Ian Bennie & Associates

Test Report No. 2023-035-S2-R1
REVISION 1

Knotwood Shadowline 200 Cladding – Vertical.

Static Serviceability limit state
& Strength limit state
WIND LOAD TESTS

by the methods of AS:4040.2-1992(R2016)
To the requirements of AS 1562.1:2018

For

Knotwood Pty Ltd

November 2023

Accredited Laboratory No. 2371
Accredited for compliance with ISO/IEC 17025 - Testing

DOCUMENT CONTROL

Revision No.	Date Issued:	Report ID:
0	04/05/2023	2023-035-S2 report
1	02/11/2023	2023-035-S2-R1 Report

Rev. 1	AMENDMENT TABLE	
Title	Section	Amendment
Sample drawings reference	Page 1: Specimen Identification	4th line, Delete “Appendix C” and replace with “Appendix A”
Serviceability limit state results	Table 2	The error was in the observations at test pressure -2.05 – fail residual deflections greater than 1.5mm. this has been corrected and more pressures added to table 2 as the sample passed residual requirements.
Signatory sign-off	Conclusion	Footer, Add signature “James Maskiell”, add signature “Ian Bennie”
Sample details	Appendix A	Original client supplied details called up incorrect product details, Clients re supplied correct product details for the sample tested.

Amended by:	Checked by:
James Maskiell 02/11/2023	Ian Bennie 02/11/2023
	

IAN BENNIE & ASSOCIATES PTY. LTD.
Building Performance Testing
ACN : 007 133 253

Accredited Laboratory No. 2371

TEST REPORT NUMBER 2023-035-S2

Test Client: Knotwood Pty Ltd
2/63 Burnside Rd, Stapylton, QLD 4207

Specimen identification:

A Knotwood Shoadowline 200 Cladding test specimen measuring 2300 mm in height x 1800 mm in width was supplied by the client. The sample consisted of vertical linear cladding fixed to Horizontal top hats @570 C/C fixed to 90mm Timber studs @ 600 C/C.
Details of the sample provided by the client are given in Appendix A.
Drawings received: 24th January 2023

Test Method: Serviceability limit state testing and Strength limit state testing were conducted in accordance with AS4040.2-1992 (R2016) Methods of testing sheet roof and wall cladding, Method 2: Resistance to wind pressures for non-cyclone regions.

Procedure: AS4040.2-1992 (R2016) nominates for Serviceability limit state testing, measurements
A. shall be taken; immediately before the application of pressure;
B. when the pressure has been applied for a period of 1 min; and
C. no more than 5 min after the completion of removal of the pressure.
Strength limit state testing test loads shall be applied for a period of 1 minute. AS/NZS1170.0-2002 Structural Design Actions Part 0: General Properties nominates variability factors (VBF) for the number of samples tested.

Test Location: Ian Bennie & Associates, Dandenong South, Victoria

Test Date: 14th April 2023

Requirements:

AS1562.1-2018 Clause 5.5.1 Serviceability test; For the cladding system subjected to the test pressure for serviceability limit state in accordance with AS 4040.2, the maximum deflection of the cladding relative to the supporting members shall not exceed (S/120 +p/30) except for overhangs where maximum deflection shall not exceed (S/60 +p/30), no de-indexing, unclipping, permanent local deformation, or fracture or failure of any part of the sheeting or of the fastenings shall occur, and the residual deflection, 1min after the removal of pressure, shall not exceed S/1000 or 1.5mm, whichever is higher. S is the span length & p is the distance between fixings.

AS1562.1-2018 Clause 5.5.2 Strength test; The cladding system shall be subjected to the test pressures for the strength limit state for non-cyclonic regions in accordance with AS4040.2. The pressure shall be sustained and with no failure of fasteners, and all parts of the cladding system shall remain in position, notwithstanding any permanent distortion that may occur in sheeting and fastenings.

1 Luisa Avenue, Dandenong South, 3175, Victoria, Australia
Telephone: (03) 9768 3640 International: +613 9768 3640 Web: ibalab.net

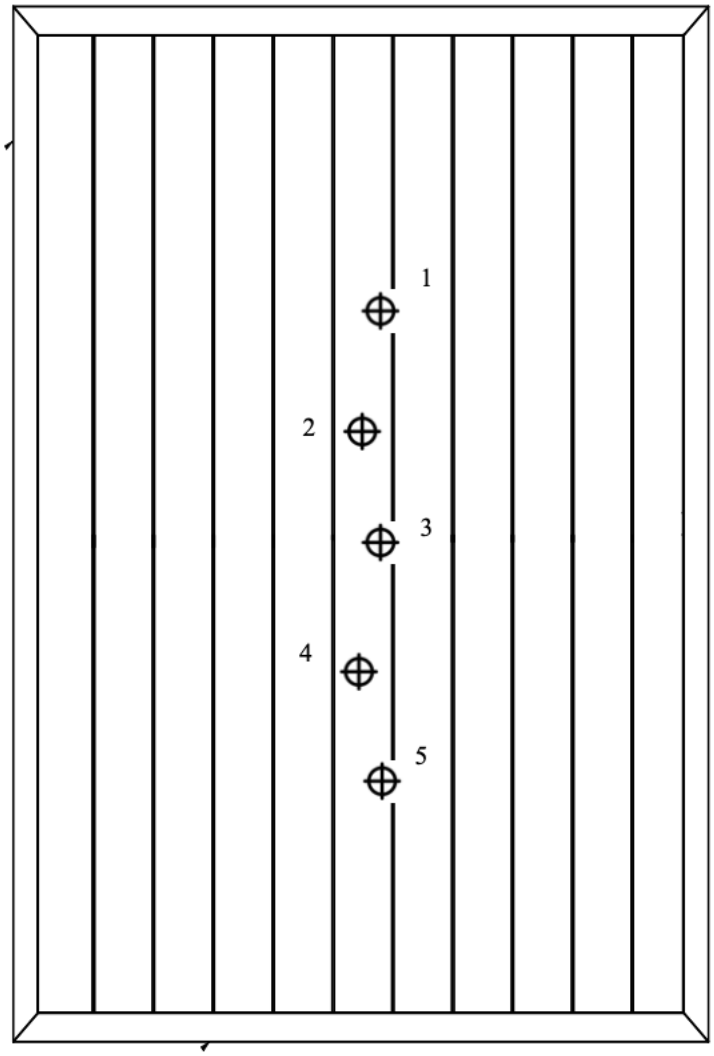


Figure 1: external view of the test sample showing displacement measurement locations.

1. Top hat at standing seam
2. Midspan between top hats at Mid-Pan
3. Top hat at standing seam
4. Midspan between top hats at Mid-Pan
5. Top hat at standing seam

Serviceability limit state test requirements

Knotwood 200 Shadowline serviceability limit state rating requirements;

AS1562.1 specifies that the maximum deflection of the cladding relative to the supporting members shall not exceed $S/120 + p/30$, where S is the span length, and p is the distance between fixings.

S/120 for the sample is 570/120 = 4.8

p/30 for the sample is 200/30 = 6.7

maximum allowable deflection allowed of the cladding relative to the support structure is 11.5mm.

The residual deflection, 1min after the removal of pressure, shall not exceed S/1000 or 1.5mm, whichever is higher.

Table 1: Serviceability limit state test recorded deflections: – 13th April 2023

Member	Pressure	*Displacements (Rounded to 0.1 mm)*			Bending Deflection (Rounded to 0.01 mm)
	kPa	Left or Top` D1	Centre D2	Right or bottom D3	$DC - \frac{(D1 + D2)}{2}$
		(mm)	(mm)	(mm)	DEF (mm)
1,2,3	Span 1 between top hats				
Preload	0.26				
Ref Zero	0.00	0.0	0.0	0.0	0.0
P1	0.40	0.6	0.8	0.9	0.1
Residual 1	0.00	0.2	0.3	0.2	0.1
P2	0.59	0.8	1.0	1.1	0.1
Residual 2	0.00	0.3	0.3	0.3	0.0
P3	0.80	0.8	1.1	1.3	0.0
Residual 3	0.00	0.3	0.3	0.3	0.0
P4	1.00	1.0	1.2	1.4	0.0
Residual 4	0.00	0.3	0.3	0.3	0.1
P5	1.20	1.0	1.2	1.4	0.0
Residual 5	0.00	0.3	0.3	0.4	0.0
P6	1.41	1.1	1.3	1.5	0.0
Residual 6	0.00	0.3	0.4	0.4	0.0
P7	1.60	1.2	1.4	1.6	0.0
Residual 7	0.00	0.3	0.4	0.4	0.0
P8	1.83	1.3	1.4	1.6	0.0

Residual 8	0.00	0.4	0.4	0.5	0.0
P9	2.00	1.4	1.6	1.7	0.0
Residual 9	0.03	0.5	0.5	0.5	0.0
Preload	-0.41				
Ref Zero	0.00	0.0	0.0	0.0	0.0
N1	-0.40	-2.5	-2.8	-2.9	-0.1
Residual 1	0.00	0.0	-0.1	0.0	0.0
N2	-0.60	-4.3	-4.9	-5.2	-0.2
Residual 2	0.00	-0.3	-0.3	-0.4	0.0
N3	-0.82	-5.2	-6.0	-6.3	-0.2
Residual 3	0.00	-0.3	-0.4	-0.4	-0.1
N4	-1.03	-6.6	-7.6	-8.1	-0.3
Residual 4	0.00	-0.4	-0.6	-0.6	-0.1
N5	-1.26	-8.1	-9.6	-10.1	-0.5
Residual 5	0.00	-0.7	-0.9	-1.0	0.0
N6	-1.42	-9.2	-10.8	-11.4	-0.5
Residual 6	0.00	-0.9	-1.2	-1.2	-0.1
N7	-1.66	-11.2	-12.7	-13.2	-0.5
Residual 7	0.00	-1.0	-1.3	-1.4	-0.1
N8	-1.84	-12.2	-13.9	-14.5	-0.5
Residual 8	0.00	-1.2	-1.5	-1.5	-0.1
N9	-2.05	-13.4	-15.2	-15.9	-0.6
Residual 9	0.00	-1.4	-1.8	-1.9	-0.1
N10	-2.22	-14.4	-16.5	-17.3	-0.7
N11	-2.42	-15.6	-18.0	-18.8	-0.8
Residual 10	0.00	-1.8	-2.4	-2.4	-0.3
3,4,5	Span 2				
Preload	0.26				
Ref Zero	0.00	0.0	0.0	0.0	0.0

P1	0.40	0.9	0.8	0.8	0.0
Residual 1	0.00	0.2	0.2	0.2	0.0
P2	0.59	1.1	1.0	1.0	0.0
Residual 2	0.00	0.3	0.3	0.3	0.0
P3	0.80	1.3	1.2	1.2	0.0
Residual 3	0.00	0.3	0.3	0.3	0.0
P4	1.00	1.4	1.4	1.3	0.0
Residual 4	0.00	0.3	0.4	0.3	0.0
P5	1.20	1.4	1.4	1.4	0.0
Residual 5	0.00	0.4	0.4	0.4	0.0
P6	1.41	1.5	1.5	1.5	0.0
Residual 6	0.00	0.4	0.5	0.4	0.1
P7	1.60	1.6	1.6	1.5	0.1
Residual 7	0.00	0.4	0.5	0.4	0.1
P8	1.83	1.6	1.6	1.7	0.0
Residual 8	0.00	0.5	0.5	0.4	0.1
P9	2.00	1.7	1.8	1.7	0.1
Residual 9	0.03	0.5	0.6	0.5	0.1
Preload	-0.41				
Ref Zero	0.00	0.0	0.0	0.0	0.0
N1	-0.40	-2.9	-2.6	-2.2	-0.1
Residual 1	0.00	0.0	0.0	0.0	0.0
N2	-0.60	-5.2	-4.9	-4.0	-0.2
Residual 2	0.00	-0.4	-0.3	-0.4	0.1
N3	-0.82	-6.3	-5.8	-4.9	-0.2
Residual 3	0.00	-0.4	-0.4	-0.4	0.0
N4	-1.03	-8.1	-7.6	-6.2	-0.4
Residual 4	0.00	-0.6	-0.5	-0.5	0.0
N5	-1.26	-10.1	-9.5	-7.8	-0.5

Residual 5	0.00	-1.0	-0.8	-0.8	0.1
N6	-1.42	-11.4	-10.8	-9.0	-0.6
Residual 6	0.00	-1.2	-1.1	-1.1	0.0
N7	-1.66	-13.2	-12.4	-10.3	-0.7
Residual 7	0.00	-1.4	-1.3	-1.1	0.0
N8	-1.84	-14.5	-13.7	-11.4	-0.8
Residual 8	0.00	-1.5	-1.5	-1.3	0.0
N9	-2.05	-15.9	-15.1	-12.6	-0.9
Residual 9	0.00	-1.9	-1.8	-1.5	-0.1
N10	-2.22	-17.3	-16.4	-13.6	-1.0
N11	-2.42	-18.8	-18.0	-14.9	-1.1
Residual 10	0.00	-2.4	-2.3	-2.0	-0.1

Table 2: Serviceability Limit State Test Pressures

Rating	SLS Design Action (kPa)	VBF	Test Pressure	Observations
$N6w_{serv}$	+1.63	1.20	+1.96	Pass
	+1.66	1.20	+2.00	Pass
$N4w_{serv}$ Corner	-1.23	1.2	-1.48	Pass
$N6w_{serv}$ General	-1.40	1.20	-1.68	Pass
	-1.53	1.20	-1.84	Pass
	-1.71	1.20	-2.05	Pass
	-2.01	1.20	-2.42	Pass

Table 3: Strength Limit State Test Pressures

Rating	ULS Design Action (kPa)	VBF	Test Pressure	Observations
N4w	+2.01	1.46	+2.80	Pass
N5w General	-2.53	1.46	-3.695	Pass
N4w Corner	-3.01	1.46	-4.395	Pass

Conclusion:

AS 4040.2-1992 (R2016) nominates that design pressures should be multiplied by the appropriate variability factor to determine the test pressures.

For deflection tests under Serviceability Limit State loads, AS1562.1-2018 table 5.1 note 1 - nominates that the coefficient of variation can be assumed as 5% unless there is evidence showing that a higher figure is warranted. For one sample being tested variability factor (VBF) is 1.20.

For Strength Limit State tests, AS/NZS 1170.0-2002 nominates that for one sample being tested, the variability factor (VBF) is 1.46.

Based on this factor, the Knotwood Shadowline 200 cladding passed the Serviceability Limit State & Strength Limit State test requirements of Australian Standard AS1562.1-2018 Design and installation of sheet roof and wall cladding by the methods of AS4040.2-1992 (R2016) Methods of testing sheet roof and wall cladding, Method 2: Resistance to wind pressures for non-cyclone regions up to the following ratings;

Housing ratings

Position on House	General	Corner
Rating	$N4_{wall}$	$N4_{wall}$

Non-Housing Ratings

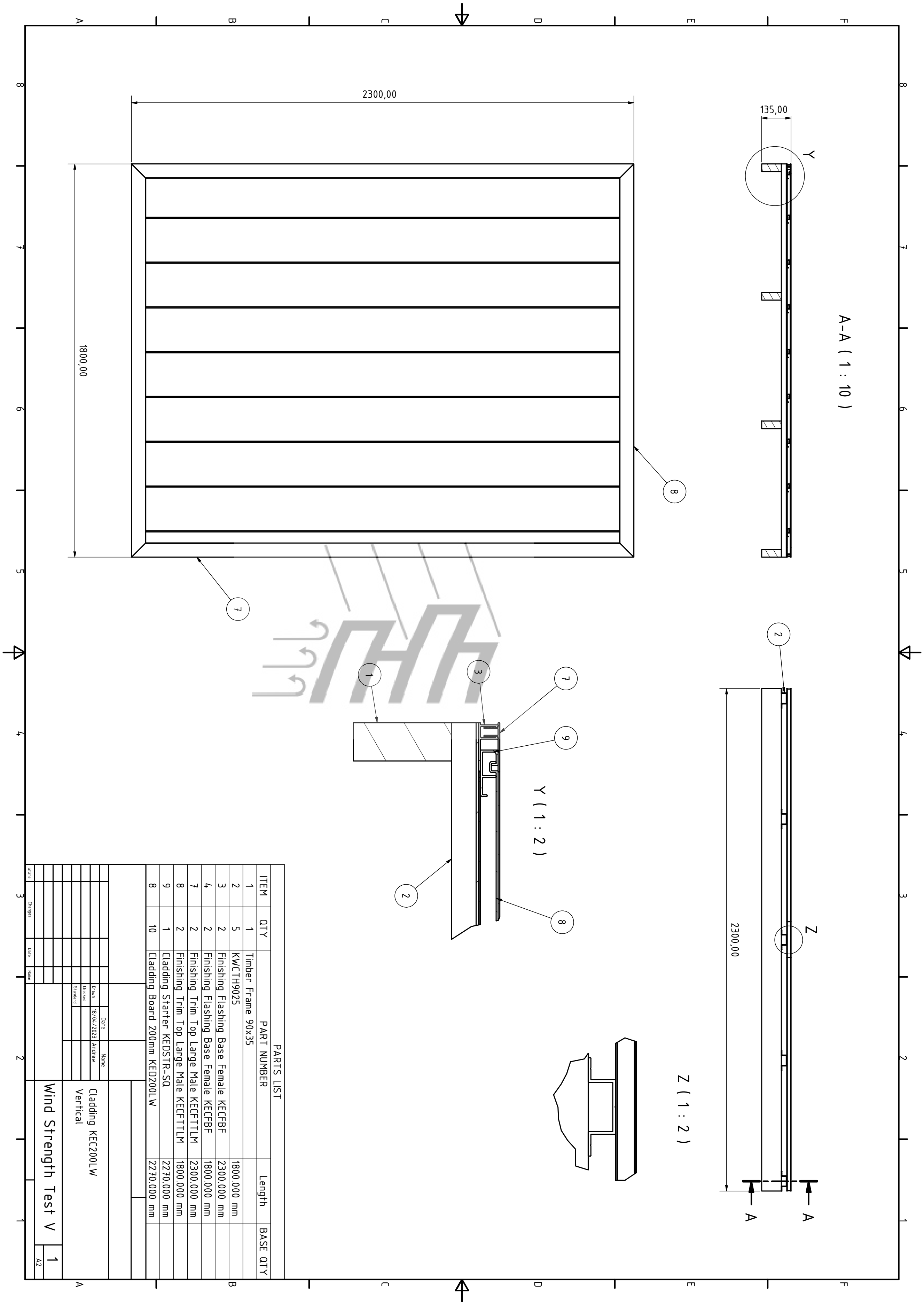
	Pressure (kPa)	
	Positive	Negative
Serviceability limit state	+1.66	-1.53
Ultimate limit state	+2.01	-3.01

Disclaimer:

Sample information, including material properties and detailing, was supplied by the client, and no verification of actual construction details or sampling of production stock could be performed. The test results contained herein apply to the sample as tested. Ian Bennie & Associates accepts no liability for claims of losses, expenses, damages, and costs arising as a result of the use of the product(s) referred to in this report.

		Written by	Checked by
Report distribution:			
Ian Bennie & Associates	PDF	James Maskiell 4th May 2023	Ian Bennie 4th May 2023
Knotwood Pty Ltd	PDF	Authorised Signatory	Authorised Signatory

Appendix A – Details of the test samples



PARTS LIST

ITEM	QTY	PART NUMBER	Length	BASE QTY
1	1	Timber Frame 90x35	1800.000 mm	
2	5	KWCTH9025		
3	2	Finishing Flashing Base Female KECFBF	2300.000 mm	
4	2	Finishing Flashing Base Female KECFBF	1800.000 mm	
7	2	Finishing Trim Top Large Male KECFTTLM	2300.000 mm	
8	2	Finishing Trim Top Large Male KECFTTLM	1800.000 mm	
9	1	Cladding Starter KEDSTR-SQ	2270.000 mm	
8	10	Cladding Board 200mm KED200LW	2270.000 mm	