



## Instructions and Specifications for Wood Decks Problems and Solutions

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The wood deck market in the United States has grown at a rate far exceeding that of other exterior wood structures during the last 10 years; dramatically increasing the demand for deck coatings. The quality of traditional wood deck construction material has gone down, new construction materials have entered the market and the demand for opaque deck coatings has increased considerably, placing extreme performance requirements on these thin finishes. These factors have led to a higher level of consumer dissatisfaction with deck finish product performance, although in recent years more consumers have been educated to the fact that decks need regular maintenance. I will address the general and specific reasons for deck finish problems and the practical solutions to obtain the best level of consumer satisfaction.

### REASONS FOR DECK FINISH PROBLEMS

#### 1. *Large increase in the number of decks*

Decks have always been known as the most difficult exterior wood surface to successfully coat. The horizontal nature of a deck exposes the wood to maximum degradation from the ultra violet (UV) rays of sun and acid rain and snow. Rain and snow stand on the surface for prolonged periods, intensifying these negative effects. Most decks are built close to the ground and are not coated on the underside allowing considerable moisture to be drawn into and through the wood by the heat of the sun. A deck faces severe abrasion from sandy or dirty foot traffic, furniture, toys, grills, etc. Decks have always had a higher percentage of problems than other exterior wood surfaces. Now, with many more decks—more problems.

#### 2. *Poorer quality deck construction materials*

In the past the vast majority of decks were built with pressure treated wood (PTW). Because this wood will not rot if properly treated, lower grades of wood, such as southern yellow pine, are being used for pressure treating. The CCA (chromated copper arsenate) pressure treatment solution will not penetrate higher-grade woods (cedar, redwood) sufficiently to pressure treat them. Additionally, “old growth” forest (200 years old or more) harvesting has been virtually eliminated in this country, leaving only “second growth” forests as a lumber source. Second growth forests are younger, smaller, fast growing hybrid trees containing more of the undesirable sapwood and knots, and less of the desirable heartwood. Milling procedures for these smaller trees produce mostly face grain boards, the most difficult to coat. Because of these reasons, the lumber supply in this country will remain at a lower quality standard.

Although protected from rot, PTW readily cracks, splits, and opens up along the grain. **Once a horizontal deck board has split, it is virtually impossible to keep it coated for any length of time.** Water and/or snow sits in these cracks and absorbs into the wood, swelling these already dimensionally unstable wood species. Adjacent coatings crack, break down, or delaminate. Additionally, “mill-glaze” and new wax-type pressure treatments present enormous adhesion and penetration barriers for coatings.

#### 3. *Mahogany and other new wood species used for deck construction*

Over the last several years we have seen the use of Mahogany and other similar woods (such as Port Orford White Cedar, Peroba de Campos and Ipe etc.) in exterior wood deck construction go from sporadic to an everyday option.

Mahogany is available in many species and can come from the Far East, Africa, The West Indies, South America, Central America, and Mexico. It is rich in natural oils, which makes it very resistant to decay. However this, along with the high density of the heartwood, makes Mahogany and other species very difficult woods for coatings “penetration” or adhesion. Ipe, the heartwood of the *Tabebuia* species is so dense that many times it will sink in water! It is virtually impenetrable by water or finishes. Additionally, Mahogany is very dimensionally unstable and friable in exterior exposures, which leads to warping, splitting, cracking and delamination of the grain. Remember, coatings cannot hold wood together under these circumstances!

Our Storm Stain Deck products can be used as successfully as anyone else’s can. However, anyone coating Mahogany or similar species of wood decks with our product does so **at their own risk and responsibility**.

4. ***The desire for opaque (solid) coatings***

Because of the poor appearance of many new deck woods and the uneven appearance of old decks with multiple coatings, consumers are demanding opaque or solid coatings for uniformity. When semi-transparent coatings weather, they erode in very tiny unseen particles. The difference in appearance between bare areas and still coated semi-transparent areas is not as dramatic. When opaque coatings erode, especially acrylics with far better film integrity, the film stays together and comes off in a very visible way. Additionally, the appearance difference is far more dramatic between bare areas and opaque or solid coatings.

**The perception is that the appearance of a semi-transparent deck that erodes to 50% bare wood after one season with no visible residue is acceptable, but a solid deck with only 5% erosion to bare wood and visible residue (peeling) is unacceptable, even after a longer period of time.**

Recoating is just as easy in either case; however, the recoating of the semi-transparent deck may be postponed because the appearance is acceptable, even though half of the deck is bare, unprotected wood.

5. ***Winter weather in the Northern U.S.A.***

Almost without exception, deck problems will occur where snow has lain on the decks for prolonged periods. Under benches, canopies, and protected areas of the same decks, the coatings are problem free. As the daytime sun melts some of the snow, the water falls to the deck boards, which are split, cracked, and open, as described above. Water sits in the cracks and absorbs into wood pores. At night it freezes and expands, widening the pores and cracks, providing larger cavities for the next days’ melting water. The cycle continues with tremendous expansion and contraction of the wood around the cracks. Hard and brittle oil base coatings crack and break down into small particles. Acrylic coatings with greater film integrity will delaminate (peel).

6. ***Spring acid shock***

“Spring acid shock” is an acid rain phenomenon that can affect all coatings on horizontal surfaces that collect and hold snow. According to Marie Frances Walk of the Acid Rain Monitoring Project at the University of Massachusetts at Amherst, “A lot of acid rain is stored in snow. The snow pack stays on top of the surface and the acid concentrates in there. When it melts, there is a big rush of acid. It’s called spring acid shock.” It was first discovered when the University’s monitoring project, which began taking acid rain measurements on 750 lakes and streams in 1983, found that there were huge fish kills occurring in early spring when the acid (low pH) waters from melting snow hit the streams, which weren’t able to neutralize the acid.

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Data collected in 1993 by the project has shown a 33% increase in acid rain effects since 1983. Changes are more dramatic in heavily industrialized, higher pollution areas.

Decks with cracks and deep grains are especially affected. The acidity level of the snow is such that, if it sat on an automobile all winter, it would eat through the automobile finish! Obviously, less sophisticated architectural coatings are more susceptible.

**7. *Weathering of Wood***

Contrary to common belief, exterior wood should not weather unless it is thoroughly prepared before staining or painting. Ultra violet rays of the sun break down lignin, (the natural glue of the wood) producing loose surface wood fibers in as little as 1-2 months. These fibers represent surface contamination that is as detrimental to adhesion as dirt, chalk, mold, mildew, or other loose material. Fibers must be removed before coating by thorough scrubbing with a stiff brush, proper pressure washing, or hand or mechanical abrasion. Sweeping or hosing down the surface is insufficient preparation.

**8. *Lack of proper preparation***

Unfortunately, most people do less to prepare their decks than they do to prepare their houses for painting or staining. As we know, decks have more severe demands placed on them, therefore preparation, the key to the success of any paint or stain, should be more thorough.

Mold, mildew, and fungus must be killed and removed. Dirt, dust, chalk, oxidized coatings, etc. must be removed. The surface should be fully rinsed with clean water after the use of a detergent, soap or mildew cleaner and allowed to dry thoroughly. Hard or glazed wood should be sanded and the residue removed. If a previous clear sealer, protector, preservative, or finish was applied, most must be totally weathered (1-2 years) and the residue removed by scrubbing or pressure washing, as above, before staining. **Before applying any product to a deck, press a piece of tape firmly onto the wood surface, pull the tape off and inspect the adhesive side. If any wood fibers or other contamination is seen, the preparation is insufficient.**

**9. *Excessive application of clear, toned or semi-transparent deck products***

This is certainly one area where more is not better. Horizontal deck surfaces do not have gravity to cause drips or runs if deck products are applied too thickly. The rule in exterior clear or semi-transparent finishes is to not build excessive film thickness.

Pigment is the only true, practical UV ray blocker. Since clears or semi-transparent are only lightly to partly pigmented, some UV rays will penetrate the coating and hit the wood surface. UV rays break down the lignin (natural glue) of the wood, causing the surface cellulose wood fibers to come loose resulting in delamination of excessive film thickness coatings. Most clear, toned and semi-transparent deck finishes perform best in one-coat applications.

**10. *Expectation level of the deck owner***

Unrealistically, many customers expect deck products to last three, four, five, or even more years. Once a coating is applied to a deck, it requires periodic maintenance. Many decks require yearly maintenance and recoating. With good weather, many decks can go two years before recoating, some even three years. However, at this point there is virtually no protective value left in any deck coating.

## PRACTICAL SOLUTIONS TO DECK STAIN PROBLEMS

*Recommendations for deck finishes, after proper and thorough preparation (coat all six sides of each board, if possible)*

### All new wood decks, as soon as possible

One Coat Storm Stain Penetrating Wood Stabilizer #20024 to stabilize the wood (recommended by Joint Coatings/Forest Products Committee Treated Wood Task Group).

### Clear Finish – Oil

One thin coat Storm Stain Clear Deck Finish and Waterproofing Sealer 20040.

### Toned Finish – Oil

One thin coat Storm Stain Hardwood Oil Finish and Waterproofing Sealer 20041, 42, 43.

### Semi-transparent finish (oil or latex)

One thin coat Storm Stain Alkyd/Linseed Oil Decking Stain 240XX or Storm Stain 100% Acrylic Latex Urethane Fortified Decking Stain 476XX.

### \*Solid (opaque)—latex only

One coat Storm Stain 100% Acrylic Solid Deck Finish 477XX thinned with one pint of water per gallon (bare wood only).

AND

One coat Storm Stain 100% Acrylic Solid Deck Finish 477XX full body.

**OR**

One coat All-Flor 530XX or Wear-All 528XX thinned with one pint water per gallon (bare wood only).

AND

One coat All-Flor 530XX or Wear-All full body.

These are the best systems available for coating wood decks.

*\* If an opaque look is desired, the customer must be informed that if the wood has split and/or snow sits on the deck, maintenance **will** be required in the Spring. Simply remove all loose product and apply a spot prime coat of the same product to the bare wood areas. Follow with a thin, even coat to the entire deck, if necessary, for uniformity.*

**The best time to finish or refinish a deck is in the spring so you can have the use of it for the season.** Once you have applied any coating to a wood deck, you should expect it to require yearly maintenance. If the winter weather is favorable, it may last two or more years. After several years it may require the use of one of the several “deck finish removers” on the market to get down to the bare wood surface and begin the cycle again.