

Most coating problems are related to one of four basic fundamentals:

A discussion of some of the more important elements of these fundamentals is offered to serve as a reference in an effort to assist the reader in avoiding costly coating problems and premature paint failures, and to provide practical solutions to reduce the incidence of annoying problems.

1. Surface Preparation

Preparing Block and Concrete Construction

Poured concrete or precast concrete surfaces should cure for a minimum of 28 days, block construction for 30–60 days, before painting, depending upon prevailing climatic conditions. Before painting new concrete surfaces, the presence of form release agents and laitance deposits must be considered. In the event form oils or waxes are present, a thorough washing with V600 Corotech Oil & Grease emulsifier followed by sand-blasting will be necessary to ensure good adhesion.

Laitance is a weak slurry of water and cement that is brought to the surface by over-troweling of concrete floors, or by vibrators used to displace air in fresh concrete of either tilt-up or poured-in-place concrete construction. This weak cement slurry becomes brittle and lacks the cohesive strength of normal concrete. It may bridge airholes, which when coated can soon disintegrate and leave uncoated voids. It must be removed by wirebrushing or brush-blasting. Poured concrete floors must be etched using a solution of 1 part V620 Corotech Concrete Etch mixed with 3 parts water to dissolve the laitance and open the pores. This will allow the penetration of the coating. Caution: Wear rubber boots and gloves, work goggles, and protective clothing. After treatment, thoroughly flush the surface with clean water to remove all acid.

Preparing Exterior Wood Surfaces

Most adhesion failures on wood are caused by water or water vapor entrapped in the substrate. Pre-priming of wood surfaces before erection would substantially reduce paint adhesion failures. Caution: Smooth planed clapboards or siding must be sanded thoroughly to break the “mill glaze” to allow proper penetration and adhesion.

Wood siding, trim sash, framing, and similar surfaces that exhibit blistering, peeling, or scaling must be cleaned to a sound substrate by appropriate means. Exposed wood should be spot-primed with a Fresh Start exterior primer before applying an overall

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coat of primer. Medium to heavy chalk deposits must be removed. To most effectively perform the operation, the use of high pressure power wash is strongly recommended. If mildew is present, N318 Multi purpose Cleaner should be added to the water according to label instructions.

Chronic peeling and scaling may be overcome by venting clapboard siding with wedges, screened disks, or installation of an exhaust fan in the laundry room and bathrooms. Peeling around window and door frames can frequently be eliminated by caulking. Damp basements can also contribute to the absorption of water in wood substrate, which is frequently the result of poor drainage around the foundation.

Unweathered areas such as eaves, ceilings, and overhangs should be washed with a detergent solution and/or rinsed with a stream of water from a garden hose to remove salts that can interfere with adhesion.

Preparing Galvanized Metal Surfaces

Standard paint systems such as oil or alkyd-based coatings or primers should not be applied directly on new galvanized metal. When the oil comes in contact with the zinc they react, creating zinc soap which causes the coating to peel. New galvanized metal exposed to a mild interior or exterior environment may be successfully coated by first thoroughly cleaning the surface with rags saturated with xylol, then priming with P04 Acrylic Metal Primer. Topcoating may be accomplished with most conventional solvent and water-thinned coatings.

Weathered galvanized metal siding covered with “white rust” must be thoroughly cleaned by wirebrushing or sanding.

Preparing Aluminum Surfaces

Bare aluminum surfaces exposed to normal environments will eventually develop a dull, darkened appearance. In a heavy industrial or salt air environment, extensive pitting and surface corrosion will develop. Non-corroded surfaces should be abraded by rubbing with fine steel wool, then aggressively cleaned with xylene to remove deposits of dirt, grease, and steel wool dust. Pitted and corroded surfaces should be sanded, then wiped clean with xylene.

Surface Preparation & Application

2. Coating Selection

Staining and Discoloration of Exterior Coatings

The oxidation of metal, bleeding of soluble colored compounds from wood, corrosive fumes, and mildew cause staining or discoloration of exterior coatings. By the use of one of the following methods, removal of these stains can be accomplished:

Gas Discoloration

This problem is caused by the actions of sulfur-containing gasses commonly associated with chemical plants and oil refineries, sewage or polluted water, and industrial plants burning high sulfur coal. Such staining can be removed by washing the affected surfaces with a diluted solution of acetic acid* or with hydrogen peroxide*, followed with a clear water rinsing. However, the condition will return unless the sulfur source is removed or the affected surface is recoated with a fume resistant paint.

Copper Staining

After wetting the surface with water, apply a solution of approximately 2 oz. of sodium metasilicate* dissolved in a gallon of water. Wash with a sponge until stain disappears, then rinse the area with clean water.

Extractive Bleeding

This is a result of water-soluble compounds in redwood or cedar permeating the painted surfaces. It may also appear as a run-down under courses of clapboard or shingle construction. Pay special attention to siding courses and butt ends of shingles. The sealed surface may then be topcoated according to label instructions. Bleeding can also occur when exterior stains have been used, and is more evident where light colored stains have been applied. The problem can be resolved by applying a darker colored stain, or prime with O94 Fresh Start® Exterior Primer under solid color stains. Water leak stains on ceilings can be suppressed with a Benjamin Moore Fresh Start® interior/exterior primer before applying the finish coat.

Mildew

This is a fungus growth that can discolor painted surfaces in almost any climate. It is most active when humidity is high and temperatures warm. Dirt deposits are sometimes mistaken for mildew. If there is any question, apply a small amount of household bleach directly on the surface. Mildew will disappear, whereas dirt will not. To effectively decontaminate large surfaces, or difficult-to-reach areas, the use of high pressure power wash is strongly recommended. The sanitized surface should be coated as soon as feasible. Caution: When using mildewcide compounds, wear rubber gloves, work goggles, and protective clothing. Adequately protect surrounding areas with dropcloths.

3. Application

Application Factors

The Product Descriptions section contains information and data necessary for the selection of coatings for a variety of uses. In order to properly interpret this information, a discussion of some of the terms used is presented below:

Stirring Pigmented Coatings

Solvent-thinned and water-based coatings may separate or stratify while standing. It is important to thoroughly mix these coatings by hand or mechanical means before using. Proper blending assures uniform color and performance throughout the container. Inadequate blending will cause irregular hiding, lack of uniformity of gloss and color, early failure or poor serviceability. Five gallon containers should be agitated on a mechanical shaker, or blended with an electric drill blade. When latex coatings are mechanically agitated, they should be allowed to stand for an hour or until the air bubbles are no longer visible. Otherwise, air entrapment can cause pitting when applied. Ensure color uniformity by stirring contents thoroughly before and occasionally during use. Prior to application, have enough product boxed or mixed in one container to complete an entire section. This practice is important with standard as well as custom blended colors.

Humidity

In geographical areas where the humidity is normally low, coatings dry more rapidly. Low humidity can create application problems with waterborne coatings, particularly on porous, exterior masonry surfaces. This can be alleviated by dampening the surface with a garden hose, or when possible, by painting on the shaded side of the structure. Painting during periods of extreme high humidity should be avoided, as moisture-laden air will retard the evaporation of solvents in oil-base coatings, causing poor gloss uniformity. Excessive humidity can cause waterborne coating to sag on vertical surfaces, and drying may be prolonged until the humidity has lowered.

Temperature

High temperatures (90°F and above) decrease viscosity, particularly with solvent products. This can result in reduced hiding, runs, or sags. In the case of latex coatings, drying will accelerate, causing rapid loss of "wet edge", restricting leveling. Low temperatures and cold surfaces cause solvent-thinned paint to thicken, thus creating stiffer brushing and promoting heavier application. Drying time is also prolonged. These combined factors will cause runs, sags, wrinkling, and flashing. Applying latex paints at temperatures below 50°F for interior products, or 40° F for exterior products will not allow the latex resin particles to coalesce. This will result in poor adhesion and early failure. It is universally recommended that no coating, solvent or water-thinned, be applied at temperatures below those temperatures.

**It is important to observe the precautions listed on the containers of these compounds for safe handling and storage.*

Surface Preparation & Application

Thinning of Latex Coatings

All Benjamin Moore® latex coatings are recommended for application as packaged, unless directed otherwise on the label. However, under certain circumstances, the addition of water may be necessary. Limited thinning may also be appropriate when coating a very porous substrate. Excessive thinning can result in the product's loss of serviceability, durability, reduction of film integrity, reduced hiding, and early coating failure.

Thinning of Oil/Alkyd Base Coatings

In areas affected by VOC legislation, it is a violation of federal law to thin solvent based coatings.

4. Work Day Abuse

Toxic Metals and the Ecology

The products listed in this manual comply with all Federal, State, and Municipal toxicity regulations existing at the time of this writing. Benjamin Moore® coatings are formulated with preservatives and mildewcides that do not contain mercury. Lead in the form of pigments or driers has been eliminated from all products. The solvents purchased by Benjamin Moore & Co. for general use are specially formulated to conform with the most stringent air pollution regulations.

Flash Point

Most solvent thinned products listed in the manual fall within the "Combustible" classification of the Hazardous Substances Act and of Transportation and Labor regulations. A few quick drying products,

having lower flash points, are classified "Flammable". These bear appropriate warning labels to ensure that proper precautions can be taken in storage and use.

Spreading Rates

The figures given represent an average of what can be expected in normal use of the products applied by brush without thinning. Spread is markedly affected by various factors, including porosity of the surface, temperature, humidity, air circulation, degree of thinning (when necessary), and method of application. Texture of the surface has a very pronounced effect on spread; paint applied to rough stucco or cinder block may spread only half as far as it would on a smoother surface.

Drying Time

Specific primers are formulated for faster drying. Most finish coatings will not reach their maximum serviceability hardness for several days. A case in point is an enamel or clear coating subjected to abrasion or pressure, as with walking surfaces. Although the typical floor coating can be returned to light service within 16–24 hours, it should be allowed to "cure" for three days before being returned to normal traffic use. Allowing primers and undercoaters to dry hard before applying the finish coating will pay dividends. The finish coat will provide maximum serviceability, and the product will cure to its formulated true lustre and color; "flashing" will be eliminated, and its leveling characteristics will be enhanced.

WARNING! If you scrape, sand or remove old paint, you may release lead dust. **LEAD IS TOXIC. EXPOSURE TO LEAD DUST CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE.**

Wear a NIOSH-approved respirator to control lead exposure. Carefully clean up with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead.

Method B-1 Chemical Stripping

B-1A Conventional Coatings

Remove all conventional coating film by using water neutralized paint and varnish remover — apply using manufacturer's recommended methods.

B-1B Epoxy or Urethane Coatings

Remove all epoxy-urethane coatings using an industrial grade epoxy urethane remover applied at a spreading rate of 100 square feet per gallon. Allow this remover to remain on the surface for 15 minutes; at this point the surface must be scrubbed using a power scrubber with a wire brush attachment. Rinse freely with clean water and allow surface to dry. Repeat this operation until all film is removed from the surface.

Method B-2 Oil & Grease Removal

B-2A Emulsifier Cleaning (SSPC-SP1)

All areas to be painted should be cleaned thoroughly with a solution of one part Corotech® V600 Oil & Grease Emulsifier mixed with ten parts water. This cleaner emulsifies all of the oily substance converting it from oil to a soap and floats it out of the surface.

Thoroughly scrub all areas until surface appears clean, then rinse well with clean water. This process should be repeated to assure that there are no other oily contaminants remaining.

B-2B Volatile Solvent Cleaning

Clean all surfaces using clean rags and solvent and changing often. This is to ensure complete removal of oil or grease and to avoid diluting and transferring of the film. NOTE: Dispose of solvent saturated rags properly to avoid spontaneous combustion.

Method B-3 Hand Tool Cleaning (SSPC-SP-2)

B-3 Hand cleaning is very slow and more expensive than power tool cleaning to achieve the same degree of cleanliness. It is also the least acceptable of all abrasive cleaning methods. It will remove loose scale, rust and paint by hand brushing, sanding, scraping, or chipping. This method will not remove tightly bound scale or paint.

After the hand cleaning operation is performed, all loose material must be removed from the surface before painting. The most acceptable method is vacuuming; but blowing with clean, dry, oil-free air or brushing, while not desirable, are permissible.

Particular attention must be directed to each welded joint to remove all welding flux, slag and fume deposits, which will cause very early failure of a coating. All weld spatter should also be removed for the same reason.

Welding areas must be detergent washed after the hand cleaning operation is performed.

Method B-4 Power Tool Cleaning (SSPC-SP-3)

B-4A When blast cleaning is not practical, power tool cleaning is the next best method to use. The cleaning operation will be compromised, however, because this method is not as efficient. It will not remove all scale or paint — only loose scale, rust, paint, or other detrimental foreign matter.

Power cleaning equipment includes all types of power tools, such as brushes, sanders, grinders, chipping hammers, roto peen de-scalers and needle guns. Oil and grease must be removed by first solvent cleaning to prevent their becoming more widely spread or imbedded in the metal where they cannot be easily removed. Heavy rust scale is normally removed by hand before using power driven tools.

Non-sparking tools must be used whenever the danger of explosion is present, such as when explosive solvents are used nearby or when the area contains a high concentration of explosive dust.

Care must be exercised when using power tools to prevent excessive scoring and roughening of the surface. Burrs and ridges contribute to premature paint failure because the sharp edges are not protected by an adequate film thickness. Excessive power brushing will burnish steel and painted surfaces to which new application of paint will not adhere. Burnished surfaces must be sanded before applying any paint. Eye protection must be worn to prevent particles from injuring worker's eyes.

B-4B Complete B-4A and follow with J1. Blast Cleaning

Some surfaces which may be blast cleaned are structural steel, tanks, and steel plate. Surfaces which must not be blast cleaned are electrical panel boards, electric motors, and mechanical equipment with reciprocating parts, exposed bearings, or packings.

For maintenance painting, it is intended that all traces of previous coating be removed only when the new and old coatings are not compatible or when the old coating shows evidence of corrosion, peeling, excessive thickness, brittleness, blistering, checking, scaling, or general disintegration. The edges of sound paint around the areas to be recoated should be feathered so that the repaired surface will have a smooth appearance. A coating shall be judged sound if the blade of a dull putty knife cannot be inserted under it. All oil or grease must be removed prior to blast cleaning as the aggregate will continue to hammer the film into the surface.

Method B-5 Commercial Blast Cleaning (SSPC-SP-6-63) NACE 3

Generally considered adequate for most surfaces and for fast drying coatings. Requires removal of loose

scale, rust, and other contaminants. It is not always necessary to remove the coating on areas that are in good condition.

Method B-6 Brush Off Blast Cleaning (SSPC-SP-7-63) NACE 4

A low cost cleaning method, often used to clean up materials and remove temporary coatings applied for protection in transit or storage; also to remove old finishes that may be in bad condition. This specification is not used in severe environments.

Method B-7 Near-White Blast Cleaning (SSPC-SP-10-63T) NACE 2

A near-white blast cleaned surface is defined as one where all oil, grease, dirt, mill scale, rust, oxides, paint, or other foreign matter has been completely removed except for very light shadows or streaks that result from discoloration. At least 95% of each square inch shall be free of visible residues. This degree of blast can be used with some generic types of coatings in place of SP-5.

Method B-8 Power Tool Cleaning To Base Metal (SSPC-SP-11)

B8-1 This cleaning method represents a higher degree of cleaning than required in the current method SSPC-SP3. This method when viewed without magnification shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter. Typical surface cleaning power tools are impact and other profile producing power tools, non-woven abrasive wheels and discs, coated abrasive flap wheel or bands, rotary impact flap assembly, or needle guns.

B8-2 Complete B8-1 followed with J-1.

Method B-9 White Metal Blast Cleaning (SSPC-SP-5-63) NACE 1

Provides maximum surface preparation by removing all rust, mill scale, and contaminants. Cleaned areas should be primed in a matter of hours. Frequently used to remove very corrosive deposits from tank interiors, and, in some cases, where accessibility of area after installation is not possible. Usually required for extremely severe chemical exposure and/or immersion service.

Caution: The correct sandblast profile must be used for each designated coating system. Following are the most commonly used aggregates to achieve the correct profile for each.

Method B-10 High Pressure Water Blast

B-10A Power wash all surfaces to remove all oil, grease, salts and other contaminants by using low pressure up to 2000 PSI.

B-10B Remove all failing material leaving only tightly adhering coating with tapered edges. This can best be accomplished by using high pressure water, ranging between 3000 and 4000 PSI.

B-10C Remove all existing coatings to expose a sound clean substrate using high pressure water with sand injection. Use aggregate size B to produce a 0.5 to 1.5 mil profile.

B-10D Oily film can be removed with injection of oil and grease emulsifier.

B-10E Inhibitors may be injected which passivates the surface.

Method C Aluminum, Fiberglass, & Galvanized Steel

C-1 Remove all oil & grease following B2A and then lightly roughen the surface using Scotch Bright Pads. (3M)

Method D Wood

D-1 New or Bare Wood

Sand surface to remove all pencil marks, dirt, grade stamps, smudges, scratches, or spongy surface wood cells. Remove any oil spots, sap, or pitch by wiping with clean rags dipped in xylol thinner. (Note: Dispose of solvent saturated rags properly to avoid spontaneous combustion). Fill all cracks, holes, or voids using appropriate filling compound and sand smooth. Remove all dust and sanding residue by wiping with a tack cloth.

D-2 Recoat Wood

Remove all dirt, dust, grease, or oil by thoroughly washing with an appropriate detergent cleanser. Rinse off soap residue with clean water. Wax contaminants must be removed with a commercial dewaxer.

Any loose or flaking paint must be removed and edges feather sanded to produce a smooth, tightly adhering, uniform surface. Glossy surfaces must be dulled with sandpaper, steel wool, or a commercial de-glosser. Coatings containing strong solvents should be tested for coating compatibility on previously coated surfaces.

Surface Preparation Methods

Method E Concrete Pretreatment

Allow new concrete to cure for 28 days before etching and coating.

E-1 Acid Etching (Hydrochloric)

All surfaces to be coated should be etched with a solution of one part Corotech Concrete Etch V620 reduced with three parts water. Apply this to the floor at approximately 100 square feet per gallon. This will dissolve the latent alkalies and any other cement contaminants on the floor area. Also, it opens up the surface to permit the floor coating to penetrate into the floor surface. After thoroughly rinsing the floor, pick up the residue with a wet or dry commercial vacuum cleaner. If proper etch has been accomplished, the concrete will have a surface texture like #1 or #2 sandpaper.

It is important now to neutralize the floor by using a solution of 5% P83 mixed with 95% water. Pick up this residue solution with a wet or dry vacuum and dry up the floor completely.

E-2 Mechanical Abrasion

This type of preparation will completely remove all existing coatings plus the laitance that occurs on the concrete surface, and will create a surface profile which is desirable for coating application. Also, the surface remains dry which speeds up the coating application. Listed below are various types of equipment used in this cleaning method:

Blast Track — Shenandoah, GA
404-251-6778

Turbo Blast — N.S.P. Inc.
Comstock Pk., MI
616-784-5401

Roto Peen — 3M Cleaning
Products Div.
St. Paul, MN

Method G Drywall

G-1 New or Bare Drywall

Remove all dust generated from sanding the mud joints by conscientiously brooming the surface or using a dry vacuum. Any water stains or nail head stains should be sealed.

G-2 Recoat Drywall

Remove all dirt, dust, grease, or oil by thoroughly washing with an appropriate detergent cleanser. Rinse off soap residue with clean water. Always wash walls from the bottom working upward.

Any loose or flaking paint must be removed and edges feather sanded to produce a smooth, uniform surface. Glossy surfaces must be dulled with sandpaper, steel wool, or a commercial de-glosser. Coatings containing strong solvents should be tested for coating compatibility on previously coated surfaces.

Method H Plaster & Masonry

H-1 New Plaster & Masonry

New surfaces should be allowed to cure 28 days prior to applying a coating system. Any surface chalk residue must be removed by thoroughly scrubbing with a stiff bristled floor brush and clean water. Patch all voids and cracks using appropriate patching material. Check all surfaces for moisture using a moisture meter, prior to applying coating system.

H-2 Recoat Plaster & Concrete

Remove all dirt, dust, grease, or oil by thoroughly washing with an appropriate detergent cleanser. Rinse off soap residue with clean water. Always wash walls from the bottom working upward. Any loose or flaking paint must be removed and the edges feather sanded to produce a smooth, uniform surface. Glossy surfaces must be dulled with sandpaper, steel wool, or a commercial de-glosser. Coatings containing strong solvents should be tested for coating compatibility on previously coated surfaces.

Method J Metal Pretreatment (phosphoric acid)

J-1 Hard to clean surfaces or areas showing rust shall be treated by applying a coat of Corotech V180 Rust Pretreatment. Allow overnight for drying, then apply paint or primer as required. Where rust is extremely heavy, two coats of V180 may be needed to completely penetrate the rust and convert it to a stable iron complex. A dry, powdery surface which may develop after application of this product is completely normal. Wipe off any loose powder with rags and solvent before painting (Note: Dispose of solvent saturated rags properly to avoid spontaneous combustion). Clean spray equipment and brushes with water after use.