

APA RATED SIDING PANELS OVER RIGID FOAM INSULATION SHEATHING

Number C465E • August 2006

ENERGY-SAVING APA STURD-I-WALL® CONSTRUCTION

Energy conservation is a big consideration in building design and construction. In hot or cold weather, high resistance to heat flow means lower heating or cooling costs to maintain a comfortable living environment.

Energy-efficient APA Sturd-I-Wall construction with U-values as low as 0.05 (R = 20) can be achieved with conventional 2x4 framing, when APA Rated Siding is installed over rigid foam insulation sheathing and batt-type insulation is used between studs.

In addition, when panel siding is used, construction costs are reduced by eliminating material and time-consuming labor costs for installing diagonal wall bracing or a separate layer of structural sheathing. Panel siding applied over maximum 1-inch-thick foam sheathing, on studs spaced either 16 or 24 inches oc and with minimum 1/2-inch-thick gypsum wallboard installed on the interior side of the wall, is an accepted alternate to the wood structural panel sheathing construction specified in the IRC for wall bracing (NER-108).

APA Rated Siding includes a wide variety of surface textures, patterns and face grades, so that it is easy to select and specify the siding grade and appearance desired for almost any style of single- or multi-family residential construction. Several types of foam sheathing are available, such as polystyrene, polyurethane and isocyanurate, commonly in thicknesses of 3/4 inch or 1 inch, with insulation values from about R-3 to R-8.

INSTALLATION RECOMMENDATIONS

Follow manufacturer's recommendations for installing foam sheathing. However, no diagonal bracing is required when APA Rated Siding panels are installed over foam sheathing as recommended.

Siding recommendations given in Table 1 apply to all wood species groups. In APA Sturd-I-Wall construction, APA Rated Siding panels designated "16 oc" may be applied vertically over foam

TABLE 1

EXTERIOR APA RATED SIDING PANELS OVER FOAM INSULATION SHEATHING⁽¹⁾

Description	Nominal Thickness (inches)	Maximum Stud Spacing (inches)	
		Long Dimension Vertical	Long Dimension Horizontal
APA Rated Siding 16 oc EXT	1 1/32 & thicker	16	24
APA Rated Siding 24 oc EXT	7/16 & thicker	24	24

(1) For installation recommendations for APA Rated Siding – Lap EXT over foam sheathing, and nailing of panel siding for braced wall applications and high wind regions, see *APA Engineered Wood Construction Guide*, APA Form E30.



sheathing when studs are spaced 16 inches o.c., or applied horizontally when studs are spaced 24 inches o.c. APA Rated Siding panels designated "24 oc" may be applied vertically or horizontally over foam sheathing with studs spaced either 16 inches or 24 inches o.c. In all cases, panel edges must be backed with framing or blocking. Provide 6 inches minimum clearance between the siding and finish grade, unless pressure-preservative treated plywood siding or wood trim board is used.

When installing siding, leave 1/8 inch space at all end and edge joints, unless otherwise recommended by the siding manufacturer. When wood structural panel siding is used for multi-story buildings, horizontal joints may require more end spacing than normally required to accommodate floor framing shrinkage. Dry lumber framing or APA Rim Board® is recommended to minimize shrinkage of rim joists.

Use non-staining 8d box nails (0.113 x 2-1/2 inches) for siding panels 1/2 inch thick or less, and 10d (0.128 x 3 inches) for thicker panels installed over foam sheathing up to 1 inch thick. Nail spacing should be 6 inches along panel edges and 12 inches along intermediate supports.

Special Precautions When Using Foam Sheathing

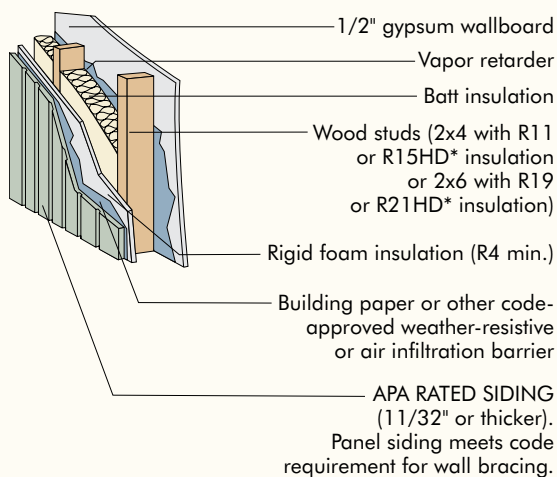
Avoid over-driving nails, which can result in dimpling of the siding due to the compressible nature of the foam sheathing. Extra caution is necessary if power-driven nails are used for attaching siding over foam sheathing.

Plywood siding is occasionally treated with water repellents or wood preservatives. If the siding has been treated, corrosion-resistant nails are recommended.

Because of the high resistance of foam sheathing and wood structural panel siding to vapor transmission, a 4-mil polyethylene vapor retarder or foil-backed gypsum wallboard is recommended on the warm side of the wall to avoid condensation in the wall cavity. Ordinary foil- or kraft paper-faced insulation batts are **not** an alternate. Also, building codes require installation of 1/2-inch gypsum wallboard, or other approved thermal barrier material, on the inside surface of the wall for fire protection when foam sheathing is used.

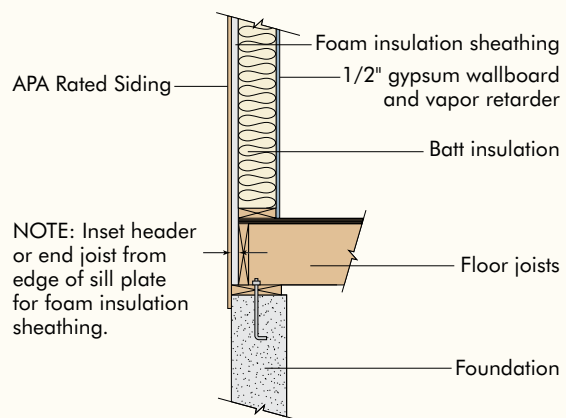
FIGURE 1

APA RATED SIDING OVER RIGID FOAM INSULATION SHEATHING



*HD designation stands for high density.

FIGURE 2



Note:

For purposes of computing percentage bracing, APA Rated Siding panels over foam sheathing may be considered Method 3 bracing, provided that the Rated Siding panels (over foam up to one-inch thick) have a minimum of 1/2-inch gypsum wallboard on the opposite/inside face of the wall. The gypsum wallboard must be attached in accordance with the requirements of Section R702.3.6 of the International Residential Code.

WALL RACKING TESTS

Wood structural panel siding meets the stiffness and strength requirements for siding panels used as wall bracing in APA Standard PRP-108 (ICC Evaluation Service, Inc. Report NER-108), when nailed in accordance with APA recommendations over foam sheathing up to 1 inch thick. Both dry and wet assemblies were tested.

Wall racking tests were conducted on 8 x 8-foot wall sections, with 2x4 studs spaced 16 inches o.c. and 24 inches o.c. One-inch-thick foam sheathing (2 lb/cu ft density) was nailed to the framing with 1-1/2-inch galvanized roofing nails spaced 8 inches o.c. along supported panel edges and 12 inches o.c. on interior supports.

Wood structural panel siding (plywood Group 4 species) was installed vertically over the foam sheathing, with galvanized box nails spaced 6 inches o.c. around panel edges and 12 inches o.c. on interior supports. (See Table 2.)

On all walls, 1/2-inch gypsum wallboard was installed horizontally on the inside surface of the wall, using 4d drywall nails spaced 8 inches o.c. along all supports. The unblocked horizontal panel joint was left unfinished, without taping or texturing. For the wet tests, the gypsum wallboard was installed after the moisture conditioning was completed.

Table 3 summarizes test results for both wet and dry conditions. All tests met the panel siding wall bracing requirements of APA Standard PRP-108.

TABLE 2

WOOD STRUCTURAL PANEL SIDING DESCRIPTION FOR WALL RACKING TESTS

APA Rated Siding-303 Span Rating	Thickness	Surface Pattern	Stud Spacing	Galv. Box Nail Size (in.)
16 oc	11/32"	Rough Sawn, no grooves	16" o.c.	8d (0.113 x 2-1/2)
24 oc	15/32"	Channel Groove, grooves 12" o.c.	24" o.c.	8d (0.113 x 2-1/2)
24 oc	19/32"	Reverse Board and Batten, grooves 12" o.c	24" o.c.	10d (0.128 x 3)

TABLE 3

WALL RACKING TESTS

Test Criterion	Dry Tests				Wet Tests	
	APA Standard PRP-108 Panel Siding Requirements	Test Results		APA Standard PRP-108 Panel Siding Requirements	Test Results	
		11/32" Siding – Studs 16" o.c.	15/32" Siding – Studs 24" o.c.		11/32" Siding – Studs 16" o.c.	19/32" Siding – Studs 24" o.c.
Defl. @ 150 lb/ft	0.2 in., max.	0.07 in.	0.10 in.	0.28 in., max.	0.10 in.	0.10 in.
Defl. @ 300 lb/ft	0.6 in., max.	0.24 in.	0.36 in.	0.8 in., max.	0.50 in.	0.45 in.
Ultimate Load	650 lb/ft, min.	669 lb/ft	701 lb/ft	500 lb/ft, min.	573 lb/ft	626 lb/ft

INSULATION VALUES

Walls fabricated with 2x4 framing and APA Rated Siding panels over foam sheathing meet stringent thermal requirements. The wall construction shown in Table 5 provides a 0.05 heat transmission (average U) value for the opaque wall with batt-type insulation. This construction illustrates one of many effective methods that can be used to reduce annual heating or cooling costs to a minimum. Wood structural panel siding, batt insulation and foam sheathing also can be combined in other ways to obtain any desired U value from 0.08 to as low as 0.05. Table 4 lists typical thermal resistance (R) values to evaluate other construction options.

TABLE 4

TYPICAL THERMAL RESISTANCE (R) VALUES

Material ⁽³⁾	Nominal Thickness (in.)	R ⁽¹⁾
APA Rated Siding (panels)	1 1/32	0.43
	7/16	0.55
	15/32	0.59
	19/32	0.74
Rigid Foam Insulation ⁽²⁾ :		
Polystyrene (unfaced)		
Molded beads	3/4	2.89
	1	3.85
Extruded foam	3/4	3.75
	1	5.00
Polyurethane (unfaced)	3/4	4.69
	1	6.25
Isocyanurate (foil faced)	3/4	5.28
	1	7.04

(1) Degree F-sq. ft-hr./BTU

(2) R values for polystyrene and polyurethane from 1997 ASHRAE Handbook of Fundamentals. For specific products, see manufacturer's data.

(3) Batt insulation commonly available with the following thermal resistance (R) values:

R11	R19 (R18 when compressed to 5-1/2")
R13	R21 HD (high density)
R15 HD (high density)	

TABLE 5

WOOD STRUCTURAL PANEL SIDING OVER FOAM INSULATION SHEATHING – MIN. 2x4 STUDS 16" OR 24" o.c.

	Resistance (R)
Outside surface (15 mph wind)	= 0.17
APA Rated Siding (7/16")	= 0.55
Foam insulation sheathing (1")	= 7.00 (min.)
Batt insulation (R15 HD) ⁽¹⁾	= 15.00
1/2" gypsum wallboard	= 0.45
Inside surface (still air)	= 0.68
Average U ⁽²⁾	= 0.050
Min. Effective R = 1/U	= 19.86

(1) High-density batt insulation

(2) Average U values include adjustment for 25% framing area with studs spaced 16" o.c. When studs are spaced 24" o.c. (22% of framing area), average U values are slightly lower and corresponding R values are higher. Average U value is based on R value at framing of 4.38 for 2x4 wood studs (6.88 for 2x6 wood studs).

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Form No. C465E/Revised August 2006

