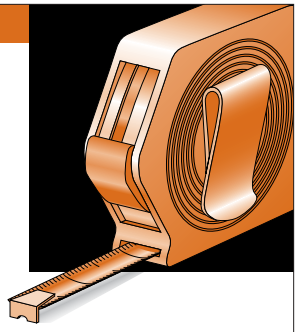
Installation and Preparation of Plywood Underlayment for Resilient Floor Covering

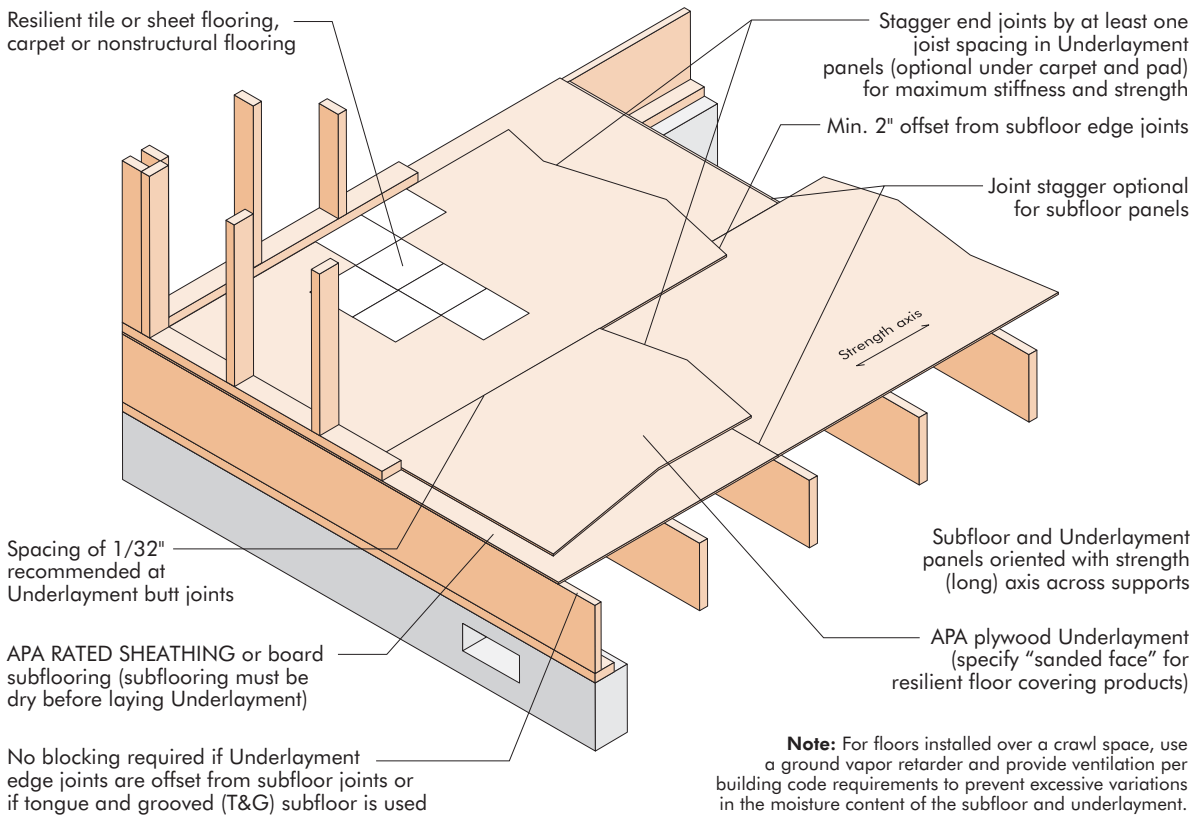


This Data File provides recommendations for residential and light commercial applications.

Underlayment grades of plywood have a solid, touch-sanded surface for direct application of carpet and pad. For areas to be covered with resilient floor covering, specify panels with "sanded face," or certain other grades as noted in Table 1. Special face and inner-ply construction of Underlayment resists dents and punctures from concentrated loads better than ordinary plywood. Applied as recommended, plywood Underlayment is also dimensionally stable and eliminates excessive swelling and subsequent buckling or humps around nails.

FIGURE 1

INSTALLMENT OF APA PLYWOOD UNDERLAYMENT



Note: For floors installed over a crawl space, use a ground vapor retarder and provide ventilation per building code requirements to prevent excessive variations in the moisture content of the subfloor and underlayment.

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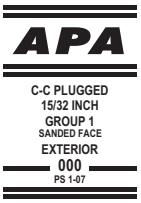
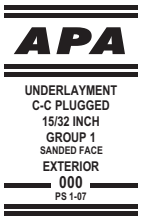
TABLE 1

RECOMMENDED PLYWOOD GRADES FOR UNDERLAYMENT

Grade[1][2]	Exposure Durability Classification	Look for These Special Notations in Panel Trademark[3]	Typical Trademarks
APA Underlayment	Exposure 1	Sanded Face	
APA C-C Plugged APA Underlayment C-C Plugged	Exterior	Sanded Face	 
APA A-C	Exterior	Plugged Crossbands Under Face[4]	
APA B-C	Exterior	" " " "	
APA A-D	Exposure 1	" " " "	
APA B-D	Exposure 1	" " " "	
APA Underlayment A-C APA Underlayment B-C	Exterior	Sanded Face	

(1) Veneer-faced, 19/32-inch or thicker panels; or APA Rated Sturd-I-Floor, Exposure 1 or Exterior marked "Sanded Face"; or APA Marine Exterior plywood also may be used for underlayment under resilient floor covering.

(2) Specific plywood grades and thicknesses may be in limited supply in some areas. Check with your supplier before specifying.

(3) Recommended for use under resilient floor covering.

(4) "Plugged Crossbands (or core)," "plugged inner plies" or "meets Underlayment requirements" may be indicated as alternate designation in or near trademarks.

Selecting the Proper Underlayment

The plywood Underlayment needed to bridge an uneven floor will depend on roughness and loads applied. Although a minimum 11/32-inch thickness is recommended, 1/4-inch plywood Underlayment may also be acceptable over smooth subfloors, especially in remodeling work. See Table 2.

For areas where resilient floor covering, such as tile or sheet flooring or fully-adhered carpet, is to be installed, use the sanded Underlayment grades recommended in Table 1. These grades provide a smooth, sanded surface that is suitable for such floor coverings.

Where floors may be subject to temporary moisture, use panels with exterior glue (Exposure 1) or APA C-C PLUGGED Exterior. APA C-D PLUGGED is not an adequate substitute for Underlayment grade since it does not ensure equivalent face veneer puncture resistance.

TABLE 2

APA PLYWOOD UNDERLAYMENT FASTENER SCHEDULE

Application[1]	Minimum Plywood Thickness (in.)	Fastener Size and Type	Fastener Spacing (in.)[3]	
			Panel Edges[2]	Intermediate
Over smooth subfloor	1/4	3d (1-1/4-in.) ring- or screw-shank nails, min. 12-1/2 gage (0.099 in.) shank dia.[4]	3	6 each way
Over lumber subfloor or other uneven surfaces	11/32		6	8 each way

(1) For underlayment recommendations beneath ceramic tile, see *APA Engineered Wood Construction Guide,* Form E30.

(2) Fasten panels 3/8 inch from panel edges.

(3) Fasteners for 5-ply plywood Underlayment panels, and for panels greater than 1/2 inch thick, may be spaced 6 inches on center at edges and 12 inches on center each way intermediate.

(4) Use 4d (1-1/2-in.) ring- or screw-shank nails, min. 12-1/2 gage (0.099 in.) shank diameter, for Underlayment panels 19/32 inch to 3/4 inch thick.

Handling Underlayment

Always protect plywood Underlayment against physical damage or water prior to application. Before installing, allow Underlayment panels to acclimatize by standing them on edge and separated for several days in the rooms where they will be installed.

Preparing the Subfloor

Plywood Underlayment should be installed only on a dry subfloor. Moisture, which may accumulate when the subfloor is exposed to weather during construction, can cause excessive expansion of the dry Underlayment panels if the subfloor is not allowed to dry adequately. A damp subfloor can also contribute to nail pops and squeaks. Normal scheduling, however, usually permits the subfloor to dry out and become conditioned in an enclosed, evenly heated environment prior to installation of the plywood Underlayment and floor covering.

To avoid callbacks, inspect the subfloor surface for evenness and flatness before installing plywood Underlayment. Uneven floor surfaces may become obvious when smooth or shiny resilient floor covering is installed, especially in large areas which have strong sidelighting from windows, doors or interior lighting. The following precautions should be observed before installing plywood Underlayment:

- When the subfloor panels are dry, visually check the subfloor end and edge joints for evenness or variations in panel thickness which might telegraph through the Underlayment. (A short straight edge – 12 to 14 inches long – provides a quick reference for this purpose.) If necessary, sand the subfloor joints with a commercial floor sander to smooth surfaces within the vicinity of joints.

- Visually check the subfloor surface for flatness between floor framing members. Add blocking or plywood cleats under the floor, and fasten the subfloor to them with screws or nails as necessary to flatten panels. For background information on buckling of panel sheathing, see *APA Technical Note: Buckling of Wood Structural Panel Sheathing,* Form D481.

Also check the subfloor for squeaks and refasten as necessary before installing the Underlayment. When furnace or hot air ducts are located in close proximity under the floor, the underfloor space should be well ventilated, or insulated above ducts in the joist cavity to avoid excessive drying of the wood floor (See APA Technical Note, *Floor Squeaks: Causes, Solutions and Prevention,* Form C468).

Installing Underlayment

Install acclimatized plywood Underlayment, smooth side up, immediately before laying the finish floor. For maximum stiffness and strength, place face grain across supports. Offset the end joints of Underlayment two inches from joists and offset Underlayment joints at least one joist spacing from subfloor end joints. Edge joints of Underlayment panels should offset by at least two inches from edge joints of subfloor panels.

Spacing of 1/32 inch at panel edges and ends is recommended. Edge spacing allows for panel expansion during construction and as the Underlayment becomes conditioned to the temperature and humidity which will be typical in service. Edge gaps should be filled just before the floor covering is installed (allowing cure time), when no movement is expected.

The recommended fastener schedule for plywood Underlayment, including fastener size, type and spacing, is given in Table 2. Begin fastening at one edge next to adjacent panel. Ensure that the panel is uniformly flat and continue by fully fastening towards the opposite edge. If power-driven fasteners are used, foot pressure should be applied near the fastener to ensure firm contact between the Underlayment and subfloor. Make sure fasteners are driven so that the fastener heads are flush with, or just slightly below the panel surface. Do not overdrive or underdrive fasteners, which could result in "telegraphing" fastener or panel joint location through resilient tile or sheet flooring. Floor squeaks can be caused by movement between Underlayment and subfloor panels or by the Underlayment sliding on the fastener. Avoid gluing the Underlayment to the subfloor with construction adhesives, which could develop installation or staining problems with certain types of resilient sheet flooring products.

Occasionally, fasteners may "pop" or "back out." In these cases, fastener heads may rise above the underlayment surface and "telegraph" as bumps through resilient floor covering. The best precautions against nail popping are to use ring- or screw-shank nails which have higher withdrawal resistance; to use a fastener length approximately equal to the total thickness of the Underlayment and subfloor; and to ensure that the subfloor is dry before attaching the Underlayment. Fasteners that are too long may "ream" a hole through the subfloor when driven, causing them to loosen later. Also, short Underlayment fasteners will minimize penetration into lumber joists, reducing the potential for fastener popping problems caused by lumber shrinkage. With longer fasteners, offset Underlayment end joints 2 inches from joists to permit end fasteners to miss joists completely.

Note: Some floor covering manufacturers recommend that edges and ends of Underlayment panels be butted to a light contact, or with an edge and end joint spacing of 1/64 inch (approximately the thickness of a matchbook cover), without filling panel joints. In this case, installation over a dry subfloor is essential.

Preparing Underlayment

Shortly before the floor covering is installed, fill all edge gaps, splits, damaged areas and rough spots in the plywood Underlayment with a hard, non-shrinking, quick-setting filler. (This step also may be necessary when fully-adhered textile (carpet) resilient floor covering is used – check recommendations of floor covering manufacturer.)

A filler restrains the edges of the panel Underlayment from closing and causing wrinkling or ridging of the floor covering over joints between Underlayment panels. Tests by APA have shown that some floor covering materials wrinkle or ridge when the Underlayment dries out and the joint reopens. If not restrained by filler, such minor panel movement at an edge joint could result from normal seasonal changes in relative humidity. Water-based flooring adhesive also may cause panels to expand temporarily. The filler also prevents flooring adhesive from entering the joint, where it could later be squeezed back out to develop a ridge in the floor covering.

A filler should be chosen that dries hard, does not shrink and is quick-setting. Most manufacturers call for about a half-hour to cure fully. If the setting time is rushed, the exposed surface of the filler may harden, but not necessarily the interior of the filled joint. Applications of the floor covering further slows the curing, and the Underlayment joint closure may squeeze the uncured filler out of the joint, resulting in a raised bead or ridge in the floor covering.

Some fillers expand slightly as they cure, making it important to complete curing before sanding. The ridge which develops in this manner is difficult to see, but it can be detected by feeling across the joint with the fingers or palm of the hand. Even this small amount of ridging may cause joint show-through in resilient floor covering.

Thorough sanding of Underlayment panel joints and any surface roughness with a heavy-duty sanding machine is recommended. Hand sanding or scraping usually is not sufficient to correct unevenness between panels and might cause joint show-through, or remove excess filler. Construction adhesive squeeze-out or excess joint filler may cause roughness, or a poor bond between floor covering and the Underlayment. Some joint fillers may prevent the flooring adhesive from adhering directly to the Underlayment panel. Sanding, then, not only smoothes the joint, but aids good bonding performance.

APA has not evaluated joint fillers and, therefore, does not recommend specific brands. The recommendations of the floor covering manufacturer should be followed.

Selecting and Applying Resilient Floor Covering

When resilient sheet flooring is installed, consider “loose-laid” perimeter-attached flooring products to minimize exposure of plywood Underlayment to moisture from water-based adhesives used for installing flooring; or choose premium-quality flooring adhesives with higher solids content and reduced water content, and allow maximum “open” time within the manufacturer’s recommendations before installing flooring. For other types of finish flooring, follow the flooring manufacturer’s recommendations for installation.

Shiny, no-wax floor covering seem to be highly susceptible to telegraphing any irregularities in the floor surface. Impeccable floor surface preparation is necessary when these floor covering products are used. Thicker, and some “loose-laid” floor covering products, are reportedly able to bridge or mask most of these imperfections. The flooring contractor should be consulted for advice on the most suitable floor covering product for a particular application.

If a monolithic appearance is desired, sheet flooring should be specified. If tile flooring is used, consider orienting embossed or inlaid patterns of adjacent tiles at 90 degrees relative to each other to accentuate the tile joint grid. Color is also a consideration, since tile joints are not as obvious in the darker hues.

Even after conscientious preparation, Underlayment panel edge joints may later open slightly, such as during the transition from high humidity in summer to lower humidity during the winter heating season. Sometimes, tile flooring joints separate on the Underlayment panel module (every 4 feet, for example). To help prevent the tile joints from opening, tile joints should be offset at least 2 inches from Underlayment joints.

APA: The Mark of Quality

The trademarks of *APA – The Engineered Wood Association* appear only on products manufactured by APA member mills and is the manufacturer's assurance that the product conforms to the standard shown on the trademark. That standard may be an APA performance standard, the *Voluntary Product Standard PS 1-07, Structural Plywood* or *Voluntary Product Standard PS 2-04, Performance Standard for Wood-Based Structural-Use Panels*. APA maintains four quality testing laboratories in key producing regions and a 42,000-square-foot research center at Association headquarters in Tacoma, Washington. APA's functions and services go far beyond quality auditing, however. APA also operates the most sophisticated program for basic panel research in the world, maintains an international network of field representatives to assist panel product users and specifiers, conducts informational meetings and seminars, publishes a vast inventory of design and application literature, works to secure code acceptance of panel products and applications, develops and maintains performance and industry product standards, and conducts in-depth market research and development programs.

Always insist on panels bearing the mark of quality – the APA trademark. Your APA panel purchase or specification is not only your highest possible assurance of product quality, but an investment in the many trade services that APA provides on your behalf.

Additional Information

For additional information about APA trademarked plywood Underlayment or other APA panel construction systems, contact APA's Product Support Help Desk at help@apawood.org or (253) 620-7400.

For additional tips and information related to APA Plywood Underlayment, refer to the following APA publications, available at www.apawood.org/publications.

- *Engineered Wood Construction Guide,* Form E30 (Refer to Table 10 for typical panel floor specifications based on finish floor installations.)
- *Builder Tip: Proper Handling and Installation of APA Plywood Underlayment,* Form R340
- *Technical Note: Buckling of Wood Structural Panel Sheathing,* Form D481

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We have field representatives in many major U.S. cities and in Canada
who can help answer questions involving APA trademarked products.
For additional assistance in specifying engineered wood products, contact us:

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