PPT Lumber:

Know What You Are Buying

by Frank Woeste, Ph.D., P.E. and Joe Loferski, Ph.D.

Most discussions about the transition to new preservative treatments have focused on the fact that the new treatments are more corrosive to metal fasteners in laboratory tests, and thus hot-dipped galvanized or stainless steel fasteners and connectors are recommended by the lumber industry. Another change that we have noticed, at least in our area of southwest Virginia, is the chemical retention levels. Specifying or buying preservative pressure treated lumber (PPT) is no longer as simple as looking for 0.25 or 0.40 on a stamp or tag.

Prior to 2004

For a couple of decades, the chemical used in our region to treat southern pine was CCA. In theory, two retention levels were available: 0.25 pcf (lbs of chemical per cubic foot of wood) for "Above Ground" use and 0.40 pcf for "Ground Contact." Note: The new term in AWPA standards for "Ground Contact" is "Soil and Freshwater Use."

The PPT southern pine lumber that was readily available in local supply stores for the past two decades was 0.40 (Ground Contact). Therefore, our opinions and observations on the excellent durability of PPT southern pine are based on Ground Contact chemical retentions. "Above Ground" treatments for dimension lumber were rarely seen in our area in the past although it was supposedly available. Now the new chemical preservatives are available in a variety of retention levels, some of which may be "code conforming" but may not yield the desired service life for critical structural components in a deck. Preservative retention levels and durability are related. For example, the Permanent Wood Foundation (PWF) System requires both a higher retention than "Ground Contact" (as well as other restrictions on heartwood content).

After January 2004

Since the switch to new chemicals for residential applications, the numbers on the tags stapled to the ends of boards are confusing without study. We now see: 0.1, 0.21, 0.25, 0.40 pcf. All pieces have the "greenish" color and generally have a high moisture content as before. The common treatments in our region are CA-B and ACQ, and these are sold side-by-side in the local lumber store. Why then do the tags show a range of retention levels, and what retentions are theoretically equivalent to the protection of the past with CCA?

The following table gives the American Wood-Preserver's Association (AWPA) required minimum retentions for dimension lumber with the "old" CCA and the new preservative chemicals.

Preservative	Above Ground (Minimum retention, pcf)	Ground Contact (Minimum Retention, pcf)
CCA	0.25	0.40
CA-B	0.10	0.21
ACQ-C (or D)	0.25	0.40

Note that required retentions for CA-B are about half of what is required for CCA and ACQ. At least in our area, almost all the dimension lumber we have purchased has been 0.10 CA-B, which is an "Above Ground" product. The image below shows two tags removed from pieces of 2-by PPT southern pine lumber. Careful examination shows that one piece was treated to 0.10 pcf CA-B (Above Ground), while the second piece was treated to 0.40 CCA-C (Ground Contact).

Thus, the new material in Above Ground applications may not have the same in-service performance levels as the CCA products simply because the CCA product used for decades was treated to a higher standard (Ground Contact). Not being aware of this subtle marketplace change, it might be easy to erroneously conclude a decade from now that the "new treatments aren't as good as the old CCA," when, in fact, they were treated to different levels.

As in the past with CCA, the AWPA standards require that the sapwood be treated to the specified level—not the heartwood. Heartwood is so impermeable that it just does not absorb the chemicals even under the high pressure of the treating process. Therefore, if a piece of lumber has a large amount of heartwood, that part of the wood is untreated and is prone to decay. Heartwood decay can compromise the load bearing capacity of critical structural elements such as ledgers, joists, beams, stair stringers, and guardrail elements. Cutting lumber may also expose untreated wood. Figure 2 shows a cross-section of a piece of 5/4x6 PPT southern pine decking. It is included here to illustrate how the sapwood can be fully penetrated with preservative (greenish area), yet the heartwood (yellowish area) is mostly untreated. In general, the wood industry recommends that cut-ends be treated with a field-applied preservative.

Figure 1. Example tags from CCA and CA-B treated lumber which are both greenish in color, but the important issue for contractors and owners is level of protection against decay. It is based on the specific chemical used and minimum retention per AWPA standards. The chemical and retention can be found in small print on the quality tag attached to the end of each piece.

Figure 2. The heartwood section of this 5/4x6 southern pine deck board is clearly indicated by the color differentiation. The heartwood section containing the pith is mostly untreated as evidenced by the yellowish pine color. The sapwood section is well treated with the greenish preservative.

Paperwork Should Reflect What You're Using

Some local building code jurisdictions have words such as, "All deck lumber shall be southern pine pressure treated to 0.40 lbs/ft3." This specification no longer has a consistent meaning, as the retentions are now product-specific. Our suggestion to some local jurisdictions is to use the words "Above Ground" or "Ground Contact." It is important for deck designers, contractors, and building officials to adopt language that clearly defines what level of treatment is intended for the different parts of a deck. With respect to posts embedded in the ground, we recommend posts be treated to 0.60 ACQ or 0.31 CA-B per AWPA Standards for Post (Building Construction-Sawn). The "cut end" should not be placed in the ground as it will expose the untreated heartwood.

Lastly, we believe that it is important to document and communicate to the owner what lumber species and retention levels will be used in their project. For example, 2x6 deck boards and 2x10 joists will be southern pine treated to 0.21 pcf CA-B, or 0.40 ACQ pcf, both "Ground Contact."

The previous example using 2x6 southern pine deck boards was not used by accident. Recently, we looked at 16-ft. long decking/lumber prices in a "big box." A brand of 5/4x6 wood-plastic-composite was $25.97, 5/4 Premium R.E.D. Mixed Southern Pine was $15.97, and 2x6 PPT No.2 Prime Southern Pine was $11.97. Builders should consider 2x6 PPT "Prime" southern pine for decking as a "customer option" since they are:

- about twice as strong as a 5/4 R.E.D. southern pine deck board,
- deflect about 70 percent less under load than a 5/4 board, and
- will last longer than 5/4 board, based on our experience. Minimal maintenance (water repellant once per year or every two years) is recommended for both products.

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Conclusion

In this article, we have only discussed two general classes of preservative treatment chemicals. AWPA standards give required retentions levels for various applications and preservative chemicals. A summary can be downloaded from Southern Pine Council™ at http://southernpine.com/awpatable2_03.pdf

We urge contractors to study the tags when purchasing lumber to make sure they are getting the "Ground Contact" product or the "Above Ground" product they desire. Deck beams, ledgers, and deck boards treated to higher retention levels should last longer in service. It would be a good practice to save a couple of end tags from the different deck components and place them in the permanent file for the project. The end tags, and possibly the invoice, are the only means of proof available for the deck contractor that the lumber or post products were treated to AWPA standards and inspected by an approved third party inspection agency. IRC (2000), Section R323.2 requires PPT lumber and plywood as required by R323.1 to "bear the quality mark of an approved inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been approved by an accreditation body that complies with the requirements of the American Lumber Standard Committee (ALSC) treated wood program." The ALSC maintains an up-to-date list of all accredited third party inspection agencies for treated wood products in the U.S. and Canada (www.alsc.org/greenbook%20collection/TreatedWood_Facsimile.pdf).

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