

Cupping Callback

Q. I added an ipe deck onto a house located on the Ashley River in Charleston, S.C., using 3/4- x 6-inch ipe decking with a continuous groove to accommodate Eb-Ty fasteners. Our crew did not finish the deck; however, the homeowner did apply a deck sealant within a few months. At the one-year walk-through, the homeowners pointed out some gaps and cupping on the deck (see lower photo below). Most of the cupping and gaps are toward the center of the deck, where the boards receive the most sunlight. The areas of decking where the deck is partially shaded are essentially perfect. Do you have any idea why this deck would have gapped and cupped so badly, and what might be done to remedy the situation?

A. *Clayton DeKorne responds:* The gaps are caused by shrinkage of the deck boards, as the wood has dried in the sun to a lower moisture content (MC) than it had when the deck was installed. Wood tends to shrink most across the grain (tangential to the circular growth rings in wood, as shown in the illustration, page 24), so flat-sawn boards always shrink more in width than in length or thickness. The cupping occurred because the top side shrank while the bottom side very likely absorbed moisture from the damp earth beneath. Because the deck is low, there is little air circulation underneath it to dissipate moisture, so the relative humidity there is much higher than on the top side. As the boards take on moisture from this damp environment, the bottom face expands, while the top surface, which is baking in the sun, dries and shrinks. The result is the cupping you now see.

In the shaded areas of the deck, the difference in moisture content across the board is not as extreme, so the boards remain flat.

If you can gain any access to the underdeck, spread poly there to prevent the ground moisture from rising. Punch holes in the poly so the water doesn't pond in it. In addition, the sides of the deck should have some type of latticework to increase the air-



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With little air circulation below a low deck, the ipe on this South Carolina deck absorbed significant moisture from the ground, while the sunny side dried. The uneven shrinkage caused the boards to cup within a year. The fix is to spread poly below the deck to prevent moisture from rising and to add lattice along the sides of the deck and louver vents in the stair risers to promote air circulation.



Got a question?

We want to hear from you!

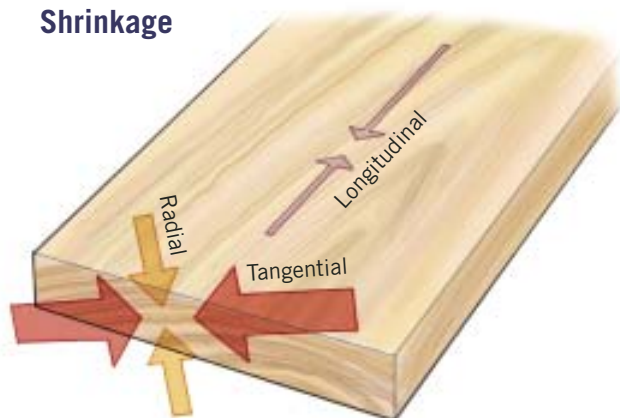
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Shrinkage



Wood shrinkage (and swelling) occurs in three directions:

Longitudinal shrinkage. The least change takes place longitudinally (parallel to the grain).

Radial shrinkage. Moderate change will occur perpendicular to the growth rings (from the center of the tree outward). In a flat-sawn board this will usually be reflected as a slight change in thickness.

Tangential shrinkage. The most change takes place along the line of the growth rings. At any set point, the change occurs along the tangent to the curve of the growth ring; therefore, flat-sawn boards tend to shrink most in width.

Even Shrinkage



Cupping

Top side: Dries and shrinks



Bottom side: Absorbs moisture and swells

When the moisture content is relatively equal on all sides, shrinkage or swelling typically occurs at an even rate (top). However, when a flat-sawn board dries out on the top but absorbs water on the bottom, cupping occurs (above).

CHUCK LOCKHART

flow and to vent the moisture. If possible, add some venting louvers in the stair risers as well.

Ipe is somewhat notorious for shrinkage, because a lot of it gets shipped with a fairly high moisture content. It's not unusual to get boards with 20% MC or higher from a hardwood distributor. For any future ipe decks you build, be sure to rip off any shrink-wrap that the boards might be bundled in, and sticker the boards on sawhorses or blocks to get them up off a slab or floor for several days before fastening them down. Avoid stacking the ipe over bare earth. Ipe is one of those woods you really should not install without being certain of the MC. Around 12% MC (to a maximum of 15% MC in humid climates) is what you'd like to see for exterior trim and deck applications in most areas of the United States.

It's worth noting that I do not think the Eb-Tys had anything to do with the problem. While Eb-Tys do force you to gap the boards initially (and therefore

you cannot lay them down tight when the MC is higher than the usual 12% equilibrium MC), I think it makes more sense to acclimate any wood decking prior to fastening. The idea that you can lay up wet boards and let them shrink to the correct gap (as some wood technologists propose) does not make sense to me. This would stress whatever type of fastener you have, and I don't think it's prudent to build that kind of stress into a deck by design. Some carpenters have written to us, arguing that the continuous groove along the boards (intended to speed up the installation of Eb-Tys) can trap blowing dirt and sand that will hold moisture and speed up the process of deterioration and rot. While this might be a long-term problem in some locations, not enough debris is likely to have accumulated in the few years to be of concern in this case.

Also, I don't think the finish the homeowner put on either helped or hurt the situation. True, ipe is one of

the few woods that can go unfinished without the wood significantly deteriorating over time. Instead, it weathers over a few years (depending on exposure to the sun) to a silver-gray. Not everyone likes this color, however. Many homeowners love the rich tone of new ipe, and as long as they are willing to maintain the finish every year or two to preserve that look, it's not a bad way to go. It's theoretically possible the finish might have trapped some of the rising moisture in the board, making the bottom side swell more, possibly increasing the distortion. However, I don't think that would be significant if you address the root cause — the moisture below the deck — in the first place. What you absolutely do *not* want to do, however, is to seal the bottom surface of the decking in an effort to fend off the absorption of moisture from below. This could create a trough out of the board that would trap rainwater, leading to reverse cupping or accelerated deterioration of the wood.