Vulcan Timber

Performance Testing Guide

New Growth Feature Timbers

ABODO

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Vulcan Timber

A Trusted Choice in High Performing Modified Timber

Vulcan thermally modified timber is a new generation of wood product that presents a renewable alternative to old growth timbers that are often from unsustainable sources, with high levels of performance and quality.

Abodo Vulcan products are made from thermally modified (TMT) clears grade FSC® certified New Zealand Radiata pine. Thermal modification is achieved by using steam and high temperatures in excess of 230°C. The modification process is made in purpose-built computer-controlled kilns. A quality control process is in place that measures selected parameters to ensure every piece of timber is modified to the correct specification and quality.

Vulcan thermally modified timber has been tested extensively over many years, both in lab and long-term accelerated field trials. This is combined with over a decade of real-world in-service history, so you can be confident of performance and durability for a lifetime.

This document provides a summary for some of this testing.

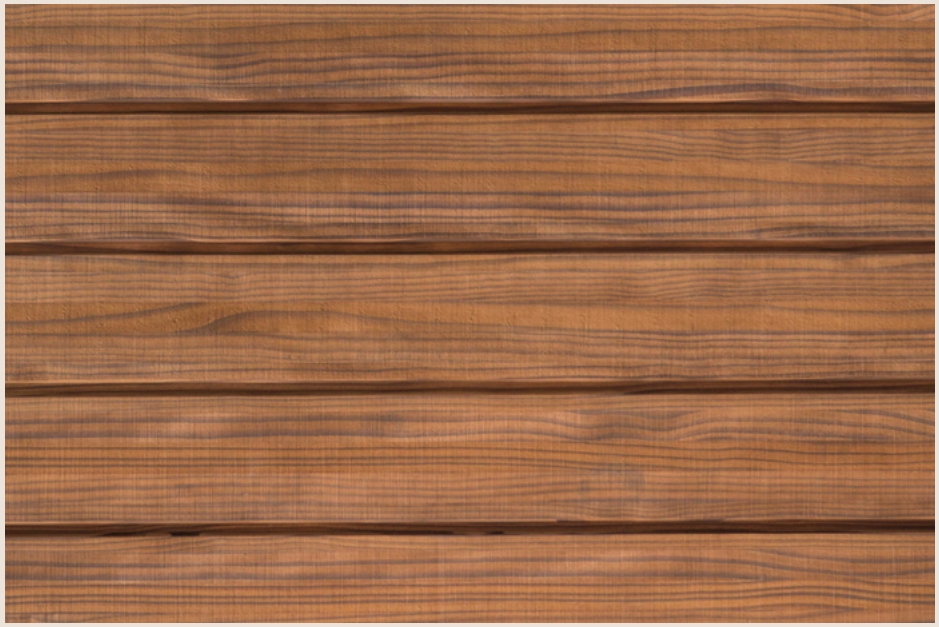
Not all Thermally Modified Wood is Created Equal

- Thermal modification is more than making wood brown – there are many new "quick and dirty" operators modifying wood.
- Careful work is required to create a thermal modification schedule that suits a particular species.
- Lower durability timbers may not be adequately durable when "general" thermal modification schedules are required.
- Any thermally modified wood should be modified at an appropriate schedule and field tested in decay tests to establish actual durability.
- Abodo has some of the most extensive field test data around which gives us surety that our product will perform as expected.

EACH SQUARE METRE STORES
7.56+
KG OF CARBON

Vulcan Cladding

-7.56+kg/m2



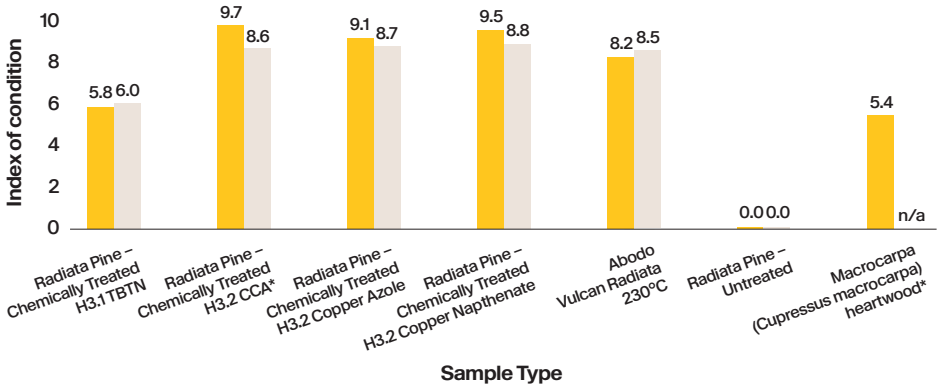
Durability

We have one of the longest running exterior durability testing programmes for thermally modified Radiata in the world, including at SCION in Rotorua for over 11 years and at our own test site at Abodo HQ in Auckland. These accelerated decay tests show Vulcan performs similarly or better than preservative treated Radiata pine and other naturally durable species.

Accelerated Above Ground Field Test – Whakarewarewa, New Zealand

Graph 1: Decking Panels – Condition After 11 Years

Samples were installed horizontally onto bearers with one end fixed to an untreated Radiata pine bearer and the other end fixed to Copper Chrome Arsenic (CCA)-treated bearer.

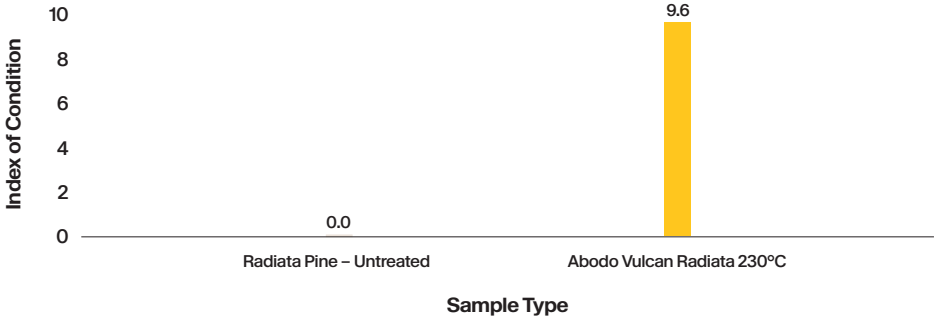


Key: Treated Bearer Untreated Bearer

*Samples assessed after 13 years.

Graph 2: Flat Panels – Condition After 11 Years

Samples were installed onto racks at a 45° angle with one end resting on an untreated Radiata pine bearer.

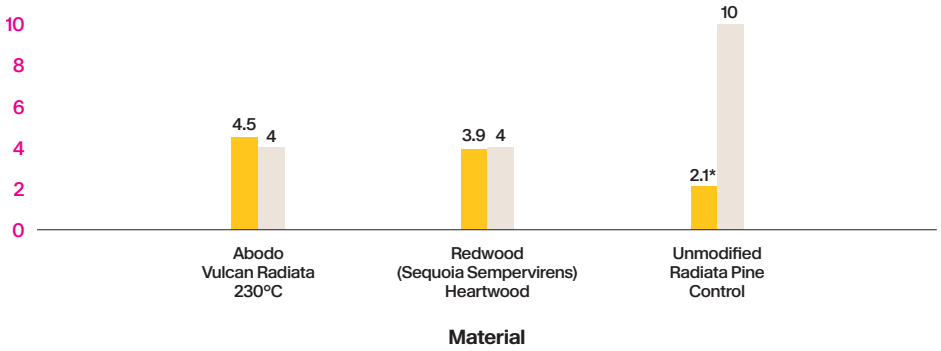


○ Flat panels Abodo Vulcan Radiata 230°C after 11 years exposure, Rotorua.

Graveyard In-ground Stake Test – Whakarewarewa, New Zealand

20mm x 20mm stakes were installed in ground contact and the condition was assessed by Scion Research after 5 years.

Graph 3: Condition of Stakes After 5 Years



Key: Index of Condition Number Failed

*Average life 2.1 years.

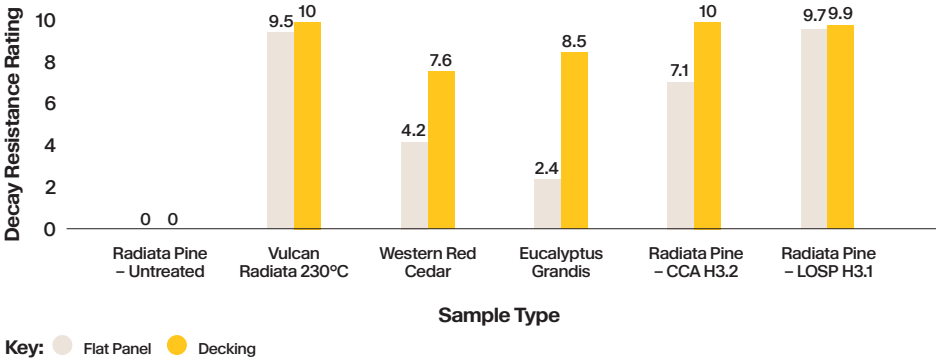
CONCLUSION: While thermally modified wood is most suited to above ground applications, this test suggests performance similar to redwood.

Above Ground Accelerated Durability Field Trial After 7+ Years (91 Months) – Abodo, Mangere

Assessments by Jeanette Drysdale, Independent Wood Protection Consultant.

Abodo Vulcan thermally modified Radiata timber samples were installed in flat panel and decking configurations according to Australasian Wood Preservations Committee (AWPC) protocols. Flat panel samples were installed onto racks at a 45° angle with one end resting on an untreated Radiata pine bearer. Decking samples were installed horizontally onto bearers with one end fixed an untreated Radiata pine bearer and the other end fixed to Copper Chrome Arsenic (CCA)-treated bearer.

Graph 4: Flat Panel and Decking – Condition of Samples After 7+ Years



CONCLUSION: After 7+ years the Vulcan Radiata 230°C is performing better than old growth Western red cedar and similarly to chemically treated Radiata pine.

○ Flat panel test racks, Mangere.

○ Decking test panels, Mangere.

Laboratory Testing – CEN/TS 15083-1: 2005

We work with EPH at IHD Dresden in Germany for European compliance testing, they are one of Europe's most respected wood testing and certification facilities.

A durability test of thermally modified Radiata pine against a laboratory test against wood decay basidiomycetes according to the laboratory test DIN CEN/TS 15083 1:2005.

Table 1: Mass Losses and Corresponding Durability of Thermally Modified Radiata Pine

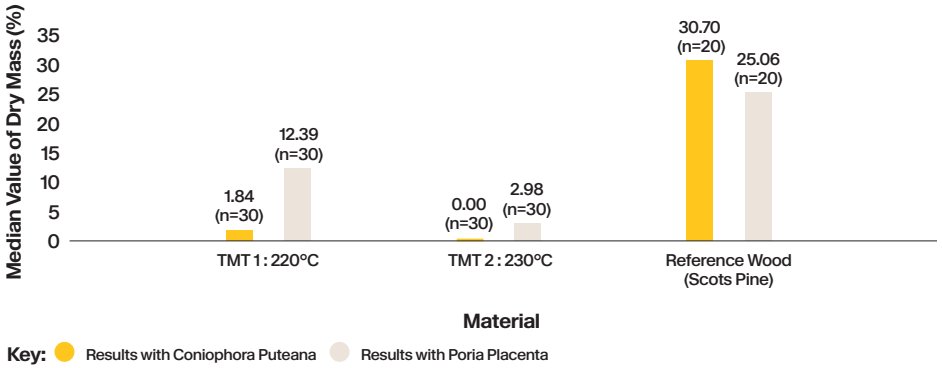
	Results with Coniophora Puteana			Results with Poria Placenta		
Material	Mean Dry Mass Loss (%)	Median Value of Dry Mass Loss (%)	Durability Class	Mean Dry Mass Loss (%)	Median Value of Dry Mass Loss (%)	Durability Class
Abodo Vulcan Radiata 230°C	0.04 (n=30)	0.00 (n=30)	1	2.48 (n=30)	2.98 (n=30)	1
Reference Wood (Scots Pine)	32.12 (n=20)	30.70 (n=20)	5	26.44 (n=20)	25.06 (n=20)	4

Table 2: Classification of Durability to EN350-1 Based on Laboratory Tests

Durability Class (EN350-1)	Description	Median Dry Mass Loss (%) According to DIN CEN/TS 15083-1
1	Very durable	≤ 5
2	Durable	> 5 bis ≤ 10
3	Moderately durable	> 10 bis ≤ 15
4	Slightly durable	> 15 bis ≤ 30
5	Not durable	> 30

RESULT: Evaluation according to EN350-1 is Durability Class 1.

Graph 5: Mass Losses and Corresponding Durability Classes of Thermally Modified Radiata Pine



Durability Assessments

Abodo's Vulcan timber has been assessed by global wood durability experts who have confirmed the long-term durability and suitability of this timber for exterior use.

AS5604-2005 Durability Assessment Class 2 Above Ground

Assessment by Australian Forest Research Company.

"With reference to AS5604-2005. Durability of Abodo Vulcan Radiata 230°C is comparable to Western red cedar (Thuja plicata Donn ex D.Don) and Macrocarpa heartwood (Monterey cypress/Cupressus macrocarpa Hartw.) referenced in AS5604-2005. Additional accelerated field testing indicates that Vulcan is potentially more durable than macrocarpa heartwood. This would indicate that the timber will achieve durability Class 2 for exterior above-ground applications."

Table 3: Probable Life Expectancy (Years) of Naturally Durable Timbers

Durability Class	In-ground	Above-ground
1	>25	>40
2	15-25	15-40
3	5-15	7-15
4	0-5	0-7

Durability Assessment to UC3

Assessment by Andy Pittman, BM Trada.

"Independent testing (according to AWPC methods) has shown that out-of-ground Vulcan is performing as well as North American sourced Western red cedar which is listed as DC2 Durable, in EN 350. For this reason, BM TRADA believe Vulcan may be expected to achieve a 30-year desired service life uncoated, against rot out of ground contact as cladding or joinery non load-bearing) in the UK. When coated (and provided the coating is maintained) BM TRADA believe Vulcan may be expected to achieve a 60-year desired service life for the same applications.

North America Durability Assessment to UC3B

Assessment by Jeff Morrell, Oregon State University.

"Field tests of Abodo Vulcan Radiata 230°C show that performance against decay fungi is similar to that of pines treated with traditional preservatives for Use Category 3B where termites are not present. This material has little or no resistance to termite attack and must be supplementally treated with a termiticide to perform where termites are present. Abodo Vulcan Radiata 230°C should perform similarly to Western red cedar in above ground applications such as cladding in terms of resistance to fungal decay."

Table 4: Comparison of Durability Between Common Naturally Durable Species and Abodo Vulcan 230°C

Species 1	Durability Class
Abodo Vulcan Radiata 230°C	UC3B (indicative)
Western Red Cedar Heart	UC3B
Coast Redwood (NZ Grown)	UC3A

New Zealand Building Code Durability Assessment

Assessment by Occulus Engineering.

"NZS3602 section 111.2.5 states that both Cypress heartwood (Macrocarpa is a variety of Cypress) and H3.2 treated Radiata pine can be used as uncoated or stained timber cladding as part of an acceptable solution, whereas H3.1 treated Radiata pine cannot.

Extrapolating from this, it would be logical to state that if the timber in question were more durable than the timber types in the acceptable solution, then the timber would perform better than the acceptable solution and therefore be acceptable and fit for purpose.

In field trials the 4 types of timber (H3.1, H3.2, Macrocarpa and Abodo Vulcan Radiata 230°C) were left exposed for approximately 11 years, and the following was observed:

- Abodo Vulcan Radiata 230°C was shown to be more durable than Macrocarpa heartwood. In order of durability: H3.1 was worst, then Macrocarpa, then Abodo Vulcan Radiata 230°C, then H3.2 CCA was best. Since Macrocarpa is a species of heart cypress, which is permitted for a no-finish or stained finish within NZS3602 clause 111.2.5, any timbers that are more durable than this would logically also be fit for purpose as a no-finish or stained finish cladding.
- Therefore since Abodo Vulcan Radiata 230°C is more durable than macrocarpa, it can be used as no-finish or stained cladding as well.
- It would appear that the threshold between a timber cladding requiring a paint versus being acceptable with a no-finish or stained finish rests between H3.1 and Cypress.
- Since Abodo Vulcan Radiata 230°C is above that threshold, it can be used as cladding without a finish or otherwise in stain or paint application."

Termite Testing

Thermally modified timber can be susceptible to termite attack unless it is further treated with a preservative treatment. We have conducted termite trials with our anti-termite chemically treated Vulcan products in various locations including Australia, USA and Taiwan to accepted international standards.

Vulcan – TPX Treated

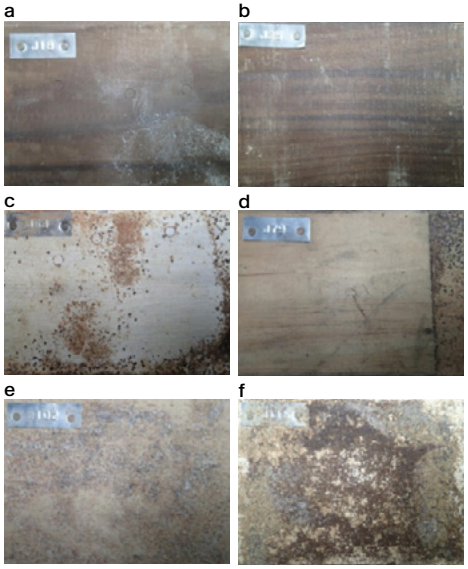
TPX has been field tested with termites according to Australasian Wood Preservation Committee (AWPC) and CNS15756 standards.

Table 5: AWPC – Drum Method – Coptotermes Acinaciformis Northern Territory, Australia

Treatment	Mass Loss	Pass / Fail
Untreated pine control	75.5%	
H3LOSP Azole and permethrin treated Radiata pine	1.1%	
TPX treated Vulcan Radiata 230°C leached	0.2%	Pass
Allowable mass loss	<5%	

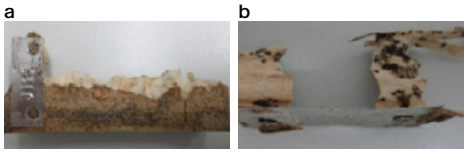
Table 6: CNS15756 – Coptotermes Formosanus (Formosan Termite) Taiwan

Treatment	Mass Loss	Pass / Fail
Untreated pine control	25.1%	
H3OPX Azole and permethrin treated Vulcan Radiata 230°C	1.1%	Pass
TPX treated Vulcan Radiata 230°C	0.7%	Pass
Allowable mass loss	<3%	



○ Example of termite attack to treated test specimens after exposure to C. acinaciformis in a Hazard Class H3 field trial for 38 weeks: a) Vulcan Radiata 230°C TPX uncoated, b) Vulcan Radiata 230°C TPX stained, c) Vulcan Radiata 230°C TPX painted, d) Radiata pine, uncoated, e) Radiata pine TPX, uncoated, LOSP, and f) Radiata pine, painted, LOSP.

○ Example of attack by C. acinaciformis termites to bait-wood after 38 weeks' exposure in a Hazard Class H3 field trial.



○ Examples of the range of termite attack and damage to non-treated Radiata pine sapwood control test specimens after exposure to C. acinaciformis in a Hazard Class H3 field trial for 38 weeks: a) 86.5% mass loss, and b) 99.3% mass loss. (Mean mass loss for seven test specimens = 95.5%).

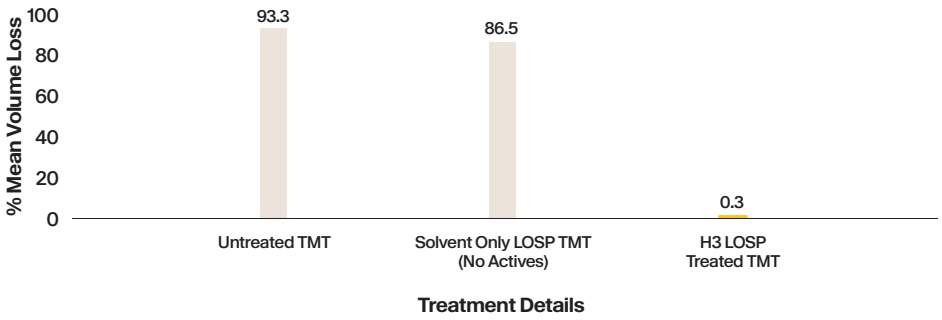
Vulcan – Azole and Permethrin Treated

Azole and permethrin treated Abodo Vulcan Radiata 230°C was exposed for a period of approximately 6 months to Coptotermes acinaciformis termites in Northern Queensland, Australia following the Brick-assembly technique described by the Australasian Wood Preservations Committee (AWPC).

70mm x 30mm cross section Abodo Vulcan Radiata 230°C was LOSP treated with preservative actives targeting the minimum AS/NZS 1604.1:2021 retention of 0.02% permethrin for H3 treated timber (plus azoles for decay control). These actives are the same type and retention as used in Abodo OPX treatment.

A leaching step was performed consisting of 7 days in a 35°C shaking water bath with the water replaced 5 times. All treatments were kept separate. Finally, all samples were vacuum dried at 40°C and -95 kPa for 5 days.

Graph 6: Treatment Volume Loss



CONCLUSION: The AWPC protocols allow a maximum of 5% volume loss for any treatment before it has deemed to have failed the test. In this trial, the treated samples had less than 5% volume loss so is deemed to be efficacious.

○ Comparative performance of Vulcan Radiata 230°C untreated (left) vs LOSP Azole and permethrin treated (right), when exposed to Coptotermes acinaciformis termites in AWPC H3 field test, Queensland.

Vulcan – Formosan Termites

Testing of Vulcan with LOSP, OPX and TPX treatments was performed by LSU AgCenter's Wood Durability Laboratory in accordance with American Wood Protection Association (AWPA) E1-23 Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites (AWPA 2024). The choice test method was used, except for the Vulcan TPX group as no-choice test.

After 28 days of exposure, the samples were removed and cleaned with distilled water. The following AWPA E1-23 Rating Scale was used to visually rate each sample.

Rating Scale:

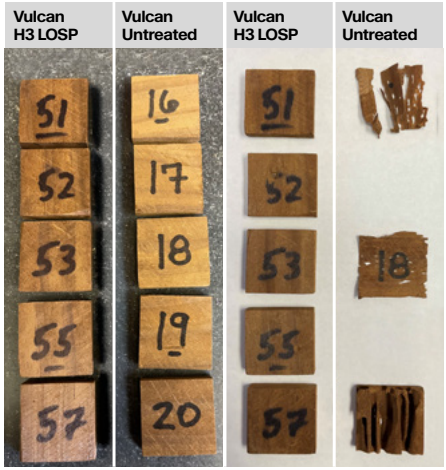
10 Sound.
9.5 Trace, surface nibbles permitted.
9 Slight attack, up to 3% of cross-sectional area affected.
8 Moderate attack, 3-10% of cross-sectional area affected.
7 Moderate/severe attack, penetration, 10-30% of cross-sectional area affected.
6 Severe attack, 30-50% of cross-sectional area affected.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

Table 7: Results – Coptotermes Formosanus Louisiana State University – USA Report #: WDL-2024-05

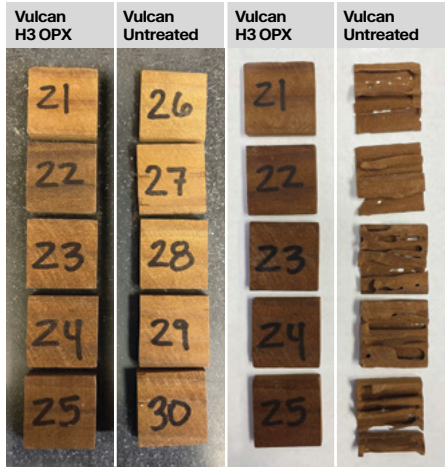
Treatment	Average Mass Loss	Average Rating
Radiata pine untreated	98.69%	0
Vulcan untreated	52.36%	0
Vulcan H3 LOSP treated	5.97%	9.7
Vulcan untreated	91.71%	0
Vulcan H3 OPX treated	5.40%	10
Vulcan untreated	73.08%	0
Vulcan TPX treated	1.30%	9.9
Radiata pine untreated	71.46%	0

CONCLUSION:

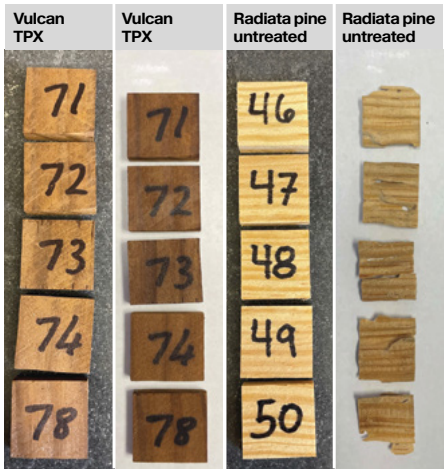
In the choice test, termites chose to feed more heavily on the untreated samples compared to the treated samples. The untreated control mortality, sample weight loss, and sample ratings were consistent with previous test results. The results from the untreated control samples indicate strong termite vigor and performance, and hence the test data are valid.
The 3 treatments demonstrated enhanced resistance to termite attack.



○ Figure 1. Samples before (left) and at the end of 28 days of testing (right).



○ Figure 2. Samples before (left) and at the end of 28 days of testing (right).



○ Figure 3. Samples before (left) and at the end (right) of 28 days of the no-choice test.

Exterior Weathering

We have R&D weathering exposure New Zealand test sites running at Mangere and Ohinewai along with third party locations in Australia, USA and Europe.

Here we find out what works (or doesn't work) in extreme weather conditions.

New Zealand has some of the most demanding weather conditions in the world in terms of UV, moisture and salty air so is a perfect testing ground for exterior timber, fixing systems and coatings.

Coatings Performance

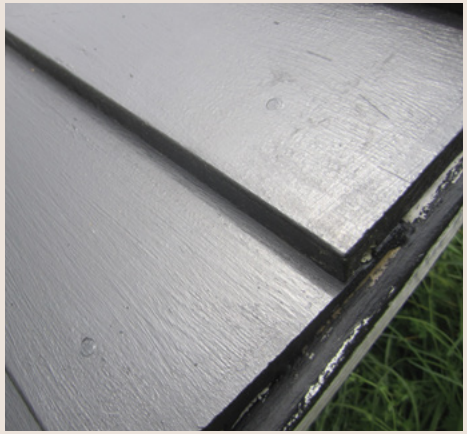
The inherent stability, open cell structure and reduced resin content of Vulcan thermally modified timber makes it an ideal substrate for coatings. Exterior weathering trials were conducted at our Tupare test site over a period of 3 years comparing Vulcan Flatsawn timber and preservative treated clears grade Radiata pine side by side with paint finish.

Two coats of oil borne primer plus 2 coats of Sonyx 101 exterior acrylic paint in Pitch Black colour were applied to the timber samples. The panels were exposed 45° angle facing North that give maximum sun exposure in the southern hemisphere.

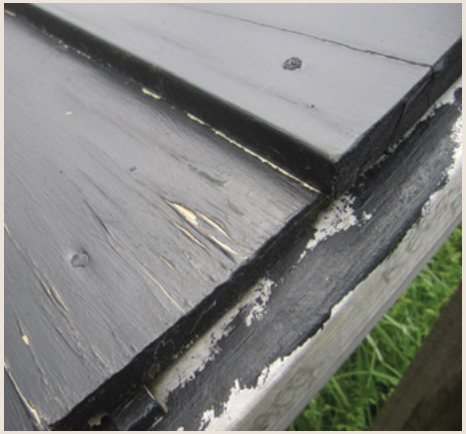
The testing was observed and verified by Resene Paints Ltd.

RESULT: After 3 years exposure the paint finish on the Vulcan Cladding was in excellent condition with no failure. The paint finish on the Radiata pine cladding had failed, with extensive flaking and cracking present due to the movement of the timber substrate.

○ Flat panel test racks, Tupare.



○ Vulcan – Painted black, 3 years exposure.



○ MCA treated kiln dried Radiata pine, 3 years exposure.

Solar Reflectance Index (SRI)

The samples were tested by Resene Paints Ltd. as per procedures described in ASTM C1549: *Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer* and ASTM C1371: *Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers*. The slide method was used for this set of Emissometer tests.

The solar reflectance index was calculated in compliance with ASTM E 1980: *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces*.

Standard solar and ambient conditions used for the calculation:

- Solar flux = 1000 W·m-2.
- Ambient air temperature = 310 Kelvin.
- Ambient sky temperature = 300 Kelvin.
- Convective coefficients = 5,12, 30 W·m-2·K-1 corresponding to low (0-2ms-1), medium (2-6 ms-1) and high (6-10 ms-1) wind conditions respectively.

Vulcan

(unweathered)

Thermal Emittance (e)	Total Solar Reflectance	Solar Absorbance
0.90	0.35	0.65

Wind Condition	Low	Medium	High
Convective Coefficients	5	12	30
SRI	37	39	40

For a complete list of SRI and indicative Light Reflectance Value numbers for all coated Vulcan colours, please refer to Abodo Vulcan Timber LRV and SRI Guide.

Glue Lamination Testing – Vulcan Laminated Vertical Grain

Extensive delamination testing has been conducted on Vulcan laminated product. The polyurethane glue line is shown to work synergistically with the thermally modified wood to create excellent adhesive performance for long-term exterior applications.

ASTM D5824

Intertek, USA conducted delamination testing on Vulcan laminated timber according to ASTM D5824. This method includes submersion in water with vacuum and pressure soak 30 minutes respectively prior to testing.

Table 8: Summary of Test Results

Procedure	Property	Delamination (in)		
		End	Edge	Total
ASTM D5824	Delamination	0.0	0.0	0.0

○ Testing in-progress detail.

○ Post-test specimen detail.

intertek
Total Quality. Assured.

AS/NZS 1328:1998

Delamination testing was conducted according to AS/NZ S1328:1998. This method includes submersion in water with two pressure soak cycles over the course of one hour followed by drying at 65°C prior to assessment of glue line performance.

Table 9: Conditions for Testing Resistance to Delamination

Treatment	Parameters	Units	Method A
Impregnation (water at (15 ± 5)°C)	Absolute pressure	kPa	25 ± 5
	Duration	Min	5
	Absolute pressure	kPa	600 ± 25
	Duration	Hour	1
	Number of impregnation cycles		2
Drying	Temperature	°C	60-70
	Air humidity	%	< 15
	Airspeed	m/s	2.5 ± 0.5
	Duration	Hours	21-22

Table 10: Delamination Test According to AS/NZS 1328.1:1998, Method B

Material	Dimensions		Lamella Height (mm)	No. of joints	Test Date	No.	l tot, Glueline (mm)	Delamination	
	Height (mm)	Glueline Width (mm)						(mm)	(%)
Abodo Vulcan Radiata 230°C	90	9	32	2	1 May 2014	1A	36	0	0.0
						1B	36	0	0.0
						1C	36	0	0.0
						1D	36	0	0.0
						1E	36	0	0.0
						1F	36	0	0.0
						1G	36	0	0.0
						1H	36	0	0.0
						1I	36	0	0.0
						1J	36	0	0.0
Min									0.0
Max									0.0
Average									0.0

RESULT: Type 1 bond – suitable for Service Class 3 (exterior) applications (AS/NZ S4364).

Structural Testing

Screw Holding

SHR conducted screw holding tests with capacity determined according to SKH-BGS 002 dd. 18-11-2017.

Table 11: Average Results of the Cleavage

Direction	Max Force	Cleavage Strength	Density
	(N)	(N/mm)	(kg/m³)
Radial	1473	29.4	418
Tangential	1764	35.1	418

RESULT: The average screw holding capacity of 1627 N is higher than the threshold value for Spruce of 1600 N comply to SKH Protocol 0605-2 dd. 19-07-2021.

Cleavage strength and screw holding capacity meet the requirements regarding burglary resistance according to AD 0823 (09-11-2022).

Mechanical Testing

AS/NZ S4063.2:2010.

Mechanical testing of Vulcan laminated timber was conducted at SCION, Rotorua according to AS/NZ S4063.2:2010.

Table 12: Bending Strength and Stiffness Properties

	Laminated 140mm x 42mm TMT				
	Bending Stiffness MoEj (GPa)	Bending Strength MoRj (MPa)	Tension Strength (MPa)	Shear Strength (MPa)	Compression Strength (MPa)
Mean	10.59	31.80	13.66	-	41.04
Minimum	8.22	19.76	7.10	-	33.85
Maximum	12.74	50.70	20.69	-	47.32
Range	4.52	30.94	13.59	-	13.47
Standard deviation	1.00	6.96	2.46	-	3.68
Coefficient of variation	9.44%	21.88%	18.04%	-	8.96%
Count	30	30	30	-	30
Characteristic strength (MPa)		20.50	9.60	-	38.50
Characteristic stiffness (GPa)	10.47				
Assigned grade	GL10	GL8	GL10	-	GL 17

RESULT: GL8 (AS 1720.1:2010).

MATERIALS & TESTING LABORATORIES LIMITED
Destructive & Non-Destructive Test House

ASTM D198 – 15

Mechanical testing of Vulcan laminated timber was conducted at Materials and Testing Laboratories according to ASTM D198 – 15.

	Mean Report Findings
Weight (kg)	4.1
Max load (kN)	22.7
Deflection (mm)	12
Modulus of rupture (Psi)	7348
Modulus of elasticity (Psi)	1051583
Maximum shear stress (Psi)	422

BS EN 310:1993

Mechanical testing of Vulcan laminated timber was conducted at Materials and Testing Laboratories according to BS EN 310:1993.

	Mean Report Findings
Weight (g)	166.4
Max load (N)	1638
Deflection (mm)	7.0
Modulus of rupture (MPa)	52.77
Modulus of elasticity (GPa)	8.75

Dimensional Stability

Dimensional stability is a key property that determines how wood will perform in service. Wood dimensions will change with changes in moisture content, either from contact with liquid water, or from changes in air humidity. Having data on the dimensional stability of a particular type of wood (modified, or unmodified) is important for understanding the in-service behaviour of the wood.

SCION, Rotorua tested comparative dimensional stability of Vulcan Flatsawn wood and commercially available wood commonly used in exterior joinery applications, using both swellometer and long-term humidity cycling methods.

Swellometer Test

Wood samples were equilibrated at 25°C, 65% RH and then soaked in water for 3 days and continuously measuring the change in tangential dimension during soaking.

RESULTS:

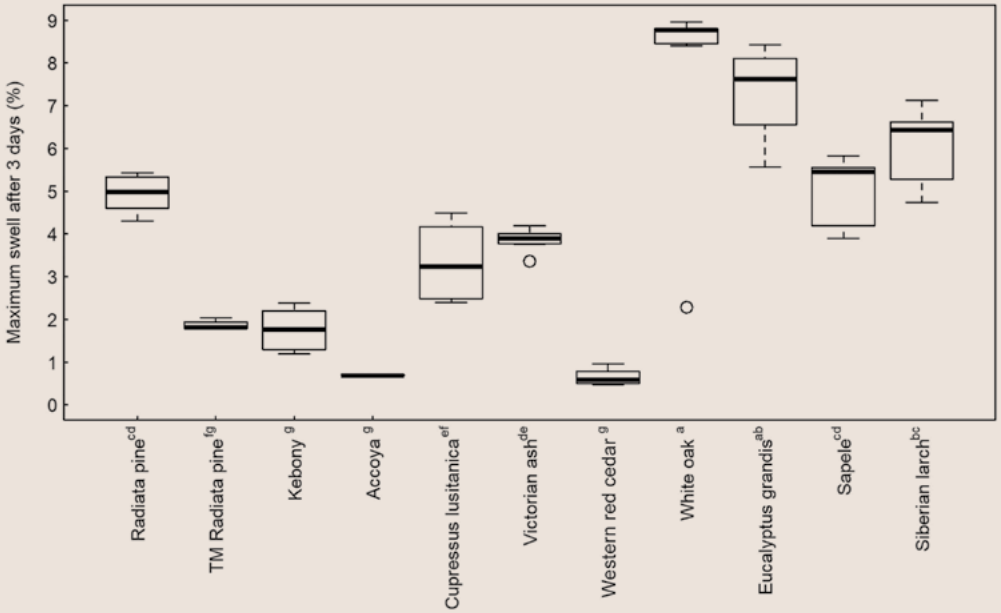


FIGURE 1. Maximum swelling following 3 days water soaking in the Swellometer test. Superscript letters indicate grouping that are not significantly different (95% confidence level).

Long-term Humidity Cycling Test

Wood samples were equilibrated to several environments ranging from low to high relative humidity and measuring the radial and tangential dimensions of the samples at each condition.

RESULTS:

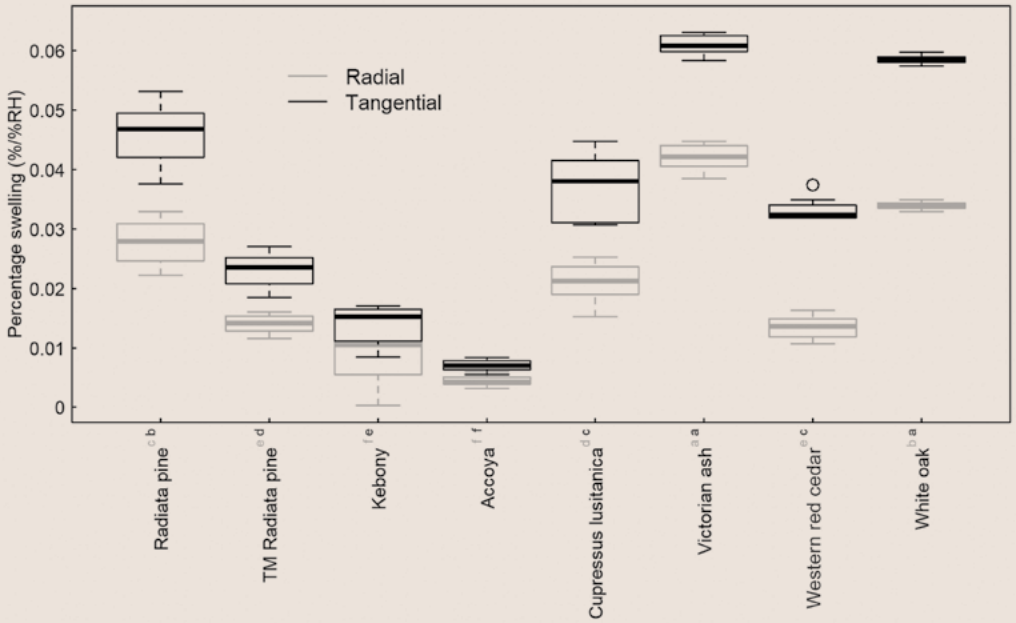


FIGURE 2. Percentage swelling for every 1% change in relative humidity for each wood type in the tangential and radial directions(shown as black and grey boxes respectively). Superscript letters indicate grouping that are not significantly different (95% confidence level).

CONCLUSIONS:

Under conditions of both water soaking and air humidity changes, Vulcan Radiata 230°C was significantly more dimensionally stable than unmodified Radiata pine, and it performed similarly to Western red cedar, a species renowned for its dimensional stability.

Kebony and Accoya Radiata pine were more dimensionally stable than thermally modified Radiata pine in relation to changes in air humidity. However when soaked in water the level of swelling in these modified timbers was not significantly different to thermally modified Radiata pine.

Victorian ash and white oak swelled as much as, or more than unmodified Radiata pine, and consequently swelled substantially more than thermally modified Radiata pine.

Flame Spread and Smoke Development Testing

Vulcan has been tested for fire performance with many globally recognised test methods.

NOTE: The below results are shown for guidance purposes only. Please consult with a professional fire engineer to establish compliance with local regulations before specification or commencement of construction. Full reports are available from Abodo on request.

USA

ASTM E84 Tunnel Test

Test facility: QAI, USA.
Testing in accordance with ASTM E84.

Classification

Flame Spread Classification	Flame Spread Index	Smoke
Class C	85	180

Wildland Urban Interface (WUI)

Test facility: Intertek, USA.
Testing in accordance with SFM 12-7A-1.

Test Requirement	Result
Absence of flame penetration through the wall assembly	PASS
Absence of glowing combustion on the interior of the assembly after 70 mins	PASS

New Zealand / Australia

ISO5660 Cone Test

Test facility: BRANZ, New Zealand.

Testing in accordance with AS/NZS 3837:1998 and ISO5660-1.

Classification according to NZBC C/VM2 Appendix A and AS5637.1:2015: **Group 3.**

United Kingdom / European Union

EN 13283:2020 European Single Burn Item (SBI)

Test facility: Meka, Latvia.

Testing according to EN 13283:2020 European Single Burn Item (SBI) Test and EN ISO 11925-2:2020.

Classification according to EN13501-1:2018: **Class D-s1-d0.**

○ WUI test.

○ ISO5660 Cone test.

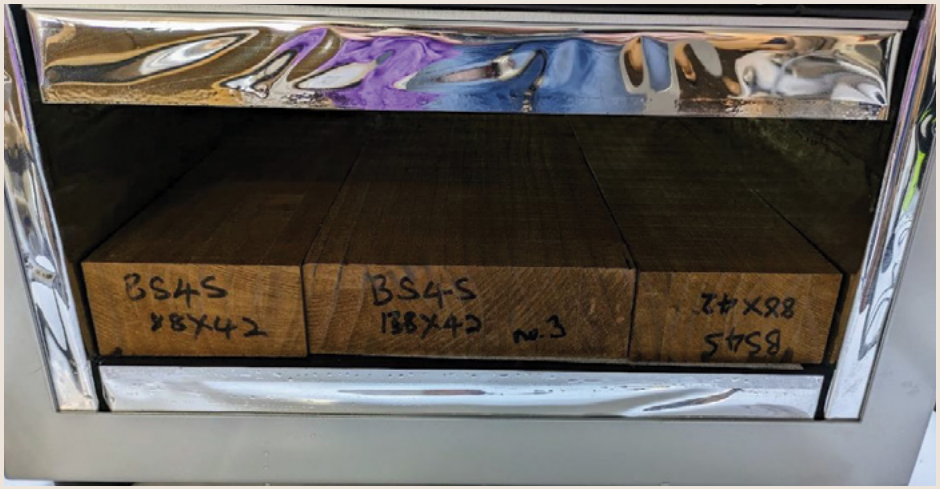
Thermal Performance

Windows are generally accepted as the weakest point of a building's insulation envelope and should be a target to reduce operation carbon.

Abodo has created Vulcan modified wood with extremely low thermal conductivity even when compared with other timber products. Performance is up to 30% better than softwood and up to 60% better than hardwood.

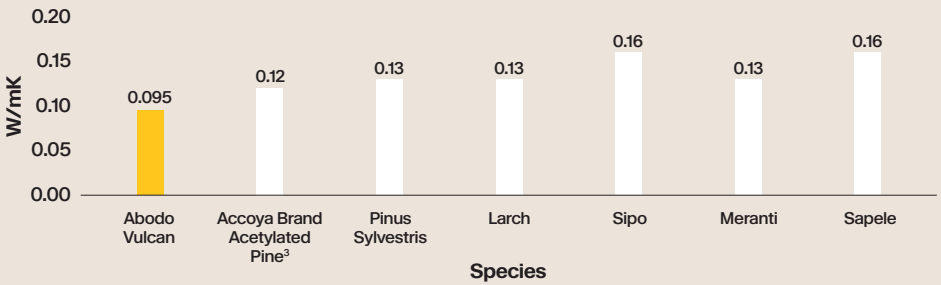
Testing was conducted by Thermtest, Sweden according to ASTM C518, ISO 8301, and EN 12667 standards.

Test Method	Average Thickness (mm)	Average Temperature (°C)	Thermal Conductivity (W/mK)	R-value (m^2K/W)
EN12667	42.55	10	0.095	0.4474



○ Sample configuration set up.

Graph 7: Comparative Thermal Performance of Various Common Joinery Timbers



Sources: accoya.com/app/uploads/2020/04/Accoya_WoodInfoGuide-1.pdf, abodo.co.nz/uploads/resource/

Emissions

Vulcan was tested according to the California Department of Public Health (CDPH) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2" and ISO 10580:2010 "Test method for volatile organic compound (VOC) emissions – resilient, textile and laminate floor coverings".

A test item was prepared from supplied product, then conditioned and tested after 14 days according to the prescribed methods for volatile organic compounds, total VOC's and aldehydes.

RESULTS:

Report No.	Test Method	Sample Size	Chamber Volume	Room Model	Emission Surface	VOC's & Aldehydes	TVOC's
J 2408191	CDPH-IAQ V1.1 2010 and CDPH-IAQ V1.2 2017: Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers	50cm x 18cm	125L	Private Office	Walls	Pass	<0.5 mg/m^3

History of Use

As the first thermally modified timber cladding product produced in the Southern Hemisphere, Abodo Vulcan has proven itself time and again. With over a decade of real-life projects in the most demanding climates around the world, there is living proof of the longevity and durability.

○ Vulcan window joinery Whangaparoa, New Zealand. Installed 2010.

○ Vulcan Cladding (Vertical Grain) – Raglan, New Zealand. Installed 2013.

○ Disclaimer:

The information in this document is designed as a guide only and has not been independently verified. No warranty or representation is offered with regards to accuracy and completeness. Abodo disclaim any liability to the fullest extent by law for any loss or damage whatsoever resulting from the use of this information in full or part.

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