- PRELIMINARY -

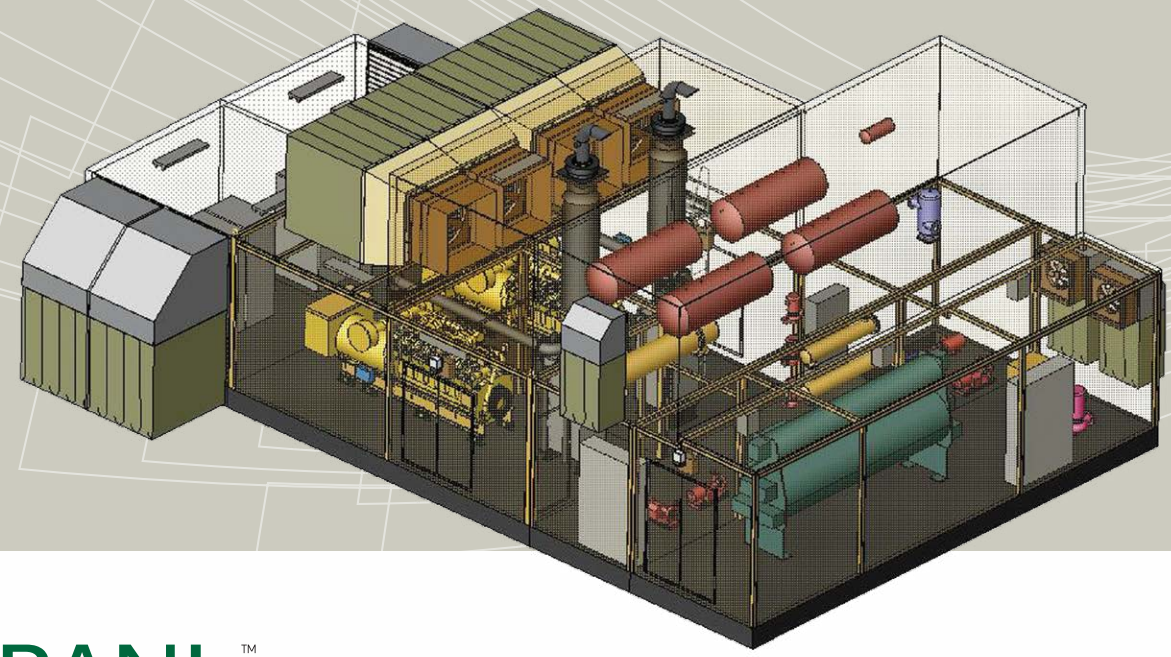
SEMCO®
A FläktGroup Brand

ACOUSTIC
THERMAL
STRUCTURAL

AT–PANL™ solutions

ACOUSTIC/THERMAL SYSTEMS

TECHNICAL GUIDE



PANL™ solutions
SYSTEMS BY SEMCO

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SEMCO's **PANL Solutions** offer a range of quality systems designed to outperform the competition and save you money.

PANL™ solutions
SYSTEMS BY SEMCO

AT-PANL™ solutions
ACOUSTIC/THERMAL SYSTEMS

MD-PANL™ solutions
MODULAR DUCT SYSTEMS

IN-PANL™ solutions
INDUSTRIAL SYSTEMS

FR-PANL™ solutions
FIRE RATED SYSTEMS

U.S. GREEN BUILDING COUNCIL MEMBER

AT-PANL™ solutions
ACOUSTIC/THERMAL SYSTEMS

ACOUSTIC
THERMAL

AT-PANL solutions Acoustic/Thermal Systems have a multitude of applications from standard built up air handling units to clean rooms, jet engine test cells, extended plenums, material handling enclosures, supply/return chase plenums, mixing plenums, and more.

SEMCO's AT-PANL solutions Acoustic/Thermal Systems have been independently tested for acoustical, thermal, and structural performance, giving you the assurance that our system will perform as required.



SUPERIOR QUALITY

- Roll formed tongue-and-groove construction, fully enclosed and insulated joint gives better fit with closer tolerance.
- Factory cut and framed openings seals exposed insulation and reduces field labor.
- Pre-formed corner panel up to 12'-0" long for added strength, rigidity, and easier installation.
- No screws through panel joints reduces installed cost and eliminates possibility of air and noise leaks that may occur with screws.
- Tongue-and-groove panel is fully insulated at the male-female joint eliminates field insulation of joints and need for screws at joints.

LOWER COST

- Computer aided structural steel design prevents overkill of structural design, provides end user with calculated safety factor, and reduces installation cost by as much as 15%.
- Large 24" x 66" standard doors with or without 12" x 12" double pane wire glass window (using standard doors lowers cost)
- Factory interior cuts, semicircular cuts, notches, and sloped ends as required reduces installed costs and accommodates equipment.
- Pre-hung doors and completely insulated panel joints saves 10% field labor and provides for a total acoustical and thermal barrier.

ATTENTION TO DETAIL

- Flexible design options to meet special requirements.
- AutoCAD drawings shorten the approval process and reduce field labor (panel layout, installation details, and individual panel markings included).
- Large removable panels allow for easy replacement of component parts.
- Flexibility in product selection to meet critical noise levels. High transmission loss (HTL) panel systems
- No-thru-metal panel designed for low temperature and condensation problems that standard panel construction cannot satisfy.

MATERIALS AND APPLICATIONS

MATERIALS

- Galvanized steel
- Stainless steel
- Aluminum
- Aluminized

THICKNESSES

- 2” thick
- 3” thick
- 4” thick
- 5” thick
- 6” thick

FINISHES

- Mill Finish
- Powder Coated

We offer various panel constructions and panel thicknesses depending on the severity of your noise sources. You no longer have to make one standard product meet all of your design needs, which allows you to design specifically for your situation without costly overkill, and more importantly, without compromising system integrity. **Applications for AT-PANL solutions include:**

- Outside Air Plenums
- Rooftop Equipment Enclosures
- Fume Hood Exhaust Plenums
- Supply/Return Chase Plenums
- Manufacturing Equipment Enclosures
- Extended Plenums (large rectangular duct)
- Built-Up Air Handlers
- Indoor & Outdoor Barrier Walls
- Relief Air Plenums
- Clean Room Enclosures
- HVAC Mixing Plenums

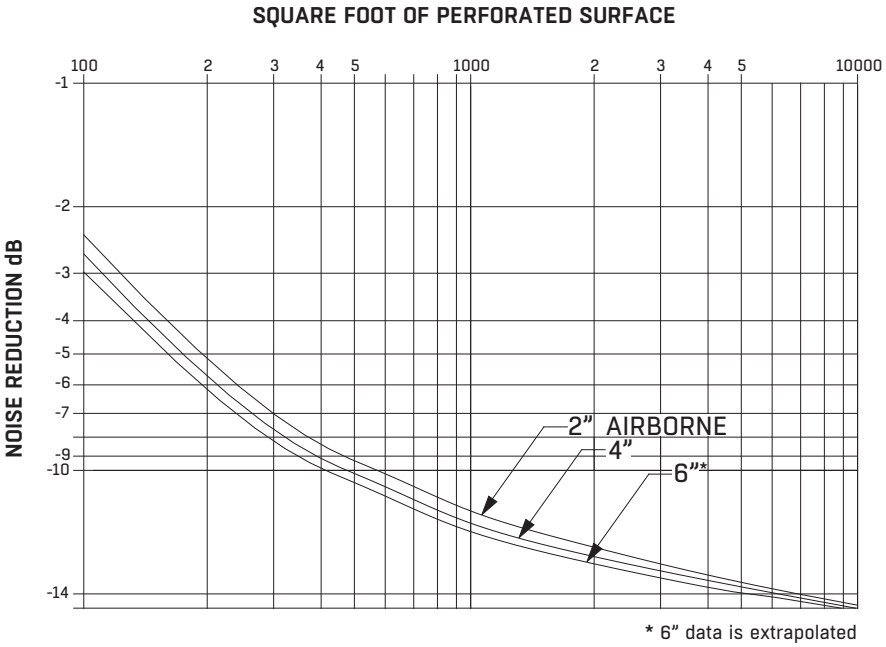
The applications for AT-PANL solutions are far-reaching. Some examples of more unique projects include enclosures for glass temper lines, golf ball washer, and pipe swaging machines. Below are some more common examples of SEMCO solutions for your acoustic-thermal panel needs.

APPLICATION	SEMCO’S STANDARD AT-PANL SOLUTION PRODUCT
Outside Air Plenums	2” galvanized panel up to 16’-0” 4” galvanized panel for 17’-0” and higher
Exhaust Plenums (Non-Corrosive)	2” or 4” galvanized panels solid interior
Exhaust Plenums (Corrosive)	2” or 4” 304 or 316 stainless steel solid interior, with optional stainless steel or galvanized exterior
Supply Air	4” galvanized solid exterior/perforated interior
Supply Air (Downstream of Final Filters or Coils)	4” galvanized solid exterior and interior
Supply Air (Medical)	4” galvanized solid exterior/perforated interior with Mylar® liner between perforated skin and insulation
Return Air	2” galvanized solid exterior/perforated interior
Intake/Discharge Plenums	2” or 4” galvanized solid exterior/perforated interior
Extended Plenums	2” galvanized exterior/perforated interior
High Noise Output (Equipment Enclosures)	HTL (High Transmission Loss) Panel System STC of 45.4” galvanized with gypsum board against solid skin
Louver Blank-Offs	2” or 4” powder coated, aluminum, galvanized steel, or uncoated stainless steel
Weather-proof Enclosures	2” or 4” panels with silicone caulk and standing seam roof
High Humidity	4” or 6” (no-thru-metal) panel system

PERFORMANCE DATA

PLENUM ACOUSTICS- AIRBORNE NOISE REDUCTION

1. Noise reduction is per square foot of perforated area. The perforated area from the fan discharge to the supply air opening is effective area of absorption of the supply system.
2. Perforated area from the fan intake to the return air opening is the effective area of absorption for the return system.
3. Area not defined by either notes 1 and 2 are not to be used in calculating dB reduction.



* 6" data is extrapolated

TRANSMISSION LOSS AND ABSORPTION COEFFICIENT

SEMCO's panel system outperforms all other commercially available modular panel systems. Backed by independently certified test data, our unique tongue & groove panel design provides optimum transmission loss and interior absorption resulting in unequaled STC and NRC ratings.

Construction	Absorption Coefficient					
	2 125	3 250	4 500	5 1K	6 2K	7 4K
2"	0.58	0.93	1.16	1.18	1.15	1.12
4"	0.70	1.14	1.18	1.14	1.14	1.16
6"	0.82	1.14	1.20	1.15	1.15	1.20

Construction	Transmission Loss						STC
	2 125	3 250	5 500	5 1K	6 2K	7 4K	
2" 18 gauge solid/22 gauge perforated	26	29	33	44	52	60	38
2" 18 gauge solid/22 gauge solid	29	35	39	47	51	64	39
4" 18 gauge solid/22 gauge perforated	26	32	38	51	60	67	43
4" 18 gauge solid/22 gauge solid	23	37	43	53	60	58	46
4" 18 gauge solid/22 gauge perf. w/ gypboard	27	34	42	53	61	70	45
6" 18 gauge solid/22 gauge perforated	28	38	44	53	62	58	49
6" 18 gauge solid/22 gauge solid	30	40	46	55	63	61	50

PERFORMANCE DATA

STRUCTURAL LOAD CONVERSIONS

Outdoor enclosures must be looked at differently than indoor enclosures. Units will be subject to structural design criteria when environmental conditions such as snow and/or wind load are considered. When these loads exist they must be considered in addition to the internal pressure. This chart expresses the equivalent pressure in water gauge with regards to wind, snow, and live loads.

Refer to ASCE 7-88 for an expanded discussion on "Minimum Design Loads for Buildings and Other Structures" for additional information such as seismic loads. Always refer to the local building codes for more specific information on local requirements.

Pressure (w.g.)	Wind Load (M.P.H.)	Snow Load (lbs. per sq.ft.)	Live Load* (lbs. per sq.ft.)
0.5	30	3	3
1.0	40	5	5
1.5	50	8	8
2.0	60	10	10
3.0	80	16	16
4.0	90	21	21
5.0	100	26	26
6.0	110	31	31
7.0	120	36	36
8.0	130	42	42
9.0	135	47	47
10.0	140	52	52
11.0	150	57	57

*Live load converted to static pressure equals 1" w.g. for each 5.2 lbs.

MAXIMUM UNSUPPORTED PERFORATED PANEL SPAN

Static Pressure	2" Roof		2" Wall		4" Roof		4" Wall		6" Roof		6" Wall	
	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG
0"	192	192	192	192	192	192	192	192	192	192	192	192
2"	159	144	136	160	192	192	192	192	192	192	192	192
4"	115	120	108	127	192	192	188	192	192	192	192	192
6"	98	107	94	111	172	175	163	183	192	192	192	192
8"	88	98	85	101	147	161	141	166	186	192	177	192
10"	78	91	76	93	130	150	126	154	165	192	158	192

All units in inches. Span based on maximum deflection of L/240

MAXIMUM UNSUPPORTED SOLID PANEL SPAN

Static Pressure	2" Roof		2" Wall		4" Roof		4" Wall		6" Roof		6" Wall	
	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG	(+) POS	(-) NEG
0"	192	192	192	192	192	192	192	192	192	192	192	192
2"	187	153	155	173	192	192	192	192	192	192	192	192
4"	133	129	123	137	192	192	192	192	192	192	192	192
6"	113	115	107	120	192	188	182	192	192	192	192	192
8"	101	105	97	109	173	173	165	180	192	192	192	192
10"	93	98	90	101	155	162	149	168	192	192	189	192

All units in inches. Span based on maximum deflection of L/240

NONCOMBUSTIBLE PERFORMANCE

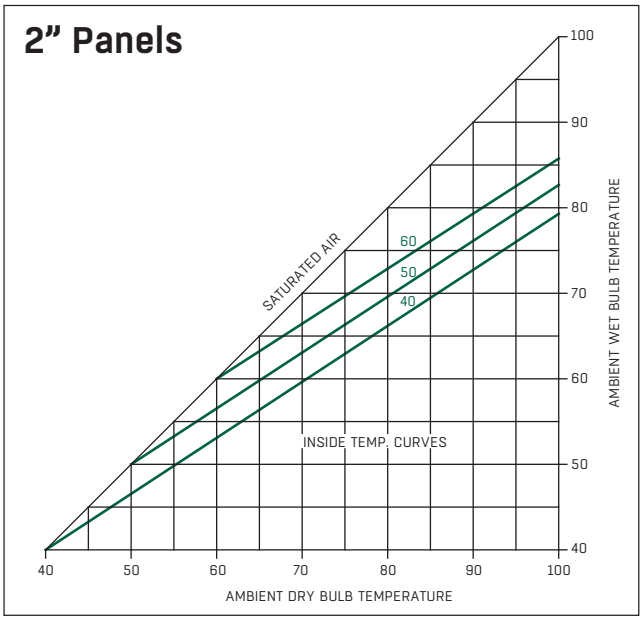
- Rated noncombustible as defined by NFPA Standard 220 when tested in accordance with ASTM E136
- Surface burning characteristics per ASTM E84 are flame spread classification = 15 and smoke developed = 0

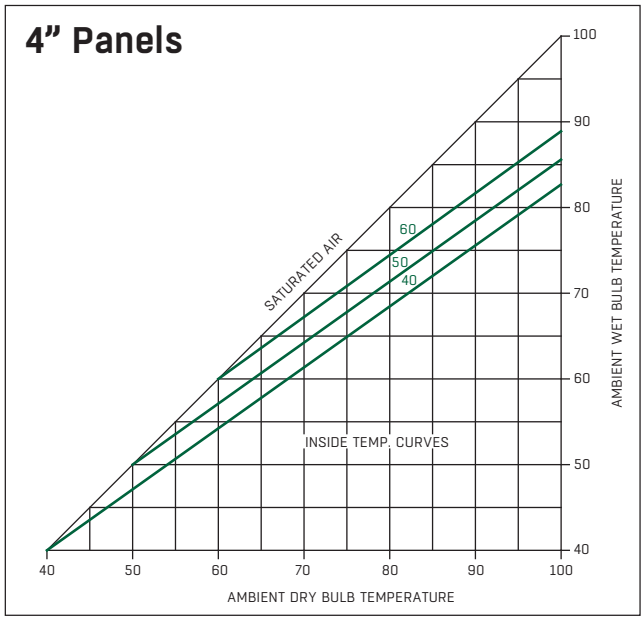
THERMAL PERFORMANCE

Thermal performance of AT-PANL™ shall provide for a U-factor of 0.10 for 2" panels* and 0.06 for 4" panels.

BTU/hour/sq. ft./degree Fahrenheit temperature difference of standard air.

The plenum installation shall be capable of withstanding both the positive and negative internal static air pressure required for the application up to 10" w.g.





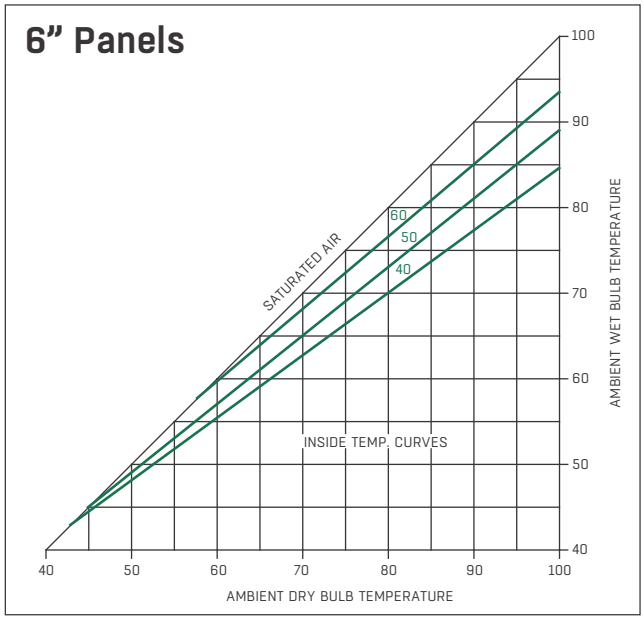
Standard Panel Construction	2" Panel	4" Panel	6" Panel
Panel U-Factor	0.10	0.06	0.05
Joint Performance Factor	0.53	0.63	0.67

Under very humid conditions the most probable location that condensation will occur is at the panel joint.

OST = TI + [JTF x (TO - TI)]

OST = Outside Skin Temperature
TI=Temperature Inside
TO=Temperature Outside
JTF = Joint Factor

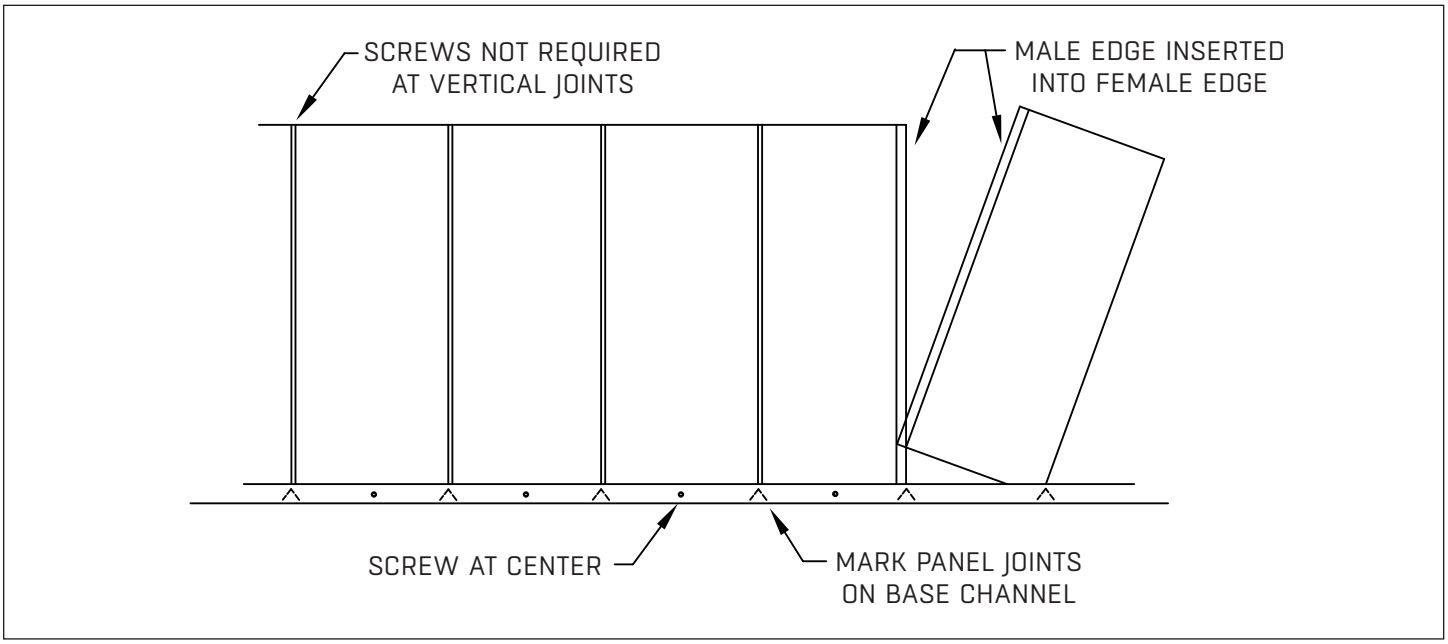
The outside skin will condense if the temperature is less than the space wet bulb.



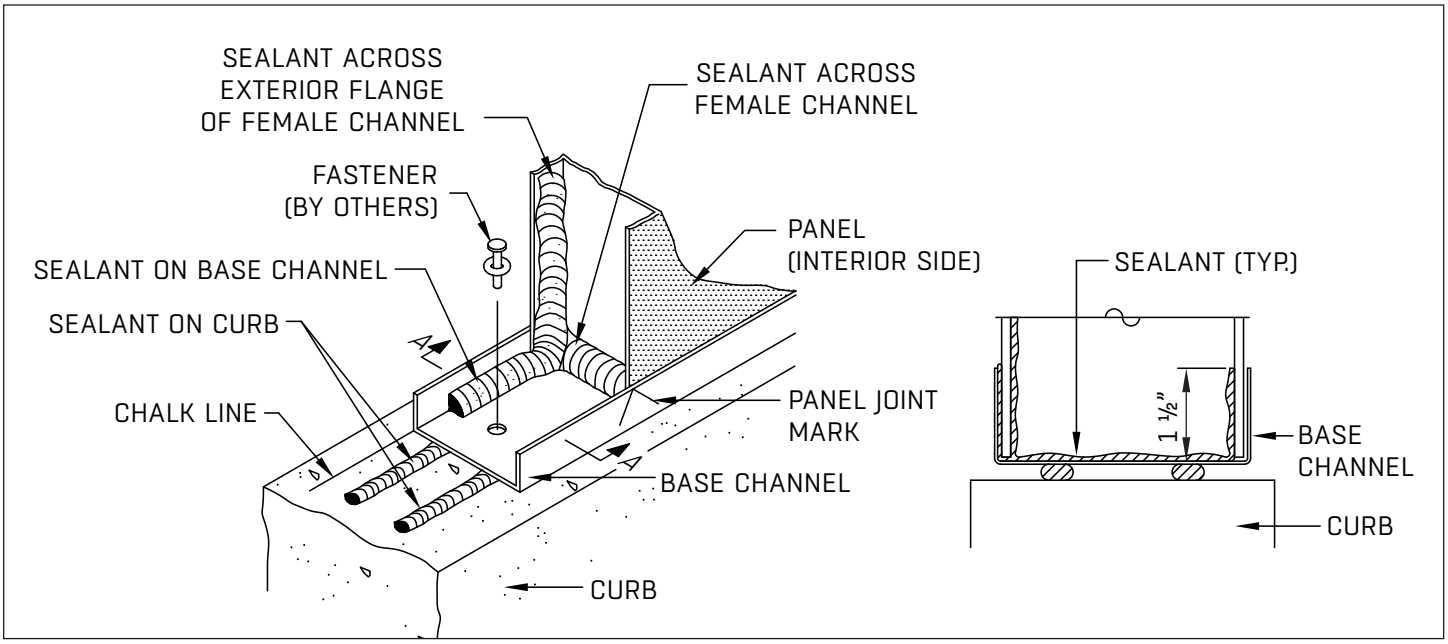
DETAILS AND DRAWINGS

FOR DETAILED ASSEMBLY INSTRUCTIONS, PLEASE REFER TO THE AT-PANL ASSEMBLY INSTRUCTIONS, AVAILABLE FROM SEMCO, LLC OR ONLINE AT WWW.SEMCOHVAC.COM

WALL PANEL

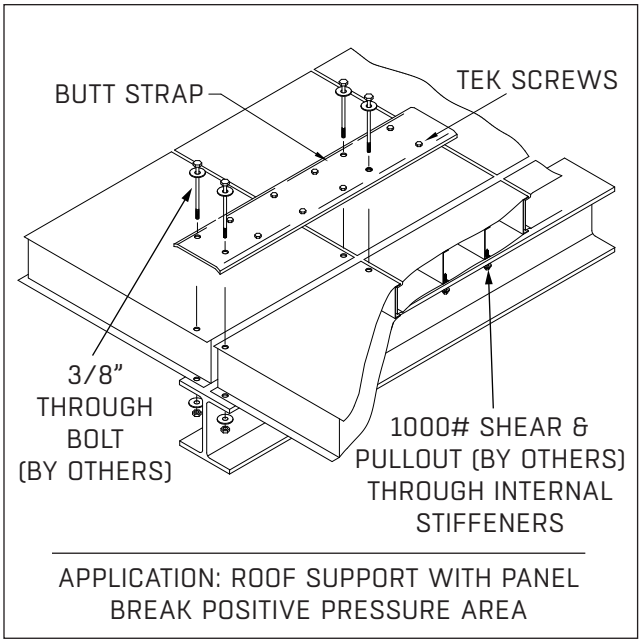


BASE CHANNEL



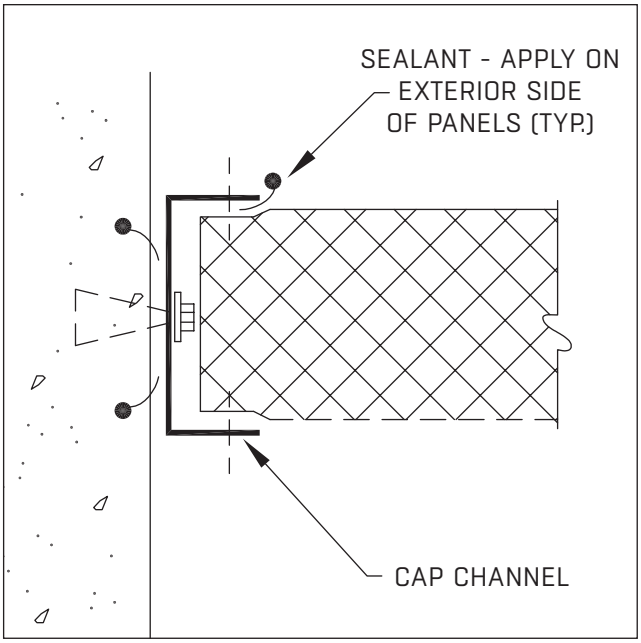
NOTE: These drawings are not intended as assembly instructions. Please refer to the AT-PANL Assembly Instructions, available from SEMCO or online at www.semcohvac.com

STRUCTURAL STEEL

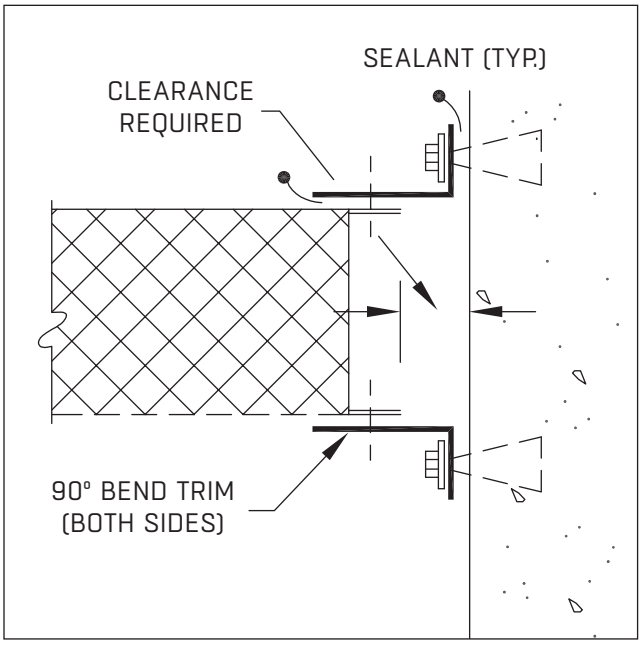


APPLICATION: ROOF SUPPORT WITH PANEL BREAK POSITIVE PRESSURE AREA

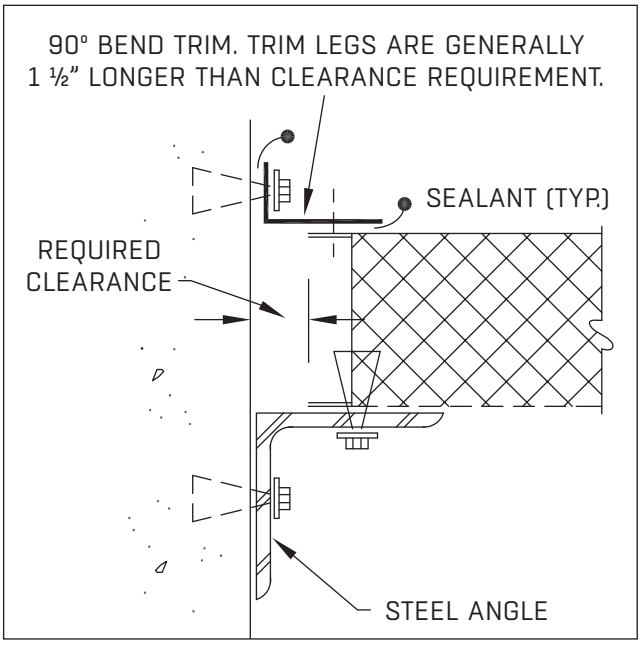
PANEL TO STRUCTURE - CAP



PANEL TO STRUCTURE - ANGLE



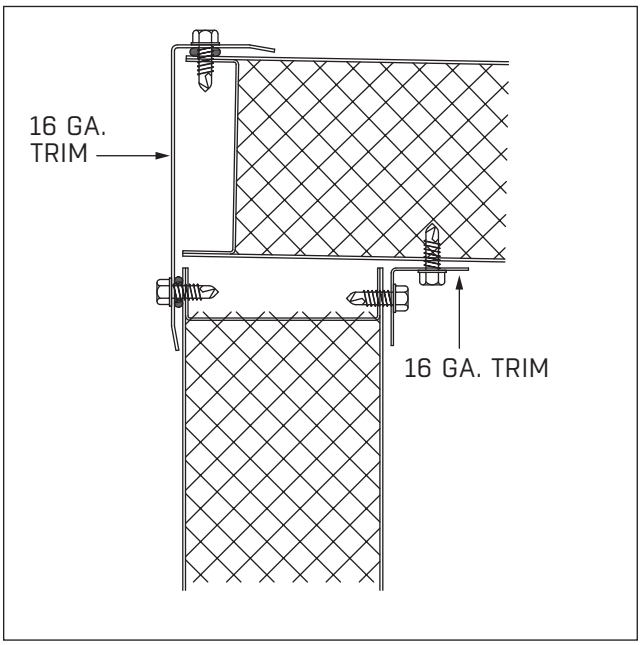
PANEL TO STRUCTURE - HD



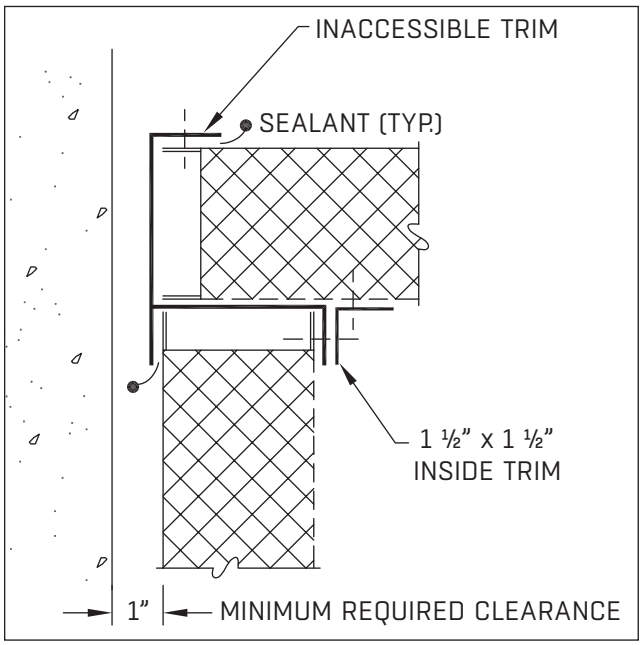
NOTE: These drawings are not intended as assembly instructions. Please refer to the AT-PANL Assembly Instructions, available from SEMCO or online at www.semcohvac.com

DETAILS AND DRAWINGS

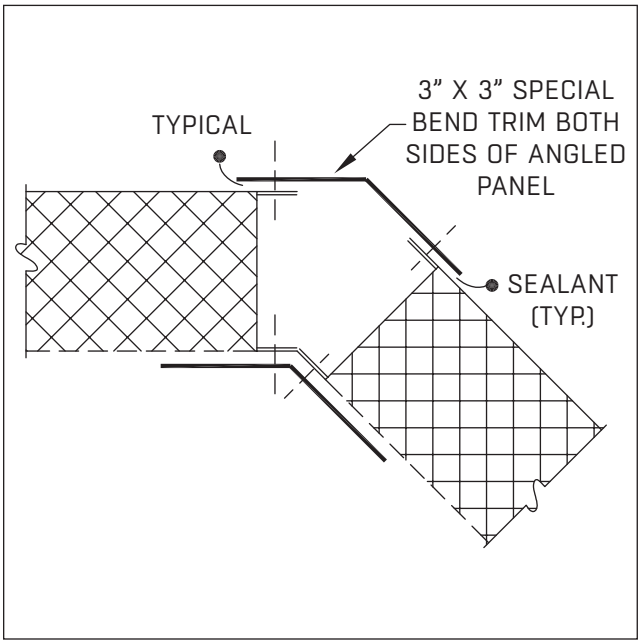
STANDARD 90° CONNECTION



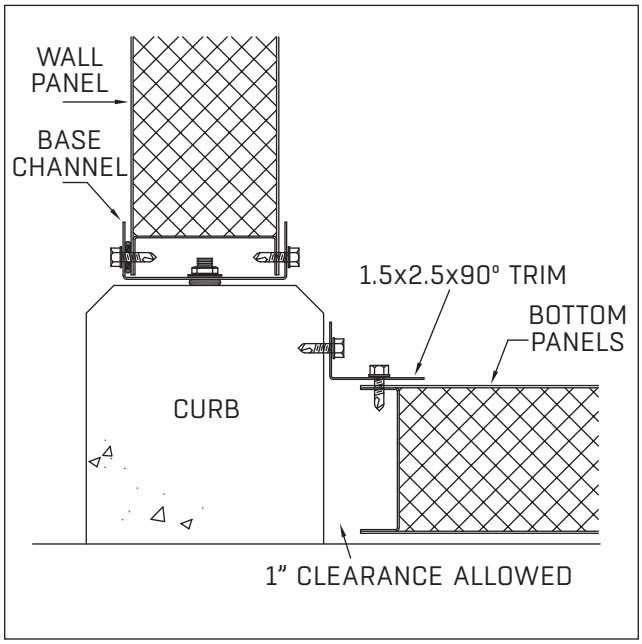
INACCESSIBLE TRIM



ANGLED PANEL TRIM

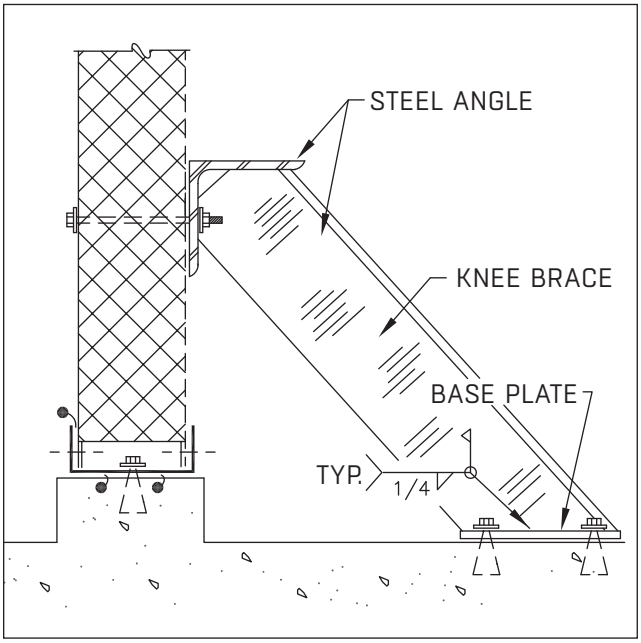


FLOOR CONNECTION AT CURB

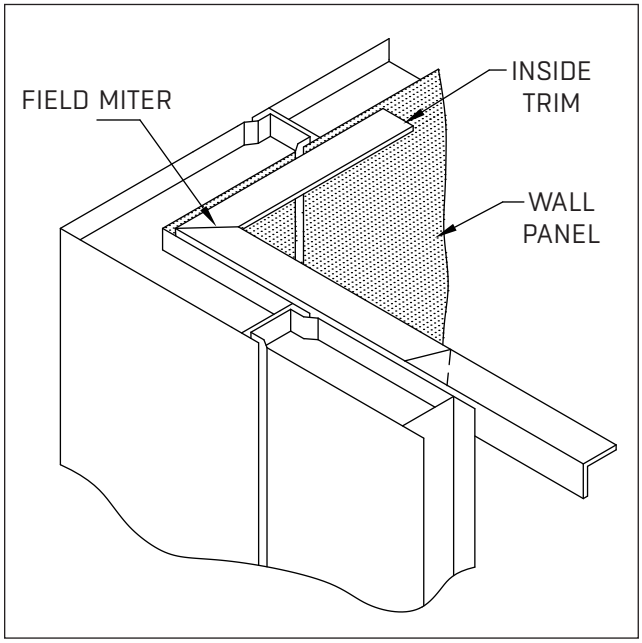


NOTE: These drawings are not intended as assembly instructions. Please refer to the AT-PANL Assembly Instructions, available from SEMCO or online at www.semcohvac.com

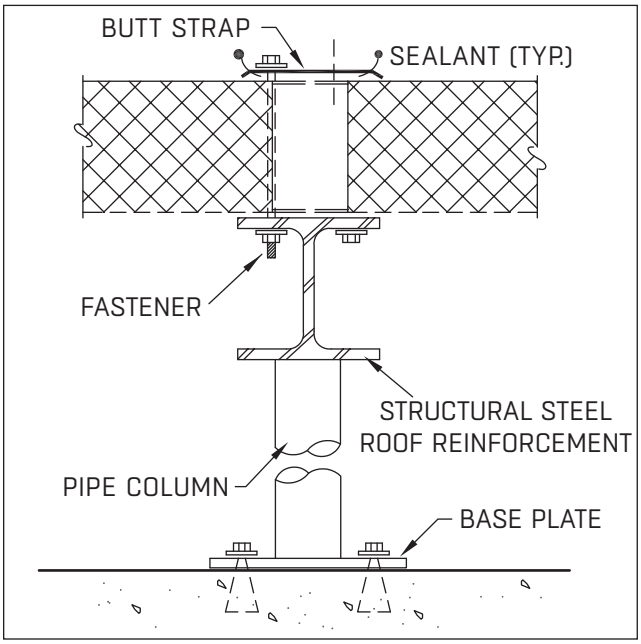
WALL PANEL SUPPORT KNEE BRACE



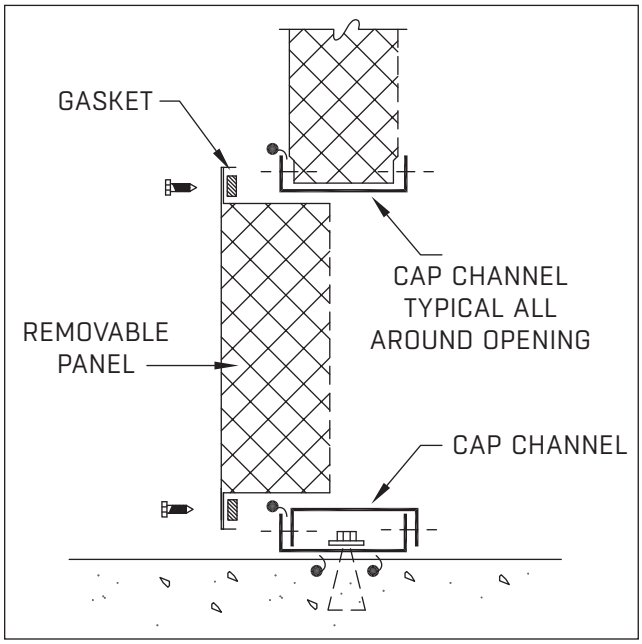
ROOF PANEL



ROOF PANEL SUPPORT WITH BREAK



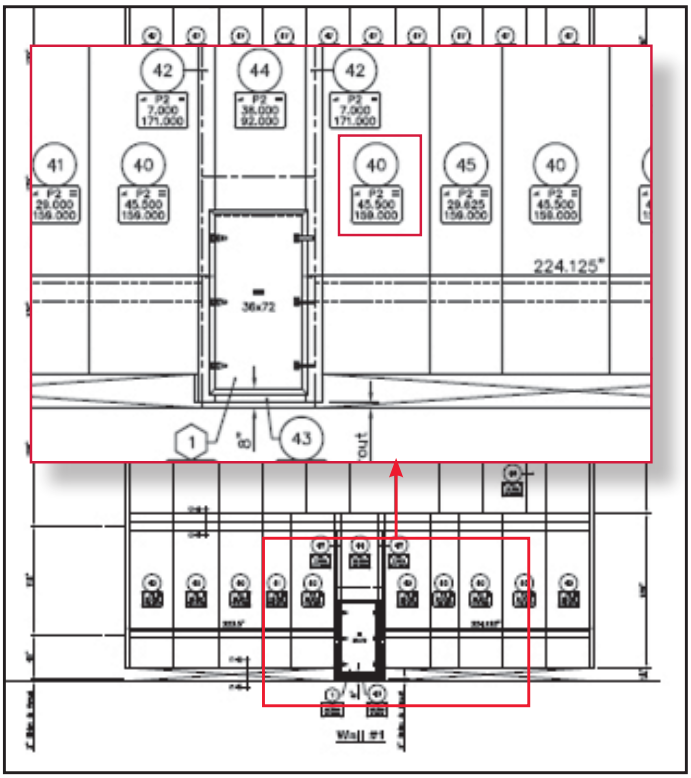
REMOVABLE PANEL



NOTE: These drawings are not intended as assembly instructions. Please refer to the AT-PANL Assembly Instructions, available from SEMCO or online at www.semcohvac.com

EASY SYSTEM LAYOUT

- Complete ¼" scale "D" size drawings ensure accurate system layout
- AutoCAD drawings with panel layout, installation details, and individual panel markings shortens the approval process and reduces field labor.
- Flexibility is built into each design to allow for unexpected job site changes
- Individual panel piece-mark and assembly drawings
- Detailed Bill of Materials



PANELS - BILL OF MATERIALS

JOB NAME : RAS AZ

JOB # : CR15822 UNIT # : Stack

CONSTRUCTION STANDARD P2

: Panel 4" 16 Ga. G90 Solid EXT /24 Ga. G90 Perf INT / 18 Ga. G90 IS @ 16" o.c. / 8#MW

Mark	Drawing No	Qty.	Width	Length	A	B	C	D	TagCode
40	1	57	45.500	159.000					A
41	1	2	29.000	159.000					A
42	1	4	7.000	171.000					A
43	1	2	38.000	6.000					A

PACKAGING OPTIONS

STANDARD LEVEL 1 PACKAGING

- Built-to-size skids
- Secure Packaging

SUPERIOR LEVEL 2 PACKAGING

- Full wood skidding top and bottom - wood framing
- Highly recommended to reduce dents and dings during shipment and storage

EXAMPLE SPECIFICATIONS

PART 1: GENERAL

This Section includes HVAC casings for field-erected, air-handling systems, plenums, and mechanical equipment housings.

Prefabricated acoustic/thermal plenums shall be installed where shown on the plans and shall be similar to AT-PANL™ Solutions, Acoustic/Thermal Panel Systems as manufactured by SEMCO, LLC, Columbia, Missouri or approved equal. Approved Manufacturers:

- SEMCO, LLC (Basis of design)
- Industrial Acoustics Company
- Commercial Acoustics

PART 2: MATERIALS

1) Acoustical enclosures shall be of AT-PANL™ dual wall tongue-and-groove panel construction finished and installed as located and sized on the contract drawings. The use of contractor's shop-constructed enclosures shall not be allowed.

2) Individual wall and roof panels shall be 4" (2"or 6") thick constructed of 18 gauge, G90 galvanized steel, solid exterior skin and a 22 gauge, G90 galvanized steel, perforated interior skin. Panels shall have a maximum width of 45 ½ inches. Panel spans up to 16'-0" shall be furnished as one piece.

3) Floor panels shall be 4" (2"or 6") thick, constructed of 16 gauge, G90 galvanized steel, solid upper skin and 22 gauge, G90 galvanized steel, solid lower skin. Intermediate floor panels shall have perforated lower skins where applicable. Spacing of internal longitudinal stiffeners shall not exceed 8".

4) Perforated interior panel sheets shall be supplied with 3/32" diameter holes spaced on 3/16" staggered centers.

5) AT-PANL™ interior shall be completely filled with a minimum three pound per cubic foot density mineral glass fiber insulation. Insulation shall be corrosion, moisture resistant, vermin proof, and rated noncombustible as defined by NFPA Standard 220 when tested in accordance with ASTM E136.

6) Internal longitudinal stiffeners shall be a minimum of 18-gauge galvanized steel and spaced so that the span does not exceed panel reinforcement 16" apart. Stiffeners shall have a depth equal to the panel thickness and be connected to both the inner and outer skin so as to provide an integral structural reinforcement within the panel.

PART 3: CONSTRUCTION

1) AT-PANL™ shall be constructed utilizing roll formed tongue and groove joints. Male edge of panel shall be metal enclosed and filled with insulation. Completed enclosures shall contain no insulation voids in joints between panels. Manufacturers furnishing individual panels with an open male channel shall fill the open channel with insulation as heretofore specified shall be attached permanently to the panel. Field insulation will not be allowed.

2) Personnel access doors shall be 24" x 66" except as noted on drawings and shall be of the pre-hung type constructed of 18 gauge, G90 galvanized steel, all welded wrap-around door frame and 18 gauge, G90 galvanized steel, solid exterior and interior skins enclosing insulation as specified for panels.

3) Doors shall be provided with a minimum of two Kason 1061 hinges and two SEMCO door latches operable from both sides of the door. Doors shall be shipped with all hardware factory installed and adjusted. Air seals suitable to provide airtight seal shall be provided between door and frame. Door swing shall be such as to open against system pressures. Each door, when required, shall have a 12" x 12" double pane safety glass viewing window.

4) Where indicated, and as sized on drawings, equipment removal doors shall be supplied to provide unobstructed opening. Doors shall be comprised of one primary and one secondary door leaf, wedge and lever latches, interior cane bolt, chain pull release and flush sill.

5) In addition to panels, sufficient trim of a minimum of 16 gauge galvanized shall be provided in standard lengths to erect casing leaving no exposed panel edges. Base channel shall have 9/16" holes pre-punched 24" on center for securing with approved fasteners to curb or pad. Sufficient panel sealant and self-tapping fasteners shall be provided to erect enclosure per manufacturer's instructions.

6) AT-PANL™ joint sealant shall be a gray colored, single component, non-sag, non-staining, permanently flexible, gun-able butyl rubber of the highest quality and conforming to federal specification TT-S-001657 for "sealing compounds, single component, butyl rubber base, solvent release type."

7) Sealant for door frame to panel applications shall be a gray polyurethane based sealant conforming to the provisions of ASTM C920 and certified to federal specification TT-S-00230C.

8) All duct and fan openings shall be provided by the panel manufacturer. All piping and conduit penetrations shall be field located and cut and sealed in accordance with manufacturer's instructions.

9) Structural integrity of the completed enclosure shall provide for maximum panel deflections of 1/240 (or 1/200) of free span when enclosure is subjected to a test pressure of (insert your pressure here)" water column (as required for application up to 10" w.g.) without the use of any fasteners at panel joints. Data used to determine structural performance shall have been the result of independent testing of a representative sample of the manufacturer's regular production which shall have been certified by the independent tester. Panels shall have been tested by subjecting them to an air pressure simulating the loading imposed under normal operation. Panel tests as a result of application to artificial loads unevenly distributed over the entire panel surface will not be accepted.

10) Structural steel required to limit the deflection herein specified shall be designed and furnished by the enclosure manufacturer and installed by the contractor. All equipment supports shall be designed, furnished and installed by the contractor.

PART 4: PERFORMANCE

See Performance Data on pages 3-4.

PART 5: CERTIFICATION

1) With submittals, the manufacturer shall provide certified test data on Transmission Loss and Sound Absorption Coefficients. The panel manufacturer shall have published data equal in all respects to panels manufactured by SEMCO, LLC. Performance data certified by an industry recognized independent acoustical testing laboratory shall be submitted to the engineer to verify that the completed housing will meet or exceed the requirements in this specification. Such data shall have been the result of certified independent testing of a representative sample of the manufacturer's regular product in accordance with applicable provisions of the American Society for Testing and Materials Procedures (423-77) and (E90-70). Performance of the enclosure shall not be impaired through prolonged exposure to noise, vibration, pressure or dampness.

2) The manufacturer shall warrant that when plenums are installed in a workmanlike manner in strict accordance with these specifications and instructions, plenums shall meet the acoustical, thermal and air pressure performance specified.

3) Plenum components shall be furnished clean, well made and free of defects adversely affecting appearance, serviceability or performance.

PART 6: SUBMITTALS

1) Provide certified test data on transmission loss and sound absorption coefficients. Test data shall be for a standard product. Signed by manufacturers of casings certifying that the acoustic performance of factory-fabricated casings complies with requirements.

2) Show sound-absorption coefficients in each octave band equal to or greater than those scheduled, when tested according to ASTM C 423.

3) Show airborne sound transmission losses equal to or greater than those scheduled, when tested according to ASTM E 90.

4) Submit full "D" size approval drawings showing the following: Fabrication, assembly, and installation, including plans, elevations, sections and details. Also, show structural where required. Access doors including frames, hinges, and latches.

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