	740	1480	2960	600	1200	1840
	175	780	1560	3120	640	1280	1950
	180	840	1680	3360	680	1360	2110
	185	880	1760	3520	720	1420	2230
	190	920	1840	3680	770	1540	2350
	195	980	1960	3920	820	1640	2450
200	1040	2080	4160	870	1740	2570	
205	1100	2200	4400	925	1850	2690	
210	1160	2320	4640	960	1920	2810	

Outputs expressed in BTUH/Panel, based on 70 °F room temperature.

PANEL OUTPUTS (METRIC)

MODULAR PANEL METRIC OUTPUTS

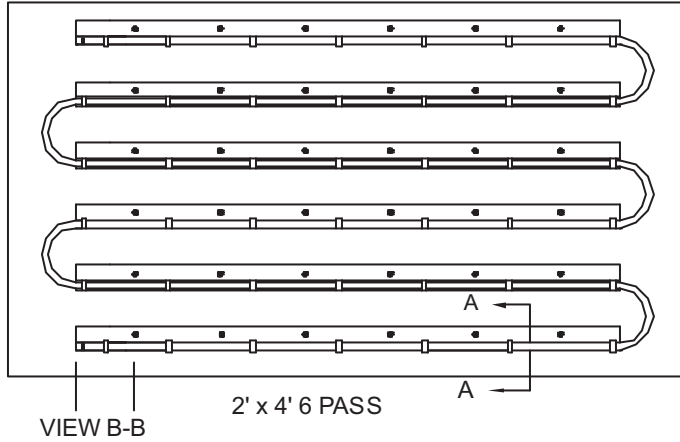
PASSES		6	6	10	5	5	5	6
PANEL DIM'S [mm]		600X1200	600X1200	1200X1200	600X600	600X1200	500X1500	600X1500
M E A N W A T E R T E M P E R A T U R E (°C)	48.9	94	188	376	79	158	212	255
	51.7	111	222	444	85	170	236	284
	54.4	129	258	516	94	188	258	311
	57.2	138	276	552	103	206	282	340
	60.0	147	294	588	111	222	304	367
	62.8	158	316	632	120	240	328	396
	65.6	170	340	680	129	258	352	425
	68.3	182	364	728	141	282	375	452
	71.1	194	388	776	152	304	400	481
	73.9	205	410	820	164	328	425	510
	76.7	217	434	868	176	352	451	540
	79.4	229	458	916	188	376	477	572
	82.2	246	492	984	199	398	502	619
	85.5	258	516	1032	211	422	527	654
	87.8	270	540	1080	226	452	549	689
	90.6	287	574	1148	240	480	571	718
93.3	305	610	1220	255	510	596	754	
96.1	323	646	1292	271	542	621	789	
98.9	340	680	1360	281	562	646	824	

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

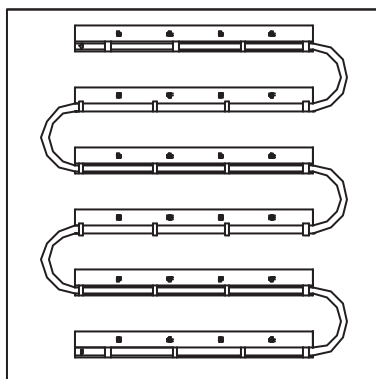
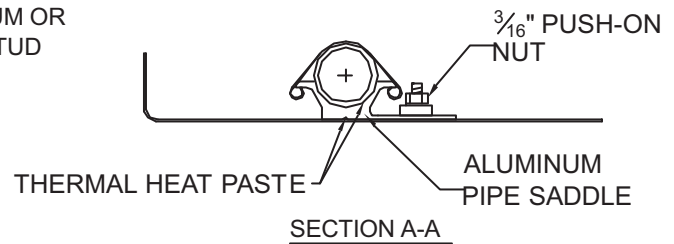
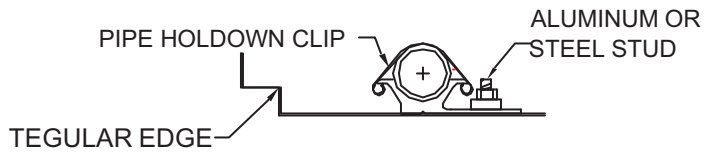
Modular Radiant Panel



6 PASS PANELS



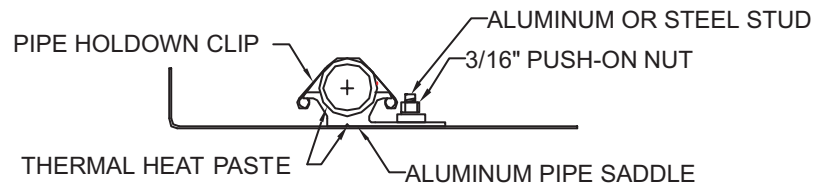
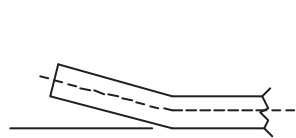
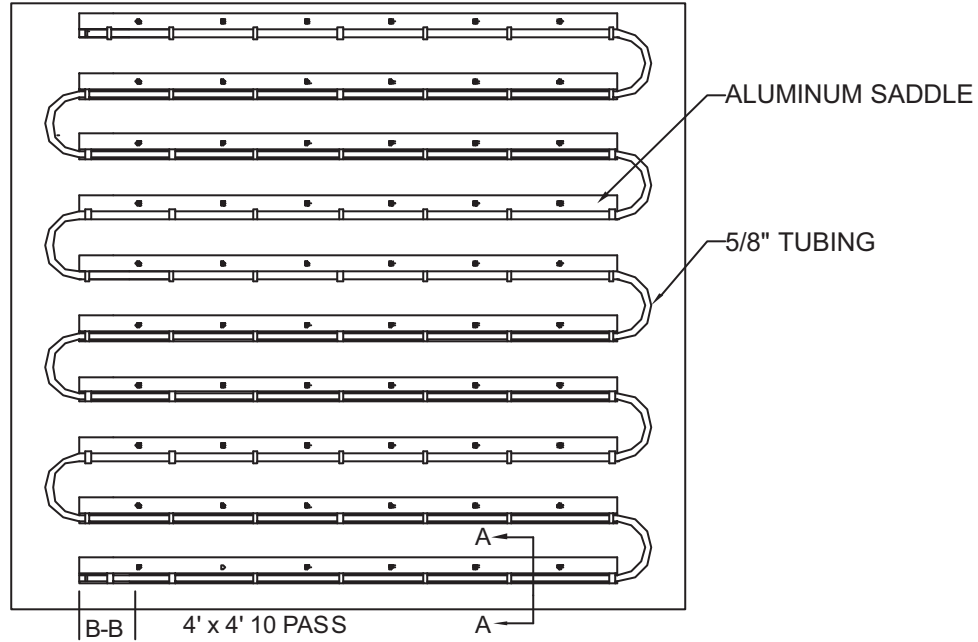
VIEW B-B



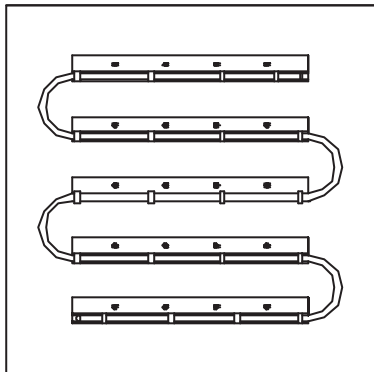
Modular Radiant Panel



MODULAR – 5 & 10 PASS PANELS

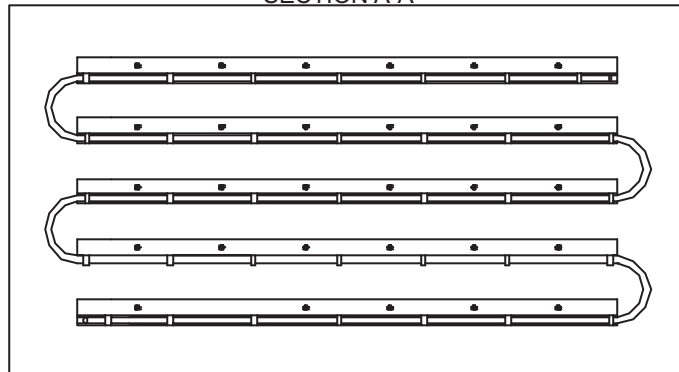


VIEW B-B



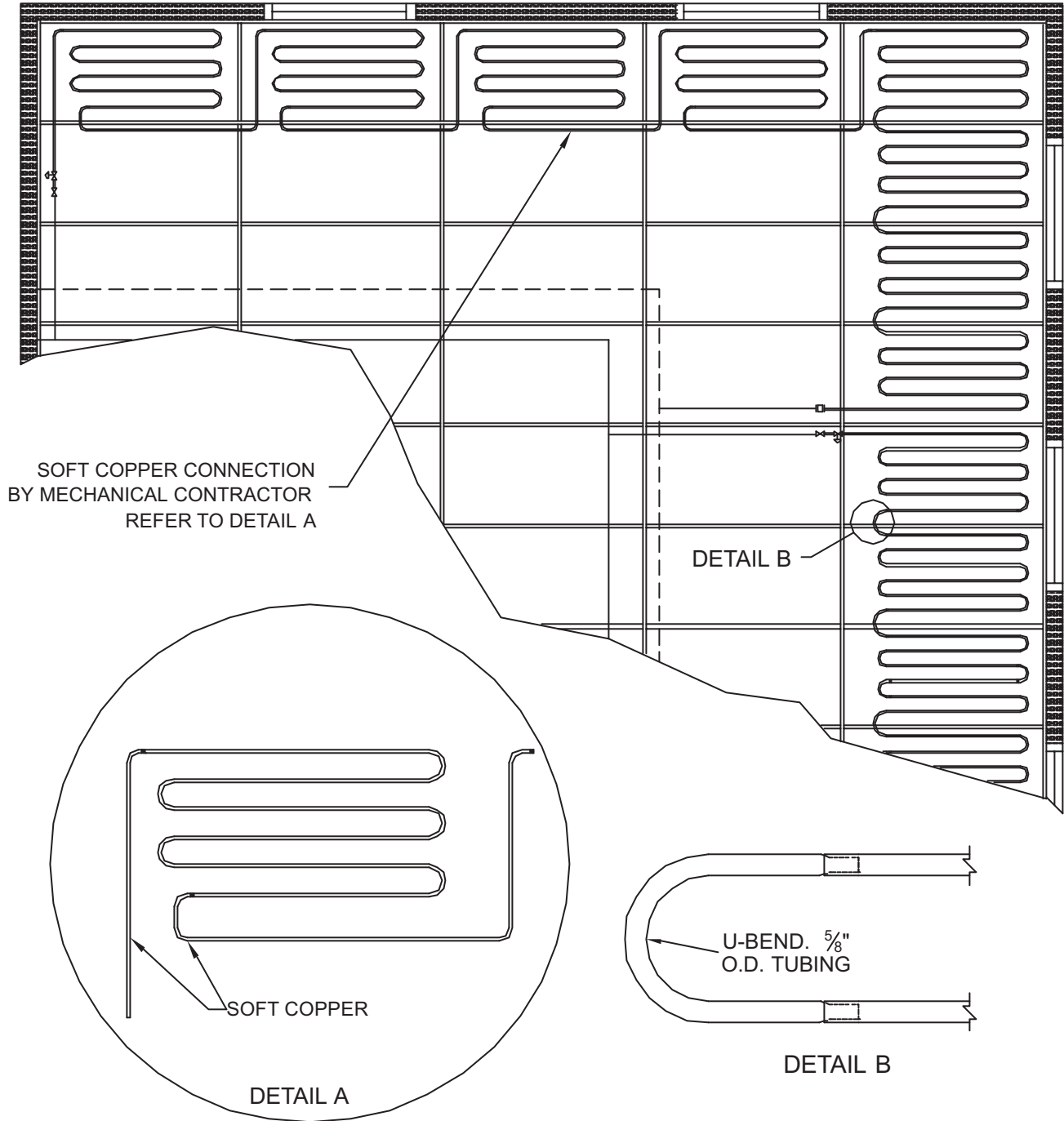
2' x 2' 5 PASS

SECTION A-A

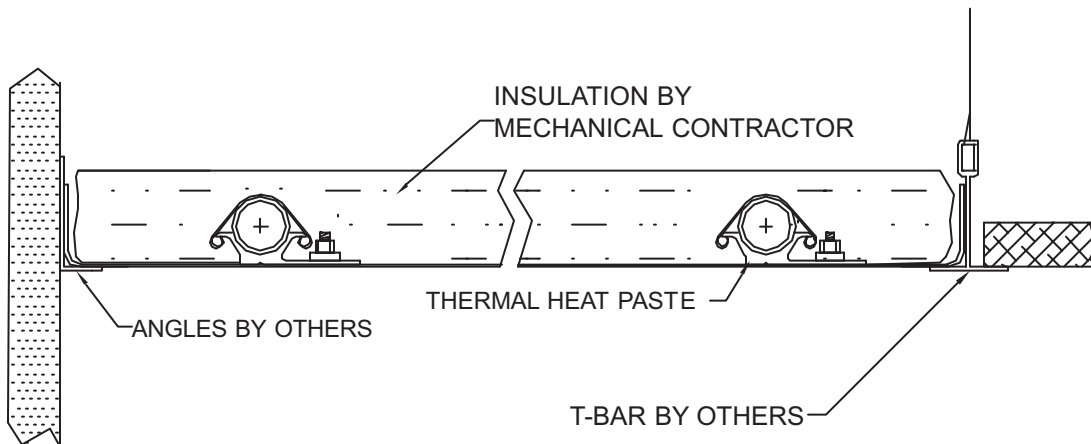
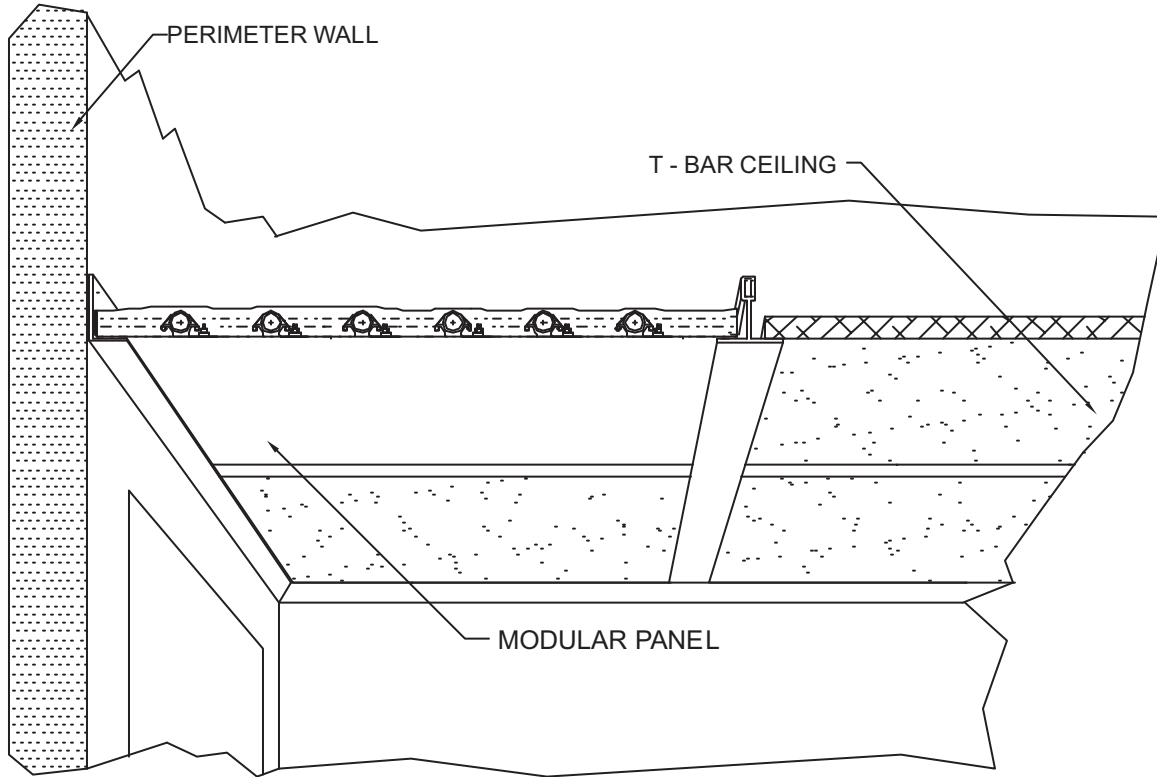


2' x 4' 5 PASS

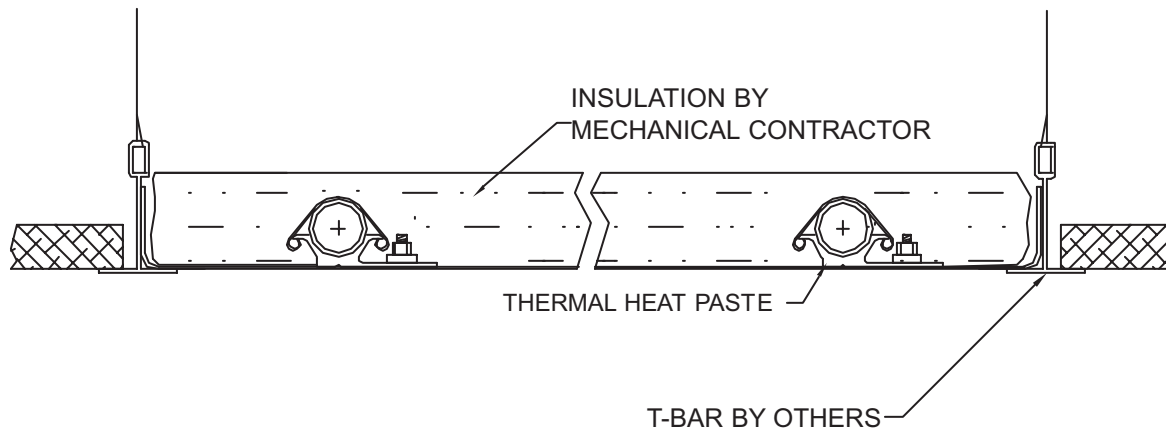
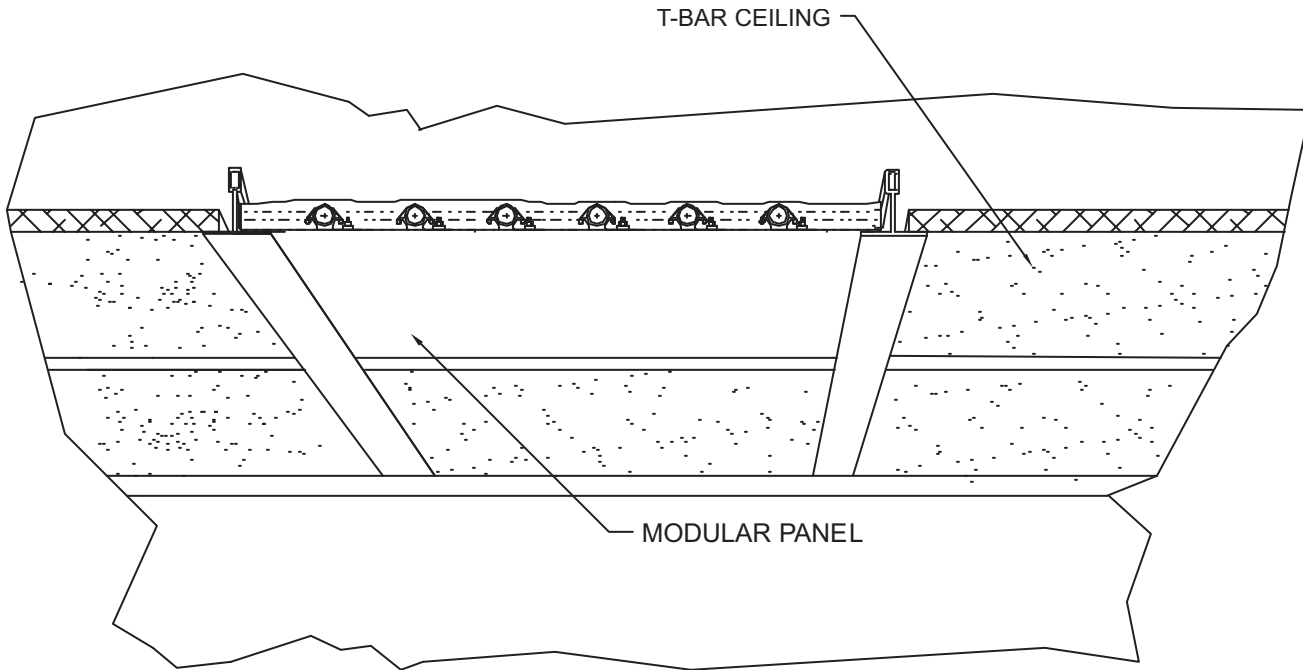
PIPING DETAILS FOR MODULAR PANELS



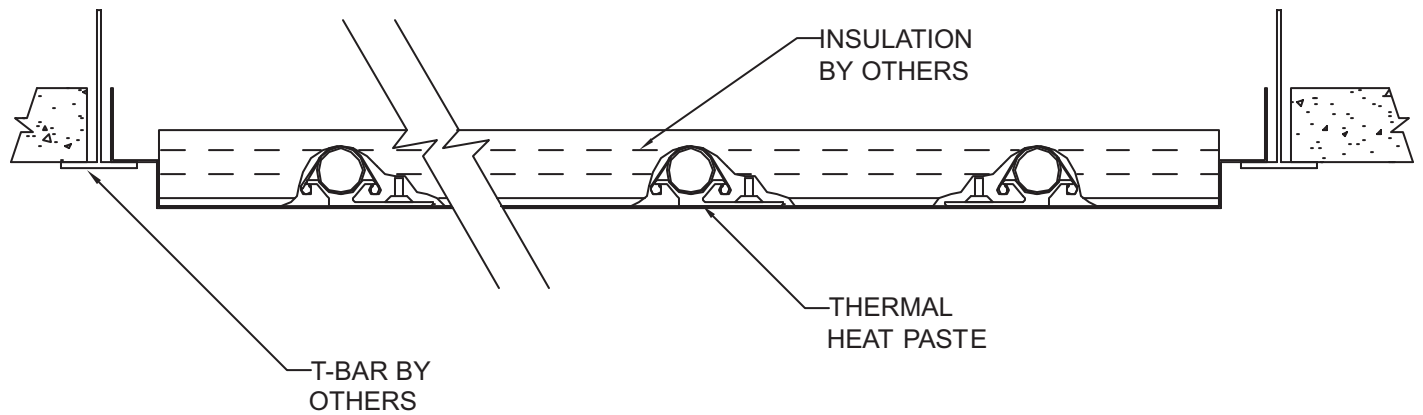
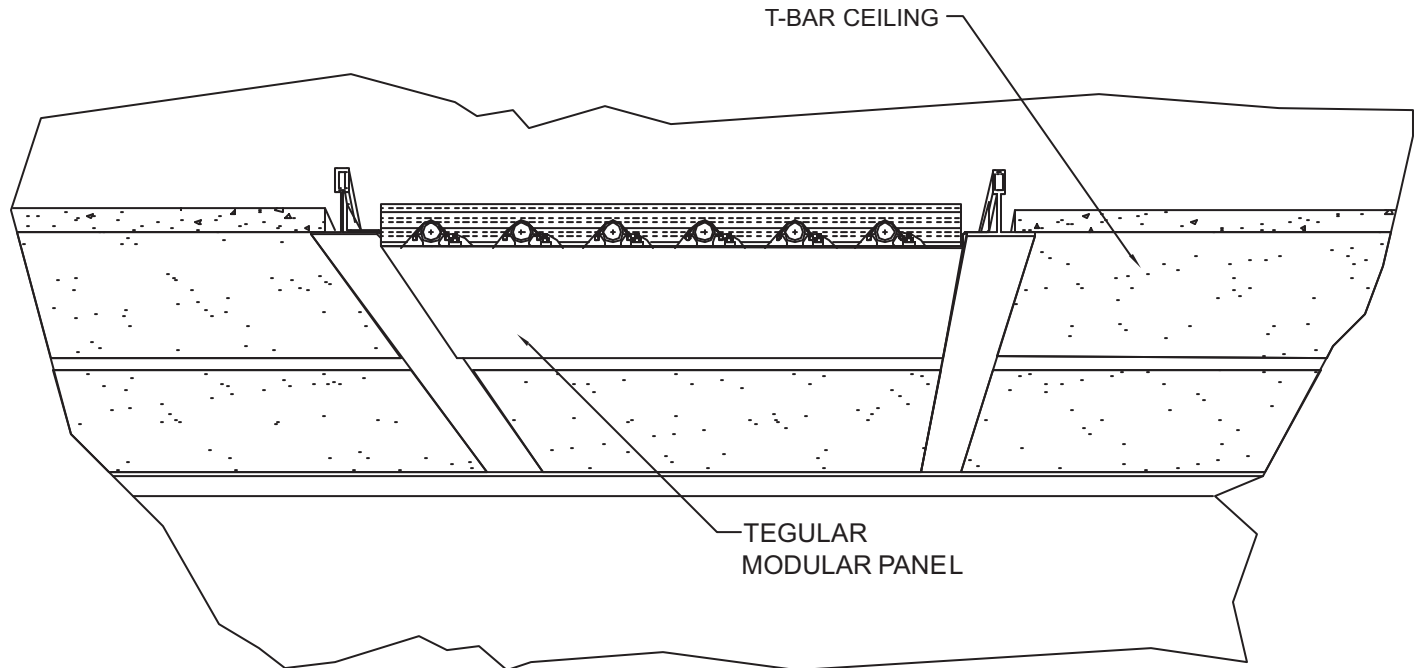
MODULAR PANEL AT PERIMETER WALL IN T-BAR CEILING



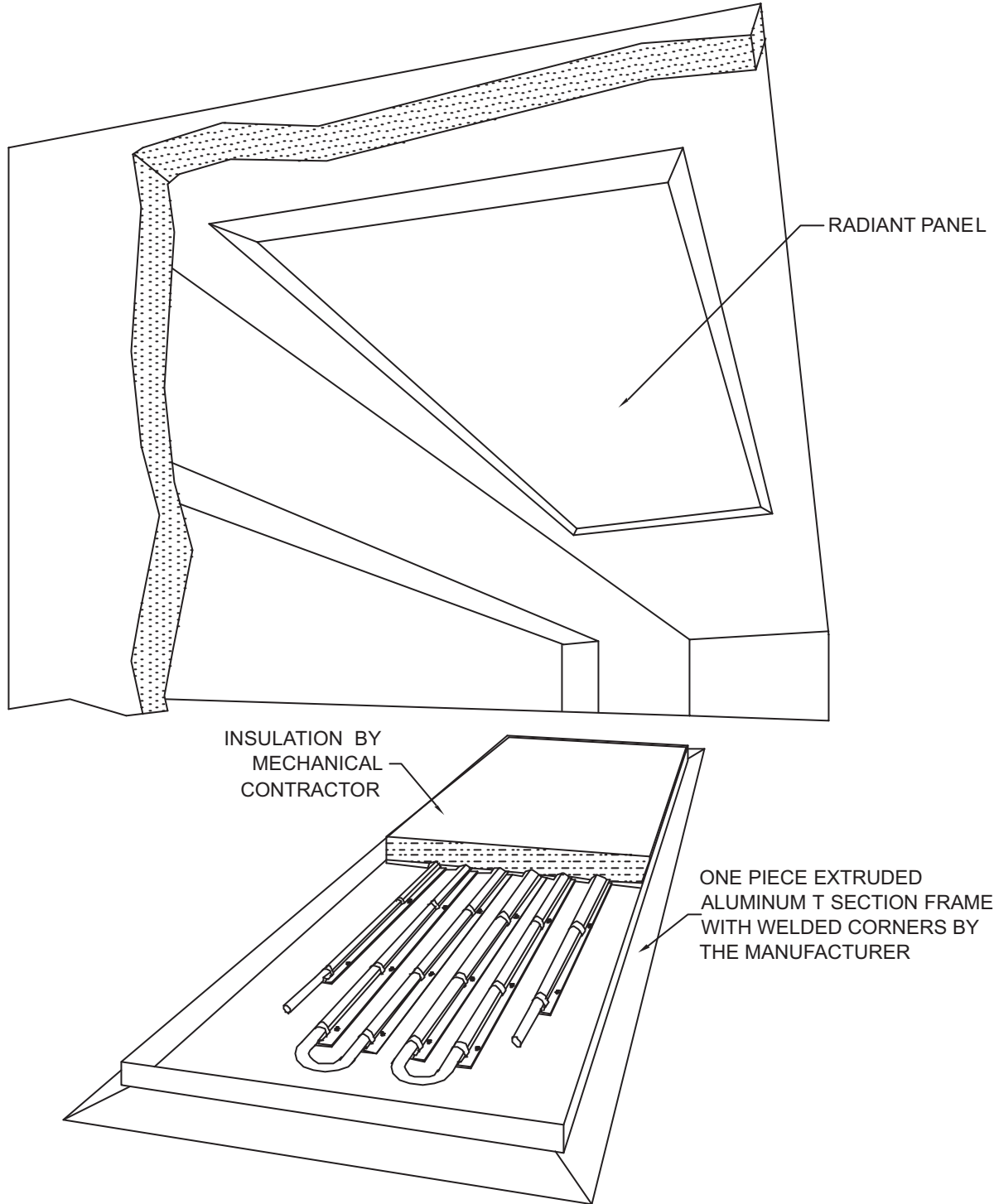
MODULAR PANEL IN T-BAR CEILING



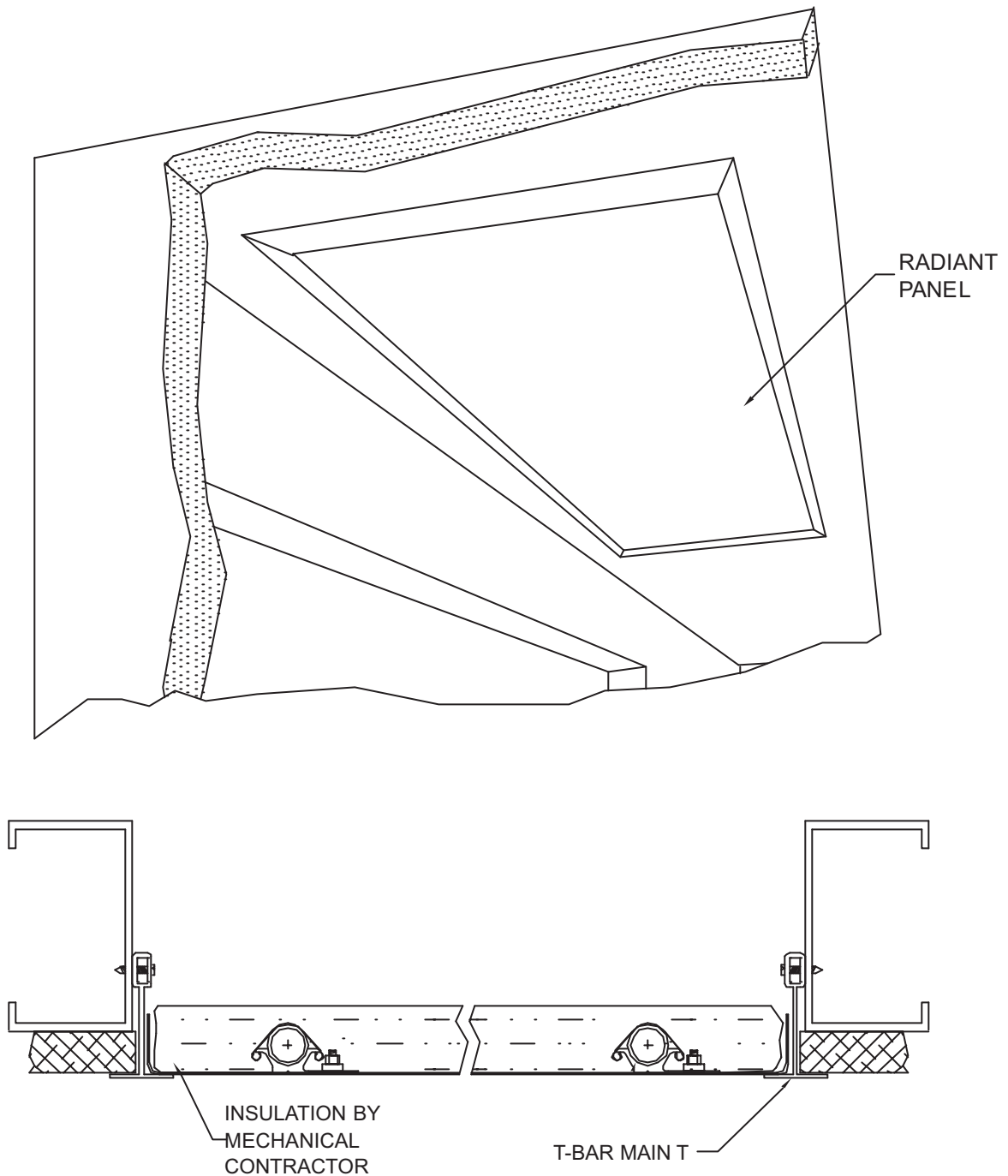
TEGULAR MODULAR PANEL IN T-BAR CEILING



FRAMED MODULAR PANEL IN GYPROC CEILING

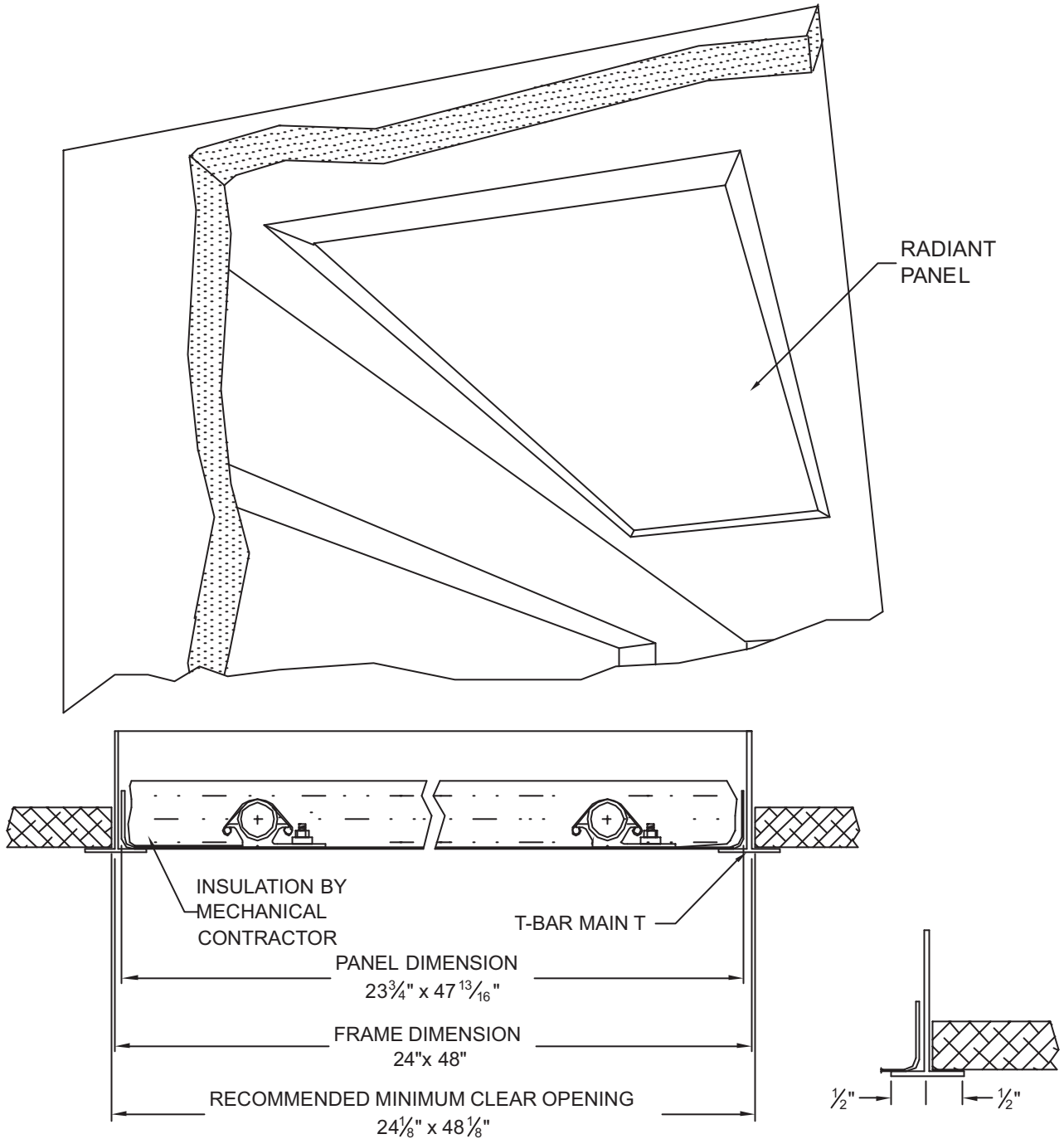


FRAMED MODULAR PANEL IN GYPROC CEILING



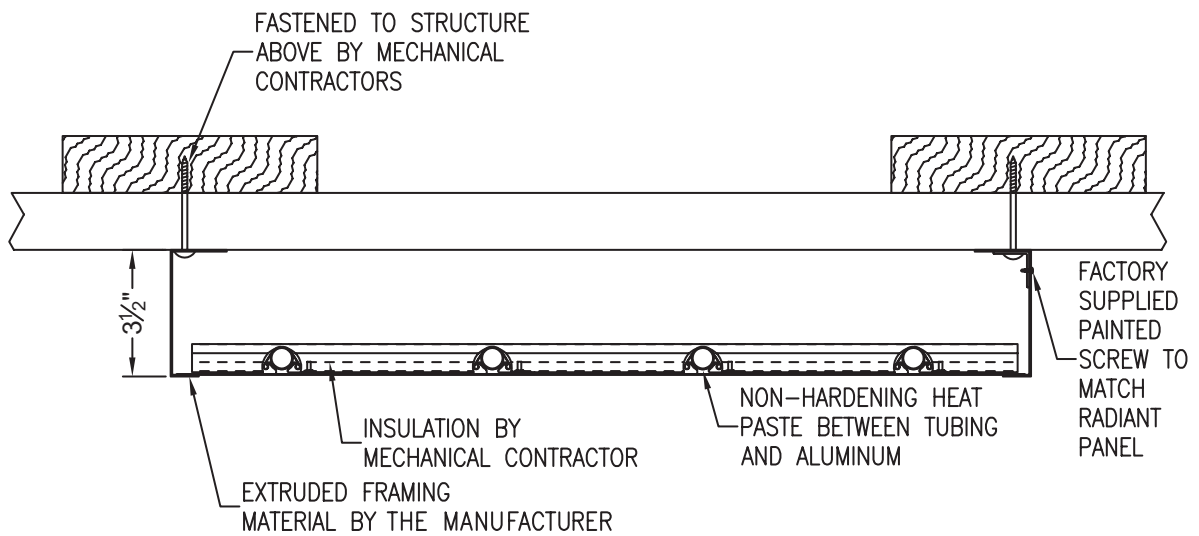
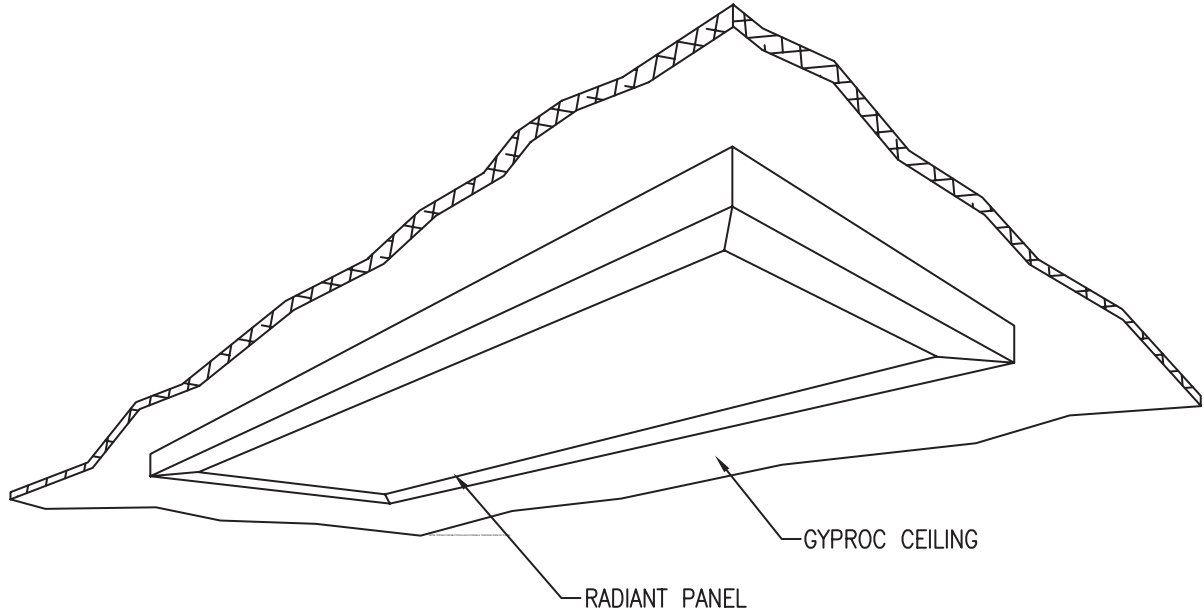
NOTE: IF SPACE ABOVE PANEL NOT ACCESSIBLE, REMOTE ACCESS PANEL REQUIRED FOR PANEL CONNECTION.

FRAMED MODULAR PANEL IN GYPROC CEILING

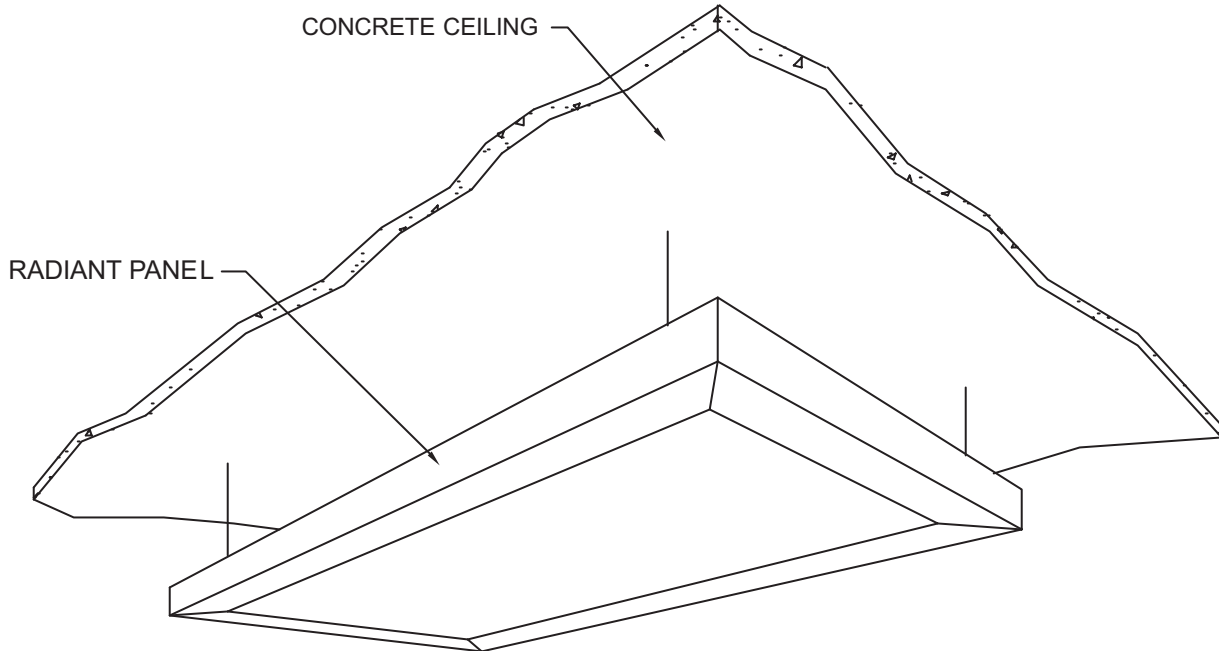


NOTE: IF SPACE ABOVE PANEL NOT ACCESSIBLE, REMOTE ACCESS PANEL REQUIRED FOR PANEL CONNECTION.

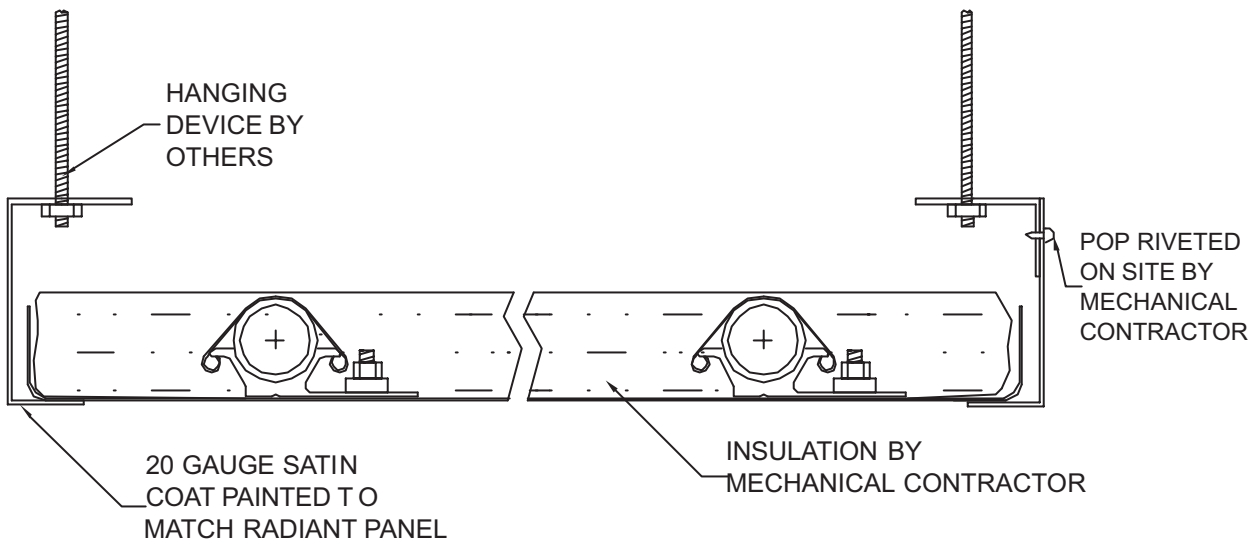
SURFACE MOUNTED MODULAR PANEL



FREE HANGING MODULAR PANEL

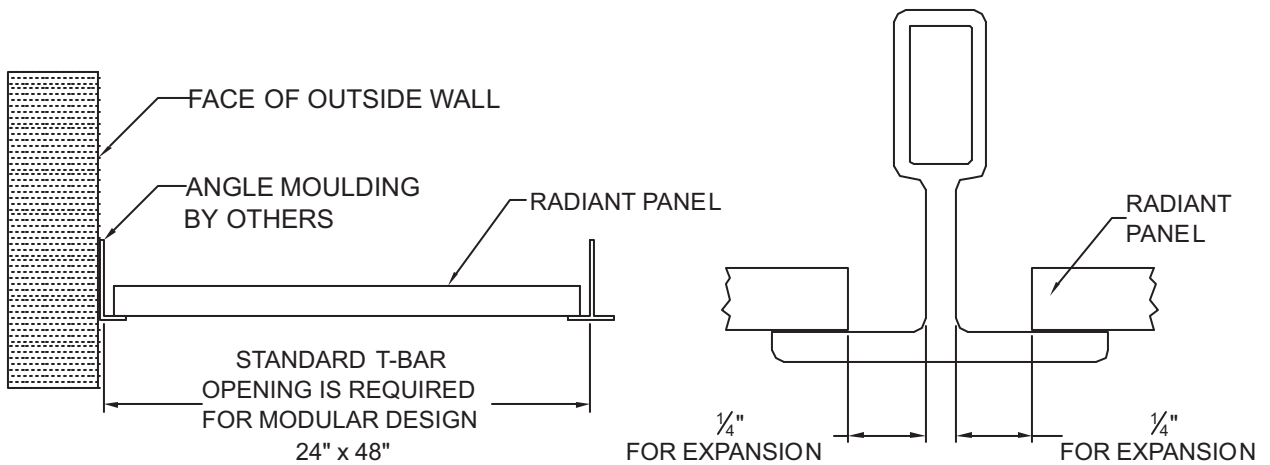
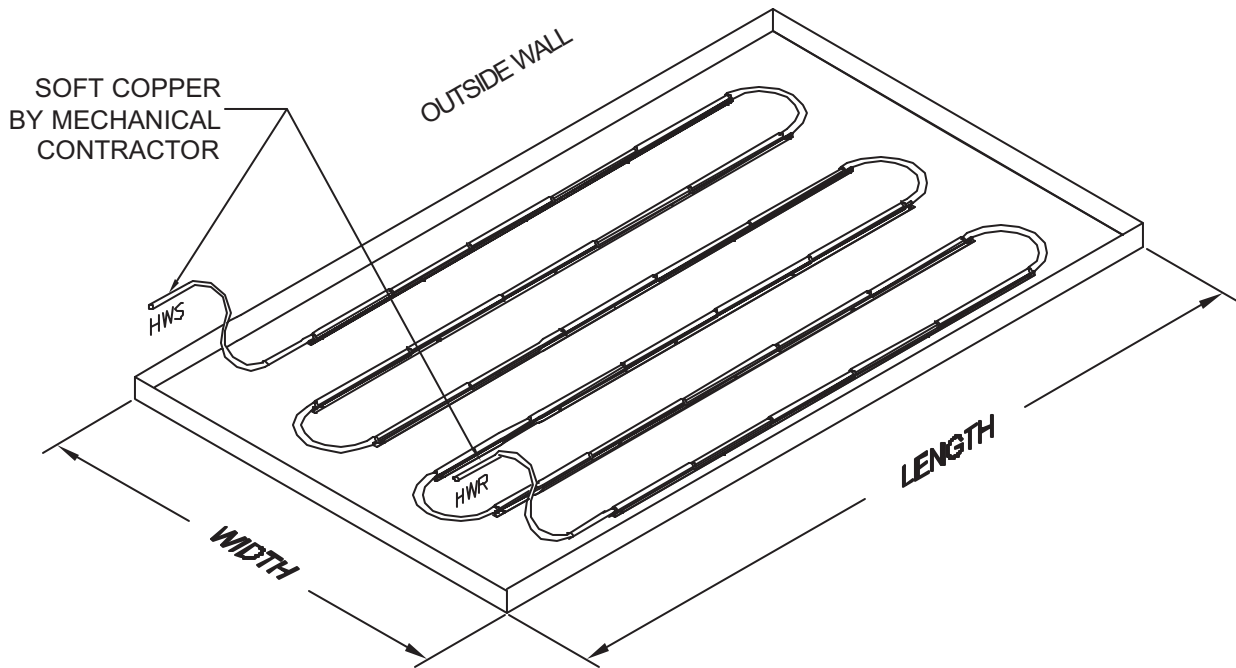


NOTE: PIPING CONNECTION ALSO POSSIBLE THROUGH SIDE OF PANEL.



SUPPLY, RETURN CONNECTION AND EXPANSION DETAILS

HOT WATER SUPPLY AT OUTSIDE WALL



EXPANSION

TAIL

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.

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DESCRIPTION

Security panel is a new concept in radiant heating panels. It is a smooth faced steel radiant panel designed and constructed to form a building feature in accordance with architectural requirements. The product can be highlighted to form an architectural feature or more typically, blended into the structure to become a hidden source of efficient heating.

ADVANTAGES

Security ceiling panel system has proven to be the most economical method of heating high security areas. The security panel system is extremely flexible, yet is damage and vandal resistant while virtually maintenance free.

APPLICATIONS

Security panels are used for psychiatric assessment areas in hospitals, youth detention centres, prisons, holding cells, and military police stations.

GENERAL SPECIFICATIONS

Material Specification

The security panel system is a custom designed system that can be recessed or surface mounted in or on columns, walls or ceilings. Hot water supply temperature may be varied depending on the heating performance required. Foil backed batt insulation on the coil or inactive side increases radiant heat transfer.

Panels are fabricated from steel plates 10 gauge satin coat (0.1345" thick). Temperature control is as for other hydronic systems; panels may be controlled individually or in zones with control and shut off valves set outside secured areas for easier maintenance. Thermostatic controls, connected to the security panel and arranged to control a zone of panels, can be supplied for setting by the customer to allow areas of a building to be heated as desired.

Dimensions and Weight

The panels are individually designed for a specific installation and are offered in widths of 12", 24" and 48". The steel panels are available in widths from 4" upward with a maximum panel length of 10'. Weight of the operating system is dependent on the design of the system but does not exceed 7.6 lb/ft² and can be as low as 4.3 lb/ft².

Materials of Construction

Pipework:	Each panel has its own serpentine pipe coil of $\frac{5}{8}$ " O.D.tubing.
Pipework attachment system:	The coil is clipped to an extruded aluminum heat saddle using cadmium plated spring steel clips. The aluminum heat saddle is attached to the panel with steel studs. Heat transfer paste is used at the interface between the aluminum heat saddle and both the steel plate and the tubing.
Panels:	Steel security panel system 10 gauge satin coat sheet (3mm 0.1345" thick). The radiant panel can be supplied with edges formed to suit the individual installation. Non radiating "in fill" panels can be supplied to form a continuous covering for the wall, column or ceiling.
Paint finish:	Panels are supplied in a white electrostatic polyester powder paint.
Insulation:	As per consultant's specifications, usually a minimum of 1" thick foil-backed batt insulation.

OPERATION AND MAINTENANCE

Security panels are incorporated into a building's heating/cooling systems 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 no clips have been displaced and that extruded planks are still securely fastened.

Cleaning

The surface of linear 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.

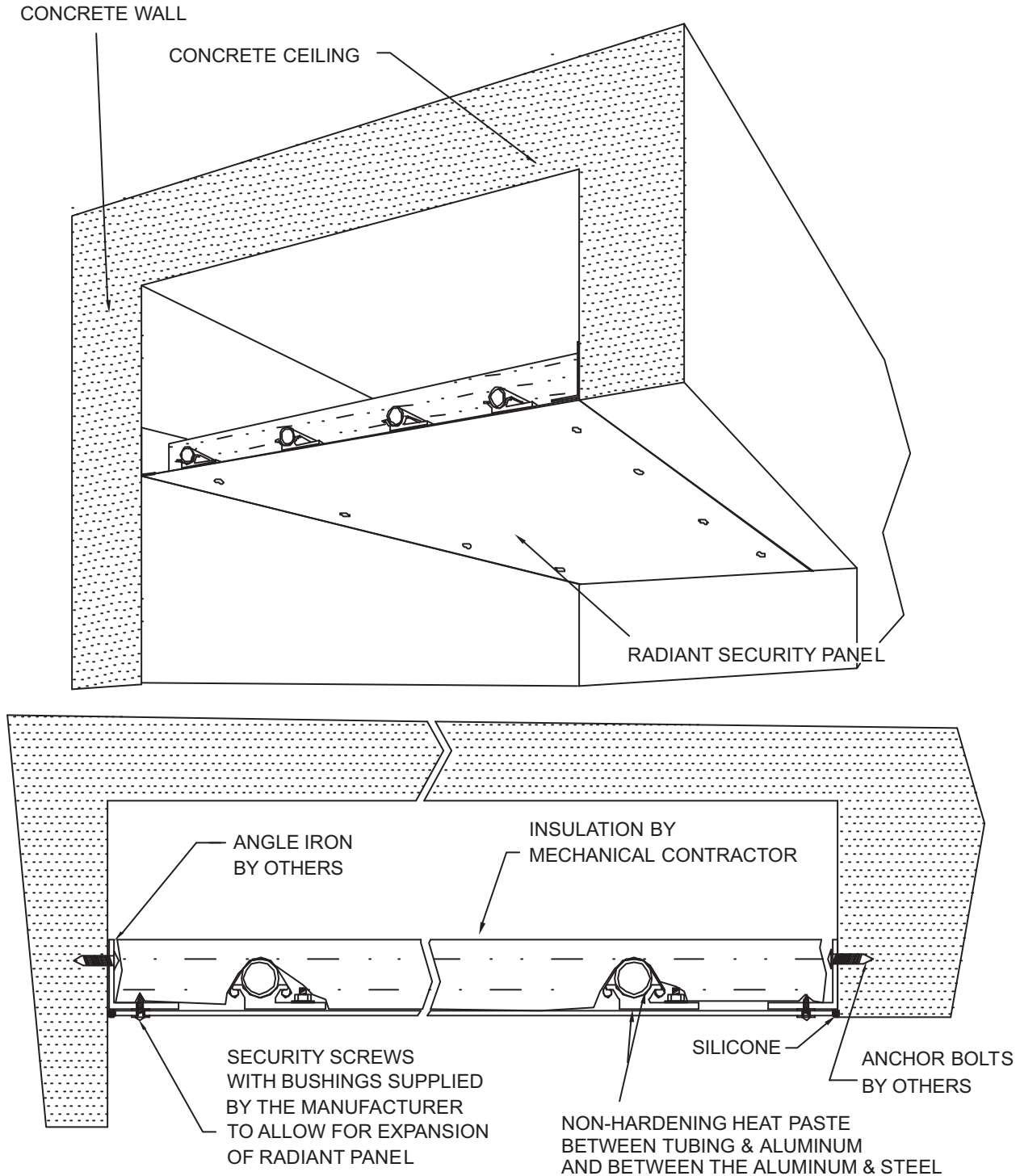
METRIC AND IMPERIAL OUTPUTS FOR SECURITY PANELS

METRIC AND IMPERIAL OUTPUTS

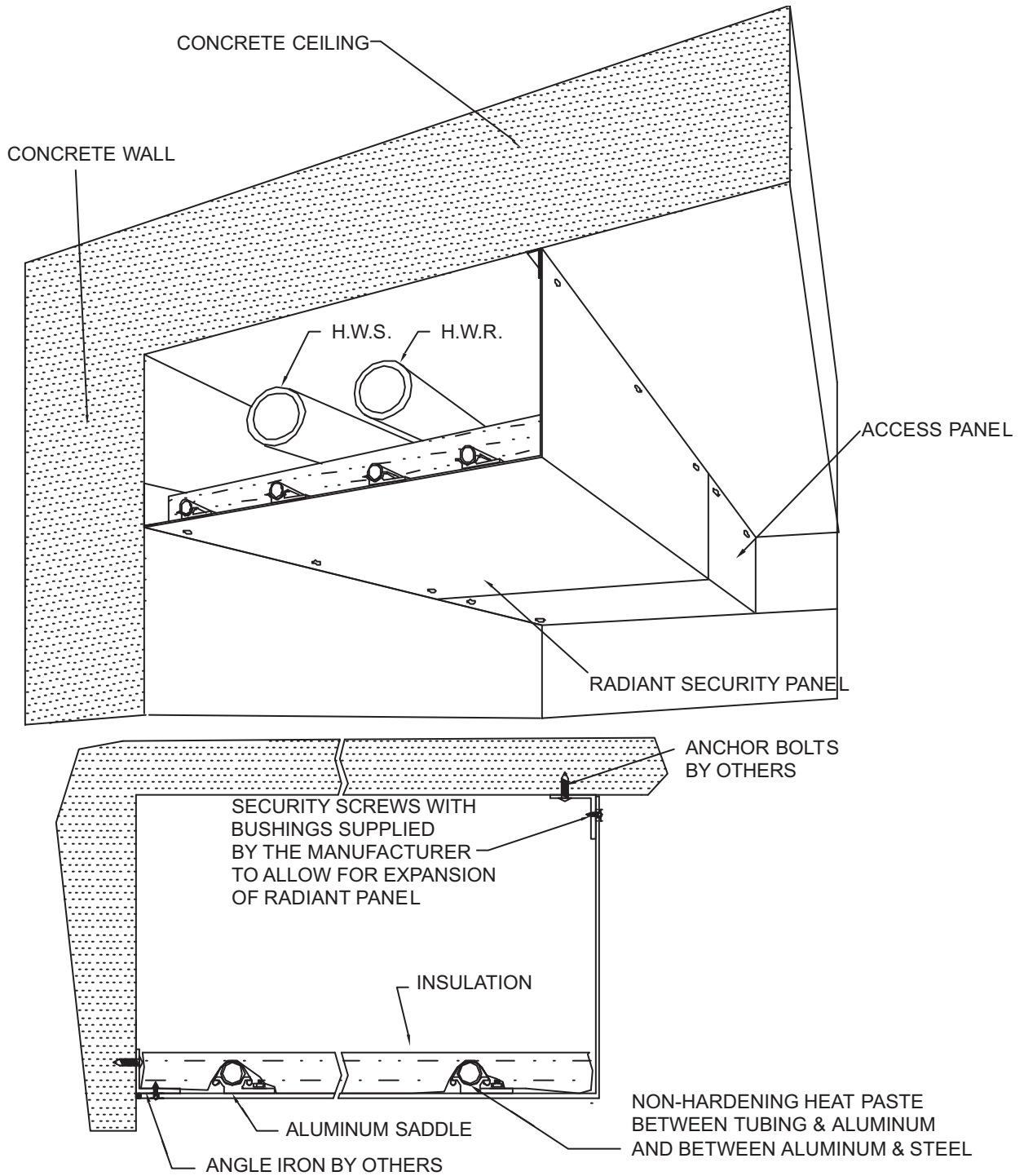
MWT°C	WATTS/metre ²	MWT°F	BTUH/foot ²
65.6	460	150	141
68.3	490	155	150
71.1	520	160	160
73.9	545	165	171
76.7	580	170	183
79.4	615	175	192
82.2	640	180	202
85.5	680	185	211
87.8	710	190	225
90.6	745	195	234
93.3	770	200	247
96.1	805	205	258
98.9	840	210	273
101.7	875	215	286

Outputs based on 6" centers and 70°F room temperature.

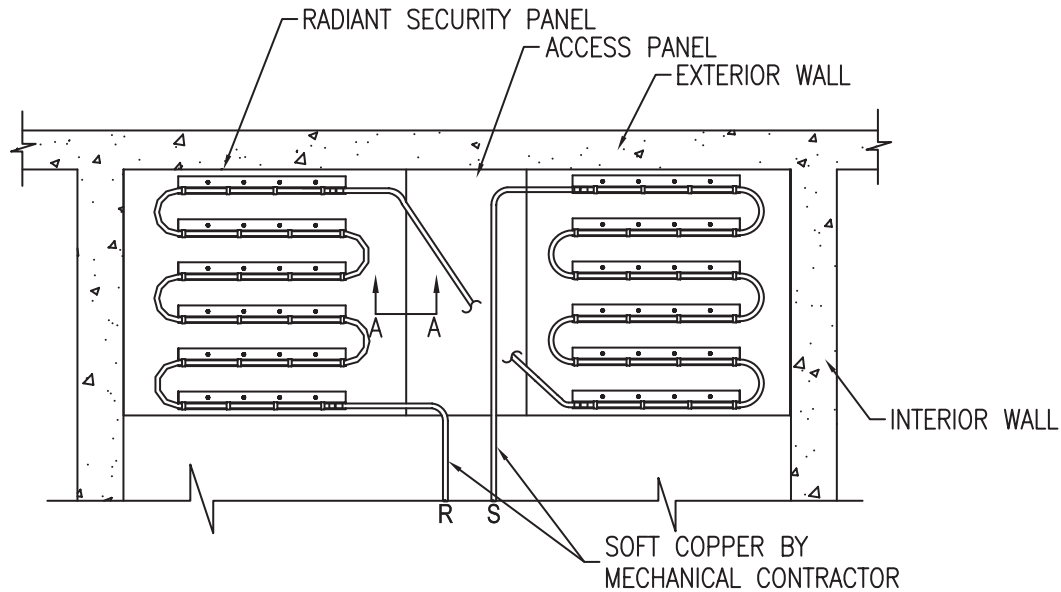
FLUSH MOUNTED SECURITY RADIANT PANEL



DROPPED SECURITY RADIANT PANEL TO ENCLOSE HEATING MAINS

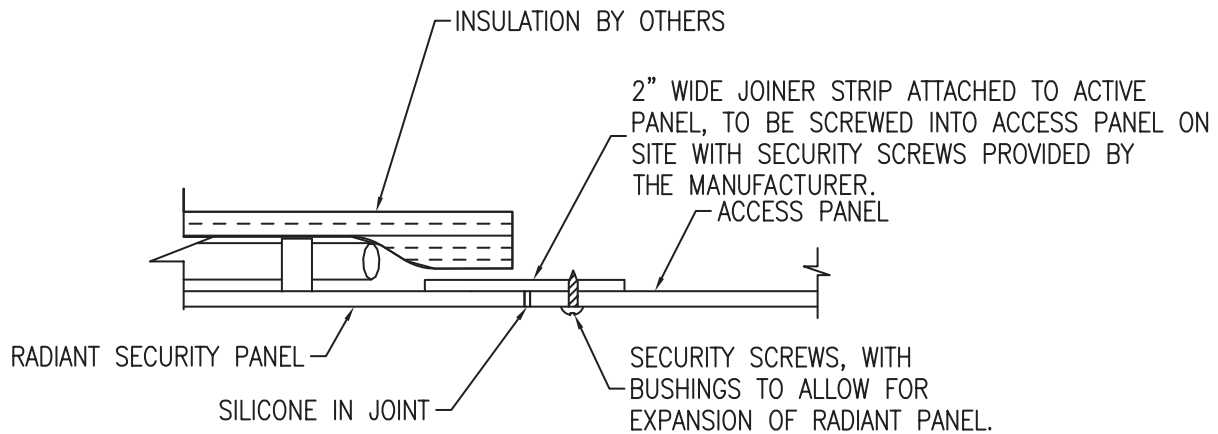


ACCESS PANEL AND PIPING DETAILS



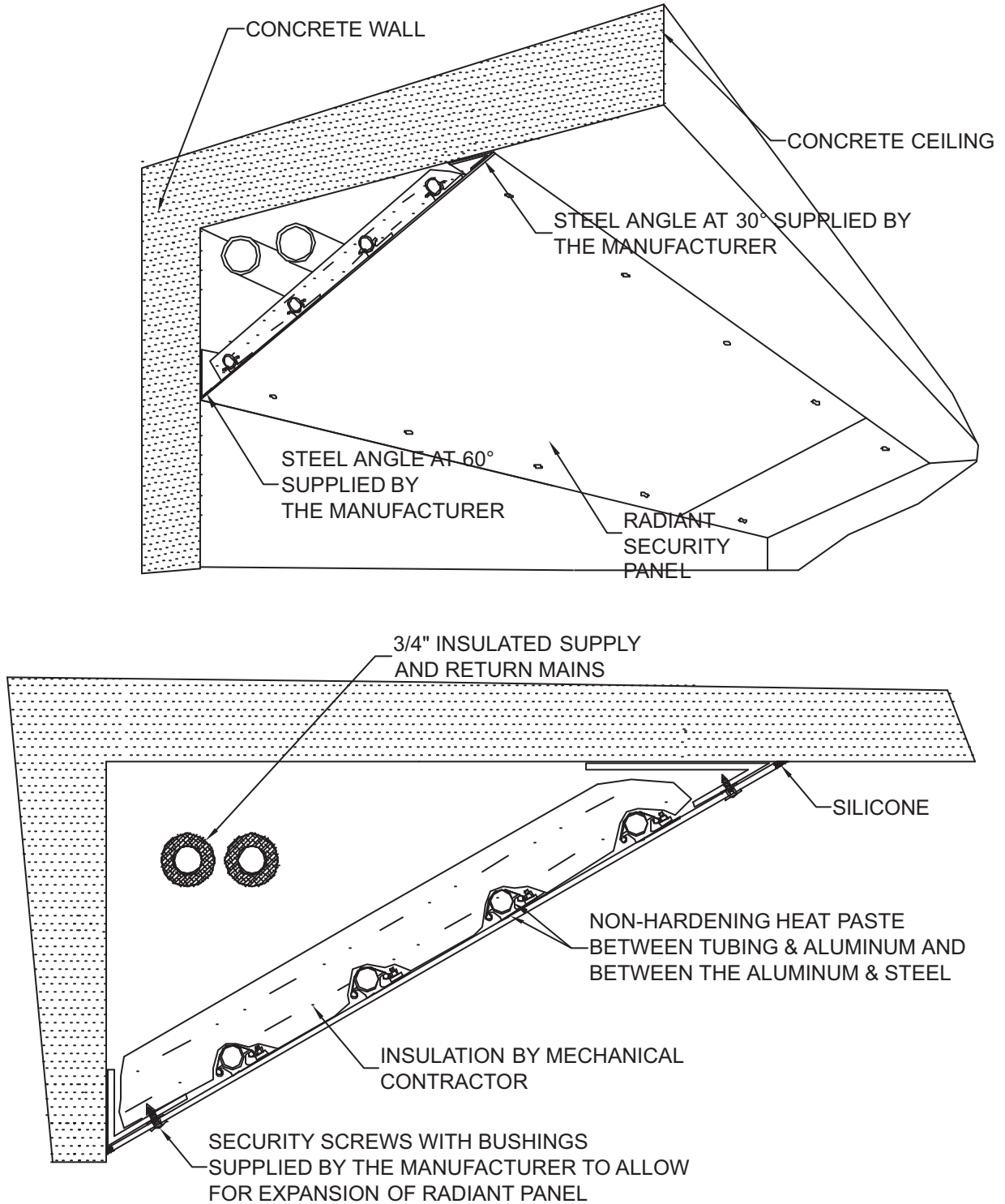
NOTE:

DUE TO WEIGHT OF PANELS, TWO SECURITY PANELS SUPPLIED WITH ACCESS PANEL FOR EASE OF INSTALLATION.



SECTION A-A
TYPICAL INTERFACE BETWEEN PANEL AND ACCESS PANEL

ANGLE MOUNTED SECURITY RADIANT PANEL



INSTALLATION INSTRUCTIONS

SECURITY RADIANT HEATING PANELS ARE FINISHED WITH ELECTROSTATIC POLYESTER POWDER PAINT. HOWEVER, THE PANEL SURFACE MUST NOT COME IN CONTACT WITH 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.

Installation, Operation & Maintenance Instructions

Installation

This booklet will provide you with detailed instructions for the installation of Linear Radiant Panels. Not all the following steps will be necessary for all applications. However, this will give you an idea of the maximum amount of work required for a radiant panel installation.

Radiant heating panels are finished with electrostatic powder paint. However, the panel surface must not come in contact with bare skin. Perspiration or grease from an ungloved hand can potentially leave a mark on the panel.

CAUTION

Installation personnel must wear clean white gloves when handling radiant panels.

CAUTION

Use a heat pad between radiant panel and copper pipe when making solder connection. Excessive heat can damage the paint finish.

SUPPLIES

With every job, the following will be supplied:

- Radiant Panels supplied crated in a logical manner (i.e. crated per floor or per room, etc.). See Fig. 1.
- Detailed shop drawings which show a legend that provides information about the different radiant panels found on the project (see Fig. 2). The numbering for the panels will be matched on the back of each panel. This will ensure quick and easy unpacking of the panels to the proper rooms.

Figure 1: Typical Crating

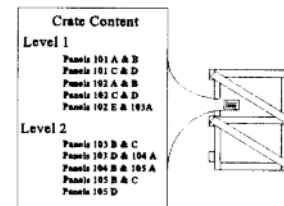
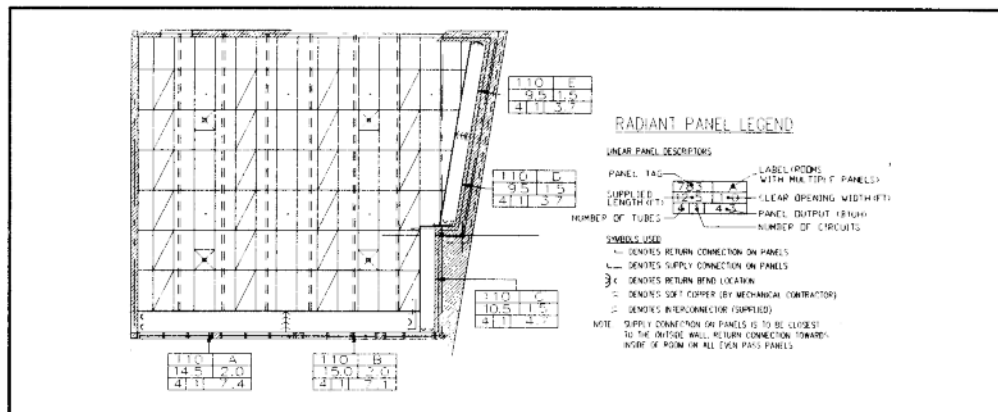


Figure 2: Shop Drawing Detail



Linear Radiant Panel



- Straight interconnectors (See Figure 3) for connections between panels.
- White gloves for installation.
- Spray bomb for any touch-ups.

Figure 3: Interconnector



INSTALLATION PROCEDURE

When installing radiant panels, you should have both the mechanical piping plan and the radiant panel shop drawing. Before starting with the installation, please familiarize yourself with the panels and their location by reviewing both drawings.

Remember that when coming in contact with the panels you should always be wearing the white gloves provided for that purpose.

UNPACKING

The crates will be sent to the job site. Once on site, you will need to:

1. Open up the crates to gain access to radiant panels. Note that the radiant panels are bundled together in groups of two.
2. Follow the numbering system to bring the appropriate panels to the designated rooms.

MEASURING

The panels will arrive on site cut to the length given to the manufacturer and with expansion allowance. If the finished wall to wall measurement was supplied to the manufacturer, the panels will be cut to size when delivered. This means that the mechanical contractor will not need to measure and cut the panels. However, since most of the measurements will have been taken prior to the walls being put up, some of the panels will be sized to fit from stud to stud and will therefore require some cutting on site.

In anticipation of the cutting operation, the manufacturer will have held back the coil and the cross brace approximately 6" on one of the end panels in a run or on each panel if only one panel spans the wall to wall dimension.

To determine the quantity of material to cut from the panels, the opening should be measured **from wall to wall at the panel height** (see Fig. 5). Remember that in order to allow for expansion of the panels you must also remove 1/2" per panel. This means that for a room containing a series of 4 panels (as shown in Fig. 6), you will need to cut an additional 2" to allow for expansion.

Figure 4: Panel with Coil Held Back

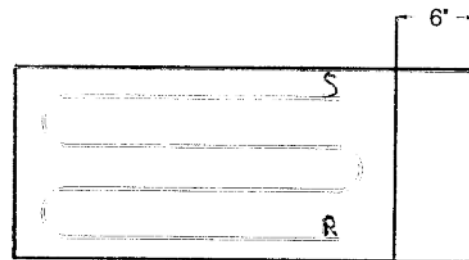


Figure 5: Measurement Height

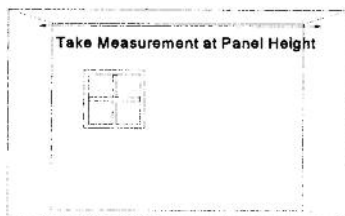
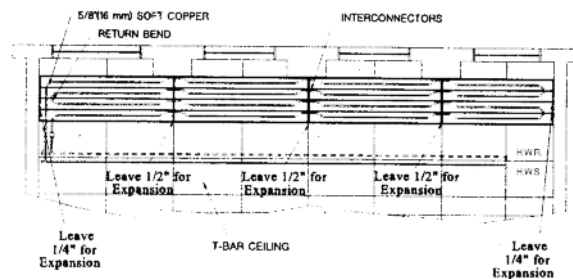


Figure 6: Installation of Radiant Panels in Series

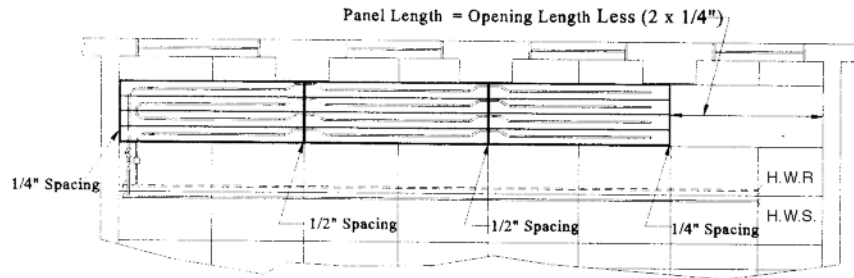


CUTTING

To cut the radiant panels to the required measurement, follow these steps

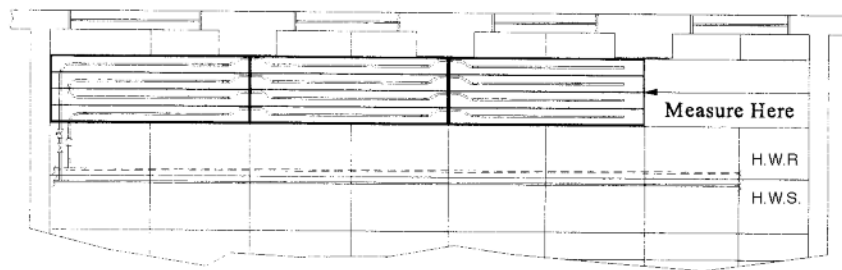
1. Install all but the last panel. See Fig. 7.

Figure 7: Installing Linear Radiant Panels



2. Measure the length of panel required. See Fig. 8.

Figure 8: Measuring for the Last Linear Radiant Panel



3. Allow 1/4" on either side of each panel in series to allow for expansion.
4. Lay the panel to be cut with the finished surface facing up.
5. Protect the finished surface before cutting.
6. Using a circular saw with a carbide tipped blade, or a jigsaw with an aluminum cutting blade, cut the panel.

INSTALLING IN T-BAR CEILINGS

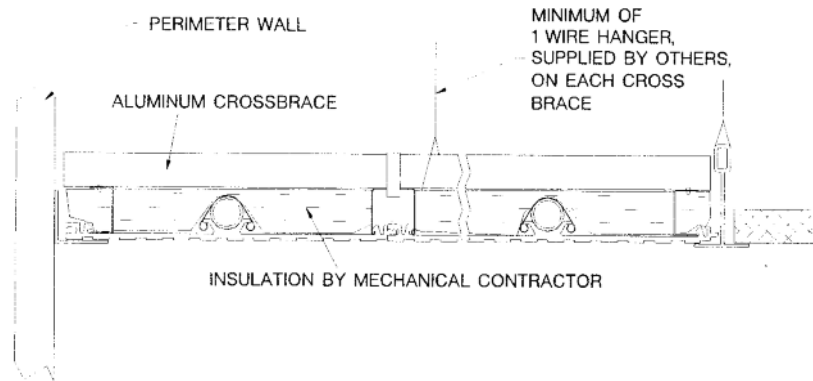
To install the panels in a t-bar ceiling, you must:

1. Ensure that the female edge of the radiant panel is positioned toward the exterior wall. See Fig. 9.
2. Lift the panel into place, making sure that 1/4" spacing is left at both ends of the panel for expansion.
3. Attach at least one tie wire from each cross brace to an anchor point found above the panel (for horizontal linear panels). See Fig. 10.

Figure 9: Female Edge



Figure 10: Tie Wire Location



4. Make all copper connections (supply and return or interconnectors). To solder the copper connections to the radiant panels, follow these steps:
 - a. Take off the clips holding the copper down using a nail slipped in the clip's loop.
 - b. Roll a discarded piece of copper under the panel's piping in order to raise it high enough for soldering.
 - c. Place a piece of heat sink material between the panel and the pipe to protect the panel.
 - d. Solder the copper connection to the piping.
 - e. Clip the piping back into place.
5. Perform an air pressure test by following the recommended procedure found in the specifications (if required).
6. Install the insulation with the foil side down. The insulation will need to be cut to length before being installed on the back of the panels.

INSTALLING IN GYPROC CEILINGS

To install radiant panels in a gyproc ceiling, you must:

1. Install the supplied frame around the opening in the gyproc. See Fig. 11. Manufacturer will supply one piece frame if called for in radiant panel specifications. Otherwise, framing material supplied and installed by ceiling contractor. Note: provisions must be made for access to back of panel for hard piped connections, for plastic tube (if specified), connections made with the panel below the ceiling, and excess tube placed back up above the ceiling.
2. Ensure that the female edge of the radiant panel is positioned toward the exterior wall. See Fig. 9.
3. Lift the panel into place.
4. Attach at least one tie wire from each cross brace to an anchor point found above the panel (for horizontal linear panels).
5. Make all copper connections (supply and return or interconnectors) through the access opening.

To solder the copper connections to the radiant panels, follow these steps:

- a. Take off the clips holding the copper down using a nail slipped in the clip's loop.
- b. Roll a discarded piece of copper under the panel's piping in order to raise it high enough for soldering.
- c. Place a piece of heat sink material between the

Figure 11: Frame Installation in Gyproc

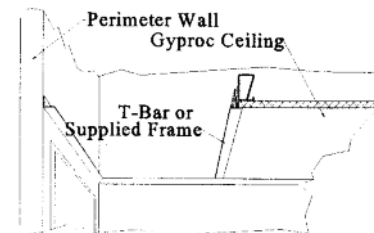
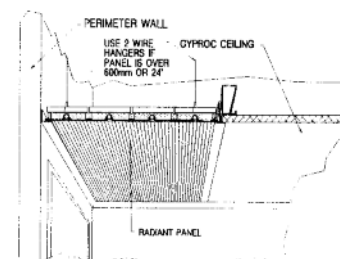
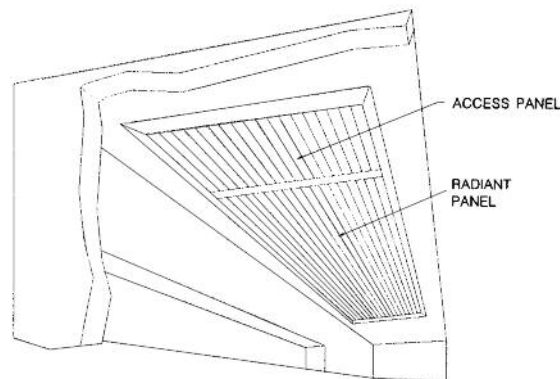


Figure 12: Linear Radiant Panel in Gyproc



- panel and the pipe to protect the panel.
- d. Solder the copper connection to the piping.
 - e. Clip the piping back into place.
6. Perform an air pressure test by following the recommended procedure found in the specifications (if required).
 7. Install the insulation with the foil side down. The insulation will need to be cut to length before being installed on the back of the panels.
 8. Close up the remaining opening with the use of the supplied inactive access panel (if provided) as shown in Fig. 13.

Figure 13: Radiant Panel With Access Panel



MISCELLANEOUS

Venting

Once the panels are installed, the piping system must be vented in order to avoid air locking.

Cleaning & Touch-up

In the event that a panel has been dirtied, the panel's face can be cleaned by using an off the shelf mild household cleaner such as Fantastik or soapy water.

If the panels have been scratched, use the supplied spray paint to touch up the panel's face. A few steps should be followed in order to touch up radiant panels:

1. Sand the affected area to remove any roughness.
2. Wipe the area clean.
3. If using a cleaner to clean the surface, let the area dry before applying the paint.
4. Holding the spray can 6 to 12 inches away from the panel's surface, apply the paint in light coats.
5. Let the paint dry before handling (Approximately 20 minutes).
6. Repeat paint application until the scratch is covered.

Repainting

The type of powder coating used for radiant panels is an ant-graffiti paint and unless retouching a small area, paint will not adhere to the powder coated face of the panels. Therefore, for applications where an entire panel must be repainted either in white or in a different colour, please contact your nearest representative.

Installation, Operation & Maintenance Instructions

Installation

This booklet will provide you with detailed instructions for the installation of Modular Radiant Panels. Not all the following steps will be necessary for all applications. However, this will give you an idea of the maximum amount of work required for a radiant panel installation.

Radiant heating panels are finished with electrostatic powder paint. However, the panel surface must not come in contact with bare skin. Perspiration or grease from an ungloved hand can potentially leave a mark on the panel.

CAUTION
Installation personnel must wear clean white gloves when handling radiant panels.

CAUTION
Use a heat pad between radiant panel and copper pipe when making solder connection. Excessive heat can damage the paint finish.

SUPPLIES

With every job, the following will be supplied:

- Radiant Panels supplied boxed and crated. See Fig. 1.
- Detailed shop drawings which follow the mechanical shop drawings (see Fig. 2).
- White gloves for installation
- Spray bomb for any touch-ups

Figure 1: Typical Crating

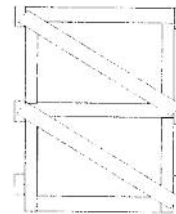
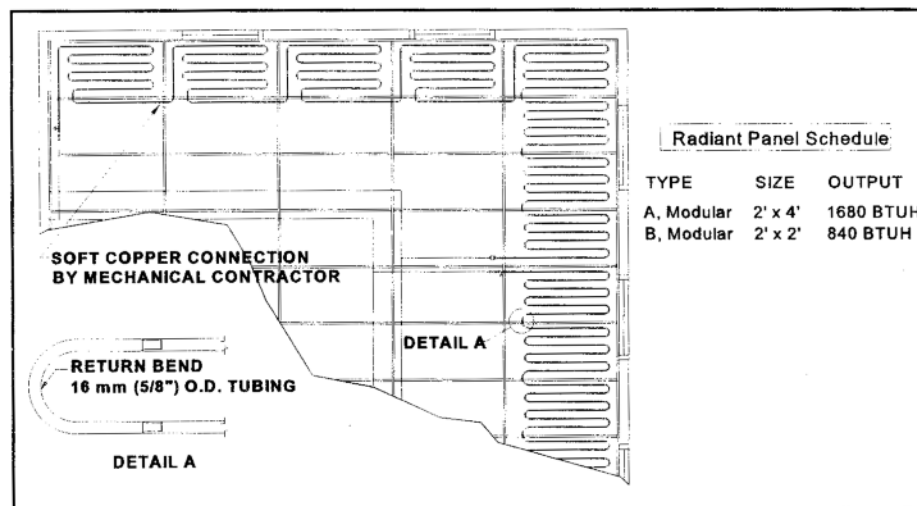


Figure 2: Shop Drawing Detail



INSTALLATION PROCEDURE

When installing radiant panels, you should have both the mechanical piping plan and the radiant panel schedule. Before starting with the installation, please familiarize yourself with the panels and their location by reviewing both documents.

Remember that when coming in contact with the panels you should always be wearing the white gloves provided for that purpose.

UNPACKING

The crates will be sent to the job site. Once on site, you will need to:

1. Open up the crates to gain access to radiant panels.
2. Follow the radiant panel schedule to bring the appropriate number of modular radiant panels to the designated rooms.

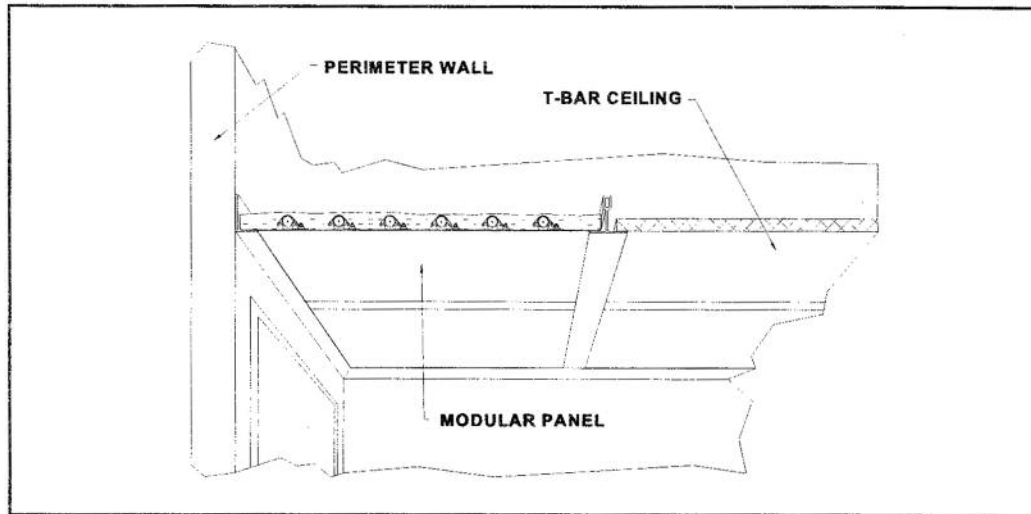
INSTALLING IN T-BAR CEILINGS

To install panels in a t-bar ceiling, you must:

1. Lift the panels into place making sure that 1/4" spacing is left at both ends for expansion.
2. Make all copper connections (supply and return or interconnectors). To solder the copper connections to the radiant panels, follow these steps:
 - Take off the clips holding the copper down using a nail slipped in the clip's loop.
 - Roll a discarded piece of copper under the panel's piping in order to raise it high enough for soldering.
 - Place a piece of heat sink material between the panel and the pipe to protect the panel.
 - Solder the copper connection to the piping.
 - Clip the piping back into place.
3. Perform an air pressure test by following the recommended procedure found in the specifications (if required).
4. Install the insulation with the foil side down. The insulation will need to be cut to length before being installed on the back of the panels.

Modular Radiant Panel

Figure 3: Installation of Modular Panel in T bar Ceiling

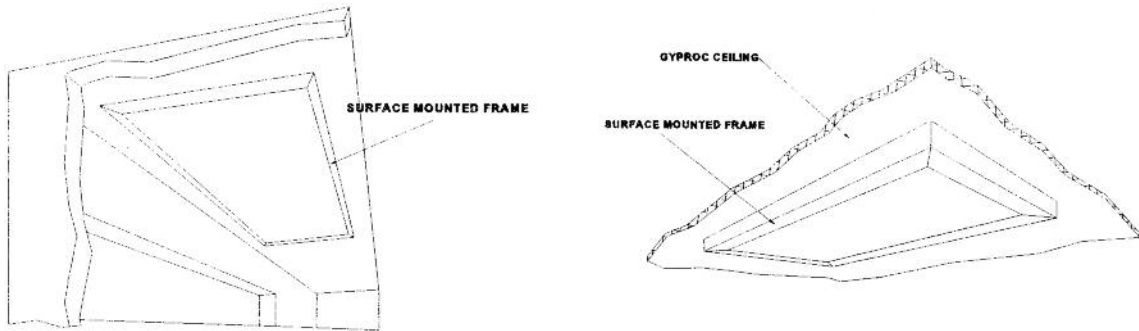


INSTALLING IN GYPROC CEILINGS

To install radiant panels in a gyproc ceiling, you must:

1. Install the supplied frame around the opening in the gyproc. See Fig. 4.

Figure 4: Frame Installations in Gyproc

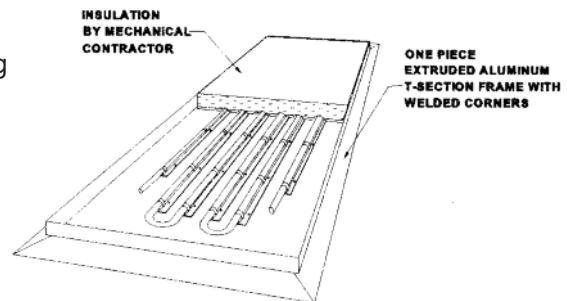


2. Lift the panel into place see Fig 5.
3. Make all copper connections (supply and return or interconnectors) through the access opening. To solder the copper connections to the radiant panels, follow these steps:
 - Take off the clips holding the copper down using a nail slipped in the clip's loop.
 - Roll a discarded piece of copper under the panel's piping in order to raise it high enough for soldering.
 - Place a piece of heat sink material between the panel and the pipe to protect the panel.
 - Solder the copper connection to the piping.
 - Clip the piping back into place.

4. Perform an air pressure test by following the recommended procedure found in the specifications (if required).

5. Install the insulation with the foil face down. The insulation will need to be cut to length before being installed on the back of the panel.

Figure 5: Modular Radiant Panel in Gyproc



MISCELLANEOUS

Venting

Once the panels are installed, the piping system must be vented in order to avoid air locking.

Cleaning & Touch-up

In the event that a panel has been dirtied, the panel's face can be cleaned by using soapy water or an off the shelf mild household cleaner such as Fantastik or soapy water. Touch ups should be done only for modular panels that are not silk screened.

If panels have been scratched, use the supplied spray paint to touch up the panel's face. A few steps should be followed in order to touch up radiant panels:

1. Sand the affected area to remove any roughness
2. Wipe the area clean
3. If using a cleaner to clean the surface, let the area dry before applying paint
4. Holding the spray can 6 to 12 inches away from the panel's surface, apply the paint in light coats
5. Let the paint dry before handling (Approximately 20 minutes)
6. Repeat paint application until the scratch is covered

Repainting

Repainting a modular panel is applicable only for panels that are not silk screened. The type of powder coating used for radiant panels is an anti-graffiti paint and unless retouching a small area, paint will not adhere to the powder coated face of the panels. Therefore, for applications where an entire panel must be repainted either in white or in a different colour, please contact your nearest Sterling representative.

