

MORE ABOUT WOOD TREATMENT: A comparison of HUO, PR-3, LP-2 & C-2 Standards
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While reviewing the articles for the July issue of Hawaii Pacific Architecture and the various references to the treatment standards HUO, PR-3, LP-2 and C-2, I realized that a rather subtle but important distinction needs to be pointed out.

Remember that "penetration" is the depth to which the preservative goes into the wood, that "retention" is the amount of preservative that remains in the wood after treatment, and that the "assay zone" is the depth of the area which is analyzed. Seems simple enough. The catch is that the relationship between the assay zone and the depth of penetration is sometimes confusing and even misleading.

The Hawaii-Use-Only (HUO) standard is defined as having a retention of 0.25 pcf in an assay zone of 0.2". The old AWPB LP-2 standard has a retention of 0.25 pcf, but in an assay zone of 0.6". AWPB C-2 for above-ground use of our common construction lumber species requires not only a retention of 0.25 pcf in a 0.6" assay zone, but in addition, a penetration of 0.4" in lumber less than 5" thick, 0.5" in lumber greater than 5" thick. What does this all really mean?

First, in order to simplify this discussion, I am going to refer to the retention test as if it were conducted on only one sample. Actually, that's not the way the tests are done. According to the AWPB standard M-2, which is the generally accepted methodology, 20 cores must be removed from 20 different pieces. Each sample must be taken from an area where the preservative penetration does not exceed 0.2", from an area containing only heartwood, with no sapwood. This means that the sample is taken to determine the worst condition, the area which is most difficult to treat. The 20 cores are then ground up, the preservative chemicals extracted and weighed, and compared to the volume of wood. But since it's difficult to visualize 20 samples at once, I'll describe the process as if it were analyzing only one piece of wood with one core sample.

In order to determine if a piece of lumber meets the rules of the HUO standard, a core sample 0.2" in diameter and 0.2" in depth is removed. For a piece of lumber to meet the LP-2 or C-2 standards, the same 0.2" diameter sample is taken, but to a depth of 0.6". Since the volume of wood in the C-2/LP-2 core sample is 3 times as large, the amount of preservative retained in the sample would have to have **3 times** as much as for the HUO. **In addition**, the C-2 standard requires that the preservative penetrate the wood to a depth of 0.4" whereas the HUO has no penetration requirement. That means that the HUO treated piece could have the entire quantity of preservative in the outer 1/16" and none in the rest of the 0.2" depth, and this is normally the case with Douglas fir. So while the HUO standard says that it will have 0.25 pcf of preservative in the outer 0.2" of the wood, it is **not** saying that the preservative will penetrate 0.2" into the wood, only that the average retention of that outer 0.2" will be 0.25 pcf.

The newly proposed PR-3 standard, which requires a 0.4" retention in a 0.2" assay zone, has some of the same problems as the HUO standard, but with some significant differences. For a piece of lumber to meet the PR-3 standard, the same 0.2" diameter sample is taken to the same 0.2" depth as for the HUO standard. The same basic rules apply: the preservative penetration at the sample must not exceed 0.2" and the sample must contain no sapwood. To meet the 0.4" pcf retention requirement, the sample would have to retain 60% more preservative than the HUO sample but still only about half (0.5333) of that in the C-2 or LP-2 samples, and

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with no minimum penetration requirements. Once again, the average retention can be achieved by loading up the outer fibers while providing no significant penetration. The greatest difference between the HUO standard and PR-3 is that PR-3 applies only to Hemlock or HemFir which has a much higher percentage of sapwood. All of the standards require 85 or 90% penetration of the sapwood, so the more sapwood the species contains, the better the treatment will be. With hemlock, a large percentage of each piece, particularly if the lumber in question is 2" or less thick, will be "thru-treated."

The "bottom line" is that the deeper the preservative penetrates into the wood, the more effective the treatment will be, assuming that the preservative is powerful enough to kill any termites that eat it. PR-3 should provide good protection because it uses CCA which is a good treating chemical, and is limited to Hemlock which accepts the preservative readily. C-2 provides good protection because it requires deep penetration. Whether or not the required depth of treatment can really be achieved is another question. HUO does none of these.

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