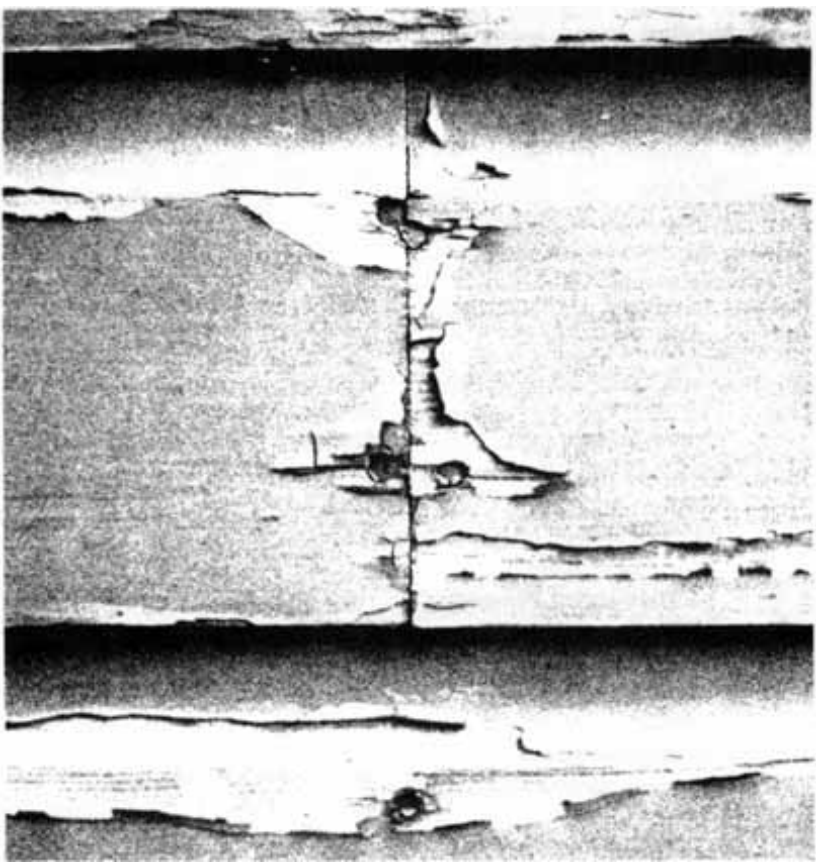
Wood Siding – Installing, Finishing, Maintaining



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Wood Siding—Installing, Finishing, Maintaining

by W. C. Feist and A. E. Oviatt[1]

Introduction

Wood siding is put on houses for many good reasons.

One reason is that it will keep the bright new "face" of any home attractive for many years to come. In fact, given reasonable care, wood siding will retain its beauty for centuries, as has been amply proved by its performance on houses that date back to early colonial times. It also has great versatility; and the large variety of patterns, sizes, and colors allows for effects ranging from the simple charm of colonial clapboard to the rustic beauty of board-and-batten and rough-textured plywood or lumber siding. In between are many other varieties and combinations that produce distinctive and attractive effects.

Then there is the ease and speed with which it can be sawed, fitted, and nailed into place. Other reasons are its fuel-saving value, because of the millions of tiny hollow fibers that make it a good insulator, and its natural resistance to the ravages of weather.

Other reasons to use wood siding include its ability to hold a wide variety of finishes-clear ones that reveal and accentuate its natural beauty, stains that impart a rustic appearance, and paints of every conceivable color. Within limits, the color scheme can be changed periodically to give a home a fresh new appearance in keeping with changing times. It is little wonder that wood siding has come to stand for warmth, comfort, security, beauty-all the things that spell "home."

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[1]Chemist and Forest Products Technologist (Retired), USDA Forest Service, Forest Products Laboratory, Madison, Wis. The laboratory is maintained in cooperation with the University of Wisconsin.

Many kinds of wood siding are on the market today. All will give good service, provided each is used properly.

There are three general categories of wood siding commonly used in construction. These are lumber, plywood, and reconstituted wood products such as hardboard and particleboard. Each product has unique characteristics that will affect the durability of any finish applied to it.

lumber

Lumber is being used less and less as exterior siding, but was once the most common wood material used in construction. Many older homes have wood siding. The ability of lumber to retain and hold a finish is affected by species, by grain direction or how the piece was sawn, and by smoothness.

The weight of wood varies greatly between species. Some common construction woods such as southern yellow pine are dense and heavy compared to the lighter weight ones such as redwood and cedar. The weight of wood is important because heavy woods shrink and swell more than light ones. This dimensional change in lumber occurs as the wood gains or loses moisture. Wood in heated homes tends to dry and shrink in the winter and gains moisture and swells in the warm summer months. Excessive dimensional change in wood consistently stresses a paint film and may result in early failure.

Some species 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 earlywood. The dark bands are formed in the summer and are called latewood (fig. 1). Bands of latewood 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 latewood

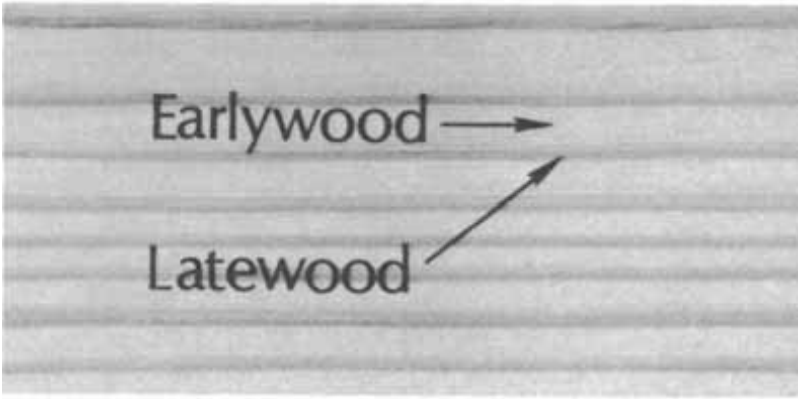


Figure 1–*Earlywood and latewood bands in southern yellow pine. These distinct bands often lead to early paint failure. Therefore, penetrating stains are preferred. M830023*

bands are not characteristic of redwood and cedar; therefore, these species are recommended when paint will be used.

Grain direction also affects paint-holding characteristics and is determined at the time lumber is cut from a log. Lumber is referred to as flat-grained, edge-grained (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, drop siding, 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 hold paint well. Flat-grained lumber will not hold paint as well since it shrinks and swells more than edge-grained lumber and because wide, dark bands of latewood are frequently present (fig. 3).

Paint will last longer on smooth, edge-grained surfaces. Penetrating stains or preservative treatments are preferred for rough-sawn lumber. These treatments often accentuate the natural or rustic look of rough-sawn lumber and allow the wood grain and surface texture to show through the finish.

For houses, bevel siding is perhaps the most widely used. (See fig. 7.) Drop siding and shiplap patterns are also used, especially on buildings without sheathing. These patterns of siding are applied horizontally and tend to make a house appear lower and longer.

Vertical siding is increasingly popular. It consists of tongued-and-grooved boards or squareedged boards applied vertically, often with narrow strips called battens nailed over the joints. Vertical patterns with smooth and rough-sawn surfaces are available in plywood of Douglas-fir, redwood, and western

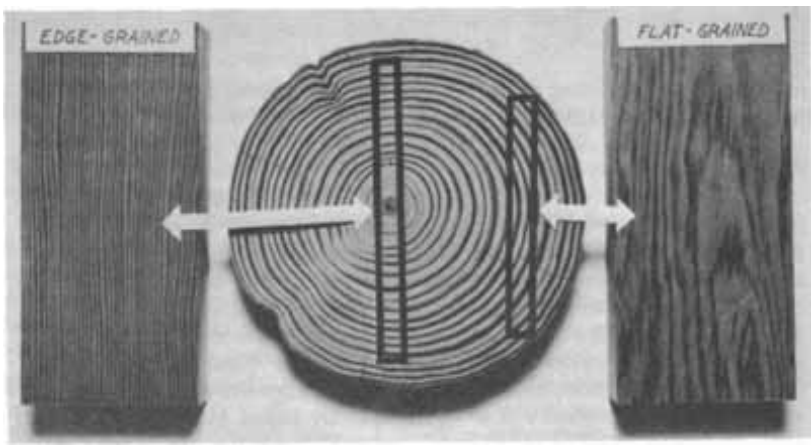


***Figure 2**–Edge-grained* (or quarter-sawed) board (left) and flat-grained *(or plainsawed) board* (right) cut *from* a log. *M147253*

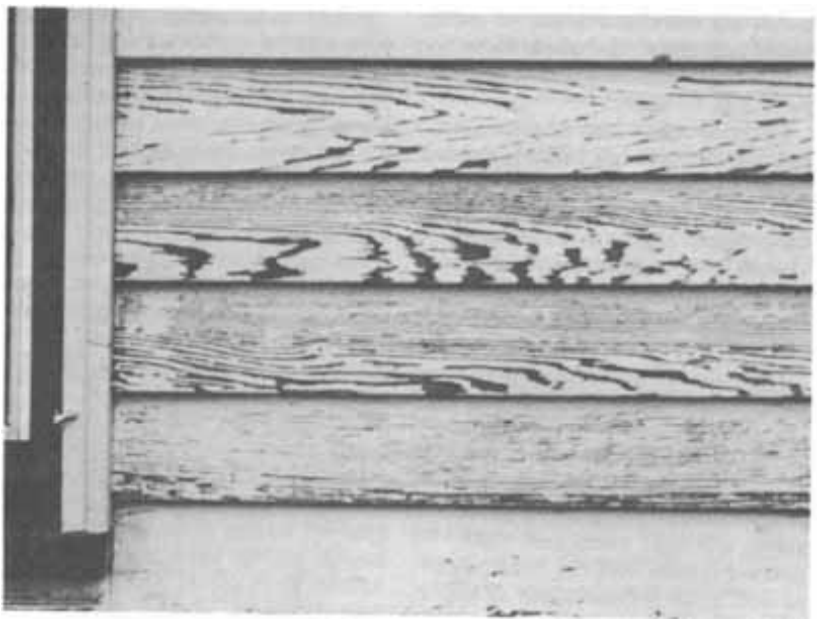


Figure 3—*Paint applied over edge grained boards (top and bottom) performs better than that applied to flat-grained boards (middle). M147211-7*

redcedar. Vertical siding tends to make a house appear taller.

Plywood

Exterior plywood with a rough-sawn surface is commonly used for siding. Smooth-sanded plywood is not recommended for siding, but it may be used in soffits. Both sanded and rough-sawn plywood can develop surface checks, especially when exposed to moisture and sunlight. These surface checks can lead to early paint failure with oil or alkyd paint systems (fig. 4). Quality acrylic latex paint systems generally perform better.

The flat-grained pattern present in nearly all plywood can also contribute to early paint failure. Therefore, if smooth or rough-sawn plywood is to be painted, special precautions should be taken. Penetrating stains are often more appropriate for smooth-sanded and especially rough-sawn exterior plywood surfaces.

Plywood manufactured with a mediumdensity paper overlay is frequently called MDO. Compared to standard rough-sawn or smooth plywood, MDO holds paint well. MDO plywood is not always a stock item in many lumber yards, but it can usually be ordered.

***Figure 4**–Early paint failure on plywood because of penetration of moisture into surface checks of plywood. M830013-6*

Reconstituted Wood Products

Reconstituted wood products are those made by forming small pieces of wood into large sheets, usually 4 by 8 feet, or as required for a specialized use such as beveled drop siding. These products may be classified as fiberboard or particleboard, depending upon the nature of the basic wood component.

Fiberboards are produced from mechanical pulps. Hardboard is a relatively heavy type of fiberboard and is used for exterior siding. It is often used as a substitute for beveled drop siding, traditionally made from solid wood.

Particleboards are manufactured from whole wood in the form of splinters, chips, flakes, or shavings. Waferboard and flakeboard are two types of particleboard made from relatively large flakes or shavings.

Only some fiberboards and particleboards are manufactured for exterior use. Film-forming finishes such as paints and solid-color stains will give the most protection to these reconstituted wood products. Some reconstituted wood products are factory primed with paint and some even have a top coat.

The kind of siding chosen will depend on where the house is built, its price range, and the architectural effect wanted. A range of quality in lumber and wood-based panel products is available from clear, smooth edge-grained to rough, flat-grained with knots. These and other visual characteristics should be given special finishing treatments in accord with the effects wanted.

Many species of wood can be used for siding. In siding cut from lumber, medium decay resistance, freedom from warping, low shrinkage, easy working qualities, and good finishing characteristics are desirable.

Among the species with all or most of these qualities are the cedars, redwood, the white pines, the spruces, and yellow-poplar. Douglas-fir and the southern pines are also used in the better clear grades. The dense hardwoods h very limited local use.

Horizontal Siding

Wood siding is simple to install. It is precision manufactured to standard sizes and is easily cut, fitted, and fixed in place with ordinary tools.

Courses of horizontal siding should be spaced so that a single board runs continuously above and below windows and above doors without notching: Bevel siding that is 6 inches wide should have at least 1 inch of overlap between courses. Siding that is 8 inches or wider should overlap 1 to 1½ inches, depending on spacing required between window heights (fig. 5).

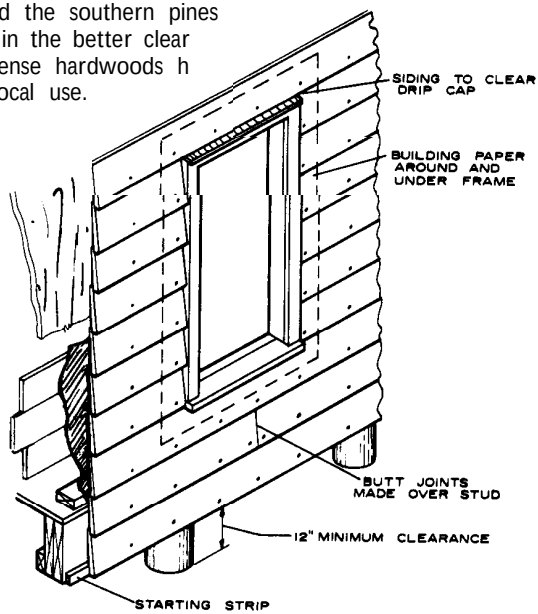


Figure S-Installation of bevel siding. ML835110

Siding should be butted snugly and squarely against door and window casings, corner boards, and adjoining boards. (Corner boards should lie flat against the sheathing.) If metal corner covers are used, siding boards should be carefully cut to avoid leaving a hollow place under the corner cover where water could collect (fig. 6). Mitered corners should be precisely fitted for the same reason.

To fasten siding in place, zinc-coated, aluminum, or other noncorrosive nails are recommended. Plain steel-wire nails, especially the large-headed type that are designed for flush driving, make unsightly rust spots on most paints. Even small-headed plain steel nails, counter-

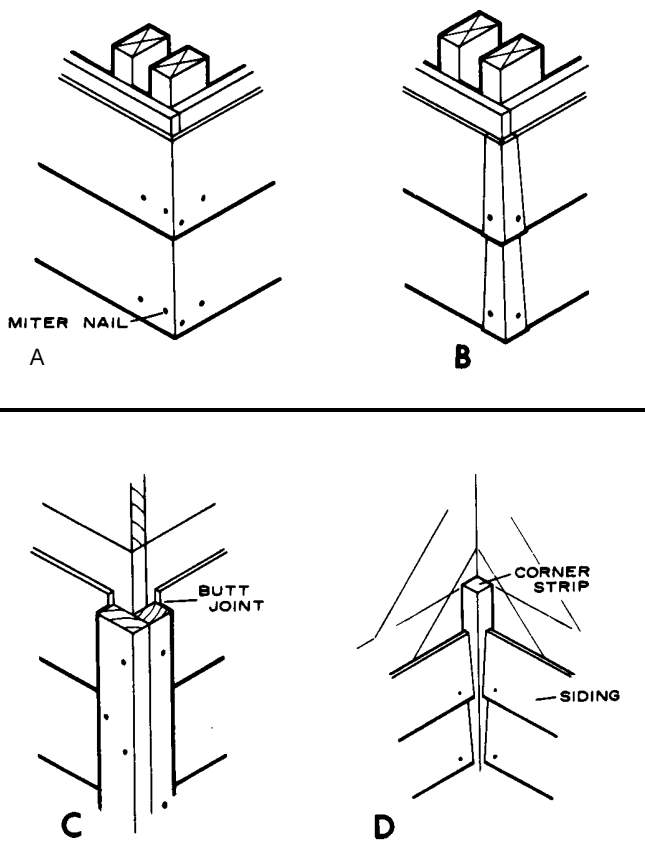


***Figure 6**—Recommended procedures for corners of siding: (A) Miter corners, (B) metal corners, (C) corner boards, and (D) interior corner. M134776*

sunk and puttied, are likely to spot the finish with rust. Naturally finished siding is installed best with aluminum or stainless steel nails.

For best performance, nailing patterns for the various kinds of siding are very important and should comply with the recommendations of the manufacturers (fig. 7).

Plywood and Other Sheet Siding

Exterior-grade plywood, paper-overlaid plywood, and similar sheet materials used for siding are usually applied vertically. When used over sheathing, plywood should be at least 1/4 inch thick, although 5/16 and 3/8 inch will normally provide a more even surface. Hardboard should be l/4-inch thick and materials such as mediumdensity fiberboard should be l/2-inch thick.

All nailing should be over studs, and total effective penetration into wood should be at least l-1/2 inches. For example, 3/8-inch plywood siding over 3/4-inch wood sheathing would require about a sevenpenny nail, which is 2-1/4

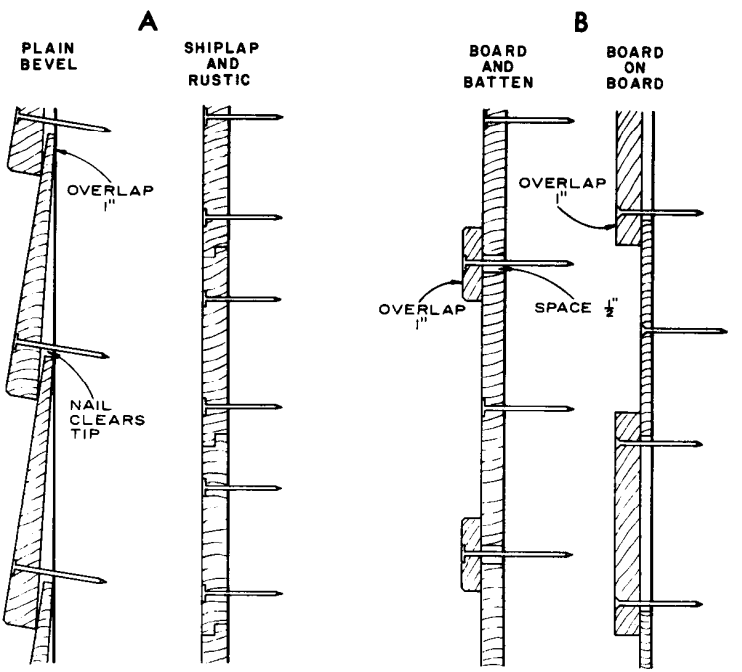


***Figure 7**–Patterns of wood siding and recommended nailing practices: (A) Horizontal application, and (B) vertical application. M139819*

inches long. This would result in a 1-1/8 inch penetration into the stud, but a total effective penetration of 1-7/8 inches into wood.

Plywood should be nailed at 6-inch intervals around the perimeter and at 12-inch intervals in the middle. Hardboard siding should be nailed at 4- and 8-inch intervals. All types of sheet material should have a joint caulked with mastic unless the joints are of the interlapping or matched type or battens are installed. Putting a strip of 15-pound asphalt felt under uncaulked joints is good practice.

Shingles and Shakes

Wood shingles and shakes have also been used as siding since colonial times, and remain popular on colonial and Cape Cod styles as well as more contemporary designs. They may be applied in single- or double-course patterns. It is permissible for singlecourses to have a larger exposure on sidewalls than on roofs, as the vertical pitch permits faster drainage and reduces wind-blown penetration of water. Headlap (the amount of lap over the second course below) may be as little as 1 inch (fig. 8).

Doublecourse application results in deeper shadow lines at the double butts. The first course may be of lower quality such as grade 3; but the top course should be grade 1, since much of the shingle or shake is exposed (fig. 9).

Some wood-based panel products have simulated shingle appearances or have premounted shingles on a backing panel.

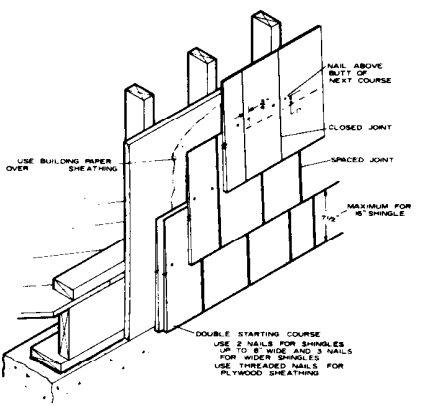


Figure 8–*Single-coursing of sidewalls (wood shingles or shakes). M134610*

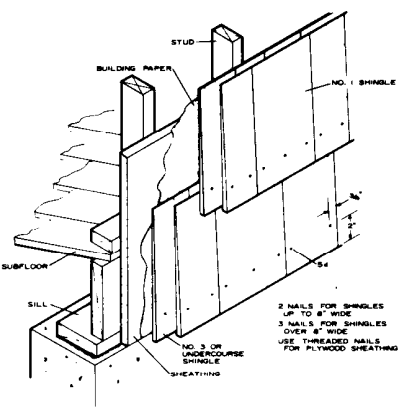


Figure 9–*Double-coursing of sidewalls (wood shingles or shakes). MI34609*

Wood siding is a part of the house; therefore, its performance is vitally affected by the rest of the structure. The whole house must be properly built to insure long-lasting service.

Insulation, weatherstripping, and generally tight construction reduce fuel bills and make for comfort, but their misuse may create some paint problems.

Water vapor formed within a house moves through the inner surfaces of the outer walls because of differences in temperature between the inside and outside. This water vapor condenses and collects as water or frost in the siding during the winter. With the return of warm weather in the spring, this moisture can-and often does-cause the exterior paint to blister. The problem has been further accentuated by air conditioning and by humidifying.

A number of measures can be taken to help keep moisture out of walls. One of the most effective is to put a good vapor barrier under the plaster, drywall, or paneling. Asphaltcoated paper, aluminum foil, and polyethylene film are satisfactory vapor barriers for homes (fig. 10).

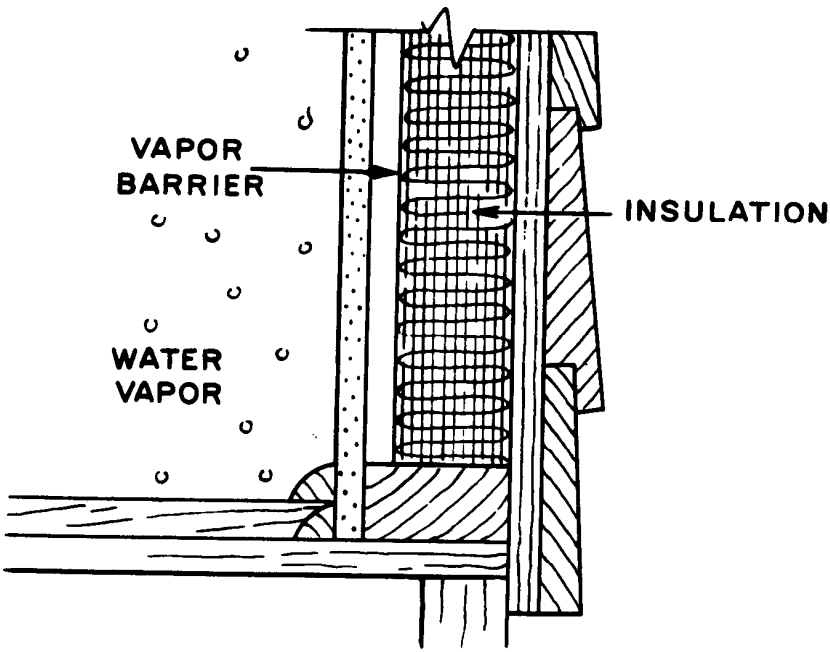


***Figure 10**–Vapor barrier (on warm side of wall) has prevented moisture from getting into walls. ML835109*

Rain and snow water must be kept out, too. Roof gutters must be sloped and have enough downspouts or they may overflow during rainstorms and let water seep into walls through joints in the siding. Attic floors should be well insulated and attic spaces ventilated so heat losses do not melt snow on roofs to produce ice dams and clog gutters (fig. 11).

Wide roof overhangs help in keeping moisture out. So, too, does metal flashing in roof valleys, along

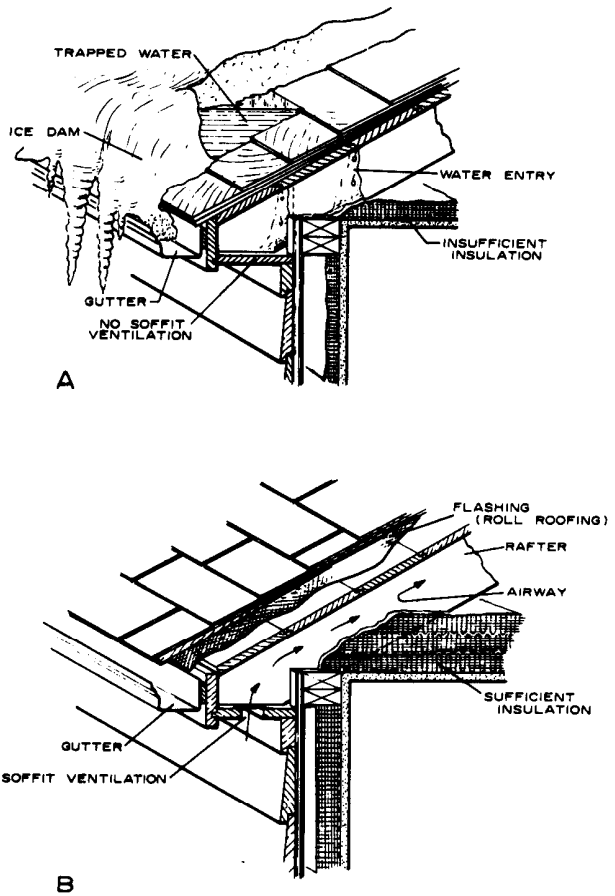


***Figure 11**–Ice dams: (A) Insufficient insulation and ventilation can cause ice dams and water damage; and (B) Good ventilation, insulation, and roof flashing minimize problems. M134787*

dormers, and around chimneys (fig. 12). Window and door frames also need adequate cap flashing.

A comparatively simple treatment for siding helps keep water out of wood. Siding can be dipped in a water-repellent preservative before it is installed or the water-repellent preservative can be brushed on after the siding is installed, but before it is painted. These preservatives are sold by lumber dealers and some paint stores. They contain fungicides, resins, and waxes (water repellent) that cause water to run off instead of penetrating into the wood at end and lap joints.

Paint

Paints are common coatings used on wood and provide the most protection. They come in a wide range of colors and may be either oil or latex based. Latex-base paints and stains are water borne, and oil or alkyd paints are solvent borne. Paints are used for decorative 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

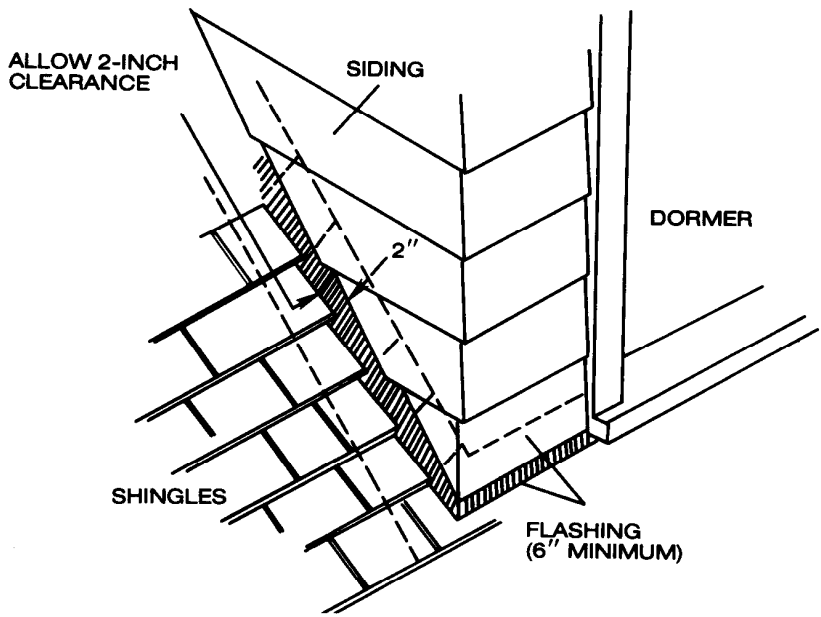


***Figure 12**–Metal flashing along dormers helps keep moisture out of siding; the flashing extends back of siding and under shingles. ML835330*

is formed. This surface film can blister or peel if the wood is wetted or if inside water vapor moves through the house wall and wood siding because of the absence of a vapor barrier or one that is defective.

Latex-base paints are generally easier to use since water is used in cleanup. They are also porous and, thus, will allow some moisture movement. In comparison, oil-base paints require organic solvents for cleanup, and some are resistant to moisture movement.

Paints perform best on smooth, edge-grained lumber of lightweight species such as redwood and cedar and on hardboard and overlaid plywood. Paints are the only way to achieve a bright white finish. However, they are subject to peeling where moisture is a problem. Paint is best for smooth surfaces; stains and preservatives, for rough surfaces.

Solid-Color Stains

Solidcolor stains, also called heavy-bodied stains, are opaque finishes, which come in a wide range of colors and are defined as stains. Solidcolor stains are made with a much higher concentration of pigment than the semitransparent penetrating stains described below. As a result, they will obscure the natural wood color and grain. Oil-base solidcolor stains tend to form a film much like paint, and as a result, can also peel loose from the substrate. Latex-base solid-color stains are also available and form a film as do the oil-base solid-color stains. These stains are similar to thinned paints.

Semitransparent Penetrating Stains

Semitransparent penetrating stains are popular for rustic finishes. They are moderately pigmented and thus do not totally hide the wood grain. These stains penetrate the wood surface, are porous, and do not form a surface film like paint. As a result, they will not blister or peel even if moisture gets into the wood. Penetrating stains are alkyd or oil based and usually contain a fungicide or water repellant. Latex-base (waterborne) stains are also available, but they do not penetrate the wood surface as do the oil-base stains.

Stains are most effective on rough lumber or plywood surfaces, but they also provide satisfactory performance on smooth surfaces. They are available in a variety of colors and are especially popular in the brown tones since they give a natural or rustic wood appearance. They are not available in white. They are also an excellent finish for weathered wood. They are not effective when applied over a solid-color stain or over old paint and are not recommended on hardboard or similar reconstituted wood panel products.

Water-Repellent Preservatives

A water-repellent preservative may be used as a natural finish. It contains a fungicide (usually pentachlorophenol or copper naphthenate), a small amount of wax as a water repellant, a resin or drying oil, and a solvent such as turpentine or mineral spirits. Water-repellent preservatives do not contain any coloring pigments.

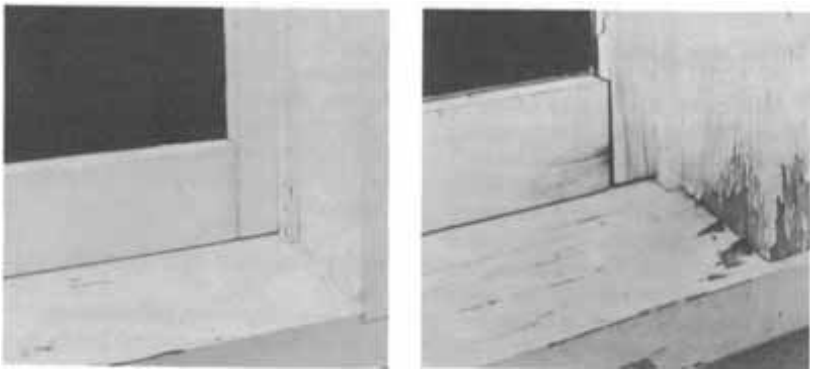
Therefore, the resulting finish will vary in color depending upon the kind of wood.

Water-repellent preservatives may also be used 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. This treatment keeps rain or dew from penetrating into the wood, especially at joints and end grain, and thus decreases the shrinking and swelling of wood. As a result, less stress is placed on the paint film, and its service life is extended (fig. 13). This stability is achieved by the small amount of wax present in water-repellent preservatives. When dip treated, the wax also decreases the capillary movement of water up the back side of lap or drop siding. The fungicide inhibits surface decay or mildew.

Be sure to purchase the correct type of water-repellent preservative. Any type of water-repellent preservative can be used as a natural exterior finish by itself, but only some are paintable. Manufacturers have also developed water-repellent preservatives specifically for exterior finishes.

Water repellants are also available. These are simply water-repellent preservatives with the preservative left out. Water repellants are not good natural finishes, but can be used as a stabilizing treatment before priming and painting.

Before purchasing and using a water-repellent preservative or water repellant, read the label carefully and follow the manufacturer's directions.



A **B**

***Figure 13**–(A) Window sash and frame treated with a water-repellent preservative and then painted and (B) window sash and frame not treated before painting. Both treatments were weathered for 5 years. Note the normally weathered paint good condition of the wood, and glazing on the treated structure. M119770, M119771*

Varnishes

Varnishes; synthetic resins; and other clear, film-forming finishes provide an attractive finish for wood since they allow the natural wood color and grain to show through. Unfortunately, the durability of these finishes on wood under the action of sunlight and moisture is limited. Regardless of the number of coats applied, the film will begin to crack and peel, and the finish will have to be completely removed by sanding or with a varnish remover before a new coat is added. In severe exposures, clear film finishes may last barely 1 year. Alternate finishes such as semitransparent stains and water-repellent preservatives will give a longer service life and are easier to refinish.

Exterior marine or spar varnishes may be used with some success on exterior doors and other areas if adequate protection from the weather is provided.

Preservatives

Wood preservatives are not considered to be finishes. However, wood properly treated with a wood preservative can withstand years of exposure to severe decay and insect attack without being affected. The common wood preservatives fall into three general categories. These are creosote, pentachlorophenol in oil, and the waterborne salt treatments such as chromated cop per arsenate (CCA). Creosote and pentachlorophenol in oil result in a dark and oily surface. Odor with creosote is a problem. Wood that has been pressure treated with creosote or pentachlorophenol in oil is not recommended for use around the home where people will come in contact with it. However, wood treated with waterborne salts is suggested for use in patio decks, outside steps, privacy fences, and other home structures. This material is generally light to bright green or brown in color. It can be used outdoors without finishing and will remain practically unchanged or weather to a light gray.

Paint

Proper surface care and preparation before applying paint to wood is essential for good performance. Wood and wood-based products should be protected from the weather and wetting both on the job site and after they are installed. Surface contamination from dirt, oil, and other foreign substances must be eliminated. Weather permitting, it is best to paint wood surfaces as soon as possible after installation.

To achieve maximum paint life, follow these steps:

1. Wood siding and trim should be treated with a paintable water-repellent preservative or water repellant. Water repellants protect the wood against the entrance of rain and dew and thus prevent swelling and shrinking. They can be applied by brushing or dipping. Lap and butt joints and the end of panel products such as plywood, hardboard, and particleboard should be especially well treated since paint normally fails in these areas first (fig. 14). Allow at least 2 warm, sunny days for adequate drying before painting the treated surface. If the wood has been dip treated, allow at least 1 week of favorable weather.

2. After the water-repellent preservative or water repellant has dried, the bare wood must be primed. Since the primer coat forms a base for all succeeding paint coats, it is very important. For woods with water-soluble extractives, such as redwood and cedar, the best primers are goodquality oil-base

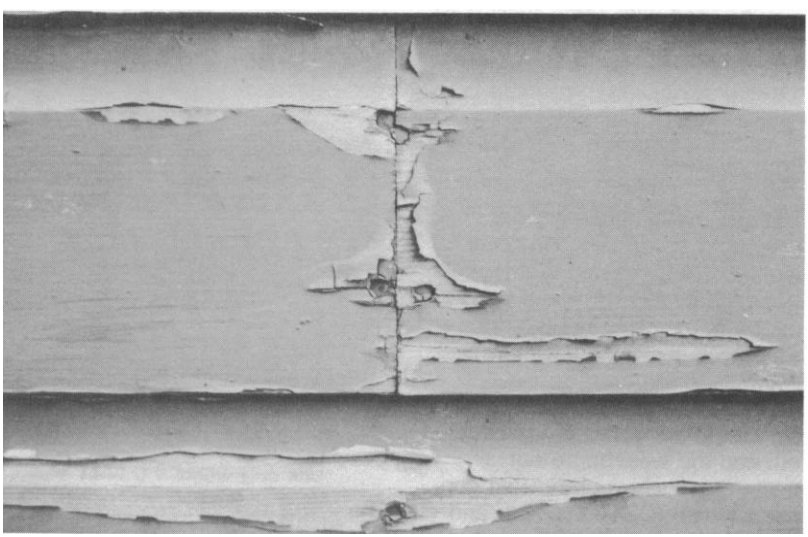


***Figure 14**—Paint normally fails first around the ends and edges of a board. Liberal application of a water-repellent preservative can prolong paint life in these areas. M8330013-5*

and alkyd-base paints. Some latex-base primer paints are also designed for use over these woods. The primer seals in the extractives so that they will not bleed through the top coat. A primer should be used whether the top coat is an oil-base or latex-base paint. For species that are predominately sapwood and free of extractives, such as pine, a highquality acrylic latex-base paint may be used as both a primer and top coat. Enough primer should be applied to obscure the wood grain. Do not spread the primer too thin. Follow the spreading rates recommended by the manufacturer. A primer coat that is uniform and of the proper thickness will distribute the swelling stresses that develop in wood and thus prevent premature paint failure.

3. Two coats of good quality acrylic latex-base house paint should be applied over the primer. If it is not practical to apply two top coats to the entire house, consider two top coats for fully exposed areas on the south and west sides. Areas fully exposed to sunshine and rain are the first to deteriorate and therefore should receive two coats. On those wood surfaces best suited for painting, one coat of a good house paint over a properly applied primer (a conventional two-coat paint system) should last 4 to 5 years, but two coats can last up to 10 years. Thus, three coats of paints last twice as long as two coats.

4. One gallon of paint will cover about 400 square feet of surface area. However, coverage can vary with different paints, application procedures, and surfaces. Research has indicated that the optimum thickness for the total paint coat (primer and two top coats) is 4 to 6 mils or about the thickness of a sheet of newspaper. The quality of paint is usually, but not always, related to the price. Brush application is always superior to roller application.

Additional Tips on Painting

To avoid future separation between paint coats, the first top coat should be applied within 2 weeks after the primer and the second coat within 2 weeks of the first. As certain paints weather, they can form a soaplike substance on their surface, this may prevent proper adhesion of new paint coats. If more than 2 weeks elapse before applying another paint coat, scrub the old surface with water using a bristle brush or sponge. If necessary to remove all dirt and deteriorated paint, use a mild detergent. Then rinse well with water and allow the surface to dry before painting.

To avoid temperature blistering, oil-base paints should not be applied on a cool surface that will be heated by the sun within a few hours. Temperature blistering is most common with thick paint coats of dark colors applied in cool weather. The blisters usually show up in the last coat of paint and occur within a few hours to 1 or 2 days after painting. They do not contain water.

Oil-base paint may be applied when the temperature is 40°F. or above. A minimum of 50°F. is desired for applying latex-base paints. For proper curing of the paint film, the temperature should not drop below 50°F. for at least 24 hours after paint application.

Low temperatures will result in paint failure.

To avoid wrinkling, fading, or loss of gloss of oil-base paints and streaking of latex-base paints, the paint should not be applied in the evenings of cool spring and fall days when heavy dews form before the surface of the paint has thoroughly dried.

Solid-Color Stains

Solidcolor stains may be applied to a smooth surface by brush or roller application, but brush application is best. These stains act much like paint. One coat of solid-color stain is adequate, but two coats will provide better protection and longer service.

Unlike paint, lap marks may form with a solid-color stain. Latex-base stains are fast drying and are more likely to show lap marks than the oil-base ones. To prevent lap marks, follow the procedures suggested under application of semitransparent penetrating stains. Solid-color acrylic latex stains are the most durable of these finishes.

Semitransparent Penetrating Stains

Semitransparent penetrating stains may be brushed or rolled on. Brushing will give better penetration and performance. These stains are generally thin and runny, so application can be messy. Lap marks will form if stains are improperly applied. Lap marks can be prevented by staining only a small number of boards or a panel at one time. This method prevents the front edge of the stained area from drying out before a logical stopping place is reached. Working in the shade is desirable because the drying rate is slower. One gallon will usually cover about 300 to 400 square feet of smooth surface and from 150 to 200 square feet of rough surface.

For long life with penetrating oil-base stain on rough-sawn or weathered lumber, use two coats and apply the second coat before the first is dry. Apply the first coat to a panel or area as you would to prevent lap marks. Then work on another area so that the first coat can soak into the wood for 20 to 60 minutes. Apply the second coat before the first coat has dried. (If the first coat dries completely, it will seal the wood surface so that the second coat cannot penetrate into the wood.) About an hour after applying the second coat, use a cloth or sponge to wipe off the excess stain that has not penetrated into the wood. Stain that did not penetrate will form an unsightly surface film and glossy spots. Avoid intermixing different brands or batches of stain. Stir stain thoroughly during application.

NOTE: Sponges or cloths that are wet with oil-base stain are particularly susceptible to spontaneous combustion. To prevent fires, bury them, immerse them in water, or seal them in an airtight container immediately after use.

A two-coat wet system on rough wood may last as long as 10 years in certain exposures. If only one coat of penetrating stain is used on new wood, its expected life is 2 to 4 years, but succeeding coats will last longer.

Water-Repellent Preservatives

The most effective method of applying a water-repellent preservative is to dip the entire board into the solution. However, brush treatment is also effective. When wood is treated in place, liberal amounts of the solution should be applied to all lap and butt joints, edges and ends of boards, and panels (fig. 15). It is important to apply liberal amounts of the solution to the end grain of wood. Areas especially vulnerable to moisture, such as the bottoms of doors and window frames, should not be overlooked. One gallon will cover about 250 square feet of smooth surface or 150 square feet of rough surface when used by itself. The life expectancy is only 1 to 2 years, depending upon the wood and exposure. Treatments on rough surfaces are generally longer lived than those on smooth surfaces. Repeated brush treatment to the point of refusal will enhance durability and performance.

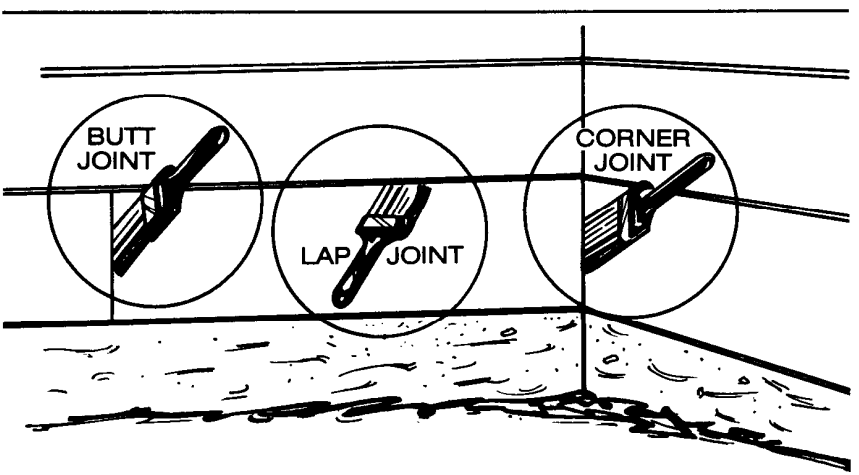


***Figure 15**–Water-repellent preservatives should be applied to all joints before painting. ML835331*

Paint

If you are refinishing an old paint coat, proper surface preparation is essential if the new coat is to give the expected performance. First, scrape away all loose paint. Use sandpaper on any remaining paint to "feather" the edges smooth with the bare wood. Then scrub any remaining old paint with a brush or sponge and water. Rinse the scrubbed surface with clean water. Wipe the surface with your hand. If the surface is still dirty or chalky, scrub it again using a detergent. Mildew should be removed with a dilute household bleach solution. Rinse the cleaned surface thoroughly with fresh water and allow it to dry before repainting. Areas of exposed wood should be treated with a water-repellent preservative or water repellant, allowed to dry for at least 2 days, and then primed. Top coats can then be applied.

It is particularly important to clean areas protected from sun and rain such as porches and side walls protected by overhangs. These areas tend to collect water soluble materials that interfere with adhesion of the new paint. It is probably adequate to repaint these protected areas every other time the house is painted.

Latex-base paint can be applied over freshly primed surfaces and on some surfaces where an oil-base paint has already been used and weathered. Where old surfaces are to be repainted with latex-base paint, a simple test should be conducted first. After cleaning the surface, repaint a small, inconspicuous area with latex-base paint and allow it to dry at least overnight. Then, to test for adhesion, firmly press one end of an adhesive bandage onto the painted surface. Jerk it off with a snapping action, If the tape is free of paint, it tells you that the latex-base paint is well bonded and that the old surface does not need priming or additional cleaning (fig. 8). If the new latex-base paint adheres to the tape, the old surface is too chalky and needs more cleaning or the use of an oil-base primer.

Solid-Color Stains

The same technique used to restore a paint coat can be used for solid-color stains.

Semitransparent Penetrating Stains

Semitransparent penetrating stains are relatively easy to refinish. Excessive scraping and sanding are usually not required. Simply use a stiff bristle bush to remove all surface dirt, dust, and loose wood fibers and then apply a new coat of stain. The second coat of penetrating stain often lasts longer since it penetrates into small surface checks, which open up as wood weathers.

Water-Repellent Preservatives

Water-repellent preservatives can be renewed by a simple cleaning of the old surface with a bristle brush and an application of a new coat of finish. To determine if a water-repellent preservative has lost its effectiveness, splash a small quantity of water against the wood surface. If the water beads up and runs off the surface, the treatment is still effective. If the water soaks in, the wood needs to be refinished.

Refinishing is also required when the wood surface shows signs of graying.

NOTE: Steel wool and wire brushes should not be used to clean surfaces to be finished with semitransparent stains or water-repellent preservatives since small iron deposits may be left behind. Pentachlorophenol may cause iron remaining on the surface to corrode. The corrosion products may then react with certain wood extractives to form a dark-blue, unsightly discoloration, which becomes sealed beneath the new finishing system. Pentachlorophenol is present in some semitransparent penetrating stains and water-repellent preservatives.

Do not mix bleach with ammonia or with any detergents *or* cleaners containing ammonia! Mixed together the two are a lethal combination, releasing a gas similar to mustard gas, as well as ammonia and chlorine gases. In several instances people have died from breathing the fumes from such a mixture. Many household cleaners contain ammonia, so be extremely careful with what types of cleaners you mix bleach.

Use caution with wood finishes that contain pesticides or preservatives. When used improperly, they can be injurious to human beings, animals, and plants. For safe and effective usage, follow the directions and heed all precautions on the labels. It is advisable to wear unlined protective gloves and to cover nearby plant life when using wood preservatives. Do not use any wood finish containing pentachlorophenol indoors.

Avoid drift from pesticides applied as a spray. They may contaminate the surrounding environment.

Store finishes containing pesticides in original containers under lock and key-out of reach of children and pets-and away from foodstuffs. Follow recommended practices for the disposal of surplus finishing materials and containers.

NOTE: Registrations of pesticides are under constant review by the U.S. Environmental Protection Agency. Use only pesticides that bear a Federal registration number and carry directions for home and garden use. Since the registration of pesticides is under constant review by State and Federal authorities, you should consult with a respons-

ible State agency as to the current status of the pesticides discussed in this report.

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