

# TEST REPORT

## DC20557-001-1

**TESTING OF ACRYLIC POWAFLEX PLASTER SYSTEM OVER JAMES HARDIE AXON™ PANEL SMOOTH FIBRE CEMENT SHEET TO THE REQUIREMENTS OF BRANZ EVALUATION METHOD NO.4 (EM4).**

### CLIENT

Specialized Coatings Ltd  
George Street  
Auckland  
NZ

All tests and procedures reported herein, unless indicated, have been performed in accordance with BRANZ ISO9001:2015 Certification



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PAGE:

**1 of 12**

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## LIMITATION

The results reported here relate only to the item tested.

## TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the BRANZ Services Agreement for this work.

## SUMMARY

Passing results were obtained for the of Acrylic Powaflex plaster system over James Hardie Axon™ Panel Smooth fibre cement sheet.

EM4 Clause	Test	Requirement	Result
5.1.1	Water vapour transmission	> 34 g/m <sup>2</sup> /day (direct fix)	71.2 g/m <sup>2</sup> /day
5.1.2	Head of water	no moisture after 72 hours	Pass
5.1.3	Adhesion - unjointed	Failed in substrate or ≥ 250 kPa	*Pass (648.5 kPa)
5.1.3	Adhesion - Slip joint	Failed in substrate or ≥ 250 kPa	*Pass (744.6 kPa)
5.1.3	Adhesion - Rebate	Failed in substrate or ≥ 250 kPa	*Pass (348.1 kPa)
5.1.4	Joint strength - Slip joint	≥ 2 kN	13.0 kN
5.1.4	Joint strength - Rebate	≥ 2 kN	16.3 kN
5.2	Heat/rain	See clause 5.2	Pass
5.3.1	Coating condition	See clause 5.3.1	Pass
5.3.2	Head of water	no moisture after 72 hours	Pass
5.3.3	Adhesion - unjointed	≥ 80% of the controls	94% (610.4 kPa)
5.3.3	Adhesion – Slip joint	≥ 80% of the controls	88% (653.0 kPa)
5.3.3	Adhesion - rebate	≥ 80% of the controls	107% (371.0 kPa)
5.3.4	Joint strength - Slip joint	≥ 2 kN and ≥ 75% of the controls	98% ( 12.8 kN)
5.3.4	Joint strength - rebate	≥ 2 kN and ≥ 75% of the controls	88% (14.3 kN)
5.4	Coating condition	See clause 5.3.1	Pass
5.4	Head of water	no moisture after 72 hours	Pass
5.4	Adhesion - unjointed	Failed in substrate or ≥ 250 kPa	*Pass (470.6 kPa)
5.4	Adhesion - Slip joint	Failed in substrate or ≥ 250 kPa	Pass (Substrate)
5.4	Adhesion - rebate	Failed in substrate or ≥ 250 kPa	*Pass (447.5 kPa)

\*Failed in Substrate



REPORT NUMBER:

ISSUE DATE:

REVIEW DATE:

PAGE:

DC20557-001-1

2 December 2025

2 December 2030

2 of 12

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REPORT NUMBER:

**DC20557-001-1**

ISSUE DATE:

**2 December 2025**

REVIEW DATE:

**2 December 2030**

PAGE:

**3 of 12**

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# 1. SCOPE

To evaluate the physical properties of Acrylic Powaflex plaster system over James Hardie Axon™ Panel Smooth fibre cement sheet to the requirements of BRANZ Evaluation Method No.4 (EM4).

The client supplied a number of prepared test specimens as described in Section 3 of EM4 including a completed wall specimen for heat/rain testing. Specimens for joint testing (Clauses 3.3 & 3.4) were supplied using two joint systems, “Rebate” and “Slip Joint”.

All of the specimens were received in a single lot and were given the following BRANZ sample designation.

- 25/215 (received 21 May 2025)

# 2. METHOD

All test samples were said to be prepared in accordance with the Specialized installation instructions, the details are given in *Specialized Powerflex acrylic system on James Hardies Axon Panel smooth*, April 2025.

The general product assemblage is as follows.

- Axon™ Panel Smooth fibre cement sheet sealed with Dulux Acratex Acra Prime WB
- Joint Preparation as per Specialized documentation (note: the nominal tested rebate joint dimensions were 90 mm wide and 5 mm deep).
- Powaflex base coat with embedded hard mesh.
- Specialized Flexifloat acrylic texture.
- Dulux Acratex Acrashield top coat.

The properties of the of Acrylic Powaflex plaster system over James Hardie Axon™ Panel Smooth fibre cement sheet were tested in accordance with EM4. The test properties and specimen requirements along with corresponding methods are listed in Table 1. Where the EM4 method provides other test method options, the selected procedure has been clearly identified, see Table 1 below.



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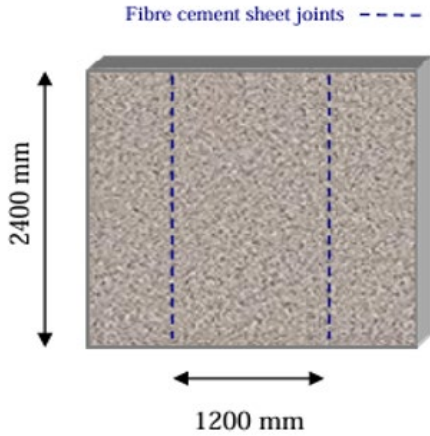
**2 December 2030**

PAGE:

**4 of 12**

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**Table 1. Test methods and clauses**

Test	Clause	Method
Water vapour transmission	5.1.1	ASTME96, wet cup.
Resistance to water penetration	5.1.2	AS/NZS 4548.5 as modified by EM4
Coating adhesion	5.1.3	Coating adhesion of the jointed and unjointed system was assed based on ASTM C297. A minimum of 5 samples were tested. Test rate was 1mm/min.
Joint tensile strength	5.1.4	Testing was conducted perpendicular to the joint across the full width of the specimens (nominally 300mm). Test rate was 1mm/min.
Heat rain exposure	5.2	<p>The test specimen was prepared in accordance with EM4 Clause 3.2, two joint types were incorporated into the test specimen. A pictorial representation is given below.</p> <div style="text-align: center;">  <p style="text-align: center;">Fibre cement sheet joints - - - -</p> <p style="text-align: center;">2400 mm</p> <p style="text-align: center;">1200 mm</p> </div> <p>Aging procedure followed the heat rain exposure method in AS/ZNS 2908.2 extended to 240 cycles.</p>
Temperature humidity cycling	5.3	<p>Test specimens were aged using the alternative cyclic aging method. This comprised of 30 cycles using the following steps.</p> <ul style="list-style-type: none"> <li>• 6 hours at 30 °C / 90 ± 5% RH</li> <li>• 6 hours at 60 °C / 75 ± 5% RH</li> <li>• 6 hours at 10 °C / 50 ± 5% RH</li> <li>• 6 hours at -10 °C, low RH</li> </ul>
Accelerated UV weathering	5.4	<p>Test specimens were aged in accordance ASTM G154 for a total of 3000 machine hours (2000 light hours). The Aging cycle consisted of the following,</p> <ul style="list-style-type: none"> <li>• 8 hours light with a set point irradiance of 0.68 W/m<sup>2</sup> at 340 nm and a black panel temperature of 60°C</li> <li>• 4 hours dark/condensation cycle with a black panel temperature of 50°C</li> </ul> <p>The Jointed samples were supported by an MDF backing during aging (that was removed for testing. The sample edges and backing were protected from moisture during the aging process.</p>

### 3. RESULTS

The acceptance criteria are given in Table 2 and the test results are given in Tables 3-14.

**Table 2. BRANZ EM4 Acceptance criteria.**

Selection	Test	Clause	Acceptance criteria
Conditioned Samples Clause 5.1	Water vapour transmission	5.1.1	For direct-fix installations the WVT value for the coated specimens shall be greater than 35 g/m <sup>2</sup> /24 hrs. There are no conditions of acceptance requirements for coatings used on cavity-based installations only
	Resistance to water penetration	5.1.2	No loss of head of water or visible signs of moisture on the underside face of the fibre cement sheets
	Coating adhesion	5.1.3	Cohesive failure of the fibre cement sheet or a minimum adhesive strength of 250 kPa.
	Joint tensile strength	5.1.4	A minimum peak tensile load of 2.0 kN
Heat rain exposure Clause 5.2	Water ingress	5.2	For direct fix installation there shall be no evidence of water ingress on the reverse side of the test panel.  For cavity installations evidence of minor water ingress is acceptable provided that the integrity of the joint has not been compromised
	Surface defects	5.2	Surface defect evaluation; <ul style="list-style-type: none"> <li>Degree of checking, rating scale ≤ 2</li> <li>Degree of cracking, rating scale ≤ 2</li> <li>Degree of blistering, density rating scale ≤ 1 and size S1</li> <li>Degree of flaking and peeling, quantity rating scale ≤ 2 and size ≤ 2</li> </ul>
Temperature humidity cycling Clause 5.3	Surface defects	5.3.1	Surface defect evaluation; <ul style="list-style-type: none"> <li>Degree of checking, rating scale ≤ 2</li> <li>Degree of cracking, rating scale ≤ 2</li> <li>Degree of blistering, density rating scale ≤ 1 and size S1</li> <li>Degree of flaking and peeling, quantity rating scale ≤ 2 and size ≤ 2</li> </ul>
	Resistance to water penetration	5.3.2	No loss of head of water or visible signs of moisture on the underside face of the fibre cement sheets
	Coating adhesion	5.3.3	Cohesive failure of the fibre cement sheet and the results shall not be less than 80% of the conditioned samples results.
	Joint tensile strength	5.3.4	A minimum peak tensile load of 2.0 kN and shall not be less than 75% of the conditioned sample results.
Accelerated UV Weathering Clause 5.4	Surface defects	5.3.1	Surface defect evaluation; <ul style="list-style-type: none"> <li>Degree of checking, rating scale ≤ 2</li> <li>Degree of cracking, rating scale ≤ 2</li> <li>Degree of blistering, density rating scale ≤ 1 and size S1</li> </ul> Degree of flaking and peeling, quantity rating scale ≤ 2 and size ≤ 2
	Resistance to water penetration	5.1.1	No loss of head of water or visible signs of moisture on the underside face of the fibre cement sheets
	Coating adhesion	5.1.3	Cohesive failure of the fibre cement sheet or a minimum adhesive strength of 250 kPa.

### 3.1 Conditioned Samples

Results for the Conditioned Samples (EM4 - Clause 5.1) are given in Tables 3-6. The tested conditioned sample meet all the performance criteria for EM4.

**Table 3. Water Vapour Transmission Rate**

Sample	WVIR (g/m2d)	Result
1	73.8	Pass (direct fix installations)
2	64.6	
3	75.3	
Mean	71.2	

**Table 4. Resistance to water penetration**

Resistance to water penetration			
Conditioning	Sample No	Observation	Result
Control	1	No loss of head or moisture penetration	Pass
	2	No loss of head or moisture penetration	
	3	No loss of head or moisture penetration	

**Table 5. Tensile adhesion of coating**

Tensile Adhesion Strength (50x50mm)			
Specimen No.	No Joint	Rebate Joint	Slip-lap Joint
	Tensile strength (kPa)	Tensile strength (kPa)	Tensile strength (kPa)
1	567.5	369.5	795.1
2	655.6	340.7	673.3
3	578.2	304.5	790.0
4	646.9	326.7	727.7
5	677.1	353.8	708.2
6	765.8	393.2	773.3
Average	648.5	348.1	744.6
Result	Pass	Pass	Pass

The failure mechanism for all tensile adhesion tests was cohesive failure of the substrate.

**Table 6. Tensile Strength of Joints**

Tensile Strength of Joints				
Specimen No.	Rebate Joint		Slip-lap Joint	
	Max Load (kN)	Elongation (mm)	Max Load (kN)	Elongation (mm)
1	15.0	4.48	12.7	3.61
2	16.5	3.70	13.3	3.21
3	16.0	3.11	13.8	3.19
4	17.0	3.49	12.7	3.36
5	17.0	3.64	12.5	3.07
Average	16.3	3.68	13.0	3.29
Result	Pass		Pass	

### 3.2 Large Scale Heat/Rain Exposure

The tested specimen meet the BRANZ EM4 acceptance criteria for the large-scale heat rain exposure for both direct fix and cavity installations. Neither joint system showed any performance variations.

**Table 6. Large Scale Heat/Rain Exposure Results**

Large Scale Heat/Rain Exposure Testing				
Visual Examinations	80 Cycles	240 Cycles		Performance criteria, EM4 Clause 5.2.1 & AS/NZS 1580.481.1
		Size	Density	
Checking	No defects observed	0	0	Size $\leq 2$ , Density $\leq 2$
Cracking		0	0	Size $\leq 2$ , Density $\leq 2$
Blistering		<1	0	Size S1, Density $\leq 1$
Flaking/peeling		0	0	Size $\leq 2$ , Density $\leq 2$
Water ingress on reverse side	None observed	None observed		Clause 5.2.1
Joint failure	None observed	None observed		Clause 5.2.1

Figure 1: Front of heat rain wall after 240 cycles –top.

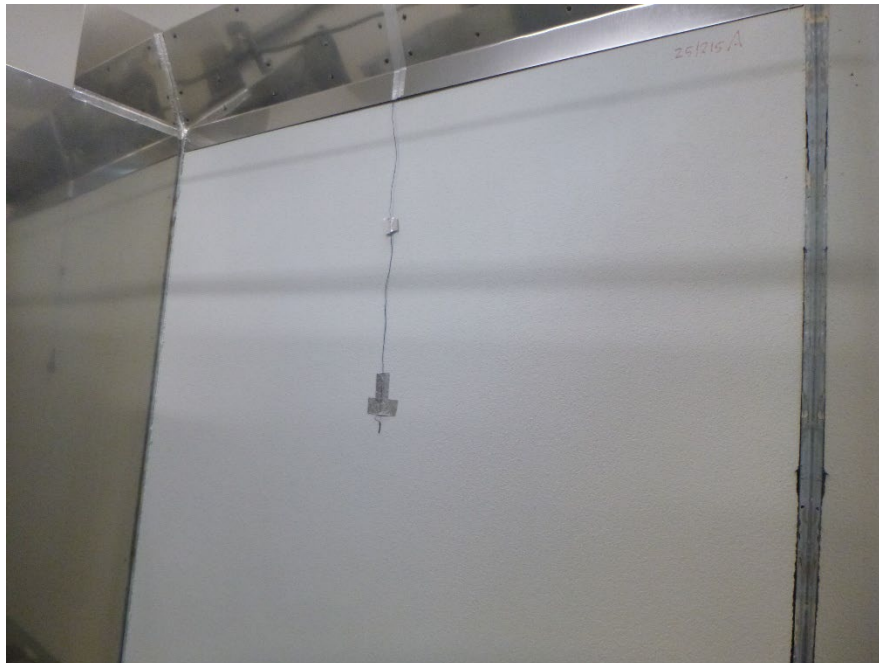


Figure 2: Front of heat rain wall after 240 cycles - bottom



Figure 3: Rear of heat rain wall after 240 cycles



### 3.3 Temperature & Humidity Cycling

**Table 7. Visual assessment of coating condition / Surface defects**

Visual assessment of coating condition - Temperature & Humidity Cycling				
Visual Examinations	Visual Assessment Ratings		Performance criteria, EM4 Clause 5.3.1 & AS/NZS 1580.481.1	Result
	Size	Density		
Checking	0	0	Size ≤2, Density ≤2	Pass
Cracking	0	0	Size ≤2, Density ≤2	
Blistering	<1	0	Size = S1, Density ≤1	
Flaking/peeling	0	0	Size ≤2, Density ≤2	

**Table 8. Resistance to water penetration (Static Head)**

Resistance to water penetration (Static Head) - Temperature & Humidity Cycling		
Sample No.	Observation	Result
4	No loss of head or moisture penetration	Pass
5	No loss of head or moisture penetration	
6	No loss of head or moisture penetration	

**Table 9. Tensile adhesion of coating**

Tensile Adhesion Strength (50x50mm) - Temperature & Humidity Cycling			
Specimen No.	No Joint	Rebate Joint	Slip-lap Joint
	Tensile strength (kPa)	Tensile strength (kPa)	Tensile strength (kPa)
1	649.7	351.6	664.7
2	676.4	376.2	739.2
3	636.0	318.9	705.1
4	518.8	302.5	579.0
5	642.9	434.6	615.8
6	538.8	442.1	614.5
Average	610.4	371.0	653.0
% Tensile retention of the conditioned samples	94%	107%	88%

**Table 10. Tensile Strength of Joints**

Tensile Strength of Joints - Temperature & Humidity Cycling				
Specimen No.	Rebate Joint		Slip-lap Joint	
	Max Load (kN)	Elongation (mm)	Max Load (kN)	Elongation (mm)
1	15.7	4.42	13.1	3.09
2	14.2	3.78	12.8	2.92
3	15.7	2.68	13.0	2.23
4	13.5	2.16	12.4	2.14
5	12.5	2.56	12.7	2.51
Average	14.3	3.12	12.8	2.58
% Tensile retention of the conditioned samples	88%	-	98%	-

### 3.4 Accelerated UV Weathering

**Table 11. Visual assessment of coating condition**

Visual assessment of coating condition – Accelerated UV Weathering				
Visual Examinations	Visual Assessment Ratings		Performance criteria, EM4 Clause 5.3.1 & AS/NZS 1580.481.1	Result
	Size	Density		
7 Checking*	1	1	Size ≤ 2, Density ≤ 2	Pass
8 Cracking	0	0	Size ≤ 2, Density ≤ 2	
9 Blistering	<1	0	Size = S1, Density ≤ 1	
10 Flaking/peeling	0	0	Size ≤ 2, Density ≤ 2	

\*very small occurrence of coating missing from prominent grains of sand encapsulated in the coating matrix.

**Table 12. Resistance to water penetration (Static Head)**

Resistance to water penetration (Static Head) – Accelerated UV Weathering		
Sample No.	Observation	Result
7	No loss of head or moisture penetration	Pass
8	No loss of head or moisture penetration	
9	No loss of head or moisture penetration	

**Table 13. Tensile adhesion of coating**

Tensile Adhesion Strength (50x50mm) - Accelerated UVWeathering			
Specimen No.	No Joint	Rebate Joint	Slip-lap Joint
	Tensile strength (kPa)	Tensile strength (kPa)	Tensile strength (kPa)
1	622.7	254.3	439.7
2	612.3	213.5	492.8
3	473.9	180.5	476.4
4	446.7	234.4	379.4
5	458.2	264.2	441.7
6	472.0	254.9	454.8
7	412.8	-	-
8	468.5	-	-
9	463.8	-	-
10	440.4	-	-
11	429.2	-	-
12	346.2	-	-
Average	470.6	233.6	447.5

## 4. REFERENCES

BRANZ Evaluation Method No.4 (EM4) - June 2005.

AS/NZS 1580.481.1:1998 Paints and Related Materials – Methods of Test – Coatings – Exposed to weathering.

AS/NZS 2908.2:2000 Cellulose-cement products Part 2: Flat sheets.

ASTM G154-23 Standard Practice for Operating Fluorescent Light Apparatus for Non-metallic Materials.



REPORT NUMBER:

ISSUE DATE:

REVIEW DATE:

PAGE:

**DC20557-001-1**

**2 December 2025**

**2 December 2030**

**12 of 12**

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