

Using Epoxy Adhesive For Outdoor Wood

System Three manufactures a number of waterproof epoxy adhesives for woodworking applications. These include T-88, G2, and GelMagic. When used indoors, and with the proper surface preparation, can withstand tremendous stress and strain. In most cases, the wood component itself will fail before the epoxy / wood bond line will.

However, using these same adhesives in outdoor applications can sometimes yield less than desired results. The thinking is since the epoxy is waterproof, then all is well. The other factor, often not considered, is the fact that wood is not waterproof. Wood acts like a sponge, soaking in both ambient moisture and that from rainfall. As it takes on moisture, the wood structure swells causing significant dimensional stresses to occur. In cases where the wood becomes saturated from rainfall, water can absorb deep into the wood and to the point where it contacts the adhesive / wood interface. The adhesive is not affected (because it's waterproof), but the wood is now undergoing a significant change from when it was originally bonded together. As the wood begins to dry, again tremendous stresses are now being applied to the joint. Many times, joints that were once tight are now open because the grain structure was crushed /compressed while expanding. As the moisture cycling process continues, further weakening of the glue bond occurs and in time, the joint can be completely compromised.

End grain exposed joints such as long grain to long grain laminations, are particularly vulnerable to moisture cycling. The exposed end grain acts like thousands of tiny straws, drawing moisture into the wood through the narrow capillaries. These same end grain exposed joints are also susceptible to rapid drying, which causes significant dimensional changes in a short period of time. These joints are often the first to break open.

In the end, the high strength, waterproof characteristics of the epoxy adhesive are no match for the stresses generated from wood movement induced by moisture cycling.

We have seen that some applications can be protected from moisture cycling. This process is outlined in our Clear Finishing Of Outdoor Wood white paper.

[Clear Finishing of Outdoor Wood](#)

If your application is not suitable for the Clear Finishing Of Outdoor Wood process, then it's advisable to consider using mechanical fasteners that will allow the wood component to move freely as it cycles moisture.