Test Results | JEM™Joints | Strength

STRENGTH

TESTED

- Strength of the JEM™Joint, landed directly between 16” on center joists by a point loaded hydraulic press for THERMORY®Ash.

RESULTS

- The JEM™Joint performs exceptionally well and determined to be exceptionally strong in use as both a decking and cladding application.

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Thermal Treated Hardwood Floor Testing
NRRI Technical Note TN-2012/02
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Objective: To conduct testing of end-jointed decking to understand the bending characteristics of an unsupported end-joint spaced at mid-span. The goal was to understand the deflection of the joint under a 300 pound proof load and to determine the maximum load at failure.

Samples: Thermal treated decking samples were provided to the Natural Resources Research Institute for evaluation of bending performance. The majority of the groups contained an end joint as shown in Figure 1. Control samples without and end joint were also tested. The groups that were evaluated included:

Decking with end-joint
1x4 (screwed)
1x4 (clips)
1x6 (screwed)
1x6 (clips)
5/4x4 (screwed)
5/4x4 (clips)
5/4x6 (screwed)
5/4x6 (clips)

Decking with butt-joint across span
1x6 (screwed)
5/4x6 (screwed)

Decking with no joint across span
No End joint
1x6 (screwed)
5/4x6 (screwed)

Testing: The bending tests of hardwood decking were completed using a modified procedure from ASTM D1037. The test groups of 3 paired hardwood decking samples were measured to determine the length, width and thickness. They were then installed into an Instron 5585H testing machine and tested to determine the load and deflection characteristics of the samples where the end-joint was placed

between simulated wood deck joists spaced at 16-in. on-center. The decking joists were attached to the steel testing frame. To attach the samples, the decking was attached to the 2-by 6-in wood joists using clips or screws (Deckmate 8 by 2" star drive) provided by Attica Millwork. The sections were then attached to the testing machine so that the joints were placed directly under the loading head.

A 3-by 6 in. loading pad was placed over the end-joint. The load was applied to the sample at a controlled rate of 0.6 in./minute. The deflection was determined at a load of 300 pounds and the total load at failure was also recorded. The mode of failure was noted.

Results: Table 1 shows the measurements for the end-joint samples tested, failure load, deflection characteristics, along with the group average. Table 2 shows the testing results for the control samples tested with a butt joint under the load head and for just the lumber itself without a joint present.

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Discussion: The testing was setup to simulate a person standing directly on top of an end joint. The goal was to determine the deflection of the joint under 300 pounds of force and to determine the maximum load at failure. There were two techniques used to attach the decking to the edge joist. For those samples where a side clip was inserted into a machined groove, the typical failure mode of the samples tested was that the bottom tongue split apart and failed. This can be seen in figures 3 and 4. For those samples with end-joints that were face screwed to the joist, the typical failure mode was lumber failure between the joists that were located on either side of the end-joint. This can be seen in figure 5.

Table 1.--Testing Results for End-Joint Samples.

Group	Sample	Thickness (in.)	Width (in.)	Fastener Type	Deflection at 300 lbs (in.)	Failure Load (lbs)	Failure Mode
1 x 4 (Screws)	1	0.78	3.73	Screws	0.13	1,592	Lumber failed
	2	0.78	3.73	Screws	0.15	1,659	Lumber failed
	3	0.78	3.73	Screws	0.15	1,092	Lumber failed
	Average		3.73		0.14	1,448	
1 x 4 (Clips)	1	0.80	3.73	Clips	0.14	1,579	Lumber and lower tongue
	2	0.78	3.73	Clips	0.12	2,262	Lower tongue
	3	0.78	3.72	Clips	0.14	1,278	Lumber failed
	Average	0.78	3.72		0.13	1,706	
1 x 6 (Screws)	1	0.79	5.90	Screws	0.10	2,134	Lumber failed
	2	0.79	5.90	Screws	0.11	2,604	Lumber failed
	3	0.79	5.91	Screws	0.11	2,756	Lumber failed
	Average	0.79	5.90		0.11	2,498	
1 x 6 (Clips)	1	0.81	5.90	Clips	0.16	2,053	Lower tongue
	2	0.79	5.90	Clips	0.16	1,564	Lower tongue
	3	0.79	5.90	Clips	0.12	1,653	Lower tongue
	Average	0.80	5.90		0.15	1,757	
5/4 x 4 (Screws)	1	1.02	3.52	Screws	0.11	1,971	Lumber failure
	2	1.02	3.53	Screws	0.11	1,875	Lumber failure
	3	1.02	3.54	Screws	0.08	2,807	Lumber failure
	Average	1.02	3.53		0.10	2,218	
5/4 x 4 (Clips)	1	1.02	3.53	Clips	0.13	1,754	Lower tongue
	2	1.02	3.51	Clips	0.13	1,647	Lumber failed
	3	1.03	3.53	Clips	0.12	1,123	Lower tongue
	Average	1.02	3.53		0.13	1,508	
5/4 x 6 (Screws)	1	1.02	5.70	Screws	0.08	2,707	Lumber failed
	2	1.03	5.70	Screws	0.08	1,991	Lumber failed
	3	1.02	5.70	Screws	0.11	2,520	Lumber failed
	Average	1.02	5.70		0.09	2,406	
5/4 x 6 (Clips)	1	1.03	5.70	Clips	0.12	1,919	Lower tongue
	2	1.04	5.70	Clips	0.12	1,806	Lower tongue
	3	1.02	5.71	Clips	0.12	1,849	Lower tongue
	Average	1.03	5.70		0.12	1,858	