Grinwood WPC Material Co., Ltd.

TEST REPORT

SCOPE OF WORK
Round hollow co-extrusion WPC decking

REPORT NUMBER
220523009SHF-001

TEST DATE(S)
2022-06-06 - 2022-08-09

ISSUE DATE
2022-08-17

PAGES
21

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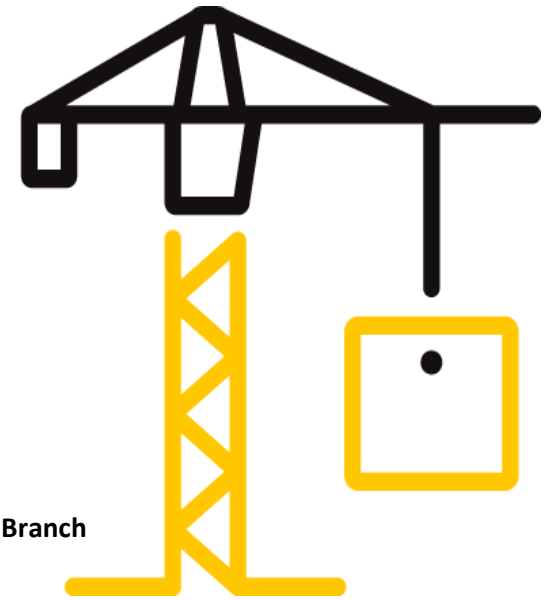

Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch

Test Report

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Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch
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Website: www.intertek.com

Test Report

Issue Date: 2022-08-17 Intertek Report No. 220523009SHF-001

Applicant: Grinwood WPC Material Co., Ltd.

Address: Longquanwu Eco-industrial Zone, Miaoxi, Huzhou, Zhejiang, China

Attn: Gang Yu

Test Type： Performance test, samples provided by the applicant.

Product Information

Product Name	Round hollow co-extrusion WPC decking	**Brand**	/
Sample Description	Good Condition	**Sample Amount**	76 pcs
		Received Date	2022-06-06

Sample ID	**Model**	**Specification**
S220532009SHF.001, 004~006, 008~010, 012~017, 019~020, 026	GW901	138X23MM

Test Methods And Standards

Test Standard	EN 15534-4:2014 Section 4.4, 4.5.1, 4.5.2, 4.5.3, 4.5.5, 4.5.7 EN 15534-1:2014 Section 6.4.2, 7.1.2.1, 7.4.1, 7.5, 8.3.1, 8.3.2, 8.3.3, 9.3, 9.4, Annex A EN 15534-1:2014+A1:2017 Section 6.3 CEN/TS 15676:2007, EN 479:2018, EN ISO 9239-1:2010, EN ISO 11925-2:2020, ISO 16869:2008, EN 322:1993, ISO 75-1:2020 & ISO 75-2:2013, EN 717-1:2004
Specification Standard	EN 15534-4:2014, EN 13501-1:2018
Test Conclusion	The samples were tested according to the above standards, and the results are shown in the following page.

Note:

1.This report relates specifically to the sample(s) that were drawn and provided by the applicant or their nominated third party. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment and only relate to the sample(s) as received and tested.

2. Test item maked with * in next page(s) is not accredited by CNAS.

Report Authorized

INTERTEK TESTING SERVICES SHENZHEN LTD. SHANGHAI FENGXIAN BRANCH 英标检验检测专用章

Name: Sally Xie
Title: Approver

Name: Flora Fan
Title: Reviewer

Name: Erin Huang
Title: Project Engineer

Test Report

Issue Date: 2022-08-17 Intertek Report No. 220523009SHF-001

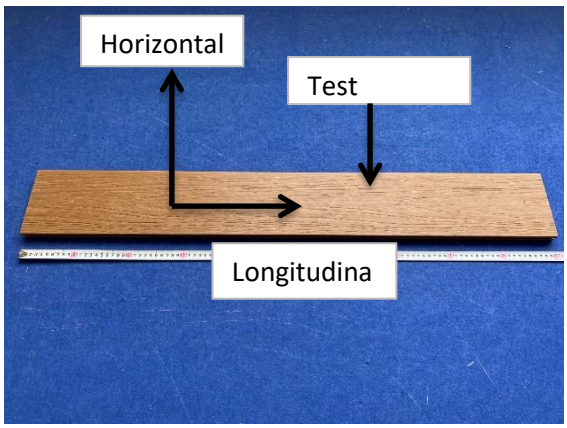
Test Items, Method and Results:

EN 15534-4:2014 Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) Part 4: Specifications for decking profiles and tiles

Test Items	Test Method	Test Results	Test requirements	Verdict
Slipperiness (Pendulum test)	EN 15534-4:2014 Section 4.4 EN 15534-1:2014 Section 6.4.2 CEN/TS 15676:2007	Surface condition: Dry Longitudinal direction: Mean: 86 Min.: 82 Horizontal direction: Mean: 90 Min.: 87	Pendulum value ⩾ 36	Pass
		Surface condition: Wet Longitudinal direction: Mean: 56 Min.: 53 Horizontal direction: Mean: 50 Min.: 46		

Note:

1. Requirement is cited from EN 15534-4:2014 Table 1.
2. Test surface and direction please refer to below picture.



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Test Items	Test Method	Test Results	Test requirements	Verdict
Falling mass impact resistance	EN 15534-4:2014 Section 4.5.1 EN 15534-1:2014 Section 7.1.2.1	Type: Hollow profile Max. Crack length (mm): No crack Max. Residual Indentation (mm): 0.09	None of 10 test specimens shall show a failure with a crack length ≥ 10 mm or a depth of residual indentation ≥ 0,5 mm.	Pass

Note:

1. The falling mass was 1000g and the height was 700mm.

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Test Items	Test Method	Test Results	Test requirements	Verdict
Flexural properties	EN 15534-4:2014 Section 4.5.2 EN 15534-1:2014 Annex A	Bending Strength: 41.0 MPa Modulus of elasiticity: 3727 MPa Maximum load: Mean: 5407 N Min.: 5174 N Deflection at 500N: Mean: 0.99 mm Max.: 1.12 mm	Flexural properties -F'max: Mean ⩾ 3300 N Min. ⩾ 3000 N -Deflection under a load of 500 N Mean ⩽ 2,0 mm Max.⩽ 2,5 mm	Pass

Note:

1. The test span was 350mm offered by applicant.

Test Report

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EN 15534-4:2014 Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) Part 4: Specifications for decking profiles and tiles

Test Items	Test Method	Test Results			Test requirements	Verdict
Creep behaviour	EN 15534-4:2014 Section 4.5.3 EN 15534-1:2014 Section 7.4.1	Span:	350	mm	Known span in use	Pass
		Mean ΔS:	1.81	mm	Mean ΔS ⩽ 10 mm	
		Max. ΔS:	2.04	mm	Max. ΔS ⩽ 13 mm	
		Mean ΔSr:	1.72	mm	Mean ΔSr ⩽ 5 mm	

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Test Items	Test Method	Test Results			Test requirements	Verdict
Moisture resistance under cyclic test conditions	EN 15534-4:2014 Section 4.5.5 EN 15534-1:2014 Section 8.3.2	Original Bending Strength:	41.0	MPa	Decrease of bending strength, Mean≤ 20 % Max.≤ 30 %	Pass
		After exposure, Mean Bending Strength:	40.4	MPa		
		Decrease:	1.5	%		
		Min Bending Strength:	37.1	MPa		
		Decrease:	9.7	%		

Note:

1. The test span was 350mm offered by applicant.

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Test Items, Method and Results:

EN 15534-4:2014 Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) Part 4: Specifications for decking profiles and tiles

Test Items	Test Method	Test Results	Test requirements	Verdict
Swelling and water absorption (28 days immersion)	EN 15534-4:2014 Section 4.5.5 EN 15534-1:2014 Section 8.3.1	Mean Swelling: 0.40 % in thickness 0.10 % in width 0.14 % in length Max. Swelling: 0.58 % in thickness 0.15 % in width 0.23 % in length Water absorption: Mean: 0.87 % Max.: 0.90 %	Means swelling: ≤ 4 % in thickness ≤ 0,8 % in width ≤ 0,4 % in length Max. swelling: ≤ 5 % in thickness ≤ 1,2 % in width ≤ 0,6 % in length Water absorption: Mean≤ 7 % Max.≤ 9 %	Pass

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EN 15534-4:2014 Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) Part 4: Specifications for decking profiles and tiles

Test Items	Test Method	Test Results	Test requirements	Verdict
Boiling Test	EN 15534-4:2014 Section 4.5.5 EN 15534-1:2014 Section 8.3.3	Water absorption in weight: Mean: 0.93 % Max.: 1.00 %	Water absorption in weight: Mean ≤ 7% Max. ≤9%	Pass

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Test Items, Method and Results:

EN 15534-4:2014 Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) Part 4: Specifications for decking profiles and tiles

Test condition: Place the test pieces horizontally in the oven, maintain the test pieces in the oven for 60 min. at 100°C.

Test Items	Test Method	Test Results
Heat reversion*	EN 15534-4:2014 Section 4.5.7 EN 15534-1:2014 Section 9.3 EN 479:2018	Test Temperature: 100°C Mean: -0.24 %

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Test Items, Method and Results:

EN 15534-4:2014 Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) Part 4: Specifications for decking profiles and tiles

Test condition: ambient air temperature 23±2°C

Test Items	Test Method	Test Results	
Heat build-up*	EN 15534-4:2014 Section 4.5.7 EN 15534-1:2014 Section 9.4	Set temperature rise for use in horizontal position:	50 °C
		Actual temperature rise for black control specimen:	49.6 °C
		Temperature of test specimen:	44.4 °C
		Predicted heat build-up ΔT:	-5.2 °C

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Test Items, Method and Results：

EN 13501-1:2018 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

1.1 CRITICAL HEAT FLUX TEST

The test was conducted in accordance with EN ISO 9239-1:2010. This test evaluates the wind-opposed burning behaviour and spread of flame of horizontally mounted floorings exposed to a heat flux radiant gradient in a test chamber, when ignited with pilot flames.

1.2 IGNITABILITY TEST

The test was conducted in accordance with EN ISO 11925-2:2020. This test evaluates the ignitability of a product under exposure to a small flame.

1.3 CLASSIFICATION CRITERIA

The classification was determined in accordance with EN 13501-1:2018. The class C_{fl} with its corresponding fire performance is given in the table below.

Table - Classes of reaction to fire performance for flooring.

Class	Test Method(s)	Classification criteria	Additional classifications
C_{fl}	EN ISO 9239-1 [a] and	Critical flux [b] ≥ 4.5 kW/m^2	Smoke production [c]
	EN ISO 11925-2 [d] Exposure = 15 s	F_S ≤ 150 mm within 20 s	-

Note:

a. Test duration = 30 min.

b. Critical flux is defined as the radiant flux at which the flame extinguishes or the radiant flux after a test period of 30 min, whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame within 30 min).

c. s1 = Smoke ≤ 750 % minutes; s2 = not s1.

d. Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack.

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Test Items, Method and Results：

2 RESULTS AND OBSERATIONS

Method	Parameter	Result
EN ISO 9239-1:2010	Critical flux (transverse), kW/m^2	5.8
	Critical flux (longitudinal), kW/m^2	4.9
	Smoke production, % minutes	199
EN ISO 11925-2:2020 Exposure = 15 s	$F_S \leq 150$ mm within 20 s	Yes

3 CLASSIFICATION

The classification has been carried out in accordance with EN 13501-1.

Fire behaviour		Smoke production	
C_{fl}	-	s	1

Reaction to fire classification: C_{fl}-s1

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Test Items, Method and Results：

4 Test Photos of EN ISO 9239-1

Before test

After test

Test Report

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Test Items, Method and Results:

EN 15534-4:2014 Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) Part 4: Specifications for decking profiles and tiles

Indenter: a hardened steel spherical body with diameter of 10 mm

Test load: Additional load of 2000N with preload of 20N

Indentation time: (25 ± 5) s

Recovery time: at least 24h

Test Items	Test Method	Test Results	
Resistance to indentation*	EN 15534-4:2014 Section 4.5.7 EN 15534-1:2014 Section 7.5	Brinell hardness:	97.62 MPa
		Rate of elastic recovery:	64.7 %

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Test Items, Method and Results:

Test Item: Fungi resistance test*

Test Method: ISO 16869:2008 Plastics - Assessment of the effectiveness of fungistatic compounds in plastics formulations

Test organisms:

Aspergillus niger ATCC 6275, Chaetomium globosum ATCC 6205, Paecilomyces variotii CBS 628.66, Penicillium funiculosum ATCC 9644, Trichoderma longibrachiatum ATCC 13631

Test condition(s): 21days, Humidity＞90%RH, Temperature: 24℃

Rating evaluation:

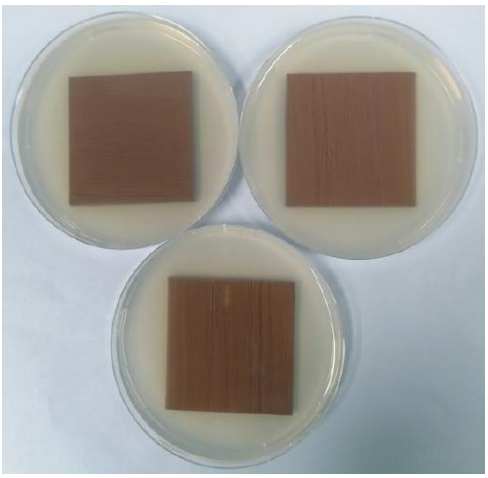
Rating	Growth	Interpretation
0	No growth	The material is resistant to fungal attack
1	Initial growth (compared with the rest of the agar surface)	The material is partially protected against fungal attack or generally not susceptible to such attack
2	Obvious growth and sporulation	The material is susceptible to fungal attack

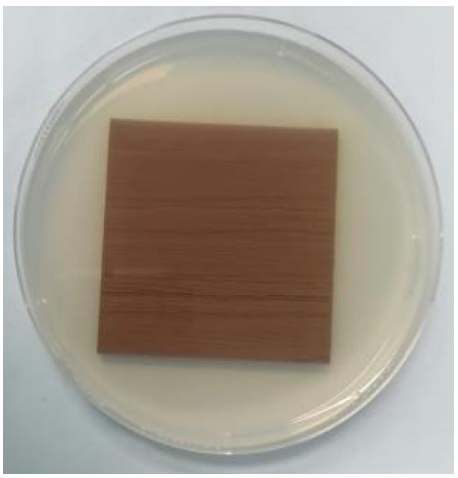
Test result:

Evaluation	Observed Growth on specimens
Rating 0	No growth, the material is resistant to fungal attack

Note: Test item was subcontracted on accreditation by CNAS L0823.

Test Photos:





Test Report

Issue Date: 2022-08-17 Intertek Report No. 220523009SHF-001

Test Items, Method and Results:

Test Item: Moisture content*

Condition: 96 hours at a temperature of 23±2°C and relative humidity of 50±5%

Test Items	Test Method	Test Results
Moisture content*	EN 15534-1:2014+A1:2017 Section 6.3 EN 322:1993	0.66%

Test Report

Issue Date: 2022-08-17 Intertek Report No. 220523009SHF-001

Test Items, Method and Results:

Test Item: Temperature of deflection under load*

Test Standard: ISO 75-1:2020 & ISO 75-2:2013

Test Condition:

Heating rate: 120 ˚C/h

Flexural stress: 1.80 MPa

Span: 64 mm

Loading side: Flatwise

Test Result:

Average temperature of deflection under load: 75.5 ℃

Note: Test item is subcontracted on Intertek Testing Services Ltd., Shanghai.
Address: Building T52-8, No. 1201 Guiqiao Road, Pudong District, Shanghai, China

Test Report

Issue Date: 2022-08-17 Intertek Report No. 220523009SHF-001

Test Items, Method and Results:

Test Item: Formaldehyde emission test

Test Method: With reference to EN 717-1:2004 chamber method, formaldehyde content was detected by UV-VIS spectrophotometer.

Test condition:

Chamber type:	1m^3 stainless steel chamber
Climatic conditions:	(23 ± 0.5)°C, (45 ± 3)% R.H.
Air exchange rate:	1.0 h^{-1}
Loading factor:	1.0 m^2/m^3
Test duration:	240 hours
Test result:	ND

Note:

1. mg/m^3 = milligram per cubic meter
2. Detection limit = 0.02 mg/m^3
3. ND = Not detected (less than the detection limit)
4. Test location: Central Chemical Lab of Intertek Testing Services Ltd., Shenzhen
Address: 5F Bldg. 1, Yuanzheng Science and Technology Industrial Park, No. 4012, Wuhe Ave. North, Bantian Street, Longgang District, Shenzhen.

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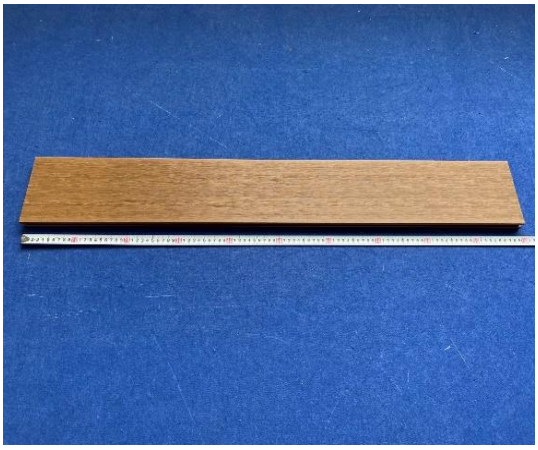
Appendix A: Sample Received Photo

Front view



Back view

Section view

Revision:

NO.	Date	Changes
220523009SHF-001	2022-08-17	First issue