



Shandong Chambroad Timber Material Co. Ltd

Product info



Top 500 Asian brands

Top 500 Chinese Enterprises

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Raw Material Sourcing

**Origin of Raw Material:
Poplar (Populus)
cultivated in China**



SCS Global Services does hereby certify that an independent audit has been completed and conformity to the applicable standard(s) has been confirmed for:

Shandong Chambroad Timber Material Co., Ltd.

Economic Development Zone, Boxing County, Binzhou City, Shandong 256500, China

This single chain of custody certificate covers the production of engineered wood products, doors and door frames, windows and window frames, wall cladding, houses and building elements, trusses and roofs, outdoor furniture and gardening, household articles, works of art and ornamental & decorative objects using the transfer system.

The facility(s) are hereby Chain of Custody certified to sell products as:

FSC 100%, FSC Mix

The assessment has been conducted by SCS Global Services in accordance with the protocols of the Forest Stewardship Council® A.C. (FSC®).

FSC Standard: FSC-STD-50-001, FSC-STD-40-004

Certificate Code: SCS-COC-007304

Trademark License Code: FSC-C157720



The mark of responsible forestry



Valid from: 11/06/2025
(DD/MM/YYYY)

Expiry date: 10/06/2030
(DD/MM/YYYY)

This certificate itself does not constitute evidence that a particular product supplied by the certificate holder is FSC-certified (or FSC Controlled Wood where applicable). Products offered, shipped or sold by the certificate holder can only be considered covered by the scope of this certificate when the required FSC claim is clearly stated on sales and delivery documents. The scope of this certificate is considered accurate on the date of issuance. The current validity and scope, including the full list of products, shall be verified on <http://info.fsc.org>. The certificate shall remain the property of SCS, and this certificate and all copies or reproductions of this certificate shall be returned to SCS immediately upon request. Where a certificate covers more than one site, the covered products and processes/activities are performed by the network of Participating Sites, and not necessarily by each of them.




Maggie Schwartz, Vice President, Natural Resources
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA



Poplar trunk



Rotary-cut to veneer



**Pressurized & vacuumed
impregnation with bio-mass
modifier**



Press to sheet



Cut to size



Rough-plane



Sanded



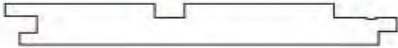
Oiled

Product Specifications

- Profiling to Chambroad MP decking

Product	Dimension	Profile	Node Display
MP-DF01-A20	20*148*2450		
MP-DF02-A20	20*170*2450		
MP-DF03-A20	20*198*2450		
MP-DW00-A20	20*148*2450		
MP-DV00-A20	20*148*2450		

- Profiling to Chambroad FP cladding

Product	Dimension	Profile	Node Display
FP-CP01-B15	15*131*2450		
FP-CP02-B15	15*131*2450		
FP-CP03-B15	15*131*2450		
FP-CF01-B15	15*131*2450		
FP-CF02-B15	15*148*2450		
FP-CF03-B15	15*170*2450		
FP-CF04-B18	18*131*2450		
FP-CF05-B18	18*148*2450		
FP-CF06-B18	18*170*2450		

Product Specifications

- Profiling to Chambroad MP soffit

Product	Dimension	Profile	Node Display
MP-SF01-B13	13*82*2450		
MP-SF02-B13	13*106*2450		
MP-SF03-B13	13*117*2450		

- Profiling to Chambroad MP lumber & beam

Product	Dimension	Profile	Node Display
MP-LF00-A30	30*82*2450		
MP-LF00-A40	40*131*2450		
MP-LF00-A50	50*148*2450		

Other sizes customizable upon request

Coating

sikkens

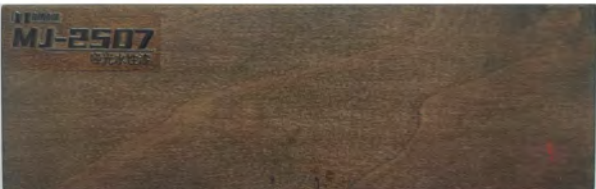
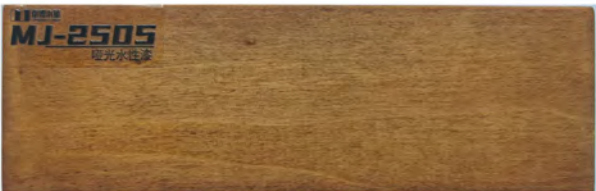
WOOD COATINGS

Product description

Waterborne, translucent, mat, primer, mid and top coat for wooden constructions with OilFinish character. Suitable as a 1-pot-3-coat system, exterior and interior. - moisture permeability - high water vapour permeability - good UV protection - tested according to DIN EN 71 Part 3 "Safety of toys"

Colour

Translucent, colour tints e.g. from the Joinery Color Classics collection. All translucent colours can be mixed with each other. The optical impression of the individual translucent colours on different substrates and with different layer thicknesses is different, therefore sample coatings have to be applied to the wood to be treated. Medium to highly pigmented translucent colours are more weather-resistant than low pigmented colours. Colourless coatings are not suitable for outdoor use. On timber rich in extractives, e.g., oak, larch or tropical wood, discolouration may occur - partially only as a result of weathering.

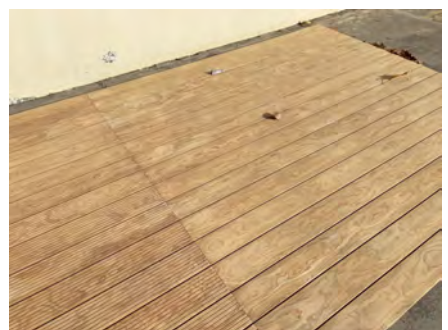
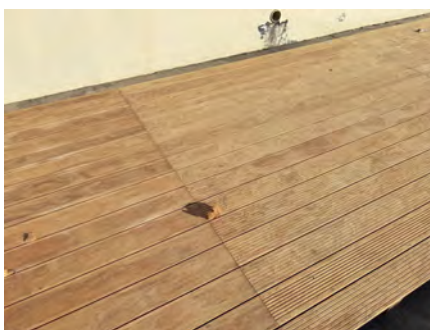
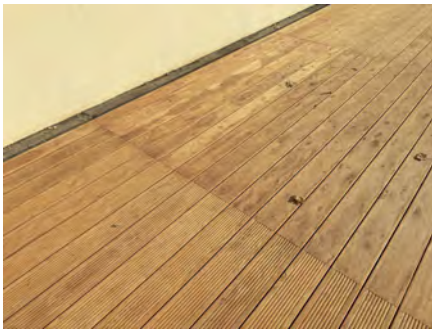


Application

- **Uncoated appearance**



- **Uncoated decking**





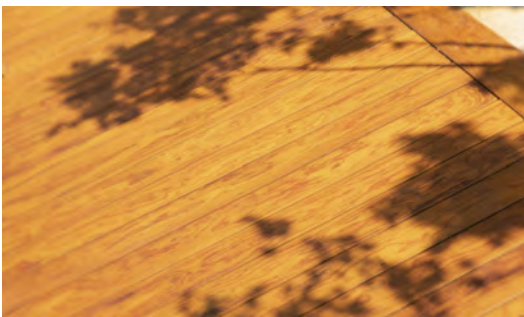
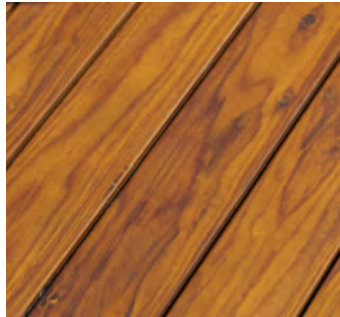
Marina Bay Sands, Singapore
March 2024



July 2024



Painted decking after 1-2 years



1
Year



No change of paint and boards.

3
Years



Mass lost 0.95mm.
Fading of paint, no change of boards, stable performance.

5
Years



Bending strength 139.5MPa, mass lost 1.31mm.
Wrinkling of paints, slight chapping of boards, no other visible changes.

8
Years



Bending strength 139.5 Mpa, mass lost 1,51mm.
Faded paint, and colour fade to grey, slight chapping.
No sign of cracking, warping, delamination etc.



Maintenance of cleaning, rinsing, polishing, oiling revived the decking as new.

Painted decking after 8 years



Uncoated cladding



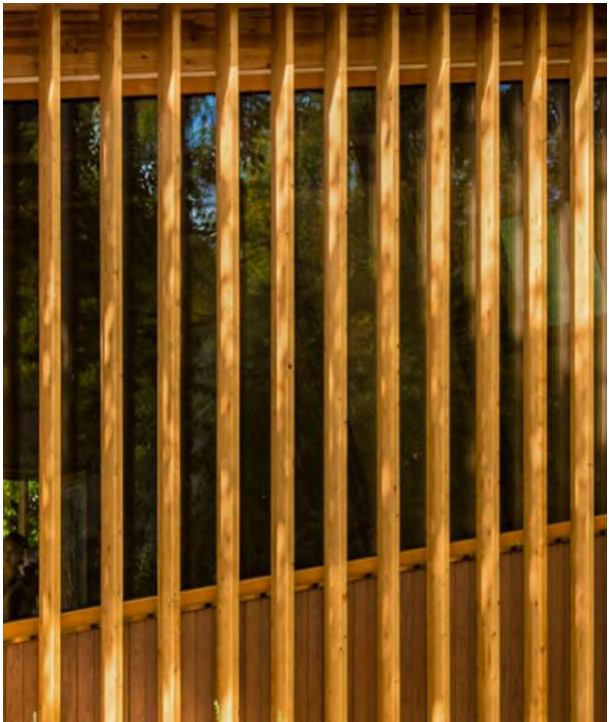
Uncoated pergola (of ≈ 10 years)



Painted pergola



Painted handrail & post



Painted glass house



Monitoring summary report for Shandong Chambroad Timber Material Co., Ltd.



MONITORING ID: 24-0297653

Monitored Party Shandong Chambroad Timber Material Co., Ltd.	amfori ID 156-059685-000	Address No.009, Chambroad Industrial Park, Economic Development Zone, Boxing County, 256500 Binzhou, Shandong Sheng, China
Monitoring Activity amfori Social Audit - Manufacturing	Monitoring Type Full Monitoring	Monitoring Partner TUV Rheinland
Monitoring Start Date 18/12/2024	Closing Meeting Finished Date 19/12/2024	Submission Date 22/12/2024
Expiration Date 22/12/2025	Announcement Type Semi Announced	
Site Shandong Chambroad Timber Material Co., Ltd.	Site amfori ID 156-059685-001	

This is an extract of the online Monitoring Result, generated on 27/12/2024, and is only valid as an acknowledgement of the result. To see all the details, review the full monitoring result, which is available on the [amfori Sustainability Platform](#) - The English version is the legally binding one.

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OVERALL RATING



SECTION RATING

PA1: Social Management System	C	
PA 2: Workers Involvement and Protection	A	
PA 3: The Rights of Freedom of Association and Collective Bargaining	A	
PA 4: No Discrimination, Violence or Harassment	A	
PA 5: Fair Remuneration	B	

Test reports & Certificates

Category	Specification	Result
Performance	Density	850-1,250 kg/m³
	Moisture content	8-12% at 65%RH, 20°C
	Janka Hardness	9053 N, ISO 3350-1975
	Elastic Modulus	20120 MPa (Front),13900 MPa (side)
	Bending Strength	170.1 MPa (front),130 MPa (side)
	Anti-slip	27°, DIN 51097:1992-11
	Fire Resistance	B-s1, d0, EN 13501-1:2018
	Durability	Class 1, EN 113-3/ EN 350
	Mould Rating	Class 0, DIN EN ISO 846, method A
	Termite resistance	Class D, DIN EN 599-1,DIN EN 350
Safety	Formaldehyde	Pass – 0,036 ppm, DIN EN 16516:2018
	Heavy Metal	Not detected, US EPA 3052
	Pentachlorolphenol	Not detected, LFGB & 64 BVL B 82.02.8-2001
	TVOC	0,216 mg/m³ ISO 16000-9:2006/ COR1-2007 ISO 16000-6:2021
	RoHS	Not detected
	SVHC	Not detected
Green	EPD	See report
Salt SprayTest		ongoing
Accelerated UV exposure test on Sikkens		painting-3132 hours ISO 11507

TEST REPORT

No. : GZIN2408001439CM01_EN

Date : 2024-09-05

Page: 3 of 3

Test Item: Static Hardness

Sample Description: Natural color wood

Test Method: ISO 3350-1975

Test Condition:

Specimen: 150 mm×75 mm×9.56 mm

Diameter of ball: 11.3mm

Penetration depth: 2.82 mm

Test Speed: 3 mm/min

Test Result:

Test Item	Test Result
Static Hardness	9053 N

Appendix information:

The test report shall only be used for clients' scientific research, teaching, internal quality control, product research and development, etc., and just for internal reference.

*****End of report*****



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t (86-20) 82155888 sgs.china@sgs.com

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TEST REPORT

No. : SHIN2408001943CM01_EN

Date : 2024-08-27

Page: 2 of 4

Summary of Results:

No.	Test Item	Test Method	Result	Conclusion
1	Global Modulus of Elasticity in Bending	With Reference to EN 408:2010+A1:2012 Clause 10	20120 N/mm ²	N/A
2	Bending Strength Parallel to Grain	With Reference to EN 408:2010+A1:2012 Clause 19	170.1 N/mm ²	N/A

Note: Pass : Meet the requirements;
Fail : Does not meet the requirements;
N/A : Not Apply to the judgment.

Original Sample Photo:



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中国·上海·浦东康桥东路1159弄69号 邮编:201319

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t(86-21)61196300 sgs.china@sgs.com

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Test Report No.: CZHL2404002732HI Date: APR. 23, 2024 Page 2 of 3

Test Result:

1.Wood-based panels — Determination of modulus of elasticity in bending and of bending strength (EN 310:1993)

- 1) Number of test sample: 6pcs
- 2) Sample size: 450×50×20mm
- 3) Distance between the supports: 400mm
- 4) Ambient condition: (20 ± 2) °C, (65 ± 5) %RH

Clause	Result
Determination of modulus of elasticity in bending and of bending strength	Bending strength: 130N/mm ² Modulus of elasticity in bending: 13900N/mm ²

Note: Only longitudinal test pieces are tested.

Photo Appendix

Photo relative to overall specimen:



Received Sample (front view)



Received Sample (side view)

Result/Rating/Record Key(s)

- I. Result/Rating Keys: P = Pass = Meet; F = Fail = Not Meet; N/A = Not applicable = Not suitable; NR = NC = Test not conduct/requested per client request; TT = Test terminated due to the earlier failure of last test.
- II. Record Keys: "C:" means Claimed parameter; "A:" means Actual recorded from test; "D:" means Data for reference only.

General Report Note(s)

- A. N.B. Only applicable clauses were shown.
- B. (1) 1mg/kg = 0.0001% (2) MDL = Method Detection Limit (3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated



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中国·常州·天宁区青洋北路47号30号楼 邮编: 213017 t (86-519)85587753 sgs.china@sgs.com

TEST REPORT

No. : XMIN2403000367CM01_EN

Date : 2024-03-15

Page: 3 of 3

1. Test Item: Anti-Slip Properties

Sample Description: See photo

Test Method: Refer to DIN 51097:1992-11

Test Condition:

Specimen: 1000mm×500mm, 1pc, see photo

Test solution: potable water with a uniform concentration of 1g/L sodium lauryl sulfate was used as a wetting agent.

Test surface: see photo

Test direction: long side direction

Test result:

Test item(s)	Test result(s)
Anti-slip properties (wet/ barefoot ramp test)	Angle of Insecurity: 27.0°

Note: 1. Test solution temperature: 29.0 °C.

2. Lab environmental temperature: 23.0 °C.

3. There was no verification surface used for test.

Appendix A: Quality group of wet/barefoot ramp test

Quality group	Angle (degrees)
A	$X \geq 12^\circ$
B	$X \geq 18^\circ$
C	$X \geq 24^\circ$

*****End of report*****



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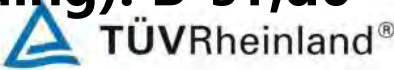
No.31 Xianghong Road, Xiang'an Torch Industrial Zone, Xiamen, Fujian Province, China 361101
中国·福建·厦门·火炬（翔安）产业区翔虹路31号 邮编: 361101

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Fire Resistance(15mm Cladding): B-s1,d0

Prüfbericht - Produkte
Test Report - Products



Seite 4 von 7
Page 4 of 7

Prüfbericht-Nr.: SI502006 001
Test report no.:

Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen / Measuring results - Remarks	Ergebnis Result																																													
1	Test conducted This test is conducted as per EN 13501-1:2018 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests. And the test methods as following: 1. EN 13823:2020+A1:2022 Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item. 2. EN ISO 11925-2:2020 Reaction to fire tests - Ignitability of building products subjected to direct impingement of flame - Part 2: Single-flame source test.																																															
2	Test results Reaction to fire classification: <i>Class B-s1, d0</i> <table><tr><th>Parameter</th><th>Test method</th><th>Results</th><th>Requirement</th><th>Verdict</th></tr><tr><td>FIGRA (W/s)</td><td>EN 13823:2020+A1:2022</td><td>55</td><td>≤ 120</td><td>Pass</td></tr><tr><td>LFS (m)</td><td>EN 13823:2020+A1:2022</td><td>< edge of specimen</td><td>< edge of specimen</td><td>Pass</td></tr><tr><td>THR_{600s} (MJ)</td><td>EN 13823:2020+A1:2022</td><td>4.7</td><td>≤ 7.5</td><td>Pass</td></tr><tr><td>Fs (mm)</td><td>EN ISO 11925-2:2020</td><td>≤ 36</td><td>≤ 150</td><td>Pass</td></tr><tr><td>SMOGRA (m²/s²)</td><td>EN 13823:2020+A1:2022</td><td>0</td><td>≤ 30</td><td>Pass</td></tr><tr><td>TSP_{600s} (m²)</td><td>EN 13823:2020+A1:2022</td><td>19</td><td>≤ 50</td><td>Pass</td></tr><tr><td>Flaming particles or droplets within 600s</td><td>EN 13823:2020+A1:2022</td><td>No</td><td>No</td><td>Pass</td></tr><tr><td>Ignition of the filter paper within 60s</td><td>EN ISO 11925-2:2020</td><td>No</td><td>No</td><td>Pass</td></tr></table>			Parameter	Test method	Results	Requirement	Verdict	FIGRA (W/s)	EN 13823:2020+A1:2022	55	≤ 120	Pass	LFS (m)	EN 13823:2020+A1:2022	< edge of specimen	< edge of specimen	Pass	THR _{600s} (MJ)	EN 13823:2020+A1:2022	4.7	≤ 7.5	Pass	Fs (mm)	EN ISO 11925-2:2020	≤ 36	≤ 150	Pass	SMOGRA (m ² /s ²)	EN 13823:2020+A1:2022	0	≤ 30	Pass	TSP _{600s} (m ²)	EN 13823:2020+A1:2022	19	≤ 50	Pass	Flaming particles or droplets within 600s	EN 13823:2020+A1:2022	No	No	Pass	Ignition of the filter paper within 60s	EN ISO 11925-2:2020	No	No	Pass
Parameter	Test method	Results	Requirement	Verdict																																												
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Flaming particles or droplets within 600s	EN 13823:2020+A1:2022	No	No	Pass																																												
Ignition of the filter paper within 60s	EN ISO 11925-2:2020	No	No	Pass																																												
3	Classification and direct field of application This classification has been carried out in accordance with EN 13501-1:2018 . a) Classification The product, "Chambroad Timber", classification is meet the following, <table><tr><th>Fire behaviour</th><th></th><th>Smoke production</th><th></th><th>Flaming droplets</th></tr><tr><td>B</td><td>—</td><td>s</td><td>1</td><td>, d 0</td></tr></table> Reaction to fire classification: <i>Class B-s1, d0</i> Remark: The classes with their corresponding fire performance are given in annex A.		Fire behaviour		Smoke production		Flaming droplets	B	—	s	1	, d 0	P ☒ F ☐ N/A ☐ N/T ☐																																			
Fire behaviour		Smoke production		Flaming droplets																																												
B	—	s	1	, d 0																																												

TEST CERTIFICATE

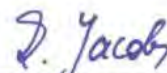
BT-25-01-14-01

- Product:** Chambroad Timber
(Biomass Modified Recombinant Poplar)
- Supplier:** Shandong Chambroad Timber Material Co., Ltd.
Economic Development Zone, Boxing County, Binzhou City,
Shandong Province, China
- Order:** Durability against wood-destroying basidiomycete fungi according to EN 113-3/EN 350
- Test report:** 2224031-2 dated 14 January 2025
- Test details:** After accelerated water leaching acc. to EN 84 each 16 test specimen replicates were tested with the fungi *Coniophora puteana*, *Rhodonia (Poria) placenta*, *Gloeophyllum trabeum*, *Pleurotus ostreatus* and *Trametes (Coriolus) versicolor*.
- Test results:** The durability of the test material "Chambroad Timber (Biomass Modified Recombinant Poplar)" against wood-destroying basidiomycete is assigned to:
Durability class 1 "very durable".
The underlying classification comprises five levels from class DC 1 "very durable" to class DC 5 "not durable".

Place, date of issue: Dresden, 14 January 2025



Head of laboratory



Engineer in charge

Durability : Class 1

TEST CERTIFICATE

BT-25-03-07-01

- Product:** Chambroad Timber
(Biomass Modified Recombinant Poplar)
- Supplier:** Shandong Chambroad Timber Material Co., Ltd.
Economic Development Zone, Boxing County, Binzhou City, Shandong Province, China
- Order:** Durability against wood-destroying soft rot fungi and other soil-inhabiting micro-organisms according to CEN/TS 15083-2/ EN 350
- Test report:** 2224031-3 dated 7 March 2025
- Test details:** After accelerated water leaching acc. to EN 84, each 30 test specimens were incubated in virulent soil over a test period of 24 weeks. The relative mass losses referred to beech and pine sapwood and the decrease of the modulus of elasticity (MOE) referred to pine sapwood were used as evaluation criteria.
- Test results:** The x-values related to the mass loss of beech and pine sapwood were each 0.06. The x-value related to the MOE loss of pine sapwood was 0.05. In result, the product "Chambroad Timber (Biomass Modified Recombinant Poplar)" is classified in

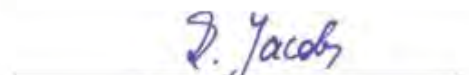
Durability class 1 "very durable"

with regard to wood-destroying soft rot fungi and other soil-inhabiting micro-organisms. The underlying classification comprises five levels from class DC 1 "very durable" to class DC 5 "not durable".

Place, date of issue: Dresden, 07 March 2025


Head of laboratory




Engineer in charge

T E S T C E R T I F I C A T E

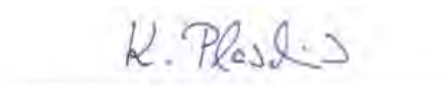
BT-24-09-24-01

- Product:** Chambroad Timber
(Biomass Modified Recombinant Poplar)
- Supplier:** Shandong Chambroad Timber Material Co., Ltd.
Economic Development Zone, Boxing County, Binzhou City,
Shandong Province, China
- Order:** Mold resistance according to DIN EN ISO 846:2020, method A
- Test report:** 2224031-1/A1 dated 24 September 2024
- Test details:** Five test specimen replicates were tested with a mixed spore suspension of *Aspergillus niger*, *Talaromyces pinophilus*, *Paecilomyces variotii*, *Trichoderma viride* and *Chaetomium globosum* without the addition of nutrients over an incubation period of 4 weeks. No artificial ageing or weathering was carried out before the fungal test.
- Test results:** The non-weathered material was resistant to mold (class "0") and did not provide a nutrient source for mold fungi.

Place, date of issue: Dresden, 24 September 2024



Head of laboratory



Engineer in charge

TEST CERTIFICATE

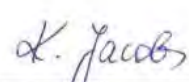
BT-25-05-28-01

- Product:** Chambroad Timber
(Biomass Modified Recombinant Poplar)
- Supplier:** Shandong Chambroad Timber Material Co., Ltd.
Economic Development Zone, Boxing County, Binzhou City,
Shandong Province, China
- Order:** Termite resistance according to EN 117, EN 84 and EN 350
- Test report:** 2224066 dated 28 May 2025
- Test details:** After accelerated water leaching acc. to EN 84 by EPH, five replicates were tested with *Reticulitermes flavipes* by the accredited subcontractor BAM Berlin (Bundesanstalt für Materialforschung und -prüfung).
- Test results:** The product "Chambroad Timber (Biomass Modified Recombinant Poplar)" is assigned as durable against the attack of termites (durability class D).

Place, date of issue: Dresden, 28 May 2025


Head of laboratory




Engineer in charge

Test Report

No.: CZXHL24001455601

Date: Jul 25, 2024

Page 2 of 3

Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	CZX24-0014556-0001.C001	Natural color plywood

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.
Formaldehyde emissions from coated and uncoated wood based on Annex 1 of the Chemical Prohibition Ordinance (ChemVerbotsV), Federal Gazette, November 26, 2018 - Formaldehyde Emissions

Test Method: With reference to DIN EN 16516:2018, analysis was performed by HPLC-DAD.

Test Item(s)	Limit	Unit(s)	MDL	A1
Chamber Volume	-	m ³	-	0.06
Sample loading	-	m ² /m ³	-	1.8
Testing Temperature	-	°C	-	(23 ± 1) °C
Air Exchange Rate	-	/h	-	0.5
Testing Humidity	-	%	-	(50 ± 5) % RH
Test Period Time	-	day	-	7
DNPH Sampling Flow	-	mL/min	-	300
DNPH Sampling Time	-	min	-	60
DNPH Sampling Volume	-	L	-	18
Formaldehyde Emission	0.1	ppm	0.01	0.036
Conclusion				Pass

Notes:

- (1) ppm = parts per million
- (2) mg/m³ = milligram per cubic meter
- (3) At 23°C and 1013hPa, 1ppm = 1.24mg/m³, 1mg/m³=0.81ppm.

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Test Report

No.: CZXHL24001366901

Date: Jun 29, 2024

Page 2 of 3

Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	CZX24-0013669-0001.C001	Log color wood

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

Element(s)

Test Method: With reference to US EPA 3052:1996, analysis was performed by ICP-OES/AAS.

Test Item(s)	Unit(s)	MDL	A1
Cadmium(Cd)	mg/kg	2	ND
Chromium(Cr)	mg/kg	2	ND
Mercury(Hg)	mg/kg	2	ND
Lead(Pb)	mg/kg	2	ND

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Test Report

No.: CZXHL24001367001

Date: Jun 29, 2024

Page 2 of 3

Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	CZX24-0013670-0001.C001	Log color wood

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

Chlorinated Phenols

Test Method: With reference to LFGB § 64 BVL B 82.02.8-2001, analysis was performed by GC-ECD or GC-MS.

Test Item(s)	Unit(s)	MDL	A1
Pentachlorophenol (PCP)	mg/kg	0.05	ND

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Test Report

No.: CZXHL24001455401

Date: Jul 25, 2024

Page 2 of 3

Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	CZX24-0014554-0001.C001	Natural color plywood

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

VOCs

Test Method: With reference to ISO 16000-9:2006 / COR1-2007 & ISO 16000-6:2021.

Testing was performed by Environmental Chamber, followed by sampling using Tenax-TA tube, analysis using Thermodesorption System with Gas Chromatography Mass Spectrometry (TDS-GC/MS).

Test Item(s)	Unit(s)	A1
Chamber Analysis Condition		
Chamber Volume	m ³	0.06
Storage condition (Temperature)	°C	(23 ± 2) °C
Storage condition (Humidity)	%	(50 ± 5) % RH
Air Exchange Rate	/h	0.5
Sample loading	m ² /m ³	0.4
Tenax Sampling Flow	mL/min	200
Tenax Sampling Time	minute(s)	25
Tenax Sampling Volume	L	5
MDL	mg/m ³	0.002
Test Time	day	7
Others		
Total Volatile Organic Compounds(TVOC)	mg/m ³	0.216

Notes:

1. mg/m³ = milligram per cubic metre

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Test Report

No.: SHAHL24016846402

Date: Aug 06, 2024

Page 2 of 4

Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	SHA24-0168464-0001.C001	Natural color wood

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015 and IEC 62321-8:2017, analysis was performed by ICP-OES/AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A1
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Cadmium (Cd)	100	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Polybromobiphenyl (PBB)	1000	mg/kg	-	ND
Monobrominated biphenyl (MonoBB)	-	mg/kg	5	ND
Dibrominated biphenyl (DiBB)	-	mg/kg	5	ND
Tribrominated biphenyl (TriBB)	-	mg/kg	5	ND
Tetrabrominated biphenyl (TetraBB)	-	mg/kg	5	ND
Pentabrominated biphenyl (PentaBB)	-	mg/kg	5	ND
Hexabrominated biphenyl (HexaBB)	-	mg/kg	5	ND
Heptabrominated biphenyl (HeptaBB)	-	mg/kg	5	ND
Octabrominated biphenyl (OctaBB)	-	mg/kg	5	ND
Nonabrominated biphenyl (NonaBB)	-	mg/kg	5	ND
Decabrominated biphenyl (DecaBB)	-	mg/kg	5	ND
Polybromodiphenyl ether(PBDE)	1000	mg/kg	-	ND
Monobrominated diphenyl ether (MonoBDE)	-	mg/kg	5	ND
Dibrominated diphenyl ether (DiBDE)	-	mg/kg	5	ND
Tribrominated diphenyl ether (TriBDE)	-	mg/kg	5	ND
Tetrabrominated diphenyl ether (TetraBDE)	-	mg/kg	5	ND
Pentabrominated diphenyl ether (PentaBDE)	-	mg/kg	5	ND
Hexabrominated diphenyl ether (HexaBDE)	-	mg/kg	5	ND
Heptabrominated diphenyl ether (HeptaBDE)	-	mg/kg	5	ND



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Test Report

No.: SHAHL24016846402

Date: Aug 06, 2024

Page 3 of 4

Test Item(s)	Limit	Unit(s)	MDL	A1
Octabrominated diphenyl ether (OctaBDE)	-	mg/kg	5	ND
Nonabrominated diphenyl ether (NonaBDE)	-	mg/kg	5	ND
Decabrominated diphenyl ether (DecaBDE)	-	mg/kg	5	ND
Bis(2-ethylhexyl) phthalate (DEHP)	1000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1000	mg/kg	50	ND
Dibutyl phthalate (DBP)	1000	mg/kg	50	ND
Diisobutyl phthalate (DIBP)	1000	mg/kg	50	ND

Notes:

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
 (2) IEC 62321 series is equivalent to EN 62321 series.
 (3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

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Test Report
(SVHC)

No.: SHAHL24016846302

Date: Aug 06, 2024

Page 4 of 15

Test Results: (Substances in the Candidate List of SVHC)

Batch	Substance Name	CAS No.	001 Concentration (%)	RL (%)
-	All tested SVHC in Candidate list	-	ND	-

Test Results: (Potential SVHC)

Batch	Substance Name	CAS No.	001 Concentration (%)	RL (%)
/	All tested Potential SVHC	-	ND	-

Notes:

- (1) The table above only shows detected SVHC, and SVHC that below RL are not reported. Please refer to Appendix for the full list of tested SVHC.
- (2) RL = Reporting Limit (Test data will be shown if it $\geq$ RL. RL is not regulatory limit.)
ND = Not detected (lower than RL), ND is denoted on the SVHC substance.
- (3) * The result is based on the calculation of selected element(s) under the worst-case scenario, and the evaluation of substance usage and material properties.
** The test result is based on the calculation of selected marker(s) and to the worst-case scenario.
Calculated concentration of boric compounds are based on water extractive boron detected by ICP-OES.
Calculated concentration of Barium diboron tetraoxide is based on water extractive boron and barium detected by ICP-OES.
RL = 0.005% is evaluated for element (i.e. cobalt, arsenic, lead, chromium (VI), aluminum, zirconium, boron, strontium, zinc, antimony, titanium, barium, cadmium respectively), except molybdenum
RL=0.0005%, boron RL=0.0025% (only for Lead bis(tetrafluoroborate)), fluorine RL=0.050%.
- (4) § The substance is proposed for the identification as SVHC only where it contains Michler's ketone (CAS Number: 90-94-8) or Michler's base (CAS Number: 101-61-1) $\geq 0.1\%$ (w/w).
- (5) / = Potential SVHC

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CERTIFICATE

EPD REGISTRATION

This document confirms that

**SHANDONG CHAMBROAD TIMBER
MATERIAL CO.,LTD**

has registered an Environmental Product Declaration (EPD) for

CHAMBROAD TIMBER

under **EPD-IES-0024955**
in the International EPD System

The EPD has been developed in accordance with ISO 14025, the General Programme Instructions, and the Product Category Rules 2019:14 of the International EPD System.
The verification was carried out by Dandan Li.

This document remains valid until 2030/7/20, unless the EPD is deregistered from the International EPD System prior to that date.



Sebastiaan Stiller
CEO of the International EPD System
Stockholm, Sweden
2025-08-13

Salt spray & sea water contact test --27 months

Chambroad Timber Performance Test Interim Report

1. Purpose

In order to test the corrosion resistance of bio-chemically modified reconstituted wood Chambroad Timber produced by Chambroad Timber Material Co., Ltd. in the heavy corrosion sea area of Hainan and the northern sea area, salt spray, aging and on-site hanging experiments at the marine test station were carried out. This report records the relevant corrosion test conditions at the current stage.

2. References and standards

GB/T 1771-2007 Paints and varnishes - Determination of resistance to neutral salt spray

GB/T 1865-2009 Paints and varnishes - Artificial aging and exposure to artificial radiation with filtered xenon-arc radiation

3. Test items

The test of the material will be divided into two parts:

1) Accelerated aging and salt spray test in the lab

To simulate the oceanic environment by conducting aging test and salt spray test with a total testing period of 2000 hours respectively. Observing the appearance on the surface and run diagnosis on the material regarding its physical properties. 2) On-site hanging test at the marine test station

2) On-site hanging test at the marine test station

Field hanging tests were conducted in the island atmosphere zone, ocean atmosphere zone and ocean splash zone. Samples were taken every three months, and the experimental period was 24 months. The weight loss method was used to calculate the corrosion rate of the test piece. The corrosion mechanism of the material was proposed by analyzing the corrosion products. The hardness and strength of the hanging piece were tested before and after, and the corrosion damage was judged by comparing the changes in strength and hardness.

4. Status quo

4.1 Laboratory aging and salt spray tests

Figures 1-3 below show the neutral salt spray test of three different samples for 504 hours, 1200 hours, and 1682 hours, respectively. The samples in each figure are teak, merbau and Chambroad Timber from left to right. After 504 hours of neutral salt spray test, as shown in Figure 1, there was no significant change in the surface properties of the three samples, and no obvious corrosion products were found. **After 1200 hours of neutral salt spray test, as shown in Figure 2, there was no significant change in the surface physical properties of the three samples, and no obvious corrosion products were found, but compared with Chambroad Timber, teak and merbau's surfaces had obvious salt residues.** After 1682 hours of neutral salt spray test, as shown in Figure 3, there was still no significant change in the surface properties of the three antiseptic woods, and no obvious corrosion products were found, but it can be seen that the adsorption capacity of merbau, teak, and Chambroad Timber decreased in turn. Since there was no obvious change on the material surface after 1680 hours of neutral salt spray test, the salt spray time was extended. **After 2560 hours of salt spray test, as shown in Figure 4, after the salt spray test, the shapes of the three types of wood did not change significantly, and there was no cracking or surface peeling.** However, the surface color of the materials deepened to varying degrees, among which teak had the most serious deepening, followed by malachite, and Chambroad Timber had the lightest deepening.



Figure 1 Salt spray test of 504 hours



Figure 2 Salt spray test of 1200 hours



Figure 3 Salt spray test of 1200 hours



Figure 4 Salt spray test of 2560 hours

Figure 5 shows the conditions of the three materials after aging tests. (a) and (b) are two groups of aging test pictures after 480 hours, and (c) and (d) are two groups of aging test pictures after 2000 hours. From left to right in the figure are the samples of merbau, teak, and Chambroad Timber (the markings in the figure are incorrect and are not used as a reference). The edges around the samples in the figure are the un-irradiated parts. It can be seen from the figure that after 480 hours of aging test, the color of the xenon lamp irradiated parts of the three samples is darker than that of the un-irradiated parts, but no powdering, blistering, cracking, or peeling occurs. After 2000 hours of aging test, the color of the sample surface is further deepened, and no powdering, blistering, cracking, or peeling occurs.

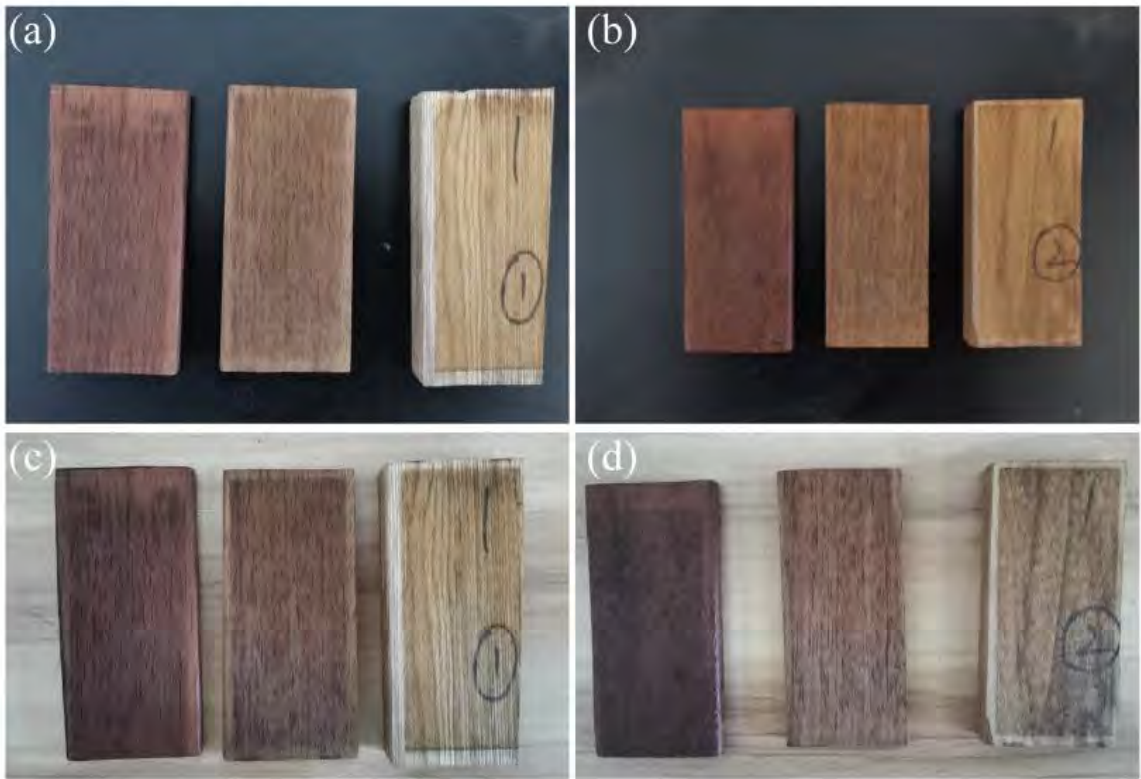


Figure 5 Aging test

4.2 On-site hanging test at the marine test station

The actual sea hanging stage of wood that needs to be tested in Qingdao has been completed. Figure 6 shows the latest situation of the land atmosphere area and the ocean hanging samples.



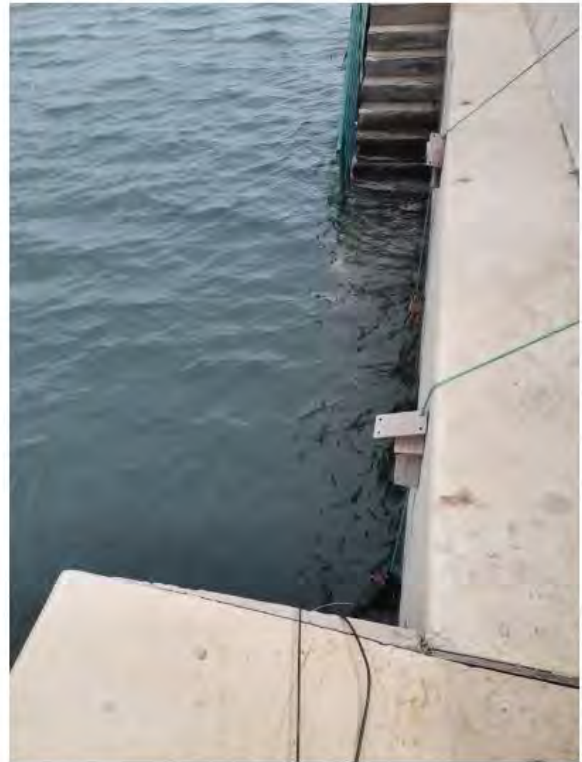


Figure 6 Hanging test in Qingdao Oceanic area

In Figure 7, (a), (b), (c), and (d) samples are samples hung in the marine atmosphere zone for 3 months, in the marine splash zone for 3 months, in the marine atmosphere zone for 6 months, and in the marine splash zone for 6 months. From left to right in each picture are samples of merbau, teak, and Chambroad Timber. From Figure (a), it can be seen that the edges of merbau and teak have slight losses, Chambroad Timber has no obvious losses, and the three materials have no peeling, blistering, or cracking. There is no obvious change in the surface color. From Figure (b), it can be seen that the color of merbau in the splash zone has obviously faded, and there is slight corrosion and slag around it, with obvious splint and more obvious roughness of the texture. There is no obvious change in the surface color of teak, with slight loss on the edge and slight spots. There is no obvious loss on the surface of Chambroad Timber, and the surface is slightly corroded, resulting in obvious roughness of its texture. From Figures (c) and (d), it can be seen that after hanging for 6 months, the surface changes of the three woods are similar to those in the first 3 months.



Figure 7 Surface changing after hanging test of 3months and 6 months at a sea in Qingdao

In Figure 8, (a) and (b) samples are divided into samples that were hung in the marine atmosphere zone for 9 months and samples that were hung in the ocean splash zone for 9 months. From left to right in each figure are samples of merbau, teak, and Chambroad Timber. From Figure (a), it can be seen that the edges of merbau and teak have slight losses, and Chambroad Timber has no obvious losses. The surface colors of the three materials have obviously faded, with merbau being the most serious, followed by teak, and Chambroad Timber being the lightest. The surfaces of the three materials have corrosion, resulting in coarsening of the grain, but there is no peeling, blistering, or cracking. From Figure (b), it can be seen that the color of the merbau in the splash zone has obviously faded, and there is slight corrosion and slag around it, with obvious splinters and obviously rough grain. The surface color of teak has faded, there is slight loss on the edges, and there are small cracks at the punching point, which tend to expand. The surface color of Chambroad Timber has faded, and the surface has slight corrosion, resulting in obvious rough grain.



Figure 8 Surface changing after hanging test of 9 months at a sea in Qingdao

In Figure 9, the left and right pictures are samples of samples hung in the marine atmosphere zone for 12 months and samples hung in the marine splash zone for 12 months. From left to right in each picture are samples of merbau, teak, and Chambroad Timber. From the left picture, it can be seen that the merbau in the atmospheric zone has slight corrosion and slag, with obvious splinters and fine cracks, and the texture is obviously rough. The surface color of teak has faded, the edges have slight losses, and the texture is obvious. The surface color of Chambroad Timber has faded, and the surface has slight corrosion, resulting in obvious roughness of its texture. Careful observation reveals the appearance of fine cracks. The surfaces of all three materials have corrosion, but there is no peeling or blistering. From the right picture, it can be seen that the edges of merbau, teak, and Chambroad Timber have slight losses, and the surface colors of the three materials have faded significantly. There is no peeling or blistering on the surfaces of the three materials.



Figure 9 Surface changing after hanging test of 12 months at a sea in Qingdao

In Figure 10, the left and right pictures are samples of samples hung in the marine atmosphere zone for 15 months and samples hung in the marine splash zone for 15 months. The left picture shows teak, merbau, and Chambroad Timber samples from left to right, and the right picture shows merbau, teak, and Chambroad Timber samples from left to right. From the left picture, it can be seen that the merbau in the atmospheric zone has slight corrosion and slag, with obvious splinters and small cracks, and the texture is obviously rough. The surface color of teak has faded, the edges have slight loss, the texture is obvious, and some holes appear on the surface. The surface color of Chambroad Timber has faded, and the surface has slight corrosion, resulting in obvious roughness of its texture. Careful observation reveals that fine cracks appear in the lower right part. The surfaces of the three materials have a

rough texture and the surface texture is lost, but there is no peeling or blistering. It can be seen from the right picture that the edges of the merbau, teak, and Chambroad Timber samples in the marine splash zone have slight loss, and the surface color of the three materials has faded significantly. There are no cracks, peeling, or blistering on the surfaces of the three materials.



Figure 10 Surface changing after hanging test of 15 months at a sea in Qingdao

In Figure 11, the left and right pictures are samples of samples hung in the marine atmosphere zone for 21 months and samples hung in the marine splash zone for 21 months. The left picture shows merbau, teak, and Chambroad Timber samples from left to right, and the right picture shows merbau, teak, and Chambroad Timber samples from left to right. It can be seen from the left picture that the merbau in the atmospheric zone has slight corrosion and slag, obvious splinters, obvious large cracks on the side, and small cracks on the front mainly extend from the bottom to the middle, with obvious rough grain. The color of the teak surface fades, there is slight loss on the edge, the grain is obvious, and the cracks are not obvious. The color of the Chambroad Timber surface fades, and the slight corrosion on the surface causes its grain to be obviously rough. The texture of the three materials is rough and the surface texture is lost. It can be seen from the right picture that the merbau, teak, and Chambroad Timber samples in the marine splash zone are better than those in the atmospheric zone, with obvious thickening of the texture, slight loss of the edge, and obvious lightening of the surface color of the three materials. There are no cracks, peeling, or blistering on the surface of the three materials.



Figure 11 Surface changing after hanging test of 21 months at a sea in Qingdao

In Figure 12, the left and right pictures are samples of samples hung in the marine atmosphere zone for 27 months and samples hung in the marine splash zone for 27 months. The left picture shows Teak, Merbau, Chambroad Timber samples from left to right, Teak, Merbau, and Chambroad Timber samples. From the left picture, it can be seen that the Teak in the marine atmosphere zone has a rough texture, slight corrosion and slag, burrs, and a large crack running through the right side. There are fine cracks extending from the bottom to the middle on the upper and lower edges. The Merbau surface has a rough texture and a lighter color. There are fine cracks on the lower edge extending from the bottom to the middle and fine cracks inside. The Chambroad Timber surface color fades, and the surface is slightly corroded, resulting in a rough texture. There are fine cracks at some positions on the edge. The texture of the three materials is rough and the surface texture is lost. From the right picture, it can be seen that the Teak, Merbau, and Chambroad Timber samples are better than those in the atmospheric zone, with a significantly coarser texture and sediments after seawater scouring. There are fine cracks inside Teak and Merbau, but compared with the marine atmosphere zone, the cracks are smaller and fewer. There are no obvious cracks inside Chambroad Timber.



Figure 12 Surface changing after hanging test of 27 months at a sea in Qingdao

4.3 Wood Corrosion Rate Calculation

The corrosion rate is calculated based on the total surface area of the initial test specimen and the corrosion weight loss after the test according to the following formula:

$$V=3.65 \times 10^3 \times (W_0-W_T)/(S \cdot T \cdot D)$$

Where, V is the corrosion rate, mm/a; W_0 is the weight of the sample before the test, g;

W_T - weight of the sample after the test, g; S - total area of the sample, cm²;

T - test time, days; D - density of the material, g/cm³. Density (0.8 g/cm³)

The corrosion mass loss was obtained through calculation, and the corrosion rates of the two materials were further calculated. The calculation results are shown in Table 1.

Table 1 Analysis of marine environmental quality of three types of wood

Material	Test area	Hanging period	Original mass (g)	Mass after removing corrosion products (g)	Mass loss (g)	Original surface area(cm ²)	Corrosion rate (mm/a)
Merbau	Oceanic atmospheric region	3 months	155.26	146.55	8.71	200	2.21
Teak			153.83	144.22	9.61	200	2.44
Chambroad timber			169.14	166.14	3.00	100	1.52
Merbau	Ocean Splash Zone	3 months	176.30	163.34	12.96	200	3.19
Teak			180.54	173.65	6.89	200	1.75
Chambroad timber			158.02	156.32	1.70	100	0.86
Merbau	Oceanic atmospheric region	6 months	186.63	174.19	12.44	200	1.58
Teak			180.60	162.12	18.48	200	2.34
Chambroad timber			180.26	177.42	2.84	100	0.71
Merbau	Ocean Splash Zone	6 months	186.62	176.98	9.64	200	1.22
Teak			186.30	160.11	20.19	200	2.56
Chambroad timber			169.83	164.89	4.94	100	1.25
Merbau	Oceanic atmospheric region	9 months	172.95	162.76	10.19	200	0.86
Teak			168.81	157.44	11.37	200	1.92
Chambroad timber			180.80	180.74	0.06	100	0.01
Merbau	Ocean Splash Zone	9 months	144.42	136.17	8.25	200	0.69
Teak			177.19	162.46	14.73	200	1.24
Chambroad timber			165.47	162.86	2.61	100	0.44
Merbau	Oceanic atmospheric region	12 months	189.40	174.81	14.59	200	0.91
Teak			169.10	159.04	10.06	200	0.63
Chambroad timber			176.17	174.93	1.21	100	0.15
Merbau	Ocean Splash Zone	12 months	183.72	173.71	10.01	200	0.62
Teak			147.73	139.47	8.26	200	0.52
Chambroad timber			168.59	167.47	1.12	100	0.14

Merbau	Oceanic atmospheric region	15 months	153.41	144.34	9.07	200	0.46
Teak			164.92	158.52	6.40	200	0.32
Chambroad timber			185.14	183.31	1.83	100	0.19
Merbau	Ocean Splash Zone	15 months	180.25	170.02	10.23	200	0.52
Teak			171.51	165.47	6.10	200	0.31
Chambroad timber			162.32	161.01	1.31	100	0.13
Merbau	Oceanic atmospheric region	21 months	176.38	161.02	15.36	200	0.55
Teak			183.24	173.60	9.64	200	0.34
Chambroad timber			179.36	176.58	2.78	100	0.20
Merbau	Ocean Splash Zone	21 months	159.87	149.61	10.26	200	0.37
Teak			174.96	166.22	8.74	200	0.31
Chambroad timber			163.29	161.13	2.16	100	0.15
Merbau	Oceanic atmospheric region	27 months	151.83	138.33	13.5	200	0.38
Teak			173.15	153.12	20.03	200	0.56
Chambroad timber			159.60	157.33	2.27	100	0.13
Merbau	Ocean Splash Zone	27 months	173.92	163.93	9.99	200	0.28
Teak			189.36	154.39	34.97	200	0.98
Chambroad timber			174.43	171.50	2.93	100	0.17

4.4 Physical properties test

The impact resistance, bending resistance, compression resistance along the grain and shear resistance along the grain of three types of untreated antiseptic wood were tested.

1) Impact resistance

As shown in the figure below, this method is to place the sample at the specified position of the simply supported beam impact machine, and then use the pendulum to fall freely to apply an impact load to the sample to break the sample. The energy absorbed by the unit cross-sectional area of the sample during the sample destruction or process, that is, the impact strength, is recorded to measure the impact toughness of the material.



First, accurately measure the width and thickness of the spline, check whether the testing machine has the specified impact speed and the correct energy range, and the energy absorbed by the broken sample is within the range of 10% to 80% of the pendulum capacity. Perform a blank test and record the measured friction loss. Lift and lock the pendulum, place the sample in a vise, and clamp the sample according to the mechanical requirements. The notch should be on the side of the pendulum impact blade. Release the pendulum, break the spline, and read and record the impact energy absorbed by the sample.

As shown in the figure below, (a), (b), and (c) are the splines after Chambroad Timber, merbau, and teak impact, respectively. This experimental impact adopts the cantilever beam impact test method, and the pendulum energy is 4J.



According to the test machine readings, the final test results are shown in the following table:

Impact strength test results (unit: kJ/m²)

Material Testing Batches	Chambroad Timber	Merbau	Teak
The Log	20	39	24
Salt spray 2000 hours	19	39	22
Qingdao Splash Zone (three months)	18	44	51
Qingdao Oceanic and Atmospheric Region (3 months)	22	37	67
Qingdao Splash Zone (6 months)	26	31	48
Qingdao Oceanic and Atmospheric Region (6 months)	21	25	51
Qingdao Splash Zone (9 months)	28	51	73
Qingdao Oceanic and Atmospheric Region (9 months)	20	35	75
Qingdao Splash Zone (12 months)	19	87	35
Qingdao Oceanic and Atmospheric Region (12 months)	15	67	64
Qingdao Splash Zone (15 months)	28	34	84
Qingdao Oceanic and Atmospheric Region (15 months)	20	64	51
Qingdao Splash Zone (21 months)	26	48	67
Qingdao Oceanic and Atmospheric Region (21 months)	18	30	53
Qingdao Splash Zone (27 months)	21	39	39
Qingdao Oceanic and Atmospheric Region (27 months)	26	31	41

2) Bending performance

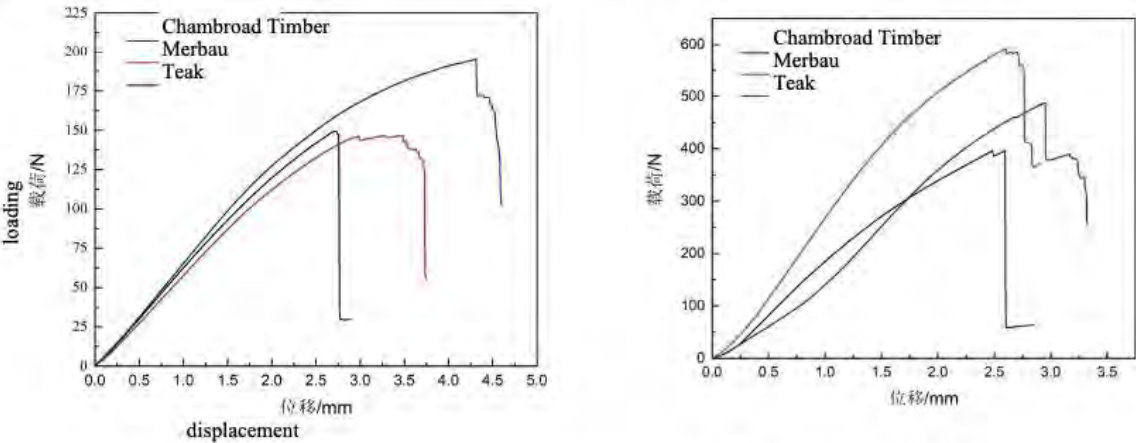
This method determines the static bending strength and elastic modulus of three-point bending. The load is applied to the middle of the specimen supported at two points for measurement. The static bending strength is determined by determining the ratio of the bending moment and the bending section modulus of the specimen when the maximum load is applied to evaluate the bending performance.

Measure the width and thickness of the specimen as shown in the figure below. The width is measured at the center of the long side of the specimen; the thickness is measured at the intersection of the diagonal lines of the specimen. Adjust the span of the two supports to at least 20 times the basic thickness of the specimen. The specimen is placed flat on the supports, with the long axis of the specimen perpendicular to the support rod and the center point of the specimen below the loading rod. Load at a constant speed throughout the test. Reach the maximum load within (60 ± 30) s until the specimen is destroyed. Read the displacement load data from the machine and draw a curve.



The figure below shows the displacement load curve of Chambroad Timber, merbau, teak in the bending test. It can be seen from the figure that when the wood is bent under radial loading, the concave surface is longitudinally compressed, and the convex surface is stretched along the grain. When the bending deformation reaches the critical point, the initial crack will occur at the outermost side of the tensile part just below the loading head. At the same time, the displacement load curve has an inflection point, and the bearing capacity of the wood decreases. The initial crack occurs near the wood ray, and the crack extension will extend along the length direction of the wood ray. The initial crack occurs near the wood ray at the outermost side of the tensile part. Then the crack changes direction at the end of the wood ray and extends along the grain. When the wood ray tissue is damaged during the bending process, the tracheid bears the bending load across the crack, acts as a bridge, and inhibits the opening of the crack. This is also the main reason for the certain toughness of wood damage.

When the crack extends along the grain to the edge of the wood ray with a larger volume, the crack propagates horizontally along the length direction of the ray again. For isotropic bending specimens, the boundary layer between the tensile and compressive parts of the specimen is neither tensile nor compressive but bears the maximum in-plane shear stress. This layer is also called the neutral layer and is generally located in the middle of the specimen. As the bending curvature continues to increase, the wood tissue near the middle of the specimen undergoes obvious shear slip, and the load-displacement curve once again turns downward. When the bending curvature increases further, the tensile part is damaged, and even the entire wood is damaged.



The static bending strength of the specimen is calculated as follows: $\sigma_b=3\times F_{\max}\times l/2\times b\times t^2$

Where, σ_b b is the static bending strength of the specimen, in megapascals (MPa);

$F_{\max}$ is the maximum load when the specimen is damaged, in Newtons (N);

l is the distance between the two supports, in millimeters (mm);

b is the width of the specimen, in millimeters (mm);

t is the thickness of the specimen, in millimeters (mm).

After calculation, the bending strength test results are as follows:

Bending test results (unit: MPa)

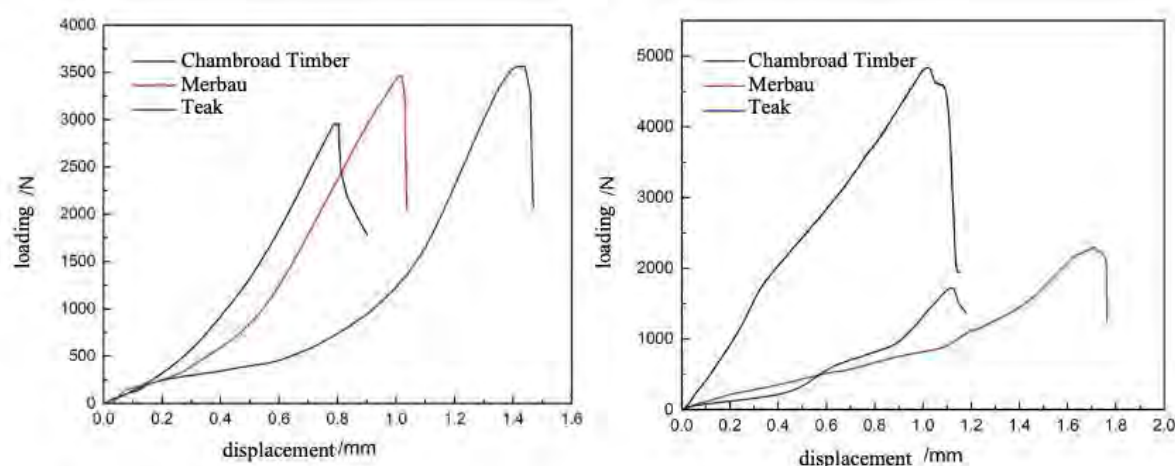
Material	Chambroad Timber	Merbau	Teak
Testing Batches			
Original ones	144.8	128.9	173.1
Salt spray 2000h tested material	139.5	127.0	149.2
Ocean splash zone (3mo)	119.0	167.4	124.9
Oceanic atmospheric region (3mo)	152.2	108.7	141.1
Ocean splash zone (6mo)	100.7	165.6	136.4
Oceanic atmospheric region (6mo)	127.3	144.5	131.7
Ocean splash zone (9mo)	145.4	114.0	132.3
Oceanic atmospheric region (9mo)	97.0	106.4	160.6
Ocean splash zone (12mo)	136.3	194.7	151.5
Oceanic atmospheric region (12mo)	100.9	219.8	163.7
Ocean splash zone (15mo)	157.3	114.3	169.6
Oceanic atmospheric region (15mo)	152.3	184.9	131.3
Ocean splash zone (21mo)	139.4	132.5	143.2
Oceanic atmospheric region (21mo)	124.6	176.2	112.6
Ocean splash zone (27mo)	130.3	139.9	147.5
Oceanic atmospheric region (27mo)	110.5	131.6	141.0

3) Shear resistance

First, measure the width and length of the shear surface of the specimen. As shown in the figure below, place the specimen into the test machine fixture, and do not use the adjustment screw to press the specimen. Place the fixture on the test machine and keep the center of the specimen's force surface consistent with the center of the pressure head. Apply the load evenly so that the specimen is destroyed within (60 ± 30) s. After the specimen is destroyed, read the experimental load displacement curve.



The figure below shows the displacement load curve of Chambroad Timber, merbau, and teak in the shear test along the grain. It can be seen from the figure below that the shear loading process of the interlayer interface of each antiseptic wood can be divided into three stages: at the initial loading stage, the load of the sample increases gently with the increase of loading displacement. At this time, the sample is in the transition stage from local surface loading to full surface loading, and the slope of the load-displacement curve is low. There are certain differences in the duration of different groups of samples in this stage, which is related to the sample processing accuracy and the hardness of the sample contact surface; after the first stage, the shear force at the sample interface increases rapidly and linearly with the increase of shear displacement. At this stage, the interface between the plies of the Chambroad Timber is in a completely elastic shear state, and the slope of the load-displacement curve is large; after reaching the load peak, the specimen is sheared and damaged. This is the third stage. The state presented by each sample in this stage is: complete loss of bearing capacity, the curve drops precipitously, and the damage feature is the complete separation of the shear surface.



By formula: $\tau = F_{\max} / b \times l$

τ is the shear strength, in megapascals (MPa);

$F_{\max}$ is the maximum load when the specimen is damaged, in Newton (N);

b is the shear surface width, in millimeters (mm);

l is the length of the shear surface, in millimeters (mm);

The shear strength is shown in the following table:

Shear resistance strength test results (unit: MPa)

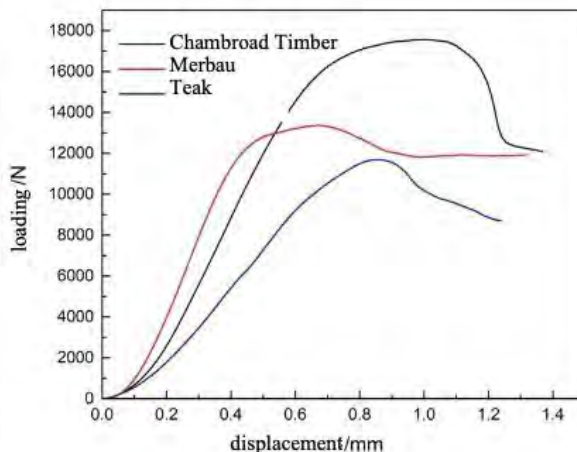
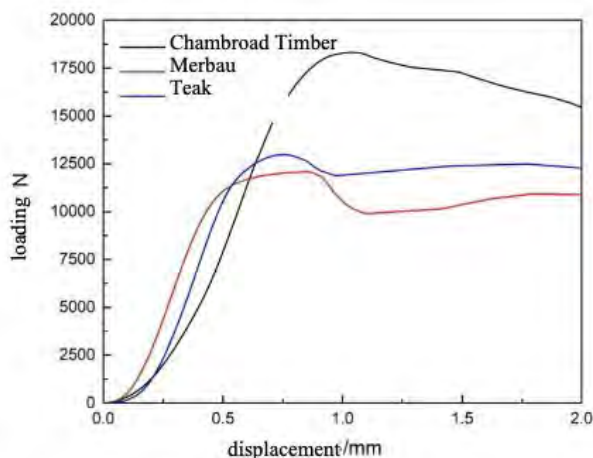
Testing Batches \ Material	Chambroad Timber	Merbau	Teak
Original ones	9.86	13.19	13.72
Salt spray 2000h tested material	8.05	6.89	9.16
Ocean splash zone (3mo)	6.34	13.53	12.90
Oceanic atmospheric region (3mo)	9.72	8.36	11.60
Ocean splash zone (6mo)	7.53	10.99	12.26
Oceanic atmospheric region (6mo)	12.7	11.12	10.86
Ocean splash zone (9mo)	15.2	12.58	16.09
Oceanic atmospheric region (9mo)	6.31	7.32	13.14
Ocean splash zone (12mo)	12.83	12.91	10.97
Oceanic atmospheric region (12mo)	12.56	12.43	11.56
Ocean splash zone (15mo)	15.07	9.09	13.15
Oceanic atmospheric region (15mo)	6.11	12.54	10.61
Ocean splash zone (21mo)	11.62	10.94	11.06
Oceanic atmospheric region (21mo)	8.46	8.63	9.87
Ocean splash zone (27mo)	13.65	9.60	11.87
Oceanic atmospheric region (27mo)	10.96	12.30	12.34

4) Compression resistance

This experiment determines the compressive performance by determining the ratio of the maximum longitudinal compression load to the cross-sectional area of the specimen. First, measure the width and length of the specimen, place the specimen on the support, apply the load evenly, and completely destroy the specimen within (60±30) seconds. Read the machine parameters, as shown in the figure below.



The following figures (a), (b), and (c) show the displacement stress curves of Chambroad Timber, merbau, and teak in the compression test along the grain. When the Chambroad Timber is compressed along the grain, the wood fibers may buckle under compression, so wrinkles will appear on the surface of the specimen when it is destroyed, and obvious plastic deformation characteristics will be shown. In the whole process, there are obvious elastic deformation stages, peak strength, and plastic deformation stages. When destroyed, the wood fibers of Chambroad Timber broke apart and the wood fibers buckled significantly.



By formula: $\tau = F_{\max} / b \times l$

τ is the shear strength, in megapascals (MPa);

$F_{\max}$ is the maximum load when the specimen is damaged, in Newton (N);

b is the shear surface width, in millimeters (mm);

l is the length of the shear surface, in millimeters (mm);

The compression resistance strength is shown in the following table:

Material	Chambroad Timber	Merbau	Teak
Testing Batches			
Original ones	94.6	86.4	82.7
Salt spray 2000h tested material	83.6	70.2	72.5
Ocean splash zone (3mo)	64.4	73.0	71.1
Oceanic atmospheric region (3mo)	91.4	75.5	81.2
Ocean splash zone (6mo)	77.2	76.8	76.1
Oceanic atmospheric region (6mo)	97.9	80.2	81.8
Ocean splash zone (9mo)	105.13	91.06	80.90
Oceanic atmospheric region (9mo)	88.19	73.74	82.09
Ocean splash zone (12mo)	99.97	83.32	90.55
Oceanic atmospheric region (12mo)	115.64	92.42	79.76
Ocean splash zone (15mo)	98.90	58.06	77.45
Oceanic atmospheric region (15mo)	72.30	83.52	70.29
Ocean splash zone (21mo)	86.24	68.42	68.42
Oceanic atmospheric region (21mo)	70.36	65.38	60.98
Ocean splash zone (27mo)	93.67	77.77	69.99
Oceanic atmospheric region (27mo)	80.34	71.07	81.98

Sikkens coating accelerated aging test -3132h



山东京博木基材料有限公司
SHANDONG CHAMBROAD TIMBER MATERIAL CO.,LTD.

Test Process Report



Product	Chambroad Timber Cladding	Test Date	20250224
Test Name	Accelerated UV exposure test on Sikkens coating		
Test Purpose	Evaluate coating durability under UV exposure		
Test Standard	ISO 11507		
Test Equipment	UV Accelerated Weathering Tester (QUV spray)		
Test Duration	3132h (Accelerated UV exposure)		
Sample Details (same batch)	Waterbase paint sample: Substrate Chambroad Timber + WF562 (primer) + WF980 (mid-coat) + WF980 (topcoat), each layer coating amount 150-175 g/m², 3 layers applied. Waterbase oil sample: Substrate Chambroad Timber + SIKKENS 771, each layer coating amount 100-125 g/m², 2 layers applied.		

Test Results

Period	Waterbase Paint Sample Performance	Waterbase Oil Sample Performance
48h		
	Exposed area getting darker	Exposed area getting darker
120h		
	Exposed area getting darker	Exposed area getting darker
240h		
	Exposed area getting darker	Exposed area getting darker, and a fine hairline crack became visible on the surface
360h		
	Exposed area getting darker.	Exposed area getting darker, and fine



		surface checking became visible.
540h		
	Exposed area getting darker.	Exposed area getting darker, and fine surface checking became visible.
660h		
	Exposed area getting darker.	Exposed area getting darker, and fine surface checking became visible.
900h		
	Exposed area getting darker.	Exposed area starts greying , and small checkings of material are visible.
1116h		
	Exposed area getting darker.	Exposed area starts greying , and small checkings of material are visible.
1332h		
	Exposed area getting darker.	Exposed area starts greying , and small checkings of material are visible.



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1500h		
	Exposed area getting darker.	Exposed area starts greying , and small checkings of material are visible.
1620h		
	Exposed area getting darker.	Exposed area starts greying, and checkings are expanding.
1884h		
	Exposed area getting darker.	Exposed area starts greying, and checkings are expanding.
2052h		
	Exposed area getting darker and starts whitening.	Exposed area starts whitening, and checkings are expanding.
2220h		
	Exposed area getting darker and starts whitening.	Exposed area starts whitening, and checkings are expanding.
2484h		
	Exposed area getting darker with	Exposed area starts whitening, and



	incipient whitening, showing no significant change from previous observation intervals.	multiple hairline cracks developed across the surface.
2844h		
	Exposed area getting darker with incipient whitening, showing no significant change from previous observation intervals.	Exposed area starts whitening, and multiple hairline cracks developed across the surface.
3132h		
	Exposed area getting darker with incipient whitening, showing no significant change from previous observation intervals.	Exposed area combined color degradation with progressive chalking, accompanied by extensive surface checking.
Conclusion	Evaluation on SIKKENS Coating UV Resistance (3132h ≈ 10-15 Years Outdoor Exposure) 1. Waterbase Paint Sample (WF562 + WF980 System) 12h: Slight color darkening. 2052h: Progressive whitening, yet film integrity remained intact, no cracking/chalking. 2. Waterbase Oil Sample (SIKKENS 771) 240h: Initial surface hairline crack, indicates inferior weatherability of the coating film. 900h: Chalky degradation with crack propagation, degradation of protective performance. 3. The waterbase oil system demonstrated: Higher greying rate and formation of surface hairline crack. In contrast, the waterbase paint system exhibited: No visible cracking after 3000h UV exposure.	
Remark	Waterbase oil coatings are easier to maintain. Based on test results, we recommend maintenance every 2 years.	