

Gluing plastic dimensional lumber

By Patrick Ropp

More people are using recycled plastic/wood composite lumber for decks and other various projects. Although each manufacturer of recycled plastic lumber has his own blend, we found that most are using very similar ingredients: an equal amount of melted recycled plastic mixed with recycled wood chips or sawdust and then extruded in the form of dimensional lumber. Since the wood is encased in plastic, the plastic/wood composite boards are supposed to last longer than traditional decking materials and carry a good warranty. Many of these boards are not intended for use as structural members, but they work great for decking and other lower load projects.

Recently, a customer called us asking if WEST SYSTEM® epoxy will glue a particular type of recycled plastic lumber. Since we only had older data on a different brand, we conducted PATTI™ adhesion tests on two new brands: Trex™ Brand and SmartDeck™. The adhesion results are shown in the following chart.

Trex

Surface Prep	Adhesive	Cure	Adhesion	Failure Mode
No Prep	105/205	Overnight	586 psi	100% Substrate
No Prep	105/205	2 Week	586 psi	100% Substrate
Sanded 80 Grit	105/205	Overnight	739 psi	98% Substrate
Sanded 80 Grit	105/205	2 Week	668 psi	96% Substrate
Flame Treatment	105/205	Overnight	617 psi	100% Substrate
Flame Treatment	105/205	2 Week	617 psi	100% Substrate

SmartDeck

Surface Prep	Adhesive	Cure	Adhesion	Failure Mode
No Prep	105/205	Overnight	607 psi	10% Substrate
No Prep	105/205	2 Week	674 psi	2% Substrate
Sanded 80 Grit	105/205	Overnight	810 psi	100% Substrate
Sanded 80 Grit	105/205	2 Week	783 psi	100% Substrate
Flame Treatment	105/205	Overnight	770 psi	100% Substrate
Flame Treatment	105/205	2 Week	841 psi	100% Substrate

Different methods of surface preparation are the variables for this test. With the Trex Decking, any surface preparation (including none at all) results in substrate failure, an indication the adhesive and adhesion are adequate for the material. Even with no surface preparation, the surface seems to be rough enough to provide a good grip for the epoxy. With the SmartDeck, we found that without surface preparation, the epoxy adhesion failed (at the interface), not the substrate. The surface was fairly smooth and just didn't have enough "tooth" for the epoxy to grab on to. When the surface was sanded or flame treated (see below), the adhesion increased as much as 25%.

I also glued two pieces of each brand of the plastic/wood composite face to face using two step bonding and cycled them in the hot/humid hut, the cool/dry hut, the hot/dry hut, and the freezer. In the 6" x 8" samples, I have not seen any delamination or failure of

either substrate.

In conclusion, sanded and flame treated TREX and SmartDeck produced the best adhesion. In both cases, a builder should see favorable results bonding TREX and SmartDeck (with some surface preparation) plastic/wood decking with WEST SYSTEM epoxy.

Flame treating a plastic surface for bonding

To flame treat a plastic surface, hold a propane torch flame about 4" to 6" from the plastic (with the tip of the flame just above the surface) and move it across the surface at a rate of 2 or 3 inches per second overlapping the previous pass slightly. Keep the torch moving and only allow the exhaust gases to hit the surface. If done correctly, the surface will not discolor or burn in any obvious way. This technique oxidizes the surface and improves adhesion. For best adhesion, bond to the surface within 30 minutes of treatment.

Sources

Trex Wood-Polymer Lumber Products

*Trex Company, LLC
20 S Cameron St
Winchester, VA 22601
(540) 678-4070
www.trex.com*

SmartDeck

*U.S. Plastic Lumber
2300 Glades Road
Boca Raton, FL 33431
888-733-2546
www.usplasticlumber.com*

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