MAHAFFEY ASSOCIATES PTY LTD
Unit 9/108-110 Percival Rd (PO Box 2162) Smithfield NSW 2164
Ph: (02) 9756 4003 Email: admin@mahaffey.com.au
ABN: 90 001 629 036

Client:	Brickworks
Job Number:	11464
Test Type:	Determination of Impact Resistance of Panels
Test Method:	Based on EOTA Technical report TR 001 Edition Feb. 2003
Product Name:	Terraçade TN smooth
Product Size:	Tiles 588 mm x 308.5 mm x 14 mm
Material:	Fired Clay
Manufacture Date:	Not Advised
Sampled by:	Client
Sample Date:	7/12/2022
Received Date:	8/12/2022
Test Date:	8/12/2022

Methodology

1- Soft Body Impact Test:

The Client supplied timber frames constructed from 90 mm x 45 mm MGP 10 onto which metal rails were screwed. The rails then supported the Terraçade tiles. The frames supported 3 Terraçade units high by 3 wide, and was therefore approximately 900 mm tall by 1800 mm wide.

The tests were conducted in the laboratory, using a steel column in the lab as the main support for the set up. The timber frame was clamped against the column with a 25 x 50 mm tube acting to space the frame away from the column. The test set-up can be seen in Photograph 1. The leather impact bag had a diameter of 450 mm. The bag was filled with sand that complies with the criteria of CEN Standard Sand as in EN 196-1, to obtain the desired total mass of 50 kg.

The impact bag was hung so as to cause the bag to impact the specimen at the mid-height of the test panel.

The impact bag was pulled back (i.e. away from the test panel) until it had risen a certain vertical distance. That distance is given in the tables below as "Height Rise/Drop". Due to the need to have the impact bag hit the mid-height of the panel under test, that Height Rise/Drop resulted in the bag needing to be pulled back until it was a certain "Height Above Floor". That was done, and then at an appropriate time, the bag was released, and impacted the panel. This was done at the lateral mid-point of the panel and also towards one end of the test panel, near the conjunction of two horizontally adjacent tiles.

A calibrated steel rule was set up perpendicular to the plane of the test panel, behind the specimen to determine how far the panel deflected under impact. It was lightly weighted down as required to prevent over-travel, but not significantly affect the travel of the panel.

The impact bag was incrementally raised to different heights shown in the results table. That corresponded to the various required impact energy levels.

Test Results

1- Soft Body Impact Test

A- End Loading

Soft Body (kg) ***50***

Energy (J)	*Height Rise/ Drop (m)*	*Height Above Floor (m)*	*Deflection (mm)*			*Damage*	*Safety Criteria*	*Serviceability Criteria*
			1st Test	2nd Test	3rd Test			
60	0.12	0.75	3	2	2	No Damage	No Collapse No Penetration No Projection	No Penetration No Degradation
100	0.20	0.83	3	4	3	No Damage		
120	0.24	0.87	4	4	-	Tile broke at 2nd test	No Collapse No Penetration No Projection (First Test)	Fail
130	0.27	0.90	4	-	-	Tile broke at 1st test	Fail	Fail

NOTE: The Safety and Serviceability criteria are as given in the EOTA Technical report TR 001

1- Soft Body Impact Test

B- Centre Loading

Soft Body (kg) ***50***

Energy (J)	*Height Rise/ Drop (m)*	*Height Above Floor (m)*	*Deflection (mm)*			*Damage*	*Safety Criteria*	*Serviceability Criteria*
			1st Test	2nd Test	3rd Test			
60	0.12	0.75	3	2	3	No Damage	No Collapse No Penetration No Projection	No Penetration No Degradation
100	0.20	0.83	49	71	-	3 tiles broke at 1st test 3 tiles broke at 2nd test	Fail	Fail

NOTE: The Safety and Serviceability criteria are as given in the EOTA Technical report TR 001

2- Hard Body Impact Test:

Methodology:

Two steel ball bearings of 0.5 & 1 kg mass respectively were used to simulate the hard body, each ball was dropped from different heights individually on the panel that to create the required impact energy on the panel. Damages were noted in the results below.

Test Results

Hard Body Impact Test:

A- Edge Near Centre Loading

Hard Body (kg) ***0.5***

Energy (J)	*Height Rise (m)*	*Damage at Centre*			*Damage at Edge*			*Safety Criteria*	*Serviceability Criteria*
		Test 1	*Test 2*	*Test 3*	*Test 1*	*Test 2*	*Test 3*		
1.30	0.27	Indent	collapse	-	-	-	-	No Collapse No Penetration No Projection (First Test)	Fail

NOTE: The Safety and Serviceability criteria are as given in the EOTA Technical report TR 001

B- Corner Loading

Hard Body (kg) ***0.5***

Energy (J)	*Height Rise (m)*	*Damage at Centre*			*Damage at Edge*			*Safety Criteria*	*Serviceability Criteria*
		Test 1	*Test 2*	*Test 3*	*Test 1*	*Test 2*	*Test 3*		
1.30	0.27	collapse	-	-	-	-	-	Fail	Fail

NOTE: The Safety and Serviceability criteria are as given in the EOTA Technical report TR 001

C- Centre Loading

Hard Body (kg) ***0.5***

Energy (J)	*Height Rise (m)*	*Damage at Centre*			*Damage at Edge*			*Safety Criteria*	*Serviceability Criteria*
		Test 1	*Test 2*	*Test 3*	*Test 1*	*Test 2*	*Test 3*		
1.30	0.27	No Damage	No Damage	No Damage	No Damage	No Damage	No Damage	No Collapse No Penetration No Projection	No Penetration No Degradation
2.50	0.51	Broke	Broke	-	No Damage	Broke	-	Fail	Fail
3.75	0.76	-	-	-	Broke (cracked)	-	-	Fail	Fail
6.00	1.22	-	-	-	Broke (cracked)	-	-	Fail	Fail

NOTE: The Safety and Serviceability criteria are as given in the EOTA Technical report TR 001

Hard Body (kg) ***1***

Energy (J)	*Height Rise (m)*	*Damage at Centre*			*Damage at Edge*			*Safety Criteria*	*Serviceability Criteria*
		Test 1	*Test 2*	*Test 3*	*Test 1*	*Test 2*	*Test 3*		
3.0	0.31	Broke	-	-	Broke (Cracked)	-	-	Fail	Fail
10.0	1.02	-	-	-	Broke (penetration)	-	-	Fail	Fail

NOTE: The Safety and Serviceability criteria are as given in the EOTA Technical report TR 001

Limitations of this Report:
This report relates solely to items of exactly the same design, dimensions, manufacturing technique etc to the items submitted for testing

This report relies on data and other information provided by the client. Errors and omissions in that are solely the responsibility of the client

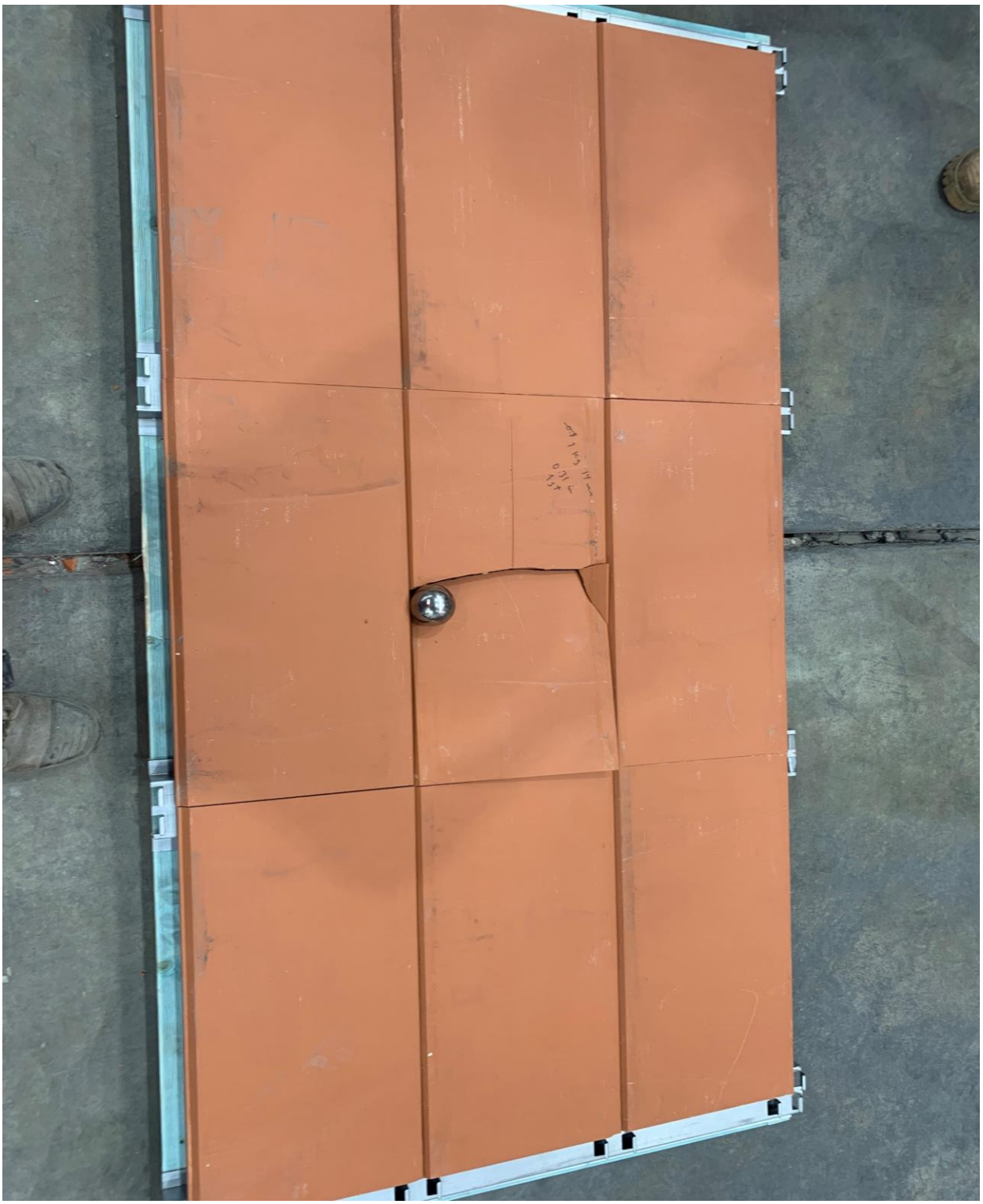
Any alterations to the design or construction etc of any part of items similar to those tested will immediately imply that this report does not relate to the new system

Assessment of the properties of the materials from which the system or components thereof was made is outside the scope of this work, and has not been carried out

David Wilmshurst
Technical Manager
Approved Signatory
Issue Date: 27/03/2023

PHOTOGRAPH 1 - Soft Impact test setup

PHOTOGRAPH 2 - Soft Body Impact Test - Deflection Measurement - Note the steel rule



PHOTOGRAPH 3 - Hard Body Impact Test - Typical Panel after test