

ULTIM8[®]

ULTIM8[®] Bamboo Composite Decking

Summary of Test Results

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innov8 + crea8

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Table of Contents

Executive Summary of Testing Results.....	3
Detailed Testing Results	4
RoHS	4
Formaldehyde	5
UV Exposure Test	6
Fire Resistance Test.....	7
Block Shear Test	8
Slip Resistance (Ramp Test)	9
CAMO Hidden Fixing System – Uplift Test	10

Executive Summary of Testing Results

Test Item	Ref. Standard	Test Condition	Result
Compressive Strength	ASTM D695-08	Specimen: 12.7x12.7x25.4mm	32.5 MPa
Compressive Strain at Yield		Testing speed: 1.3mm/min	6.30%
IZOD Impact Strength (Notched)	ASTM D256-06a Method C	Width: 3.7mm The capacity of the pendulum: 2.75J	12J/m, C (Complete break)
Water Absorption	ASTM D570-98 (2005)	Drying conditions: 50°C, 24 hrs Immersion cond: 23°C, 24 hrs	0.67%
Flexural Strength	ASTM D790-07 Method A	Specimen: 127x1x3.7mm	36.8 MPa
Flexural Modulus		Testing speed: 1.5mm/min Span 58mm	4360 MPa
RoHS Test	2002/95/EC, IEC62321	See details	Cd: ND Pb: 8ppm Hg: ND CrVI: ND
Formaldehyde	AS/NZS 4266.1:2004, 4266.16:2004, UV-Vis	See details	0.1 mg/L
UV Exposure	ASTM G 154-06, ISO105-A02: 1993/Cor.2:2005	See details	Grade 4
Fire Resistance	UL94 Ed.5 Oct 29 1996, sec. 7	See details	Burning class HB
Block Shear Test			6.0MPa, 6.1MPa
Slip Resistance		See details	R11
CAMO Uplift test	ASTM E 330-02, ICC-ES AC174, ASTM D 7032-08	See details	88mm: 1098 kg/m ² 137mm: 678 kg/m ²

Detailed Testing Results

RoHS

In accordance with RoHS Directive 2002/95/EC, and its amendment directives to determine the Cadmium, Lead, Mercury, and Hexavalent Chromium content for the samples submitted

Test Method:

1. With reference to IEC62321 for Cadmium content. Analysis was performed by ICP-EOS
2. With reference to IEC62321 for Lead content. Analysis was performed by ICP-EOS
3. With reference to IEC62321 for Mercury content. Analysis was performed by ICP-EOS
4. With reference to IEC62321 for Hexavalent Chromium content by Colorimetric method

Results:

Test results by chemical method (Unit: mg/kg)

Test Item(s)	Result	MDL	RoHS Limit
Cadmium (Cd)	ND	2	100
Lead (Pb)	8	2	1000
Mercury (Hg)	ND	2	1000
Hexavalent Chromium (CrVI)	ND	2	1000

Note:

1. mg/kg = ppm
2. ND = Not Detected
3. MDL = Method Detection Limit
4. The maximum permissible limit is quoted from the document 2005/618/EC amending RoHS directive 2009/95/EC

Formaldehyde

Test Item(s)	Unit	Test Method (reference)	Result	MDL
Formaldehyde Emission Content	mg/L	AS/NZS 4266.1:2004 & 4266.16:2004, UV-Vis	0.1	0.1

Note:

1. mg/L = milligram per litre
2. MDL = Method Detection Limit

Reference Information:

1. AS/NZS 1859.1:2004 Amdt 1(2006-02-03) for Particle Board

Grade E0: Formaldehyde Emission \leq 0.5 mg/L

Grade E1: Formaldehyde Emission \leq 1.5 mg/L

Grade E2: Formaldehyde Emission \leq 4.5 mg/L

2. AS/NZS 1859.2:2004 Amdt 1(2006-02-03)/Amdt 2(2006-04-19) for Dry-processed Fibre Board

Grade E0: Formaldehyde Emission \leq 0.5 mg/L

Grade E1: Formaldehyde Emission \leq 1.0 mg/L

Grade E2: Formaldehyde Emission \leq 4.5 mg/L

UV Exposure Test

Test Method:

ASTM G 154-06, Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Test Cycle:

Cycle 1

Lamp type: UVA-340

8h UV at 60±3°C BPT, 0.89 W/(m²•nm) @340nm

4h condensation at 50±3°C BPT

1000 hour test duration

Test Results:

Grey Scale: Grade 4

Appearance: Visible colour change appeared on sample's surface

Notes:

1. According to ISO105-A02: 1993/Cor.2:2005, Grey scale is determined under D65 standard light, Grade 5 is the best and Grade 1 is the worst
2. Grey scale was judged 7 days after UV Exposure Test

Fire Resistance Test

Test Method:

UL94 Ed.5 Oct 29 1996, section 7

Test Results:

Sample No.	Burning Distance	Burning Time	Burning Rate
1	0.0mm	0.0s	-
2	0.0mm	0.0s	-
3	0.0mm	0.0s	-

Notes:

1. According to UL94 Ed.5 Oct 29 1996, section 7, a material class HB shall:
 - a. Not have a burning rate exceeding 40mm/min over a 75mm span for specimens having a thickness of 3.0-13.0mm, or
 - b. Not have a burning rate exceeding 75mm/min over a 75mm span for specimens having a thickness of less than 3.0, or
 - c. Cease to burn before the 100mm reference mark

Block Shear Test

Test Method:

Load applied to prepared samples to test the shear strength of bamboo plastic composite material. Load applied using Instron series 4204 calibrated Universal Testing Machine, with a load rate of 1.3mm/min. 30 samples were tested across each plane of the cross-section of the composite decking, for 60 samples in total. Test data analysed in accordance with the statistical procedures set in AS/NZS4063

Test Results:

Position of Specimen	Mean Shear Strength (MPa)
Direction 1	6.0
Direction 2	6.1

Slip Resistance (Ramp Test)

Test Method:
DIN 51130:2004

Test Results:

Test Item	Test Method	Test Result
Slip Resistance (Ramp Test)	DIN 51130:2004	Mean overall acceptance angle: 25.0° Slip resistance assessment group: R11

Notes:

R Value	Category	Angle of Inclination
R9	Low	6-10°
R10	Normal	>10-19°
R11	Above Average	>19-27°
R12	High	>27-35°
R13	Very High	>35°

CAMO Hidden Fixing System – Uplift Test

Test Method:

ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference

Referenced Standards:

ICC-ES AC174, Acceptance Criteria for Deck Board Span Ratings and Guardrail systems (Guards and Handrails)

ASTM D 7032-08, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards and Handrails)

Test Specimen:

Three deck mock-ups were created per specimen size (88mm and 137mm), with five specimens on each deck. Each deck consisted of three spans, with 406mm centres.

Test Results:

88mm ULTIM8 Bamboo Composite Decking installed with National Nails CAMO hidden fixing system

Test Specimen	Maximum Sustained Uplift Load	Comments
1	3,296 kg/m ²	Boards broke around screw heads and disengaged
2	3,418 kg/m ²	
3	3,174 kg/m ²	
Average	3,296 kg/m ²	

137mm ULTIM8 Bamboo Composite Decking installed with National Nails CAMO hidden fixing system

Test Specimen	Maximum Sustained Uplift Load	Comments
1	2,075 kg/m ²	Boards broke around screw heads and disengaged
2	2,075 kg/m ²	
3	1,953 kg/m ²	
Average	2,034 kg/m ²	

Test Summary:

In accordance with Section 4.1.4 of AC174:

Allowable Uplift Capacity = Average ultimate load divided by a factor of 3.0

Deck Board Used in Testing	Total Uplift Load	Allowable Uplift Capacity
88mm ULTIM8 Bamboo Composite Decking	3,296 kg/m ²	1,098 kg/m ²
137mm ULTIM8 Bamboo Composite Decking	2,034 kg/m ²	678 kg/m ²