

Evaluation Report

Janka Hardness of Bamboo Flooring

Job No. 9-14

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Introduction

This report covers Janka Hardness testing of block laminated Bamboo flooring submitted by Harmony Timber Floors. The specimen were delivered pre-cut by the client to 400 mm in length as specified by DAFF to suit the test procedures from JJ Mack Australian Methods for Mechanical Testing Small Clear Specimens of Timber (1979).

Specimen

To prevent splitting in longitudinal direction DAFF instructed the client to glue laminate three bamboo boards (14 mm thickness) together creating block laminated test specimen of approximately 42.5 mm in thickness.

Sixteen Bamboo Flooring specimen with nominal dimensions of 42.5 mm in thickness, 137 mm in width and 400 mm in length arrived at the DAFF Testing Facility in Salisbury, Queensland on July 4th 2014. The specimen were labelled accordingly and stored in a 12% MC condition chamber until testing commenced on July 14th.

Test Methodology

The Janka Hardness test measures the force required to indent the specimen with a steel ball (or hemispherical end of a cylindrical tool) of 11.28 mm diameter to a depth of 5.64 mm at a rate of 6.5 mm/min.

Prior to testing the specimen were stabilized in the testing laboratory at a controlled environment at 22°C (±1) to ensure adequate temperature during the testing process. The Janka Hardness test was conducted on a Shimadzu AG-X 10 tonne universal testing machine.

The test was conformed closely following the methodology specified in JJ Mack Australian Methods for Mechanical Testing Small Clear Specimens of Timber (1979). The original test was designed to test a solid block of timber on its three different faces and the minimum test dimensions (25 x 50 x 150mm) were chosen to prevent the timber block from splitting.

For the Bamboo flooring specimen the client was interested in the hardness of the material's surface only.

A pre-test had deemed the material suitable for indentation and revealed no splitting problems. Specimen were tested in their original state of 42.5 mm in thickness and width corresponding to their commercial profile (137 mm).

Two (2) indentions were made on the top surface of each specimen. The averaged measurements were used to calculate the corresponding overall Janka Hardness value for each individual specimen.

Results

A total of 16 specimen were tested on 14/7/2014. Measurements range from 11.36 kN (2552.71 lbf) to 20.70 kN (4654.44 lbf). The total average is 16.08 kN (3614.03 lbf) and the total standard deviation is 2,20 kN (494.13 lbf).

Full test data is given in Appendix 1.

Conclusion

The tests indicate a Janka rating of greater than '10' and the test material can be classified as 'very hard'. (Table depicts the current classification categories in Australia).

For reasons of comparison a range of common commercial timber species used in the Australian flooring and decking industry are presented in 2.

The Bamboo Flooring specimen reached a Janka hardness value of 16.1 kN exceeding e.g. Grey Ironbark (14.0 kN).

Table 1: Janka Hardness classification categories

Janka Rating (kN)	Janka Rating (lbf)	Hardness
<5.5	<1,236.45	Soft
5.5 - 7	1,236.45 – 1,573.67	Moderate
7 - 10	1,573.67 – 2,248.09	Hard
> 10	> 2,248.09	Very Hard

Table 2: Common commercial Australian flooring timber species (Bootle, 2010) compared to bamboo test specimen

Species (material)	Janka Hardness (kN)	Janka Hardness (lbf)
Bamboo Flooring (tested)	16.1	3,619.42
Jarrah	8.5	1,910.88
Spotted Gum	11.0	2,472.90
Blackbutt	9.1	2,045.76
Grey Ironbark	14.0	3,147.33
Cypress Pine	6.1	1,371.34



References

Mack, J.J. (1979): Australian methods for mechanically testing small clear specimens of timber. *DBR Technical Paper (Second Series) C.S.I.R.O.*, 31.

Boote, K.R. (2010): Wood in Australia. Types, Properties, and Uses. *McGraw-Hill (2nd Edition)*.

Appendix 1

Figure 1: Test report




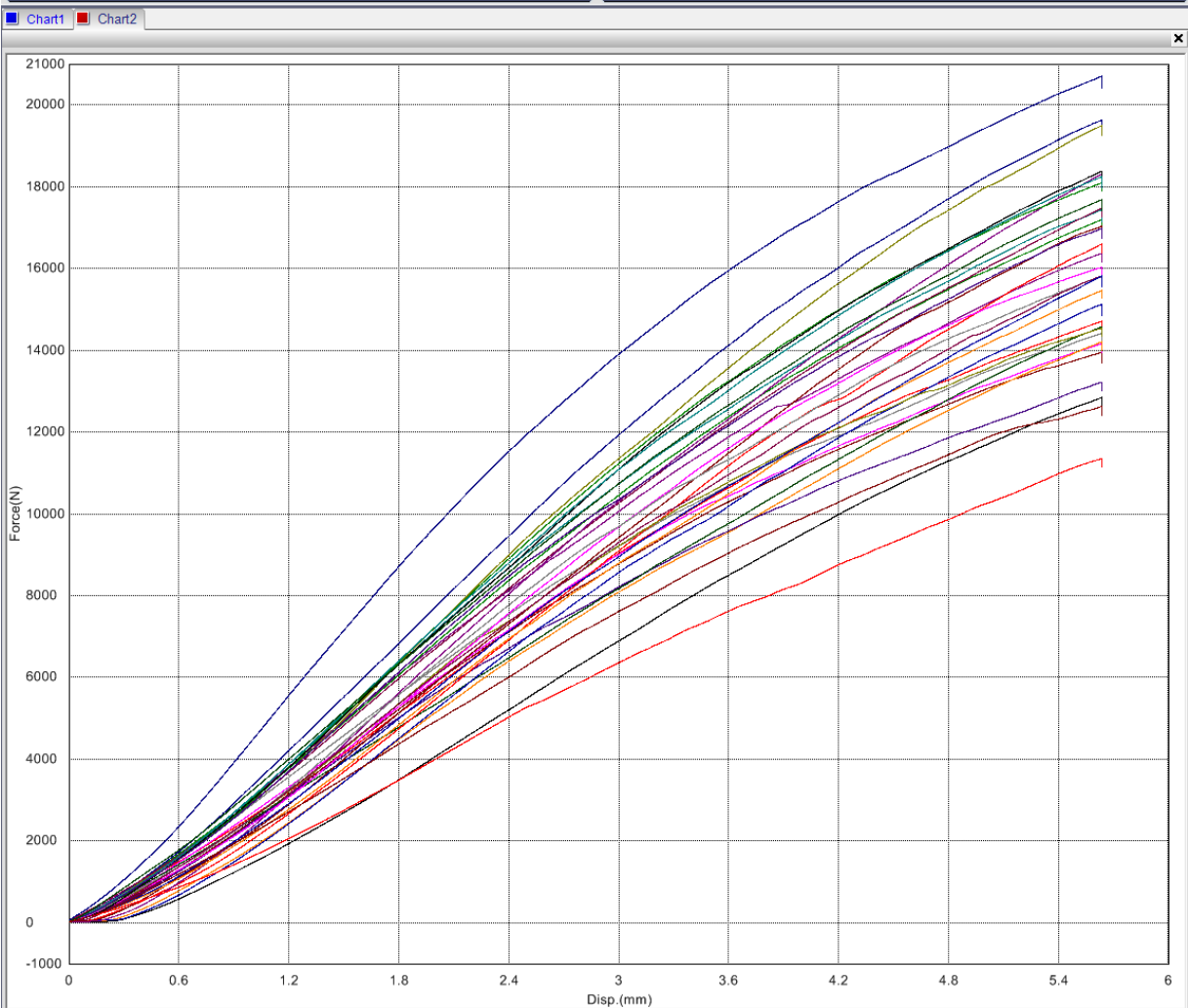
 Queensland Government Department of Agriculture, Fisheries and Forestry		Janka Hardness to JJ Mack Australian Method					 Accredited for compliance with ISO/IEC 17025. Accreditation No 14200.	
		The results reported herein apply only to this sample of specimens as provided by client.						
Report number	Report date	Client	Method File Name	Testing machine	Test Type	Speed	Deflection device	Test Date
9-14	14/07/2014	Harmony Timber Floors	Janka Hardness	Single	Compression	6.5 mm/min	Nil	14/07/2014
Name	Thickness	Width	Length	Max Force	Material	Comments		
Unit	(mm)	(mm)	(mm)	(N)				
9-14-1	42.5	137	400	14,330.4	bamboo	max force is calculated as average of two indentions on the top face		
9-14-2	42.5	137	400	16,791.3	bamboo	max force is calculated as average of two indentions on the top face		
9-14-3	42.5	137	400	19,567.0	bamboo	max force is calculated as average of two indentions on the top face		
9-14-4	42.5	137	400	14,293.7	bamboo	max force is calculated as average of two indentions on the top face		
9-14-5	42.5	137	400	13,531.5	bamboo	max force is calculated as average of two indentions on the top face		
9-14-6	42.5	137	400	17,459.0	bamboo	max force is calculated as average of two indentions on the top face		
9-14-7	42.5	137	400	13,899.2	bamboo	max force is calculated as average of two indentions on the top face		
9-14-8	42.5	137	400	15,866.7	bamboo	max force is calculated as average of two indentions on the top face		
9-14-9	42.5	137	400	17,679.0	bamboo	max force is calculated as average of two indentions on the top face		
9-14-10	42.5	137	400	19,404.5	bamboo	max force is calculated as average of two indentions on the top face		
9-14-11	42.5	137	400	15,289.2	bamboo	max force is calculated as average of two indentions on the top face		
9-14-12	42.5	137	400	15,638.4	bamboo	max force is calculated as average of two indentions on the top face		
9-14-13	42.5	137	400	18,314.7	bamboo	max force is calculated as average of two indentions on the top face		
9-14-14	42.5	137	400	16,404.6	bamboo	max force is calculated as average of two indentions on the top face		
9-14-15	42.5	137	400	16,752.8	bamboo	max force is calculated as average of two indentions on the top face		
9-14-16	42.5	137	400	11,995.1	bamboo	max force is calculated as average of two indentions on the top face		
Testing Officer: JF				50 Evans Rd				
				Salisbury QLD 4107				
Signatory: 				Ph: (07) 3277 0070				Page 1 of 1
				Fax: (07) 3875 1015				

Figure 2: Results (Data)

Name	Max_Force	
Parameter	Calc. at Entire Areas	
Pass/Fail		
Unit	N	N
9-14-1 _1	14,711.3	
9-14-1 _2	13,949.4	
Average		14,330.4
9-14-2 _1	16,376.8	
9-14-2 _2	17,205.8	
Average		16,791.3
9-14-3 _1	19,632.3	
9-14-3 _2	19,501.6	
Average		19,567.0
9-14-4 _1	14,166.4	
9-14-4 _2	14,420.9	
Average		14,293.7
9-14-5 _1	14,215.6	
9-14-5 _2	12,847.3	
Average		13,531.5
9-14-6 _1	17,441.9	
9-14-6 _2	17,476.0	
Average		17,459.0
9-14-7 _1	13,220.4	
9-14-7 _2	14,577.9	
Average		13,899.2
9-14-8 _1	15,124.8	
9-14-8 _2	16,608.6	
Average		15,866.7
9-14-9 _1	17,037.3	
9-14-9 _2	18,320.7	
Average		17,679.0
9-14-10 _1	18,105.4	
9-14-10 _2	20,703.6	
Average		19,404.5
9-14-11 _1	14,545.9	
9-14-11 _2	16,032.5	
Average		15,289.2
9-14-12 _1	15,808.5	
9-14-12 _2	15,468.2	
Average		15,638.4
9-14-13 _1	18,380.9	
9-14-13 _2	18,248.4	
Average		18,314.7
9-14-14 _1	15,828.4	
9-14-14 _2	16,980.7	
Average		16,404.6
9-14-15 _1	17,685.6	
9-14-15 _2	15,820.0	
Average		16,752.8
9-14-16 _1	11,355.3	
9-14-16 _2	12,634.9	
Average		11,995.1
TotalAverage		16,076.0

Figure 3: Results (Graphs)



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