

# Treated Wood for Ground Contact, Minus the Toxic Pesticides

Accoya, now code-approved for fungus and termite resistance, relies on acetylation as a benign alternative to conventional pressure-treated wood.

by [Paula Melton](#)

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The creators of this life-size model of Noah's Ark claim it is the largest timber structure in the world. The building is clad in unfinished Accoya.

Photo: Answers in GenesisConnect occupants with nature: great idea, but who asked for the toxic fallout?

Insect- and rot-resistant boardwalk sleepers, decking, and exterior structural members are commonly needed to provide low-impact access to the outdoors. But there's really no perfect solution, especially given the need for products that are code-rated for ground contact. You end up choosing between wood treated with toxic metals and biocides on the one hand, or aesthetically and environmentally iffy plastics on the other (see [The Great Eight: High-Impact Material Choices](#)). But there may finally be a dark horse racing up to take their place.

*Acetylated wood*—treated with what amounts to really, really strong vinegar—has been on the market as a decking for a while now. Until recently, though, it wasn't code-approved for ground contact in the U.S and Canada. That changed in October 2015 when [Accoya got the long-awaited nod](#) from the International Code Council (ICC).

## Very durable, mostly harmless

Accoya, produced by London-based Accsys Technologies, is available as decking, door and window framing, exterior cladding, and exterior structural members. Made of Forest Stewardship Council-certified (FSC) radiata pine sourced from New Zealand, the product is manufactured in the Netherlands and distributed globally. (*Pinus radiata* is an endangered species in its native habitat but not in New Zealand, where it's been cultivated since the early 20<sup>th</sup> century.)

Unlike conventional pressure treatments, which infuse the wood with chemicals but don't chemically change the wood, acetylation actually alters the chemistry of the wood's cell walls. The raw material is immersed in acetic anhydride (a strong, vinegar-like substance that gives the finished product a lingering vinegary odor) in a pressurized reactor. The chemical's primary effect, [according to researchers at the U.S. Department of Agriculture Forest Products Lab](#), is to drastically reduce the wood's ability to absorb water.

With its low moisture content, acetylated wood cannot support the growth of organisms of decay. Conventional treatments accomplish this with copper, which is toxic to aquatic life, and proprietary fungicides—both of which gradually leach out into nearby soil and water. Accoya contains no formulated biocides and doesn't actually appear to kill insects like termites and carpenter ants, though it does deter these pests (more on this below). The product is [certified Cradle to Cradle \(C2C\) Gold](#), but has a Platinum rating for material health impacts.

According to John Alexander, director of sales and head of product development at Accsys, these effects are permanent and evenly distributed all the way through the cross section. "There is no acetyl leaching from the wood," he told BuildingGreen. "This has been proven in the laboratory and demonstrated in real life with 20-year-old canal wall linings maintaining the original acetyl level and resisting rot." The company backs its claims: it offers a 25-year warranty for Accoya that's subjected to permanent freshwater or ground contact, and a 50-year warranty when it's used in other applications.

## Field notes on performance and termites

BuildingGreen spoke with Dan Taylor, outside sales account manager at Snavelly Forest Products, a North Carolina-based distributor of Accoya and other wood products. "We're real excited about it" due to its low toxicity and high performance, he said. "It is very, very stable. There is nothing else like it." Taylor added that radiata pine has always been a favorite at the company because it's easy to mill (Snavelly used to import and distribute it, untreated, to high-end furniture makers).

The company also still distributes the last of its remaining stock of Perennial, an acetylated decking product that [Eastman Chemical Company stopped producing in 2014](#). Perennial is a great workhorse for everyday use, Taylor said, but Accsys "does a much better job in the acetylation process; it's a much friendlier product to use."

Since Snavelly is located in the southern U.S., we asked Taylor about his customers' experiences with acetylated wood and termites. "We've never seen any jobs where termites have attacked it," Taylor said. "Termites will chew on it, but the percentage of wood fiber that they actually take away is about 2%. They don't like it, so they walk away from it."

Field tests commissioned by Accsys from Louisiana State University returned similar results, and five-year, third-party trials in Florida and Costa Rica showed that Accoya meets the AWP A E7-09 in-ground stake test and the AWP A E18-06 ground proximity test required to meet the U.S. building code for a ground-contact rating. The company has also passed termite testing in Japan, Australia, and Thailand.

## Side benefits of acetylation

In addition to the core performance attributes—rot and insect resistance—acetylation has other performance benefits, the company claims. Because it doesn't swell and shrink like most other wood products, coatings appear to last longer than they do on naturally rot-resistant woods like cedar and larch, and tests have suggested the wood is more dimensionally stable than these species as well.

Accoya products also have better thermal performance than untreated hardwoods often used in windows and doors, according to the company. "Wood thermal conductivity is a function of density and moisture content," explained Alexander, who argues the higher R-value was also an advantage in decking. "Accoya has a lower equilibrium moisture content and lower density" than mahogany, Ipé, and composite decking, he said. "Stability, flatness, smoothness, and lack of splintering as it ages make it a very barefoot-friendly decking option."

## Two big weaknesses: Shipping and cost

Acetylation is a well understood technology that's been around for a very long time, but it's never enjoyed a lot of market share in North America.

That's likely in part because it didn't have code approval for ground contact until recently. But its high first cost will remain a barrier, even if its durability and low maintenance might save owners money in the long run. "It is rather expensive," admitted Taylor. "The price per thousand board feet is comparable to tropical hardwood." Many of his customers use it for framing, signage, or decorative entryways or storefront façades. (One remarkable exception is [The Ark](#), a massive seven-story building that's also a full-size rendering of the ship the biblical Noah is said to have built. The Ark's creators claim it is the largest timber structure in the world, and the entire thing is clad in unfinished Accoya.)

"The first project we considered it for was a series of train stations," said Nicholas Papaefthimiou, an architect with ZGF. "I love using wood for a whole host of environmental reasons and design reasons, and it seemed like it would be durable enough to sit outside and not weather and crack and split. The client was really excited about it as well" because of its "sustainability story." The plan was to use exposed Accoya for structural glulams in the canopy. Then the recession hit. "The client went with off-the-shelf bus shelters," he told BuildingGreen.

Although Papaefthimiou still thinks Accoya is a great product, he only suggests it when cheaper, equally high-performing alternatives won't work. Unlike with the thermally modified products he sometimes chooses, "acetylation preserves the light color; it has a light, birchy kind of tone," he explained. But that beauty is not worth paying for if you're planning to paint it anyway. "Accoya's claims are great—and I actually believe most of them," he joked. But the cost has just been too high for ZGF projects that have considered it in the past.

The fact that the pine for Accoya comes from New Zealand for treatment in the Netherlands and is then shipped around the world probably doesn't help the price tag. It's not necessarily great for Accoya's environmental footprint either, though the company has addressed this through various initiatives (including 50% renewable energy for manufacturing) and has achieved a Gold rating in C2C for renewable energy and carbon management.

Although the company provides an [online carbon calculator](#) to compare the global warming impact of shipping Accoya with that of shipping competing products, its marketing information relies heavily on Accoya's projected 50-year lifespan to argue for a superior carbon footprint. However, service life is not predictable and may be impacted by factors other than the product's durability. It is typically normalized across a product category to ensure fair comparison of embodied carbon data. We recommend referencing Accoya's [environmental product declaration](#) (EPD) for third-party-verified embodied carbon data instead of using a calculator that's provided primarily as a marketing tool.

BuildingGreen asked Alexander if the company had considered adding a manufacturing plant in the U.S. or Canada. "Absolutely," he replied. But the short-term plan is to "establish ourselves at scale in Europe" while building market share stateside. Meanwhile, the company has also introduced a composite wood product, Tricoya, that is made from acetylated chips, fibers, or particles.

Accoya's EPD, FSC certification, Cradle to Cradle certification, and Cradle to Cradle [Material Health Certificate](#) mean that it can contribute to all three Building Product Disclosure and Optimization credits in LEED v4.

### **For more information:**

Accsys Technologies  
[accyawood.com](http://accyawood.com)

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