Installation Expertise with Tim McAdoo

Engineered Wood Flooring

Typically, engineered wood flooring is made from layers or veneers of solid wood glued together to make a suitable flooring plank. The grain directions of the different veneers are typically rotated 90 degrees to the previous layer to reduce the overall width expansion/shrinkage of the engineered flooring. The wear surface or top veneer is most often thicker than the remaining or core veneers. As a performance issue, the thicker the top veneer the more engineered flooring performs similar to solid wood flooring. The purpose of all the layers is to restrain the dimensional change across the grain with an adjacent longitudinally oriented veneer. With a significant moisture change and a thick top layer, the unequal dimensional changes of the core and face can result in dramatic distortion such as cupping, crowning, and or bowing.

The expansion/shrinkage rate of engineered flooring is near 0.5% from green to oven dry for both width and length. With a 4% change in moisture, a 4" x 48" long board can shrink/expand about 1/32" in length and have a .003" change in width. Compared to a solid oak board would be .010” (<1/64”) in length and .059” (1/16”) in width. This 4% change in moisture can result in noticeable end gapping from shrinkage or end lift from expansion of engineered flooring.

Basically the product should be a consistent size and flat enough to be properly installed per instructions. There is a moisture content requirement of 5% to 9% at time of shipment in order for the flooring to perform in a typical indoor environment. There are exceptions for flooring that is specifically manufactured for arid climates or areas with generally high humidity.

What does this have to do with installation and performance of the flooring? Engineered flooring is marketed as being more suitable for environments with more adverse moisture conditions such as below grade slabs and basements fall into this category. With these applications the potential is in place for greater moisture change than solid flooring. The construction of the product makes it more stable than solid wood so the flooring should not react to the extent of solid wood where “extra” moisture is present. This is true for width of the product but may not be true for length. Extra moisture can result in end lift or extra drying can result in end gaps. Many instructions call for no acclimation because of the tight fit of the configuration so some moisture change is inevitable. Again, always make a moisture test on the installed product if you expect a significant gain in moisture; some slight spacing at ends may be necessary during installation. There is little you can do for a significant expected loss of moisture and related end gaps. *(Continued on page 2)*

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Another performance concern with engineered flooring is cracks in the top veneer. During the manufacture of the veneers cracks are inevitable. For rotary peeled veneers the actual cutting and flattening of the veneer will always result in latent veneer cracks or lathe checks. Even with sliced veneers, checks occur as the veneer is bent as the cutting knife slices the log. Fewer checks generally occur as the bending is not as severe as a peeled veneer. After drying, assembly, and finishing these checks are filled and are no longer an issue. They can be noticed later if environmental change occurs, particularly when related to shrinkage. Many cracks can also manifest themselves if the finish is not flexible enough to accommodate the movement during seasonal change or acclimation. In addition, if the construction is unbalanced, particularly as related to moisture, cracks can occur. The core stock is dryer than the face, as the face shrinks it is restrained by the core and fractures occur at the latent checks. Another cause of face checking is wet maintenance. When the flooring is wetted the water can soak into the latent cracks causing cyclical expansion and shrinkage as repeated exposure occurs. The finish breaks and the condition becomes worse. This almost always shows at the ends of the boards more than along edges, as the end grain open cells can potentially absorb more moisture.

Using a moisture meter on the flooring before installation can determine average moisture content and the expected changes during seasonal cycling. Too much change and the flooring will develop performance issues such as cupping, crowning, gapping, and cracking. In particular, cracking and cupping may occur in arid environmental situations as the flooring acclimates after installation. Many manufacturers recommend that the relative humidity be maintained between 35% and 55% for standard product to properly perform. This equates to 6.9% to 10.1% EMC, an average of 8.5%. In many areas of the country this environment cannot be maintained without installing humidification systems during winter heating.

Engineered flooring with an exotic face veneer can also have similar issues to the temperate North American hardwood species. Many are considered quite stable with a low percentage of shrinkage/expansion from green to oven dry. However, since they have a lower fiber saturation percentage, the expansion/shrinkage is more concentrated. For instance Brazilian Tigerwood shrinks approximately 8% from green to oven-dry, considered a low shrinkage factor. However, its reported fiber saturation is about 20%. This translates into more concentrated movement for each percentage change in moisture content compared to temperate hardwoods. In addition, exotic species, particularly South American woods, may have chemical inclusions within the wood fiber that can create discoloration or finish interruptions as the flooring cycles seasonally. White spots that develop in Brazilian cherry after light exposure are an example of this. The adhesive bond performance between the flooring and the substrate is dependent on the proper choice of adhesive, the proper application technique, and the proper installation of the flooring. The flooring contractor is generally responsible for these procedures. Clean, dry and flat is the mantra for the substrate. Proper spread rates and working times as the directions instruct are the guidelines for the adhesive. Any condition that is not properly followed can result in an improper bond and related noises and movement. (*Continued on page 3)*

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Engineered Wood Flooring Continued…

Taking moisture readings of the flooring to determine suitability for the area's geographic environmental conditions and advising the consumer if performance is in question can help with the final installation decision. Consider with caution if the flooring is not at the final projected acclimated condition and how it will perform during the acclimation adjustment. If a significant change is expected, not proceeding with the installation, changing the product, or changing the expected environment to a more suitable condition are options to consider. As stated in many instruction sheets, once the flooring is installed you have accepted all aspects of the product and site conditions as being correct. Any later issues can become your sole responsibility.

About Tim McAdoo:

Tim is a certified instructor for Armstrong, Avaire, Konecto and Starloc products an has been a member of the Armstrong Installation Training Team since 1984. Tim has highly developed installation skills and qualifications that have been combined over his 32 years in the floor covering industry. Tim is privy to all the latest innovations and techniques used in the installation of their products.

We are sure you will find your skills improved after attending one of his installation courses.

To view a complete list and register for one of Tim's installation trainings, click here on the QR or visit: http://www.jjhaines.com/for-customers/installation-training/

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