

# Texas Agricultural Extension Service

## Painting the Exterior Wood of Your Home

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Painted wood siding and trim add color and beauty to the exterior home surface and provide protection against weathering. Proper wood products and paint selection, as well as proper surface preparation and finish application, will make this pleasing appearance last longer.

### Selecting Wood Species and Products for Painting

Wood siding and trim are usually selected by price or availability. However, they should be selected by species, type of wood product and manufacturing methods used. All these factors are related to paint longevity.

#### Wood Species

Softwoods, those trees that have needle-like leaves that are usually evergreen, are the most common species for siding and trim. However, hardboard siding products are made using both softwoods and hardwoods. The hardwoods are those trees with broad leaves that usually drop in the fall.

Softwood species can be divided into four basic groups in respect to paintability (Table 1).

Softwood species that are best for painting are those of low density (lighter weight) with narrow summerwood bands. These are listed in Group 1 of Table 1. Of these, western redcedar, redwood and

cypress are the most commonly used for siding and trim in Texas.

Western redcedar and redwood do have a major painting problem. They have extraneous materials called extractives, some of which are water soluble. The attractive color, dimensional stability and natural decay resistance of many species exist because of such extractives, but the extractives can be transported, via water movement, to the wood surface. Once the water evaporates, the extractives are left as a reddish-brown to black stain, which is particularly noticeable on white or very light-colored paints or solid-color stains.

Group 2 species are good choices for painting, but are not used much in Texas. Group 3 species are not good choices for painting, but also are not used much in Texas. Group 4 species should not be painted unless certain rules are followed. But Douglas-fir, western larch and southern pine are commonly used in Texas for painted siding and trim without special at-

tention to paint choice or application techniques.

#### Wood Products

**Lumber.** Lumber siding and trim are found on many homes. Even brick veneer homes will usually have lumber for gable siding and fascia trim. Unfortunately, this lumber is usually selected by price rather than paintability. The initial savings are usually offset by increased required repainting.

Various types of wood siding patterns are used, including bevel, tongue and groove and shiplap. These patterns are applied horizontally or at an angle. Vertical siding patterns include tongue and groove and shiplap, but also board and batten and board-on-board (Figure 1). Vertical siding probably provides better paint longevity because it sheds water better and is slightly more resistant to sunlight due to a smaller angle of incident.

Correct lumber siding application is important to paint longevity. Courses of horizontal siding

*Table 1. Softwood species grouped by paintability. Group 1 has the best and group 4 the least paint longevity.*

Group 1	Group 2	Group 3	Group 4
Cedar	Pine	Ponderosa pine	Douglas-fir
Alaska	Eastern white	White fir	Western Larch
California	Western white	Western Hemlock	Pine
incense	Sugar	Spruce	Red
Port-Orford			Southern
Western			Tamarack
redcedar			
White			
Cypress			
Redwood			

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should be continuous immediately above and below windows and doors, eliminating seams. Siding should be tightly butted against door and window casings, corner boards and adjoining boards (Figure 2).

Nails used to attach lumber siding should be driven into studs and have a minimum 1 1/2-inch wood penetration, not counting the siding. For example, 3/4-inch wood siding nailed over 1/2-inch wood sheathing requires a sevenpenny nail, which is 2 1/4 inches long. The required 1 1/2-inches is achieved by the nail passing through the 1/2-inch wood sheathing and penetrating into the wooden stud 1-inch. The other 3/4-inch nail length is required to penetrate the siding, which does not count towards the required wood penetration. Hot-dipped galvanized, aluminum or stainless steel nails should be used rather than the plain steel-wire type, which cause rust spots on the paint surface. Even when countersunk and puttied, plain steel nails are likely to rust.

Nailing patterns are very important and should comply with manufacturer's recommendations. Solid lumber siding should be nailed to allow boards to shrink and swell. This reduces tensile stresses at the nails, which can cause wood cracking and splitting and lead to paint failures. Plain bevel siding should be face-nailed, one nail per bearing, so that the nail clears the undercourse edge. Shiplap siding of 4- and 6-inch widths is face nailed with one nail per bearing 1-inch from each overlapping edge. Boards that are 8 inches or more in width require an additional centered nail. Tongue and groove siding 6 inches or less in width is face nailed with one eightpenny nail per bearing or blind-nailed with one sixpenny

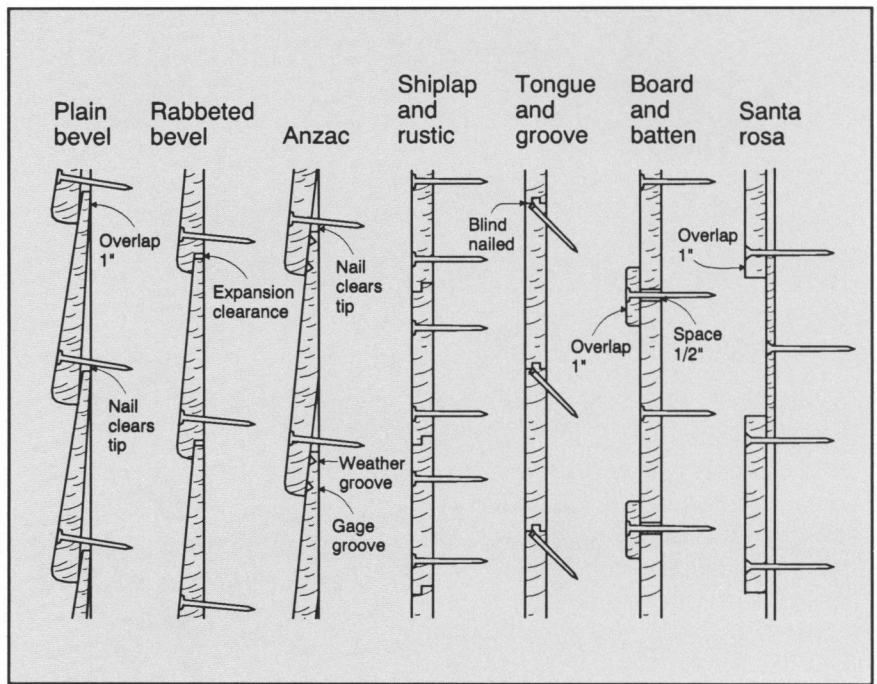


Figure 1. Proper nailing techniques for each lumber siding style are indicated above.

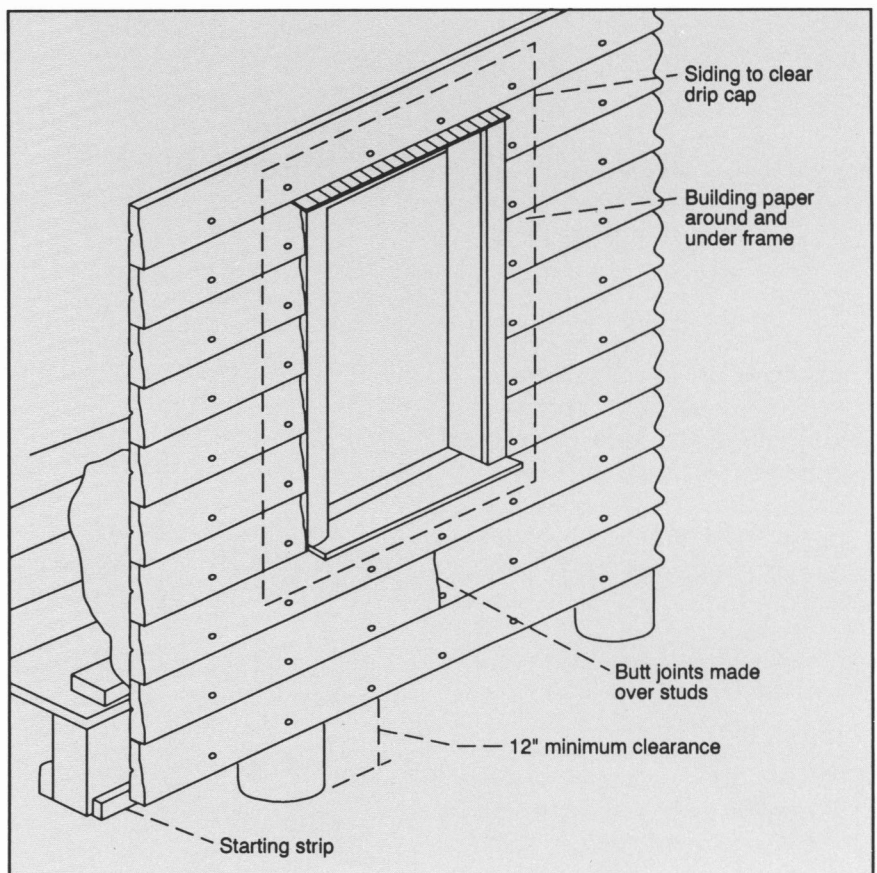


Figure 2. Correct installation of lumber siding is essential.



finish nail through the tongue. Boards greater than 6 inches in width require face nailing with two eightpenny nails. Board and batten type siding consists of underboards and batten strips. The underboards are spaced 1/2 inch apart and nailed with one eightpenny or ninepenny siding nail at the board center. The batten strips are 1 1/2 inches wide and nailed at the center with a tenpenny or twelvepenny nail. If board-on-board or Santa Rosa styles are used, the underboards are fastened with one nail at the center. The outer boards lap the underboards by 1 inch and are face nailed with two tenpenny or twelvepenny nails 1 1/4 inches from the edge.

**Plywood.** Smooth and roughsawn yellow pine, Douglas-fir and Western redcedar plywoods are popular for both siding and soffits. Vertical grooving to simulate board and batten and other patterns are available. Roughsawn plywood can be used for siding and soffits, but smooth plywood should only be used for soffits. Plywood should never be left unfinished when used for exterior siding or soffit. The thin surface veneer quickly degrades due to weathering, which causes surface checks, especially when fully exposed to moisture and sunlight. Surface checks lead to early paint failures. Roughsawn plywood siding is best because it holds more paint, which provides more protection against these surface checks.

Plywood covered with a medium-density paper overlay (MDO) is the best plywood choice for painting. It is not a stock item at most lumber yards, but can usually be ordered. The MDO plywood prevents exposed surface checks. The next best choice would be the roughsawn western redcedar. Both

Douglas-fir and southern pine are poor choices for painting.

Plywood should be at least 1/2 inch thick when used for siding. Joints should be caulked with mastic unless they are the interlapping or matched type or if battens are used. If joints are left uncaulked, it is best to apply a strip of 15-pound asphalt felt under them. When two or more plywood sheets are applied vertically, metal flashing should be used to protect the top edge of the lower sheet and the edges should be treated with a water repellent. Plywood should be nailed to studs using a 6 inches on center spacing at panel edges and 12 inches on center otherwise.

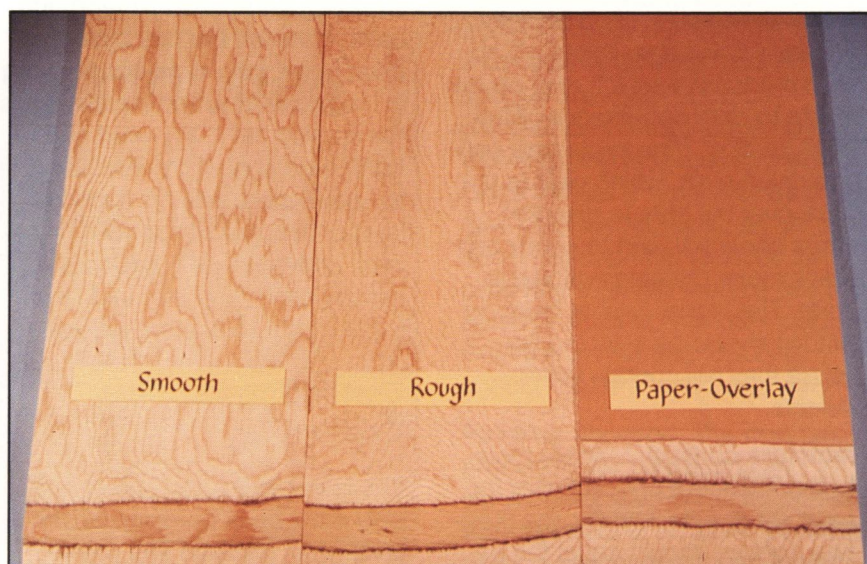
**Hardboard.** Hardboard is a popular choice for siding in Texas and is used extensively by many builders because of price. It often comes primed from the factory and can provide an excellent surface for painting. Hardboard siding should be nailed to studs using a 4 inches on center spacing at panel edges and 8 inches on center otherwise. Extractives leaching to the surface are a problem with hardboard.

### **Preservative treated wood.**

Treated wood is sometimes used for siding and trim. The preservative used is chromated-copper-arsenate (CCA). Trade names for this treatment include Wolman CCA, Osmose K33 and Boliden CCA. Southern pine is the most common CCA treated species used in Texas. It is used mostly for house fascia boards and other trim, fences and decks. Southern pine is in Group 4 (Table 1), which means it is difficult to keep well painted without frequent repainting. But there are times it must be used to prevent costly wood decay repairs. CCA treated pine, when used on the home and for fences and decks, must be redried after treatment. This is indicated on the quality grade mark by the symbol "KDAT." Aluminum nails should not be used for CCA treated lumber due to possible staining caused by a reaction between the treatment chemicals and the aluminum.

### **Manufacturing Methods**

**Sawing process.** How a board is cut from the log affects paint longevity (Figure 3). Softwood lumber is flat-grained, edge-grained or a



*Paper overlay plywood is best for painting, but smooth and rough texture can be used.*



combination of the two. Flat-grained lumber shrinks and swells more and has wider, darker bands of latewood, making it less desirable for painting than edge-grained. Most standard lumber grades contain a large percentage of flat-grain. Board and batten and shiplap siding are mostly flat-grained, while bevel siding of redwood and cedar can be obtained in either flat or edge-grained. But the edge-grained siding will be quite expensive.

**Surface texture.** Lumber and plywood siding are either left in the original roughsawn condition or planed smooth. It is best to use smooth lumber for painting. Rough-sawn lumber siding is best finished natural using either a solid-color stain or a penetrating, pigmented, wood preservative containing ultraviolet light absorbers and a water repellent. Because of minute surface checks in plywood, it is best to use roughsawn plywood for painted siding. It will hold more paint, which gives better protection to keep rain from penetrating the surface checks.

**Defects.** Lumber defects affect paint longevity. Defects include knots, bark, splits, pitch pockets and insect damage. Knots will absorb more paint, which may cause a light-to-dark appearance of the paint coating. Pine knots may contain much resin, which causes the paint over the knot to discolor. Large knots will tend to check and crack more, creating noticeable splits. The higher lumber finishing grades should be selected because they will contain fewer defects.

**Moisture content.** Lumber moisture content is a critical factor for paint service life. Initially, the moisture content should equal the expected average moisture content that the wood will have when in

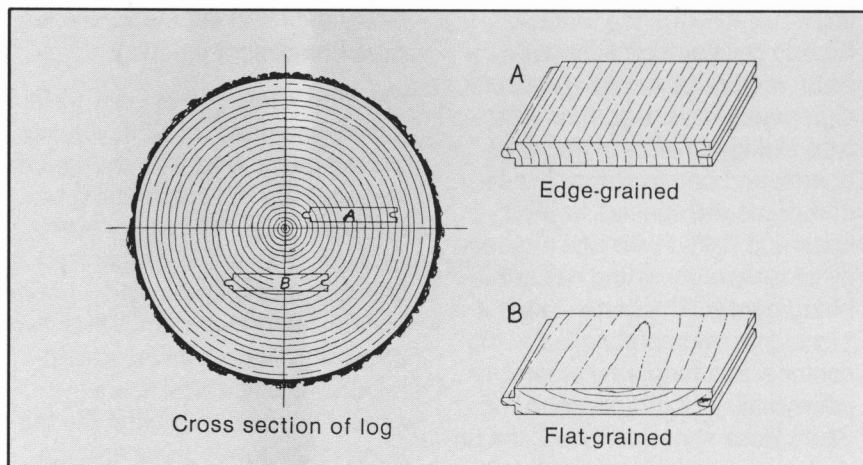


Figure 3. The way lumber siding is cut from a log affects paint longevity (Source: USDA-FS Agricultural Handbook 647).

use. Lumber should be dried to this value by the manufacturer and specified by a quality grade stamp. Air-dried lumber will have an average moisture content of around 19 percent; kiln-dried should average about 15 percent. It is best to use kiln-dried lumber, which is designated by the symbols "KD" or "MC 15" on the quality grade stamp. Air-dried lumber is designated by the symbol "S-Dry." If the lumber is green, designated by the symbol "S-GRN," it should not be used for siding and trim. Green lumber will shrink as it dries, stressing the applied film-forming paint. If the lumber has been over-dried, it will gain moisture, swelling in the process, which also stresses the applied paint. Plywood and hardboard should be conditioned for the average relative humidity level of the area where used. However, plywood and hardboard usually are not conditioned to the same moisture content as lumber.

## Controlling Moisture Content

The wood moisture content not only must be at the appropriate level when installed and painted, but also must be maintained during the entire life of the struc-

ture. This is not only beneficial for paint service life, but also for controlling decay and insect attack. To minimize moisture damage to the structure and the outside paint coat, use the following construction guidelines.

- A wide-roof overhang provides siding and trim protection from rain and sunlight. The best choice is a 2- to 3-foot overhang, but most Texas homes have 18 inches or less.
- Metal flashing in roof valleys, junctions of roofs and walls, along dormers and around chimneys will prevent rain water or melted ice and snow from entering the home.
- Properly installed and maintained gutters and downspouts prevent wetting of fascia board and soffit due to overflow and splash-up on siding near ground level.
- Proper insulation and ventilation of the attic and crawl spaces helps prevent moisture movement from these areas into the home.
- Exhaust fans should be used to remove moist air in bathrooms, kitchens and utility rooms. They must be vented to the outside and not into the attic or crawl space. Clothes dryers must be vented to the outside and not into the home, crawl space or attic. Plumbing must be maintained to eliminate leaks.
- Crawl space clearance between the ground and floor joists should be at least 18 inches. The soil should be covered with 6-mil polyethylene plastic to prevent soil moisture movement up into the home. The crawl space should



be properly vented, and the vents should be left open except during the coldest weather. Drainage should be away from the crawl space.

- Wood siding, sheathing or plates must be at least 8 inches above the outside groundline to prevent rotting.

## Painting New Wood Siding and Trim

**Paint selection.** Paint selection should be based on wood type and species, as well as paint quality and elasticity.

Wood types include solid wood, plywood and hardboard. The wood type species are usually the softwoods rather than hardwoods except for hardboard, which can be both.

Paint quality is not always related to cost, but higher priced paints usually contain more solids. The better paints normally contain at least 50 percent solids by weight.

Paint elasticity depends on the chemicals used to form the finish film. This film must be able to withstand periodic wood surface shrinking and swelling. Oil-based paints become brittle with age and crack or separate from the wood.

All acrylic latex paint is highly elastic and is more resistant to aging.

**Painting solid wood.** Paints selected for solid wood siding and trim should be based on the wood species groups given in Table 1. Group 1 species can be painted with either oil or latex-based paints. These woods, especially redwood and western redcedar, have water-soluble extractives that migrate to the wood surface when moisture conditions change, and can bleed through the topcoats causing discoloration. This can be prevented by using oil or alkyd-based or stain-blocking acrylic latex-based primers.

The best way to paint Group 1 woods is to:

1. apply a paintable water repellent to the new wood.
2. allow the water repellent to dry for two sunny days (read label instructions).
3. apply a stain-blocking acrylic latex-based primer.
4. apply two topcoats of an all acrylic latex-based paint. If roughsawn wood of these species is used, it is best to

finish the wood with solid-color stains or a penetrating, pigmented wood preservative containing ultraviolet light absorbers and a water repellent.

Group 2 species can be painted using either oil or latex-based paints. Primers can be alkyd, oil or latex. The best way to paint these wood species is the same as for Group 1, except the stain-blocking acrylic latex-based primer is not necessary. Roughsawn wood of these species should be finished as recommended for Group 1 species.

Group 3 species should be treated with a paintable water repellent prior to painting. The best paint choice is all acrylic latex, but oil-based paint can be used. Roughsawn wood of these species is best not painted but finished with penetrating wood preservatives or solid-color stains.

Group 4 species should be finished using a penetrating wood preservative that contains ultraviolet light absorbers and a water repellent. However, they are often painted using oil or alkyd-based paints. The result is paint failure within two to three years and subsequent similar refailures with each repainting. If these species are specified to be painted, they must be treated first with a paintable water repellent. Once the water repellent has dried (see label instructions), an all acrylic latex primer must be applied and then followed by two topcoats of an all acrylic latex paint. Both the primer and topcoats should *not* be thinned with water.

**Painting plywood.** The best paint procedure for plywood is an acrylic latex stain-blocking primer with topcoats of an all acrylic latex paint. A pretreatment with a paintable water repellent will improve



*Wood that is treated with water repellent sheds water, but nontreated wood absorbs water quickly.*





*Southern pine trim not treated with a water repellent and painted with oil-based paint quickly fails.*

durability. If MDO plywood is used, oil or latex-based paints can be used for both the primer and topcoats. Water repellents are not recommended for MDO plywood.

Solid-color and penetrating stains are not recommended for plywood because they provide less protection from weathering than paint. Roughsawn plywood can be finished natural if a pigmented, wood preservative containing ultraviolet light absorbers and a water repellent are used.

**Painting hardboard.** Hardboard may have water-soluble extractives that must be controlled by using an acrylic latex stain-blocking primer. The topcoats should be an all acrylic latex paint. Pre-treatment with a paintable water repellent is not recommended for hardboard.

**Painting treated pine.** CCA treated pine must be treated with a paintable water repellent prior to painting. The primer and topcoats must be all acrylic latex paint. It is best not to paint CCA treated pine fences and decks, but finish them with a pigmented, wood preservative containing ultraviolet light absorbers and a water repellent. White picket fences are popular and CCA treated pine should be

used for such fencing because of protection against decay and termites. Painting procedures for picket fences would be the same as given above.

## Painting Tips for New Wood

It is extremely important that exterior wood be finished correctly the first time. Initial mistakes affect later paint applications unless the first finish is completely removed, which is difficult and expensive. Maximum paint longevity can be achieved by using the following recommendations:

- Reduce wood shrinking and swelling in the beginning. Treating wood with a paintable water repellent before painting will protect against rain and heavy dew, which can cause dimensional changes. Group 4 wood species should always be treated with a paintable water repellent prior to painting. Water repellents should also be used on plywood, but not on hardboard. They are optional for lumber from Group 1 and 2 species, but if used will certainly improve paint longevity chances.
- Apply a primer after the water repellent has had adequate drying time. This provides a base for all succeeding paint coats. Primers are required for both oil-based and latex-based topcoats. They must block extractives in wood species such as western redcedar, redwood and cypress. Only acrylic latex paint is recommended to prime Group 4 species.

- After the required primer drying time (see label), apply two topcoats. Allow one to two drying days between oil-based coats, but acrylic latex coats can usually be applied within a few hours of each other.
- Avoid future paint coat separations by applying the first topcoat within two weeks after the primer and the second topcoat within two weeks after the first. If more than two weeks elapse between coats, scrub the old surface with water and a mild detergent, rinse and allow the surface to dry. Then, apply the next coat of paint.
- Strive to achieve the optimum thickness for the primer and two topcoats, which is 3.5 to 5 mils, the thickness of a sheet of newspaper. Thin coats will erode more rapidly while thick coats tend to build up and develop cracks. Thin coats are easily obtained with latex paints because they successfully cover the primer coat at only one-half the required thickness. It is not wise to thin high quality all-acrylic latex paint for this reason. Usually, one gallon of paint will cover about 400 square feet. However, this varies with different paints, surface characteristics and application methods. Brush application is better than roller or spray, especially for the first coat.
- Do not apply oil-based paints to a cool surface that will be sun heated within a few hours. This causes temperature blistering, which is a common occurrence when thick, dark-colored paints are applied in cool weather. The blisters usually appear in the last paint coat after a few hours or up to one or two days later.
- Apply oil-based paint when the temperature is 40° F. and above. Latex-based paints require a minimum of 50° F. for at least 24 hours after application to achieve proper curing. Lower temperatures will cause poor paint film coalescence and early paint failure. Wrinkling, fading or loss of gloss of an oil-based paint and streaking of a latex-based paint can be prevented with proper application. Do not apply paints during cool spring and fall evenings when heavy dew forms before the paint dries.
- Allow at least two hours for paint to dry prior to sunset. Heavy dew before adequate latex paint drying time can result in serious water absorption problems, causing major finish failure. Do not begin painting in the morning until all dew condensation has evaporated.



## Preparing and Repainting Wood

Proper surface preparation is necessary before repainting. This requires removing all loose paint, sanding to "feather" the edges around remaining paint and cleaning the surface. Cleaning requires scrubbing the remaining old paint with a water, detergent and bleach mixture as follows:

- 1/3 cup of household detergent
- 1 cup household laundry bleach (5 percent sodium hypochlorite)
- 3 quarts warm water

**WARNING:** Do not mix liquid household bleach with ammonia or any detergent or cleaners that contain ammonia. When mixed together, they become a lethal combination, similar to mustard gas. People have died from breathing the fumes from such a mixture. Many household cleaners contain ammonia, so be extremely careful!

Cleaning with this mixture not only removes dirt and old paint film, but also mildew. Rinse the cleaned surface thoroughly and allow it to dry prior to repainting.

An alternative cleaning method is to rent a power washer at a paint store or rental outlet. It is best to obtain one that allows bleach and detergent to be mixed in the water spray. They have a pressure potential of up to 2500 pounds per square inch, which can damage the wood surface if not used cautiously. Pressure is usually controlled by how far the wand is held from the wood. Power washing removes all old dirt and mildew quickly and easily, and also can be used to remove loose, flakey paint. Allow proper drying of the power washed wood prior to repainting. Extreme caution is recommended when power washing painted plywood, particularly the type called T-111. It is very easy to peel

away the surface veneer. It is probably best to clean painted plywood by scrubbing with the mixture given previously.

All large areas of exposed wood that have been scraped, sanded or power washed should be coated with a paintable water repellent. Wipe away any water repellent accidentally applied to areas still coated with paint. Allow two sunny days for the water repellent to dry and then apply a primer coat. Only those bare wood areas treated with the water repellent need to be primed. Paint topcoats can then be applied. When repainting with oil-based paints, only one topcoat is required if the remaining old paint surface is still in good condition. Paint choices for repainting are the same as when painting for the first time. It depends primarily on wood species and whether lumber, plywood or hardboard is being repainted. Paint application techniques, times and temperatures are also the same.

Latex paint can be applied over freshly primed surfaces and weathered paint. However, it is best to test such an application first before doing the whole job. After cleaning the surface, repaint a small area using the latex paint and allow overnight drying. To test for adhesion, firmly attach one end of an adhesive bandage onto the repainted surface. Jerk it off with a snapping action, using the unattached bandage end. If the end that was attached to the repainted area is free of paint, the latex paint is well bonded. If the new latex paint adheres to the bandage tape, the old surface is too chalky and needs more cleaning or the application of an oil-based primer. If both the new latex and old paints adhere to the tape, the old paint is not well bonded and must be removed before repainting.

## Mildew Control

Mildew is a constant problem for much of Texas, particularly the Gulf Coast and East Texas. It is caused by fungi (microscopic plant life), which are most common and extensive in warm, humid climates. They usually are black in color, but can be brown, red, green and other colors. Mildew can grow on any part of the home whether painted or not, but is most likely found on walls behind trees or shrubs where air movement is restricted. Mildew is also found where dew formation is most likely such as eaves, the ceilings of porches and carports, and the wall area between studs. The dew provides the moisture required by the mildew fungi.

Paint choice can help reduce mildew activity. Zinc oxide, a common paint pigment in topcoats, inhibits mildew, whereas titanium dioxide, another common paint pigment, does not. The type of oil-based paint is also important. Mildew progresses more rapidly on exterior flat oil-based paint than on semigloss or gloss enamel. Acrylic latex paint has the best resistance to mildew of the water-based paints. Paints or stains containing linseed-oil are very susceptible to mildew. Porous latex paints without a mildewcide that are applied over a linseed-oil based primer will develop severe mildew in warm, humid climates.

Mildew can also be controlled by buying paints that have mildewcides added. The paint label should indicate whether a mildewcide has been added. If not, ask your local paint dealer to add one.

Mildew must be removed prior to painting. This can be achieved by using the cleaning methods described earlier or spraying the mildewed area with a chlorine solu-



*Mildew must be removed prior to painting. Painting over it, as shown here, will only hide it for a short time.*

tion containing a 1:1 ratio of household bleach (5 percent sodium hypochlorite) and water. An all plastic garden pump or commercial sprayer can be used to apply the chlorine solution. Commercial sprayers should be designed to withstand the corrosive nature of chlorine. Mildew is killed instantly by the chlorine solution. The sprayed areas should be rinsed thoroughly and plants and

grass should be thoroughly wetted prior to application, and rinsed well afterward.

### References

Negley and Company. Which Paints Last Longer on Yellow Pine? San Antonio, TX. May 1972.

USDA-FS. Agricultural Handbook No. 647. Finishing Wood Exteriors, Selection, Application and Maintenance. May 1986.

### General Painting Tips

- Mix paint according to the manufacturer's directions. Always stir the paint thoroughly before applying.
- Always begin painting at the high part of the house and work down. Complete the painting job by doing trim work (windows, doors and shutters) last.
- Apply the finishing coat generously and brush out.
- Always paint with the wood grain, using even brush pressure. Work all the way across the width of the section being painted before starting a new area below. This helps eliminate lap marks in the paint.
- After the primer has thoroughly dried, apply finishing coat(s) promptly. Label instructions on the can will give required drying time between coats for the primer and finish paints.

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