



TEST REPORT

DC17616-01

TESTING TO A MODIFIED VERSION OF EOTA TRO04 – DETERMINATION OF THE RESISTANCE TO DELAMINATION (WIND UPLIFT)

CLIENT

Ardex New Zealand Limited
32 Lane Street
Woolston
Christchurch

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



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LIMITATION

The results reported here relate only to the item/s 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.



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1. OBJECTIVE

To carry out a wind uplift/adhesion testing on three Ardex membranes bonded to two different substrates before and after cyclic aging. Testing was completed to a modified version of EOTA TR004 – Determination of the resistance to delamination.

2. DESCRIPTION OF MATERIAL TESTED

The client provided four sample types for testing and the sample description as stated by the client are given below (Table 1). Each sample was given a BRANZ sample designation.

Table 1. Sample numbers.

BRANZ sample No.	Sample description
23/272 A	Butynol – Fibre cement
23/272 B	Butynol – Ply
23/273 A	WPM715 Weldtec – Fibre cement
23/273 B	WPM715 Weldtec – Ply
23/274 A	TPO – Fibre cement
23/274 B	TPO – Ply

3. DESCRIPTION OF TEST PROCEDURE

The as received samples were conditioned for 7 days under standard laboratory conditions (23 °C and 50% RH) prior to aging (and testing for the control samples). The aged specimens were subjected to the following temperature and humidity cycle for a total of 30 cycles.

- 6 hours at 30°C / 90 ± 5% RH;
- 6 hours at 70°C / 75 ± 5% RH;
- 6 hours at 10°C / 50 ± 5% RH; and
- 6 hours at -10°C / low RH

The samples were cut into 100 mm x 100 mm test specimens. Aluminium mounting dollies (100 mm x 100 mm) were glued (using a 2-part epoxy) to the top and bottom faces of the test specimens and allowed to cure for minimum of 24 hours. The specimens were tested using an Instron 5569 load frame and 10kN load cell, at an extension rate of 10 mm/min. Six specimens of each type were tested to determine the failure mechanism of each specimen and the resistance to delamination.



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4. RESULTS

The test results are given in Tables 2-13 and evidence of the failure mechanisms for the control samples can be found in Figures 1-6. Please note, no image was recorded for 23/273 (A) control specimens.

Table 2. 23/272 (A) control results.

23/272 (A) Fibre cement control samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	1722	170	Cohesive failure fibre cement
2	2209	218	Cohesive failure fibre cement
3	1575	154	Cohesive failure fibre cement
4	2195	217	Cohesive failure fibre cement
5	2111	207	Cohesive failure fibre cement
6	2091	206	Cohesive failure fibre cement
Average	1984	195	

Table 3. 23/272 (A) aged results.

23/272 (A) Fibre cement aged samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	2620	258	Cohesive failure fibre cement
2	2636	261	Cohesive failure fibre cement
3	2337	228	Cohesive failure fibre cement
4	1893	187	Cohesive failure fibre cement
5	2604	255	Cohesive failure fibre cement
6	1717	168	Cohesive failure fibre cement
Average	2301	226	

Table 4. 23/272 (B) control results.

23/272 (B) Ply control samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	2805	280	Cohesive failure Ply
2	2314	230	Cohesive failure Ply
3	2223	222	Cohesive failure Ply
4	1453	145	Cohesive failure Ply
5	2041	204	Cohesive failure Ply
6	1254	125	Adhesive failure Ply/Membrane
Average	2015	201	



Table 5. 23/272 (B) aged results.

23/272 (B) Ply aged samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	1406	139	Adhesive Failure Ply/Membrane
2	1766	176	Adhesive Failure Ply/Membrane
3	1999	198	Cohesive Failure Ply
4	1190	119	Adhesive Failure Ply/Membrane
5	1492	148	Adhesive Failure Ply/Membrane
6	1574	157	Adhesive Failure Ply/Membrane
Average	1571	156	

Table 6. 23/273 (A) control results.

23/273 (A) Fibre cement control samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	1603	158	Adhesive failure Fibre Cement/Membrane
2	1625	160	Adhesive failure Fibre Cement/Membrane
3	1084	106	Adhesive failure Fibre Cement/Membrane
4	1069	105	Adhesive failure Fibre Cement/Membrane
5	1432	141	Adhesive failure Fibre Cement/Membrane
6	1246	123	Adhesive failure Fibre Cement/Membrane
Average	1343	132	

Table 7. 23/273 (A) aged results.

23/273 (A) Fibre cement aged samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	3579	351	Cohesive failure fibre cement
2	2601	257	Cohesive failure fibre cement
3	3546	344	Cohesive failure fibre cement
4	2346	230	Cohesive failure fibre cement
5	3938	384	Cohesive failure fibre cement
6	3603	354	Cohesive failure fibre cement
Average	3269	320	



Table 8. 23/273 (B) control results.

23/273 (B) Ply control samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	2847	284	Adhesive failure Ply/Membrane
2	2278	227	Adhesive failure Ply/Membrane
3	2716	271	Adhesive failure Ply/Membrane
4	2530	252	Adhesive failure Ply/Membrane
5	2173	217	Adhesive failure Ply/Membrane
6	2227	222	Adhesive failure Ply/Membrane
Average	2462	246	

Table 9. 23/273 (B) aged results.

23/273 (B) Ply aged samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	4822	478	Cohesive failure Ply
2	3389	338	Cohesive failure Ply
3	3664	365	Cohesive failure Ply
4	5281	525	Cohesive failure Ply
5	4025	401	Cohesive failure Ply
6	2851	284	Cohesive failure Ply
Average	4005	399	

Table 10. 23/274 (A) control results.

23/274 (A) Fibre cement control samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	2041	200	Cohesive failure fibre cement
2	2547	251	Cohesive failure fibre cement
3	2220	218	Cohesive failure fibre cement
4	2306	228	Adhesive failure fibre cement/membrane
5	2048	201	Cohesive failure fibre cement
Average	2233	219	



Table 11. 23/274 (A) aged results.

23/274 (A) Fibre cement aged samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	2749	270	Cohesive failure fibre cement
2	2492	244	Cohesive failure fibre cement
3	1254	123	Cohesive failure fibre cement
4	2054	202	Cohesive failure fibre cement
5	1002	99	Cohesive failure fibre cement
6*	455	45	Adhesive failure membrane/dolly
Average	1910	188	

*Not included in the calculations.

Table 12. 23/274 (B) control results.

23/274 (B) Ply control samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	2512	250	Adhesive failure ply/membrane
2	2983	297	Adhesive failure ply/membrane
3	2628	262	Adhesive failure ply/membrane
4	2981	297	Adhesive failure ply/membrane
5	2385	238	Adhesive failure ply/membrane
6	2249	224	Adhesive failure ply/membrane
Average	2623	261	

Table 13. 23/274 (B) aged results.

23/274 (B) Ply aged samples			
Sample No.	Peak force (N)	Resistance to delamination (kPa)	Failure mechanism
1	2954	296	Adhesive failure Ply/Membrane
2	2728	272	Adhesive failure Ply/Membrane
3	2048	203	Cohesive failure Ply
4	3119	311	Cohesive failure Ply
5	2828	281	Adhesive failure Ply/Membrane
6	1460	145	Cohesive failure Ply
Average	2523	251	

Figure 1. 23/272 (A) control samples

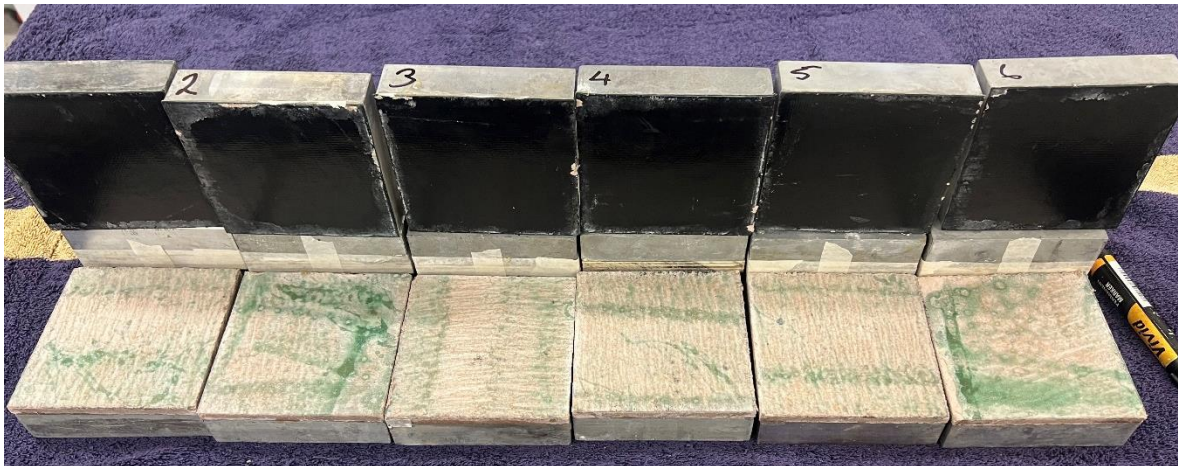


Figure 2. 23/272 (B) control samples

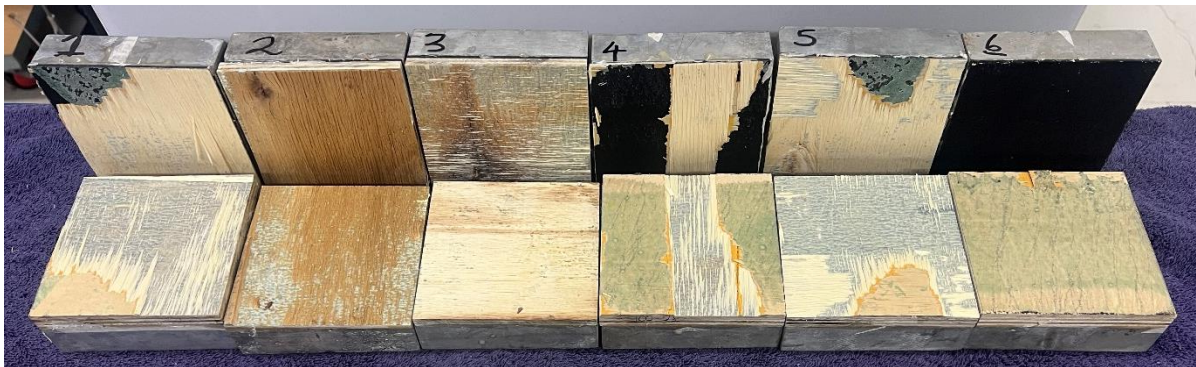


Figure 3. 23/273 (B) control samples

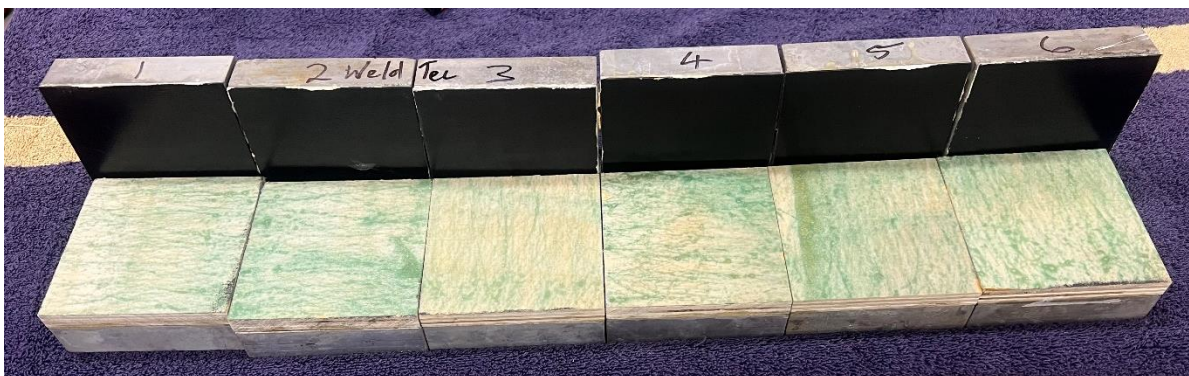


Figure 4. 23/274 (A) control samples

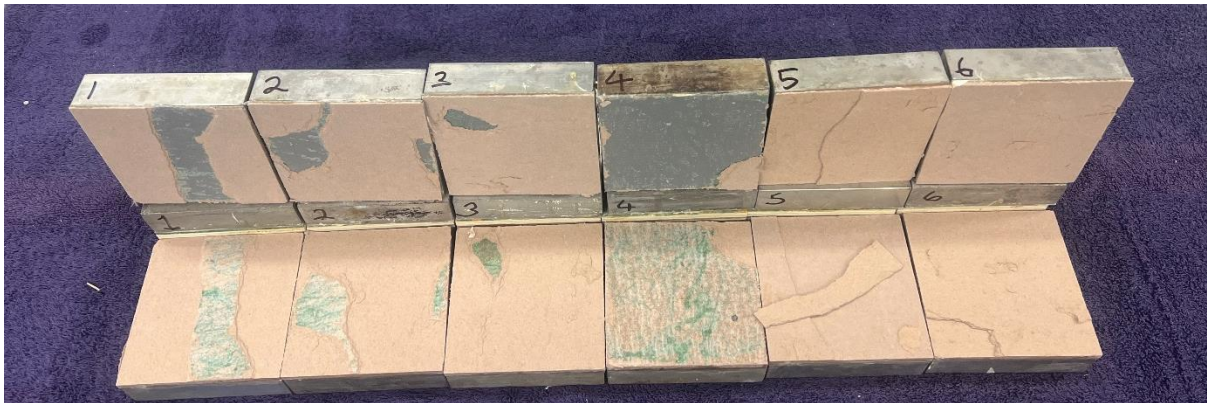
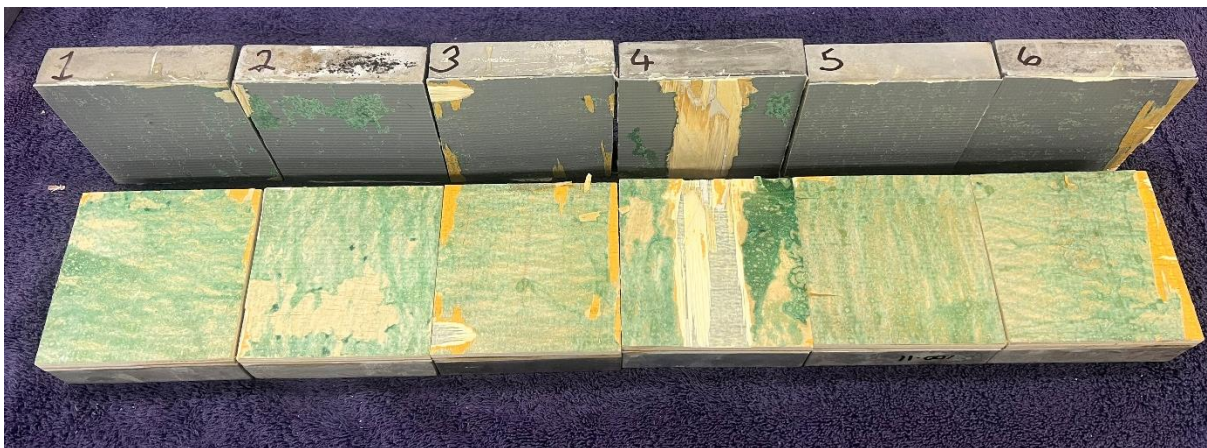


Figure 5. 23/274 (B) control samples



5. REFERENCE

EOTA, Technical Report 004 revised Determination of the resistance to delamination, May 2004.