

MAINTENANCE GUIDEBOOK VI - PAINTING MAINTENANCE

CHAPTER THREE - PAINTS AND COATINGS

SECTION A THE COMPOSITION OF PAINTS

Most paints consist of binder, pigment, and solvent. The binder is the holding agent of the paint. A higher proportion of binder ensures better adhesion, a glossier finish, and more washable and weather-resistant paint.

The pigment is a powdery substance, which, when mixed with the binder and solvent, determines both the color and the paint's hiding power. A coating can be either pigmented (opaque or semi-transparent) or clear (no hiding pigments). Paint is always pigmented, by definition. Pigments protect the substrate from degradation due to sun and weather. Certain pigments also protect against corrosion. Some pigments can even give protection from fire by setting up a heat-resistant barrier.

Pigments can be subdivided into prime and filler pigments. Prime pigments are generally costly and something intrinsic to the mixture—for example, titanium dioxide (TiO₂), which is an excellent white hiding pigment. An example of a filler pigment would be calcium carbonate (caulk), which is inexpensive but adds only body to the paint.

The solvent keeps the paint liquid; when the solvent evaporates, the paint becomes thick, firm, and finally solid—a paint film is formed. If water is used as a solvent, the paint is called a "water-based paint." Another paint solvent is used in "oil-based paint." Neither of these terms is technically correct, but they differentiate between basic paint types, and give a clue to what solvent to use for thinning and clean-up. Paint thinners are sometime referred to as Volatile Organic Compounds (VOC), the amount of which is regulated by the EPA. Although the EPA's regulation concerns the manufacturer rather than the user, the applicator should avoid adding solvents to paints so as not to add to pollution.

The combination of resin and solvent is referred to as the vehicle. This is the liquid part of the paint, which is normally clear or transparent. In some forms, depending on the resin used, it is called varnish. The vehicle becomes paint when pigment is added.

The combination of resin and pigments is called the solids or total solids. It is the part of the paint that ends up on the surface being painted. The rest, the solvent, evaporates into the air. The amount of total solids in paint is generally expressed as a percentage. A paint has 50% solids if 50% of the paint remains on the surface and the other 50% evaporates. In general, water-based paints have lower total solids than their solvented counterparts, but generally less film build-up is required.

The terms "water-based paint" and "latex paint" are used interchangeably, although this is not technically correct. Even though the major solvent in latex paint is water, most of these products also contain VOCs, which as co-solvents are necessary parts of most water-based paints.

It is the resin that determines the product type and how it cures, while the solvent determines how the product dries. Curing and drying are not always related. Although a product may dry in a short time, it may not cure (reach its maximum hardness, toughness, and chemical resistance) for a much longer time. For example, many latexes dry (to the touch) in a few hours, but they take weeks to cure. During this curing time, the coating can be severely damaged by premature washing.

SECTION B GENERIC DESCRIPTIONS OF PAINTS AND COATINGS

The major classifications of cure types used in maintenance are:

- Oxidative—examples are alkyds and oils. They cure when oxygen from the air causes a chemical reaction called cross-linking. Generally this type of product needs a day to dry and a month to cure.
- Coalescent—examples are typical latexes, such as acrylics and PVAs. These cure when the water evaporates and the gelatinous beads that are left behind flow together and adhere to one another to form a film. These dry in a few hours and take several weeks to cure.
- Chemical Cure—examples are two-component epoxies, which cure by chemical reaction. Typically, two chemicals are mixed and cause an exothermic (heat-generating) reaction, which causes cross-linking of the resin molecules to form a solid film. These dry in several hours and cure in several weeks.
- Evaporative—examples are lacquers and shellac, which cure strictly by evaporation. When the solvent evaporates it leaves behind long strands of microscopic filaments which form a continuous film. Once the evaporating solvent leaves the film, it is fully cured. Only evaporative-curing coatings can be redissolved in their own solvent.

SECTION C TYPES AND USES OF PAINTS AND COATINGS

1. PRIMERS

The primer is the first coating applied directly to the substrate. It can be either oil-based or latex. There are many specialty primers on the market, often shellac-based or water-borne alkyds and acrylic-hybrid products, most often pigmented. They provide the bite (adhesion) into the substrate, and are designed for the penetration and sealing of it. Good painting procedure mandates that all wood be back-primed prior to installation. This is the application of primer to all sides and edges—including those which will not be exposed to view and will not receive a finish coat—to seal the wood and

reduce its shrinking and swelling due to humidity changes.

Ferrous-metal building components are usually factory-primed. A corrosion-resistant primer should be applied, after proper surface preparation, any time bare metal is exposed and rust or corrosion has formed.

A primer should be used, whenever a painted substrate is exposed, to spot-prime the substrate before repainting. Primers that have remained unfinished for an extended time should be reprimed before finishing.

2. SEALERS

Sealers can be latex, oil, water-borne, or one of the hybrids, clear or pigmented. If they incorporate the features of a primer, they are referred to as primer-sealers, as are most dry-wall primer-sealers. Most sealers, including those used for wood and masonry, are clear. Wood sealers prevent the drawing out of resins from the finish and into the substrate, leaving the wood unprotected.

Clear masonry sealers are sometimes used as a finish, but this is best limited to masonry used on the interior of a building. Masonry exposed to weather needs to be able to "breathe," or allow the small amount of water vapor it absorbs evaporate through its pores. If the water is kept inside the masonry by a sealer, it can expand during freezing weather, causing spalling of the masonry and subsequent water-penetration problems. Any sealer, including graffiti-resistant sealers, applied to masonry should be 90-95% permeable to water vapor to avoid this problem.

3. UNDERCOATERS

An undercoater is a foundation coat for enamels. It is generally oil-based because of oil's excellent penetration and adhesion capabilities. It may also contain strong solvents for better adhesion to previous coatings, and may be formulated for ease of sanding and smoothing.

4. MASONRY FILLERS

Masonry fillers have higher concentrations of pigmentation and are specifically formulated to fill pores and small voids in masonry. The binders range from small amounts of inexpensive binder to relatively high concentrations of catalyzed binders intended for use under high-performance coatings.

5. WOOD FILLERS

Wood fillers are used to fill the pores of open-grain wood. They are usually highly pigmented and can be either neutral (translucent) in color or colored to bring out the grain of wood. They are available in a wide variety of binders to be compatible with subsequent finish coats.

6. FINISH COATS

Finish coats are the final paint products applied over primers, sealers, or undercoaters. They should be durable, cleanable, safe, and aesthetically pleasing. Such paints are available in oil or latex, and in both interior and exterior grades. Use of a paint in a way or a location for which it was not intended can have unexpected consequences. For instance, paints for exterior use could contain built-in mildewcides which can be injurious to indoor house plants.

The following are generalizations about three basic classifications of finish coats.

a. Flat Finish

A flat finish is usually the easiest to apply and is the least affected by marginal surface preparation. Because it has good hiding ability, it can hide minor imperfections. It also has good reflectivity. A flat finish is the least durable of the finishes, is relatively easily damaged, and is difficult to maintain and keep clean.

b. Semi-gloss

A semi-gloss finish is generally used for painting kitchen and bathroom walls because it has good washability and stain resistance. There are numerous sheen levels available, depending on the manufacturer. Since semi-gloss paint amplifies surface imperfections, it requires more meticulous surface preparation than a flat finish.

c. Gloss

A gloss finish is the most durable, washable, and stain-resistant, and is therefore best for high-use areas. Although it has the best moisture tolerance and the most abrasion resistance, it is least tolerant of surface imperfections, amplifying them because of its gloss. Although it is often referred to as enamel, that term is not accurate.

7. FLOOR PAINTS

Floor paints available for use on wood, concrete, or metal are generally gloss, except for latexes, which are usually semi-gloss. Oil-based floor paints are frequently more durable than their latex counterparts. Because floors highlight surface flaws, proper surface preparation is extremely important. In areas subject to high abrasion or chemical exposure, such as in a boiler or maintenance room, two-component epoxies are recommended.

8. VARNISH

Varnish is a clear protective coating available in flat, semi-gloss, and gloss, and in a range of hardness and toughness. Its most common non-furniture use is for finishing and sealing interior unstained woodwork. Although it is available with ultraviolet-blocking agents, which offer some protection from the sun, its use is not recommended outdoors, where clear finishes break down more rapidly than stains and paints. Polyurethane fortification increases a varnish's durability.

9. STAINS

Stains are available in a wide variety of vehicles, solvents, resins, pigments, and dyes, both organic and inorganic. They can be transparent, semi-transparent, and opaque. There are interior and exterior formulations and some which are applicable to both exposures.

Exterior finishing stains, recommended for siding and other large flat areas, are available in both latex and oil formulations. Both the opaque and the semi-transparent are popular. They are brush-, pad-, or spray-applied, with little or no wiping and no additional finish coats. When two coats are used, the finish becomes opaque.

Interior stains, used to enhance the appearance of wood, are available in an even wider variety of generic types and colors, each with its advantages and disadvantages. The most popular are solvent-based wiping stains, transparent or semi-transparent, which require a finish. They are called wiping stains because excess material must be wiped off after application of the stain.

Wise users select a complete system from one manufacturer to be sure of the compatibility of all the elements of the system.

10. TEXTURE COATINGS

Texture coatings are usually latex and generally applied to surfaces with a hopper gun. These coatings cannot be washed, but can be repainted with latex applied with spray equipment or a long-nap roller.

SECTION D INTERIOR PAINTS AND COATINGS

Although manufacturers explain the intended uses of their products on the label, their use of painting-related terms is not consistent. For instance, the words "paints" and "coatings" are used interchangeably, although they don't mean the same thing. Likewise, the words "enamel" and "glossy finish" mean "flat wall enamels." Major interior paint and coating categories include:

- Acrylic Latex Flat Wall Paint;
- Alkyd Flat Wall Paint;
- Interior Semi-Gloss Latex Enamel;
- Wall and Trim Semi-Gloss Enamel;
- Alkyd Floor and Deck Enamel;
- Alkyd Gloss Wall and Trim Enamel;
- Polyester Epoxy;
- Acrylic Epoxy.

SECTION E EXTERIOR PAINTS AND COATINGS

Manufacturers' product designations are as follows:

- Oil-Based House Paint;
- Flat Latex House Paint;
- Alkyd Enamel Trim Colors;
- Semi-Gloss Latex House and Trim Paint;
- Gloss Oil Floor-and-Deck Enamel;
- Oil-Based Universal Primer;
- Hardboard Primer/Sealer;
- Ranch, Barn, and Roof Paint.

END OF CHAPTER THREE