Wood Decks That Last

JOSH MILEY

You can get great results with treated decking if you select, install, and maintain it properly

by John Paulin

When a potential client says, "I don't want another wood deck," I don't need to ask why. I've heard enough stories from unhappy homeowners about checked, twisted, or cracked wood decking. But the problem actually isn't the wood. Poor manufacturing methods, inferior lumber and fasteners, faulty installation methods, and inadequate maintenance all contribute to wood decking's bad reputation. I've been successfully building wood decks for almost 25 years and have learned how to build them so that they last—and look good—for a long time.

Check Moisture Content

A basic understanding of wood is key to a quality installation (see Understanding Wood, page 23). For instance, in order to gap wood decking properly—to allow for drainage and prevent debris from collecting between boards—you need to know

about its moisture content (**Figure 1**). Sun exposure will dry wet decking, which will cause it to shrink; a moist environment may cause very dry decking to swell. How much the decking will shrink or swell after installation—and therefore, how much you will need to adjust the board spacing to accommodate that future movement—will depend on its initial moisture content, which can vary quite a lot. A good moisture meter is essential for measuring this.

Four methods—drip drying, kiln drying, air drying, and thermal modification—are used to dry decking lumber, and each results in a different moisture content. Drip-dried decking, the wettest, typically has 35% MC or more, while kiln-dried decking has between 15% and 19% MC. The moisture content of air-dried decking depends on how much moisture is in the local environment and how long the wood has had to adjust to it. Thermally modified decking is the driest, with around 7% or 8% MC.

Drip-dried decking. Wet decking is usually installed immediately after delivery, but I prefer to let it dry a little first. When possible, I have it delivered to the site a couple of weeks early and stack it off the ground, with 1/2-inch-thick stickers between each layer to allow air to move through the stack. I'll store it under a roof if I can; otherwise, I'll cover it with a tarp whenever wet weather is expected.

Prior to installation, I always check the moisture content of the lumber to determine how far to gap the decking; generally I've found that whether I install wet wood immediately or after a couple of weeks of drying, the gaps are about the same. If the lumber has been stacked for a long time, however, and is quite dry, I follow the gapping guidelines for kiln-dried or air-dried decking.

When installing wet wood decking on decks that will get full sun exposure for more than 25% of the day, I butt the boards tightly against each other, anticipating that they will shrink, creating the required gap. If the deck will be in total shade or will get sun exposure for less than 25% of the day, I gap the decking by 1/8 inch.

Kiln-dried decking. When decking has been kiln-dried, I make sure it stays dry. When I place an order with the treatment plant (which typically also does the kiln-drying), I request that the lumber be wrapped or tarped during shipment. If I purchase it from a lumberyard, I first check that it's been stored in a dry area; again I request that it be wrapped while being delivered to my jobsite. Once the material has been dropped off, I cover it with tarps.

For decks that get sun exposure 75% of the day, I gap kiln-dried decking 1/8 inch, knowing that the decking will shrink a little. If the deck is in the shade or will get less than 25% daily sun exposure, I gap the decking 3/16 inch.

Air-dried decking. It can take two or three months to properly air-dry wet lumber, even if it's stored under a roof, with air circulating over and through the bundles. Once it has been air-dried down to between 15% to 19% MC—or the same as the moisture in the air—I follow the same gapping process as for kiln-dried wood.

Thermally modified decking. This wood typically has a moisture content of around 7% to 8%, so it will rarely shrink, but it could swell. I follow the same gapping procedures as for kiln-dried wood.

I fasten down all decking, regardless of moisture content, that I've installed over the course of the day. Otherwise, it may swell or shrink slightly overnight, changing the size of the gap.

Figure 1. When wood decking is installed, the gaps between the deck boards should be sized according to their moisture content at the time of installation. Kiln-dried decking will require wider gaps than wet lumber.

Figure 2. End cuts and bolt holes in pressure-treated decking and framing should always be re-treated with a wood preservative prior to installation. Sealing the ends of the boards with a penetrating oil will help block moisture absorption through the end grain, which will limit cracking and checking.

Staging the Job

Sorting out the decking prior to installation speeds up construction, saves on material, and results in a better-looking job. Sorting the decking by length—full-length, 3/4-length, 1/2-length, and step boards (which need to be long enough for the treads)—makes it easy to determine in advance where the full-length boards will go, and where to use the other lengths. At the same time, I look for bad knots, gouges, and other imperfections.

If decking will be used for the rail cap, I set aside the very best boards for it. I typically ease the rail-cap edges and ends with a 1/2-inch-diameter round-over bit.

Installation

As a carpenter, I want the finished deck to look as good as possible, and as a contractor who does warranty work, I want the deck to last for years to come. I always re-treat sawn or drilled areas with a surface preservative containing 1% copper naphthenate or 2% zinc naphthenate before I install pressure-treated wood (**Figure 2).** This is especially important if the lumber is heartwood, which doesn't accept penetrating preservatives well. I also go a step further whenever it's practical, using a penetrating preservative, usually Outlast Q8 Log Oil (outlastcta.com), to seal the end grain of boards that won't be accessible after the deck is finished.

Cupping. Decking cups when the moisture content on the top surface is different than it is on the bottom. This is especially a problem for decks built in full sun (because the sun dries out the top surface) or low to the ground (where the bottom absorbs moisture from the ground). One way to minimize this problem is to mill flat-sawn or plain-sawn 5 1/2-inch-wide boards with a 1/8-inch crown. With vertical-grain decking, I recommend a 1/16-inch crown.

Peeling. While deck boards can cup no matter which way you install them, peeling often results when the decking is installed bark side down. This is because the pith side on the bottom surface is prone to shelling, especially in trees like southern pine that have dense latewood growth rings. Also, on the bark side of the board there is more sapwood—which accepts preservatives and stains more easily than heartwood. For these reasons, lumber should always be installed bark side (outer tree rings) out, or up, even though that face may not be the better-looking one (**Figures 3, 4**). As an old carpenter once told me, "The outside of the tree should face the weather."

Twisting, warping, cracking, checking, and splintering. These conditions result when moisture content changes too

Figure 3. Even though the bark side of this decking has a knot, it should still be installed facing toward the weather.

Figure 4. Some decking might initially look better with the bark side down, but eventually water can get under the grain and lift it, causing the board to peel.

quickly. Controlled drying of the decking prior to installation can help minimize these problems, particularly when the deck will have full sun exposure. Using wood that has been kiln dried after treatment will help, as will using vertical-grain (quarter-sawn) lumber. When building in hot temperatures or full sun exposure, we also often soak the deck down with water at the end of the day, and sometimes twice on really hot days. This cools the lumber and prevents it from drying out too quickly.

Debris. Debris that collects in gaps between decking can be hard to remove. Not only is it unattractive, but lingering debris also retains moisture and prevents the decking from drying. Milling the decking with a bevel on the edge and gapping the decking appropriately will allow most debris to pass through (see Custom Decking, page 24).

Understanding Wood

Heartwood is at the center of a log's cross-section and is usually darker in color than the surrounding sapwood. Heartwood is not "living" wood; its job is to support the tree. As a tree gets older and larger, storage cells in its center die. Various natural chemicals collect there, providing decay resistance—the degree of which depends on the tree's species, growth site, size, and age.

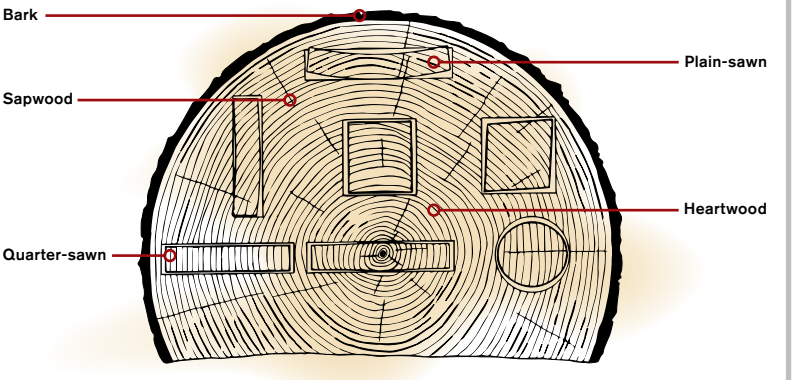
Sapwood is the part of the tree between the heartwood and the bark. Its main purpose is to transport water and nutrients through its cells from the roots to the leaves. Each year a new layer of wood, continuous from roots to crown, grows around the existing wood (and creates a new tree ring). Sapwood in lumber is susceptible to decay and needs treatment to endure in outdoor service.

Plain-sawn lumber (also called flat-sawn) comes from the most common method of sawing logs, which produces the widest boards with the least amount of waste. Plain-sawn boards have a cathedral-grain effect on their faces and a fairly flat arched pattern on the ends. The annual rings range in orientation from being almost parallel with the face of the board to being at an angle of 70 degrees.

Quarter-sawn lumber has a nice straight grain, or vertical grain, on the face. The grain pattern on the ends will range from running perpendicular to the face of the board to running at about 60 degrees from it. Quarter-sawing produces more waste than plain sawing, resulting in higher costs, but quarter-sawn lumber is more resistant to warping with changes in moisture content, and much more stable. In addition, it accepts stains better and more uniformly than plain-sawn lumber and is less prone to checking. If it were always available and in the homeowner's budget, all my decks would be built with quarter-sawn lumber.

To learn more about wood so you can make better decisions about lumber, see the following:

- "Inside Story of a Tree," wolmanizedwood.com/inside_story
- "Differences Between Heartwood and Sapwood," fpl.fs.fed.us/documnts/fplrn/fplrn147.pdf
- "Sawn Lumber," advantagelumber.com/sawn-lumber



Growth-ring orientation influences how lumber shrinks and distorts as it dries, as shown in this illustration from the Forest Products Laboratory.

Figure 5. To provide a stronger connection, the author often uses construction adhesive when installing T&G or shiplap porch flooring.

Figure 6. After installation, the author protects wood decking from rain and construction damage with a layer of plastic. The interlocking rubber mats provide additional impact protection and limit UV exposure.

Porch Flooring

There are a couple of extra steps I take for porch flooring that I usually do not take for deck floors. When installing tongue-and-groove or shiplap porch flooring, for example, I apply an exterior wood adhesive to the floor joists before fastening the boards, to help keep the flooring secured to the joist (**Figure 5**). I glue down only one board at a time, which allows me to use my board bender in case a board needs to be pulled tightly.

Once the porch flooring is installed, I cover it with plastic and rubber mats (**Figure 6**). The plastic keeps water off in the event of rain, to help prevent swelling, while the mats protect against the dents or scratches that could result from something being dropped on the flooring while the porch roof is being installed. The mats also shade the flooring from the sun—which could otherwise prematurely dry out the flooring and cause shrinkage and cupping, especially in the dead heat of summer—and they make for a nice cushion while we're working on the ceiling and roof.

Custom Decking

I don't care for the wood decking that's generally available in lumberyards. Dealers stock what they think will sell, and treating companies process the wood that dealers order. Good-looking, high-performance wood decking exists; it costs more and may take a little searching to find but is worth the expense and effort.

While I've tried some newer products, like thermally modified wood (with mixed results), now I buy my own lumber—high-grade, vertical-grain southern yellow pine—from a local high-end lumber mill. They truck it to a treatment plant, where the lumber is pressure-treated, milled to my specs with a crown and tapered sides, and kiln-dried (see photo, below). This way I know I'm getting what I want. I have happier clients, too, even though they pay slightly more for their decks.

Fasteners

Your choice of fastener is as important as—if not more important than—your decking selection. I never use small trim-head screws with wood decking that will be exposed to full sun, especially when installing ipe or any decking that hasn't been milled with a crown. Instead, I fasten the decking down with #10-diameter screws with larger heads, which helps prevent the decking from cupping (**Figure 7**). PAM (pamfast.com) and Muro (muro.com) make collated stainless steel screws for their fastening guns that require no pre-drilling even in dense exotic hardwoods like ipe.

We don't often use nails anymore, but when we do, we have had fairly good success with hot-dipped galvanized ring-shank nails or Duo-Fast's (duo-fastconstruction.com) 3¼-inch screw-shank nails. Screw-shank nails from other manufacturers don't seem to hold as well.

When installing our custom-milled shiplap porch flooring, we use 7/16-inch crown stainless steel staples (**Figure 8**). We shoot the 2½-inch-long staples into the grooves that are milled into the decking, so they're virtually invisible.

The only hidden fastener product that seems to work well with wood decking is Grabber's Deckmaster system (grabberman.com) (**Figure 9**). It's not the quickest one to install, but it has performed well on the several decks I've used it on. I do not use hidden biscuit systems with wood decking; I have seen too many failures, including on decks built with exotic hardwoods.

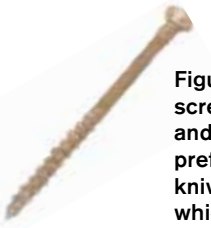


Figure 7. Wood decking installed with small trim-head screws will eventually start to cup, which lifts the decking and breaks the screws. The #10 deck screws the author prefers have a wide heads to hold the boards down. Cutting knives on the underside help countersink the screw heads, which prevents splitting.

Figure 8. A worker fastens the author's custom-milled shiplap porch flooring to the framing with 2½-inch-long stainless steel staples. This area will later be enclosed with a screened porch, so the joints between boards need to be tight to keep insects out.

Figure 9. When the deck design requires hidden fasteners, the author uses Grabber's Deckmaster brackets, which are available in both powder-coated (shown) and stainless steel versions.

Figure 10. Easing the edges and ends of the decking with a 1/2-inch-diameter round-over bit helps prevent splinters from forming, while a final sanding removes mill marks. As soon as possible after completion, the author will seal the deck with a penetrating stain or water-repellent finish.

Finishing Details

I usually cut decking so that it extends 1½ inches past the outer band, then rout the decking with a ½-inch-diameter round-over bit (**Figure 10**). Besides softening the edges and giving the deck a stylish look, routing the edges and ends of boards can prevent splintering as well. I also rout the edges and ends of my rail cap, splices in decking, bench seating, arbor support posts, and any other item that may come in contact with hands or feet.

Sanding often gets overlooked by deck builders, but it's very important. I keep an orbital sander and belt sander readily available by my saw horses to smooth out areas where it looks like a splinter is getting started or where the grain has raised, or to eliminate an ink mark or other imperfection. And if the decking or flooring cups a little at the end of the project, I sand the floor down before staining it.

Maintenance

We seal decks immediately upon completion, regardless of whether the wood is wet or kiln-dried. While the sealer may not hold up as long, this provides the wood with immediate protection from the elements. Unless it's raining or the temperature is too cold (below 50°F) to allow penetration of the product, I don't recommend waiting more than three to four weeks to seal wood decking.

For a natural finish, we use either Wolman's oil-based RainCoat clear water repellent or Amteco's TWP 200 clear stain. We also use TWP semi-transparent stains, but there are probably others that work just as well.

We avoid applying film-forming finishes to wet woods, nor will we warrant semi-transparent stains that have been applied to wet lumber.

The resealing process is different for each deck. It depends on how often the deck gets used, how much sun exposure it gets, and what the wood product is. Decks that are used more often and have full sun exposure require resealing more often than shaded decks. Exotic hardwoods also require frequent resealing because the density of the wood prevents the sealer from penetrating.

I offer a maintenance service program to all my customers. I recommend resealing after the first year, regardless of whether the deck has been finished with a clear or semi-transparent stain. With clear finishes, I then recommend re-coating every year; with semi-transparent stains, I recommend re-coating every other year. ❖

John Paulin owns Tailor Decks in Statham, Ga., which he founded in 1994.