

FIRE RATED SYSTEMS

FR **PANEL**
SOLUTIONS

TECHNICAL GUIDE

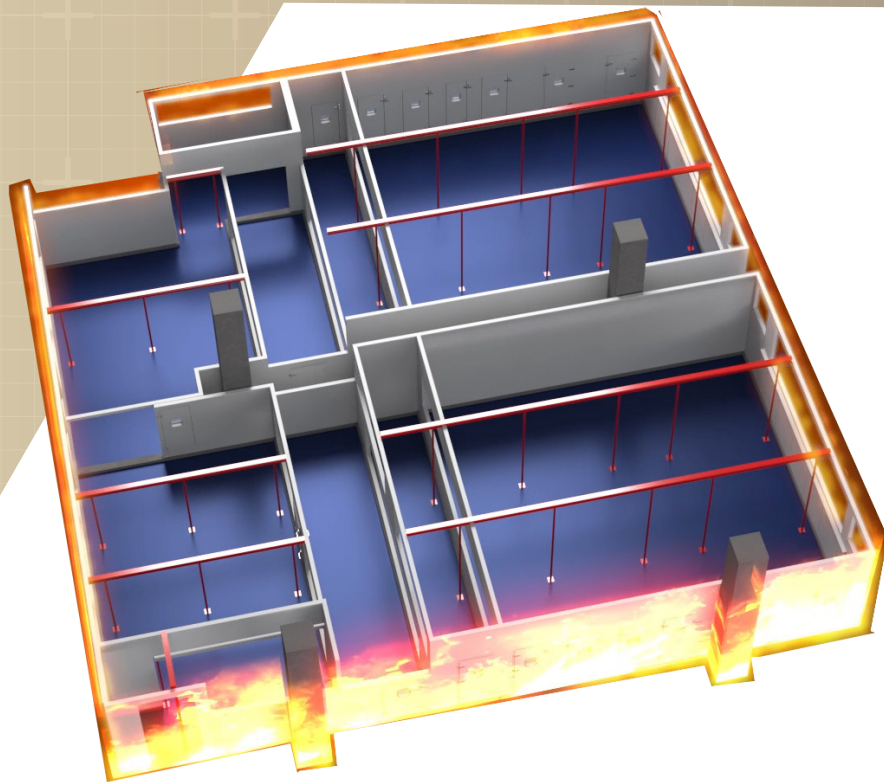


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ABOUT FR-PANEL SOLUTIONS

FläktGroup® SEMCO®’s fire-rated panel system (FR-PANEL) is a fire-resistant panel, which is also building code-compliant. The FR-PANEL system currently includes a one-hour and two-hour fire protection option.

To ensure the safety and integrity of the FR-PANEL system, FläktGroup SEMCO hired a third-party professional testing agency to perform a series of compliancy tests. These tests have concluded that the FR-PANEL system is National Fire Protection Association (NFPA) 251 compliant for thermal and acoustical panels. All tests were performed using Underwriter’s Laboratory’s (UL) UL-263 “Standard for Fire Tests of Building Construction and Materials”, which uses ASTM-E119 test criteria.

FläktGroup SEMCO’s FR-PANEL has a remarkably low thermal transfer rate, that exceeds one or two-hours of fire protection during a fire event. Unlike competitive brands, the FläktGroup SEMCO FR-PANEL system, does not require vertical panel joint fasteners, making it easy to assemble. The FR-PANEL system is held together with a precision roll-formed tongue-and-groove design joint. The tongue-and-groove design make the FR-PANEL ideal for applications such as, stairwell chase, interior walls, elevator shafts, equipment rooms, penthouse construction, building cladding, rectangular duct work and custom fire protection.

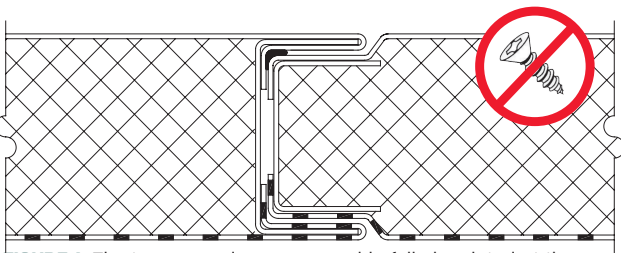


FIGURE 1: The tongue-and-groove panel is fully insulated at the male-female joint., allowing for acoustically and thermally better joints with less installation time.

A computer-aided design is provided during the planning stages, so customers are able to optimize layout and minimize the use of costly structural steel.

All panels will arrive on job sites neatly stacked, palletized and individually labeled. The complete finalized ¼” scale “D” size assembly drawings, will be sent with the shipment.

ADVANTAGES

- Roll formed tongue-and-groove construction, fully enclosed and with insulated joints gives it a better fit with closer tolerance.
- Eliminating the use of screws through vertical panel joints, reduces the installation cost and removes the possibility of air and noise leakage.
- The tongue-and-groove panels are fully insulated at the male-female joint eliminating the need for field insulation.
- Complete ¼” scale “D Size” assembly drawings
- Individually piece marked panels
- Internal media provides excellent fire protection and low sound transmission loss.
- Significantly low thermal transfer rate exceeding one or two hours of protection during fire events.
- Panels up to 12’-0” in length, adding strength and rigidity, making installation easier.
- No-thru-metal panels solving condensation and low temperature issues that may occur with standard panels.
- CAD drawings prevent the over use of structural steel, providing the customer with a calculated safety factor and reducing installation costs by as much as 15%.
- The drawings identify areas where factory interior cuts, notches and sloped ends are required, reducing install costs and utilizing equipment efficiently.
- Flexible design options to meet special requirements.
- Auto CAD drawings shorten the approval process and reduce field labor by providing panel layout, installation details and individual panel markings.
- The FR-PANEL system meets critical noise levels criteria for high transmission loss panel systems.



NFPA-CERTIFIED



INTEGRATED STRUCTURE

FR-PANEL ESSENTIALS

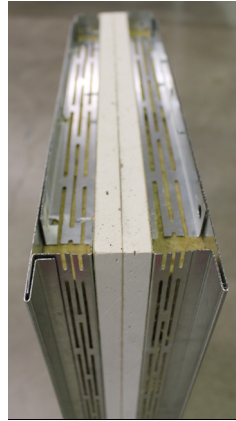


FIGURE 2: 2 HR FR-PANEL cross section, shows the tongue-in-groove joint and 4" thickness

MATERIALS:

- Galvanized steel
- Galvannealed steel
- Stainless steel

THICKNESS:

- 4 inches (See **FIGURE 2**)

FINISHES:

- Mill finish
- Field paintable

BEST APPLICATIONS:

- Interior walls
- Stairwell chase
- Elevator shafts
- Equipment rooms
- Penthouse construction
- Building cladding
- Rectangular duct work
- Custom fire protection (See **FIGURE 3**)

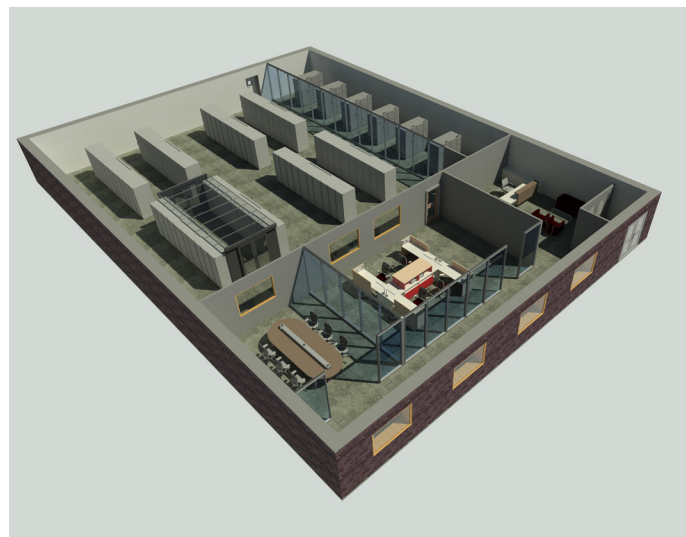


FIGURE 3: An example of a data center constructed with FR-PANELS

EASY SYSTEM LAYOUT

- All panels include a complete ¼ " scaled "D" drawings to ensure accurate system layout. (**FIGURE 4**)
- Auto CAD drawings with panel layout, installation details and individual panel markings, shorten the approval process and time spent on field labor. (**FIGURE 4**)

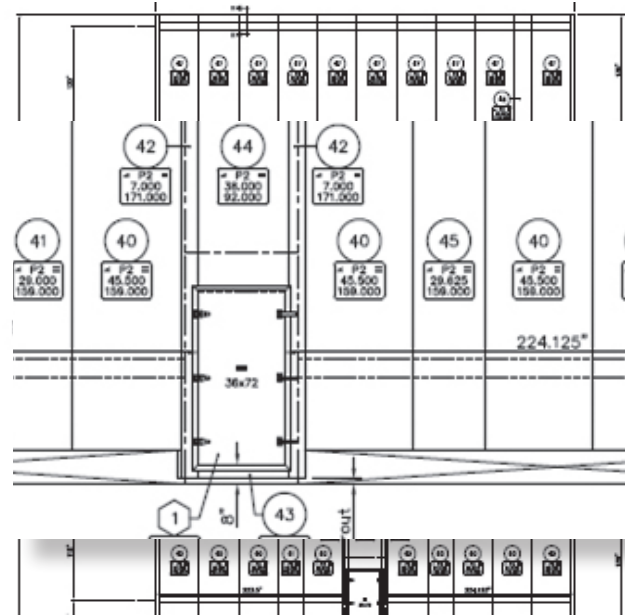


FIGURE 4: An example of an Auto CAD panel layout.

- Individual panel piece-mark and assembly drawings. (**FIGURE 5**)
- Flexibility is built into each design to allow for unexpected job-site changes.
- A detailed bill of materials is provided.

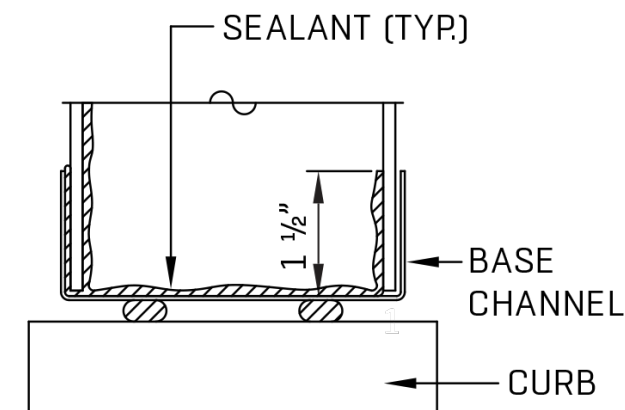
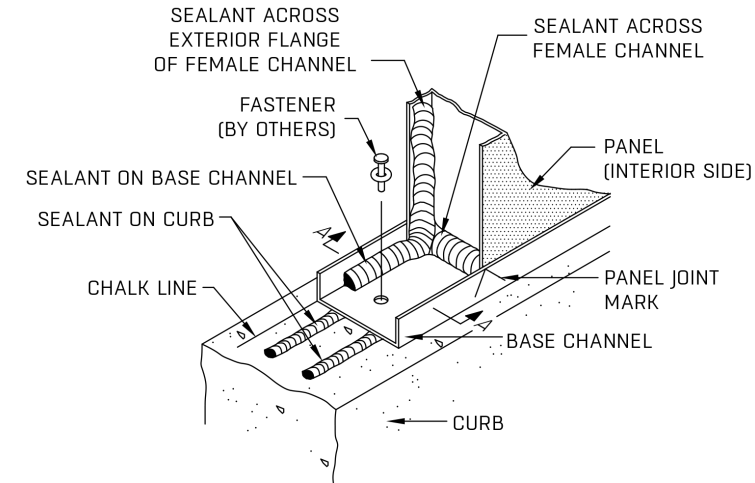


FIGURE 5: An example of panel piece-mark

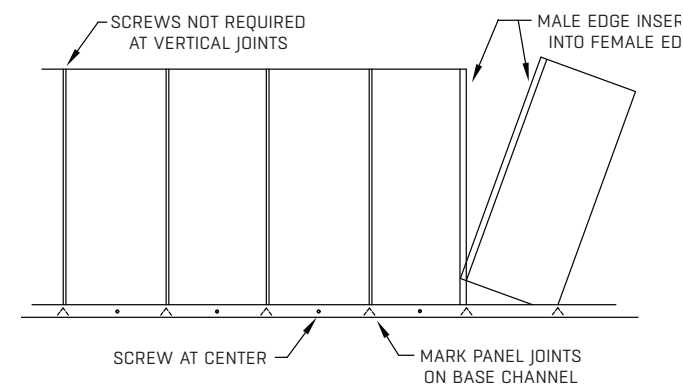
DETAILS AND DRAWINGS

For detailed assembly instructions, please refer to the FR-PANEL Assembly Instructions

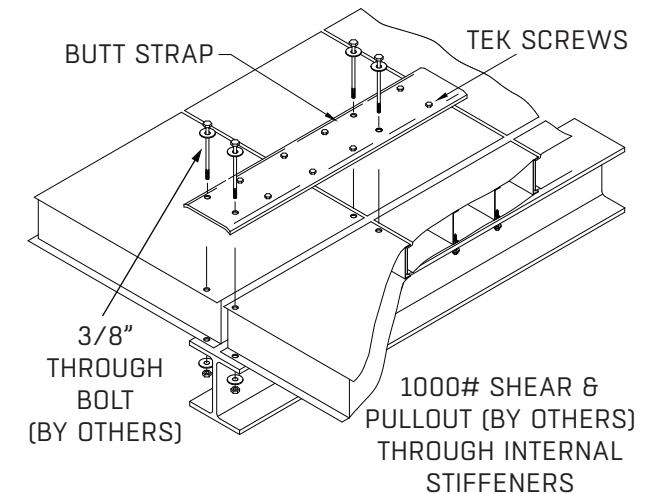
BASE CHANNEL



WALL CHANNEL

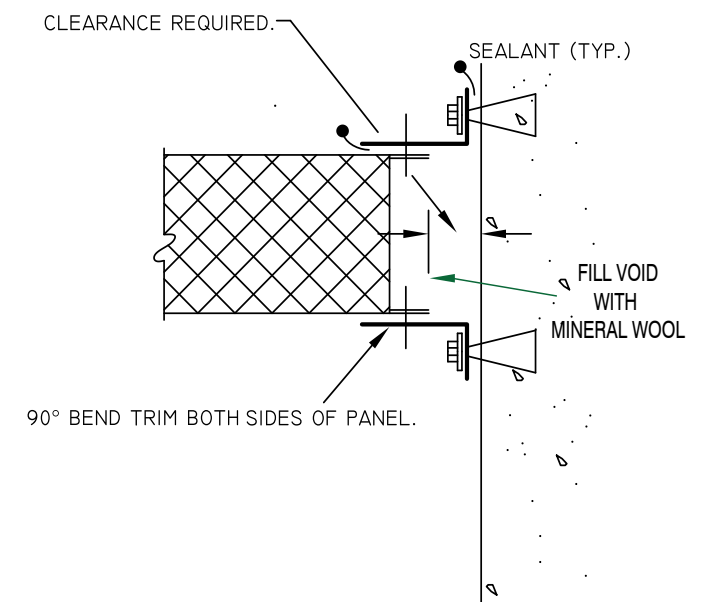


STRUCTURAL STEEL

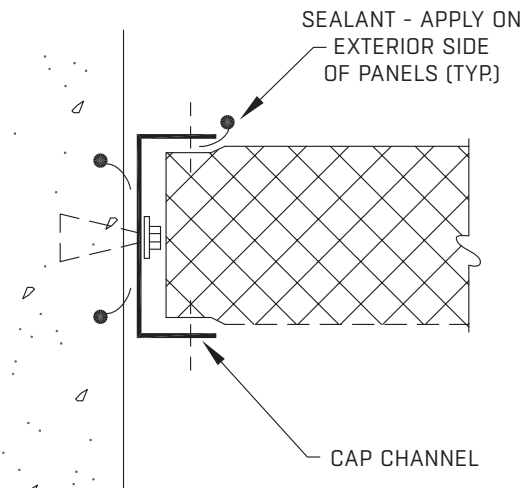


APPLICATION: ROOF SUPPORT WITH PANEL BREAK POSITIVE PRESSURE AREA

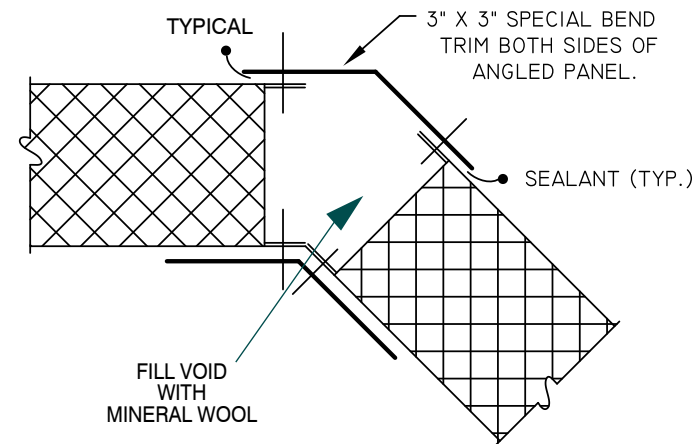
PANEL TO STRUCTURE - ANGLE



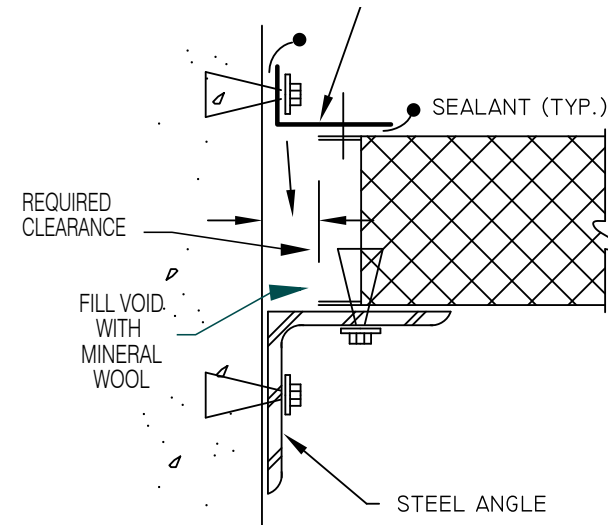
PANEL TO STRUCTURE - CAP



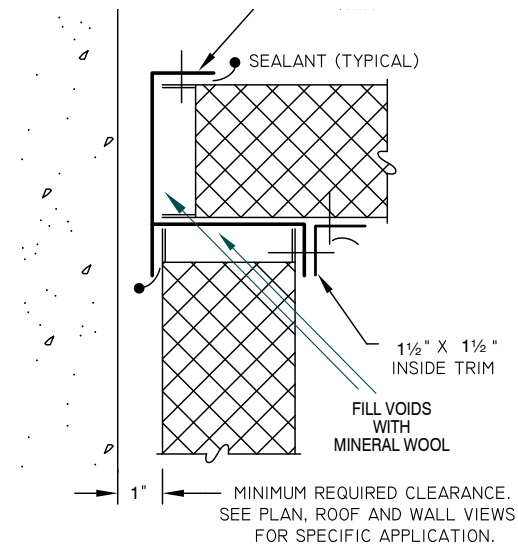
ANGLED PANEL TRIM



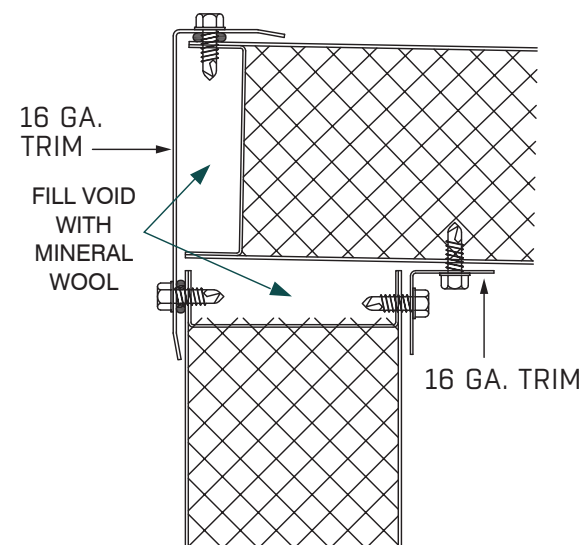
PANEL TO STRUCTURE - HD



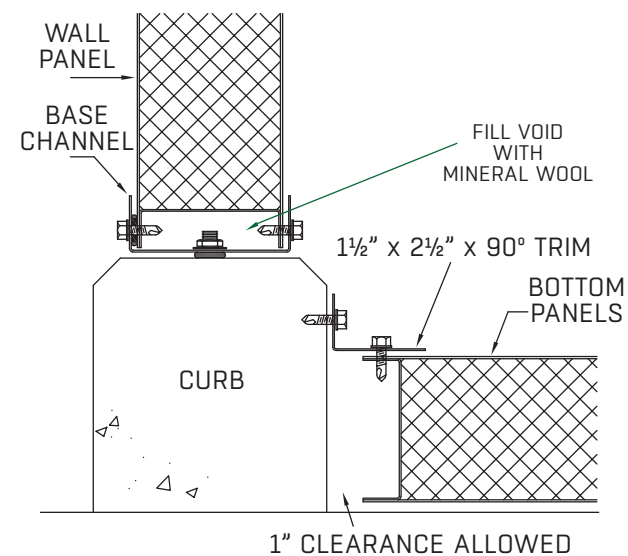
INACCESSIBLE TRIM



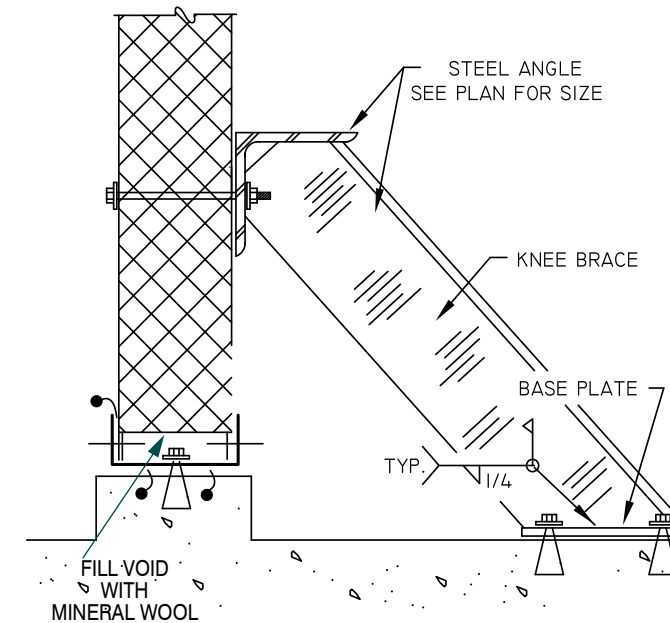
STANDARD 90° CONNECTION



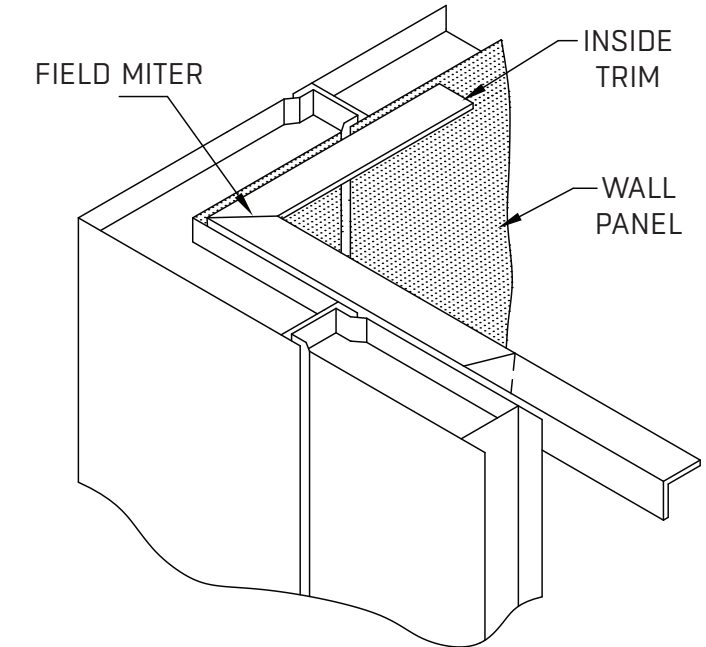
FLOOR CONNECTION AT CURB



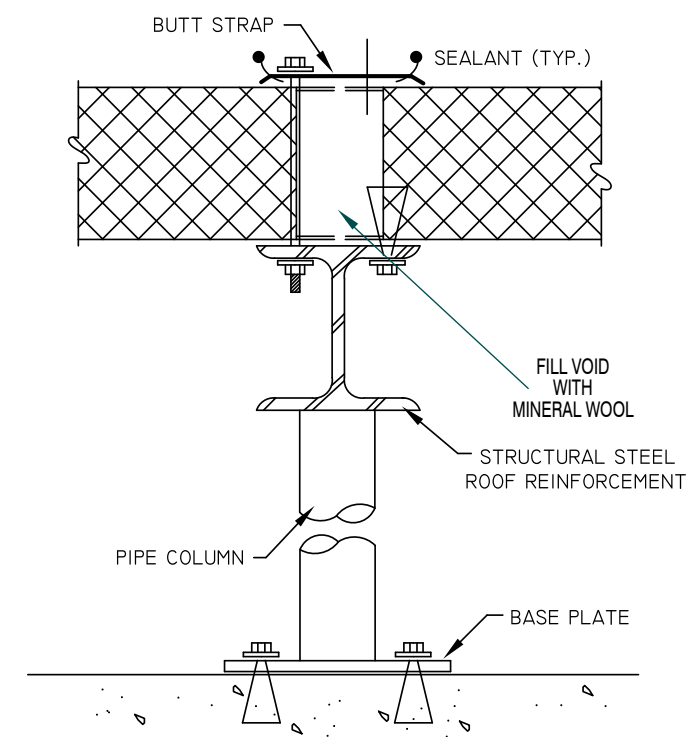
WALL PANEL SUPPORT KNEE BRACE



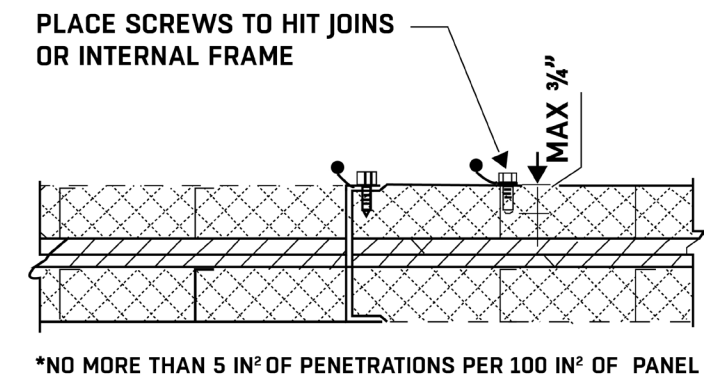
ROOF PANEL



ROOF PANEL SUPPORT WITH BREAK



MEMBRANE PENETRATIONS



FR-PANEL PERFORMANCE DATA

1 HR FR-PANEL			
TESTING CATEGORY		STANDARD	RESULTS
FIRE	VERTICAL (WALL) FIRE RETARDANT	ASTM E119	1 HOUR
	HORIZONTAL (ROOF) FIRE RETARDANT		1 HOUR
	SMOKE DEVELOPMENT AND FLAME SPREAD	ASTM E84	FLAME SPREAD = 0
			SMOKE DEVELOPED = 0
ACOUSTICAL	SOUND TRANSMISSION LOSS	ASTM E90	STC 42
	SOUND ADSORPTION	ASTM C430	NRC 0.25
STRUCTURAL	HORIZONTAL COMPRESSIVE ULTIMATE LOAD	ASTM E72-15	13,192 LBS.
	VERTICAL COMPRESSIVE ULTIMATE LOAD		7,254 LBS.
	12 FT TRANSVERSE ULTIMATE LOAD		39 PSF
THERMAL	THERMAL TRANSMITTANCE (U-VALUE)	ASTM C236	0.11 BTU/HRFT²F
	THERMAL TRANSMITTANCE (R-VALUE)	ASTM C1363	7.86 BTU/HRFT²F
WEATHER	AIR INFILTRATION	ASTM E283	<0.01 CFM/F² AT 20 PSF
	WATER PENETRATION	ASTM E331	0 AT 20 PSF

DETAILED LOOK AT STRUCTURAL TESTING DATA

1 HR FR-PANEL — TRANSVERSE ULTIMATE LOAD (HORIZONTAL)				
TESTING CATEGORY	STANDARD	L/360 (PSF)	L/240 (PSF)	L/180 (PSF)
6 FT. TRANSVERSE LOAD	ASTM E72-15	34.0	42.7	50.8
12 FT. TRANSVERSE LOAD		25.9	58.5	90.1

2 HR FR-PANEL			
TESTING CATEGORY		STANDARD	RESULTS
FIRE	VERTICAL (WALL) FIRE RETARDANT	ASTM E119	2 HOUR
	HORIZONTAL (ROOF) FIRE RETARDANT		—
	SMOKE DEVELOPMENT AND FLAME SPREAD	ASTM E84	FLAME SPREAD = 0
			SMOKE DEVELOPED = 5
ACOUSTICAL	SOUND TRANSMISSION LOSS	ASTM E90	STC 42
	SOUND ADSORPTION	ASTM C430	NRC 0.25
STRUCTURAL	HORIZONTAL COMPRESSIVE ULTIMATE LOAD	ASTM E72-15	11,129 LBS.
	VERTICAL COMPRESSIVE ULTIMATE LOAD		17,107 LBS.
	12 FT TRANSVERSE ULTIMATE LOAD		33 PSF
THERMAL	THERMAL TRANSMITTANCE (U-VALUE)	ASTM C236	0.11 BTU/HRFT²F
	THERMAL TRANSMITTANCE (R-VALUE)	ASTM C1363	7.86 BTU/HRFT²F
WEATHER	AIR INFILTRATION	ASTM E283	<0.01 CFM/F² AT 20 PSF
	WATER PENETRATION	ASTM E331	0 AT 20 PSF

DETAILED LOOK AT STRUCTURAL TESTING DATA

2 HR FR-PANEL — TRANSVERSE ULTIMATE LOAD (HORIZONTAL)				
TESTING CATEGORY	STANDARD	L/360 (PSF)	L/240 (PSF)	L/180 (PSF)
6 FT. TRANSVERSE LOAD	ASTM E72-15	34.0	42.7	50.8
12 FT. TRANSVERSE LOAD		4.5	5.4	6.3

1 HR FR-PANEL — TRANSVERSE ULTIMATE LOAD (VERTICAL)				
TESTING CATEGORY	STANDARD	L/360 (PSF)	L/240 (PSF)	L/180 (PSF)
6 FT. TRANSVERSE LOAD	ASTM E72-15	44.9	53.6	61.7
12 FT. TRANSVERSE LOAD		25.9	58.5	90.1

2 HR FR-PANEL — TRANSVERSE ULTIMATE LOAD (VERTICAL)				
TESTING CATEGORY	STANDARD	L/360 (PSF)	L/240 (PSF)	L/180 (PSF)
6 FT. TRANSVERSE LOAD	ASTM E72-15	44.9	53.6	61.7
12 FT. TRANSVERSE LOAD		15.4	16.3	17.2

DETAILED LOOK AT ACOUSTICAL TESTING DATA

The result of the ASTM E90 transmission loss testing on non-load-bearing wall assembly for both the 1 HR and 2 HR FR-PANEL is shown in the table below.

FREQUENCY (HZ)	63	125	250	500	1,000	2,000	4,000	8,000	STC
TRANSMISSION LOSS (dB)	20	28	42	57	63	64	74	71	42

The result of the ASTM C430 sound absorption testing on non-load-bearing wall assembly for both the 1 HR and 2 HR FR-PANEL is shown in the table below.

FREQUENCY (HZ)	125	250	500	1,000	2,000	4,000	NRC
TRANSMISSION LOSS (dB)	0.27	0.15	0.05	0.03	0.01	0.03	0.05

CERTIFICATIONS

Intertek ATI — an independent laboratory, has verified that the 1 HR and 2 HR FR-PANEL systems have achieved the certifications in the chart below:

CERTIFICATION	DESCRIPTION
ASTM E119	VERTICAL WALL FIRE RETARDANT TEST
ASTM E84	SMOKE DEVELOPMENT AND FLAME SPREAD RATINGS TEST
ASTM E283 AND ASTM E331	AIR FILTRATION AND WATER PENETRATION TEST
ASTM C1363 AND ASTM C236	THERMAL TRANSMITTANCE AND RESISTANCE RATING TEST
ASTM E72	COMPRESSIVE AND TRANSVERSE LOAD RATING TEST
ASTM E90 AND ASTM C430	SOUND TRANSMISSION LOSS AND ABSORPTION RATING TEST

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 FR-PANEL SPECIFICATIONS

1 HR & 2 HR FIRE-RATED PANELS

FläktGroup SEMCO's FR-PANEL system is a fire-rated panel system, which is engineered for use in interior, exterior, non-load bearing and load bearing wall usage. The panels are manufactured by FläktGroup SEMCO LLC of Columbia, Missouri or by an approved alternate manufacturer. Industrial Acoustics Company and Commercial Acoustics have been designated as the approved alternate manufacturers of the FläktGroup SEMCO designed FR-PANEL system.

MATERIALS

EXTERIOR

The enclosure or structural system shall be of FR-PANEL dual wall tongue-and-groove panel construction, finished and installed as located and sized on the contract drawings. The use of the contractor's shop constructed enclosures or structures will not be allowed.

Individual wall and roof panels shall be 4 inch thick and constructed of 18-22-gauge, G90 galvanized steel, solid exterior skin and an 18-22-gauge, G90 galvanized steel, solid interior skin. Panels shall have a maximum width of 45½ inches. Panel spans up to 12 feet shall be furnished as one piece.

INTERIOR

The FR-PANEL interior shall be filled with a minimum of 8.5 pounds per cubic foot density steel wool insulation. Insulation shall be fire retardant, corrosion, moisture resistant, vermin proof and rated noncombustible as defined by ASTM C612.

Internal longitudinal stiffeners shall be a minimum of 18-gauge galvanized steel and spaced so that the span does not exceed panel reinforcement of more than 15 inches apart. Stiffeners shall have a depth equal to the panel thickness and be connected to the skin and other stiffeners on the other side, so as to provide an integral structural reinforcement within the panel. (See **FIGURES 6 & 7**)

RECOMMENDED CONSTRUCTION MATERIALS

- 3M™ Fire Barrier Sealant 2,000+ or equivalent
- Rockwool® Conrock® 8.5 lb/ft³ mineral wool insulation or equivalent

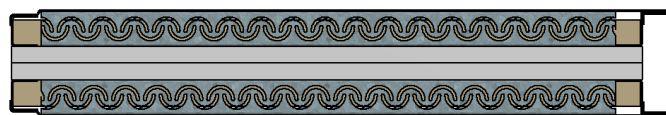


FIGURE 6: Cross-section of the 1 HR FR-PANEL

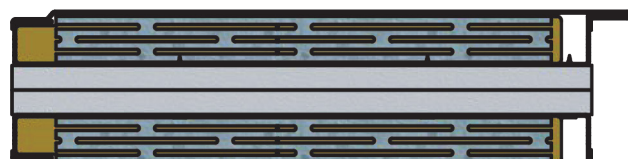


FIGURE 7: Cross-section of the 2 HR FR-PANEL

CONSTRUCTION

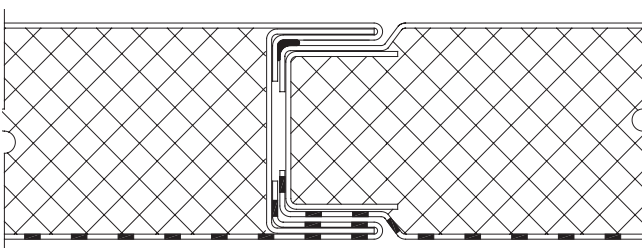


FIGURE 8: Tongue-and-groove joint example

FR-PANELS shall be constructed utilizing roll-formed tongue-and-groove joints. (See **FIGURE 8**) Male edge of the 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.

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

FR-PANEL joint sealant shall be tested up to 2 hours and conform to the ASTM E814 (UL 1479) standard for the penetration fire-stop systems fire test, as well as, ASTM E1966 (UL 2079) standard test method for fire-resistive joint systems.

All duct and fan openings shall be provided by the panel manufacturer. All piping and conduit penetrations shall be provided by the panel manufacturer, and sealed in accordance with manufacturer's instructions.

Structural integrity of the completed enclosure shall provide for maximum panel deflections of 1/240 of free span when enclosure is subjected to a test pressure of 10 inches of water column without the use of any fasteners or 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.

Structural steel required to limit the deflection and fire proofing ability 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.

RESTRICTIONS

- FR-PANELS are suitable for the purposes which they are suggested or reviewed by FläktGroup SEMCO. Any other application besides the application was originally designed for may result in failed integrity of the FR-PANEL, voiding its ASTM E119 one hour or two hour rating. FläktGroup SEMCO is not liable for the FR-PANEL under such condition.
- The FR-PANEL is not designed for field cutting. Any field cut may result in failed integrity of the FR-PANEL, voiding its ASTM E119 one or two hour rating. FläktGroup SEMCO is not liable for the FR-PANEL under such condition.
- Customer is responsible for the structural strength of the whole system and properly designed and integrated with the FR-PANELS.
- Customer is responsible for the fire resistance protection of the structural support, framing and making sure other adjacent construction is properly designed and integrated with the FR-PANEL system.
- Customer is responsible for ensuring that panel joint seals and perimeter seals are properly specified for the project's moisture and vapor control requirements.

If any one of the above limitations is violated, FR-PANEL is no longer applicable for its original design purpose. FläktGroup SEMCO is not liable for the FR-PANEL under such condition.

PERFORMANCE

See **PAGES 6-8**.

CERTIFICATION

See **PAGE 9**.

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

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

SUBMITTALS

Provide certified test final report. Test data shall be for a standard product, signed by the manufacturers of the casings, certifying that the acoustical performance of factory-fabricated casings complies with requirements.

Submit approval for generic drawings showing the following: fabrication, assembly instruction and installation guide.

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FR-PANEL TECHNICAL GUIDE / 20231004

FläktGroup® SEMCO® delivers smart, energy-efficient, air-quality solutions to support every building application. We offer our customers innovative technologies, high-quality products and outstanding performance supported by more than fifty years of accumulated industry experience. The broadest offering on the market and a strong market presence in 65 countries worldwide guarantees that we are always by your side, ready to deliver: Excellence in Solutions.

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