



Engineered Wood

CONSTRUCTION GUIDE



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WOOD

The Natural Choice



Engineered wood products are a good choice for the environment. They are manufactured for years of trouble-free, dependable use. They help reduce waste by decreasing disposal costs and product damage. Wood is a renewable resource that is easily manufactured into a variety of viable products.

A few facts about wood.

- **We're growing more wood every day.** Forests fully cover one-third of the United States' and one-half of Canada's land mass. American landowners plant more than two billion trees every year. In addition, millions of trees seed naturally. The forest products industry, which comprises about 15 percent of forestland ownership, is responsible for 41 percent of replanted forest acreage. That works out to more than one billion trees a year, or about three million trees planted every day. This high rate of replanting accounts for the fact that each year, 27 percent more timber is grown than is harvested. Canada's replanting record shows a fourfold increase in the number of trees planted between 1975 and 1990.



- **Life Cycle Assessment shows wood is the greenest building product.**

A 2004 Consortium for Research on Renewable Industrial Materials (CORRIM) study gave scientific validation to the strength of wood as a green building product. In examining building products' life cycles – from extraction of the raw material to demolition of the building at the end of its long lifespan – CORRIM found that wood was better for the environment than steel or concrete in terms of embodied energy, global warming potential, air emissions, water emissions and solid waste production. For the complete details of the report, visit www.CORRIM.org.

- **Manufacturing wood is energy efficient.**

Wood products made up 47 percent of all industrial raw materials manufactured in the United States, yet consumed only 4 percent of the energy needed to manufacture all industrial raw materials, according to a 1987 study.

Material	Percent of Production	Percent of Energy Use
Wood	47	4
Steel	23	48
Aluminum	2	8

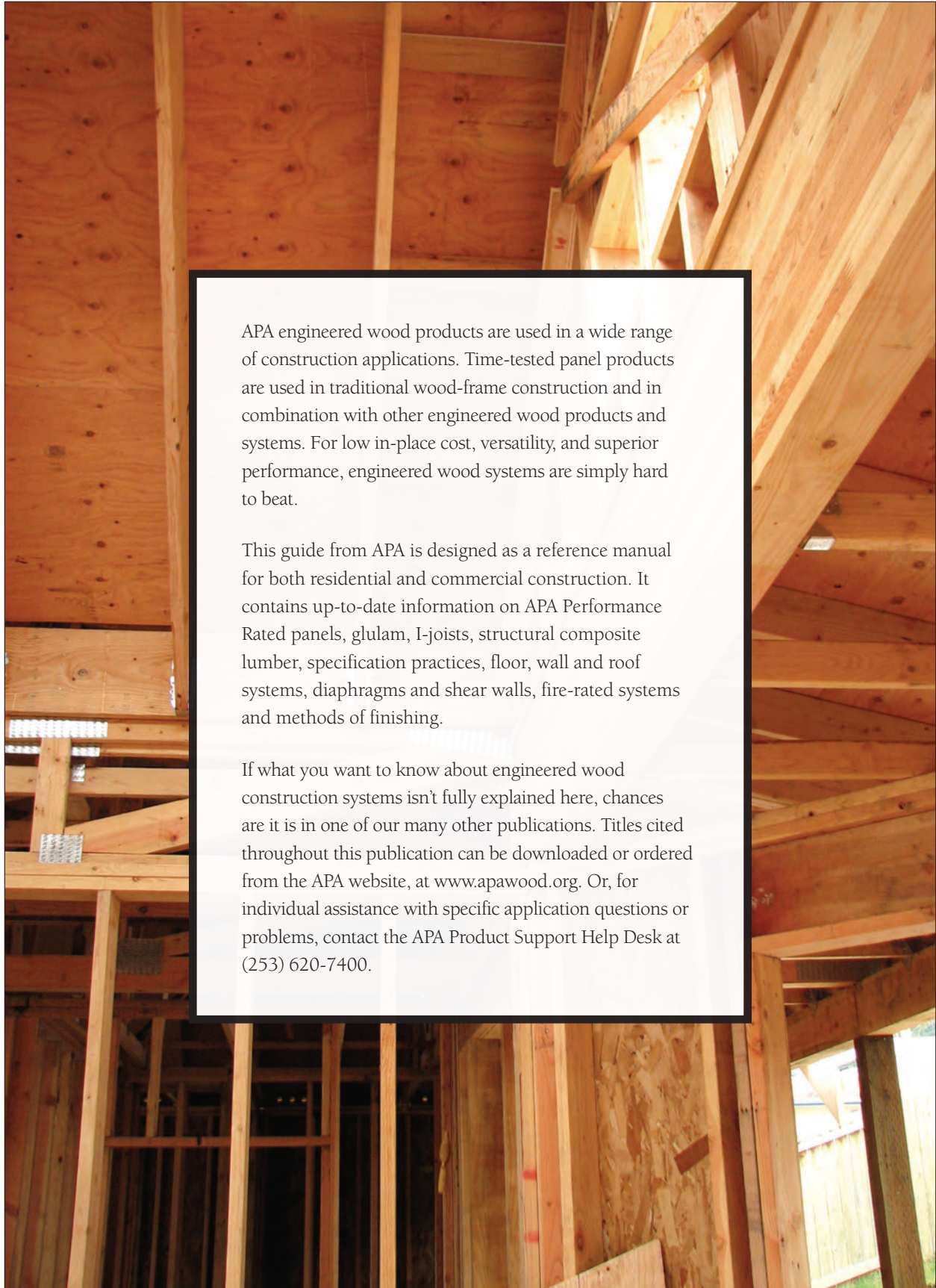


- **Good news for a healthy planet.** For every ton of wood grown, a young forest produces 1.07 tons of oxygen and absorbs 1.47 tons of carbon dioxide.

Wood: It's the natural choice for the environment, for design and for strong, lasting construction.



NOTICE:
The recommendations in this guide apply only to products that bear the APA trademark. Only products bearing the APA trademark are subject to the Association's quality auditing program.



APA engineered wood products are used in a wide range of construction applications. Time-tested panel products are used in traditional wood-frame construction and in combination with other engineered wood products and systems. For low in-place cost, versatility, and superior performance, engineered wood systems are simply hard to beat.

This guide from APA is designed as a reference manual for both residential and commercial construction. It contains up-to-date information on APA Performance Rated panels, glulam, I-joists, structural composite lumber, specification practices, floor, wall and roof systems, diaphragms and shear walls, fire-rated systems and methods of finishing.

If what you want to know about engineered wood construction systems isn't fully explained here, chances are it is in one of our many other publications. Titles cited throughout this publication can be downloaded or ordered from the APA website, at www.apawood.org. Or, for individual assistance with specific application questions or problems, contact the APA Product Support Help Desk at (253) 620-7400.



GUIDE TO ENGINEERED WOOD PRODUCTS

The evolution of engineered wood products has greatly expanded building options and methods in all forms of residential and commercial construction. The product section of this APA guide provides product information and specification recommendations for several of the most common engineered wood products – plywood, oriented strand board, glulam, and I-joists. Other engineered wood products that are often used in the construction systems described in this guide include Rim Board® and structural composite lumber (SCL).

“Engineered wood” describes wood products that are engineered for structural applications. Plywood has been used since the 1940s, and is considered by many to be the original engineered wood product. All glued engineered wood products are made by combining wood strands, veneers, lumber or other wood fiber with adhesive to form a larger composite structural unit. They are designed and manufactured to maximize the natural strength and stiffness characteristics of wood by optimally orienting the wood veneers, strands or laminations and by combining wood with durable adhesives.

PANEL SELECTION AND SPECIFICATION

Manufacturing and Performance Standards

Panels for construction and industrial applications can be manufactured in a variety of ways – as plywood (cross-laminated wood veneer), oriented strand board (OSB) or other wood-based panel products.

Some plywood panels are manufactured under the detailed manufacturing specifications or under the performance testing provisions of [Voluntary Product Standard PS 1-09 for Structural Plywood](#), developed cooperatively by the plywood industry, user groups and the U.S. Department of Commerce. Other plywood panels, however, as well as composite and OSB panels, are manufactured under the provisions of [APA PRP-108, Performance Standards and Qualification Policy for Structural-Use Panels](#), or under [Voluntary Product Standard PS 2-10, Performance Standard for Wood-Based Structural-Use Panels](#), that establish performance criteria for specific designated construction applications.

These APA Performance Rated Panels are easy to use and specify because the recommended end use and maximum support spacings are clearly indicated in the APA trademark located on the panel. By broadening the range of panel configurations and compositions,

TABLE 1

VENEER GRADES

A	Smooth, paintable. Not more than 18 neatly made repairs, boat, sled, or router type, and parallel to grain, permitted. Wood or synthetic repairs permitted. May be used for natural finish in less demanding applications.
B	Solid surface. Shims, sled or router repairs, and tight knots to 1 inch across grain permitted. Wood or synthetic repairs permitted. Some minor splits permitted.
C	Improved C veneer with splits limited to 1/8 inch width and knotholes or other open defects limited to 1/4 x 1/2 inch.
Plugged C	Wood or synthetic repairs permitted. Admits some broken grain.
C	Tight knots to 1-1/2 inches. Knotholes to 1 inch across grain and some to 1-1/2 inches if total width of knots and knotholes is within specified limits. Synthetic or wood repairs. Discoloration and sanding defects that do not impair strength permitted. Limited splits allowed. Stitching permitted.
D	Knots and knotholes to 2-1/2 inch width across grain and 1/2 inch larger within specified limits. Limited splits are permitted. Stitching permitted. Limited to Exposure 1.

APA Performance Rated Panels allow more efficient use of raw materials. APA PRP-108 Performance Standards are recognized through **ESR-2586 by the International Code Council Evaluation Service (ICC-ES, www.icc-es.org)** and HUD^(a). PRP-108, PS 1 and/or the PS 2 grade conformance where applicable are given in the lower portion of the APA trademark. Plywood panels manufactured to these performance standards, depending on bond classification, veneer species and Performance Category, etc., are in many instances identical to panel grades as defined in Product Standard PS 1-09.

Typical APA panel trademarks are illustrated and explained at right.

Grade Designations

Structural panel grades are generally identified in terms of the veneer grade used on the face and back of the panel (e.g., A-B, B-C, etc.), or by a name suggesting the panel's intended end use (e.g., APA RATED SHEATHING, APA RATED STURD-I-FLOOR, etc.). See **Tables 2–4**.

Veneer grades define veneer appearance in terms of natural unrepaired growth characteristics and allowable number and size of repairs that may be made during manufacture. See Table 1. The highest quality veneer grade commonly available is A. The minimum grade of veneer permitted in Exterior plywood is C-grade. D-grade veneer is only permitted to be used in panels intended for applications protected from long-term exposure to weather.

Sanded, Unsanded and Touch-Sanded Panels

Panels with B-grade or better veneer faces are always sanded smooth in manufacture to fulfill the requirements of their intended end use – applications such as cabinets, shelving, furniture, built-ins, etc. APA RATED SHEATHING panels are unsanded since a smooth surface is not a requirement of their intended end use. Still other panels – APA UNDERLAYMENT, APA RATED STURD-I-FLOOR, APA C-D PLUGGED, and APA C-C PLUGGED – require only touch sanding for “sizing” to make the panel thickness more uniform.

Unsanded and touch-sanded panels, and panels with B-grade or better veneer on one side only, usually carry the APA trademark on the panel back. Panels with both sides of B-grade or better veneer, or with special overlaid surfaces (such as HIGH DENSITY OVERLAY) usually carry the APA trademark on the panel edge.

Thickness Designation and Performance Category

Up until 2008, the thickness of structural panels like plywood and OSB was designated and labeled by the panel's nominal thickness which was subject to a plus and minus tolerance specified in the Voluntary Product Standards PS 1 and PS 2. The tolerance on unsanded panel types used in construction is plus or minus 1/32 inch of the designated thickness. The tolerance on sanded grades of plywood is plus or minus 1/64 inch of the designated thickness. These thickness tolerances were applied at the time of manufacturing or at a standard dry condition since it is recognized that actual panel thickness may naturally change due to changes in panel moisture conditions.

Model codes, technical recommendations, designs and specifications have been based upon the use of these panel nominal thicknesses. However, packaging and labeling regulations adopted as state and local law specify that labeling of dimensions comply with standards developed by the National Conference on Weights and Measures. These

The diagram illustrates three APA panel trademarks with numbered callouts (1-16) pointing to specific parts of the label. The first trademark is for a STURD-I-FLOOR panel (240c), the second is for SHEATHING (48/24), and the third is for SIDING (160c). The callouts are: 1 Panel grade, 2 Span Rating, 3 Tongue-and-groove, 4 Siding face grade, 5 Species group number, 6 Bond classification, 7 Decimal thickness designation (this value is generally at or near the lower tolerance specified in PS 1 or PS 2), 8 Mill number, 9 Product Standard, 10 APA's performance rated panel standard, 11 HUD recognition, 12 Performance Category, 13 Panel grade, Canadian standard, 14 Panel mark – Rating and end-use designation per the Canadian standard, 15 Canadian performance rated panel standard, 16 Panel face grain orientation indicator.

(a) HUD recognition of wood-based APA Performance Rated Panels is contained in *Use of Materials Bulletin UM-40*.

regulations require dimensional labeling that is incompatible with the thickness tolerances specified in PS 1 and PS 2. To jointly comply with these regulations while maintaining the specifications within model codes and other existing specifications used in the construction industry, structural panels are now labeled with both a Performance Category and a decimal thickness designation. The decimal thickness designation is generally at or near the lower thickness tolerance permitted in PS 1 and PS 2.

The term “Performance Category” is defined within PS 1 and PS 2 as **a panel designation related to the panel thickness range that is linked to the nominal panel thickness designations used in the International Building Code (IBC) and International Residential Code (IRC). For purposes of labeling, abbreviations PERF CAT, CAT, or Category are permitted within the panel grade mark.** The 2012 International Building Code (IBC) and International Residential Code (IRC) state that **the Performance Category value shall be used as the “nominal panel thickness” or “panel thickness” whenever referenced in the code.**

This publication widely uses the Performance Category as the panel designation. There are some places where traditional nominal thickness designations are used, and in those instances, they should be considered as equivalent to the Performance Category.

Bond Classification

APA trademarked panels may be produced in two bond classifications – Exterior and Exposure 1. The bond classification relates to moisture resistance of the glue bond. Since aesthetic (nonstructural) attributes of panels may be compromised to some degree by exposure to weather, installation recommendations in this publication are designed to provide optimum overall performance.

Bond classification of the panel does not relate to fungal decay resistance of the panel. Fungal decay of wood products may occur when the moisture content exceeds 20 percent for an extended period. See *APA Technical Note, Controlling Decay in Wood Construction, Form R495*, for a discussion of fungal decay. Prevention of fungal decay is a function of proper design, material specification, construction and maintenance of the structure. While this publication includes many of the applicable provisions, reference to local building codes and other design documents is also necessary.

Exterior panels have bonds capable of withstanding repeated wetting and redrying or long-term exposure to weather or other conditions of similar severity.

Exposure 1 panels are suitable for uses **not** involving long-term exposure to weather. Panels classified as Exposure 1 are intended to resist the effects of moisture due to construction delays, or other conditions of similar severity. Exposure 1 panels may also be used when exposure to the outdoors is on the under-side only, such as at roof overhangs, although appearance characteristics of the panel grade should also be considered. Exposure 1 panels are made with the same exterior adhesives used in Exterior panels. However, because other panel compositional factors may affect bond performance, only Exterior panels should be used for long-term exposure to the weather.

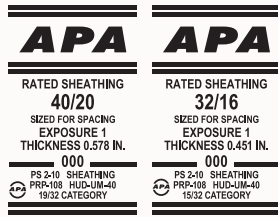
C-D Exposure 1 APA Rated Plywood Sheathing, sometimes called “CDX” in the trade, is occasionally mistaken as an Exterior panel and erroneously used in applications for which it does not possess the required resistance to weather. “CDX” should only be used for applications as outlined under Exposure 1 above. For sheathing grade panels that will be exposed long-term to the weather, specify APA Rated Sheathing Exterior (C-C Exterior plywood under PS 1).

Continued on page 12

TABLE 2

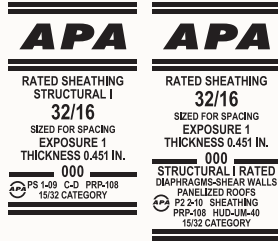
**GUIDE TO APA PERFORMANCE RATED PANELS^{(a)(b)}
FOR APPLICATION RECOMMENDATIONS, SEE FOLLOWING PAGES.**

APA RATED SHEATHING
Typical Trademark



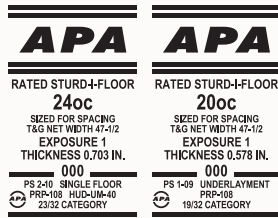
Specially designed for subflooring and wall and roof sheathing. Also good for a broad range of other construction and industrial applications. Can be manufactured as OSB, plywood, or other wood-based panel. BOND CLASSIFICATIONS: Exterior, Exposure 1. COMMON PERFORMANCE CATEGORIES: 3/8, 7/16, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.

APA STRUCTURAL I
RATED SHEATHING^(c)
Typical Trademark



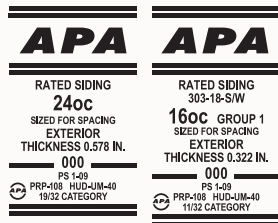
Unsanded grade for use where shear and cross-panel strength properties are of maximum importance, such as panelized roofs and diaphragms. Can be manufactured as OSB, plywood, or other wood-based panel. BOND CLASSIFICATIONS: Exterior, Exposure 1. COMMON PERFORMANCE CATEGORIES: 3/8, 7/16, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.

APA RATED
STURD-I-FLOOR
Typical Trademark



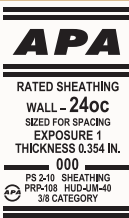
Specially designed as combination subfloor-underlayment. Provides smooth surface for application of carpet and pad and possesses high concentrated and impact load resistance. Can be manufactured as OSB, plywood, or other wood-based panel. Available square edge or tongue-and-groove. BOND CLASSIFICATIONS: Exterior, Exposure 1. COMMON PERFORMANCE CATEGORIES: 19/32, 5/8, 23/32, 3/4, 1, 1-1/8.

APA RATED SIDING
Typical Trademark



For exterior siding, fencing, etc. Can be manufactured as plywood, as other wood-based panel or as an overlaid OSB. Both panel and lap siding available. Special surface treatment such as V-groove, channel groove, deep groove (such as APA Texture 1-11), brushed, rough sawn and overlaid (MDO) with smooth- or texture-embossed face. Span Rating (stud spacing for siding qualified for APA Sturd-I-Wall applications) and face grade classification (for veneer-faced siding) indicated in trademark. BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES: 11/32, 3/8, 7/16, 15/32, 1/2, 19/32, 5/8.

APA RATED SHEATHING – WALL
Typical Trademark



Specially designed for wall sheathing. Not intended for roof or floor sheathing. Can be manufactured as OSB, plywood, or other wood-based panel. BOND CLASSIFICATION: Exposure 1. COMMON PERFORMANCE CATEGORIES: 3/8, 7/16, 15/32.

(a) Specific grades, Performance Categories and bond classifications may be in limited supply in some areas. Check with your supplier before specifying.

(b) Specify Performance Rated Panels by Performance Category and Span Rating. Span Ratings are based on panel strength and stiffness. Since these properties are a function of panel composition and configuration as well as thickness, the same Span Rating may appear on panels of different Performance Categories. Conversely, panels of the same Performance Category may be marked with different Span Ratings.

(c) For some Structural I plywood panel constructions, the plies are special improved grades. Panels marked PS 1 are limited to Group 1 species. Other panels marked Structural I Rated qualify through special performance testing.

TABLE 3

**GUIDE TO APA SANDED AND TOUCH-SANDED PLYWOOD PANELS^{(a)(b)(c)}
FOR APPLICATION RECOMMENDATIONS, SEE FOLLOWING PAGES.**

<p>APA A-A Typical Trademark (mark on panel edge)</p> <p style="border: 1px solid black; padding: 2px;">A-A • G-1 • EXT • 0.734 IN. • APA • 000 • PS 1-09 • 3/4 CAT</p>	<p>Use where appearance of both sides is important for interior applications such as built-ins, cabinets, furniture, partitions; and exterior applications such as fences, signs, boats, shipping containers, tanks, ducts, etc. Smooth surfaces suitable for painting. BOND CLASSIFICATIONS: Exposure 1, Exterior. COMMON PERFORMANCE CATEGORIES: 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA A-B Typical Trademark (mark on panel edge)</p> <p style="border: 1px solid black; padding: 2px;">A-B • G-1 • EXT • 0.234 IN. • APA • 000 • PS 1-09 • 1/4 CAT</p>	<p>For use where appearance of one side is less important but where two solid surfaces are necessary. BOND CLASSIFICATIONS: Exposure 1, Exterior. COMMON PERFORMANCE CATEGORIES: 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA A-C Typical Trademark</p> 	<p>For use where appearance of only one side is important in exterior or interior applications, such as soffits, fences, farm buildings, etc.^(d) BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES: 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA A-D Typical Trademark</p> 	<p>For use where appearance of only one side is important in interior applications, such as paneling, built-ins, shelving, partitions, flow racks, etc.^(d) BOND CLASSIFICATION: Exposure 1. COMMON PERFORMANCE CATEGORIES: 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA B-B Typical Trademark (mark on panel edge)</p> <p style="border: 1px solid black; padding: 2px;">B-B • G-2 • EXT • 0.578 IN. • APA • 000 • PS 1-09 • 19/32 CAT</p>	<p>Utility panels with two solid sides. BOND CLASSIFICATIONS: Exposure 1, Exterior. COMMON PERFORMANCE CATEGORIES: 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA B-C Typical Trademark</p> 	<p>Utility panel for farm service and work buildings, boxcar and truck linings, containers, tanks, agricultural equipment, as a base for exterior coatings and other exterior uses or applications subject to high or continuous moisture.^(d) BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES: 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA B-D Typical Trademark</p> 	<p>Utility panel for backing, sides of built-ins, industry shelving, slip sheets, separator boards, bins and other interior or protected applications.^(d) BOND CLASSIFICATION: Exposure 1. COMMON PERFORMANCE CATEGORIES: 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>

Continued on next page

TABLE 3 continued

**GUIDE TO APA SANDED AND TOUCH-SANDED PLYWOOD PANELS^{(a)(b)(c)}
FOR APPLICATION RECOMMENDATIONS, SEE FOLLOWING PAGES.**

APA UNDERLAYMENT
Typical Trademark



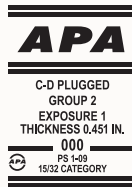
For application over structural subfloor. Provides smooth surface for application of carpet and pad and possesses high concentrated and impact load resistance. For areas to be covered with resilient flooring, specify panels with "sanded face."^(e) BOND CLASSIFICATION: Exposure 1. COMMON PERFORMANCE CATEGORIES^(f): 1/4, 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.

APA C-C PLUGGED^(g)
Typical Trademark



For use as an underlayment over structural subfloor, refrigerated or controlled atmosphere storage rooms, pallet fruit bins, tanks, boxcar and truck floors and linings, open soffits, and other similar applications where continuous or severe moisture may be present. Provides smooth surface for application of carpet and pad and possesses high concentrated and impact load resistance. For areas to be covered with resilient flooring, specify panels with "sanded face."^(e) BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES^(f): 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.

APA C-D PLUGGED
Typical Trademark




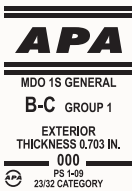
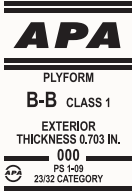
For open soffits, built-ins, cable reels, separator boards and other interior or protected applications. Not a substitute for Underlayment or APA Rated Sturd-I-Floor as it lacks their puncture resistance. BOND CLASSIFICATION: Exposure 1. COMMON PERFORMANCE CATEGORIES: 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.

- (a) Specific plywood grades, Performance Categories and bond classifications may be in limited supply in some areas. Check with your supplier before specifying.
- (b) Sanded Exterior plywood panels, C-C Plugged, C-D Plugged and Underlayment grades can also be manufactured in Structural I (all plies limited to Group 1 species).
- (c) Some manufacturers also produce plywood panels with premium N-grade veneer on one or both faces. Available only by special order. Check with the manufacturer. For a description of N-grade veneer, refer to the APA publication *Sanded Plywood*, Form K435.

- (d) For nonstructural floor underlayment, or other applications requiring improved inner ply construction, specify panels marked either "plugged inner plies" (may also be designated "plugged crossbands under face" or "plugged crossbands" or "core"); or "meets underlayment requirements."
- (e) Also available in Underlayment A-C or Underlayment B-C grades, marked either "touch sanded" or "sanded face."
- (f) Some panels with Performance Categories of 1/2 and larger are Span Rated and do not contain species group number in trademark.
- (g) Also may be designated APA Underlayment C-C Plugged.

TABLE 4

GUIDE TO APA SPECIALTY PLYWOOD PANELS^(a)
FOR APPLICATION RECOMMENDATIONS, SEE FOLLOWING PAGES.

<p>APA Decorative Typical Trademark</p> 	<p>Rough-sawn, brushed, grooved, or striated faces. For paneling, interior accent walls, built-ins, counter facing, exhibit displays. Can also be made by some manufacturers in Exterior for exterior siding, gable ends, fences and other exterior applications. Use recommendations for Exterior panels vary with the particular product. Check with the manufacturer. BOND CLASSIFICATIONS: Exposure 1, Exterior. COMMON PERFORMANCE CATEGORIES: 5/16, 3/8, 1/2, 5/8.</p>
<p>APA High Density Overlay (HDO)^(b) Typical Trademark (mark on panel edge)</p> <p>HDO • INDUSTRIAL • A-A • G2 • EXT • 0.734 IN. • APA • 000 • PS 1-09 • 3/4 CAT</p>	<p>Has a hard opaque resin-fiber overlay on one or both faces. Abrasion resistant. For concrete forms, cabinets, countertops, signs, tanks. Also available with skid-resistant screen-grid surface. HDO is manufactured in two grades: Concrete Form and Industrial. BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES: 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA Medium Density Overlay (MDO)^(b) Typical Trademark</p> 	<p>Smooth, opaque, resin-fiber overlay on one or both faces. Ideal base for paint, both indoors and outdoors. For exterior siding, paneling, shelving, exhibit displays, cabinets, concrete forms, signs. MDO is manufactured in two grades: Concrete Form and General. BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES: 11/32, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.</p>
<p>APA Marine Typical Trademark (mark on panel edge)</p> <p>MARINE • A-A • EXT • 0.609 IN. • APA • 000 • PS 1-09 • 5/8 CAT</p>	<p>Ideal for boat hulls. Made only with Douglas-fir or western larch. Subject to special limitations on core gaps and face repairs. Also available with HDO or MDO faces. BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES: 1/4, 3/8, 1/2, 5/8, 3/4.</p>
<p>APA Plyform Class I^(b) Typical Trademark</p>  <p>Typical Trademark (mark on panel edge)</p> <p>PLYFORM • B-B • CL I • EXT • 0.734 IN. • APA • 000 • PS 1-09 • 3/4 CAT</p>	<p>Concrete form grades with high reuse factor. Sanded both faces and mill-oiled unless otherwise specified. Special restrictions on species. Also available in HDO or MDO for very smooth concrete finish, and with special overlays. BOND CLASSIFICATION: Exterior. COMMON PERFORMANCE CATEGORIES: 19/32, 5/8, 23/32, 3/4.</p>
<p>APA Plyron Typical Trademark (mark on panel edge)</p> <p>TEMPERED PLYRON • EXT • 0.734 IN. • APA • 000 • 3/4 CAT</p> <p>STANDARD PLYRON • EXP 1 • 0.734 IN. • APA • 000 • 3/4 CAT</p>	<p>Hardboard face on both sides. Faces tempered, untempered, smooth or screened. For countertops, shelving, cabinet doors, flooring. BOND CLASSIFICATIONS: Exposure 1, Exterior. COMMON PERFORMANCE CATEGORIES: 1/2, 5/8, 3/4.</p>

(a) Specific plywood grades, Performance Category and bond classifications may be in limited supply in some areas. Check with your supplier before specifying.

(b) Can also be manufactured in Structural I (all plies limited to Group 1 species).

Moisture Exposure Recommendations

APA recommendations take into account bond classification as well as other panel compositional factors that may affect bond or panel performance.

The table at right provides guidance regarding moisture content and recommended bond classification.

By far, most wood structural panels are used in interior or dry-use moisture conditions, where in-service moisture content will be less than 16 percent over the service life. In North America the typical in-service equilibrium moisture content is in the 8 percent to 12 percent range for wood structural panels.

Occasionally, however, an application will subject panels to higher long-term moisture conditions, such as in locations where relative humidity is 90 percent or more for long periods of time.

In-Service Moisture Content	End-Use Moisture Conditions	Recommended Bond Classification	Design Moisture Conditions ^(a)
Less than 16%	Dry uses	Exposure 1 or Exterior	Dry
16% to 19%	Humid interior or protected uses	Exposure 1 or Exterior	Wet
	Long-term exposure to weather	Exterior	Wet
Greater than 19%	Other very humid or wet uses	Exterior ^(b)	Wet
	Ground contact	Exterior ^(b)	Wet

(a) Contact APA for specific design provisions.
 (b) Recommend pressure treatment.

Group Number

Plywood can be manufactured from over 70 species of wood. These species are divided on the basis of strength and stiffness into five Groups under Voluntary Product Standard PS 1. Strongest species are in Group 1; the next strongest in Group 2, and so on. The Group number that appears in the trademark on some APA trademarked panels – primarily sanded grades – is based on the species used for face and back veneers or upon equivalent strength testing of the panel. Where face and back veneers are not from the same species Group, the higher Group number is used, except for sanded panels 3/8 inch thick or less and Decorative panels of any thickness. These are identified by face species because they are chosen primarily for appearance and used in applications where structural integrity is not critical. Sanded panels greater than 3/8 inch are identified by face species if C or D grade backs are at least 1/8 inch and are no more than one species group number larger. Some species are used widely in plywood manufacture; others rarely. Check local availability if a particular species is desired.

Span Ratings

APA RATED SHEATHING, APA RATED STURD-I-FLOOR and APA RATED SIDING carry numbers in their trademarks called Span Ratings. These denote the maximum recommended center-to-center spacing in inches of supports over which the panels should be placed in normal code-conforming construction. Except for APA RATED SIDING panels, the Span Rating applies when the long panel dimension or strength axis is across supports, unless the strength axis is otherwise identified on the panel. The Span Rating of APA RATED SIDING panels applies when panels are installed vertically (parallel to studs).

The Span Rating on APA RATED SHEATHING panels appears as two numbers separated by a slash, such as 32/16, 48/24, etc.^(a) The left-hand number denotes the maximum recommended spacing of supports when the panel is used for roof sheathing with the **strength axis of the panel across three or more supports (two or more spans)**. The right-hand number denotes the maximum recommended spacing of supports when the panel is used for subflooring with the **strength axis of the panel across three or more supports (two or more spans)**. A panel marked 32/16, for example, may be used for roof decking over supports up to 32 inches on center or for subflooring over supports up to 16 inches on center. When APA RATED SHEATHING is used for roof decking and subfloor applications see Tables 30 and 12 respectively, for recommended live-load capacities.

The Span Rating on APA RATED STURD-I-FLOOR and APA RATED SIDING panels appears as a single number. APA RATED STURD-I-FLOOR panels are designed specifically for single-floor (combined subfloor-underlayment) applications under carpet and pad and are manufactured with Span Ratings of 16, 20^(b), 24, 32 and 48. The Span Ratings for APA RATED STURD-I-FLOOR panels, like those for APA RATED SHEATHING, are based on application of the panel with the **strength axis of the panel across three or more supports (two or more spans)**. When APA RATED STURD-I-FLOOR is used for single-floor applications see Table 12 for recommended live load capacities. APA RATED STURD-I-FLOOR may be also used in roof decking applications. For such applications, see Table 30 for recommended roof live load capacities.

APA RATED SIDING is available with Span Ratings of 16 and 24 inches. Span-rated panels and lap siding may be used direct to studs or over nonstructural wall sheathing (Sturd-I-Wall construction), or over nailable panel (see Table 22) or lumber sheathing (double wall construction). Panels and lap siding with a Span Rating of 16 inches may be applied direct to studs spaced 16 inches on center. Panels and lap siding bearing a Span Rating of 24 inches may be used direct to studs 24 inches on center. All RATED SIDING panels may be applied horizontally direct to studs 16 or 24 inches on center provided horizontal joints are blocked. When used over structural sheathing, the Span Rating of APA RATED SIDING panels refers to the maximum recommended spacing of vertical rows of fasteners rather than to stud spacing.

For a description of Span Ratings under the Canadian Standard for Construction Sheathing, refer to the *APA Product Guide: Oriented Strand Board, Form W410*.

How to Order APA Panels

Sanded and Touch-Sanded Panels: Designate Performance Category, APA trademark, grade, Group number^(c), bond classification, dimensions, number of pieces. For example:

- 3/4 APA A-A, Group 1, Exterior, 48" x 96", 100 pcs.
- 3/8 APA Underlayment, Group 1, Exposure 1, 48" x 96", 100 pcs.

(Designate "sanded face" if panels are to be used under resilient flooring, or see Table 14 for additional information.)

Performance Rated Panels: Designate Performance Category, APA trademark, grade, Span Rating, bond classification, dimensions, number of pieces. For example:

- 15/32 APA RATED SHEATHING, 32/16, Exposure 1, 48" x 96", 100 pcs.
- 23/32 APA RATED STURD-I-FLOOR 24 oc, Exposure 1, 48"^(d) x 96", 100 pcs. (Note "square edge" or "tongue-and-groove" as desired.)

Rated Sidings: Designate Performance Category, APA trademark, face grade (for APA RATED SIDING-303), Span Rating, texture, pattern, dimensions, number of pieces. For example:

- 19/32 APA RATED SIDING 303-18-W, 16 oc, rough-sawn Texture 1-11[®], grooves 4" o.c., 48" x 96", 100 pcs. (Note manufacturer's trade name if desired.)

Concrete Form: Designate Performance Category, APA trademark, Class, dimensions, number of pieces. For example:

- 5/8 APA PLYFORM Class I, 48" x 96", 100 pcs. (Plyform panels are manufactured only as Exterior panels and are mill-oiled unless otherwise specified.)

(a) Exceptions are APA RATED SHEATHING intended for use as wall sheathing only, and APA RATED WALL BRACING. The trademarks for such panels contain a single number similar to the Span Rating for APA RATED SIDING.

(b) For Span Rating of 20, actual support spacing is 19.2 inches.

(c) Underlayment and C-C Plugged panels Performance Category 1/2 and larger are generally span rated and do not contain species group number in trademark. Designate Span Rating.

(d) Most tongue-and-groove panels are manufactured with a 47-1/2-inch net face width, although manufacturing practices vary. Check with your supplier.

Overlaid Panels: Designate Performance Category, APA trademark, grade, Group number, dimensions, number of pieces. For example:

- 1/2 APA MEDIUM DENSITY OVERLAY (MDO) GENERAL or (APA RATED SIDING 303-OL in the case of overlaid panels produced under the APA RATED SIDING-303 manufacturing specification), Group 1, 48" x 96", 100 pcs. (Any special requirements, such as only one side overlaid, surface texture or weight of surfacing material, should be stated after the standard specification.)

Grade Availability

Some panel grades, Performance Categories, Span Ratings, or species may be difficult to obtain in some areas. Check with your supplier for availability or include an alternate panel in specifications. Standard panel dimensions are 4 feet by 8 feet, although some mills also produce larger panels.

Nail Sizes

Various nail penny sizes are referenced throughout this document. For most cases, the appropriate lengths and wire sizes can be found in Table 5.

Metric Conversions

Metric equivalents of panel thickness and common sizes of wood structural panels are tabulated at right (1 inch = 25.4 millimeters):

TABLE 5

NAIL SIZES (ASTM F1667)

Penny Size (d)	Type	Length (in.)	Wire Diameter (in.)
3d	Ring- or screw-shank	1-1/4	0.099*
	Finish	1-1/2	0.072
4d	Box and Casing	1-1/2	0.080
	Ring- or Screw-shank	1-1/2	0.099*
6d	Finish	2	0.092
	Box and Casing	2	0.099
	Siding	1-7/8	0.106
	Common	2	0.113
	Ring- or Screw-shank	2	0.120*
8d	Finish	2-1/2	0.099
	Box and Casing	2-1/2	0.113
	Siding	2-3/8	0.128
	Common	2-1/2	0.131
	Ring- or Screw-shank	2-1/2	0.120* or 0.131*
10d	Box and Casing	3	0.128
	Common	3	0.148
16d	Box and Casing	3-1/2	0.135
	Common	3-1/2	0.162
	Sinker	3-1/4	0.148

*International Staple, Nail and Tool Association (ISANTA) ESR-1539 available at www.icc-es.org

PANEL DIMENSIONS (Width x Length)

ft	Metric Soft Conversion, mm
4 x 8	1220 x 2440
4 x 9	1220 x 2740
4 x 10	1220 x 3050

PANEL THICKNESS

in.	mm
1/4	6.4
5/16	7.9
11/32	8.7
3/8	9.5
7/16	11.1
15/32	11.9
1/2	12.7
19/32	15.1
5/8	15.9
23/32	18.3
3/4	19.1
7/8	22.2
1	25.4
1-3/32	27.8
1-1/8	28.6

Panel Storage and Handling

Like all building materials, APA trademarked structural wood panels should be properly stored, handled and installed to assure superior in-service performance.

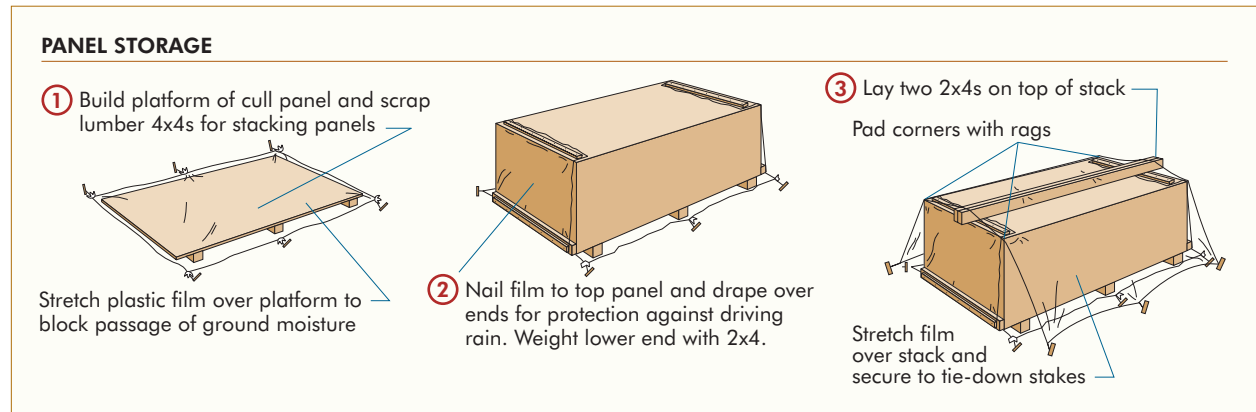
Protect the edges and ends of panels, especially tongue-and-groove and shiplap-edged panels. Place panels to be moved by forklift on pallets or bunks when received to avoid damage by fork tines.

Panels to be transported on open truck beds should be covered with standard tarpaulins or “lumber wraps.” For open railcar shipment, use “lumber wrap” to avoid extended weather exposure.

Whenever possible, store panels under a roof, especially if they won't be used soon after received. Keep sanded and other appearance grades away from open doorways, and weight down the top panel in a stack to help avoid any possible warpage from humidity. If moisture absorption is expected, cut steel banding on panel bundles to prevent edge damage.

Panels to be stored outside should be stacked on a level platform supported by 4x4 stringers or other blocking. Never leave panels or the platform in direct contact with the ground. Use at least three full-width supports along the 8-foot length of the panel – one centered and the others 12 to 16 inches from each end.

Cover the stack loosely with plastic sheets or tarps. Anchor the covering at the top of the stack, but keep it open and away from the sides and bottom to assure good ventilation. Tight coverings prevent air circulation and, when exposed to sunlight, create a “greenhouse” effect which may encourage mold formation.



PANEL SPECIFICATION GUIDE⁽¹⁾

CSI* Division 3 – Concrete Formwork

A. Materials

1. Forms – Plywood concrete forms shall be (specify appropriate grade):⁽²⁾

APA PLYFORM CLASS I EXT,

APA HIGH DENSITY OVERLAY CON-
CRETE FORM PLYFORM CLASS I
EXT, or

APA MEDIUM DENSITY OVERLAY
CONCRETE FORM PLYFORM CLASS
I EXT.

Use plywood thickness sufficient to support concrete at temperature and rate poured⁽³⁾; securely brace and shore forms to prevent displacement and to safely support construction loads.

CSI* Division 6 – Wood and Plastics

A. General Provisions

1. Identification Requirements – Each panel shall be identified with the appropriate trademark of APA, and shall meet the requirements of the latest edition of Voluntary Product Standard PS 1, Voluntary Product Standard PS 2 or APA PRP-108 Performance Standards.

2. All panels which have any edge or surface exposed long term to the weather shall be classed Exterior.⁽⁴⁾⁽⁵⁾

3. Panel Performance Category, grade, and Group number or Span Rating shall be at least equal to that shown on the drawings.⁽⁶⁾ Application shall be in accordance with recommendations of APA.⁽⁷⁾

B. Roof Sheathing

1. Panel roof sheathing shall be (specify appropriate grade):

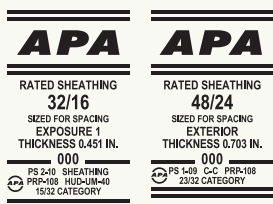
APA RATED SHEATHING EXP 1

APA RATED SHEATHING EXT

APA RATED SHEATHING/CEILING
DECK EXP 1

APA STRUCTURAL I RATED SHEATHING
EXP 1, or

APA STRUCTURAL I RATED SHEATHING
EXT.



Sheathing exposed long term to weather shall be classed Exterior.⁽⁵⁾

Install with the long dimension or strength axis of the panel across supports, except where noted⁽⁸⁾, and with panel continuous over two or more spans. For pitched roofs, place screened surface or side with skid-resistant coating up, if OSB panels are used. Wear skid-resistant shoes when installing roof sheathing and keep roof deck free of dirt, debris and sawdust during construction. Suitable edge support shall be provided where indicated on drawings (or in recommendations of APA)⁽⁶⁾ by use of panel clips, tongue-and-groove edges, or lumber blocking between joists. Panel end joints shall occur over framing.

Spacing of 1/8" is recommended at all panel ends and edges, unless otherwise indicated by the panel manufacturer.⁽⁹⁾

Unless special nail provisions are required (e.g., high wind areas), nail 6" o.c. along supported panel edges and 12" o.c. at intermediate supports, except that when supports are spaced 48" o.c. or more, space nails 6" o.c. at all supports. Use 8d common nails, except that when panels have a Performance Category of 1-1/8, use 8d ring-shank or 10d common.⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾⁽¹³⁾

Cover roof sheathing as soon as possible with roofing felt or shingle underlayment for protection against excessive moisture prior to roofing application.

C. Floors

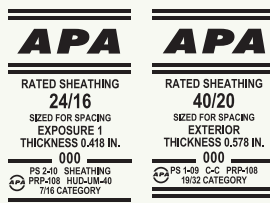
1. Subflooring (under structural finish floor such as wood strip or underlayment) – Panel subflooring shall be (specify appropriate grade):

APA RATED SHEATHING EXP 1

APA RATED SHEATHING EXT

APA STRUCTURAL I RATED SHEATHING
EXP 1, or

APA STRUCTURAL I RATED SHEATHING
EXT.



Install with the long dimension or strength axis of the panel across supports and with panel continuous over two or more spans. Panel end joints shall occur over framing. **Spacing of 1/8" is recommended at panel ends and edges,**⁽⁹⁾ unless otherwise indicated by the panel manufacturer.

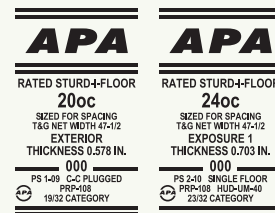
Nail 6" o.c. along supported panel edges and 12" o.c. at intermediate supports with 6d common nails for panels with a Performance Category of 1/2 or smaller, 8d for greater Performance Categories⁽¹³⁾. Where panels have a Performance Category of 1-1/8 and supports are 48" o.c., nails shall be 8d ring-shank or 10d common and spaced 6" o.c. at all supports.⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾⁽¹³⁾

Sand subfloor joints if necessary to smooth surface prior to installing underlayment or finish flooring.

2. Combined subfloor-underlayment (under carpet and pad)⁽¹⁴⁾ – Combined subfloor-underlayment panels shall be (specify appropriate grade):

APA RATED STURD-I-FLOOR EXP 1, or

APA RATED STURD-I-FLOOR EXT.



Install with the long dimension or strength axis of the panel across supports and with panel continuous over two or more spans. Panel edges shall be tongue-and-groove or supported on 2-inch lumber blocking installed between joists. Protect against damage until finish floor is installed.

Stagger panel end joints. Panel end joints shall occur over framing. **Spacing of 1/8" is recommended at panel ends and edges,** unless otherwise indicated by the panel manufacturer.⁽⁹⁾

For nailed floors, nail panels 6" o.c. at supported panel edges and 12" o.c. at intermediate supports, except that when supports are spaced 48" o.c., space nails 6" o.c. at all supports. Use 6d ring- or screw-shank nails for panels with a Performance Category of 3/4 and smaller, and 8d for thicker panels.⁽¹³⁾ With

*Construction Specifications Institute
Notes to Panel Specification Guide on page

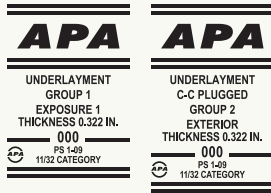
Performance Category 1-1/8 panels, 10d common nails may be used if supports are well seasoned.⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾⁽¹³⁾

Fill and thoroughly sand edge joints.⁽¹⁵⁾ Lightly sand any surface roughness, particularly around fasteners.

For field-glued floors, use adhesives meeting **ASTM D3498** or **APA Specification AFG-01**, applied in accordance with the manufacturer's recommendations. If OSB panels with sealed surfaces and edges are used, use only solvent-based glues; check with panel manufacturer. Apply continuous line of glue (1/4" thick) on joists, and continuous or spaced line of glue (1/8" thick) in groove of tongue-and-groove panels. Use 6d ring- or screw-shank nails spaced 6" oc at panel ends and 12" oc at intermediate bearings.⁽¹⁰⁾⁽¹³⁾⁽¹⁶⁾

3. Underlayment (over subflooring) – Plywood underlayment shall be (specify appropriate grade)⁽¹⁷⁾:

- APA UNDERLAYMENT EXP 1
- APA UNDERLAYMENT C-C PLUGGED EXT, OR
- APA C-C PLUGGED EXT.



Plywood Performance Category 19/32 or larger, APA RATED STURD-I-FLOOR EXP 1 or APA RATED STURD-I-FLOOR EXT may be specified. Apply underlayment just prior to laying finish floor and protect against damage until finish floor is installed.

For maximum stiffness, install underlayment with the face grain across supports. Stagger underlayment end joints at least one joist spacing (optional under carpet and pad) with respect to subfloor end joints and offset all edge joints by at least two inches from edge joints in the subfloor panels. Underlayment panel end joints should be offset two inches from framing below subfloor to avoid nailing into framing (which may lead to nail pops). **Butt panel ends and edges to a close but not tight fit (1/32" space is recommended).** Nail 6" o.c. along panel edges and 8" o.c. each way throughout remainder of panel with 3d ring-shank nails for panel Performance Categories of 11/32 to

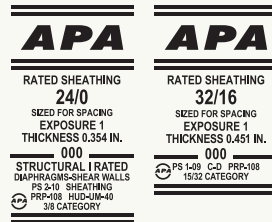
1/2, or 4d spaced 6" o.c. along edges and 12" o.c. each way for panel Performance Categories up to 3/4.⁽¹¹⁾⁽¹³⁾⁽¹⁸⁾ Fastener length should be slightly longer than the total thickness of the underlayment and subfloor.

Fill and thoroughly sand edge joints.⁽¹⁵⁾ Lightly sand any surface roughness, particularly around fasteners.

D. Wall Sheathing

1. Panel wall sheathing shall be (specify appropriate grade):

- APA RATED SHEATHING EXP 1
- APA RATED SHEATHING EXT
- APA STRUCTURAL I RATED SHEATHING EXP 1,
- APA STRUCTURAL I RATED SHEATHING EXT, or
- APA RATED WALL BRACING EXP 1.



Spacing of 1/8" is recommended at panel ends and edges, unless otherwise indicated by the panel manufacturer.⁽⁹⁾

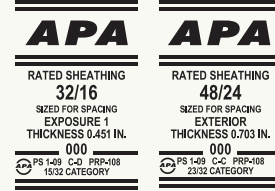
Unless special nail provisions are required (e.g., high wind areas), nail 6" o.c. along supported panel edges and 12" o.c. at intermediate supports with 6d common nails for panels with a Performance Category of 1/2 and smaller, and 8d for greater thicknesses.⁽¹⁰⁾⁽¹²⁾⁽¹³⁾

Apply weather-resistant barrier over panel wall sheathing.

E. Treated Plywood

1. Fire-retardant-treated plywood – All plywood shall be pressure-treated in accordance with American Wood Protection Association (AWPA) Standard U1 with an approved (high temperature Interior Type A-HT) (Exterior Type) fire retardant. Each panel shall be labeled or marked by an approved independent testing agency. After treatment, plywood shall be dried to an average moisture content of 15 percent or less.

Plywood shall be all-veneer APA RATED SHEATHING (or better, depending on appearance desired) EXP 1 or EXT.



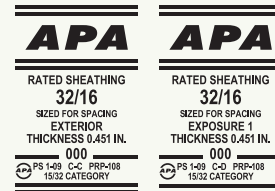
Note: Span Ratings and load capacities are based on untreated panels, and may not apply following fire-retardant treatment (FRT). Obtain structural performance characteristics of FRT panels from the company providing the treatment and redrying service.

2. Preservative-treated plywood –

Treated plywood for (state application) shall be pressure-treated in accordance with AWP A U1 with (creosote) (pentachlorophenol) (waterborne) preservatives, as required for (coastal water) (wood foundation) (ground contact) (above ground) exposure. Plywood treated with waterborne preservatives shall be dried after treatment to a moisture content of 18 percent or less.

All treated plywood used in the Permanent Wood Foundation System (PWF) shall be marked PS 1, PS 2 or APA Standard PRP-108, and marked by an approved inspection agency certified to inspect preservative-treated wood, indicating compliance with the treating, drying, retention and penetration requirements of AWP A Standard U1, or equivalent code-approved preservative-treating and quality control requirements. The mark shall also identify the intended use as Permanent Wood Foundation material.

Plywood shall be all-veneer APA RATED SHEATHING (or better, depending on appearance desired) EXP 1 or EXT.



Notes to Panel Specification Guide on page 19.

F. Glued Plywood Components

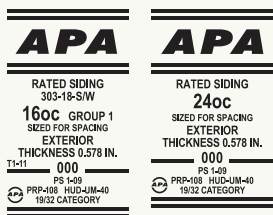
1. General – All plywood components shall be fabricated in accordance with the appropriate APA Fabrication Specification.⁽¹⁹⁾ Each original plywood panel shall bear the appropriate trademark of APA. Glue shall be of resorcinol or phenolic resin base (for outdoor exposure), or casein with a mold inhibitor (for indoor exposure).

CSI* Division 7 – Thermal and Moisture Protection

A. Siding

Siding shall be (specify appropriate grade):⁽²⁰⁾

APA RATED SIDING EXT, or
APA MEDIUM DENSITY OVERLAY
(MDO) GENERAL EXT.



Spacing of 1/8" is recommended at panel ends and edges, unless otherwise indicated by the panel manufacturer. Unless special nail provisions are required (e.g., high wind areas), nail panel siding 6" o.c. along panel edges and 12" o.c. at intermediate supports with 6d nonstaining⁽²¹⁾ box, casing or siding nails for panels with a Performance Category of 1/2 and smaller, and 8d for greater thicknesses.⁽¹⁰⁾⁽¹³⁾

Unless special nail provisions are required (e.g., high wind areas), fasten lap siding installed over panel or lumber sheathing 8" o.c. along bottom edge, or as otherwise recommended by manufacturer. Nail lap siding installed direct to studs or over nonstructural sheathing at each stud. Use 6d nonstaining⁽²¹⁾ box, casing, or siding nails for siding with a Performance Category of 1/2 or smaller, and 8d for thicker panels⁽²²⁾. If siding is applied over nonstructural sheathing, use next larger nail size. Use nonstaining box nails for siding installed over foam insulation sheathing ensuring adequate penetration into the studs to resist wind loads.

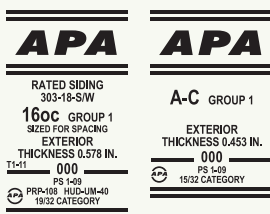
Prior to installing siding, apply weather-resistant barrier (e.g., building paper) over studs or sheathing.⁽⁶⁾

All panel edges should be sealed. For panels to be painted, sealer can be paint primer; for panels to be stained, sealer should be a water-repellent preservative compatible with the finish.

B. Soffits

Soffits shall be (specify appropriate grade):⁽⁵⁾

APA A-C EXT
APA B-C EXT
APA C-C P&TS EXT
APA RATED SIDING 303 EXT,⁽²⁰⁾ or
APA MEDIUM DENSITY OVERLAY
(MDO) GENERAL EXT.⁽²²⁾



Unless special nail provisions are required (e.g. high wind areas) nail 6" o.c. at supported panel edges and 12" o.c. at intermediate supports, with 6d nonstaining⁽²¹⁾ box, casing, or siding nails for panels with a Performance Category of 1/2 and smaller, and 8d for Performance Categories up to 3/4.⁽¹³⁾

CSI* Division 9 – Finishes (Painting)⁽²⁰⁾

A. Preparation of Surfaces

1. Exterior Panels – Panels to be exposed outdoors shall have all edges sealed. With paint, sealer may be a liberal coat of exterior house paint primer. With stain, seal with water-repellent preservative compatible with finish coat.

Surface shall be clean, dry and free of loose wood fibers.

2. Interior Panels – Surface shall be clean, dry and free of loose wood fibers. Holes and cracks shall be filled with putty or plastic wood (except for rustic type panels intended for stain finish). After dry, sand lightly in the direction of the grain of face veneer or texture to match existing surfaces.

Any tree pitch or sap spots shall be first touched up with a sealer.

B. Application of Finish

(Specify by brush, roller, or spray; brush application of the first coat gives best performance.)

Exterior Panels, Painted – *First coat:* Exterior stain-blocking primer as recommended by manufacturer of finish coat. (May be tinted.) Apply quantity as recommended by paint manufacturer.

Second coat: Top-quality exterior all-acrylic latex house paint designed for use with primer; color as selected. Two topcoats provide better performance.

Exterior Panels, Stained – *First coat:* Top-quality exterior penetrating semi-transparent oil stain where grain showthrough is desired;⁽²³⁾ or heavily pigmented solid-color oil or latex stain where grain is to be masked;⁽²⁴⁾ color as selected. Apply in one or two coats as recommended by manufacturer.

Use stain-blocking primer with light-colored solid-color latex stains.

Interior Panels, Painted – *First coat:* Stain-blocking primer as recommended by manufacturer of finish coat.

Second coat: Flat, semi-gloss or gloss topcoat designed for use with primer; color as selected. Use two topcoats if needed to cover.

Interior Panels, Color Tone – *First coat:* Stain and companion sealer mixed to selected color (or sealer, then stain applied separately).

Second coat: Interior satin varnish (additional coats can be applied as desired for depth of luster).

Interior Panels, Light Stain – *First coat:* Pigmented resin sealer (wiped off when tacky).

Second coat: Clear resin sealer.

Third coat: Tinted undercoat; thin enamel; pigmented sealer; or light stain applied thinly and wiped to the desired color depth; color as selected.

Fourth coat: Interior satin varnish (additional coats can be applied as desired for depth of luster).

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Notes to Panel Specification Guide:

- (1) The APA trademarks shown here are typical examples only. Refer to the following sections for specific panel grade and thickness recommendations.
- (2) Structural I grade (all plies limited to Group 1 species) can be specified when greater stiffness or strength is required.
- (3) Performance Category recommendations are contained in *APA Design/Construction Guide: Concrete Forming, Form V345*.
- (4) Exposure 1 may be specified for applications where temporary exposure to the weather will be required.
- (5) Open soffits or roof sheathing exposed on the underside may be any panel classed Exposure 1 where appearance is not a major consideration.
- (6) Refer to the appropriate application recommendations in this brochure.
- (7) References to APA's recommendations may allow subsequent specification concerning nailing, edge support and panel orientation to be omitted.
- (8) Long dimension of panel may be parallel to supports if panel has adequate thickness. See Table 33 for roof panels applied parallel to supports.
- (9) Supported panel joints shall occur approximately along the centerline of framing with a minimum bearing of 1/2".
- (10) Engineered shear walls and diaphragms may require additional nailing. See recommendations in Tables 29 and 38. Diagonal bracing is not required for braced wall sections when panel wall sheathing, APA RATED WALL BRACING or panel siding (APA RATED SIDING) is used.
- (11) Other code-approved fasteners may be used.
- (12) Fasteners shall be located 3/8" from panel edges.
- (13) See **Table 5, page 14**, for nail dimensions.
- (14) Specify veneer-faced STURD-I-FLOOR with "sanded face" when resilient flooring is to be applied (or see note 17 for additional grades). Otherwise, an additional layer of "sanded face" underlayment is recommended when resilient flooring is to be applied over STURD-I-FLOOR.
- (15) This step may not be necessary under some carpet and structural flooring products – check with flooring manufacturer.
- (16) Some local building codes accept 12" spacing with glue but current IBC and IRC require 6" fastener spacing at edges. When panels with a Performance Category greater than 3/4 are used in glued floors, use same fastener schedule as for nailed-only construction.
- (17) For areas to be covered with resilient flooring or fully adhered carpeting, specify Underlayment or C-C Plugged panel grades marked "sanded face." Underlayment A-C, Underlayment B-C, Marine EXT or sanded plywood grades marked "Plugged Crossbands Under Face," "Plugged Crossbands (or Core)," "Plugged Inner Plies" or "Meets Underlayment Requirements" may also be used under resilient flooring or fully adhered carpeting.
- (18) For panels with a Performance Category of 1/4, nail 3" o.c. along panel edges and 6" o.c. each way throughout remainder of panel, with 3d ring-shank nails. See **Table 14** for underlayment recommendations.
- (19) Design and fabrication specifications for plywood box beams, stressed-skin panels, curved panels, sandwich panels and all-plywood beams are available from APA.
- (20) See *APA Product Guide: Performance Rated Siding, Form E300*.
- (21) Hot-dip or hot-tumbled galvanized steel nails are recommended for most siding applications. For best performance, stainless steel nails or aluminum nails should be considered. APA tests also show that electrically or mechanically galvanized steel nails appear satisfactory when plating meets or exceeds thickness requirements of **ASTM A641 Class 2 coatings**, and is further protected by yellow chromate coating.

Note: Galvanized fasteners may react under wet conditions with the natural extractives of some wood species and may cause staining if left unfinished. Such staining can be minimized if the siding is finished in accordance with APA recommendations, or if the roof overhang protects the siding from direct exposure to moisture and weathering.

- (22) Specify MDO plywood with one face of Medium Density Overlay as described in Voluntary Product Standard PS 1.
- (23) Semitransparent stains may be used on plywood face grades 303-OC, 303-NR and 303-6-W. Other 303 face grades should not be finished with semitransparent stains unless specifically recommended by the panel manufacturer.
- (24) Only latex formulations are recommended on APA 303-SR and 303-NR grades of plywood siding.

ADDITIONAL INFORMATION

About APA – The Engineered Wood Association



APA – *The Engineered Wood Association* is a nonprofit trade association of and for structural wood panel, glulam timber, wood I-joist, structural composite lumber, and other engineered wood product manufacturers. Based in Tacoma, Washington, APA represents approximately 150 mills throughout North America, ranging from small, independently owned and operated companies to large integrated corporations.

Always insist on engineered wood products bearing the **mark of quality** – the APA or APA EWS trademark. Your APA engineered wood purchase is not only your highest possible assurance of product quality, but an investment in the many trade services that APA provides on your behalf. The Association's trademark appears only on products manufactured by member mills and is the manufacturer's assurance that the product conforms to the standard shown on the trademark.

For panels, that standard may be the Voluntary Product Standard PS 1-09 for Structural Plywood, Voluntary Product Standard PS 2-10, Performance Standards for Wood-Based Structural-Use Panels or APA PRP-108 Performance Standards and Qualification Policy for Structural-Use Panels. Panel quality of all APA trademarked products is subject to verification through APA audit.

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APA's services go far beyond quality testing and inspection. Research and promotion programs play important roles in developing and improving construction systems using wood structural panels, glulam, I-joists, and structural composite lumber, and in helping users and specifiers to better understand and apply engineered wood products. For more information, please see the back cover.

Engineered Wood Construction Guide

APA offers a comprehensive set of services and tools for design and construction professionals specifying and using engineered wood products and building systems. If you're looking for detailed product information, training material, or technical assistance, APA can help.

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- Training materials and assistance, including Wood University, APA's online portal for engineered wood education, located at www.wooduniversity.org
- Information to protect homes against damaging moisture infiltration through the Build a Better Home and Free From Mold programs, including guides and details for builders at www.buildabetterhome.org and an inspection regimen for homeowners at www.freefrommold.org
- More than 200 downloadable CAD details, found at www.apacad.org
- Field representatives in many major U.S. cities and Canada who can answer questions about APA trademarked products

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