LINEAR PANEL

DESCRIPTION

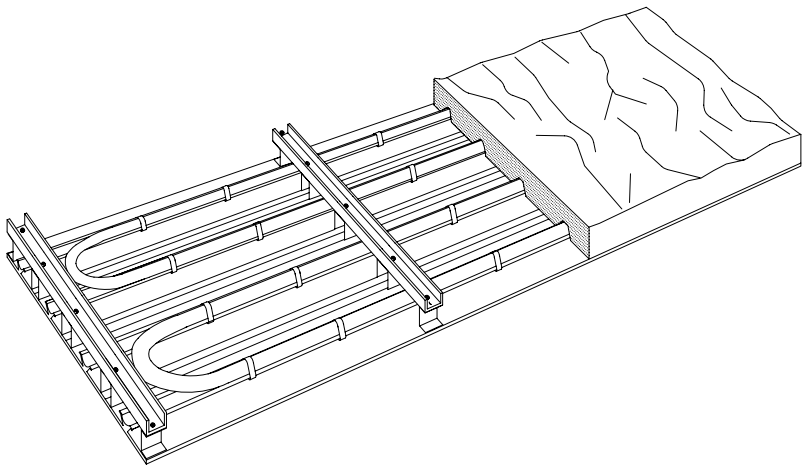
Linear panels are an established approach to radiant heating. The linear panel is an extruded aluminum radiant heating strip that provides exceptionally high heat transfer. Linear panels are available in virtually any width and length up to a maximum of 4800mm. This product, while offering an up-to-date 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 that 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 4800 mm and widths in multiples of 150 mm. An operating weight of 9.76 kg/m2 should be used when calculating the requirements for clipping and suspension components.

Materials of Construction

Pipework:	16 mm 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 38 mm x 19 mm x 1.6 mm 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 25 mm 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

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 chart on L-5.
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 cirucuit, 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-15, and the pressure drops for the flexible interconnectors can be found on page L-16.

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.

Twa Panel Systems, Inc. provides 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.

LINEAR PANEL METRIC OUTPUTS

# OF TUBES		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	-	75	90	105	-	157	188	215
	51.7	60	70	-	89	107	123	-	181	217	248
	54.4	68	82	-	102	124	142	-	205	246	281
	57.2	76	90	-	116	141	160	-	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 IMPERIAL OUTPUTS

# OF TUBES		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	-	78	94	109	-	163	196	224
	125	62	73	-	93	111	128	-	188	226	258
	130	71	85	-	106	129	148	-	213	256	292
	135	79	94	-	121	147	166	-	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

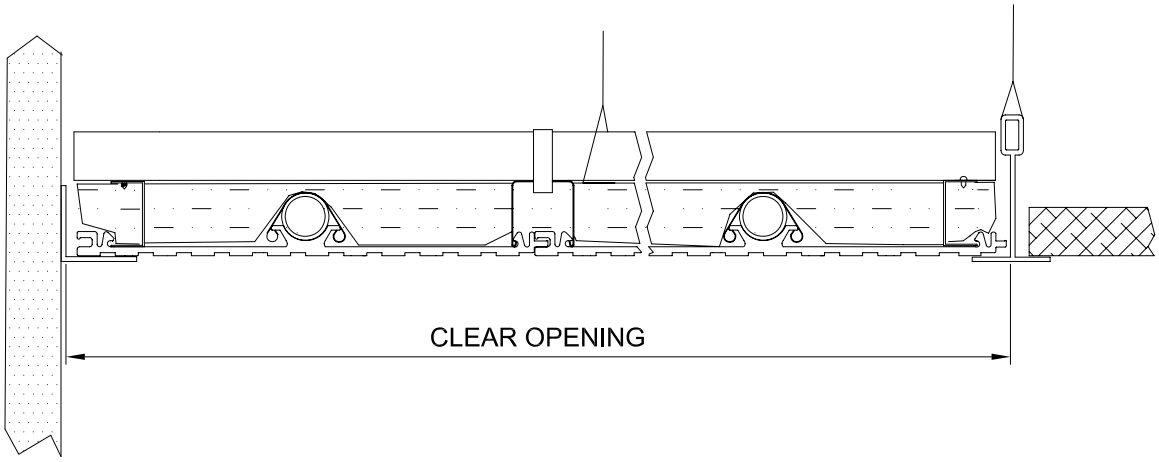
OUTPUTS EXPRESSED IN BTUH/LINEAL FOOT OF PANEL AND ARE BASED ON 70°F ROOM TEMPERATURE. FOR EVERY 1°F DECREASE IN ROOM TEMPERATURE BELOW 70°F, THE OUTPUT INCREASES BY 0.9%. FOR EVERY 1°F INCREASE IN ROOM TEMPERATURE ABOVE 70°F, THE OUTPUT DECREASES BY 0.9%.

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 & FINISHED OPENINGS**

Note: Table for ethylene and propylene 50/50 glycol also available upon request.

LINEAR PANEL

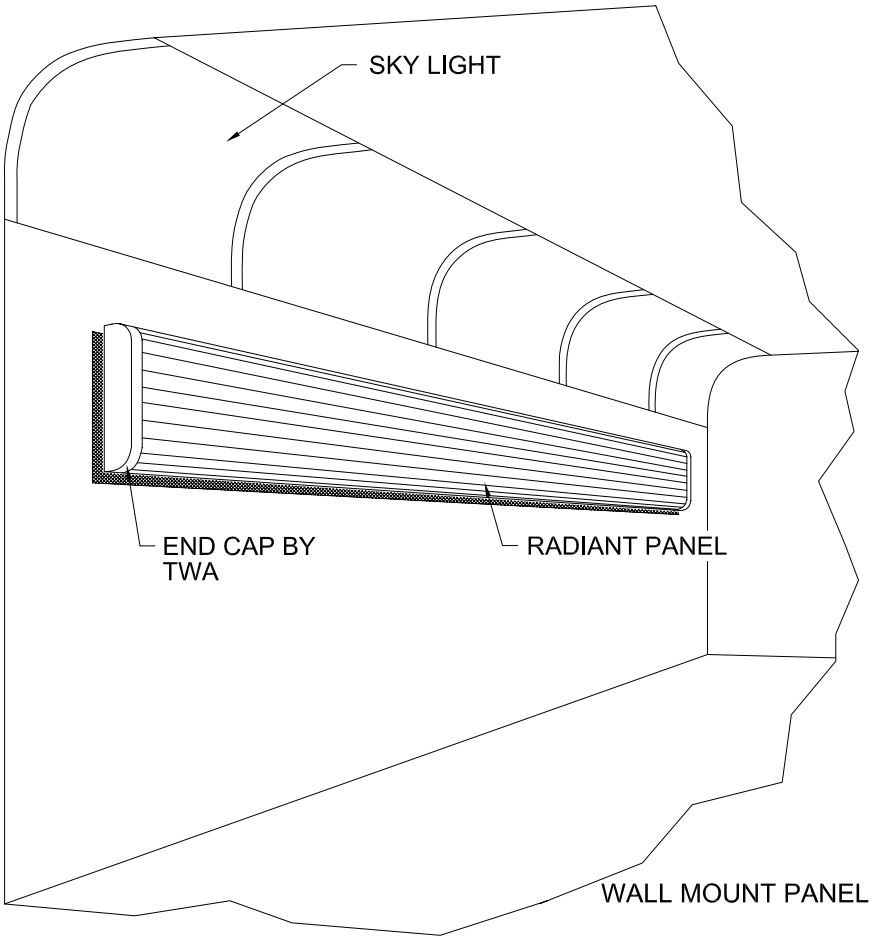


RADIANT PANEL WIDTHS & FINISHED OPENINGS

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

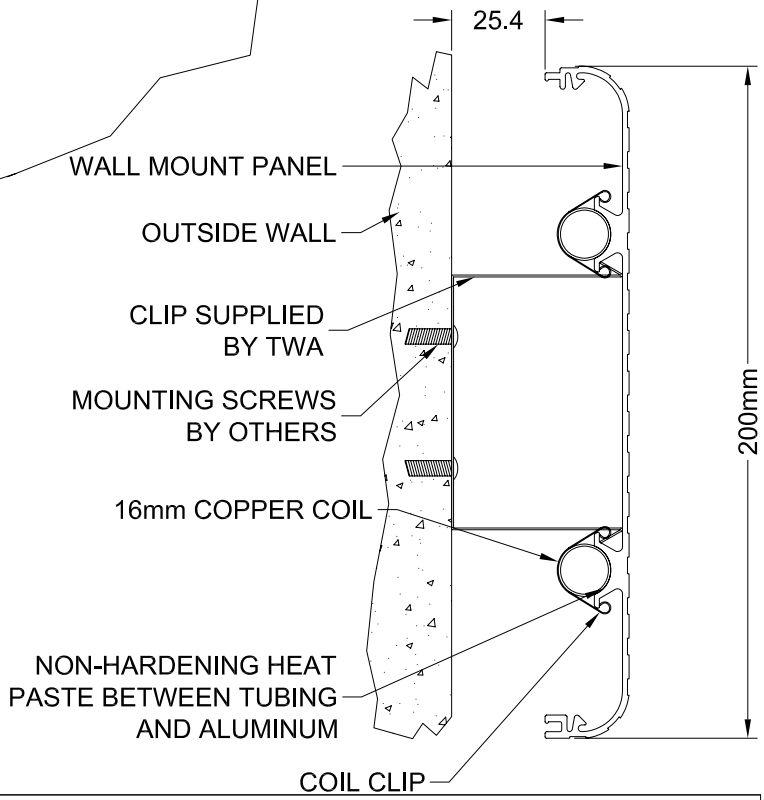
NOTE: FINISHED OPENINGS DO NOT INCLUDE SUPPORT ANGLE THICKNESS.

LINEAR PANEL



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

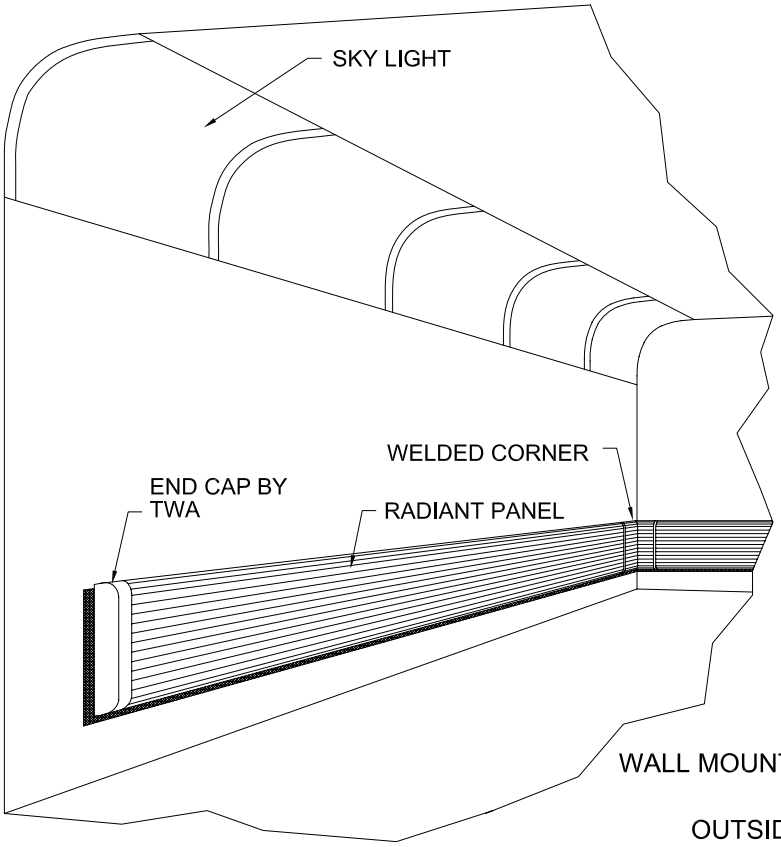
MWT (°F)	OUTPUT (Btuh/ft)	MWT (°C)	OUTPUT (W/m)
160	300	71.1	289
165	321	73.9	309
170	345	76.7	331
175	366	79.4	352
180	389	82.2	374
185	410	85.5	394
190	434	87.8	416
195	454	90.6	437
200	478	93.3	459
205	498	96.1	479



8" WALL MOUNT PANEL

Twa Panel Systems, Inc. | FRENGER | L-8

LINEAR PANEL



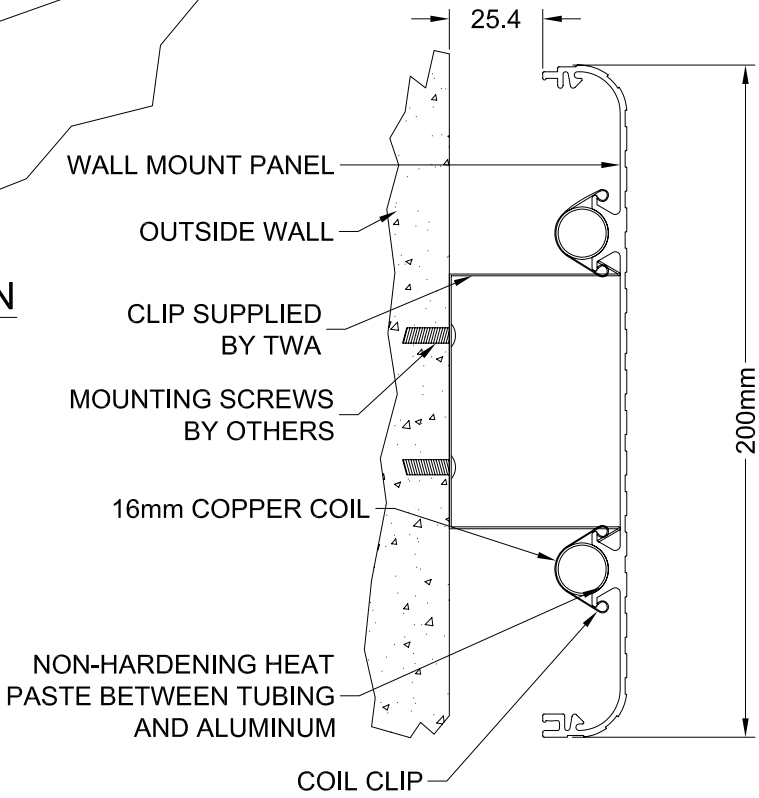
TYPICAL INSTALLATION

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



8" FLOOR MOUNT PANEL

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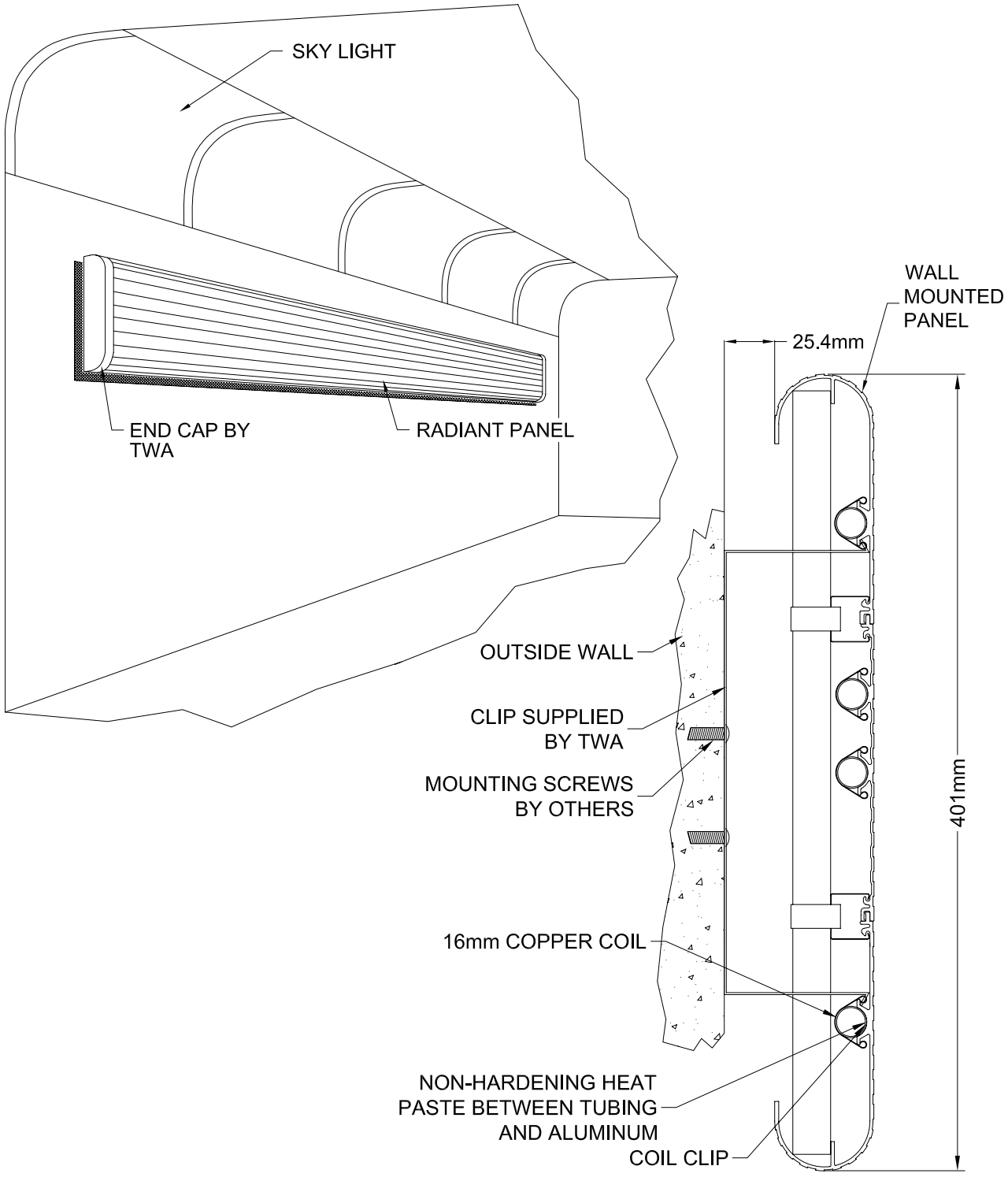
LINEAR PANEL



WALL MOUNT PANEL

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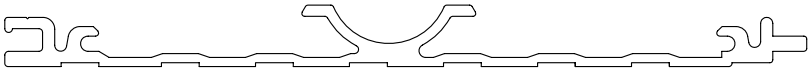
LINEAR PANEL

4" (102mm) 1 PASS



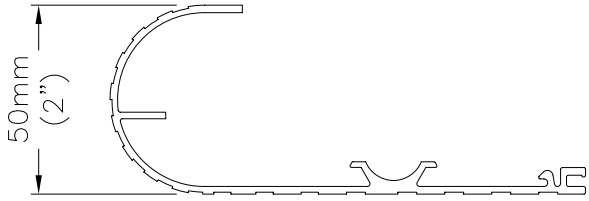
6" (154mm) 1 PASS

6" (154mm) 2 PASS

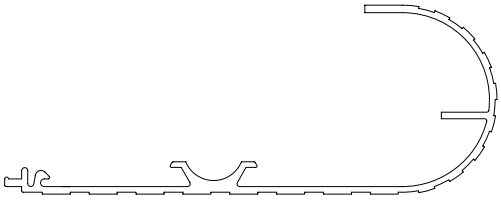
152mm (6") 1-PASS CURTAIN TRACK

LINEAR CURTAIN TRACK		
Twa Panel Systems, Inc.	FRENGER®	L-10

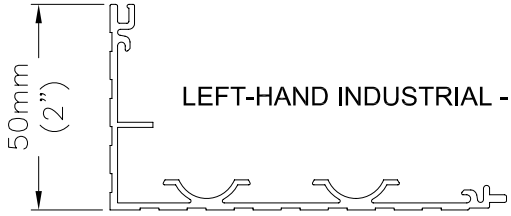
LINEAR PANEL



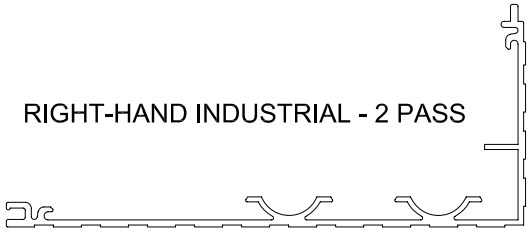
2" BULLNOSE - 1 PASS - LEFT



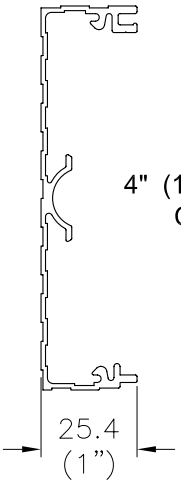
2" BULL NOSE - 1PASS - RIGHT



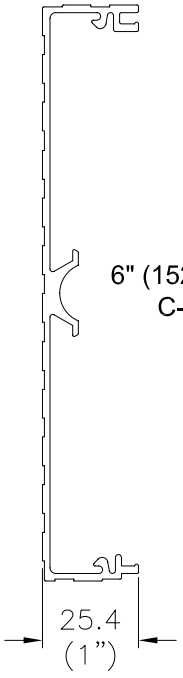
LEFT-HAND INDUSTRIAL - 2 PASS



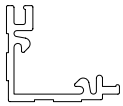
RIGHT-HAND INDUSTRIAL - 2 PASS



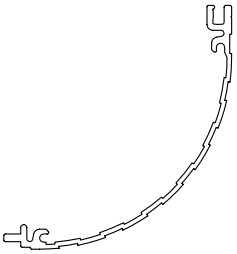
4" (102mm) 1-PASS
C-SECTION



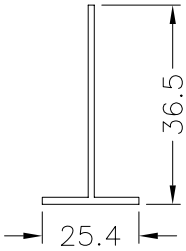
6" (152mm) 1-PASS
C-SECTION



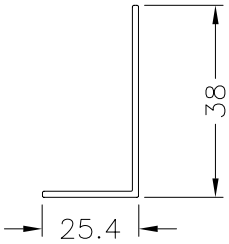
25mm (1") CORNER



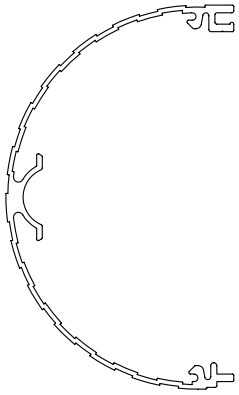
50mm J-SECTION



EXTRUDED ALUMINUM
T-ANGLE



EXTRUDED ALUMINUM
L-ANGLE



4" (102mm) 1-PASS BULLNOSE

MISCELLANEOUS LINEAR EXTRUSIONS

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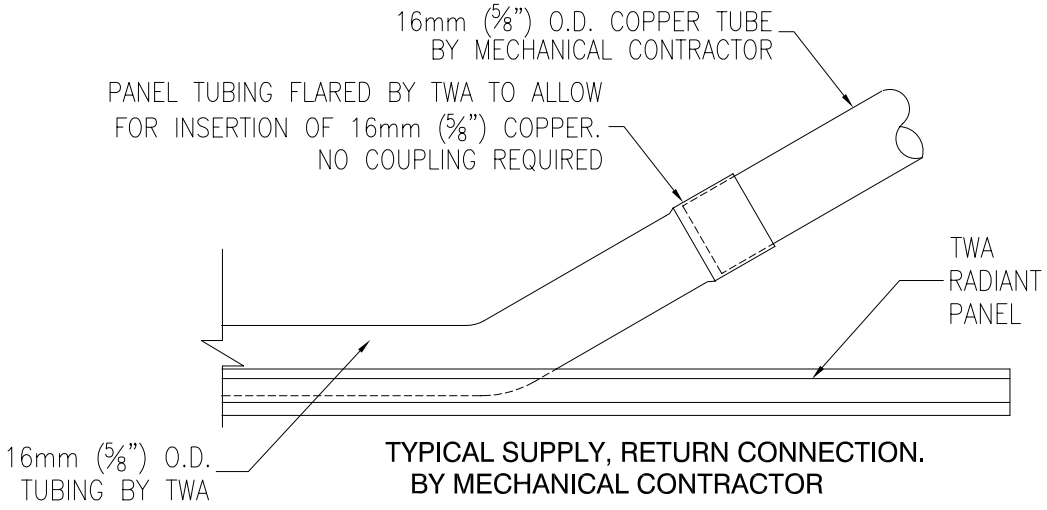
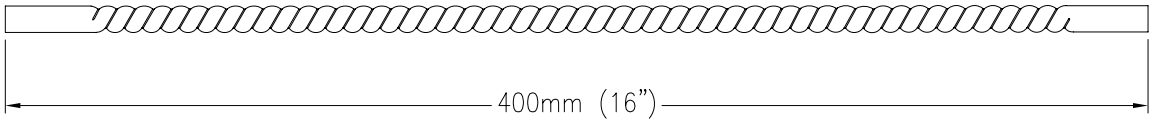
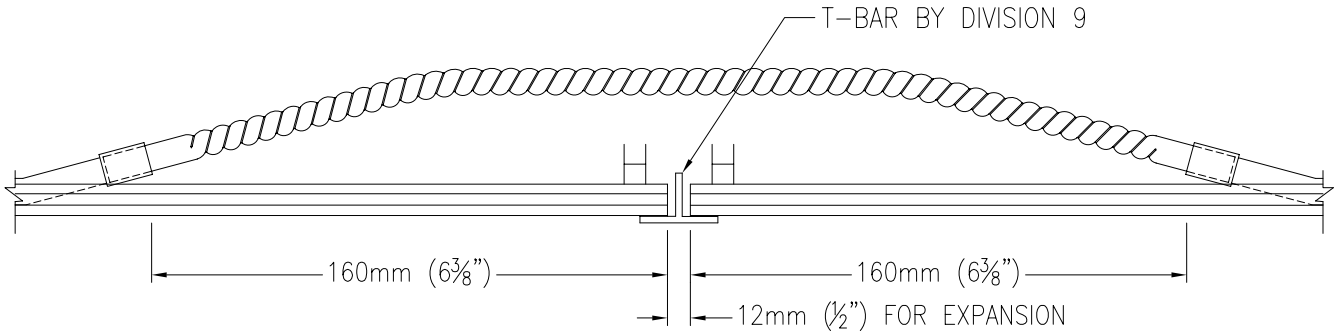


TYPICAL SUPPLY, RETURN CONNECTION.
BY MECHANICAL CONTRACTOR





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

COPPER CONNECTION DETAILS

Twa Panel Systems, Inc.	FRENGER	L-12

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.

4. ALL RADIANT PANELS MUST HAVE AT LEAST ONE TIE WIRE ON EACH CROSS BRACE.

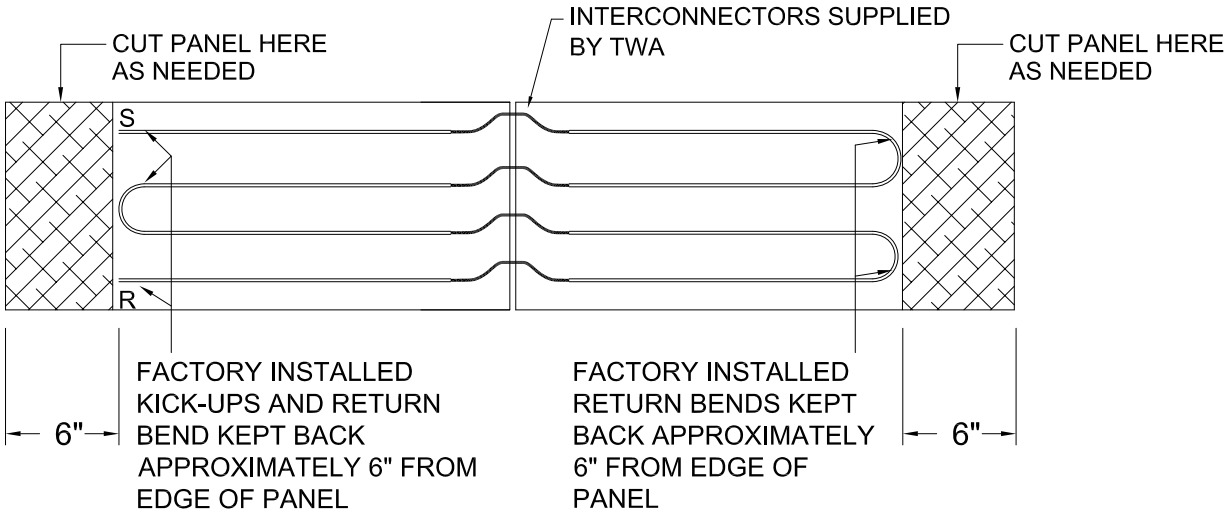
5. CROSS BRACING ON RADIANT PANELS:
   - 2 BRACES - UP TO 1500 mm (5 feet)
   - 3 BRACES - 1501 mm TO 3055 mm (10 feet)
   - 4 BRACES - 3056 mm TO 4275 mm (14 feet)
   - 5 BRACES - 4276 mm TO 4885 mm (16 feet)

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.

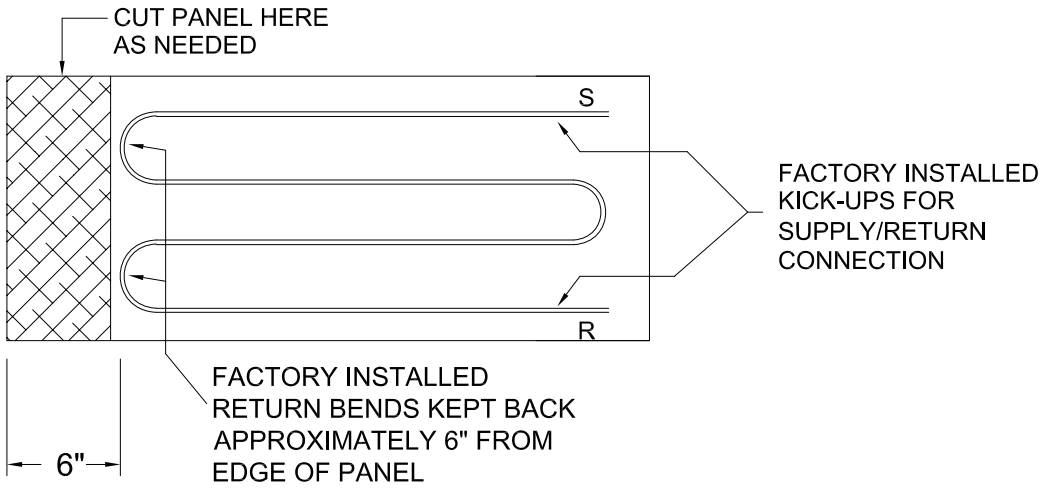
7. WHEN PANELS REQUIRE SITE CUTTING, FOLLOW THESE STEPS:
   1. Install all but the last panel, measure length required,
   2. Cut last panel to required length using procedure listed in part 6 above,
   3. Install final panel in ceiling.

8. TWA PANEL SYSTEMS, INC. IS RESPONSIBLE ONLY FOR THE SUPPLY OF RADIANT PANELS. OTHERS ARE TO SUPPLY AND INSTALL THE FOLLOWING:
   1. Necessary piping between panels (other than Twa 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 mouldings.

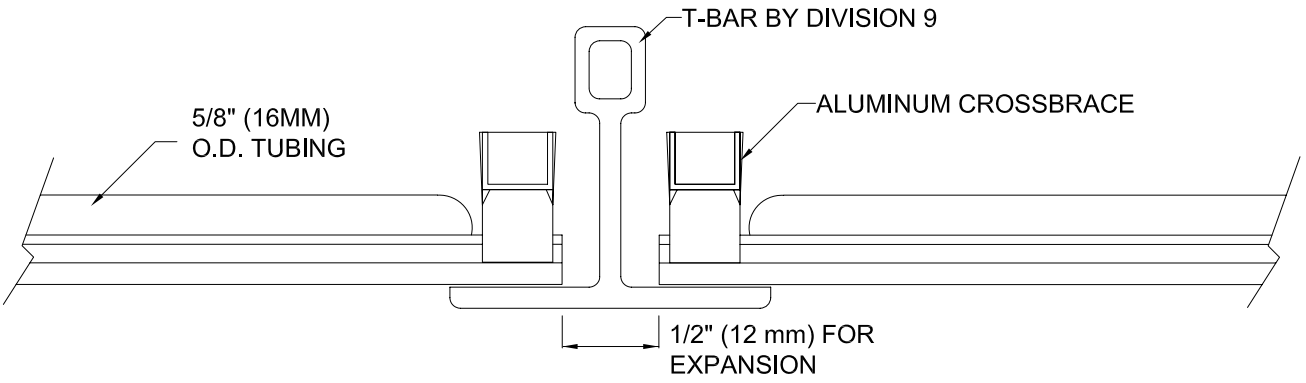
MULTI-PANEL INSTALLATION



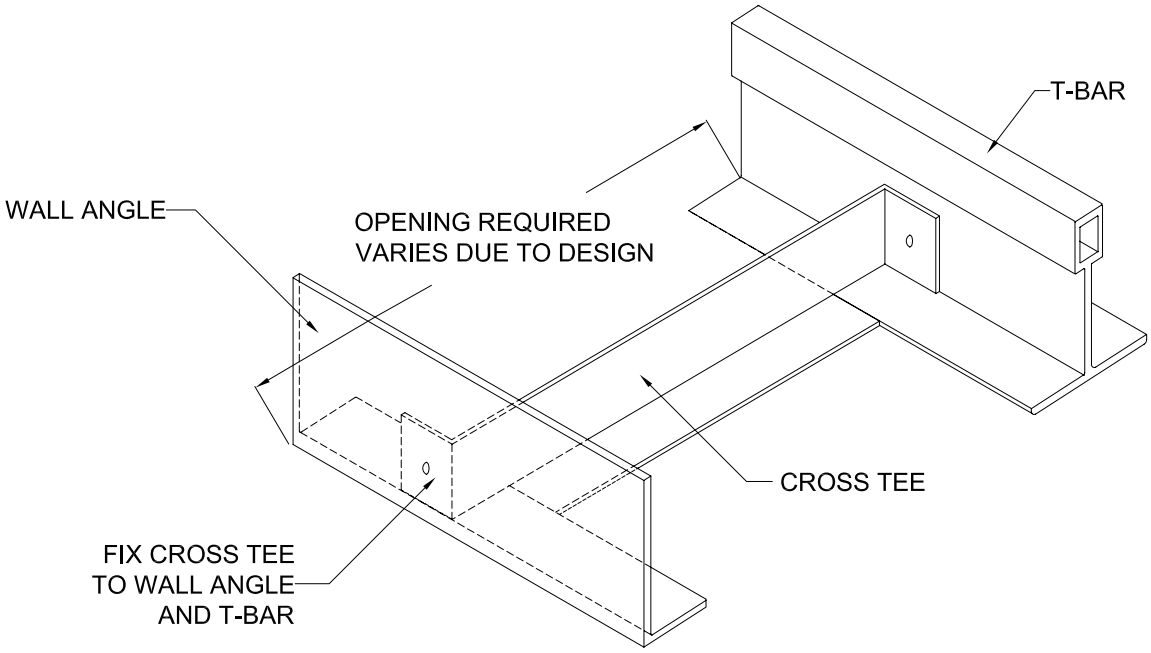
SINGLE PANEL INSTALLATION



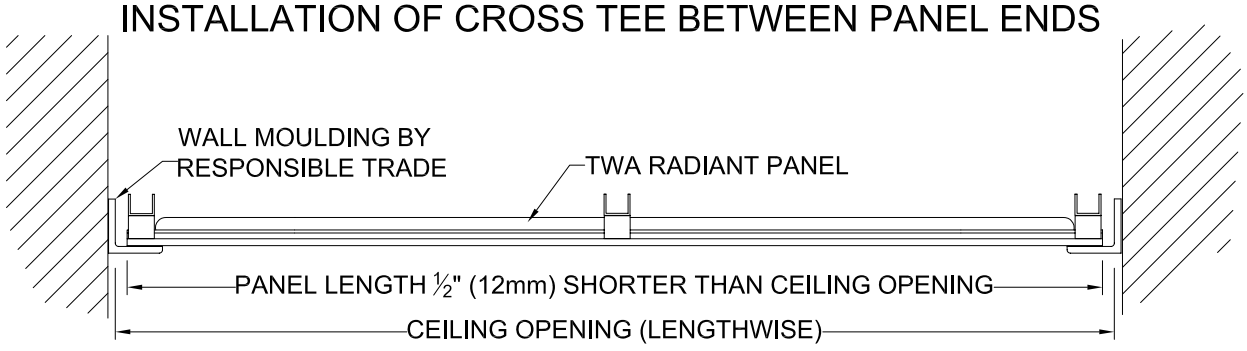
LINEAR PANEL



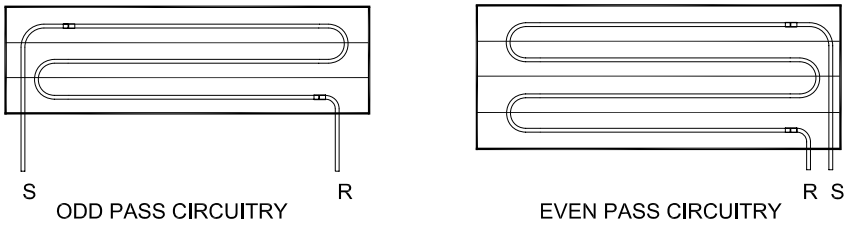
EXPANSION GAP FOR TWA RADIANT PANEL



INSTALLATION OF CROSS TEE BETWEEN PANEL ENDS

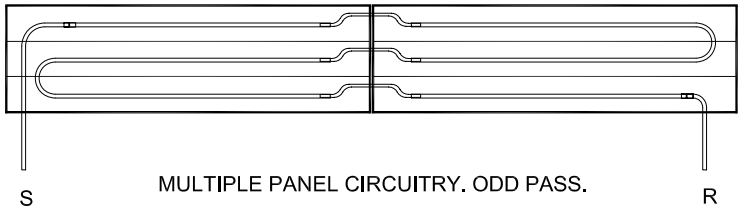


LINEAR PANEL EXPANSION DETAILS		
Twa Panel Systems, Inc.	FRENGER	L-15

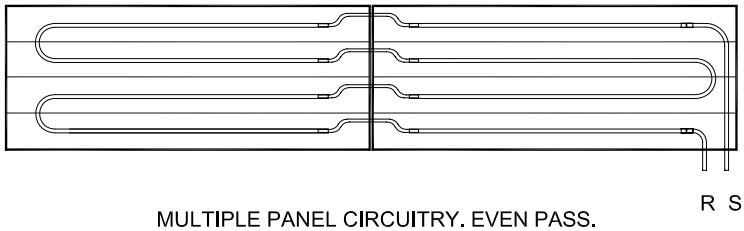


ODD PASS CIRCUITRY

EVEN PASS CIRCUITRY



MULTIPLE PANEL CIRCUITRY. ODD PASS.



MULTIPLE PANEL CIRCUITRY. EVEN PASS.

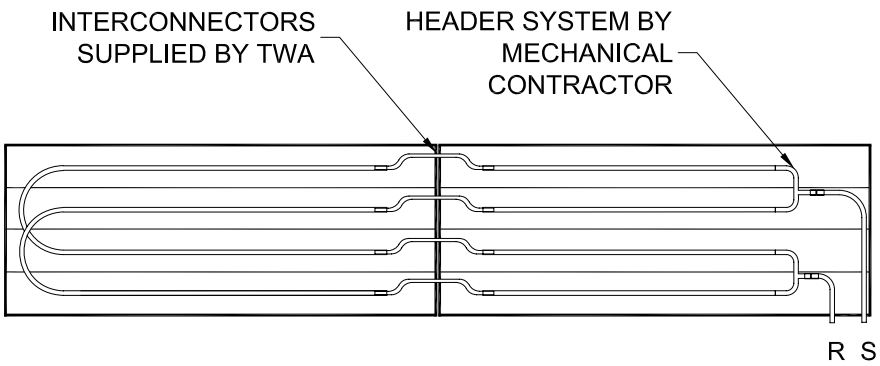
Single panel length to a maximum of 16 feet (4877 mm).
Pressure drop for Twa Panel Systems, Inc. 5/8" (16 mm) O.D. tubing:

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

at 0.032 L/s is 0.050 m drop per 10 m
at 0.063 L/s is 0.203 m drop per 10 m
at 0.126 L/s is 0.711 m drop per 10 m
at 0.157 L/s is 1.020 m drop per 10 m
at 0.189 L/s is 1.422 m drop per 10 m

Refer to L-17 for additional pressure drop info.

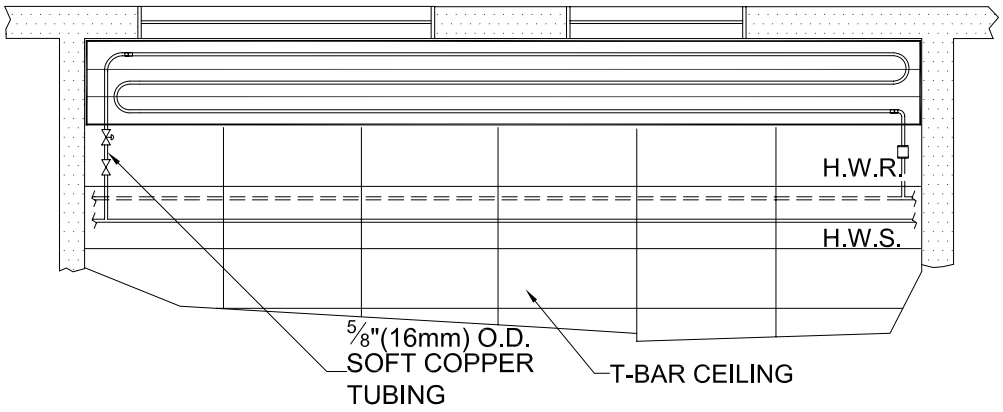
HEADER CIRCUITRY



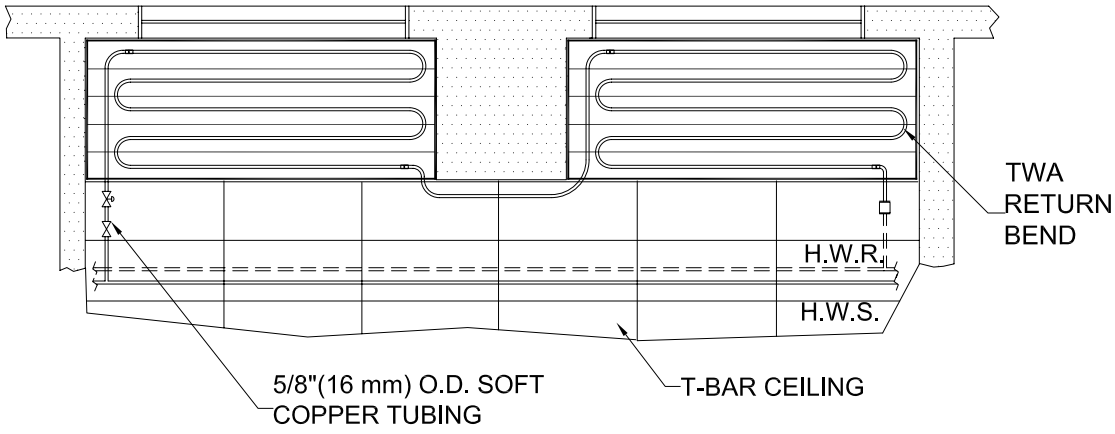
MULTIPLE PANEL CIRCUITRY FOR LONGER ZONES

TWA 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 PANEL



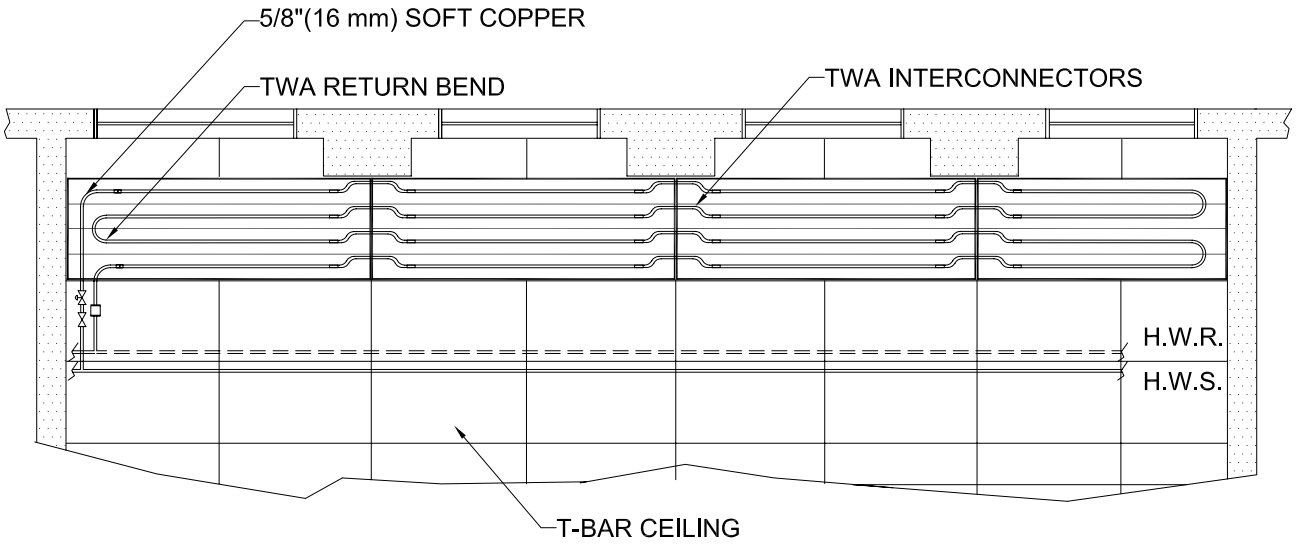
ODD NUMBER OF PASSES SINGLE PANEL,
LENGTH UP TO 16 FEET (4877 mm)



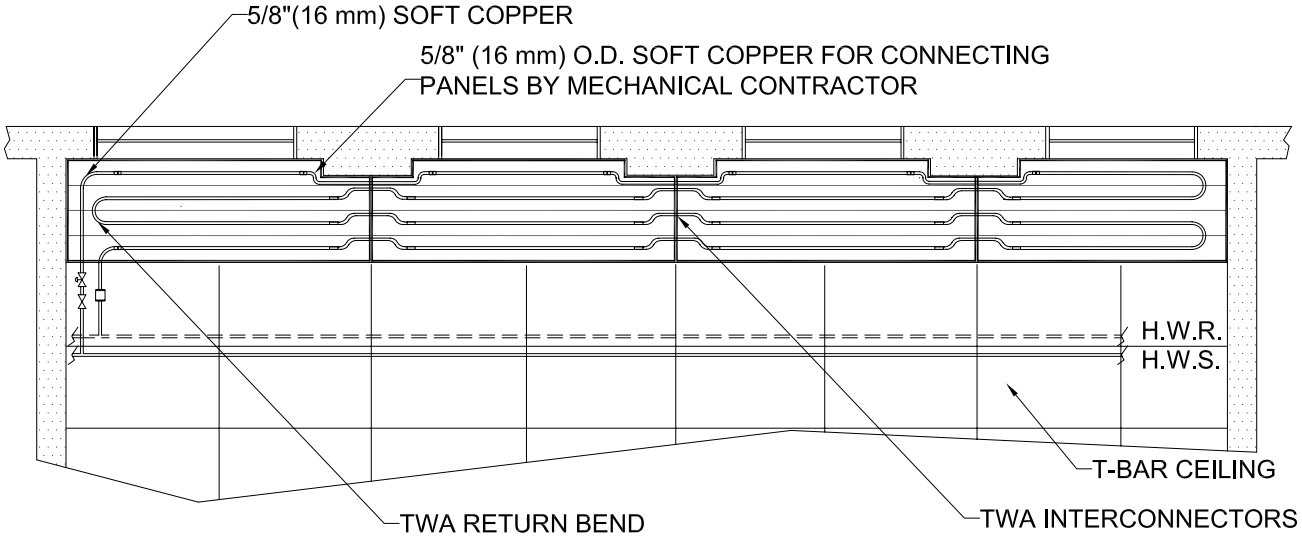
TWO ODD NUMBER PASS PANELS PIPED
AROUND COLUMN

LINEAR PANELS IN T-BAR CEILING		
Twa Panel Systems, Inc.	FRENGER	L-18

LINEAR PANEL



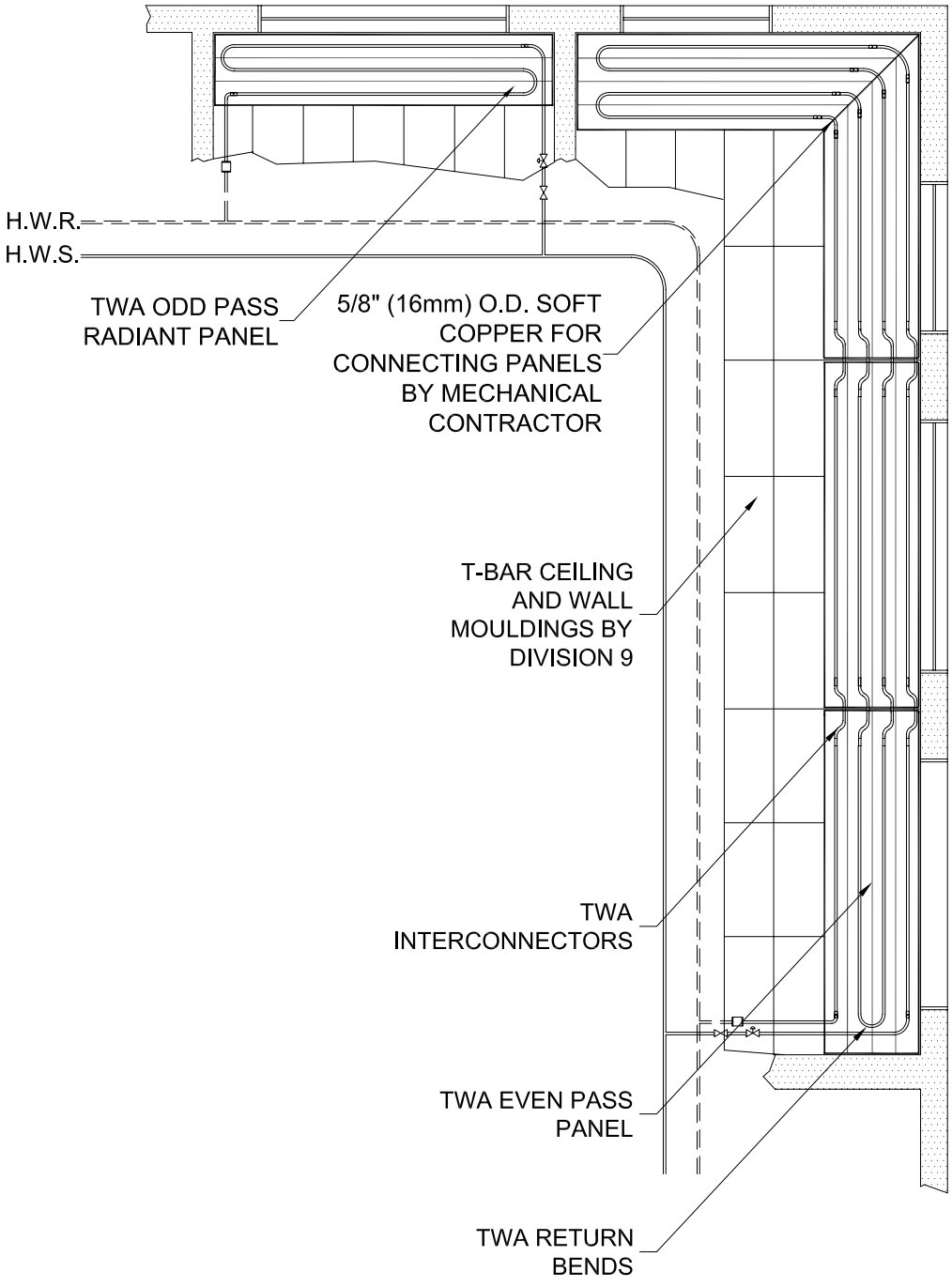
TWA RADIANT PANELS POSITIONED CLEAR OF PERIMETER COLUMNS. EVEN PASS COILING SHOWN



TWA RADIANT PANELS NOTCHED AROUND PERIMETER COLUMNS. EVEN PASS COILING SHOWN

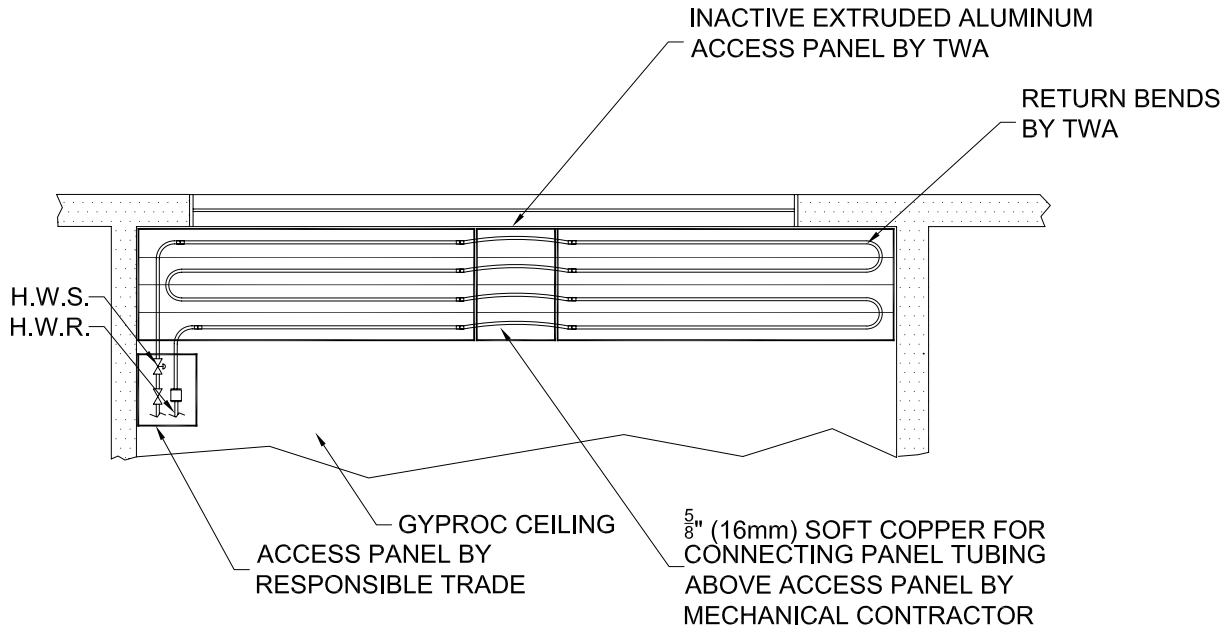
PERIMETER PANELS WITH COLUMN INTERFERENCE		
Twa Panel Systems, Inc.	FRENGER	L-19

LINEAR PANEL

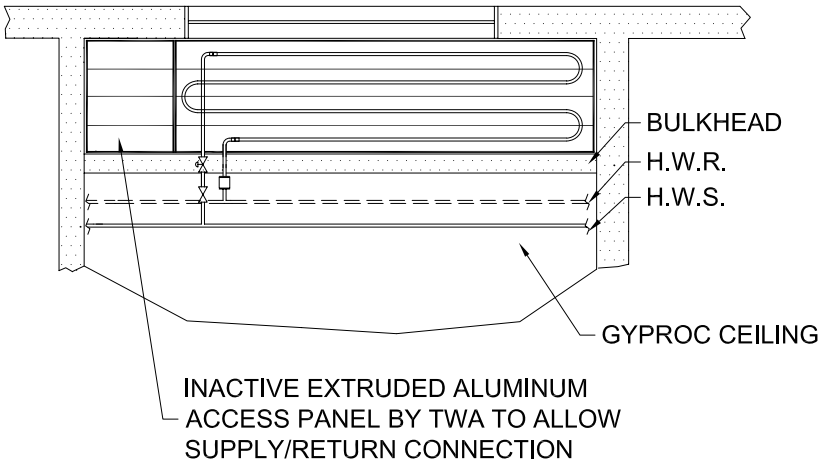


PIPING DETAIL FOR ODD AND EVEN PASS LINEAR PANELS

Twa Panel Systems, Inc. | FRENGER | L-20

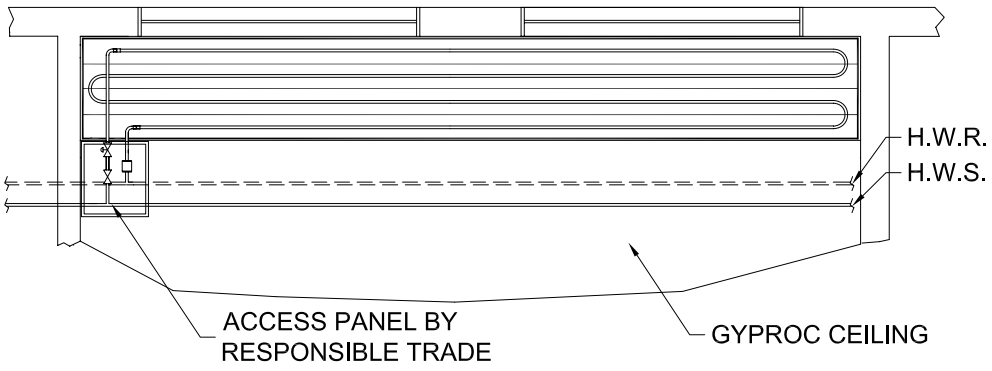


TWO PANEL EVEN PASS CONFIGURATION

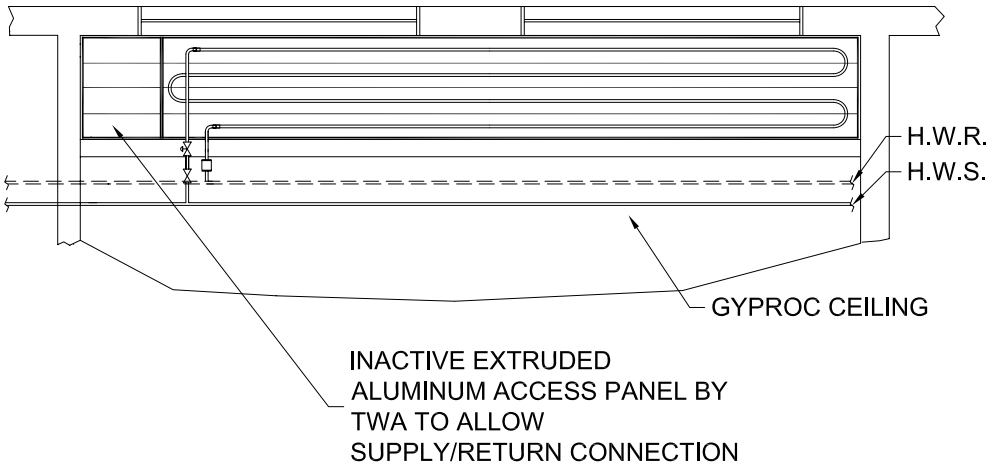


SINGLE PANEL EVEN PASS CONFIGURATION

LINEAR PANEL

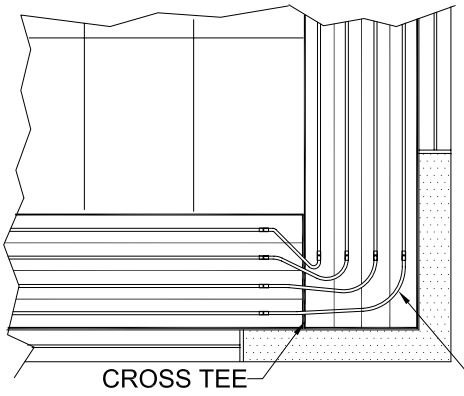


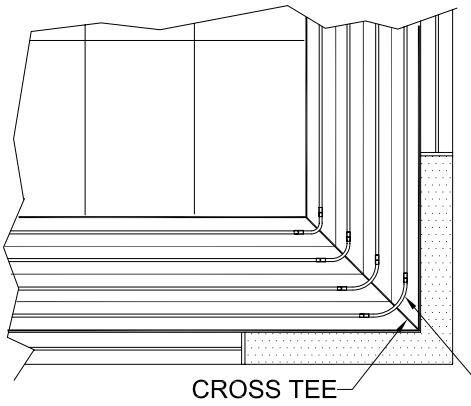
ACCESS PANEL BY OTHERS

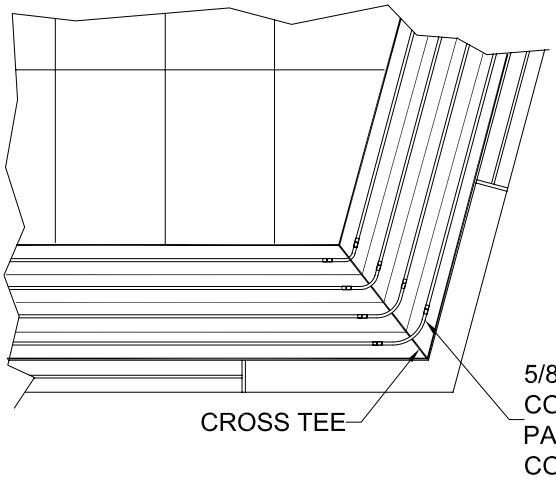


ACCESS PANEL BY TWA

ACCESS PANELS WHERE ACCESSIBILITY IS REQUIRED		
Twa Panel Systems, Inc.	FRENGER	L-21-B

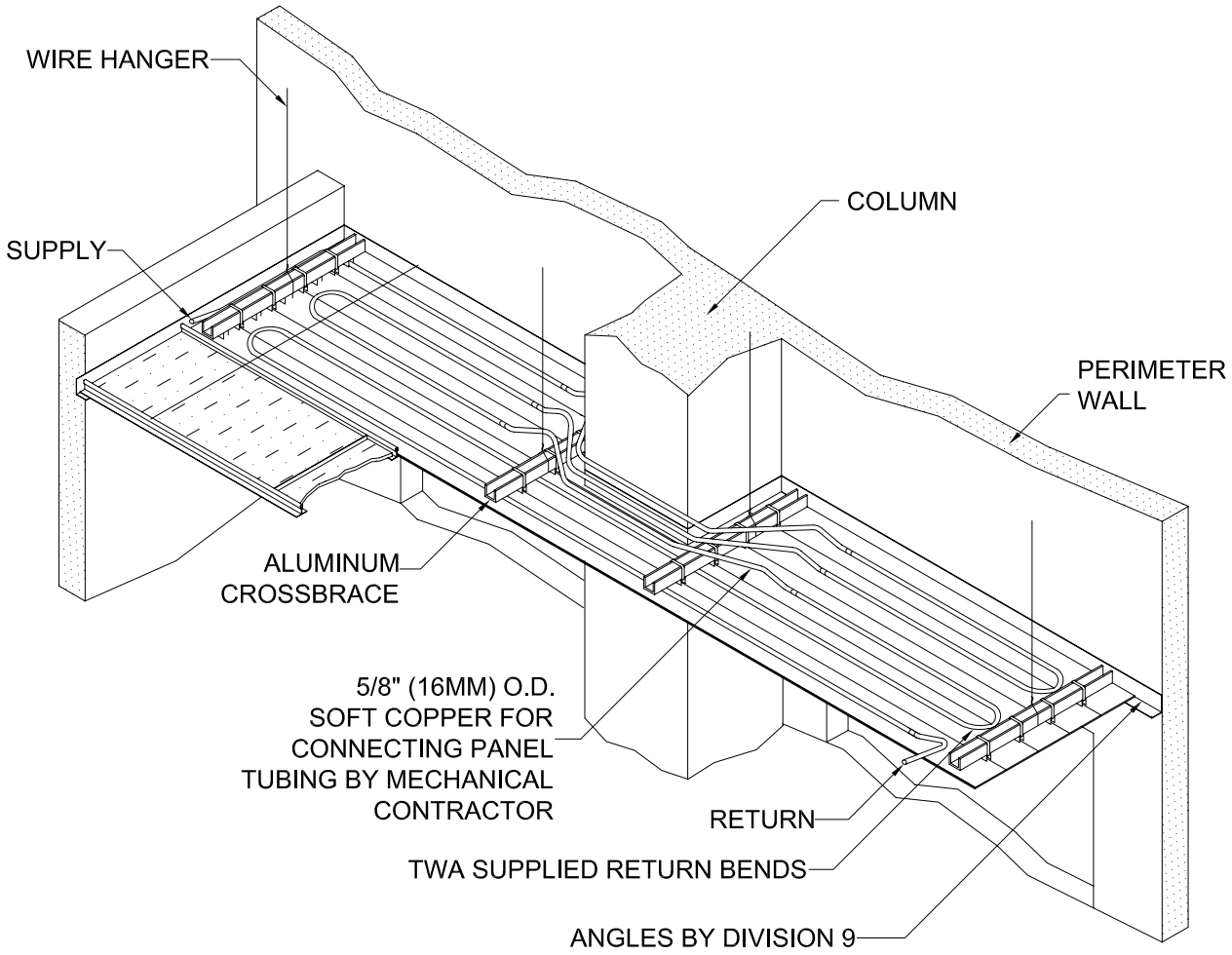






CORNER DETAILS

LINEAR PANEL

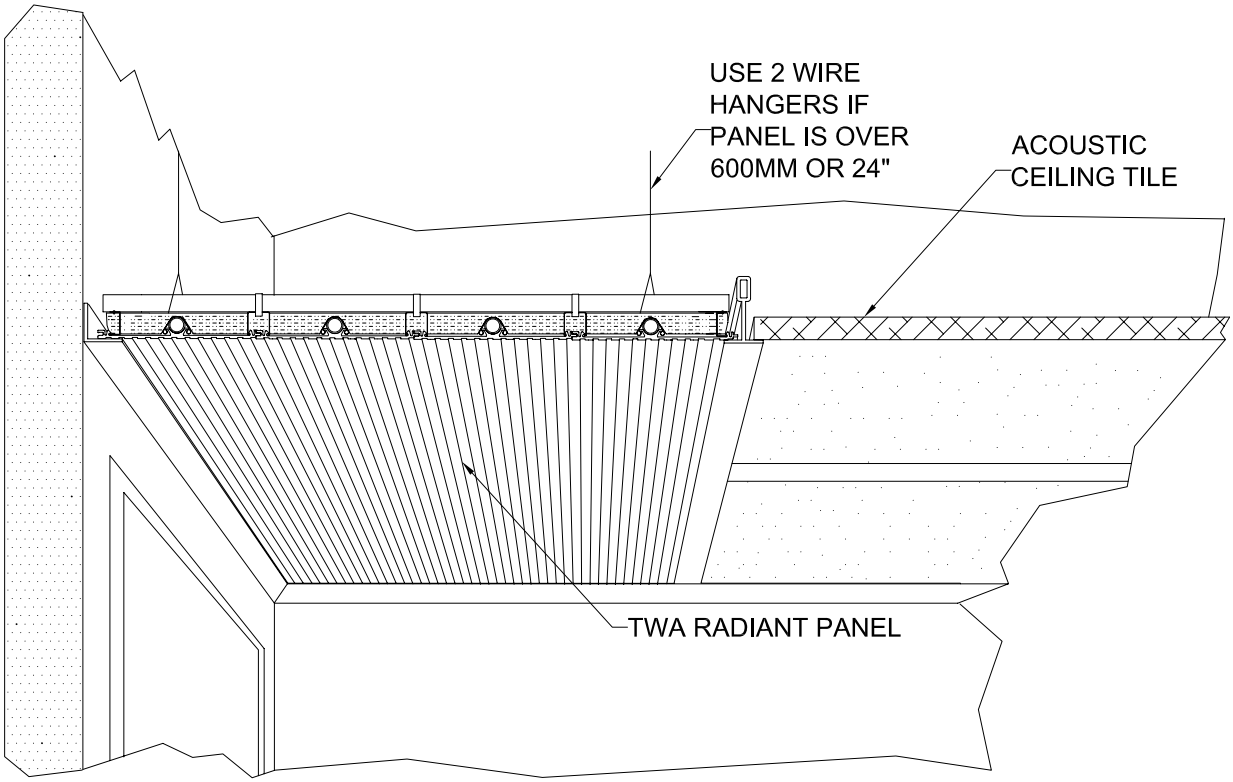


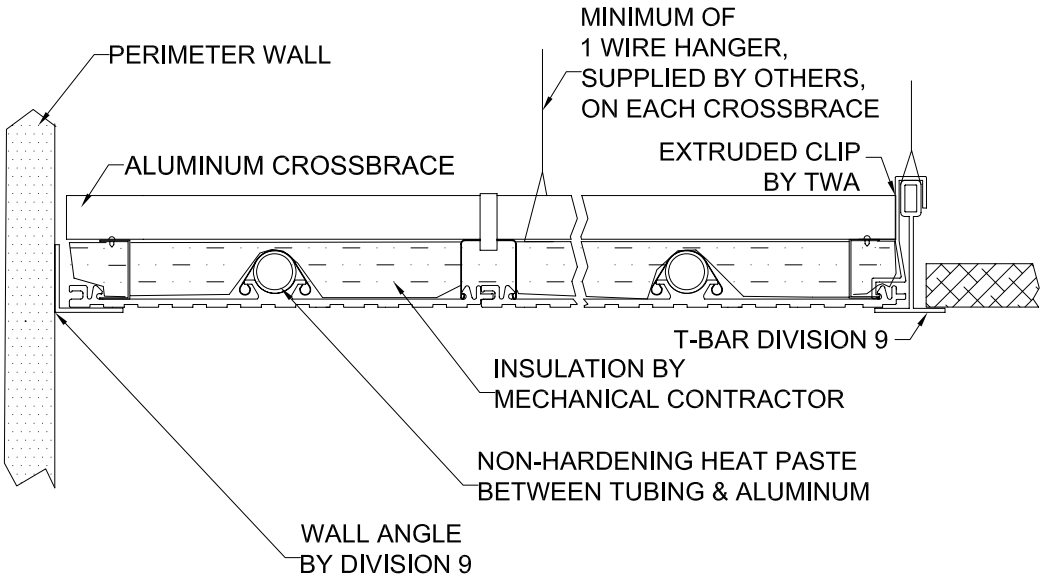
NOTE: PANEL WIDTH VARIES DUE TO DESIGN.

SERPENTINE CIRCUITING AROUND COLUMN

Twa Panel Systems, Inc.	FRENGER.	L-23

LINEAR PANEL

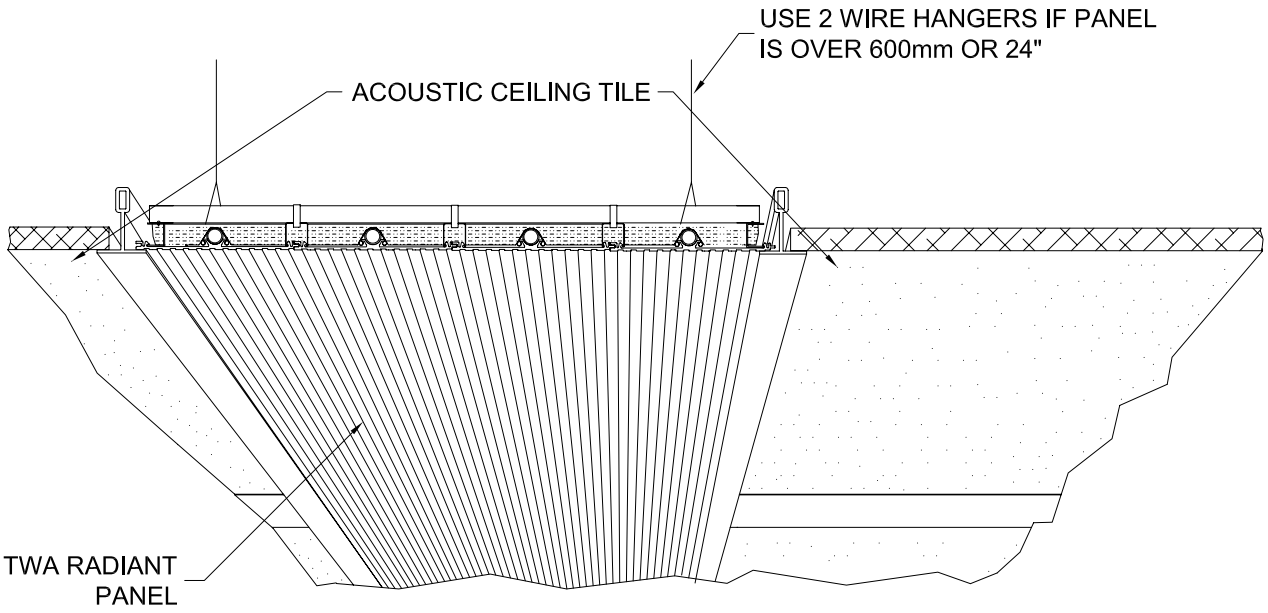


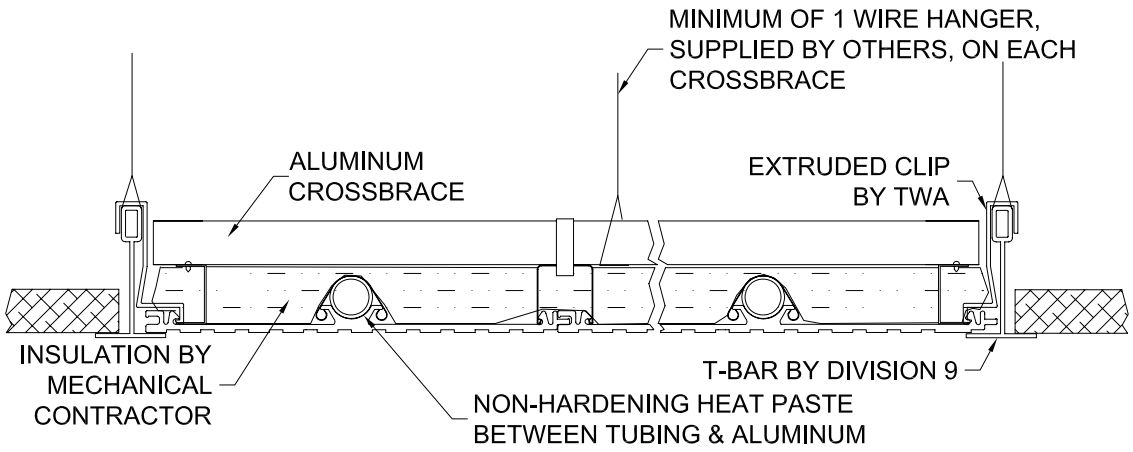


NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

INSTALLED IN PERIMETER T-BAR CEILING

LINEAR PANEL

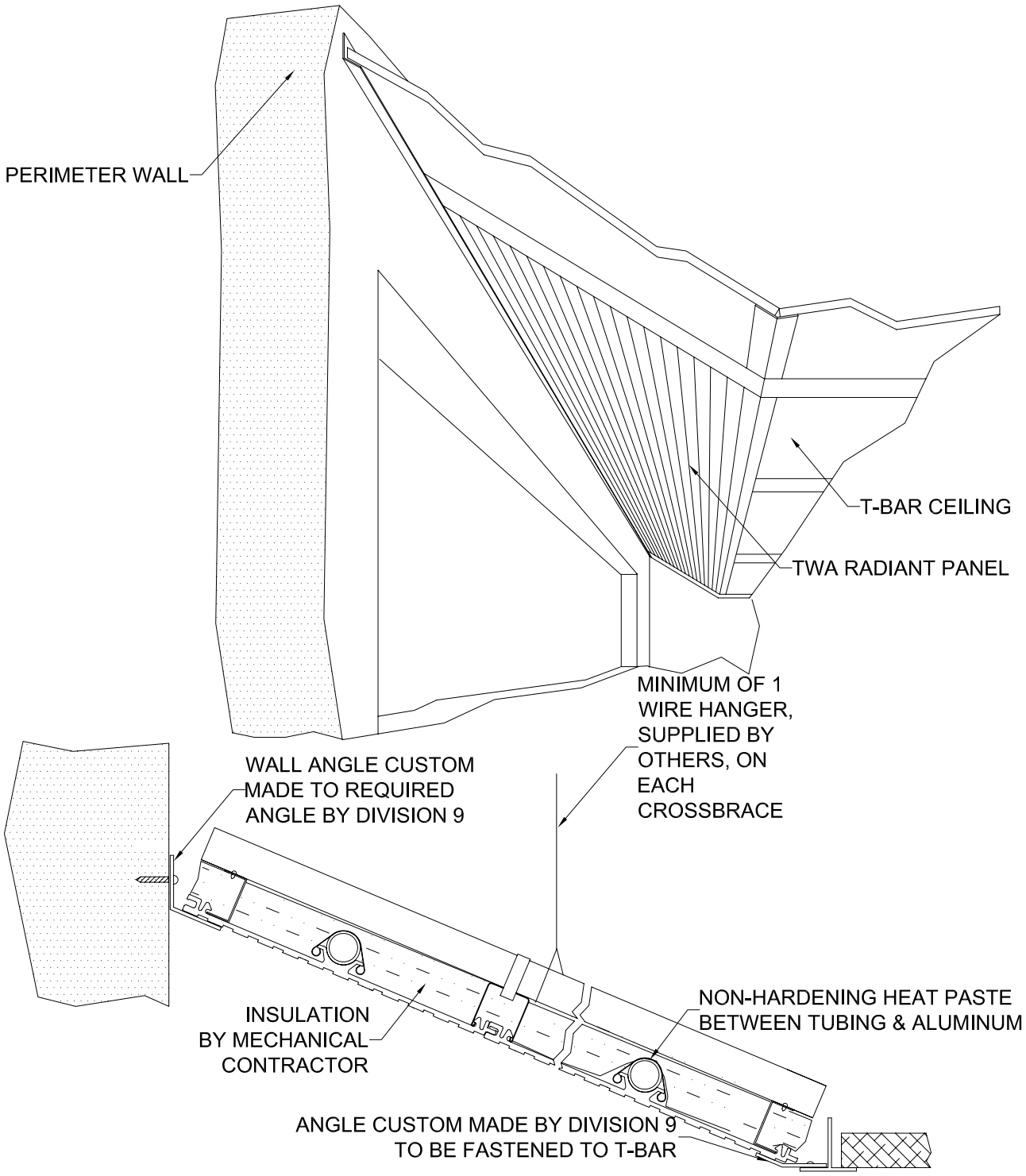




NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

INSTALLED IN INTERIOR T-BAR CEILING		
Twa Panel Systems, Inc.	FRENGER	L-25

LINEAR PANEL

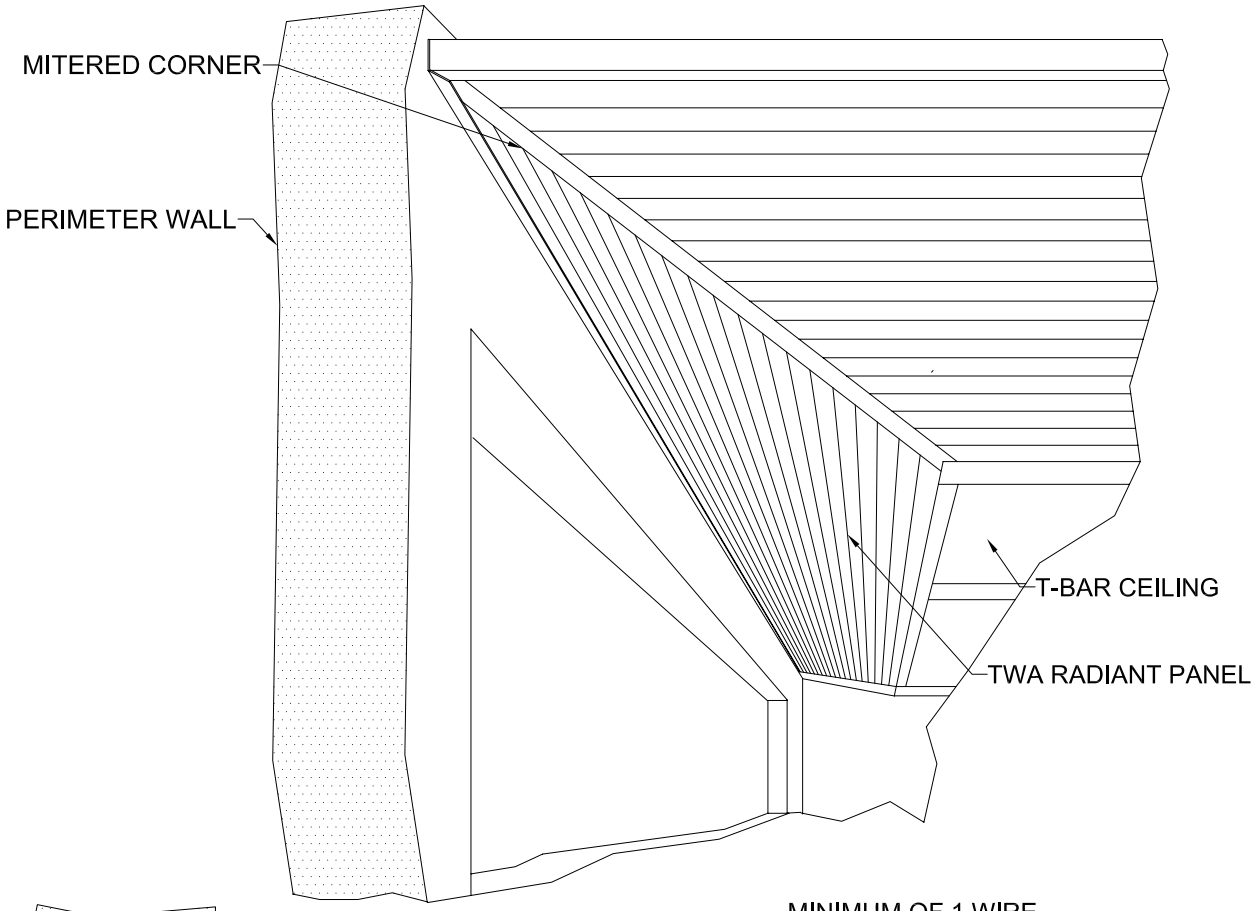


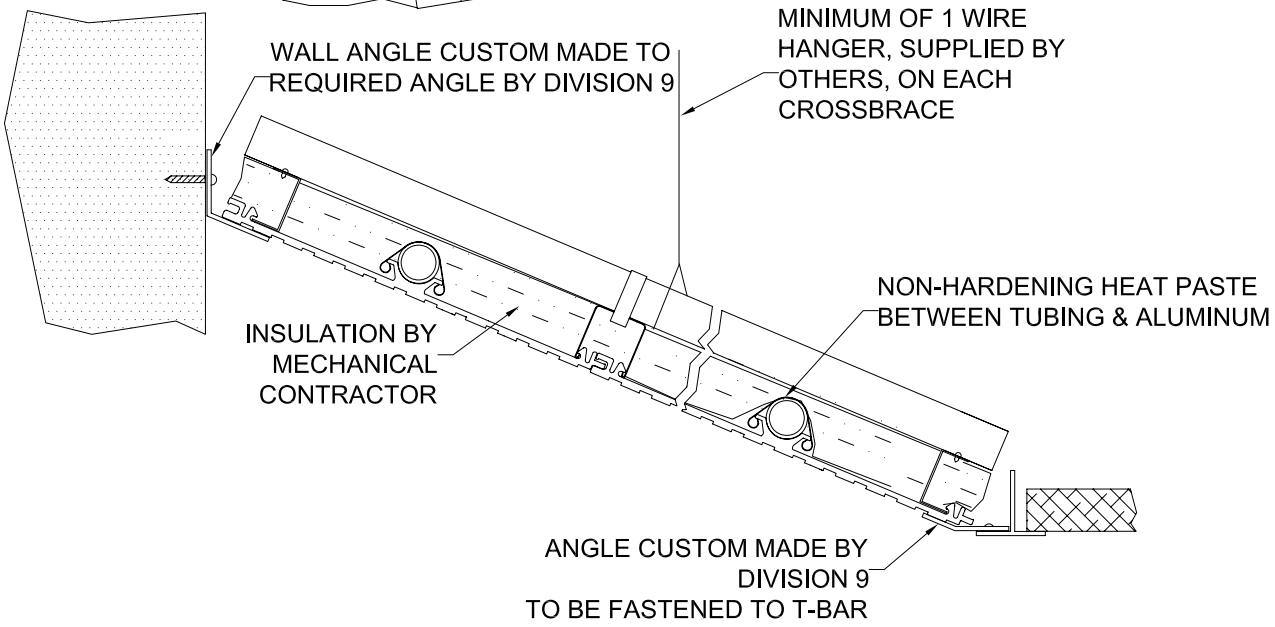
NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

SLOPED LINEAR PANEL IN T-BAR CEILING

Twa Panel Systems, Inc.	FRENGER	L-26

LINEAR PANEL

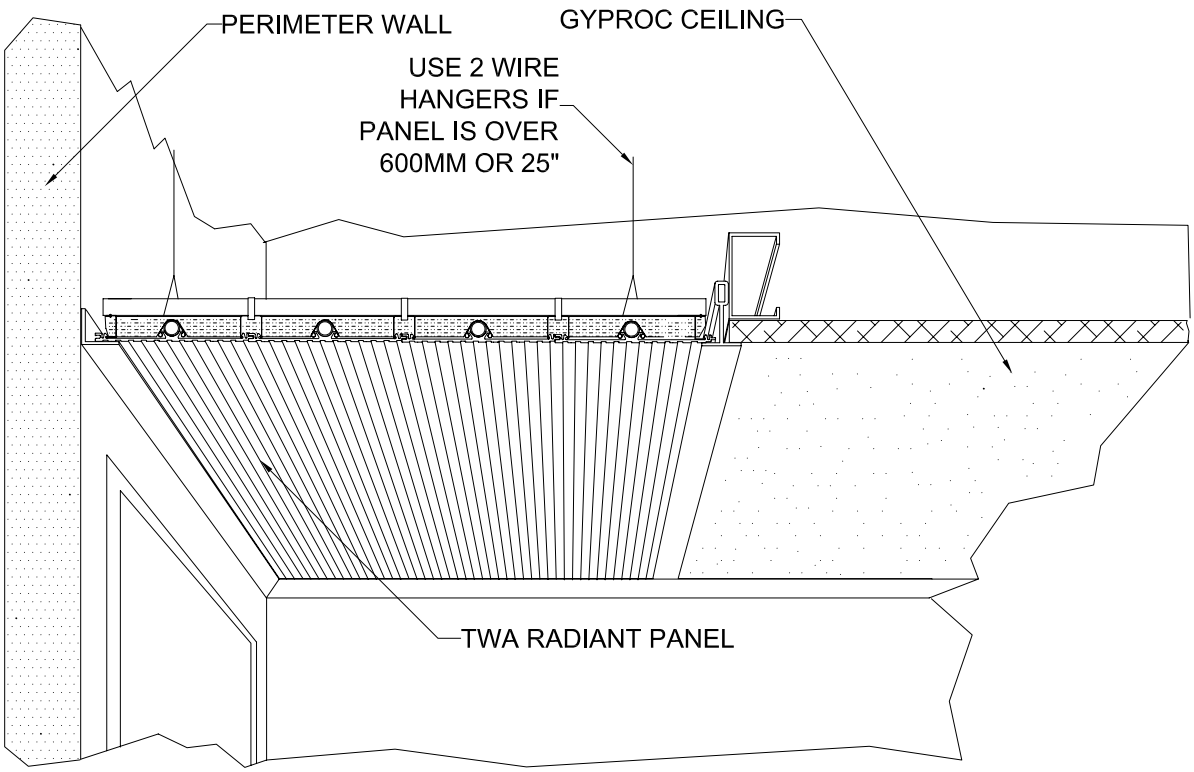


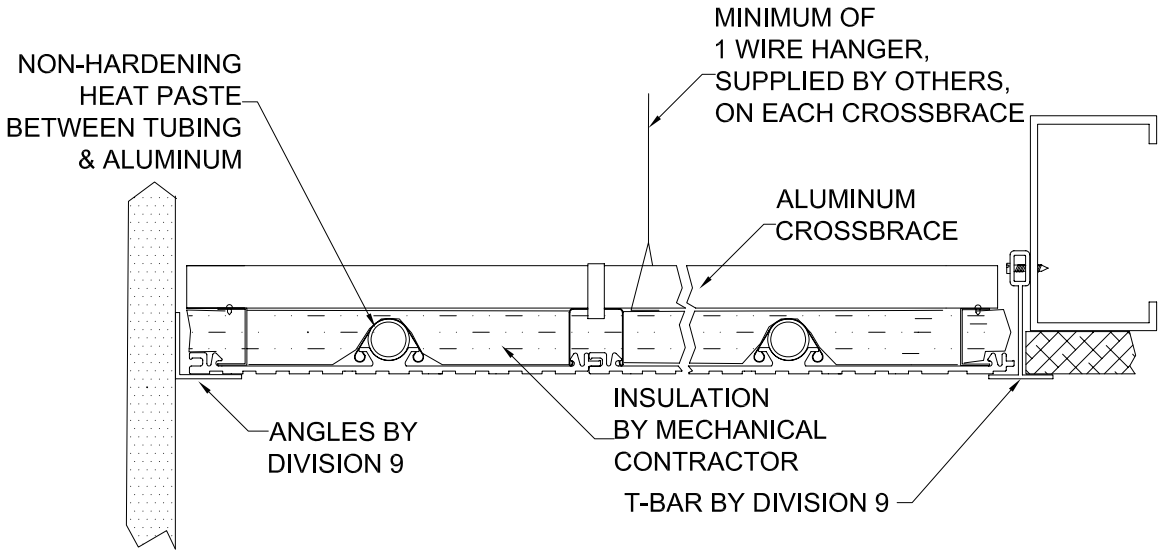


SLOPED LINEAR PANEL IN T-BAR CEILING WITH CORNER

Twa Panel Systems, Inc.	FRENGER	L-26-B

LINEAR PANEL



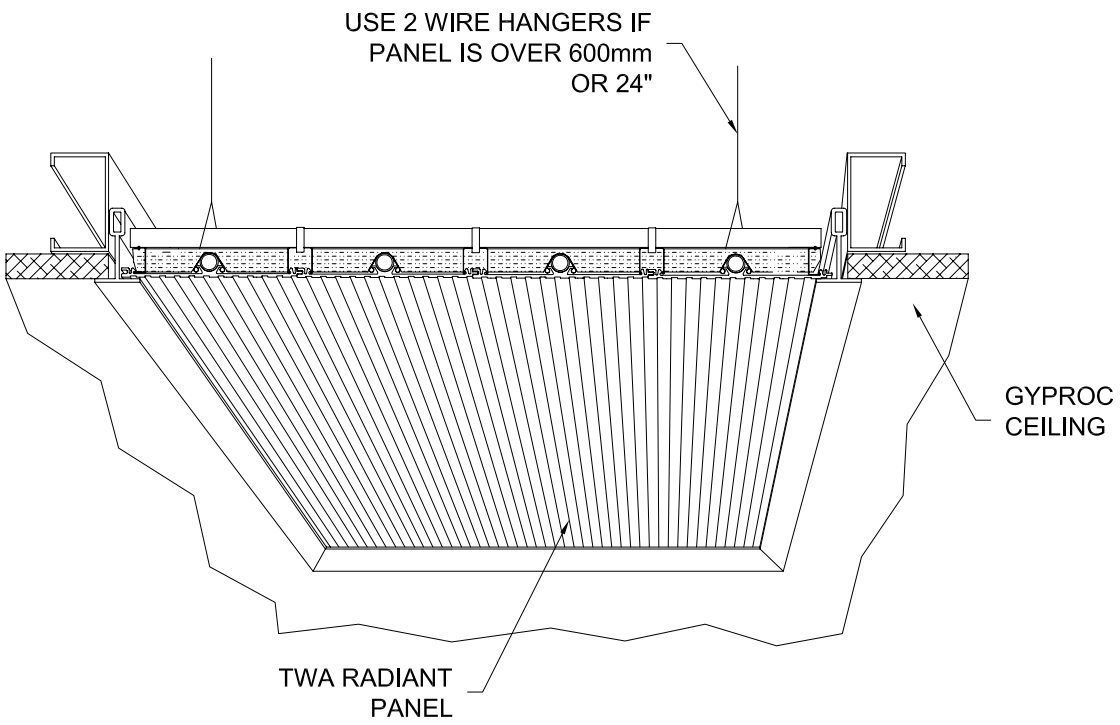


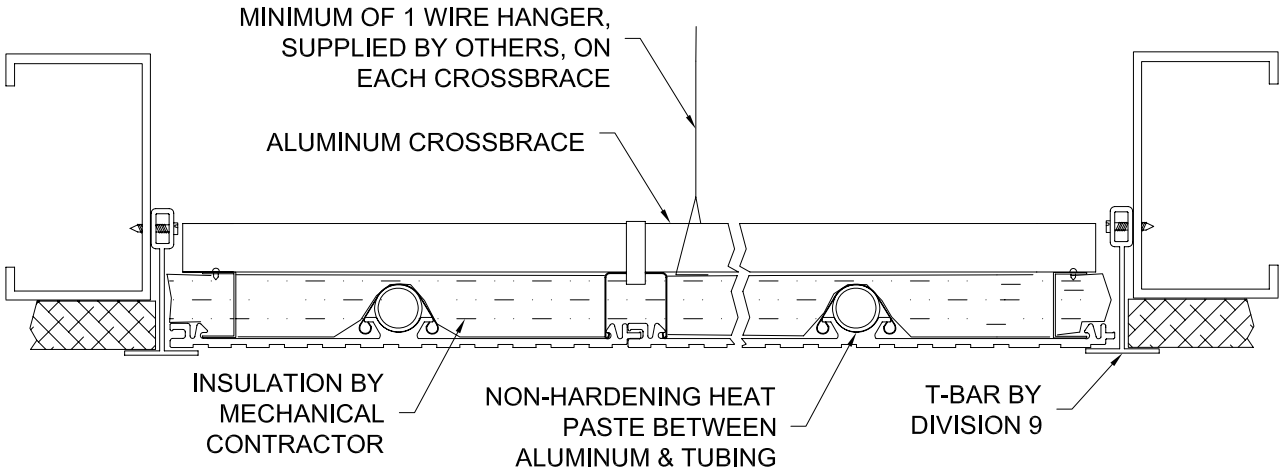
NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.
ACCESS TO SUPPLY, RETURN AND INTERCONNECTION BETWEEN PANELS WILL BE REQUIRED.

LINEAR PANELS AT PERIMETER WALL IN GYPROC CEILING

Twa Panel Systems, Inc.	FRENGER	L-27

LINEAR PANEL

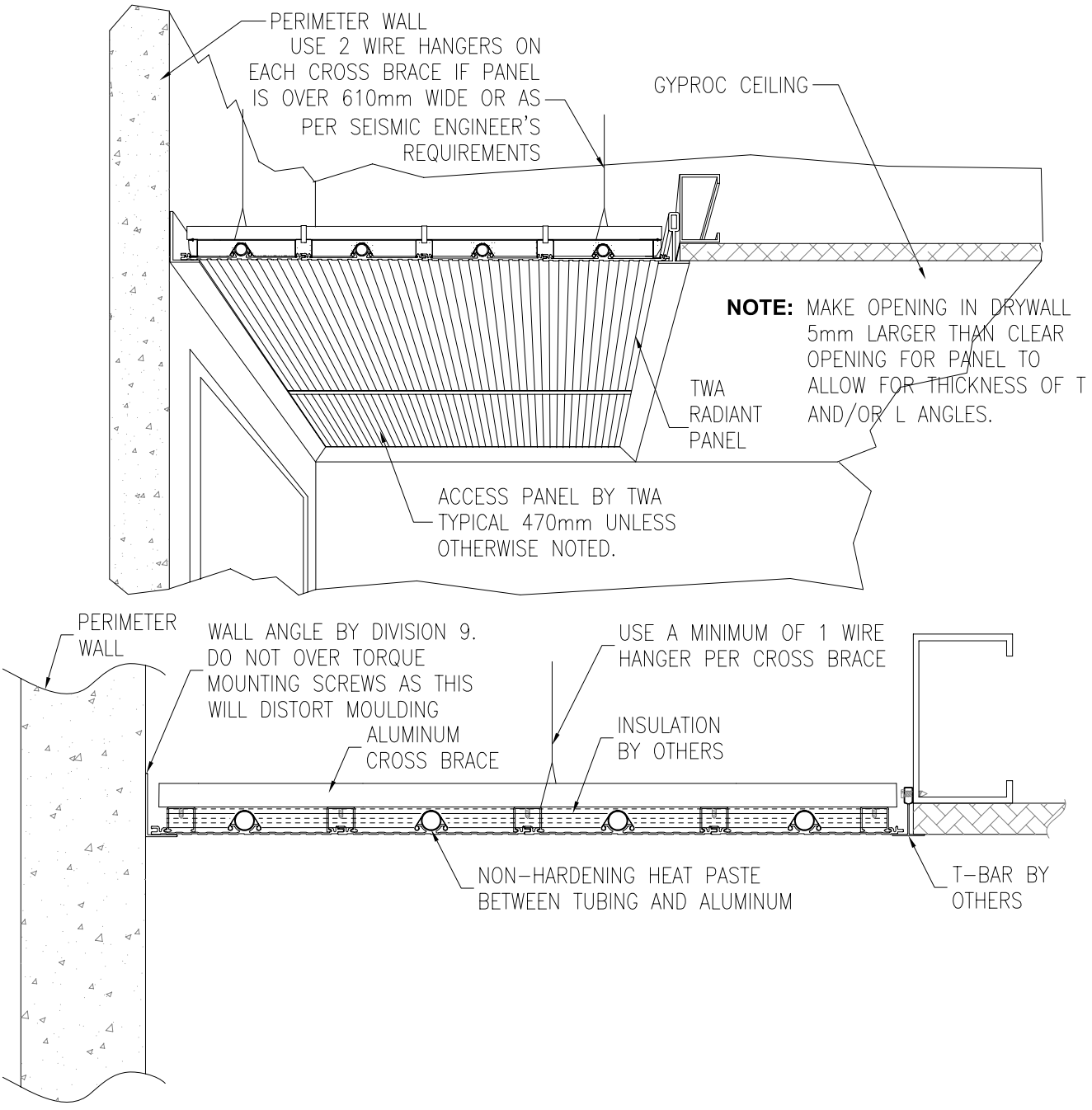




NOTE: OPENING FOR RADIANT PANEL OBTAINED FROM L-7.
ACCESS TO SUPPLY, RETURN AND INTERCONNECTION
BETWEEN PANELS WILL BE REQUIRED.

LINEAR PANELS IN GYPROC CEILING		
Twa Panel Systems, Inc.	FRENGER	L-27-B

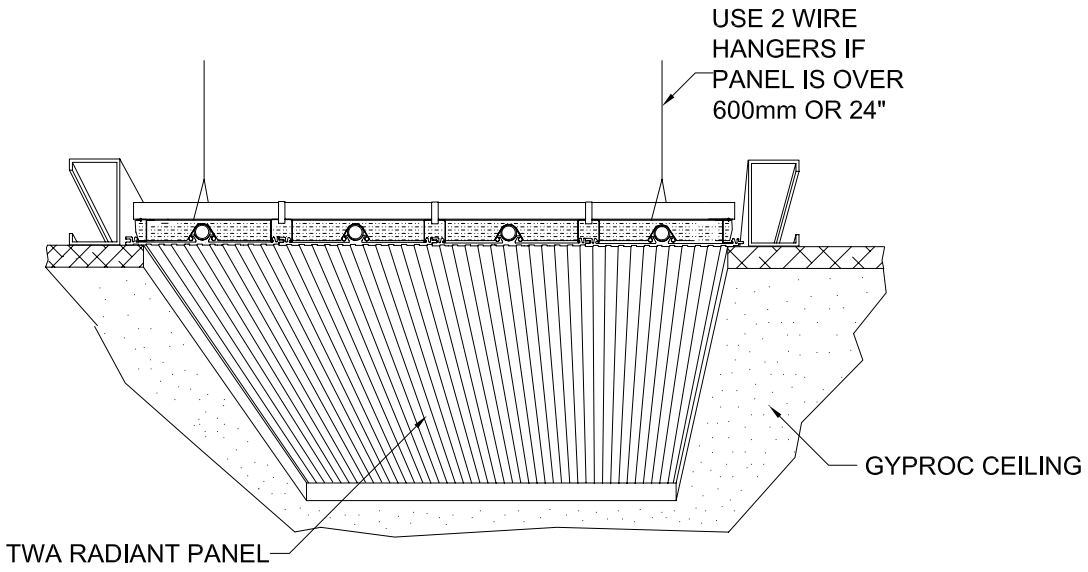
LINEAR PANEL

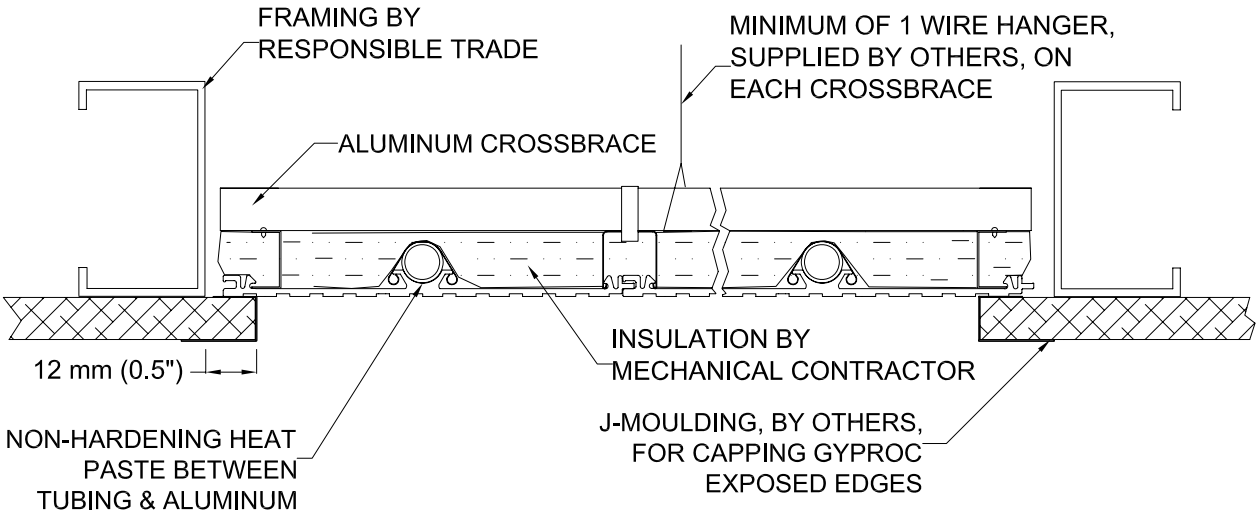


LINEAR PANELS AT PERIMETER WALL IN GYPROC CEILING

Twa Panel Systems, Inc. | FRENGER | L-27-C

LINEAR PANEL

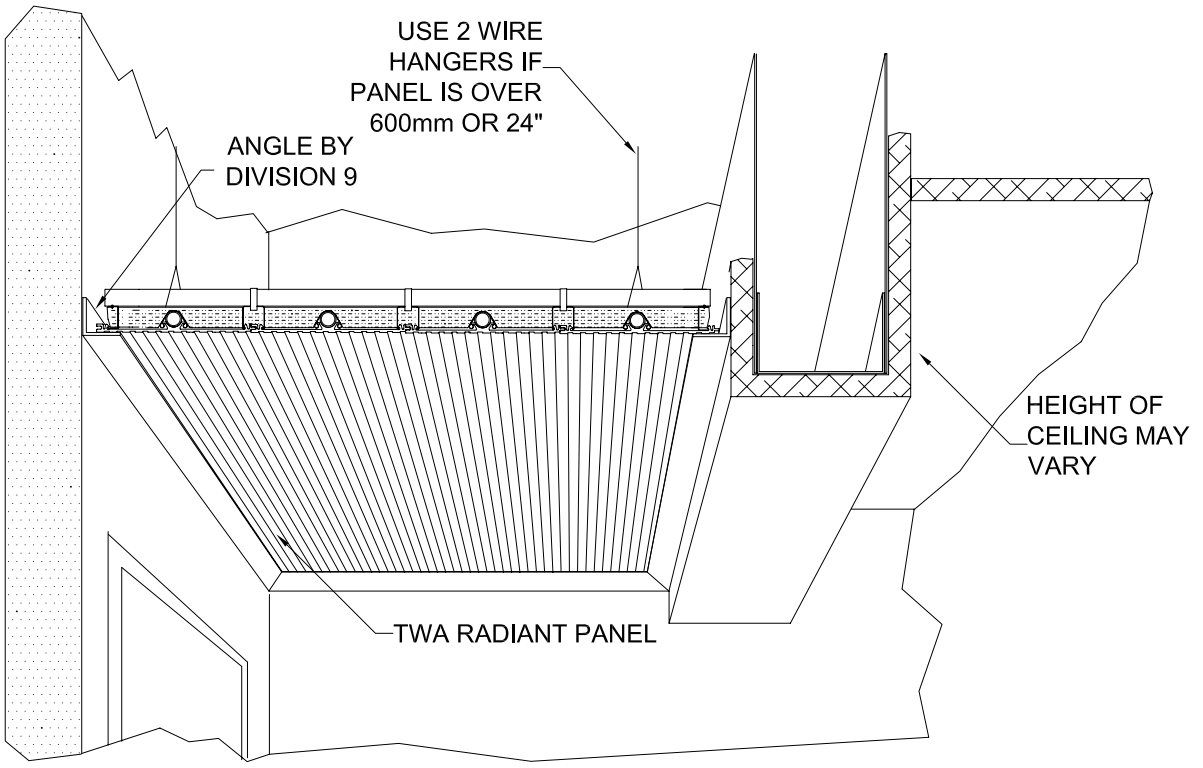


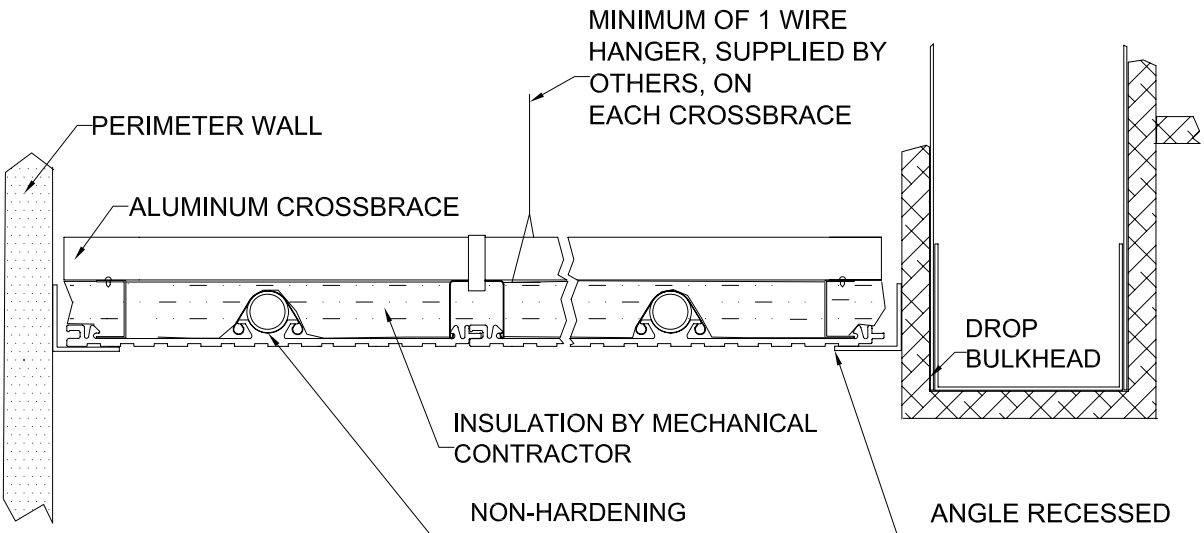


NOTE:
ACCESS TO SUPPLY, RETURN AND INTERCONNECTION BETWEEN PANELS WILL BE REQUIRED. OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

RECESSED LINEAR PANEL IN GYPROC CEILING		
Twa Panel Systems, Inc.	FRENGER	L-28

LINEAR PANEL

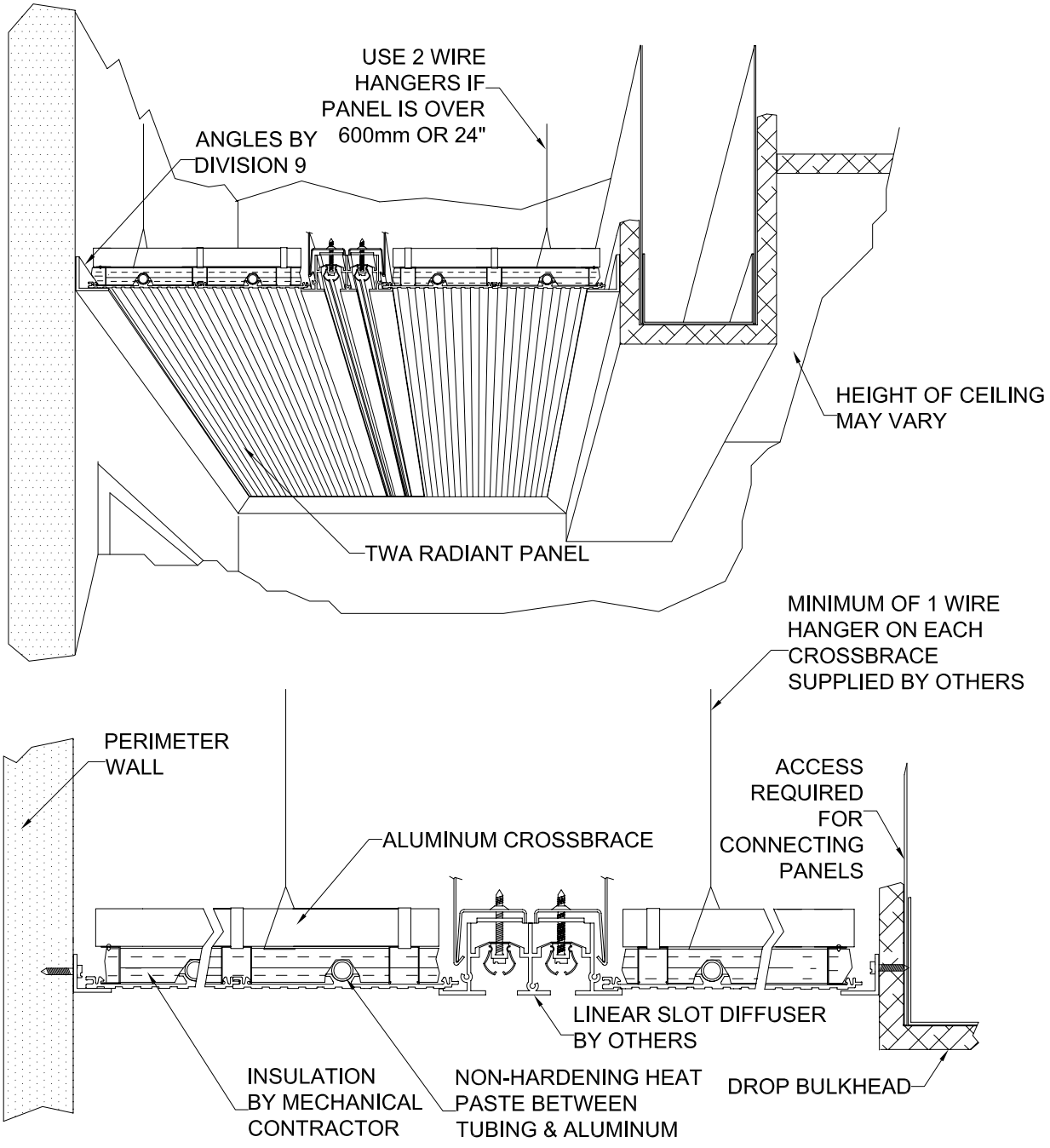




NOTE:
OPENING FOR RADIANT PANEL OBTAINED FROM L-7.
ACCESS THROUGH BULKHEAD REQUIRED FOR CONNECTION

LINEAR PANEL BEHIND BULKHEAD

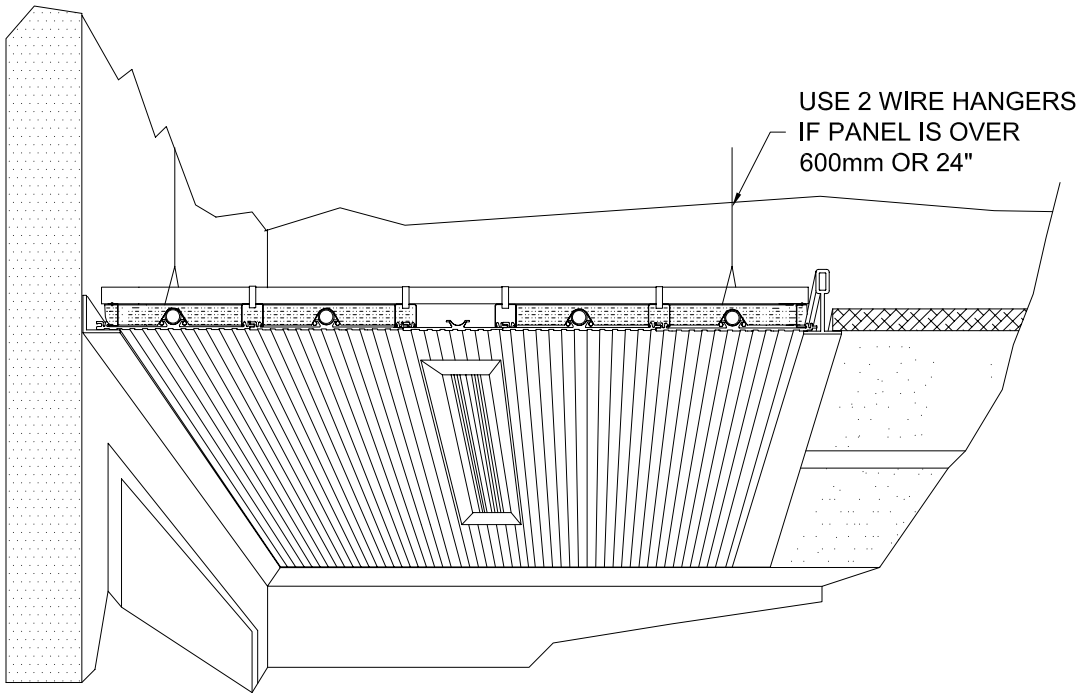
Twa Panel Systems, Inc. | FRENGER® | L-29

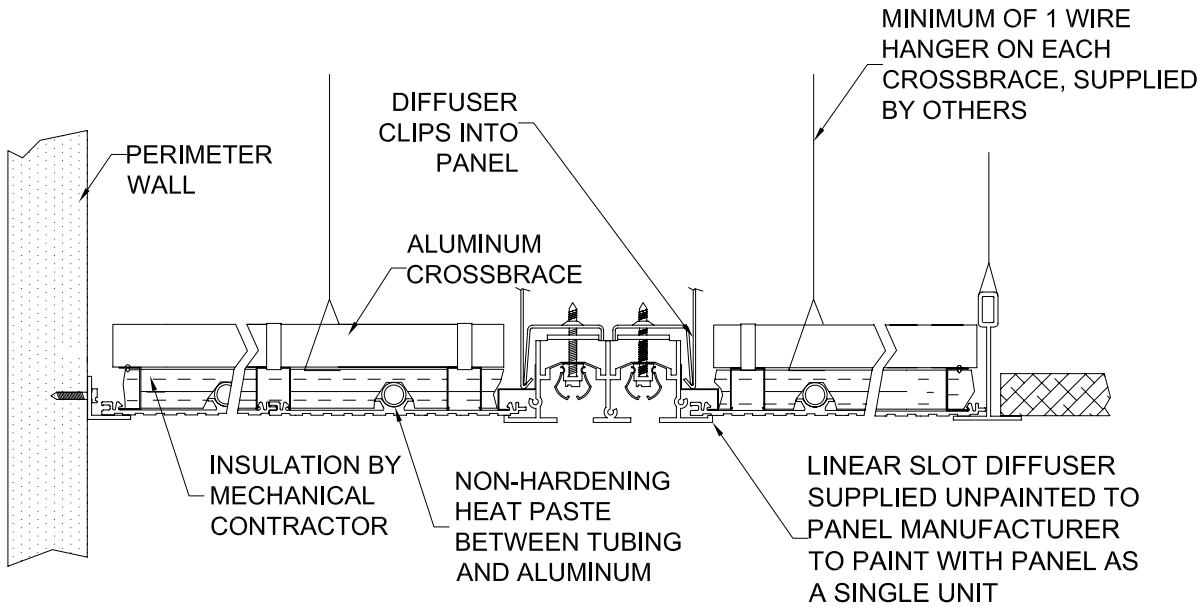


SLOT DIFFUSER IN LINEAR PANEL BEHIND BULKHEAD

Twa Panel Systems, Inc. | FRENGER | L-30

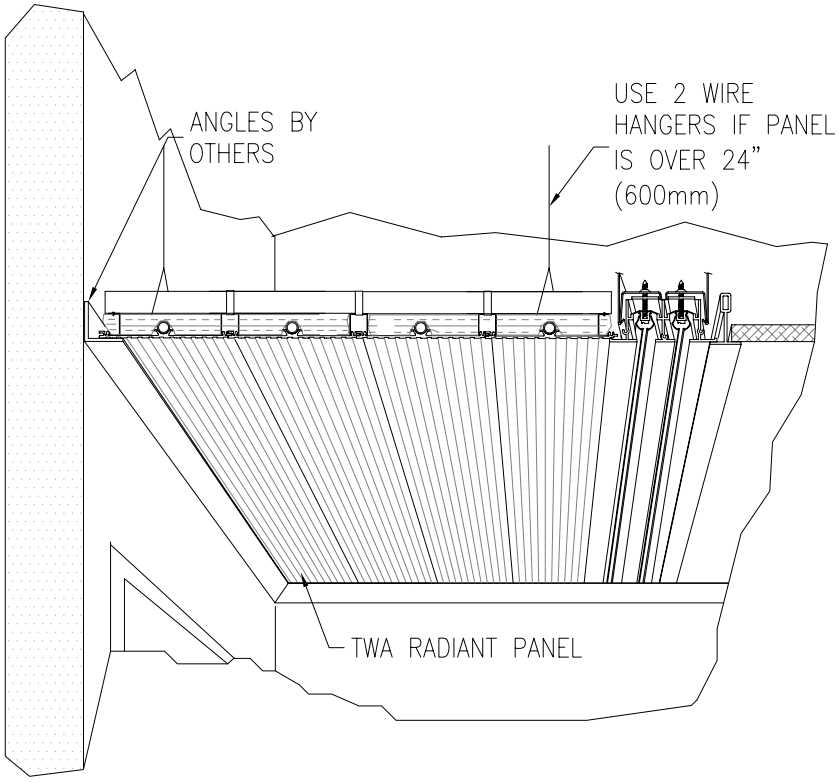
LINEAR PANEL

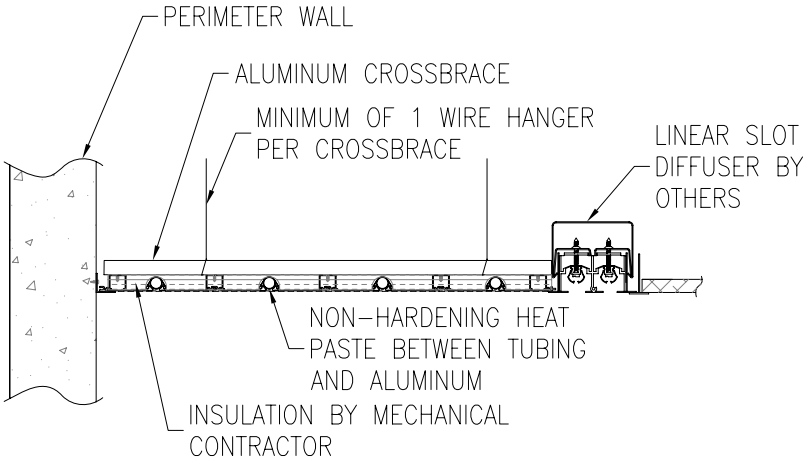




SLOT DIFFUSER IN LINEAR PANEL IN T-BAR		
Twa Panel Systems, Inc.	FRENGER®	L-30-B

LINEAR PANEL

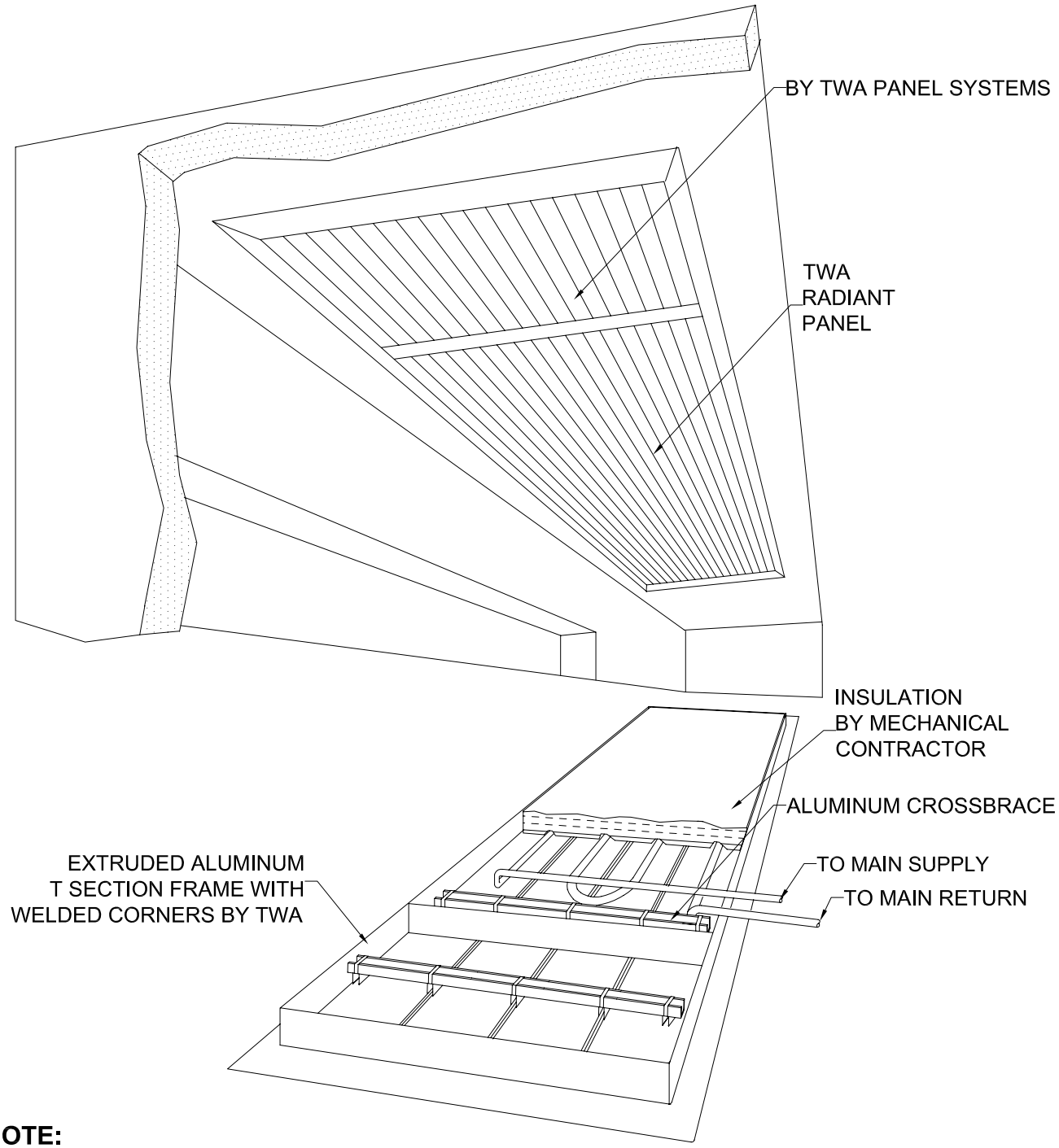




SLOT DIFFUSER IN LINEAR PANEL

Twa Panel Systems, Inc. | FRENGER | L-30-C

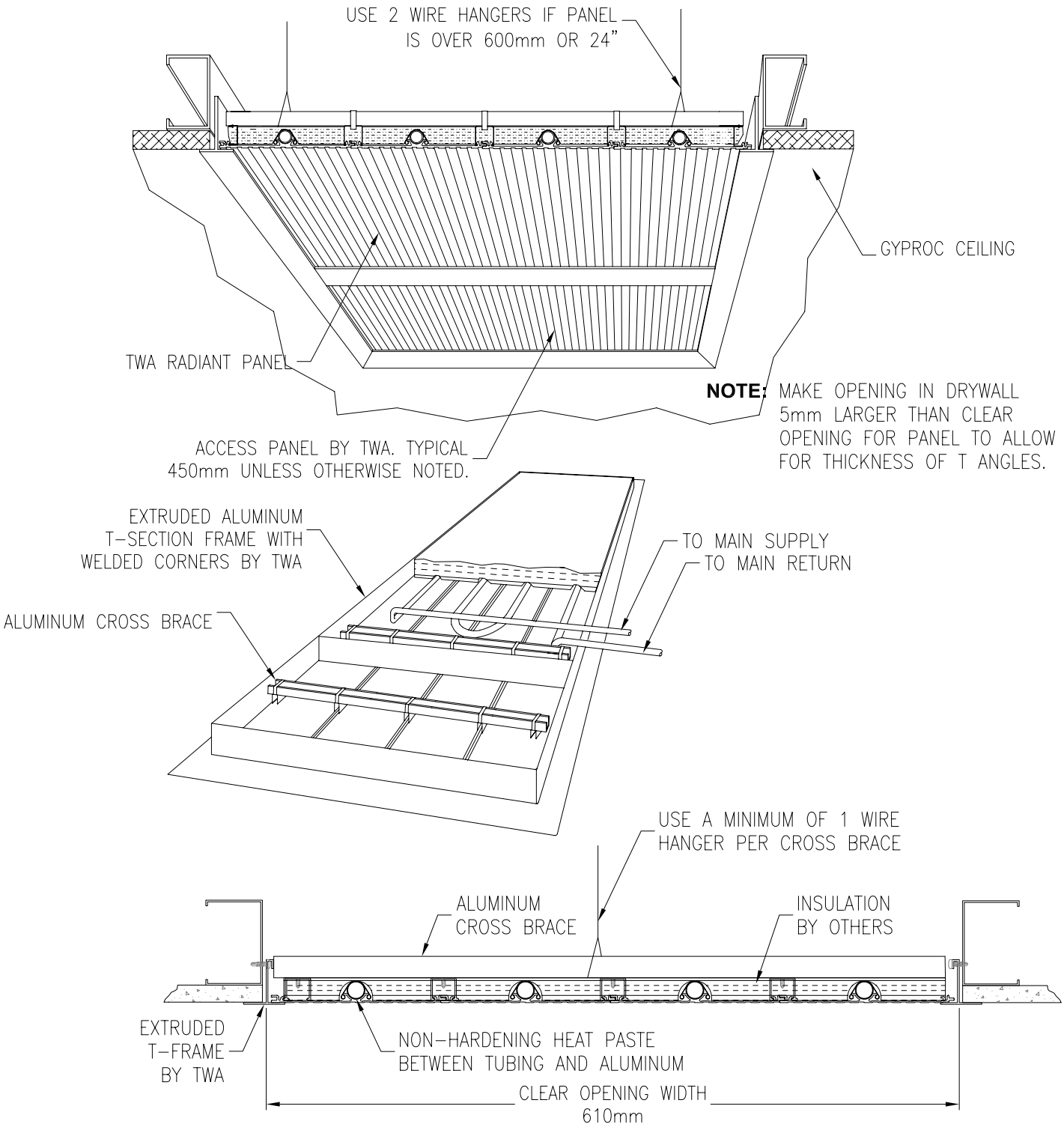
LINEAR PANEL



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

FRAMED PANEL WITH ACCESS PANEL IN GYPROC CEILING		
Twa Panel Systems, Inc.	FRENGER	L-31

LINEAR PANEL

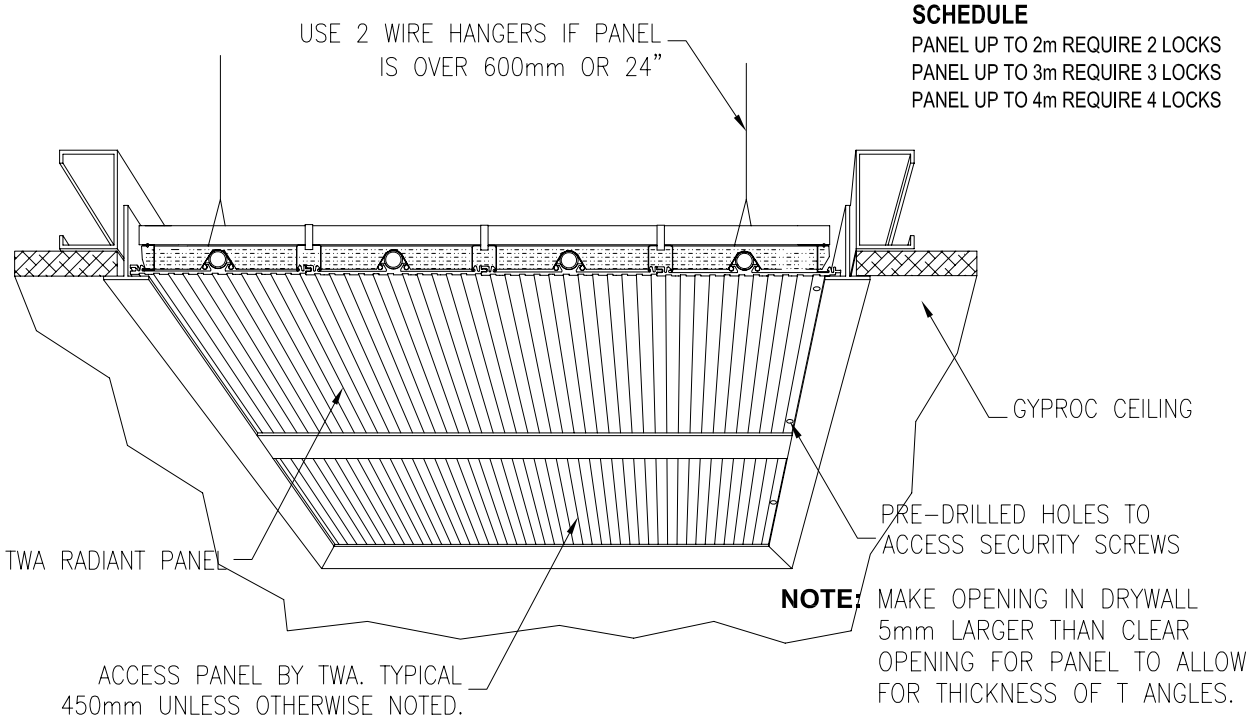


FRAMED LINEAR PANEL IN GYPROC CEILING

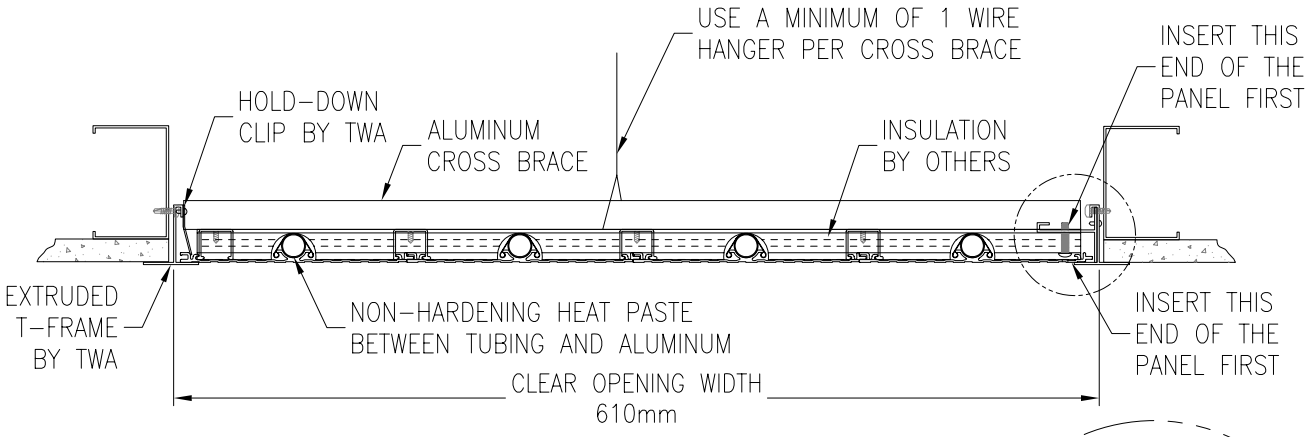
Twa Panel Systems, Inc. | FRENGER | L-31-A

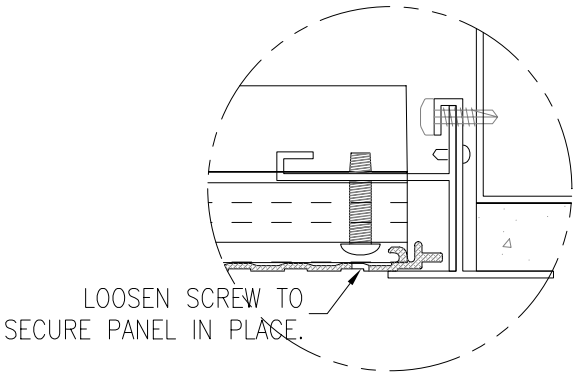
LINEAR PANEL

SCHEDULE
PANEL UP TO 2m REQUIRE 2 LOCKS
PANEL UP TO 3m REQUIRE 3 LOCKS
PANEL UP TO 4m REQUIRE 4 LOCKS



NOTE: MAKE OPENING IN DRYWALL 5mm LARGER THAN CLEAR OPENING FOR PANEL TO ALLOW FOR THICKNESS OF T ANGLES.

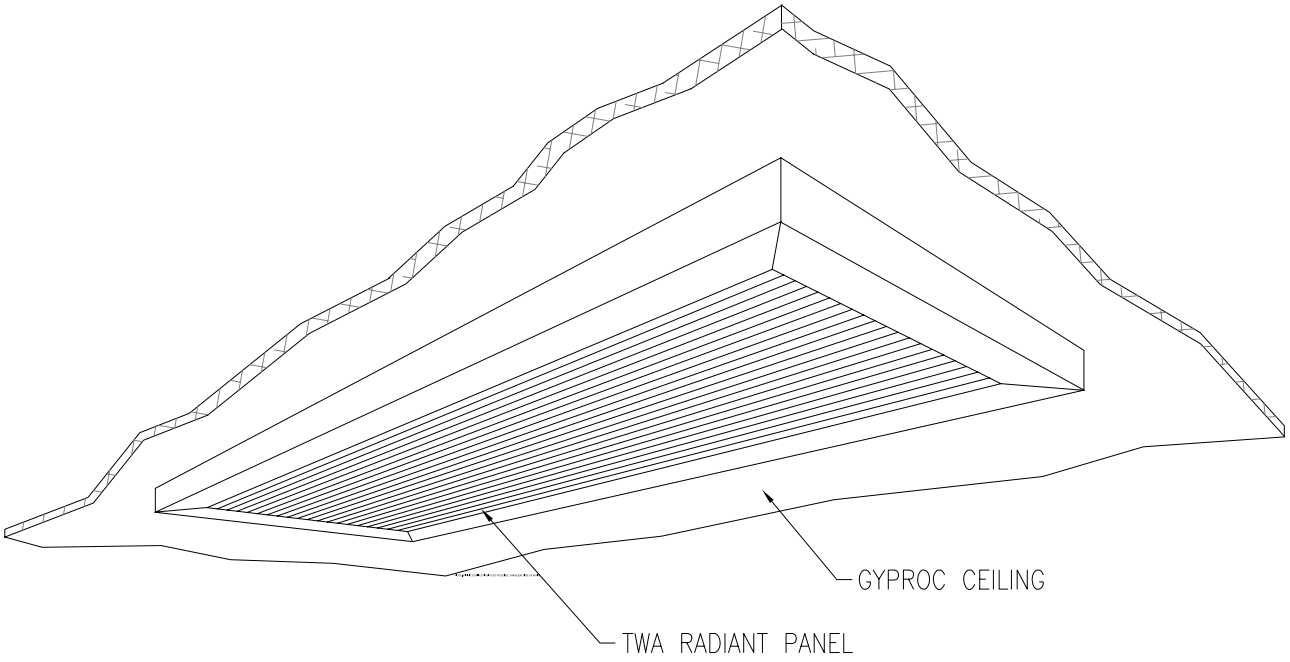


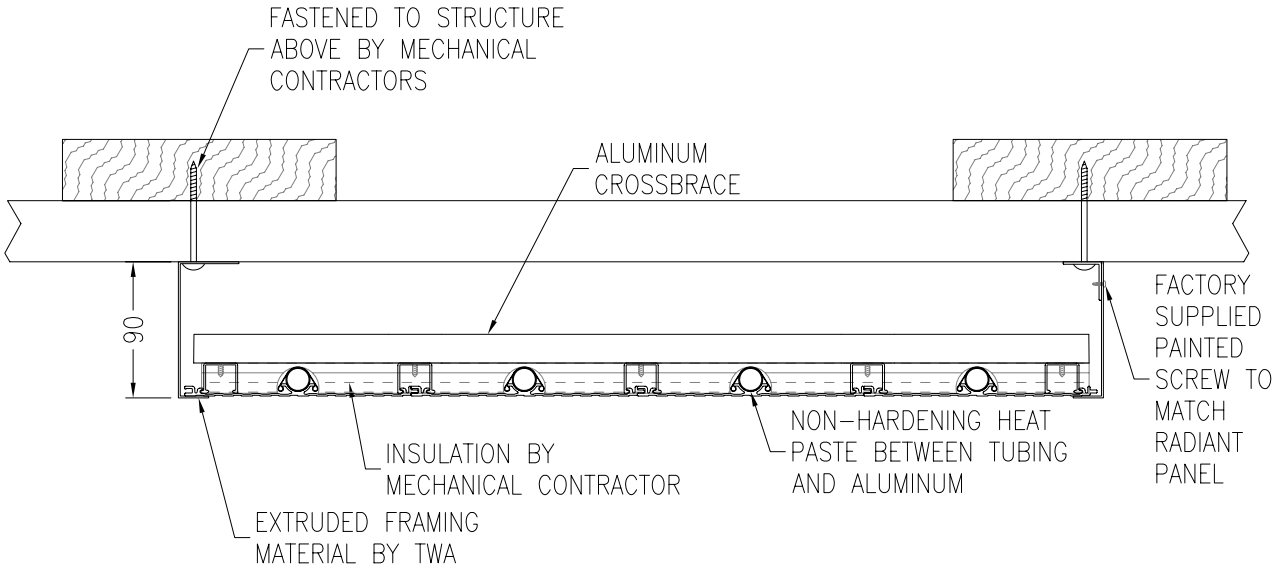


REMOVABLE LOCKING LINEAR PANEL IN GYPROC CEILING

Twa Panel Systems, Inc.	FRENGER.	L-31-C

LINEAR PANEL

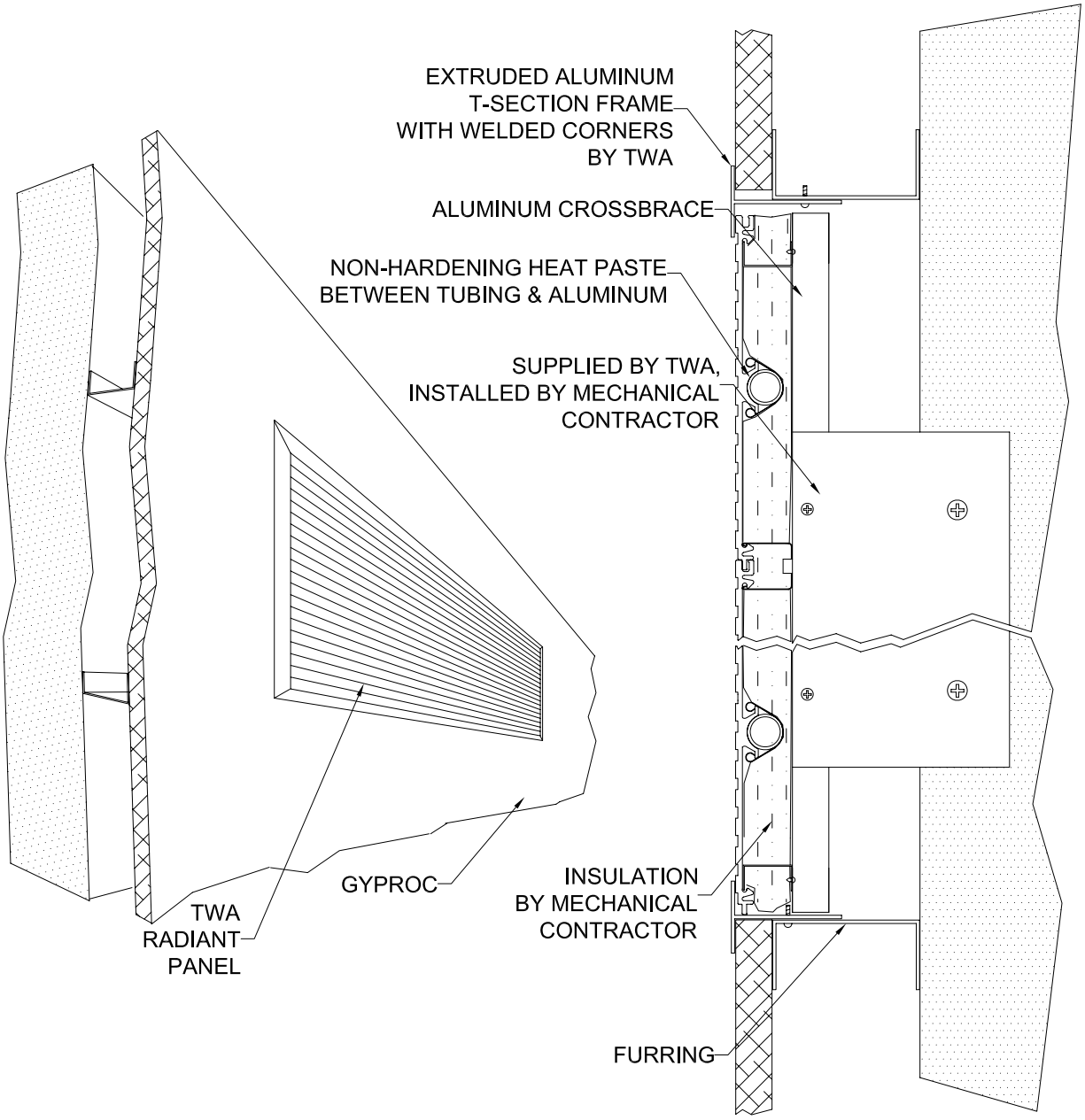




SURFACE MOUNTED LINEAR PANEL

Twa Panel Systems, Inc. | FRENGER® | L-32

LINEAR PANEL

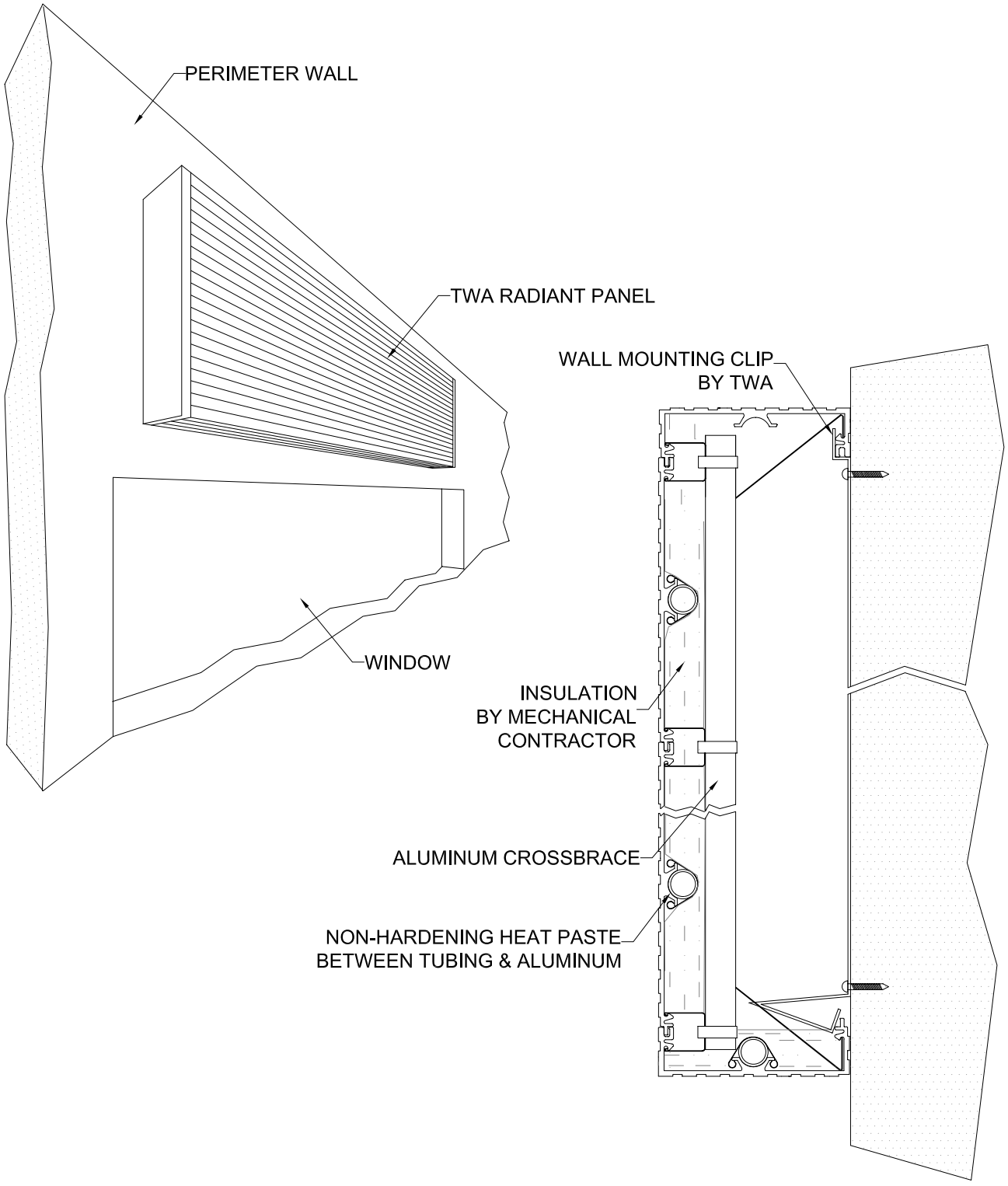


NOTE:
ACCESS REQUIRED TO THE BACK OF RADIANT PANEL TO ALLOW FOR CONNECTION OF PIPING AND HOLDING BRACKET.

OPENING FOR RADIANT PANEL OBTAINED FROM L-7.

VERTICAL LINEAR PANEL IN GYPROC WALL		
Twa Panel Systems, Inc.	FRENGER	L-33

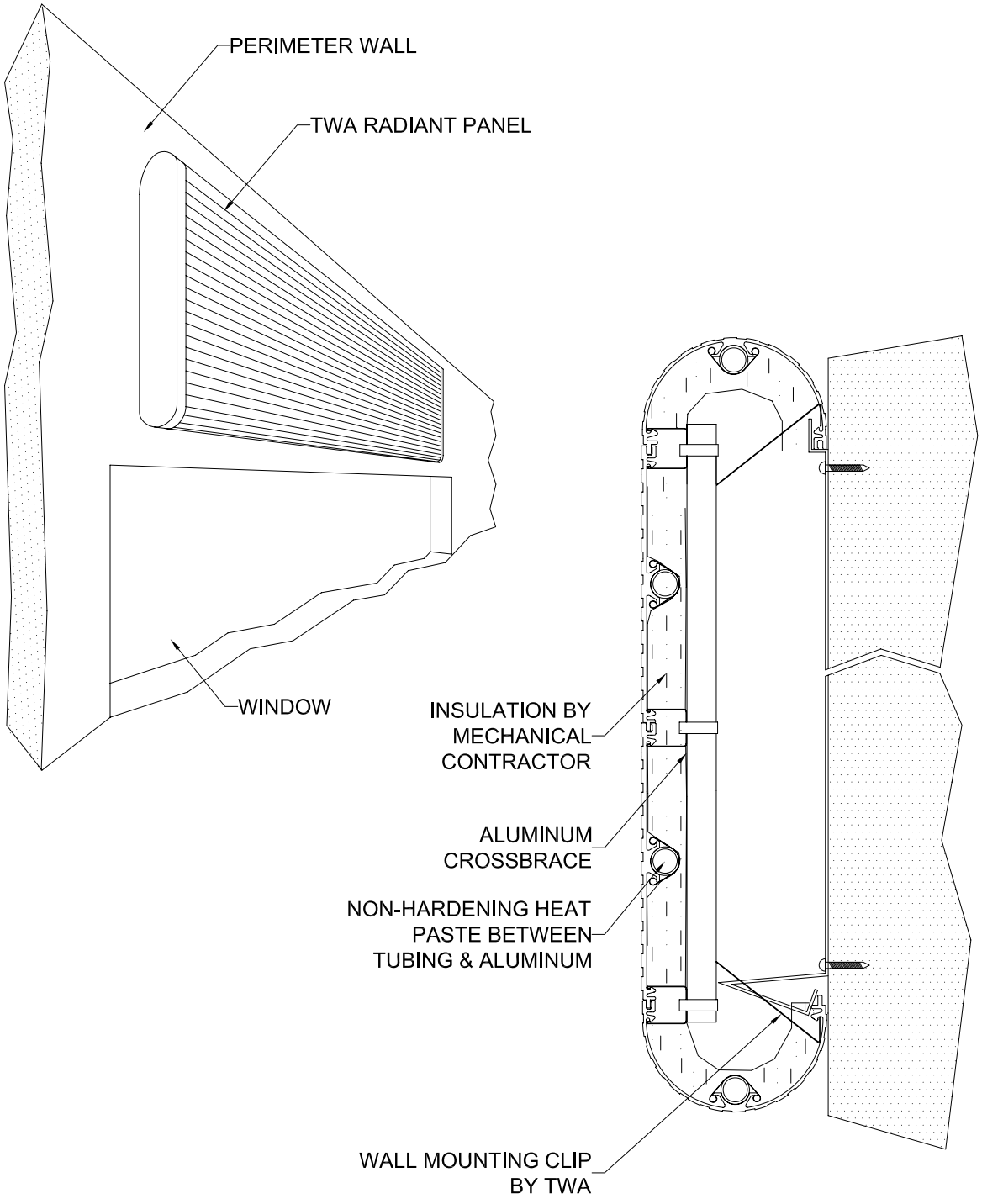
LINEAR PANEL



SURFACE WALL MOUNTED LINEAR PANEL

Twa Panel Systems, Inc.	FRENGER.	L-34

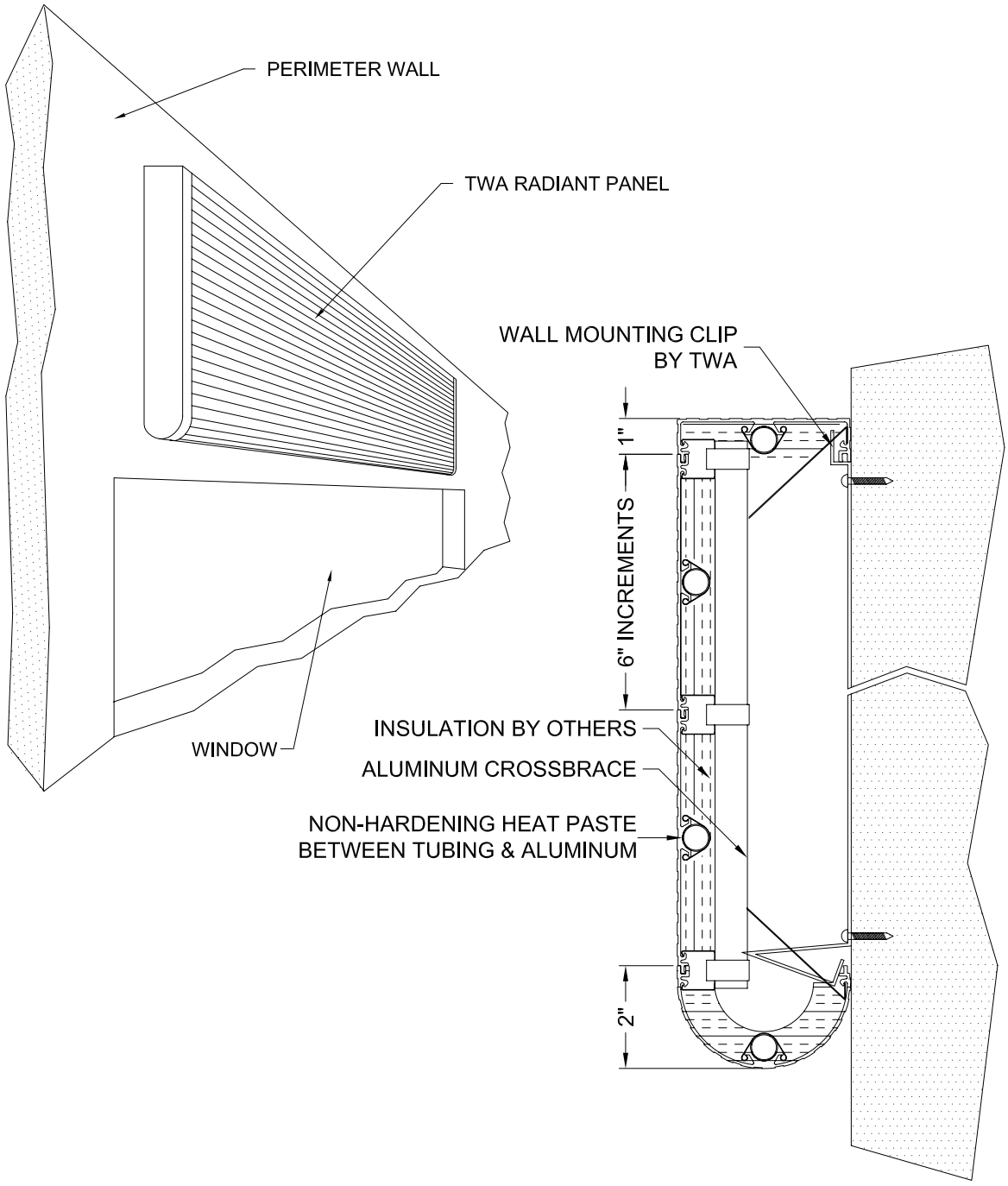
LINEAR PANEL



SURFACE WALL MOUNTED LINEAR PANEL

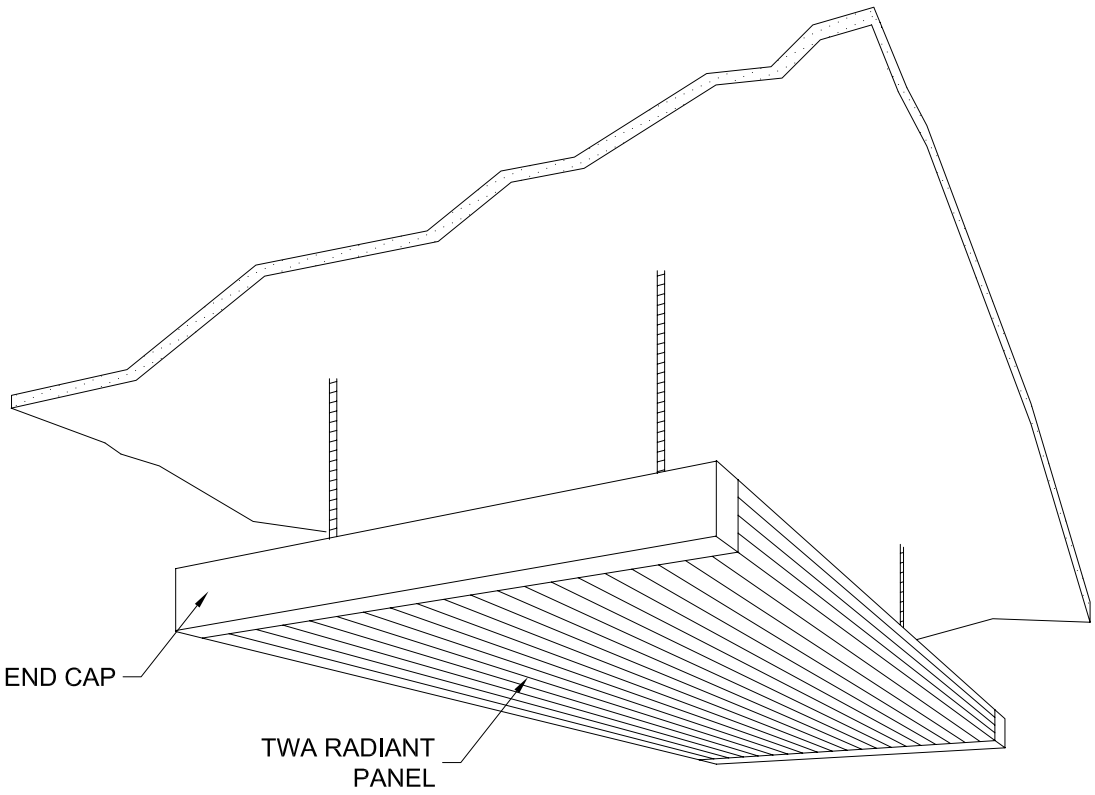
Twa Panel Systems, Inc. | FRENGER | L-34-B

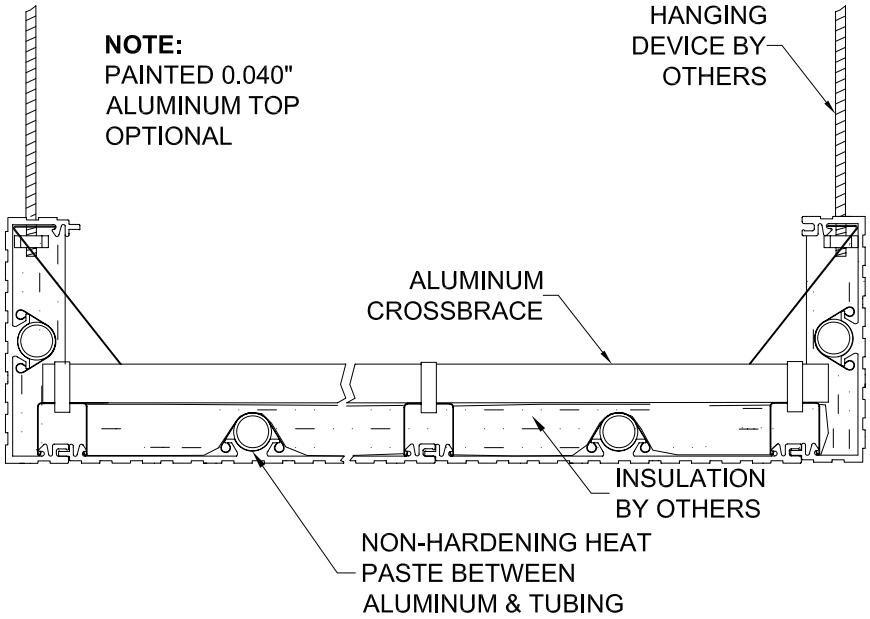
LINEAR PANEL



SURFACE WALL MOUNTED LINEAR PANEL		
Twa Panel Systems, Inc.	FRENGER®	L-34-C

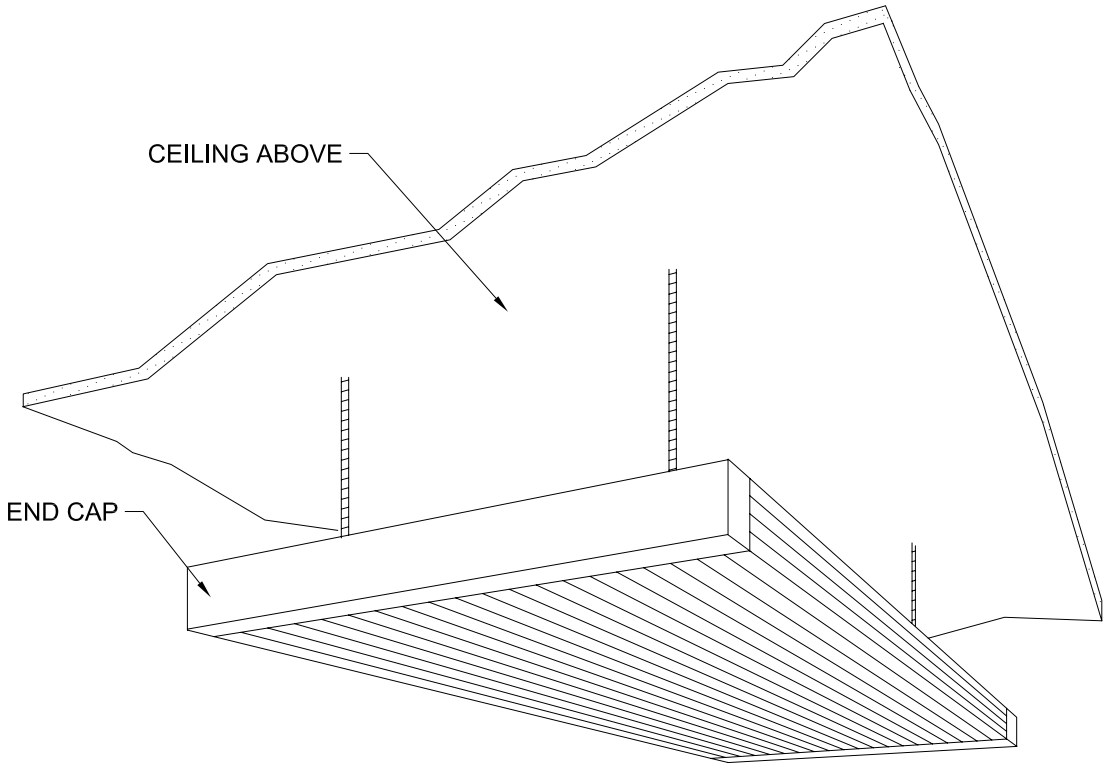
LINEAR PANEL

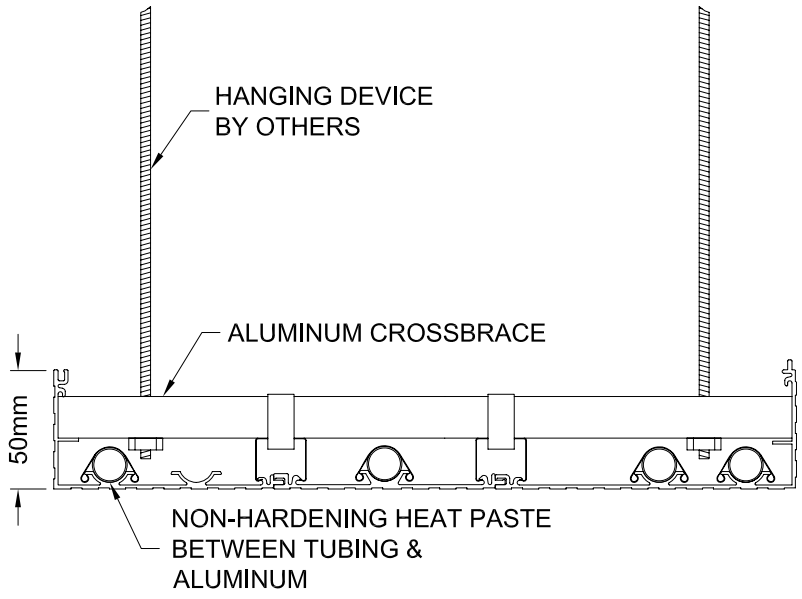




HANGING LINEAR PANEL IN EXPOSED AREA

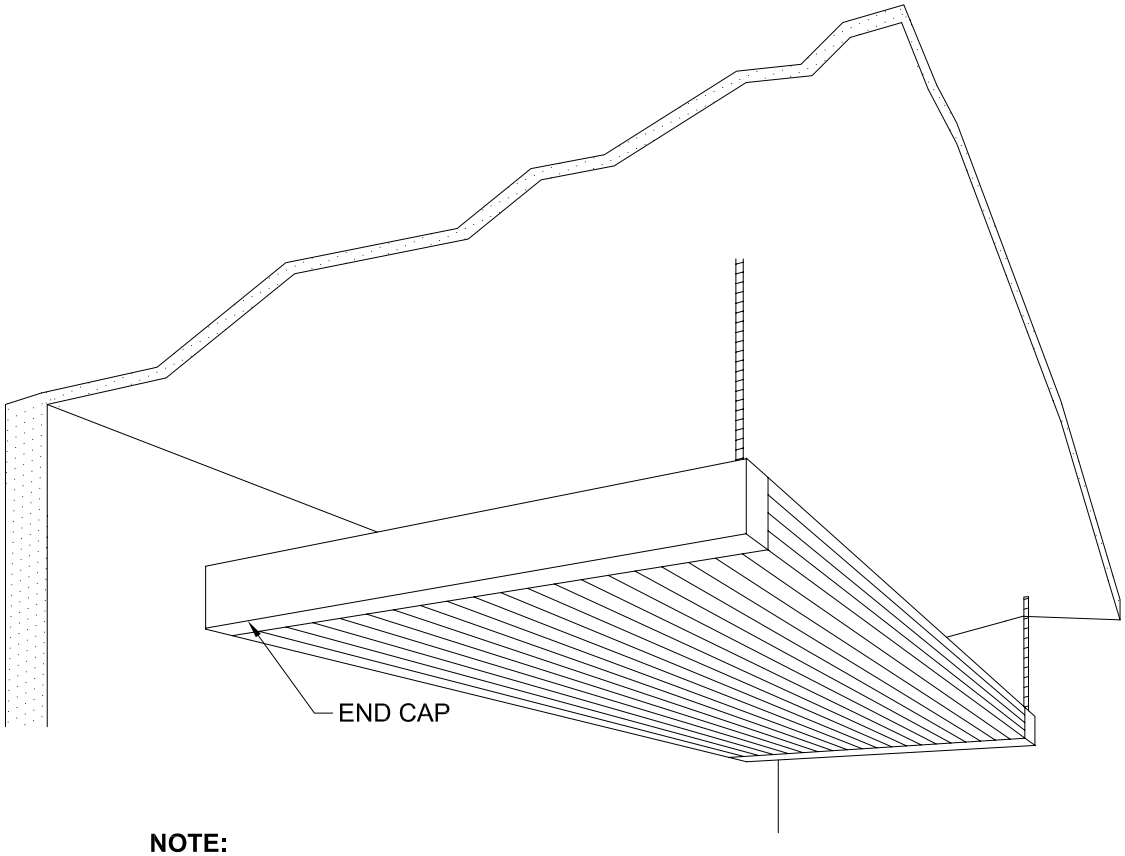
LINEAR PANEL



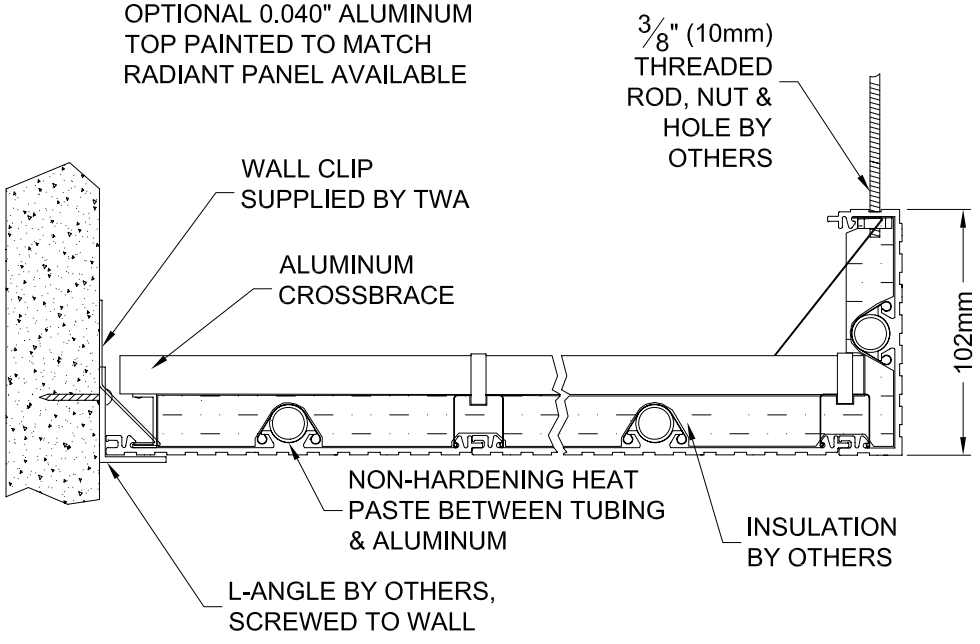


HANGING INDUSTRIAL LINEAR PANEL		
Twa Panel Systems, Inc.	FRENGER®	L-35-B

LINEAR PANEL



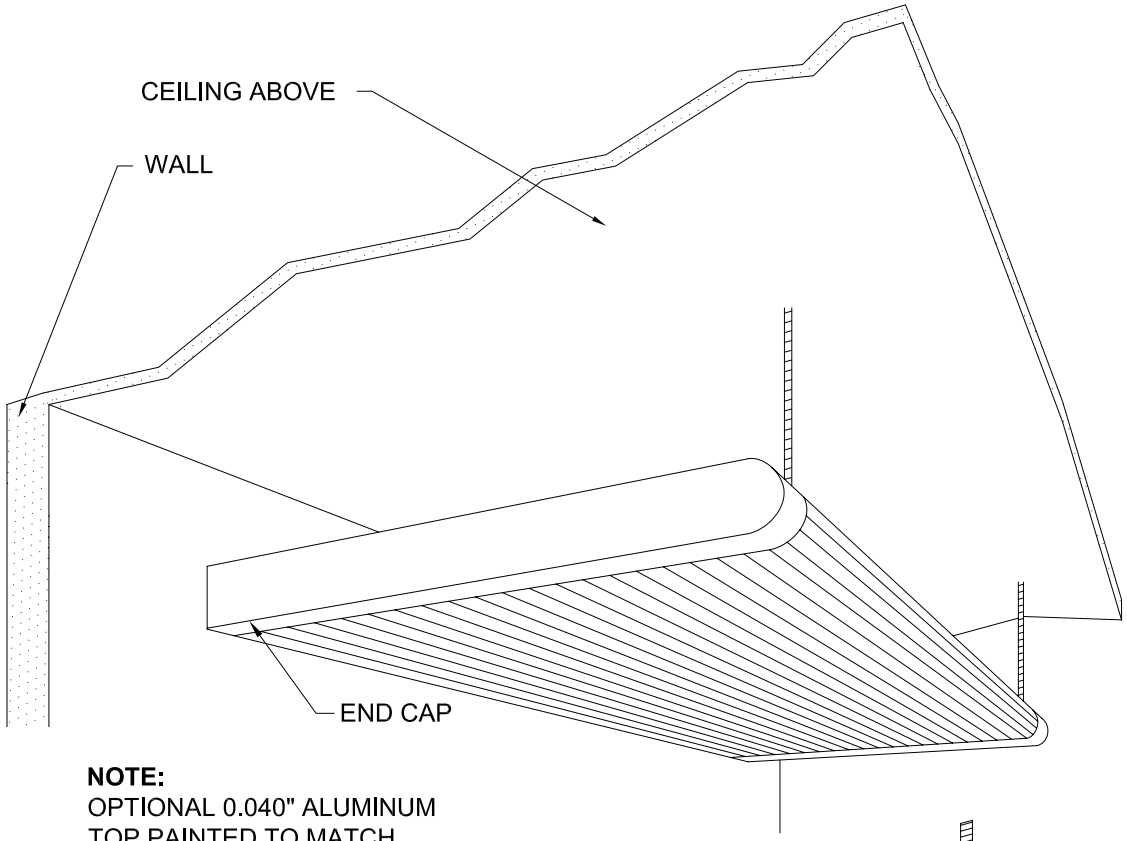
NOTE:
OPTIONAL 0.040" ALUMINUM
TOP PAINTED TO MATCH
RADIANT PANEL AVAILABLE



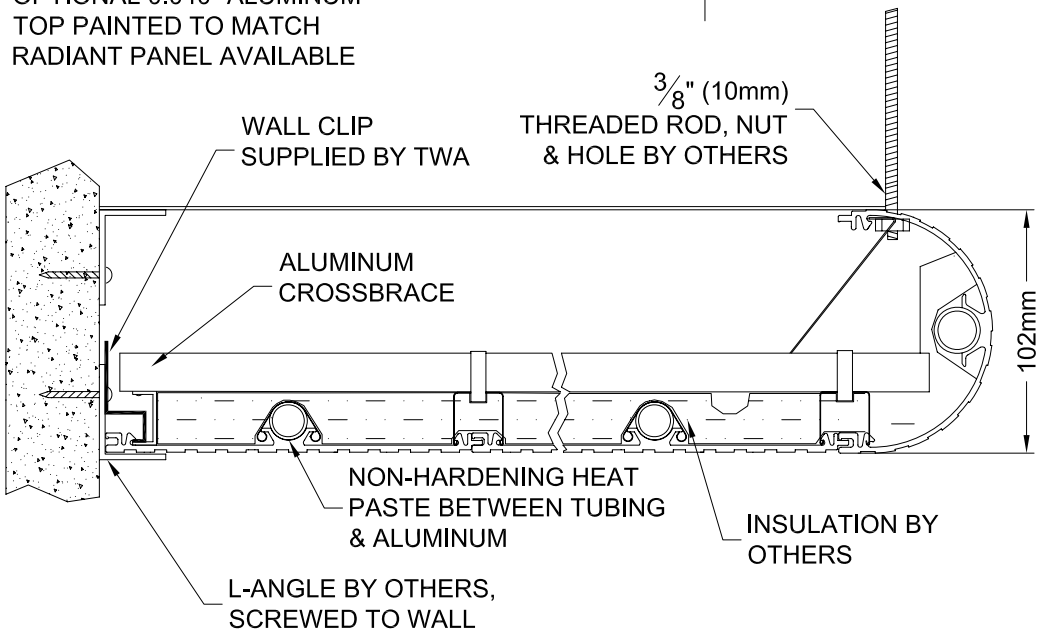
HANGING LINEAR PANEL IN EXPOSED AREA

Twa Panel Systems, Inc.	FRENGER	L-36-A

LINEAR PANEL

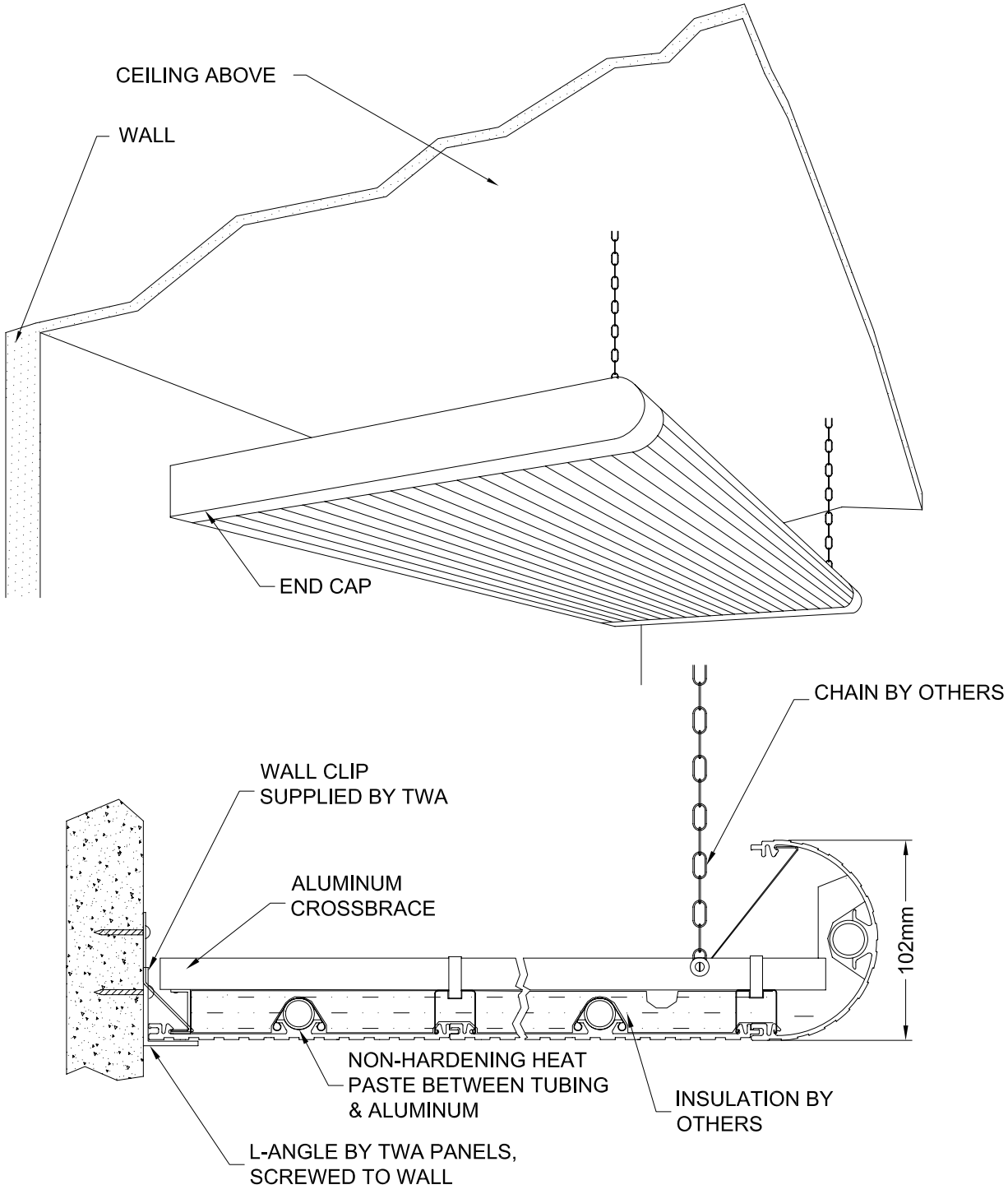


NOTE:
OPTIONAL 0.040" ALUMINUM
TOP PAINTED TO MATCH
RADIANT PANEL AVAILABLE



HANGING LINEAR PANEL IN EXPOSED AREA		
Twa Panel Systems, Inc.	FRENGER	L-36-B

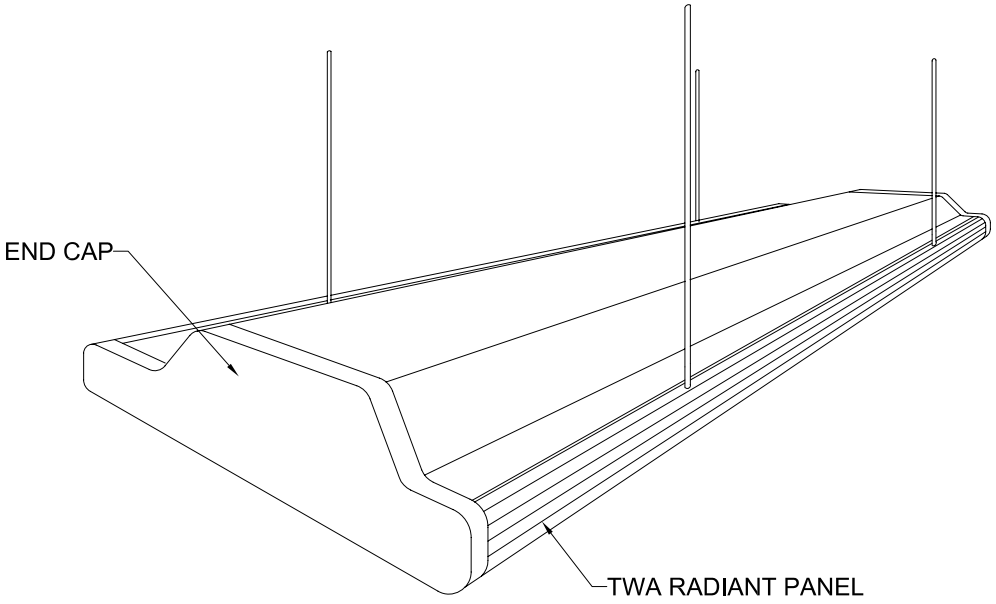
LINEAR PANEL

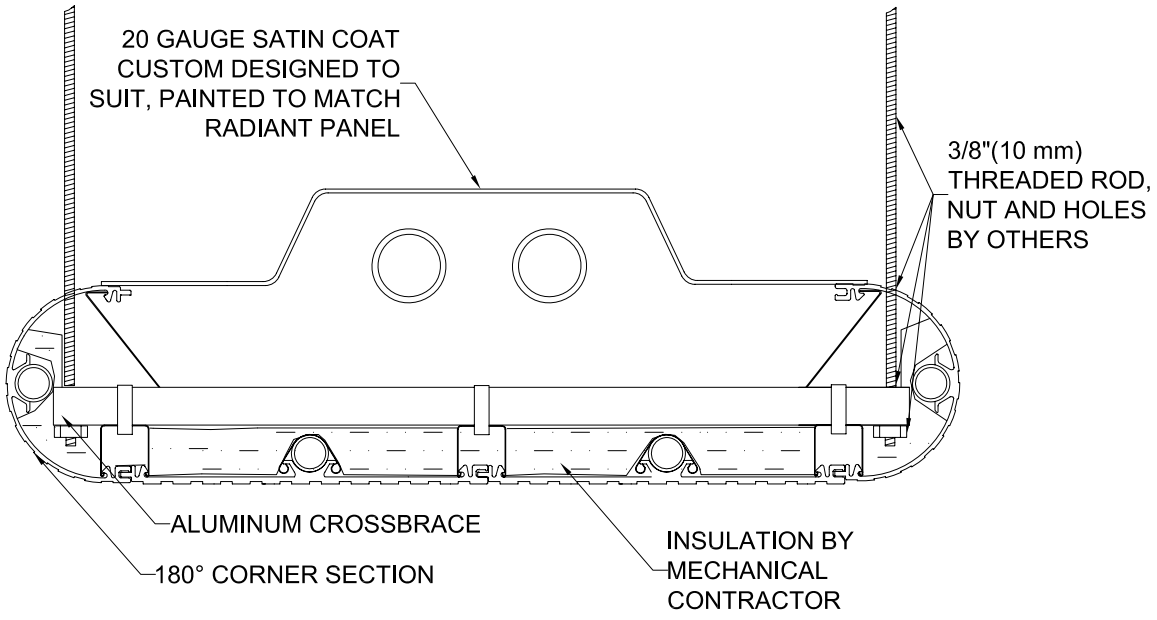


HANGING LINEAR PANEL IN EXPOSED AREA

Twa Panel Systems, Inc.	FRENGER.	L-36-C

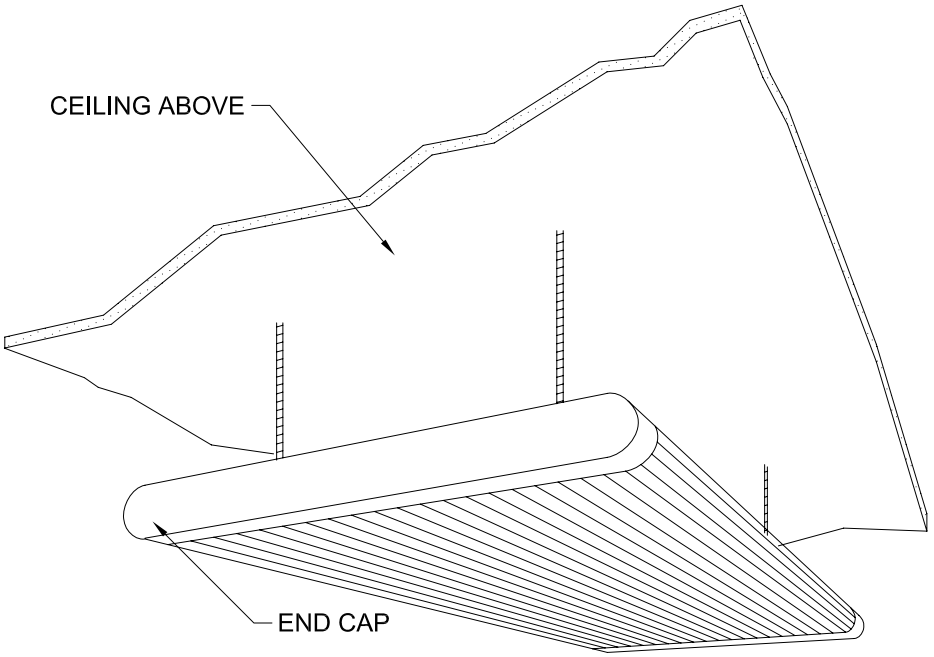
LINEAR PANEL

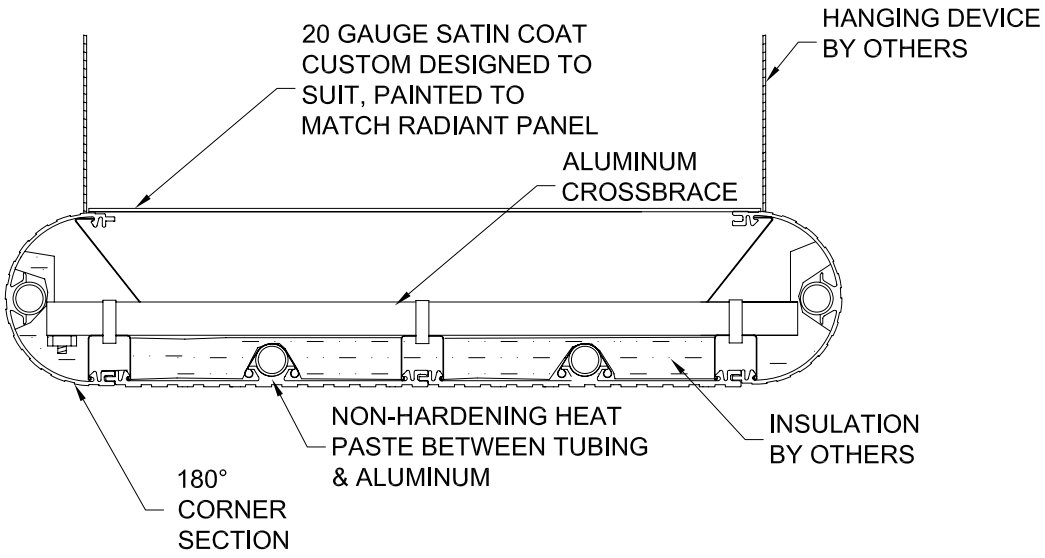




ENCLOSED LINEAR PANEL IN EXPOSED AREA

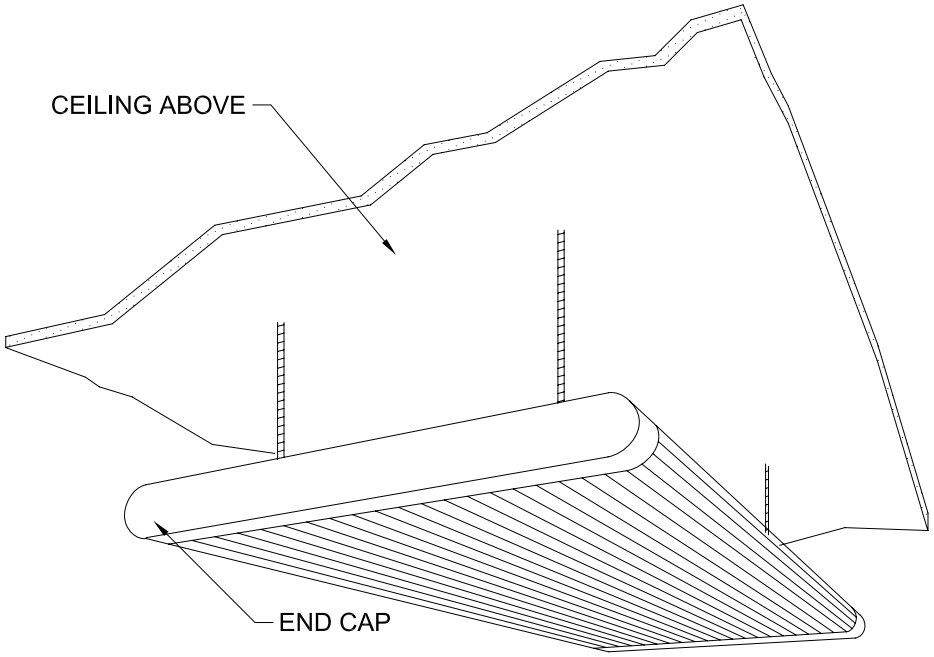
LINEAR PANEL

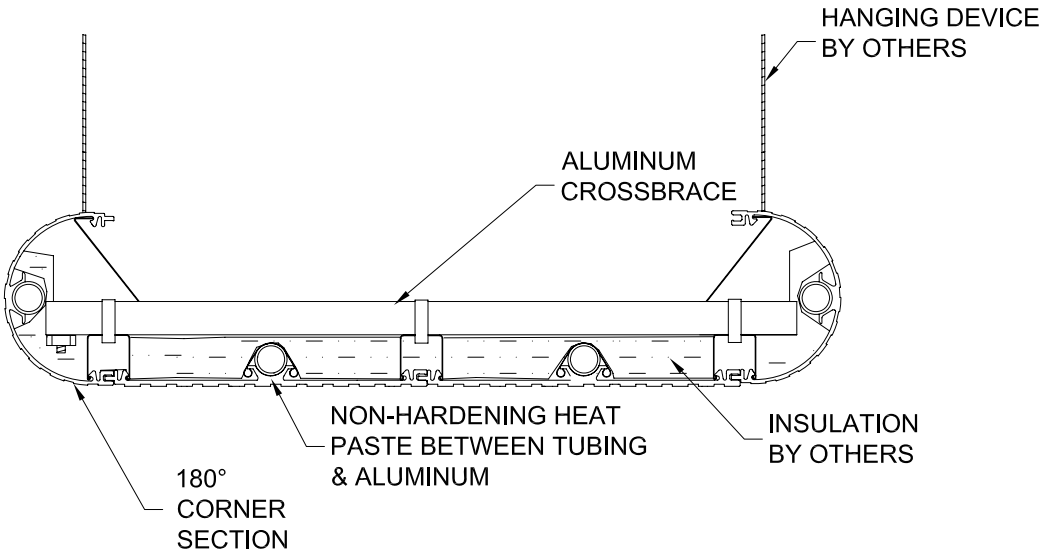




HANGING LINEAR PANEL IN EXPOSED AREA		
Twa Panel Systems, Inc.	FRENGER	L-37-B

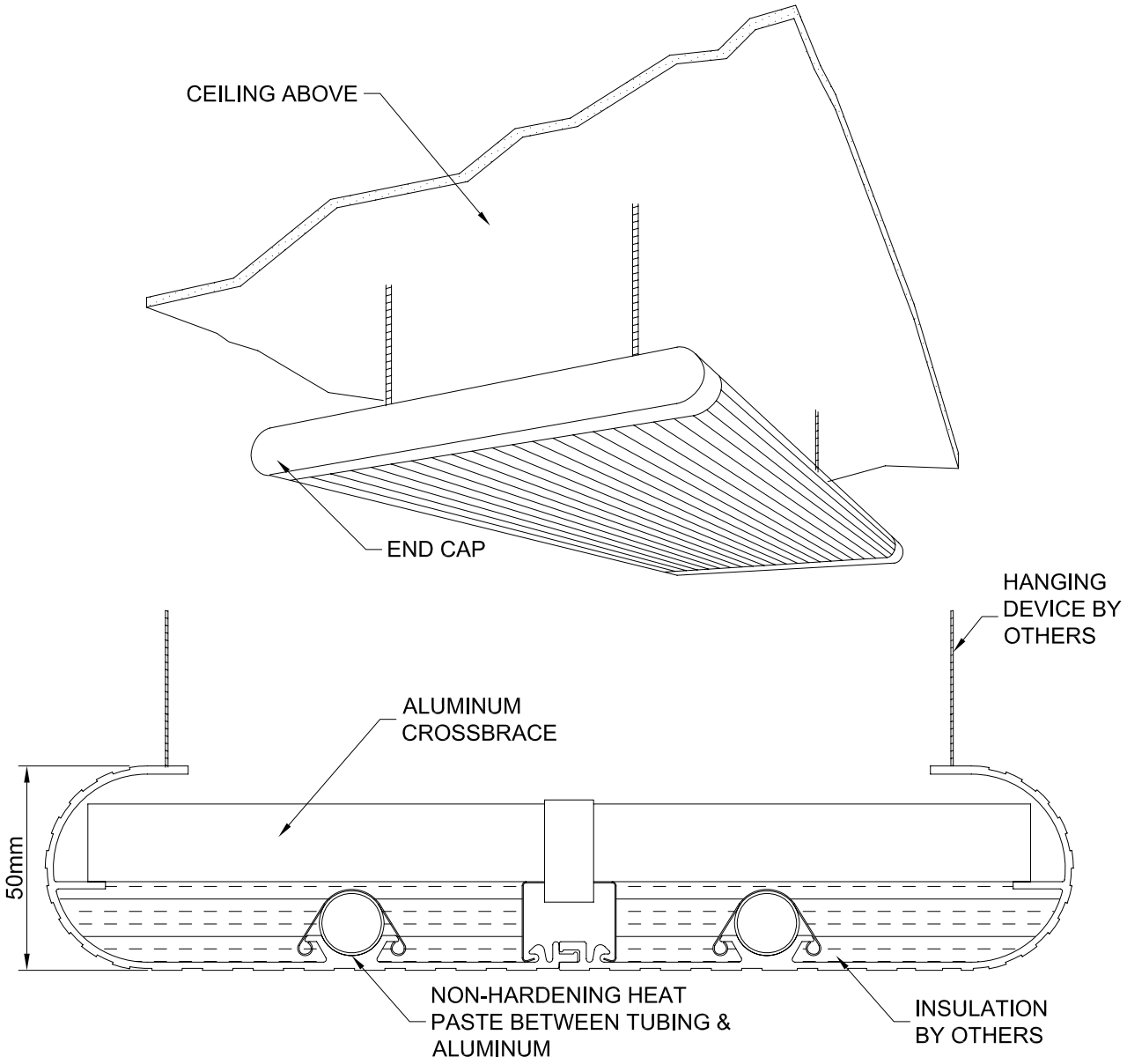
LINEAR PANEL





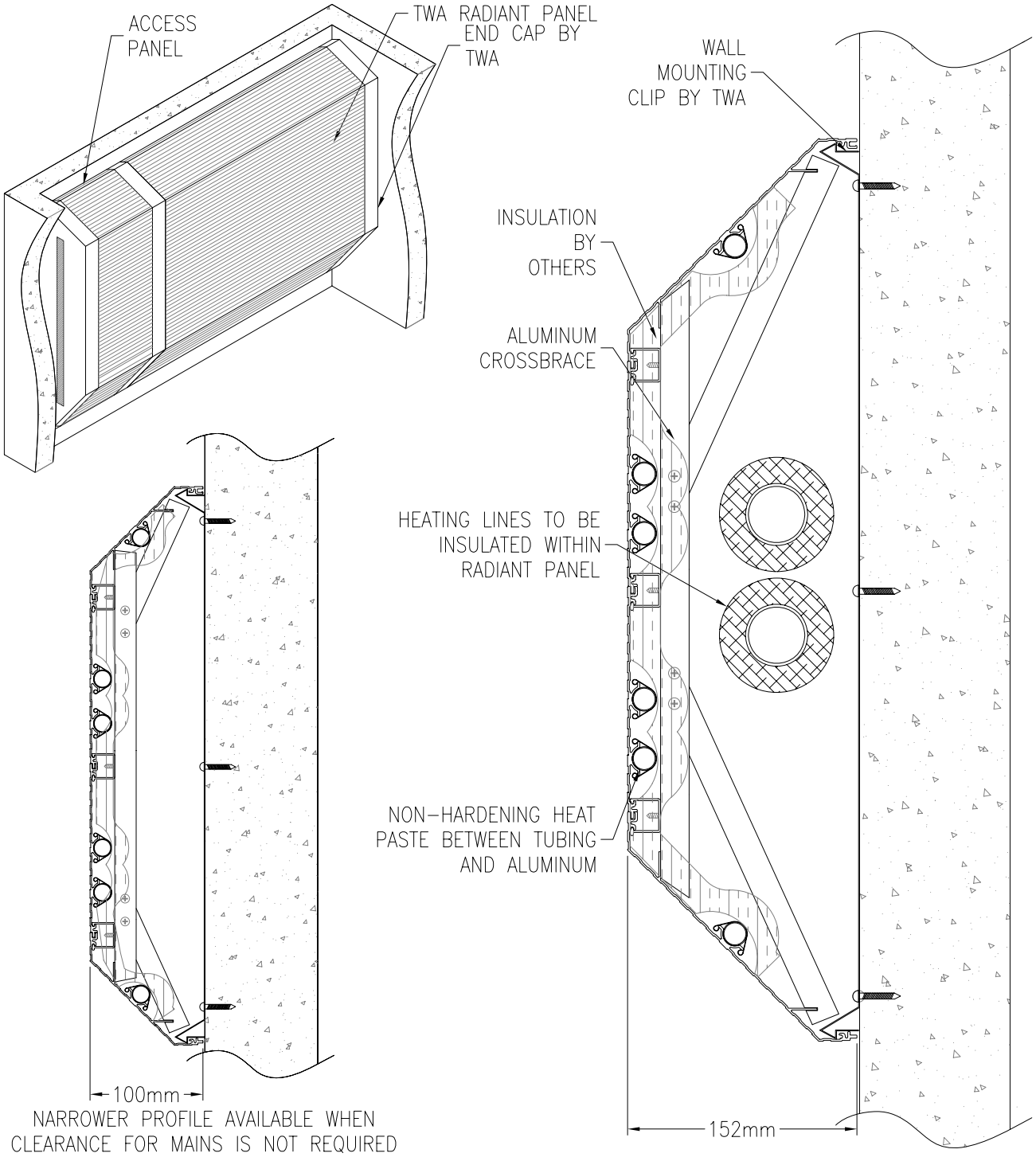
HANGING LINEAR PANEL IN EXPOSED AREA		
Twa Panel Systems, Inc.	FRENGER®	L-37-C

LINEAR PANEL



HANGING LINEAR PANEL IN EXPOSED AREA		
Twa Panel Systems, Inc.	FRENGER®	L-37-D

LINEAR PANEL

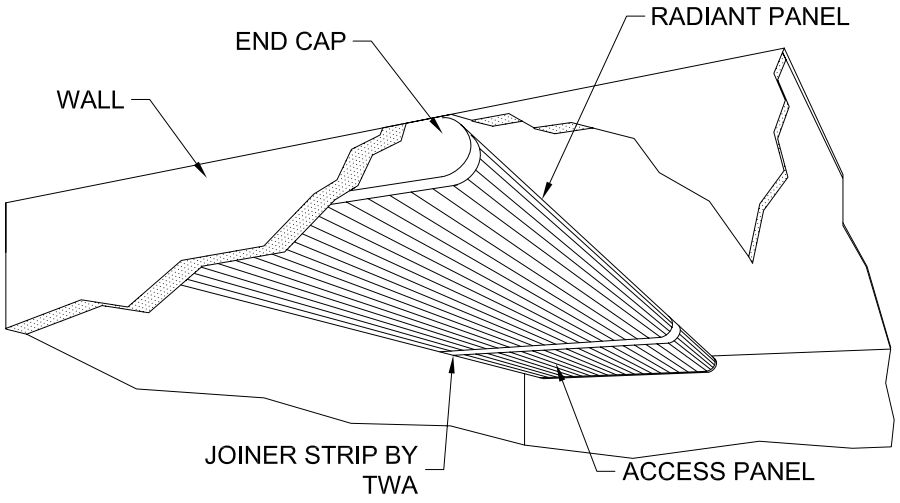


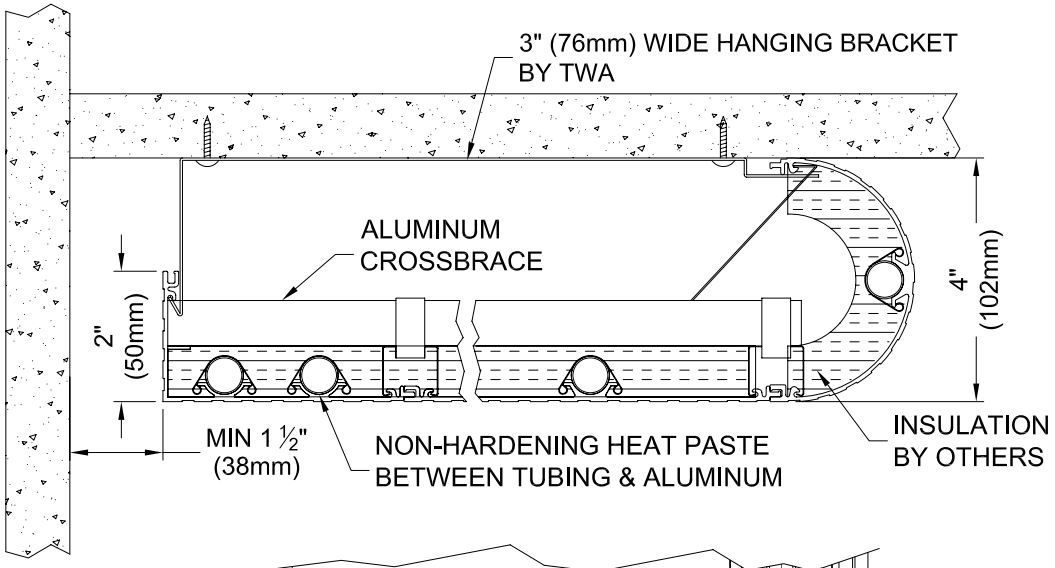
NARROWER PROFILE AVAILABLE WHEN CLEARANCE FOR MAINS IS NOT REQUIRED

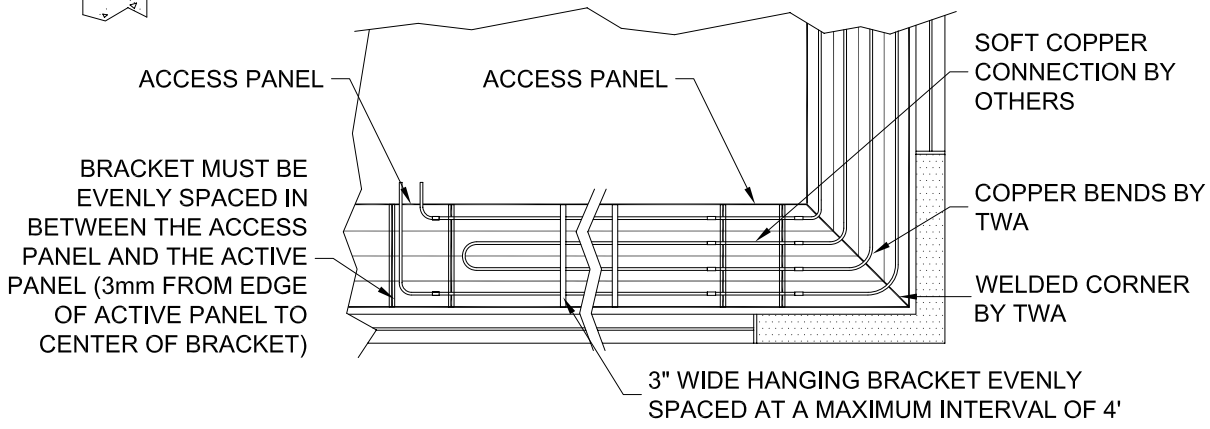
WALL MOUNTED LINEAR PANEL FOR GYMNASIUM

Twa Panel Systems, Inc. | FRENGER | L-38

LINEAR PANEL

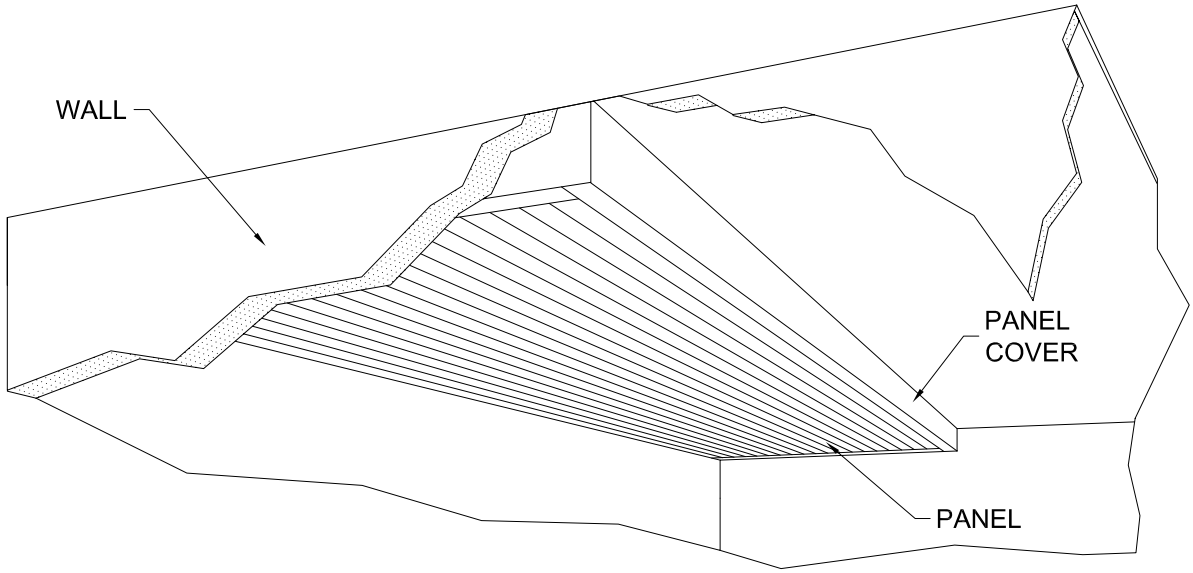


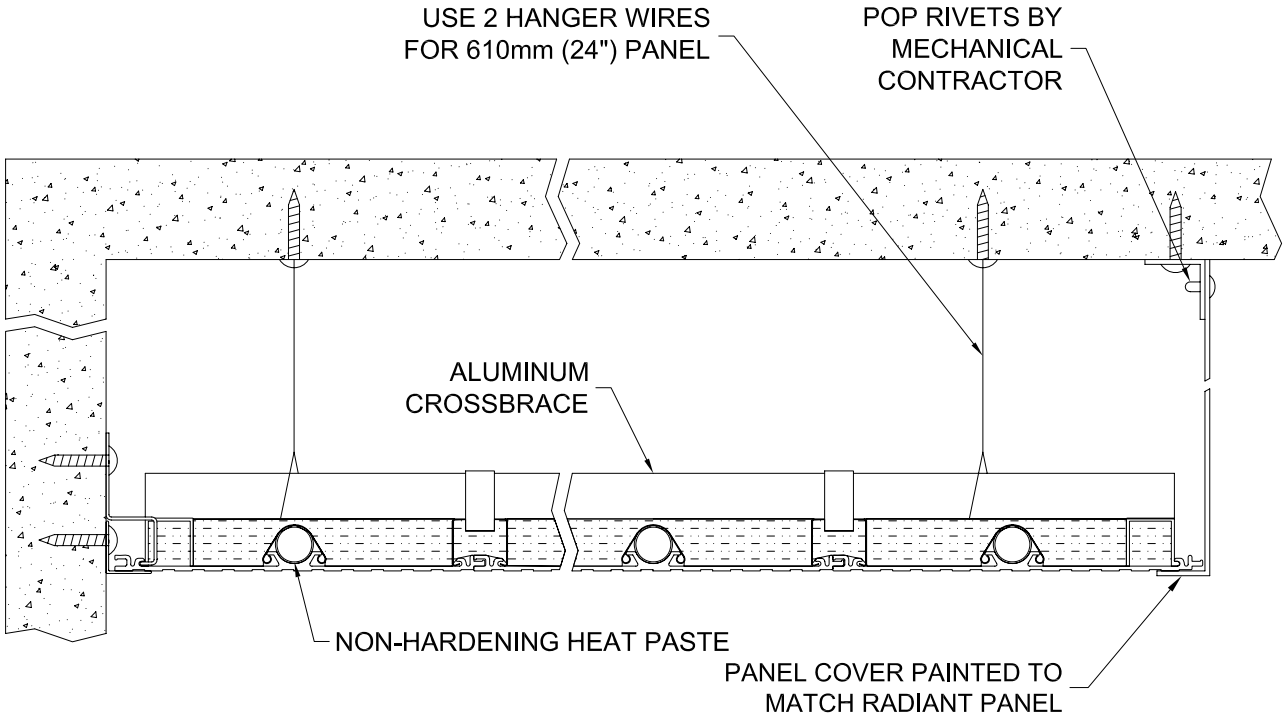




SURFACE MOUNTED LINEAR PANEL

LINEAR PANEL

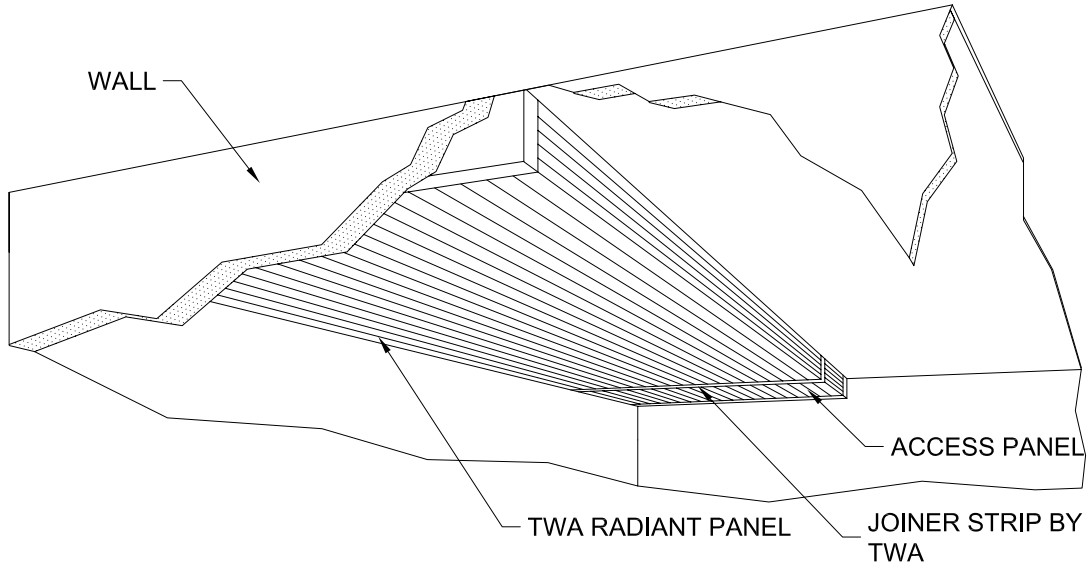


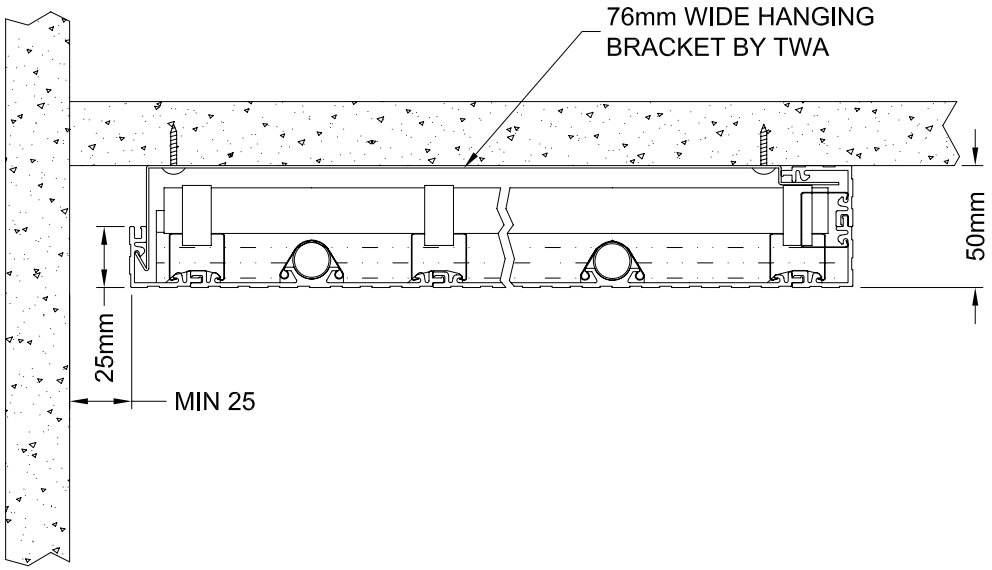


SURFACE MOUNTED LINEAR PANEL

Twa Panel Systems, Inc.	FRENGER	L-39-B

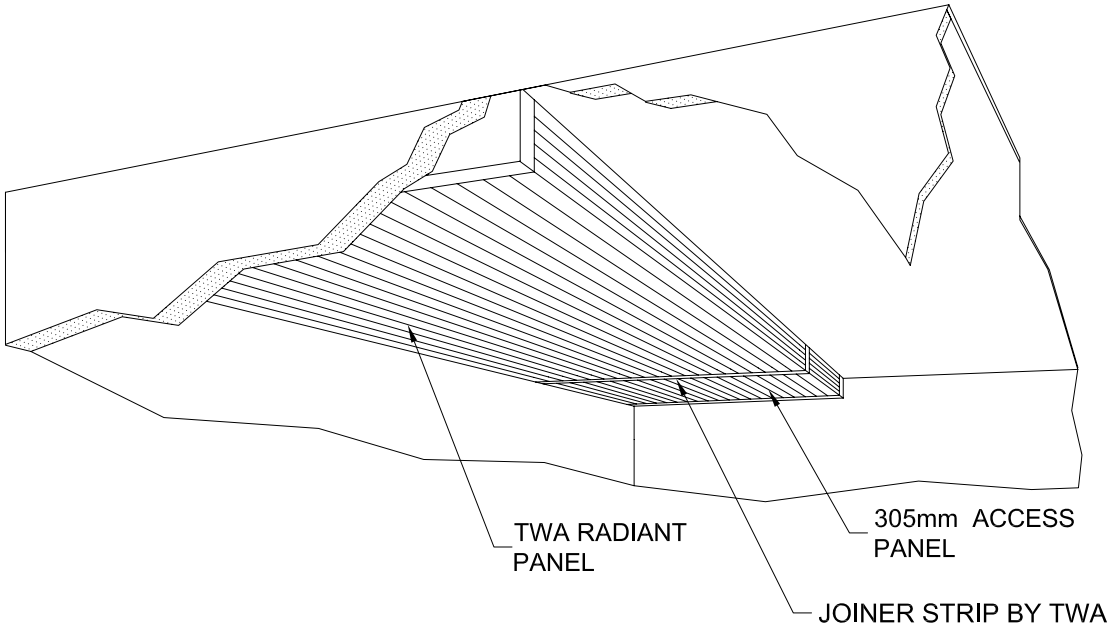
LINEAR PANEL

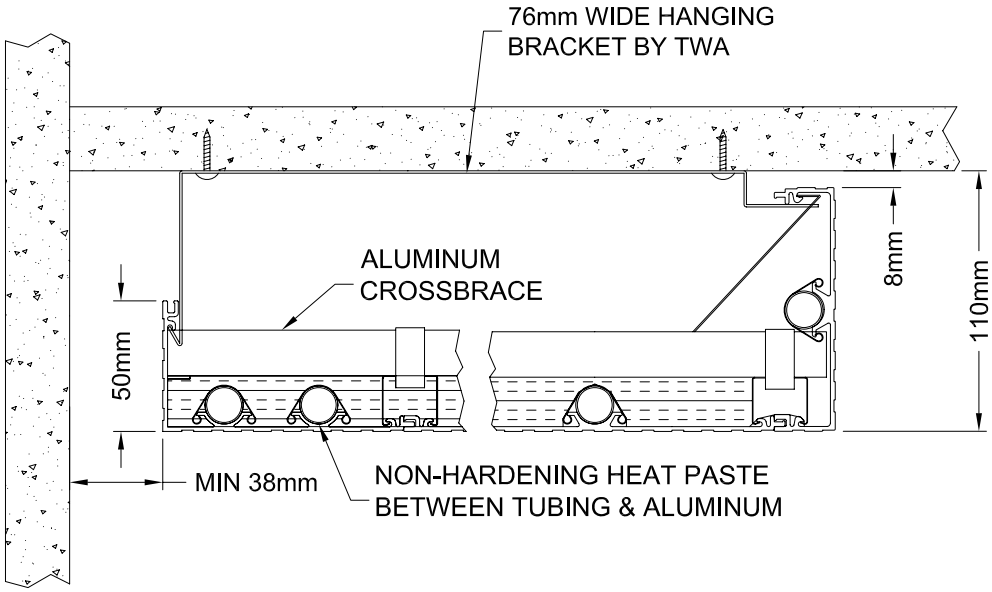




SURFACE MOUNTED LINEAR PANEL		
Twa Panel Systems, Inc.	FRENGER	L-39-C

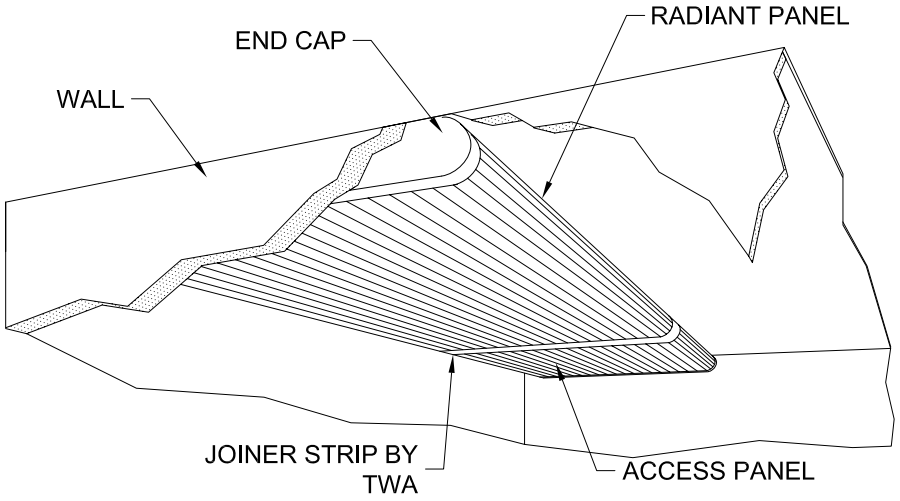
LINEAR PANEL

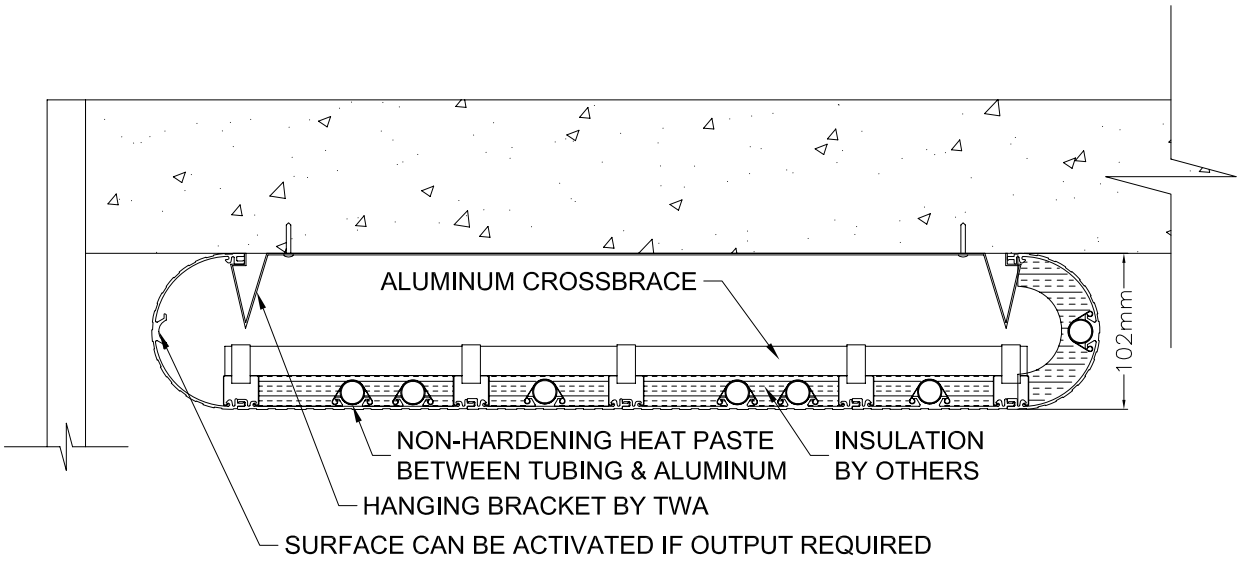




SURFACE MOUNTED LINEAR PANEL		
Twa Panel Systems, Inc.	FRENGER®	L-39-D

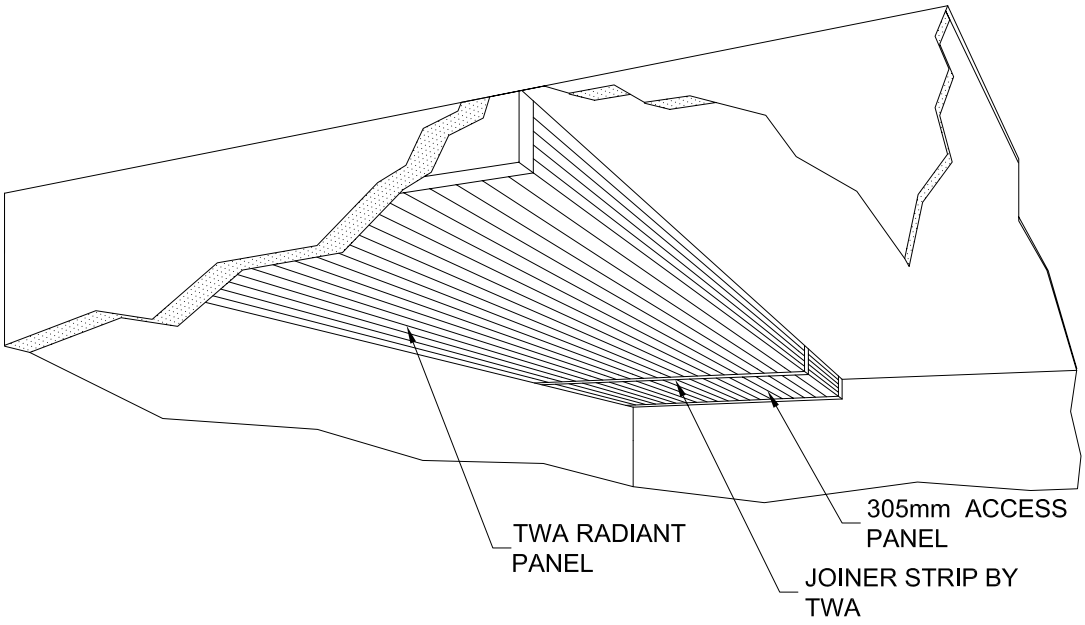
LINEAR PANEL

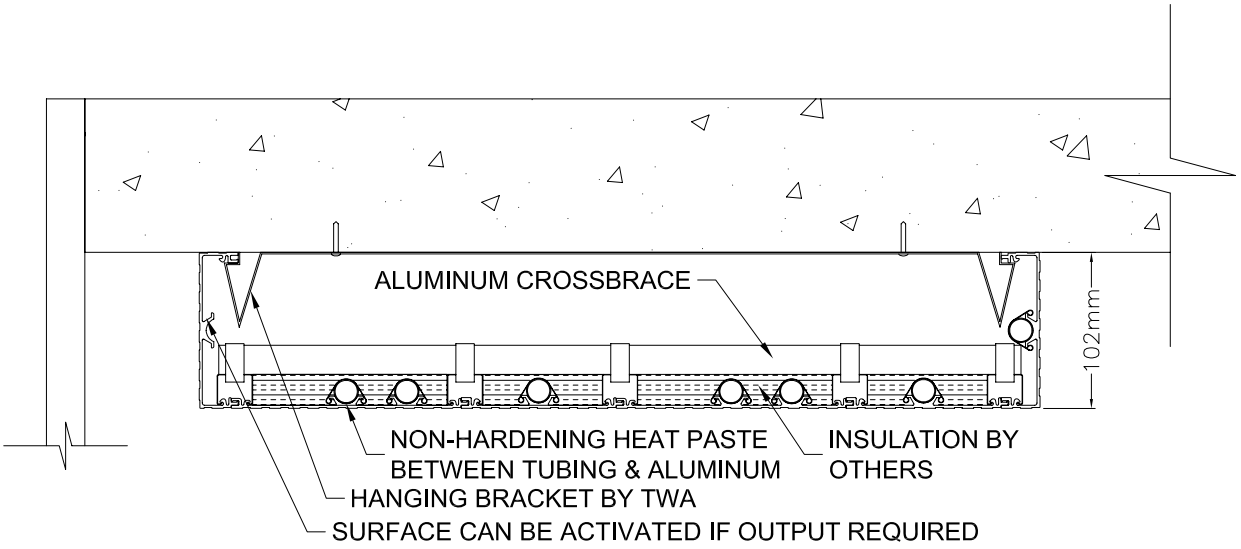




SURFACE MOUNT WITH 102mm BULLNOSE		
Twa Panel Systems, Inc.	FRENGER®	L-39-E

LINEAR PANEL

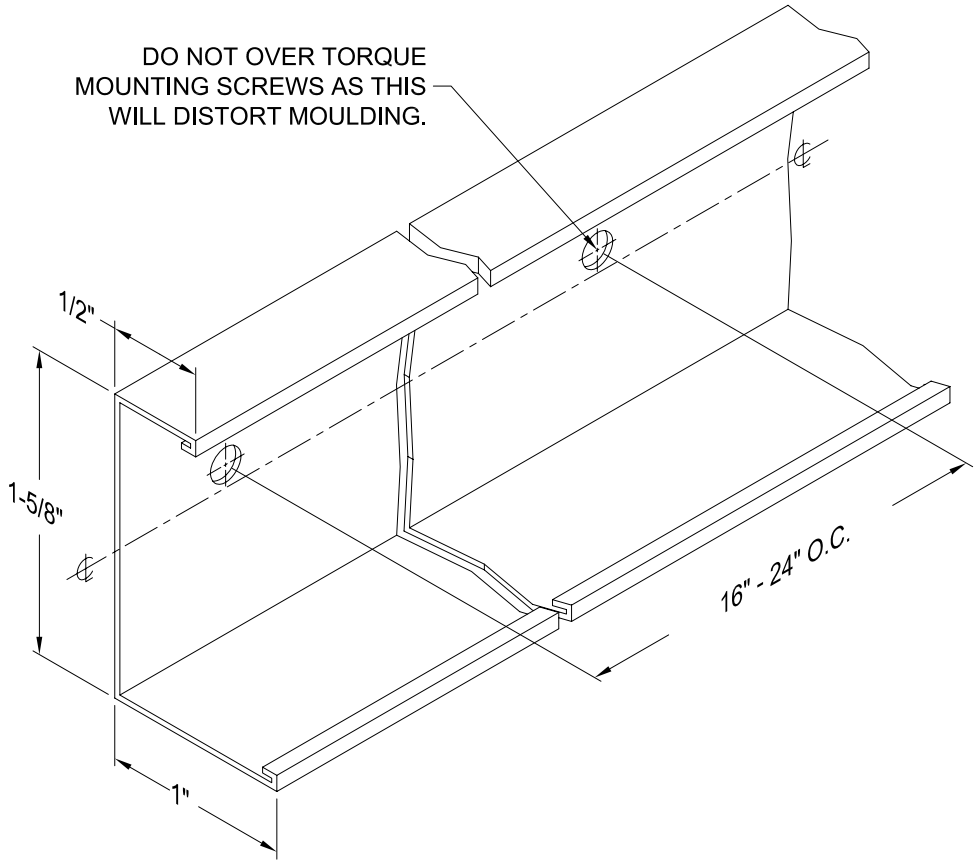




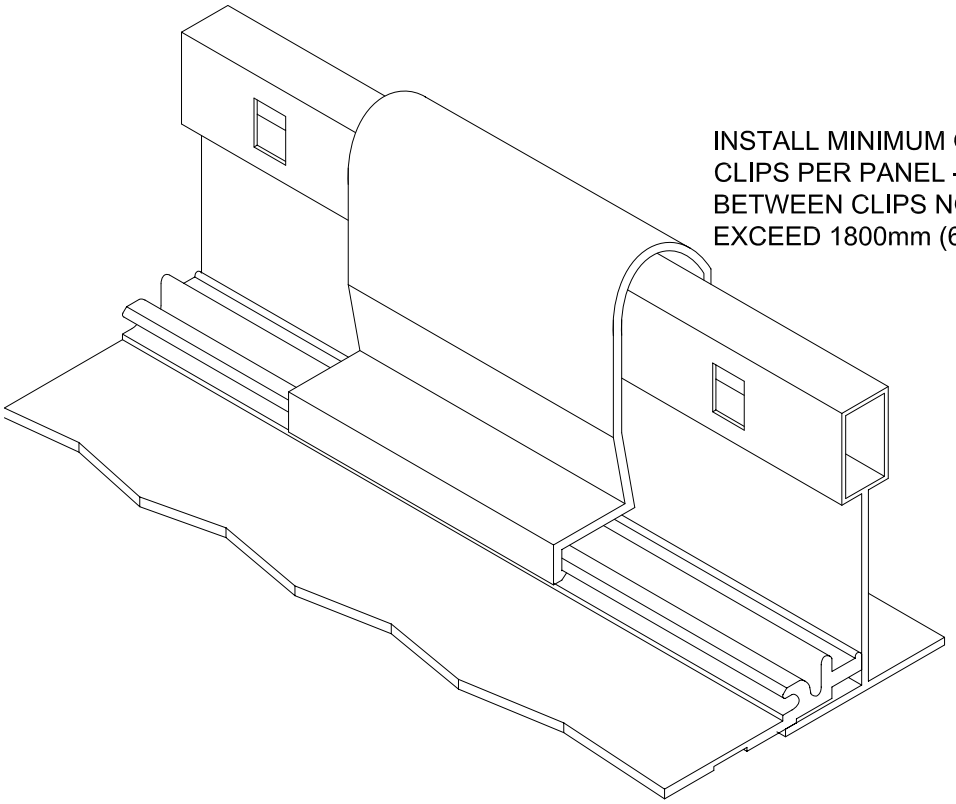
SURFACE MOUNT WITH 102mm CORNER

Twa Panel Systems, Inc. | FRENGER. | L-39-F

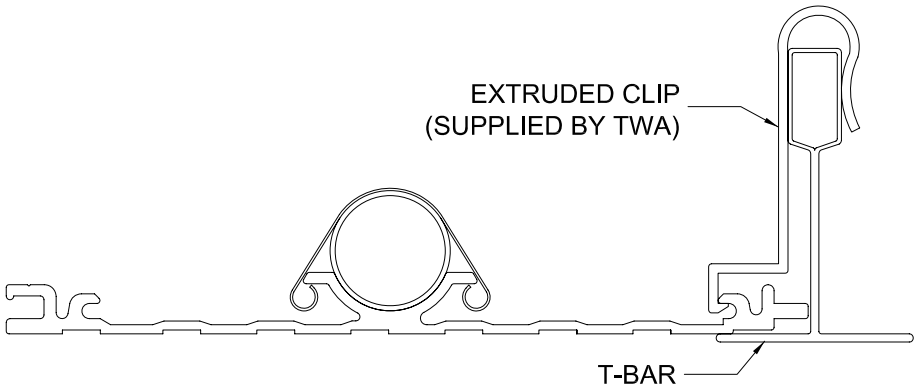
LINEAR PANEL



PERIMETER CHANNEL ANGLE



INSTALL MINIMUM OF 2
CLIPS PER PANEL - SPACING
BETWEEN CLIPS NOT TO
EXCEED 1800mm (6').



CLIP USED TO HOLD PANEL
TIGHT AGAINST T-BAR.

T-BAR CLIP		
Twa Panel Systems, Inc.	FRENGER®	L-41

INSTALLATION INSTRUCTIONS

Twa Panel Systems, Inc. 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.