



The Great Stain Shoot-Out

Twenty-two finishes were applied to six different types of wood decking—here's what we learned at the nine-month mark

by Kim and Linda Katwijk and Sheena Klien

Wood decks are exposed to extreme elements, the worst of which are rain and sunlight. When wood gets wet, it absorbs moisture and swells; then, when it dries out again, it shrinks. This movement eventually creates cracks and checks that allow damaging moisture to penetrate even deeper into the wood. Meanwhile, sunlight contains ultraviolet radiation that degrades the lignin holding the cellulose fibers on the wood's surface together, causing the surface to turn gray as the fibers detach. Weathering is more of a cosmetic problem than a structural one, but adding free water to a compromised wood surface creates an

environment where mold, mildew, and decay fungus can thrive and lead to rot.

Hence the need for an effective deck finish that protects wood from moisture and blocks damaging UV rays. Ideally, the finish should maintain a pleasing appearance, be easy to apply, and last at least one year before needing to be reapplied. Are there any stains that are up to the task?

In a quest to find out what works and what doesn't, we obtained 22 wood finishes and applied each one to six common examples of wood decking. We're calling it the Great Stain Shoot-Out, an ongoing test that will last at least two



Figure 1. Deck boards were divided into sections with masking tape, and finish was applied to each section per manufacturer recommendations. Stains were tested on (left to right) lodgepole pine, ACQ-treated southern yellow pine, micronized CA-treated southern yellow pine, ipe, western red cedar, and ACQ-treated hem-fir decking.

years as we allow time and the elements to do their worst.

The Setup

We started by contacting every coatings manufacturer we could think of that offers a finish specifically for wood decking. Seventeen of them responded and sent us samples—22 different finishes in all (see the chart on page 28).

Our testing began October 28, 2014. The decking that we applied the finishes to included green southern yellow pine (SYP) pressure-treated with micronized-copper azole; SYP treated with ACQ and allowed to air-dry for two weeks before being stained; seasoned ipe; seasoned and well-checked western red cedar from an old deck; seasoned and well-checked pressure-treated ACQ hem-fir from an old deck; and green lodgepole pine.

While most coatings manufacturers do not recommend applying a finish to unseasoned decking, contractors stain green boards all the time. We decided to include green lumber in our testing in order to simulate real-world conditions. Between the three new boards, the two old, checked boards, and the extremely dense ipe, we fully expected the stains to have a tough go.

All the boards started off as 16-footers, but were cut in half for ease of handling. We used blue painter's tape to divide the boards into twelve sections, applied the finishes, then moved the boards inside our open-air shop to dry (**Figure 1**).

Application

We applied each sample to each of the six boards following the manufacturer's application instructions. In cases where

the manufacturer specifically required two coats, we applied them. Then we allowed the finishes to dry for two weeks prior to putting them out in the weather. During the drying period, the temperature hovered between 58°F and 60°F during the day and 48°F and 50°F at night, well within the drying conditions specified by the manufacturers.

Some deck builders don't like to fuss over the finish, and they leave it up to the homeowner or a painting contractor. For others, applying the finish is an important final step in the total deck-building process. To give both groups an idea of what to expect, we carefully read and followed the application instructions for each sample and rated each one on a simple scale:

Easy = Send out a monkey with a paint brush at any time of the day and the

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	Penetration**	Moisture content (averaged)	Color retention*	Water beading
Wolman F&P Finish and Preservative (redwood)	Mid	13.4%	Good	Partial
Ready Seal (light oak)	Shallow	11.0%	Fair	None
Arborcoat Classic Translucent Oil Finish 326 (natural)	Mid	12.6%	Poor	Partial
Cutek Extreme (dark cedar)	Deep	10.5%	Good	Yes
Sun Frog Deck Sealer (transparent cedar)	Deep	11.6%	Fair	Yes
Penofin Blue Label Penetrating Oil Finish (western red cedar)	Shallow	11.9%	Poor	None
Sun Frog Eco Fin (transparent, cedar tone)	Film	12.7%	Poor	None
Defy Extreme Wood Stain (cedar tone)	Film	12.9%	Poor	None
Penofin Verde Penetrating Oil Finish (rosewood)	Shallow	14.7%	Poor	None
Sansin DEC Enviro Stain (nano Monterey red)	Film	11.7%	Good	None
TWP 115 Total Wood Preservative (honeytone)	Mid	11.8%	Good	None
Superdeck Transparent Stain and Sealer 1901 (cedar)	Mid	12.0%	Poor	None
Armstrong's Semi-transparent Wood Stain (cedar)	Mid	11.5%	Poor	Partial
Penofin Red Label Penetrating Oil Finish (transparent cedar)	Shallow	11.3%	Poor	Partial
Storm Systems Semi-transparent	Film	10.7%	Good	None
Olympic Elite Woodland Oil (mountain cedar)	Mid	9.9%	Good	Yes
Olympic Maximum Semi-transparent 716 (cedar natural tone)	Shallow	7.1%	Good	None
Flood CWF-UV Penetrating Wood Finish (cedar tone)	Film	11.0%	Good	None
Cabot Australian Timber Oil (natural)	Film	13.4%	Good	None
Penofin for Hardwoods (transparent, neutral tone)	Shallow	9.4%	Poor	None
Penofin Marine Oil Wood Finish	Shallow	9.6%	Poor	None
Gulf Synthetics Deck Revive Polymer Coating (white)	Film	15.4%	N/A	None

* Excludes ipe ** Finishes marked "film" showed no penetration, and instead formed a film over the liquid stain.

After 9 months, the best-looking stain across all six types of wood decking was Sansin Dec Enviro Stain. But Cutek Extreme performed almost as well, and was much easier to apply, making it the author's top choice at the midpoint of the testing.

deck will look great!

Medium = The finish needs to be applied at just the right temperature, with no direct sunlight; each board must be stained end-to-end in a continuous stroke to prevent lap marks.

Difficult = Even after doing all the tricky stuff, you need to wipe off the excess stain 20 minutes after application—which isn't difficult on a small sample, but is no fun on a large, wet deck.

Nine-Month Observations

Here on the west side of Washington state, we typically enjoy about 35 inches of rain per year. The precipitation is usually in the form of drizzle rather than rain, which keeps everything damp for extended periods of time—most residents would say nine to 10 months of the year. However, last winter turned out to be one of the driest we've ever seen, resulting in conditions that were drier

and sunnier during our testing period than we had expected.

On a hot day in July 2015, we gathered together to observe the deck finishes and to draw preliminary conclusions. We had assigned numbers rather than labels to the samples, so all observations were done blindly, without any of the observers knowing the brand of the finish.

Most of the contestants didn't fare particularly well at the nine-month mark

	Mold growth	Flakes, peels, or rubs off	Effort to apply	Effort to re-apply	Appearance after nine months (rank)	Cost per gallon	Website	Notes
	No	No	Medium	Medium	2nd	\$25	rustoleum.com	
	No	No	Easy	Easy		\$39	readyseal.com	
	Yes	No	Medium	Medium		\$42	benjaminmoore.com	
	No	No	Easy	Easy	3rd	\$110	cutekextreme.com	A top pick; provides 400 to 800 sf coverage per gallon
	No	No	Medium	Medium	5th	\$50	sunfrogwood sealers.com	
	No	Flakes	Medium	Easy		\$45	penofin.com	
	Yes	Rubs	Medium	Medium		\$55	sunfrogwood sealers.com	
	Yes	No	Medium	Medium		\$47	defywoodstain.com	
	Severe	Rubs	Medium	Easy		\$56	penofin.com	
	No	No	Medium	Medium	1st	\$69	sansin.com	Two coats required
	No	No	Difficult	Difficult		\$34	gemini-coatings.com	
	Yes	No	Medium	Medium		\$35	superdeck.com	Available in 100, 250, and 350 g/l VOC versions
	Yes	No	Easy	Easy		\$37	armclark.com	
	No	Rubs	Medium	Easy		\$48	penofin.com	Available in 100, 250, and 550 g/l VOC versions
	No	No	Easy	Easy		\$36	stormsystem.com	
	No	Rubs	Easy	Easy	4th	\$40	olympic.com	Available in 100 and 550 g/l VOC versions
	No	No	Easy	Easy		\$37	olympic.com	
	No	No*	Easy	Easy		\$20	flood.com	
	No	No*	Medium	Medium		\$38	cabotstain.com	Available in 275 and 550 g/l VOC versions
	Yes	No	Medium	Easy		\$49	penofin.com	Available in 100, 250, and 550 g/l VOC versions
	Yes	No	Medium	Easy		\$49	penofin.com	
	No	No	Medium	N/A		\$73	gulfsynthetics.com	Requires a separate primer, 1 qt./gallon latex paint for color, and two coats

in our testing, though there were a few notable exceptions. For example, our pick for the best-looking finish, Sansin Dec Enviro Stain, showed good color retention on all species, even on the new ACQ SYP and green lodgepole pine. The other finishes performed poorly on the green wood, a point that deck builders who apply finish to decking as soon as they've installed it should pay particular attention to. Both Wolman F&P

and Cutek Extreme also seemed to be performing quite well, with good color and no mold formation.

Weathering. While some of the finishes did a good job of retaining their original color, others turned noticeably gray, especially on the three pieces of green decking and the ipe. To see how durable the color was, we vigorously rubbed the stain samples with our thumbs. We found that we could rub some of the

finishes off, and in some cases, the finish even flaked off. As expected, none of the finishes performed particularly well on ipe.

Moisture resistance. During our testing, the boards were sprinkled by a short, light rain shower, which gave us a pretty good indication of how well the finishes repelled moisture. We observed the boards for a half-hour after the rain to see if water would bead up, or if it would

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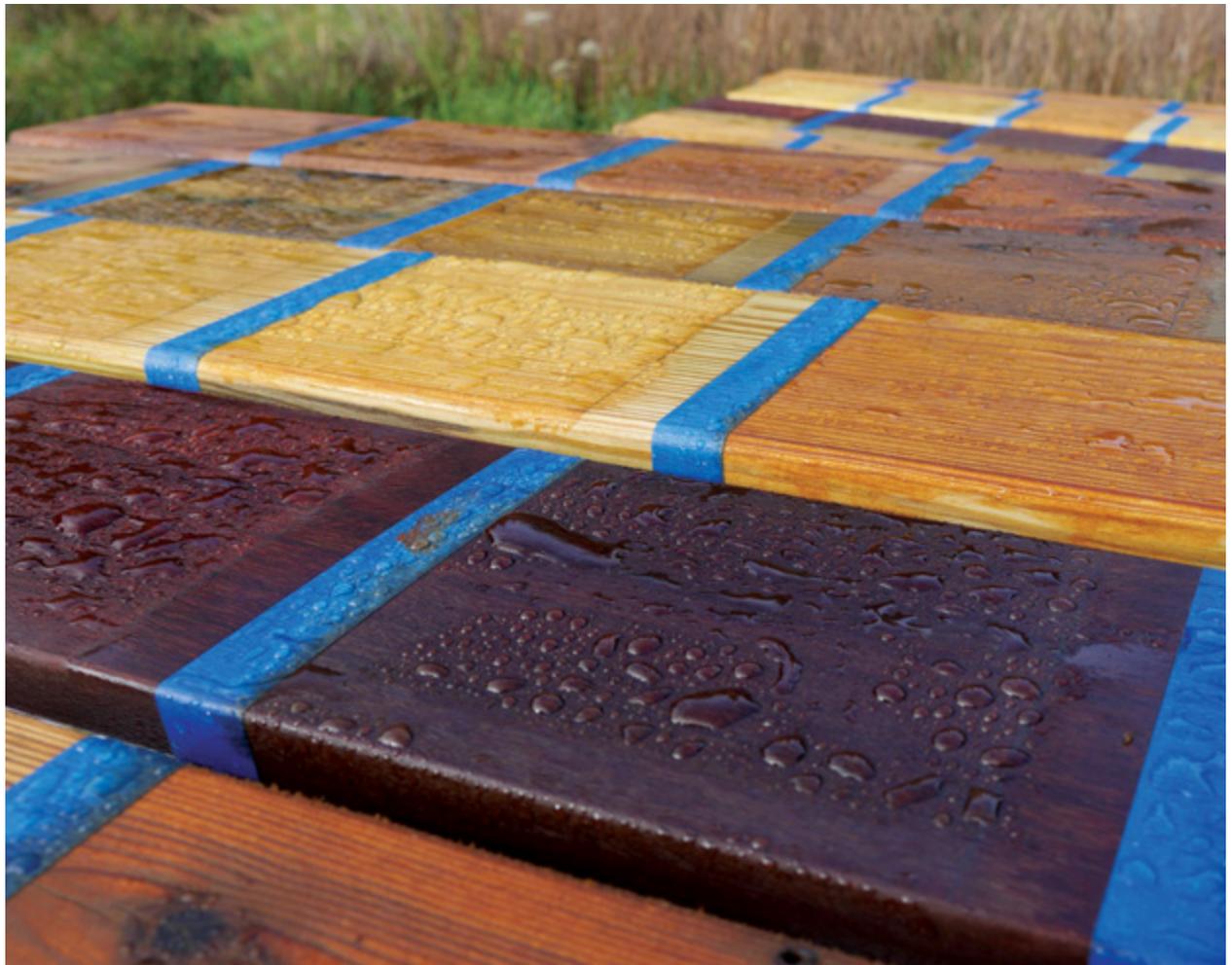


Figure 2. Some of the finishes did a good job of repelling moisture, even after nine months (top). Actual moisture content was tested (above) after soaking the boards for three days, then allowing them to dry for four hours. The results are noted on the chart on page 28.

just soak into the wood. Though unscientific, this seemed to demonstrate dramatically how well each finish was protecting the wood underneath it.

After our initial observations, we ran a sprinkler and exposed the boards to moisture continuously for 72 hours. We allowed the boards to dry for four hours, then tested moisture content with a General Tools MMD4E pin-type moisture meter (**Figure 2**). We took three readings for each stain on each board, then averaged the readings together. We also calculated an overall average from the readings of each stain on all of the species.

Curiously, our initial observations about water beading didn't seem to correlate to the measured moisture content.

Penetrating or Film-Forming?

To find out how deeply these finishes would penetrate wood, we drilled 1/2-inch-deep by 1 1/4-inch-diameter flat-bottomed holes with a Forstner bit into red-cedar and lodgepole pine boards (we knew that penetration would be minimal in any tropical hardwood decking, so we didn't test any ipe) (below left). Next, we poured a sample of each finish into the holes to a depth of 1/4 inch and let the samples stand for four weeks (bottom). Finally, we ripped the boards twice—once on each side of the hole—to give us a clear view of how far each finish penetrated into the surrounding wood (below right).

In some cases, the finish was completely absorbed into the wood. In others, the finish dried to form a film. And in some cases, the stain didn't penetrate at all; instead, a film formed over the top of the finish, leaving most of the liquid trapped beneath. We classified the samples according to what we observed, rating stain penetration as deep, mid, shallow, or film-forming.

In general, how deeply a finish penetrated the wood depended more on the species of wood than on whether the finish was oil- or water-based, or listed as a film-forming or penetrating stain. For example, in lodgepole pine, deep was 3/8 inch; in cedar, deep was more than 1 1/4 inches. Shallow in lodgepole pine was less than 1/8 inch; in cedar, it was 1/4 inch to 1/8 inch.



Nor did the presence (or absence) of beading indicate anything about the ability of the finish to retain color, as noted on the chart.

Mold. We also carefully visually examined each sample for mold and mildew. Some boards grew mold all over, some grew a few small spots, and some did not grow any mold at all. For example, while the old cedar was especially susceptible to growing mold, some stains, such as our top choice, Cutek, inhibited the mold from growing even on that board.

Difficulty of re-staining: Because of the high rate of failure, especially with the green wood samples, most of the test boards needed to be scuff-sanded before being refinished. Less than a handful needed only to be cleaned off for us to reapply the stain. Again, we rated the finishes according to our easy/medium/difficult scale.

Recommendations

We didn't find a miracle finish: one that was easy to apply and that still repelled moisture and mold and looked great at the nine-month mark in our testing. In fact, if you study the chart, you'll discover that failure is the norm, especially when a finish is applied to green decking. If you—or your clients—insist on applying a finish immediately after a deck is built, be cautious when choosing the finish, and follow the instructions exactly. Our testing shows that if a manufacturer doesn't recommend a finish for green wood, there's a good reason.

But we did find some finishes that we liked, and we do believe in second chances. So we dried and refinished all the boards, and a year from now, we'll reveal what we learn in Round 2 of the Great Stain Shoot-Out. ❖

Contributing editor Kim Katwijk is a deck builder in Olympia, Wash. He is being assisted in the testing by his wife, Linda, and his daughter, Sheena Klien, who also hosts the website deckcritic.com.