



PAINT FAILURE



Paint on a surface provides protection against the deteriorating effects of the various elements. It prevents interior and exterior structural damages which normally would cost the average property owner millions of dollars in repairs each year.

NORMAL SURFACE DETERIORATION

Deterioration of paints on exterior surfaces normally proceeds through two stages. The first stage involves a change in appearance resulting from soiling, color change or flating and usually has no significant effect on the protective qualities of the paint.

Soiling, or dirt collection, is caused by rain washing dirt from roofs, gutters, or eaves, impurities in the air, pollen, salt residues and sap drippings from trees. Dirt pick-up is greater with softer paints such as those with a linseed oil base and is more visible on white and other light colored paints.

Many bright colors turn dull and fade with time. Paints that are tinted become paler. Since chalking of surfaces usually produces a white or very light chalk, the process tends to mask the color. Both exterior latex and enamel paints, which are hard coatings, fade more slowly in comparison to the less durable linseed oil paints.

Interior paints will normally change rather slowly in appearance with time. Usually this change in appearance has no significant effect on the protective properties of the paint.

The first stage changes of interior paints are somewhat similar to the changes occurring in exterior paints, but for different reasons. Soiling results from dust, smoke, fingerprints, fumes and residues. Gloss is lessened as a result of constant cleaning; also, some coatings lose gloss as they age. Color change occurs more slowly in areas which are covered.

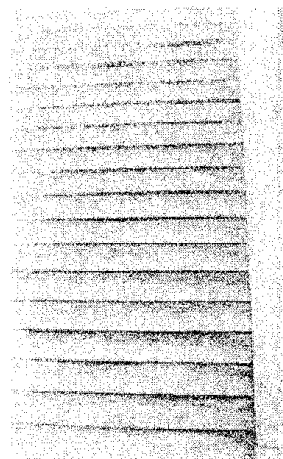


Figure 1-Soiling

repainting becomes necessary; however, before a new coating is applied, the loose powdery pigment should be removed by scrubbing, wire brushing, sanding the surface, or power washing.

- **Checking** and cracking result from stresses within the paint film and occur when the coating becomes hard and brittle. Checking, sometimes called alligatoring, appears as fine breaks in the top coat of the paint film. Checking can usually be remedied by a light sanding followed with light dusting to remove the loose powder and dirt from the surface prior to repainting.
- **Cracking** is an expanded form of checking resulting when the cracks, which penetrate inward to the wood, become larger and longer.
- **Flaking** is an outgrowth of cracking that allows moisture to penetrate the wood surface. This condition eventually results in small pieces of the paint film working loose and falling from the surface.
- **Peeling** is an expanded form of flaking in which large strips of paint can be easily removed. Neglect from the time that cracking, flaking and peeling occur can result in complete deterioration of the wood surface. This condition requires extensive and difficult preparation and sometimes costly repairs prior to recoating.

Cracking, flaking and peeling are among the most difficult of paint defects to repair. When relatively small areas show evidence of failure, the defective paint can be removed by scraping, wire brushing or sanding. When these conditions exhibit failure on 25 percent or more of the surface, complete removal of the failing area is recommended. This should be followed by "feathering out" the edges of the sound coating by sanding. The prepared area should be treated as a new wood surface when repainting.



Figure 3—Peeling

SPECIFIC FACTORS CAUSING PAINT FAILURE

Moisture, known as paint enemy No. 1, is the major cause most paint failures. There are three main sources of moisture that cause a coating to fail:

- exterior leaks,
- water vapor from the ground
- vapor-laden air from within the structure.

Exterior leaks usually can be prevented by constant observation and correction of certain defective construction details. Among these details are secure waterproofing of roofs, eaves and outside walls and proper flashing and gutter installation.

Water vapor penetration from underneath a structure can be prevented by adequate drainage, a well ventilated crawl space, screened vents in the foundation and installation of vapor barriers.

Moisture-laden air within the structure can be prevented by the installation of air vents and by providing natural and mechanical means of ventilation.

Successful preventatives for the numerous conditions described above are based on three things:

- proper surface preparation,
- selection of coatings and
- application of coatings.

The factors effecting these are the nature of the substrate, condition of the surface to be painted, type of exposure, type of coating to be applied and safety factors.

Durability of the coating system is of prime importance. No single coating system will perform satisfactorily on all surfaces and under all conditions; therefore, a knowledge of the various types of products available is essential.

OTHER FAILURES

Chalking is the result of "weathering" of the coating surface. Controlled chalking is sometimes desirable, since it is a self-cleaning process. Excessive chalking can only be remedied by extensive preparation, i.e., removing the loose powdery pigment by scrubbing, wire brushing, or sanding the surface, followed with the application of an appropriate primer.

Checking and cracking occur when a coating becomes hard and brittle. Checking appears as fine breaks in the top coat of the paint film. Cracking is an expanded form of checking resulting when the cracks become larger and longer, which extend to the metal substrate. These failures can be remedied by proper preparation of the metal substrate followed by the application of an anti-corrosive metal primer and careful selection of a compatible top coat.

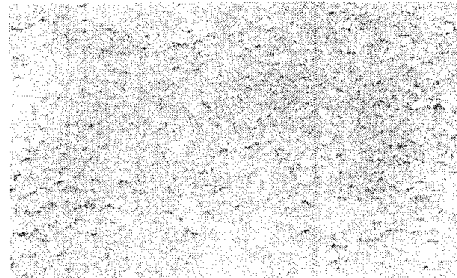


Figure 7-Checking and Cracking

Flaking is an outgrowth of cracking which results in small pieces of paint working loose and falling from the metal surface. Peeling is an expanded form of flaking where large strips of paint can be easily removed.

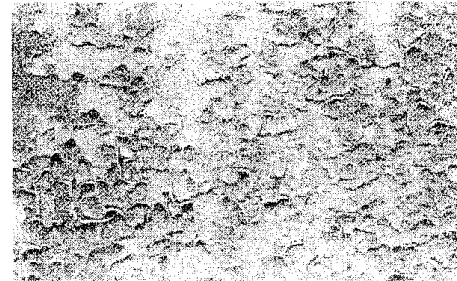


Figure 8-Flaking

To remedy flaking and peeling, defective paint should be removed from 6 to 12 inches beyond the failing area and the edges of the sound coating "feathered out" by sanding.



All masonry substrates are hard, contain lime and other soluble salts, and are porous.

The surface condition of new masonry varies from rough and porous to very smooth and glossy. Rough and porous masonry surfaces need little preparation and if adequately aged, provides good surface conditions for coating application. Very smooth masonry can create paint failure caused by lack of adhesion. This results in rapid flaking and peeling. To prevent this failure, the surface must be properly etched. Etching may include wire brushing, scraping, acid washing or sand blasting, depending upon the extent of the paint failure.

Fresh masonry surfaces are highly alkaline. Alkalinity can cause failure to an applied coating unless the coating is alkali resistant. Alkali resistant coatings include latex and rubber based paints. Paint manufacturers recommend at least three months of weathering before new masonry surfaces are coated.

All masonry surfaces contain water soluble salts which dissolve in moisture. The moisture is either carried through the substrate causing a chalky deposit to crystallize on the surface called efflorescence, or the moisture is trapped under the paint film and loss of adhesion may occur in spots. Moisture is carried through or trapped under the paint film, depending on the sealing qualities of the paint.

Efflorescence can be removed and corrected by wire brushing, followed by a washing with one of the following solutions:

- muriatic acid
- Trisodium Phosphate (TSP)
- Hydrochloric acid

Regardless of the solution used, a clean water rinse is the final step.

Improper curing (also called improper aging or improper weathering) of masonry surfaces results in uneven color and gloss of the coating. This condition is usually followed by "popping." Popping is caused by moisture penetrating the porous substrate which softens, swells, and pops the coating from the surface.



Figure 7-Checking and Cracking