

Cure Paint Failure with Clear Penetrating Epoxy Sealer TM

Invented and manufactured by

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How to get more life from paint on old, weathered wood

The old wood may look sound, but there are all-too-often mysterious failures. Even after cleaning off the loose wood, after fillers and repaint it is not unusual to see paint failures only one to three years later.

Why is this? If the paint was stuck well in the first place, why is the paint coming loose from the wood?

The wood is actually rotting away from under the paint. This is why paint comes loose from wood.

The usual restoration technology consists of cleaning off the obviously decayed areas so the wood looks sound, applying some filler or caulk to make it smooth, and then painting the prepared surface.

In many cases, wood actually rots faster after this kind of repair. Moisture accumulates under the filler, the wood rots and swells and pushes up the filler under the paint. It was not always this way.

Long ago, putty was used as filler, and the putty was made from lead carbonate [white lead] and linseed oil, and the paint itself contained lead carbonate pigment. Fungal cells can't grow in wood next to paints or fillers containing lead, a mild but effective fungicide. A few decades ago, the use of lead in architectural paints, fillers and other products was discontinued. Now, rot was inevitable, for air [there is air in wood], warmth and food were all present already. For the fungus that eats wood, this was a comfortable furnished house and a kitchen full of food. That's one thing that happened, here's another:

Lumber companies have developed faster growing trees, since perhaps 1950 or so. You can look at the end-grain and see

the annual growth rings spaced an eighth to a quarter-inch apart. Old-growth high-quality wood has its growth rings less than a thirty-second of an inch apart. Faster-grown wood has more porosity and less inherent rot resistance. For the fungus, this is a fine wine to accompany the dinner.

Here are two factors, each contributing to paint failure due to wood rotting sooner. Each by themselves might not have been so bad. But a third thing happened, and first I need to explain about how oil-base enamel paints are made.

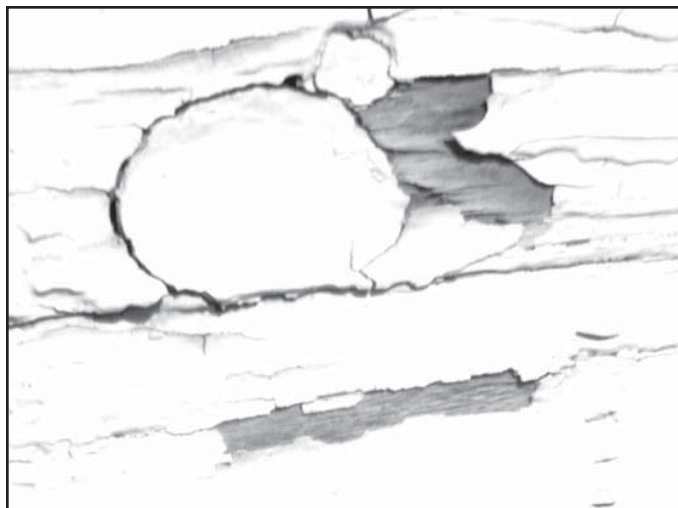
The paint resins were commonly linseed oil from the flax plant [or other similar oils], boiled to partly cure them. This gave a very flexible cured film, so as the wood naturally aged and warped and checked and even rotted a bit underneath, the paint could stretch, and resist cracking and tearing. Thus, the paint was still able to keep rainwater away from the wood, most of the time.

These boiled resins are more viscous [thicker], and require more solvent to thin them down to brushable or sprayable

consistency. This was not really an issue until some State governments felt it necessary to regulate [meaning force a reduction of] the solvent content of paints, called the Volatile Organic Content [V. O. C.].



Paint manufacturers had two solutions to the forced reduction of V.O.C. One was to use less flexible resins that were more liquid, and the resulting paint films were stiffer and did not stretch as much. On fast-grown wood these cracked sooner.



The other solution was to make a water-borne primer, but that just made the situation worse, as the tight bond of a flexible water-repellent resin with the wood was no longer there. In its place was an acrylic resin, an ester [which slowly decomposes in water] bonded not-very-well to damp wood, compared to an oilseed resin on dry wood. When the water finally diffused away under the paint film, there were now microscopic air gaps under that film, and in the years to come here was another factor that favored paint failing sooner.

Those three things all conspired to make wood rot more readily. But why does it rot in the first place?

There is a way that water gets under a painted surface and starts the rot process, even if the paint film is intact. Consider the morning dew. Do you know why it is there?

Everything radiates heat, depending on how hot it is. You have likely felt radiated heat from a campfire or a hot stove. The clouds above radiate downwards about as much heat as the surface of the earth radiates upwards. Thus, the clouds act as a heat mirror, keeping the surface of our planet from getting really cold at night. When there are no clouds overhead, the earth radiates its heat away to the night sky, which is about 450 degrees below zero. When the surface gets cold enough at night, moisture in the air condenses. That is dew. The temperature at which dew forms is called the Dew Point.

Wood contains over a thousand times as much moisture as air. When the outer building surface is cold enough for dew, water vapor similarly condenses on the back side of the paint film, and the wood becomes completely waterlogged in a microscopic layer just below the painted surface.

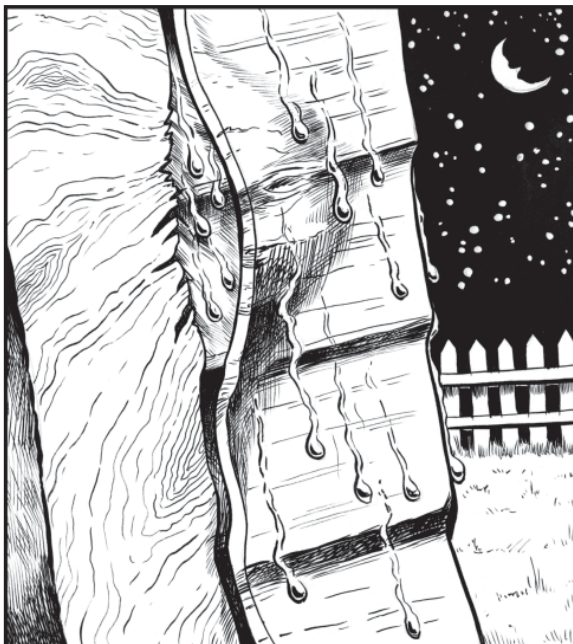
When the sun comes up in the morning, the outside dew evaporates, and a new day begins. Below the paint film, however, there now exists warm, damp wood. These are perfect conditions for fungal spores to hatch, grow, eat the wood, multiply rapidly and teach their young. Water vapor has a volume over a thousand times more than its liquid form, thus painted wood gets wet rapidly but dries out much more slowly. This gives time for fungal activity and decay of wood under the paint.

Day after day, the wood rots a little more. Eventually the paint cracks and peels. Now we have a problem; let's see what a solution might look like.

The three most important functions that must be performed by a wood primer are to glue down the topcoat, discourage rot at the wood surface beneath it, and glue itself to the wood. It is almost impossible for a waterborne [acrylic latex] primer to do this, since the wood fibers will immediately absorb the water first. This reduces the adhesion that may be obtained by any resin that dries on damp wood. As the water diffuses away from under the paint film, it leaves microscopic air voids. Fungal activity can start there. The modern oil-base primers don't stick to bare wood anywhere near as well as the old ones used to. What can we do that will work?

Smith & Co. makes a product, Clear Penetrating Epoxy Sealer™ [CPES™], which does on older, weathered wood [as well as new wood] similar things as the older oil-based primers did on old-growth high-quality wood. You can also buy it under the MultiWoodPrime™ label from some distributors. It is the same product, but labeled so a shopper in the store can see from the label that this product makes paint or varnish stick better and last longer. See www.multiwoodprime.com.

This solvent-borne high-quality impregnating primer can develop an excellent adhesive bond to the resins and fibers of wood. Chemical bonds with mechanical flexibility can be obtained since CPES is made with similar resins to the natural resins of wood which have similar chemical groups and can react together. This resin is water repellent, thus allowing water vapor to pass but discouraging the condensation of liquid water. The result is wood fibers bonded together and coated with a water-repellent resin not easily digestible by fungi. This naturally discourages fungal activity. The three essential reasons are that the fungi are deprived of an air space under the paint film, the wood moisture content under the paint film tends to be lower and



the available food supply is made less attractive. By removing these key elements necessary for fungal growth, and by actually gluing the paint to the wood, early failure of painted wood is reduced and many more years of paint life are commonly seen.

One measure of primer quality is adhesion despite wood expansion and contraction. The primer must form a film and glue the surface fibers together, and allow film elongation so that it can keep water out. Some commercially available oil-base primers actually dry to leave a gummy residue with no film integrity. You can test this for yourself.

Just paint your oil-base primer on a plastic bag, let it dry a few days or more, and then peel it off the bag [if you can] and see that it stretches a bit.

It has been my experience from observing the results of my painting-contractor customers over the last thirty years that solvent-borne primers which bond well to wood and have a water-repellent resin system [rather than acrylic esters] give the best long-term performance of any paint job on wood. Topcoats are a different matter, and there are many latex-acrylic formulations that give excellent performance.

- Steve Smith