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Legacy report on the 1997 Uniform Building Code™, the 2000 International Building Code® and the 2000 International Residential Code®

DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07410—Metal Roof and Wall Panels

acsys, Inc. STRUCTURAL INSULATED BUILDING PANELS

acsys, Inc.
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1.0 SUBJECT

acsys, Inc. Structural Insulated Building Panels.

2.0 DESCRIPTION

2.1 General:

The acsys, Inc. Structural Insulated Building Panels are factory-assembled structural panels consisting of a galvanized steel corrugated panel encapsulated within a monolith of molded expanded polystyrene (EPS). The panels have steel channels factory-installed on both ends of the corrugated steel panels. The panels are used as load-bearing and nonload-bearing walls in buildings classified as UBC (1997 Uniform Building Code™) and IBC (2000 International Building Code®) Type V construction. In addition, panels installed in accordance with Section 2.8 as exterior nonload-bearing walls are permitted to be used in buildings classified as UBC noncombustible construction and IBC Types I, II and III construction. The insulated panels are 6 inches (152 mm) thick, weigh approximately 2½ psf (12.21 kg/m²), are available in 25½-inch (648 mm) and 49½-inch (1258 mm) widths, and are up to 16 feet (4880 mm) long. The panels have a thermal resistance (R-value) of 24.8°F-ft²-h/Btu (4.36 m²-k/w) at a temperature of 25°F (-3.9°C).

The panels are manufactured in two types: T-Panels and ½-T-Panels. Figures 1 and 2 provide additional descriptions.

The T-Panels are sold under the trade names “acsys” and “Koreteck”. The T-Panels serve as the standard building block of the system, and are manufactured with ship-lap edges along both longitudinal edges of the panel. These ship-lap edges are alternated for a steel-to-steel connection as shown in Figures 1 and 2.

2.2 Materials:

2.2.1 Steel Core: The building panel core is manufactured from No. 20 gage [0.0360 inch (0.91 mm) base-metal thickness], cold-formed galvanized steel sheets conforming

to ASTM A 653, Designation SS, Grade 33, and ASTM A 924, having a minimum yield strength of 33,000 psi (227 MPa), a minimum tensile strength of 45,000 psi (310 MPa), and a G60 coating. The steel sheets have 3-inch-deep (76-mm) corrugations, with webs having a pitch of 60 degrees. The webs have 1¾-inch-diameter (44.4 mm) holes, centered on the web and spaced at 6 inches (152 mm) on center. Details are shown in Figures 1 and 2.

2.2.2 Factory-installed End Channels: Channels factory-installed on both ends of the panels are G90 galvanized 3⅝-inch-deep (92 mm) C-sections with 1⅝-inch (41.3 mm) flange widths. These sections are formed from No. 18 gage [0.0470 inch (1.19 mm) base-metal thickness] cold-formed steel conforming to ASTM A 653, Designation SS, Grade 33, with a minimum yield strength of 33,000 psi (227 MPa), a minimum tensile strength of 45,000 psi (310 MPa), and a G60 coating.

2.2.3 Field-installed Top and Bottom Tracks: The field-installed top and bottom steel tracks are formed from G90 galvanized 0.0470-inch (1.19 mm) C-section, No. 18 gage [0.0470 inch (1.19 mm) base-metal thickness] cold-formed steel conforming to ASTM A 653, Designation SS, Grade 33, with a minimum yield strength of 33,000 psi (227 MPa), a minimum tensile strength of 45,000 psi (310 MPa), and a G60 coating. See Figures 6 and 7 for the required channel shape and dimensions.

2.2.4 Miscellaneous Steel: The field-installed angle section used for exterior corner connection shall consist of either 4½-inch-by-4½-inch (114 mm by 114 mm) angles or 4½-inch-by-1½-inch (114 mm by 38 mm) angles, as required. The angle sections must be formed from G60 galvanized, No. 18 gage [0.0470 inch (1.19 mm) base-metal thickness] cold-formed steel conforming to ASTM A 653, Designation SS, minimum Grade 33, with a minimum yield strength of 33,000 psi (227 MPa) and a minimum tensile strength of 45,000 psi (310 MPa). The angle sections are installed as exterior corner connections for panels. See Figures 3 and 5.

2.2.5 Expanded Polystyrene (EPS): The steel core of the panels is embedded in nominal 0.95 pcf (15.2 kg/m³) EPS by a molding process involving beads, as specified in the approved quality control manual. The EPS has a flame-spread index not exceeding 25 and a smoke-developed index not exceeding 450 when tested in accordance with UBC Standard 8-1 (ASTM E 84), and complies with ASTM C 578-01, Type I.

*Corrected June 2005

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2.2.6 Welding: The factory-installed end channels are welded with E80 filler metal having a minimum diameter of 0.09 inch (2.25 mm). Other weld requirements are in accordance with AWS D1.3-98. Allowable tension loads are determined in accordance with Section 2217 of the UBC or Section 2205 of the IBC, as applicable.

2.3 Allowable Loads:

The allowable axial and transverse uniform loads are noted in Table 1. The allowable racking shear load for wall panels used as a shearwall is shown in Table 1, provided the shear wall height-to-width ratio does not exceed 1:1.

Combined axial and transverse loads must comply with the following equation:

$$\frac{\text{Applied Transverse Load [psf (Pa)]}}{\text{Allowable Transverse Load [psf (Pa)]}} + \frac{\text{Applied Axial Load [plf (Pa)]}}{\text{Allowable Axial Load [plf (Pa)]}} \leq 1$$

In load-bearing wall applications, structural calculations justifying load transfer connections must be provided to the building official for approval.

2.4 Openings:

Wall openings must be framed with conventional materials, and must be designed in accordance with the UBC and the IBC, as applicable, to the satisfaction of the building official.

2.5 Installation:

The field-installed steel bottom track must be secured at a maximum of 12 inches (305 mm) on center, using power-driven concrete fasteners when the system is installed on concrete floors or wood screws when the system is installed on wood floors. The fasteners must comply with the applicable code or be recognized in a current evaluation report and sized to resist applied loads. The *acsys*^{Inc.} panels are installed into the track and fitted together with the ship-laps along the panel edges. The panels are oriented to mate the metal of the ship-lap edges, and stitched together along the panels' longitudinal edge using No. 14 by 3/4-inch (19.1 mm), self-drilling metal screws spaced at 24 inches (610 mm) on center. The field-installed steel top track that is either horizontal or angled to match the roof slope is installed as shown in Figure 6. The field-installed top and bottom tracks are secured to the steel core of the *acsys*^{Inc.} panels using No. 14, hex-head, self-drilling screws, spaced at 12 inches (305 mm) on center (maximum) or as specified in Table 1 for shear walls. Typical installation details are shown in Figures 3 through 9. Corner panels are installed as shown in Figures 3 and 5.

The panels are supplied to the jobsite with a set of shop drawings indicating the exact location of each panel. The foam plastic can be field-cut using hot wire tools.

2.6 Thermal Barrier:

The interior of the building must be protected from the exposed foam plastic insulation of the wall panels by an approved 15-minute-rating thermal barrier such as minimum 1/2-inch-thick (12.7 mm) regular gypsum wallboard complying with ASTM C 36, with the long dimension of the wallboard perpendicular to the long dimension of the panels. The gypsum wallboard must be applied to the interior facing of the wall panels and attached using 3-inch-long (76 mm), No. 10 wafer-head, self-drilling, metal drywall screws at 8 inches (203 mm) on center at vertical joints along the raised internal fluted section of the steel panel core and 1 inch (25.4 mm) from the panel edges at 12 inches (305 mm) on center at wall perimeter.

2.7 Exterior Cladding:

The *acsys*^{Inc.} panels must be covered on the exterior with the Senergy Senerflex exterior insulation and finish system, with

the coating lamina applied over the *acsys*^{Inc.} panel as described in ER-3850; or a cementitious exterior wall covering installed in accordance with the applicable code or a current ICC-ES evaluation report; or an approved weather-resistant wall covering recommended by the manufacturer, and a weather-resistive barrier. The weather-resistive barrier must comply with the applicable code or be recognized in a current evaluation report as complying with Section 1402 of the UBC or Section 1405.2 of the IBC, whichever is applicable. Flashing of penetrations and openings shall be in accordance with Section 1403.2 of the UBC, Section 1405.3 of the IBC or Section R703.8 of the IRC, as applicable.

2.8 Nonload-bearing Walls Required to Be of Noncombustible Construction (UBC) and Types I, II, III Construction (IBC):

2.8.1 Interior Finish: The interior finish consists of one layer of 5/8-inch-thick (15.9 mm), Type X gypsum wallboard, complying with ASTM C 36, installed vertically or horizontally and fastened to the panel by penetrating the steel corrugated core with 2 1/2-inch-long (63.5 mm), buglehead self-tapping screws spaced at 12 inches (305 mm) on center at the perimeter and in the field of the gypsum wallboard. All board joints must be taped and treated with joint compound. Fastener heads must also be treated with joint compound. Wall openings shall be framed with No. 18 gage [0.047 inch (1.19 mm)] steel channels installed as shown in Figures 8 and 9.

2.8.2 Exterior Finish: The Senergy exterior finish system, consisting of Senerflex Alpha Base Coat, Senergy reinforcing mesh, Senergy Classic Finish Coat, and Sonolastic 150 VLM Sealant, is applied to the exterior face of the wall panel. Preparation, application and curing of the Senergy Senerflex Wall System must be in accordance with the Senergy instruction procedure and evaluation report ER-3850, without the foam plastic insulation board. Wall openings shall be framed with No. 18 gage [0.047 inch (1.19 mm)] steel channels installed as shown in Figures 8 and 9.

2.9 Special Inspection:

In jurisdictions enforcing the IBC, special inspections in accordance with IBC Sections 1704.1 and 1704.12 are required for the Senergy exterior finish system. Duties of the special inspector include verifying field preparation of materials, expiration dates, installation of components, curing of components, installation of joints and sealants.

2.10 Identification:

Each panel is identified by a label bearing the *acsys*^{Inc.} name and address, product name and type, thickness of the panel with steel core gage, name of the inspection agency (STI Northwest) and the evaluation report number (PFC-5881).

Where *acsys*^{Inc.} panels are used on walls required to be of noncombustible construction (UBC) or Types I, II, III construction (IBC), the edge or each face of the *acsys*^{Inc.} panel is labeled with the following information:

1. Inspection agency name (STI Northwest).
2. Product for which the insulation is listed (*acsys*^{Inc.} panels).
3. *acsys*^{Inc.} company name as the insulation manufacturer.
4. Flame-spread and smoke-development classifications.
5. The evaluation report number (ER-5881).

Each field-installed steel track has a legible label, stamp or embossment, at a minimum of 48 inches (1219 mm) on center, indicating the *acsys*^{Inc.} Panel name and logo or initials, material minimum base-metal thickness, yield strength [if greater than 33 ksi (228 MPa)] and the name or logo of the inspection agency (STI Northwest).

3.0 EVIDENCE SUBMITTED

Data in accordance with the Acceptance Criteria for Foam Plastic Insulation (AC12), dated July 2002; report of transverse load tests in accordance with ASTM E 1592; report of racking shear tests in accordance with ASTM E 455; report of room corner fire tests in accordance with UBC Standard 26-3; report of intermediate-scale, multistory fire test in accordance with UBC Standard 26-9; structural calculations; and a quality control manual.

4.0 FINDINGS

That the *acsys*^{Inc.} insulated steel building panels described in this report comply with the 1997 *Uniform Building Code*TM (UBC), the 2000 *International Building Code*[®] (IBC) and the 2000 *International Residential Code*[®] (IRC), subject to the following conditions:

- 4.1 Panels are manufactured, identified and installed in accordance with this report and the manufacturer's instructions.
- 4.2 Remaining portions of the building structure are designed and constructed in accordance with the applicable code.
- 4.3 Plans and calculations showing compliance with this report are submitted to the building official for approval.
- 4.4 Panels are limited to allowable loads as set forth in this report. Calculations demonstrating that the applied loads comply with this report must be submitted to the building official for approval.

- 4.5 The EPS foam plastic is separated from the building interior with an approved thermal barrier, as described in Section 2.6 of this report.
- 4.6 Panel openings comply with Section 2.4 of this report.
- 4.7 Panels are limited to use in buildings of UBC Types II-N and V construction, and IBC Types I, II, III and V construction.
- 4.8 Special inspection is provided in jurisdictions enforcing the IBC in accordance with IBC Sections 1704.1 and 1704.12, for installations with the Senergy exterior finish system.
- 4.9 When regulation is under the IRC, compliance with Section R324.4 of the IRC must be demonstrated.
- 4.10 The system may be installed on nonload-bearing exterior walls required to be of noncombustible construction (UBC) or Types I, II, III (IBC) construction, provided construction is in accordance with Section 2.8 of this report. Installation of the exterior finish system is by applicators approved by the exterior finish system manufacturer.
- 4.11 Panels are fabricated at the *acsys*^{Inc.} manufacturing facility in Post Falls, Idaho, under a quality control program with inspections conducted by STI Northwest (AA-677).

This report is subject to re-examination in one year.

TABLE 1—ALLOWABLE LOADS

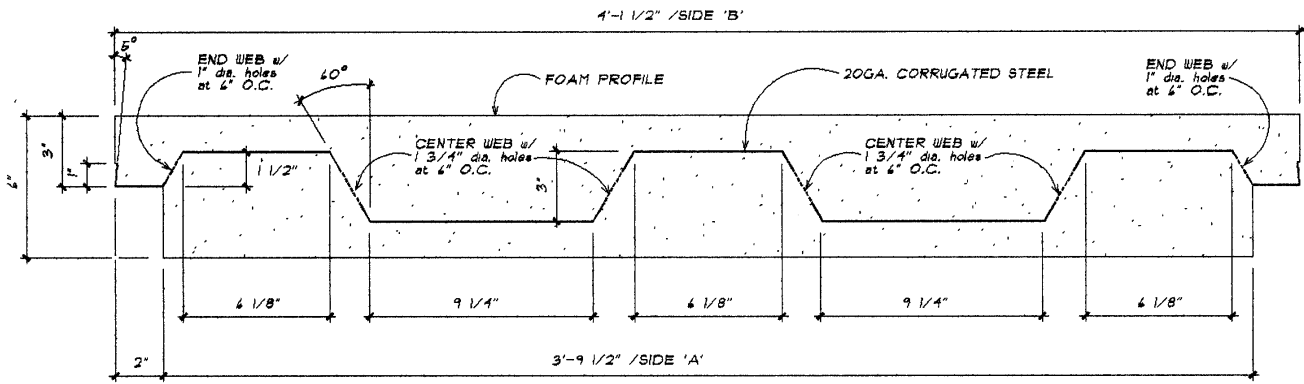
PARAMETER	WALL HEIGHT (feet)						
	10	11	12	13	14	15	16
Transverse load ¹ (psf)	41	36	30	25	22	19	16
Axial load ² (plf)	2448	2291	2121	1964	1782	1641	1515
Racking shear load ³ (plf)	209	190	174	161	149	139	130
Lap fastener spacing for racking shear load (inches)	10	12	13	13	14	15	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8, 1 psf = 6.894 kPa, 1 plf = 14.6 N/m.

¹Allowable loads are test values from 10-foot-, 13-foot- and 16-foot single span condition with factor of safety equal to 1.75 calculated in accordance with AISI Cold-Formed Specification. All other values were derived from linear interpolation.

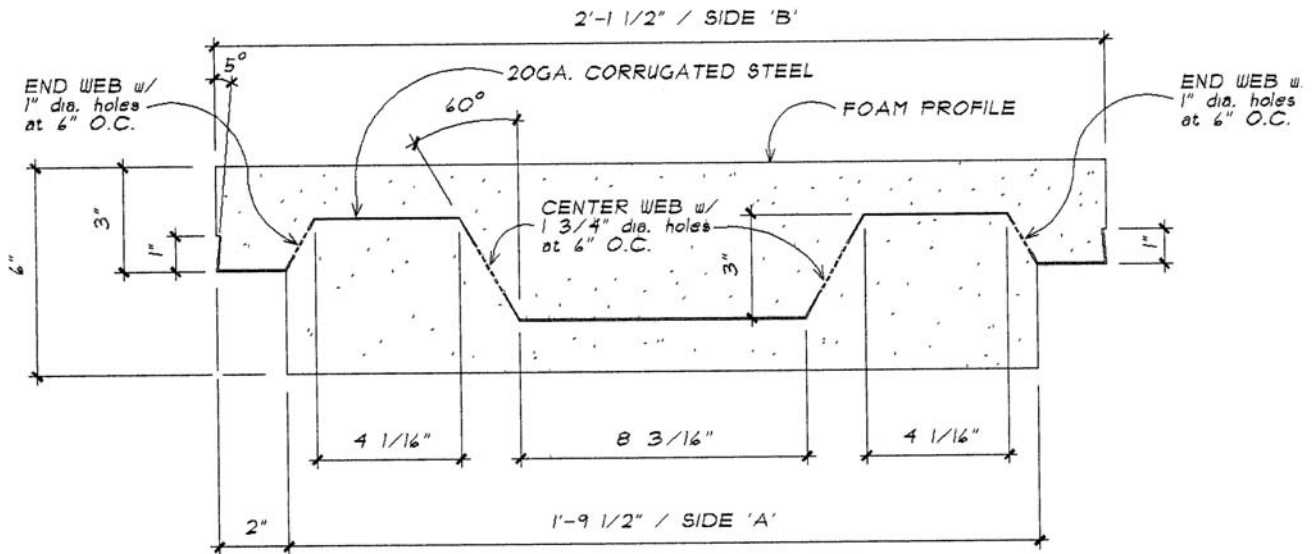
²Allowable loads are calculated values excluding the panel weight, in accordance with the AISI Cold-Formed Specification.

³The allowable loads are based only on the panel in-plane racking shear strength. Remaining portions of the structure supporting the panels, including connections of the panel to the field-installed track and of the field-installed track to the supports, must be designed to resist all loads imposed on the panel in accordance with the applicable code. The maximum span-width ratio is 4:1.



4-FOOT T-PANEL

FIGURE 1—SECTION OF CORE STEEL, 4-FOOT PANELS



2-FOOT 1/2 T-PANEL

FIGURE 2—SECTION OF CORE STEEL, 2-FOOT PANELS

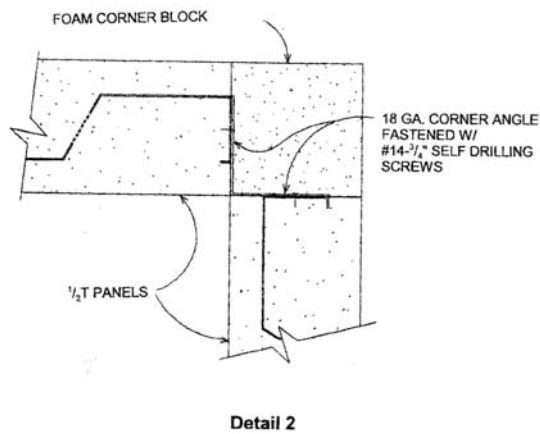
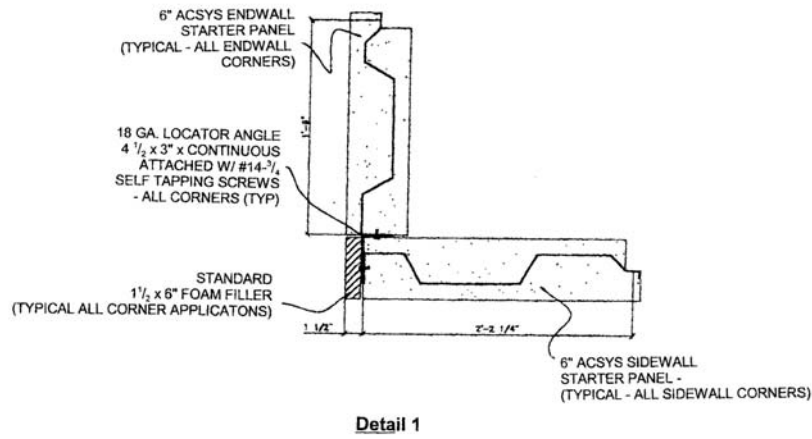


FIGURE 3—TYPICAL CORNER APPLICATION

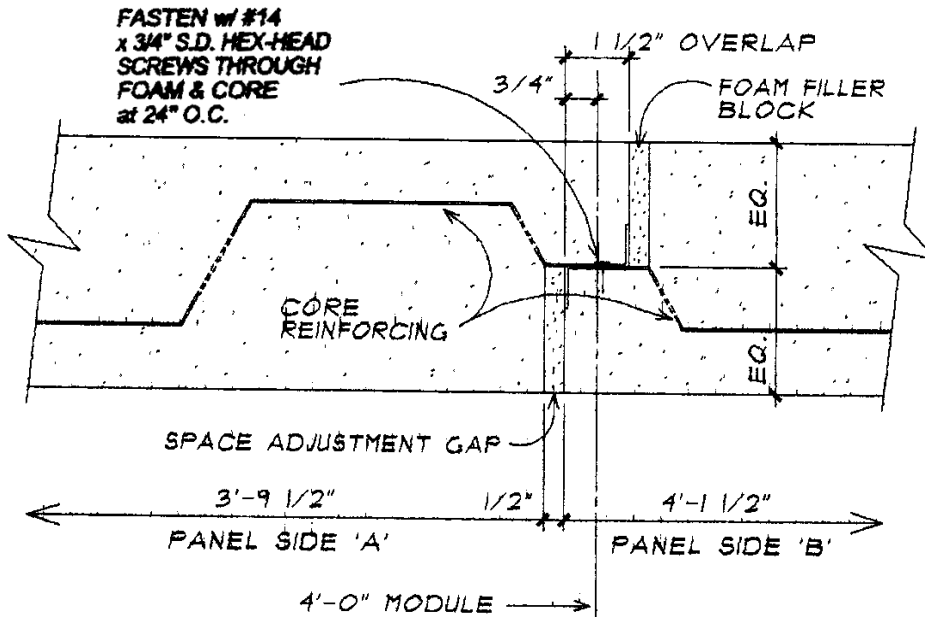


FIGURE 4—TYPICAL PANEL JOINT CONNECTION DETAIL

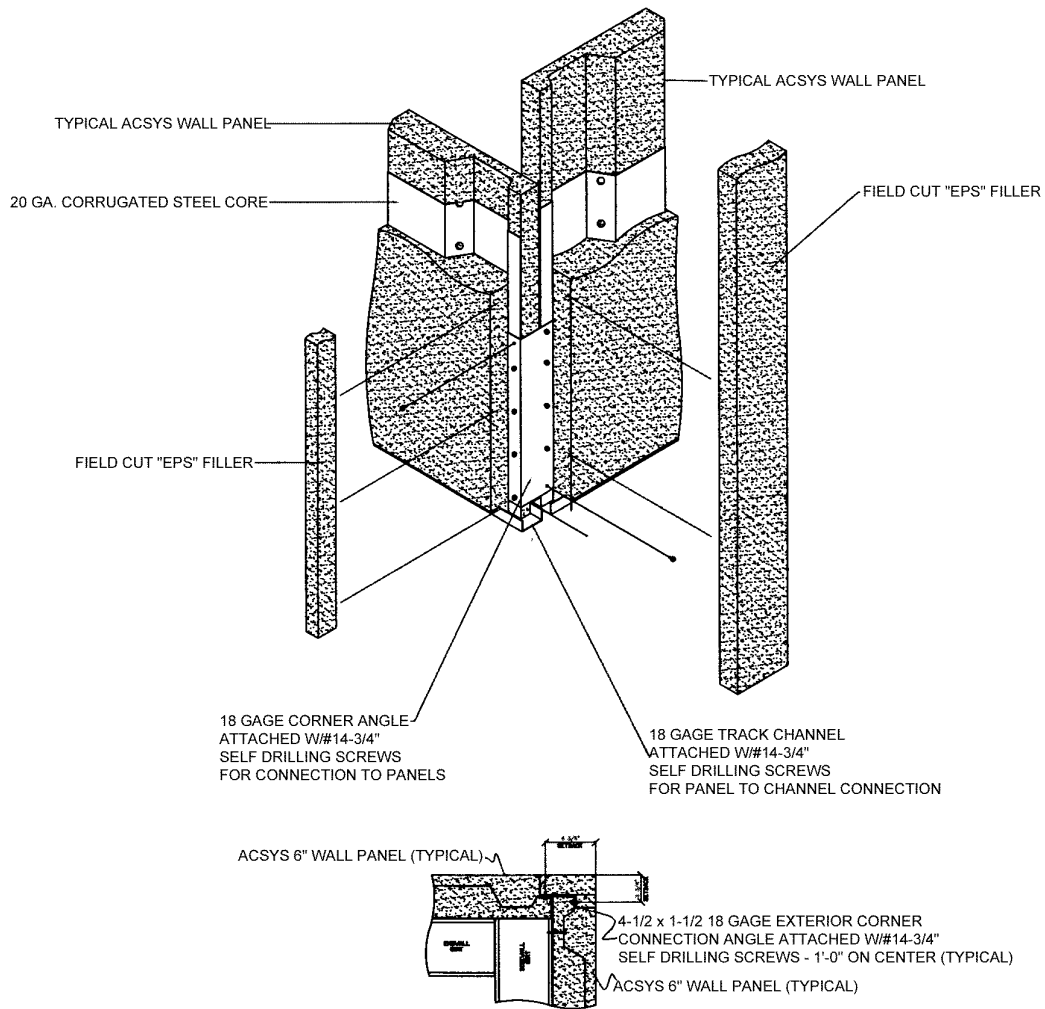


FIGURE 5—CORNER DETAIL IN ISOMETRIC

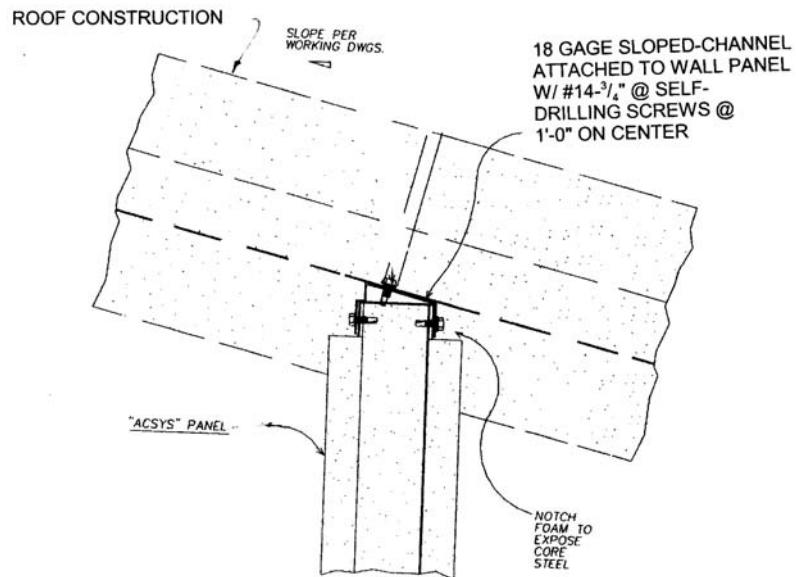


FIGURE 6—TYPICAL PANEL CONNECTION SHOWING SLOPED CHANNEL

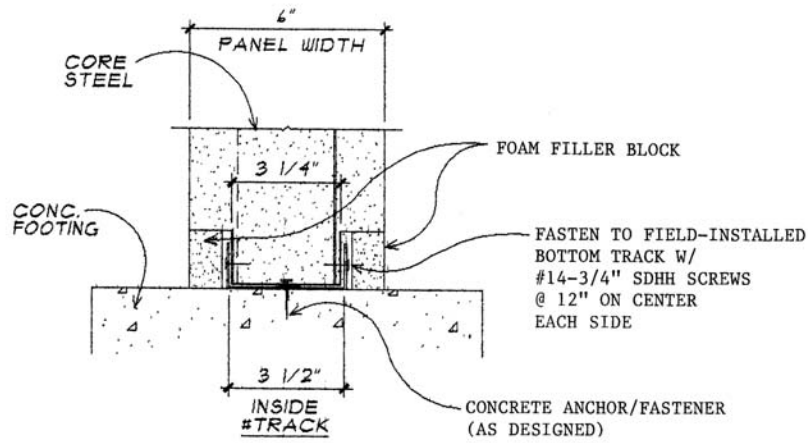


FIGURE 7—TYPICAL BASE APPLICATION—ABOVE GROUND

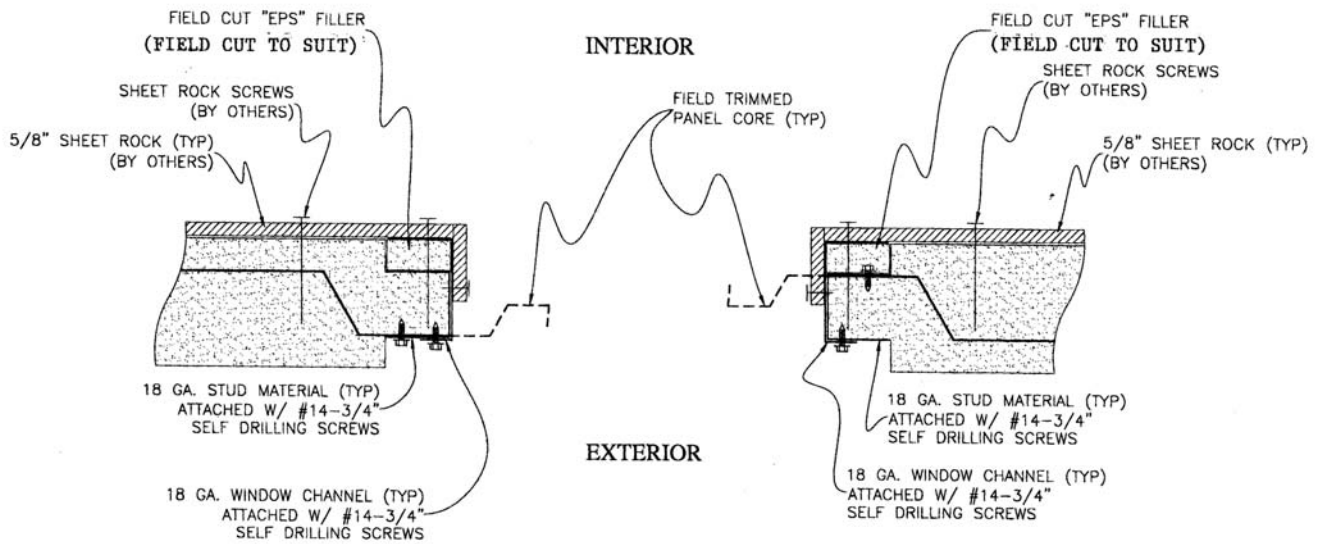


FIGURE 8—VERTICAL SECTION OF WINDOW JAMB CONNECTION AND FIELD CUT

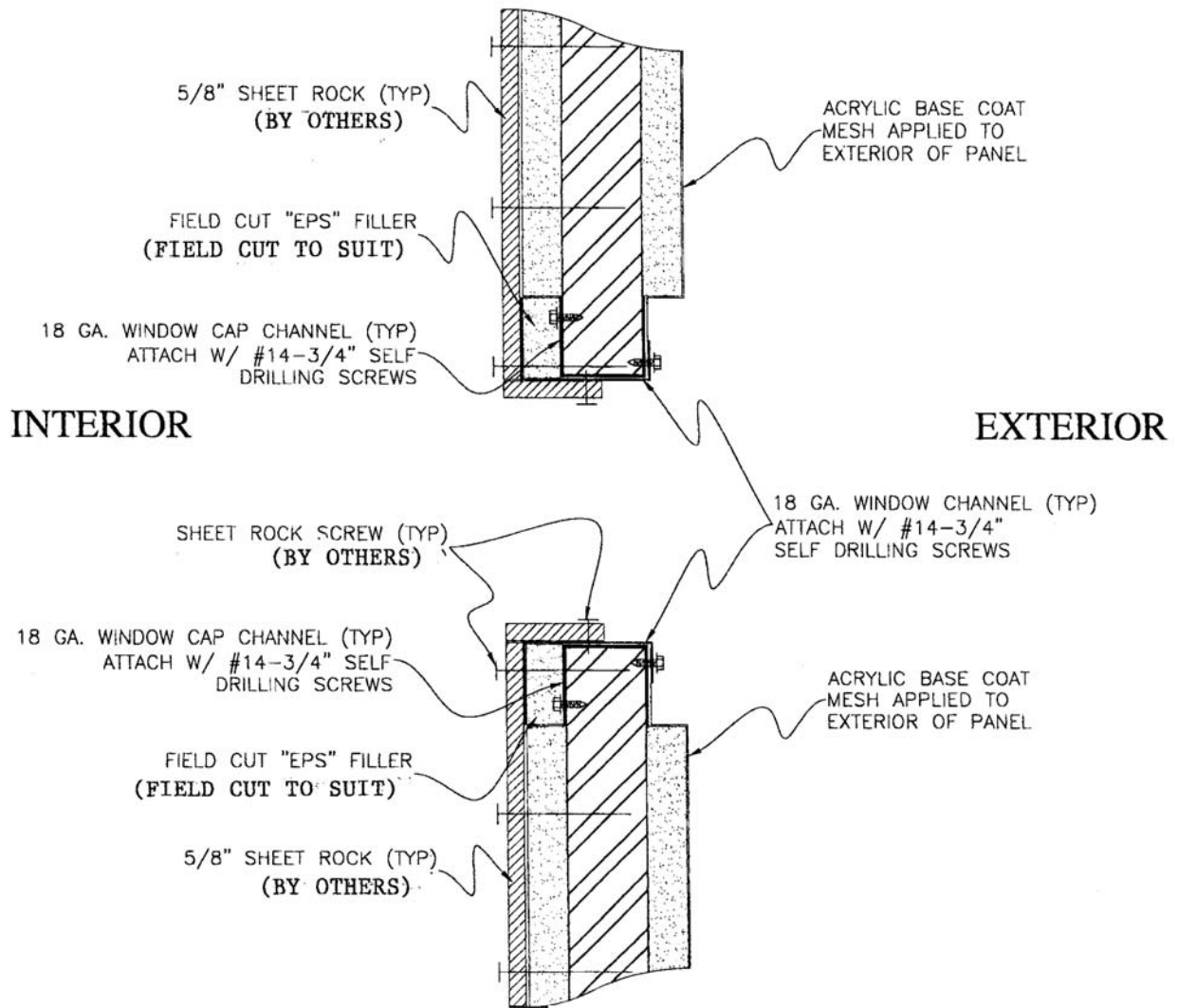


FIGURE 9—HORIZONTAL SECTION OF WINDOW JAMB CONNECTION AT FIELD CUT