



a guide to
**Southern Pine
Flooring**

Southern Pine by Design

Product Performance Facts



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Southern Pine Floors: Attractive, Durable, Versatile

Three primary surfaces enclose every room: walls, a ceiling and a floor. Of the three, it's the floor that is subjected to persistent wear: friction from footsteps and the movement of furniture, as well as the weight and use of appliances and other equipment. Choosing a flooring material, therefore, demands proper knowledge of the material and its performance characteristics. And a long service life depends on a complete understanding of installation, finishing, and maintenance requirements, too. Any investment in wood flooring can be justified



when the material selected provides long-term resistance to wear, general utility, and a decorative appearance.

Properly installed and cared for, high-quality Southern Pine flooring products meet the challenges of the most demanding applications.

Since Colonial Times, Southern Pine floors have proven to be extremely durable, serviceable, and attractive additions to homes and all kinds of other structures including schools, churches, sports venues and commercial buildings. Dramatic improvements in the seasoning of Southern Pine flooring material, as well as refined manufacturing and machining processes, have been combined to assure a smooth, stable floor surface. With its distinctive grain pattern, the inherent beauty of a Southern Pine floor is a feature well known to

designers, builders, and homeowners nationwide.

This publication is a compilation of information needed to specify, select, install and maintain Southern Pine flooring products, for both interior and protected exterior applications.

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Product Description

Grades

Flooring grades are based upon appearance criteria, limiting defects such as tight knots, splits, pitch, shake, stain, or wane. The Southern Pine Inspection Bureau (SPIB) has established a variety of lumber grades for the manufacture of Southern Pine flooring.

When selecting a Southern Pine floor, individual tastes or perhaps a design requirement will govern which grade best suits a given application. Knot sizes, and overall content of knots may or may not be desirable to a specifier or homeowner in a given application.

Refer to Table 1 below for a brief description of Southern Pine flooring grades. For more detailed information regarding specific lumber characteristics — size, condition and limitations of knots, splits and checks permitted — refer to Section 200 of SPIB's *Standard Grading Rules for Southern Pine Lumber, 2002 Edition*.



At the mill, flooring is sorted according to grade and length.

Table 1: Southern Pine Flooring Grade Descriptions

GRADE	CHARACTERISTICS
*B&B	Highest recognized grade of flooring. Generally clear, although a limited number of pin knots are permitted. Finest quality for natural or staining finish.
C	Excellent for painted or natural finish where requirements are less exacting. Reasonably clear but permits limited number of surface checks and small tight knots.
C&BTR	Combination for B&B and C grades; satisfies requirements for high-quality finish.
D	This grade requires a face as good as D Finish grade except scant width of face not permitted and only medium warp allowed. Economical, serviceable grade for natural or painted finish.
No. 1	No. 1 Flooring is not provided under SPIB Grading Rules as a separate grade but, if specified, will be designated and graded as D flooring.
No. 2	This grade requires a face as good as No. 2 Boards which is suitable for high-quality sheathing. High utility value where appearance is not a factor.
No. 3	Admits all pieces below No. 2 Flooring, if suitable for low-cost sheathing or lathing without wasting over 1/4 length of any piece.

* Most mills do not manufacture all products and all grade separations.

SOURCE: *Standard Grading Rules for Southern Pine Lumber, 2002 Edition*, published by the Southern Pine Inspection Bureau
To obtain a copy, please contact SPIB; phone: 850/434-2611, Fax: 850/433-5594. Order online at: www.spib.org.

Sizes and Patterns

The most common thicknesses of Southern Pine flooring are 1" and 1-1/4" nominal (3/4" and 1" actual). The general information and recommendations contained in this publication are applicable for these thicknesses. Standard widths range from 2" nominal (1-1/8" actual) to 6" nominal (5-1/8" actual). Wider widths are also manufactured. Typically, *strip* flooring is a term given to material that is 3-1/2" or narrower and *plank* flooring is classified as material that is 4" and wider.

Southern Pine flooring is widely available in lengths ranging from 8 to 16 feet. Longer or custom lengths maybe available on a "special order" basis. Increasingly, finger-jointing is being used to produce longer lengths, making more efficient use of high-grade stock; see photo. If not otherwise specified, Southern Pine flooring will have tongue-and-groove (T&G) edges with plain ends.

A specification option is end-matched flooring. End-matched floor boards have a tongue or a groove on each end. Refer to Figure 1. This tongue-and-groove pattern on the strip flooring sides and ends provides load-bearing capabilities for screed installation systems where end joints occur between the screeds (the subflooring nailing base; refer to page 7). End-matching also reduces the amount of strip end cuts in comparison to plain-end flooring, and somewhat reduces waste and labor.

As a log is sawn, the position of the log relative to the saw cut determines the wood grain's orientation relative to the flooring wear surface. Refer to Figure 2.

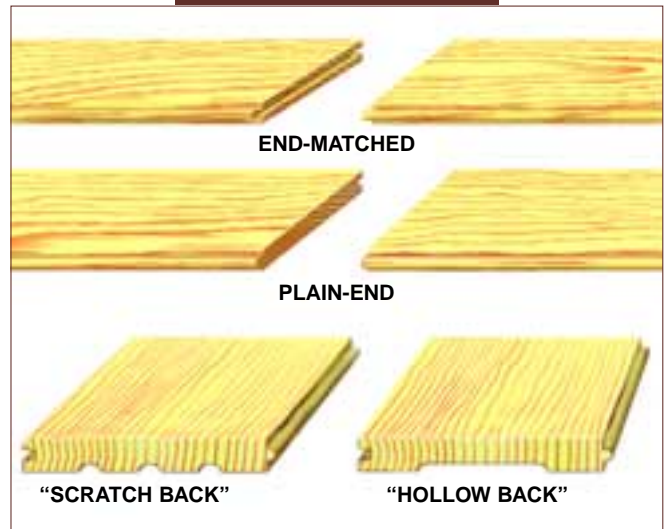
Flat or **mixed grain** flooring is commonly referred to as "flat-sawn" flooring. It has a growth ring configuration parallel to the wearing surface but, in general, it is graded and sorted irrespective of the wood grain orientation and consequently is considered "mixed grain" flooring.

Another grain configuration that can be specified is **edge** or **vertical grain** flooring, where the growth rings are perpendicular to the flooring wear surface. This product is equivalent to "quarter-sawn" material in hardwood flooring. Edge-grain flooring has a harder wearing surface than flat-grain material, and is desirable for high-traffic areas such as kitchens, hallways, or family rooms. Commercial or institutional floors for offices, schools, retail or industrial environments resist wear and indentations better by using Southern Pine edge-grain material.

Typically, Southern Pine flooring is manufactured with a "stress-relief" pattern on the underside of each piece to minimize the effects of moisture-related dimensional changes. Relief types include a shallow, wide groove known as a "hollow back", or a series of grooves commonly referred to as "scratch-back". Refer to Figure 1.

Prior to final product selection, consult a knowledgeable flooring dealer who can describe flooring grades and patterns, as well as provide samples of Southern Pine flooring.

Figure 1: Flooring Patterns

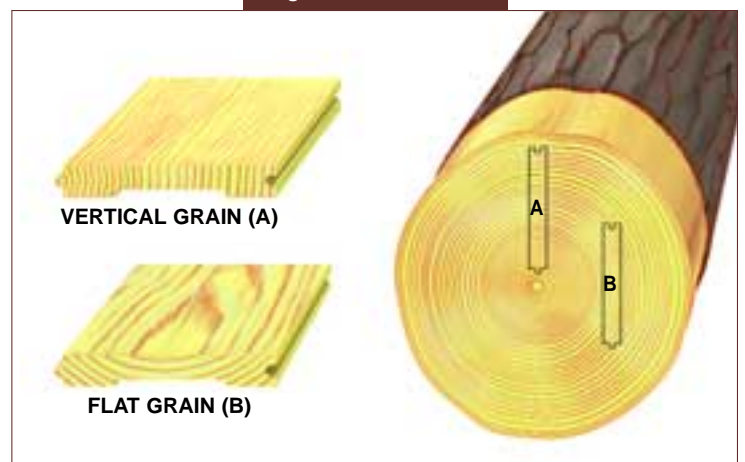


Flat grain



Vertical grain

Figure 2: Wood Grain



Wood and Water Relationships

Wood is hygroscopic – it will absorb moisture and expand when exposed to high humidity. Conversely, wood also expels moisture and shrinks in low humidity environments, changing and balancing with its general surroundings. On average, wood will change 1% in dimension for every 4% change in its ambient moisture content. A door that periodically “sticks” is a good example of this expansion and contraction behavior.

Before it can be used for interior purposes, a majority of the water in wood must be removed. To achieve proper moisture content levels, Southern Pine lumber is kiln dried prior to its manufacture into flooring. A kiln is a closed system having temperature, humidity, and air flow controls that lower the wood’s moisture content to desirable levels. Adjusting the heat, steam and air flow speed during the kiln-drying process conditions the wood for its intended use, while reducing defects such as splitting, warping, checking, and casehardening.

Moisture content is a measure of the weight of the water in wood, expressed as a percentage of the oven-dry wood. According to the SPIB grading rules, Southern Pine flooring must have a maximum moisture content of 15% for D and Better grades in 1” and 1-1/4” nominal thicknesses (3/4” and 1” actual thicknesses). However, if specified, represented, or grade marked as “kiln-dried” flooring, the maximum moisture content shall be 12% for 90% of the pieces, and 15% moisture content for the remainder. Refer to Paragraph 162 of the SPIB grading rules for more information.

Proper Storage and Handling

Moisture will damage flooring! Careful adherence to some reasonable, time-tested practices during the distribution and delivery process from sawmill to distributor, to dealer, to final installation site will prevent moisture problems and visual damage to the flooring. Proper storage and handling practices are paramount for assuring a Southern Pine floor’s readiness and suitability for installation.

An appropriate storage site at the distributor or dealer would be a dry, enclosed building having a level floor, with flooring stored in a clean location. A wrapping of paper or plastic will further protect the flooring from moisture and dirt. Using a first in/first out (FIFO) inventory method will minimize flooring storage time and reduce exposure to excess dust and humidity. Flooring should *always* be delivered to the jobsite under dry weather conditions!



Properly drying and conditioning Southern Pine in a kiln helps reduce warping, splits and checks.



Once delivered from the mill to the dealer, Southern Pine flooring should be stored in a clean, dry, enclosed building.

Jobsite Acclimation

Assuming the flooring has been properly stored and transported, it is equally important that the builder conduct a regimented construction timetable, completing the tasks necessary to assure all of the following jobsite conditions exist *prior* to flooring delivery.

The building's interior must be thoroughly **DRY**. If the average moisture content of drywall, subfloors, ceilings, and framing is below 12 to 14%, the building components are considered to be dry.

Areas to receive wood flooring must have suitable ventilation.

Required Jobsite Conditions:

- 1** The building is fully enclosed; all windows and exterior doors are installed.
- 2** The proper subfloor nailing base is installed.
- 3** The heating/cooling system is operational.

Proper jobsite acclimation is essential for the installation of a high-quality, serviceable Southern Pine floor!

If jobsite conditions 1, 2 and 3 have been met, sufficient preparation is complete and the delivery of flooring may take place.

If any of the construction steps are incomplete prior to delivery, the floor has a greater likelihood for installation-related problems due to excessive moisture conditions.

Acclimating a Southern Pine floor allows time for the wood to adjust itself dimensionally, enabling the floor to reach a balancing point — a state in which it neither absorbs nor evaporates water vapor. This state is commonly referred to as its equilibrium moisture content, or EMC. The acclimation time period is generally between five to fourteen days for Southern Pine flooring, depending upon humidity and/or jobsite conditions among rooms.

It is recommended that the material be sorted and stacked in *each room* receiving flooring. Acclimating the material in this manner takes into consideration varying ambient conditions that may exist between rooms.

Stack the flooring in unopened bundles, spacing it evenly and neatly. Use clean, dry spacer sticks between each bundle level, allowing space for air circulation between the bundles. Do not open the package banding, but remove and dispose of any plastic or paper wrapping.

A wood moisture meter is a tool every installer of wood floors should own. Guessing is virtually eliminated from flooring acclimation when using a moisture meter.

After five days of acclimation, moisture meter readings should be taken and recorded of the subfloor, the flooring and of the walls in each room. Twenty-four hours later, take another reading. If the readings show any consistency, the flooring has reached its equilibrium moisture content and is ready for installation. If the moisture content readings fluctuate either up or down, do not install the floor, as more acclimation time will be required. Wait at least another day and take additional sets of readings. Until the Southern Pine flooring, the subfloor nailing base, and the walls are neither gaining nor losing moisture, acclimation is incomplete.

When the equilibrium moisture content is attained, the Southern Pine flooring has been properly acclimated. It is now ready for installation.



With a fully enclosed building, windows, doors and nailing base installed, and the HVAC system operational, flooring delivery can occur. Material is neatly stacked in each room to receive flooring.



Consistent readings from a moisture meter will indicate that the flooring has reached its equilibrium moisture content and is ready for installation.

Subfloor Installation

A suitable moisture barrier and subfloor nailing base (over concrete slab or wood joists) must be installed to provide adequate protection and support for the flooring.

Remember: the nailing base should be in place prior to flooring delivery and the acclimation period.

Recommended Moisture Barriers

Two types of moisture barrier material are recommended beneath Southern Pine flooring:

Polyethylene: A 6-mil thickness is preferred; 4-mil is acceptable. The 6-mil material has a perm rating of 0.08. A perm rating below 1.0 for polyethylene is required to retard moisture.

Roofing felt paper: Two layers of 15 lb. paper, or one layer of 30 lb. paper.

Subfloors Over Concrete

Concrete is a porous material that allows the migration of water vapor from the ground into the structure. Concrete hardens over time, but it can still contain water up to 60 days after installation, and sometimes longer.

Proper construction practices require that a vapor barrier be installed prior to the concrete installation to reduce the moisture absorption process. Southern Pine flooring can be installed on concrete subfloors, either on or above grade.

Once the concrete is determined to be dry, a moisture barrier and nailing base can be installed. Refer to Figures 5 and 6.

To create a nailing base over concrete, two methods can be used: either a layer of dimension lumber strips (called “screeds”) or a layer of plywood. When using the screed method, it is recommended that 2x4 material be used, cut into lengths varying from 18” to 48”.

Screeds must be dry. **If pressure-treated screeds are used, they MUST be kiln dried after treatment (KDAT).**

Clean the concrete, removing any oils or other foreign material. For a screed nailing base, apply a cold cutback asphalt adhesive mastic to the surface at a spread rate of 35 square feet per gallon and embed screeds on the wide face, 12” on center, perpendicular to the direction the flooring will lay. End walls should have a continuous screed run. A 3/4” gap should be left between walls and screed ends. Apply the moisture barrier, overlapping sides 4” and touching end walls.

For a plywood nailing base over concrete, spread cold cutback mastic at a 50 sq.ft. per gallon rate. Allow two hours setting time; lay the moisture barrier with a 4” side overlap and touching the end walls. When using a 15 lb. felt moisture barrier, an additional layer of a cold cutback asphalt adhesive mastic and felt is applied. Stagger felt seams to prevent direct alignment with the first layer. Laying plywood diagonally to the direction of the flooring will offset plywood joints with floor nailing.

Start with a 4’x4’ section every other course, staggering plywood joints. Allow a gap of 1/4” to 1/2” between panels, and a 3/4” gap at walls. Use at least 9 nails per panel, nailing outward from the center, flattening the panels. Refer to Figures 5 and 6.

Figure 3: Moisture Barrier



Figure 4: Screed Method

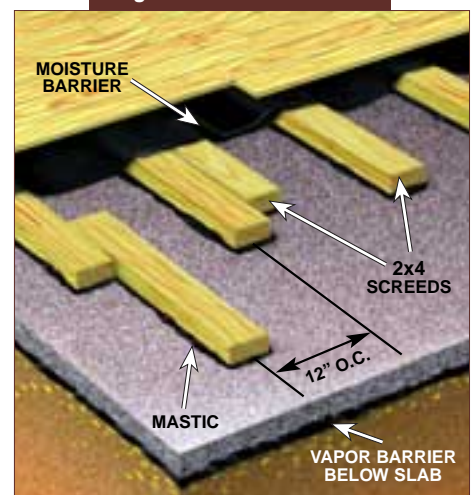


Figure 5: Subfloor Detail

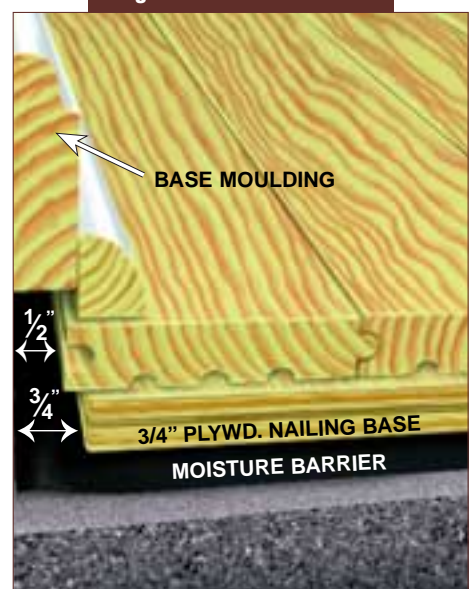
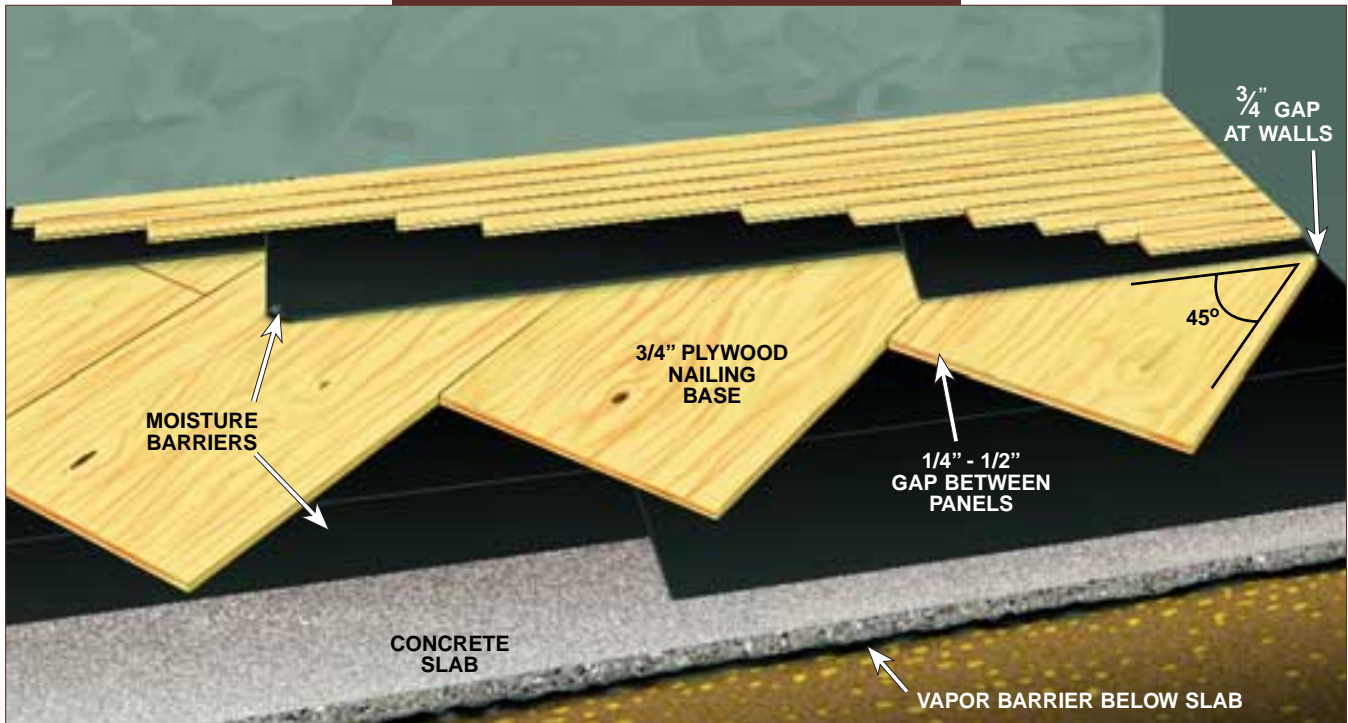


Figure 6: Plywood Nailing Base Over Concrete Slab



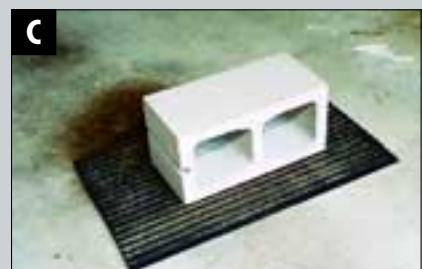
Concrete Condition Check

If a moisture meter is unavailable to check the condition of the concrete, a sheet of polyethylene cut to 24" x 24" will reveal the slab's moisture condition. Secure the polyethylene to the concrete with duct tape (A), forming an air-sealing bond. Wait 24 hours. If condensation develops between the concrete and the polyethylene sheet (B), do not install flooring; the concrete is too wet for wood flooring and must be permitted more time to cure. If the structure is several months old and the concrete has cured, yet the poly test still reveals condensation formation, inspect the site for moisture problems caused by improper drainage. Slower percolating soils do not drain as efficiently, causing hydrostatic water pressure. Correct a drainage problem by upgrading or adding drain tiles at the foundation footings.

A similar moisture test for concrete is the "rubber mat" test. Lay a rubber mat flat on the concrete floor. Place a concrete block, tool box or other heavy object on top of the mat, (C) trapping any air from escaping. After 24 hours, lift the mat. If the concrete is darker beneath the mat on a lighter background concrete, then moisture has formed, indicating the concrete is too wet for flooring. Dark concrete surfaces tend to camouflage wetness; therefore, use the rubber mat test on light-colored concrete surfaces for best results.

Until the concrete is noticeably dry on the underside of the polyethylene or the rubber mat, **do not install the subfloor**. Should wet concrete still be evident, fans and dehumidifiers will improve air circulation and lower the humidity.

When the concrete is determined to be dry, a moisture barrier and nailing base can be installed.



Subfloors Over Wood Joists

For installation of flooring over wood floor joists, a subfloor nailing base consisting of a minimum 5/8" plywood or 3/4" oriented-strand-board (OSB) is required. Lay the subfloor panels perpendicular to the joists.

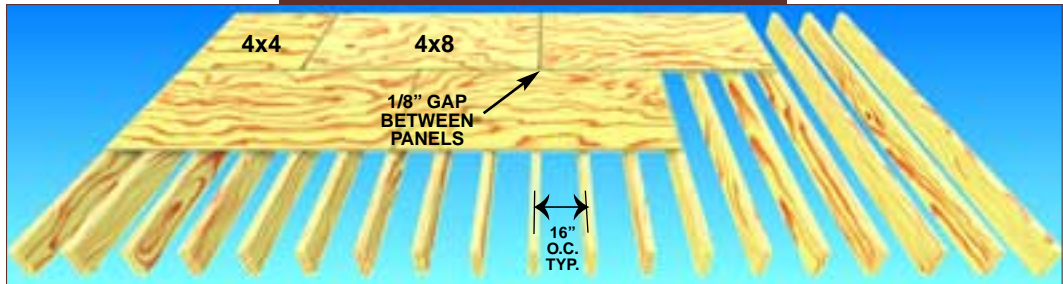
Use of a caulk-type construction adhesive between plywood subfloor and joists provides additional anchoring support. Starting with a single 4'x4' panel in one corner, alternating courses of 4'x8' panels

are to be staggered, offsetting the end seams. An 1/8" space between panels allows for panel expansion and prevents panel squeaks. Position all seams between panels directly over the joists. A 6d screw or ring-shank nail is recommended every 6" for fastening panels to floor joists.

Lay the moisture barrier atop the plywood, overlapping edges 4" and touching all walls. If 15 lb. felt is chosen, stagger the edges of the second layer in relation to the first.

Check local building codes to verify subfloor requirements for your area.

Figure 7: Plywood Subfloor Over Wood Joists



Rows of plywood panels are staggered over floor joists (typically 16" o.c.). Begin in one corner with a 4'x4' panel. Allow 1/8" space between panels; seams are positioned directly over joists.



Strip Flooring

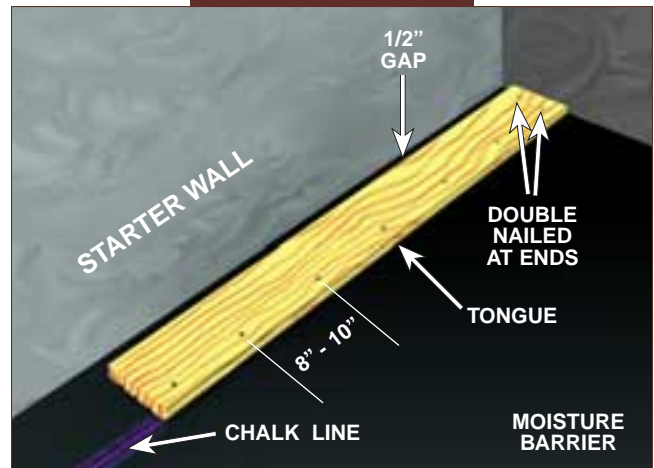
Inspect plywood nailing bases for evenness and sand any peaking edges, leveling the seams. Flooring should lay perpendicular to the floor joists. It should also lay with the strips spanning the longer room dimension end-to-end. It is advantageous if the overall strip layout runs lengthwise the same direction as traffic lanes rather than at right angles across the strip widths. (See Figure 9)

Begin with the “starter strip” of flooring alongside an exterior wall, preferably the longest room dimension. Refer to Figure 8. If flooring will be installed in several rooms, locate the starter strip in a hallway that includes the longest end-to-end span. The starter strip will be the beginning strip in rooms either to the left or right of it.

Strike a chalk line one strip wide plus 1/2” from the starting wall, making certain chalk lines are square. This 1/2” gap is a buffer zone for expansion. Mouldings will conceal the 1/2” gap between finished flooring and end walls. Allow a 1/8” space around door jambs and wall partitions. Refer to Figure 10. Face-nail starter strip tongue side out, with 6d or 8d finishing nails, 1” from tongue side. Countersink nail heads and align groove side with chalk line. Refer to Figure 8.

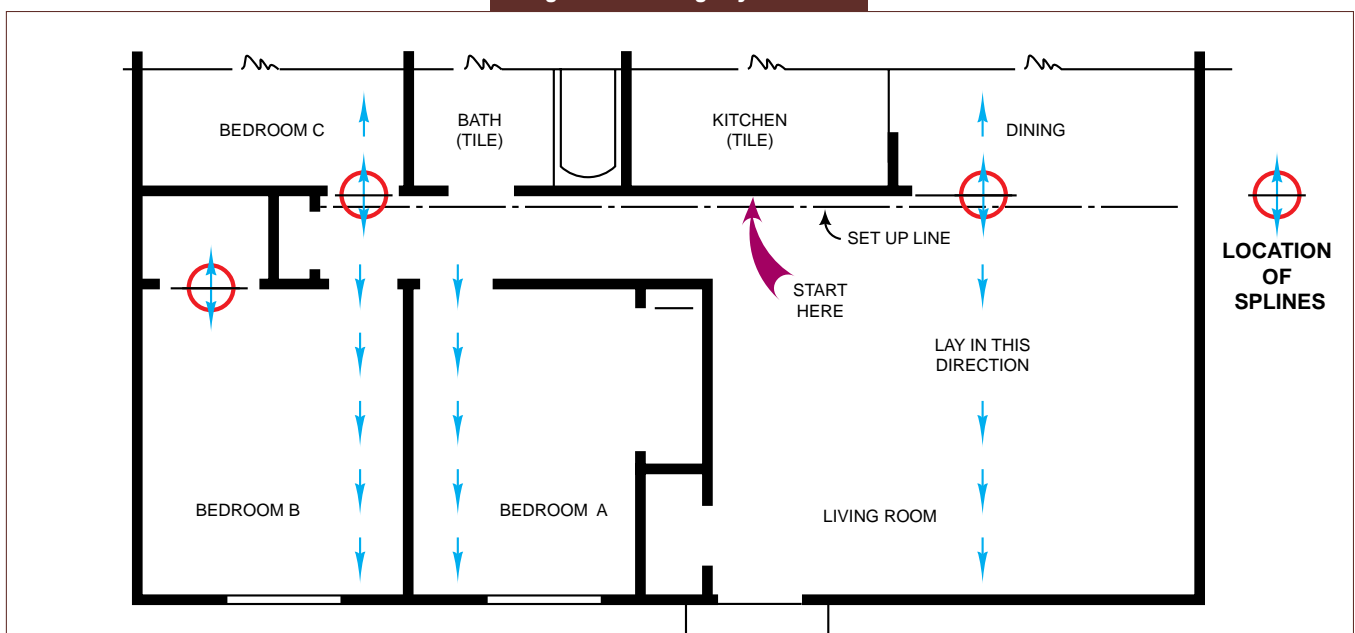
Each course will be nailed with your back to the starter wall, working from left to right. Recommended nail spacing is 8” to 10” and double-nailed 1” to 3” from ends. Use strips 8” or longer on the ending wall and begin the next course with the remaining piece. Loosely lay the next 7 or 8 rows. Do not use strips shorter than 6”. Arrange lengths randomly, avoiding clusters of short strips. Using a tapping block, insert each strip groove to tongue. Blind-nail the tongue into the subfloor. (See Figure 11) Avoid nailing into subfloor seams, as nails will not anchor properly. Nail and countersink 2 to 3 rows, clearing the starter wall for

Figure 8: Starter Strip



Lengths of flooring are arranged randomly. Using a power nailer, the tongue is blind-nailed to the subfloor nailing base.

Figure 9: Flooring Layout Plan



the use of a power nailer. Countersink all face nails and nail each strip end. Nail strip sides using an 8" spacing.

If necessary, rip the last row leaving a 1/2" space between the wall and flooring. Face-nail the last runs of the floor when unable to blind-nail by hand.

Proper nailing should incorporate using enough nails, proper spacing, and the correct nail type. It will also reduce the likelihood of floor squeaks.

Plank Flooring

The installation of plank flooring (4" and wider) is similar to that of strip floor installations, with a few noteworthy exceptions.

Generally, recommended fastener spacing is 8"; however, consult the flooring manufacturer's instructions for specific fastener information.

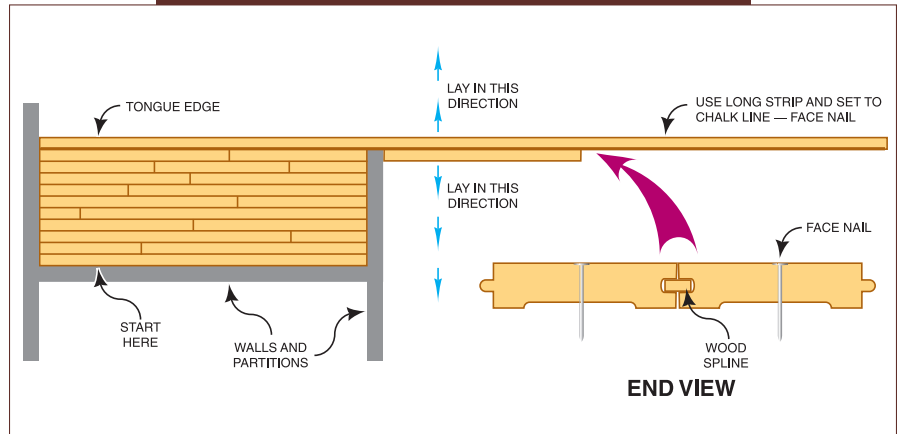
The wider widths of plank flooring *increases* the amount of expansion and shrinkage related to moisture absorption and evaporation, magnifying board separations and cupping. Applying a sealer to the planking underside prior to installation may reduce the impact of potential moisture change problems. Experienced flooring installers recommend face-nailing plank flooring that is 8" and wider. Face nailing can further reduce cupping.

In addition, plank floors are *not recommended* for installation over radiant-heated subfloors.

Radiant-Heated Floors

Installation of the subfloor nailing base over radiant-heated systems is slightly different. Plywood panels cut in 4'x4' sections and saw-kerfed on the underside with a 12" grid 3/8" inches deep will adhere to a radiant-heated floor using a 35 sq.ft. per gallon cutback mastic spread rate. Gluing the plywood in place avoids damage nailing may cause.

Figure 10: Laying Flooring Around Walls and Partitions

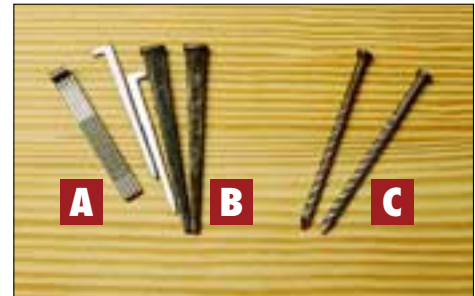


Lay the main area of flooring even with room projections ■ Extend the next course across the room ■ Align the extended strip to a chalk line and face-nail it ■ Fashion a tongue for the grooved edge by inserting a spline ■ Flooring may be installed in either direction from the spline

Table 2: Nailing Schedule

RECOMMENDED NAILING FOR T&G SOUTHERN PINE FLOORING 1" and 1-1/4" thicknesses		
FLOORING WIDTH	NAIL TYPE	TONGUE OR BLIND NAIL SPACING
1/2" to 3-1/2"	7d or 8d cut nail or screw nail	8" to 10" and double-nailed 1" to 3" from ends
4" and wider	7d or 8d cut nail or screw nail	every 8"

NOTE: DO NOT glue Southern Pine flooring.



Proper flooring fasteners are essential: **A** Power gun nails **B** Cut nails **C** 8d (2-1/2") screw nails

Figure 11: Nailing Detail



Starter strip is face-nailed 1" from tongue side, leaving 1/2" gap at wall to permit seasonal expansion of the floor. After 2 or 3 rows, a power nailer can begin blind-nailing through the tongue.

Proper finishing begins with thorough removal of all construction debris from the newly installed floor. Nail all loose flooring and replace any damaged boards. Countersink and fill any exposed nail heads, then inspect the floor for any other surface imperfections or obstructions.

Sanding the Floor

Always sand lengthwise in the direction of the strips, never across. With two-thirds the room length in front of you, begin walking a drum sander forward while slowly lowering the drum to the floor surface. Before stopping the forward pass, slowly raise the drum and stop. Walk the drum sander in the opposite direction, slowly lowering the drum, walking backwards along the same path. Repeat the stopping and drum lifting or starting and drum lowering procedures on each directional change. Begin a new pass forward every 3" to 4" (about the width of one strip) into the unsanded area. After completing the entire room width, walk forward in the opposite direction to sand the remaining area. In other words, you will be walking forward facing the opposite wall. Overlap the passes two to three feet. Refer to Figure 12.

Use an edge sander in closets and in areas the drum sander will not reach. Generally, recommended sanding results can be achieved with three sanding cuts (progressively using grits of coarse, medium and fine). Finally, the use of a screen disk (same grit as the fine cut) on a buffing machine blends the telltale marks of edge and drum sanders.

Stains & Sealers

Floor finishes provide both a protective and decorative surface. A stain is one option, adding warmth and charm. Stains are available in a wide range of colors.

If the new floor is not stained, it is recommended that a protective sealer be applied. The two types of sealers are penetrating sealers and surface sealers.

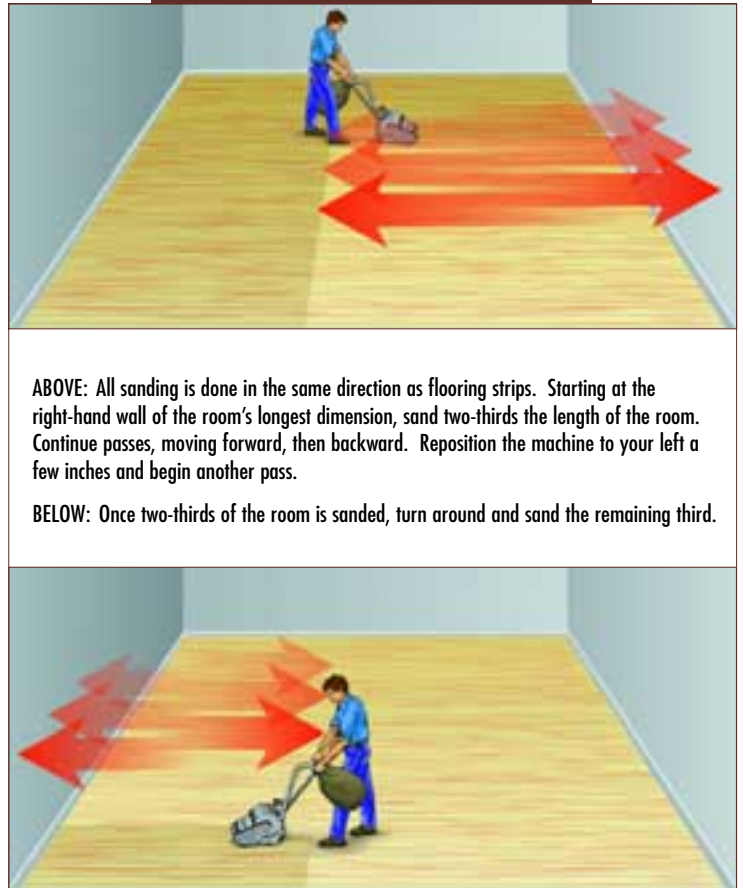
Penetrating sealers are floor waxes that prevent the penetration of liquids and dirt into the flooring. Chips and scratches are maintainable with small amounts of wax. On new floors, a liquid buffing wax applied to a wax finish forms an additional barrier to dirt and stains. Read the buffing wax label carefully, making certain it is suitable for wood floors. *Do not* use any product containing water.

Refinishing existing flooring generally does not require a preliminary sanding but, rather, a thorough cleaning and another coat of wax, without leaving any evidence of wax overlap in heavy traffic areas. Penetrating sealers have a lower luster (or a more moderate shine). As the patina sheen wears away, a reapplication of wax will restore it.

Surface sealers, on the other hand, do not penetrate the wood-wearing surface. Instead, they create a wood-bonding surface layer. Different types including polyurethanes, moisture-cured urethanes, and acid-cured urethanes.

Polyurethanes are the more popular surface sealers. They provide both dura-

Figure 12: Sanding the Finished Floor



ABOVE: All sanding is done in the same direction as flooring strips. Starting at the right-hand wall of the room's longest dimension, sand two-thirds the length of the room. Continue passes, moving forward, then backward. Reposition the machine to your left a few inches and begin another pass.

BELOW: Once two-thirds of the room is sanded, turn around and sand the remaining third.



Ideally, the entire sanding operation should remove no more than 1/32" of wood.

bility and moisture resistance. They are available in oil and water-based formulations, in addition to high-gloss, semi-gloss, matte, and satin finishes.

Polyurethane sealers offer excellent resistance to water, scuff marks and scratches, and provide a durable finish for high-traffic areas such as hallways, kitchens, bathrooms and family rooms. However, polyurethane finishes have a tendency to “yellow” as they age, slightly tinting the floor color. When regular maintenance no longer provides satisfactory floor surface appearance, sanding is recommended before applying a new coat.

Moisture-cure urethanes are the hardest of the surface sealers. These urethane sealers are extremely prone to errors. Do not attempt to apply urethane sealers without the supervision of an experienced floor finisher.

Acid-cured urethanes, also known as “Swedish finishes”, provide a clearer and somewhat harder surface finish than polyurethanes. Again, due to the technical intricacies of application, consult a floor finishing professional.

The finish selected will affect how often the floor needs cleaning. A lighter floor will hide dust better; however, dirt, spills, and grit may remain more visible leading to more frequent sweeping. A lighter floor coloring enhances room size; a room appears larger and brighter.

On the other hand, darker colors of finishes tend to conceal scratches, cracks, grit, and sediment, and are more forgiving than lighter colors. Dark floor colors help to camouflage the visual damages of heel marks, gouges, and furniture scratches. Since dark colors absorb light rather than reflect it, a dark floor color may make a room appear smaller than lighter colors.

Finish Application

When applying penetrating stains and finishes, begin by applying enough of the finish lengthwise to cover about one foot from the side wall to the mouldings. Using cloth rags, a brush, or a lambswool pad, wipe evenly to the wall. Apply the stain or wax, then remove and wipe away the excess. To begin a new run, overlap about 3” (one strip wide) taking care to remove any excess and preventing lap marks. Water, perspiration, hand prints, and knee imprints are impenetrable by stains and waxes. Prevent these common causes of discoloration and spotting by avoiding all unnecessary contact with the floor.

Allow overnight drying, returning the next day for a power buff with a fiber buffing or No.1 steel wool. Clean the floor to remove all dust. Apply a second wax layer, or if a stain was applied on the first pass, apply the first layer of wax.

With polyurethane finishes, apply along the length of the room, maintaining a wet edge and feathering brush-stroke overlaps. If edges tack dry, do not overlap brush strokes. Any minor mistakes can be corrected with a buffer.

Allow polyurethane layer to dry (usually overnight) then buff with 120 grit screen or No.2 steel wool pad. Three coats provide optimum floor protection and durability. Remember to buff between each coat.



During finishing, avoid unnecessary contact with the floor by using a fabric runner. Stains and waxes cannot penetrate perspiration, hand and knee imprints.



Darker color finishes tend to conceal minor scratches and gouges better than lighter colors, and are well-suited for commercial applications.



A finish is applied in the same direction as the flooring, using a lambswool pad. New runs overlap about 3”.



When using a brush, maintain a wet edge, feathering overlaps. Buffing will correct minor errors.

With proper care of the finish, a Southern Pine floor is easily maintained and will keep its “new” look for many years.

If the builder, floor installer, or previous owner does not provide a record indicating whether a surface sealer or a penetrating sealer was applied, a simple test will determine what type of finish was used. In a closet or other inconspicuous location, use a coin or knife to scratch the floor surface. If the finish flakes, it is likely to be a surface sealer. If it does not flake, it is most likely a wax finish.

Penetrating Sealers

Sweep the floor regularly or vacuum, but *do not use* a beater-bar type.

Wipe liquid spills promptly. Use No.2 steel wool on stains caused by water, cigarette burns, ink, or pets. Rewax the area.

Do not use water to maintain wax finishes. For stains, use vinegar, wood floor cleaners, mineral spirits or ammonia. Use very fine steel wool to clean the area, then dry it. Reapply the same color and brand of stain wax, if necessary.

Small repairs can be made by applying a small amount of wax to the affected area, then buffing.

Surface Sealers

Surface sealers require very different care and cleaning procedures than do penetrating sealers.

Wipe spills promptly with a dry cloth. Use a damp cloth on sticky spills, then wipe dry with another clean cloth.

Sweeping regularly reduces scratching. *Do not use beater-bar vacuums on wood floors.*

Never use ammonia, oil soap, or any other household cleaner on surface sealers; surface damage and dulling will result.

For general maintenance, use a solution of 1/4 cup vinegar to 4 cups of warm water, dipping it with a clean cloth and wringing dry. Wipe or mop the floor. Using a second cloth, wipe the floor dry.

Do not use waxes to restore the shine on surface sealers. To restore original luster, remove room contents, clean thoroughly, then steel wool the entire surface. Use only the same brand surface sealer as on the existing floor (or read carefully the recommended finish instructions of the sealer manufacturer).

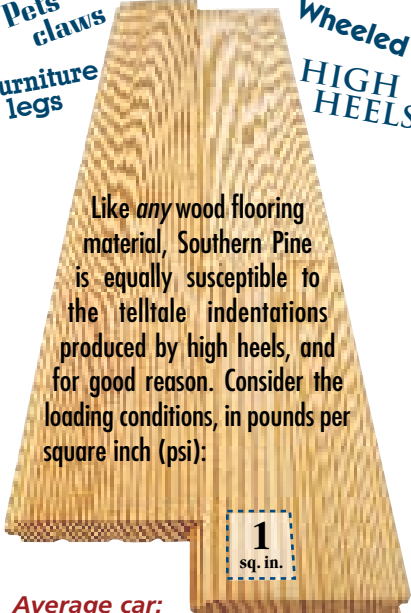
HIGH RISK TRAFFIC

Pets' claws

Furniture legs

Wheeled toys

HIGH HEELS!



Like *any* wood flooring material, Southern Pine is equally susceptible to the telltale indentations produced by high heels, and for good reason. Consider the loading conditions, in pounds per square inch (psi):

Average car:
28 to 30 psi

Adult Elephant:
50 to 100 psi

125 lb. woman wearing high heels: 2,000 psi.

GENERAL MAINTENANCE TIPS — KEEP YOUR SOUTHERN PINE FLOORS LOOKING NEW

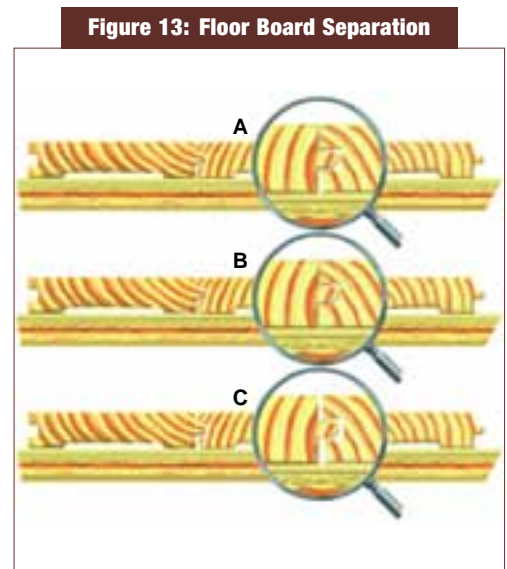
- Use door mats at entryways. Do not use cocoa fiber or rubber-backed mats.
- Do not slide refrigerators or other heavy appliances on the floor. Place a clean sheet of plywood on the floor for protection from scratches and gouges.
- Use area rugs in high-traffic lanes.
- Avoid wearing high-heeled shoes.
- Use floor protectors beneath furniture.
- Sweeping regularly prevents scratching from dirt and grit. Daily sweeping is recommended in homes with small children or large families.
- Avoid using water on wood floors. Water causes wood to expand.
- Direct sunlight can discolor wood. Use draperies or blinds to shield the floor from direct sunlight.

Floor Board Separation

Floor board separation or “cracks” under normal circumstances are to be expected in any wood floor. Plank floors, especially, shrink up to 2.5 times more than strip floors. Floor board separation is normal under the following circumstances:

- 1 Board gaps found during dry winter months close and disappear in spring.
- 2 In strip floors, separations up to the thickness of a dime are normal.
- 3 Panelizing caused by subfloor movement. Panelizing can also be caused by the finish material cementing several board courses together, creating fewer cracks. Consequently, the resulting cracks may be wider than a dime’s thickness.

How do cracks occur? A, Flooring when laid; B, the same flooring after it has absorbed moisture as a result of damp conditions in the unfinished house; C, the same flooring after subsequent drying. The inverted V-shaped joint is permanently deformed, and there is a wide crack.



Troubleshooting Guide		
PROBLEM	CAUSE(S)	REMEDY
Floor board separation	<p>Dryer air from the home’s heating system</p> <p>If floor was acclimated during wet conditions and then installed, the building was not ready for flooring. The structure was not in its occupied condition when the flooring was delivered. Equilibrium moisture content occurred after the floor was installed.</p> <p>Inadequate nail spacing</p> <p>Floor does not have a sealing finish.</p>	<p>Not a defect in the floor, if the boards expand in the summer months, closing the separation.</p> <p>If flooring has a polyurethane finish, a polyurethane filler can be troweled into the floor gaps.</p> <p>Face-nail boards every 8” to 10”, countersink and fill holes. Refer to Table 2, page 10.</p> <p>Stabilize the environment establishing the equilibrium moisture content (EMC) and apply a sealing finish.</p>
Floor board buckling	<p>Inadequate crawl space ventilation, unprepared building (windows and/or doors not installed when flooring was delivered), inadequate nailing, missing or improper vapor barriers.</p>	<p>Moisture-related solutions include adding adequate ventilation, installing a vapor barrier in crawl space, checking foundation for water drainage.</p>
Floor board cupping (convex) <i>board edges higher than center</i>	<p>Site-related moisture conditions (see floor board buckling causes)</p>	<p>Locate and correct moisture causing element.</p>
Floor board crowning (concave) <i>board edges are lower than center</i>	<p>Floor boards were sanded when cupped. Later, when the floor loses moisture, the underneath side of the boards lay flat exposing the reverse cupping.</p>	<p>Locate and correct moisture cause. Allow building components to dry thoroughly.</p>
Squeaking floors	<p>Inadequate nailing of either the boards or the subfloor</p>	<p>Locate cause and re nail. Refer to Table 2, page 10.</p>

The porch has withstood the test of time as an icon of American architecture, adding comfort, distinction and value. Today's home designs incorporate the porch as a natural extension of the family's living space.

Southern Pine flooring has enjoyed a long history in porch construction. As with indoor flooring material, the effect of moisture in contact with wood is a top concern when designing and building a porch.

Southern Pine, combined with the technology of wood preservation, is a superior porch flooring choice. With its built-in resistance to decay and termites, pressure-treated Southern Pine porch flooring, properly installed, will provide decades of satisfying service.

This section provides information related to material specification, handling and storage, installation, finishing, and general construction considerations for porch floors using preservatively treated Southern Pine.

Sizes, Grades and Patterns

The size, grade and pattern of flooring utilized in porches will depend upon the type of protection given to the structure. Porches without complete roof protection are generally constructed in the same manner as outdoor decks, incorporating a surface of either 2"x6" nominal size or 5/4x6 radius-edge pressure-treated Southern Pine. A dimension (2x) lumber grade of No.1 provides optimum appearance. Radius-edge decking is available in Premium or Standard grades.

The recommendations outlined in this section refer to flooring for fully-covered porches. Porch flooring is similar in sizes, grades, and patterns as the interior flooring described earlier in this booklet.

Typically, nominal thicknesses are 1" and 1-1/4" (3/4" and 1" actual) with the tongue-and-groove pattern, available in widths of 4" to 6" nominal (3-1/8" to 5-1/8" actual). The grade of C&Better is most-often specified for porch flooring applications. Refer to Table 1 on page 2 for complete descriptions of flooring grades.

Protective Preservative Treatment

To combat the deteriorating effects of outdoor exposure, moisture, decay and termite attack, pressure treatment with a waterborne preservative is strongly recommended for all wood components of the porch (e.g. framing, flooring, steps, railings, balusters). These preservatives are odorless and paintable, offering superior protection

to Southern Pine products in severe outdoor exposure conditions.

Standards developed by the American Wood Preservers' Association (AWPA) govern the use and specification of all wood preservatives used in pressure-treating processes. Most building codes require that wood in close proximity to the ground be pressure-treated to specific preservative retention levels, according to AWPA Standards. This

requirement applies to flooring and floor joists within 18" of exposed soil and structural materials such as columns, posts, girders and beams, within 12" of exposed soil. The preservative retention level specified for above-ground uses of Southern Pine is 0.25 pcf (pounds of preservative per cubic foot). For ground contact, a preservative retention level of 0.40 pcf meets AWPA Standards.

Generally, the 0.25 pcf retention is adequate for porch flooring, floor joists, and other porch materials used in above-ground applications, while the 0.40 pcf retention is required for wood in direct contact with the soil, such as posts and columns.

For complete details about products, standards and applications, consult the booklet *Pressure-Treated Southern Pine*, available from the Southern Pine Council.

Moisture Content and Material Acclimation

Prior to pressure treatment, a package of Southern Pine T&G porch flooring is at a moisture content of 12% for the majority of pieces if specified, represented, and grade marked as kiln-dried (KD). Refer to important information under the section "Wood and Water Relationships" on page 4. With a waterborne preservative, water is part of



the pressure-treating process, greatly increasing the moisture content of the wood, often to a moisture content of 50% and higher.

For porch flooring, the specification of material that is kiln-dried-after-treatment (KDAT) is highly recommended. Redrying the treated material will return each piece to a workable moisture content, generally to 19% or less. The advantages of KDAT flooring material include enhanced dimensional stability, plus reduced tendencies to warp, twist, and cup.

The same basic rules for proper storage, handling, and shipping as discussed earlier for interior flooring also apply here; see page 4. Remember, the pressure treatment of wood *does not* prevent the normal passage of moisture in and out of lumber. KDAT Southern Pine flooring will react the same as untreated interior flooring when exposed to moisture prior to installation and finishing.

A period of acclimation should be given to both the porch framing components and the pressure-treated porch flooring. Upon completion of the porch framing, it is common for experienced builders to allow one to two weeks for the framing materials to reach an equilibrium moisture content (EMC) with the exterior conditions, prior to flooring installation. This practice will reduce potential problems of buckling or separation of the flooring if installed on the framing too soon.

Proper acclimation of the flooring begins with its delivery to the job site. The material should be unloaded in a dry place and stacked on stringers to permit adequate air circulation. A layer of polyethylene should be positioned directly under all packages of flooring to prevent moisture absorption from the ground. If the temporary storage area is not fully protected from precipitation, the flooring must be *loosely covered* for protection from moisture (4-mil polyethylene is commonly used), yet allowing adequate circulation of air within the package. If at all possible, do not store the flooring in an area that receives direct sunlight most of the day, or in an enclosed, heated space. These conditions can allow the flooring to equalize at a moisture content *too low* for its intended use.

Generally, one to two weeks is considered an adequate acclimation period for KDAT porch flooring. The average moisture content of wood materials used in exterior applications is 12% for most areas of the U.S.

Porch Flooring Installation and Finishing

Reducing the opportunities for dimensional changes to the material due to moisture fluctuations is the key to long-term performance of the porch floor. Proper porch flooring installation actually involves applying the finish *prior* to installation.

Many builders begin with a coat of a water-repellent sealer on the top of all floor joists, providing added protection against joist expansion due to excessive collection of moisture.

For the porch flooring, begin with a coat of paintable water-repellent sealer to all four sides and the ends, followed by (after adequate drying time) a coat of high-quality, mildew-resistant oil-based primer for exterior use. Consider applying a coat of the final oil-based porch enamel to the tongue and grooves (also to the end of any piece that will be adjacent to the house) and installing it while the paint is still wet. This procedure not only assures an effective seal against moisture penetration, but also provides a good bond between floor boards.

Unlike interior flooring, T&G porch flooring is fastened *directly* to the floor joists. No additional nailing base is needed. A minimum 1/2" expansion space is maintained between the flooring area and house (or wall) to allow for dimensional change. This space can be concealed with decorative exterior trim (also acclimated).

Each piece of flooring is blind-nailed at *every* joist, using hot-dip galvanized 8d ring-shank nails. Extend floor to create a 1" overhang beyond the band joist.

Upon completion of the flooring installation, two coats of the oil-based porch enamel to the surface and exposed ends is recommended. Solid-color stains should *never* be used on a porch floor due to their low resin content.

To maintain the optimum performance of a porch following proper design, material specification, installation and finishing, a regular maintenance program should be undertaken. Inspection for water accumulation, integrity of the soil barrier, and any raised fasteners are just a few items to include in a periodic examination of the structure. Take necessary corrective action as soon as possible. Refinishing porch flooring can be expected every 3 to 5 years, depending upon weather conditions and the amount of exposure to direct sunlight.



Figure 14: Porch Flooring Details



ADDITIONAL INFORMATION

The Southern Pine Council offers a wide variety of other helpful publications. A single copy is free upon request. Materials available and the cost per copy for quantities include:

Southern Pine Use Guide

(#200, \$2)

design values, grade descriptions, sample specifications

Pressure-Treated Southern Pine

(#300, \$2)

preservative types & retentions, standards, proper use & handling

For a free listing of all publications and video programs, request the *Catalog*. Direct inquiries to:

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On behalf of the Southern Pine Council, SFPA maintains a staff of marketing directors and overseas consultants. These professionals are available to conduct seminars and to offer technical assistance regarding the specification and use of Southern Pine lumber products. Please contact SFPA for details.

Porch Design Considerations

Attention to proper porch design is as important to the longevity of the structure as are the details of porch flooring specification and installation. Inadequate air circulation beneath the porch and trapped moisture between framing components will greatly reduce the serviceability and long-term appearance of the porch.

The following recommendations are key elements to the proper design and construction of a fully-covered porch:

- Slope the exposed soil underneath the porch away from the center to permit runoff of any water that may accumulate.
- To reduce the upward migration of moisture from the exposed soil beneath the porch, cover with a moisture barrier (4-mil polyethylene is acceptable), leaving two feet of exposed soil inside the perimeter of the porch. Anchor edges of this barrier with gravel.
- Encourage air flow beneath the porch by using ornamental vents or lattice skirting.
- Slope the porch framing 1/4" per foot away from the house to permit adequate water runoff.
- Vent columns and newell posts at top and bottom.
- Check with your local building code department to be sure all code requirements are satisfied within your porch design.



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