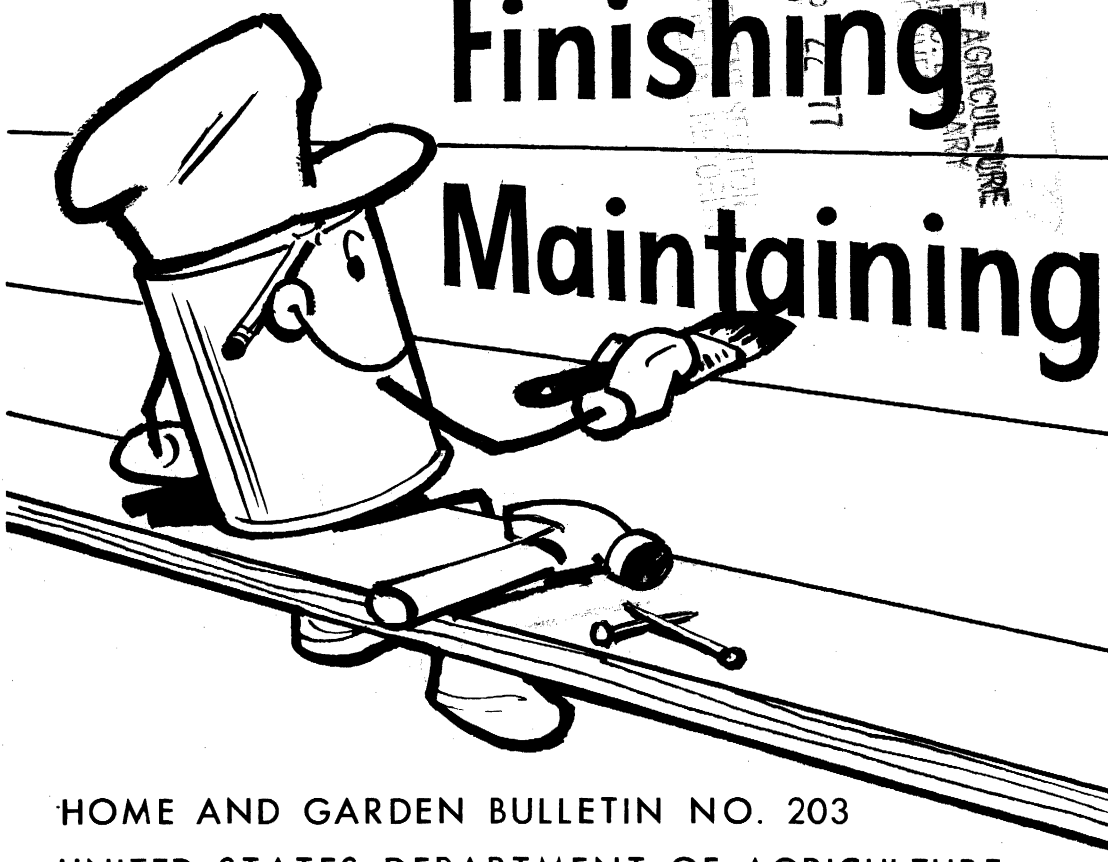
WOOD SIDING

Installing

Finishing

Maintaining



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WOOD SIDING

Installing - Finishing - Maintaining

By Forest Products Laboratory, Forest Service,
U.S. Department of Agriculture

Wood siding is put on houses for many good reasons.

One reason is 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.

There are sound design and structural reasons, too, for using wood and wood-based materials for siding. Its great flexibility and variety in patterns, sizes, and colors range from the captivating simplicity of Colonial clapboard to the equally charming board-and-batten and rough-textured plywood or lumber siding of modern ranch and rambler houses. In between are many other varieties and combinations that produce distinctive and attractive effects.

Then there are the hardheaded dollars-and-cents reasons, such as wood's low initial cost and the ease and speed with which it can be sawed, fitted, and nailed into place. Other reasons are its fuel-saving value, due to the millions of tiny hollow fibers that make it a good insulator, and its natural resistance to the ravages of weather.

Other reasons include wood's 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."

Many kinds of wood siding based on lumber, plywood, and fiberboard are on the market today (fig. 1). All will give good service, provided each is used right. For houses, bevel siding is perhaps the most widely used. Drop siding and shiplap patterns are also used, especially on houses without sheathing. These patterns of siding are applied horizontally and tend to make a house appear lower and longer.

Vertical siding is increasingly popular on one-story houses. It consists of tongued-and-grooved boards or square-edged boards applied vertically, usually 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 redcedar. Vertical siding tends to make a house appear taller.

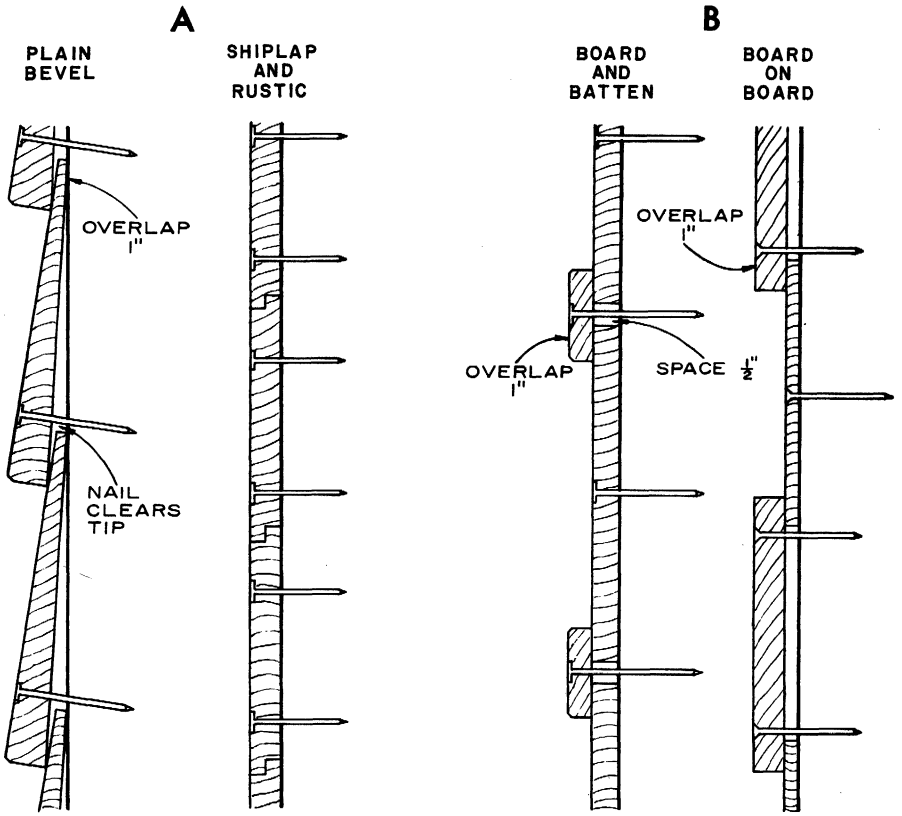


Figure 1.—Patterns of wood siding and recommended nailing practices. *A*, horizontal application, and *B*, vertical application.

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 is available, from clear, smooth edge grained to rough, flat grained with knots and other characteristics that should be given special finishing treatments in accord with the effects wanted.

Paints last longer on edge-grained softwoods of low density that are low in swelling than on dense flat grained. Such flat-grained boards are better left rough sawn, and finished with a stain.

In painting flat-grained surfaces with broad bands of summerwood, special care should be given in selecting high-quality nonporous primers and topcoats that will protect the wood surface from excessive wetting with moisture (dew and rain).

Any wood surfaces such as those of plywood and fiberboards that are overlaid with resin-treated paper are excellent for painting. The overlay serves as a stabilizer against swelling from moisture.

Installing Wood Siding

Wood siding is simple to install. It is precision-manufactured to standard sizes, 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 6 inches wide should have at least 1 inch of overlap between courses. Siding 8 inches or wider should overlap 1 to 1 1/2 inches, depending on spacing required between window heights (fig. 2).

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. 3). Mitered corners should be precisely fitted for the same reason.

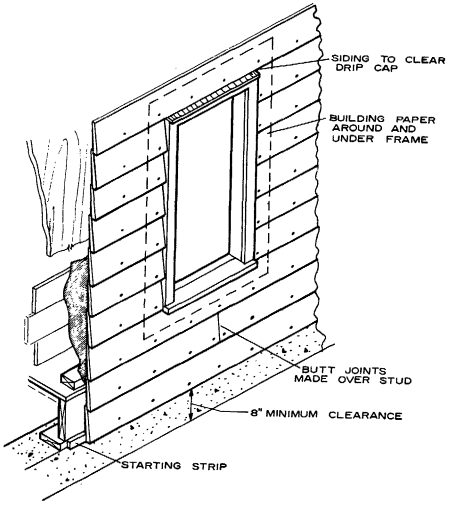


Figure 2.—Installation of bevel siding.

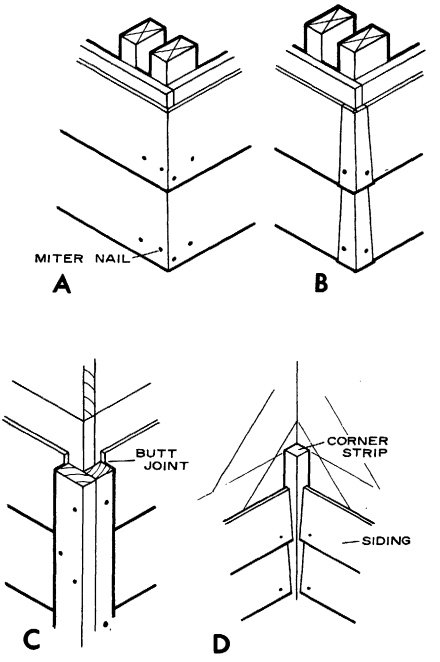


Figure 3.—Recommended procedures for corners of siding: *A*, miter corners; *B*, metal corners; *C*, corner boards; *D*, interior corner.

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, countersunk and puttied, are likely to spot the finish with rust. Natural finished siding is installed best with aluminum nails.

Nailing patterns for the various kinds of siding are very important for best performance, and should comply with the recommendations of the manufacturers (fig. 1).

The House and Moisture

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 (fig. 4).

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. Asphalt-coated paper, aluminum foil, and polyethylene film are good vapor barriers.

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. 5).

Wide roof overhangs help in keeping moisture out. So too, does metal flashing in roof valleys, along dormers, and around chimneys (fig. 6). Window and door frames also need adequate cap flashing.

A comparatively simple treatment for siding helps keep mois-

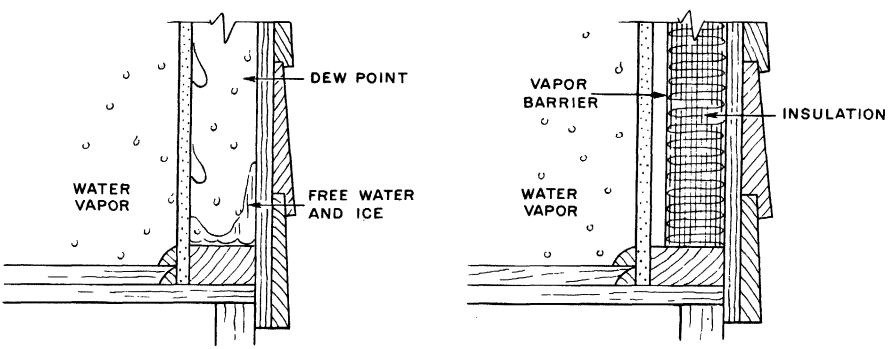


Figure 4.—Vapor barriers avoid moisture problems in walls. *Left*, water vapor from inside house moved out through wall. When vapor met outside cold air, moisture condensed and froze. As outside temperatures rose in spring and summer, ice melted, and moisture was free to move through siding and destroy paint coating. *Right*, vapor barrier (on warm side of wall) has prevented moisture from getting into walls.

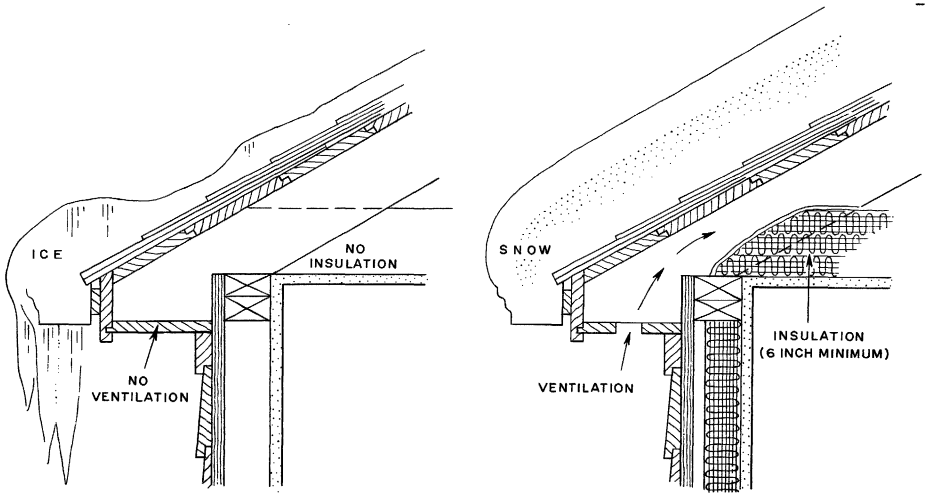


Figure 5.—Snow and ice dams: *Left*, ice dams often build up on the overhang of roofs and in gutters and cause melting snow water to back up under shingles and under the facia board of closed cornices. Damage to ceilings inside and to paint outside results. *Right*, ice dams can be avoided by adequate ventilation and insulation.

ture out of walls. 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 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.

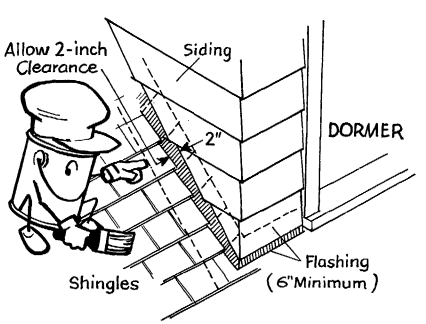


Figure 6.—Metal flashing along dormers helps keep moisture out of siding; the flashing extends back of siding and under shingles.

Wood Finishes

The first finish on siding is the most important. It is the foundation for all subsequent finishes, and will probably remain there for the life of the house.

Selection of a finish must be made from two broad classes: (1) Natural finishes and (2) paints. The natural finishes may be stains or preservatives. The choice will depend to a great extent on personal preference, with consideration of the advantages and disadvantages of each class of finish (fig. 7).

Natural Finishes

Natural-type finishes may either form a surface coat or penetrate the wood. Natural finishes that form a surface coating give a lustrous, even a glossy coating. These are chiefly spar varnishes. A really durable nat-

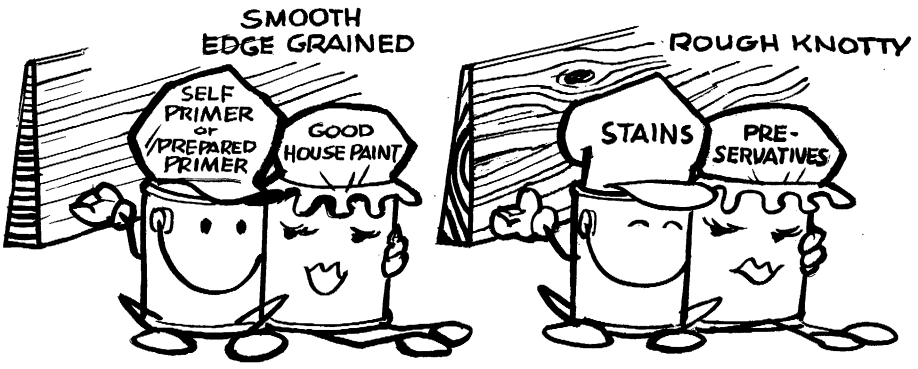


Figure 7.—Paint is best for smooth surfaces; stains and preservatives, for rough surfaces.

ural finish of this type has yet to be developed.

The penetrating natural finishes leave little or no continuous coating on the surface. Because there is no coating, there is no failure by blistering or peeling. These finishes are, therefore, ideally suited for rough and flat-grained surfaces that are difficult to paint effectively. Penetrating natural finishes include oil-base penetrating pigmented stains and water-repellent preservative finishes. Water-repellent preservatives penetrate wood readily and protect it from end staining, excessive cupping or twisting, and mildew. Wood finished in this manner will weather to a clean-buckskin or a light-tan color. Preservative-type finishes usually need refurbishing about every 2 years. Adding pigment to the water-repellent preservative will enhance the durability. Penetrating pigmented stains can be applied at any time over the water-repellent preservative treatment.

Good penetrating pigmented stains are inexpensive and much more durable than water-repellent preservative-type finishes. Stains penetrate and color wood, partially obscure the grain, but leave little or no surface film. Rough-sawn weathered wood and absorptive surfaces are especially suitable for stains. Good stains should last at least 5 years, and may last as long as 9 or 10. Even on planed surfaces, they will last at least as long as many paints before needing renewal.

Since stains form little or no coating on the surface of the wood, they do not crack, curl, flake, or scale. Neither do they blister. Hence they are easily maintained, and are ideal for finishing surfaces such as plywood and flat-grained surfaces that are difficult to paint.

House Paints

House paint is the most widely used finish for wood siding, and white is the most popular color. A good house paint should last at least 4 to 5 years before it must be renewed.

House paint consists of two parts, a solid part (pigments) and a liquid part (the vehicle). The pigments include hiding (opaque) pigments and transparent (extending) pigments. The vehicle of an oil-base paint consists generally of a drying oil (usually linseed oil) or an oil modified with an alkyd resin, a solvent (mineral spirits or turpentine), and a small amount of paint drier to harden the paint promptly after application. The vehicle of latex paint consists of a suspension of resin particles, usually acrylic or vinyl, in water. The performance characteristics of a paint are dependent to a great extent on the nature of the pigment, the proportion of pigment to vehicle, and the kind of vehicle.

Oil-base and alkyd house paints.—In these the white house paints may be classified simply according to the kind of white pigments used in them. The white pigments used have been white lead oxide, zinc oxide, and titanium dioxide.

Each type has some of the characteristics generally considered essential in good house paint. These include durability sufficient to last 4 to 6 years before needing renewal, a normal form of wearing that insures a good repaint surface with a minimum of preparatory work, and a normally fast rate of wear from the surface. The wear requirement prevents the accumulation of an excessively thick film of paint when a reasonable maintenance schedule is followed (a single coat every 4 or 5 years or two coats every 6 years). Paint should also have a clean, highly reflective color and ability to remain free from excessive dirt collection in service. It should be nonsensitive to moisture, and should not be stained by metal corrosion and wood extractives. Nor should it be discolored by hydrogen sulfide or organic sulfides. No one type of house paint on the market has all of these characteristics.

All types of paint have some desirable features and some that are not so desirable. To select the type of paint likely to give the most satisfactory service, the homeowner should be familiar with the conditions in his area to which house paints are subjected. He must also know the types of paint that will stand up best under these conditions—which of the various paint properties are important to him under the circumstances and which are relatively unimportant.

In terms of years of use, white lead paint is the oldest. It has been used on houses in this country since Colonial times, and is still preferred by some painters and houseowners to the other types of house paints. However, it accounts for only a very small fraction of the total house paint used in this country. Legislation on the use of lead in paint will very likely restrict lead to levels of 0.5 percent or less because of its toxicity.

White lead paint is a durable paint that normally fails by

chalking and crumbling. Probably the most important of its properties, however, is its nonsensitiveness to water. Even when exposed to water for a long time, it swells only about as much as wood does when wet. Consequently, it has little tendency to blister, and can be used where moisture blistering is an obvious paint problem. One of the more serious objections to white lead paint is its retention of dirt. Another objection is that it discolors on contact with hydrogen sulfide gases that cause the formation of black lead sulfide.

A few paints pigmented with a combination of white lead and titanium are sold as "titanized white lead." Paints of the titanium-lead type are nonsensitive to moisture, therefore very blister resistant. Because of this property, titanium and lead pigments were used universally for many years in house paint primers.

Paint with zinc oxide pigment usually has a brilliant and highly reflective color, remains uniformly clean in service, and is mildew resistant. It is generally hard, and wears away slowly. Paints of this type normally fail by cracking, curling, and flaking. With paints that fail in this manner, the coating on the wood must not be permitted to become too thick, and the cracking failure must not be permitted to advance too far before repainting. Because zinc-containing paints swell when wet, they blister more readily on contact with water than do the other types of paint.

Zinc-containing paints also are likely to become stained by nail rust and by the corrosion products of iron and copper screens reacting with zinc. House paints made with zinc oxide and titanium dioxide, often called "fume-proof" paint, do not discolor on exposure to hydrogen sulfide or organic sulfide gases.

Paints of titanium pigment combined with alkyd-oil resin vehicles are widely used. Alkyd paints are sold as "flat-alkyd, low-luster, breather-type, blister-resistant, and self-priming" paints. They may have little or no gloss, and also be very porous. The performance of alkyd paints relates to quality; the better the quality, the better the performance.

Titanium-alkyd paints normally fail by cracking and peeling, and may chalk excessively if formulated with an excessively low-vehicle content. The porous nature of the flat-alkyd type paints makes them quite susceptible to extractive staining over redwood and cedar. These paints should, therefore, be applied over a nonporous, zinc oxide-free primer, which will protect the wood surface from excessive moisture in the form of rain and dew. They resist sulfide discoloration.

Dark-color paints, sometimes called trim paints or trim-and-trellis paints, consist chiefly of dark-color pigments with little, if any, white pigment or extending pigment. In most trim paints, the major part of the vehicle is varnish, usually an alkyd-resin

varnish. Iron oxide paints—the familiar red barn paints—may also be classified as dark-color paints. Sometimes used on houses, they are very durable if of good quality. In general, good paints of dark colors are more durable than white or light-color paints.

Latex house paints.—Exterior latex white paints are usually based on suspensions of either acrylic or vinyl resins and titanium dioxide pigment. Latexes of this type may also be modified with alkyd-oil resins. These paints can have excellent adhesion to wood surfaces, blister resistance, tint retention, and durability. Their ease of application and cleanup with water makes them very popular. Like the flat-alkyd paints, however, they are porous, and should be applied over a nonporous oil-base primer on both new wood, which contains colored extractives, and old chalky oil-base paint.

Paint Primers

Some paints can be used as self-primers, whereas others require a special primer for the first coat on new wood. The proper choice of primer can do much to insure long-lasting, trouble-free paint performance. In particular, a primer should be nonporous, flexible, and blister resistant. It should therefore not contain zinc oxide pigment. Most paint manufacturers provide special, zinc-free house paint primers or undercoaters for use with a rule, it is wise to use primer their paints containing zinc. As and finish paint of the same brand.

The "breather-type" paints and titanium flat-alkyd resin paints are usually used as self-primers, but may be too porous to provide complete protection against moisture.

Very refractory wood surfaces, such as those of dense pine or fir, flat grain, wood with knots, and exterior plywood, may need the protection from moisture in many situations that only aluminum primer can provide. Aluminum paint for wood is the most impervious (nonporous) of the primers.

Selection of a particular type of house paint requires careful consideration. Where moisture troubles are widespread, a zinc-free paint of a high-quality latex is to be preferred. The construction of the house should also be considered. Does it have a wide roof overhang to shield the walls? Does it have adequate gutters and downspouts, and are they properly installed? Is there a good vapor barrier plus the insulation? Are the attic spaces well insulated and vented? If the answers are "yes," the probabilities for minimal maintenance and successful paint performance are very good.

Finishing Wood Siding and Trim

Painting

Questions that arise for applying finish include: When to

paint? Where to begin? How many coats?

Finish can be applied with a brush, a spray, or a roller. A brush is generally used, and, for purposes of this publication, brush application is assumed.

The following are three simple steps in painting exterior wood:

(1) Apply water-repellent preservative by brush, roller, or squirt can to all joints (wherever two pieces of wood come together) and ends of boards (fig. 8). Dry 2 days before priming.

(2) Apply nonporous, zinc-free oil-base primer thick enough to cover the wood grain.

(3) Within 2 days to 2 weeks after applying primer, apply latex or oil-base topcoats. Two topcoats should be applied in areas fully exposed to the weather.

Finish is best applied during warm dry weather when several weeks of sunshine can be expected. This creates a problem for houses built during fall or winter; often builders let them stand with a prime coat until spring before finishing the job. This procedure can result in trouble. The better practice in these situations is to brush water-repellent preservatives on the siding, after which it can go without finish until spring.

The answer to the question "How many coats?" depends largely on the kind of paint selected. As a rule, three coats are recommended for new wood. Many builders apply only two. The third coat may be applied only to areas exposed to severe weathering. A first paint job of oil-base paint should be 4 1/2 to 5 mils (thousandths of an inch) thick, which is about the thickness of a dollar bill. It is difficult, if not impossible, to apply that much by brush with one primer and one finish coat of today's average paints. Exceptionally heavy coats, where oil-base paint is applied at a rate of 450 to 500 square feet a gallon, are likely to result in wrinkling, loss of gloss,

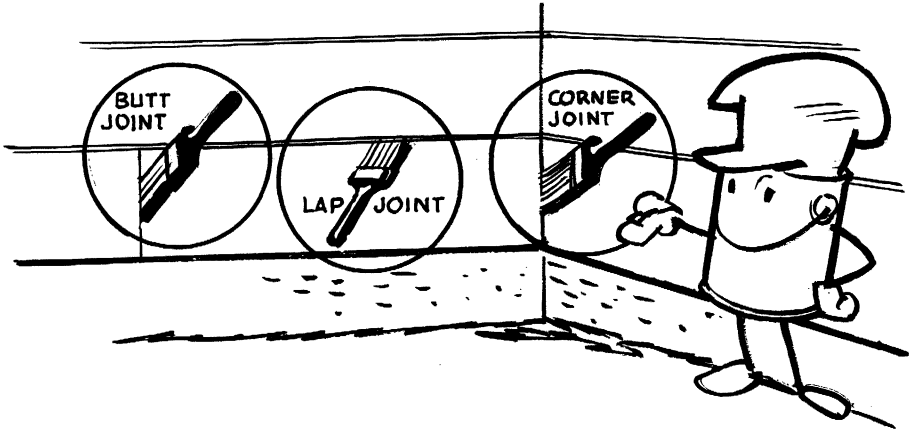


Figure 8.—Water-repellent preservatives should be applied to all joints before paintings.

Figure 9.—Three coats of paint will last twice as long as two coats.

and slow drying during cold weather. The optimum thickness of a three-coat latex system is 3 to 3.5 mils (fig. 9).

With paint, an old craftman's rule is: "Follow the sun around the house." This means that the north side should be painted early in the morning, the east side late in the morning, the south side well after noon, and the west side during late afternoon.

Morning dew or the water of a brief shower should be wiped off, and painting can begin after half an hour of warm-weather sunshine. After many hours of hard rain, however, a day or two of drying is needed.

The amateur painter can learn to gage spreading rates by applying a pint of paint evenly over a measured area. For example, at a spreading rate of 450 square feet to the gallon, a pint covers 55 square feet, or an area of 5 by 11 feet; at 550 square feet a gallon, a pint covers about 70 square feet, or an area of 5 by 14 feet. The average beginner tends to spread paint too thinly.

For modern oil paints of average composition, a total thickness of between 4 1/2 and 5 mils results when one coat of house-paint primer is applied at 450 square feet a gallon and two coats of finish paint at 550 square feet a gallon each.

In warm dry weather, each coat of oil-base paint should dry a day or two before the next is applied. Cold or damp weather may make an extra day or two advisable, but more than 2 weeks between coats should be avoided. Coats of latex paint can be applied within a few hours of each other.

Staining

Penetrating stains are very easy to apply. For smooth surfaces that are not too absorptive, two coats of stain are not recommended because the second coat will not penetrate. This results in holdout of the stain in certain areas to produce unsightly glossy spots. On smoothly planed wood surfaces a one-coat application will last about 3 years. Rough-sawn and weathered wood surfaces are much more absorptive than newly planed surfaces, and are finished best with two coats of penetrating stain. Two coats of stain on rough surfaces will last 8 to 10 years. The second coat of stain should be applied within an hour of the first so that both coats will penetrate. If the first is allowed to dry, it acts as a sealer, and the second coat cannot penetrate. Stain that has not penetrated after an hour should be wiped from the sur-

face. Penetrating stain will "lap" badly if the front edge of stain area is permitted to dry. Stains should therefore be applied to only one or two courses of siding at a time, and the course should be completed before painting is stopped.

Because the stain penetrates, there is no coating on the surface that can later separate by peeling and flaking. Penetrating stains are therefore ideal finishes for wood surfaces considered difficult to paint and for those exposed to high-moisture conditions.

Maintenance of Finishes

Repainting or Restaining

Hot summer sun, wind-driven rain, hail, dust, and winter snow and ice gradually take a toll on even the best finish. How frequently the finish should be renewed is governed by the rate at which it weathers away.

As pointed out, a paint maintenance program is determined by the kind of paint used in the first paint job. The basic rule is, paint only after most of the old paint film has weathered away. Always remember that coating thickness can build up dangerously if paint, especially oil base, is applied too frequently. Abnormal behavior spells trouble and possibly costly removal of old paint by blowtorch or by paint and varnish remover.

Paint that starts to crack and peel from the wood indicates that a serious moisture problem may be involved. It may indicate two conditions: (1) Either a primer was used that was sensitive to water and perhaps too porous to provide adequate protection from rain and dew or (2) moisture from cold weather condensation or ice dams is excessively wetting the walls and the siding.

Quality latex paints properly applied to old painted surfaces are proving excellent refinish systems. Latex does not always bond well to chalk surfaces, and because of its porosity, it holds rain and dew. In turn, this water can penetrate the paint film and produce an abnormal peeling problem. When repainting chalky surfaces with exterior latex, therefore, it is advisable either to remove the chalk by sanding, scrubbing, or steel wooling or to apply a new coat of oil-base primer over the chalk. Recent developments in latex paint formulation have greatly improved performance over old paint. Thus, it is important to read the directions on a label carefully before applying latex over old chalky paint.

Penetrating natural stains are easy to renew. Fresh finish is simply applied when the old finish appears to need it. As with the first finishing job, any excess of stain or oil should be wiped off, so that formation of a surface coat is prevented.

Eliminating Troubles

Paint troubles arise from various causes. Most common are porous finish systems that allow

rain and dew to enter the coating; improper first priming of wood with wide summerwood bands; repainting too soon without washing; moisture vapor troubles in tightly built insulated houses that lack vapor barriers; or rain or other water getting behind the siding. Evidence of paint trouble usually comes in the form of cracking, blistering, and peeling.

Before repainting, the probable cause of the trouble should be ascertained. If it is due to springtime blistering on localized areas on the house in the colder northern states, a more effective vapor barrier is needed. This can be obtained by painting the indoor side of the exterior walls. Two coats of aluminum paint plus two coats of decorative paint are best for sand-finish plaster. On smooth plaster, a primer-sealer and at least one coat of semigloss paint make a good barrier. Shutting off humidifiers will also help.

Where the trouble is due to water that gets inside the walls from the roof, leaks should be found. If the trouble is due to ice damming (fig. 5), the situation can be improved by increasing the insulation in the attic floor to a minimum thickness of 6 inches and by increasing the screened venting area of the attic to 1/225 of the ceiling area. If the gutters overflow during heavy rains, additional downspouts may be needed or the gutters may need to be cleaned and rehung with a greater pitch. If paint fails first at ends of boards, water is getting through the joints of the siding, and the lap and butt joints should be treated with water-repellent preservatives before repainting. This type of solution is highly penetrating, and creeps well into the joints to seal them against future inroads of rainwater.

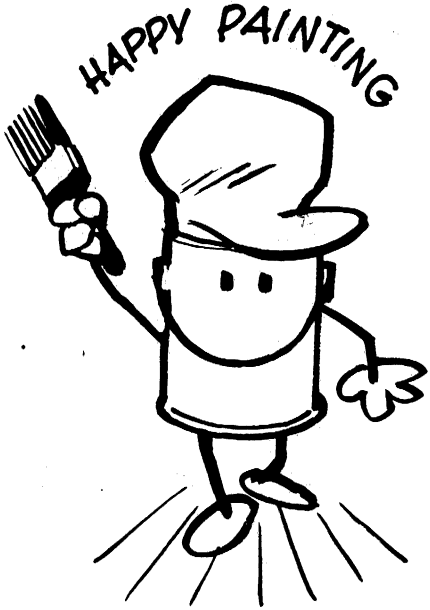
"Snowflake" type peeling of paint, especially in protected areas, indicates that the old paint surface was not adequately washed before repainting.

Tan- to brown-discoloration stains on redwood and cedar siding on all sides of the house mean that the paint was too thin and porous, which allowed rain and dew to pass through the coating to dissolve the extractives. This type of paint condition frequently involves peeling because too much rain and dew penetrate the old paint layers. These failures occur on all sides of a building and on both heated and unheated buildings. These failures are usually corrected by priming all old paint surfaces with a good nonporous oil-base primer before the top coat is added.

Whatever the cause of a paint problem, it should be found and corrected before the house is repainted. Then the repaint job should markedly reduce future recurrences of abnormal paint behavior.

Wood preservatives used improperly can be injurious to man, animals, and plants. Therefore, for safe and effective usage it is essential to follow the directions and heed all precautions on the labels.

Store preservatives in original containers—out of reach of children and pets—and away from foodstuff.



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