QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

5110 North Mingo Road
Tulsa, Oklahoma
74117 USA
918.437.8333 ph. | 918.437.8487 fx.

CLIENT: **MOSO NORTH AMERICA, INCORPORATED**
3200 East Broadway
Vancouver British Columbia
Canada V5M 1Z8

Test Report No: TUL0392 R1	Report Date: April 19, 2024 Revision Date: April 26, 2024

SUBJECT: MOSO Bamboo Decking X-treme/Thermo for use at 24-inch deck board span / 100 psf, and 16-inch stair tread span.

SAMPLING DETAIL: Test samples were randomly selected from existing inventory at the Vancouver warehouse by QAI personnel Matt Lansdowne on Mach 4, 2023 The random sampling was conducted to ensure samples tested were representative of standard product manufacture.

DATE OF RECEIPT: Sample was received at QAI Tulsa, Oklahoma facility on April 25, 2023, in good condition.

TESTING PERIOD: May 19th, 2023, to March 18th, 2024.

AUTHORIZATION: QAI Proposal 22JL10192r4 dated February 7, 2023, signed by Brett L. Kelly, CEO, on February 8, 2023.

TEST PROCEDURE: Testing in accordance with the following:

- ICC-ES AC174 *Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)* approved January 2012.
- ASTM D7032-21 *Standard Specification for Establishing Performance Ratings for Wood Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards and Handrails*.

TEST RESULTS: Based on evaluation by QAI of MOSO Bamboo Decking X-treme/Thermo bamboo decking of nominal ¾-inch thickness and 5.5 inches width, the noted product was found to have a maximum span rating as outlined below.

PRODUCT	SPAN RATING		WIND UPLIFT (psf)	INSTALLATION
	DECKING	STAIR TREAD		
1'' (3/4'') MOSO Bamboo Decking X-treme/Thermo	100 psf @ 24"	16" span	-100	MOSO Bamboo Decking X-treme/Thermo stainless steel hidden clips fastened with one #8 x 1 1/4" stainless steel screw at each joist.

Prepared By

William B. Randall
Laboratory Testing Technician

Signed for and on behalf of QAI Laboratories Inc.

Matt Lansdowne
Director of Engineering

SUMMARY OF REQUIREMENTS AND RESULTS

Property	*Test Method*	*Number of Specimens*	*Test Requirement*	*Test Results*	*Section*
*Flexural Strength Modulus (*Max Stress*)*	ASTM D6109	Minimum 10 Each Formulation	Report	MOSO Bamboo Decking X-treme/Thermo: Max Stress:10,266 psi,	**1.1**
Flexural Stiffness (MOE)	ASTM D6109	Minimum 10 Each Formulation	Report	MOSO Bamboo Decking X-treme/Thermo: MOE: 1,971,404 psi	**1.1**
Temperature Effect, Low -20°F Flexural	ASTM D7032 / ASTM D6109	Minimum 10 Each Formulation	Report Change	MOSO Bamboo Decking X-treme/Thermo: Max Stress: 11,706 psi (0% change) MOE: 2,089,085 psi (0% change)	**1.2**
Temperature Effect, High 125°F Flexural	ASTM D7032 / ASTM D6109	Minimum10 Each Formulation	Report Change	MOSO Bamboo Decking X-treme/Thermo: Max Stress: 9,341 psi (9.3% change) MOE: 1,971,404 psi (2.4% change))	**1.3**
Moisture Effect, Submerged Flexural	ASTM D7032 / ASTM D6109	Minimum 10 Each Formulation	Report Change	MOSO Bamboo Decking X-treme/Thermo: Max Stress: 10,654 psi (0% change) MOE: 1,963,790 psi (0% change)	**1.4**
Ultraviolet Resistance (2000 hours) Flexural	ASTM G155 / ASTM D6109	Minimum 5 Each Formulation	Report Change	MOSO Bamboo Decking X-treme/Thermo Control: Max Stress:13,166 psi MOE:1,452,788 psi MOSO Bamboo Decking X-treme/Thermo Exposed: Max Stress: 12.082 psi (8% change) < 10% MOE: 1,539,387 psi (0% change)	**2.1**
Freeze-Thaw Flexural	ASTM D7032 / ASTM D6109	Minimum 5 Each Formulation	Report Change	MOSO Bamboo Decking X-treme/Thermo: Max Stress: 10,226 psi (5% change) < 10% MOE: 1,877,234 psi (0% change)	**2.2**
Biodeterioration (Fungi)	ASTM D7032 /ASTM D2017	5 Each Formulation	Must Exceed Control	MOSO Bamboo Decking X-treme/Thermo: Complies	**3.1**
Biodeterioration (Termite)	ASTM D7032 /ASTM D3345	5 Each Formulation	Must Exceed Control	MOSO Bamboo Decking X-treme/Thermo: Complies	**3.2**
Surface Burning Characteristics	ASTM D7032 /ASTM E84	1 Run	FSI ≤ 200	MOSO Bamboo Decking X-treme/Thermo: FSI = 5	**4.0**
Duration of Load	ASTM D7031	Minimum 15 Samples	No Failures or Tertiary Creep	MOSO Bamboo Decking X-treme/Thermo: Complies @ 24'' and 100 psf	**5.0**
Creep Recovery	ASTM D7032	Minimum 3 samples	% Recovery > 75%	MOSO Bamboo Decking X-treme/Thermo: Complies @ 24'' and 100 psf	**6.0**

SUMMARY OF REQUIREMENTS AND RESULTS CONTINUED

Determination of Unadjusted Allowable Load Deck Board	ASTM D7032 / ASTM D6109	Minimum 28 Samples	≥ 2.5 psf x Adjustments	MOSO Bamboo Decking X-treme/Thermo: 446 psf @ 24 inches > 100 psf Complies	**7.1**
Determination of Unadjusted Allowable Load Stair Tread	ASTM D7032	28 Each Product	≥ 815 lbs Failure ≤0.125'' @304 lbs	Ultimate: 1548 lbs 574 lbs @ 0.125'' Deflection @ 16'' Span Complies	**7.2**
Mechanical Holding Tests	ASTM D330	Each Product Installation	Ultimate Load / FS 3.0	MOSO Bamboo Decking X-treme/Thermo stainless steel hidden clips were fastened using one #8 x 1 1/4" stainless steel screw. Allowable: -100 psf	**7.3**
Static Coefficient of Friction	ASTM D2047	3 each side, wet & dry	Static Coefficient of Friction of 0.5 or greater	Smooth side: Dry: 0.79 Wet: 1.14 Grooved side: Dry: 0.83 Wet: 1.07	**8.0**

Details of testing for MOSO Bamboo Decking X-treme/Thermo can be found on subsequent pages of this report.

1. DECK BOARD FLEXURAL TEST ADJUSTMENT FACTORS

Test Procedure: Testing was conducted in accordance with Section 4.4 of ASTM D7032 referencing ASTM D6109. This testing was conducted to evaluate temperature and moisture effects by comparing exposed materials to control samples for loss in strength and stiffness.

All test samples were cut to 25'' length for testing at client requested span of 24''. After sample cutting, samples were conditioned at standard conditioning of 75°F ± 3°F and 50% ± 5% relative humidity for a minimum of 48 hours prior to exposure and testing detailed below.

MOSO Bamboo Decking X-treme/Thermo were measured to have a nominal thickness of ¾" and a width of 5 ½".

All loading was conducted at 1% strain/min with a cross head speed of 1.42 in/min where 0.75 was the measured thickness of the MOSO Bamboo Decking X-treme/Thermo products.

Adjustment factors were determined from the exposures outlined below. The decrease in flexural strength and flexural stiffness, in the exposed samples was determined as the loss in strength and stiffness (Modulus of Elasticity (MOE)) compared to control mean values.

1.1 FLEXURAL STRENGTH (Max Stress) AND STIFFNESS (MOE) CONTROL

After conditioning 28 samples of the X-Treme decking were tested for flexural strength (Max Stress) and flexural stiffness (MOE) following ASTM D6109 on a 24" span.

Test Requirements:

Report Values

Test Results:

Baseline Max Stress and MOE Flexural Strength Values for MOSO Bamboo Decking X-treme/Thermo

No.	Maximum Load	Maximum Stress	Modulus of Elasticity
	(lbs)	(psi)	(psi)
1	879.4	8998	2107512
2	848.9	8915	1904999
3	892.7	9225	1712334
4	968.9	10041	1844326
5	1182.6	12065	2080395
6	1152.1	11987	1828305
7	756.6	7859	2071908
8	837	8761	2042996
9	692.1	7406	1914422
10	1174.9	12237	2279708
11	1085.3	11406	1901320
12	1147.9	11928	1830489
13	953.2	10058	1844653
14	922.5	9682	1925347
15	984.1	9958	2108808
16	1232.6	12827	1929465
17	825.1	8612	2028472
18	902.7	9438	2158364
19	1006	10659	1959392
20	947	9902	1724032
21	1064.6	10999	1954679
22	1102.6	11659	2056260
23	862	9582	1859040
24	914.9	9486	1899033
25	1019.8	13196	2351921
26	972.9	10262	2261951
27	882.4	9264	1838341
28	950	9917	1780832
Mean:	**970.0**	**10226.0**	**1971403.7**
Std. Dev.:	**134.1**	**1477.2**	**163730.0**
CV:	**0.138**	**0.144**	**0.083**

Control X-Treme/Thermo: Max Stress: 10,226 psi MOE: 1,971,403 psi

1.2 FLEXURAL STRENGTH (Max Stress) AND FLEXURAL STIFFNESS (MOE) LOW TEMPERATURE

10 samples of X-Treme decking were tested for low temperature effects on flexural strength (Max Stress) and flexural stiffness (MOE) following Section 4.5.1 of ASTM D7032. Samples were conditioned at -20°F ± 4°F for a minimum of 48 hours until samples were at temperature saturation. Samples were removed and immediately tested for flexural strength (Max Stress) and flexural stiffness (MOE) at 24-inch support span following ASTM D6109.

Test Requirements:

Compare Values to Control Flexural Strength (Max Stress) and Flexural Stiffness (MOE).

Test Results:

Low Temperature Max Stress and MOE Flexural Strength Values for MOSO Bamboo Decking X-treme/Thermo.

No.	Maximum Load (lbs)	Maximum Stress (psi)	Modulus of Elasticity (psi)
1	983.8	10602	1868079
2	1099.6	11794	1931600
3	1005.3	10836	2131703
4	1071.1	11490	2051144
5	1236.3	13171	2383752
6	1004.5	10837	2099865
7	1198.2	12777	2100606
8	983.9	10507	1985507
9	1317.2	13754	2249508
10	1049.9	11300	2040569
Mean:	**1095.0**	**11706.8**	**2084233.3**
Std. Dev.:	**117.2**	**1148.7**	**150022.6**
CV:	**0.1070**	**0.0981**	**0.0720**

Low Temp. MOSO Bamboo Decking X-treme/Thermo:
Max Stress: 11,706.8 psi Change: 0%
MOE: 2,084,233 psi Change: 0%

1.3 FLEXURAL STRENGTH (Max Stress) AND FLEXURAL STIFFNESS (MOE) HIGH TEMPERATURE

10 samples of X-Treme decking were tested for high temperature effects on flexural strength (Max Stress) and flexural stiffness (MOE) following Section 4.5.1 of ASTM D7032. Samples were conditioned at 125°F ± 4°F for a minimum of 48 hours until samples were at temperature saturation. Samples were removed and immediately tested for flexural strength (Max Stress) and flexural stiffness (MOE) at 24-inch support span following ASTM D6109.

Test Requirements:

Compare Values to Control Flexural Strength (Max Stress) and Flexural Stiffness (MOE).

Test Results:

High Temperature Max Stress and MOE Flexural Strength Values for MOSO Bamboo Decking X-treme/Thermo.

No.	Maximum Load (lbs)	Maximum Stress (psi)	Modulus of Elasticity (psi)
1	1189.7	12635	1997011
2	655.4	6871	1652671
3	1064.1	11259	2040051
4	809.2	8614	1995463
5	828.1	8799	2086878
6	780.3	8233	1983723
7	1020.2	10725	2036760
8	797.1	8402	1660318
9	799.7	8535	2042154
10	809.6	8630	1742951
Mean:	875.3	9270.3	1923798.0
Std. Dev.:	161.8	1718.6	168853.2
CV:	0.1848	0.1854	0.0878

High Temp. MOSO Bamboo Decking X-treme/Thermo:
Max Stress 9,270 psi Change: 9.3%
MOE: 1,943,892 psi Change: 2.4%

1.4 FLEXURAL STRENGTH (Max Stress) AND FLEXURAL STIFFNESS (MOE) MOISTURE EFFECTS

10 samples of MOSO Bamboo Decking X-treme/Thermo were tested for moisture effects on flexural strength (Max Stress) and flexural stiffness (MOE) following Section 4.5.1 of ASTM D7032. Samples were submerged in a water bath maintained at standard conditioning for a minimum of 48 hours until samples were considered to be saturated. Samples were removed and immediately tested for flexural strength (Max Stress) and flexural stiffness (MOE) at 24-inch support span following ASTM D6109

Test Requirements:

Compare Values to Control Flexural Strength (Max Stress) and Flexural Stiffness (MOE).

Test Results:

Moisture Effects Max Stress and MOE Flexural Strength Values for MOSO Bamboo Decking X-treme/Thermo.

No.	Maximum Load	Maximum Stress	Modulus of Elasticity
	(lbs)	(psi)	(psi)
1	1189.7	12635	1997011
2	655.4	6871	1652671
3	1064.1	11259	2040051
4	809.2	8614	1995463
5	828.1	8799	2086878
6	780.3	8233	1983723
7	1020.2	10725	2036760
8	797.1	8402	1660318
9	799.7	8535	2042154
10	809.6	8630	1742951
Mean:	**1033.3**	**10653.5**	**1963790.1**
Std. Dev.:	**106.2**	**1077.9**	**92364.9**
CV:	**0.1028**	**0.1012**	**0.0470**

Moisture effect MOSO Bamboo Decking X-treme/Thermo:
Max Stress 10,653 psi Change: 0%
MOE: 1,973,901 psi Change: 0%

2. DECK BOARD FLEXURAL TEST END USE ADJUSTMENTS FACTORS

Test Procedure: Testing was conducted in accordance with Section 4.4 of ASTM D7032 referencing ASTM D6109. This testing was conducted to ultraviolet (UV) resistance and freeze-thaw resistance by comparing exposed materials to control samples.

UV samples were cut to 7'' length, 2.1" width from 3/4'' products to accommodate placement in ASTM G155 compliant UV test equipment. Control samples for comparison where cut to 7'' length, 2.1" width from 3/4'' thickness.

Freeze-thaw test samples were cut to 24'' length per the requested span.

After sample cutting, samples were conditioned at standard conditioning of 75°F ± 3°F and 50% ± 5% relative humidity for a minimum of 48 hours prior to exposure and testing detailed below.

All loading was conducted at 1% strain/min with a cross head speed of 1.42 in./min (R = 0.00185 x L2/t or R = 0.00185x242/0.8) where 0.8 was the measured thickness of the MOSO Bamboo Decking X-treme/Thermo products.

End Use Adjustment Factors were determined from the exposures outlined below compared to control testing outlined in Section 1.1 of this report, where adjustments were considered values of deterioration greater than 10% loss as outlined in ASTM D7032.

2.1 ULTRAVIOLET (UV) RESISTANCE

10 test samples of MOSO Bamboo Decking X-treme/Thermo were removed from standard conditioning cut to dimensions of 2.1 inches width x 8 inches length; to fit into the ASTM G155 UV exposure apparatus. The boards measured 0.8 inches thickness from the manufacture. Following sample preparation, 10 specimens were exposed for UV resistance following ASTM G155 Cycle 1, with 0.35 W/(m^2-nm) at 340 nm wavelength, with an exposure of 102 minutes of light at 63ºC black panel temperature with 18 minutes of light and water spray at air temperature for 2,000 hours in accordance with ASTM D7032. 10 control specimens were placed back into conditioning for match testing for flexural strength.

Following UV exposure, UV exposed samples and 10 control samples were tested following ASTM D6109, with the UV exposed face located in tension during flexural testing.

The control and after UV weathered samples were tested at a span of 7 inches.

Test Requirements:

Compare UV Values to Control Flexural Strength (Max Stress) and Flexural Stiffness (MOE).

Test Results:

Control Samples Max Stress and MOE Flexural Strength Values for MOSO Bamboo Decking X-treme/Thermo

No.	Maximum Load (lbs)	Maximum Stress (psi)	Modulus of Elasticity (psi)
1	1873.1	15924	1425536
2	1245	9811	1181480
3	1532.8	13932	1648763
4	1454.7	11878	1475852
5	1610.1	14262	1428030
6	1727.7	15195	1469866
7	1324.2	12335	1640092
8	1461.5	12786	1481140
9	1527.7	13492	1549651
10	1440.9	12049	1227469
Mean:	**1519.8**	**13166.4**	**1452787.9**
Std. Dev.:	**183.8**	**1783.1**	**152836.6**
CV:	**0.1209**	**0.1354**	**0.1052**

CONTROL Moso X-Treme/Thermo:
Max Stress: 13,166 psi
MOE: 1,452,788 psi

UV Exposed Samples Max Stress and MOE Flexural Strength Values for MOSO Bamboo Decking X-treme/Thermo.

No.	Maximum Load (lbs)	Maximum Stress (psi)	Modulus of Elasticity (psi)
1	1875.7	15692	1528938
2	1375.7	11419	1383946
3	1448.7	12339	1533012
4	1341.1	11587	1529312
5	1406.9	11718	1569555
6	1481.9	12710	1627163
7	1287.8	10411	1455560
8	1334.9	11386	1622403
9	1272.9	11070	1647279
10	1534.1	12484	1496711
Mean:	1436.0	12081.6	1539388
Std. Dev.:	175.6	1444.2	81927.1
CV:	0.1223	0.1195	0.0532

UV EXPOSED MOSO Bamboo Decking X-treme/Thermo:
Max Stress: 12,081 psi CHANGE:8.2%
MOE: 1,539,388 psi CHANGE:0%

Max Stress % Change < 10%, MOE % Change < 10% no end use adjustment factor required.

2.2 FREEZE-THAW RESISTANCE

5 test samples of MOSO Bamboo Decking X-treme/Thermo were removed from standard conditioning and exposed to freeze-thaw resistance. Samples were submerged underwater for a period of 24 hours, following which the specimens were placed in a freezer maintained at -20°F ± 4°F for 24 hours. Following, specimens were placed in room temperature for 24 hours.

This process was followed for a total of 3 cycles. Following exposure, the samples were tested at 24-inch span following ASTM D6109.

Test Requirements:

Compare Freeze-Thaw Values to Control Flexural Strength (Max Stress) and Flexural Stiffness (MOE).

Test Results:

Freeze-Thaw Max Stress and MOE Flexural Strength Values MOSO Bamboo Decking X-treme/Thermo.

No.	Maximum Load (lbs)	Maximum Stress (psi)	Modulus of Elasticity (psi)
1	849.6	8883	1848809
2	907.5	9657	1778590
3	838.8	8718	1832964
4	937.6	11125	2150298
5	976.7	10223	1775513
Mean:	**902.0**	**9721.2**	**1877234.8**
Std. Dev.:	**58.3**	**991.9**	**156052.5**
CV:	**0.0647**	**0.1020**	**0.0831**

FREEZE-THAW MOSO Bamboo Decking X-treme/Thermo:

Max Stress: 9,721 psi CHANGE: 4.9%
MOE: 1,877,235 psi CHANGE: 4.8%

Max Stress % Change < 10%, MOE % Change < 10% no end use adjustment factor required.

3.0 BIODETERIORATION TESTING

Test Procedure: Testing was conducted in accordance with Section 4.8 of ASTM D7032 for fungal and termite resistance.

3.1 FUNGAL DECAY RESISTANCE

MOSO Bamboo Decking X-treme/Thermo were evaluated for fungal decay resistance following method AWPA Standard E10 by Louisiana Forest Products Development Center (International Accreditation Services, Inc. TL-350).

Test Requirements

Test samples are to show decay resistance to equivalent to that of preservative-treated or the heartwood of naturally durable wood used in identical applications, as measured by visual inspection and average weight loss.

Test Results

Findings by Louisiana Forest Products Development Center found MOSO Bamboo Decking X-treme/Thermo products exhibited good resistance to the decay fungi compared with the untreated pine and sweetgum controls and comply with ICC-ES AC174 and ASTM D7032

See Louisiana Forest Products Development Center test report WDL-2023-14b dated 09/15/2023 found in Appendix A.

3.2 TERMITE RESISTANCE

MOSO Bamboo Decking X-treme/Thermo was evaluated for termite resistance following method ASTM D3345-17 by Louisiana Forest Products Development Center (International Accreditation Services, Inc. TL-350).

Test Requirements

Visual inspection of the test specimens shall demonstrate resistance to termite attack equivalent to that of preservative treated or the heartwood of naturally durable wood used in identical applications.

Test Results

Findings by Louisiana Forest Products Development Center found MOSO Bamboo Decking X-treme/Thermo products exhibited strong resistance to termite attack with the termites exhibiting light attack on the machined surfaces of the test samples and comply with ICC-ES AC174 and ASTM D7032

See Louisiana Forest Products Development Center test report WDL-2023-14 dated 08/08/2023 found in Appendix B.

4.0 SURFACE BURNING CHARACTERISTICS

MOSO Bamboo Decking X-treme/Thermo products were evaluated to ASTM E84-21 to determine surface burning characteristics.

Test Requirements

Products evaluated are to have a flame spread index of < 200 evaluated to ASTM E84.

Test Results

MOSO Bamboo Decking X-treme/Thermo products surface burning characteristics are outlined below.

PRODUCT	FLAME SPREAD INDEX	SMOKE DEVELOPED INDEX
X-Treme decking	5	10

For further details, see QAI test report TUL0392-FT-1 issued July 2, 2023, found in Appendix C.

MOSO Bamboo Decking X-treme/Thermo when evaluated to ASTM E84-21 were found to have flame spread < 200.

5.0 DURATION OF LOAD

MOSO Bamboo Decking X-treme/Thermo of 0.8 inches thickness were evaluated to ICC-ES AC174 referencing ASTM D7021 Section 5.10.2 for duration of load, with 15 samples tested.

Specimens were loaded to two times the expected span load, increased by the applicable adjustment factors determined in Sections 1 and 2 of this report, determined based on the target of 100 psf design load at 24-inch span. The intended load for application was calculated based on simply supported beam theory, by determining the appropriate center point load for producing equivalent stress in a simply supported beam of the same geometric properties (ie, shape of the profile) as follows:

Required pressure resistance = 2 x 100 psf x worst case between strength and stiffness adjustment.
MOSO Bamboo Decking X-treme/Thermo: 2 x 100 psf * (1 + 9.4%) = 219 psf
219 lbs/ft^2 * Width (5.5 inches / 12 inches/ ft) = 100 lbs/ft applied load

Based on equivalent stress: $M_w y/I = M_{c+} y/I$

Where M_w = moment due to distributed line load (lbs/ft)
M_c = moment due to concentrated load (lbs)
y = distance to maximum stress from the neutral axis (Thickness / 2)
I = moment of inertia (in^4)

$M_w = M_c = (wL^2 / 8) = (PL/4)$

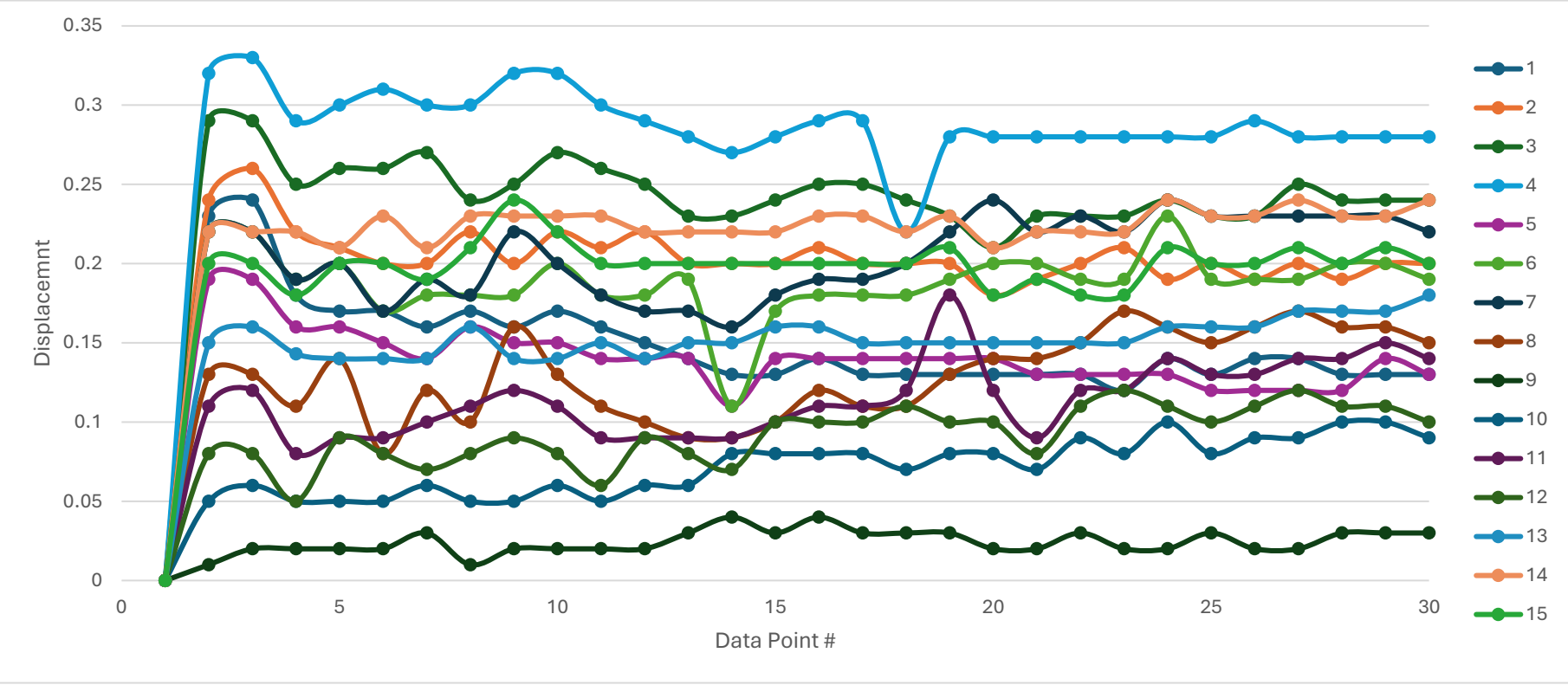
$P = w$

Based on the above 100 lbs center point load was applied to the MOSO Bamboo Decking X-treme/Thermo samples for duration of load evaluation.

Test Requirements
No failures, and no evidence of tertiary creep.

Test Results

MOSO Bamboo Decking X-treme/Thermo Duration of Load Test Summary.



No evidence of tertiary creep was found during creep loading of MOSO Bamboo Decking X-treme/Thermo as shown above.

6.0 CREEP RECOEVERY

MOSO Bamboo Decking X-treme/Thermo of 0.8 inches thickness were evaluated to ASTM D7032 Section 5.4 for duration of load, with 3 samples tested.

Specimens were loaded to two times the expected span load, increased by the applicable adjustment factors determined in Sections 1 and 2 of this report, determined based on the target of 100 psf design load at 24-inch span. The intended load for application was calculated based on simply supported beam theory, by determining the appropriate center point load for producing equivalent stress in a simply supported beam of the same geometric properties (ie, shape of the profile) as follows:

Based on equations, outlined in Duration of Load section of this report, 100 lbs center point load was applied to the MOSO Bamboo Decking X-treme/Thermo samples for creep recovery.

Test Requirements

The average Percent recovery shall be no less than 75%

Test Results

Sample #	no load	initial loading	24 hours loaded	Initial unloaded	24 hours unloaded	Percent Recovery
1	5.03	5.09	5.16	5.08	5.09	98.81%
2	5.13	5.15	5.15	5.09	5.10	99.42%
3	5.06	5.15	5.16	5.09	5.10	99.21%
Average	5.07	5.13	5.16	5.09	5.10	99.14%

MOSO Bamboo Decking X-treme/Thermo was found to have greater than 75% recovery after duration of load evaluation.

7.0 DECKBOARD PERFORMANCE RATINGS

Deck board performance ratings were determined for MOSO Bamboo Decking X-treme/Thermo products to determine unadjusted allowable load including use as stair tread, and mechanical holding capacity. Mechanical holding was done to ASTM E330 per ASTM D7032, a max of 300 FS was applied.

MOSO Bamboo Decking X-treme/Thermo factors determined in section 1 and 2 of this report are outlined below:

PRODUCT	FLEXURAL ADJUSTMENT (WORST-CASE)		END USE ADJUSTMENT (WORST-CASE)	
	STRENGTH	STIFFNESS (MOE)	STRENGTH	STIFFNESS (MOE)
MOSO Bamboo Decking X-treme/Thermo	9.3[1]	2.4[2]	0[3]	0[3]

Note 1: Strength flexural adjustment is based off worst case value determined from high temperature exposure.
Note 2: Stiffness flexural adjustment is based off worst case value determined from high temperature exposure.
Note 3: End Use adjustment did not exceed 10% loss, no end use strength adjustment applied.
Note 4: End Use adjustment did not exceed 10% loss, no end use strength adjustment applied.

7.1. ADJUSTED ALLOWABLE LOAD DETERMINATION-DECKBOARDS

28 samples each of MOSO Bamboo Decking X-treme/Thermo products were cut to 26'' length and placed at standard conditioning.

Following, the samples were tested following ASTM D6109 at 24'' span, and ultimate load, Max Stress, MOE, and load at L/180 span recorded.

From the determined loads noted above, the equivalent applied pressure (psf) was determined following general engineering principles for stress determination in simply supported beams, converting the stress induced through third point loading to equivalent pressure (psf) based on the formulas:

$Stress_{CENTER\ POINT} = Stress_{UNIFORM}$

$Stress = M*y/I$

Where M = Maximum moment due to loading type (lbs*ft).
y = distance perpendicular from neutral axis to outer edge (ft).
I = moment of inertia of section about the neutral axis (ft^4).

Following

$Stress_{CENTER\ POINT} = Stress_{\omega}$

Where Maximum Moment Center Point Bending Stress = PL / 4
Where P = Max Test Load (lbs)
L = Test Span (ft)

Maximum Uniform Load = $\omega L^2 / 8$
Where ω = Uniform Load (lbs /ft)

Thus: $((PL / 4) * y) / I = ((\omega L^2 / 8) * y) / I$

Solving for $\omega = (P*8) / (L * 4)$: lbs/ft

Therefore $\omega = (P*2) / L$: lbs/ft

Converting to psf = (ω * 12 inches / 1 ft) / Width (ft) = Allowable Pressure (psf)

Test Requirements

Unadjusted Allowable Load Based is Lesser between Flexural Strength / 2.5 and Load @ 1/180 Deflection
Adjusted Allowable Load = Unadjusted Allowable Load x Factors from Sections 1 and 2 of this report outlined below.

PRODUCT	STRENGTH ADJUSTMENT	STIFFNESS ADJUSTMENT
X-Treme decking	9.3%	2.4%

Adjusted Allowable Load > 100 psf @ 24 inches Span Deck board.

Test Results:

MOSO Bamboo Decking X-treme/Thermo Flexural Performance Results

No.	Load at Break (lbs)	Load at displacement: Span/180=.133in (lbs)	Maximum Load (lbs)	Maximum Stress (psi)	Modulus of Elasticity (psi)	Ultimate load (F.S.=2.5) (lbs)
1	507.1	230.3	879.4	8998	2107512	351.76
2	670.5	200.4	848.9	8915	1904999	339.56
3	218.4	184.4	892.7	9225	1712334	357.08
4	297.2	198	968.9	10041	1844326	387.56
5	757.2	228.8	1182.6	12065	2080395	473.04
6	603.9	195.3	1152.1	11987	1828305	460.84
7	529.1	221.2	756.6	7859	2071908	302.64
8	543.6	216.2	837	8761	2042996	334.8
9	249.4	195.8	692.1	7406	1914422	276.84
10	893.1	242.3	1174.9	12237	2279708	469.96
11	440.9	199.2	1085.3	11406	1901320	434.12
12	392.3	195.8	1147.9	11928	1830489	459.16
13	312.1	192.2	953.2	10058	1844653	381.28
14	244	202.7	922.5	9682	1925347	369
15	385.2	234.9	984.1	9958	2108808	393.64
16	189.3	205.7	1232.6	12827	1929465	493.04
17	516.5	215.6	825.1	8612	2028472	330.04
18	631.8	228.6	902.7	9438	2158364	361.08
19	577.9	203.4	1006	10659	1959392	402.4
20	133	183.2	947	9902	1724032	378.8
21	496.3	211.6	1064.6	10999	1954679	425.84
22	757.9	214.5	1102.6	11659	2056260	441.04
23	142.3	186.3	862	9582	1859040	344.8
24	337.7	203.8	914.9	9486	1899033	365.96
25	377.9	201.1	1019.8	13196	2351921	407.92
26	403.8	236.1	972.9	10262	2261951	389.16
27	310.5	193.3	882.4	9264	1838341	352.96
28	148.7	189	950	9917	1780832	380
Mean:	**431.0**	**207.5**	**970.0**	**10226.0**	**1971403.7**	**388.0**
Std. Dev.:	**8316.3**	**16.9**	**134.1**	**1477.2**	**163730.0**	**53.6**
CV:	**19.2960**	**0.081**	**0.138**	**0.144**	**0.083**	**0.138**

Unadjusted Maximum Load: 388 lbs Unadjusted Load @ L/180: 208 lbs
Adjusted Maximum load based on Strength Reductions: 354 lbs.
Adjusted Load @ L/180 based on Stiffness: 205 lbs.
Factor of safety (F.S.): 2.5

(207 lbs x .986) = 205 lbs/ft = ω
205 lbs/ft x (5.5 inches / 12 inches/ ft) =446 psf allowable load.

205 lbs center point loading = 446 psf pressure for equivalent stress > 100 psf target at 24'' on center spacing.

7.2 ADJUSTED ALLOWABLE LOAD DETERMINATION-STAIR TREAD

28 samples of MOSO Bamboo Decking X-treme/Thermo products were cut to 17'' length and placed at standard conditioning.

Following, the samples were supported at 16 inches span, and a concentrated load applied at the edge of the stair tread sample over a 4 $inch^2$ square area at midspan. The load required to achieve 0.125 inch deflections were recorded.

Test Requirements

Deck board products used as stair tread, are to resist an applied load of 750 lbs, with adjustments based on strength determined in Sections 1 and 2 of this report applied.

Deck board products used as stair treads are to have a minimum load capacity of 300 lbs at 0.125'' deflection, with adjustments based on stiffness determined in Sections 1 and 2 of this report applied.

The minimum adjusted load requirements for MOSO Bamboo Decking X-treme/Thermo products are outlined below:

PRODUCT	MINIMUM STAIR TREAD LOAD CAPACITY (lbs) ADJUSTED WITH 9.4% STRENGTH	MINIMUM LOAD REQUIRED @ 0.125'' DEFLECTION (lbs) ADJUSTED 2.4% STIFFNESS
MOSO Bamboo Decking X-treme/Thermo	820	307

Test Results:

MOSO Bamboo Decking X-treme/Thermo Stair Tread Performance Results

	Deflection	Maximum	Load at Deflection:	Ultimate Load
	at 300.0 lbs	Load	0.125 in	F.S.: (2.5)
No.	(in)	(lbs)	(lbs)	(lbs)
1	0.06539	1352	563.9	540.8
2	0.05914	1676.1	599.8	670.44
3	0.06836	1377	536.7	550.8
4	0.05934	1357.5	604.1	543
5	0.06599	1240.6	563	496.24
6	0.07459	1295.6	495.1	518.24
7	0.05311	1761.6	640.3	704.64
8	0.05644	1632.6	620.6	653.04
9	0.06133	1422.1	579.1	568.84
10	0.06962	1080.4	531.8	432.16
11	0.06397	1510.6	576.9	604.24
12	0.05507	1636.3	627	654.52
13	0.06404	1365.1	576.6	546.04
14	0.05832	1541.8	592.8	616.72
15	0.06763	1699.9	545.9	679.96
16	0.06937	1401.6	537	560.64
17	0.06274	1657.5	586	663
18	0.05976	1556	585.9	622.4
19	0.06914	1478.5	532.9	591.4
20	0.06388	1808.7	576.2	723.48
21	0.04874	2047.9	690.9	819.16
22	0.05497	1693.9	624.8	677.56
23	0.05398	1640.1	632.8	656.04
24	0.07427	1332.5	495.8	533
25	0.04881	2161.7	696.1	864.68
26	0.0605	1528.7	581.2	611.48
27	0.06243	1651.4	576.3	660.56
28	0.06864	1422	535.9	568.8
Mean:	**0.062**	**1547.5**	**582.3**	**619.0**
Std. Dev.:	**0.007**	**233.1**	**49.2**	**93.3**
CV:	**0.1111**	**0.1507**	**0.0845**	**0.1507**

Moso Average Ultimate Load: 1547 lbs > 820 lbs requirements. Complies.

Moso Unadjusted Load @ 0.125” deflection: 582 lbs > 307 lbs requirement. Complies.

MOSO Bamboo Decking X-treme/Thermo has met requirements for use as stair treads at 16’’ span.

7.3 MECHANICAL FASTNER TEST

MOSO Bamboo Decking X-treme/Thermo products outlined in this report are supplied with fasteners provided with fastener systems as outlined below:

PRODUCT	FASTENER TYPE	INSTALLATION DESCRIPTION
MOSO Bamboo Decking X-treme/Thermo	Stainless steel proprietary hidden clip for installation of MOSO Bamboo Decking X-treme/Thermo.	X-Treme hidden clips fastened using one #8 x 1-1/4" stainless steel wood screw at each joist location.

Decks of minimum 4’ x 8’ size were constructed, with 2-inch x 6-inch Southern Yellow Pine (SYP) joists spaced at 24’’ on center used as supports for installation of the deck board samples.

Test assemblies were constructed and tested for fastener capacity in accordance with ASTM E330-14 by QAI Laboratories Inc., Medley, FL facility.

Installation Instructions can be found in Appendix G of this test report.

Test Requirements:

Uplift resistance = ultimate load with a factor of safety of 3.0 applied.

Test Results:

Results of testing MOSO Bamboo Decking X-treme/Thermo products are outlined below.

TEST#	MOSO Bamboo Decking X-treme/Thermo
Assembly 1 (psf)	300
Assembly 2 (psf)	300
Assembly 3 (psf)	300
Average (psf)	300
Allowable Uplift (psf)	**100 psf**

Additional details can be found in QAI Laboratories Test report TUL-0392 dated January 5th, 2024 found in Appendix D

MOSO Bamboo Decking X-treme/Thermo was found to have an allowable uplift resistance of 100 psf when installed with X-Treme stainless steel hidden clip at each joist location, anchored with a #8 1-1/4-inch length coarse thread wood screw.

8.0 STATIC COEFFIDIENT OF FRICTION

.

Test Procedure: Testing was done in accordance with ASTM D7032 referencing ASTM D2047.

Testing Requirements

The test was conducted to evaluate the Friction coefficient of the samples in various orientations.

Test Results

TEST#	Coefficient of Friction
Smooth dry[1]	0.79
Smooth wet[1]	1.14
Grooved dry[2]	0.83
Grooved wet[2]	1.07

1: Additional details can be found in QAI Laboratory test report TUL0392-6.1 dated July 5th, 0223 found in Appendix E of this report.
2: Additional details can be found in QAI Laboratory test report TUL0392-6.2 dated July 5th, 2023 found in Appendix F of this report.

APPENDIX A – Fungal Decay Report WDL-2020-12a dated 14/1/2021 by Louisiana Fore Products Development Center

Report: WDL-2023-14b

Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures on TUL0392 Wood Plastic Composite Outdoor Decking

Report #: WDL-2023-14b

Final Report To:

Michael Lowry
QAI - Operations Manager - Tulsa

Submitted By:

Wood Durability Lab
Louisiana Forest Products Development Center
School of Renewable Natural Resources
LSU Agricultural Center
Baton Rouge, LA 70803
Tel. (225)578-4255
Fax (225)578-4251

September 15, 2023

We kindly request that all public references to the content of this report be attributed to "LSU AgCenter's Wood Durability Laboratory."

Statements of conformity and the decision rule to specifications are not made or implied in this report. Please review the results, expand uncertainty, and specifications to ensure they meet your requirements.

Report: WDL-2023-14b

TABLE OF CONTENTS

SIGNATORIES……..……...…….....….3

BACKGROUND……...……..4

OBJECTIVES……..……..…..…….5

MATERIALS AND METHODS……..……..……..……..….5

RESULTS.....……..……5

CONCLUSIONS….……..…….……6

REFERENCES CITED……...……...…….6

RESULT TABLES……..……...……....……7

FIGURES…….,…...8

APPENDIX A: IAS CERTIFICATE OF ACCREDITATION……..……...10

.

END OF REPORT……13

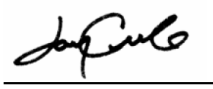
Report: WDL-2023-14b

Report approved by:

Date: 9/15/23

Q.Wu, Ph.D.
Professor, Wood Science
Wood Durability Laboratory, Quality Manager
Phone: (225) 578-8369
Fax: (225) 578-4251
E-mail: qwu@agcenter.lsu.edu

Report prepared by:



Date: 9/11/23

J.P. Curole
Research Associate
Phone: (225) 578-4157
Fax: (225) 578-4251
E-mail: jcurole@agcenter.lsu.edu

Report: WDL-2023-14b

Background

The Wood Durability Laboratory (WDL) at the LSU AgCenter became an ISO 17025 accredited laboratory through the International Accreditation Services (IAS) accreditation system on March 1, 2008. Additional test standards were added by IAS to the WDL approved scope of services on July 24th, 2008, November 20th, 2009, May 31st, 2012, January 24th, 2014, March 31st, 2016, July 26th, 2016, June 6th, 2018, April 28th, 2020, and March 3rd, 2022 (Table 1). The lab has been operating under ISO 17025 Guidelines for over ten years. This report is a compliance with ICC-ES AC85. This report has not been reviewed by a licensed professional engineer nor a third party skilled in the art. Samples and information sheets on traceability of samples were provided by the sponsor and verified at the time of sample creation. The results from this test only relate to the items tested.

Table 1. Current scope and WDL test methods accredited by IAS.

IAS Accreditation Number:	**TL-350**
Accredited Entity:	Wood Durability Laboratory
Address:	227 Renewable Natural Resources Louisiana State University Baton Rouge, Louisiana 70803
Contact Name:	Dr. Qinglin Wu, Director
Telephone:	(225) 578-8369
Effective Date of Scope of Accreditation:	March 3rd, 2022
Accreditation Standard:	ISO/IEC Standard 17025:2017

Fields of Testing	**Accredited Test Methods**
Wood testing	ASTM Standards D143[2], D1037[2] (Compression Parallel to surface, section 12 excluded), D2395[8], D3043[5] (Methods A & D only), D3201[10], D3500[10], D4442[8], and D5456[5] (Test methods referenced in Annex A3 & A4); AC257[3] test methods referenced in Section 4.0, excluding 4.3.1.1, 4.3.1.2, 4.3.1.4, & 4.3.2.2)
Wood preservatives	ASTM Standards D2481[3], D3273[5], D3345[1], D4442[8], D4445[3], D5516[4], and D5664[10] AWPA Standards E1[1], E5[3], E7[1], E9[3], E10[1], E11[1], E12[1], E16[3], E18[3], E20[6], E21[4], E22[2], E23[2], E24[1], E26[4] and E29[5] WDMA Standards TM-1[1] and TM-2[1] WDL-SOP-25[6] – Field Evaluation of Termiticide against Subterranean Termites AC380[7] test methods referenced in Sections 3, 4.1, 4.2 and 4.3, excluding 4.4.1 through 4.4.9)

Approved: [1]March 1, 2008, [2]July 24, 2008, [3]November 20, 2009, [4]May 31, 2012, [5]January 24, 2014, [6]March 31, 2016, [7]July 26, 2016, [8]June 6, 2018, [9]April 28, 2020, and [10]March 3, 2022.

Report: WDL-2023-14b

OBJECTIVES

The objective of this study was to evaluate a TUL0392 WPC Outdoor Decking product, untreated southern pine, untreated sweetgum, and MCA treated reference control for prevention of decay attack in an AWPA E10-22 soil-block culture test.

Table 2. TUL0392 WPC Outdoor Decking samples plus untreated control samples.

ID	Controls	Fungus
1-10	Untreated Pine	GT
11-20	Untreated Pine	PP
41-45	MCA treated lumber	GT
46-50	MCA treated lumber	PP
21-25	TUL0392	GT
26-30	TUL0392	PP

ID	Controls	Fungus
21-30	Untreated Sweetgum	TV
31-40	Untreated Sweetgum	IL
51-55	MCA treated lumber	TV
56-60	MCA treated lumber	IL
51-55	TUL0392	TV
56-60	TUL0392	IL

MATERIALS AND METHODS

Testing procedures used were based on the AWPA E10-22 "Standard Method of Wood Preservatives by Laboratory Soil-Block Cultures" (AWPA 2023). Decay fungi were obtained from the USDA FPL, Madison, Wisconsin, consisting of *Gloeophyllum trabeum*, *Postia placenta*, *Trametes versicolor*, and *Irpex lacteus*. The decay fungi were grown on agar media for two weeks prior to being placed into the testing bottles (on the top of each feeder strip). After a two-week growing period in the testing bottles (allowing the fungi to grow on the feeder strip); test samples were placed on top of the feeder strips. Substrates used were southern pine for brown rot decay and sweetgum for white rot decay. Five samples were tested per group.

RESULTS

The data obtained were analyzed for termite resistance with means and standard deviations (SPSS 25). The Least Significant Difference (LSD) mean separation test procedure was used (Steel and Torrie 1980). Different capital letters following each data value within columns indicate that significant differences were found at the significance level $\alpha = 0.05$. Significant differences were not found among treatments when means shared the same letters within columns. All data and records collected during the tests are maintained and are available upon request per ISO 17025 Lab Guidelines.

Table 3 summarizes the brown rot fungi data and white rot fungi data for weight loss. Figure 1 shows plots of the individual groups against the brown rot decay fungi. Figure 2 shows plots of the individual groups against the white rot decay fungi.

1. *Gloeophyllum trabeum* – The pine controls had the largest weight loss of 42.75%. The TUL0392 WPC Outdoor Decking averaged 4.58% weight loss. The MCA control had 4.27% weight loss. The pine controls are significantly different from the other two groups at $\alpha=0.05$.

2. *Postia placenta* – The pine controls had the largest weight loss of 40.22%. The TUL0392 WPC Outdoor Decking averaged 4.72% weight loss. The MCA control had 11.21% weight loss. All groups are significantly different from one another at α=0.05.

3. *Trametes versicolor* – The sweetgum controls had the largest weight loss at 85.76%. The TUL0392 WPC Outdoor Decking averaged 4.64% weight loss. The MCA controls had 4.13% weight loss. The sweetgum controls are significantly different from the other two groups at α=0.05.

4. *Irpex lacteus* - The sweetgum controls had the largest weight loss at 66.94%. The TUL0392 WPC Outdoor Decking averaged 5.08% weight loss. The MCA controls had 4.13% weight loss. The sweetgum controls are significantly different from the other two groups at α=0.05.

It needs to be pointed out that there was surface damage observed from the WPC samples. Thus, the small observed weight loss (~5% by weight) could be from variability in estimating dry sample weight in calculating actual moisture content and sample weight loss. There could be also some small amount of the WPC formulation material, which is leached out of samples during testing and changed sample weight, see Figure 3.

CONCLUSIONS

The TUL0392 WPC Outdoor Decking samples had around 5% sample weight loss. This test demonstrated that the TUL0392 WPC Outdoor Decking had good resistance to decay fungi. The MCA treated wood group had about the same weight loss values (from 4.13% to 11.21%) as the TUL0392 WPC group had. The MCA samples performed as expected and had similar weight losses as in previous tests. The untreated control wood showed high sample weight loss (from 40.22 to 42.75% for pine control and from 66.94% to 85.76% for sweetgum control), indicating that the fungi used were of high vigor and the data are valid.

REFERENCES CITED

American Wood Protection Association (AWPA). 2023. Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures (E10-22). 2023 book of standards. Birmingham, AL.

American Society for Testing and Materials Standard Test Method for Wood Preservatives by Laboratory Soil-block Cultures (ASTM 1413).

SPSS 27 for Windows. 2023. Chicago, IL.

Steel, R.G.D. and J.H. Torrie. 1980. Principle and procedures of statistics – A biometrical approach. 2nd edition. McGraw Hill. New York. 633.

Report: WDL-2022-13b

Table 3. Summary data for weight loss % for brown rot fungi and white rot fungi.

WDL-2023-14b QAI			
Brown Rot Weight Loss Stats			
Group ID	**BR Decay**	**Weight Loss %**	**LSD Group**
Untreated Sweetgum	*Gloeophyllum trabeum*	42.75%	
Treated MCA		4.27%	
TUL0392		4.58%	

Group ID	**BR Decay**	**Weight Loss %**	**LSD Group**
Untreated Sweetgum	*Postia placenta*	40.22%	
Treated MCA		11.21%	
TUL0392		4.72%	

WDL-2023-14b QAI			
White Rot Weight Loss Stats			
Group ID	**WR Decay**	**Weight Loss %**	**LSD Group**
Untreated Sweetgum	*Trametes versicolor*	85.76%	
Treated MCA		4.13%	
TUL0392		4.64%	

Group ID	**WR Decay**	**Weight Loss %**	**LSD Group**
Untreated Sweetgum	*Irpex lacteus*	66.94%	
Treated MCA		4.01%	
TUL0392		5.08%	

*Weight loss values sharing a capitol LSD letter are not significantly different at α=0.05.

Report: WDL-2022-13b

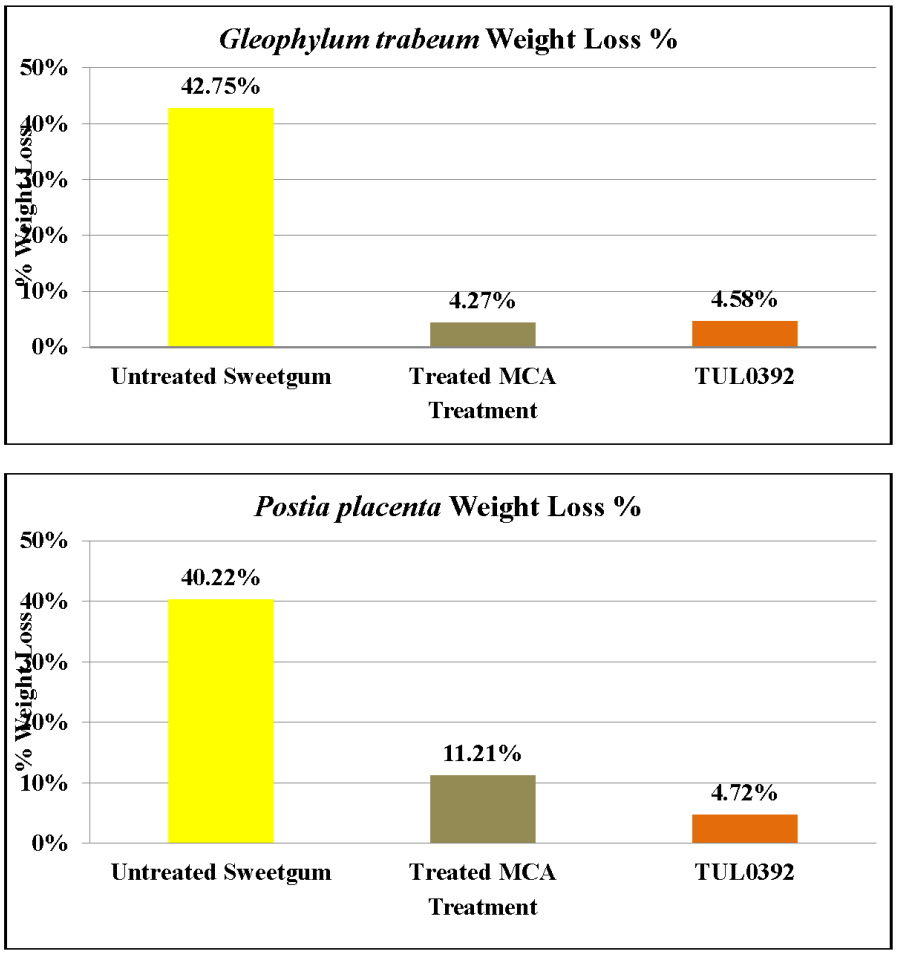


Figure 1. Graphs of means for percent weight loss tested against *Gloeophyllum trabeum* and *Postia placenta* brown rot fungi for 16 weeks.

Report: WDL-2022-13b

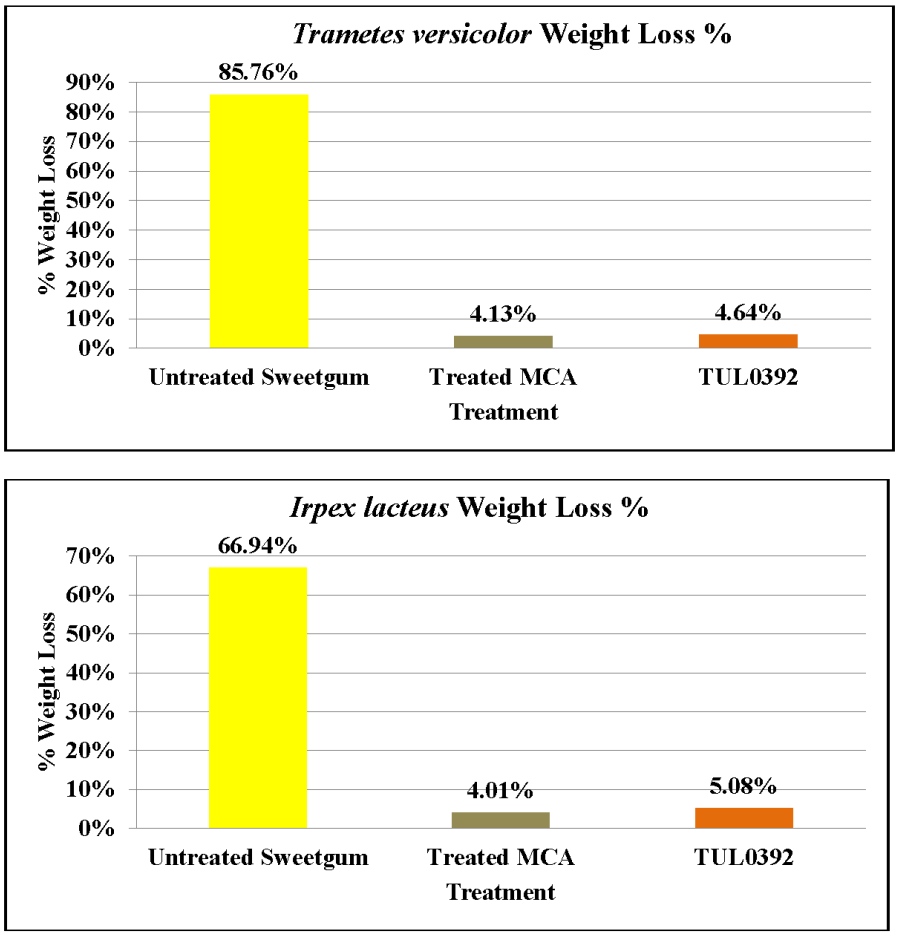


Figure 2. Graph of means for percent weight loss tested against *Trametes versicolor* and *Irpex lacteus* white rot fungi for 16 weeks.

Report: WDL-2022-13b

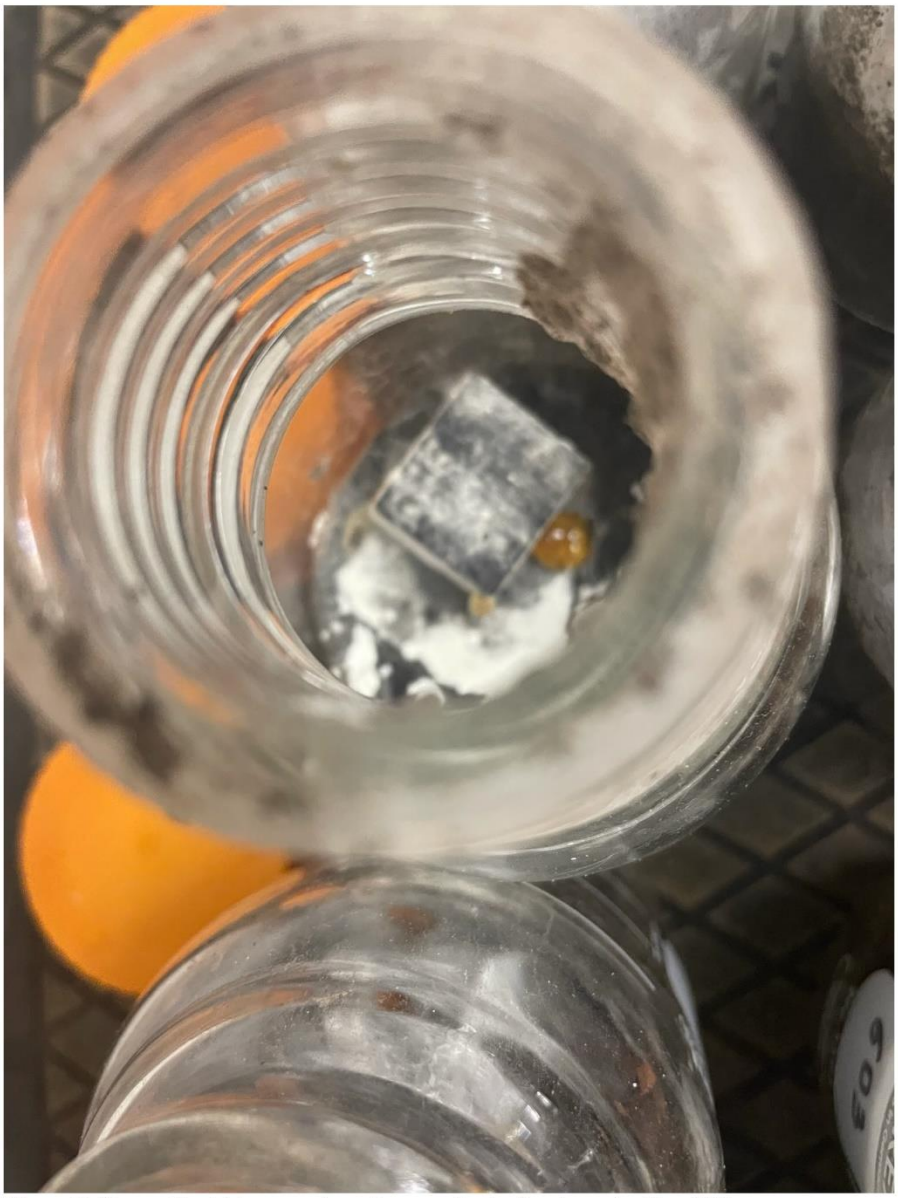


Figure 3. Brown liquid is present on the samples in the decay bottles. This was seen on most, if not all the TUL0392 WPC Outdoor Decking samples.

Report: WDL-2022-13b

INTERNATIONAL ACCREDITATION SERVICE®

CERTIFICATE OF ACCREDITATION

This is to attest that

WOOD DURABILITY LABORATORY
227 RENEWABLE NATURAL RESOURCES, LOUISIANA STATE UNIVERSITY
BATON ROUGE, LOUISIANA 70803, U.S.A.

Testing Laboratory TL-350

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date July 9, 2020

IAS ACCREDITED

President

Visit www.iasonline.org for current accreditation information.

Report: WDL-2022-13b

SCOPE OF ACCREDITATION

International Accreditation Service, Inc.
3060 Saturn Street, Suite 100, Brea, California 92821, U.S.A. | www.iasonline.org

WOOD DURABILITY LABORATORY

Contact Name Dr. Qinglin Wu **Contact Phone** +225 578-8369

Accredited to ISO/IEC 17025:2017 *Effective Date July 9, 2020*

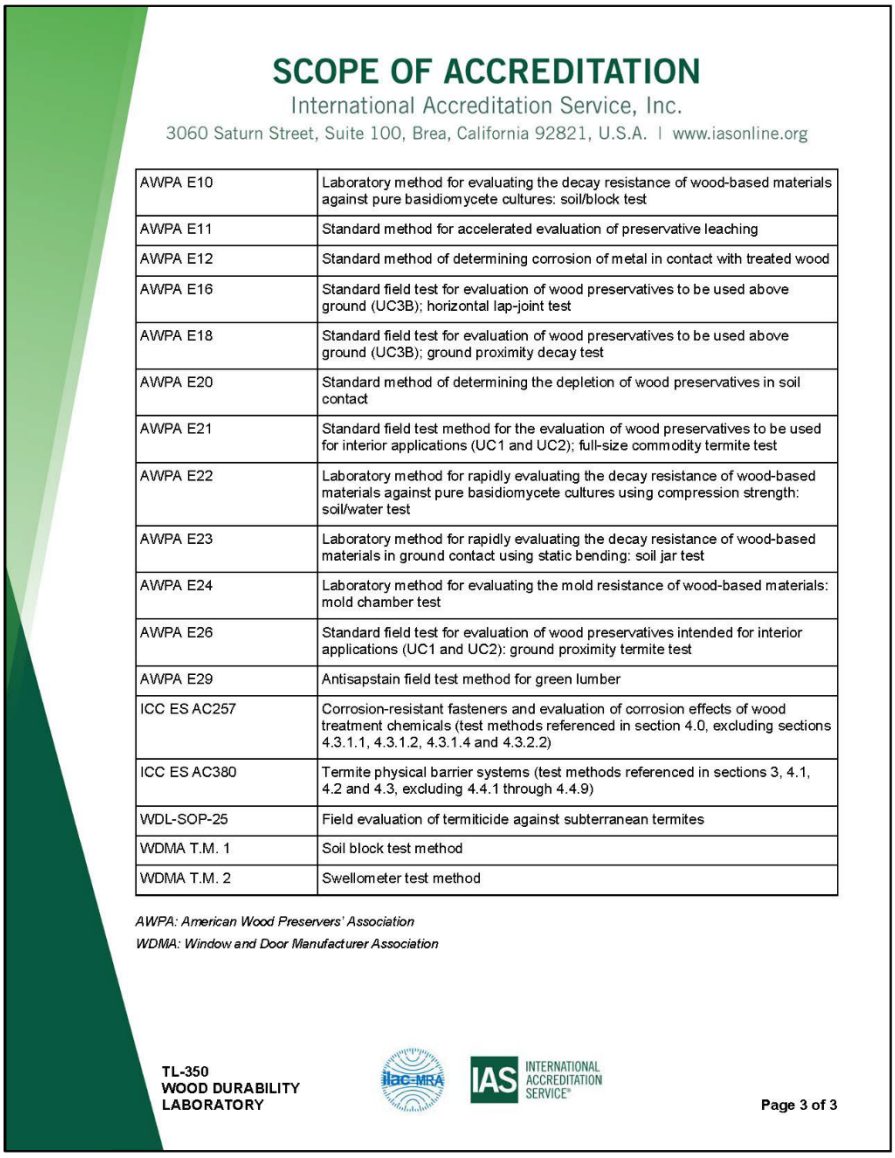
Physical	
ASTM D143	Standard test methods for small clear specimens of timber
ASTM D1037	Standard test methods for evaluating properties of wood-base fiber and particle panel materials (compression parallel to surface, section 12, excluded)
ASTM D2395	Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials
ASTM D2481	Standard test method for accelerated evaluation of wood preservatives for marine services by means of small size specimens
ASTM D3043	Standard test methods for structural panels in flexure (methods A and D only)
ASTM D3273	Standard test method for resistance to growth of mold on the surface of interior coatings in an environmental chamber
ASTM D3345	Standard test method for laboratory evaluation of wood and other cellulosic materials for resistance to termites
ASTM D4442	Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials
ASTM D4445	Standard test method for fungicides for controlling sapstain and mold on unseasoned lumber (laboratory method)
ASTM D5456	Standard specification for evaluation of structural composite lumber products (test methods referenced in annex A3 and A4 only)
ASTM D5516	Standard test method for evaluating the flexural properties of fire-retardant treated softwood plywood exposed to elevated temperatures
AWPA E1	Laboratory methods for evaluating the termite resistance of wood-based materials: choice and no-choice tests
AWPA E5	Standard test method for evaluation of wood preservatives to be used in marine applications (UC5A, UC5B, UC5C); panel and block tests
AWPA E7	Standard field test for evaluation of wood preservatives to be used in ground contact (UC4A, UC4B, UC4C); stake test
AWPA E9	Standard field test for the evaluation of wood preservatives to be used above ground (UC3A and UC3B); L-joint test

TL-350
WOOD DURABILITY
LABORATORY

ilac-MRA IAS INTERNATIONAL ACCREDITATION SERVICE®

Page 2 of 3

Report: WDL-2022-13b



SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

3060 Saturn Street, Suite 100, Brea, California 92821, U.S.A. | www.iasonline.org

AWPA E10	Laboratory method for evaluating the decay resistance of wood-based materials against pure basidiomycete cultures: soil/block test
AWPA E11	Standard method for accelerated evaluation of preservative leaching
AWPA E12	Standard method of determining corrosion of metal in contact with treated wood
AWPA E16	Standard field test for evaluation of wood preservatives to be used above ground (UC3B); horizontal lap-joint test
AWPA E18	Standard field test for evaluation of wood preservatives to be used above ground (UC3B); ground proximity decay test
AWPA E20	Standard method of determining the depletion of wood preservatives in soil contact
AWPA E21	Standard field test method for the evaluation of wood preservatives to be used for interior applications (UC1 and UC2); full-size commodity termite test
AWPA E22	Laboratory method for rapidly evaluating the decay resistance of wood-based materials against pure basidiomycete cultures using compression strength: soil/water test
AWPA E23	Laboratory method for rapidly evaluating the decay resistance of wood-based materials in ground contact using static bending: soil jar test
AWPA E24	Laboratory method for evaluating the mold resistance of wood-based materials: mold chamber test
AWPA E26	Standard field test for evaluation of wood preservatives intended for interior applications (UC1 and UC2): ground proximity termite test
AWPA E29	Antisapstain field test method for green lumber
ICC ES AC257	Corrosion-resistant fasteners and evaluation of corrosion effects of wood treatment chemicals (test methods referenced in section 4.0, excluding sections 4.3.1.1, 4.3.1.2, 4.3.1.4 and 4.3.2.2)
ICC ES AC380	Termite physical barrier systems (test methods referenced in sections 3, 4.1, 4.2 and 4.3, excluding 4.4.1 through 4.4.9)
WDL-SOP-25	Field evaluation of termiticide against subterranean termites
WDMA T.M. 1	Soil block test method
WDMA T.M. 2	Swellometer test method

AWPA: American Wood Preservers' Association

WDMA: Window and Door Manufacturer Association

TL-350
WOOD DURABILITY
LABORATORY

ILAC-MRA IAS INTERNATIONAL ACCREDITATION SERVICE®

Page 3 of 3

Report: WDL-2022-13b

END OF REPORT

APPENDIX B – Termite Resistance Report WDL-2023-14 dated 08/08/2023 by Louisiana Fore Products Development Center

Report: WDL-2023-14

Formosan Subterranean Termite Resistance Study of Wood Plastic Composite Outdoor Decking and Untreated Southern Pine Control

WDL Report #: WDL-2023-14

Michael Lowry
QAI - Operations Manager - Tulsa

Submitted By:

Wood Durability Lab
Louisiana Forest Products Development Center
School of Renewable Natural Resources
LSU Agricultural Center
Baton Rouge, LA 70803
Tel. (225) 578-4131
Fax (225) 578-4251

August 8, 2023

Report: WDL-2023-14

TABLE OF CONTENTS

SIGNATORIES……..……...…….....….3

BACKGROUND……..……..4

OBJECTIVES……..……..…....……..5

MATERIALS AND METHODS……..……..……..…..…..5

RESULTS.....……..……6

CONCLUSIONS…..……..…….7

REFERENCES CITED……...……...…….8

FIGURES……...…….9

APPENDIX A: IAS CERTIFICATE OF ACCREDITATION……..10

END OF REPORT……13

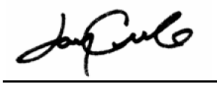
Report: WDL-2023-14

Report approved by:

Date: 8/8/23

Q.Wu, Ph.D.
Professor, Wood Science
Wood Durability Laboratory Director
Phone: (225) 578-8369
Fax: (225) 578-4251
E-mail: qwu@agcenter.lsu.edu

Report prepared by:



Date: 8/8/23

J.P. Curole
Research Associate
Wood Durability Technical Manager
Phone: (225) 578-4157
Fax: (225) 578-4251
E-mail: jcurole@agcenter.lsu.edu

Report: WDL-2023-14

Background

The Wood Durability Laboratory (WDL) at the LSU AgCenter became an ISO 17025 accredited laboratory through the International Accreditation Services (IAS) accreditation system on March 1, 2008. Additional test standards were added by IAS to the WDL approved scope of services on July 24th, 2008, November 20th, 2009, May 31st, 2012, January 24th, 2014, March 31st, 2016, July 26th, 2016, June 6th, 2018, April 28th, 2020, and March 3rd, 2022 (Table 1). The lab has been operating under ISO 17025 Guidelines for over ten years. This report is compliant with ICC-ES AC85. This report has not been reviewed by a licensed professional engineer nor a third party skilled in the art. Samples and information sheets on traceability of samples were provided by the sponsor and verified at the time of sample creation. The results from this test only relate to the items tested.

Table 1. Current scope and WDL test methods accredited by IAS.

IAS Accreditation Number:	**TL-350**
Accredited Entity:	Wood Durability Laboratory
Address:	227 Renewable Natural Resources Louisiana State University Baton Rouge, Louisiana 70803
Contact Name:	Dr. Qinglin Wu, Director
Telephone:	(225) 578-8369
Effective Date of Scope of Accreditation:	March 3rd, 2022
Accreditation Standard:	ISO/IEC Standard 17025:2017

Fields of Testing	**Accredited Test Methods**
Wood testing	ASTM Standards D143[2], D1037[2] (Compression Parallel to surface, section 12 excluded), D2395[8], D3043[5] (Methods A & D only), D3201[10], D3500[10], D4442[8], and D5456[5] (Test methods referenced in Annex A3 & A4); AC257[3] test methods referenced in Section 4.0, excluding 4.3.1.1, 4.3.1.2, 4.3.1.4, & 4.3.2.2)
Wood preservatives	ASTM Standards D2481[3], D3273[5], D3345[1], D4442[8], D4445[3], D5516[4], and D5664[10] AWPA Standards E1[1], E5[3], E7[1], E9[3], E10[1], E11[1], E12[1], E16[3], E18[3], E20[6], E21[4], E22[2], E23[2], E24[1], E26[4] and E29[5] WDMA Standards TM-1[1] and TM-2[1] WDL-SOP-25[6] – Field Evaluation of Termiticide against Subterranean Termites AC380[7] test methods referenced in Sections 3, 4.1, 4.2 and 4.3, excluding 4.4.1 through 4.4.9)

Approved: [1]March 1, 2008, [2]July 24, 2008, [3]November 20, 2009, [4]May 31, 2012, [5]January 24, 2014, [6]March 31, 2016, [7]July 26, 2016, [8]June 6, 2018, [9]April 28, 2020, and [10]March 3, 2022.

Report: WDL-2023-14

OBJECTIVES

The objective of this study was to evaluate one treated wood product and untreated southern pine control for prevention of Formosan subterranean termite (*Coptotermes formosanus*) feeding in an AWPA E1 no-choice test.

Table 2. Identification of the WPC plus controls.

WDL-2023-14 Termite Test		
Treatment	**Sample ID**	**MC Sample ID**
Untreated Pine	1-5	1-5mc
TUL0392	6-10	6-10mc

MATERIALS AND METHODS

Procedure

The test was performed in accordance with American Wood Protection Association (AWPA) E1-23 Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites (AWPA 2023). The no-choice method was used. The test started on 7/7/23 and was completed on 8/4/23. The experiment consisted of 5 wood product samples and 5 southern pine sapwood untreated controls. The TUL0392 wood product samples were milled into 1 x 1 x panel thickness (3/4") and the pine controls were precisely machined into 1 x 1 x ¼ in. test specimens.

Each test jar contained 150 grams of autoclaved sand and 30 milliliters of distilled water. A sample was placed in each jar on top of the sand with an aluminum barrier to prevent chemical leaching into the sand. Four hundred termites were introduced to each jar on the side opposite to the sample. Termites were obtained from USDA Laboratory in New Orleans on 7/6/23 and added to the E1-17 test on7/7/23. Samples of termites were taken, weighed and the average weight per termite was determined to be 0.00458 grams per termite. Therefore, each jar contained 1.83 grams of termites determined by weight.

After 28 days of exposure, the samples were removed and cleaned with distilled water. The following AWPA E-1 Rating Scale was used to visually rate each sample.

10 Sound
9.5 Trace, surface nibbles permitted
9 Slight attack, up to 3% of cross-sectional area affected
8 Moderate attack, 3-10% of cross-sectional area affected
7 Moderate/severe attack, penetration, 10-30% of cross-sectional area affected
6 Severe attack, 30-50% of cross-sectional area affected
4 Very severe attack, 50-75% of cross-sectional area affected
0 Failure

Report: WDL-2023-14

RESULTS

The data obtained were analyzed for termite resistance with means and standard deviations (SPSS 2023). The Least Significant Difference (LSD) mean separation test procedure was used (Steel and Torrie 1980). Different capital letters following each data value within columns indicate that significant differences were found at the significance level $\alpha = 0.05$. Significant differences were not found among treatments when means shared the same letters within columns. All data and records collected during the tests are maintained and are available upon request per ISO 17025 Lab Guidelines.

Table 3. Data for termite mortality, sample weight loss, and sample rating.

WDL-2023-14a E1 testing						
Treatment	**Mortality**	**AVE**	**Weight Loss**	**AVE**	**Ratings**	**AVE**
Untreated Pine	8%		44.81%		0	
	9%		38.83%		0	
	7%	**7.70%**	42.93%	**43.87%**	0	**0**
	7%		47.31%		0	
	8%		45.50%		0	
TUL0392	61%		3.01%		9.5	
	48%		2.49%		9.5	
	78%	**59.35%**	2.48%	**2.53%**	9.5	**9.5**
	56%		2.03%		9.5	
	55%		2.64%		9.5	

Table 4. Termite mortality, weight loss, and sample rating and statistics*.

WDL-2023-14a Termite Test		
Treatment	**Mortality**	**LSD Group**
Untreated Pine	7.70%	**A**
TUL0392	59.35%	**B**

Treatment	**Weight Loss**	**LSD Group**
Untreated Pine	43.87%	**A**
TUL0392	2.53%	**B**

Treatment	**Rating**	**LSD Group**
Untreated Pine	0	**A**
TUL0392	9.5	**B**

*Groups containing the same capital letter are not significantly different at $\alpha = 0.05$.

Report: WDL-2023-14

Table 3 provides a summary of the means (Avg.) for the primary data of interest (i.e., percent mortality, percent weight loss, and treatment ratings). Table 4 provides the statistical data for termite mortality, sample weight loss, and sample rating in a descending order using the Least Significant Difference (LSD) mean separation test procedure.

Percent Termite Mortality. All live termites were counted after the 28-day exposure period. Percent mortality was obtained with this calculation: ((initial termites – live termites) / initial termites) *100. Mean percent termite mortality for the pine controls resulted in the lowest mortality at 7.70%. The TUL0392 group had 59.35% termite mortality. The mortality data for the untreated pine controls were significantly different from the TUL0392 group at α=0.05 significance level.

Percent Sample Weight Loss. Percent weight loss was based on the original oven dry weight using this formula: (calculated ODWt – final ODWt)/calculated ODWt) *100. The test sample oven dry weight is determined by measuring the moisture content of the matched sample and using it to calculate the sample oven dry weight. The final oven dry weight was determined by oven drying the sample after the test. Weight loss for the untreated controls was highest at 43.87%. The TUL0392 group had 2.53% sample weight loss. The weight loss data for the untreated pine controls were significantly different from the TUL0392 group at α=0.05 significance level

Sample Rating. Trained and experienced scientists estimated the extent of damage by visually sample rating each sample. The rating scale used was 0 to 10. The mean rating value of the untreated pine controls was 0. The TUL0392 group was found to have trace surface nibbles resulting in 9.5 damage ratings. The ratings for the untreated pine controls were significantly different from the TUL0392 group at α=0.05 significance level

CONCLUSIONS

The TUL0392 samples had almost complete resistance to Formosan subterranean termite attack with surface nibbles present on the samples after the 28-day test duration. The untreated control mortality, sample weight loss, and sample ratings were consistent with previous test results. The results from the untreated control samples indicate strong termite vigor and performance, and hence the test data are valid.

Report: WDL-2023-14

REFERENCES CITED

American Wood Protection Association (AWPA). 2023. Standard method for laboratory evaluation to determine resistance to subterranean termites (E1-23). 2023 book of standards. Birmingham, AL.

American Society for Testing and Materials (ASTM). 2023. Standard test method for laboratory evaluation of solid wood for resistance to termites (D3345-22).

SPSS 25 for Windows. 2023. Chicago, IL.

Steel, R.G.D. and J.H. Torrie. 1980. Principle and procedures of statistics – A biometrical approach. 2nd edition. McGraw Hill. New York. 633p.

Report: WDL-2023-14

Figure 1. All samples at 28 days of testing against Formosan subterranean termites.

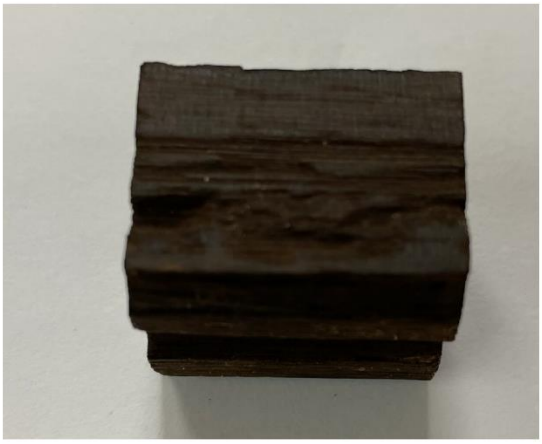


Figure 2. One sample at 28 days of testing against Formosan subterranean termites.

Report: WDL-2023-14

INTERNATIONAL ACCREDITATION SERVICE®

CERTIFICATE OF ACCREDITATION

This is to attest that

WOOD DURABILITY LABORATORY
227 RENEWABLE NATURAL RESOURCES, LOUISIANA STATE UNIVERSITY
BATON ROUGE, LOUISIANA 70803, U.S.A.

Testing Laboratory TL-350

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date July 9, 2020

IAS ACCREDITED

President

Visit www.iasonline.org for current accreditation information.

Report: WDL-2023-14

SCOPE OF ACCREDITATION

International Accreditation Service, Inc.
3060 Saturn Street, Suite 100, Brea, California 92821, U.S.A. | www.iasonline.org

WOOD DURABILITY LABORATORY

Contact Name Dr. Qinglin Wu **Contact Phone** +225 578-8369

Accredited to ISO/IEC 17025:2017 *Effective Date July 9, 2020*

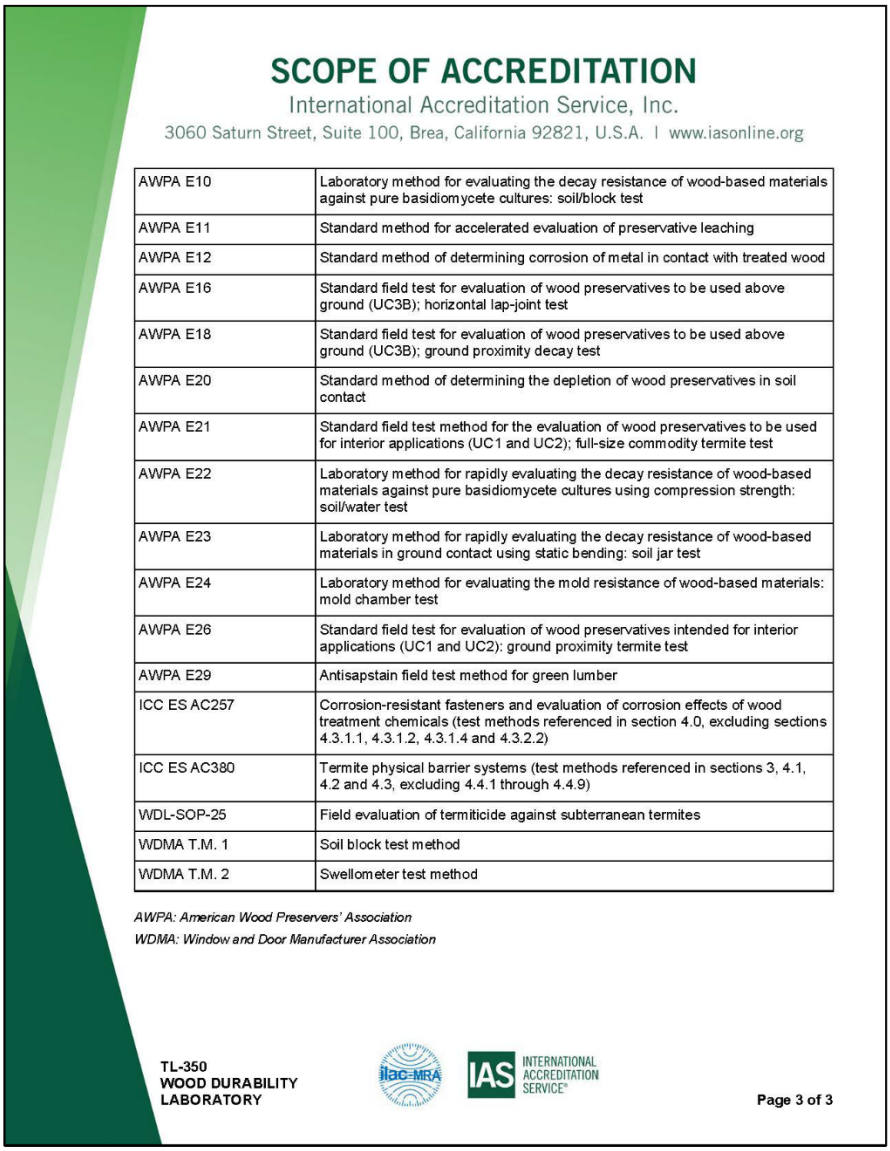
Physical	
ASTM D143	Standard test methods for small clear specimens of timber
ASTM D1037	Standard test methods for evaluating properties of wood-base fiber and particle panel materials (compression parallel to surface, section 12, excluded)
ASTM D2395	Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials
ASTM D2481	Standard test method for accelerated evaluation of wood preservatives for marine services by means of small size specimens
ASTM D3043	Standard test methods for structural panels in flexure (methods A and D only)
ASTM D3273	Standard test method for resistance to growth of mold on the surface of interior coatings in an environmental chamber
ASTM D3345	Standard test method for laboratory evaluation of wood and other cellulosic materials for resistance to termites
ASTM D4442	Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials
ASTM D4445	Standard test method for fungicides for controlling sapstain and mold on unseasoned lumber (laboratory method)
ASTM D5456	Standard specification for evaluation of structural composite lumber products (test methods referenced in annex A3 and A4 only)
ASTM D5516	Standard test method for evaluating the flexural properties of fire-retardant treated softwood plywood exposed to elevated temperatures
AWPA E1	Laboratory methods for evaluating the termite resistance of wood-based materials: choice and no-choice tests
AWPA E5	Standard test method for evaluation of wood preservatives to be used in marine applications (UC5A, UC5B, UC5C); panel and block tests
AWPA E7	Standard field test for evaluation of wood preservatives to be used in ground contact (UC4A, UC4B, UC4C); stake test
AWPA E9	Standard field test for the evaluation of wood preservatives to be used above ground (UC3A and UC3B); L-joint test

TL-350
WOOD DURABILITY
LABORATORY

ilac-MRA IAS INTERNATIONAL ACCREDITATION SERVICE®

Page 2 of 3

Report: WDL-2023-14



SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

3060 Saturn Street, Suite 100, Brea, California 92821, U.S.A. I www.iasonline.org

AWPA E10	Laboratory method for evaluating the decay resistance of wood-based materials against pure basidiomycete cultures: soil/block test
AWPA E11	Standard method for accelerated evaluation of preservative leaching
AWPA E12	Standard method of determining corrosion of metal in contact with treated wood
AWPA E16	Standard field test for evaluation of wood preservatives to be used above ground (UC3B); horizontal lap-joint test
AWPA E18	Standard field test for evaluation of wood preservatives to be used above ground (UC3B); ground proximity decay test
AWPA E20	Standard method of determining the depletion of wood preservatives in soil contact
AWPA E21	Standard field test method for the evaluation of wood preservatives to be used for interior applications (UC1 and UC2); full-size commodity termite test
AWPA E22	Laboratory method for rapidly evaluating the decay resistance of wood-based materials against pure basidiomycete cultures using compression strength: soil/water test
AWPA E23	Laboratory method for rapidly evaluating the decay resistance of wood-based materials in ground contact using static bending: soil jar test
AWPA E24	Laboratory method for evaluating the mold resistance of wood-based materials: mold chamber test
AWPA E26	Standard field test for evaluation of wood preservatives intended for interior applications (UC1 and UC2): ground proximity termite test
AWPA E29	Antisapstain field test method for green lumber
ICC ES AC257	Corrosion-resistant fasteners and evaluation of corrosion effects of wood treatment chemicals (test methods referenced in section 4.0, excluding sections 4.3.1.1, 4.3.1.2, 4.3.1.4 and 4.3.2.2)
ICC ES AC380	Termite physical barrier systems (test methods referenced in sections 3, 4.1, 4.2 and 4.3, excluding 4.4.1 through 4.4.9)
WDL-SOP-25	Field evaluation of termiticide against subterranean termites
WDMA T.M. 1	Soil block test method
WDMA T.M. 2	Swellometer test method

AWPA: American Wood Preservers' Association

WDMA: Window and Door Manufacturer Association

TL-350
WOOD DURABILITY
LABORATORY

ilac-MRA IAS INTERNATIONAL ACCREDITATION SERVICE®

Page 3 of 3

Report: WDL-2023-14

END OF REPORT

APPENDIX C – Surface Burning Characteristics Report TUL0392-FT-2 dated 08/10/2023 for MOSO Bamboo Decking X-treme/Thermo by QAI Laboratories

QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

5110 N. Mingo Rd.
Tulsa, OK 74117
918.437.8333 ph. | 918.437.8487 fx.

CLIENT: Moso North America
3200 East Broadway
Vancouver British Columbia, Canada V5M 1Z8

Test Report Number :	TUL0392-FT-2	Date:	August 10, 2023

SAMPLE ID: The client identified the following test material as:
BO-DK20-G2-UF

SAMPLING DETAIL: Test samples were submitted to the laboratory directly by the client. No sampling or sample preparation were observed by QAI staff.

DATE OF RECEIPT: Samples were received at QAI facilities on: April 25, 2023

TESTING PERIOD: Monday, July 31, 2023

AUTHORIZATION: Testing was authorized by Brett Kelly for proposal 22JL10192r4 signed August 19, 2021.

TEST REQUESTED: Perform standard flame pread and smoke density developed classification tests on the sample supplied by the client in accordance with ASTM E2768 - 11 "Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials". The referenced Flame Spread and Smoke Development Index was calculated per ASTM E84-18 version.

TEST RESULTS:

Flame Spread	Smoke Developed
0	15

Conclusion: When tested in accordance to ASTM E2768-11 the material resulted in a class 'A during the first 10 minutes of the test with a maximum flame spread of: 18.4 feet from the burner during the 30-minute flame exposure. The product BO-DK20-G2-UF DOES NOT meet the above specification for Ignition Resistant Material.

Prepared By

Scott Berry
Lab Supervisor - Fire

Signed for and on behalf of
QAI Laboratories, Inc.

Mike Lowry
Operations Manager

THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.

SCOPE: This fire-test-response standard is used for the comparative surface burning behavior of building materials is applicable to exposed surfaces such as walls, ceilings and others. The test is conducted with the specimen in the ceiling position with the surface to be evaluated exposed face down to the ignition source. The material, product, or assembly shall be capable of being mounted in the test position during the test. Thus, the specimen shall either be self-supporting by its own structural quality, held in place by added supports along the test surface, or secured from the back side. The purpose of this test method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke developed index are reported. However, there is not necessarily a relationship between these two measurements.

USE: The use of supporting materials on the underside of the test specimen has the ability to lower the flame spread index from those which might be obtained if the specimen could be tested without such support. These test results do not necessarily relate to indices obtained by testing materials without such support.

Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place.

This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire-hazard or fire-risk assessment of the materials, products, or assemblies under actual fire conditions.

PROCEDURE: A brief overview of the method is as follows: The test specimen, a material between 20 and 24 inches in width by 24 feet +/- 12 inches in length is loaded onto the water cooled ledge of the fire test chamber when tested to ASTM E84 or CAN/ULC-S102. If tested to CAN/ULC-S102.2 the specimen is tested on the chamber floor. The inside dimensions are 17 3/4 inches +/- 1/4" wide by 12 inches +/- 1/2" deep by 25 feet long. The fire test chamber is a rectangular horizontal duct with a removable lid. The sides and base of the chamber are lined with an insulated firebrick with pressure tight observation windows down one side for a technician to observe flame progression during the duration of the 10-minute test period. The chamber lid is lowered into test position with non combustible concrete board placed between the specimen and chamber lid. A draft of 240 feet per minute which is maintained inside the test chamber throughout the test period by the means of an electronic fan afterburner and an electronically controlled damper door system located downstream of the test chamber in the exhaust ducting. The test is started when the test flame is ignited at the front of the test chamber. An electronic photocell system located in the exhaust system downstream from the test chamber is used to plot the smoke developed for use in calculating the smoke developed index while a technician plots the flame spread distance used in determining the flame spread index. The test is run for the 10 minute duration in accordance to the method.

(See Diagrams in the Appendix of this report.)

PREPARATION AND CONDITIONING:
The sample board material was delivered to QAI in 23.5 inches wide X 6 feet long X 0.5 inches thick pieces. Four pieces of the six foot sample were screwed to four pieces of concrete board fo a total os 16 pieces being used. 16 of these pieces were used for the test. (See Photos in Appendix of this report). The specimen was placed in the conditioning room (maintained at 70 ± 5° F and a relative humidity of 50 ± 5%) for a minimum of 72 hours prior to testing.

MOUNTING METHOD:
The test ready sample consisting of 16 pieces measuring 23.5 inches wide X 6 feet long and an overall test thickness of 0.5 inches were stacked end to end on the chamber ledge to fulfill the chamber requirements for testing. Prior to testing the samples were covered with 1/4 inch cement board as required in the test method.

ASTM E2768 Test Results:

CLIENT NAME:	**Moso North America**	**TEST DATE:**	7/31/2023
SAMPLE ID:	BO-DK20-G2-UF		
SAMPLE IGNITION:		**01:15**	Minutes / Seconds
MAX FLAME FRONT:		**18.4**	Feet
TIME TO MAXIMUM SPREAD:		**27:39**	Minutes / Seconds
TEST DURATION:		**30:00**	Minutes / Seconds
SUMMARY:	FLAME SPREAD:	**0**	*0 Unrounded*
	SMOKE DEVELOPED:	**0**	*2 Unrounded*

OBSERVATIONS:

Crackling was observed at 00:54. Charring was observed at 01:00. Afterburn was observed at 30:01.

Note* - The 2018 ASTM E84 standard was utilized when calculating the Flame Spread and Smoke Index numbers as provided on page 1.

SUMMARY OF ASTM E84 / UL 723 RESULTS:

Because of the possible variations in reproducibility, the results are adjusted to the nearest figure divisible by 5.
Smoke Density values over 200 are rounded to the nearest figure divisible by 50.

In order to obtain the Flame Spread Classification, the above results should be compared to the following table:

NFPA CLASS[1]	IBC CLASS[2]	FLAME SPREAD	SMOKE DEVELOPED
A	A	0 through 25	Less than or equal to 450
B	B	26 through 75	Less than or equal to 450
C	C	76 through 200	Less than or equal to 450

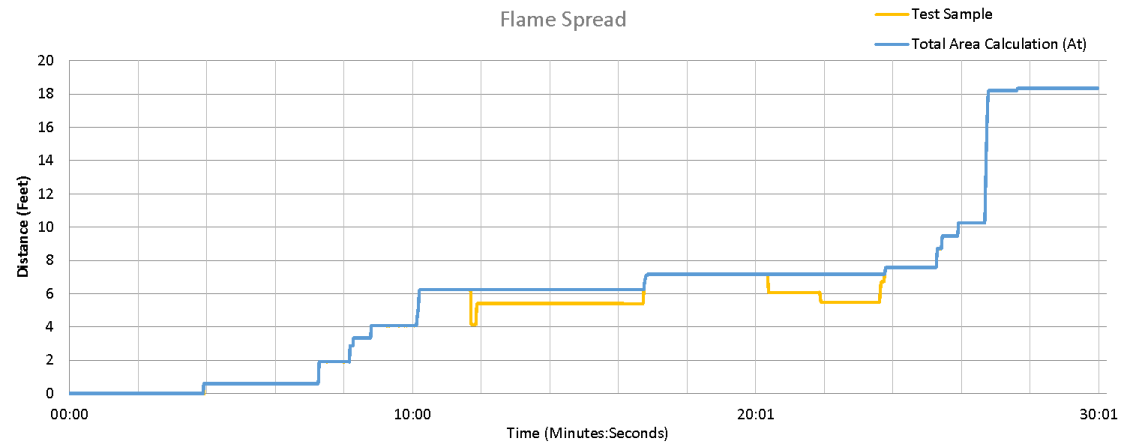
BUILDING CODES CITED:

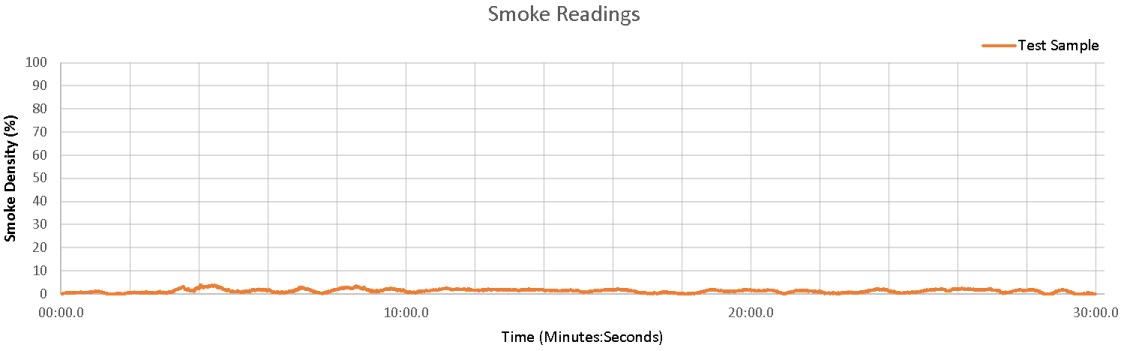
1. National Fire Protection Association, ANSI/NFPA No. 101, "Life Safety Code"

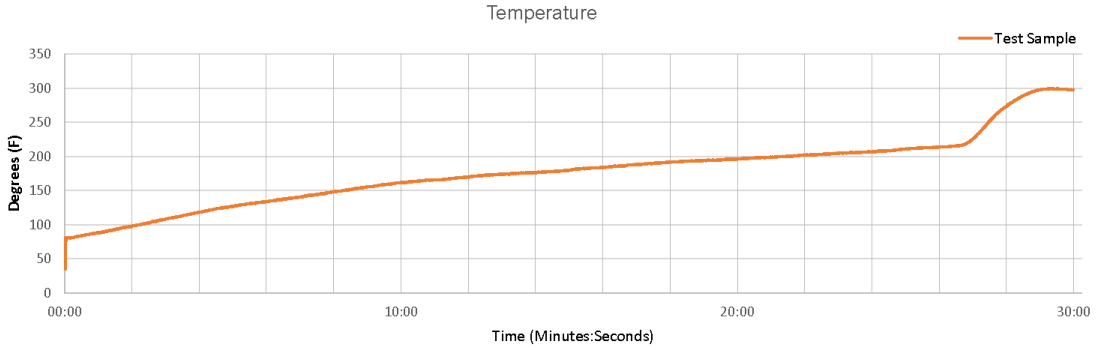
2. International Building Code, Chapter 8, Interior Finishes, Section 803.

THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.

RESULTS CONTINUED:







APPENDIX

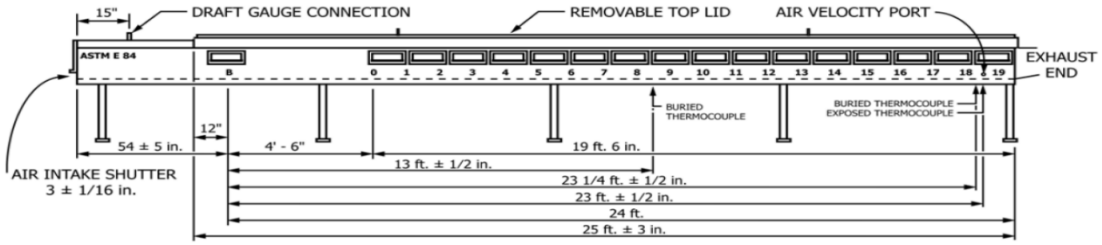


Diagram 1. Test Chamber side view showing critical dimensions.

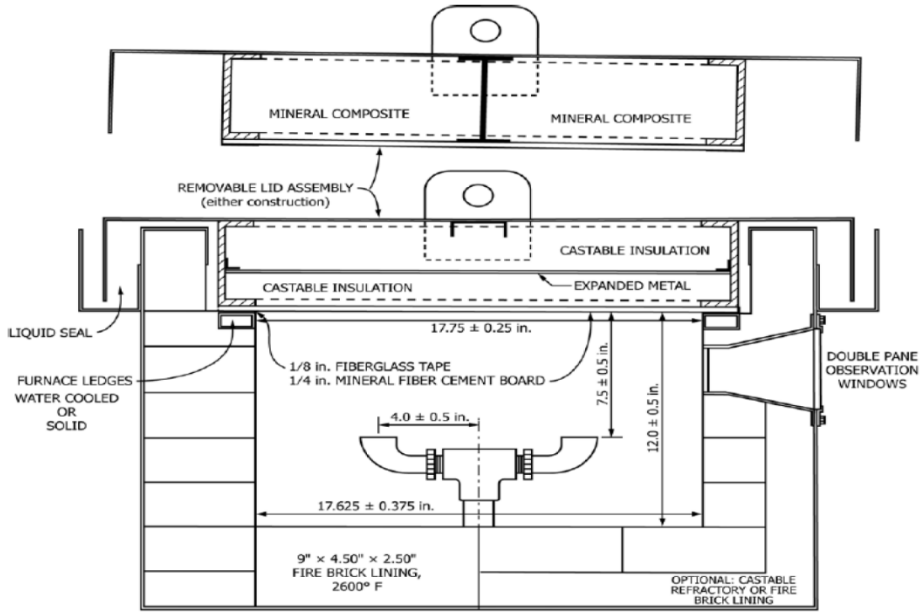


Diagram 2. Test Chamber looking down chamber showing critical dimensions.

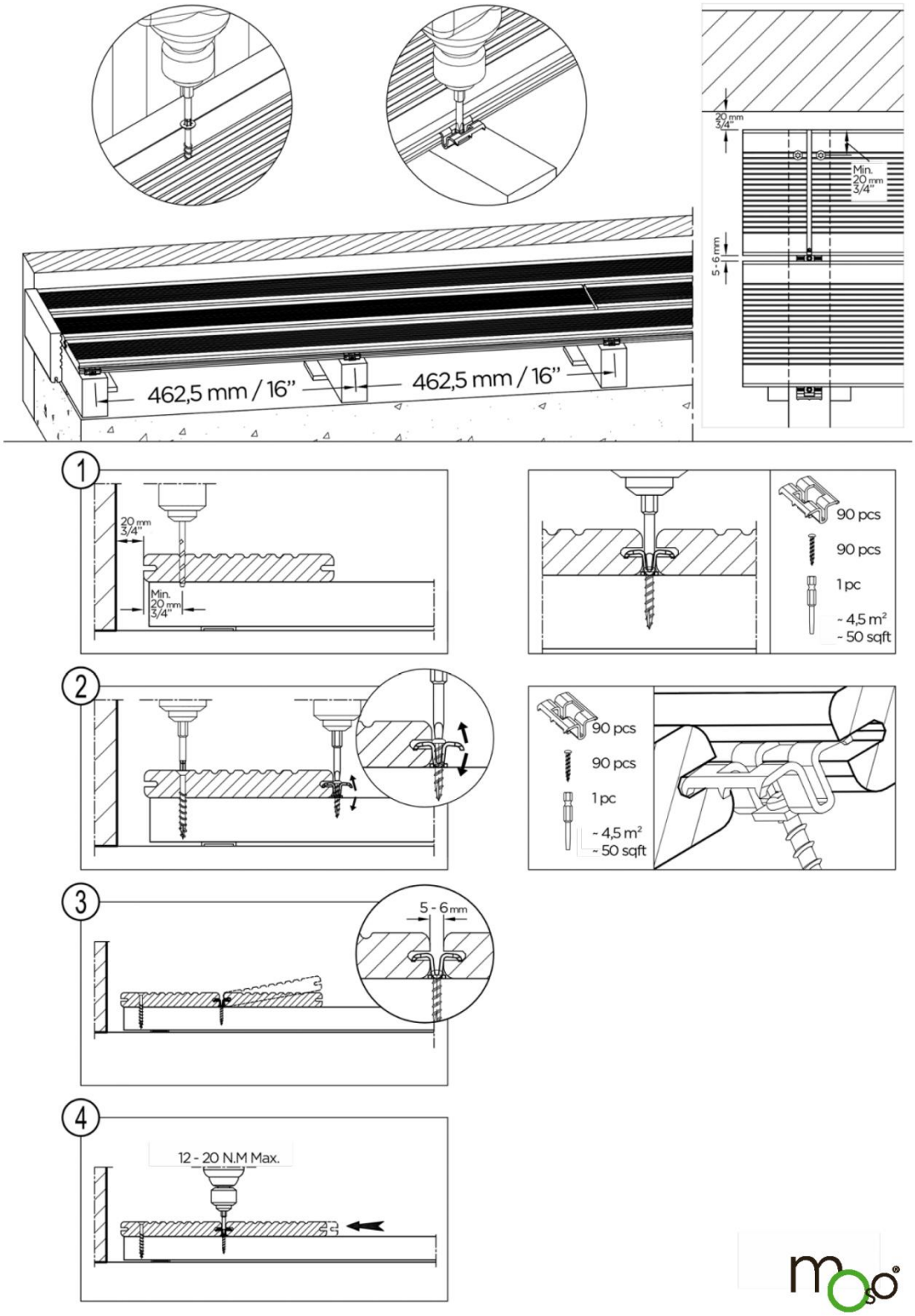
THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.

APPENDIX

Photo 1. Surface of Specimen Tested before/after

*****<<<END OF TEST REPORT>>>*****

THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.



installation instruction bamboox-treme® clips/fastener

DECKING BOARDS REPLACEMENT (NOT APPLICABLE FOR SIDING/ CLADDING)

Using the Bamboo X-treme fastener allows an easy replacement of (damaged) boards, without having to remove the rest of the installed deck.

1. Unscrew Bamboo X-treme fasteners that hold the row of decking boards including the one to be turned over / replaced. Slide the boards to make room to release the board that has to be replaced. Slide the fasteners inside the groove channel of boards A and B (drawing 1').
2. Position the clean face (or new board) and slide the Bamboo X-treme fasteners back in the groove channel of the replaced board (using a screw driver) (drawing 2'). Tighten the screws down (a special bit is provided).
3. Slide the boards on either side of the turned/ replaced board back into position, and replace/tighten the screws of the fasteners for the whole row.

AUSTAUSCH VON MONTIERTE TERRASSENDIELEN (NICHT ANWENDBAR FÜR FASSADENELEMENTE)

Die Bamboo X-treme-Klipse ermöglichen einen leichten Austausch von beschädigten Dielen, ohne hierzu die gesamte, bereits montierte Terrasse wieder ausbauen zu müssen.

1. Lösen Sie die Schrauben der Bamboo X-treme Klipse, mit denen die Dielenreihe einschließlich der umzudrehenden/zu ersetzenden Diele befestigt sind. Verschieben Sie die Dielen, damit Platz zum Lösen der zu ersetzenden Diele entsteht. Schieben Sie die Klipse in die Nutführung der Dielen A und B (Zeichnung 1').
2. Platzieren Sie die gewünschte neue Dielen zurück und schieben Sie die Klipse wieder in die Seitennutung. Zentrieren Sie die Clips erneut auf den Unterkonstruktionsbalken. (Zeichnung 2'). Schrauben Sie die Clips mit dem mitgelieferten Torx Bit wieder fest.
3. Schieben Sie die Dielen auf beiden Seiten der gedrehten/ersetzten Platte wieder in Position, und ziehen Sie die Schrauben der Clips für die gesamte Reihe wieder an.

SOSTITUZIONE DEI LISTELLI DECKING (NON APPLICABILE PER RIVESTIMENTO)

La clip Bamboo X-treme permette di congiungere le estremità delle tavole. Questo permetterà di sostituire un lato danneggiato senza dover smontare tutta la terrazza già posata.

1. Svitare le clip che fissano la fila di doghe Bamboo X-treme, compresa quella da sostituire. Far scorrere le doghe per fare spazio alla doga che deve essere sostituita. Far scorrere gli elementi di fissaggio all'interno del canale della scanalatura delle tavole A e B (vedere disegno 1').
2. Posizionare la tavola nuova ed inserire le clip facendole scorrere nelle scanalature (mediante un cacciavite ad esempio) (vedere disegno 2). Riavvitare le clip usando lo strumento specifico in dotazione.
3. Far scorrere le tavole su entrambi i lati riposizionandole nel punto giusto. Serrare le viti degli elementi di fissaggio per l'intera fila.

REMPLACEMENT DES LAMES (NON APPLICABLE AU REVETEMENT / BARDAGE)

Le clip Bamboo X-treme permet de faire la jonction entre deux lames placées bout à bout. Ceci permettra de remplacer une face endommagée sans être amené à démonter toute la terrasse déjà installée.

1. Dévissez les fixations bambou X-treme qui retiennent la rangée de lames de terrasse, y compris celle qui doit être retournée / remplacée. Faites glisser les planches afin de laisser la place pour libérer la planche qui doit être remplacée. Faites glisser les fixations à l'intérieur de la rainure des planches A et B.
2. Positionner la bonne face (ou la nouvelle lame) et remettre les clips sur les lambourdes en les coulissant dans les rainures (à l'aide d'un tournevis par exemple) (drawing 2'). Revisser les clips à l'aide de l'embout spécial fourni.
3. Glissez les lames de chaque côté de la lame retournée/remplacée en position, et replacez/serrez les vis des fixations pour toute la rangée.

VLONDERPLANKEN VERVANGEN (NIET TOEPASBAAR VOOR GEVELBEKLEDING)

Het gebruik van Bamboo X-treme clips biedt de mogelijkheid eenvoudig beschadigde vlonderplanken te vervangen zonder het complete terras te hoeven demonteren.

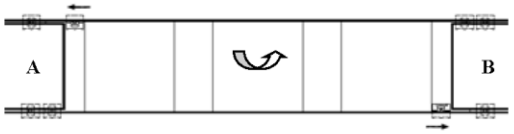
1. Schroef de Bamboo X-treme schroeven van rij planken inclusief de te vervangen plank los, schuif de clips met behulp van b.v. een schroevendraaier uit de zijdelijngse groef. Schuif de clips in de groeven van planken A en B (tekening 1').
2. Plaats de omgekeerde plank of een nieuwe plank en breng de clips weer aan op de onderconstructie door ze in de groeven te schuiven met behulp van een schroevendraaier. (tekening 2'). Schroef de clips weer vast met behulp van de meegeleverde Torx bit.
3. Schuif de planken aan beide zijden van de omgekeerde / vervangen plank terug op hun plaats en plaats de schroeven van de hele rij vast.

SUSTITUCIÓN DE LAS LAMAS DE TARIMA DE EXTERIOR (NO APLICABLE PARA FACHADA))

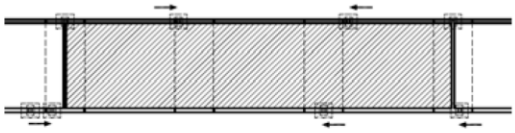
El clip Bamboo X-treme permite la unión de dos lamas colocadas lado a lado. Esto permitirá sustituir una cara dañada sin tener que desmontar toda la tarima ya instalada.

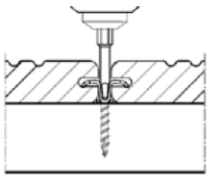
1. Desatornillar los clips Bamboo X-treme que fijaban la lama que se va a sustituir (incluidos los clips de unión con las lamas A y B) y deslizarlos por las ranuras de las lamas A y B (ver dibujo 1').
2. Colocar la cara correcta (o la nueva lama) y volver a poner los clips sobre los rastreles deslizándolos por las ranuras (por ejemplo, con un destornillador) (ver dibujo 2'). Volver a atornillar los clips con la boquilla especial incluida.
3. Deslice las lamas a cada lado de la lama girada / reemplazada en su posición y reemplace / apriete los tornillos de los clips para toda la fila.

(1')



(2')





201804

www.moso.eu/x-treme | www.moso-bamboo.com/x-treme

APPENDIX D – Mechanical Fastner Holding Report TUL0392-PT-FL-1 dated 01/20/2023 for MOSO Bamboo Decking X-treme/Thermo by QAI Laboratories

QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

8148 NW 74 Avenue
Medley, FL, 33166
305.885.3328 ph. | 305.885.3329 fx

CLIENT: Moso North America, Inc.
8400 Remington Ave,
Pennsauken Township, NJ 08110

Project No: TUL-0392	**Report Date:** January 5, 2024

SAMPLE ID: Series: 5 1/2" x 0.8" Bamboo X-treme Decking Panels

SAMPLE DESCRIPTION: 8'-0'' (96") Width x 4'-0'' (48") Height; See page 3 for full description.

SAMPLING DETAIL: The test sample manufactured by Moso North America, Inc. was submitted directly to QAI by the client. Samples were not independently selected for testing.

DATE OF RECEIPT: Samples were received at the QAI Miami Laboratory on September 14, 2023, and in good condition.

TESTING PERIOD: December 27, 2023.

TESTING LOCATION: QAI Laboratories – Miami, Florida, USA

AUTHORIZATION: QAI proposal number 22JL10192r4 dated February 7, 2023, signed by Bratt Kelly, CEO of Moso North America, Inc, dated February 8, 2023.

TEST PROCEDURE: Testing to the following requirements:

- ASTM E330/E330M-14 (Method B) Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

TEST RESULTS: The 5 1/2" x 0.8" Bamboo X-treme Decking Panels achieved the results found on pages 3-4 of this test report when tested in accordance with the ASTM E330/E330M.

CONTENTS: Test report pages 1 through 5.

Prepared By

Lusinda Delgado

Lusinda Delgado
Technical Report Writer

Printed from scanned document

Signed for and on behalf of QAI Laboratory

Digitally signed by Jose Sanchez
Date: 2024.01.05 15:47:17 -05'00'

Jose Sanchez
Operation Manager

THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.

Table of Contents		Page	Rev
Sample A-1, A-2, and A-3			
Description of Test Sample		3	
Decking		3	
Sample Installation		3	
Results Sample A-1			
Design Load Test Positive	ASTM E330	3	
Results Sample A-3			
Design Load Test Positive	ASTM E330	4	
Results Sample A-3			
Design Load Test Positive	ASTM E330	4	
Appendix A		5	
Notes Table		5	
Revision Table		5	

Technician:
Alejandro Lemos

THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.

DESCRIPTION OF SAMPLE	
Model Designation:	Series: 5 1/2" x 0.8" Bamboo X-treme Decking Panels
Overall Size:	8'-0'' (96") Width x 4'-0'' (48") Height
Sample A-1, A-2, and A-3	

Decking
2" x 6" yellow pine wood joist spaced 24" on center.

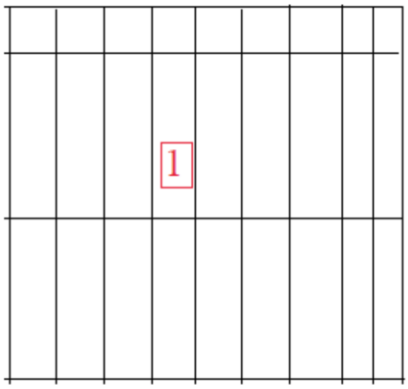
Sample Installation
The decking was installed to the wood joist using a metallic hidden clip at each joist. The hidden clips were fastened using one #8 x 1 1/4" stainless steel screw.

Sample: A-1	**Temperature:**	78.1°F	**Barometric Reading:** 30.0 inches Hg
Title of Test		Design Load Test Positive Load	
See appendix A			
Pressure	**Deflection**	**Permeant Set**	**Results**
20 psf	0.062"	0.012"	Passed
40 psf	0.108"	0.013"	Passed
60 psf	0.148"	0.015"	Passed
80 psf	0.179"	0.017"	Passed
100 psf	0.224"	0.020"	Passed
120 psf	0.276"	0.022"	Passed
140 psf	0.322"	0.026"	Passed
160 psf	0.353"	0.027"	Passed
180 psf	0.384"	0.030"	Passed
200 psf	0.421"	0.034"	Passed
220 psf	0.434"	0.039"	Passed
240 psf	0.452"	0.044"	Passed
260 psf	0.492"	0.052"	Passed
280 psf	0.532"	0.068"	Passed
300 psf	0.688"	0.072"	Passed
315 psf	Wood joist broke		

Sample: A-2	Temperature:	78.1°F	Barometric Reading: 30.0 inches Hg
Title of Test		Design Load Test Positive Load	
See appendix A			
Pressure	**Deflection**	**Permeant Set**	**Results**
20 psf	0.078”	0.009”	Passed
40 psf	0.101”	0.012”	Passed
60 psf	0.142”	0.014”	Passed
80 psf	0.173”	0.018”	Passed
100 psf	0.224”	0.023”	Passed
120 psf	0.265”	0.027”	Passed
140 psf	0.303”	0.029”	Passed
160 psf	0.332”	0.031”	Passed
180 psf	0.354”	0.034”	Passed
200 psf	0.388”	0.038”	Passed
220 psf	0.434”	0.045”	Passed
240 psf	0.532”	0.050”	Passed
260 psf	0.562”	0.055”	Passed
280 psf	0.623”	0.062”	Passed
300 psf	0.635”	0.069”	Passed

Sample: A-3	Temperature:	78.1°F	Barometric Reading: 30.0 inches Hg
Title of Test		Design Load Test Positive Load	
See appendix A			
Pressure	**Deflection**	**Permeant Set**	**Results**
20 psf	0.056”	0.003”	Passed
40 psf	0.098”	0.006”	Passed
60 psf	0.135”	0.012”	Passed
80 psf	0.182”	0.015”	Passed
100 psf	0.212”	0.020”	Passed
120 psf	0.261”	0.025”	Passed
140 psf	0.306”	0.032”	Passed
160 psf	0.354”	0.045”	Passed
180 psf	0.465”	0.057”	Passed
200 psf	0.588”	0.065”	Passed
220 psf	0.622”	0.069”	Passed
240 psf	0.652”	0.071”	Passed
260 psf	0.688”	0.075”	Passed
280 psf	0.734”	0.077”	Passed
300 psf	0.795”	0.081”	Passed

Appendix A



Notes
* designates measurements by laboratory ** as per manufacturer QAI does not have, nor does it intend to acquire or will acquire, a financial interest in any company manufacturing or distributing products tested or labeled by QAI. QAI is not owned, operated or controlled by any company manufacturing or distributing products it tests or labels.

REVISION HISTORY:
1/5/2024: Initial report release

*******END REPORT*******

THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.

APPENDIX E – Static Coefficient of Friction Report TUL0392-PT 6.2 dated 07/05/2023 for MOSO Bamboo Decking X-treme/Thermo by QAI Laboratories

QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

5110 N. Mingo Road
Tulsa, OK 74117
918.437.8333 ph. | 918.437.8487 fx.

CLIENT: **Moso North America, Inc**
PO Box 793
Worcester, PA 19490

Test Report No: TUL0392PT-6.2	Date: July 5, 2023

SAMPLE ID: Sample Identified as; **BO-DK20-G2-UF (Double Grove with reeded face)**

SAMPLING DETAIL: Selection of the test samples was conducted by a QAI representative Matt Lansdowne at the Moso Bamboo X-treme facility, located at 3200 East Broadway, Vancouver British Columbia Canada on March 4, 2023.

DATE OF RECEIPT: Samples were received at QAI on April 25, 2023.

TESTING PERIOD: June 26, 2023

AUTHORIZATION: Proposal No.: 22JL10192r4 signed by Brett Kelly on February 8, 2023. PO#157516

TEST PROCEDURE: ASTM D2047-17, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

REMARKS: The Occupational Safety and Health Administration recommend that walking surfaces have a static coefficient of friction of 0.5. According to 28 CFR Ch. 1-1994 Section A4.5.1, a static coefficient of friction of 0.6 is recommended for accessible routes and 0.8 for ramps.

TEST RESULTS: Detailed test results are presented in the subsequent pages of this report.

Prepared By

Rocky Hale
Material Test Technician

Signed for and on behalf of QAI Laboratories, Inc.

Jarred L. Johnson
2023.07.05 10:09:30 -05'00'

Jarred Johnson
Project Reviewer

Procedure and Results:

The test shoe materials used during the test were leather purchased and specified to conform to Federal Specification KK-L-165C, the test shoe was assembled and maintained as per Section 7 and all testing conducted in accordance with Section 8. Results are reported in Tables 1 through 2 of this report. Photo of sample can be seen on last page.

All materials and equipment used during test conformed to the relevant applicable sections of the test method.

Environment: The testing was conducted in a controlled environment of 71°F and 53% relative humidity.

Coating Identification: None Specified by Client

Calibration Performed: Calibration was performed on an OVCT tile using leather foot.
Calibration Tile Arithmetic Average: 0.51

Sample ID: BO-DK20-G2-UF (Double Grove with reeded face) Reeded Face Tested

Table 1- Test Results with Leather Test Shoe, Dry Condition

Specimen	Determination	Static Coefficient of Friction
1	1	0.92
	2	0.66
	3	0.94
	4	0.74
2	1	0.93
	2	0.84
	3	0.97
	4	0.74
3	1	0.77
	2	0.80
	3	0.91
	4	0.70
	Arithmetic Average:	0.83
	Standard Deviation:	0.1056

Table 4- Test Results with Leather Test Shoe, Wet Condition

Specimen	Determination	Static Coefficient of Friction
1	1	1.06
	2	1.00
	3	1.16
	4	1.03
2	1	1.08
	2	1.03
	3	1.14
	4	1.00
3	1	1.13
	2	1.00
	3	1.16
	4	1.03
	Arithmetic Average:	1.07
	Standard Deviation:	0.0635

Photo

*** END OF TEST REPORT ***

APPENDIX F – Static Coefficient of Friction Report TUL0392-PT 6.2 dated 07/05/2023 for MOSO Bamboo Decking X-treme/Thermo by QAI Laboratories

QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

5110 N. Mingo Road
Tulsa, OK 74117
918.437.8333 ph. | 918.437.8487 fx.

CLIENT: **Moso North America, Inc**
PO Box 793
Worcester, PA 19490

Test Report No: TUL0392PT-6.1	Date: July 5, 2023

SAMPLE ID: Sample Identified as; **BO-DK20-G2-UF (Double Grove with reeded face)**

SAMPLING DETAIL: Selection of the test samples was conducted by a QAI representative Matt Lansdowne at the Moso Bamboo X-treme facility, located at 3200 East Broadway, Vancouver British Columbia Canada on March 4, 2023.

DATE OF RECEIPT: Samples were received at QAI on April 25, 2023.

TESTING PERIOD: June 26, 2023

AUTHORIZATION: Proposal No.: 22JL10192r4 signed by Brett Kelly on February 8, 2023. PO#157516

TEST PROCEDURE: ASTM D2047-17, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

REMARKS: The Occupational Safety and Health Administration recommend that walking surfaces have a static coefficient of friction of 0.5. According to 28 CFR Ch. 1-1994 Section A4.5.1, a static coefficient of friction of 0.6 is recommended for accessible routes and 0.8 for ramps.

TEST RESULTS: Detailed test results are presented in the subsequent pages of this report.

Prepared By

Rocky Hale
Material Test Technician

Signed for and on behalf of QAI Laboratories, Inc.

Jarred L. Johnson
2023.07.05 09:44:56 -05'00'

Jarred Johnson
Project Reviewer

Procedure and Results:

The test shoe materials used during the test were leather purchased and specified to conform to Federal Specification KK-L-165C, the test shoe was assembled and maintained as per Section 7 and all testing conducted in accordance with Section 8. Results are reported in Tables 1 through 2 of this report. Photo of sample can be seen on last page.

All materials and equipment used during test conformed to the relevant applicable sections of the test method.

Environment: The testing was conducted in a controlled environment of 71°F and 53% relative humidity.

Coating Identification: None Specified by Client

Calibration Performed: Calibration was performed on an OVCT tile using leather foot.
Calibration Tile Arithmetic Average: **0.51**

Sample ID: **BO-DK20-G2-UF Double Grove with Smooth Face Tested**

Table 1- Test Results with Leather Test Shoe, Dry Condition

Specimen	Determination	Static Coefficient of Friction
1	1	0.96
	2	0.66
	3	0.86
	4	0.58
2	1	0.92
	2	0.62
	3	0.84
	4	0.66
3	1	0.93
	2	0.84
	3	0.93
	4	0.66
	Arithmetic Average:	**0.79**
	Standard Deviation:	**0.1410**

Table 4- Test Results with Leather Test Shoe, Wet Condition

Specimen	Determination	Static Coefficient of Friction
1	1	1.10
	2	1.05
	3	1.16
	4	1.04
2	1	1.16
	2	1.06
	3	1.20
	4	1.17
3	1	1.20
	2	1.17
	3	1.20
	4	1.17
	Arithmetic Average:	**1.14**
	Standard Deviation:	**0.606**

Photo

*** END OF TEST REPORT ***

APPENDIX G – Product Instructions

▶ www.moso-bamboo.com/x-treme/decking

MOSO® Bamboo X-treme® Outdoor Decking

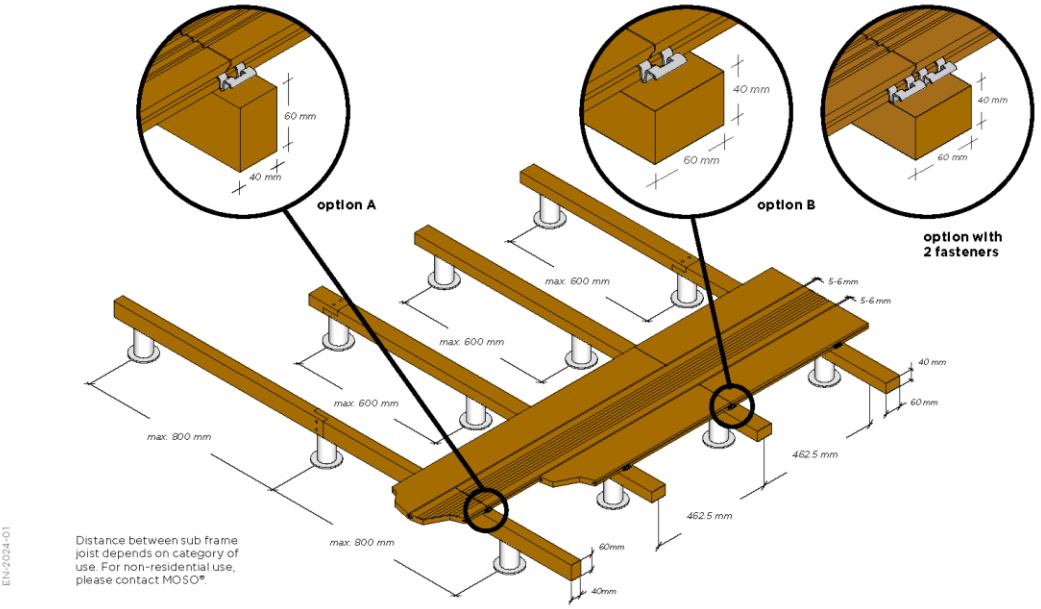
Installation instructions

Before installation

- Make sure that the installation of the decking complies with local building regulations and guidelines.
- Waterlogging under the decking must be avoided by preparing a water permeable ground structure. This can be achieved by sand layers and gravel dispersion above.
- Use cement/stone tiles 40-50 mm thick or pedestals, to support the sub frame (see drawing).
- Place a root barrier under the tiles and pedestals to prevent weeds growing under the decking.
- We recommend installing the decking boards with a slope of 1-2% to enable water to run off the surface. Alternatively, the decking can be installed without a slope, but due to the fact that water stays on the surface longer, it is possible more superficial cracks will develop. If the installation is done without a slope, more cleaning will be required.
- The decking with the curved surface BO-DTHT191G-C can be installed without a slope. Thanks to the curved surface, fast drainage from the boards is guaranteed.
- Ensure good ventilation of the decking by keeping at least 20 mm gap from walls and objects and avoid closing the decking at the sides. The gap between the boards must be open to ensure unrestricted ventilation.
- When the surface / soil underneath the decking is not fast drying, there should be at least 100 mm distance between the decking and the surface underneath.
- Use sub frame joists with the minimum size of 40x60 mm. MOSO® recommends the use of MOSO® Thermo-Density® or Outdoor-Density® Sub frame joists, which are specifically produced for use in combination with our decking products. Alternatively, suitable joists are those with the same durability class as the decking; aluminum sub frame joists, stable hardwood joists or pine joists. When using hardwood or pine as joists, make sure the moisture content of these joists is below 12%. Avoid direct contact with the soil.
- MOSO® Sub frame joists can be installed without gaps, connecting the joists with screws and glue suited for outdoor use. Other sub frame joists should be installed according to the instructions of the supplier.
- In order to create a stable deck frame, the outsides of the frame have to be connected at regular intervals to the ground / structure below. Alternatively cross bracing can be applied.
- Install the boards on sub frame joists with 462.5 mm space between the joists (centre-to-centre) so each board is supported by 5 joists. Always install the ends of the boards exactly on the joist. Distance between sub frame joist depends on category of use. For non-residential use, please contact MOSO®.
- If a random installation pattern is preferred, make sure that the sub frame joists (centre-to-centre) are no more than 300 mm apart.
- Always install cut boards on at least 3 sub frame joists.

Please note

- The MOSO® Bamboo X-treme® Outdoor Decking Board is a natural product, some variation in colour, grain and appearance is normal. Colour can change fast from dark brown to brown or grey, depending on the climatic conditions and maintenance schedule. Occasionally, some bleeding can appear.
- Small cracks and splinters on the surface and on the end of the boards can arise from the different drying characteristics of the surface and cross cut ends. The surface will also get rougher over time. This phenomenon is normal for most wood species and is minimised for this product by its unique 'Thermo-Density®' production method. Cracks on the board ends can be further minimised by applying sealer to the ends of the boards (see 'the installation').
- Splinters and roughness can be removed by cleaning the surface of the decking with the silicon carbide broom or machine disk which MOSO® supplies. The surface will become smoother and splinters are removed.
- Dimensional changes or cupping of the boards can occur after installation. This phenomenon is normal for most wood species and is minimized for this product by its unique Thermo-Density® production process.
- When using the flat side of the boards as top surface please note that deformation under influence of climate may be more visible. Some deformation and/or cupping of the material can occur. This phenomenon is normal for outdoor exposed wood and cannot be grounds for a claim.
- If the product is installed in a (partly) closed area, such as a conservatory or a under a canopy, where the ventilation is limited, superficial fungi may appear on the the surface. This is a normal phenomenon: the fungi can easily be cleaned with a damp cloth and will not affect the material. To avoid this problem, sufficient ventilation has to be provided in the area.



Distance between sub frame joist depends on category of use. For non-residential use, please contact MOSO®.

EN-2024-01

▶ www.moso-bamboo.com/x-treme/decking

MOSO® Bamboo X-treme® Outdoor Decking

Installation instructions

The installation

- Keep at least 5-6 mm gap between the boards (in width direction). With MOSO® Fastener installation this is automatically the case.
- Due to the stability of the boards and the end-match system, no expansion gap is needed on the ends of the boards.
- Every cut end has to be treated with board end sealer, to prevent water penetration. A sealer is available from MOSO®.
- In case of unfinished decking board we advise to oil the decking shortly after installation but no later than after the first winter. The best time is 3-4 months after installation when the surface is more open than immediately after installation.

Installation with MOSO® Asymmetric Fasteners

- Determine the surface side of the boards (grooved or flat surface).
- Press fastener with hooked side in the edge groove of one board.
- Pre-drill the joist screw holes 30 mm deep. On bamboo joists: use a 3.5 mm wide drill bit 110 mm long.
- Fully tighten the screw. Always screw vertically to the joist. Apply low torque with slow screwing speed on the screwing machine. Perform some tests for correct torque and speed adjustment before full installation.
- Install every following board by sliding it under the waved side of the fasteners.
- Use approx. 20/17/14/13 fasteners per m², this depends on the board width. When the tongue and groove are connected on the joist, use 1 fastener (preferably 2 fasteners) to tighten both boards (see drawing page 9 option A / B).
- For bamboo or wood joists only use the included stainless steel decking screws (4.5 x 30 mm).
- Please watch the installation video **www.moso-bamboo.com/youtube/x-treme**

Screw down installation

- Determine the surface side of the boards (grooved or flat surface).
- Pre-drill the screw holes 20 mm from the side of the board. Be sure to pre drill with a large enough drill (80% of screw diameter) to avoid cracking of the decking.
- Always screw both sides (left and right in the width direction) of the board.
- Use at least A2 grade stainless steel screws: approx. 5 x 50 mm for 20 mm thickness decking board. Approx. 5 x 70 mm for 30 mm thickness decking board.

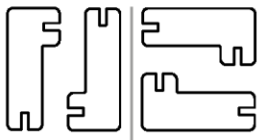
Chevron installation

It is also possible to install the decking boards in a chevron pattern. Please follow the installation instructions at: **www.moso-bamboo.com/x-treme/decking-chevron**

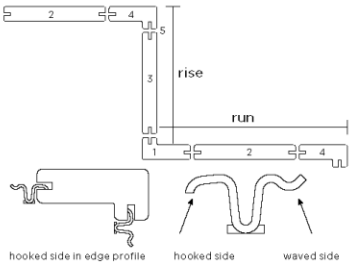
Edge profile installation

- When finishing the edge of a deck with the MOSO® Bamboo X-treme® Edge profile, it is important to place the hooked side of the MOSO® Fastener in the edge profile grooves (see drawing below).
- The edge profile can also be used for stairs. Standard Bamboo X-treme® stair dimensions are available in the table below. For other dimensions, boards have to be cut to size and either installed screwed down through the board or with fasteners in new edge grooves made on site.
- In case of stair application: Install decking and edge profiles on the decking steps substructure in the following sequence (the numbers refer to the drawing below):
  1. Attach the edge profile(s) in the inner corner of the steps to the sub structure with MOSO® Asymmetric Fasteners. Place fasteners with a maximum centre-to-centre distance of 462,5 mm. Ensure the hooked side of the MOSO® Fastener (see drawing below) is placed in the edge grooves of the edge profile. Fully tighten the screws.
  2. Slide the horizontal decking board(s) in place. Do not fix the other side yet (so no fastener placed).
  3. Slide the vertical decking board(s) in place and attach the top side to the substructure with fasteners. Ensure the waved side of the fastener is placed in the edge groove of the board. Do not fully tighten the screws yet.
  4. Slide the outer corner edge profile(s) in place. Slide MOSO® Asymmetric Fasteners between the decking board(s) (nr. 2 & 3 in the drawing below) and the edge profile(s), ensuring correct orientation of the fasteners. Attach to the sub structure. Fully tighten the screws.
  5. Fully tighten the screws left unsecured in step 3.

Run/rise dimensions



vertical orientation	**horizontal orientation**
run (board 2)	**run** (board 2)
137 mm = 189 mm	137 mm = 259 mm
155 mm = 207 mm	155 mm = 277 mm
178 mm = 230 mm	178 mm = 300 mm
rise (board 3)	**rise** (board 3)
137 mm = 259 mm	137 mm = 189 mm
155 mm = 277 mm	155 mm = 207 mm
178 mm = 300 mm	178 mm = 230 mm



Cleaning and maintenance

Oiled version

- MOSO® Bamboo X-treme® Outdoor Decking is oiled, on both sides, with Woca Exterior Wood Oil (teak colour).
- Clean the floor at least once per year with Woca Exterior Wood Cleaner and the silicon carbide broom or disk. Follow the instructions at: **www.moso-bamboo.com/youtube/x-treme** Depending on climate and use it may be necessary to perform cleaning more than once per year.
- Remove the dirt water residue on the boards with clean water and let the surface dry.
- Apply 1-2 new layers of Woca Exterior Wood Oil (teak colour). This maintenance should be undertaken 1-2 times a year to prevent the bamboo becoming grey and losing its characteristic bamboo grain. The best time to do initial oiling is 3 to 4 months after installation, or after the first winter, when the surface is more open than immediately after installation. Follow the instructions at: **www.moso-bamboo.com/youtube/x-treme**
- It is advisable to keep the decking free from dust and dirt as much as possible (clean by broom regularly).

Unfinished version

- You can leave the decking without any maintenance, but take into consideration that without maintenance and oiling the deck will develop a rougher, fissured surface that will lighten quicker and become grey (similar to most timber).
- Maintenance with Woca Exterior Wood Oil is recommended. The best time to do initial oiling is 3 to 4 months after installation, when the surface is more open than immediately after installation.
- Clean the decking with clean water, cleaner and silicon carbide broom or disk.
- Let the decking dry. When the decking is completely dry please follow MOSO® maintenance & cleaning instructions for oiling.
- After this first application the decking can remain without oil treatment for natural greying. However annual cleaning with the silicon carbide broom or disk is obligatory. If you want to keep a darker colour, regular application with Woca Exterior Wood Oil is needed.
- It is advisable to keep the decking free from dust and dirt as much as possible (clean by broom regularly).

Storing

Store in a cool and dry place away from direct sunlight, and protected from weather influences, dirt and dust.

Additional note

Whilst all due care is taken to ensure the accuracy of the installation instructions, individual circumstances (location, sub floor and installation procedures) may vary and are beyond the manufacturer's control. In case of doubt, therefore, consult the distributor. Always follow the local building code.

These instructions are subject to change. For the latest version visit: www.moso-bamboo.com/x-treme/decking

EN-2024-01

▶ www.moso-bamboo.com/youtube/x-treme

MOSO® Bamboo X-treme® Outdoor Decking

Maintenance & cleaning

Maintenance Woca

The surface of decking is weathered under influence of wind, rain, frost and sunshine (UV). As a result, the surface turns grey, dirty and cracks/splinters will appear. Woca Denmark has developed different outdoor cleaning and maintenance products. Woca Exterior Wood Cleaner loosens dirt and removes green growth from the surface, without damaging it.

Maintenance of flat surface

Please be aware that on the flat surface, irregularities in the surface (e.g. cracks, splinters) may be more visible than on the grooved surface. With regular maintenance with Woca Exterior Wood Oil, this will be reduced.

Cleaning

- Soak MOSO® Bamboo X-treme® with plenty of water and leave it for 10 min. If possible use a garden hose.
  Do not use high-pressure cleaners.
- Mix Woca Exterior Wood Cleaner with water in the ratio 1:2 and apply it. If the decking is extremely dirty, exterior cleaner may be used undiluted. Clean the decking with a silicon carbide broom or machine disk. Scrub the soaked material lengthwise following the bamboo grain until the material appears clean. If the decking has been installed flat side up, first scrub at an angle of 45 degrees before scrubbing in the length direction. When using a machine disk this is not necessary. Repeat the cleaning if necessary. Clean the surface carefully with water.
- Leave MOSO® Bamboo X-treme® to dry for approx. 24 hours. The material must be completely dry before oil treatment can be done.

Application of oil

- Apply in dry weather only. Avoid direct sunlight and high temperatures.
- Stir the oil thoroughly before use. Apply an even thin coat of oil with an applicator or a brush (decking with non slip grit only with a brush).
- The oil is cream-coloured when it is wet.
- After a few minutes, the material has an oily appearance as the water is evaporating.
- Wipe off any excess oil with clean cotton cloths after no more than 5-10 minutes.
- Take particular care to remove excess oil from joints and grooves.
- Repeat the above process.
- When the material is dry, it may be polished with a polishing pad or polishing machine to ensure an extra hard-wearing surface. It takes 24 to 48 hours for the oil to harden thoroughly, depending on weather conditions and outdoor temperature. The material should not be exposed to water during this period.
- Pay attention to the ends of the joists and cut ends of the boards, which tend to absorb more water, and finish well to minimise water ingress. A sealer is available from MOSO.

Theoretical consumption

- Mix Woca Exterior Wood Cleaner with water in the ratio 1:2 and apply it. If the decking is extremely dirty, exterior cleaner may be used undiluted.
- Woca Exterior Wood Oil: 12 - 15 m² / litre.

Risk of self-ignition

Due to the risk of self-ignition it is important that oil-wetted cloths are soaked in water and are disposed in a tightly closed container after use. For more details, check the instructions of the finish supplier.

SEALER-05
Sealer for ends of boards 250 ml

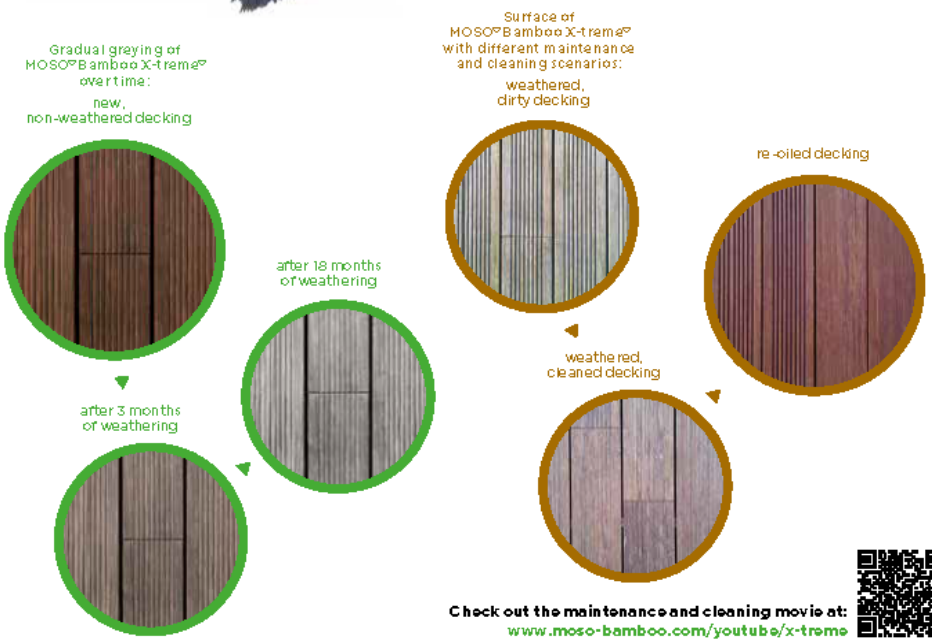
DISK-02
16" Silicon carbide disk

BROOM-02
Silicon carbide broom

CLEANER-WOCA-01
Woca Exterior Wood Cleaner 2.5 ltr

OIL-WOCA-011
Woca Exterior Wood Oil Teak 2.5 ltr

WOCA-APPLICATOR
Woca Applicator set for oil



MOSO®
Bamboo X-treme®
User information

Appearance and colour

MOSO® Bamboo X-treme® is a natural product, which can vary in colour, grain and appearance. Colour will change over time depending on the maintenance schedule. The boards have a brown to dark brown colour when installed, which turns into a lighter caramel colour several weeks after installation. Without further maintenance the colour gets greyish relatively fast (similar to most other wood species).

If a brown colour is preferred, maintenance should be done with Woca Exterior Wood Oil or a comparable waterbased oil/saturator with teak colour pigments.

Directly after decking installation, but even better after 3-4 months, 1 coat of oil (pre-oiled version) or 2 layers of oil (unfinished version) have to be applied. For further details see the decking installation instructions.

MOSO® Bamboo X-treme® shows similarity to other hardwoods in grain and structure. The characteristic bamboo nodes however can still be recognised and provide the product with a special and lively look.

Decking around a swimming pool

If MOSO® Bamboo X-treme® Outdoor Decking is to be used around swimming pool areas, the following has to be taken into account: MOSO® Bamboo X-treme® is a natural (wood like) product. As with any wooden product used outdoors, there is always a risk of formation of splinters, however splinters from MOSO® Bamboo X-treme® are normally smaller than (tropical) hard wood splinters. A regular application of oil (more frequently necessary around swimming pools) is required to reduce the formation of splinters. Furthermore, regular maintenance with the silicon carbide broom or disk is required to effectively remove splinters and smooth the surface. The boards must be installed in such a way that the surface water cannot flow directly into the pool.
Also bear in mind that treated swimming pool water contains salt and chlorine which can cause the boards around the pool to "weather" and become bleached faster than the boards in areas not exposed to the swimming pool water.

Normal phenomena

Cracks on the surface and on the ends of the boards can occur due to the different drying characteristics of the surface and board ends. This does not affect the stability or durability of the board.

The surface side of the boards will become rougher over time and can form (small) splinters as a result of continuous water absorption and desorption due to dry and wet weather periods. Dimensional change or cupping of the boards can occur after installation. These phenomena are normal for most hardwood species and MOSO® Bamboo X-treme®.

After installation, there might be some bleeding or leaching of colour from the bamboo material when it gets wet, e.g. when it rains. This possible bleeding is typical for wood and will disappear over time. The brownish liquid can easily be cleaned from the Bamboo X-treme® material, however controlled water drainage and prevention of splash water is required to prevent any discoloration of surrounding or underlying building components.

EN-2024-01

Private Residence Sardegna decking installed near a cliff edge by the sea - Portobello di Gallura - Sardegna, Italy

Endless possibilities with
MOSO® Bamboo X-treme®

The Roofs residential towers Closed cladding installed at the crown of the buildings - (2200 m²) The Hague, the Netherlands

installation instruction bamboox-treme® clips/fastener

READ THIS INSTALLATION NOTICE CAREFULLY BEFORE STARTING YOUR DECKING PROJECT
Failure to follow these instructions may void the warranty.

FOR SIDING/CLADDING INSTALLATION, PLEASE DOWNLOAD THE INSTALLATION INSTRUCTIONS FROM:
US/CANADA: **www.moso-bamboo.com/siding**
ALL OTHER: **www.moso.eu/cladding**

Prior to installation, following measures should be undertaken:
- Make sure that joist spacing is 462,5 mm / 16" (or 18" or 20") (centre to centre).
- Make sure there is adequate and unobstructed air flow under the deck to prevent excessive water absorption by the boards.
- Use a stable joist material to secure the decking structure.

Installation steps:
1. Position the 1st board and leave a 20 mm / 3/4" gap from any permanent structure (drawing 1)
2. Pre-drill the 1st board with Ø4,5 mm drill hole 20 mm / 3/4" from the side of the board. Fix the exterior side of the 1st board, at every support joist, using stainless steel screws 5x50 mm (drawing 2). (Alternatively the boards may be fixed with Bamboo X-treme starter/end clips.)
3. Insert Bamboo X-treme fasteners into the groove channel of the 1st board at every support joist. Install the screw for ¾ of the way. Depending on the joist material, you may need to pre drill before screwing. Drill bit should be Ø3.5 x 80- 110 mm. The drill hole MUST at least be 30 mm deep. (drawing 2)

Joists material	Pre drilling
Softwood	No
Tropical hardwood	Recommended
X-treme sub beams	Yes
Aluminum or steel*	Yes

* Use special screws for aluminum or steel

4. Position the next board against the fastener. Slightly lift the outer edge of the board to ease the assembly of the board into the fastener. Bamboo X-treme fasteners allow a 5- 6 mm / 3/16" gap between the boards (drawing 3).
5. When the 2nd board has been placed correctly, tighten the Bamboo X-treme screws down. Always screw vertically to the joist. Apply low torque with slow screwing speed on the drilling machine. Perform some tests for correct torque speed adjustment before full installation. A special square bit (S2) is provided.(drawing 4)
6. Repeat steps 3; 4 and 5 until the last board. Adjust the final board and fix the exterior side to the joist using stainless steel screws 5x50 mm. Pre-drill the board with Ø4,5 mm drill hole. (Alternatively the exterior edge of the final row of boards may be fixed with Bamboo X-treme starter/end clips.)

GUIDE DE POSE A LIRE ENTIÈREMENT ET ATTENTIVEMENT AVANT LE DÉBUT DU CHANTIER
Le non-respect de ces consignes de pose annule la garantie

POUR L'INSTALLATION DE BARDAGE / REVÊTEMENT, VEUILLEZ TÉLÉCHARGER LES INSTRUCTIONS D'INSTALLATION DEPUIS LE LIEN SUIVANT: ETATS UNIS ET CANADA:
www.moso-bamboo.com/siding
EUROPE ET AUTRES: **www.moso.eu/cladding**

Avant la pose, certaines mesures doivent être prises :
- L'entraxe des lambourdes doit être égal à 462,5 mm, la rainure / languette doivent être placées sur une lambourde.
- Assurer une ventilation suffisante sous la terrasse pour éviter une reprise d'humidité excessive des lames.
- Utiliser des lambourdes en bois stable pour sécuriser la structure.

Étapes à suivre pour l'installation :
1. Poser la 1ère lame à 20 mm du mur éventuel. (Dessin 1)
2. Réaliser un pré-perçage avec une mèche de Ø4.5 mm à 20 mm du bord de la 1ère lame. Fixer le coté extérieur de la 1ère lame dans la lambourde en utilisant des vis Inox 5x50 mm (Dessin 2). (Alternativement, les lames peuvent être fixées avec des clips de démarrage Bamboo X-treme.)
3. Glisser les clips Bamboo X-treme dans la rainure de la 1ère lame, centrer-les sur la lambourde. Insérer la vis à ¾

En fonction du matériau utilisé pour la lambourde, le pré- perçage est obligatoire avec une mèche Ø3,5 x 80-110 mm. La profondeur du trou doit être égale à 30 mm minimum. (Dessin 2)

Type de lambourde	Pré- perçage
Résineux	Non
Exotique	Recommandé
Bamboo X-treme	Oui, obligatoire
Aluminium ou acier *	Oui, obligatoire

* Utiliser des vis spéciales pour l'aluminium ou l'acier.

4. Emboîter la 2ème lame en la soulevant légèrement. Le clip Bamboo X-treme garantie un espacement réglementaire de 5-6 mm entre les lames. (Dessin 3)
5. La 2ème lame est en place, terminer le vissage des clips Bamboo X-treme à l'aide de l'embout carré (S2) spécialement fourni. Visser verticalement à la lambourde. Ne pas appliquer une couple de serrage très élevé en vissant dans la lambourde. Faire un test au préalable pour ajuster le couple de la visseuse. (Dessin 4)
6. Répéter les étapes 3; 4 et 5 jusqu'à la dernière lame. Ajuster la dernière lame par découpe avec une scie circulaire et visser le coté extérieur avec des vis Inox 5x50 mm. Pré percer la lame avec une mèche Ø4,5 mm. (Alternativement, les lames de la dernières rangée de planches peuvent être fixées avec des clips de démarrage Bamboo X-treme.)

ACHTUNG: LESEN SIE DIESE MONTAGEANLEITUNG VOR DER MONTAGE.
Bei nicht befolgen der anleitung entfällt die garantie!

FÜR HOLZVERKLEIDUNGEN/ FASSADENELEMENTE LADEN SIE BITTE DIE MONTAGEANLEITUNG HERUNTER VON:
DEUTSCH: www.moso.eu/fassadenelemente
US/KANADA: www.moso-bamboo.com/siding

Vor der Montage muss folgendes beachtet werden:
- Der Unterkonstruktionsabstand muss 462,5 mm (Achsmass) betragen, Jede Stirnkante muss auf einem Balken aufliegen.
- Sorgen Sie für eine gute, uneingeschränkte Hinter Lüftung der Terrasse, so dass vermieden wird, dass die Dielen zu viel Feuchte aufnehmen.
- Nutzen Sie eine stabile Unterkonstruktion.

Montage Schritten:
1. Lassen Sie mindestens 20 mm Luft zu angrenzenden Wänden und anderen festen Bauteilen (Zeichnung 1)
2. Bohren Sie die erste Diele vor mit Ø4,5 mm, 20 mm vom Außenrand der Diele. Montieren Sie die erste Diele auf jeden UK balken, nach vorbohren, mit einer Edelstahlschraube 5 x 50 mm (Zeichnung 2). (Alternativ können die Dielen auch mit Bamboo X-treme Start/Ende Klipse befestigt werden.)
3. Platzieren Sie die Klipse in der Seiten Nutzung der Diele und montieren Sie die Schraube ca. ¾ tief. Abhängig vom UK material ist es notwendig vor zu bohren. Der Bohrer muss ein Metallbohrer sein, Ø3.5 x 80- 110 mm (Zeichnung) das Bohrloch muss mindestens 30 mm tief sein (Zeichnung 2).

UK Material	vorbohren
Weichholz	Nein
Tropisches Hartholz	Empfohlen
X-treme UK Balken	Ja
Aluminium oder Stahl*	Ja

* Verwenden Sie Spezialschrauben für Aluminium oder Stahl

4. Platzieren Sie die nächste Diele mit den Klipsen in der Seitennut. Heben Sie die Diele leicht an um das Platzieren zu erleichtern. Bamboo X-treme Klipsen ergeben eine 5-6 mm Fuge zwischen den Dielen. (Zeichnung 3)
5. Wenn die zweite Diele richtig platziert ist, fixieren Sie die Schrauben immer senkrecht in die Unterkonstruktion.
Nutzen Sie ein niedriges Drehmoment bzw. Drehgeschwindigkeit beim Schrauben.
Machen Sie ein paar Tests für die richtige Einstellung vor der tatsächlichen Installation.
Ein spezieller Bit (S2) ist in jeden Karton Klipsen enthalten. (Zeichnung 4)
6. Wiederholen Sie die Schritte 3, 4 und 5 bis zur letzten Diele. Bohren Sie die letzte Diele vor mit 4,5 mm, 20 mm vom Außenrand der Diele. Montieren Sie diese letzte Diele auf jeden Unterkonstruktionsbalken, nach vorbohren mit einer Edelstahlschraube 5 x 50 mm.

www.moso.eu/x-treme | www.moso-bamboo.com/x-treme

201804

installation instruction bamboox-treme® clips/fastener

LEES DEZE INSTALLATIE INSTRUCTIE NAUWKEURIG VOOR AANVANG VAN DE MONTAGE
Bij het niet opvolgen van deze instructie vervalt de garantie

VOOR DE INSTALLATIE VAN GEVELBEKLEDING DOWNLOAD DE INSTALLATIE INSTRUCTIE OP:
www.moso.eu/cladding

Let op volgende punten voor aanvang van de installatie:
- De onderconstructiebalken afstand dient 462,5 mm te bedragen (as tot asmaat), monteer de mes en groef altijd op een onderconstructiebalk.
- Zorg voor voldoende ventilatie onder het terras om waterabsorptie aan de onderkant van de vlonderplanken te vermijden.
- Zorg voor een stabiele onderconstructie door gebruik te maken van stabiele (Hardhout) onderconstructiebalken.

Installatie stappen:
1. Plaats de eerste vlonderplank op minimaal 20 mm afstand van een vaste constructie (b.v. muur) (tekening 1).
2. Boor de eerste vlonderplank voor met Ø4,5 mm boor, 20 mm van de zijkant van de plank. Fixeer de plank op elke onderconstructiebalk met RVS schroeven 5x50 mm (tekening 2). (De planken mogen ook worden bevestigd met Bamboo X-treme starter/eind clips.)
3. Plaats de clip in de zijgroef van de eerste vlonderplank op elke onderconstructiebalk. Draai de schroef ¾ vast, gebruik hiervoor de meegeleverde S2 bit. Afhankelijk van de dichtheid van de onderconstructiebalken is het mogelijk dat moet worden voorgeboord. De metaalboor moet afmetingen Ø3,5 x 80-110 mm hebben. Het boorgat moet minstens 30 mm diep zijn. (tekening 2)

onderconstructiebalk	voorboren
Geimpregneerd naaldhout	Nee
Tropisch hardhout	Aanbevolen
X-treme balken	Ja
Aluminium of staal*	Ja

* gebruik speciale schroeven voor alu of staal

4. Plaats de volgende vlonderplank tegen de clip door deze aan één kant omhoog te brengen. Bij de Bamboo X-treme clips montage ontstaat een voeg van 5-6 mm (tekening 3).
5. Als de 2e vlonderplank goed geplaatst is kan de ¾ gemonteerde clipschroef volledig vastgedraaid worden. Vastschroeven geschied op accuboormachinestand langzaam en met laag koppel. Voer een paar tests uit om het resultaat te controleren voordat daadwerkelijk geïnstalleerd wordt. (tekening 4)
6. Herhaal stappen 3, 4 en 5 tot de laatste vlonderplank. Boor de laatste vlonderplank voor met Ø4,5 mm boor, 20 mm van de zijkant van de plank. Fixeer de plank op elke onderconstructiebalk met RVS schroeven 5 x 50 mm. (De planken mogen ook worden bevestigd met Bamboo X-treme starter/eind clips.)

LEGGERE ATTENTAMENTE I CONSIGLI DI INSTALLAZIONE PRIMA DI INIZIARE LA POSA DEL DECKING
Il mancato rispetto delle seguenti istruzioni annullerà la garanzia

PER INSTALLAZIONE COME RIVESTIMENTO, SCARICARE LE ISTRUZIONI D'INSTALLAZIONE DA: www.moso.eu/cladding

Prima dell'installazione, è bene prendere in considerazione le seguenti misure:
- Assicurarsi che lo spazio tra i travetti sia 462,5 mm (tra asse e asse) e che l'incastro maschio/femmina delle tavole sia sempre sostenuto da un travetto.
- Assicurarsi che ci sia un adeguato e libero flusso d'aria sotto il decking per evitare eccessivi assorbimenti d'acqua delle tavole.
- Utilizzare un materiale stabile per realizzare la sottostruttura del decking.

Procedura di installazione:
1. Posizionare la prima tavola e lasciare 20 mm di spazio da ogni struttura permanente (vedere disegno 1)
2. Pre-forare la prima tavola a 20 mm dal bordo con un foro da Ø4,5 mm. Fissare il lato esterno della prima tavola ad ogni travetto della sottostruttura, utilizzando viti in acciaio inossidabile 5x50 mm (vedere disegno 2). (In alternativa, le tavole possono essere fissate con le clip Bamboo X-treme inizio / fine).
3. Inserire le clips Bamboo X-treme nella fresata laterale della prima tavola in corrispondenza di ogni travetto. Posizionare le viti ed avvitare per ¾. (vedere disegno 2)
   In base al materiale utilizzato per i travetti della sottostruttura, può essere necessario pre-forare prima di avvitare. La foratura dovrebbe essere Ø3,5 x 80- 110mm ed il foro deve essere almeno profondo 30 mm. (vedere disegno 2)

Materiali per sottostruttura	Pre-foro
Legni teneri	No
Legni tropicali	Consigliato
Travetti X-treme	Si
Alluminio o acciaio*	Si

* Utilizzare viti speciali per alluminio o acciaio

4. Posizionare la tavola successiva contro le clips installate. Sollevare leggermente il bordo esterno della tavola per facilitarne l'alloggiamento. Le clips Bamboo X-treme garantiscono la distanza minima regolamentare di 5-6 mm tra le tavole installate (vedere disegno 3).
5. Dopo aver posizionato correttamente la seconda tavola, stringere completamente le viti Bamboo X-treme. Avvitare sempre verticalemente al travetto. Coppia e velocità di avvitamento del trapano devono essere basse. Si consiglia di eseguire alcuni test per trovare la giusta regolazione della coppia prima di procedere con l'installazione completa.Viene fornita una speciale punta quadrata (S2) (vedere disegno 4).
6. Ripetere le operazioni dei punti 3; 4; 5 e 6 fino all'ultima tavola. Posizionare l'ultima tavola, avvitando il bordo esterno alla sottostuttura utilizzando viti in acciaio inossidabile 5x50 mm. Pre-forare la tavola con un foro di Ø4,5mm.

LEER ATENTAMENTE LOS CONSEJOS DE ESTA GUÍA DE INSTALACIÓN ANTES DE INICIAR SU OBRA
Si no se siguen estas instrucciones se anulará la garantía

PARA LA INSTALACIÓN DE REVESTIMIENTO / FACHADA, DESCARGUE LAS INSTRUCCIONES DE INSTALACIÓN DESDE:
US/CANADA: **www.moso-bamboo.com/siding**
RESTO: **www.moso.eu/cladding**

Antes de la instalación, deberán adoptarse las siguientes medidas:
- Asegúrese de que el espacio entre las vigas sea de 462,5 mm, siempre apoyando el machihembrado de la tarima sobre un rastrel.
- Asegúrese de que haya una buena ventilación y no hayan obstáculos al flujo de aire debajo de la cubierta para evitar un exceso de absorción de agua por parte de las lamas.
- Utilice rastreles de una madera estable para asegurar la estabilidad de la estructura de la cubierta.

Pasos para la instalación:
1. Coloque la primera lama y deje un espacio de 20 mm respecto a la pared o a cualquier otra estructura permanente (ver dibujo 1)
2. Pre-taladre la primera lama con una broca de Ø4,5 mm a una distancia de 20 mm del borde de la lama. Fije el lado exterior de la primera lama al rastrel, utilizando tornillos de acero inoxidable 5x50 mm (ver dibujo 2). (Alternativamente, las lamas se pueden fijar con clips Bamboo X-treme)
3. Inserte los clips Bamboo X-treme en la ranura de la primera lama y céntrelos al rastrel. Pre-atornille el tornillo a ¾ (ver dibujo 2). Dependiendo del material utilizado como rastrel, será necesario pre-taladrar con una una broca de Ø3.5 x 80 - 110 mm (ver dibujo). En tal caso, el taladro DEBERÁ ser al menos de 30 mm de profundidad.

Material rastrel	Pre-taladrar
Conífera	No
Madera tropical	Recomendado
Rastrel bambu X-treme	Si, obligatorio
Aluminio o acero*	Si

* Utilizar tornillos especiales para aluminio o acero

4. Coloque la siguiente lama levantando ligeramente el borde exterior. El clip Bamboo X-treme facilita el montaje de las lamas y garantiza un mínimo de separación de 5-6 mm entre las lamas (ver dibujo 3).
5. Una vez la segunda lama esté correctamente instalada, apriete los tornillos Bamboo X-treme con la ayuda del destornillador cuadrado (S2) suministrado a tal efecto. Mantener el tornillo perpendicular al rastrel. Aplicar baja velocidad de atornillado al taladro. Hacer varias pruebas para validar la fuerza a aplicar antes de realizar la instalación (ver dibujo 4).
6. Repita nuevamente los pasos 3, 4 y 5 hasta la última lama. Ajuste la lama final cortando con una sierra circular y fijando el lado exterior al rastrel con tornillos de acero inoxidable 5x50 mm. Pre-taladre la lama con una broca de Ø4,5 mm.

201804

www.moso.eu/x-treme | www.moso-bamboo.com/x-treme

Revision	Date	Comments	Eng/Tech
0	April 19, 2024	Original Issue	ML
1	April 26, 2024	Product name updated: from Moso X-Treme decking to MOSO Bamboo Decking X-treme/thermo. Revision block added. End of test report note added.	WBR

*** END OF TEST REPORT ***