Improve Stucco Performance with Structural Wood Panel Sheathing

It is possible to reduce callbacks, increase the structural strength of buildings and improve the appearance of stucco exterior finishes all at the same time. How? Easily, by using structural wood panels as a substrate for stucco and following the installation recommendations of the American Plywood Association (APA).

Why Structural Wood Panel Sheathing?

Structural wood panel wall sheathing works with lumber framing and fasteners to tie the roof, wall, floor and foundation of a structure together. This improves strength and rigidity and increases racking-resistance.

Other methods of construction can lead to excessive deformation of the structure under tacking loads, as Figure 1 graphically shows.

Deformation translates into cracking of brittle finishes such as stucco. Cracking translates into callbacks. Structural wood panel sheathing helps builders decrease callbacks by reducing cracking.

Do The Job Right

Proper installation is important if these desirable results are to be achieved. Fortunately, correct installation is simple. It involves six steps:

1. Make certain that wall framing is as even as possible. Before framing the wall, sight along the length of each stud. Pull warped or bowed studs for use in blocking or other noncritical applications. Assemble the remaining studs so that any crown is oriented in the same direction. This will provide the most uniform possible nailing surface.

This article provides an overview of the advantages of wood panel wall sheathing used with exterior stucco, and offers some basic installation guidelines.
2. **Specify structural wood panel sheathing which has adequate stiffness and dimensional stability to do the job.** APA recommends using thicker-than-usual wall sheathing for stucco application. The stiffness of the upgraded panel gives an extra measure of support for the heavy, brittle stucco surface. Panels may be plywood nonveneer or composite. Any panel type will do, as long as it is properly specified and installed, as shown in Figure 2. Greater stiffness can also be achieved by applying sheathing horizontally, with the long panel dimension (strength axis) across studs.

**Horizontal application:** For studs spaced 16 inches o.c., use x-inch APA Rated Sheathing 24/0, Exposure 1. For studs spaced 24 inches o.c., use 7/16 inch APA Rated Sheathing 20/0 or 24/16, Exposure 1.

**Vertical application:** For studs spaced 16 inches o.c., use 15/32-inch APA Rated Sheathing 32/16, Exposure 1. For studs spaced 24 inches o.c., use 19/32-inch APA Rated Sheathing 40/20, Exposure 1. If using plywood, APA recommends 5-ply, 5-layer panel construction.

Table 1 gives complete recommendations. The thickness and span rating listed here are minimums; builders may substitute thicker panels with higher span rating.

3. **Use blocking fix best performance.** When installing panels horizontally, use blocking along the horizontal joints between studs. When using 2x6 lumber studs, a continuous 2x lumber beltline (installed flatwise) an be dadoed into the exterior edge of the studs to serve as blocking.

Blocking is required for braced wall sections and shear wall applications. When it is not required by code, APA still recommends blocking to eliminate potential for cracking of the stucco finish along horizontal joints.

4. **Space panels properly.** The importance of proper panel spacing cannot be emphasized strongly enough. Panels which are butted
tightly together may buckle if they absorb moisture. Improper spacing is one of the main causes of callbacks.

Panels should be spaced 1/8-inch apart at all edges and ends. This allows for expansion if panels are subject to higher moisture levels after installation.

When wall sheathing is installed along the band joist between floors in multi-story construction, spacing between panels should allow for lumber shrinkage as well. This is true whether panels are installed horizontally or vertically. Figure 3 shows an appropriate construction detail using a section of sheathing as a filler along the band joist. Note that the sheathing is installed so that it provides a shear connection for wall and floor framing above and below the band joints.

**Figure 3.** Horizontal joints in structural wood panel sheathing at band joist (for multi-story buildings, provide spacing at horizontal joints for “settling” shrinkage of framing).

### Table 1. Recommended thickness and Span Rating for structural wood panel wall sheathing for stucco exterior finish.

<table>
<thead>
<tr>
<th>Stud Spacing (in.)</th>
<th>Panel Orientation</th>
<th>APA RATED SHEATHING</th>
<th>Minimum Nominal Thickness (in.)</th>
<th>Minimum Span Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Horizontal (c)</td>
<td>3/8</td>
<td>24/0</td>
<td>32/16</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>15/32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Horizontal (c)</td>
<td>7/16</td>
<td>24/0</td>
<td>40/20</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>19/32</td>
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</tbody>
</table>

(a) Strength axis (long panel dimension) perpendicular to studs for horizontal application; or parallel to studs for vertical application.
(b) Recommendations apply to all-veneer plywood, oriented strand board (OSB), waferboard or composite (APA COM-PLY) panels.
(c) Blocking recommended between studs along horizontal panel joints.
(d) For plywood, 5-ply/5-layer panel construction is recommended.

5. **Use adequate fasteners.** Panel fastening normally consists of 6d nails for panels 1/2-inch thick or less, or 8d for thicker panels. Other code-approved fasteners, such as staples, may also be used. Spacing of 6 inches o.c. at panel edges and 12 inches o.c. at intermediate studs is normally acceptable. Closer spacing or other fastener sizes may be required for engineered shear wall applications.
6. Use two layers of building paper. Building paper is required as a weather-resistive barrier when stucco is applied over structural wood panel sheathing. Typically a vapor-permeable, waterproof, asphalt-saturated building paper is specified (per Federal Specification UU-B-790 Type 1, Grade D). Two layers of this building paper are required in accordance with Section 4706 (d) of the 1988 Uniform Building Code.

Fire-rated Wall Construction

The 1988 Uniform Building Code permits construction of a one-hour fire-rated, load-bearing exterior wall using 7/8-inch exterior cement (stucco exterior finish) over plywood wall sheathing. This construction, which uses 2x wood studs spaced 16 inches o.c., eliminates the need for a separate layer of 5/8-inch Type X gypsum sheathing. Thus it can save substantially on material and labor costs. This wall assembly may be insulated without degrading its fire resistance rating by filling the stud cavity with mineral fiber or glass fiber.

Structural Panels Over Metal Frames

Modern fastening methods are rapidly expanding the use of APA panels over metal framing. Self drilling, self-tapping fasteners may be used to attach panels up to 1x-inch thick to steel framing members up to 3/16-inch thick (use Type S screws for 20-25 gauge steel or Type S-12 for thicker 12-18 gauge steel).

Hardened screw-shank nails or pneumatically driven steel pins may be used to fasten panels to lighter framing members. In that case, APA advises use of a construction adhesive.

Since threads usually extend only par-way up the shank of self-drilling, self-tapping screws and screw-shank nails, it is important to specify a length sufficient to engage the metal framing.

A typical panel-to-metal framing system is illustrated in Figure 4.

Load-span recommendations are the same as for wood-frame systems. For more information on recommended fasteners and adhesives and on allowable lateral loads for fasteners in engineered shear wall applications, contact the framing manufacturer or distributor.

REFERENCES

About the Author...
John D. Rose is senior engineer of the Technical Services Division of the American Plywood Association, Tacoma, Washington where he has been employed since 1963. He is active in the American Society of Testing and Materials (ASTM), the Structural Engineers Association of Washington and the Forest Products Research Society. A graduate of the University of Michigan, Mr. Rose has a B.S. in Civil Engineering and has been recognized for scholastic achievement in both Engineering and Civil Engineering.