DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Housing - Federal Housing Commissioner	STRUCTURAL ENGINEERING BULLETIN NO. 1128 Rev. 1 (Supersedes issue dated June 4, 2001)
TO: DIRECTORS, SINGLE FAMILY HOCs DIRECTORS, MULTIFAMILY HUBs	ISSUE DATE March 1, 2005
	REVIEW DATE March 1, 2008

SUBJECT: 1. **Item Description** Shop Fabricated Foam Core Sandwich Panels Premier Panels

2. **Name and address of Manufacturer** Premier Industries, Inc.
17001 Fish Point Road
Prior Lake, MN 44372

This Structural Engineering Bulletin (SEB) should be filed with other SEBs and related Bulletins on materials or products as required by prescribed procedures.

The technical description, requirements and limitations expressed herein do not constitute an endorsement or approval by the Department of Housing and Urban Development (HUD) of the subject matter, and any statement or representation, however made, indicating approval or endorsement by HUD is unauthorized and false, and will be considered a violation of the United States Criminal Code, 18 U.S.C. 709.

NOTICE: THIS BULLETIN APPLIES TO DWELLING UNITS BUILT UNDER HUD HOUSING PROGRAMS. NON-HUD-INSURED UNITS MAY OR MAY NOT BE IN CONFORMINTY WITH THE REQUIREMENTS OF THE HUD MINIMUM PROPERTY STANDARDS.

Any reproduction of this Bulletin must be in its entirety and any use of all or any part of this Bulletin in sales promotion or advertising is prohibited.

1. General:

This Bulletin sets forth specific requirements under the Technical Suitability of Products Program for determining the eligibility of housing to be constructed under HUD mortgage insurance, or other HUD housing programs.

2. Scope:

This Bulletin applies only to the structural features of this method of construction. Final determination of eligibility is made by the appropriate HUD Field Office. Other factors considered will be valuation, location, architectural planning and appeal, mechanical equipment, thermal characteristics, and market acceptance. Consideration is also necessary to determine whether a specific property will qualify under the specific HUD program, when constructed according to the method outlined in this Bulletin, and where the structure is to be located.

In geographical areas subject to hurricanes, earthquakes, or other severe conditions affecting dwelling structures, the HUD Field Office or Homeownership Center shall require additional safeguards in proposed designs, when necessary.

3. Minimum Property Standards (MPS):

Compliance with HUD MPS will be determined by the HUD Field Office or Homeownership Center on the same basis as submissions involving conventional construction, except for the special features described in this Bulletin.

4. Inspection:

Field compliance inspections covering conventional items of construction and any special features covered in this Bulletin shall be made in accordance with prescribed procedures.

The appropriate HUD Field Office or Homeownership Center shall furnish a copy of a HUD field inspection report to Headquarters, FHA Standards, Office of Manufactured Housing Programs, when there is:

a. Evidence of noncompliance with portions of the system of construction described in this Bulletin.

b. Faulty shop fabrication, including significant surface defects.

c. Damage to shop fabricated items or materials due to improper transportation, storage, handling or assembly.

d. Unsatisfactory field workmanship or performance of the product or system.

e. Any significant degradation or deterioration of the product or evidence of lack of durability or performance.

Periodic plant inspections will be made by HUD Field Office, Homeownership Center, State Agency personnel, or a HUD designated representative in accordance with their prescribed procedures. Factory inspection reports shall be submitted to HUD Headquarters, upon request.

5. Certification:

The manufacturer named in this Bulletin shall furnish the builder with a written certification stating that the product has been manufactured in compliance with the HUD Minimum Property Standards (MPS), except as modified by this Bulletin. The Builder shall endorse the certification with a statement that the product has been erected in compliance with the HUD MPS except as modified by this Bulletin, and that the manufacturer's certification does not relieve the Builder, in any way, of responsibility under the terms of the Builder's Warranty required by the National Housing Act, or under any provisions applicable to any other housing program. This certification shall be furnished to the HUD Field Office upon completion of the property.

OUTLINE DESCRIPTION, CATEGORY II CONSTRUCTION

GENERAL:

Shop fabricated foam core sandwich roof, exterior wall, and floor panels are furnished in this method of construction. Panels consist of oriented strand board (OSB) skins and polystyrene foam cores. Panels are transported to the building site where they are connected together.

All materials and methods of installation shall be in accordance with HUD Minimum Property Standards (MPS), Use of Materials Bulletins (UM), and Materials Releases (MR), except as may be specifically noted herein. Plumbing, heating and electrical systems are field installed and connected.

This Bulletin is based upon a structural review of the Premier Structural Sandwich Panels, but may be considered applicable to all structurally similar units of this company. Foundation design and nonstructural items (such as architectural, plumbing, heating and electrical features) are not covered by this Bulletin.

SPECIFICATIONS:

Form HUD-92005, "Description of Materials" specifying only the structurally related items (Nos. 1 to 12, 14, 26, and 27), as originally submitted for determination of technical suitability, describes the materials that shall be used in construction of housing units under this system of construction.

DRAWINGS:

The following drawing(s) by Premier Industries, Inc. shall be considered an integral part of this Bulletin:

Drawing No.	Date	Description
PBS-000	03/19/98	Section
PBS-001	03/19/98	Section
PBS-002	03/19/98	Panel Precautions
PBS-100	03/19/98	Panel Plate Connections
PBS-105	03/19/98	Double Spline Connection
PBS-110	03/19/98	I-Joist Spline Connection
PBS-115	03/19/98	Double 2x Lumber Connection
PBS-120	03/19/98	Top Spline Connection
PBS-125	03/19/98	Panel to Slab/Fnd Connection
PBS-130	03/19/98	Platform Framing w/ Joist Hanger
PBS-135	03/19/98	Platform Framing
PBS-140	03/19/98	Foundation Framing Connection
PBS-141	08/20/99	Foundation Framing Connection
PBS-145	03/19/98	Panel Corner Connection
PBS-150	03/19/98	Angled Panel Corner Connection
PBS-155	03/19/98	Beveled Blk Wall/Roof Connection
PBS-160	03/19/98	Beveled Wall/Roof Connection
PBS-165	03/19/98	Truss Bearing on Wall
PBS-170	03/19/98	Floor Power Blocking
PBS-175	03/19/98	2x Panel Joint Connection
PBS-180	03/19/98	I-Joist Panel Connection
PBS-185	03/19/98	Panel To Steel Member
PBS-190	03/19/98	Roof Valley Connection
PBS-195	03/19/98	Ridge Cap Roof Connection
PBS-200	03/19/98	12:12 Pitch Ridge Connection
PBS-205	03/19/98	Eave Details
PBS-215	03/19/98	Ledger Detail
PBS-220	03/19/98	Parapet Detail
PBS-225	03/19/98	Insul Beam Header
PBS-230	03/19/98	Wall Panel Box Header
PBS-235	03/19/98	Typical Panel Wall
PBS-240	03/19/98	Typical Opening Framing
PBS-245	03/19/98	Post to Concrete Anchorage
PBS-250	03/19/98	Post to Concrete Anchorage
PBS-255	03/19/98	Interior Wall Connection
PBS-275	03/19/98	Roof/Floor Openings
PBS-280	03/19/98	Roof Penetrations
PBS-290	03/19/98	Interior Wall Connection

The Builder shall submit construction drawing(s) to the HUD Field Office or Homeownership Center with each application under HUD housing programs, which shall include the same or similar structural features as shown on the drawings listed above. Copies of these listed drawings shall also be furnished to the HUD Field Office or Homeownership Center by the Builder upon request.

SPECIAL CONSTRUCTION FEATURES:

General: Premier Structural Sandwich Panels are factory assembled sandwich panels consisting of expanded polystyrene (EPS) cores with oriented strand board (OSB) facings produced at locations listed in Table 1 of this report. The panels are used as load bearing wall, roof, and floor components. Panels are produced in widths ranging from 4 to 8 foot and lengths ranging from 8 to 24 foot. The panels are manufactured in a Type S, Type I, and Type L panel configuration shown in Figures 1, 2, and 3 of this report.

Type S Panel: The core for the Type S panel is recessed along the panel sides to receive nominal 4 inch (102 mm) wide OSB spline and recessed on the ends to receive solid sawn dimensional lumber sized to match the core thickness. See Figure 1 of this report.

Type I Panel: The Type I panel is recessed along the panel side to receive I-joist splines and recessed on the ends to receive nominal 2 inch thickness. See Figure 2 of this report.

Type L Panel: The Type L panel is recessed along the panel sides and ends to receive nominal 2 inch thick solid sawn dimensional lumber sized to match the core thickness. See Figure 3 of this report.

FIGURE 1
TYPE S PANEL

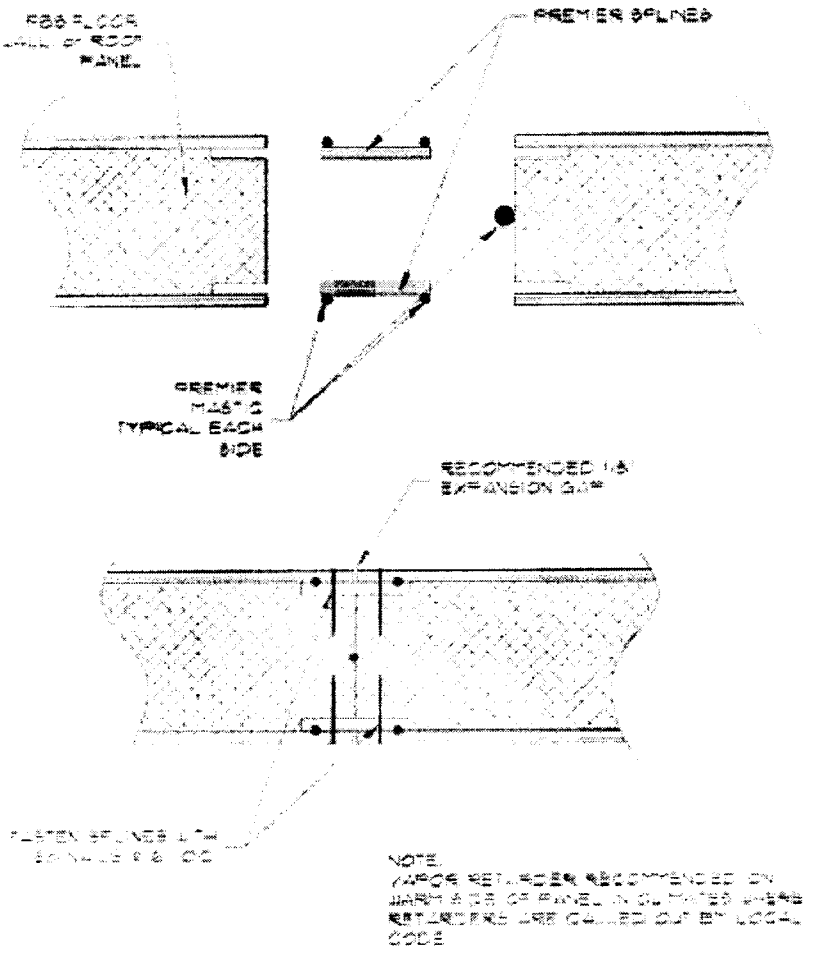


FIGURE 2
TYPE I PANEL

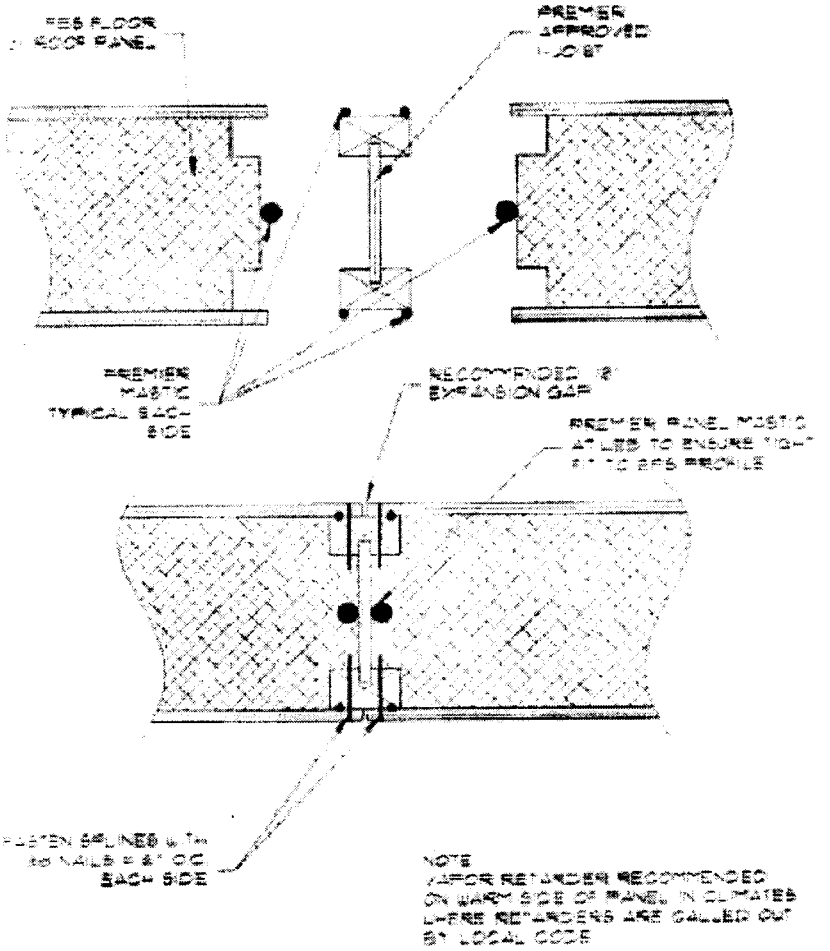
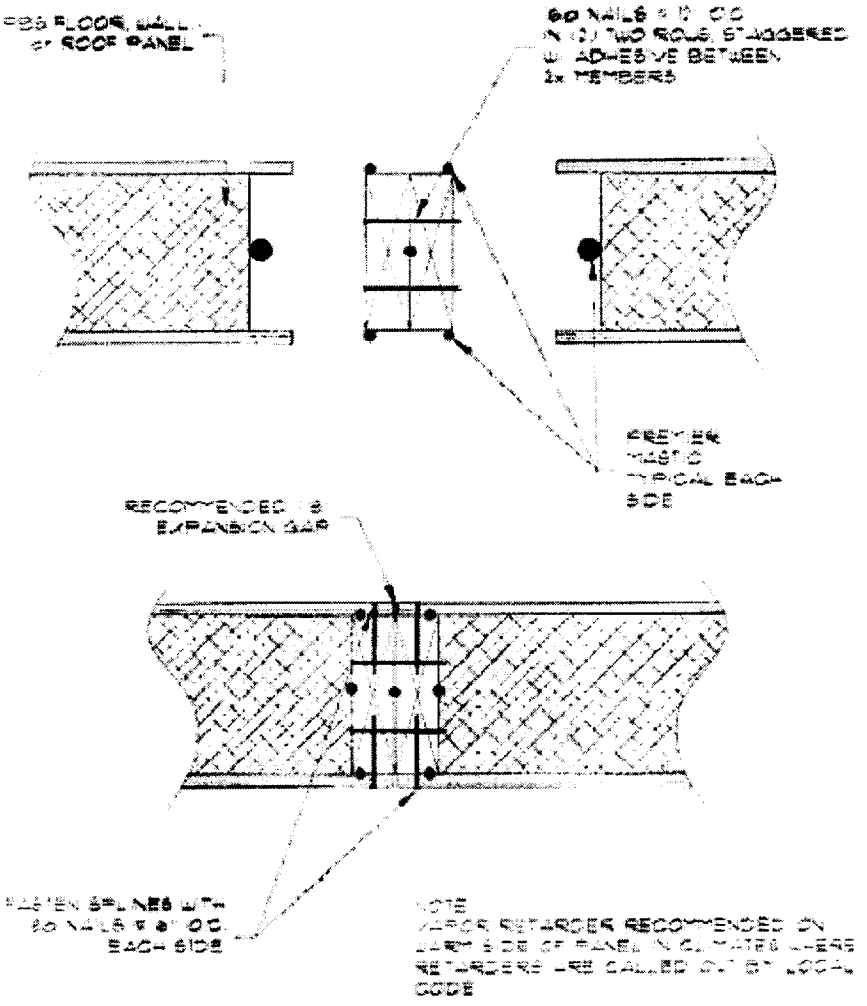


FIGURE 3
TYPE L PANEL



Materials:

Core: The core material is EPS foam plastic with a thickness of 3½ to $11^{1}/_{4}$ inches. The EPS core has flame spread rating of not more than 75 and a smoked developed rating of not more than 450 when tested in accordance with ASTM E 84 and a density of 0.95 pcf.
Facing: Panel facing material is $^{7}/_{16}$ to $^{3}/_{4}$ inch thick Structural 1, Exposure 1 OSB complying with DOC PS-2.
Adhesive: The adhesive is Structural grade Type II, Class 2 laminating adhesive. (Ashland Adhesive Isoset WD3-A322/CX-47, Ashland Adhesive Isogrip 3030D, Morad Adhesive Mor-Ad M-715/CRL-A, or Morad Adhesive Mor-Ad M640 Series)

Splines: The splines for the Type S panels are nominal 4 inches wide by $^{7}/_{16}$ inch thick OSB material. The splines for Type I panels are I-joist, sized in depth to match the core thickness. The splines for Type L panels are nominal 2 inches thick dimensional lumber sized in depth to match the core thickness.

DESIGN AND CONSTRUCTION REQUIREMENTS:

Design Loads: The method of construction described in this Bulletin is based on the allowable superimposed loads noted in Tables 2 through 11 of this report. The Builder shall submit structural calculations to the local HUD Office or Homeownership Center showing that these loads have not been exceeded.

TABLE 1

LOCATIONS OF PREMIER INDUSTRIES, INC / d.b.a.	LOCATION NUMBERS FOR PRODUCT IDENTIFICATION
Premier Building Systems 4609 70th Ave. E Fife, Washington 98424	PB-31
Premier Building Systems 3434 West Papago Street Phoenix, Arizona 85009-6733	PB-32

TABLE 2
TYPE S PANELS[1]
MAXIMUM ALLOWABLE TRANSVERSE LOADS(psf)

PANEL CORE THICKNESS (inches)	DEFLECTION	PANEL SPAN								
		8 ft	10 ft	12 ft	14 ft	16 ft	18 ft	20 ft	22 ft	24 ft
3½[2]	$L/360$	40	30	20	15	10	----	----	----	----
	$L/240$	60	40	35	25	15	----	----	----	----
	$L/180$	60	55	45	35	20	----	----	----	----
5½[2]	$L/360$	50	40	30	25	20	15	10	----	----
	$L/240$	80	60	35	30	30	20	15	----	----
	$L/180$	80	60	45	40	35	30	20	----	----
$7^1/_4$[3]	$L/360$	60	60	40	35	25	20	15	15	10
	$L/240$	85	75	60	50	40	30	25	20	20
	$L/180$	85	75	70	60	50	40	30	25	25
$9^1/_4$[4]	$L/360$	80	65	50	40	35	25	20	20	20
	$L/240$	85	65	55	50	45	40	35	30	25
	$L/180$	85	65	55	50	45	40	40	35	35
$11^1/_4$[4]	$L/360$	95	75	50	50	50	40	30	25	20
	$L/240$	95	75	60	65	50	45	40	35	30
	$L/180$	95	75	60	65	50	45	40	35	35

1. Floor panels shall have a minimum $^3/_4$-inch thick top skin or a minimum $^7/_{16}$-inch thick top skin overlaid with minimum $^7/_{16}$ inch thick finish flooring perpendicular to the panels.
2. 3½ inch and 5½-inch core panels shall be limited to a maximum span of 12 feet when used in roof applications.
3. $7^1/_4$ inch core panels shall be limited to a maximum span of 14 feet when used in roof applications.
4. $9^1/_4$-inch and $11^1/_4$-inch core panels shall be limited to a maximum span of 16 feet when used in roof applications.

TABLE 3
TYPE I PANELS[1]
MAXIMUM ALLOWABLE TRANSVERSE LOADS (psf)

PANEL CORE THICKNESS (inches)	DEFLECTION	PANEL SPAN (feet)									
		4[2]	8	10	12	14	16	18	20	22	24
$7^1/_4$	$L/_{360}$	130	135	95	60	50	40	30	20	20	15
	$L/_{240}$	315	150	105	90	70	55	40	30	25	25
	$L/_{180}$	320	150	105	90	85	55	50	40	35	30
$9^1/_4$	$L/_{360}$	195	165	125	70	65	60	50	35	30	25
	$L/_{240}$	320	165	125	105	95	85	70	50	45	35
	$L/_{180}$	320	165	125	105	95	85	75	65	55	45
$11^1/_4$	$L/_{360}$	260	145	105	85	85	75	60	40	35	30
	$L/_{240}$	320	145	105	95	85	75	70	60	55	45
	$L/_{180}$	320	145	105	95	85	75	70	60	55	50

1. Floor panels shall have a minimum $^3/_4$-inch thick top skin or a minimum $^7/_{16}$-inch thick top skin overlaid with minimum $^7/_{16}$-inch thick finish flooring perpendicular to the panels.
2. Panels spanning 4 feet shall be a minimum of 8 feet long spanning a minimum of two 4-foot spans. No single span conditions shall be permitted.

TABLE 4
TYPE L PANELS[1]
MAXIMUM ALLOWABLE TRANSVERSE LOADS (psf)

PANEL CORE THICKNESS (inches)	DEFLECTION	PANEL SPAN (feet)									
		4[2]	8	10	12	14	16	18	20	22	24
3½	$L/360$	105	45	35	25	15	10	----	----	----	----
	$L/240$	225	70	45	35	25	15	----	----	----	----
	$L/180$	300	90	60	45	35	25	----	----	----	----
5½	$L/360$	255	130	55	40	30	25	20	15	----	----
	$L/240$	290	180	85	60	50	35	30	20	----	----
	$L/180$	290	180	110	80	65	50	40	30	----	----
$7^1/_4$	$L/360$	255	170	80	65	55	40	30	25	----	----
	$L/240$	290	190	130	100	80	60	50	35	----	----
	$L/180$	290	190	135	115	105	80	60	45	----	----
$9^1/_4$	$L/360$	285	190	115	100	80	60	45	35	30	30
	$L/240$	325	190	145	135	120	90	70	50	45	40
	$L/180$	325	190	145	135	120	110	90	70	60	55
$11^1/_4$	$L/360$	325	190	165	140	115	90	75	60	45	35
	$L/240$	325	190	165	155	130	110	95	85	70	55
	$L/180$	325	190	165	155	130	110	95	85	85	70

1. Floor panels shall have a minimum $^3/_4$-inch thick top skin or a minimum $^7/_{16}$-inch thick top skin overlaid with minimum $^7/_{16}$-inch thick finish flooring perpendicular to the panels.
2. Panels spanning 4 feet shall be a minimum of 8 feet long spanning a minimum of two 4-foot spans. No single span conditions shall be permitted.

TABLE 5
TYPE S PANELS
MAXIMUM ALLOWABLE AXIAL LOADS (plf)

PANEL CORE THICKNESS (inches)	PANEL SPAN					
	8 ft	**10 ft**	**12 ft**	**16 ft**	**20 ft**	**24 ft**
3½	3500	2555	2450	2120	----	----
5½	4250	4040	3375	3920	2815	----
$7^1/_4$	4915	4325	4475	4195	3495	3065

TABLE 6
TYPE L PANELS
MAXIMUM ALLOWABLE AXIAL LOADS (plf)

PANEL CORE THICKNESS (inches)	PANEL SPAN					
	8 ft	**10 ft**	**12 ft**	**16 ft**	**20 ft**	**24 ft**
3½	4725	3905	3095	2620	----	----
5½	5850	5890	4280	4310	2935	----
$7^1/_4$	6850	6110	5555	5180	4835	4080

TABLE 7
ALL PREMIER WALL PANELS
MAXIMUM ALLOWABLE POINT LOADS (lbs)

	1½ inch Minimum Bearing Width	3 inch Minimum Bearing Width
Standard Detail	2040	2450
Additional Cap Plate[1]	4030	4680

1. See Figure 4 of this report.

FIGURE 4
PREMIER CAP PLATE

FIGURE 4 — PREMIER CAP PLATE

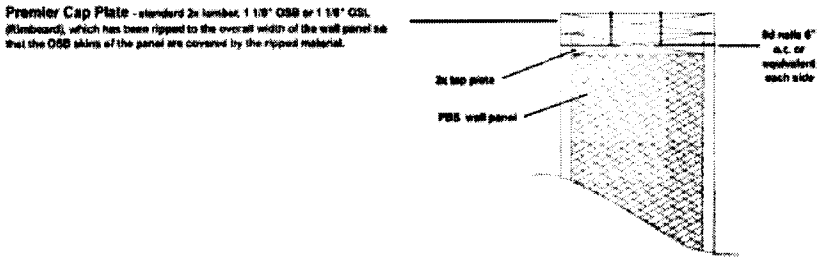


TABLE 8
MAXIMUM ALLOWABLE HEADER LOADS WITH NO SPLINES (plf)

HEADER DEPTH (inches)	DEFLECTION	HEADER SPAN			
		4 ft	6 ft	8 ft	10 ft
12	$L/360$	740	385	230	140
	$L/240$	740	385	230	140
	$L/180$	740	385	230	140
18	$L/360$	795	575	385	310
	$L/240$	795	575	385	310
	$L/180$	795	575	385	310
24	$L/360$	885	630	430	360
	$L/240$	885	630	430	360
	$L/180$	885	630	430	360

TABLE 9
MAXIMUM ALLOWABLE HEADER LOADS WITH SPLINES (plf)

HEADER DEPTH (inches)	DEFLECTION	HEADER SPAN			
		4 ft	6 ft	8 ft	10 ft
12	$L/360$	345	245	155	100
	$L/240$	450	295	190	125
	$L/180$	630	380	235	155
18	$L/360$	705	390	255	235
	$L/240$	750	480	300	280
	$L/180$	750	480	300	280
24	$L/360$	700	580	370	350
	$L/240$	895	580	370	350
	$L/180$	895	580	370	350

TABLE 10
PREMIER WALL PANELS[1, 2]
MAXIMUM ALLOWABLE SHEAR WALL LOADS

PANEL TYPE	MINIMUM OSB FACE THICKNESS	ATTACHMENTS[3]				SHEAR (plf)
		2x Framing		Splines		
		Fasteners	Spacing	Fasteners	Spacing	
L or S	$7/16$ inch	8d nail	6 inches	8d nail	6 inches	300
S	$7/16$ inch	8d nail	4 inches	#6 Screw	4 inches	600[4]

1. Framing lumber shall be a minimum of Douglas Fir-Larch having a minimum specific gravity of 0.50.
2. Minimum panel width shall be four feet. The maximum panel height-to-width ratio shall be 3½:1.
3. Nails are box nails. Screws are #6 x $1\frac{1}{4}$ inch Type W drywall screws.
4. Two top plates are required.

TABLE 11
PREMIER PANELS[1]
MAXIMUM ALLOWABLE DIAPHRAGM LOADS

MINIMUM OSB FACE THICKNESS	ATTACHMENTS						SHEAR (plf)
	Panel Supports[2]		Panel Joints - Top Only[3]		Panel Joints - Top & Bottom[4]		
	Fasteners	Spacing	Fasteners	Spacing	Fasteners	Spacing	
$^{7}/_{16}$ inch	PBS Screw[5]	12 inches	8d nail	3 inches	8d nail	6 inches	425
$^{7}/_{16}$ inch	PBS Screw[5]	3 inches	8d nail	2 inches	8d nail	4 inches	510

1. The maximum panel height-to-width ratio shall be 4½:1.
2. See Figure 5 of this report.
3. See Figure 6 of this report.
4. See Figure 7 of this report.
5. Premier Building Systems specially designed "Big Blue" screws.

Fire Protection and Interior Finish: The EPS foam core shall have a flame spread rating of not more than 75 and a smoke development rating of not more than 450 when tested in accordance with ASTM E 84. All interior ceilings and wall surfaces are covered with ½ inch thick gypsum wallboard or other approved 15 minute thermal barrier. Floor finish shall be a minimum of $^5/_8$ inch blandex or plywood.

Framing of Loadbearing Walls: Wood-to-wood connections shall be provided between bearing walls and roof/ceiling or floor construction. Floor covering, including carpeting and vinyl tile, shall not be continued under loadbearing walls.

Roof Construction: Trussed rafters shall be designed and constructed in accordance with Truss Plate Institute (TPI 1-1995), "National Design Standard for Metal-Plate-Connected Wood Truss Construction", and the appropriate HUD Truss Connector Bulletin.

MANUFACTURING PLANT(S):

Premier Panels covered under this Bulletin will be produced in the following plant(s):

Premier Building Systems
4609 70th Ave. E
Fife, Washington 98424

Premier Building Systems
3434 West Papago Street
Phoenix, Arizona 85009-6733

The appropriate HUD Field Office or Homeownership Center in whose jurisdiction the manufacturing plant is located, or HUD designated representative will inspect this (these) plant(s) in accordance with prescribed procedures.

QUALITY CONTROL:

The appropriate HUD Field Office or Homeownership Center in whose jurisdiction the manufacturing plant is located, or the State Agency (in Category III states) shall review and approve plant fabrication procedures and quality control program, to ensure compliance with approved plans and specifications. The quality control program shall include field erection or supervision by Underwriter's Laboratories, Inc.

RECORD OF PROPERTIES:

The manufacturer shall provide HUD a list of the first ten properties in which the component or system described in this Bulletin is used. The list shall include the complete address, or description of location, and approximate date of installation or erection. Failure of the manufacturer to provide HUD with the above information may result in cancellation of this Bulletin.

NOTICE OF CHANGES:

The manufacturer shall inform HUD in advance of changes in production facilities, transportation, field erection procedures, design, or materials used in this product. Further, the manufacturer must inform HUD of any revision to corporate structure, change of address or change in name or affiliation of the prime manufacturer. Failure of the manufacturer to notify HUD of any of the above changes may result in cancellation of this Bulletin.

EVALUATION:

This SEB is valid for a period of three years from the date of initial issuance or most recent renewal or revision, whichever is later. The holder of this SEB shall apply for a renewal or revision 90 days prior to the Review Date printed on this SEB. Submittals for renewal or revision shall be sent to:

U. S. Department of Housing and Urban Development
Office of Manufactured Housing Programs
451 Seventh Street, SW, Room 9168
Washington, DC 20410-8000

Additionally, the appropriate User Fee shall be sent to:

U. S. Department of Housing and Urban Development
Miscellaneous Income - Technical Suitability of Products Fees
Bank of America
P. O. Box 198762
Atlanta, GA 30384-8762

The holder of this SEB may apply for revision at any time prior to the Review Date. Minor revisions may be in the form a supplement.

If the Department determines that a proposed renewal or supplement constitutes a revision, the appropriate User Fee for a revision will need to be submitted in accordance with Code of Federal Regulations 24 CFR 200.934, "User Fee System for the Technical Suitability of Products Program", and current User Fee Schedule.

CANCELLATION:

Failure to apply for a renewal or revision shall constitute a basis for cancellation of the SEB. HUD will notify the manufacturer that the SEB may be canceled when:

1. conditions under which the document was issued have changed so as to affect production of, or to compromise the integrity of the accepted material, product, or system,

2. the manufacturer has changed its organizational form without notifying HUD, or

3. the manufacturer has not complied with responsibilities it assumed as a condition of HUD's acceptance.

However, before cancellation, HUD will give the manufacturer a written notice of the specific reasons for cancellation, and the opportunity to present views on why the SEB should not be canceled. No refund of fees will be made on a canceled document.

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This Structural Engineering Bulletin is issued solely for the captioned firm and is not transferable to any person or successor entity.

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