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Cupped Hardwood Floors. Why?

Cupping is the condition of the edges being higher than the center of the boards, providing a wavy, washboard appearance (photo below). The cupped plank, or strip, has a concave or dished appearance. Cupping is one of the two most common complaints in the hardwood flooring industry, yet least understood.



Cupping of wide boards, four inch to seven inch widths is characteristic to a degree. Boards are rectangle in shape and the tree is round, giving the board a natural tendency to be round, depending on the cut of the board. Wide width cupping is not normally seen in normal lighting but noticed in reflective light. Slight cupping of wide width planks is characteristic and not associated with this discussion.

The most common condition causing cupping is the sub-floor having a higher moisture content than the wood itself. The moisture moves from the sub-floor into the drier wood flooring, leaving the bottom higher in moisture content than the top of the board, causing the bottom to swell more than the top of the board. The top is not swelling at the same rate as the bottom, leaving the top smaller and cupped.

An example of this condition would be a new construction home without heat or air conditioning when the floor is installed. The condition of new construction buildings are generally wet after with the sub-floor high in moisture content. The installers arrive to install wood that is drier than the sub-floor. The heat, or air conditioning, is turned on after the installation, drawing the moisture from the sub-floor into the drier hardwood flooring resulting in the cupped condition.

Homes with crawl spaces require placement of a vapor barrier on the ground to stop the capillary water movement from the soil into the buildings sub-floor. After placement of the vapor barrier, the sub-floor must be given time to acclimate to the new conditions of the crawl space changed by placement of the vapor barrier. Failure to allow time for the building to acclimate to the new conditions may result in cupping due to the higher moisture content in the sub-floor compared to the wood flooring.

Professionals know the need for the crawl space vapor barrier, but novices are unaware, and do not as a general rule, take the time to investigate the site. The novice, or untrained installer, installs the wood flooring without acclimating to the conditions of the site, does not check sub-floor moisture content and installs the new flooring without a vapor barrier placed on the ground. Cupping could easily appear within days.

To prevent cupping, remember that the wood must contain the same, or nearly the same, moisture content of the sub-floor, the home must be acclimatized to In use conditions before and during the installation, and moisture barriers must be in place.

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03-14-2008, 07:17 PM

#1

honey

Posts: n/a

Wood floor cupping

We have a year-round vacation home near Bath, Maine in which we recently had a 24' x 20' pre-finished red oak floor installed. It is a ranch-style with a crawl space. We stay in the house several weekends a month throughout the year.

This past summer, we removed the carpet, revealing the plywood subfloor (2 layers) and our carpenter ordered the prefinished flooring and let it acclimate in our house for 2 weeks prior to installation. He put a felt layer on the plywood and then installed the flooring during the very dry July and August. Just 2 weeks later we noticed several boards cupping. A few weeks after that most of the boards had cupped. **The crawl space is often damp and in several spots water collects after rains and snow melts. When we bought the house in 2000, we layed down heavy duty polyethelene sheeting in the crawl space over dirt but not where the ledge is exposed (about 1/3 of the crawl space).**

The flooring company said the problem with the cupping floors was the damp crawl space. Our carpenter had an insulation specialist take a look. **He advised encapsulating the walls and ground with a vapor-tight 20 mil barrier, filling in the low spots, and installing a sump pump, in the crawl space.** This would cost us \$5600.

The carpenter has taken responsibility for the cupped flooring and is willing to replace the floor, if necessary.

We are hoping to avoid the cost of the encapsulation and/or the hassle of the floor replacement, if possible.

Was the felt layer a sufficient vapor barrier?

Is the encapsulation necessary?

Will the cupping reverse itself if the crawl space is encapsulated?

Should the flooring be replaced?

If so, would it need a different vapor barrier material to keep the floor from cupping?

Would a different vapor barrier mean encapsulation is unnecessary?

What would you advise in this situation? Thank you.

03-14-2008, 10:04 PM

#2



Re: Wood floor cupping

honey,

Join Date: Aug 2007
Posts: 733

First off.....excellent description with lots of pertinent info.

Second....but not really an answer to your question.... When flooring is properly acclimated, it has to be stickered so each piece is separated from its neighbor by 3/4" or so. Time consuming, but necessary. Simply stacking the boxes or wood in piles is not going to help acclimate the material. Don't know what your guy did, but that's how it is properly done.....with bare wood flooring. However.....trying to acclimate flooring that's already finished on one side can be a exercise in futility.....or frequently counterproductive. IOW, it can easily make trouble rather than help. Why? Because the finish on the one side will impede/slow the rate of moisture exchange..... while the other unfinished side will exchange quite freely. Cupping can (usually does) start immediately when this happens.

This point concerning finish on one side vs no finish on the other sideis very important in your situation.

Third.....no... felt paper is not really an adequate precaution when installing the flooring.... in a situation such as you describe. (Going solely on your description) Felt paper (15# or 30#) is technically a vapor retarder...not a true vapor barrier. Pink rosin paper would offer even less protection from vapor transmission. Common black felt paper (aka.....roofing felt) is frequently used as a "housewrap". It is used as such because it sheds water droplets which make it thru the siding materialbut also because it will allow the transmission of water vapor which might get inside a wall cavity. To repeat.....resists droplets, but allows vapor transmission. 30# allows less transmission than 15#...as you might well suspect.

What you really needed was a true vapor barrier, such as 6-mil or heavier plastic sheeting. Yes, the nails from installing the flooring would penetrate the plastic, but this is insignificant. The plastic would still be 99.99% effective as a vapor barrier. Very little moisture would find its way thru those tiny penetrations.

Consider that if this crawl space is as wet as you describe.....it has no doubt led to the cupping of your flooring. But also consider that it is wetting the plywood as well....and the other structural members. Not a good thing over the long haul. If your guy had placed 6 mil or better under the finish flooring...that would have done nothing to protect the structural members or the subfloor. You'd then find out that you had a serious problem when there was eventual structural failure.

What to do now? Good question. I like to think that there's a remedy that won't require removing and replacing the flooring. Hard to say from here though. (But do be grateful that you have a stand-up guy who is offering to make things right as they're hard to find these days.)

One approach that may be worth consideration is shooting the underside of the ply subfloor and the joists, etc.....with polyurethane foam (a closed cell product). Not only would it serve as a vapor barrier, but will also cause the floor to be warmer. Potential downsides are.....if you'd be burying electrical wiring junction boxes, etc.....and that all the excess moisture now contained in the subfloor and the underside of your finish flooring will have to escape thru the cracks between the individual flooring boards....and/or thru the finish on the flooring itself. That may be the fly in the ointment. Most pre-finished flooring these days comes with either a catalyzed finish or a ceramic finish. Both are highly resistant to the passage of vapor. It will pass thru, but at a slow rate. Therefore, it may take a while for the moisture content inside the boards to even out and the cupping to disappear.....and you will have to be patient.

On the other hand.... expecting things to get better without at least sealing off the wet dirt under the crawl is futile. It won't. Sealing that off *may* work and the boards *may* return to flat.....eventually, also. I kinda doubt that this approach will result in a flat floor any sooner than shooting the underside with foam. Might, might not.

Despite all your good and thorough info, there are still some questions/factors that can only or best.... be answered on site before the bestest, most hopeful remedy can be determined.

In the end, the boards may not return to dead flat no matter what remedy(s) you decide to try. Be patient to a fault (as much as a year after remedy perhaps), but don't be surprised is you to sand the floor and refinish to regain a truly flat floor.

(Is there any way to avoid the bulk of the under-crawl water problems by simply diverting water? If you lay plastic under there and the water enters on top of that plastic and pools there instead.....not much has been accomplished.)

Last edited by goldhillier : 03-14-2008 at 10:29 PM.

03-17-2008, 09:53 PM

#3

honey

Posts: n/a

Re: Wood floor cupping

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