

0267-C-17/1
3 October 2017

Test report

Magply MG-Fibreboard



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the building envelope**

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0267-C-17/1

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Magply MG-Fibreboard

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17-C-0129; Black Mountain Insulation Ltd.

Date of order

22 August 2017

Project number

0267-C-17/1

Author

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Subject

determination of product characteristics

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Contents

	Contents	1
1	Introduction	2
2	Investigation	3
3	Test methods and results	4
3.1	Squareness	4
3.2	Dimensional stability under specified temperature and humidity conditions	5
3.3	Soft body impact resistance	6
3.4	Hard body impact resistance	7
3.5	Walkability	7
3.6	Axial loading test	8
I	Delivery Note and photos of the delivered samples	
II	Investigation	

1 Introduction

By order of Kiwa BDA Expert Centre Building Envelope, Kiwa BDA Testing B.V. has determined a number of product characteristics with several thicknesses of the flat sheet (board) **Magply MG-Fibreboard**.

On 10 July 2017 the required samples, provided by Mr D. Pirret of IPP Ltd, have been received at Kiwa BDA Testing B.V. for the purpose of testing.

On the samples the following data were found.

Description

- Product : Magply MG-Fibreboard
- Manufacturer : IPP Ltd.
- Production date/code :

20 mm – 2,4 × 1,2	Magply	2016051920
12 mm – 2,4 × 1,2	Magply	20161112012
9 mm – 2,4 × 1,2	Magply	017408009
6 mm – 2,4 × 1,2	Magply	-
3 mm – 2,4 × 1,2	Magply	? 2803 ?

See annex I for the Delivery Note and photos of the delivered samples.

2 Investigation

The investigation has been performed in coherence with the stipulations mentioned in:

- EN 12467:2016 – Fibre-cement flat sheets – Product specification and test methods.
- European directive ETAG 006:2000/Amended:2012 – Guideline for the European Technical Approval of systems of mechanically fastened flexible roof waterproofing membranes.
- European directive ETAG 016:2004 – Guideline for European Technical Approval of self-supporting composite lightweight panels, Part 4 – Specific aspects relating to self-supporting composite lightweight panels for use in internal walls and ceilings.

The investigation has been performed in the period from week 34 up to and including week 37, 2017.

3 Test methods and results

3.1 Squareness

The squareness of the fibre boards has been determined according to EN 824:2013 – Thermal insulating products for building applications – Determination of squareness.

The dimensions of test specimens have been 2400 mm × 1200 mm (full size product).

Table 1 – Squareness, thickness 3 mm

Test specimen	Thickness [mm]	Deviation from squareness					Max. [mm.m ⁻¹]
		thickness (S _d) [mm]	length (S _b) [mm.m ⁻¹]		width (S _b) [mm.m ⁻¹]		
			side 1	side 2	side 1	side 2	
1	3	0,0	+ 1,3	+ 1,2	0,0	- 1,7	1,7
2	3	0,0	+ 1,5	+ 0,7	0,0	- 1,7	1,7
3	3	0,0	+ 1,7	+ 0,5	- 1,9	- 1,8	1,9

Table 2 – Squareness, thickness 6 mm

Test specimen	Thickness [mm]	Deviation from squareness					Max. [mm.m ⁻¹]
		thickness (S _d) [mm]	length (S _b) [mm.m ⁻¹]		width (S _b) [mm.m ⁻¹]		
			side 1	side 2	side 1	side 2	
1	6	0,0	+ 1,8	+ 1,0	0,0	- 2,2	2,2
2	6	0,0	+ 1,8	+ 0,3	0,0	- 2,5	2,5
3	6	0,0	- 2,8	0,0	+ 0,8	+ 0,4	2,8

Table 3 – Squareness, thickness 9 mm

Test specimen	Thickness [mm]	Deviation from squareness					Max. [mm.m ⁻¹]
		thickness (S _d) [mm]	length (S _b) [mm.m ⁻¹]		width (S _b) [mm.m ⁻¹]		
			side 1	side 2	side 1	side 2	
1	9	0,0	+ 1,0	+ 1,3	- 1,8	+ 0,9	1,8
2	9	0,0	+ 1,0	+ 1,9	- 1,1	+ 0,9	1,9
3	9	0,0	+ 0,8	+ 1,4	- 1,2	+ 0,8	1,4

Table 4 – Squareness, thickness 12 mm

Test specimen	Thickness [mm]	Deviation from squareness					Max. [mm.m ⁻¹]
		thickness (S _d) [mm]	length (S _b) [mm.m ⁻¹]		width (S _b) [mm.m ⁻¹]		
			side 1	side 2	side 1	side 2	
1	12	0,0	+ 1,0	+ 1,7	0,0	+ 1,2	1,7
2	12	0,0	+ 1,3	0,0	+ 0,8	0,0	1,3
3	12	0,0	0,0	0,0	+ 0,8	+ 0,9	0,9

Table 5 – Squareness, thickness 20 mm

Test specimen	Thickness [mm]	Deviation from squareness					Max. [mm.m ⁻¹]
		thickness (S _d) [mm]	length (S _b) [mm.m ⁻¹]		width (S _b) [mm.m ⁻¹]		
			side 1	side 2	side 1	side 2	
1	20	0,0	+ 0,8	+ 0,5	0,0	+ 1,3	1,3
2	20	0,0	+ 0,9	+ 0,8	0,0	+ 2,2	2,2
3	20	0,0	+ 0,9	+ 0,6	0,0	+ 2,0	2,0

3.2 Dimensional stability under specified temperature and humidity conditions

The dimensional stability has been determined according to EN 1604:2013 – Thermal insulating products for building applications – Determination of dimensional stability under specified temperature and humidity conditions.

In a time period of two weeks the test specimens have been conditioned to dimensional equilibrium with an atmosphere at 23 °C and 50% relative humidity.

The dimensions of the test specimens have been set at 200 mm × 200 mm.

By request of the principal the test conditions have been set at 48 hours at 70 °C and 90% relative humidity.

Table 6 – Dimensional stability, 3 mm board

Test specimen	Dimensional change		
	length [% (L/L)]	width [% (L/L)]	thickness [% (L/L)]
1	- 0,05	- 0,06	- 0,52
2	- 0,03	- 0,01	+ 0,45
3	- 0,03	- 0,03	- 3,91
Mean	0,0	0,0	- 1,3
Root mean square	0,0	0,0	1,6

Table 7 – Dimensional stability, 6 mm board

Test specimen	Dimensional change		
	length [% (L/L)]	width [% (L/L)]	thickness [% (L/L)]
1	+ 0,03	+ 0,02	+ 0,10
2	+ 0,02	0,00	+ 1,36
3	+ 0,02	+ 0,01	+ 0,61
Mean	0,0	0,0	+ 0,7

Table 8 – Dimensional stability, 9 mm board

Test specimen	Dimensional change		
	length [% (L/L)]	width [% (L/L)]	thickness [% (L/L)]
1	+ 0,04	+ 0,04	- 0,49
2	+ 0,01	+ 0,03	+ 0,75
3	+ 0,01	+ 0,04	- 0,13
Mean	0,0	0,0	0,0
Root mean square	0,0	0,0	0,5

Table 9 – Dimensional stability, 12 mm board

Test specimen	Dimensional change		
	length [% (L/L)]	width [% (L/L)]	thickness [% (L/L)]
1	+ 0,10	+ 0,21	+ 0,57
2	+ 0,16	+ 0,13	+ 0,68
3	+ 0,08	+ 0,13	+ 0,89
Mean	+ 0,1	+ 0,2	+ 0,7

Table 10 – Dimensional stability, 20 mm board

Test specimen	Dimensional change		
	length [% (L/L)]	width [% (L/L)]	thickness [% (L/L)]
1	+ 0,09	- 0,05	- 0,13
2	+ 0,07	+ 0,10	+ 0,29
3	- 0,09	- 0,11	+ 0,30
Mean	0,0	0,0	0,2
Root mean square	0,1	0,1	0,2

3.3 Soft body impact resistance

The determination of soft body impact resistance has been performed according to EOTA Technical report TR 001:2003 – Determination of impact resistance of panels and panel assemblies, § 2 – Test method for determining soft body impact resistance.

The soft body impactor used has been a spherical canvas bag of diameter 400 mm, filled with 3,0 mm diameter glass spheres to give a total weight of 50 kg.
The test specimen has been loaded for ‘Safety in use’ assessment following TR 001, § 2.3.2 – Serviceability impact resistance.

The boards, thickness 9 mm, have been installed on a 140 mm × 44 mm stud partition wall with studs 600 mm centres and no vertical noggins.
The height has been 2400 mm, screwed with standard drywall screws at 150 mm centres.

The test, including the conditioning of the test specimens, has been performed at (23 ± 5) °C.

Table 11 – Results for safety in use, thickness 9 mm

Damage	Total impact energy	
	200 Nm	300 Nm
Collapse	no	no
Penetration	no	no
Projection	no	yes

See also photo 1, 2, 3 and 4 in annex II.

3.4 Hard body impact resistance

The determination of hard body impact resistance has been performed according to EOTA Technical report TR 001:2003 – Determination of impact resistance of panels and panel assemblies, § 3 – Test methods for determining hard body impact resistance.

The test specimen has been loaded for ‘Safety in use’ assessment following TR 001, § 3.3.2 – Safety in use impact resistance.

The hard body impactor used has been a steel ball, with a diameter of 63,5 mm, with a mass of 1030 g (1,0 kg steel ball).

The boards have been installed on a support of wooden beams with a free span of 600 mm. The applied total impact energy has been 10,0 Nm.

The test, including the conditioning of the test specimens, has been performed at (23 ± 5) °C.

Table 12 – Results for safety in use

Damage	Thickness of the board	
	9 mm	12 mm
Collapse	no	no
Penetration	no	no
Projection	no	no

See also photo 5 and 6 in annex II.

3.5 Walkability

The determination of the safety in use of panels with respect to a single person walking has been performed according to ETAG 016-4, § C.3 – Walkability.

The test has been carried out on simply supported single span boards of full width, with a thickness of 12 mm and a thickness of 20 mm.

The span has been 600 mm for both thicknesses.

The load has been applied through a timber block measuring 100 mm × 100 mm. In order to avoid local stresses, a 10 mm thick layer of rubber or felt has been placed between the timber block and the top skin.

A load of 1200 N has been applied at mid-span on the edge of a flat board.

The test, including the conditioning of the test specimens, has been performed at (23 ± 5) °C.

Table 13 – Results 12 mm board

Test specification	Results
Panel thickness: 12 mm	sagging: 30 mm
Span: 600 mm	small crack in the board

Table 14 – Results 20 mm board

Test specification	Results
Panel thickness: 20 mm	sagging: 5 mm
Span: 600 mm	no brakage of the board

See also photo 7 in annex II.

3.6 Axial loading test

The determination of the axial failure of a fastener under static loading, irrespective of the failure mode, has been performed according to ETAG 006:2000/Amended:2012, annex D.2.1: Axial loading test.

The following screw type has been investigated in combination with a substrate of Magply MG-Fibreboards.

System 267 A

Easy Drive Drywall Screw 3,5 × 45 mm
Magply MG-Fibreboard 9 mm

System 267 B

Easy Drive Drywall Screw 3,5 × 45 mm
Magply MG-Fibreboard 12 mm

Table 15 – Axial loading test

Test specimen	Axial load [N]	
	267 A (9 mm)	267 B (12 mm)
1	1501	1468
2	1159	1528
3	1350	1638
4	1338	1516
5	1386	1637
6	1389	1815
7	1474	1717
8	1383	1695
9	1522	1834
10	1424	1780
Mean value (m)	1393	1663
Standard deviation s ($\sigma_{(n-1)}$)	103	129
5%-fractile ($k_n = 1,92$ [N])	1195	1415
Failure mode	pull through	pull through

$$5\% - \text{fractile} = m - (k_n \times s)$$

Wherein:

m is the mean value;

k_n is a factor that belongs to a one-sided 5% probability of falling below;

s is the standard deviation.

See also photo 8, 9 and 10 in annex II.

Remarks:

The results are only related to the investigated samples, products and/or systems. Kiwa BDA Testing B.V. is not liable for interpretations or conclusions that are made in consequence of the results obtained.

The uncertainty of measurement can be retrieved at Kiwa BDA Testing B.V.

If sampling was not performed by Kiwa BDA Testing B.V., no judgement can be given with regard to the origin and representativeness of the samples.

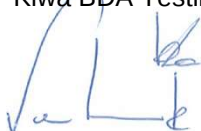
Gorinchem, 3 October 2017

The laboratory



K. van Zee
manager

Kiwa BDA Testing B.V.



C.W. van der Meijden MSc
technical director

I Delivery Note and photos of the delivered samples

Delivery Note No. Sample

From

IPP Ltd
Bradwell Hall
Bradwell on Sea
Essex
CM0 7HX

Tel: 01621 776252

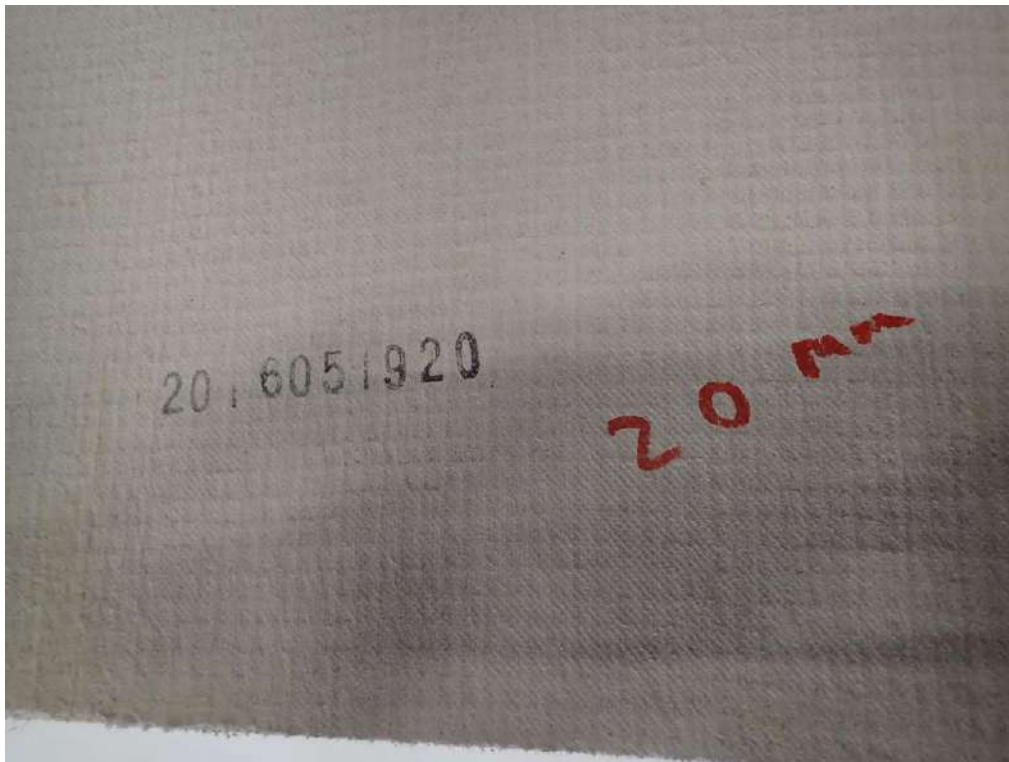


Customer Order: Sample	Date: 05/07/2017
Delivery Address: Kiwa BDS testing B.V Avelingen West 37 4202 MS Gorinchem The Netherlands	
Special Instructions Tel. (31) 653766169.	
Product	Quantity
20mm 2.4 x 1.2 Magply	5
12mm 1.2 x 2.4 Magply	12
9mm 1.2 x 2.4 Magply	12
6mm 1.2 x 2.4 Magply	4
3mm 1.2 x 2.4 Magply	4
Name	
Signature	Date

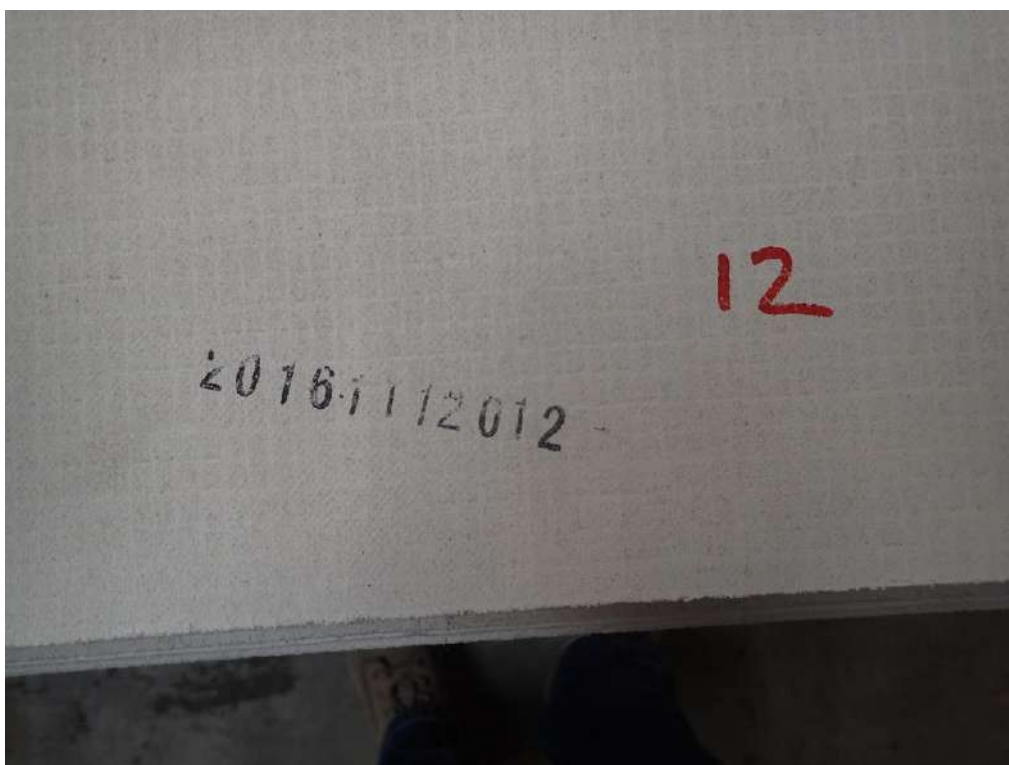
Stack of samples



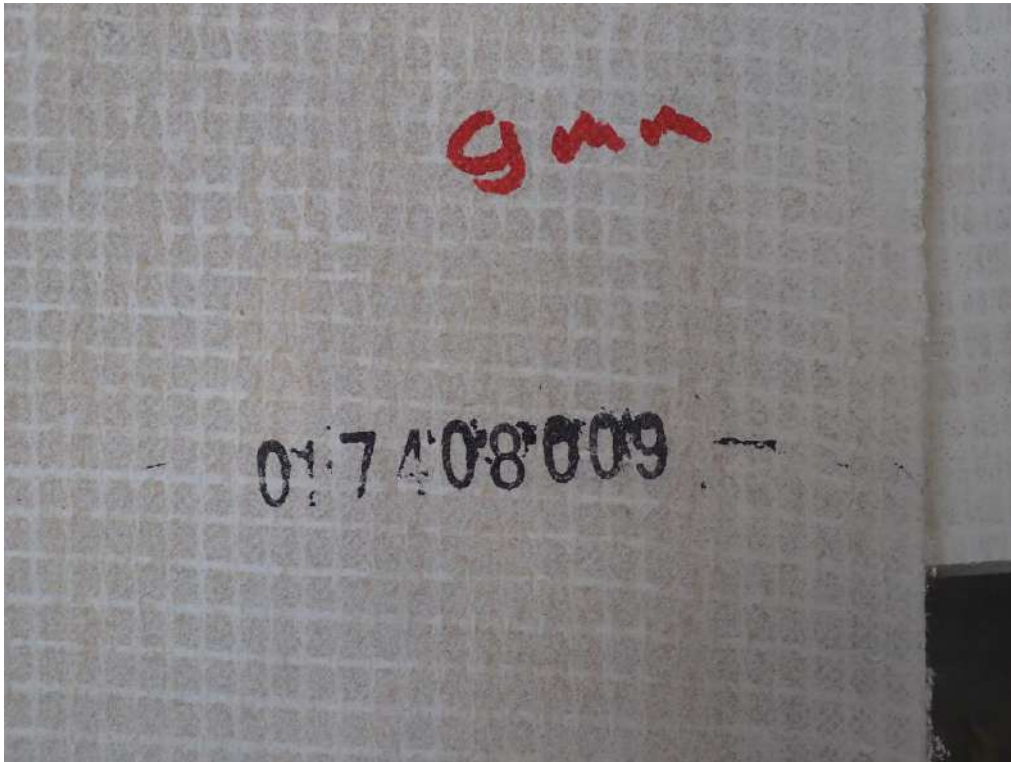
Sample: Magply 20 mm



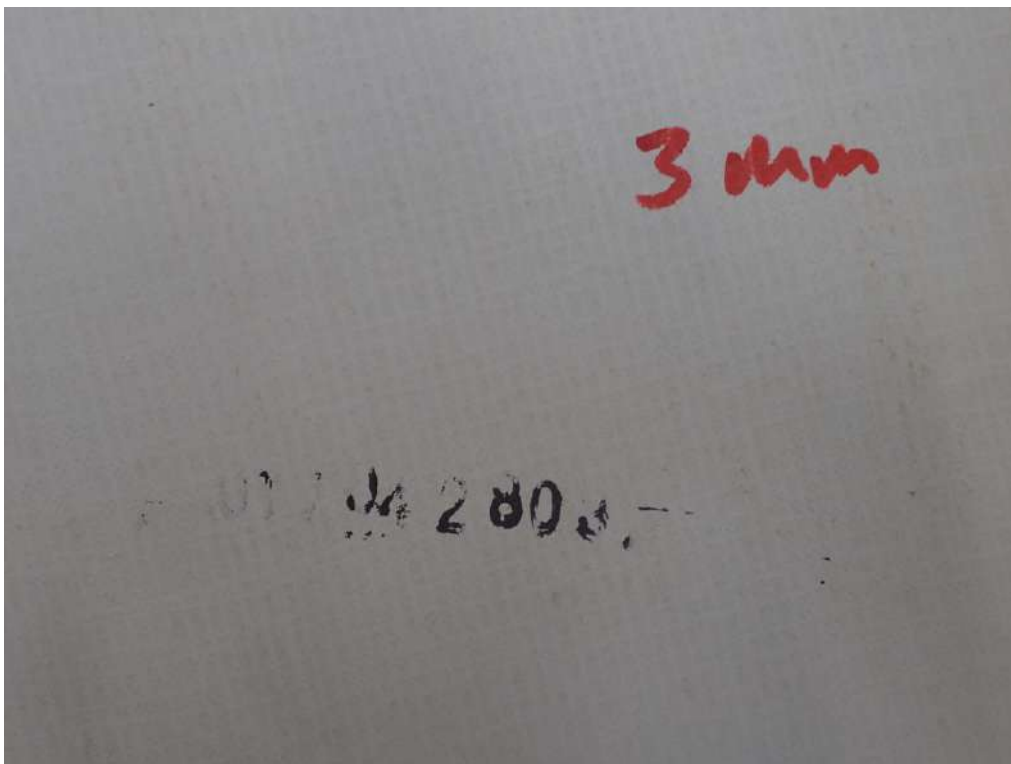
Sample: Magply 12 mm



Sample: Magply 9 mm



Sample: Magply 3 mm



II Investigation

Photo 1

Test rig soft body impact.



Photo 2

Distance between screws.



Photo 3

Soft body.

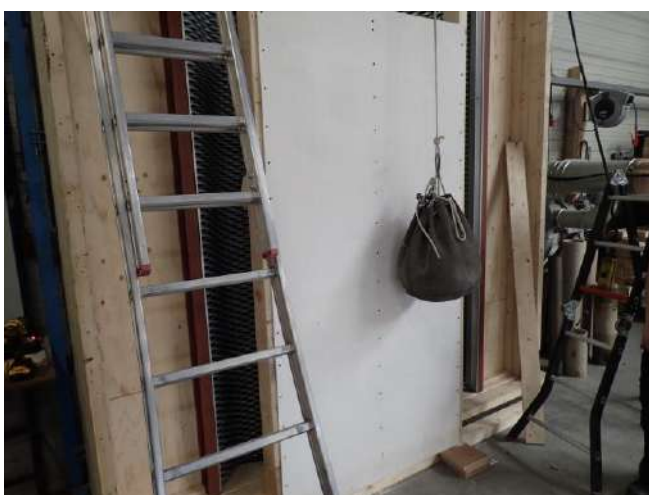


Photo 4

Damage after 300 Nm soft
body impact.



Photo 5

Test rig hard body impact.



Photo 6

No damage after hard body
impact.



Photo 7

Test rig walkability.



Photo 8
Test rig axial loading test.



Photo 9
Failure mode 9 mm board.

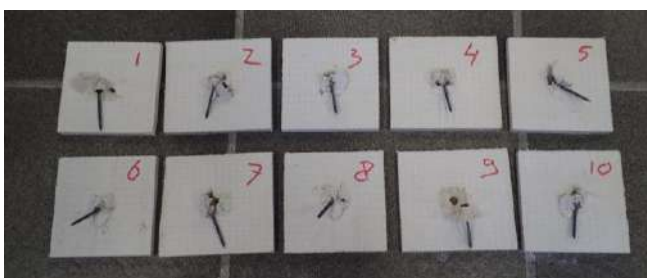


Photo 10
Failure mode 12 mm board.

