Choosing an Exterior Finish for Wood

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All too often, exterior finishes for wood are short-lived in durability or fail completely. Failure is usually the result of the wrong kind of finish being applied to the wood surface or of not following recommended application procedures. In either case, the homeowner is faced with the expensive and time-consuming problem of refinishing. As a result, instruction should be given in selecting the appropriate finish/wood combination and in following through by applying the finish as specified by the manufacturer. This publication will discuss how to select the appropriate finish for the many different types of wood surfaces.

Wood Products and Finishes
There are three general categories of exterior finishes for wood. These are (1) paint, either latex or oil base, (2) penetrating stains, and (3) water-repellent preservatives. Each finish has particular advantages and disadvantages, and the one you choose will depend upon personal preference and upon the type of wood to be finished. There are also three general categories of wood products commonly used in construction. These are (1) lumber, (2) plywood, and (3) manufactured wood-based materials such as hardboard or particleboard. Let's look at the different wood products, their surface characteristics, and the type of finish most suited for them.

Lumber
Lumber is the most common wood material used in construction. Its ability to retain and hold a finish is affected by species, by grain direction, or how the piece was sawn, and by smoothness. All of these characteristics will affect the service life of any finish which is applied.

The species of wood being finished is important. Some woods have wide bands of dark, dense wood alternating with bands of light, softer wood. The light bands are formed in the spring of the year and are called springwood or earlywood. The dark bands are formed in the summer and are called summerwood or latewood (Fig. 1). Bands of summerwood are characteristic of Southern Yellow Pine and some boards of Douglas Fir. Paint will not hold well on these species, and penetrating stains are preferred. On the other hand, wide summerwood bands are not characteristic of redwood and cedar; therefore, these species are preferred when paint will be used.

Figure 1. Springwood and summerwood bands in Southern Yellow Pine. These distinct alternating bands often lead to early paint failure. Therefore, penetrating stains are preferred.
Grain direction also affects paint-holding characteristics and is determined at the time lumber is cut from a log. Grain can be referred to as flat, edge (quartersawed), or a combination of the two (Fig. 2). Most standard lumber contains a high percentage of flat grain. Lumber used for board and batten siding, dropsiding, or shiplap is frequently flat grained. Bevel siding of redwood or cedar is often, but not always, manufactured so that it is edge grained. Edge grained bevel siding will usually hold paint well. Flat grained lumber will not hold paint well since it shrinks and swells more than edge grained lumber and because wide bands of dense latewood are frequently present.

Paint also tends to spread better and last longer on smooth surfaces. Penetrating stains or preservative treatments are preferred for rough sawn siding. These treatments often accentuate the natural or rustic look of rough sawn siding.

Manufactured Wood Products
Manufactured wood products include hardboard siding, usually factory primed, tempered hardboard, and particleboard. All of these may be painted. The unprimed materials may be stained or preservative-treated.

Types of Finishes
Paint

Paints are the most common coating used on wood. They come in an infinite variety of colors and may be either oil or latex (water) based. Paints are used for aesthetic purposes, to protect the wood surface from weathering, and to conceal certain defects.

Paints are applied to the wood surface and do not penetrate it deeply. The wood grain is completely obscured, and a surface film is formed. This surface film can blister or peel, particularly if the wood is repeatedly wetted or if water vapor is moving through the house wall and wood siding, owing to the absence of a vapor barrier.

Latex paints are generally easier for the layman to use since water can be used in clean-up. They are also porous and, thus, will allow some moisture movement. Oil-based paints require organic solvents for clean-up.

Some woods, such as cedar and redwood, contain water soluble extractives. Whenever these woods are painted for the first time, an oil base primer must be applied to the bare wood. The primer seals in the extractives so that they will not bleed through the top coat. The primer must be used whether the top coat is an oil base or latex base paint.

On those wood surfaces best suited for painting, one top coat with primer will last about 3-5 years. However, if two top coats of high quality paint are properly applied over a primer, the life expectancy may be as long as 10 years. The quality of paint is usually related to the price. One gallon of paint will cover about 400 square feet of surface area. However, coverage can vary with different paints and application procedures.

Latex paint can be applied over freshly-primed surfaces and on some surfaces where an oil base paint has already been used and has partially deteriorated. Where old surfaces are to be repainted, a simple test should be conducted first. Just repaint a small, inconspicuous area with latex paint, and allow it to dry at least overnight. Then, to test for adhesion, firmly press one end of a “band aid” type adhesive bandage onto the painted surface. Jerk it off with a snapping action. If the tape is free of paint, it tells you the latex paint is well bonded and the old surface does not need priming. If the new latex paint adheres to the tape, the old surface is too chalky and needs

Figure 2. Flat and edge grain in Southern Yellow Pine.

Plywood

Exterior plywood is available with a smooth sanded surface, a rough sawn surface, or covered with a medium density paper overlay. The medium density overlay, frequently called MDO, holds paint well. The MDO product, however, is often difficult to purchase and is relatively expensive. Sanded and rough sawn plywood tend to develop surface checks, especially when exposed to the sun. This leads to early paint failure. Hence, penetrating stain or preservative treatments are more appropriate for both the smooth sanded and rough sawn exterior softwood plywood.
more cleaning or the use of an oil-base primer. Cleaning can be done by scraping off all loose paint and by then scrubbing with steel wool and detergent.

**Penetrating Stains**

Penetrating stains are a relatively recent development and are growing in popularity. They are moderately pigmented and, thus, do not totally hide the wood grain. These stains penetrate the wood surface and do not form a surface film like paints. As a result, they will not blister or peel even if moisture gets into the wood.

Penetrating stains are ideal for homes as well as for livestock housing. They are available in a variety of colors and are especially popular in the brown tones since they give a “natural wood appearance” (Fig. 3). They are not available in white.

![Figure 3. House finished with a brown penetrating stain to give a natural wood appearance.](image)

Stains are most effective on rough lumber surfaces, but they also provide satisfactory performance on smooth surfaces. On plywood surfaces, where paint normally checks, they also perform well.

Most penetrating stains are based on linseed oil. Some also contain a fungicide and water repellent. They are usually “thin,” making brush application messy. Lap marks will form if the stain is improperly applied (Fig. 4). You can prevent these lap marks, however, by staining only a small number of boards or a panel at a time. This prevents the front edge of the stained area from drying out before a logical stopping place is reached. One gallon will cover about 400-500 square feet of smooth surface and from 250-300 square feet of rough surface.

Usually the first coat of penetrating stain on new woods will last 2-4 years, but succeeding coats will last longer. As wood weathers, small surface checks open up, and the stain can achieve better penetration. In renewing a penetrating stain, excessive scraping and sanding is not required. Simply use a stiff bristle brush or steel wool to remove surface dirt and dust; then apply a new coat of stain.

Penetrating stains can be confused with the so-called solid color or heavy body stains. Like paints, these stains obscure most of the wood grain and form a surface coating.

![Figure 4. Lap marks formed by improper application of penetrating stain.](image)

**Water-Repellent Preservatives**

A water-repellent preservative may be used as a colorless finish. It contains only a fungicide (usually pentachlorophenol or penta) and a small amount of wax as a water repellent (Fig. 5). This finish gives wood an attractive, natural, tan color which may vary slightly depending on the kind of wood. The preservative prevents wood from graying by inhibiting mildew.

Water-repellent preservatives can be applied by spray, brush, or dip methods and are suitable for all common lumber and exterior plywood. One gallon will cover about 250 square feet of smooth surface or 150 square feet of rough surface. The life expectancy is only 1-3 years, depending upon the wood and exposure. However, the system can be renewed by a
simple cleaning of the old surface with a bristle brush and applying a new coat of water-repellent preservative.

Water-repellent preservatives may be used in another way. They are also recommended as a treatment for bare wood before priming and painting or in areas where old paint has peeled, exposing bare wood, particularly around butt joints or in corners (Fig. 6). The wood preservative treatment keeps water, such as rain or dew, from penetrating into the wood, especially at joints and end grain. In turn, this treatment decreases the shrinking and swelling of wood. As a result, less stress is placed on the paint film. This stability is achieved by the small amount of wax present in water-repellent preservatives. The wax also decreases the capillary movement of water up the back side of lap siding. The fungicide inhibits decay even if the wood becomes wet enough to support decay organisms. Allow surfaces treated with water-repellent wood preservatives to dry for two warm, sunny days before priming and top coating. During damp or cool weather, allow additional time.

Safety

Paint, stain, and preservative materials, if misused, can be harmful to humans, animals, and plants. Avoid breathing their vapors, and avoid skin contact. Store the materials in the original containers and keep them out of the reach of children. Read and follow the safety precautions and directions for use on the container. Bury, immerse in water, or seal in an air-tight container all cleaning rags which are wet with oil-base paint or stain because of the spontaneous combustion hazard.

Summary

For longest service life give careful attention to matching the appropriate finishing system to the wood surface. Paints, either oil based or latex, work best on smooth surfaces of redwood or cedar with vertical grain. They tend to check or fail on common plywood and on flat or rough sawn boards of many species. Penetrating stains work well on rough surfaces of all species of wood, regardless of grain characteristics. They are also acceptable on smooth surfaces. Water-repellent preservatives work well on most wood surfaces. Unlike painted surfaces, wood surfaces treated with penetrating stains or water-repellent preservatives are easier to refinish. Both of these finishes are increasing in popularity owing to their ability to maintain the "natural" characteristics of wood.

Once the appropriate finishing system is selected, care must also be exercised in its application. Follow procedures as outlined by the manufacturer or supplier.

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Photos in Figure 6 courtesy of U.S. Forest Products Laboratory, Madison, Wisconsin.

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