

QUESTION & ANSWER

Swelling Capstock Decking

Q I recently completed a deck with capstock composite decking, but now the ends of the decking are swelling. The customer is not happy. Why did this happen, and how can I prevent it from happening again?

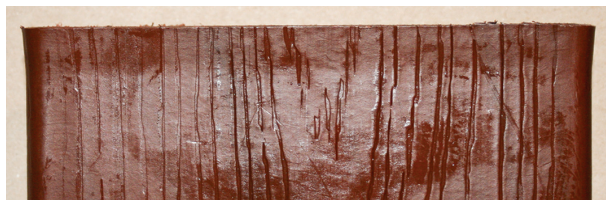
A Shane O'Neill, founder and chief technology officer of Compositology, a technical consulting firm focused on composite building products, responds: You are seeing in the field what I and others in the composite-decking manufacturing business have studied in accelerated and extreme laboratory experiments — the ends of capstock composite decking (which is extruded with a thin, tough layer of pure plastic surrounding a composite core or in some cases, covering only the top and sides of the board) flaring out. This is the same effect you see when a sheet of OSB has been left out in the rain — the edges swell. The problem is water. There is no way around it: Wood loves water. Water is so critical to a tree's existence that it makes up about half the weight of green wood. When wood has the chance to pick up water, it will always do so.

In decking, the problem lies with the nature of the composite. A large portion of the composite decking available on the market is a “wood-plastic composite” or WPC. As the name implies, these compounds are a mixture of wood fibers and various types of plastics (the most common being polyethylene). During the WPC manufacturing process, the wood is dried to a moisture content of nearly zero, then mixed with the plastic and other additives. This mixture is processed under high pressure, which compresses the hot, doughy mix and forms it into the product you see and use. The goal of this process is to fully coat the wood particles in plastic to keep out water and prevent decay.

Water has little effect on the plastic components. For example, even though some of the entirely-plastic cellular PVC decking products have the highest water absorption values



The ends on these capstock deck boards swelled because of water absorption in a lab environment.



for any decking, the boards do not show end flare or curling due to water uptake. This is because there is no wood there to swell. The issue with WPCs is that you can never truly cover all of the wood with plastic. It's a goal of the industry, but the process is imperfect.

Depending on composition and processing variables, the decking's resistance to water absorption will vary. The best WPCs currently on the market will pick up less than 3 percent moisture after being underwater for a month. Some products, however, will gain three or four times that amount. And when wood gets wet, it swells. In fact, the pressure developed by swelling wood is about 100 times higher than that of the air driving your pneumatic nailer, and about 10 times higher than the pressure used in making the WPC.

Before capstock decking, you really didn't see this flaring issue. That was simply because all six sides of a board would pick up water and the entire board would swell. Because the swelling was uniform, nobody noticed it unless it made the boards crown or popped the fasteners. Since then, the “capstock revolution” has taken over the composite-decking industry. Most of the major WPC manufacturers now carry a capstock (or coextruded) product.

With capstock decking, you have sealed a WPC — which wants to absorb water — in a protective wrapper. This offers many advantages, but the uncapped ends of the boards are free to pick up water just like before. Since only the ends of capstock decking take on much water, that's where the swelling happens. I've measured the water absorption rate through the ends of a capped WPC and found it to be more than six times higher than through the cap. Unfortunately, the real kicker is that once the decking flares, the flare never fully goes away. Even if you completely dry the deck, the swelling may go down some, but the board will never be the same.



In this Washington state deck, the ends of the capstock decking have swollen after installation.

QUESTION & ANSWER

Minimizing Water Absorption

Consider using capstock products with a lower wood content (manufacturers can provide this information for comparison), or use a traditional, uncapped WPC. As stated before, traditional (non-capped) WPCs do swell, but since they swell all over, the end flare is minimized or even eliminated. Those may not be options, though, as a homeowner may have his or her mind already set on a specific product or aesthetic.

When you do use capstock decking, end-seal the boards. I have a feeling that someone very soon will launch a product specifically meant to seal ends and cuts on capped WPCs. A conventional end sealant for drying lumber may be an option.

Also give the deck a chance to breathe. Think of the space under a deck like the attic of a house. If you don't put in soffit and peak ventilation, the inside of the attic turns into a hot box and problems ensue. A similar scenario happens underneath a deck, so keep the framing as high off the ground as possible and limit restrictions along the sides of the deck. For example, while it may look great to have full-length stairs with risers all around the deck, you have basically created a sealed vault of moisture. Cross-ventilation is your friend. Use lattice liberally to keep kids and animals out from underneath while allowing air to flow.

Prep the site. Make sure the area under the deck slopes away from the house with no big dips for water to pool in. With poor-draining soils like heavy clay, it may be easier to put a layer of fill down to raise the grade under the deck so it's higher there than at the deck's edges. Top the ground with a heavy poly vapor barrier, and cover that with crushed stone. This will help to shed water to the deck edges and keep groundwater from perking up under the deck.

Don't make the problem worse. Anything that can put water under a deck shouldn't be under a deck. Reroute dryer vents, sump-pump discharges, AC condenser drains, and gutter downspouts so that they don't put water under the deck. If the roof is pitched so that water falls in the direction of the deck, put a gutter up. ❖

GOT A QUESTION FOR OUR EXPERTS?

Send it to *Professional Deck Builder*, 186 Allen Brook Lane, Williston, VT 05495; or e-mail it to prodeck@hanleywood.com.