



TEST REPORT

No.: D3.2 – part 5

Tests on load application details of axially loaded sandwich panels

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Task: 3.4

Object: Load bearing capacity of load application details of axially loaded sandwich panels

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Table of contents

1	Preliminary remark	4
2	Tested types of sandwich panels	4
3	Test performance and results of the tests	6
3.1	Preliminary remarks	6
3.2	Test series I: Introduction of loads by contact	7
3.3	Test series II: Tests on corner details	8
3.4	Test series III: Tests on corner details with glued core	9
3.5	Test series IV: Tests on improved corner details	12
4	Determination of the material properties	13
4.1	Mechanical properties of the metallic surface layers	13
4.2	Mechanical properties of the core layer	14
4.3	Wrinkling stress of the faces	15
5	Summary	16

Annex I:	Tests on introduction of load by contact (122 pages)
Annex II:	Tests on corner details without gluing (68 pages)
Annex IIIa:	Test on corner details with glued core – single-span tests (22 pages)
Annex IIIb:	Test on corner details with glued core – cantilever tests (14 pages)
Annex IVa:	Test on improved corner details – improvement by glued angles (26 pages)
Annex IVb:	Test on improved corner details – improvement by dowels (18 pages)
Annex V:	Pictures of cross panel tensile tests (6 pages)

1 Preliminary remark

Traditionally sandwich panels are used as covering elements of buildings. In this application the panels only transfer transverse loads (wind, snow) to the substructure by bending. In the panels only the stress resultants of bending moment and transverse force are effective. A recent tendency, especially in the area of smaller buildings – such as cooling chambers, climatic chambers and clean rooms – is to apply the panels without substructure. In this application the wall panels have to transfer normal forces in addition to the stress resultants arising from transverse loads. This results in the question for the load-bearing capacity of the panels in the areas of load application, i.e. at the lower ends of the panels and at the connection between wall and ceiling (Fig. 1), where the superimposed loads from the ceiling are applied as normal force into the inner face of the wall panels.

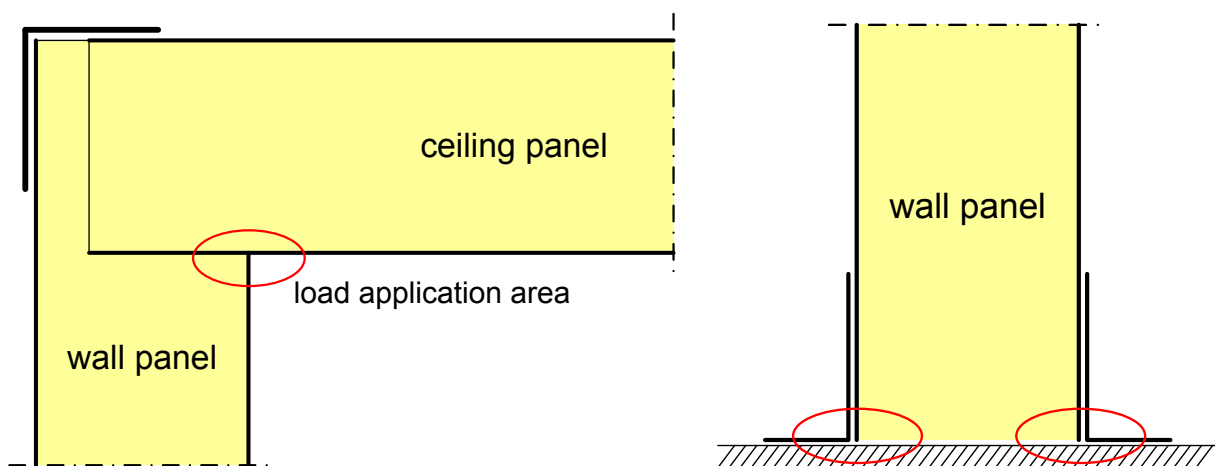


Fig. 1: Typical connection between wall and ceiling and lower end

A design concept for axially loaded sandwich panels was developed within the framework of the EASIE project. The design concept also includes the determination of the local load bearing capacity of the load application area. In deliverable D3.2 – part 5, the results of the experimental tests on load application details are presented. The evaluation of the results can be found in deliverable D3.3. Deliverable D3.3 is also dealing with the numerical calculations and the derivation of a design concept.

2 Tested types of sandwich panels

Investigations on different types of sandwich panels were performed. The tested types of panels are summarized in Tab. 1.

No.	core material	core thickness	face material	face thickness	profiling of faces
A	PU	100	steel	0,50	lightly profiled
B *)	PU	100	steel	0,75	lightly profiled
C	EPS	100	steel	0,60	flat
D	EPS	100	GFRP	1,8	flat
E	MW	100	steel	0,50	lightly profiled

*) discontinuous produced panel

Tab. 1: Tested types of sandwich panels

The geometry of the panels with lightly profiled faces (type A, B, E) was measured. The results are shown in the following figures.

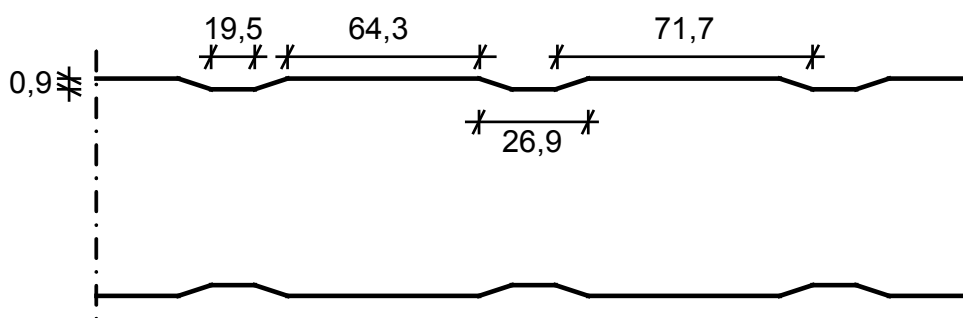


Fig. 2: Geometry of panel type A

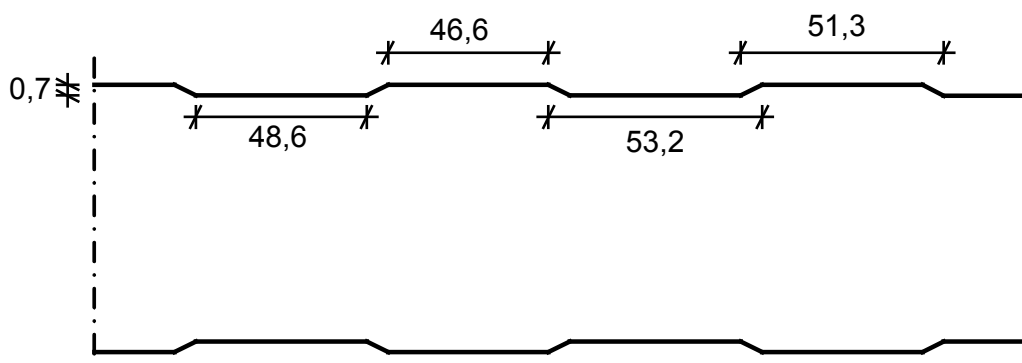


Fig. 3: Geometry of panel type B

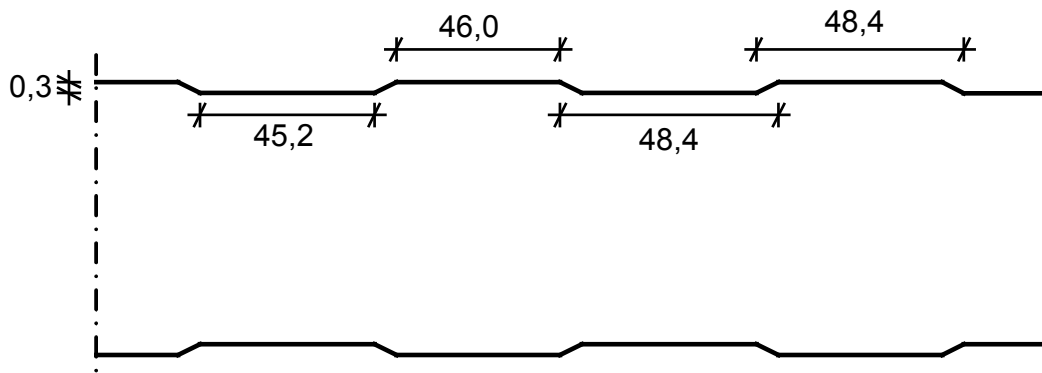


Fig. 4: Geometry of panel type E

3 Test performance and results of the tests

3.1 Preliminary remarks

To examine the load bearing capacity of the load application area, where the loads are introduced from the ceiling into the wall panel, different tests were performed. For all tests specimens with the width 400 mm have been used. At the load application area local failure occurs (crippling of the cut edge or local buckling, Fig. 5), so short sections of panels (ca. 300-400 mm) have been used.



Fig. 5: Local failure at load application area

At the lower end of the specimens aluminium angles were glued on the faces of the panel and additionally they were screwed to the panel by self drilling screws. The angles were screwed to a wooden board, so the lower end of the tested panel can be regarded as clamped.



Fig. 6: Lower end of the tested specimens

3.2 Test series I: Introduction of loads by contact

Test to determine the load bearing capacity of the free cut edge of the panel were performed. The load was introduced by contact. The test set up is shown in Fig. 7 und Fig. 8. For introducing the load into the face of the panel a plate of steel has been used. For comparison instead of a plate of steel a section of a sandwich panel was used for introducing the load in some tests (Fig. 9).

Annex I shows the results of the tests. For each test, a table listing all relevant parameters is given, followed by the graphs of the measured values. In addition significant pictures are shown for each test.

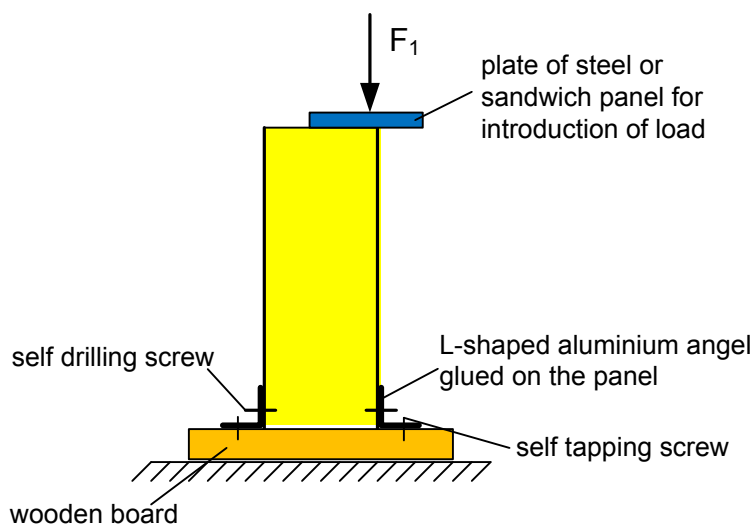


Fig. 7: Test set-up of test series I



Fig. 8: Test set-up of test series I



Fig. 9: Introduction of load by plate of steel and by sandwich panel

3.3 Test series II: Tests on corner details

Test on typical corner details for the connection between wall and ceiling were performed. The test set up is shown in Fig. 10 and Fig. 11. For panels with thicknesses used in the tests failure does usually not occur at the free cut edge of the wall panel, but shear failure of the ceiling panel occurs. Therefore the load was not introduced by a sandwich panel, but by a plate of steel. An aluminium hollow section was placed on the plate of steel and on an additional hinged support. The load was introduced in the hollow section.

Because of the deflection of the ceiling panel a rotation occurs at the line of load application. This results in an additional horizontal load. To consider this additional load in the tests the angle α , the hollow section was placed on the wall panel, was varied. Additional to the applied

load F_1 the reaction force F_2 at the hinged support was measured. The load introduced in the cut edge can be calculated by subtracting F_2 from F_1 .

Annex II shows the results of the tests. For each test, a table listing all relevant parameters is given, followed by the graphs of the measured values. In addition significant pictures are shown for each test.

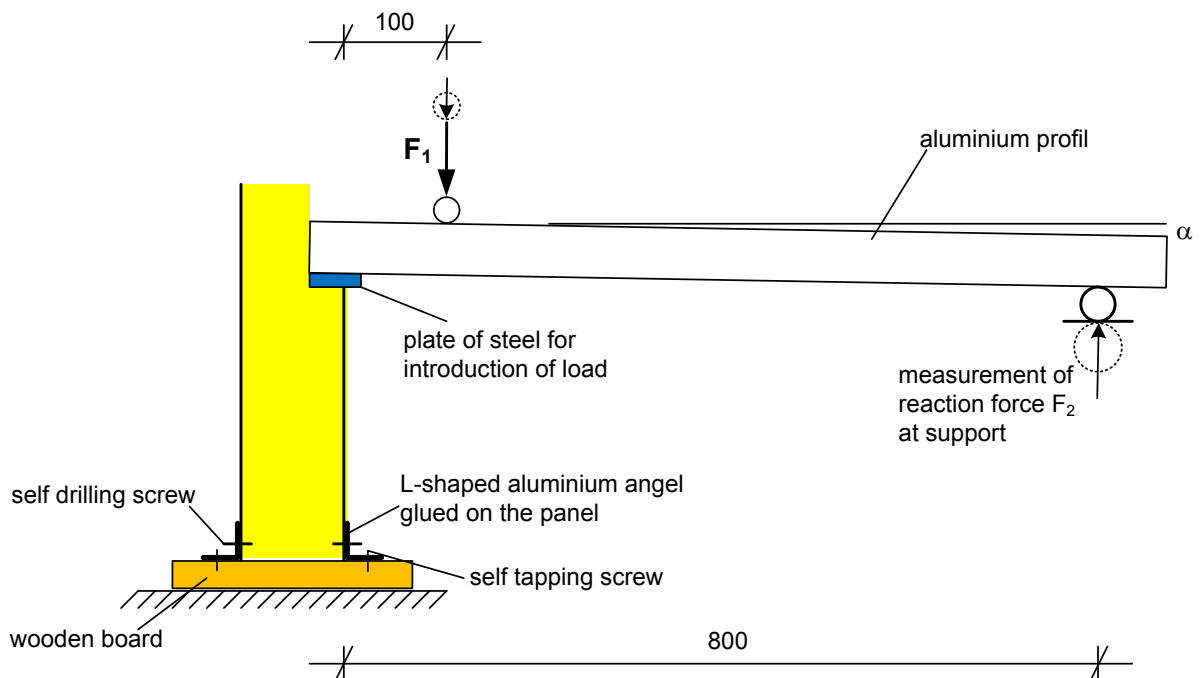


Fig. 10: Test set-up of test series II

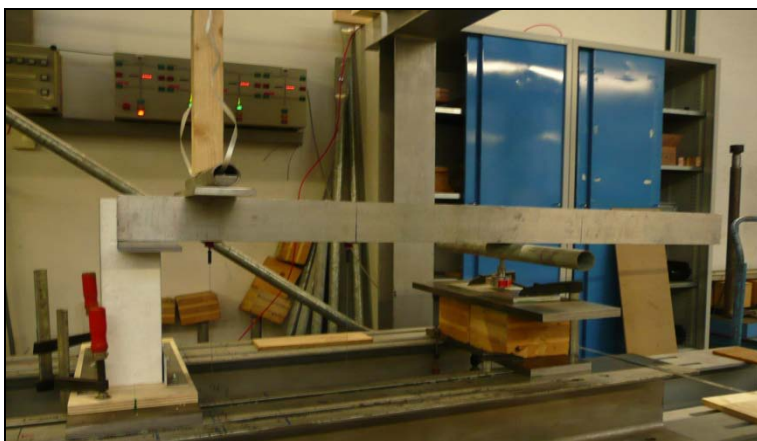


Fig. 11: Test set-up of test series II

3.4 Test series III: Tests on corner details with glued core

Especially for cooling chambers it is common practice to glue the cores of ceiling and wall panels. Therefore tests on glued corner details were performed. A wall panel and a ceiling panel of the same type were glued with glue „OTTOCOLL® P84“ (polyurethane glue). The

ceiling panel was loaded as single span beam (test series IIIa) and as lever arm (test series IIIb).

The test set up of test series IIIa (single span) is shown in Fig. 12 and Fig. 13. The ceiling panel was supported by an additional hinged support and loaded by four line loads. During the test the reaction force F_2 at the support and the deflection in mid-span at the lower face of the panel were measured.

Annex IIIa shows the results of the tests.

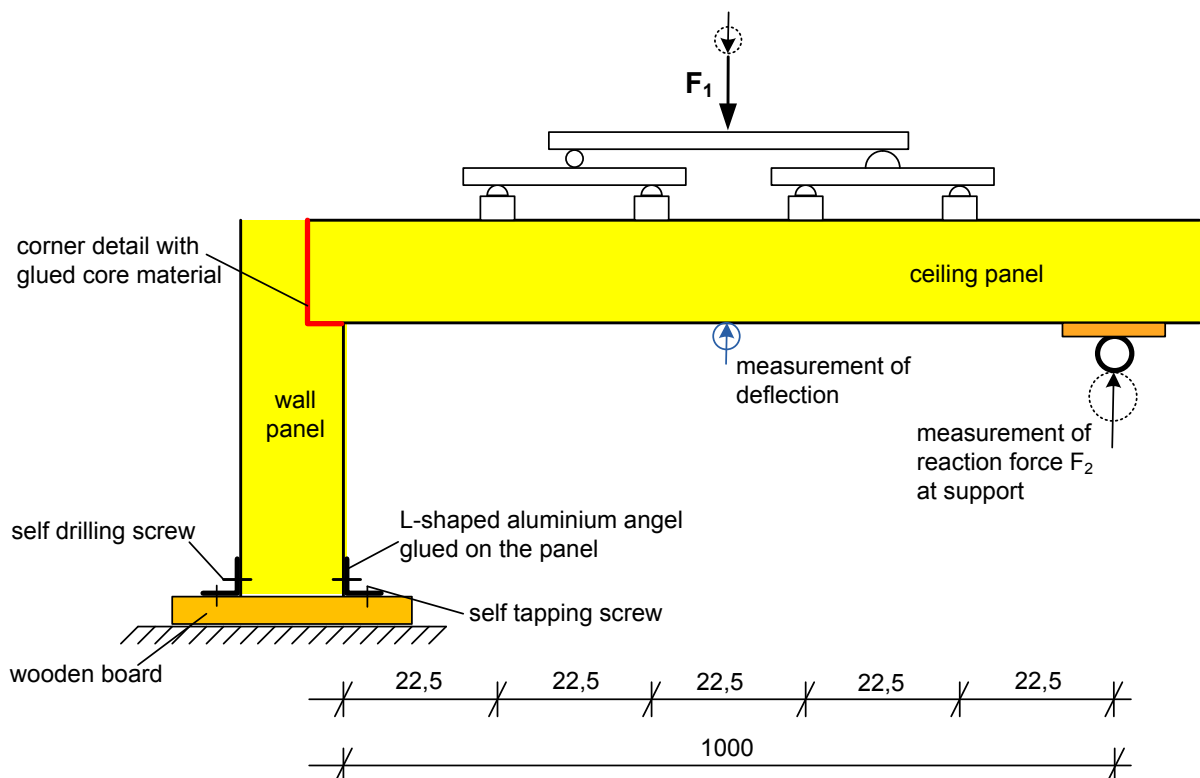


Fig. 12: Test set-up of test series IIIa



Fig. 13: Test set-up of test series IIIa

Fig. 14 and Fig. 15 show the test set up of test series IIIb (lever arm). The ceiling panel was loaded by a line load. The distance a between the inner face of the wall panel and the applied load was varied. The deflection of the ceiling panel was measured at the lower face. Annex IIIb shows the results of the tests.

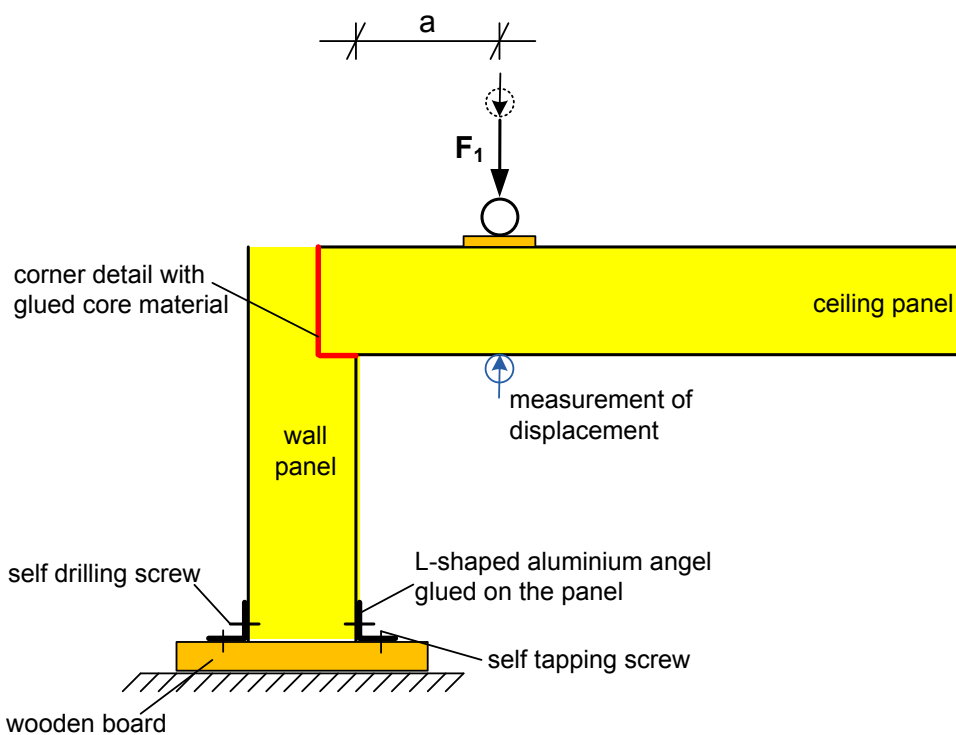


Fig. 14: Test set-up of test series IIIb



Fig. 15: Test set-up of test series IIIb

3.5 Test series IV: Tests on improved corner details

Tests on improved corner details were performed. The load application area was improved by a glued angle (Fig. 16) or by three dowels (Fig. 17) screwed in the core material of the wall panel. Dowels FID 50 of Würth and W-ID 95 of Fischer were used (Fig. 18).



Fig. 16: Wall panel with glued angle for improvement of the load application area

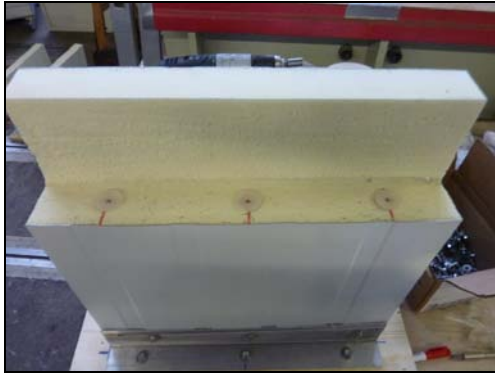


Fig. 17: Application of dowels in the core material

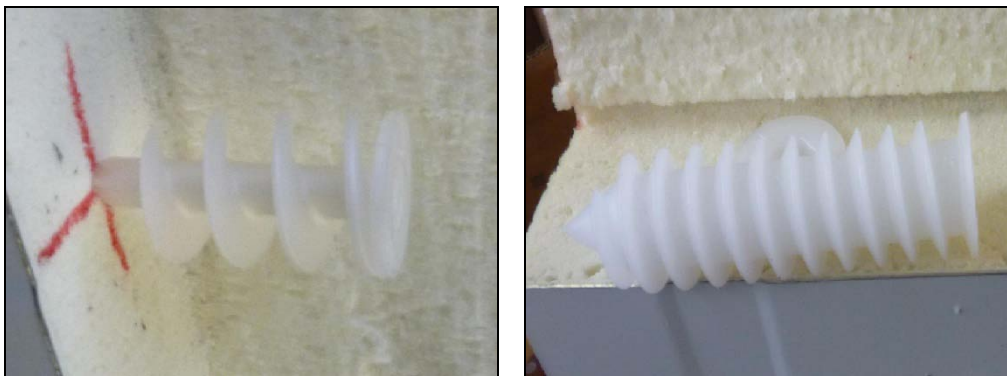


Fig. 18: Dowel FID 50 and W-ID 95

The improved corner details were tested with the test set up of test series I (chapter 3.2) and test series II (chapter 3.3).

Annex IVa shows the results of the tests on corner details improved by glued angles. Annex IVb shows the results of the tests on corner details improved by dowels.

4 Determination of the material properties

4.1 Mechanical properties of the metallic surface layers

For each tested type of panel, specimens for tensile tests according to EN 10002-1 were worked out and tensile tests for determining the mechanical properties of surface layers were done. For the determination of the yield strength $R_{eH}/R_{p0,2}$ and the tensile strength R_m , the core thicknesses t_k determined on the specimens were used. The mean values of the results are listed in Tab. 2.

type of panel		t_k	$R_{eH}/R_{p0,2}$	R_m
		[mm]	[N/mm ²]	[N/mm ²]
A	top side of production	0,474	358	405
	bottom side of production	0,472	358	403
B	top side of production	0,765	399	403
	bottom side of production	0,759	406	402
C	face 1	0,538	412	456
	face 2	0,541	406	453
D	GFRP			
E	face 1	0,474	461	468
	face 2	0,476	472	479

Tab. 2: Mechanical properties of the metallic surface layers

4.2 Mechanical properties of the core layer

The mechanical properties of the core layer were determined according to EN 14509. The determination of the compression strength f_{cc} , the tensile strength f_{ct} , the shear strength f_{cv} , as well as the appropriate shear, compression and tensile module values G_C , E_{cc} and E_{ct} was realized on at least three specimens. The analysis of the modulus of elasticity E_C was realised as mean value from the compression and tensile module of a specimen pair. The mean values of the results are listed in Tab. 3 and Tab. 4. Some pictures of the specimens after tensile test are shown in Annex V.

No.	f_{cv}	f_{cc}	f_{ct}
	[N/mm ²]	[N/mm ²]	[N/mm ²]
A	0,09	0,10	0,14
B	0,11	0,19	0,21
C	0,10	0,15	0,16
D	0,11	0,14	0,23
E	0,08	0,09	0,12

Tab. 3: Mechanical properties of the core layer – strength

No.	G_C	E_{Cc}	E_{Ct}	E_C
	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]
A	2,93	2,95	3,24	3,10
B	3,56	3,83	6,32	5,08
C	4,18	6,38	10,56	8,47
D	6,10	6,39	10,18	8,29
E	9,82	9,33	12,08	10,71

Tab. 4: Mechanical properties of the core layer – module

4.3 Wrinkling stress of the faces

Single-span bending tests were performed with every type of sandwich panel. The sandwich panels with a length of 6000 mm were loaded until failure in a vacuum chamber under uniform surface load. For the calculation of the wrinkling stress the measured thickness of the steel faces and the measured thickness of the panels were used. The results of the single-span bending tests are listed in Tab. 5.

type of panel		thick-ness of panel (mean value)	width of panel	span	core sheet thickness of compressed face	failure load incl. dead weight	wrinkling stress
		[mm]	[mm]	[mm]	[mm]	[kN/m]	[N/mm ²]
		D	B	l_a	t_k	p	σ_w
A	top side of production	99,4	1176	5700	0,474	2,69	198
	bottom side of production	99,3	1178	5700	0,472	2,75	203
B	top side of production	98,9	1194	5700	0,765	4,41	200
	bottom side of production	89,9	1195	5700	0,759	4,43	202
C	face 1	100,3	1196	5700	0,538	2,79	174
	face 2	100,2	1196	5700	0,541	2,76	177
D	face 1 *)	101,6	1194	5700	1,8	1,01	19
	face 2	101,8	1194	5700	1,8	1,45	28
E	face 1	99,4	999	5800	0,475	1,17	105
	face 2	99,5	999	5800	0,475	1,51	136
		99,4	1000	5800	0,475	1,69	151

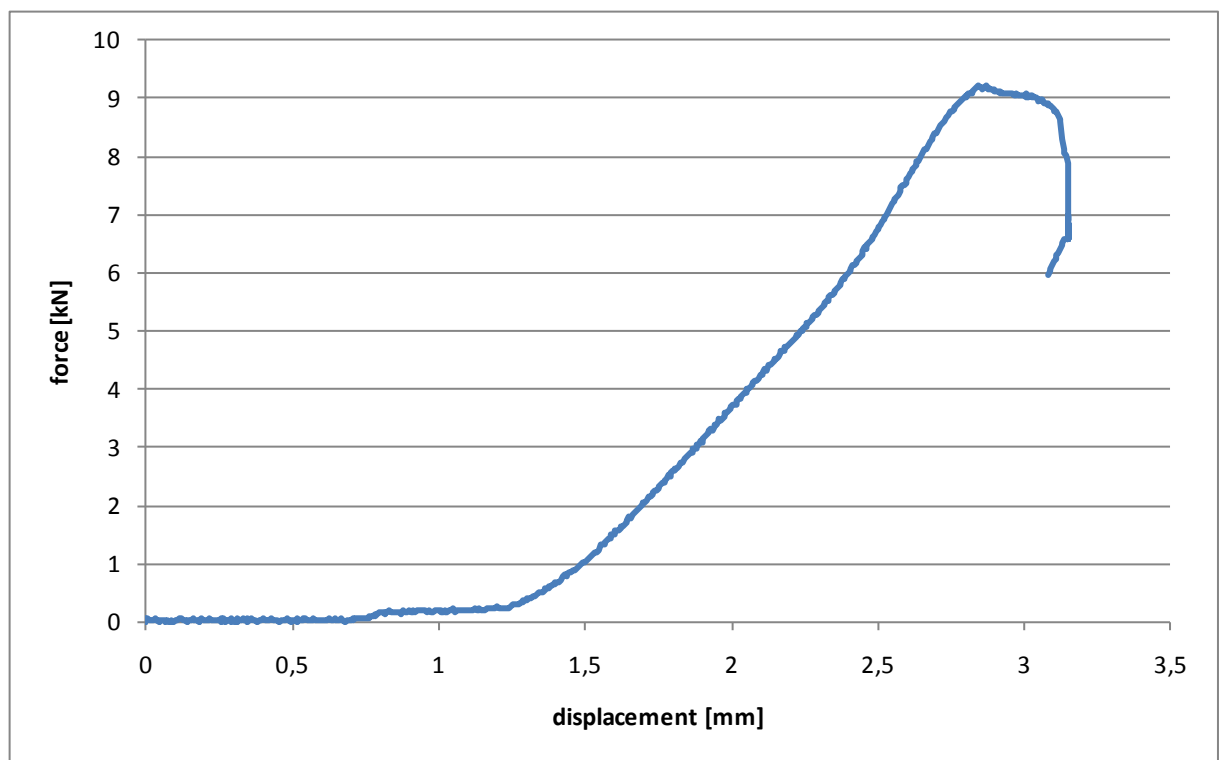
*) reduced wrinkling stress caused by cut of core material in mid-span

Tab. 5: Wrinkling stress of the faces

5 Summary

WP 3, task 3.4 of the EASIE project deals with sandwich panels used for buildings without substructure. In this application the wall panels have to transfer normal forces in addition to transverse loads. In deliverable 3.2 – part 5 the results of the experimental tests on load application details of axially loaded sandwich panels are presented.

Test No.	I-A-1	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions:		
width b	396 mm	
height l	303 mm	
thickness d	94 mm	
ultimate load	9,22 kN	
ultimate stress	49,1 N/mm ²	
ultimate stress based on failed width	73,7 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 2/3b	

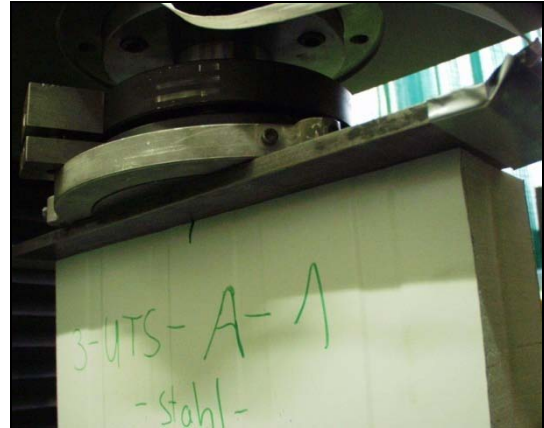


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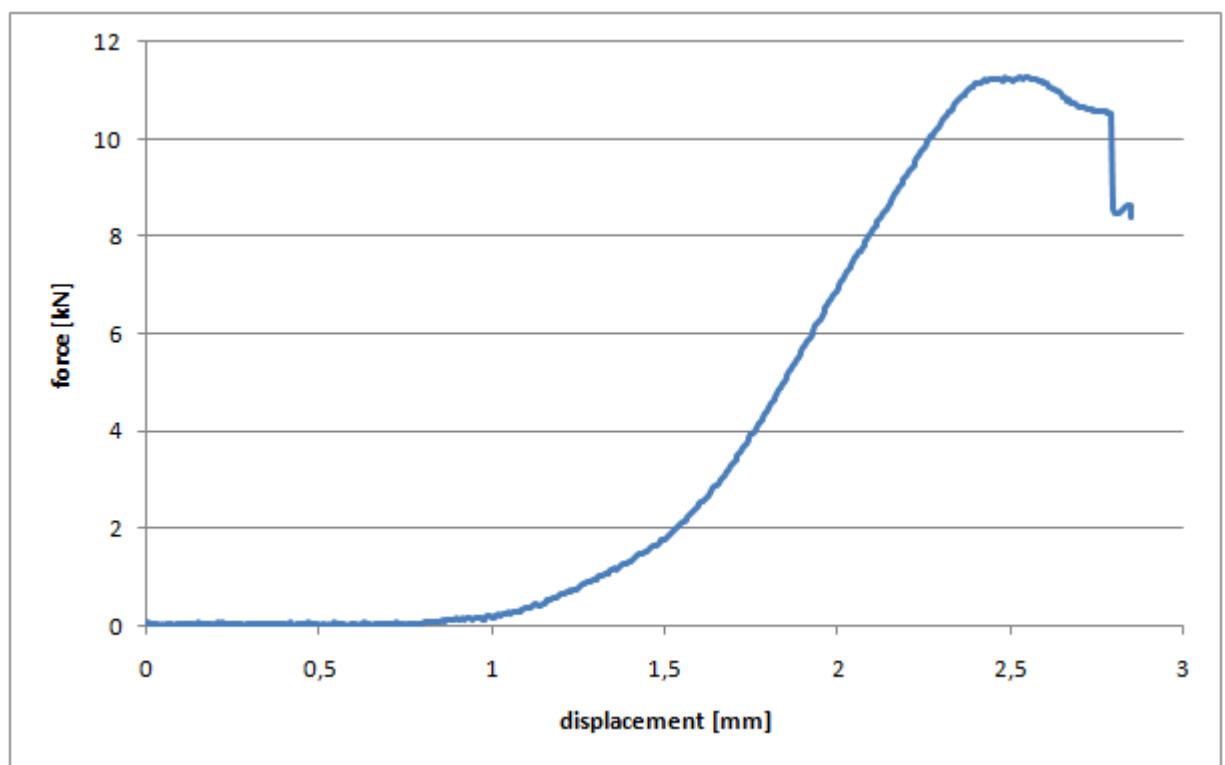
I-A-1



Crippling of the stressed face

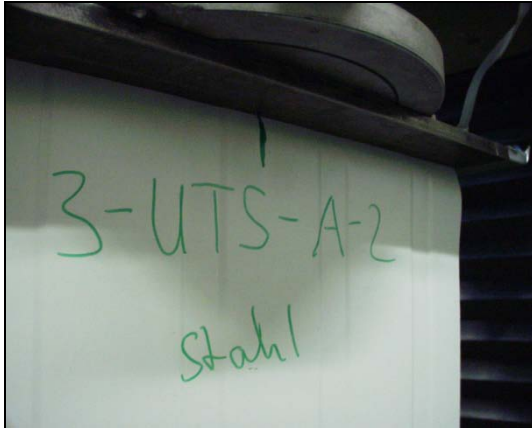


Test No.	I-A-2	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions:		
width b	399 mm	
height l	299 mm	
thickness d	94 mm	
ultimate load	11,26 kN	
ultimate stress	59,5 N/mm ²	
ultimate stress based on failed width	71,4 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 5/6b	

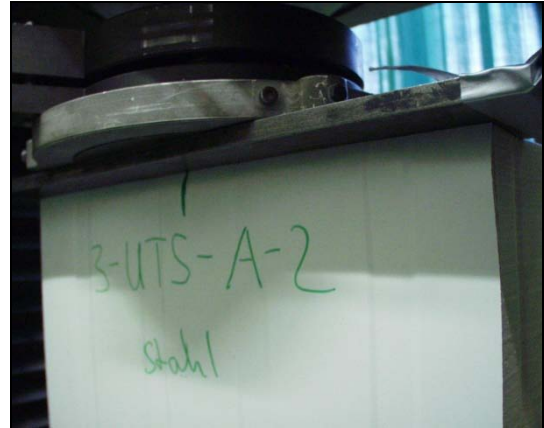


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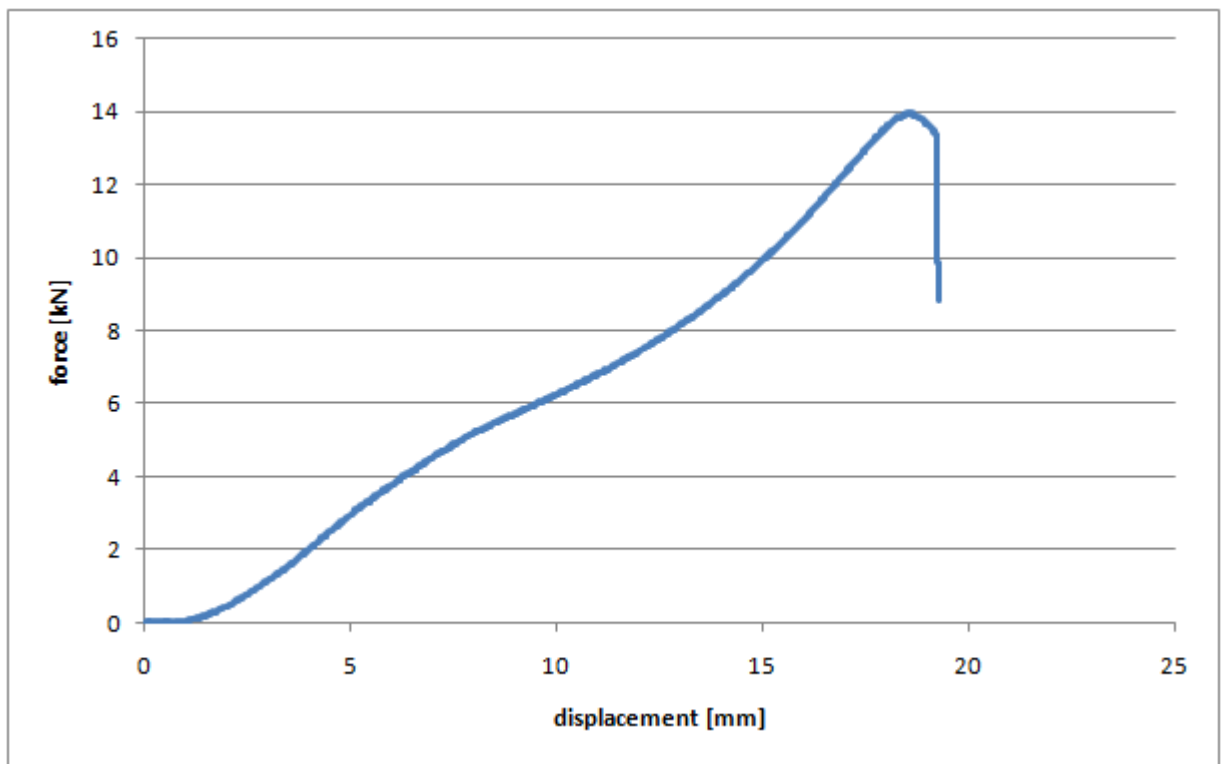
I-A-2



Crippling of the stressed face

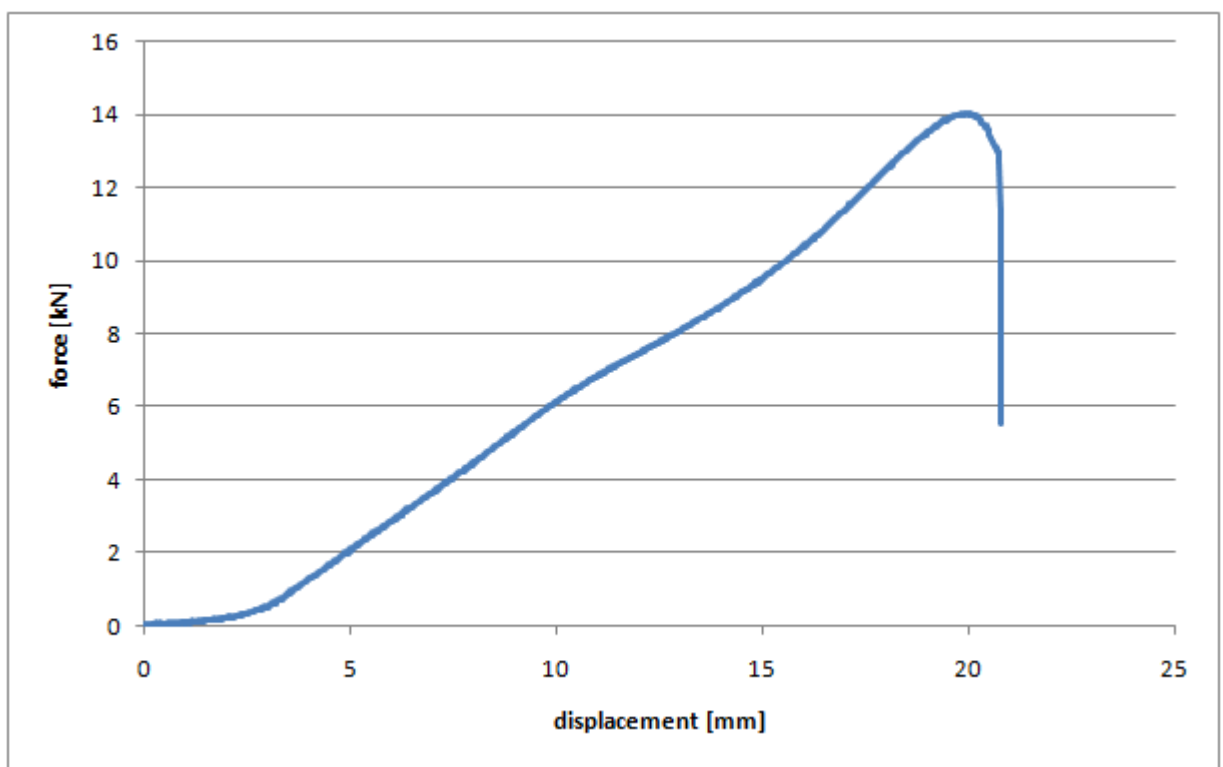


Test No.	I-A-3	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions:		
width b	396 mm	
height l	299 mm	
thickness d	96 mm	
ultimate load	13,98 kN	
ultimate stress	74,5 N/mm ²	
ultimate stress based on failed width	74,5 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



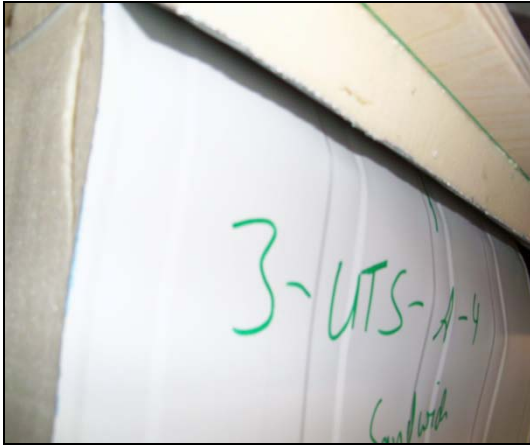
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Test No.		I-A-4
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions:		
width b	397 mm	
height l	298 mm	
thickness d	97 mm	
ultimate load	14,03 kN	
ultimate stress	74,6 N/mm ²	
ultimate stress based on failed width	74,6 N/mm ²	
Failure mode	cripling o the stressed face, failure of core material	
Remarks	failed width b	



Test No.

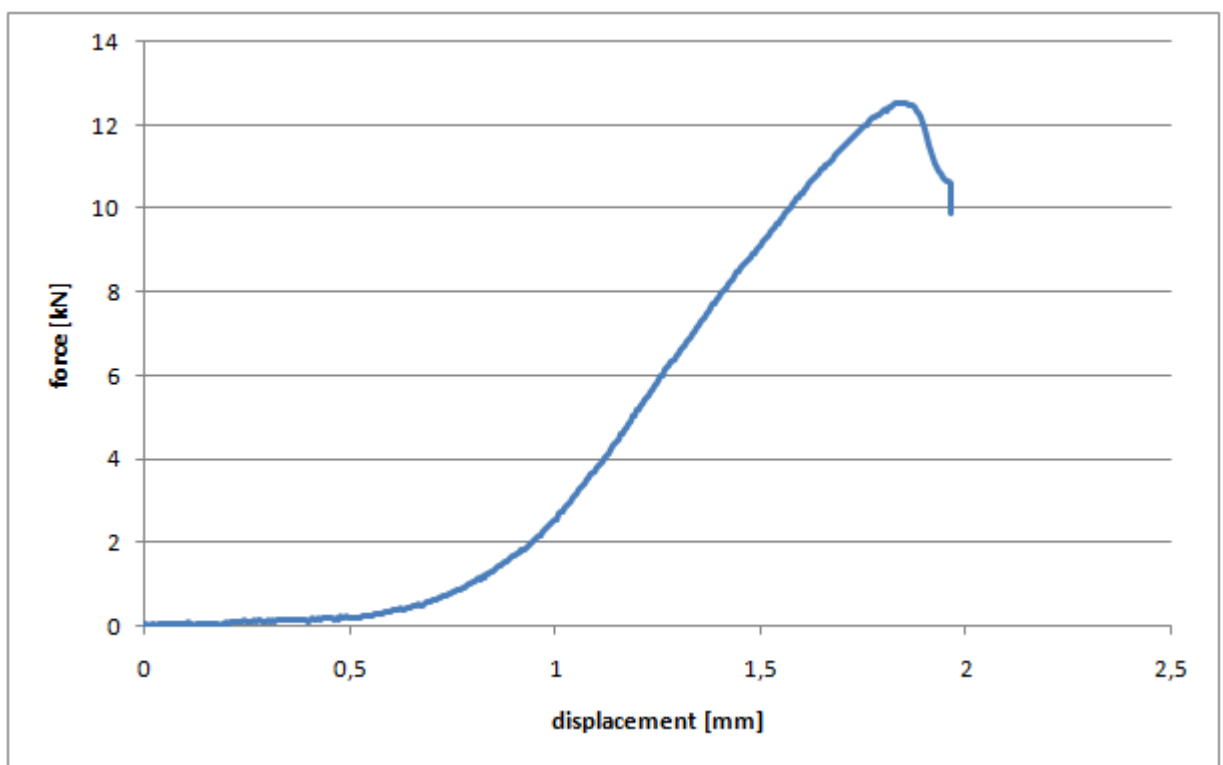
I-A-4



Failure of the stressed face

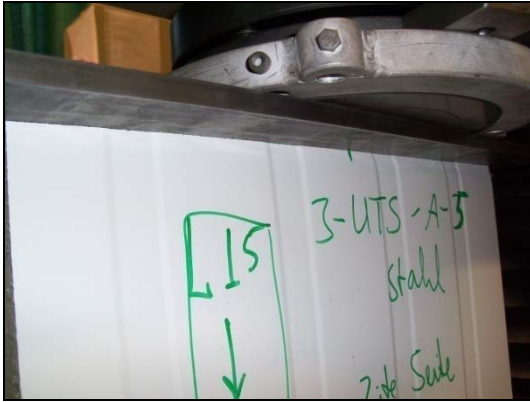


Test No.	I-A-5	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	bottom side of production	
Measured dimensions:		
width b	399 mm	
height l	299 mm	
thickness d	94 mm	
ultimate load	12,53 kN	
ultimate stress	66,5 N/mm ²	
ultimate stress based on failed width	76,0 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 7/8b	



Test No.

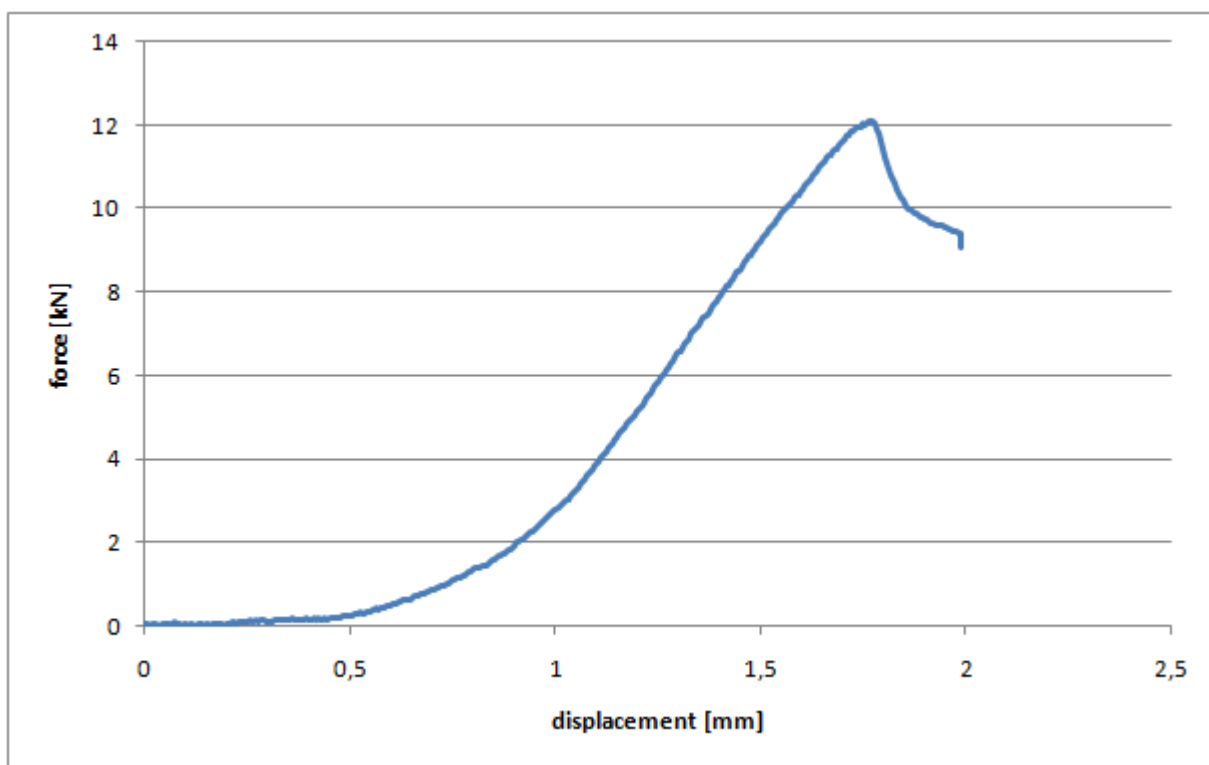
I-A-5



Failure of the stressed face



Test No.	I-A-6	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	bottom side of production	
Measured dimensions:		
width b	396 mm	
height l	299 mm	
thickness d	96 mm	
ultimate load	12,11 kN	
ultimate stress	64,8 N/mm ²	
ultimate stress based on failed width	64,8 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 5/6b	



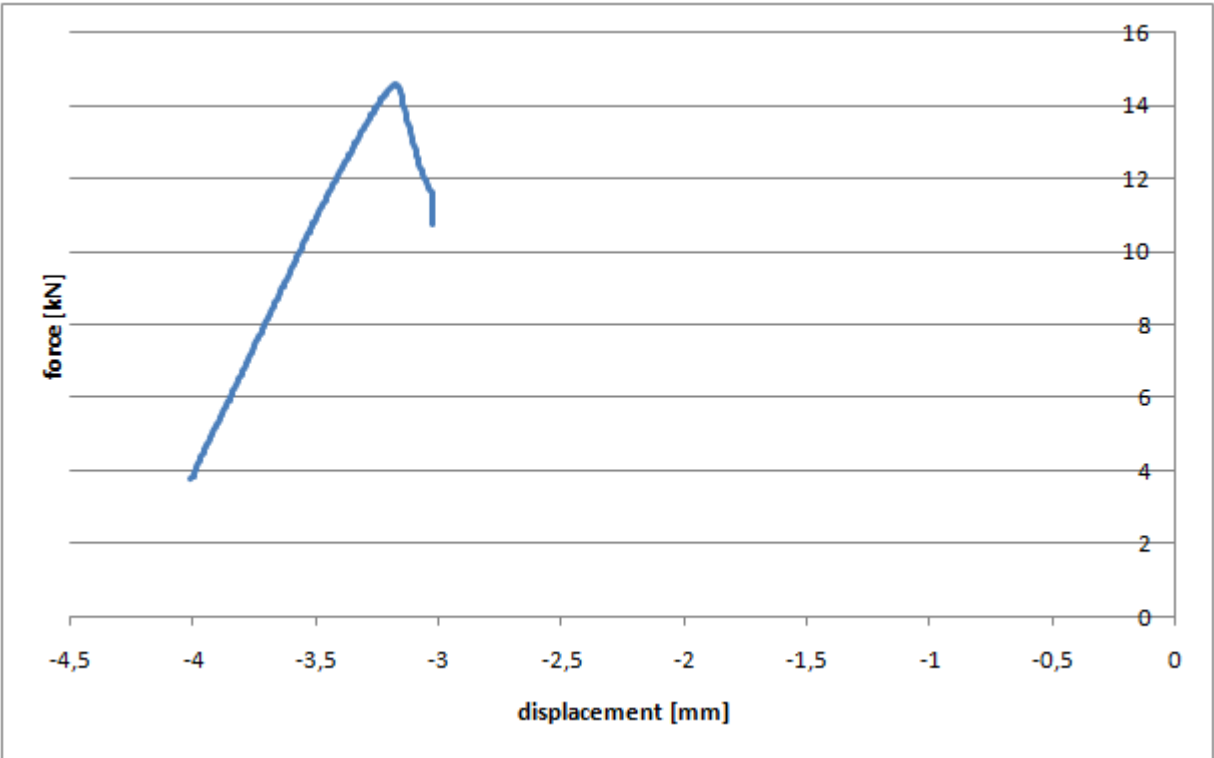
Test No.

I-A-6



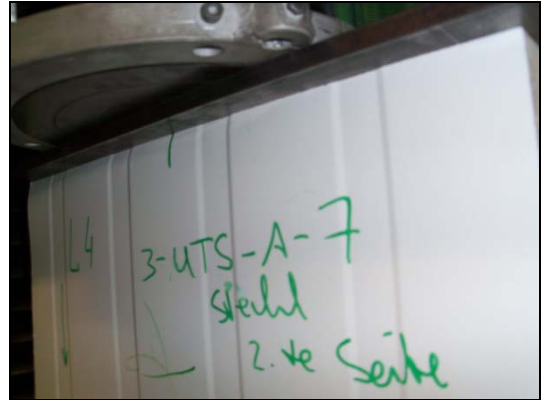
cripling of the stressed face



Test No.		I-A-7
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	bottom side of production	
Measured dimensions:		
width b	396 mm	
height l	303 mm	
thickness d	94 mm	
ultimate load	14,58 kN	
ultimate stress	78 N/mm ²	
ultimate stress based on failed width	78 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	
 <p>The graph shows a force-displacement curve. The y-axis is labeled 'force [kN]' and ranges from 0 to 16 with major ticks every 2 units. The x-axis is labeled 'displacement [mm]' and ranges from -4,5 to 0 with major ticks every 0,5 units. The curve starts at approximately (-4, 4), rises linearly to a peak of 14,58 kN at a displacement of about -3,2 mm, and then drops to approximately 11 kN at -3 mm displacement.</p>		

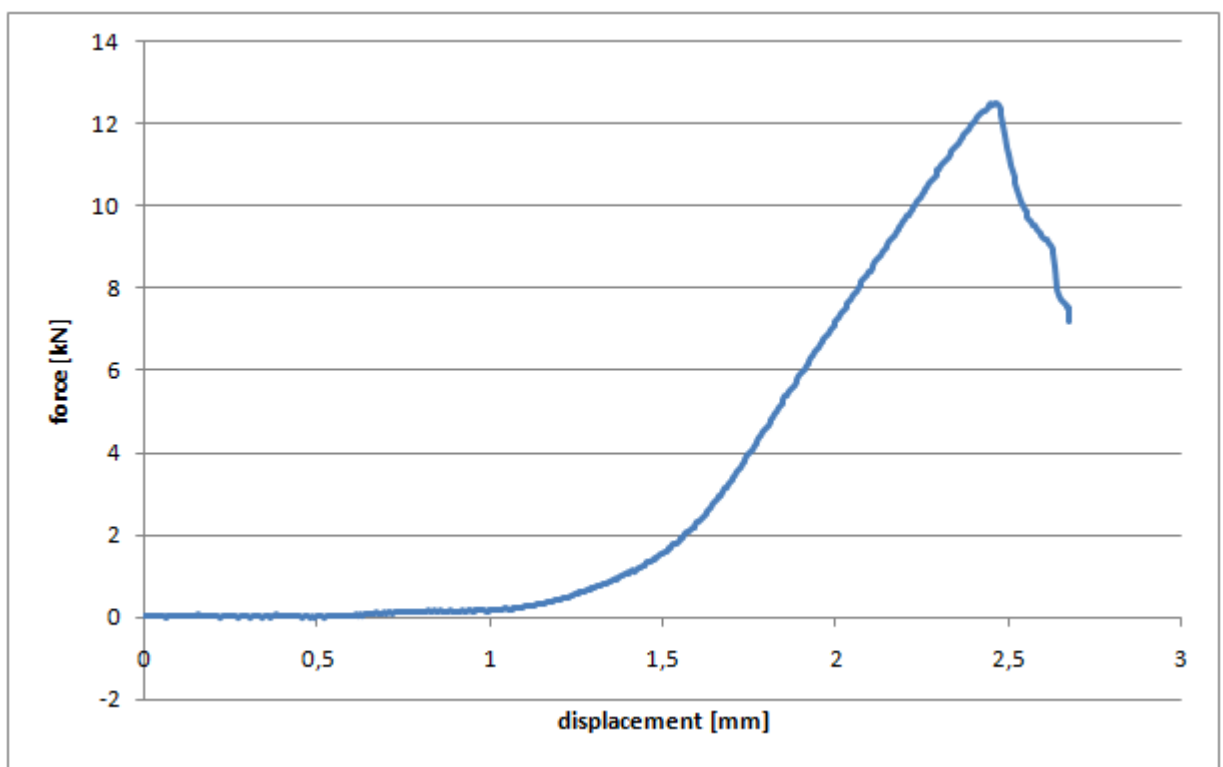
Test No.

I-A-7



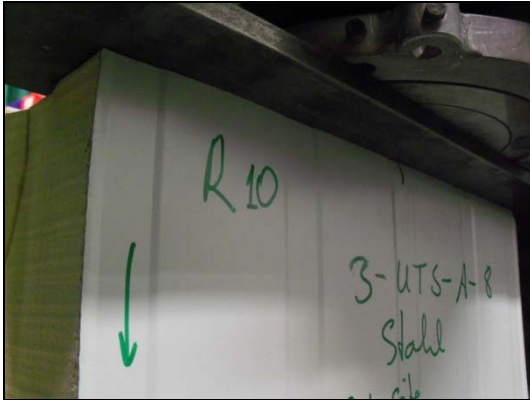
cripling of the stressed face

Test No.	I-A-8	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	bottom side of production	
Measured dimensions:		
width b	397 mm	
height l	298 mm	
thickness d	97 mm	
ultimate load	12,5 kN	
ultimate stress	66,7 N/mm ²	
ultimate stress based on failed width	77,8 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 6/7b	

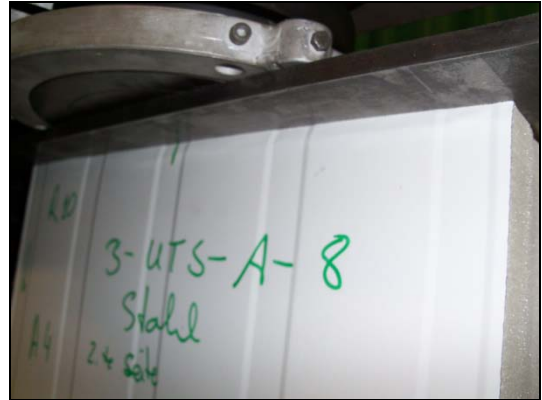


Test No.

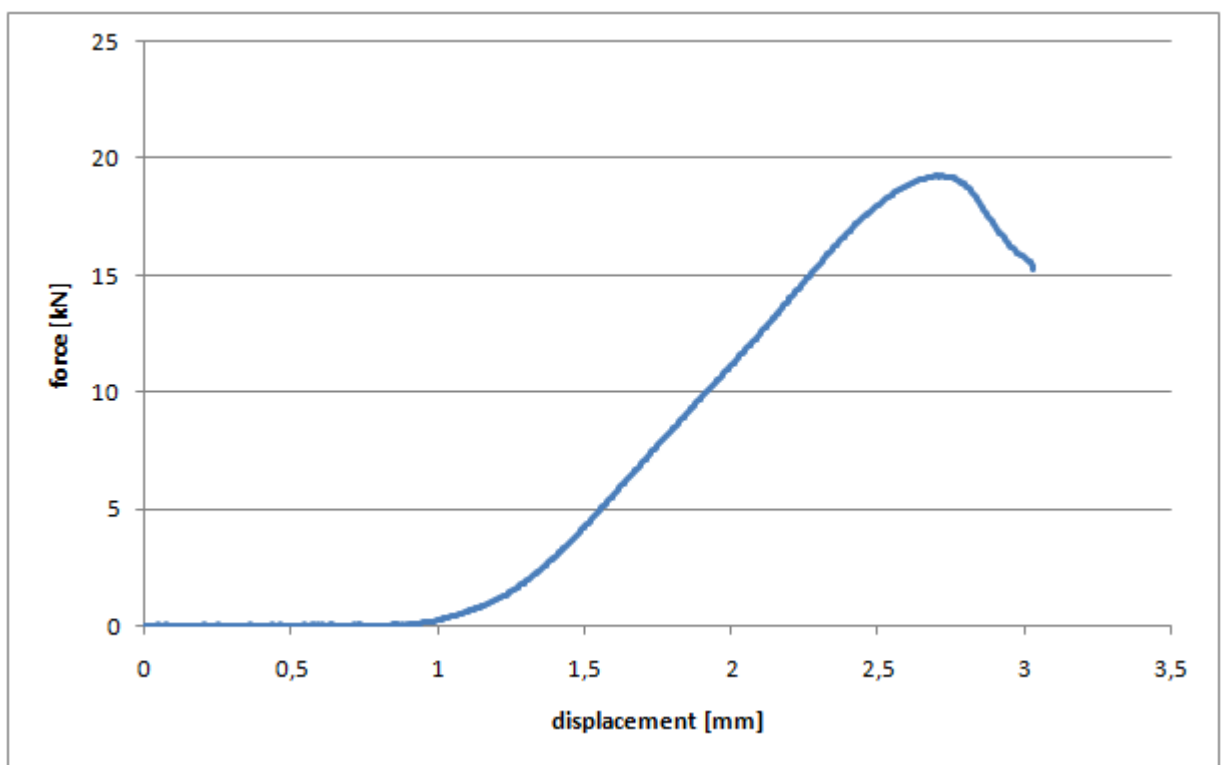
I-A-8



cripling of the stressed face

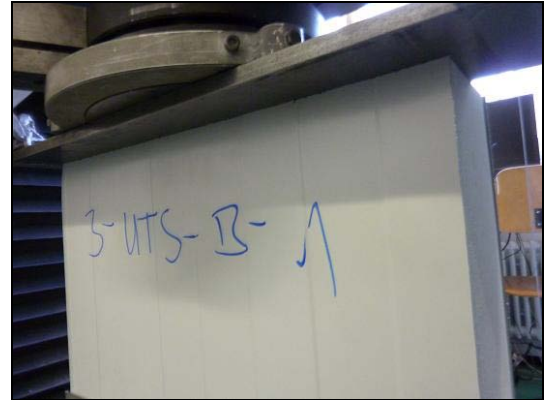


Test No.	I-B-1	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	302 mm	
thickness d	100 mm	
ultimate load	19,24 kN	
ultimate stress	63,1 N/mm ²	
ultimate stress based on failed width	63,1 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No.

I-B-1

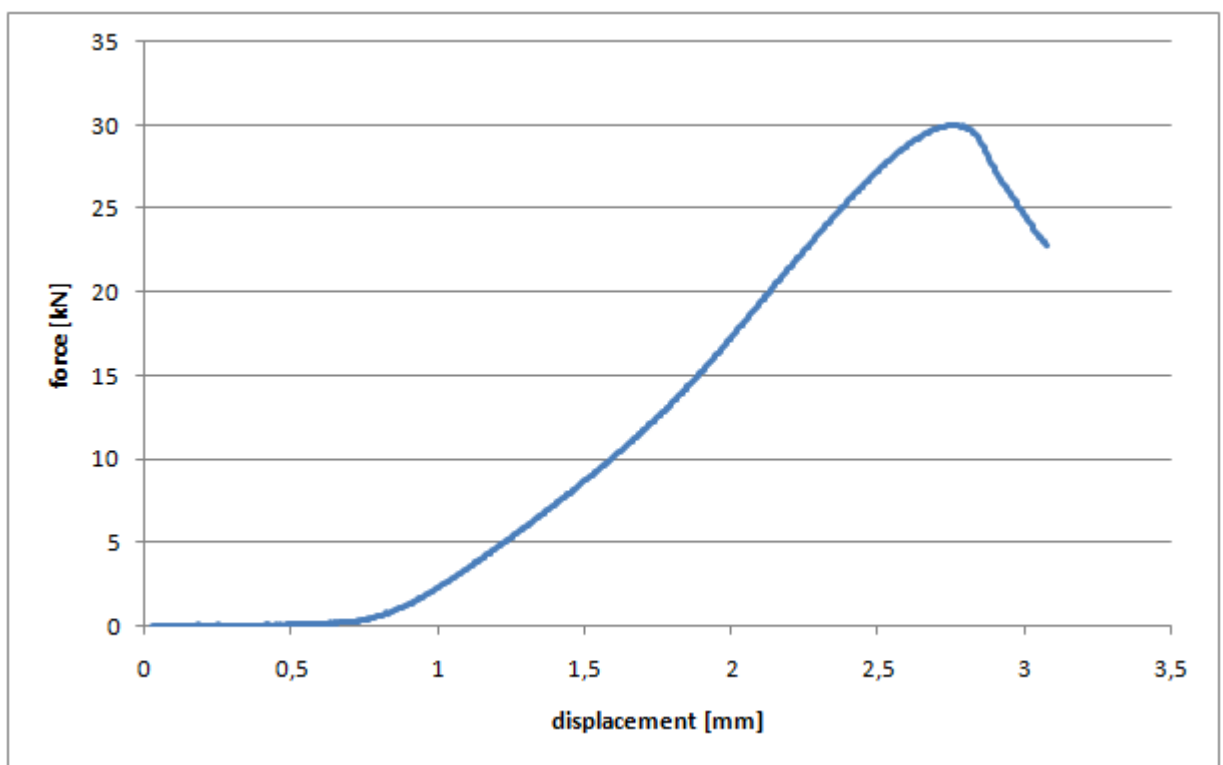


Failure of the stressed face



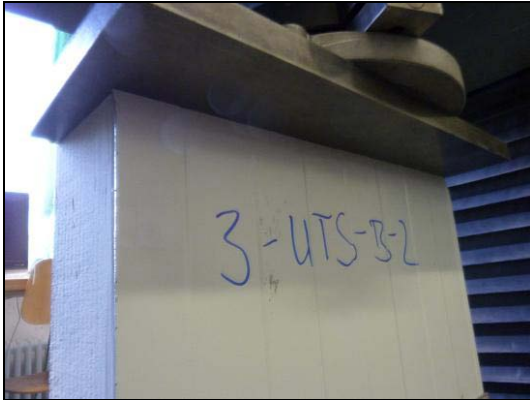
Compound between core and face

Test No.	I-B-2	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	302 mm	
thickness d	100 mm	
ultimate load	29,95 kN	
ultimate stress	98,3 N/mm ²	
ultimate stress based on failed width	98,3 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No.

I-B-2

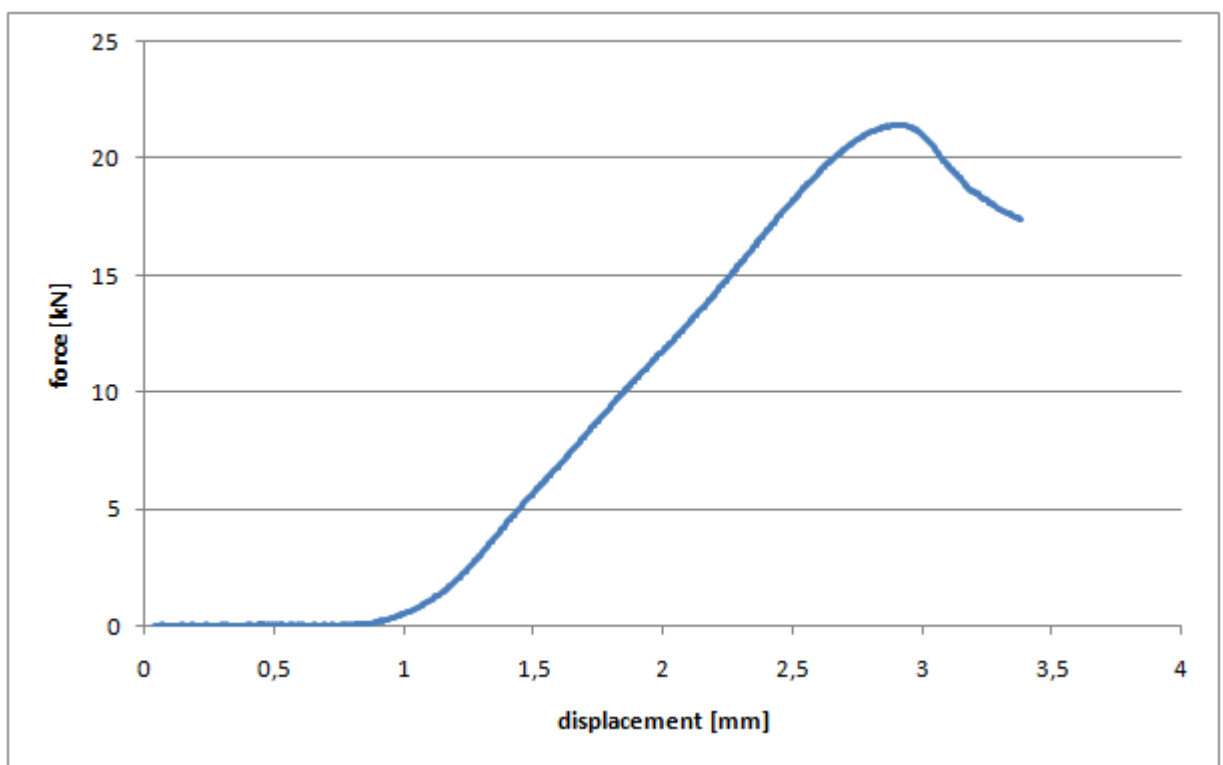


Failure of the stressed face



Compound between core and face

Test No.	I-B-3	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	297 mm	
thickness d	100 mm	
ultimate load	21,42 kN	
ultimate stress	70,5 N/mm ²	
ultimate stress based on failed width	70,5 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	

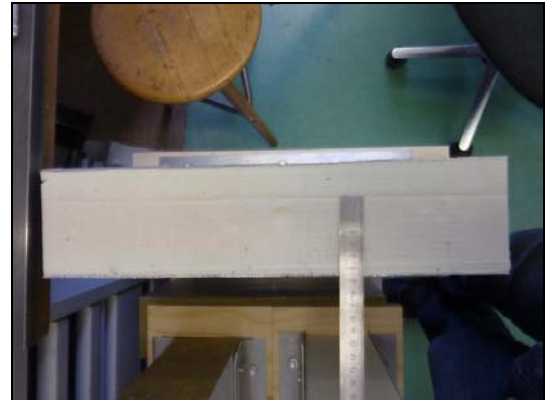


Test No.

I-B-3

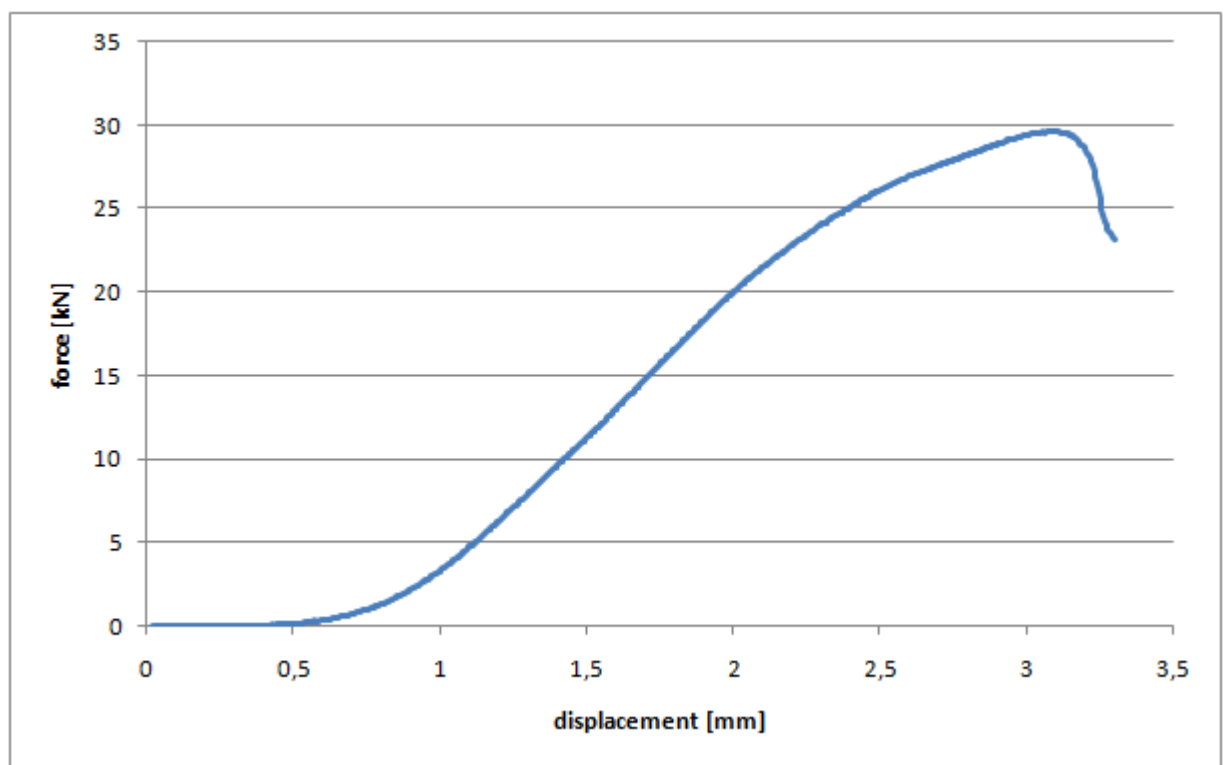


Failure of the stressed face



Compound between core and face

Test No.	I-B-4	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	297 mm	
thickness d	100 mm	
ultimate load	29,61 kN	
ultimate stress	97,4 N/mm ²	
ultimate stress based on failed width	97,4 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	

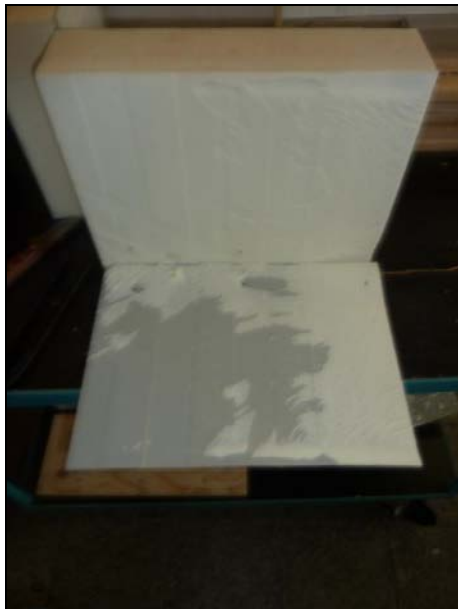
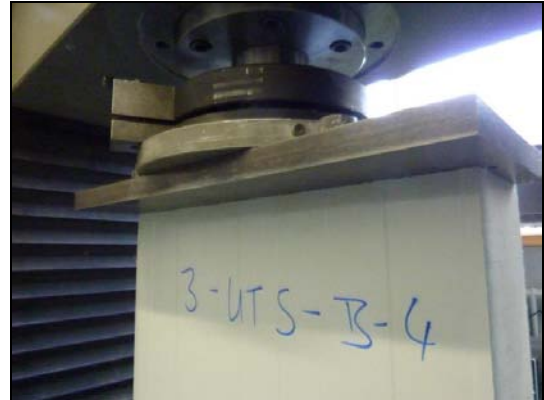


Test No.

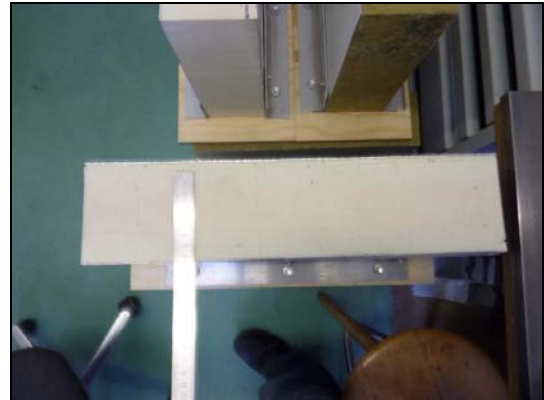
I-B-4



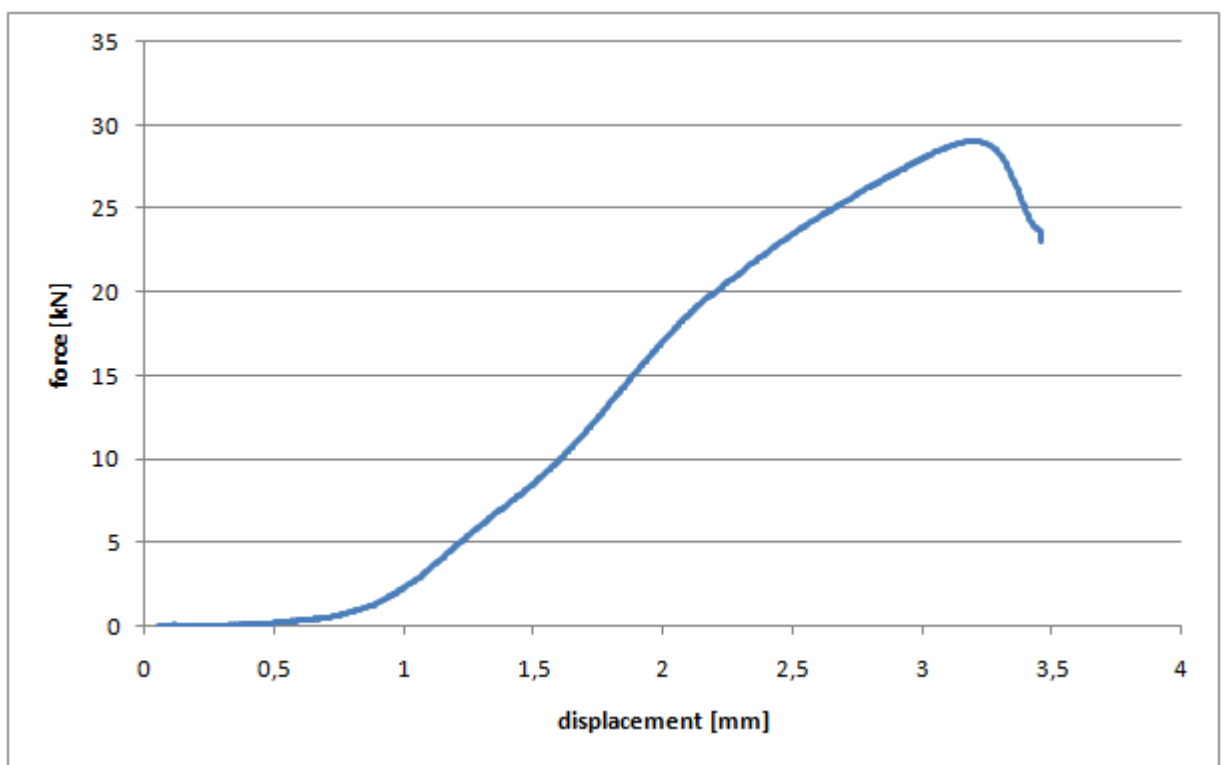
Failure of the stressed face



Compound between core and face

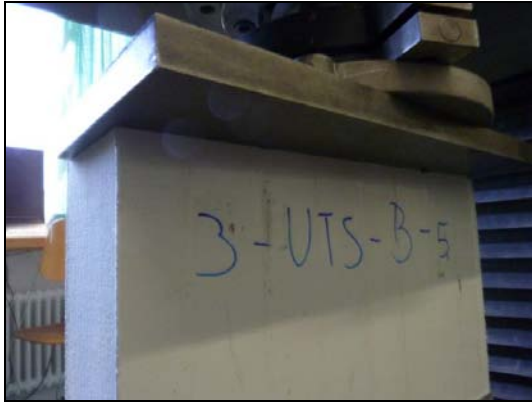


Test No.	I-B-5	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	295 mm	
thickness d	99,5 mm	
ultimate load	29,02 kN	
ultimate stress	95,2 N/mm ²	
ultimate stress based on failed width	95,2 N/mm ²	
Failure mode	cripling of stressed face	
Remarks	failed width b	



Test No.

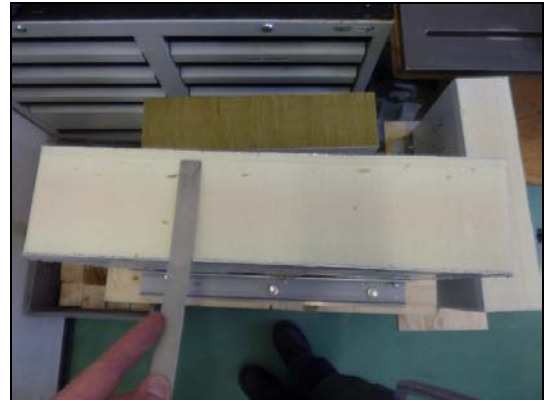
I-B-5



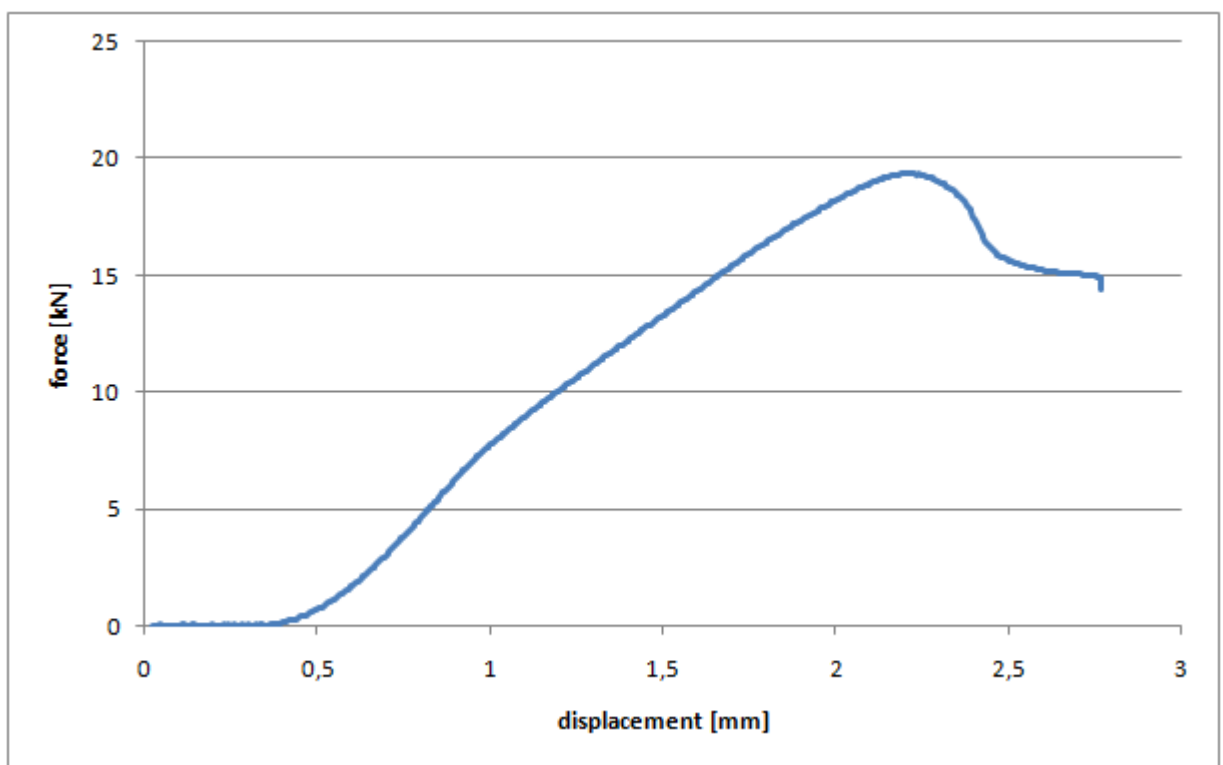
Failure of the stressed face



Compound between core and face

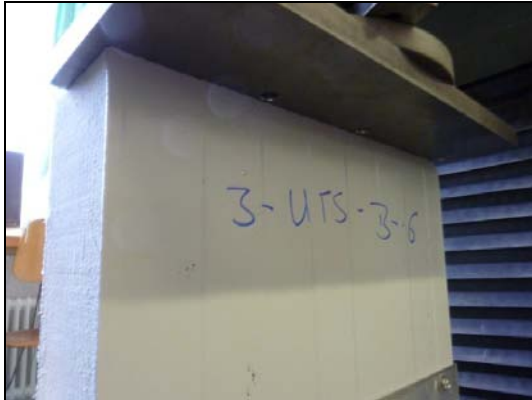


Test No.	I-B-6	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	295 mm	
thickness d	99,5 mm	
ultimate load	19,40 kN	
ultimate stress	63,7 N/mm ²	
ultimate stress based on failed width	63,7 N/mm ²	
Failure mode	cripling of stressed face	
Remarks	failed width b	

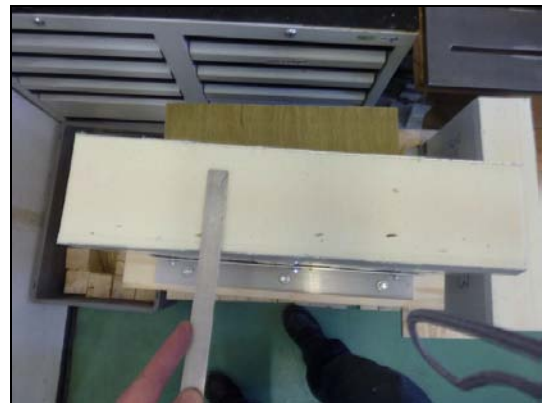


Test No.

I-B-6

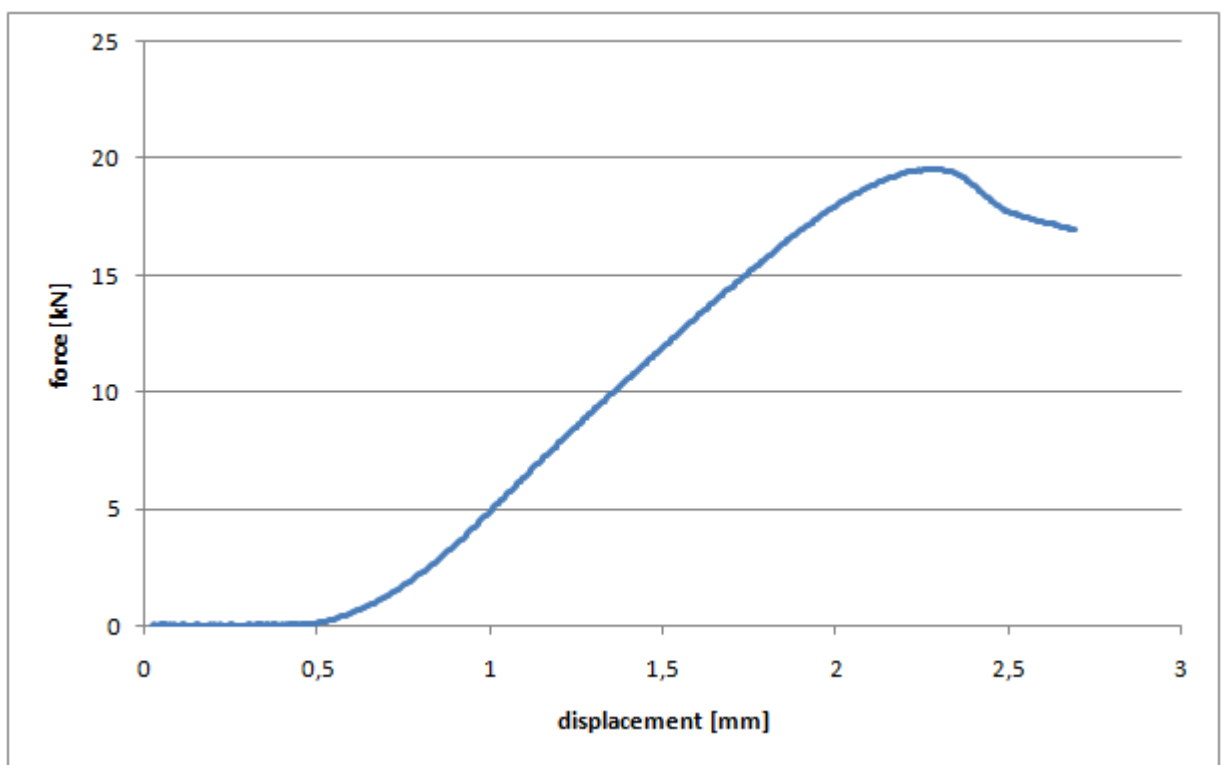






Failure of the stressed face



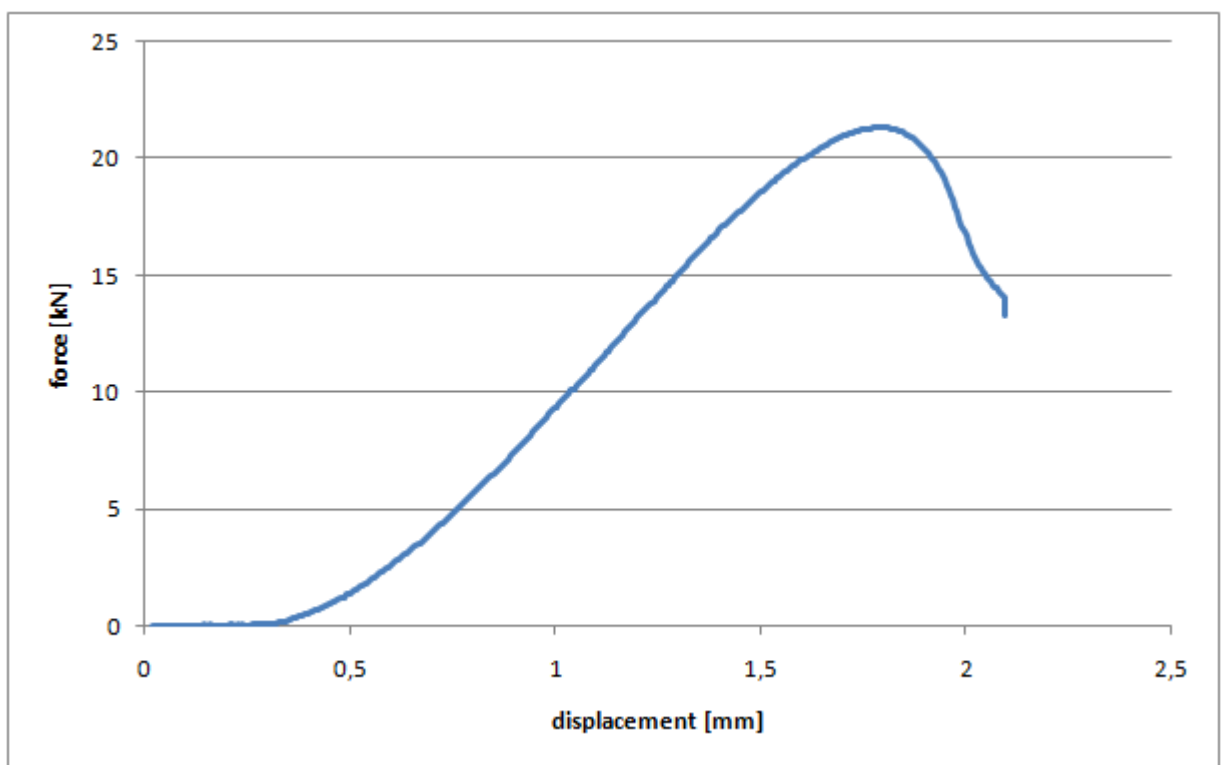
Compound between core and face

Test No.	I-B-7	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	301 mm	
thickness d	99,5 mm	
ultimate load	19,54 kN	
ultimate stress	64,3 N/mm ²	
ultimate stress based on failed width	64,3 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No.	I-B-7
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	

Test No.		I-B-8
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	301 mm	
thickness d	99,5 mm	
ultimate load	21,33 kN	
ultimate stress	70,2 N/mm ²	
ultimate stress based on failed width	70,2 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



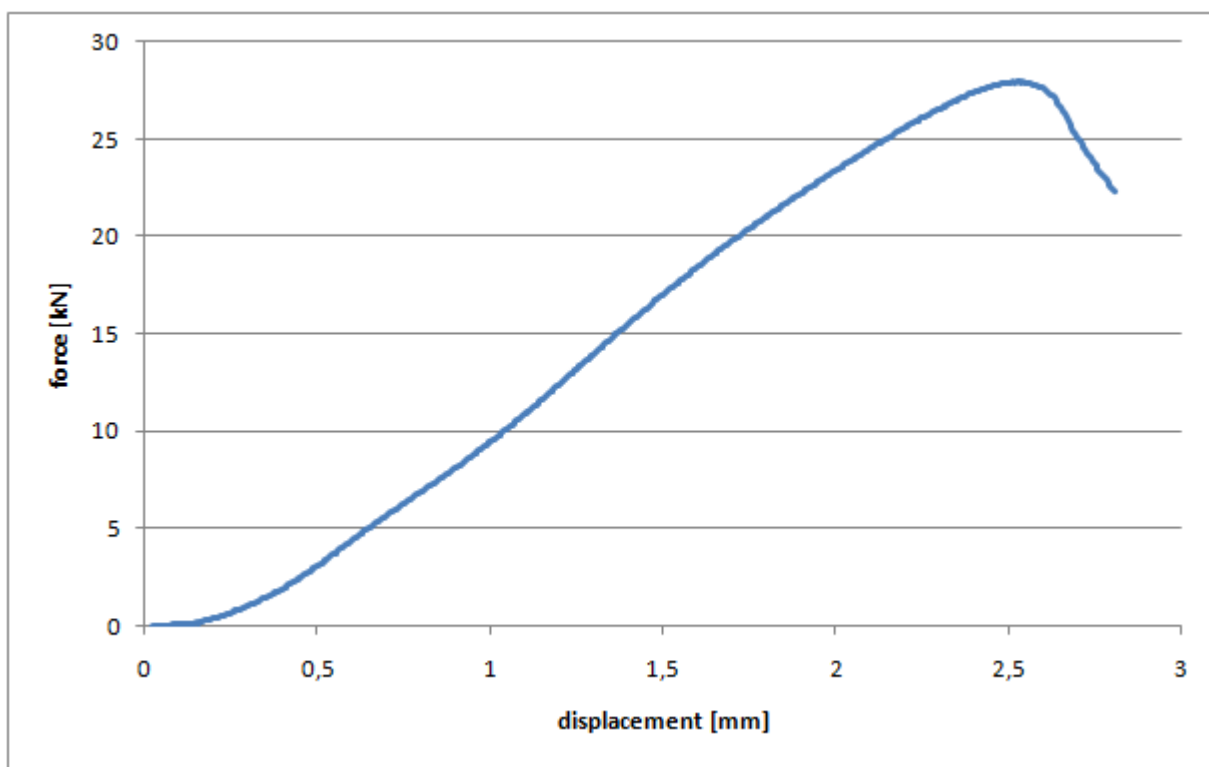
Test No.

I-B-8



Compound between core and face

Test No.	I-B-9	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	28,01 kN	
ultimate stress	92,1 N/mm ²	
ultimate stress based on failed width	92,1 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No.

I-B-9

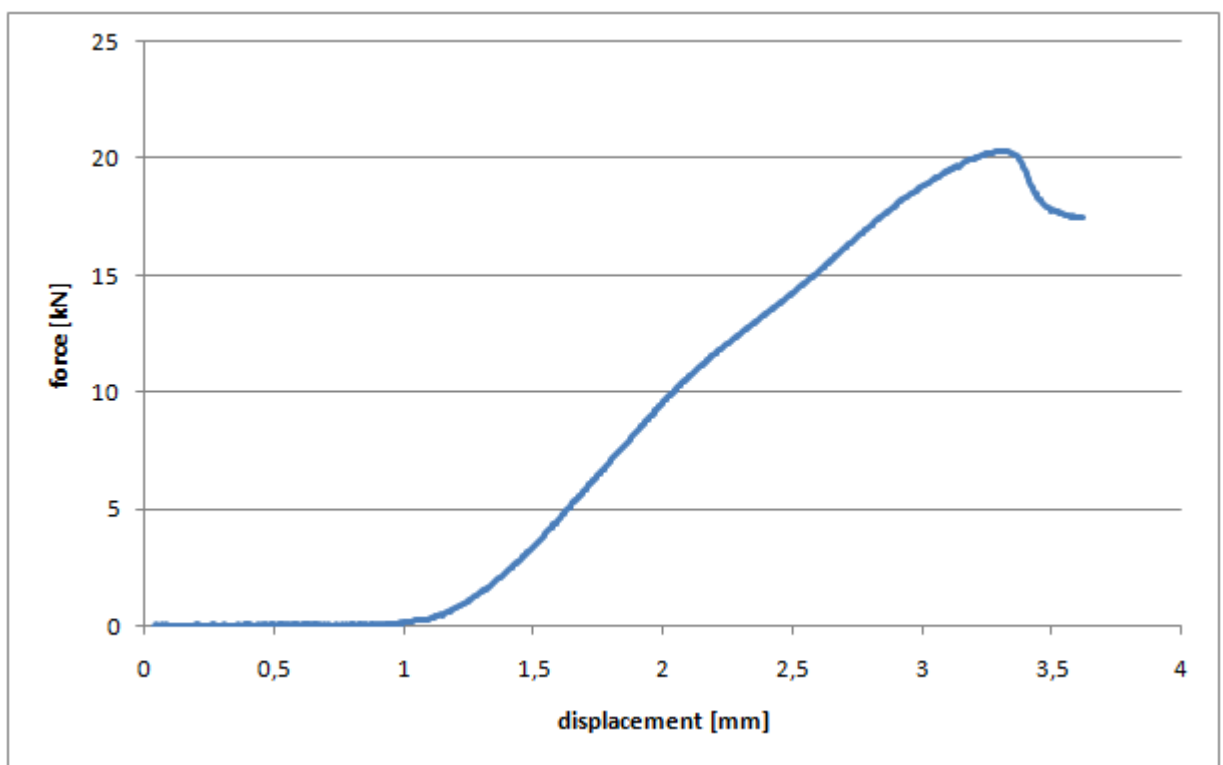


Failure of the stressed face



Compound between core and face

Test No.	I-B-10	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	20,33 kN	
ultimate stress	66,9 N/mm ²	
ultimate stress based on failed width	66,9 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No.

I-B-10

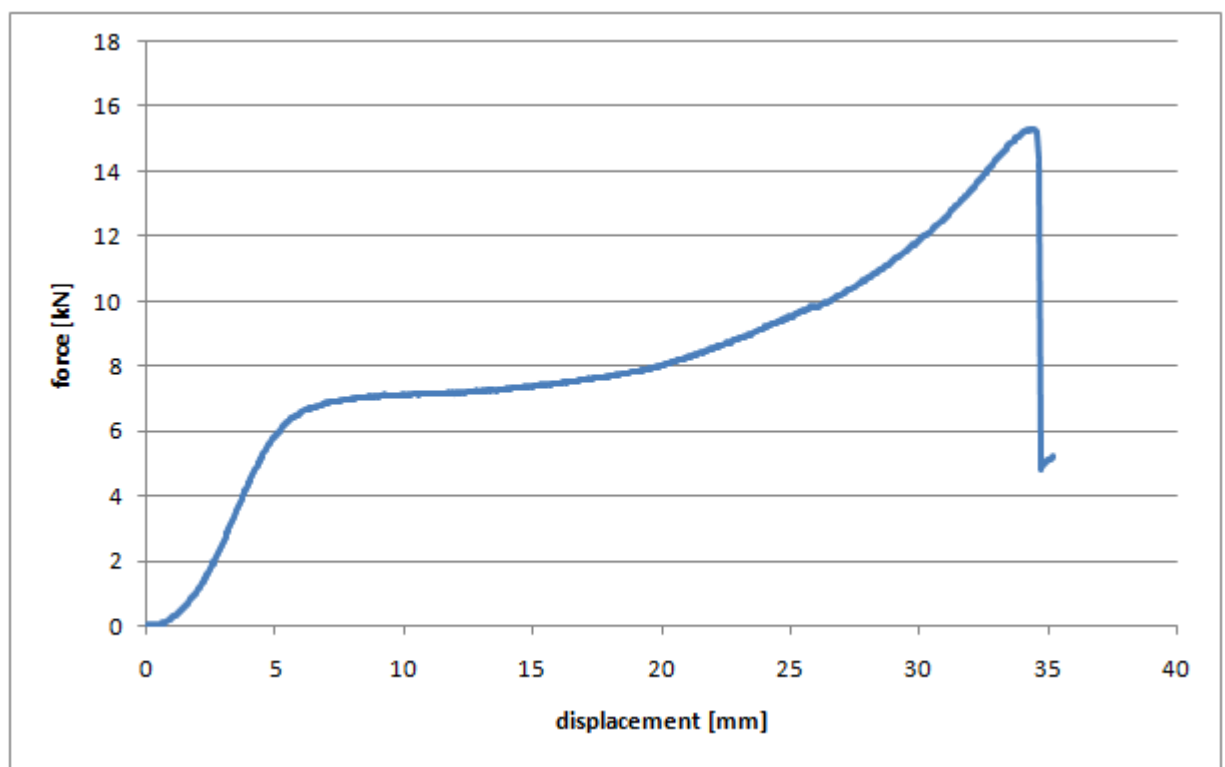


Failure of the stressed face



Compound between core and face

Test No.	I-B-11	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	299 mm	
thickness d	99 mm	
ultimate load	15,30 kN	
ultimate stress	50,3 N/mm ²	
ultimate stress based on failed width	50,3 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	

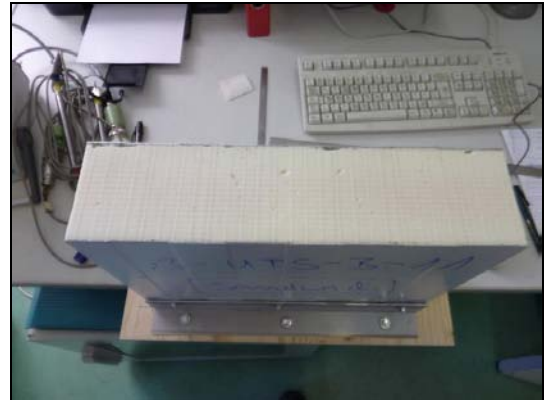


Test No.

I-B-11

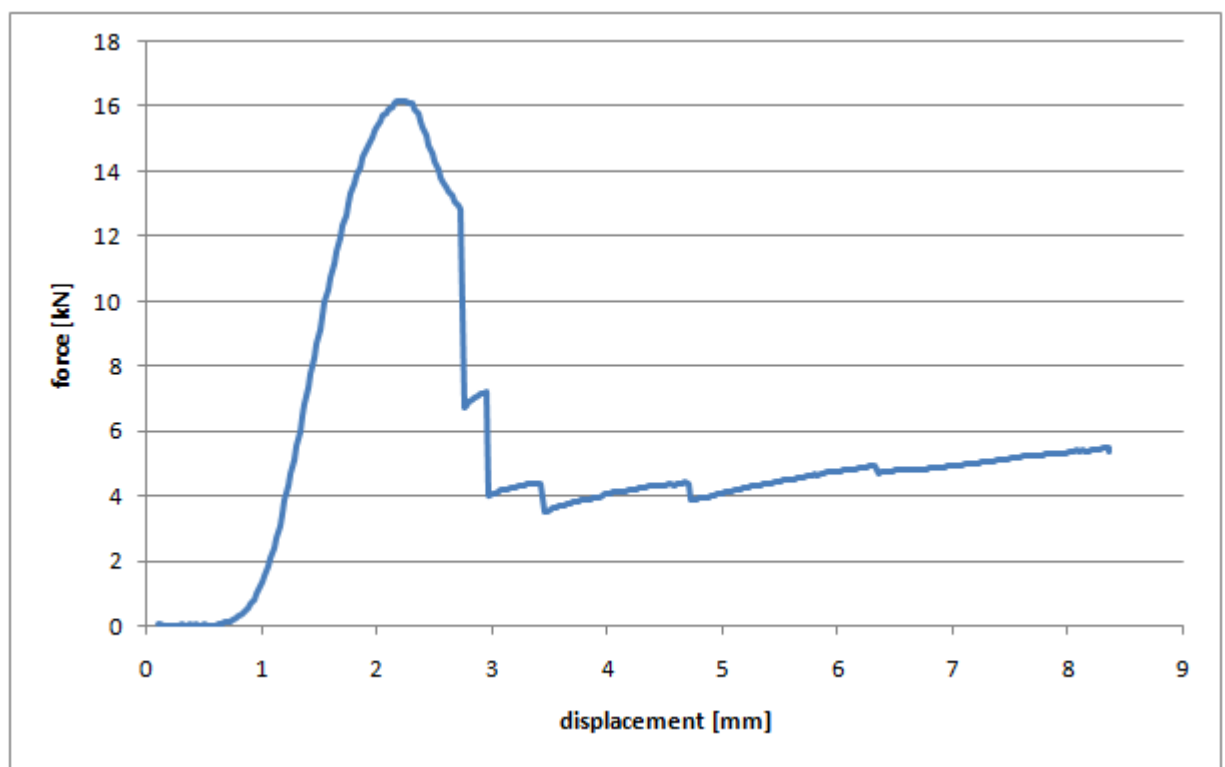


Failure of the stressed face



Compound between core and face

Test No.	I-B-12	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	299 mm	
thickness d	99 mm	
ultimate load	16,16 kN	
ultimate stress	53,2 N/mm ²	
ultimate stress based on failed width	53,2 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	



Test No.

I-B-12

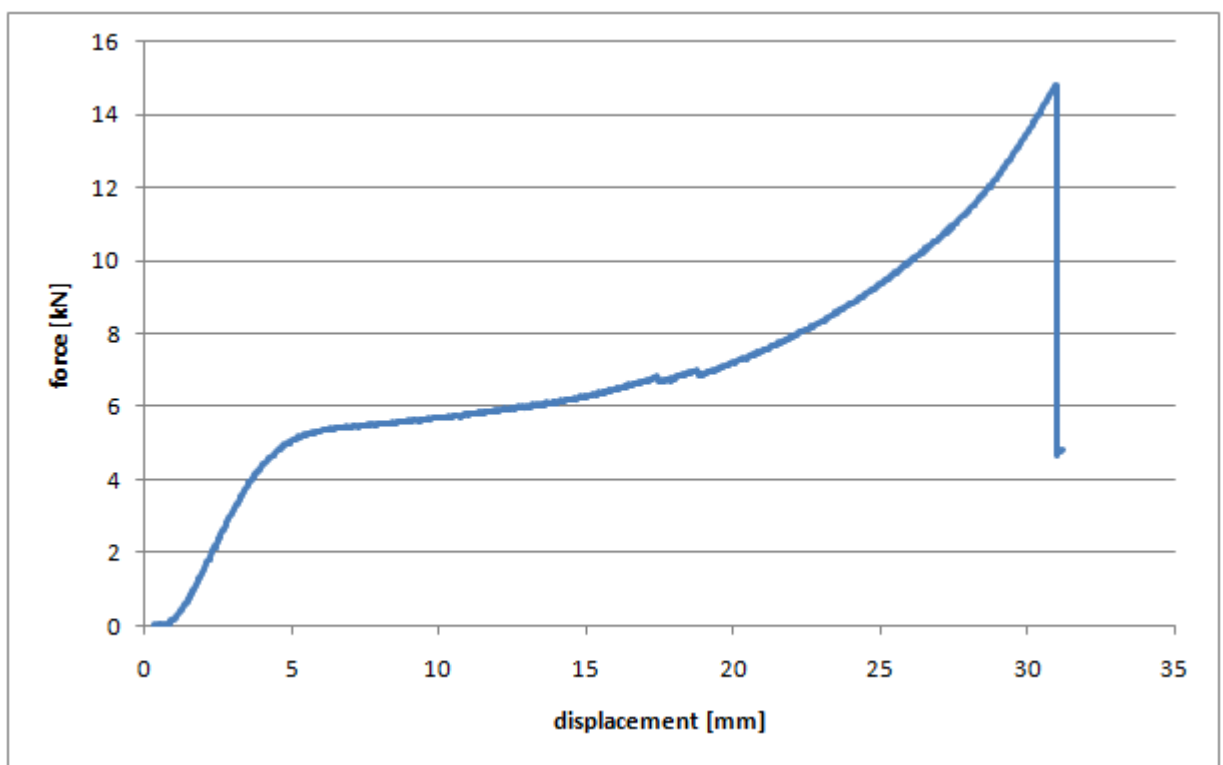


Failure of the stressed face



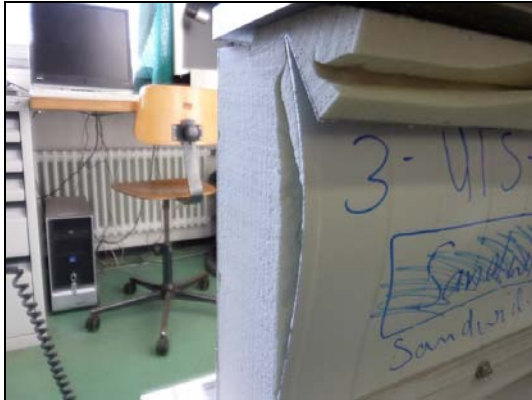
Compound between core and face

Test No.	I-B-13	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	14,82 kN	
ultimate stress	48,6 N/mm ²	
ultimate stress based on failed width	48,6 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	



Test No.

I-B-13

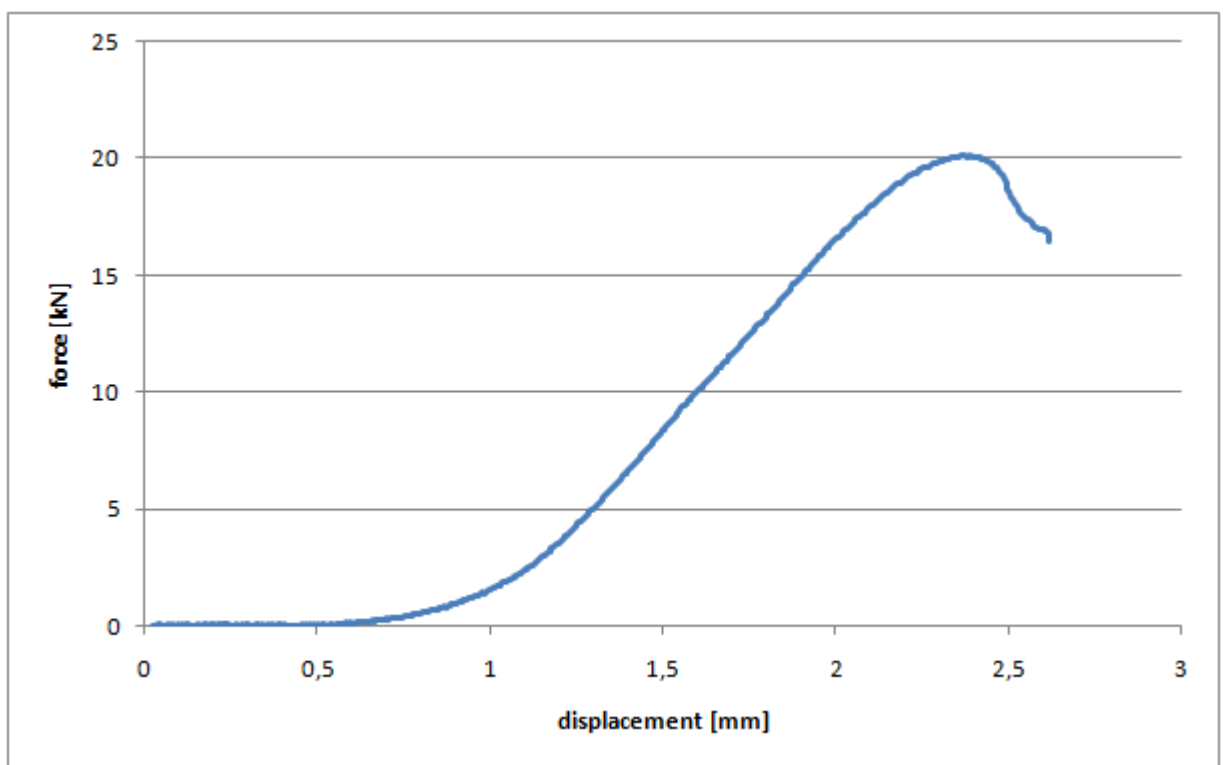


Failure of the stressed face



Compound between core and face

Test No.	I-B-14	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	20,16 kN	
ultimate stress	66,1 N/mm ²	
ultimate stress based on failed width	66,1 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No.

I-B-14

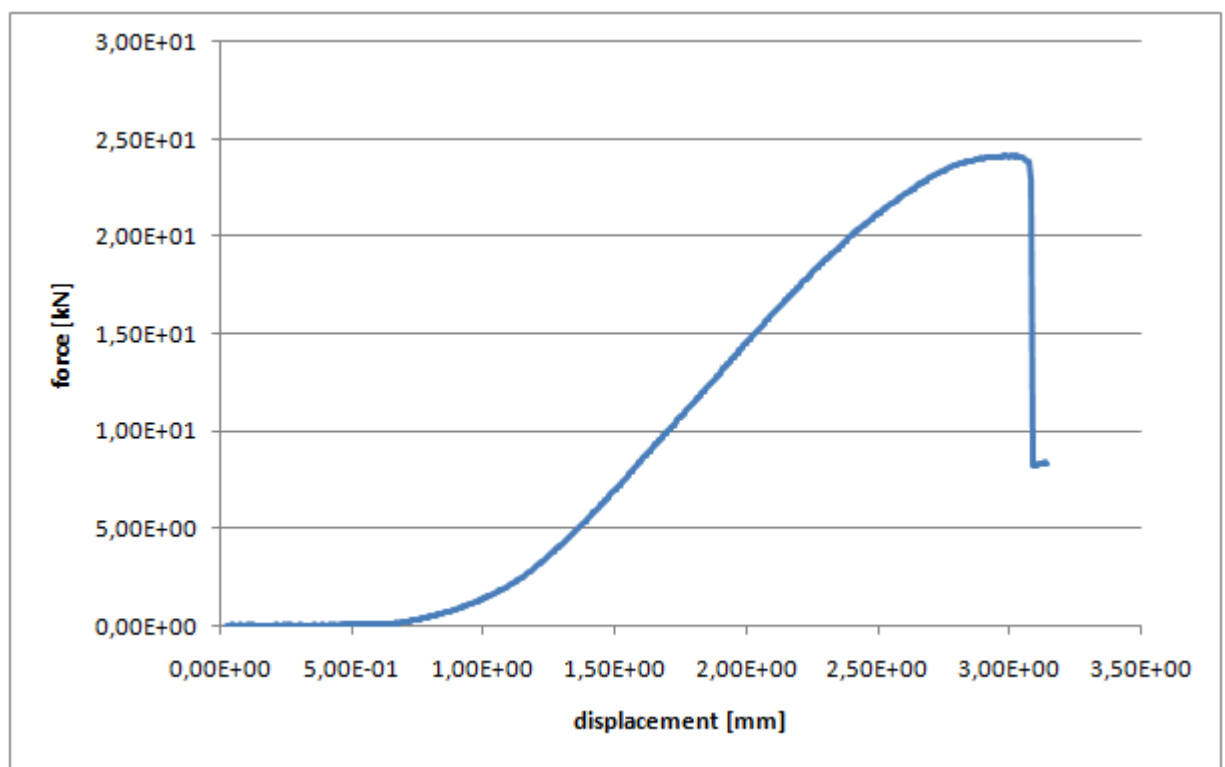


Failure of the stressed face



Compound between core and face

Test No.	I-B-15	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	24,13 kN	
ultimate stress	79,2 N/mm ²	
ultimate stress based on failed width	79,2 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	



Test No.

I-B-15

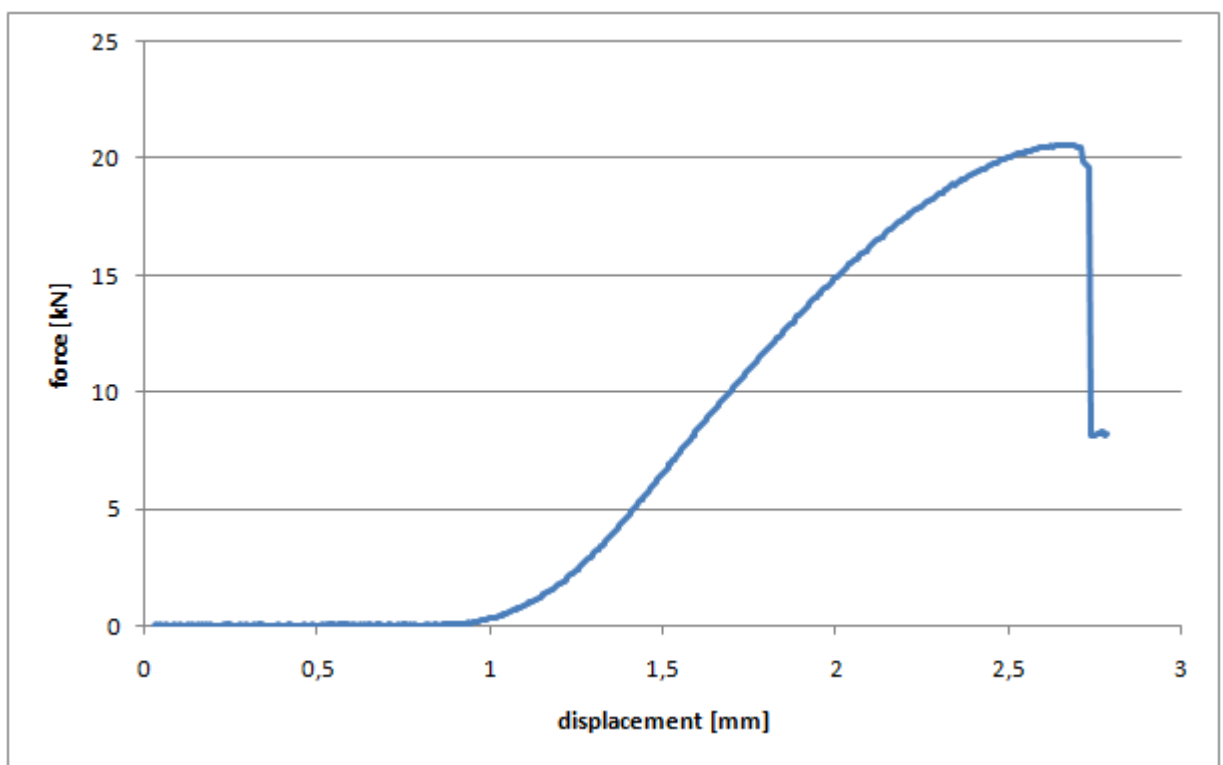


Failure of the stressed face



Compound between core and face

Test No.	I-B-16	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	20,60 kN	
ultimate stress	67,6 N/mm ²	
ultimate stress based on failed width	67,6 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	



Test No.

I-B-16

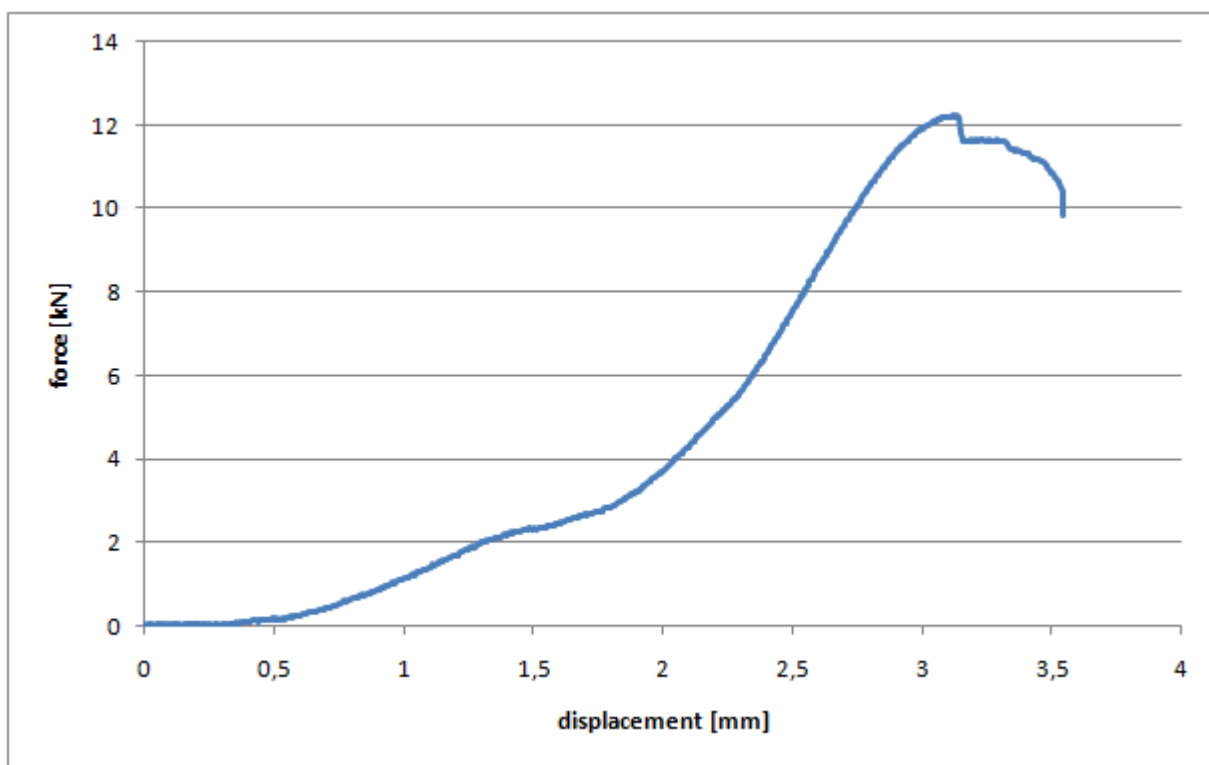


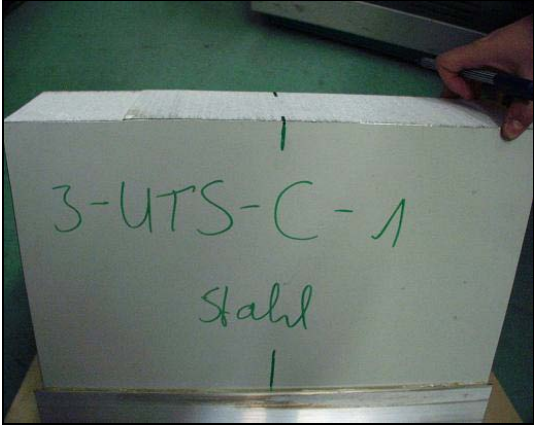


Failure of the stressed face



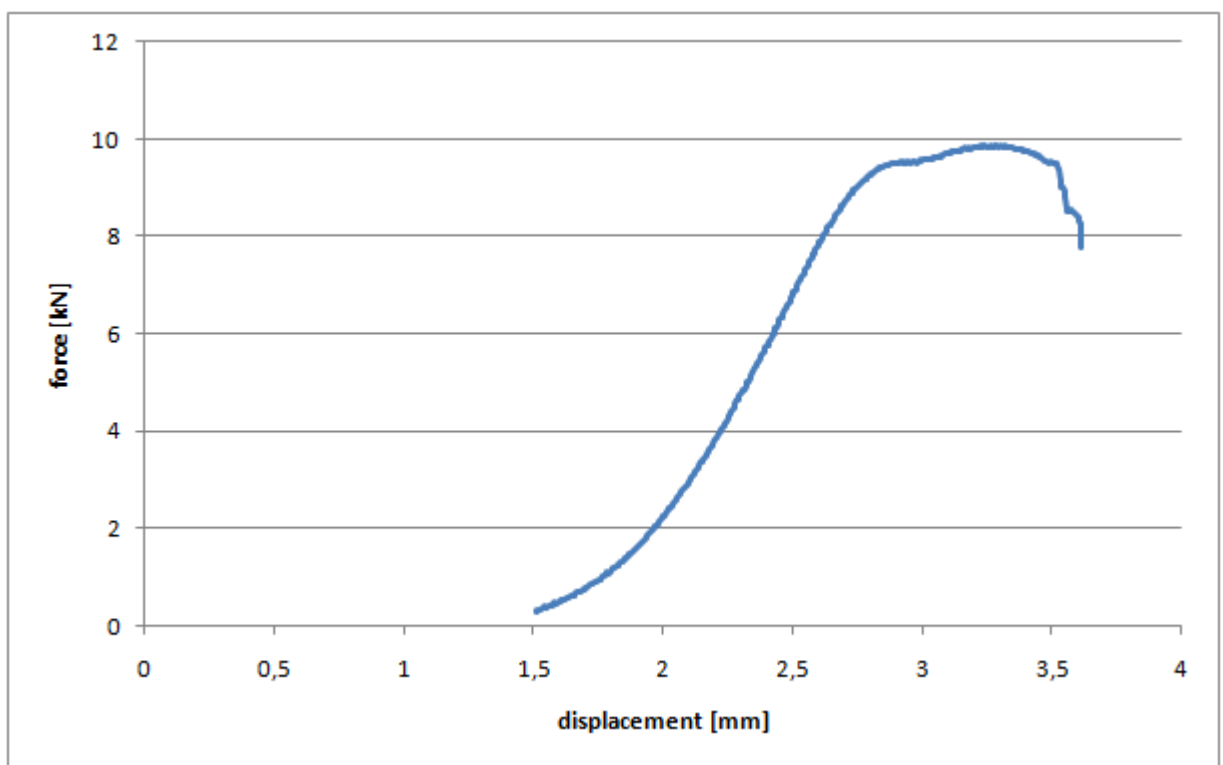
Compound between core and face

Test No.	I-C-1	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	C	
faces	0,60 mm steel	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	390 mm	
height l	293 mm	
thickness d	99 mm	
ultimate load	12,26 kN	
ultimate stress	58,32 N/mm ²	
ultimate stress based on failed width	58,32 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No.	I-C-1
 <p>Uneven cutting of load application line</p>	 <p>Failure of the stressed face</p>
 <p>Cracks in the core material caused by cutting</p>	

Test No.	I-C-2	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	C	
faces	0,60 mm steel	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	391 mm	
height l	291 mm	
thickness d	99 mm	
ultimate load	9,89 kN	
ultimate stress	46,9 N/mm ²	
ultimate stress based on failed width	62,8 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 3/4b	



Test No.

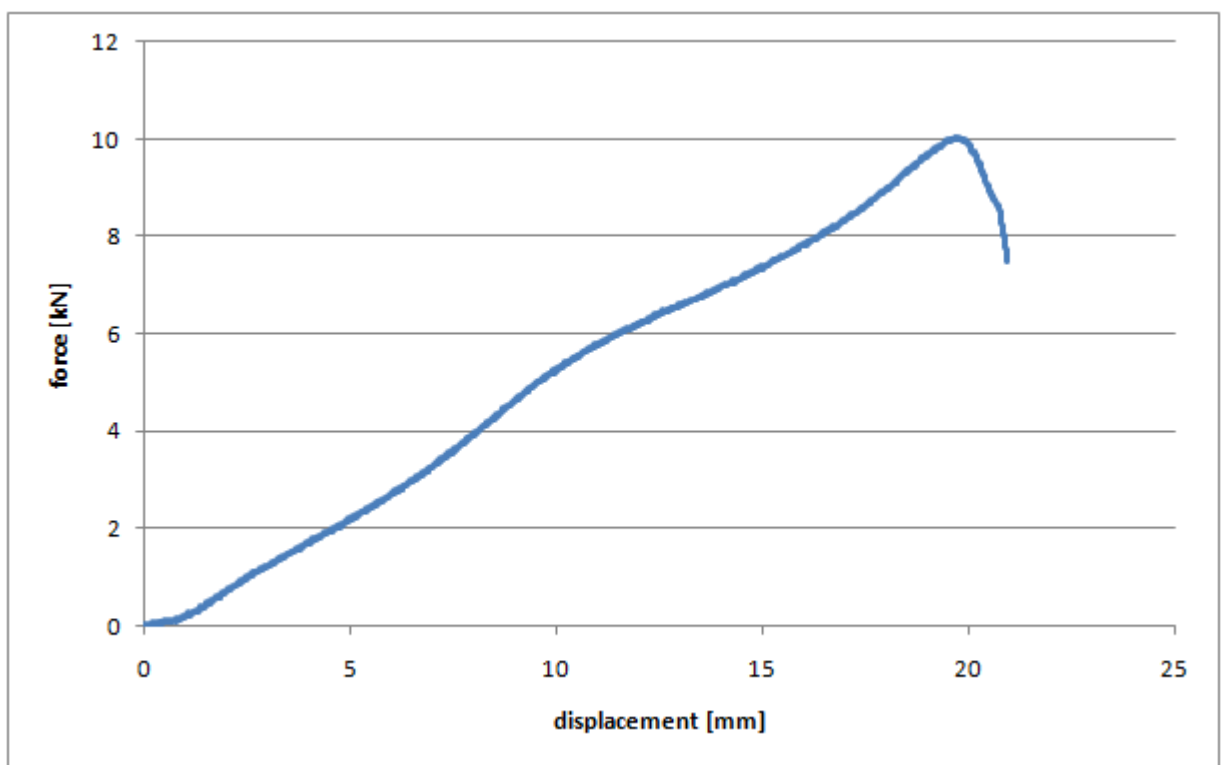
I-C-2






Failure of the stressed face

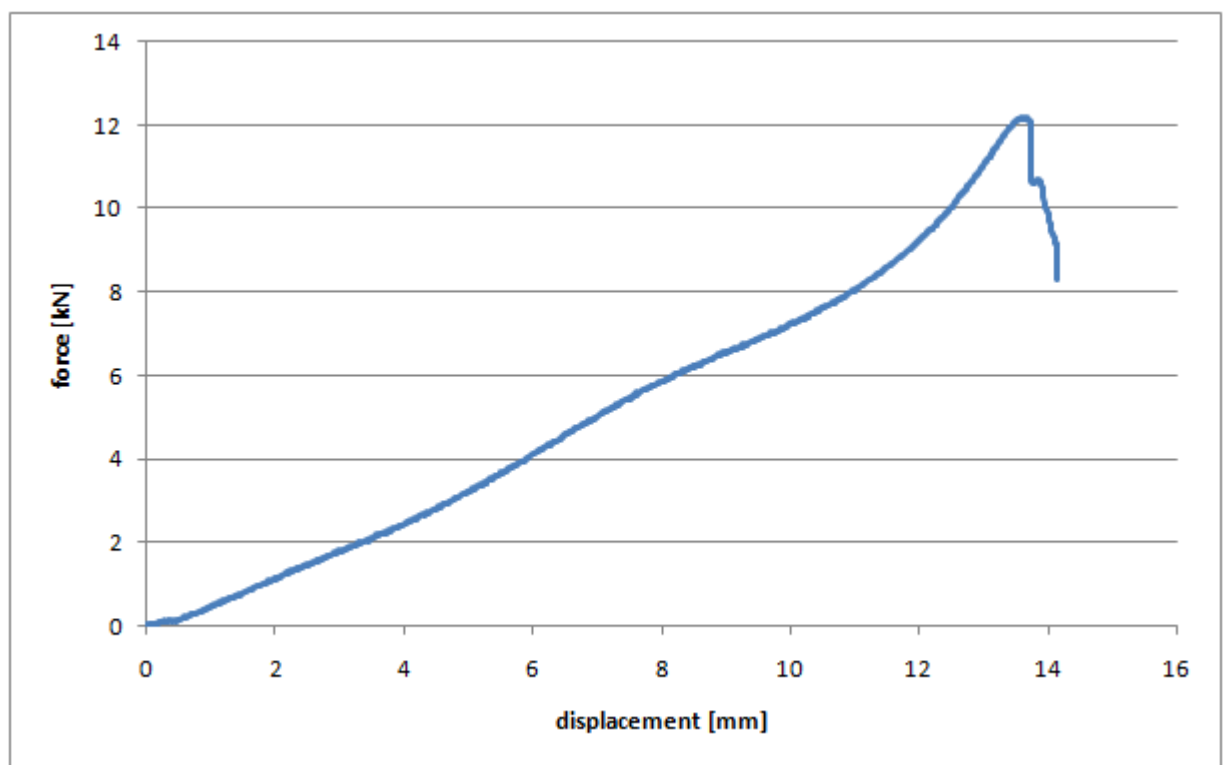


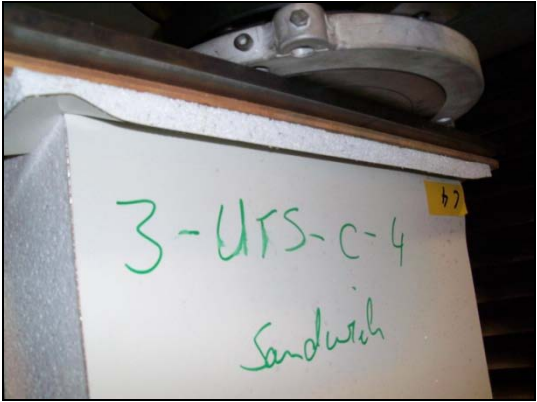
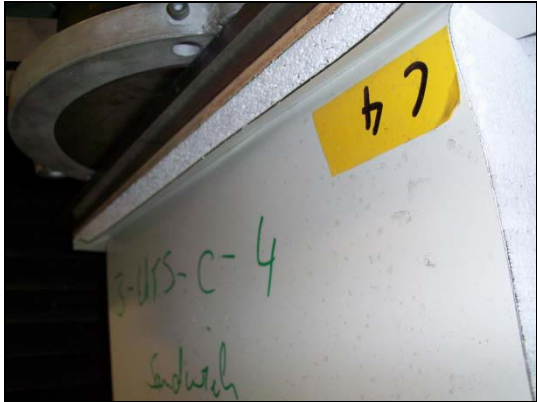
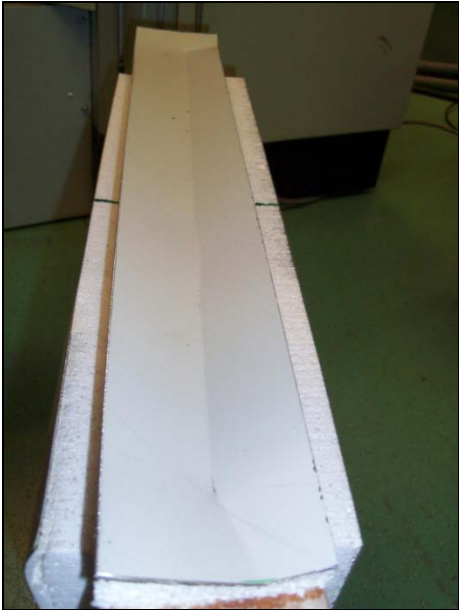
Test No.	I-C-3	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	C	
faces	0,60 mm steel	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	390 mm	
height l	291 mm	
thickness d	99 mm	
ultimate load	10,02 kN	
ultimate stress	47,7 N/mm ²	
ultimate stress based on failed width	47,7 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



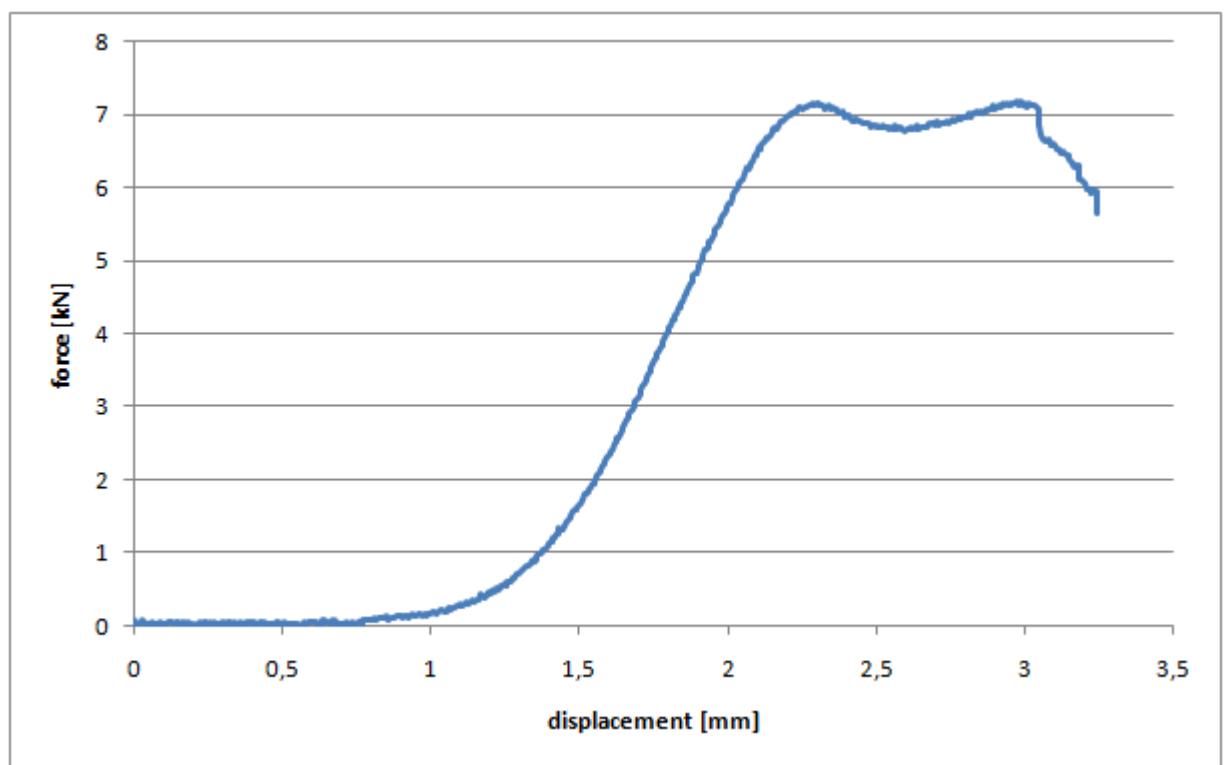
Test No.	I-C-3
 <p>Failure of the stressed face</p>	
	
<p>Sandwich panel used for introduction of load</p>	

Test No.	I-C-4	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	C	
faces	0,60 mm steel	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	390 mm	
height l	292 mm	
thickness d	100 mm	
ultimate load	12,18 kN	
ultimate stress	57,9 N/mm ²	
ultimate stress based on failed width	57,9 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



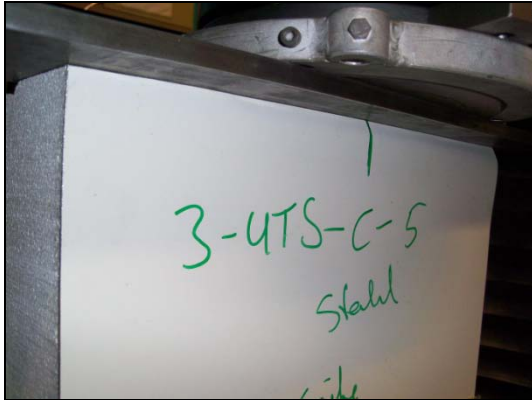
Test No.	I-C-4
 <p>Failure of the stressed face</p>	
	
<p>Sandwich panel used for introduction of load</p>	

Test No.	I-C-5	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	C	
faces	0,60 mm steel	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	390 mm	
height l	291 mm	
thickness d	99 mm	
ultimate load	7,18 kN	
ultimate stress	34,2 N/mm ²	
ultimate stress based on failed width	51,2 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 2/3b	

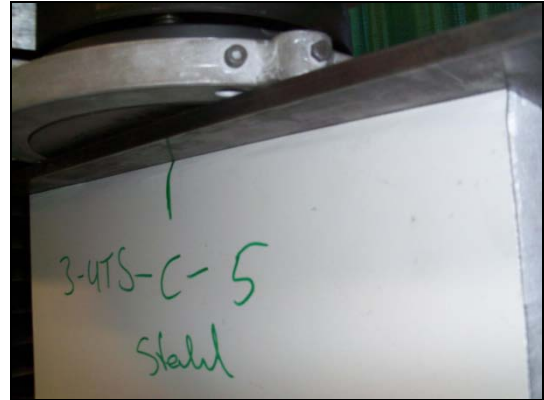


Test No.

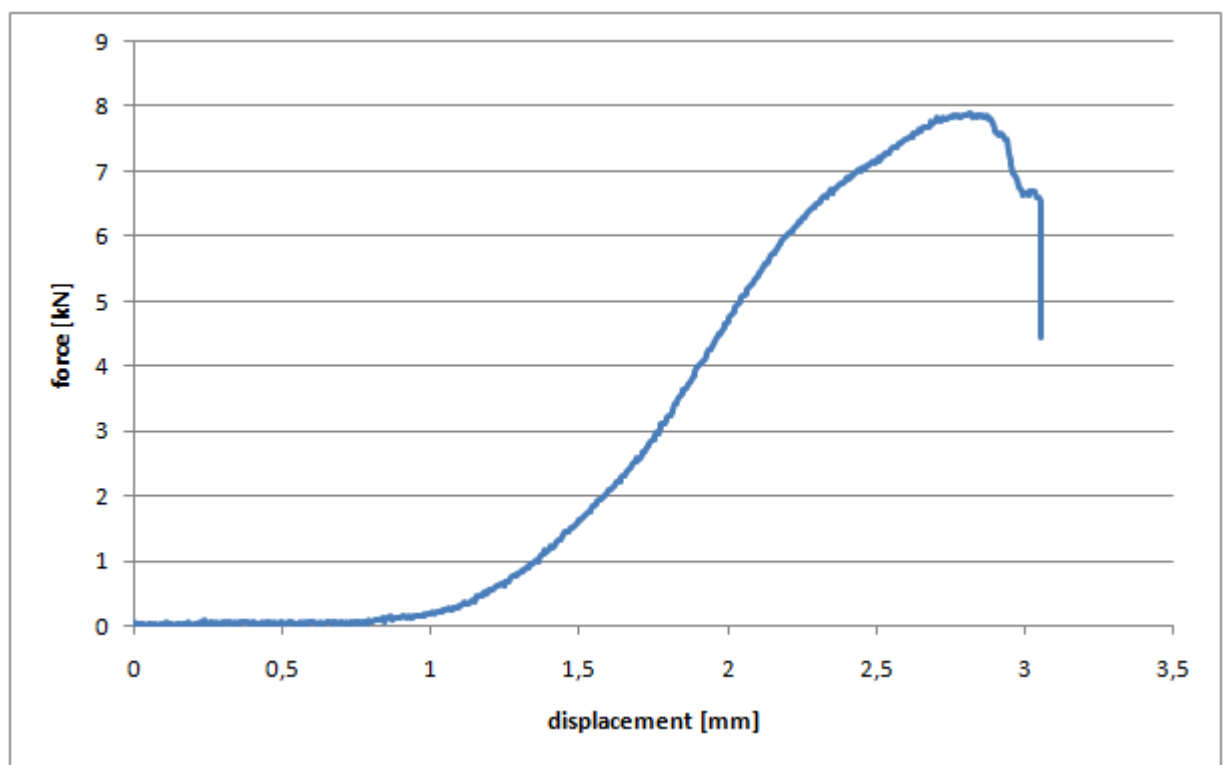
I-C-5



Failure of the stressed face

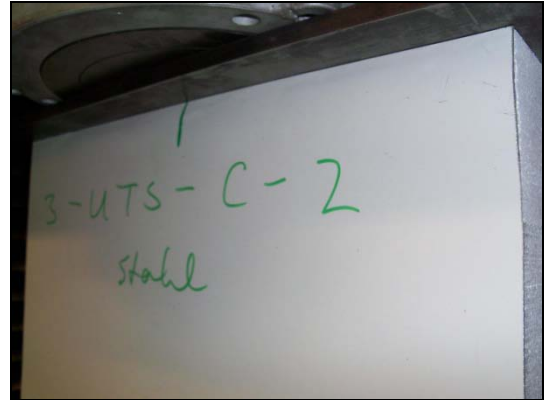
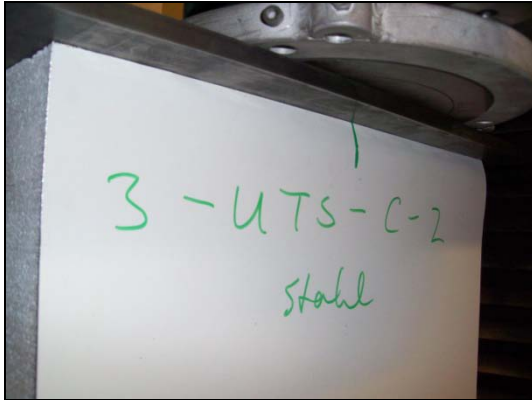


Test No.	I-C-7	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	C	
faces	0,60 mm steel	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	391 mm	
height l	291 mm	
thickness d	99 mm	
ultimate load	7,89 kN	
ultimate stress	37,4 N/mm ²	
ultimate stress based on failed width	44,9 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 5/6b	



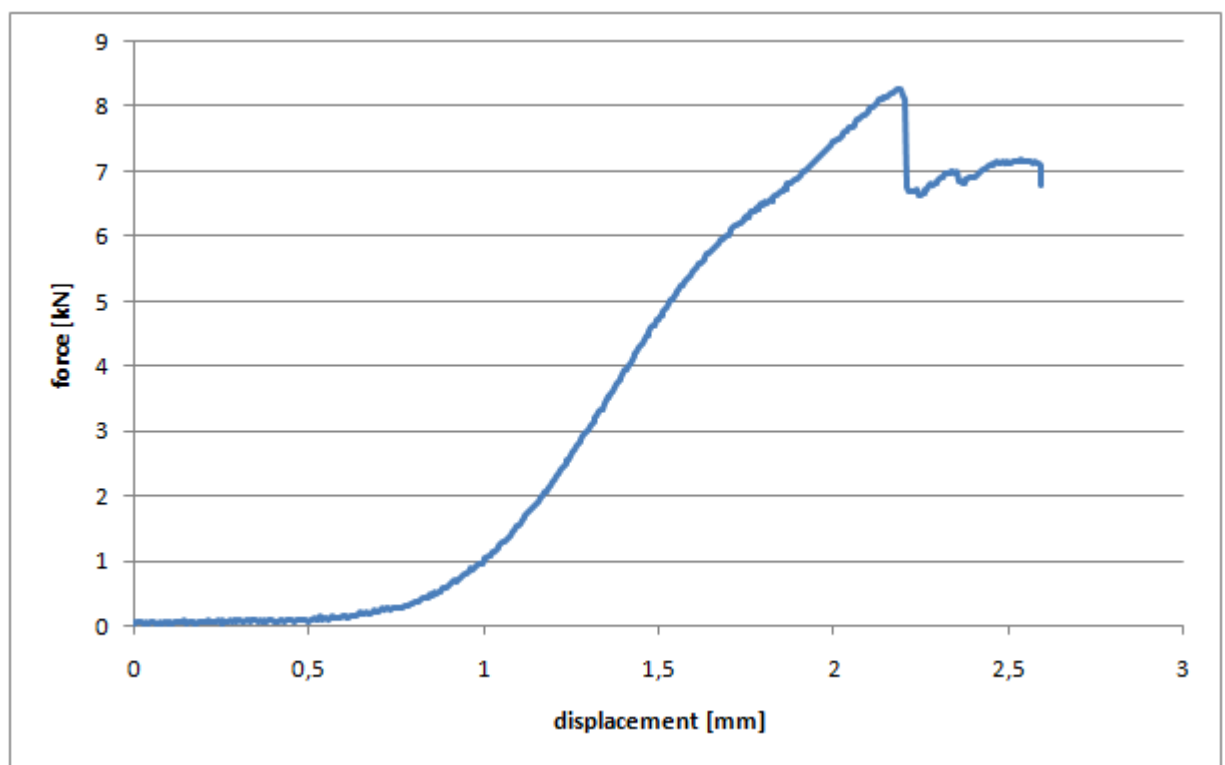
Test No.

I-C-7



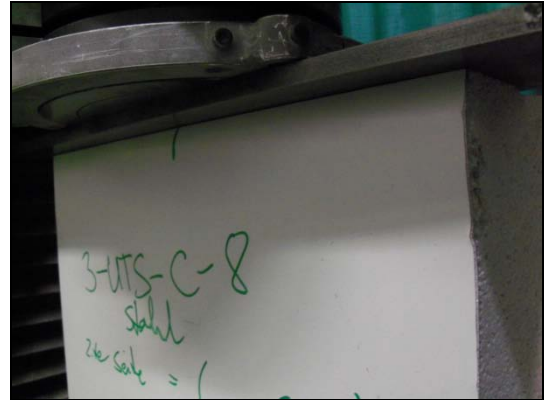
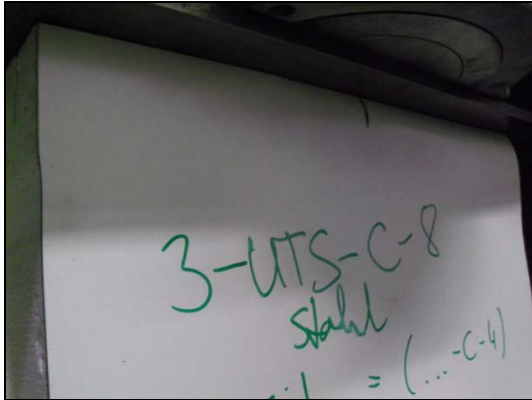
Failure of the stressed face

Test No.	I-C-8	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	C	
faces	0,60 mm steel	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	390 mm	
height l	292 mm	
thickness d	100 mm	
ultimate load	8,26 kN	
ultimate stress	39,3 N/mm ²	
ultimate stress based on failed width	52,4 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width 3/4b	



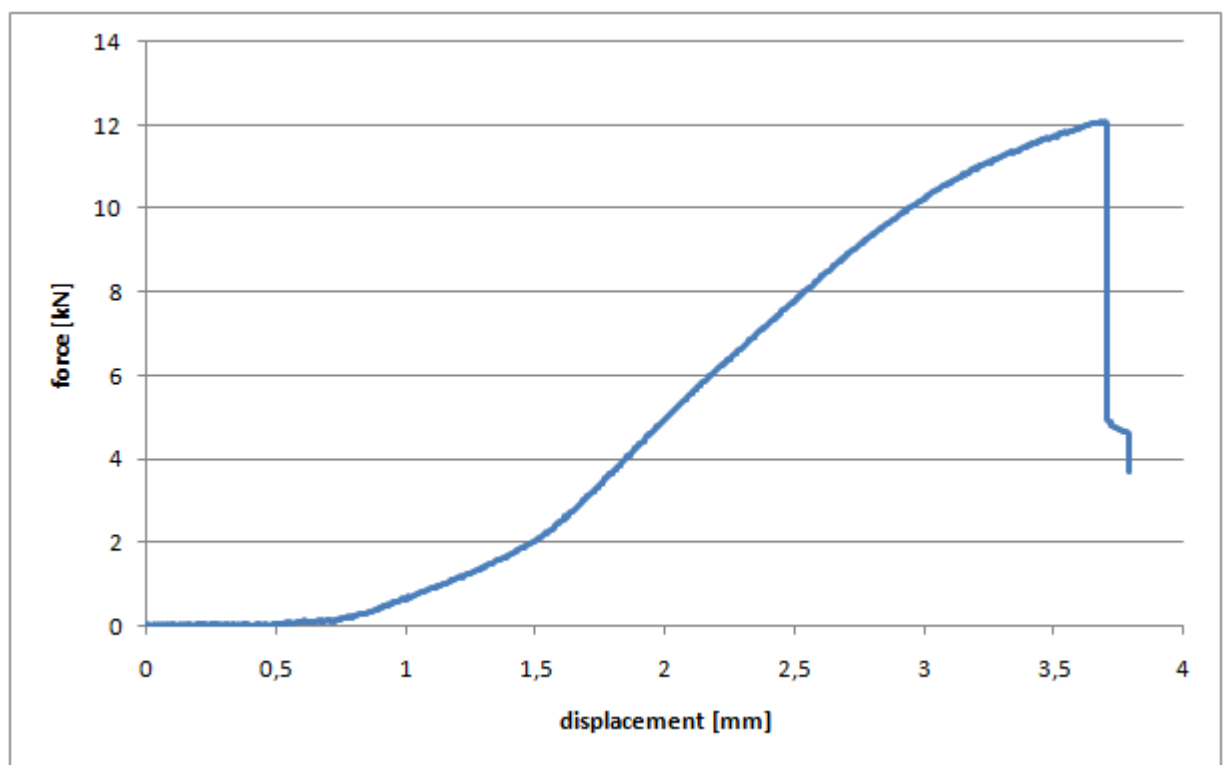
Test No.

I-C-8



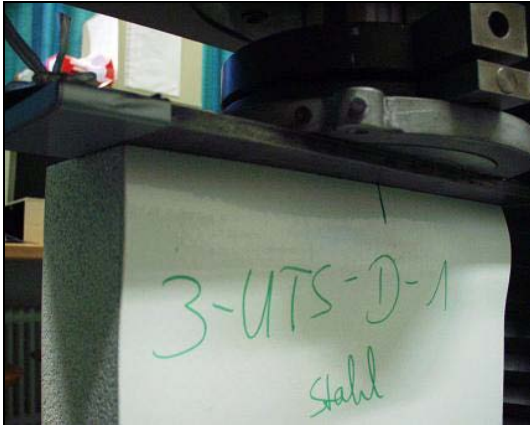
Failure of the stressed face

Test No.	I-D-1	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300 mm	
thickness d	101 mm	
ultimate load	12,10 kN	
ultimate stress	16,8 N/mm ²	
ultimate stress based on failed width	16,8 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	



Test No.

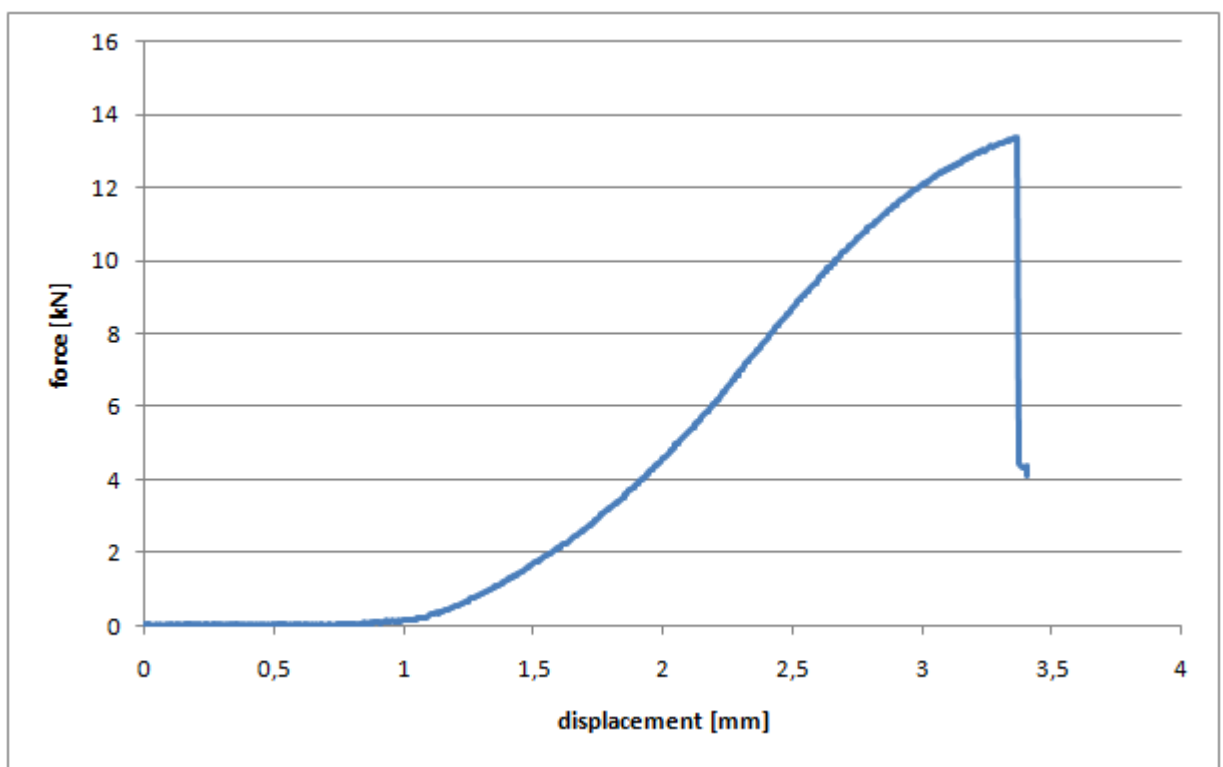
I-D-1



Failure of the stressed face

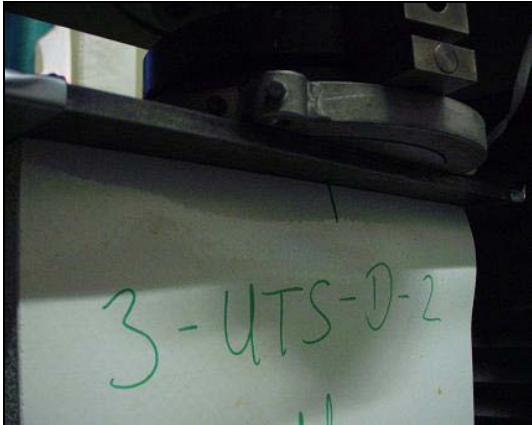


Test No.	I-D-2	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	300 mm	
thickness d	102 mm	
ultimate load	13,37 kN	
ultimate stress	18,6 N/mm ²	
ultimate stress based on failed width	18,6 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	

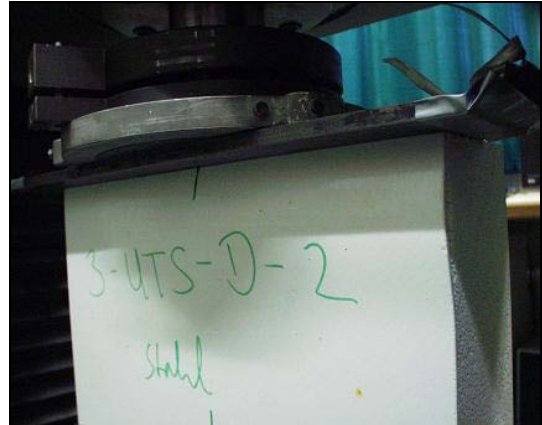


Test No.

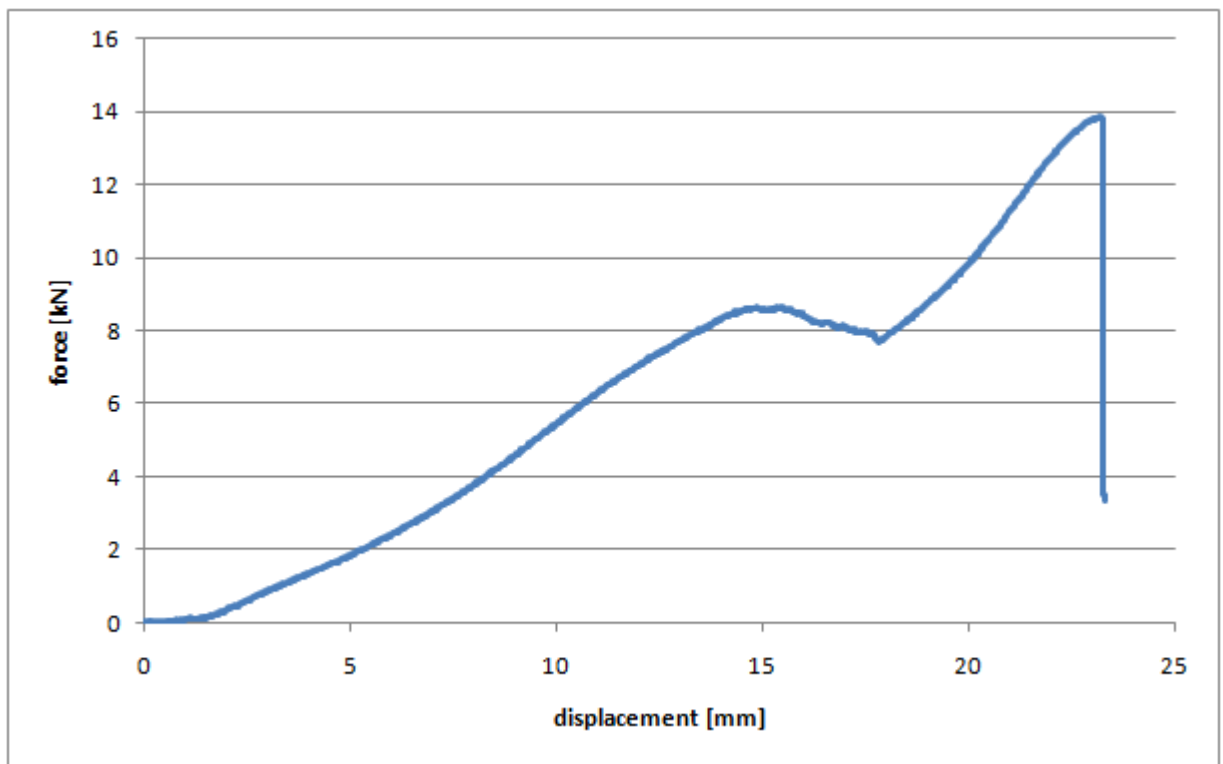
I-D-2

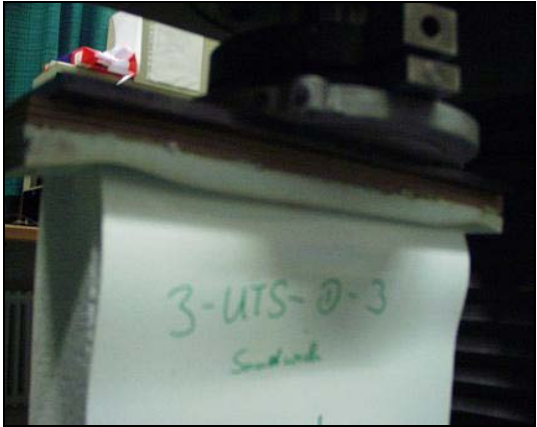
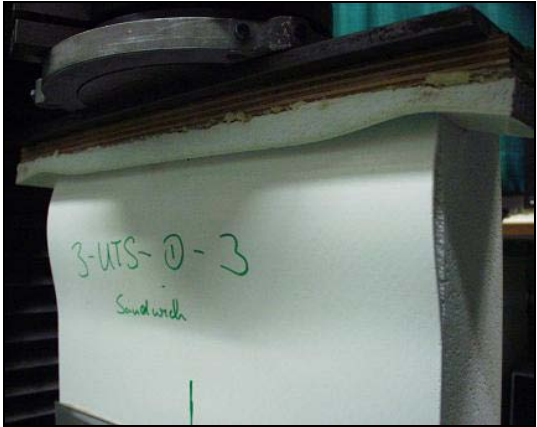



Failure of the stressed face

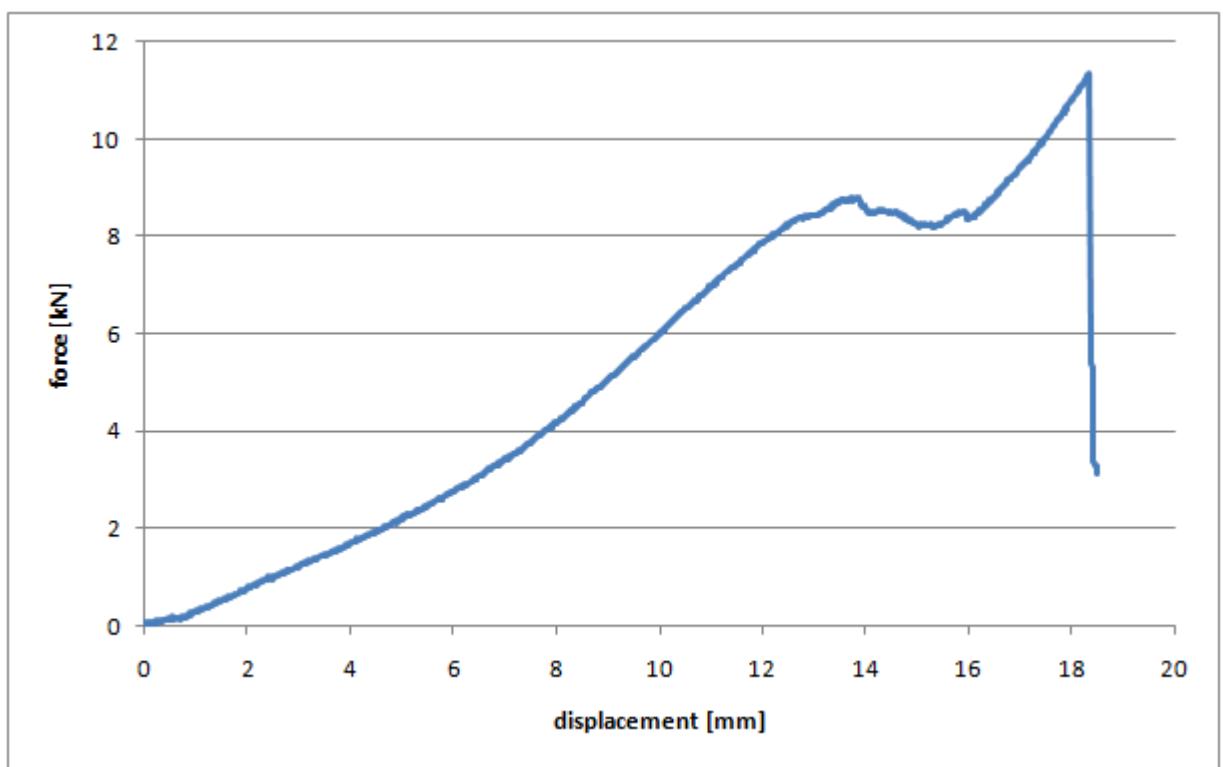


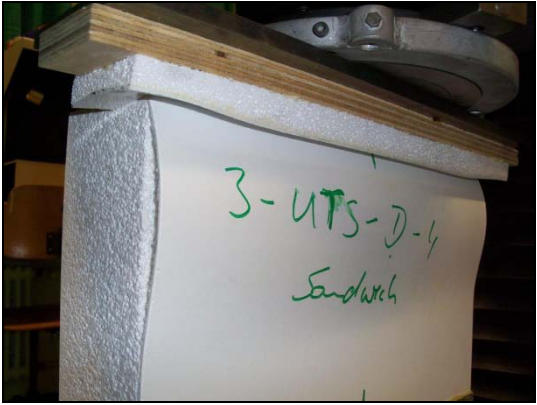
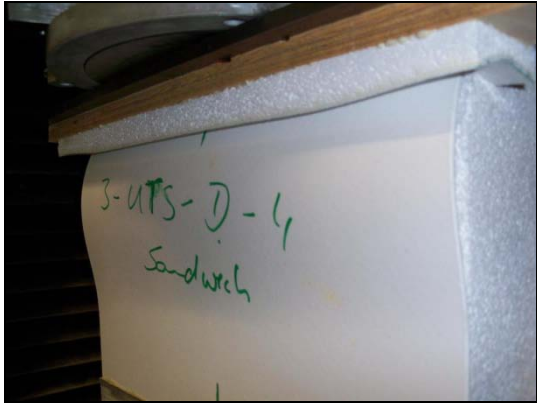

Test No.	I-D-3	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	300 mm	
thickness d	102 mm	
ultimate load	13,87 kN	
ultimate stress	19,3 N/mm ²	
ultimate stress based on failed width	19,3 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	



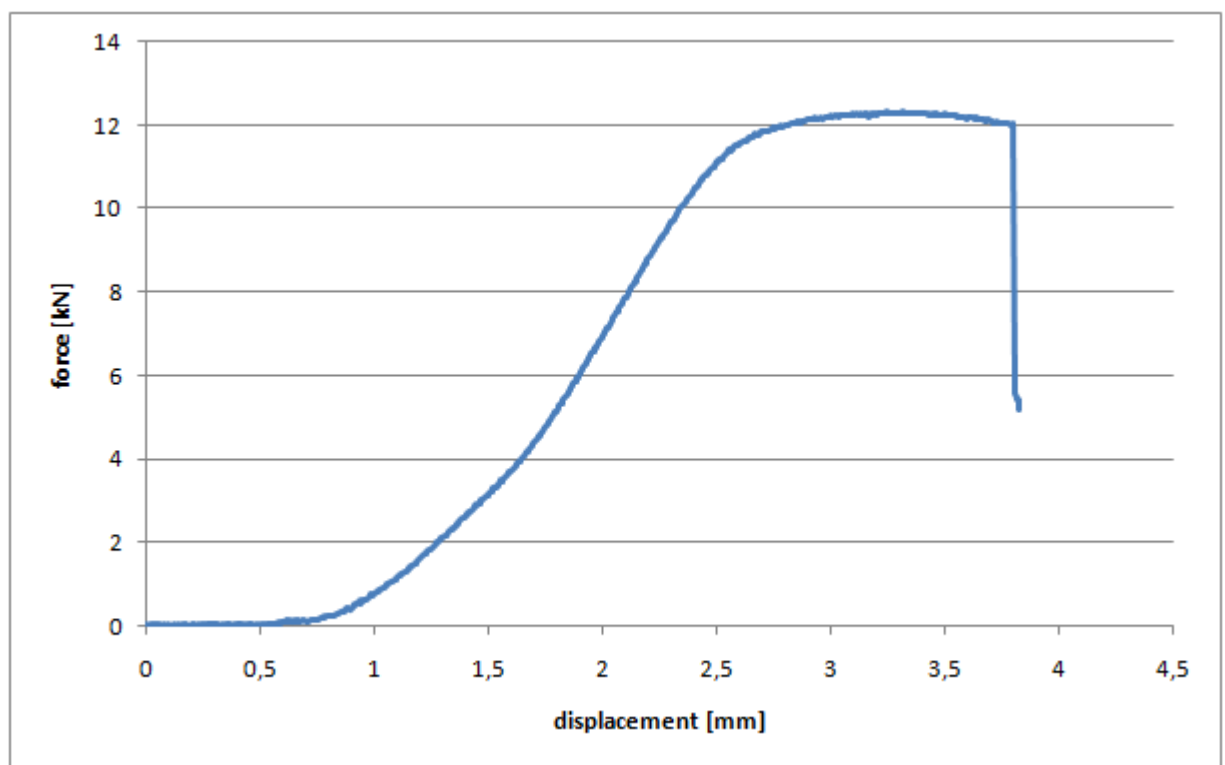
Test No.	I-D-3
 <p>Failure of the stressed face</p>	
	
<p>sandwich panel used for introduction of load</p>	

Test No.	I-D-4	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	300 mm	
thickness d	102 mm	
ultimate load	11,34 kN	
ultimate stress	15,8 N/mm ²	
ultimate stress based on failed width	15,8 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	



Test No.	I-D-4
 <p>Failure of the stressed face</p>	
 <p>sandwich panel used for introduction of load</p>	

Test No.	I-D-5	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	300 mm	
thickness d	102 mm	
ultimate load	12,35 kN	
ultimate stress	17,2 N/mm ²	
ultimate stress based on failed width	17,2 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	

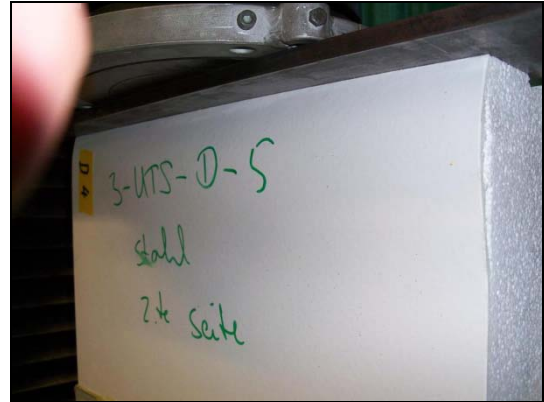


Test No.

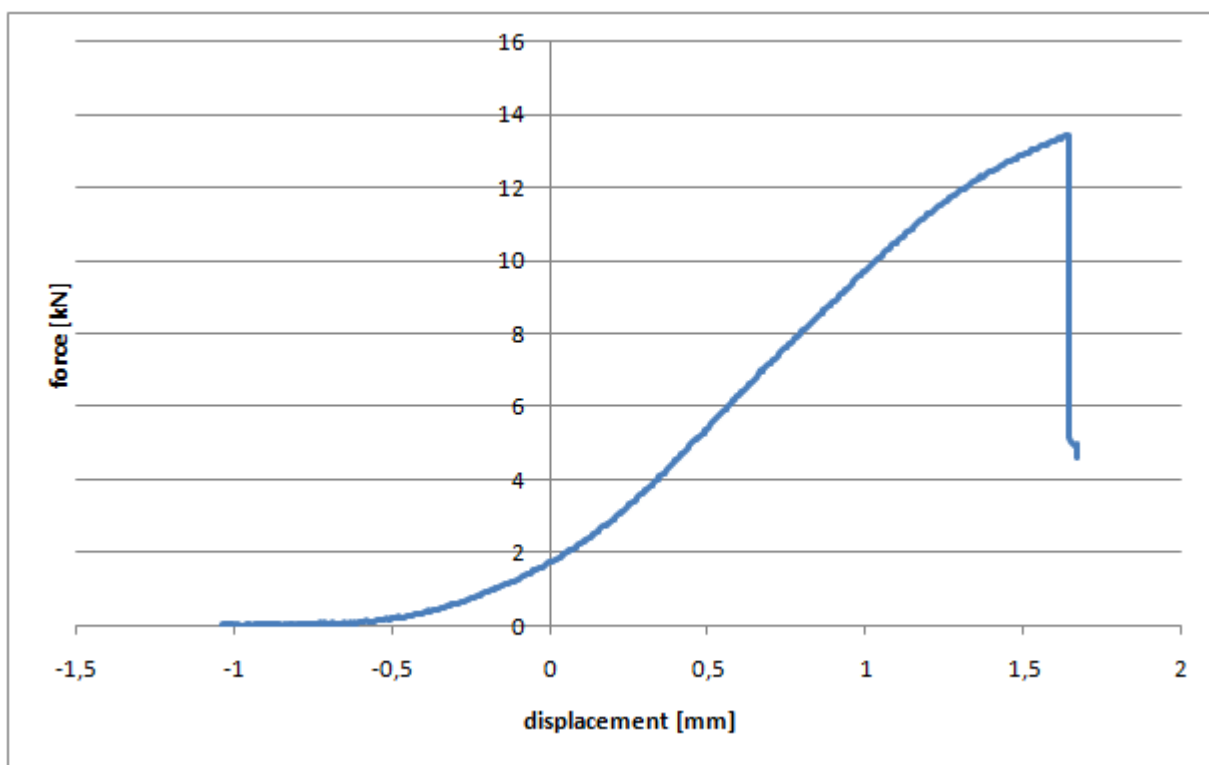
I-D-5



Failure of the stressed face

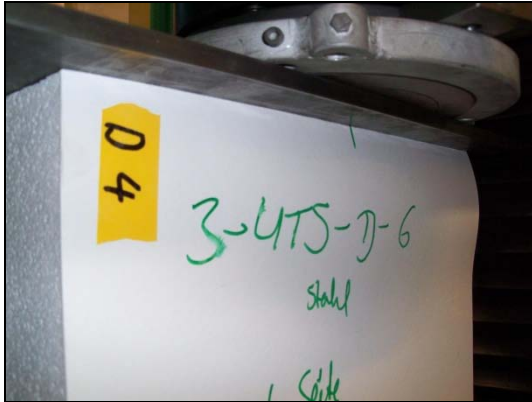


Test No.	I-D-6	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	300 mm	
thickness d	102 mm	
ultimate load	13,43 kN	
ultimate stress	18,7 N/mm ²	
ultimate stress based on failed width	18,7 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	

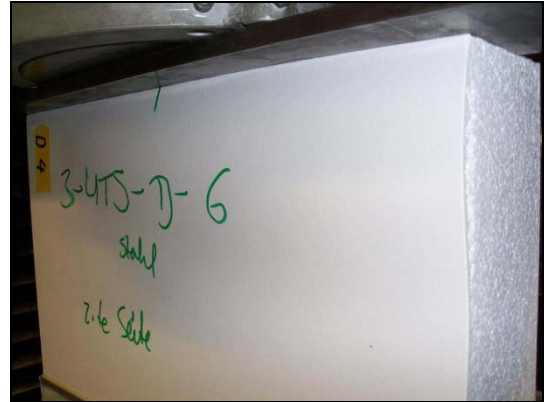


Test No.

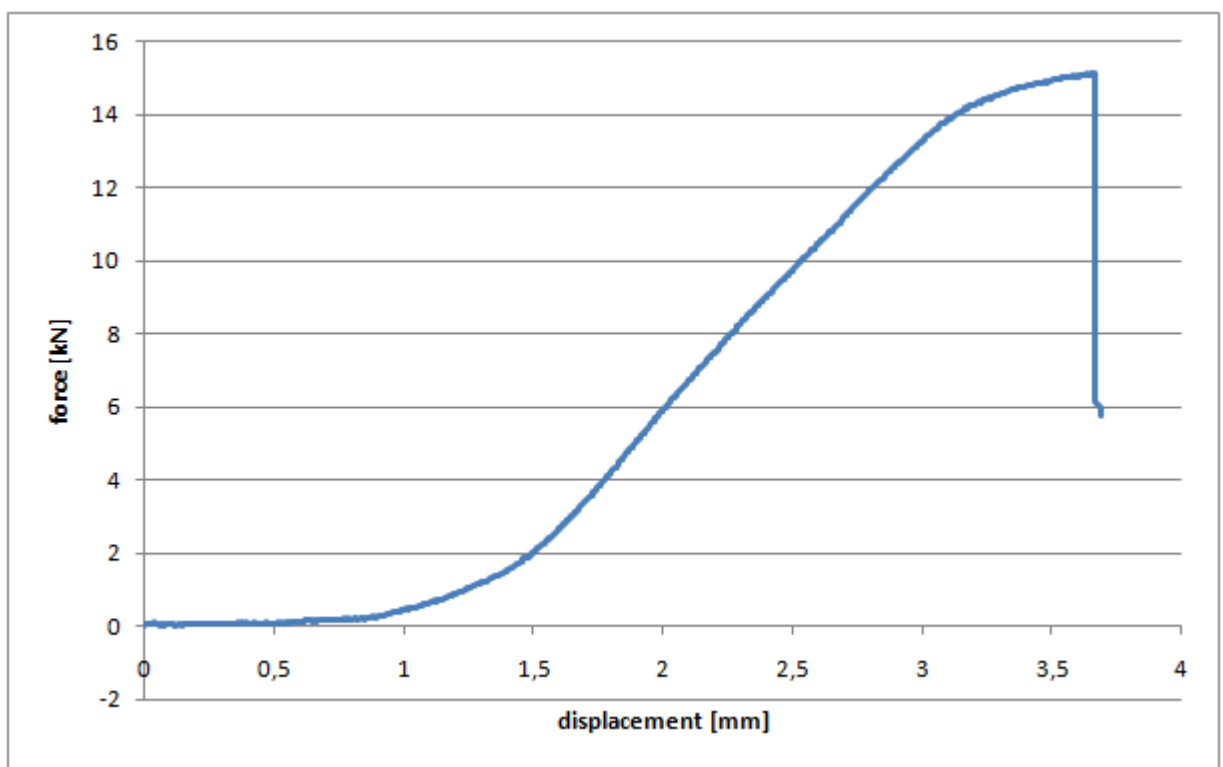
I-D-6



Failure of the stressed face

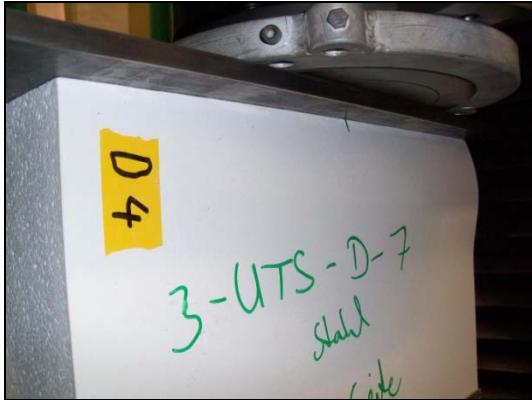


Test No.	I-D-7	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300 mm	
thickness d	101 mm	
ultimate load	15,16 kN	
ultimate stress	21,0 N/mm ²	
ultimate stress based on failed width	21,0 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	

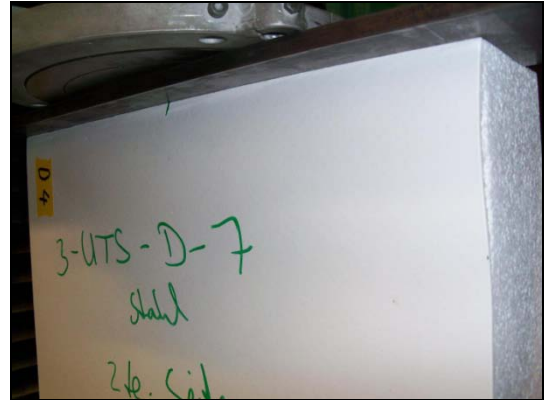


Test No.

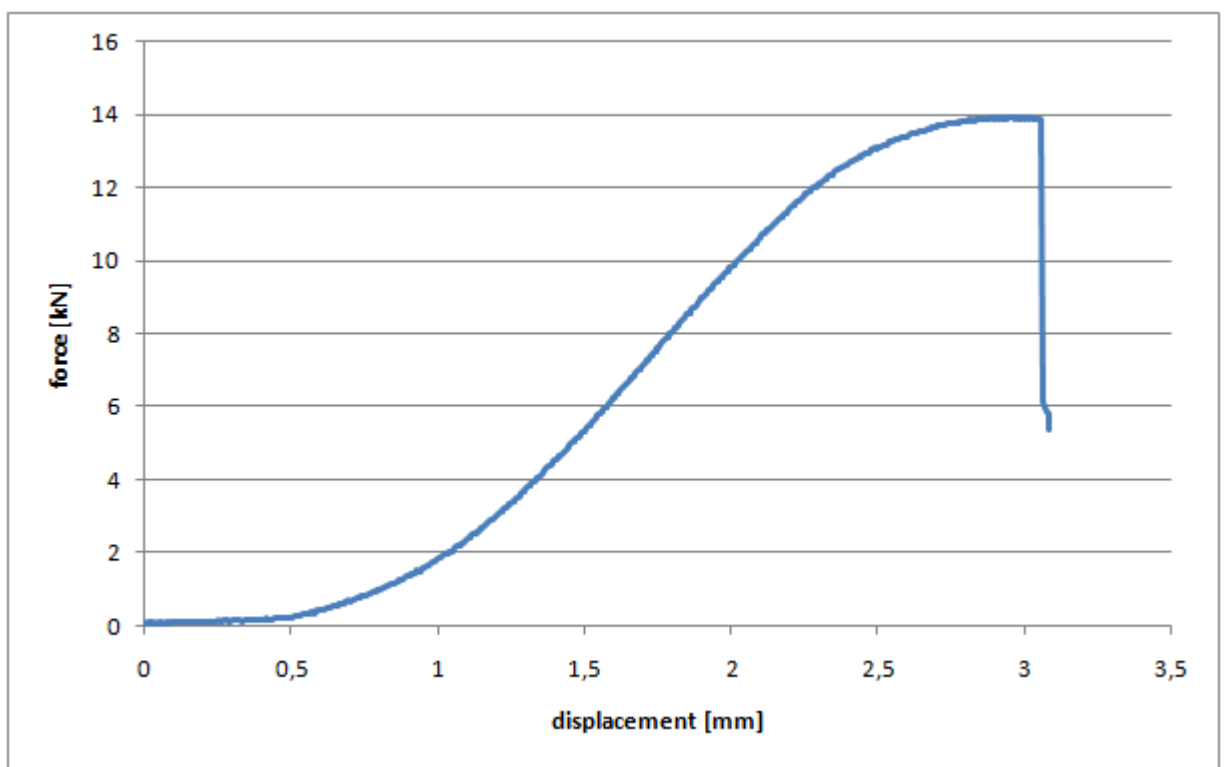
I-D-7



Failure of the stressed face



Test No.	I-D-8	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	D	
faces	1,80 mm GFRP	
core	100 mm EPS	
stressed face	-	
Measured dimensions:		
width b	399 mm	
height l	300 mm	
thickness d	102 mm	
ultimate load	13,91 kN	
ultimate stress	19,4 N/mm ²	
ultimate stress based on failed width	19,4 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b	

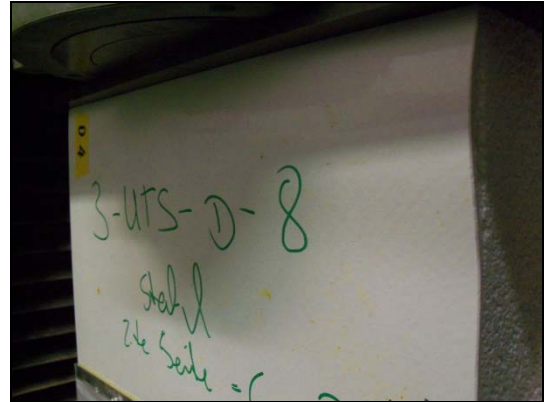


Test No.

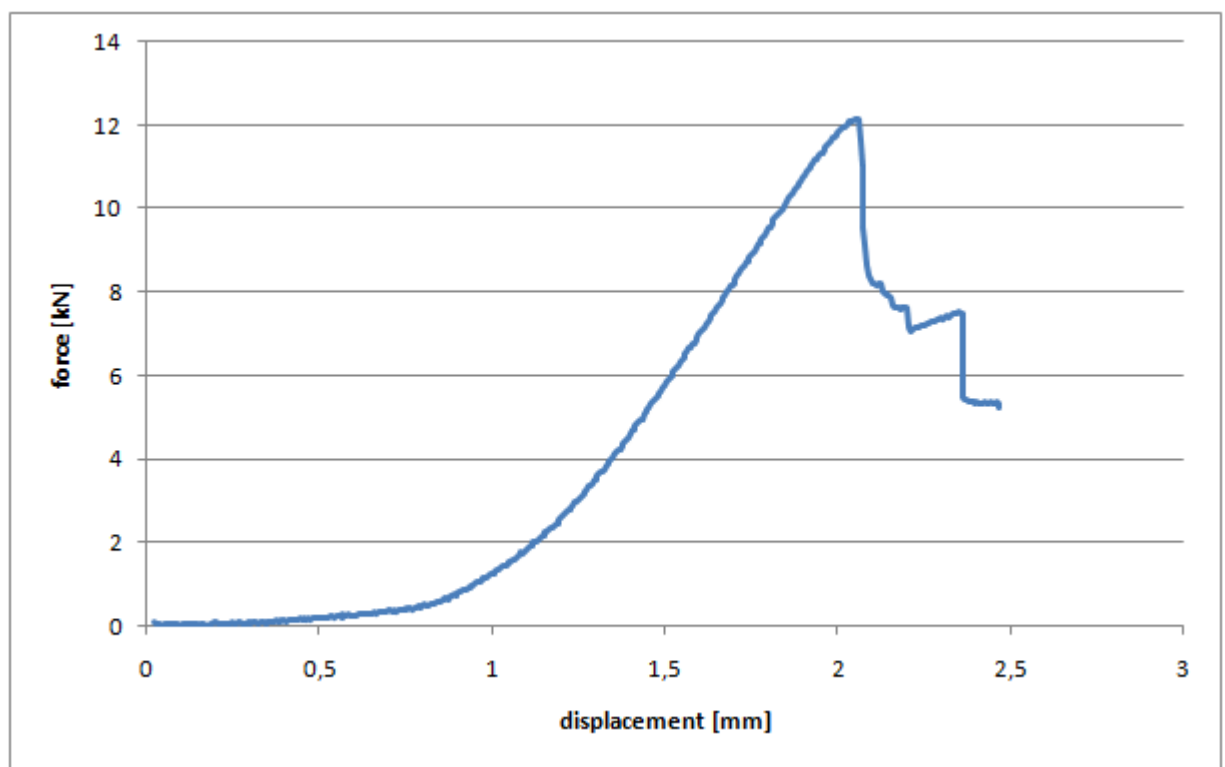
I-D-8



Failure of the stressed face



Test No.	I-E-1	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	12,12 kN	
ultimate stress	63,7 N/mm ²	
ultimate stress based on failed width	72,8 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b=351mm	



Test No.

I-E-1

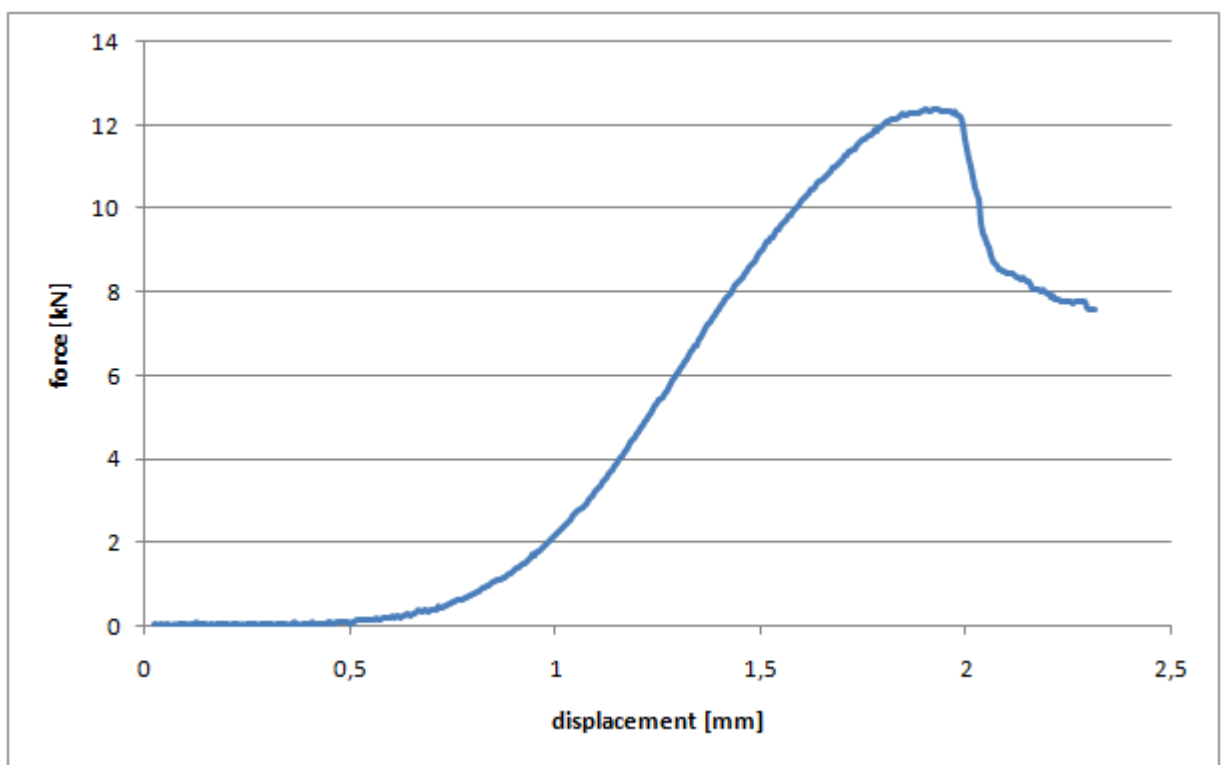


Failure of the stressed face



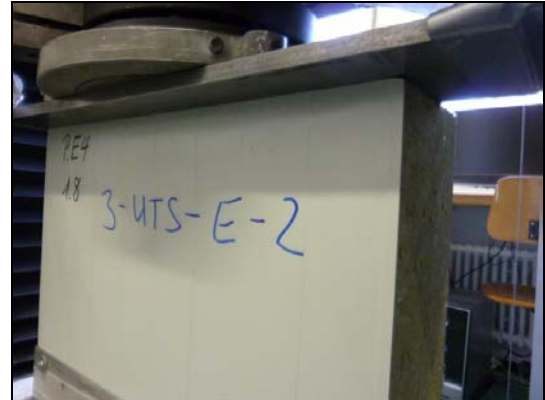
Compound between core and face

Test No.	I-E-2	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	299 mm	
thickness d	100 mm	
ultimate load	12,37 kN	
ultimate stress	64,9 N/mm ²	
ultimate stress based on failed width	66,8 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=390mm	



Test No.

I-E-2

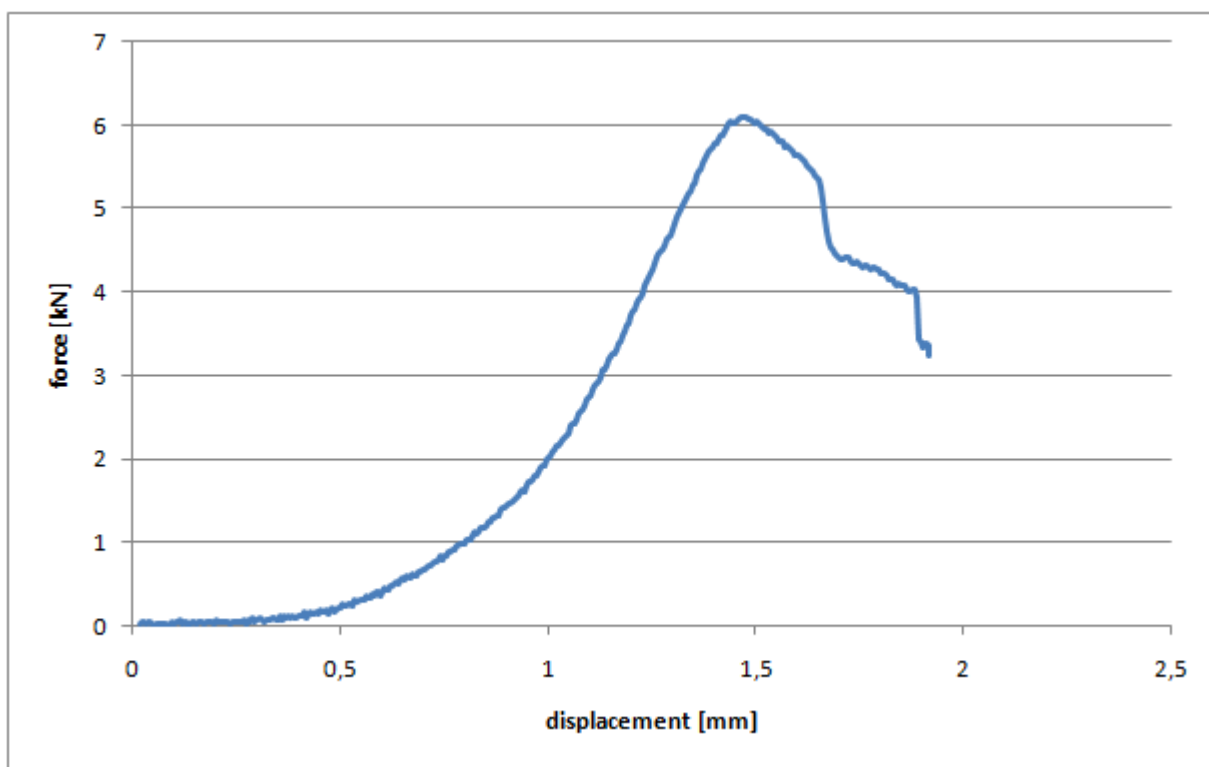


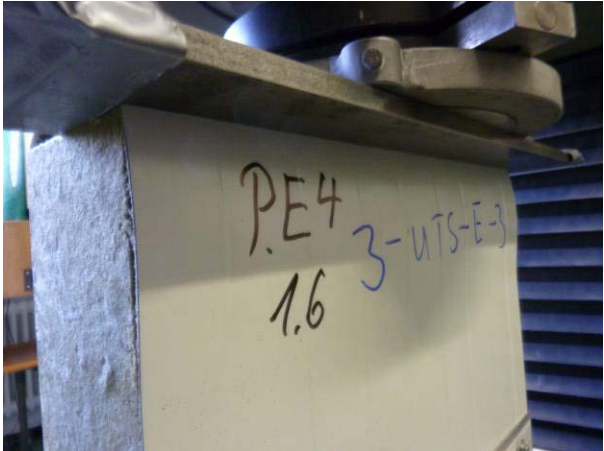
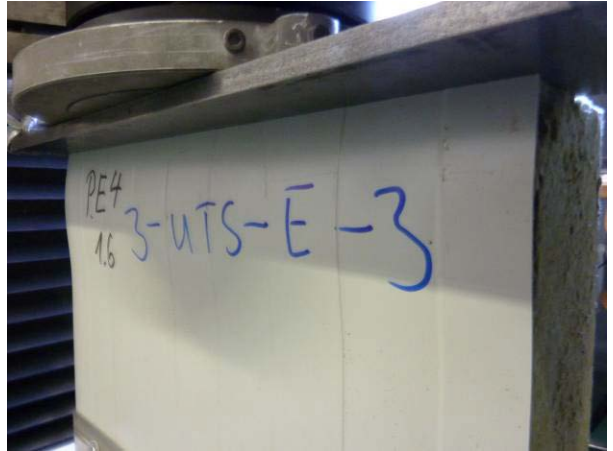

Failure of the stressed face



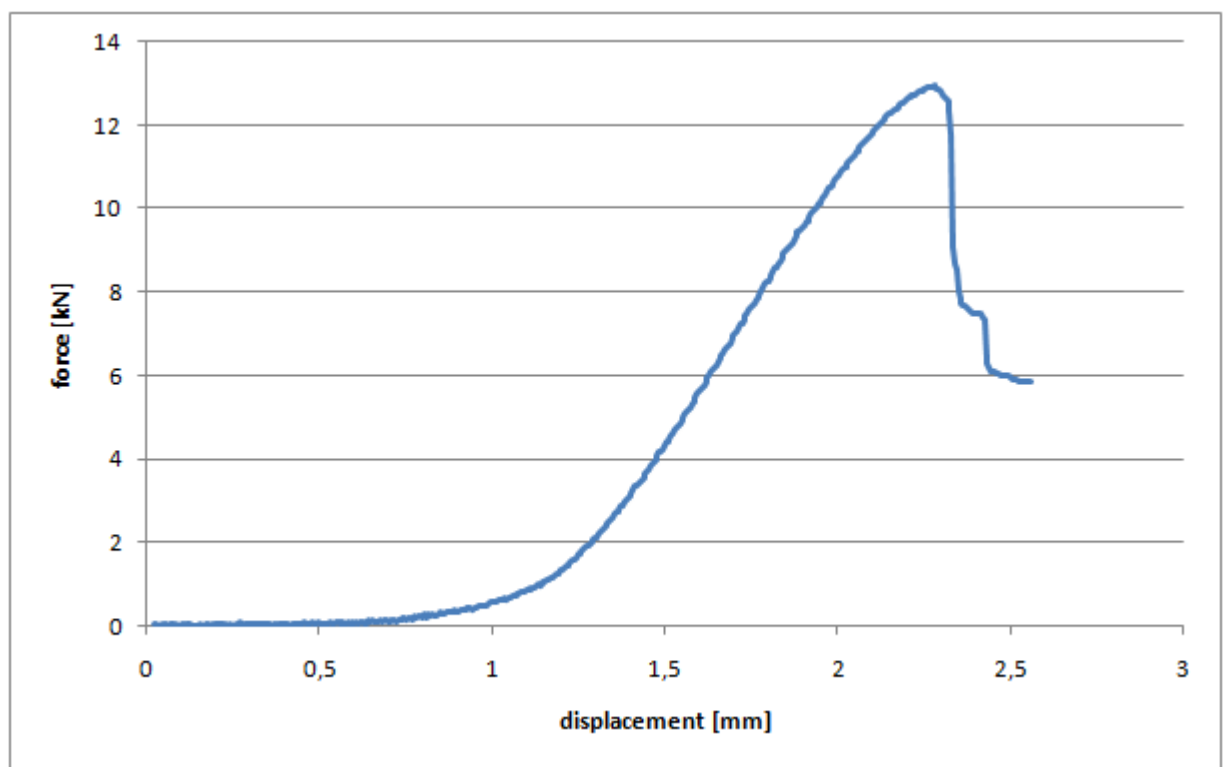
Compound between core and face



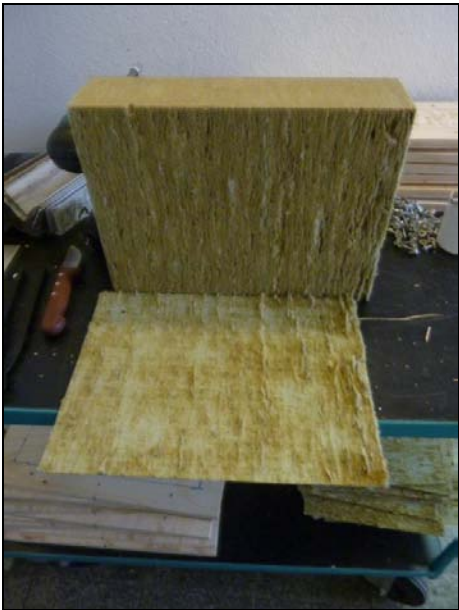
Test No.	I-E-3	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300,5 mm	
thickness d	99,5 mm	
ultimate load	6,10 kN	
ultimate stress	32,1 N/mm ²	
ultimate stress based on failed width	32,1 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



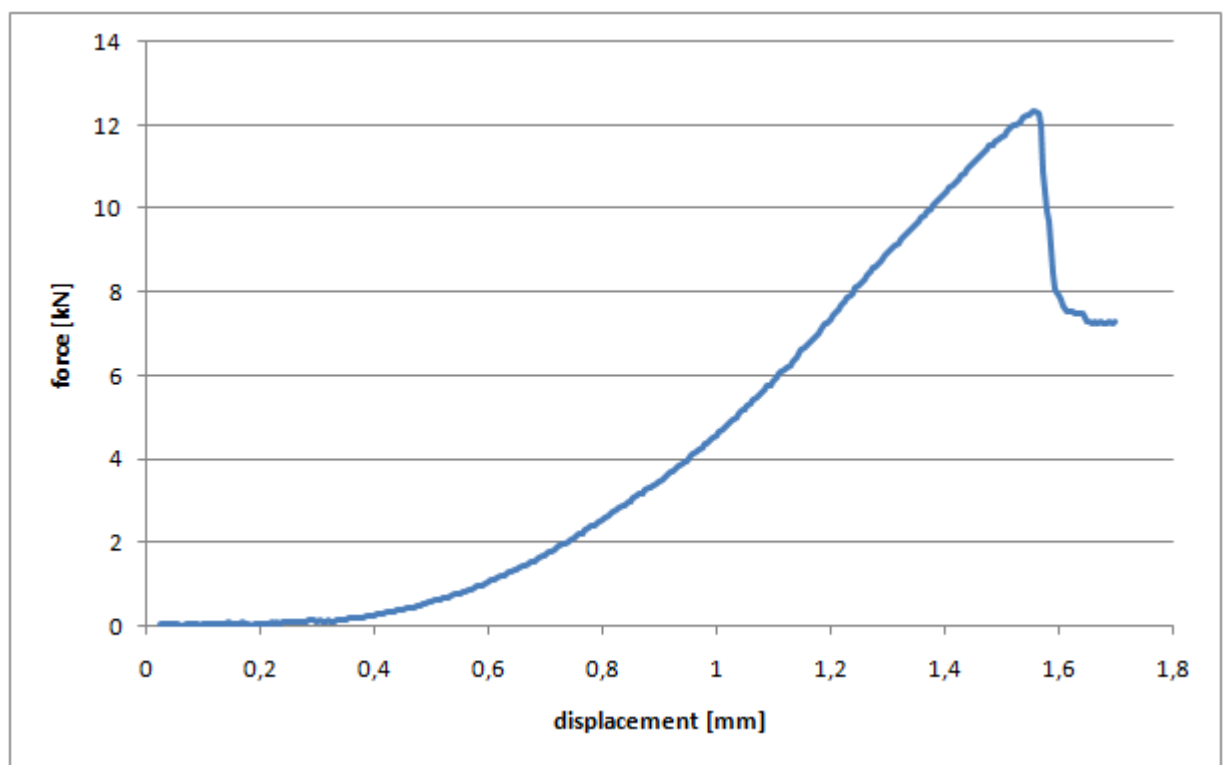
Test No.	I-E-3
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	

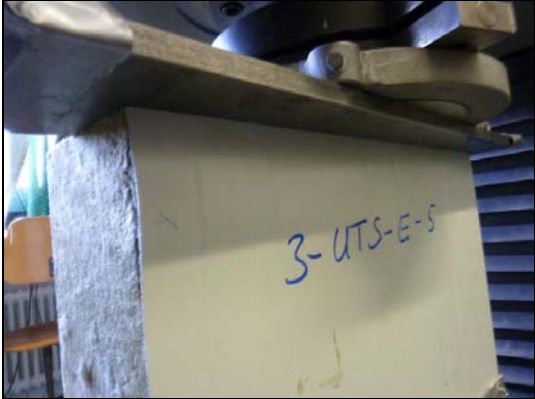


Test No.	I-E-4	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300,5 mm	
thickness d	99,5 mm	
ultimate load	12,97 kN	
ultimate stress	68,3 N/mm ²	
ultimate stress based on failed width	72,6 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b=376mm	



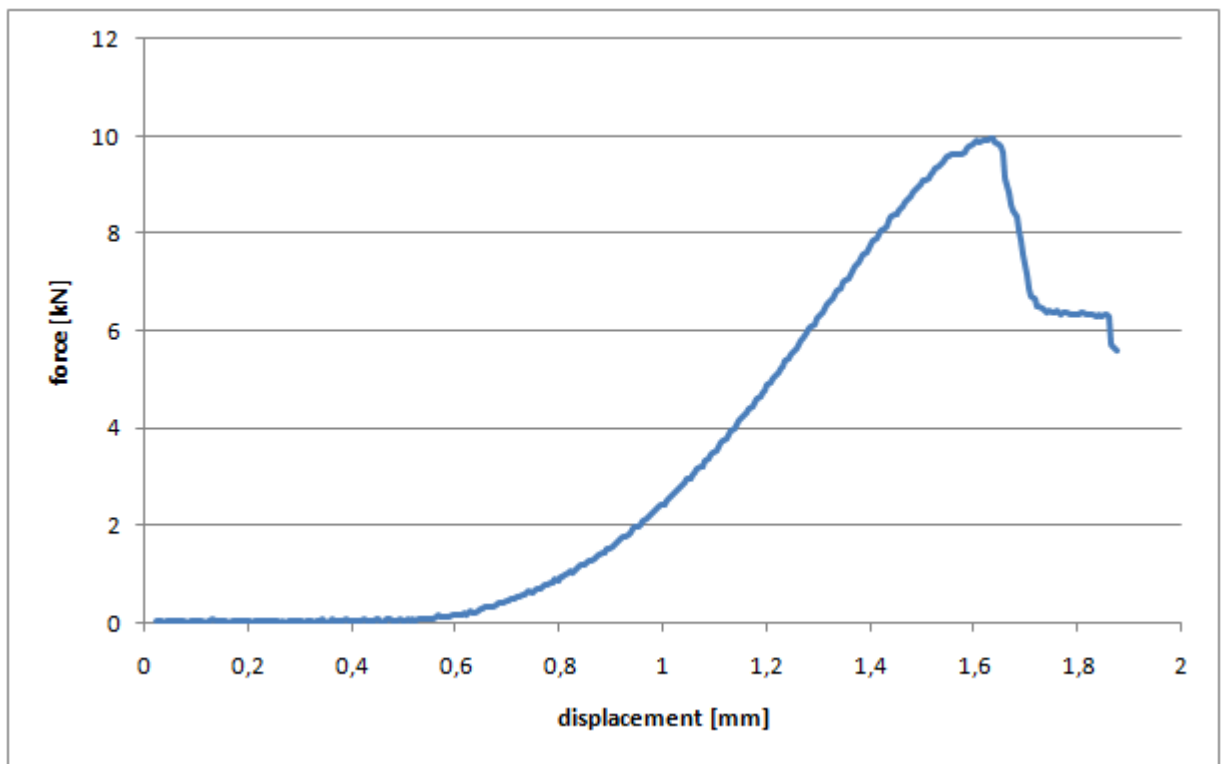
Test No.	I-E-4
 <p>Failure of the stressed face</p>	
	
<p>Compound between core and face</p>	

Test No.	I-E-5	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	302 mm	
thickness d	99,5 mm	
ultimate load	12,32 kN	
ultimate stress	64,7 N/mm ²	
ultimate stress based on failed width	65,7 N/mm ²	
Failure mode	long wave buckling of the stressed face	
Remarks	failed width b=395mm	



Test No.	I-E-5
 <p>Failure of the stressed face</p>	
	
<p>Compound between core and face</p>	

Test No.	I-E-6	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	302 mm	
thickness d	99,5 mm	
ultimate load	9,96 kN	
ultimate stress	52,3 N/mm ²	
ultimate stress based on failed width	58,7 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=357mm	



Test No. **I-E-6**

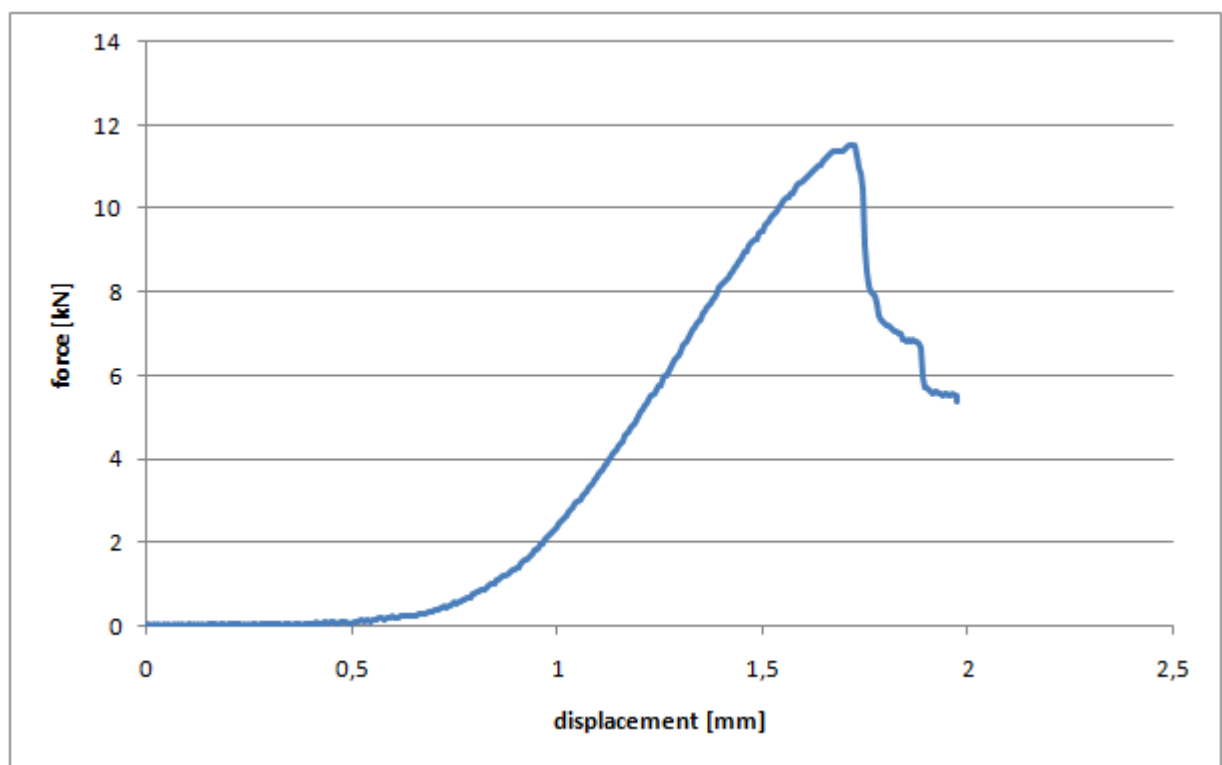



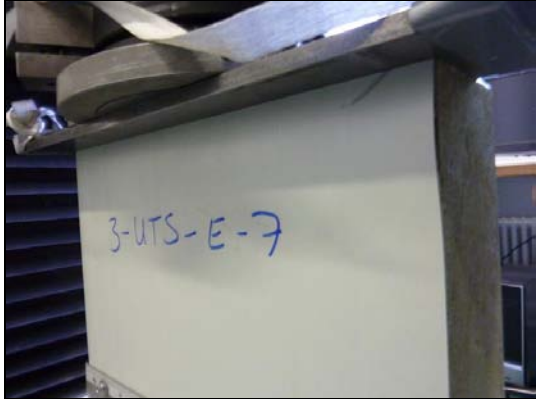

Failure of the stressed face



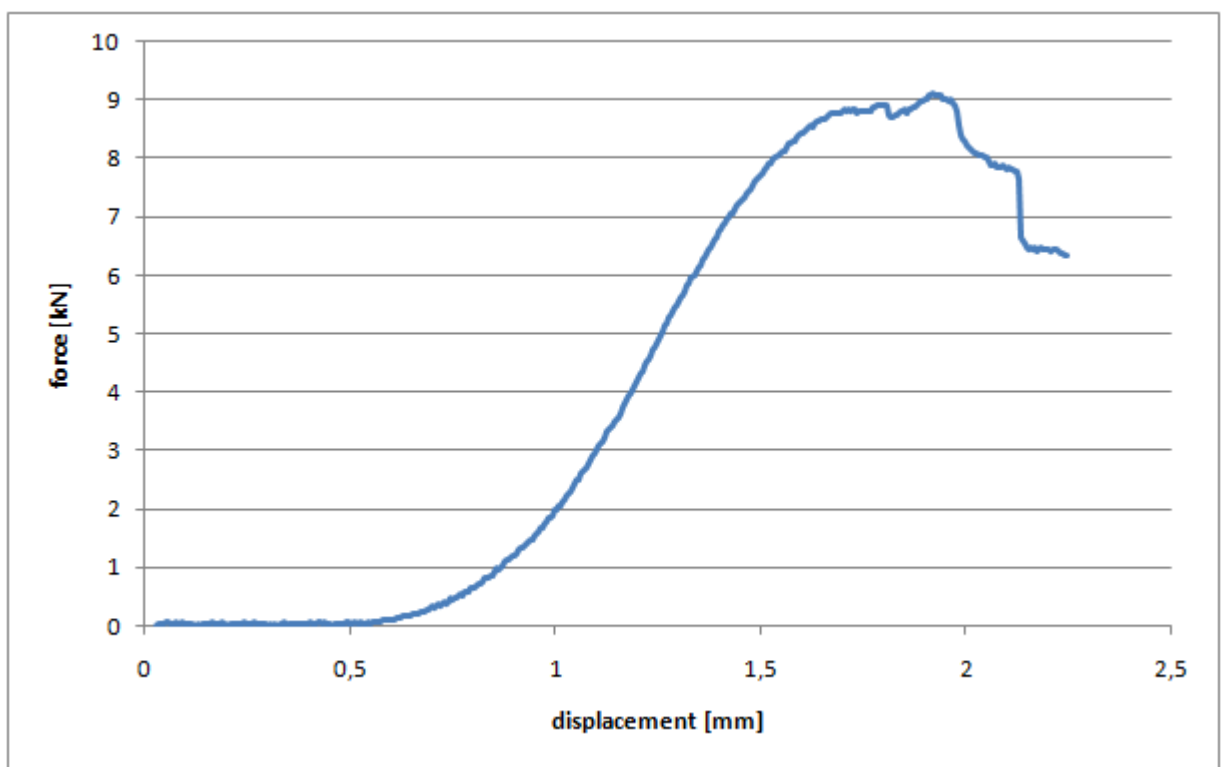
Compound between core and face


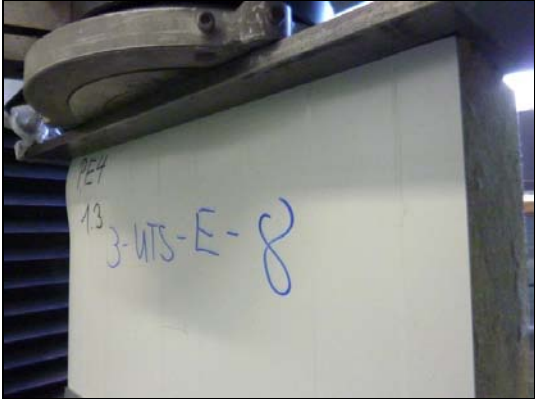

Test No.	I-E-7	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300 mm	
thickness d	99,5 mm	
ultimate load	11,50 kN	
ultimate stress	60,5 N/mm ²	
ultimate stress based on failed width	64,4 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=376mm	



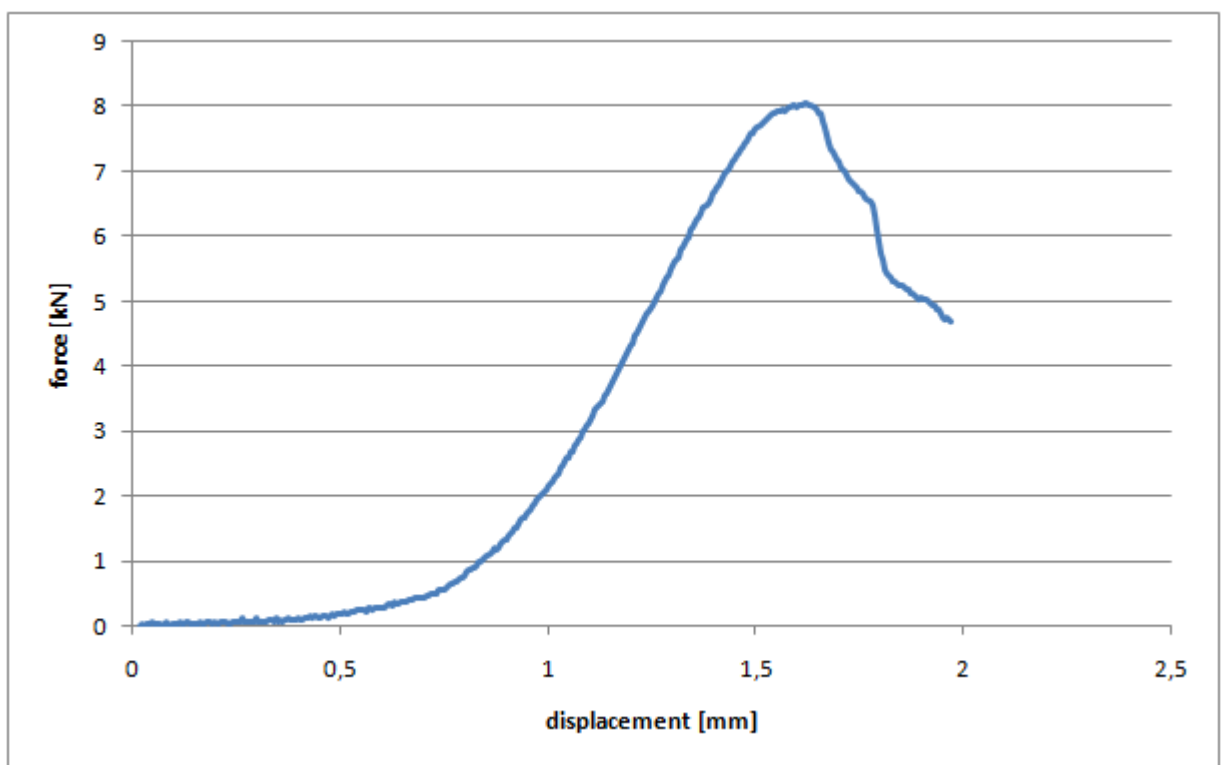
Test No.	I-E-7
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	


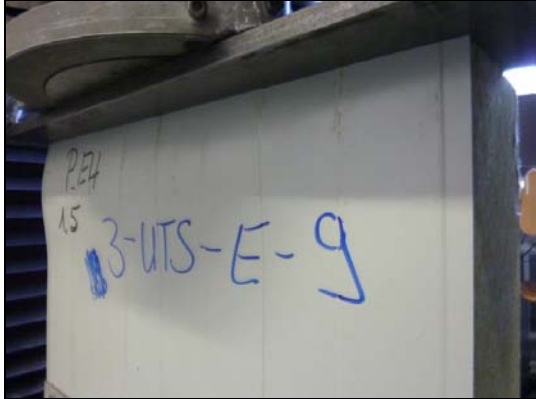

Test No.	I-E-8	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	301 mm	
thickness d	99,5 mm	
ultimate load	9,13 kN	
ultimate stress	48,1 N/mm ²	
ultimate stress based on failed width	51,4 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=374mm	



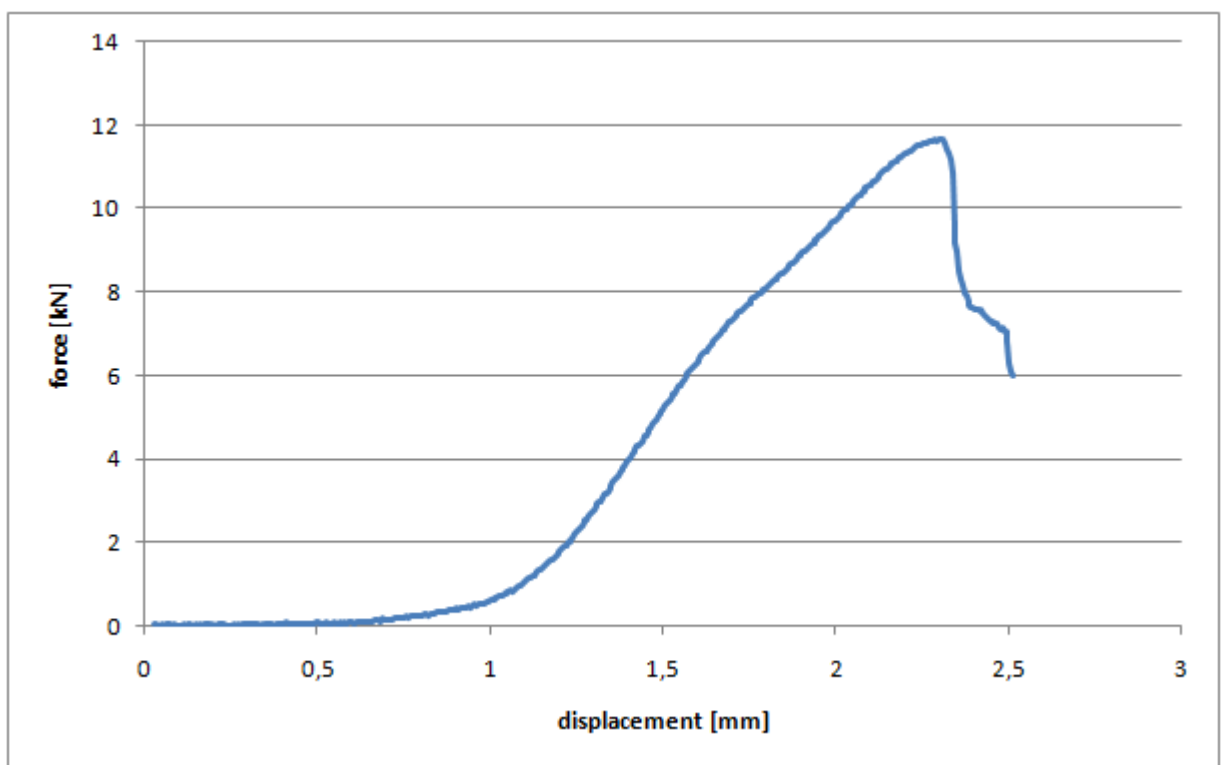
Test No.	I-E-8
 <p>Failure of the stressed face</p>	
	
<p>Compound between core and face</p>	




Test No.	I-E-9	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	301 mm	
thickness d	99,5 mm	
ultimate load	8,04 kN	
ultimate stress	42,3 N/mm ²	
ultimate stress based on failed width	46,4 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=365mm	



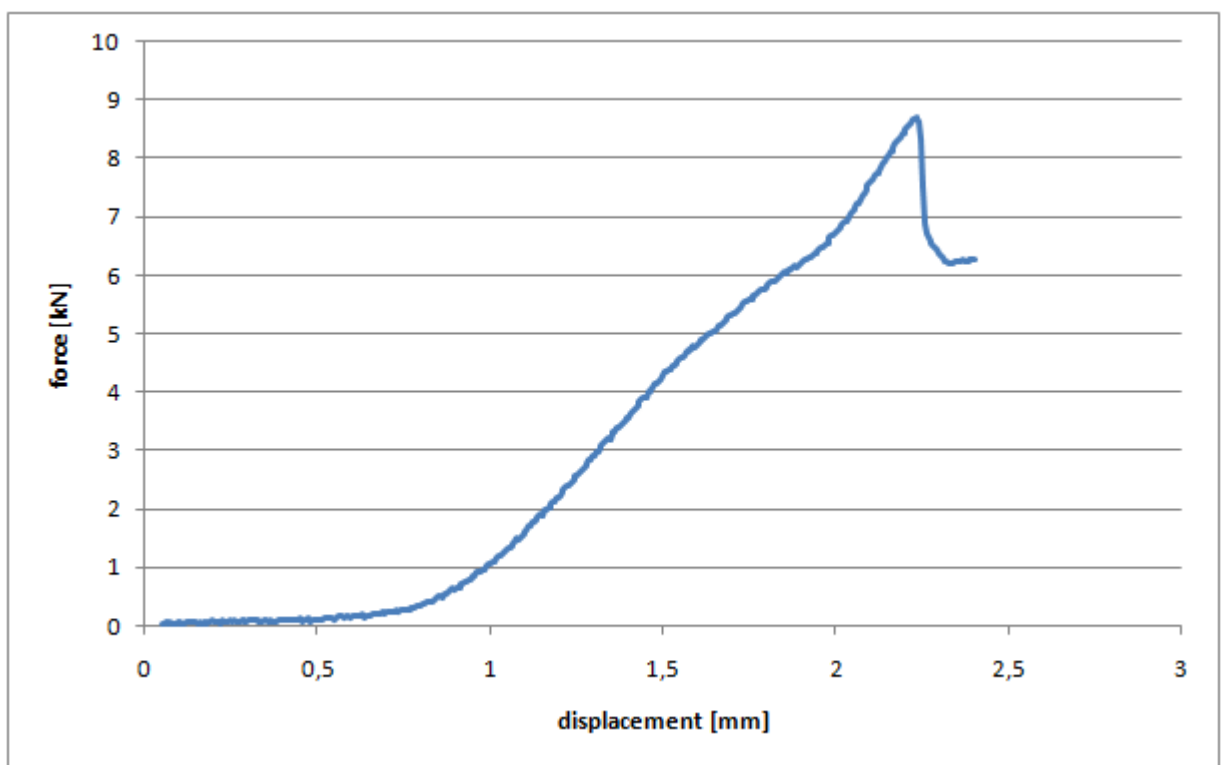
Test No.	I-E-9
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	


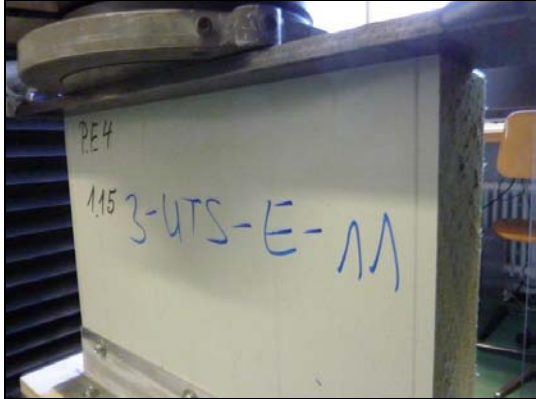
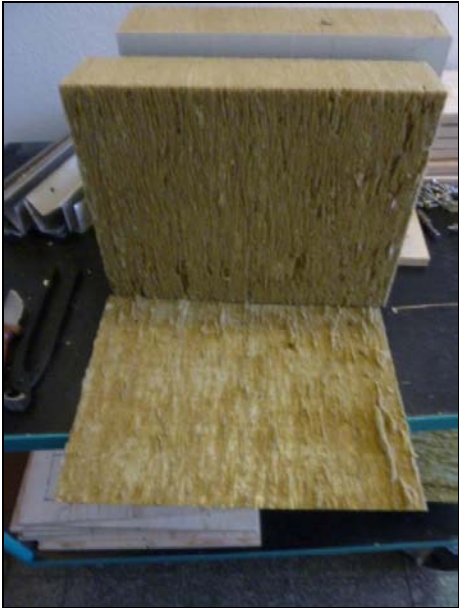
Test No.	I-E-10	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	301 mm	
thickness d	99,5 mm	
ultimate load	11,66 kN	
ultimate stress	61,4 N/mm ²	
ultimate stress based on failed width	64,1 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=383mm	



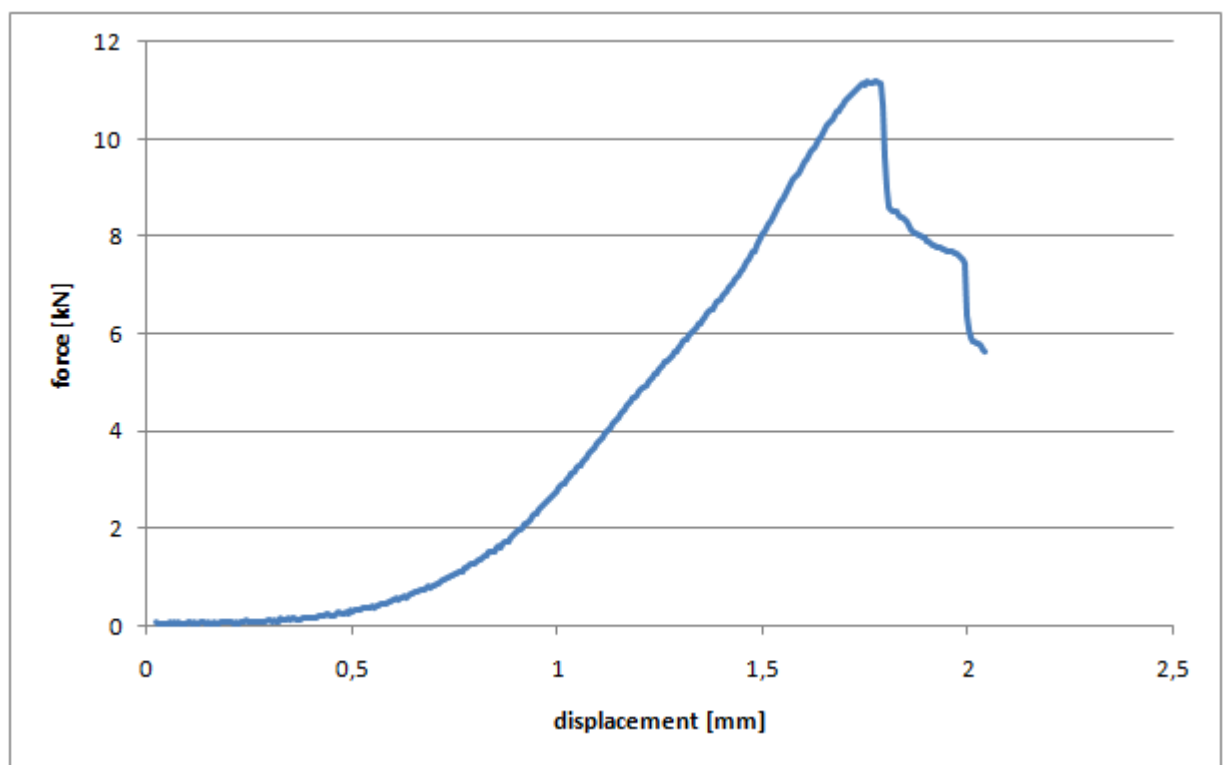
Test No.	I-E-10
 <p>Failure of the stressed face</p>	
	
<p>Compound between core and face</p>	


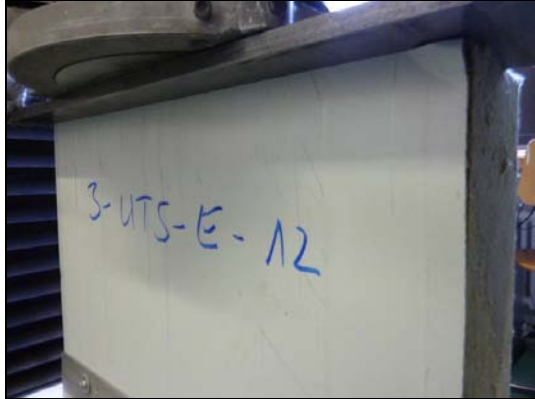
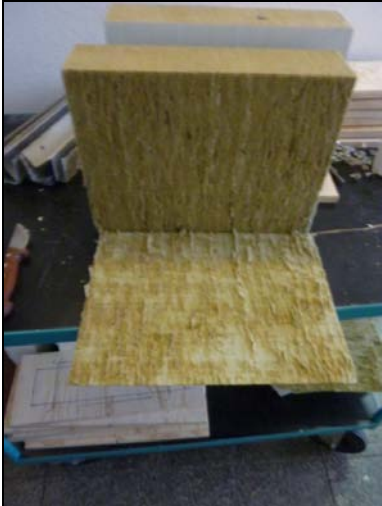

Test No.	I-E-11	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	302 mm	
thickness d	99 mm	
ultimate load	8,71 kN	
ultimate stress	45,7 N/mm ²	
ultimate stress based on failed width	49,6 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=370mm	



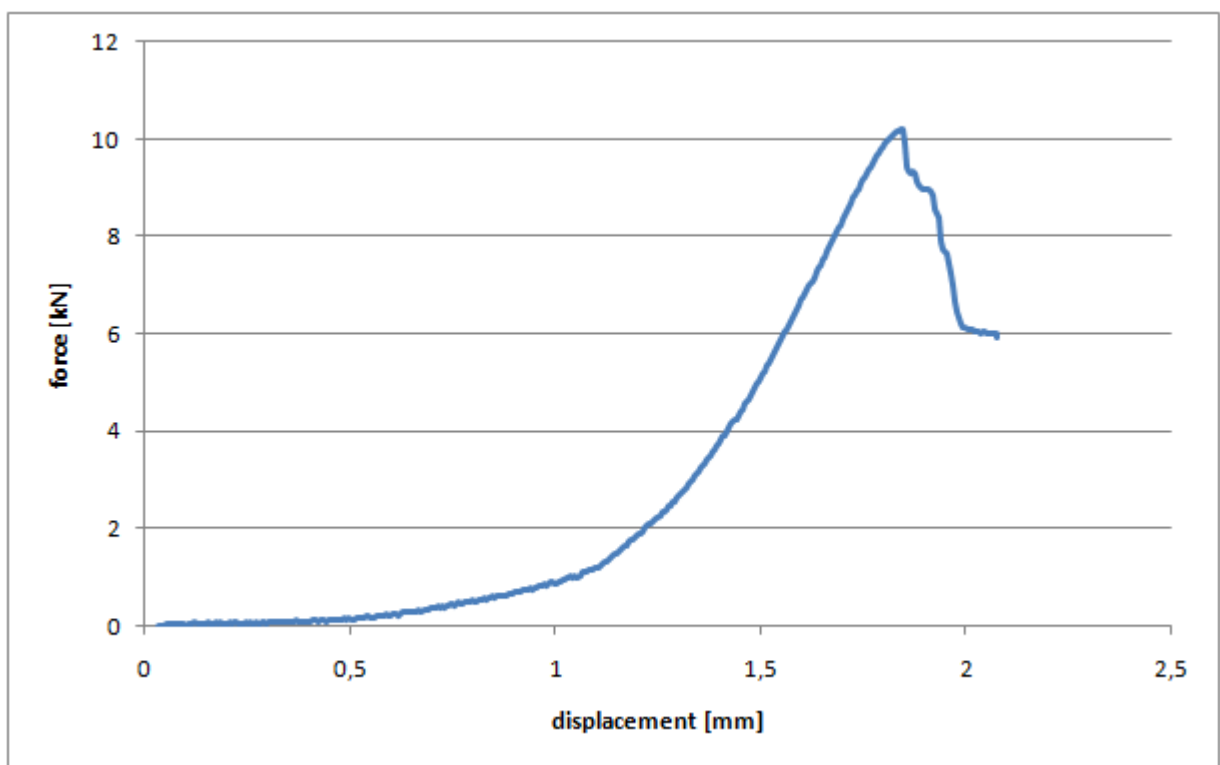
Test No.	I-E-11
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	

Test No.	I-E-12	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	302 mm	
thickness d	99 mm	
ultimate load	11,18 kN	
ultimate stress	58,7 N/mm ²	
ultimate stress based on failed width	67,3 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=350mm	

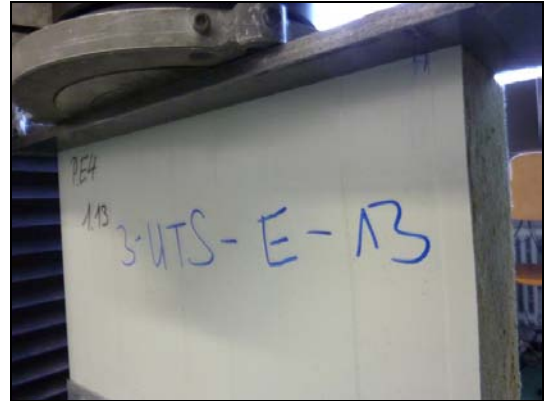


Test No.	I-E-12
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	 <p>Damage of the face</p>

Test No.	I-E-13	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300 mm	
thickness d	100 mm	
ultimate load	10,20 kN	
ultimate stress	53,6 N/mm ²	
ultimate stress based on failed width	59,6 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=360mm	



Test No. **I-E-13**

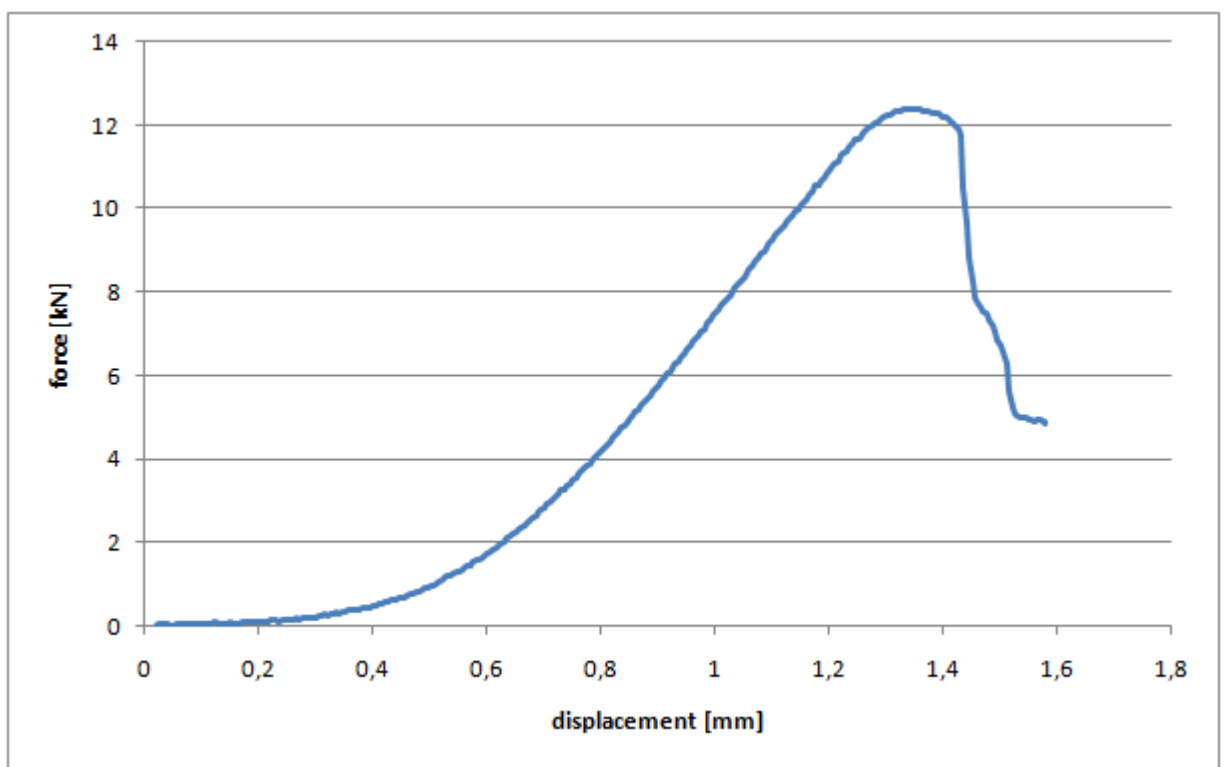



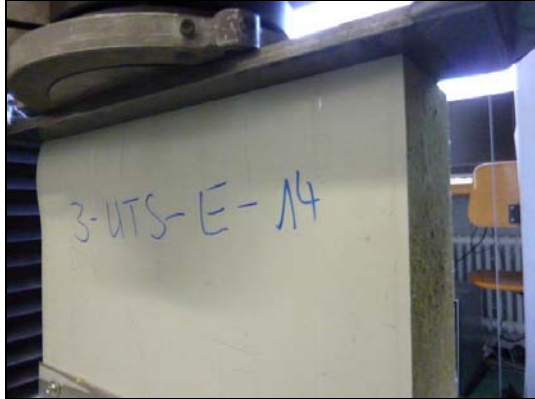
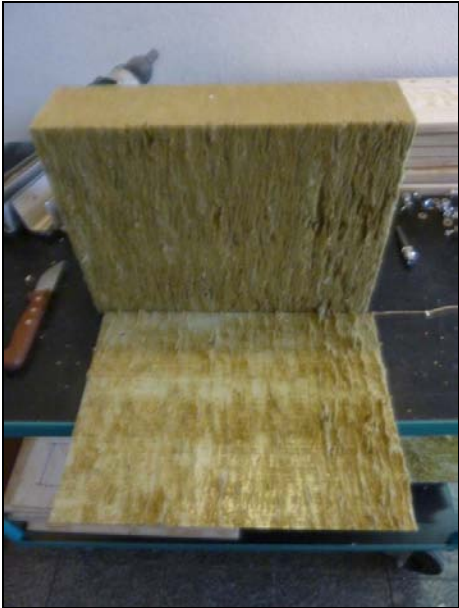
Failure of the stressed face



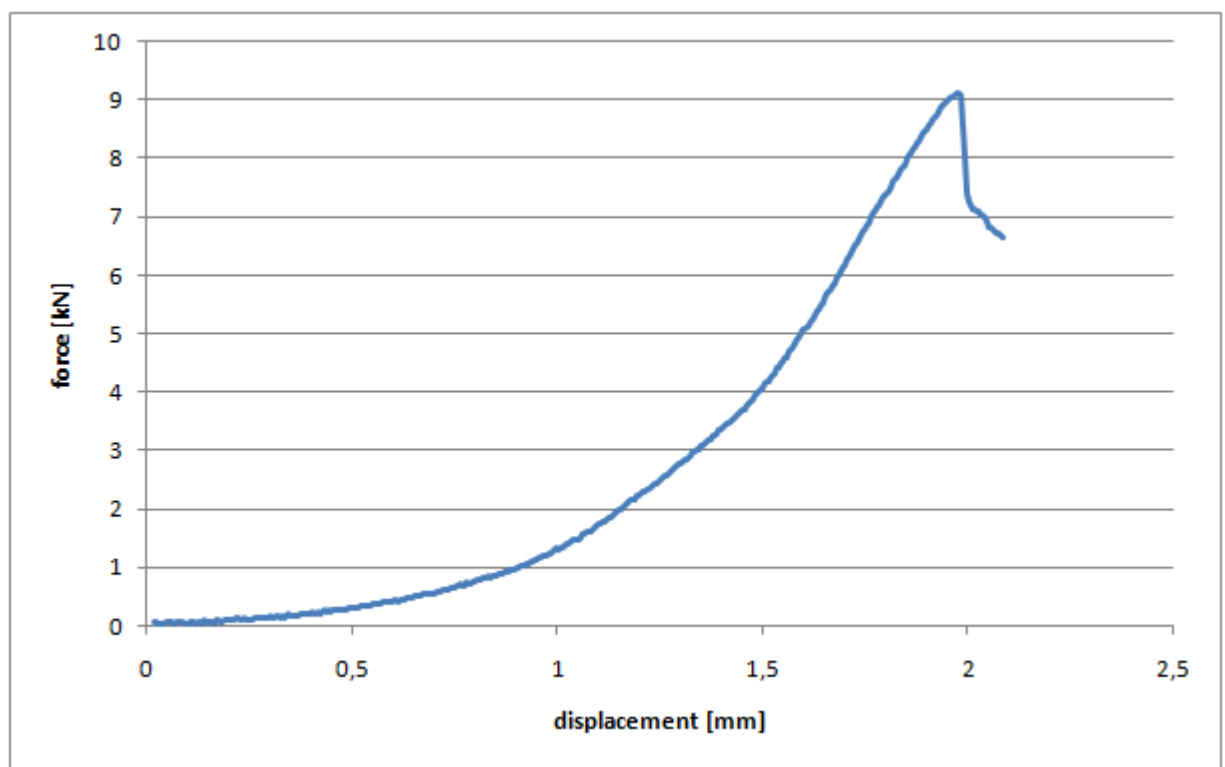
Compound between core and face


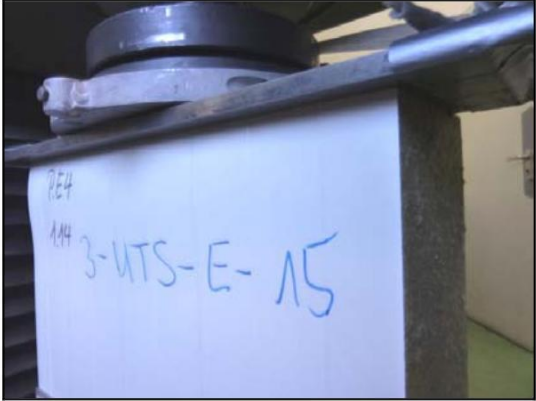
Test No.	I-E-14	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	300 mm	
thickness d	100 mm	
ultimate load	12,36 kN	
ultimate stress	64,9 N/mm ²	
ultimate stress based on failed width	68,5 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=380mm	



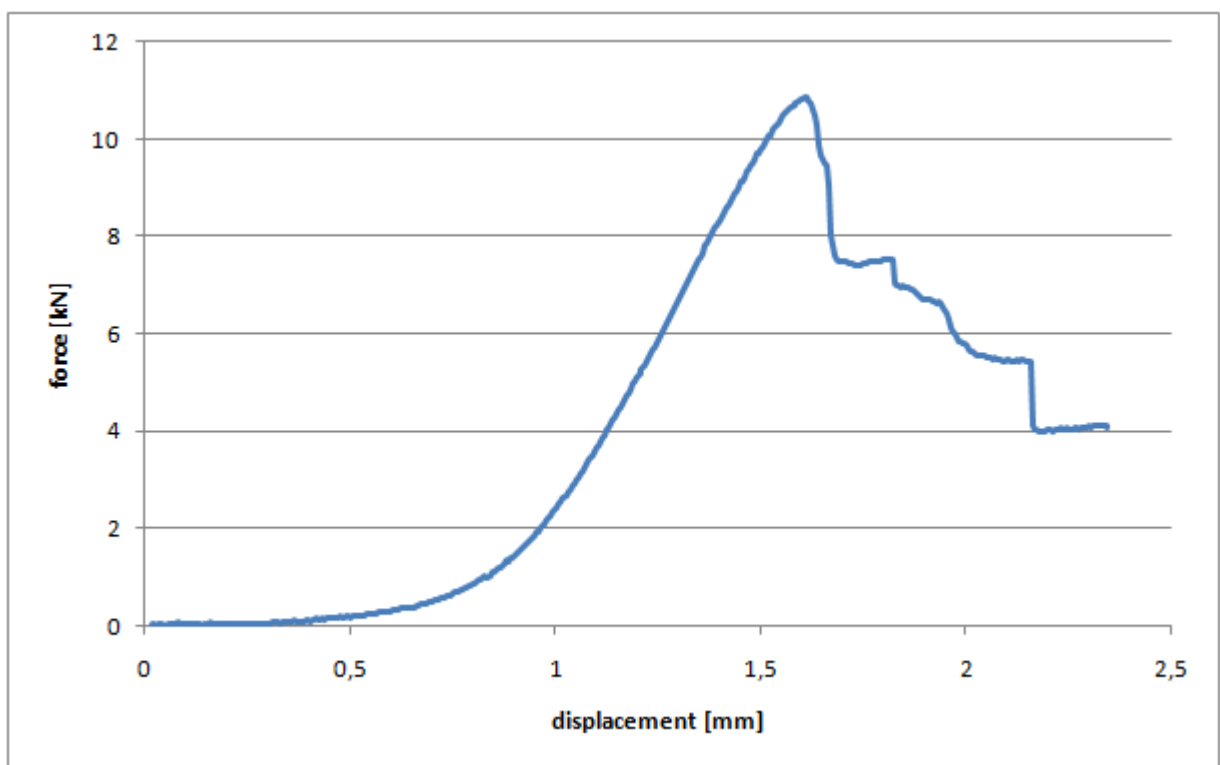
Test No.	I-E-14
 <p>Failure of the stressed face</p>	
	
<p>Compound between core and face</p>	

Test No.	I-E-15	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	300 mm	
thickness d	100 mm	
ultimate load	9,12 kN	
ultimate stress	47,9 N/mm ²	
ultimate stress based on failed width	53,3 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=360mm	



Test No.	I-E-15
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	

Test No.	I-E-16	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	401 mm	
height l	301 mm	
thickness d	100 mm	
ultimate load	10,87 kN	
ultimate stress	57,1 N/mm ²	
ultimate stress based on failed width	57,1 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	

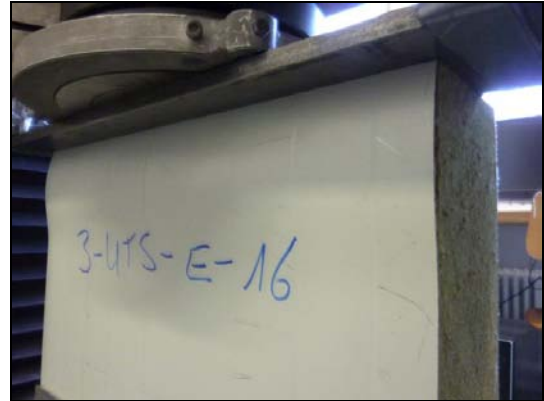


Test No.

I-E-16

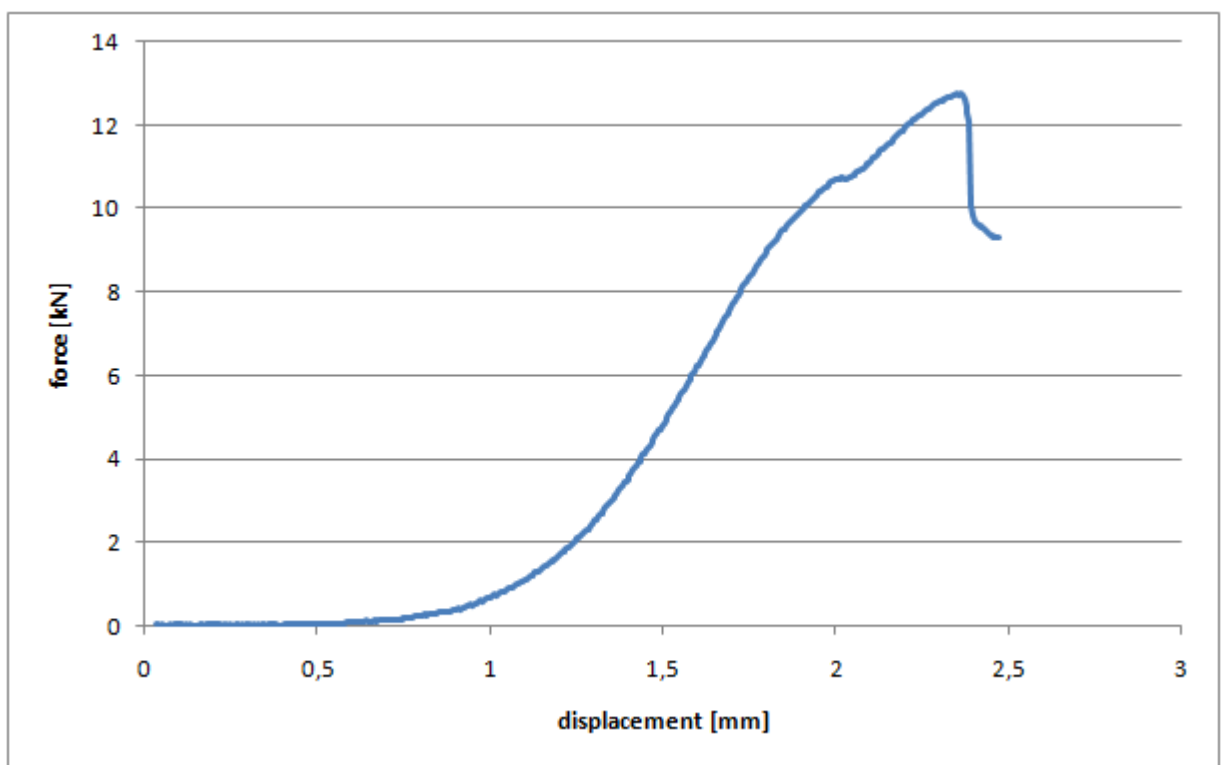



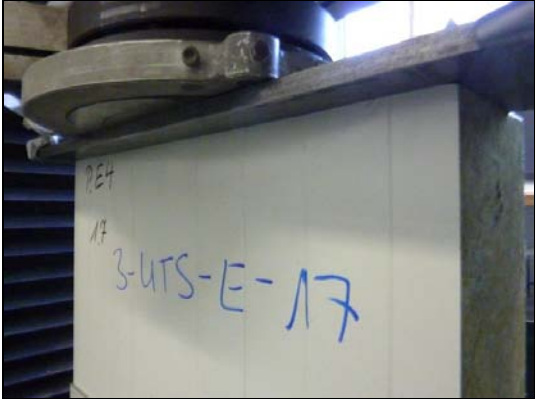

Failure of the stressed face



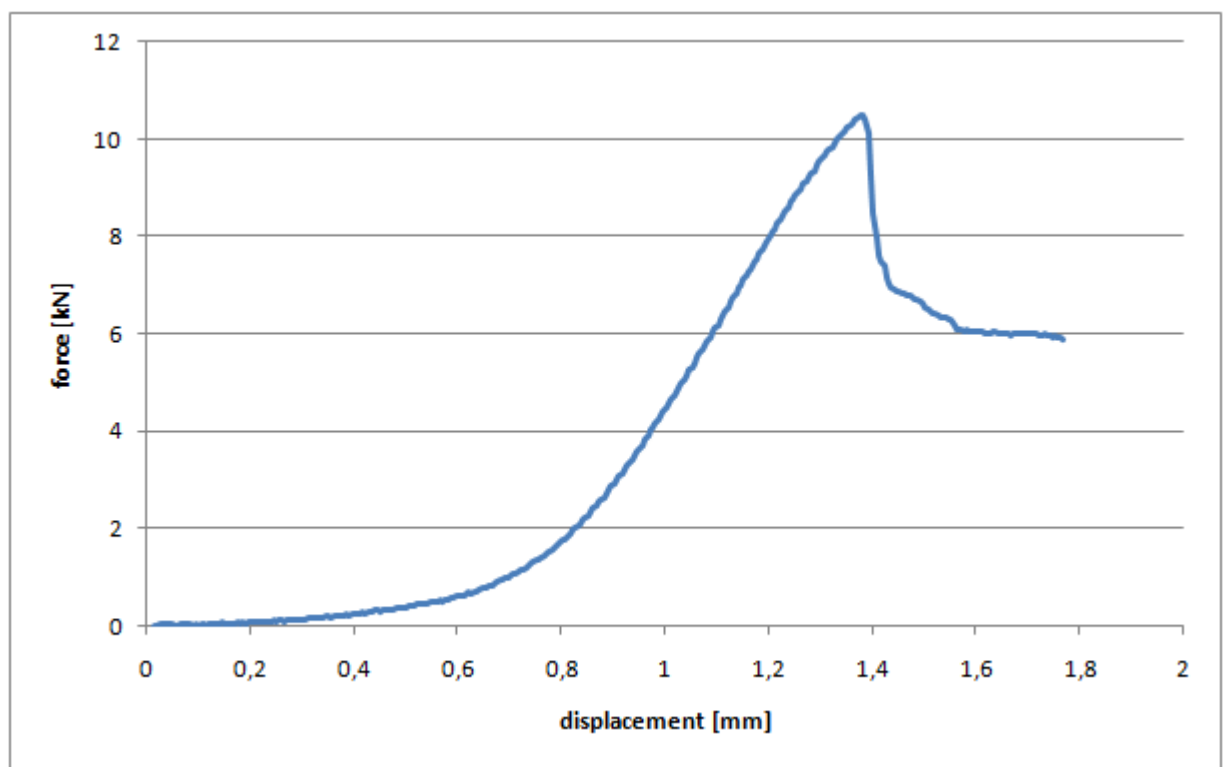
Compound between core and face

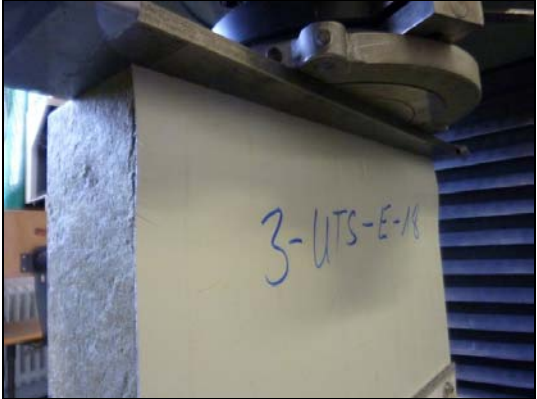
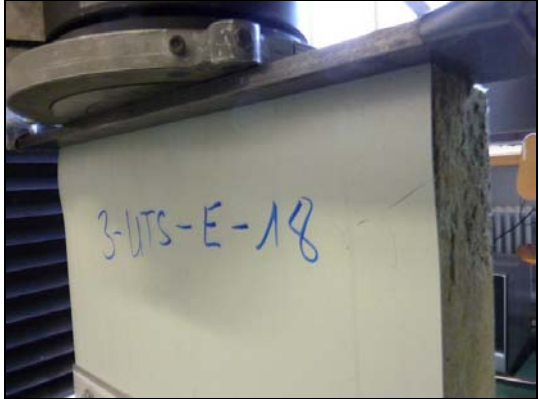
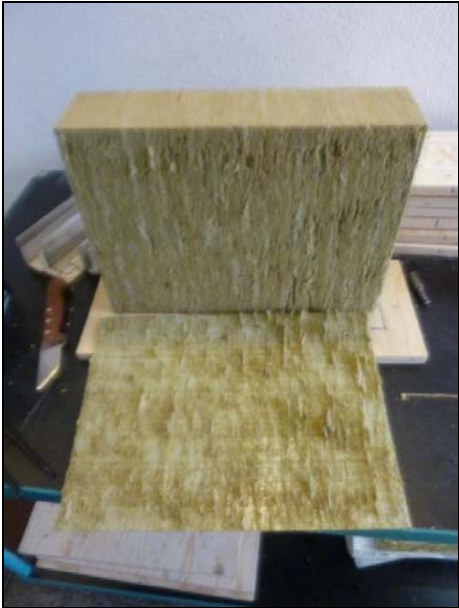
Test No.	I-E-17	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300 mm	
thickness d	99,5 mm	
ultimate load	12,76 kN	
ultimate stress	67,2 N/mm ²	
ultimate stress based on failed width	81,4 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b=330mm	



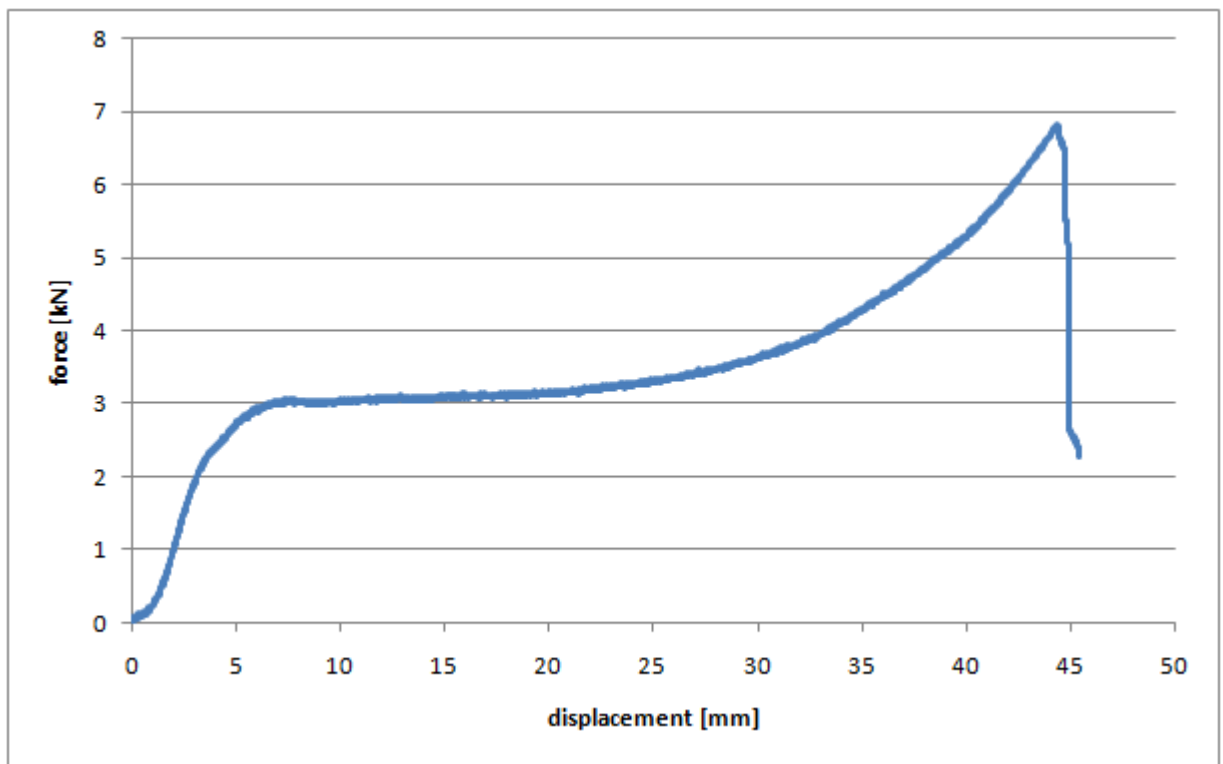
Test No.	I-E-17
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	

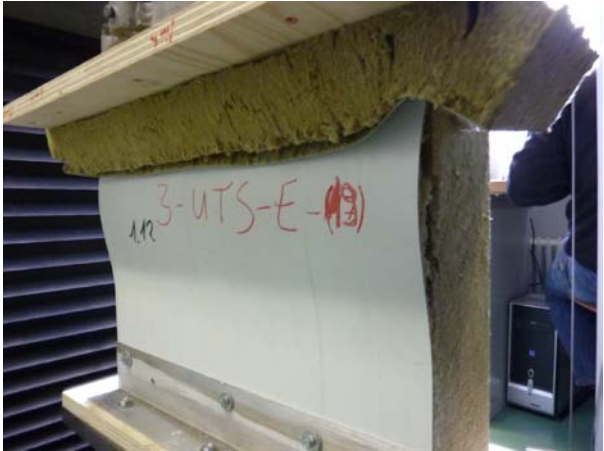


Test No.	I-E-18	
type of test	introduction of load by contact	
load introduction	steel sheet	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	300 mm	
thickness d	99,5 mm	
ultimate load	10,51 kN	
ultimate stress	55,3 N/mm ²	
ultimate stress based on failed width	55,3 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



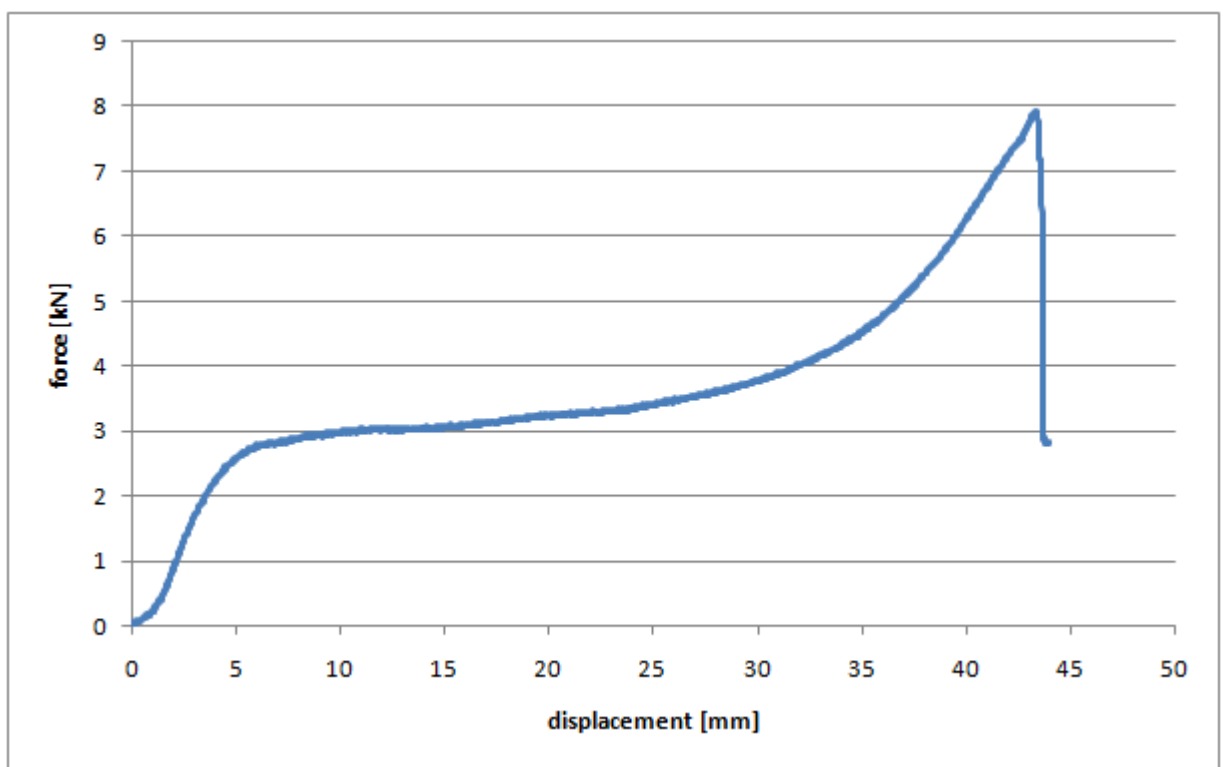
Test No.	I-E-18
 <p>Failure of the stressed face</p>	
	
<p>Compound between core and face</p>	


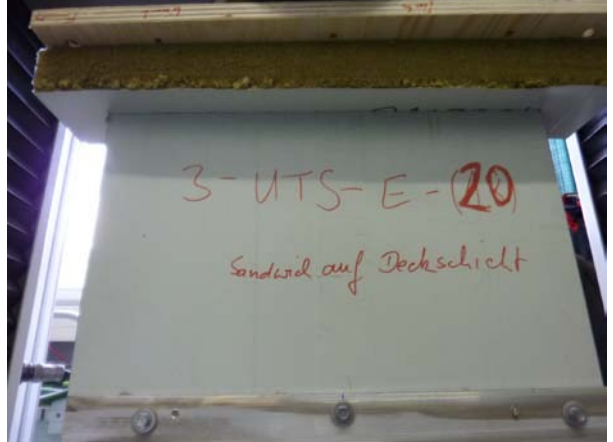


Test No.	I-E-19	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l		
thickness d		
ultimate load	6,84 kN	
ultimate stress	36,0 N/mm ²	
ultimate stress based on failed width	36,0 N/mm ²	
Failure mode	buckling of the stressed face	
Remarks	failed width b	



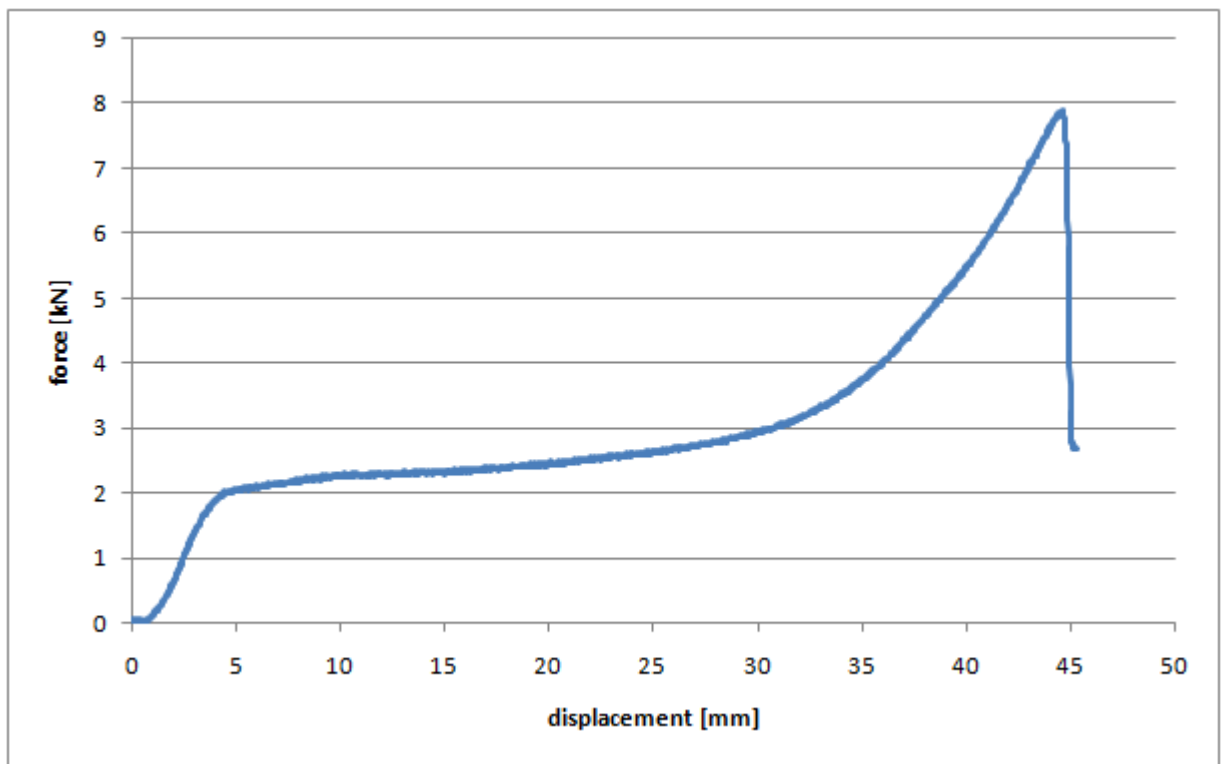
Test No.	I-E-19
 <p>Failure of the stressed face</p>	 <p>Failure of the stressed face</p>
 <p>Compound between core and face</p>	

Test No.	I-E-20	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	- mm	
thickness d	- mm	
ultimate load	7,93 kN	
ultimate stress	41,7 N/mm ²	
ultimate stress based on failed width	41,7 N/mm ²	
Failure mode	buckling of the stressed face	
Remarks	failed width b	



Test No.	I-E-20
	
Failure of the stressed face	Failure of the stressed face
	
Compound between core and face	

Test No.	I-E-21	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	- mm	
thickness d	- mm	
ultimate load	7,90 kN	
ultimate stress	41,6 N/mm ²	
ultimate stress based on failed width	41,6 N/mm ²	
Failure mode	cripling of the stressed face	
Remarks	failed width b	



Test No. **I-E-21**



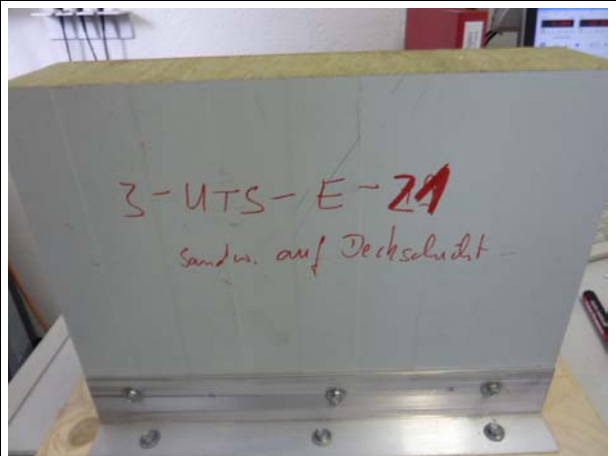
Failure of the stressed face



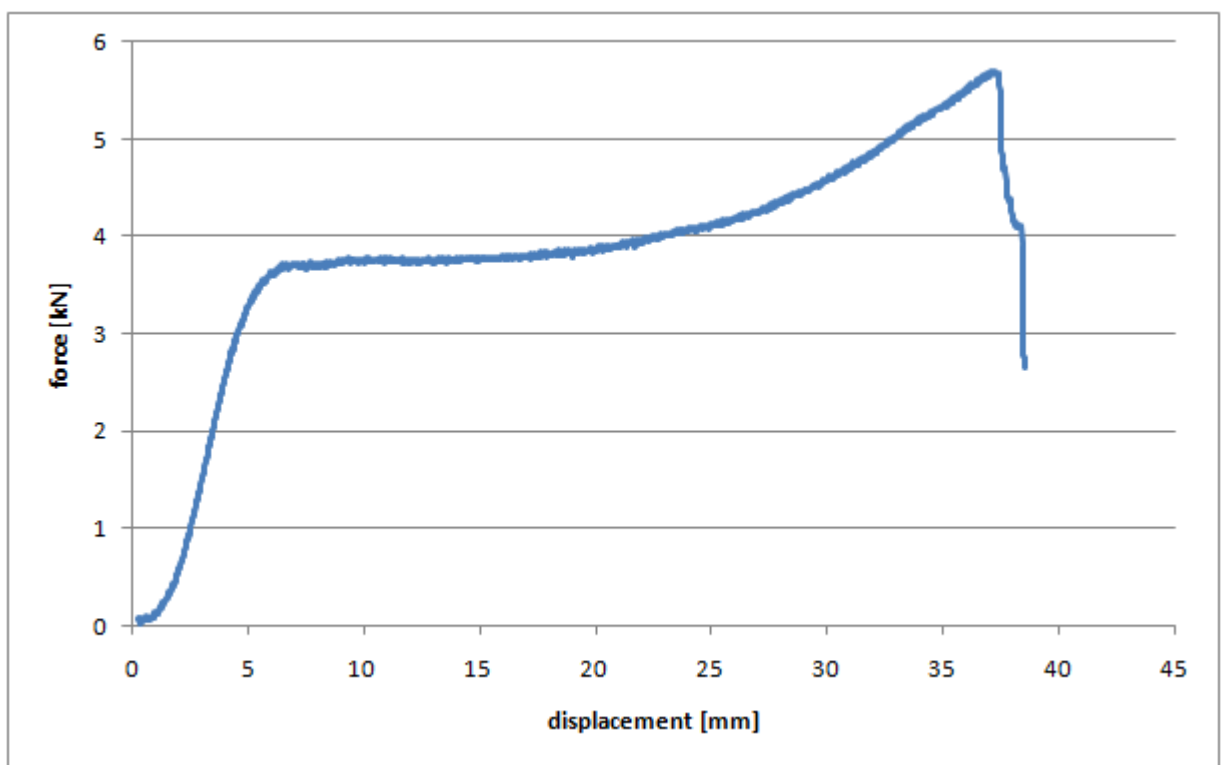
Failure of the stressed face



Compound between core and face

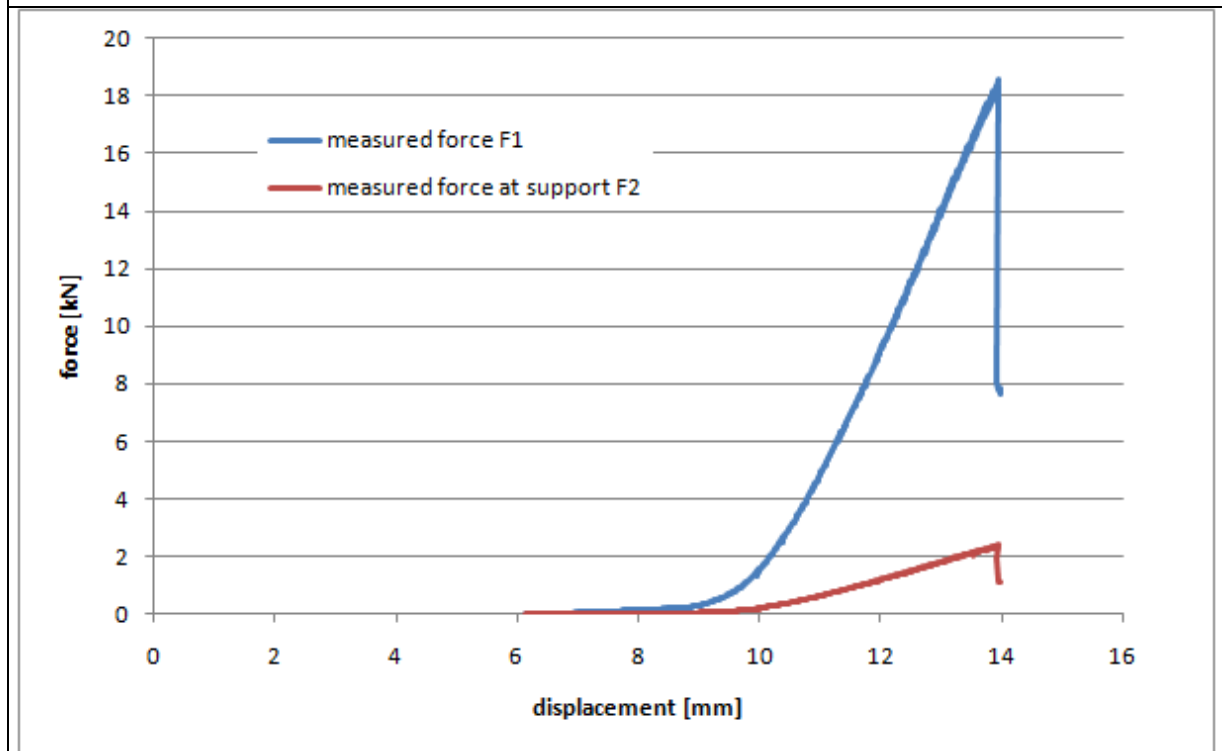


Test No.	I-E-22	
type of test	introduction of load by contact	
load introduction	sandwich panel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions:		
width b	400 mm	
height l	- mm	
thickness d	- mm	
ultimate load	5,69 kN	
ultimate stress	29,9 N/mm ²	
ultimate stress based on failed width	29,9 N/mm ²	
Failure mode	buckling of the stressed face	
Remarks	failed width b	



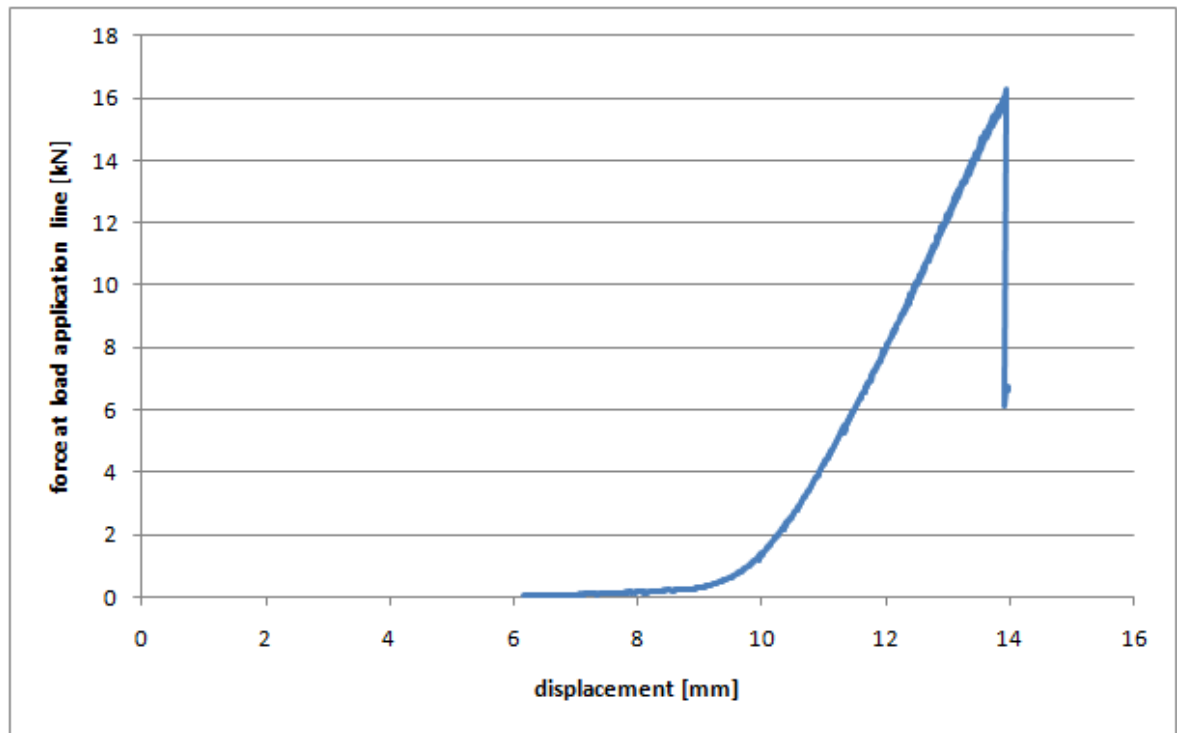
Test No.	I-E-22
 <p>Failure of the stressed face</p>	
 <p>Compound between core and face</p>	 <p>Failure of the stressed face</p>

Test No.	II-A-8		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	A		
faces	steel 0,50 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	400 mm	a	100 mm
height h ₁	296 mm	e	100 mm
thickness D	96 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	0,516 °
ultimate load at line of load application			16,29 kN
ultimate stress of compressed face			85,9 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

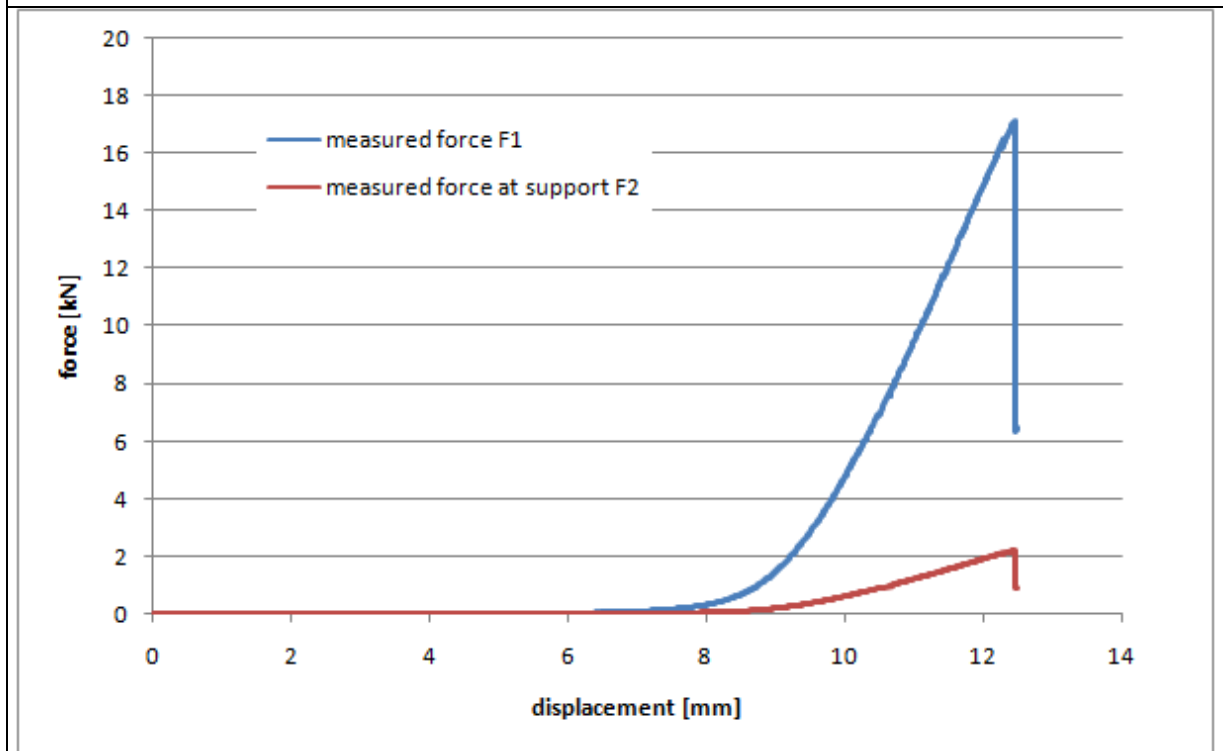
II-A-8



Failure of the stressed face

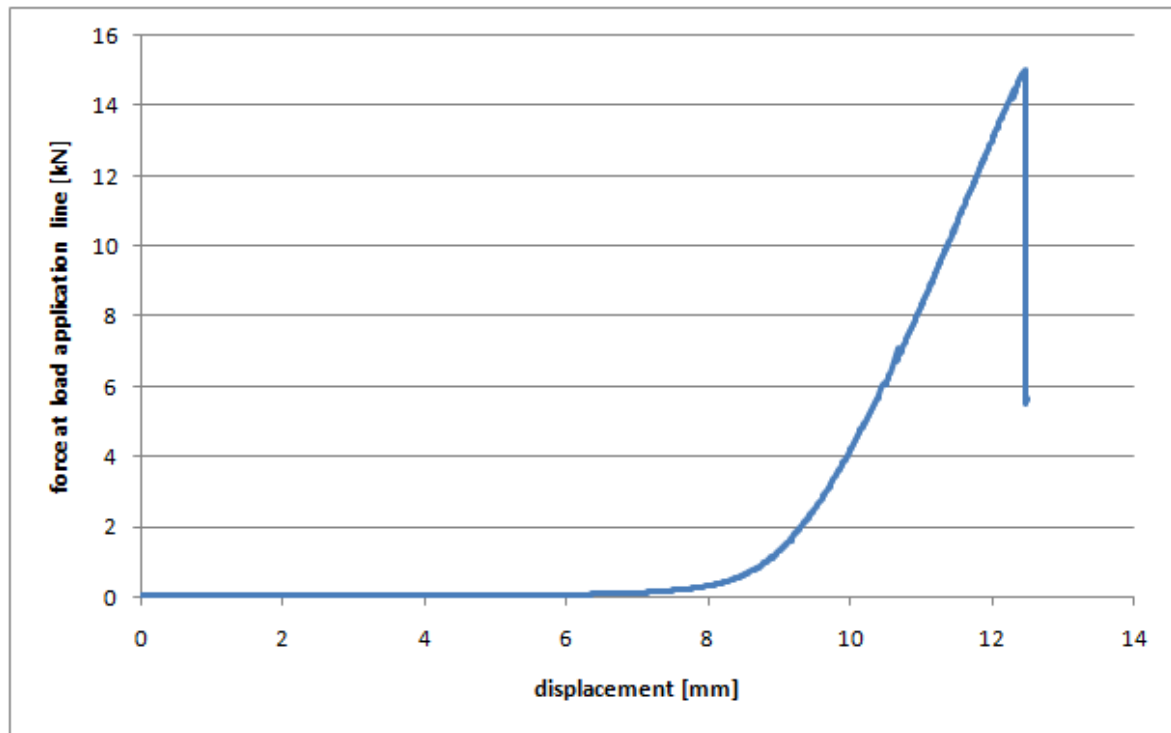


Test No.		II-A-9	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	A		
faces	steel 0,50 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	399 mm	a	100 mm
height h ₁	304 mm	e	100 mm
thickness D	96 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	1,5472 °
ultimate load at line of load application			15,01 kN
ultimate stress of compressed face			79,4 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

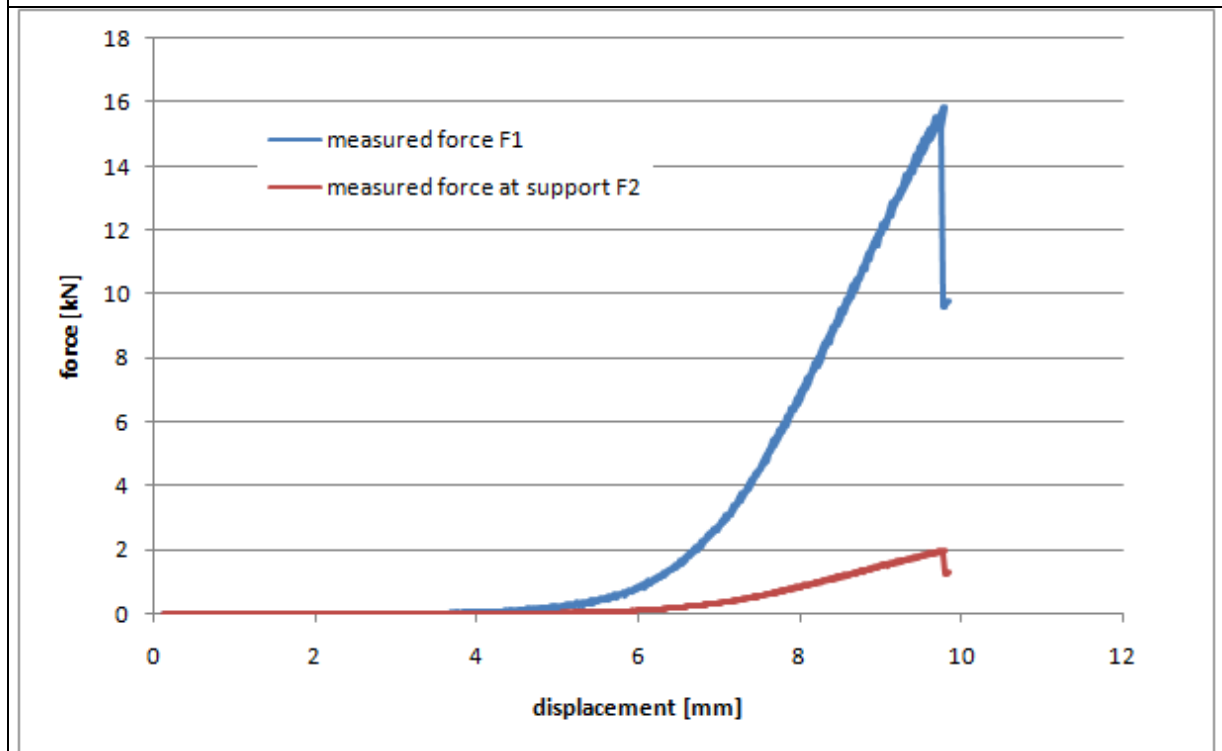
II-A-9



Failure of the stressed face

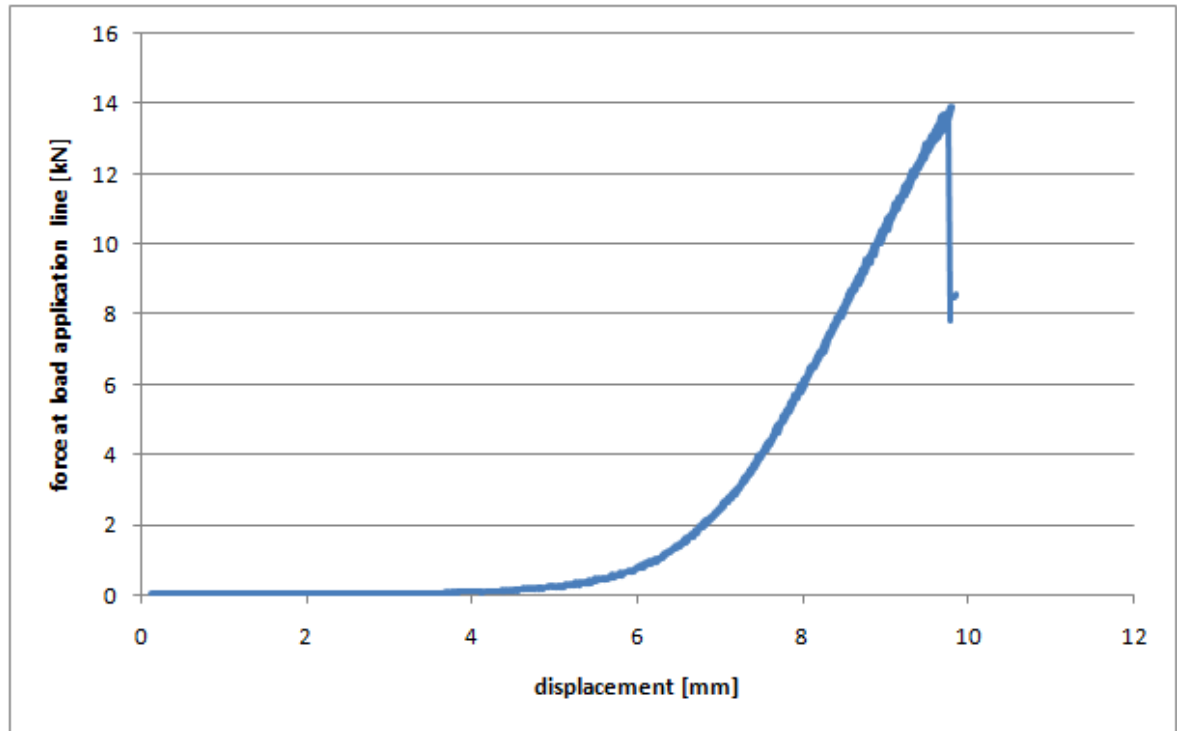


Test No.		II-A-10	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	A		
faces	steel 0,50 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	399 mm	a	100 mm
height h ₁	300 mm	e	100 mm
thickness D	95 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	48 mm	α	°
ultimate load at line of load application			13,93 kN
ultimate stress of compressed face			73,7 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

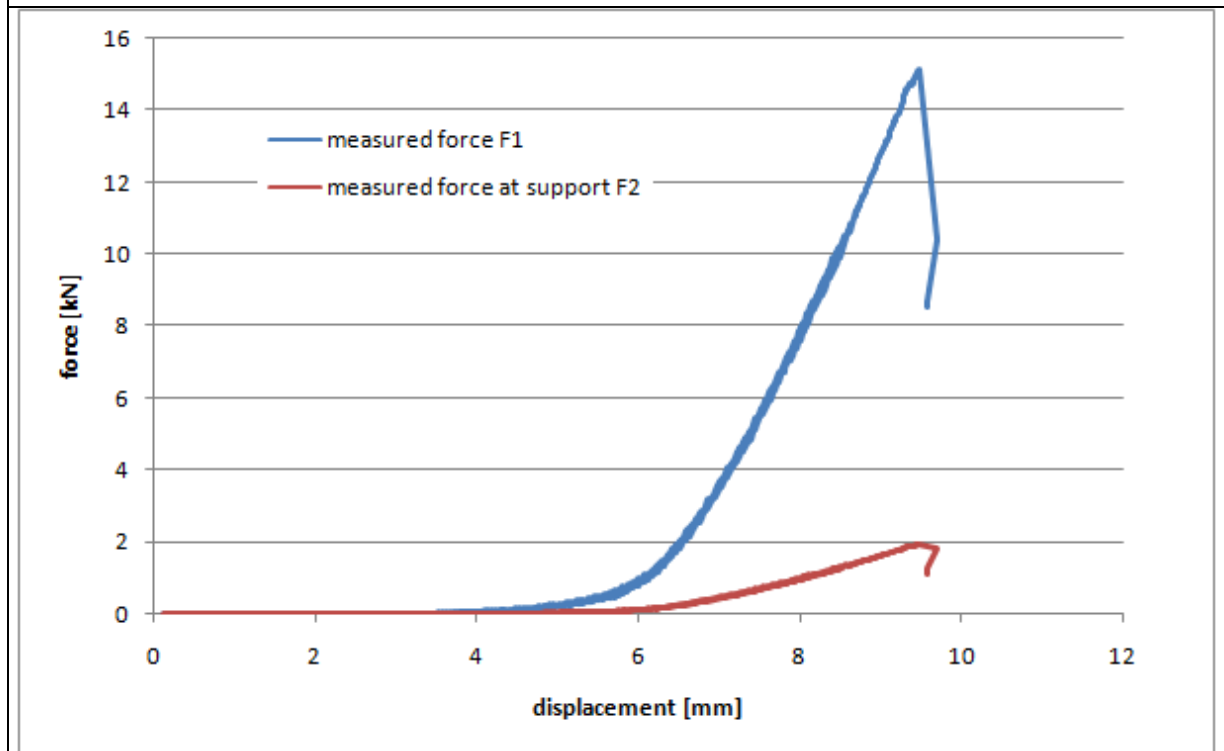
II-A-10



Failure of the stressed face

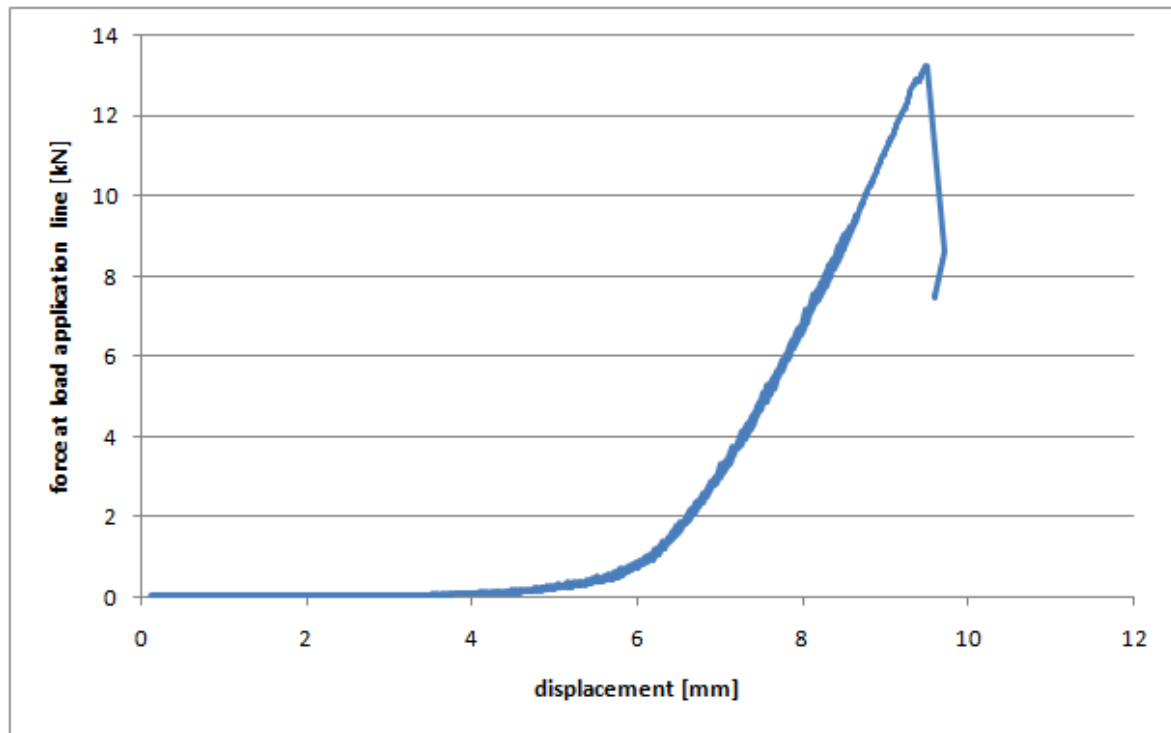


Test No.		II-A-11	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	A		
faces	steel 0,50 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	399 mm	a	100 mm
height h ₁	300 mm	e	100 mm
thickness D	94 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	46 mm	α	1,3179 °
ultimate load at line of load application			13,26 kN
ultimate stress of compressed face			70,1 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

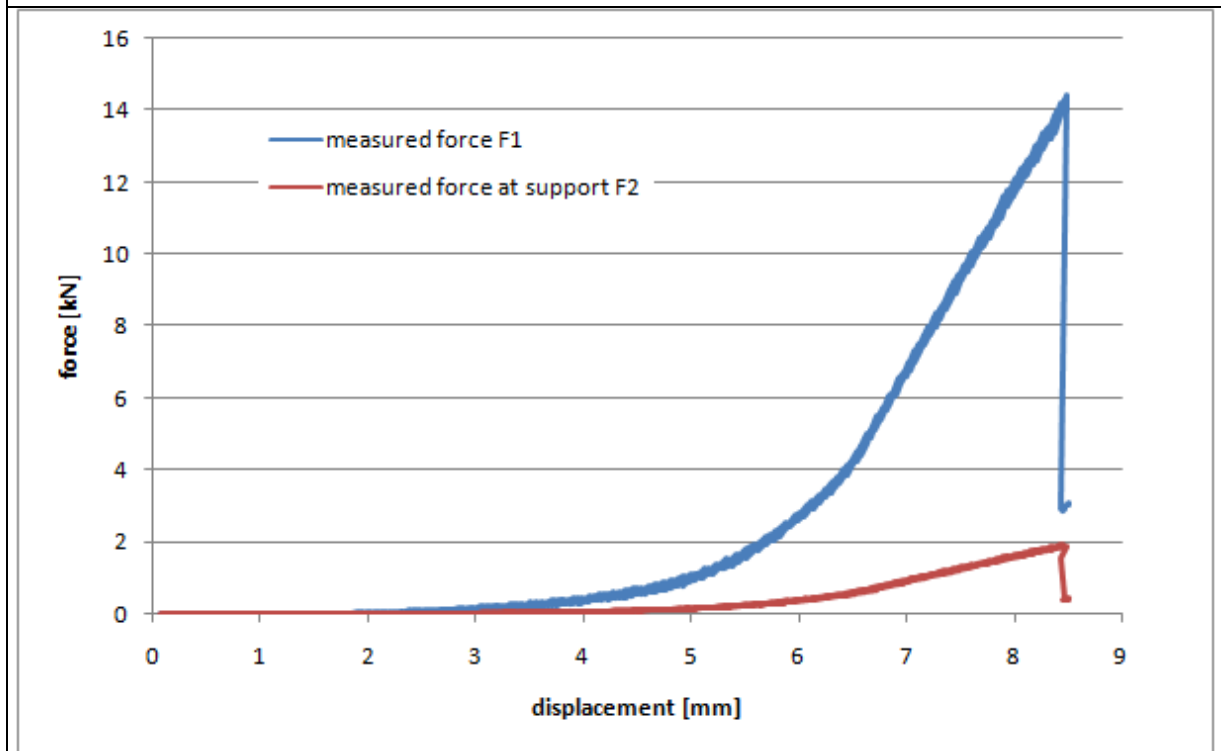
II-A-11



Failure of the stressed face

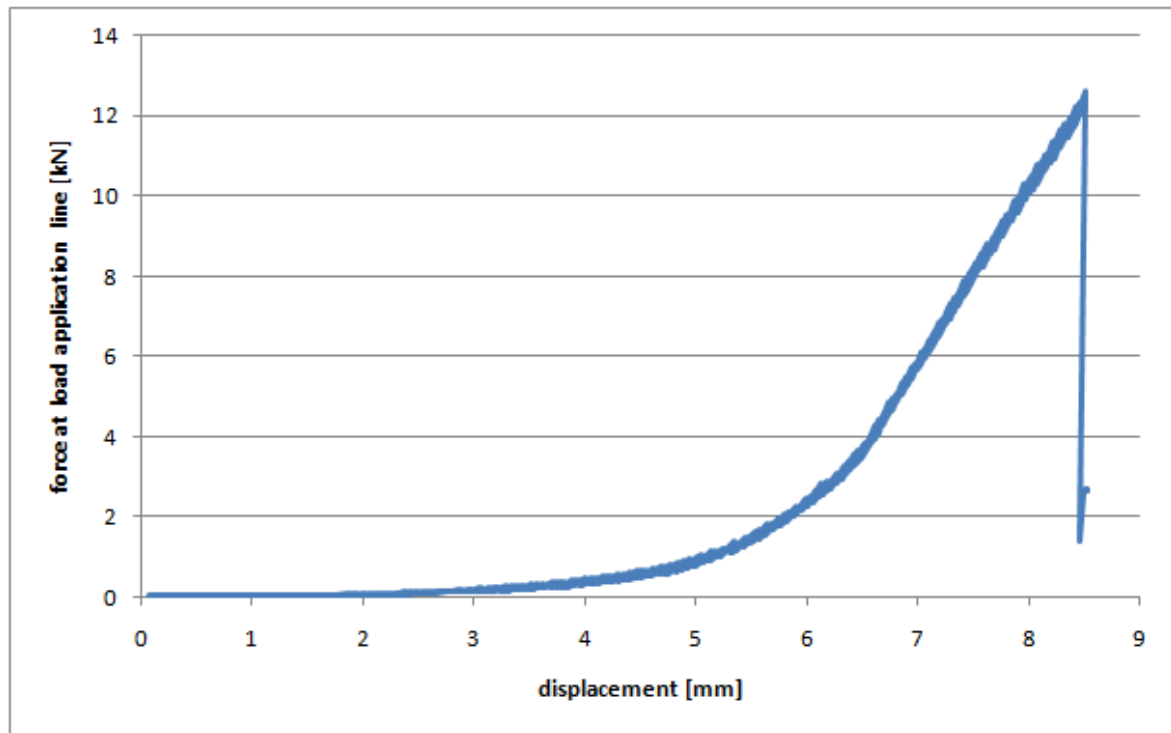


Test No.		II-A-12	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	A		
faces	steel 0,50 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	296 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	2,178 °
ultimate load at line of load application			12,63 kN
ultimate stress of compressed face			66,6 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

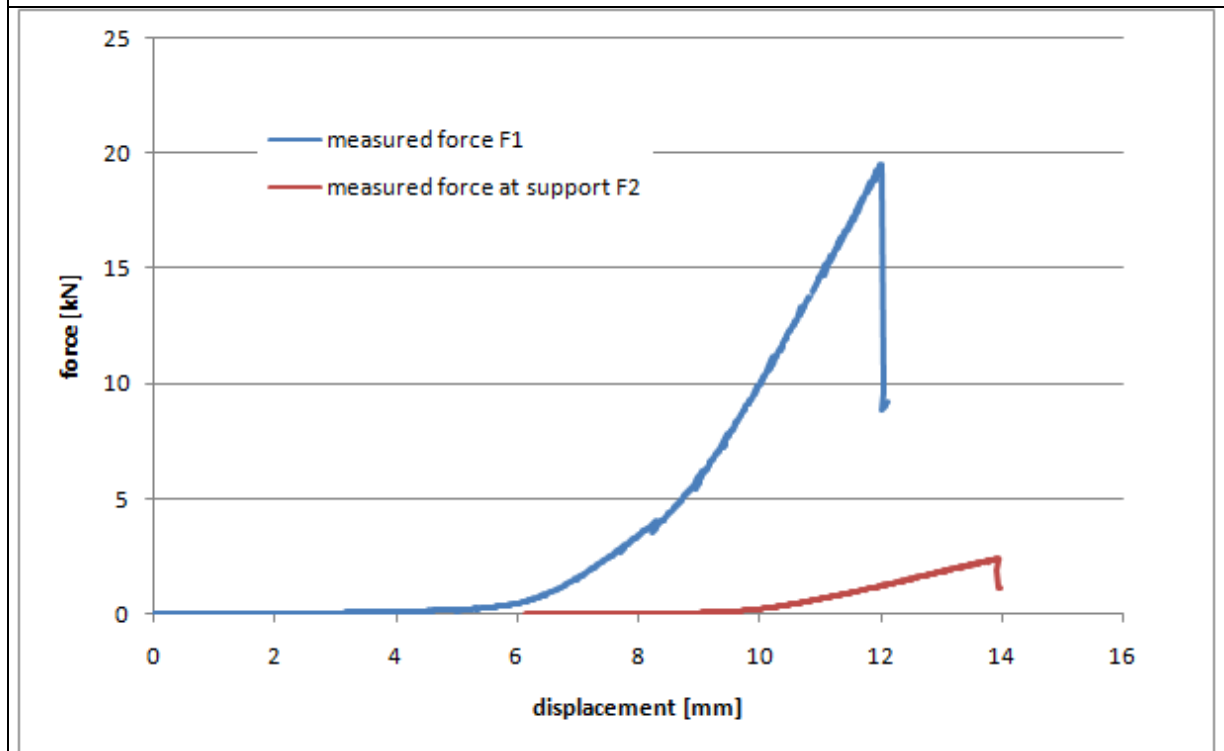
II-A-12



Failure of the stressed face

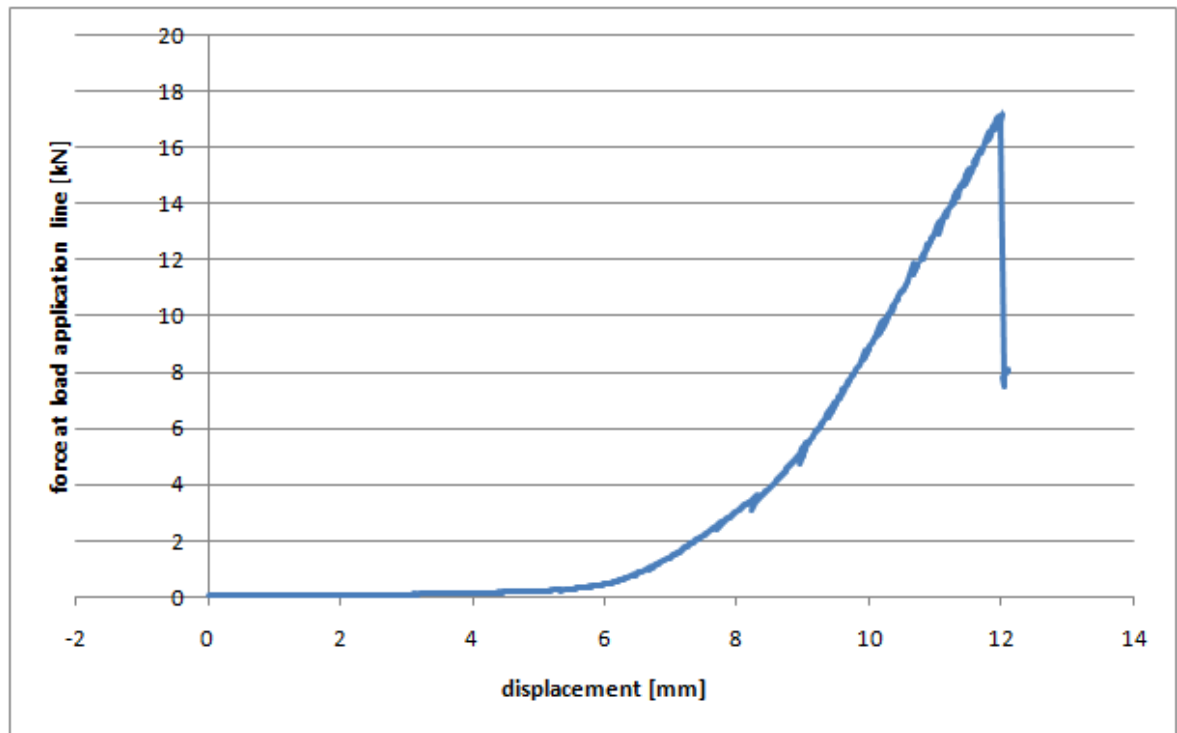


Test No.		II-A-13	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	A		
faces	steel 0,50 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	398 mm	a	100 mm
height h ₁	302 mm	e	100 mm
thickness D	96 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	47 mm	α	0,688 °
ultimate load at line of load application			17,27 kN
ultimate stress of compressed face			91,5 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

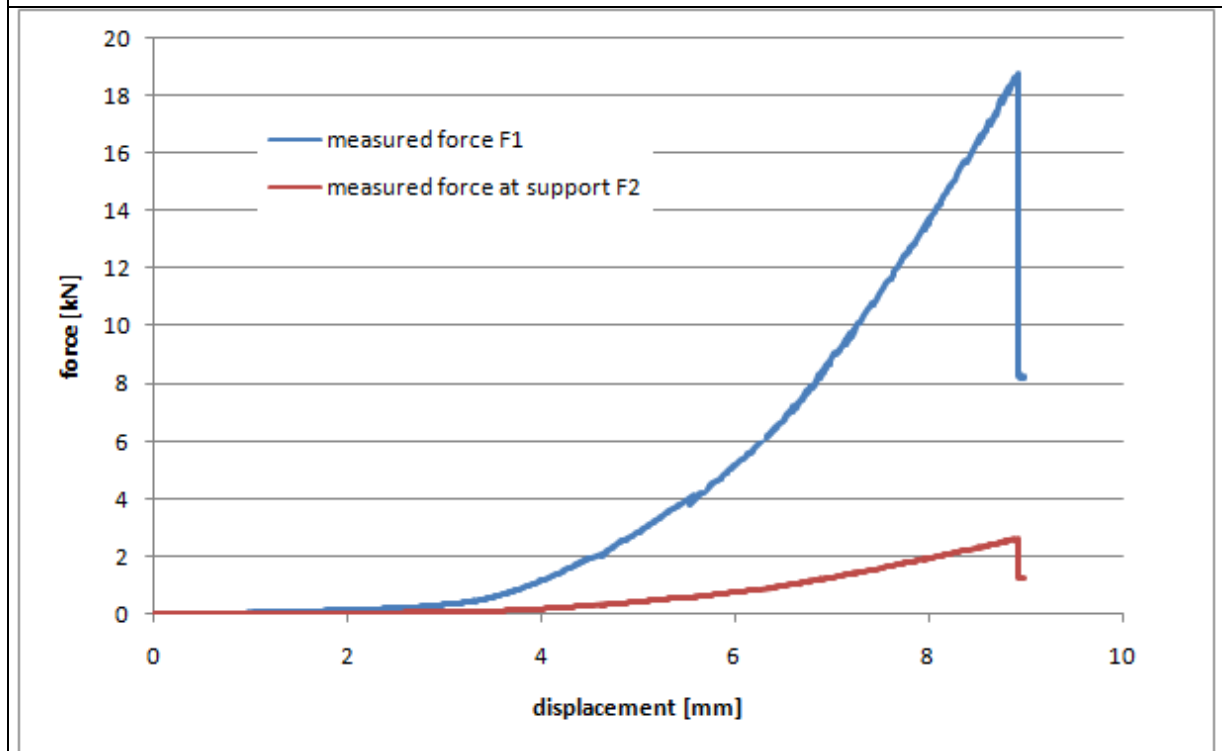
II-A-13



Failure of the stressed face

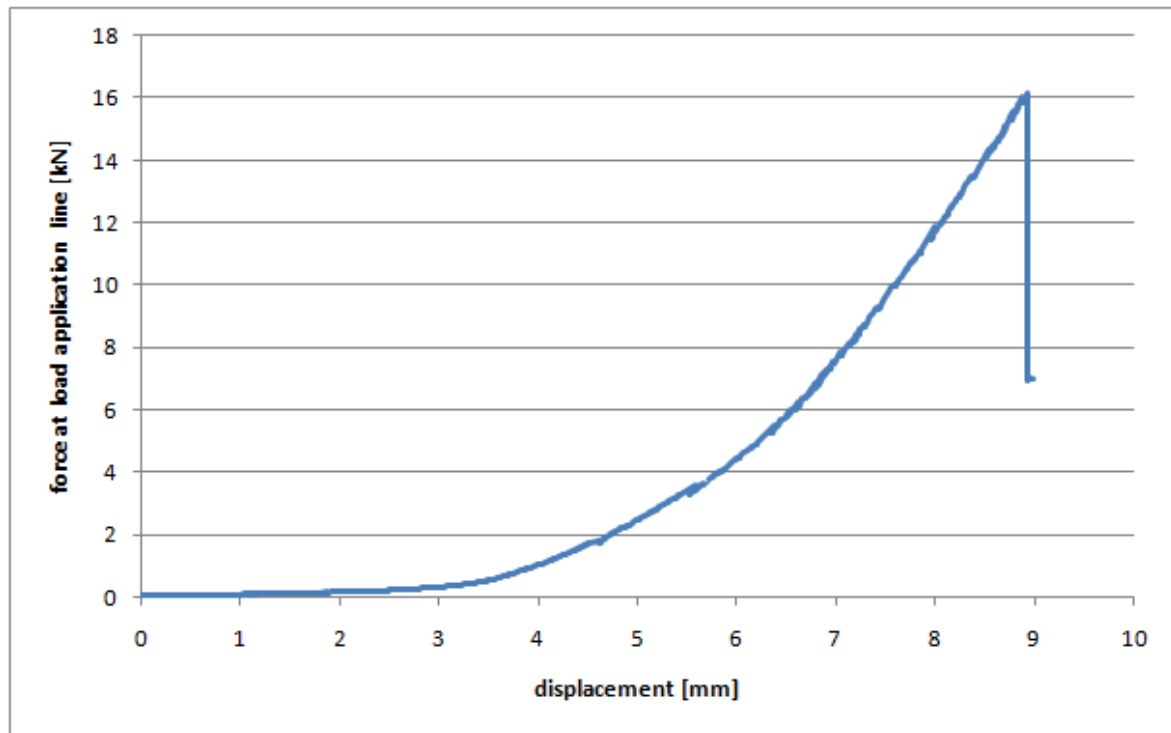


Test No.		II-A-14	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	A		
faces	steel 0,50 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	399 mm	a	100 mm
height h ₁	296 mm	e	100 mm
thickness D	96 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	0,115 °
ultimate load at line of load application			16,17 kN
ultimate stress of compressed face			85,5 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

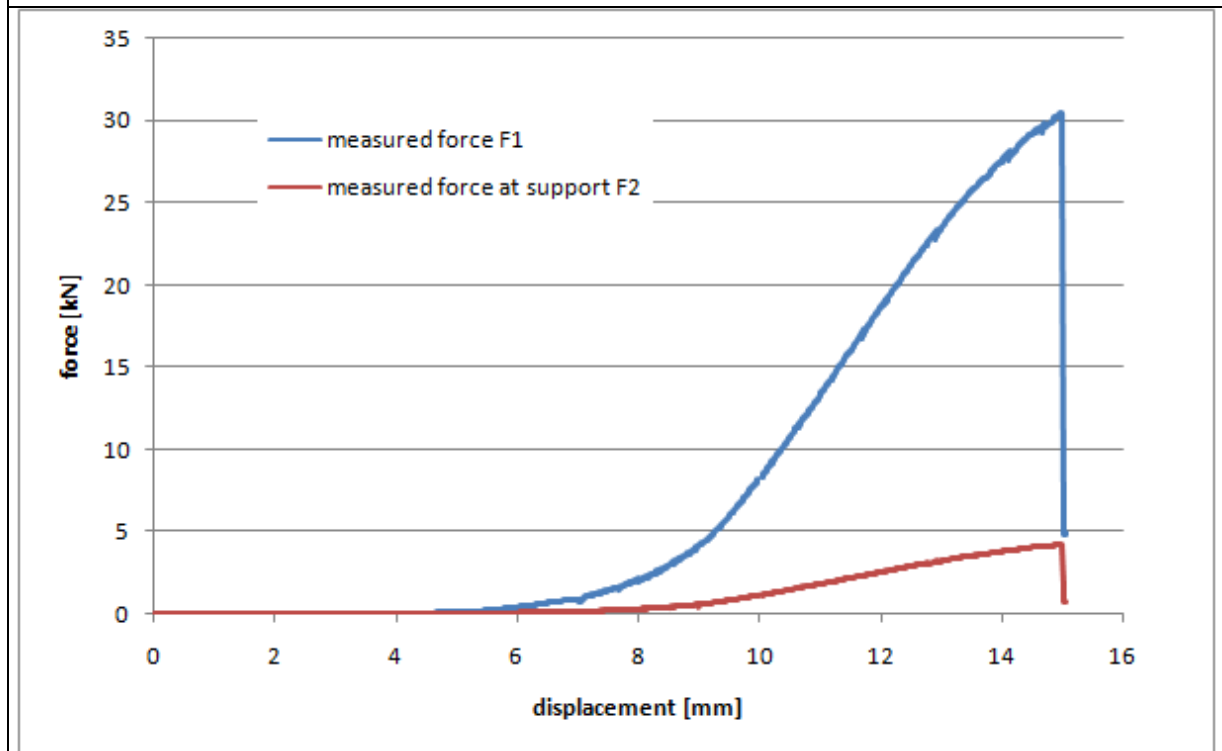
II-A-14



Failure of the stressed face

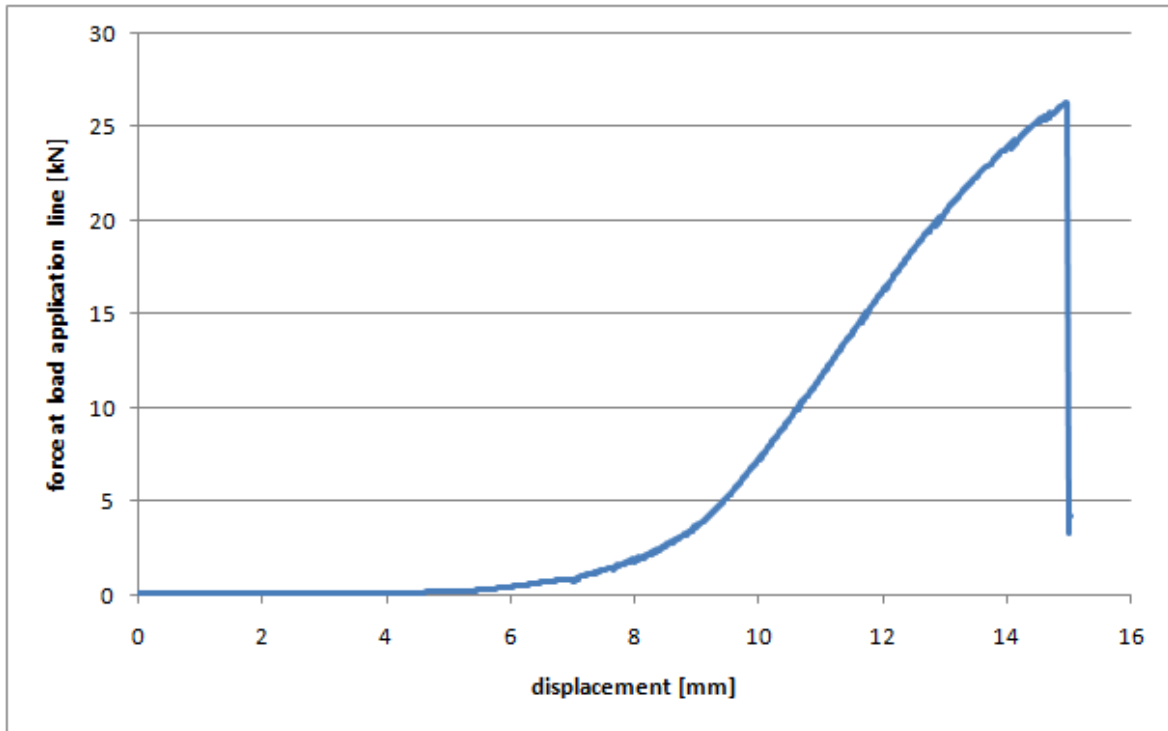


Test No.		II-B-1	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	295 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	48 mm	α	1,891 °
ultimate load at line of load application			26,28 kN
ultimate stress of compressed face			86,2 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

II-B-1

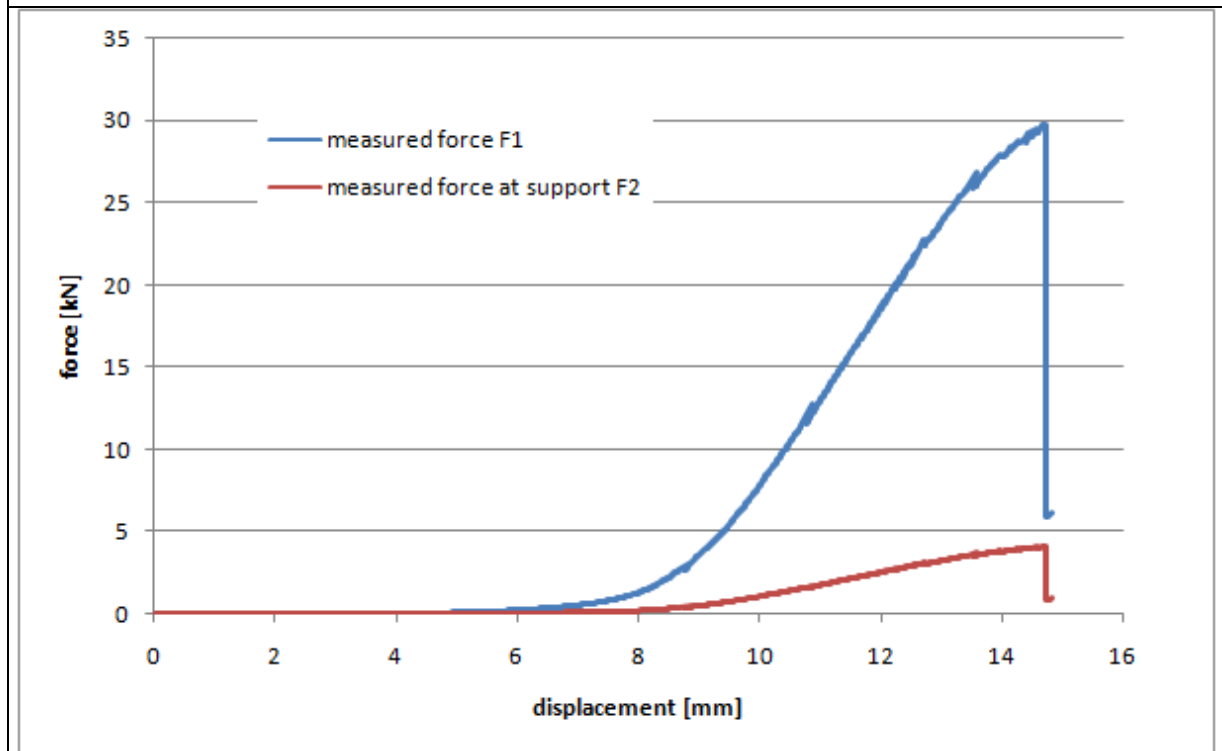


Failure of the stressed face



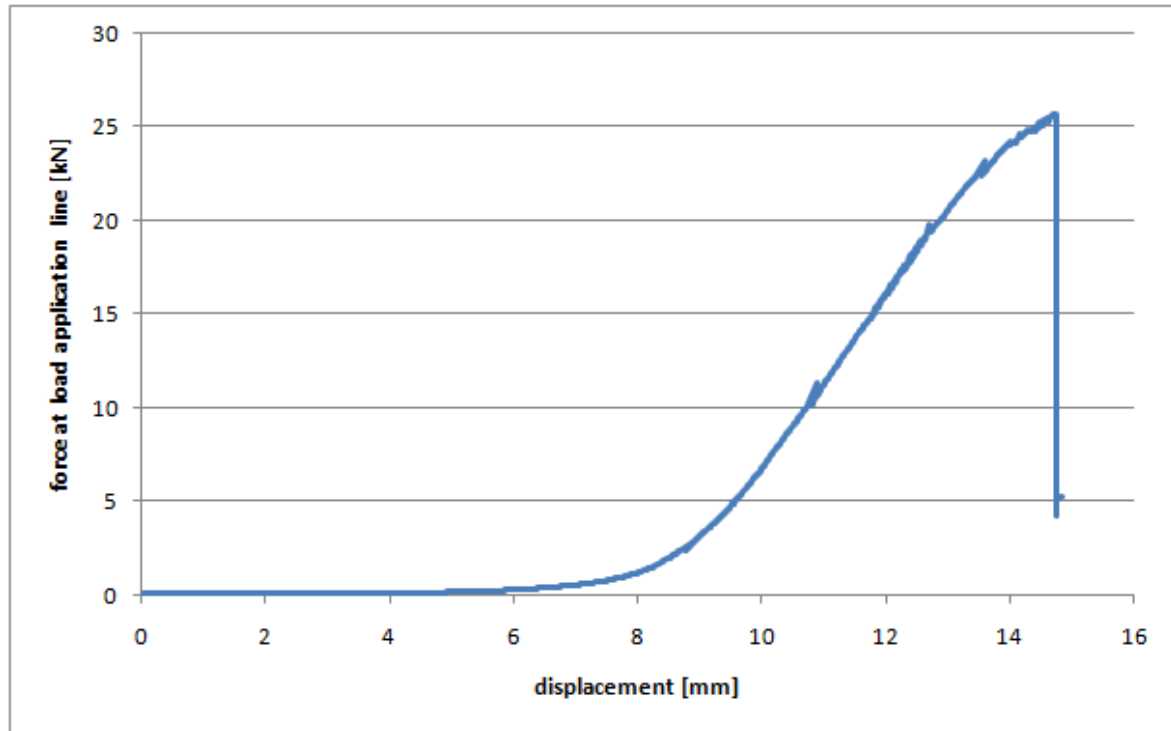
Compound between core and face

Test No.		II-B-2	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	300 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	1,0314 °
ultimate load at line of load application			25,72 kN
ultimate stress of compressed face			84,4 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

II-B-2

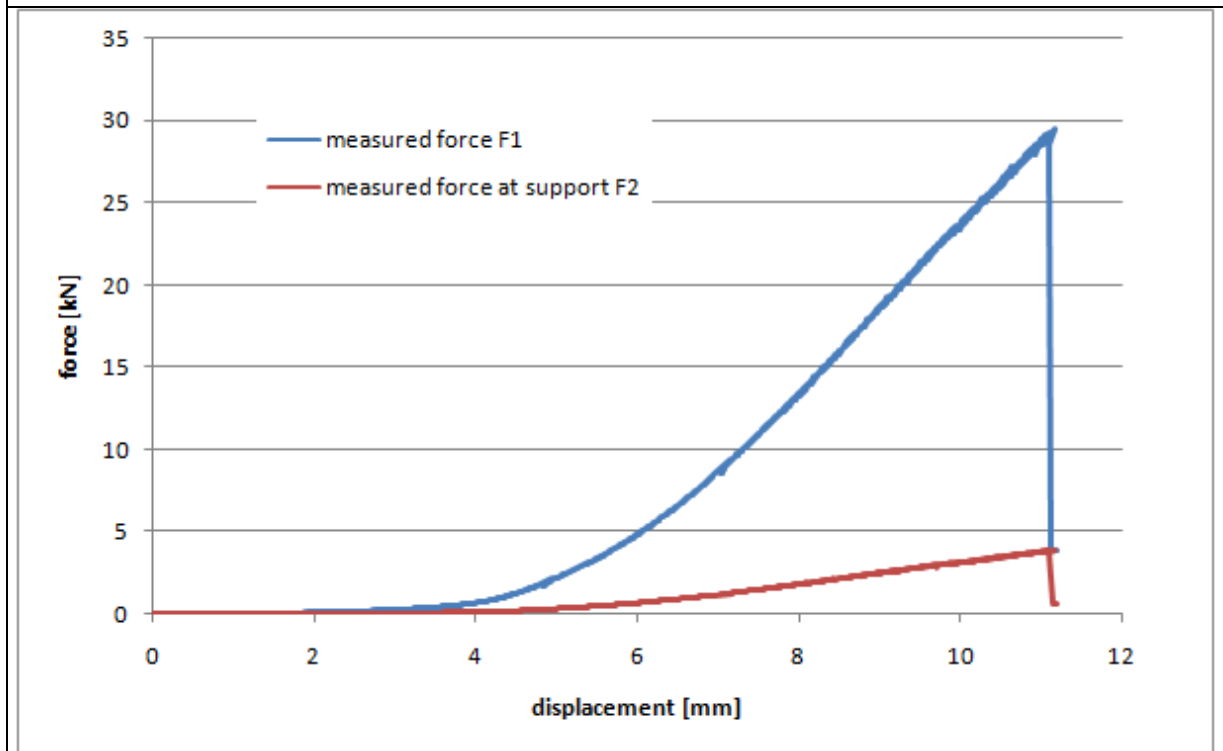


Failure of the stressed face



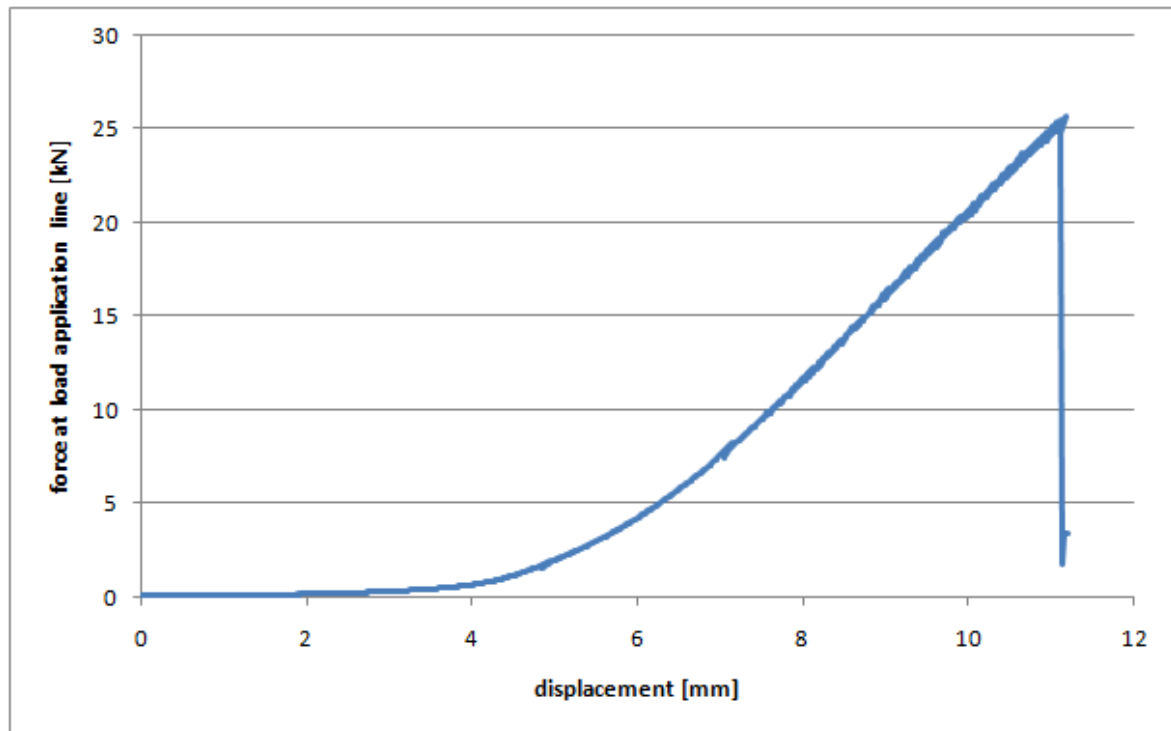
Compound between core and face

Test No.		II-B-3	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	300 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	48 mm	α	0,3438 °
ultimate load at line of load application			25,70 kN
ultimate stress of compressed face			84,3 N/mm ²
Failure mode	buckling and delamination of the compressed face		
Remarks			



Test No.

II-B-3

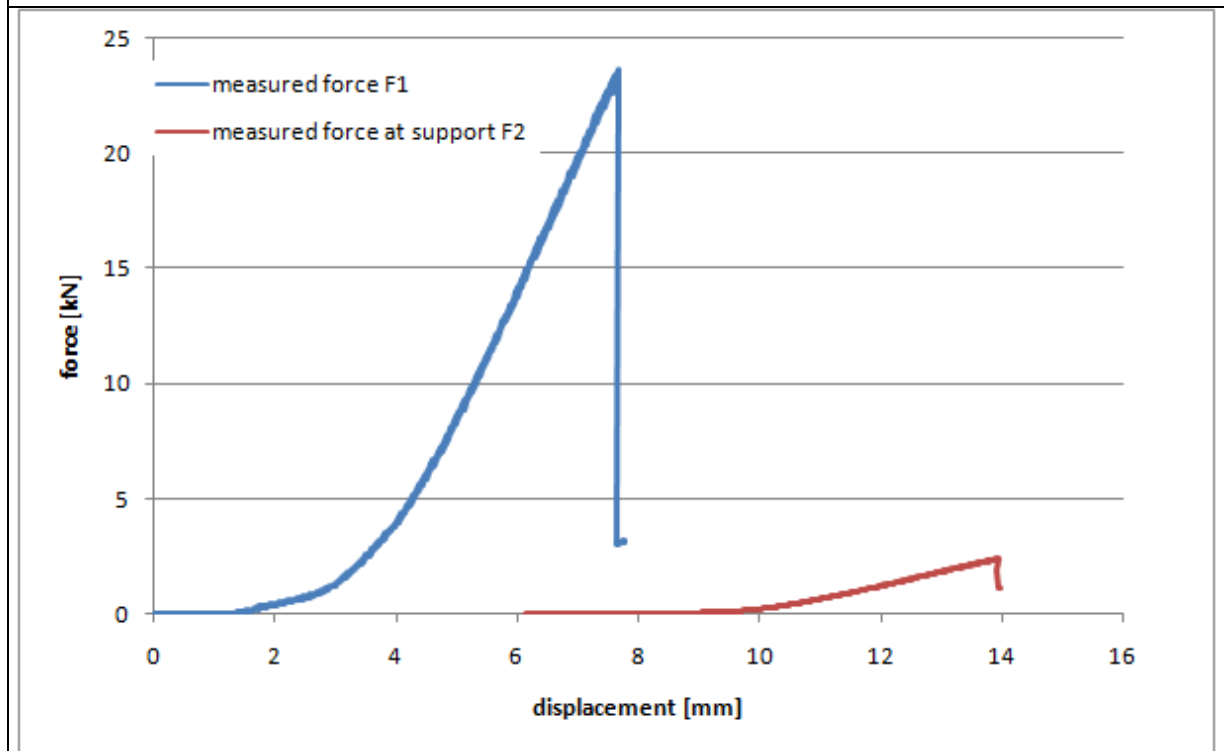


Failure of the stressed face



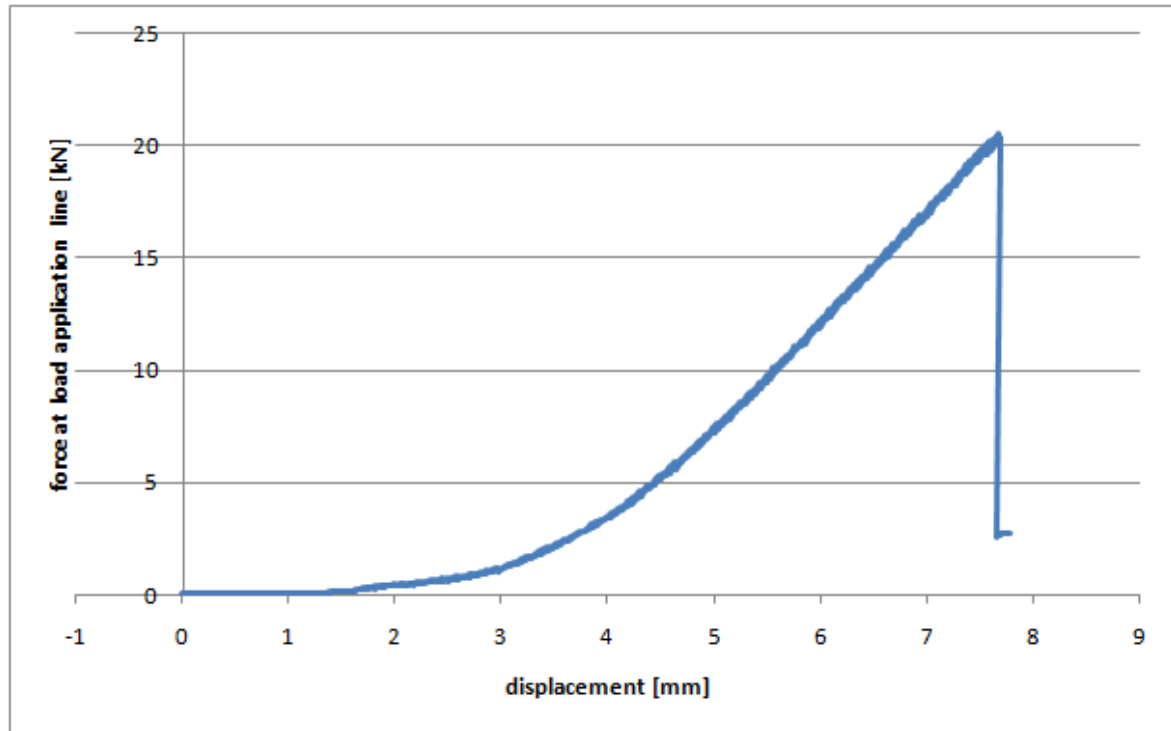
Compound between core and face

Test No.	II-B-4		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	401 mm	a	100 mm
height h ₁	296 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	50 mm	α	°
ultimate load at line of load application			20,55 kN
ultimate stress of compressed face			67,3 N/mm ²
Failure mode	buckling and delamination of the compressed face		
Remarks			



Test No.

II-B-4

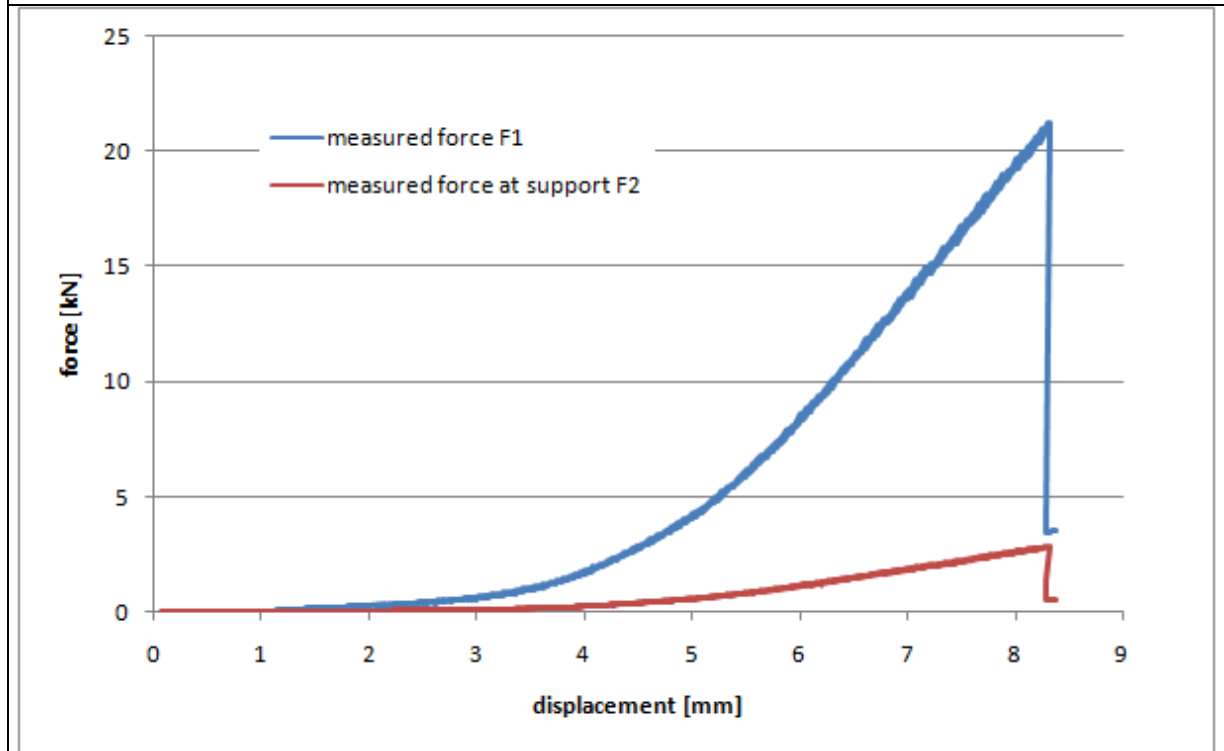


Failure of the stressed face



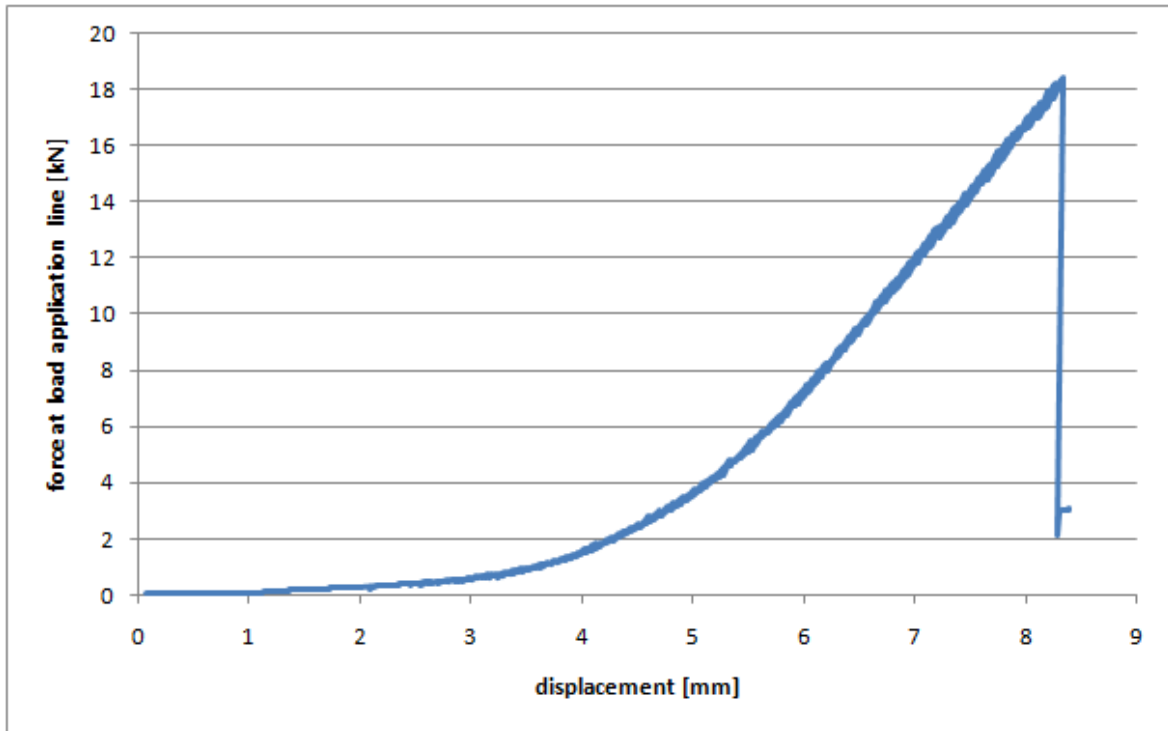
Compound between core and face

Test No.		II-B-5	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	299 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	0,34378 °
ultimate load at line of load application			18,43 kN
ultimate stress of compressed face			60,5 N/mm ²
Failure mode	buckling and delamination of the compressed face		
Remarks			



Test No.

II-B-5



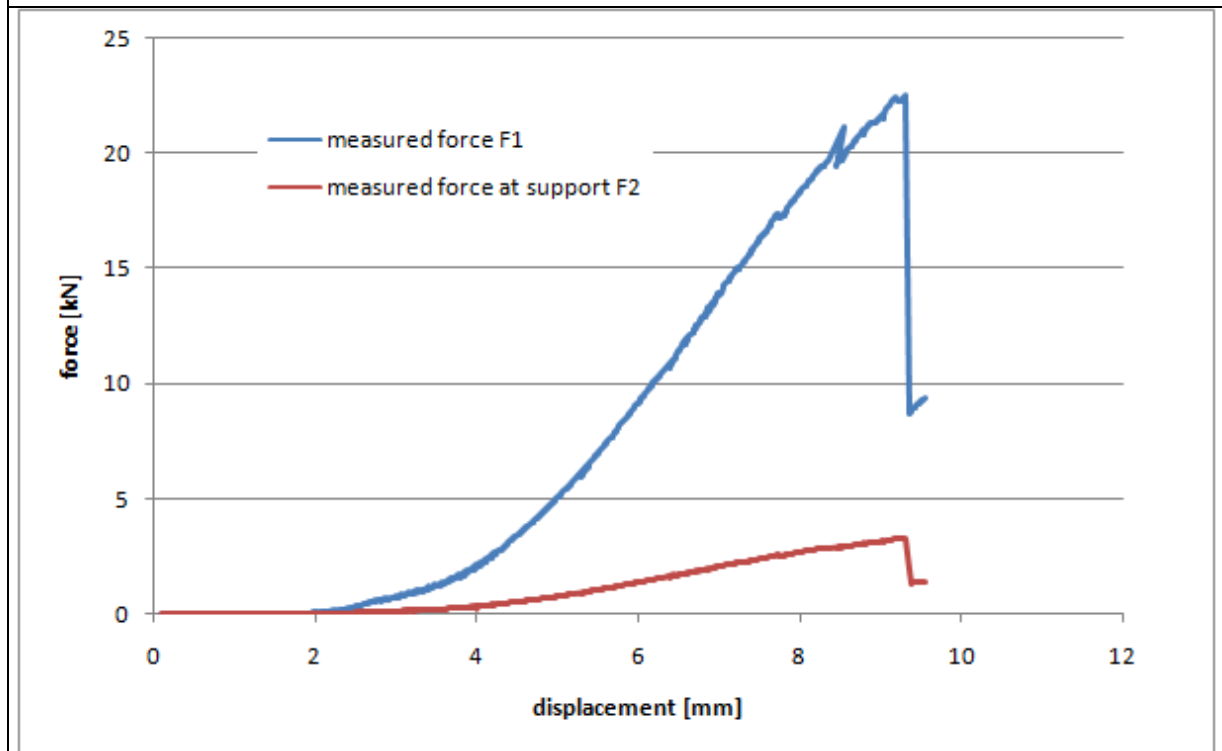
Failure of the stressed face



Compound between core and face

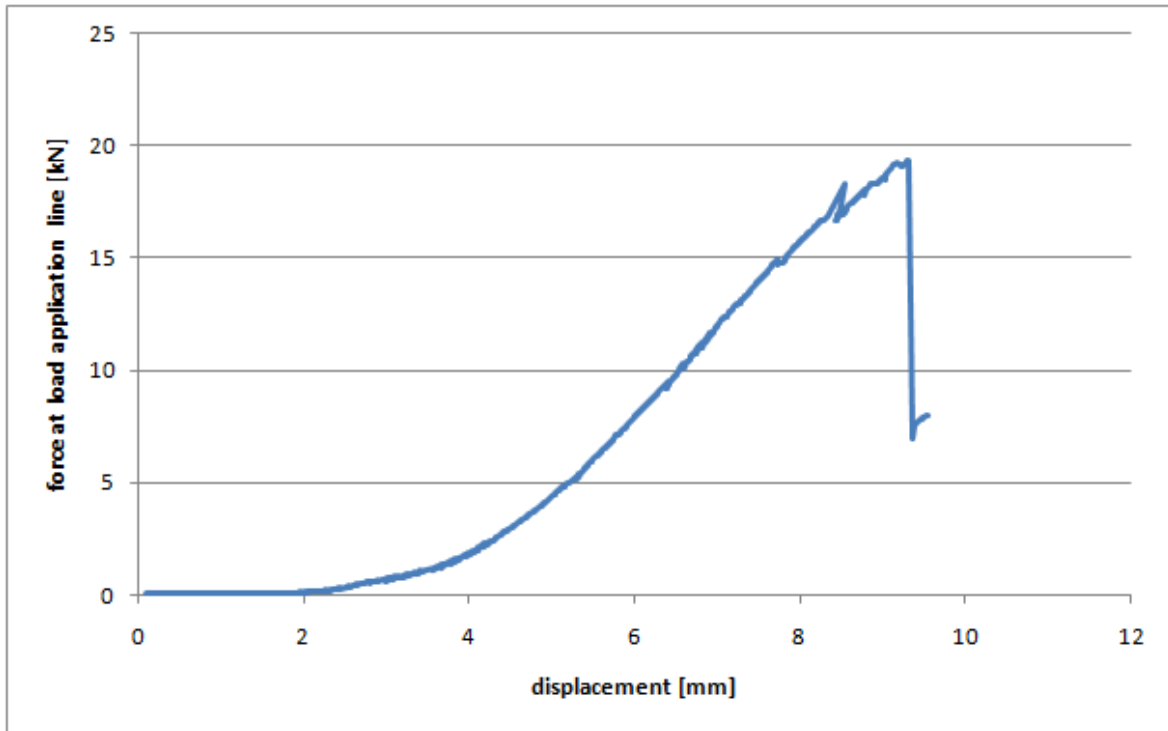


Test No.		II-B-6	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	296 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	1,26061 °
ultimate load at line of load application			19,37 kN
ultimate stress of compressed face			63,6 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			

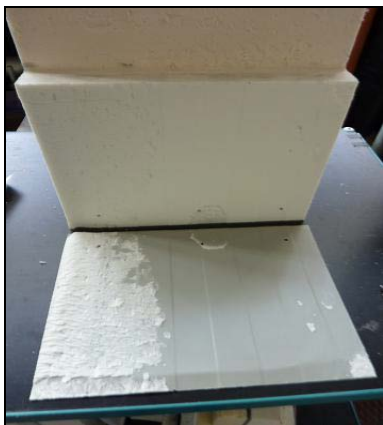


Test No.

II-B-6

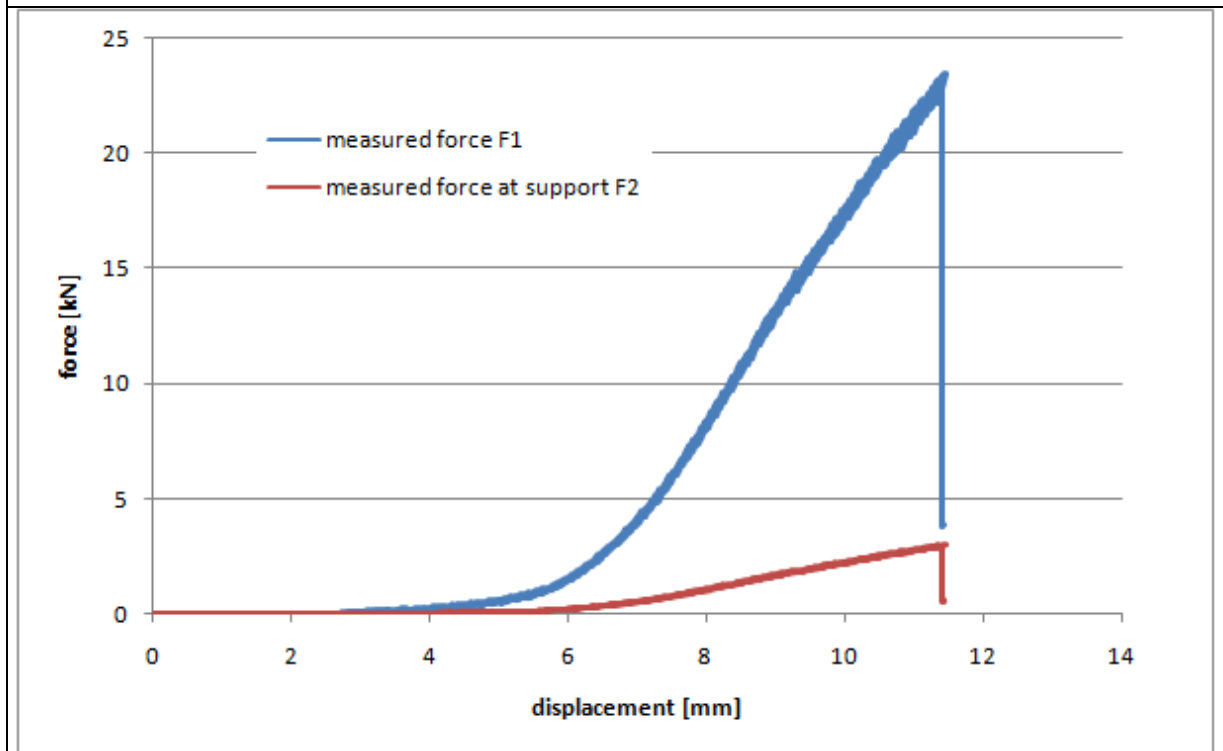


Failure of the stressed face



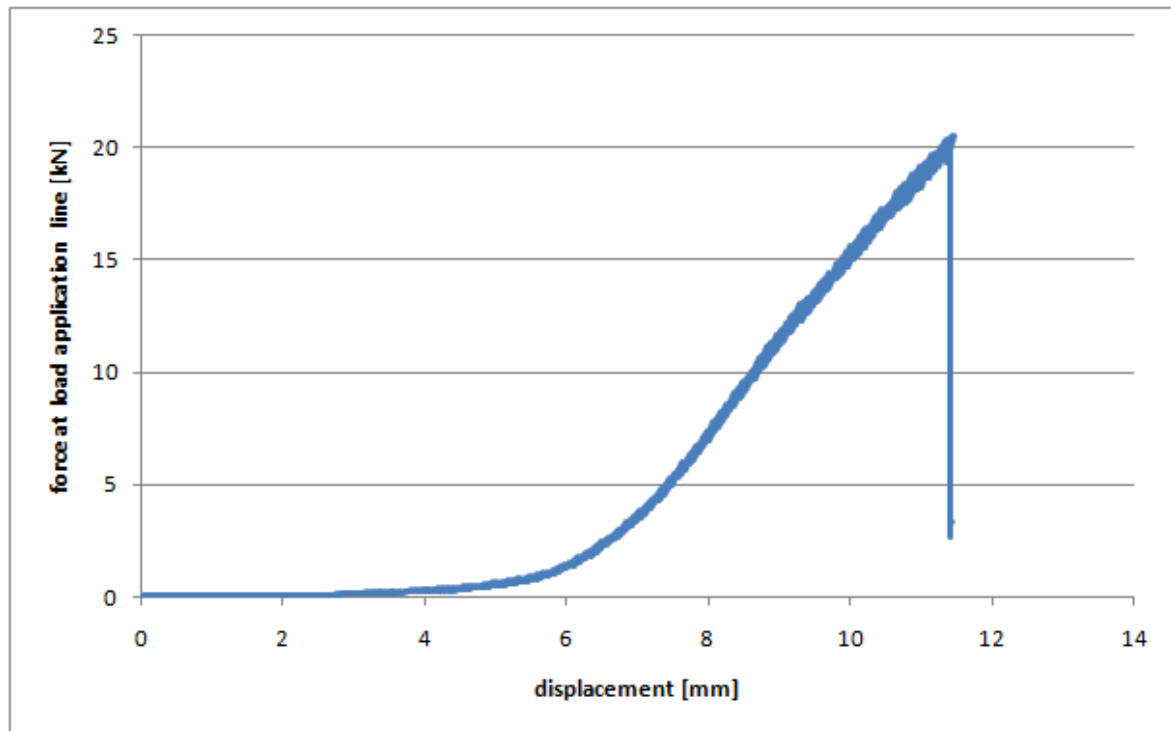
Compound between core and face

Test No.		II-B-7	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	301 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	0,45837 °
ultimate load at line of load application			20,56 kN
ultimate stress of compressed face			67,4 N/mm ²
Failure mode	buckling and delamination of the compressed face		
Remarks			



Test No.

II-B-7

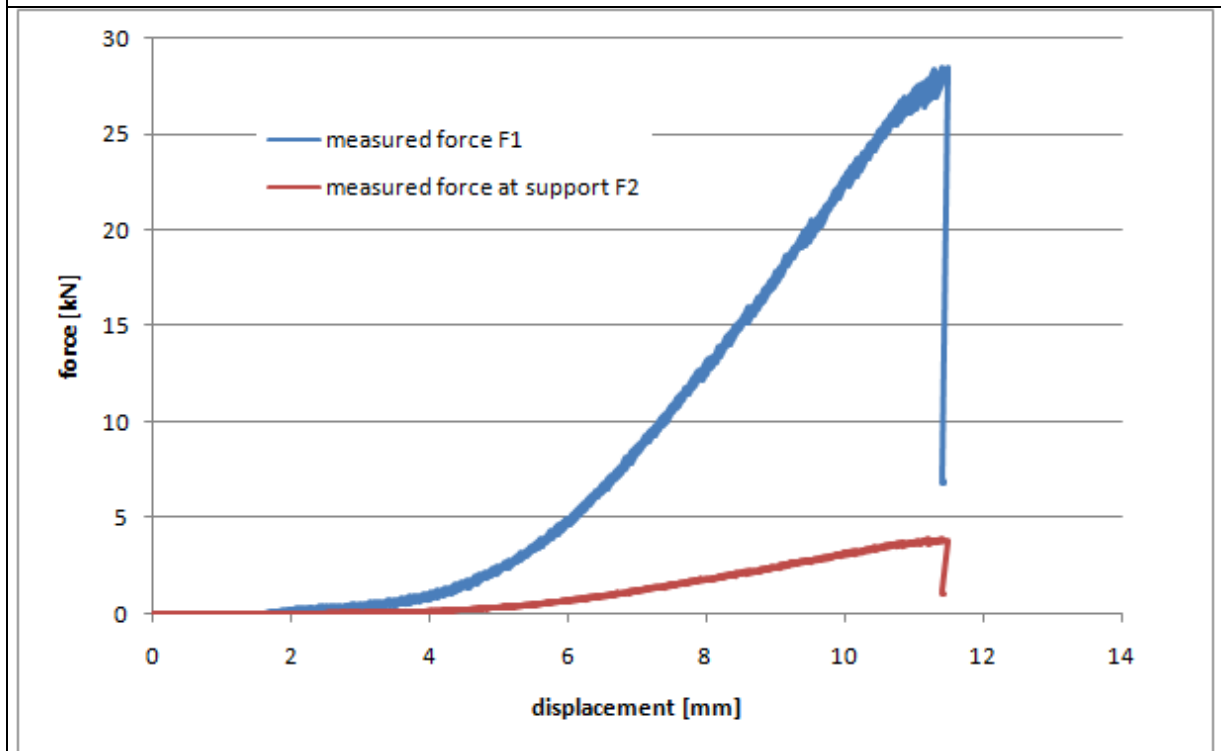


Failure of the stressed face



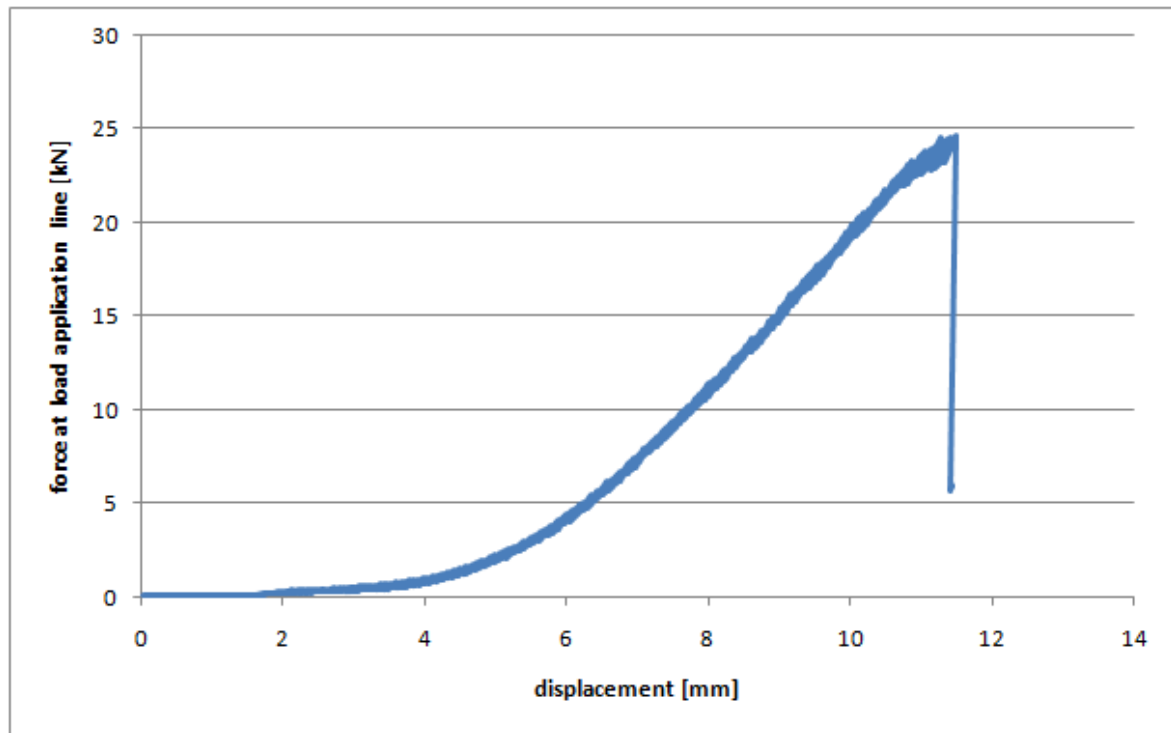
Compound between core and face

Test No.		II-B-8	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	302 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	0,51567 °
ultimate load at line of load application			24,67 kN
ultimate stress of compressed face			80,9 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

II-B-8

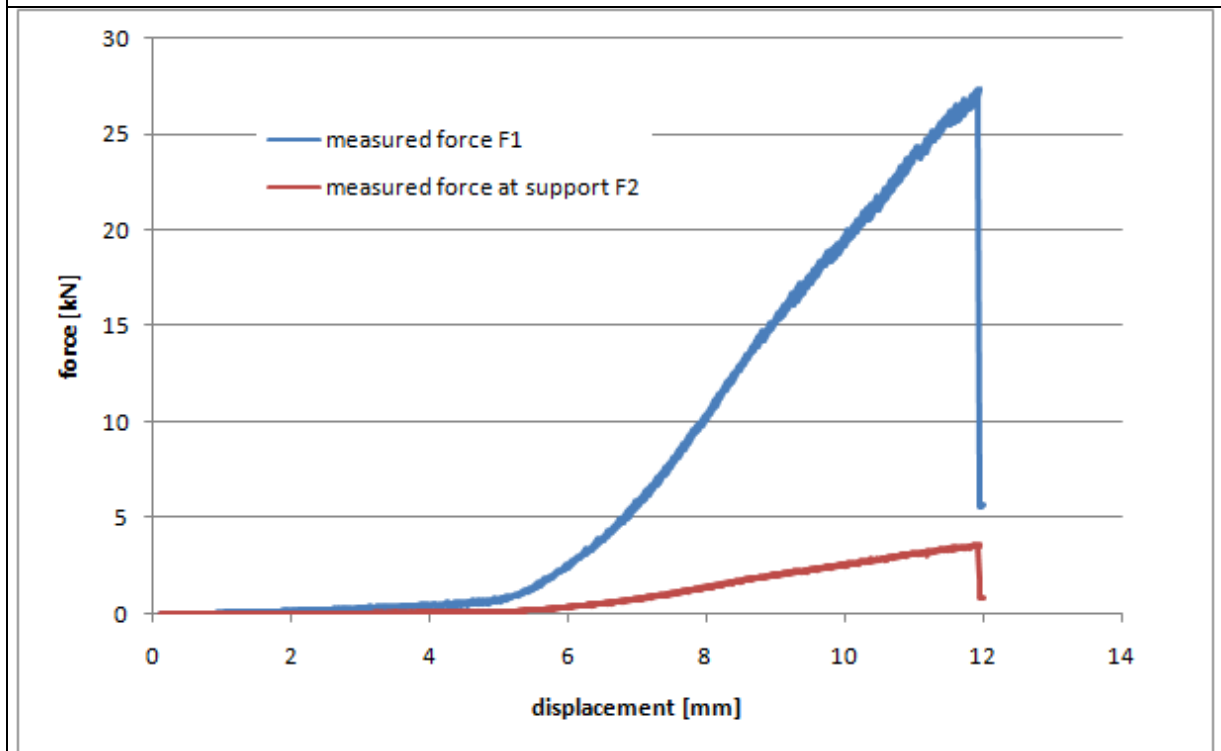


Failure of the stressed face



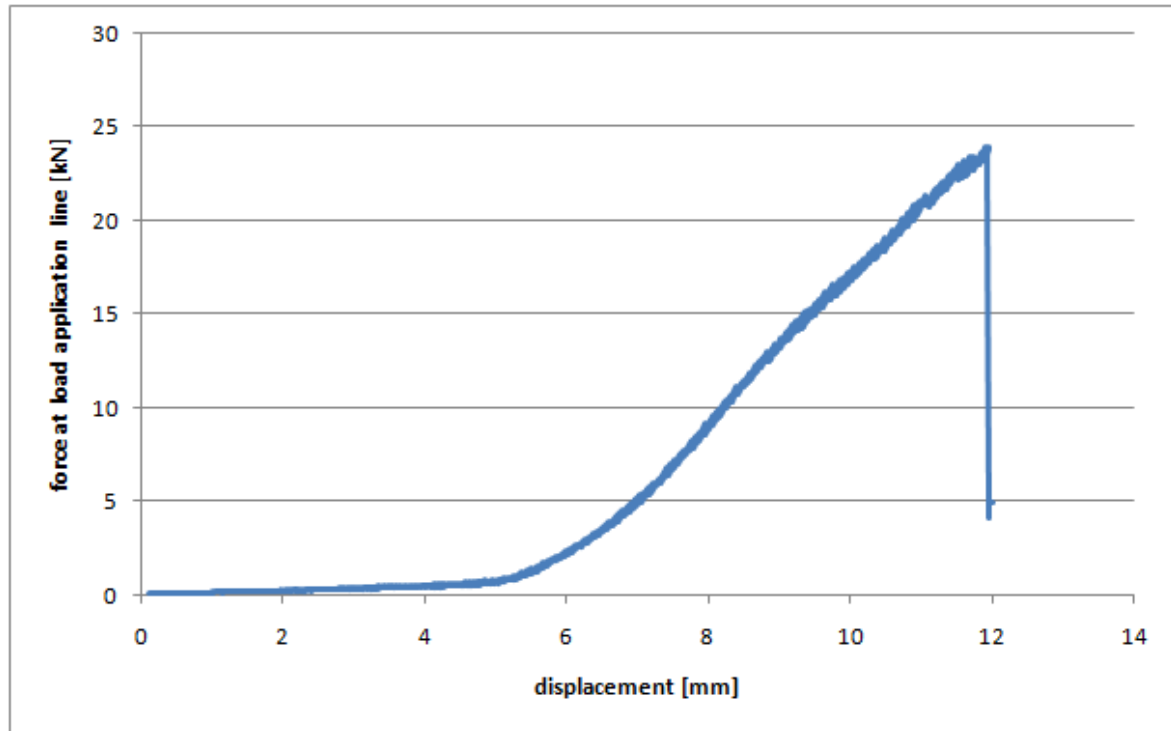
Compound between core and face

Test No.		II-B-9	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	301 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	1,08869 °
ultimate load at line of load application			23,90 kN
ultimate stress of compressed face			78,4 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

II-B-9

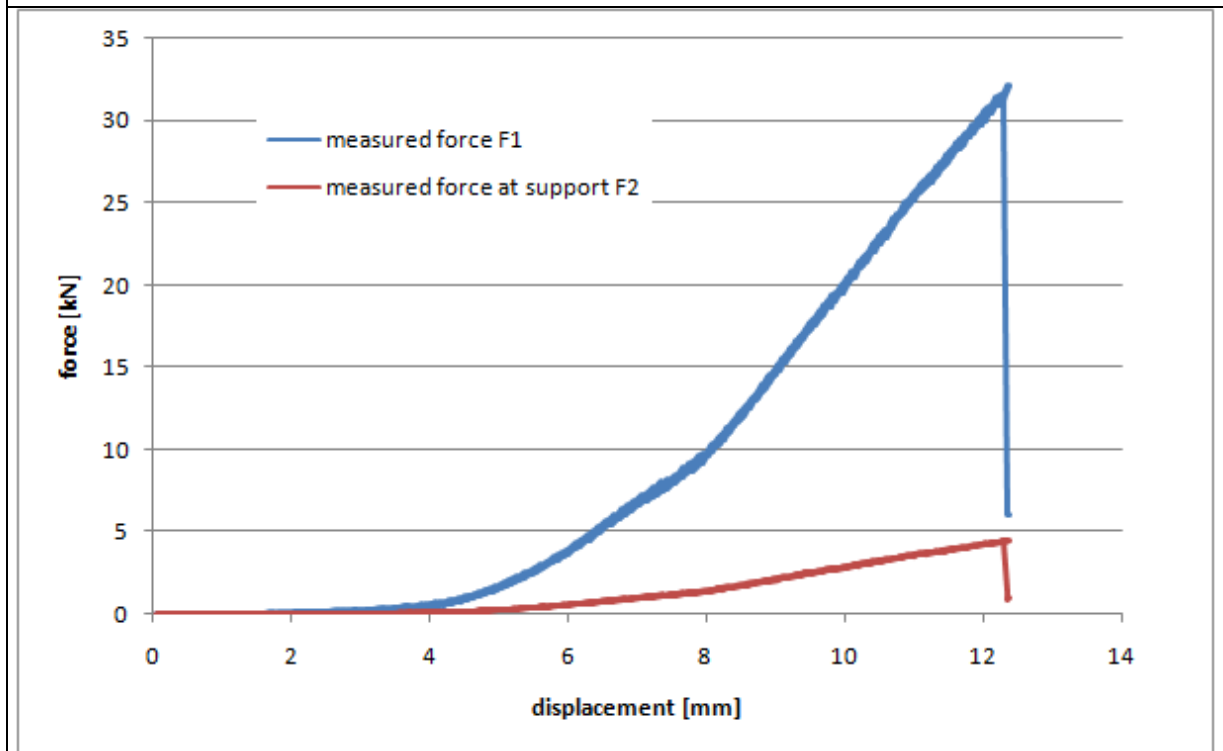


Failure of the stressed face



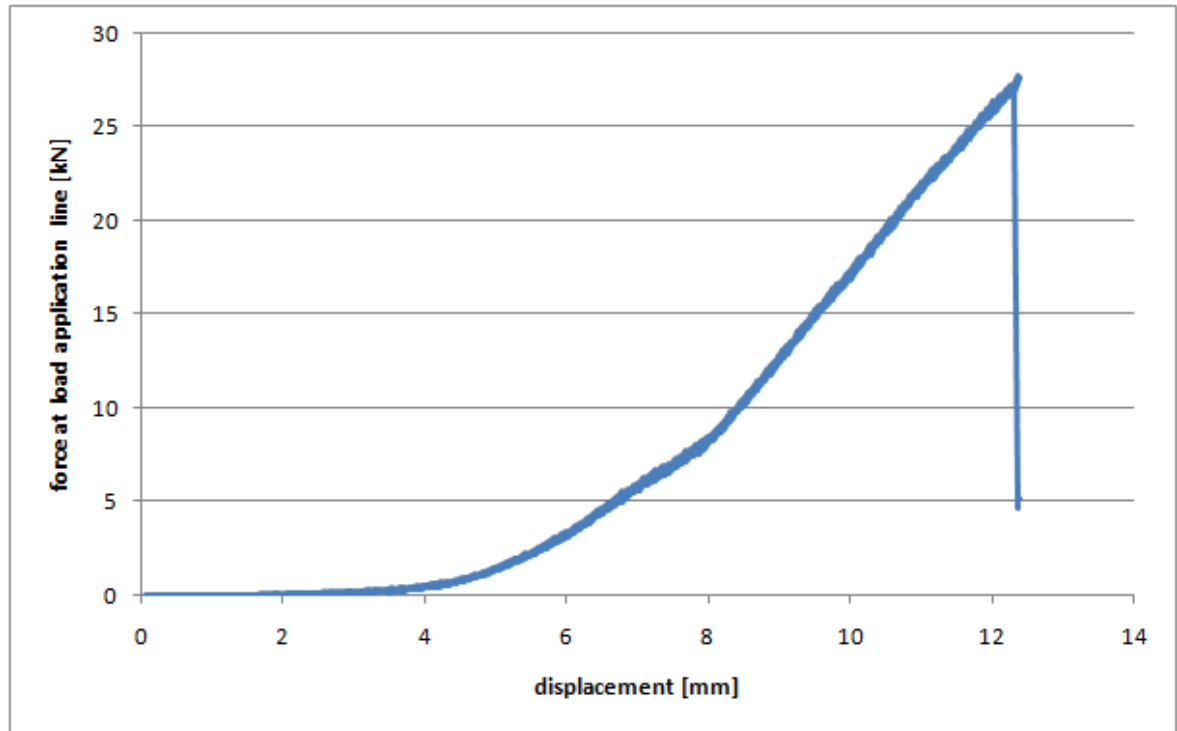
Compound between core and face

Test No.		II-B-10	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	399 mm	a	100 mm
height h ₁	300 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	50 mm	α	1,26061 °
ultimate load at line of load application			27,80 kN
ultimate stress of compressed face			91,4 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

II-B-10

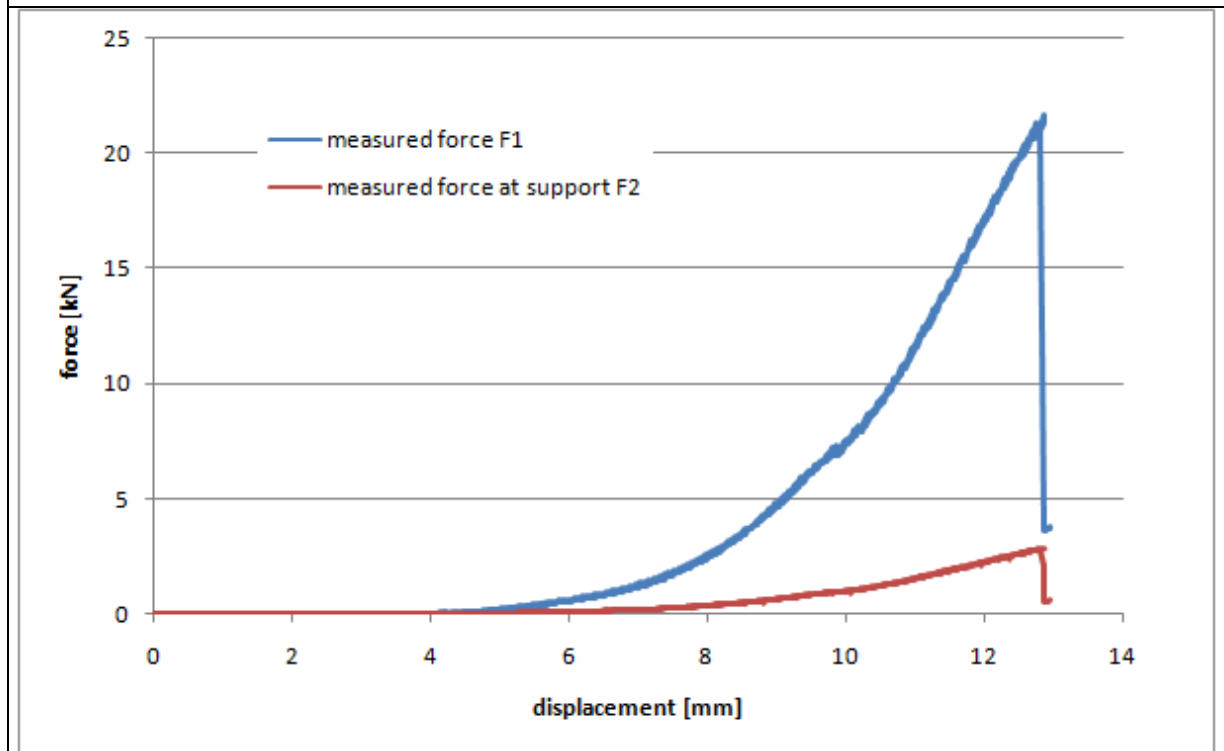


Failure of the stressed face



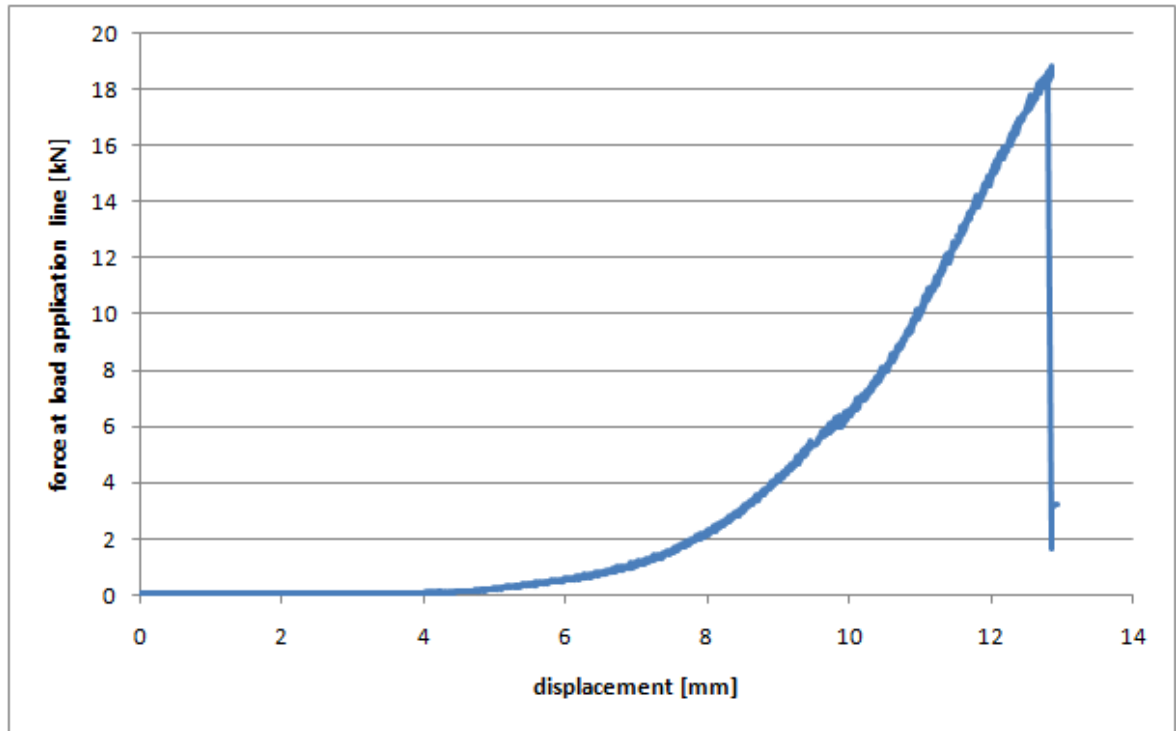
Compound between core and face

Test No.		II-B-11	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h_1	299 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h_2	101 mm	g	800 mm
thickness of cutting d_2	52 mm	α	0,458 °
ultimate load at line of load application			18,86 kN
ultimate stress of compressed face			61,9 N/mm ²
Failure mode	buckling and delamination of the compressed face		
Remarks			



Test No.

II-B-11

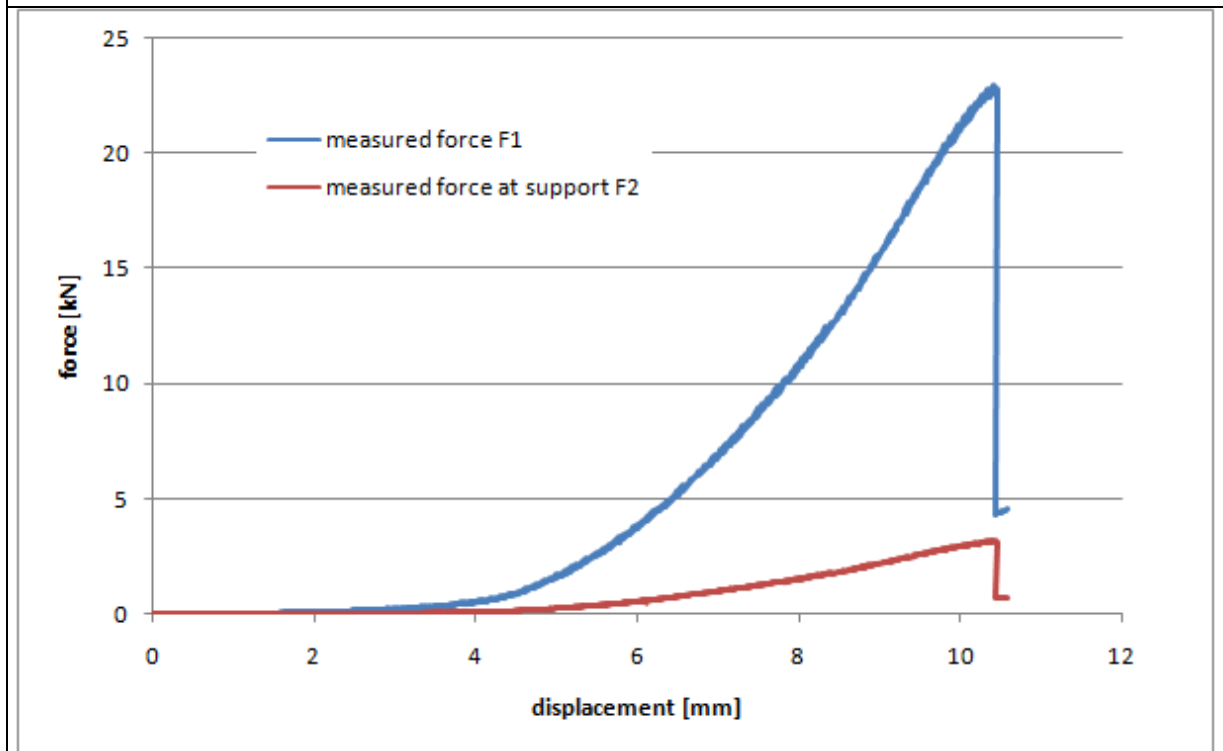


Failure of the stressed face



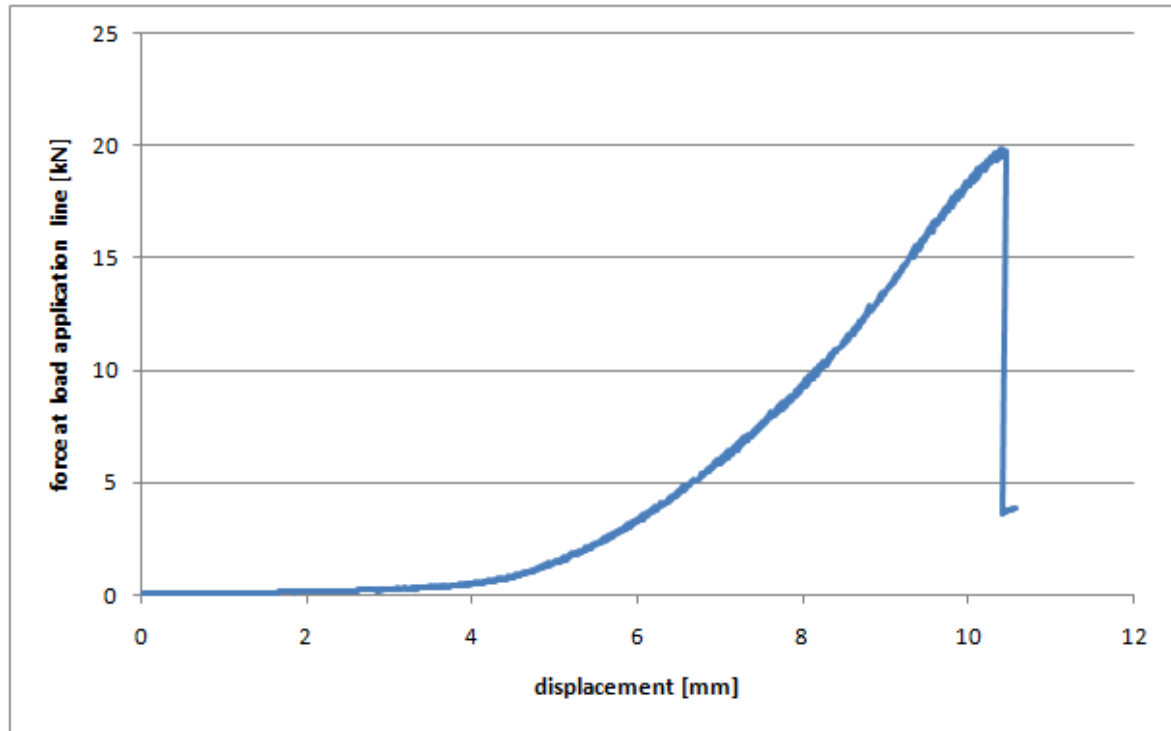
Compound between core and face

Test No.		II-B-12	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	B		
faces	steel 0,75 mm		
core	PU 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	298 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	102 mm	g	800 mm
thickness of cutting d ₂	49 mm	α	0,358 °
ultimate load at line of load application			19,88 kN
ultimate stress of compressed face			65,2 N/mm ²
Failure mode	buckling and delamination of the compressed face		
Remarks			



Test No.

II-B-12

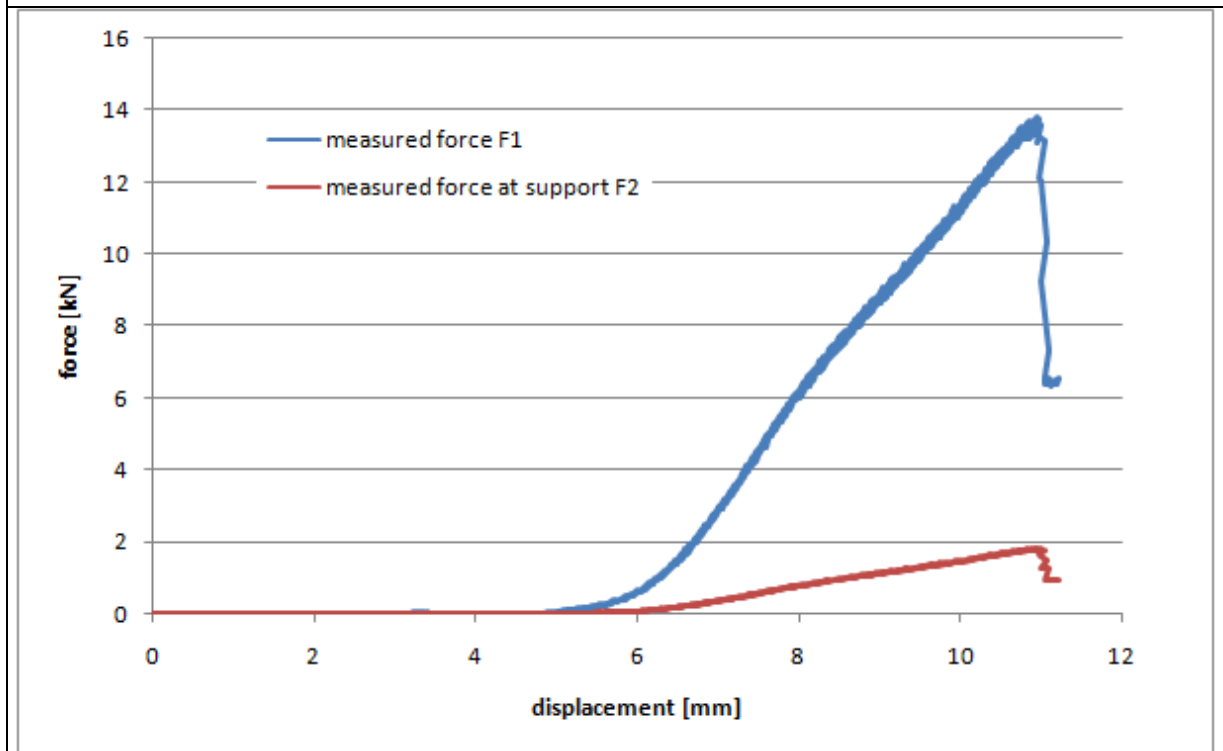


Failure of the stressed face



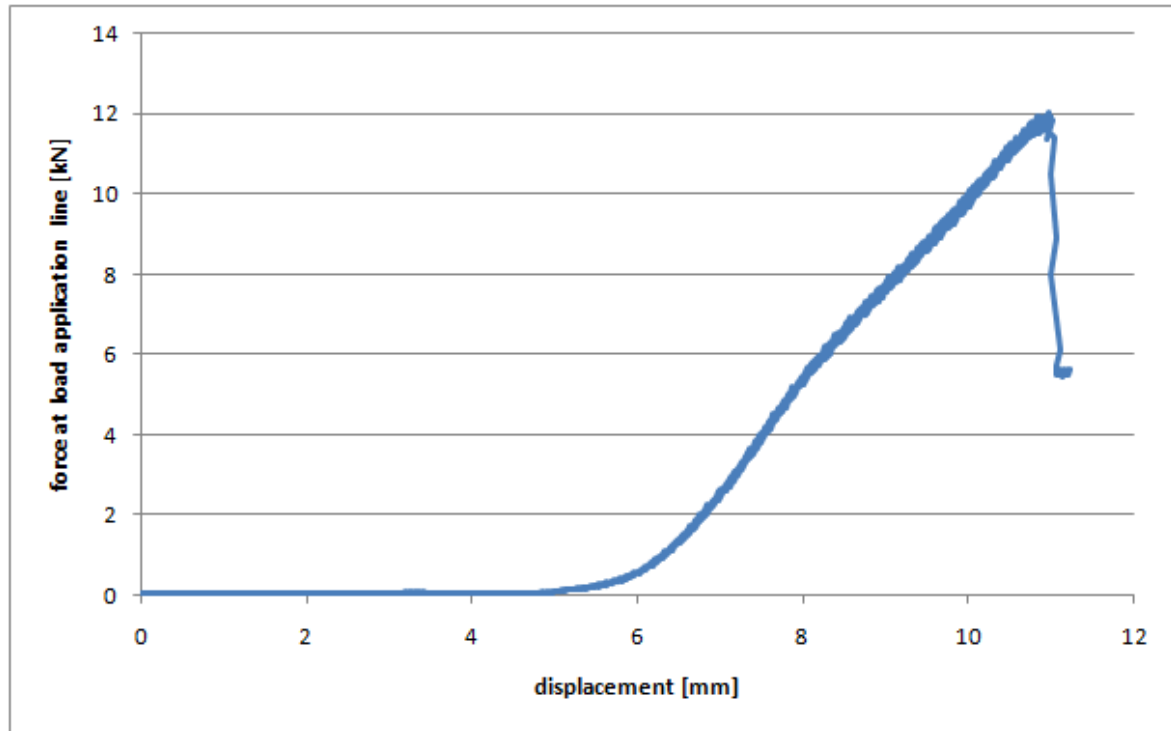
Compound between core and face

Test No.		II-C-1	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	C		
faces	steel 0,60 mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	299 mm	a	100 mm
height h ₁	279 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	101 mm	g	800 mm
thickness of cutting d ₂	71 mm	α	1,20 °
ultimate load at line of load application			12,05 kN
ultimate stress of compressed face			56 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			

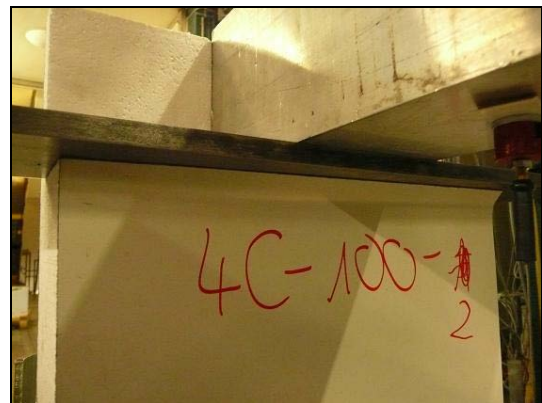


Test No.

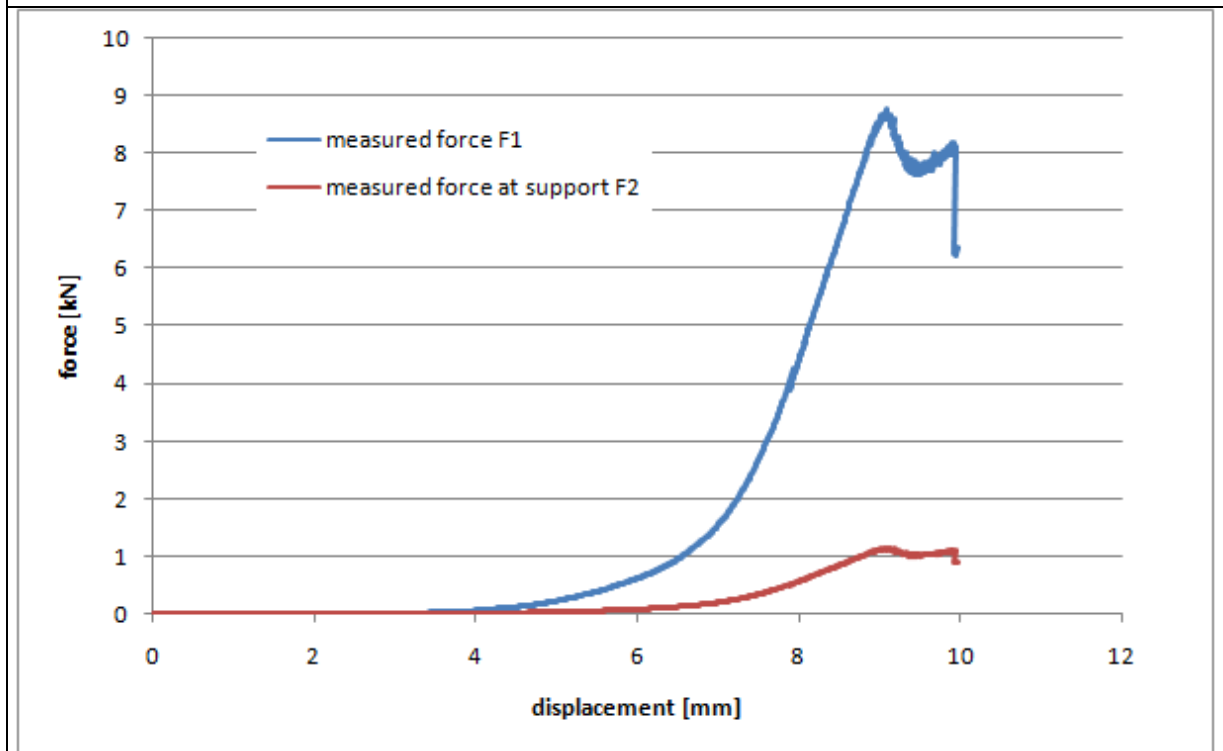
II-C-1



Failure of the stressed face

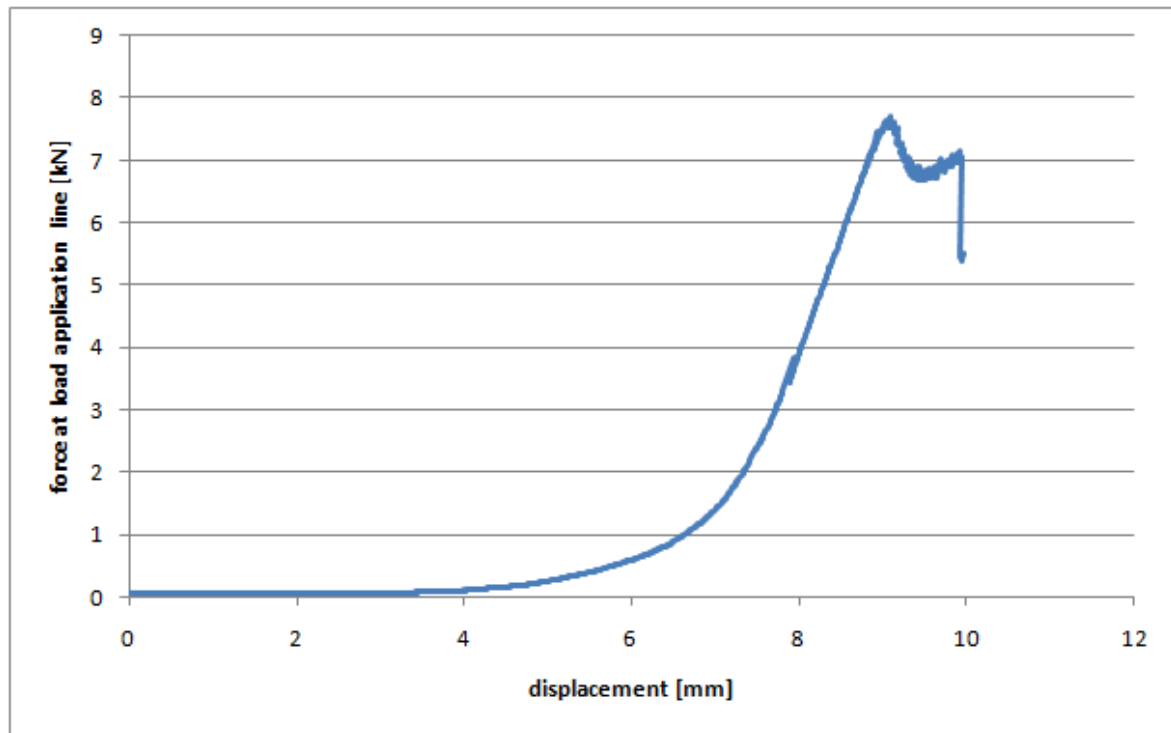


Test No.		II-C-6	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	C		
faces	steel 0,60 mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	391 mm	a	100 mm
height h ₁	292 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	- mm	g	800 mm
thickness of cutting d ₂	- mm	α	1,547 °
ultimate load at line of load application			7,10 kN
ultimate stress of compressed face			33,7 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

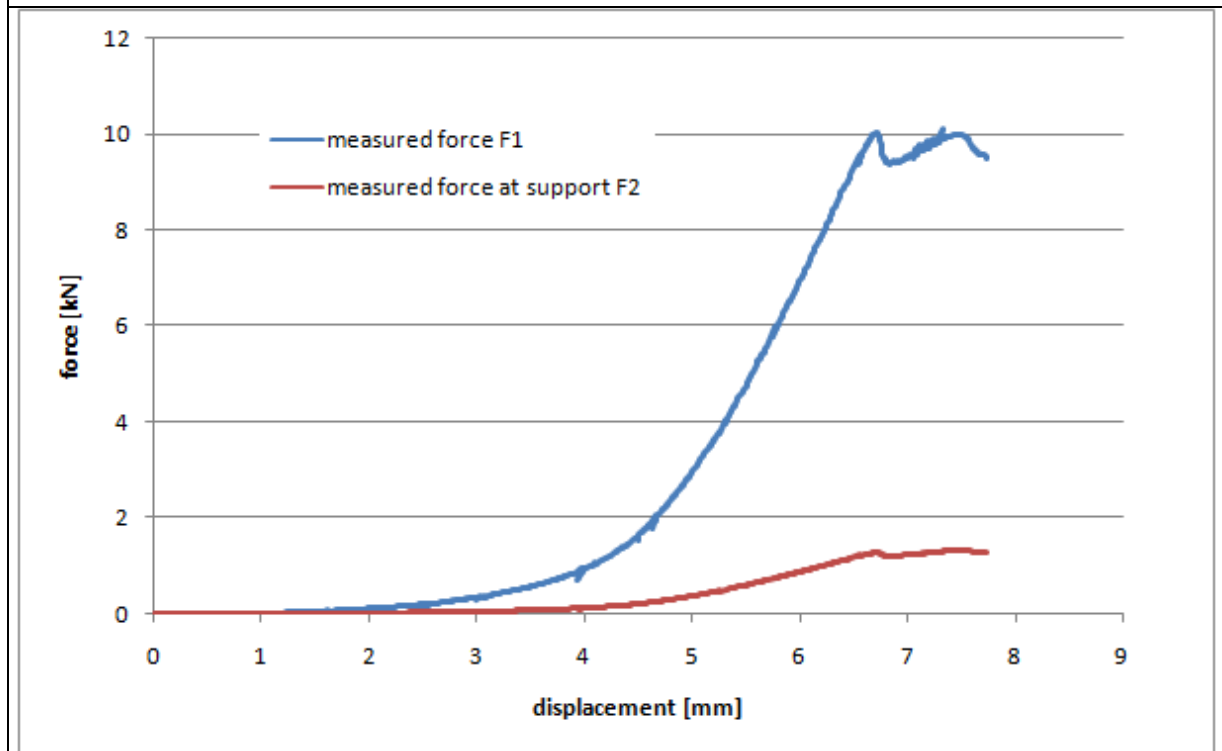
II-C-6



Failure of the stressed face

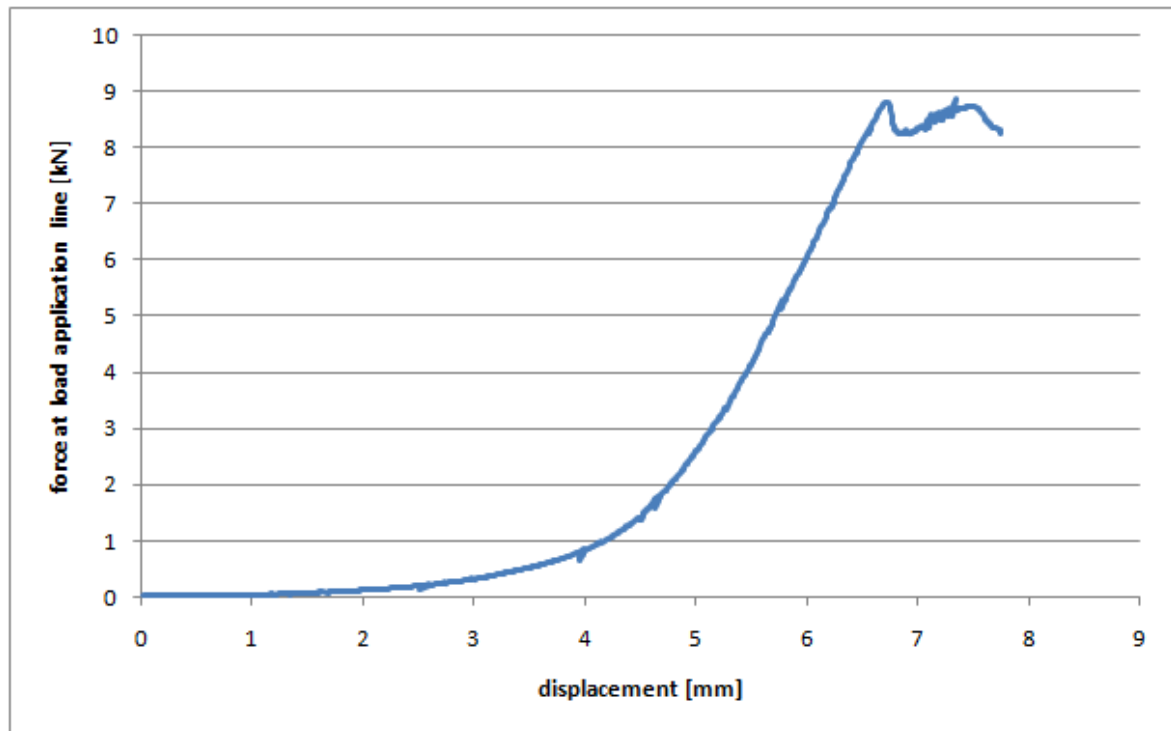


Test No.		II-C-7	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	C		
faces	steel 0,60 mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	391 mm	a	100 mm
height h ₁	292 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	- mm	g	800 mm
thickness of cutting d ₂	- mm	α	0,516 °
ultimate load at line of load application			8,88 kN
ultimate stress of compressed face			42,1 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

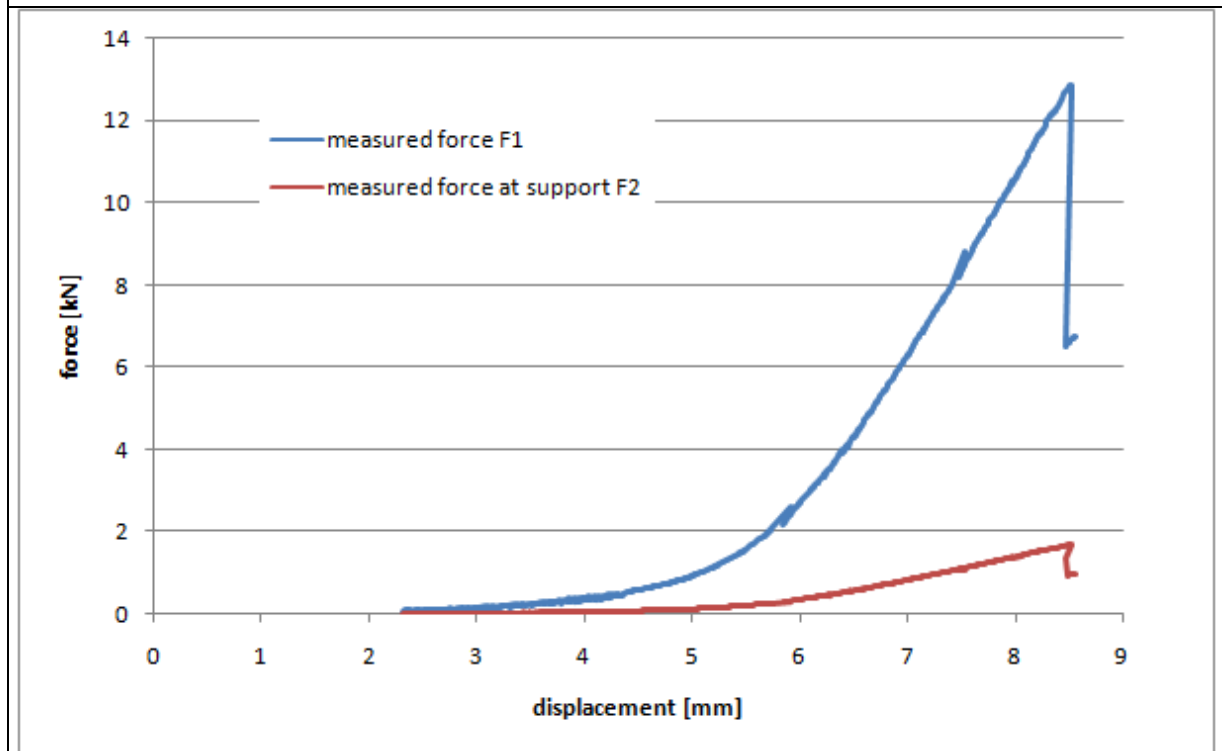
II-C-7



Failure of the stressed face

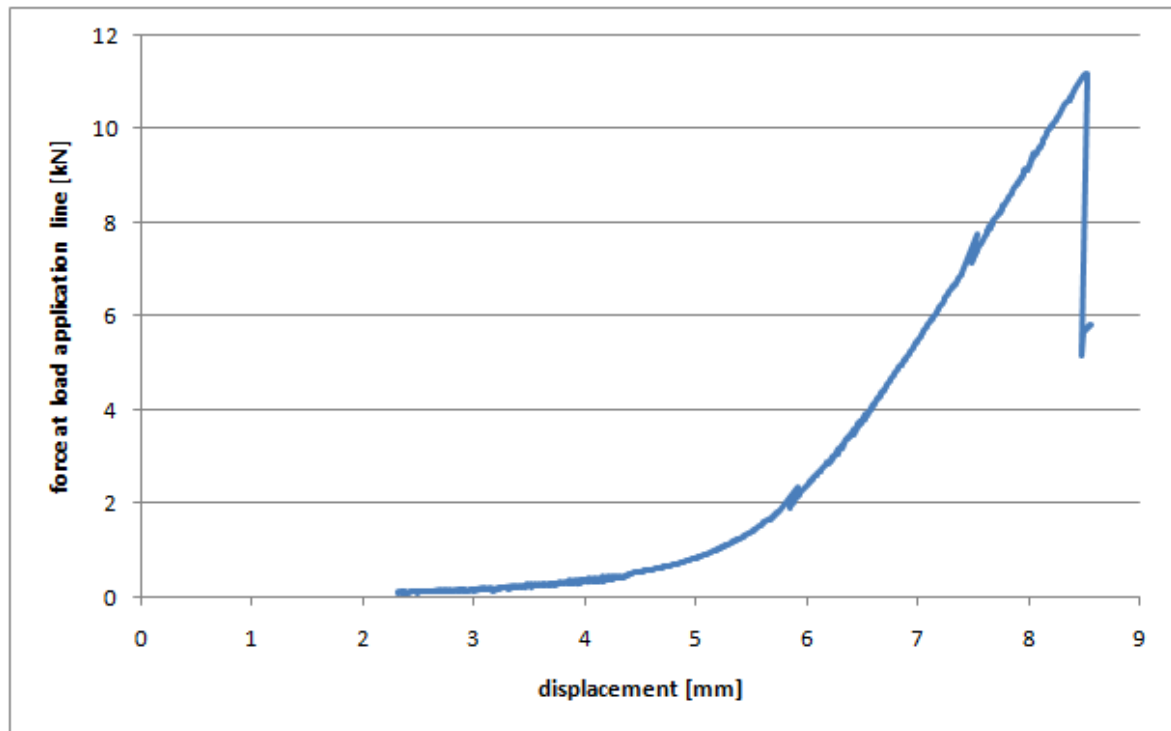


Test No.		II-C-8	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	C		
faces	steel 0,60 mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	391 mm	a	100 mm
height h_1	292 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h_2	- mm	g	800 mm
thickness of cutting d_2	- mm	α	0,688 °
ultimate load at line of load application			11,20 kN
ultimate stress of compressed face			53,2 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

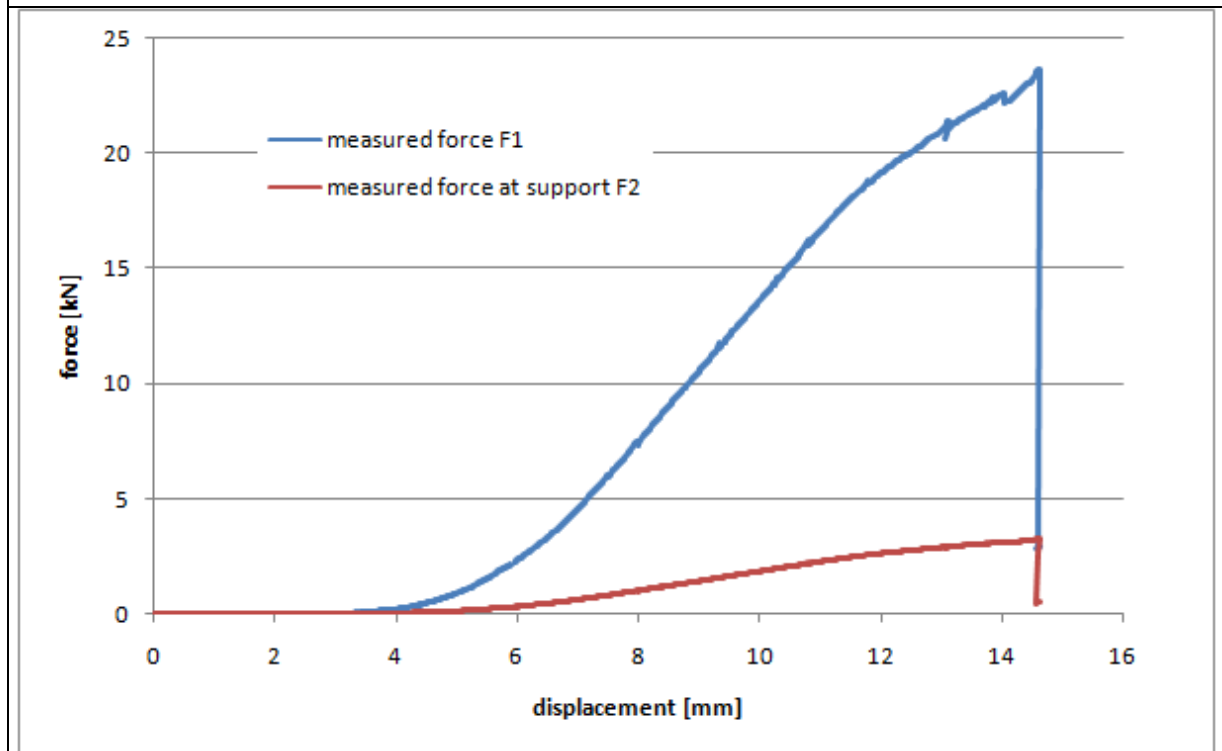
II-C-8



Failure of the stressed face

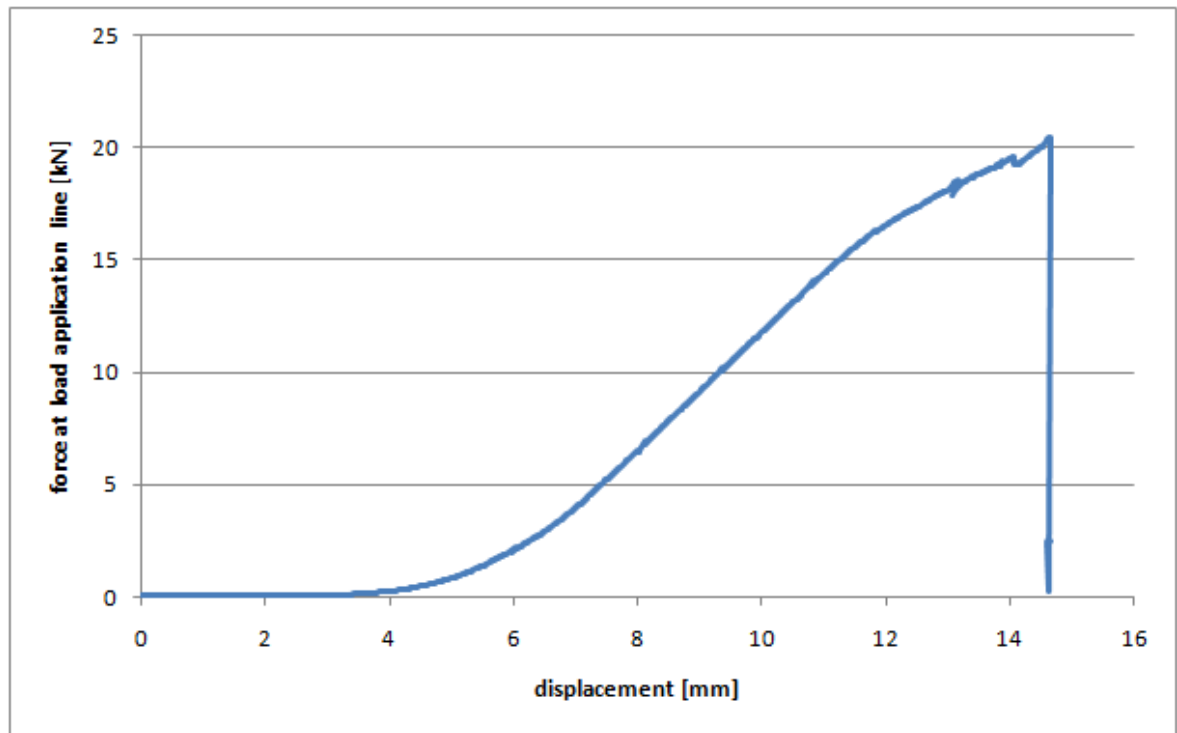


Test No.		II-D-4	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	D		
faces	GFRP 1,8mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	300 mm	a	100 mm
height h ₁	299 mm	e	100 mm
thickness D	101 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	1,09 °
ultimate load at line of load application			20,44 kN
ultimate stress of compressed face			37,8 N/mm ²
Failure mode	buckling of the compressed face		
Remarks			



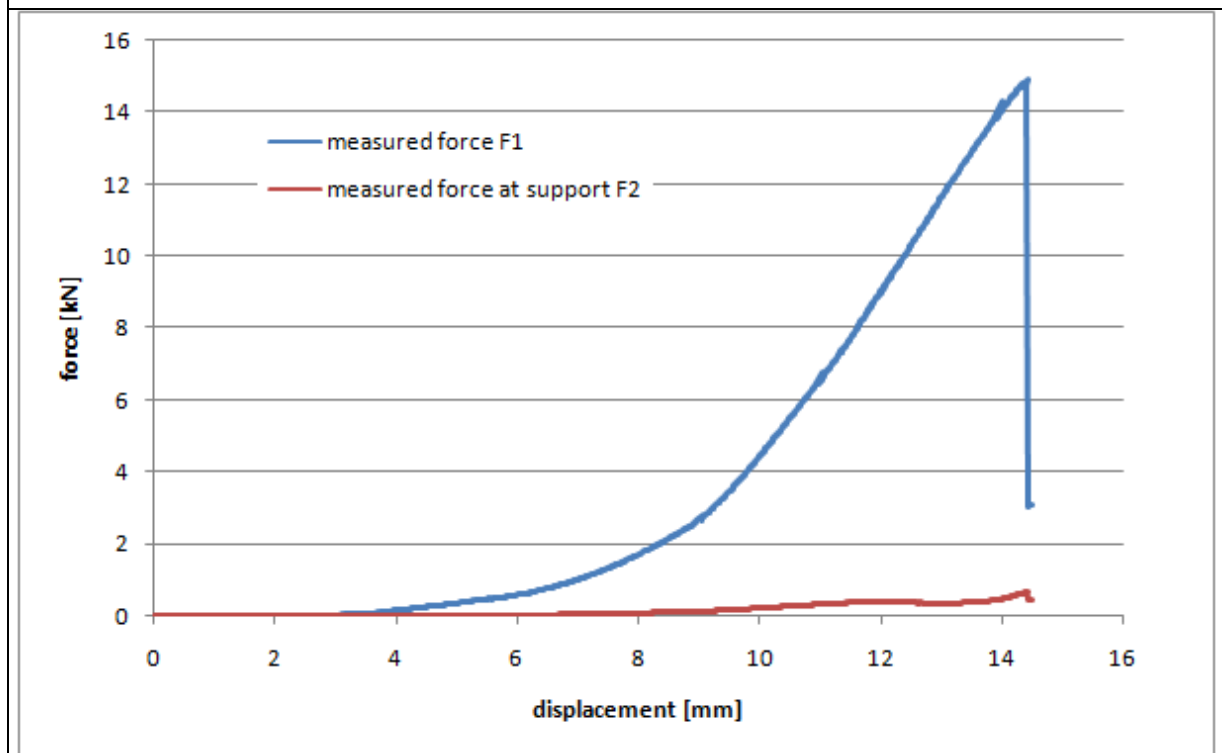
Test No.

II-D-4



Failure of the stressed face

Test No.	II-D-5		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	D		
faces	GFRP 1,8mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	299 mm	a	100 mm
height h ₁	299 mm	e	100 mm
thickness D	102 mm	f	400 mm
height of cutting h ₂	99 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	1,72 °
ultimate load at line of load application			13,09 kN
ultimate stress of compressed face			24,3 N/mm ²
Failure mode	buckling of the compressed face		
Remarks	measurement of force F ₂ failed, ultimate load at load application line determined by calculation		



Test No.

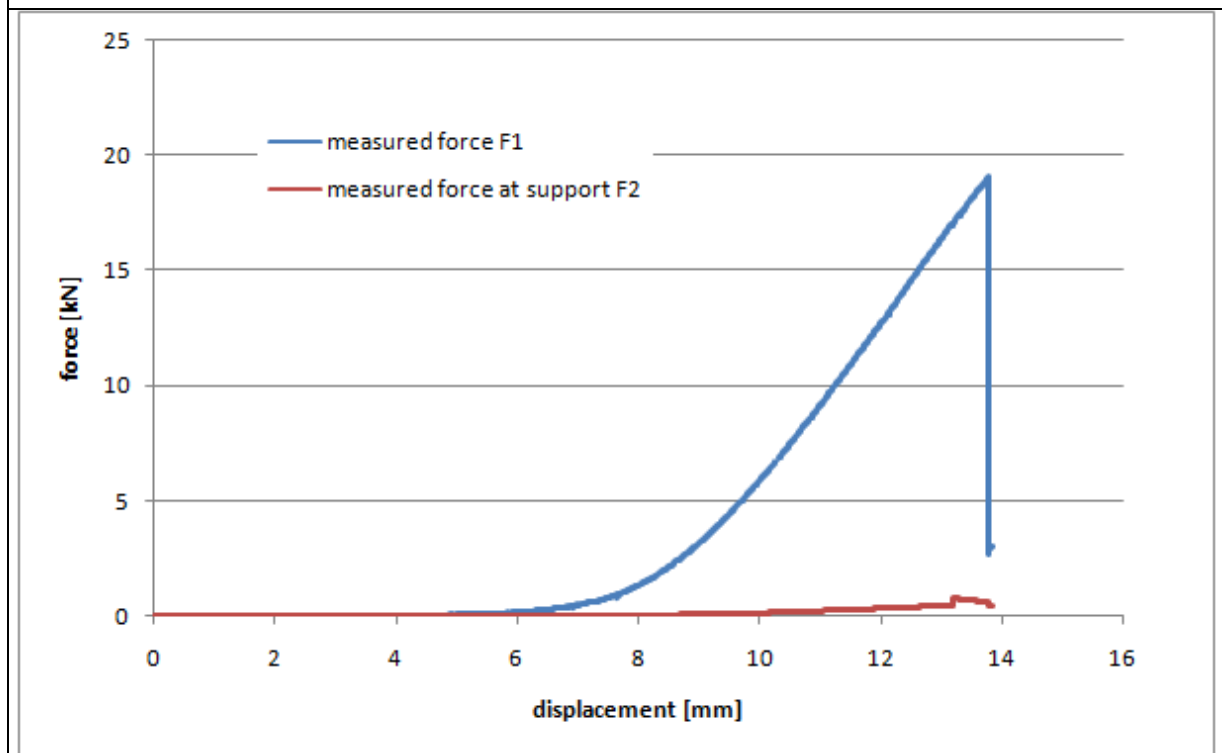
II-D-5



Failure of the stressed face

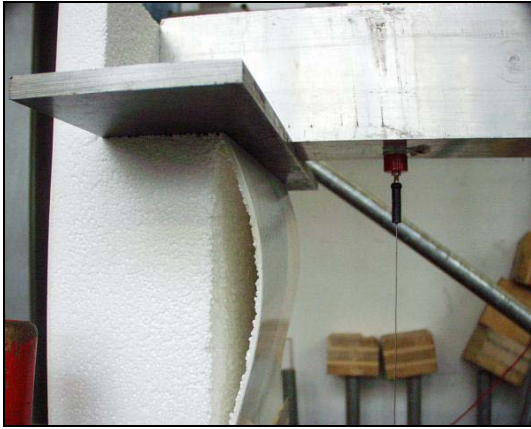


Test No.	II-D-6		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	D		
faces	GFRP 1,8mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	300 mm	a	100 mm
height h_1	299 mm	e	100 mm
thickness D	102 mm	f	400 mm
height of cutting h_2	100 mm	g	800 mm
thickness of cutting d_2	70 mm	α	0 °
ultimate load at line of load application			16,72 kN
ultimate stress of compressed face			31 N/mm ²
Failure mode	buckling of the compressed face		
Remarks	measurement of force F_2 failed, ultimate load at load application line determined by calculation		



Test No.

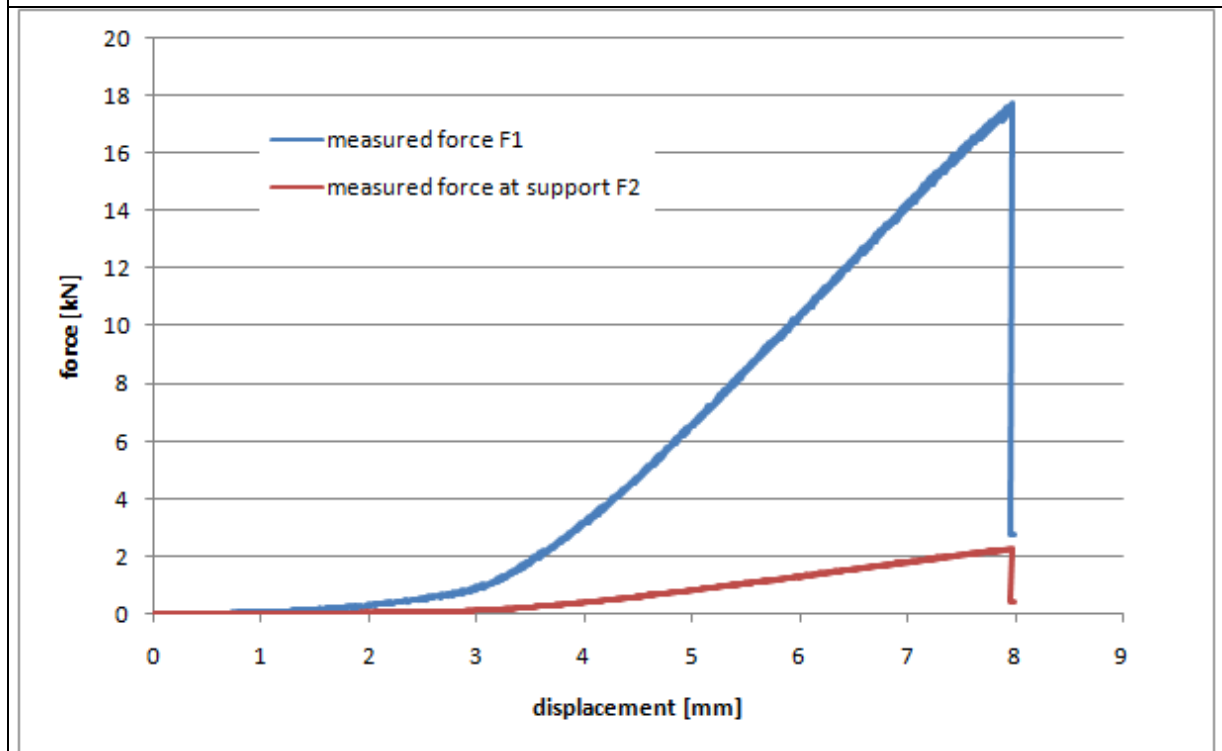
II-D-6



Failure of the stressed face

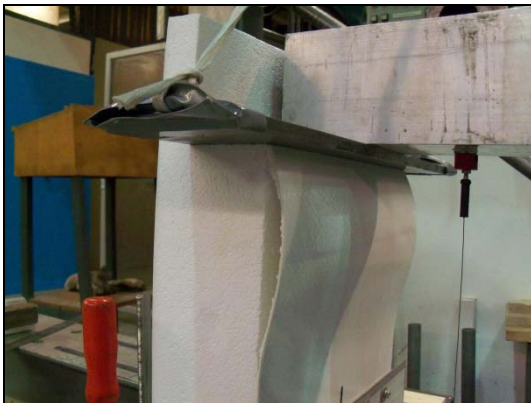
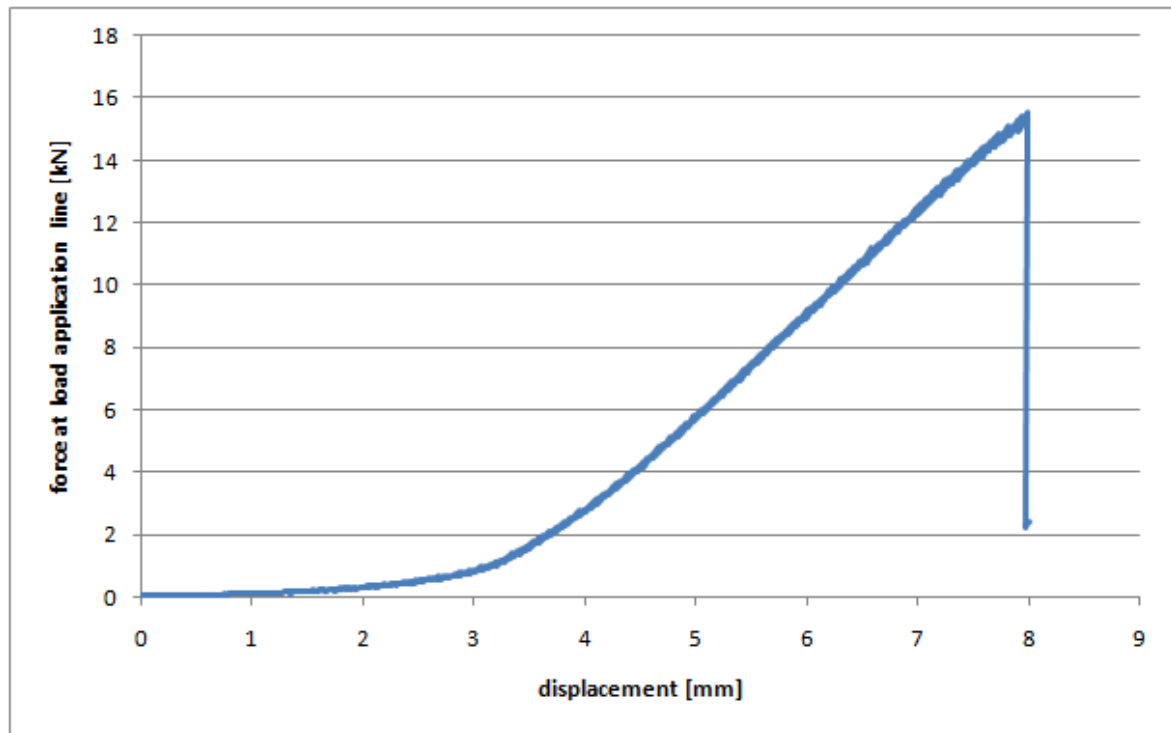


Test No.		II-D-7	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	D		
faces	GFRP 1,8mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	299 mm	a	100 mm
height h ₁	299 mm	e	100 mm
thickness D	102 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	1,38 °
ultimate load at line of load application			15,52 kN
ultimate stress of compressed face			28,8 N/mm ²
Failure mode	buckling of the compressed face		
Remarks			



Test No.

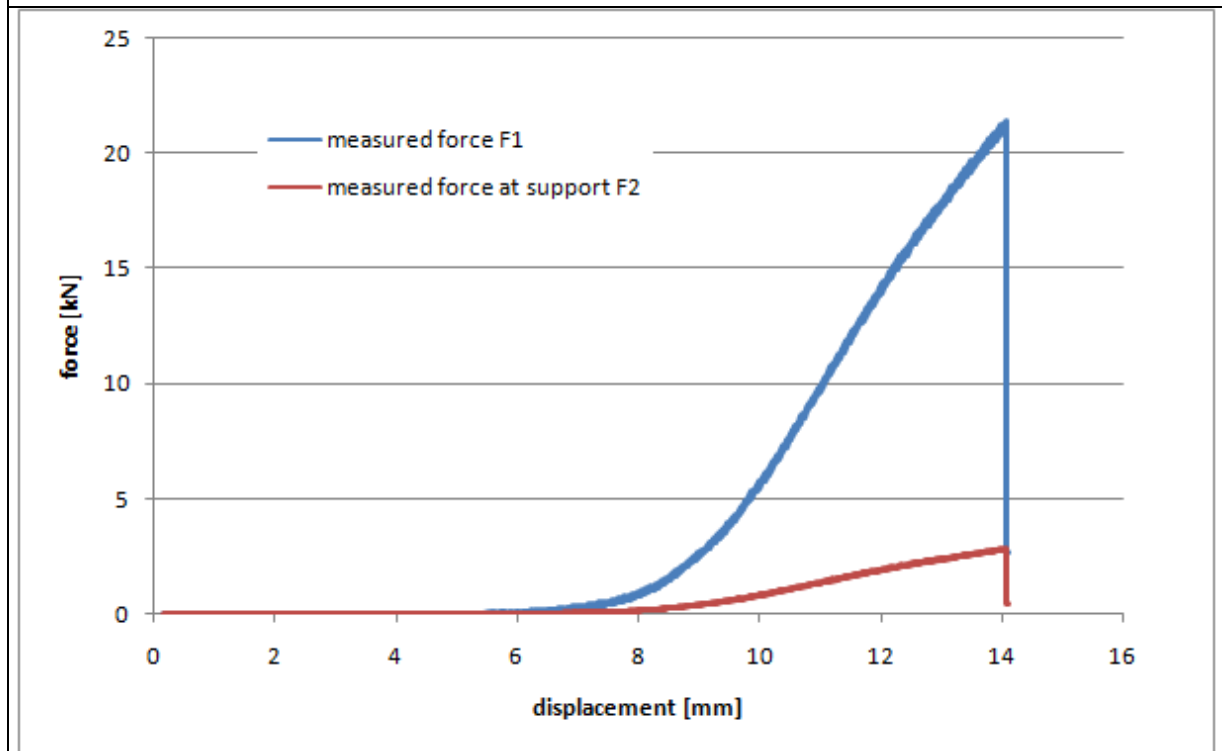
II-D-7



Failure of the stressed face

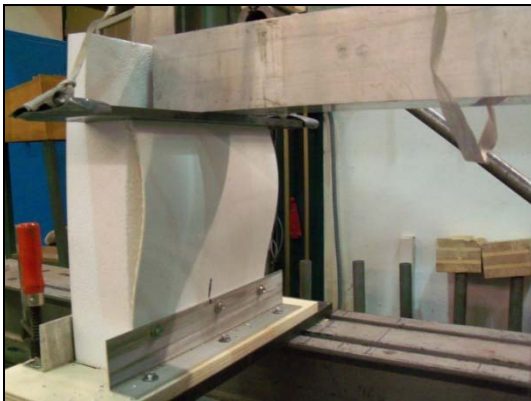
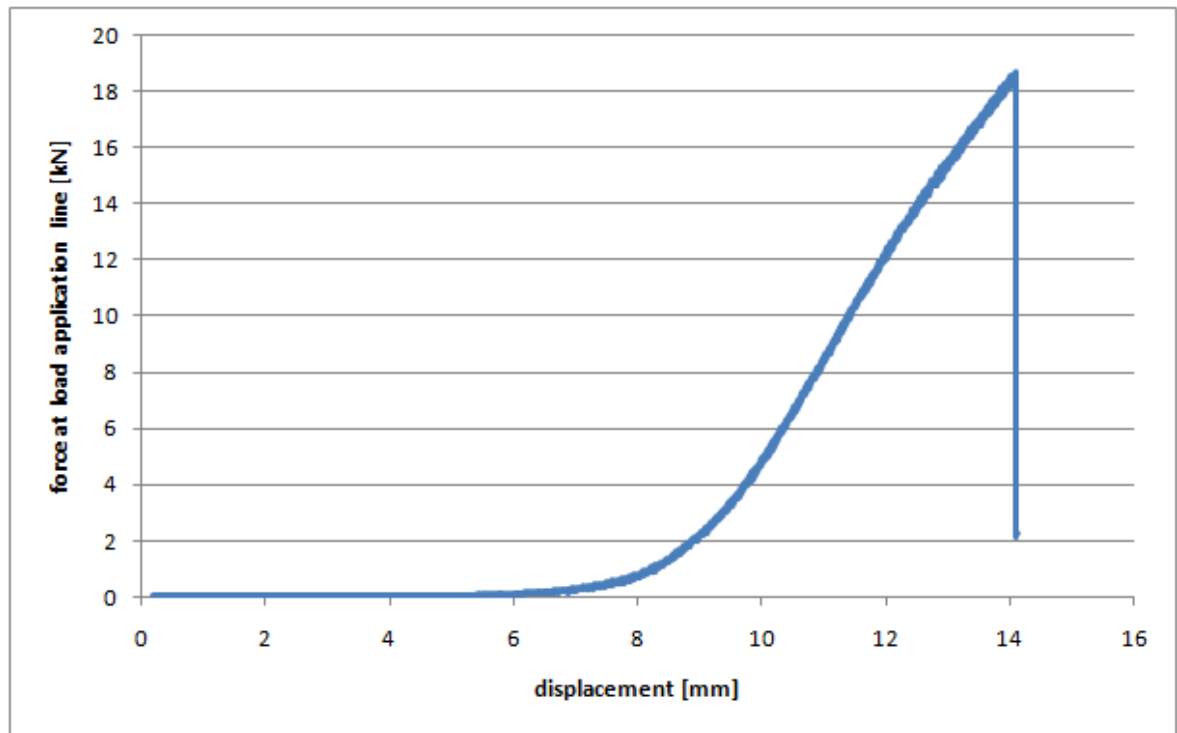


Test No.	II-D-8		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	D		
faces	GFRP 1,8mm		
core	EPS 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	299 mm	a	100 mm
height h ₁	299 mm	e	100 mm
thickness D	102 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	0,286 °
ultimate load at line of load application			18,73 kN
ultimate stress of compressed face			34,8 N/mm ²
Failure mode	buckling of the compressed face		
Remarks			



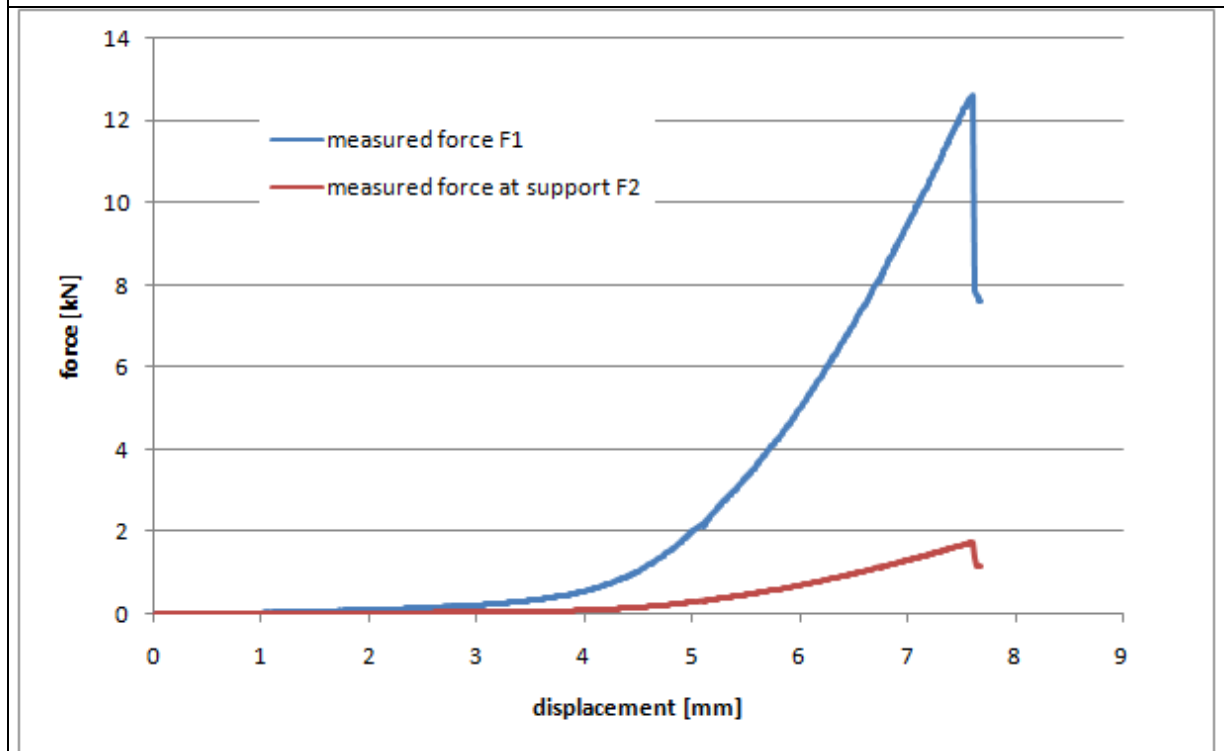
Test No.

II-D-8



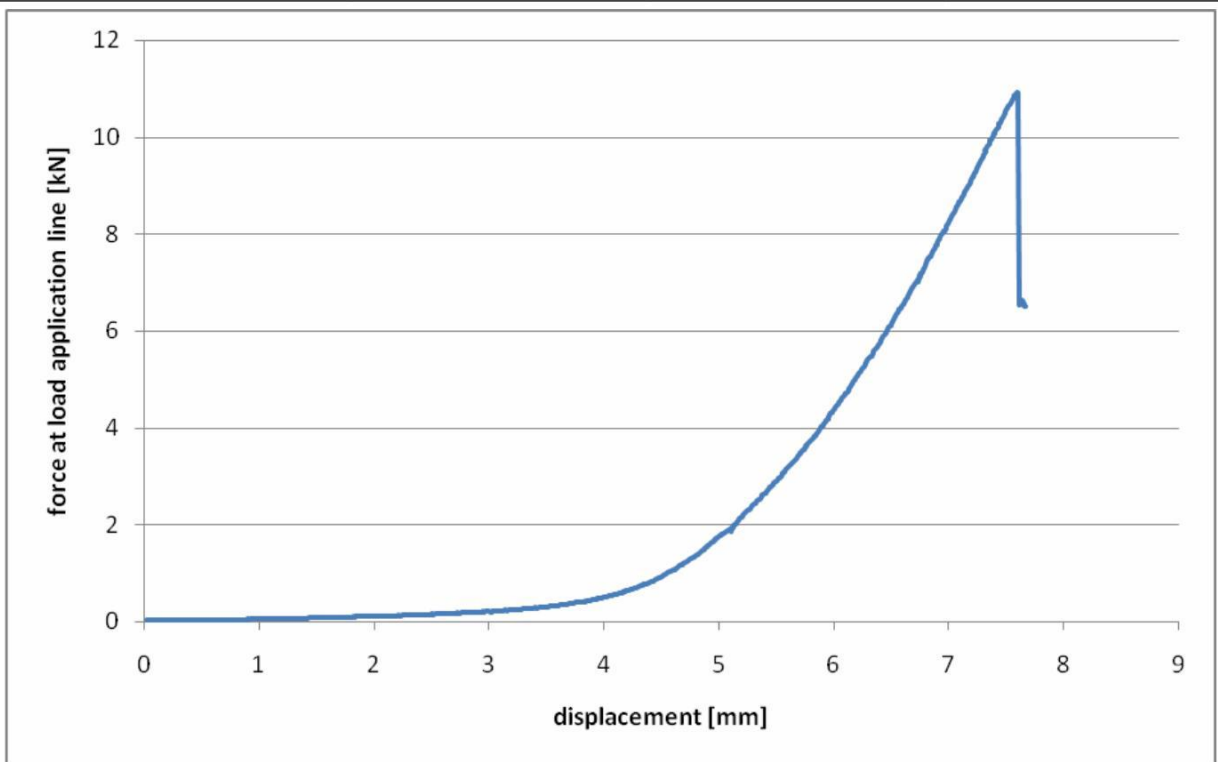
Failure of the stressed face

Test No.		II-E-1	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	E		
faces	Steel 0,50mm		
core	Mineral wool 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	301 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	1,662 °
ultimate load at line of load application			10,93 kN
ultimate stress of compressed face			57,5 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

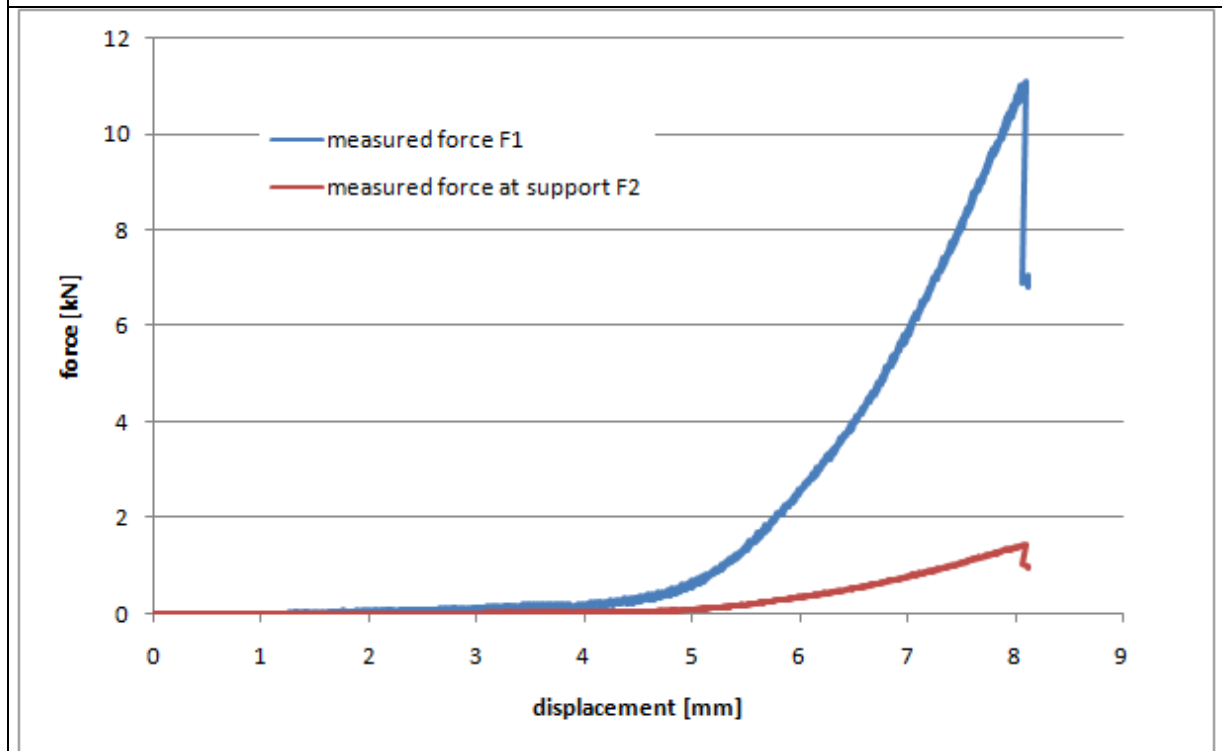
II-E-1



Failure of the stressed face

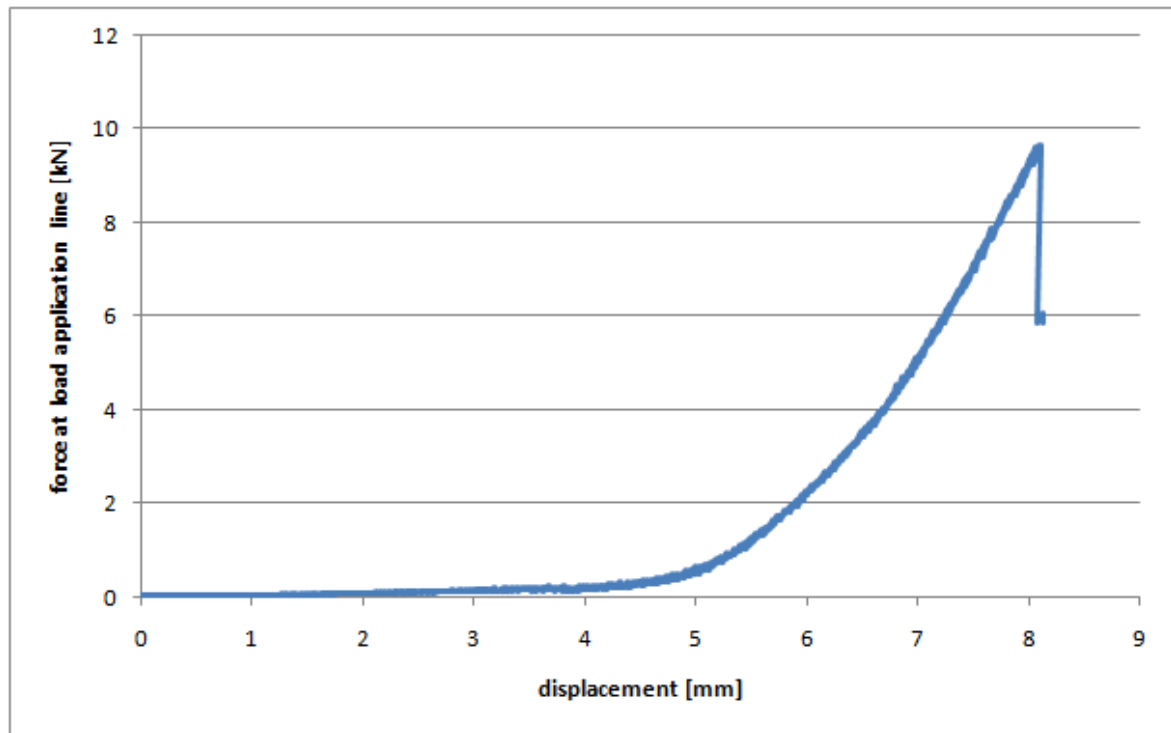


Test No.	II-E-2		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	E		
faces	Steel 0,50mm		
core	Mineral wool 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	400 mm	a	100 mm
height h ₁	301 mm	e	100 mm
thickness D	99 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	1,089 °
ultimate load at line of load application			9,68 kN
ultimate stress of compressed face			50,9 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

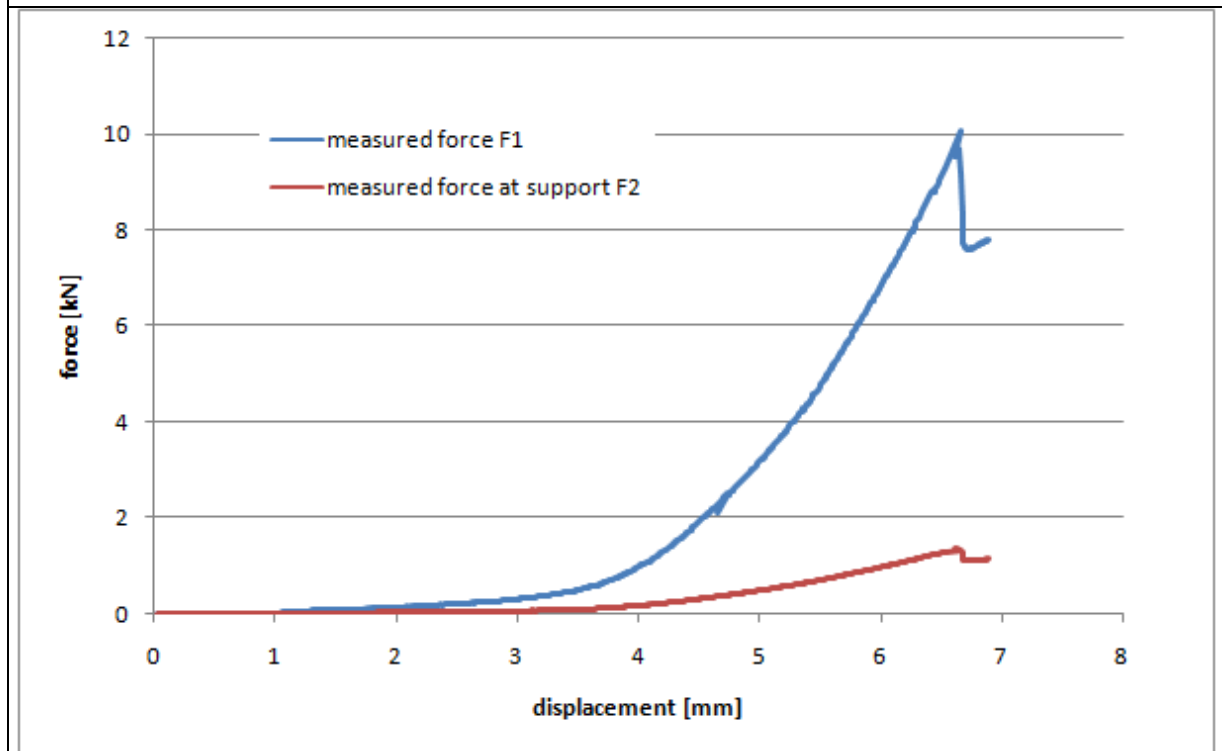
II-E-2



Failure of the stressed face

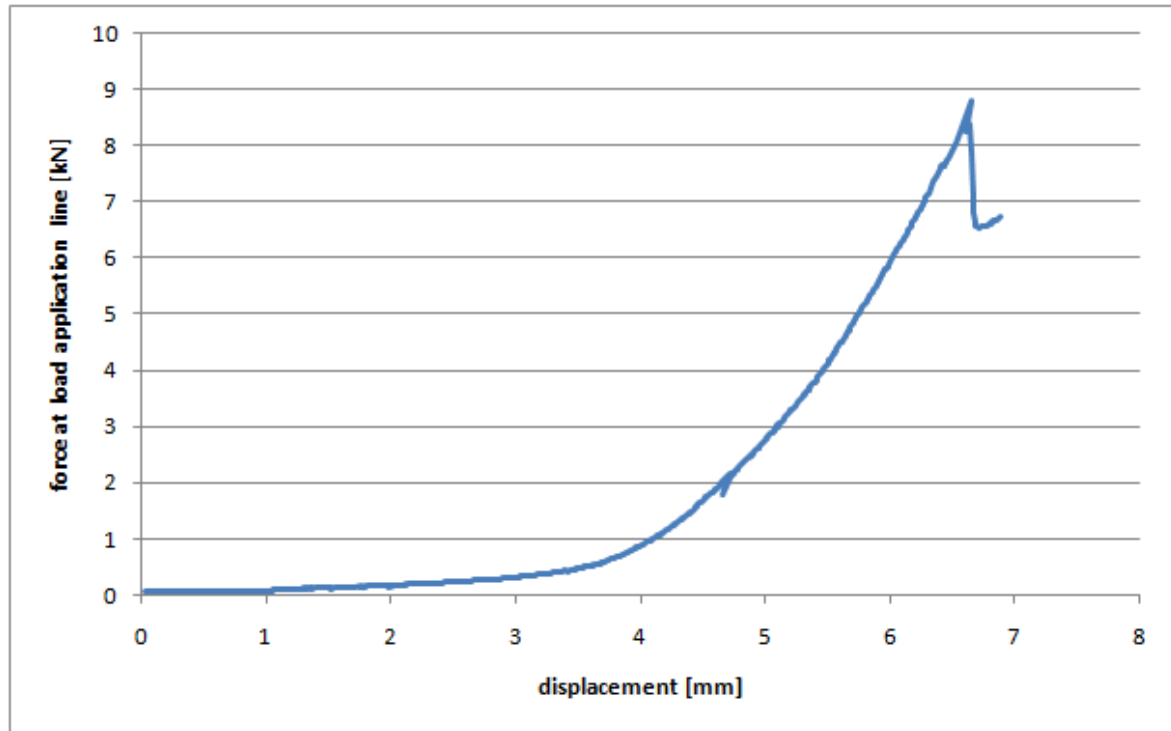


Test No.		II-E-3	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	E		
faces	Steel 0,50mm		
core	Mineral wool 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	303 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	99 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	0,401 °
ultimate load at line of load application			8,82 kN
ultimate stress of compressed face			46,4 N/mm ²
Failure mode	cripling of the compressed face		
Remarks			



Test No.

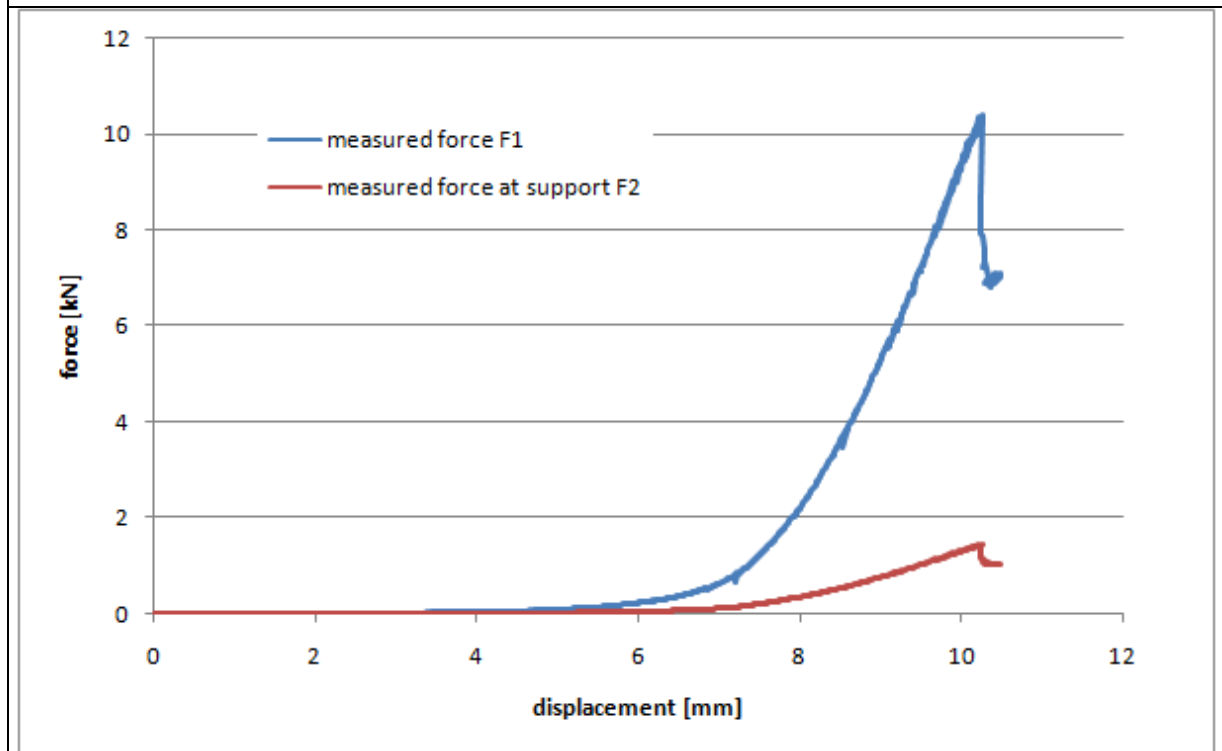
II-E-3



Failure of the stressed face

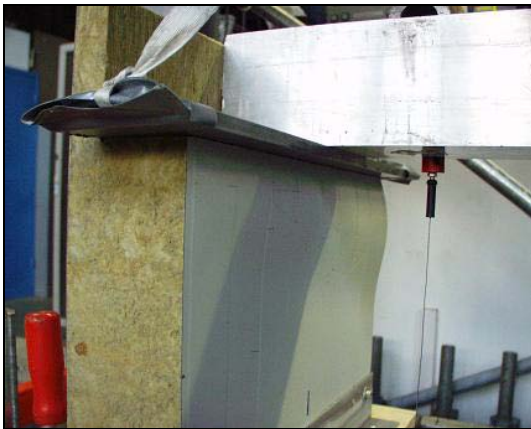
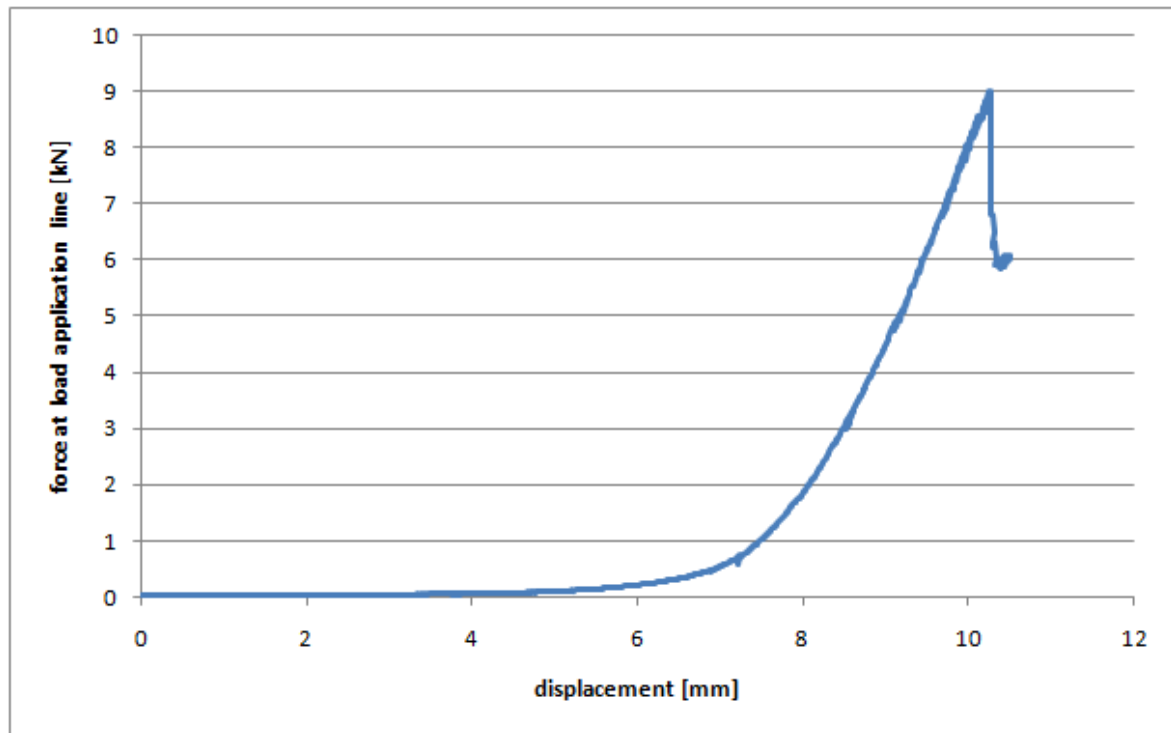


Test No.		II-E-4	
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	E		
faces	Steel 0,50mm		
core	Mineral wool 100 mm		
stressed face	top side of production		
Measured dimensions:		Dimensions of test set up	
width b	400 mm	a	100 mm
height h ₁	302 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	99 mm	g	800 mm
thickness of cutting d ₂	70 mm	α	0,344 °
ultimate load at line of load application			9,02 kN
ultimate stress of compressed face			47,5 N/mm ²
Failure mode	buckling of the compressed face		
Remarks			



Test No.

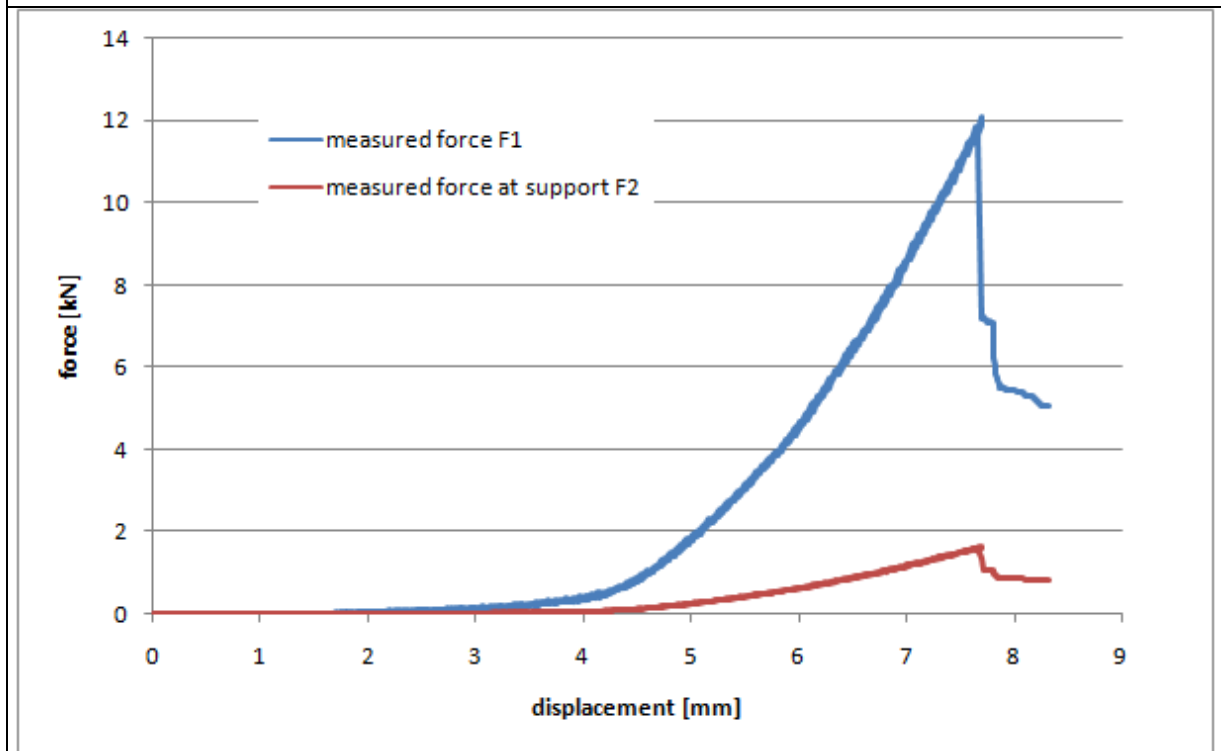
II-E-4



Failure of the stressed face

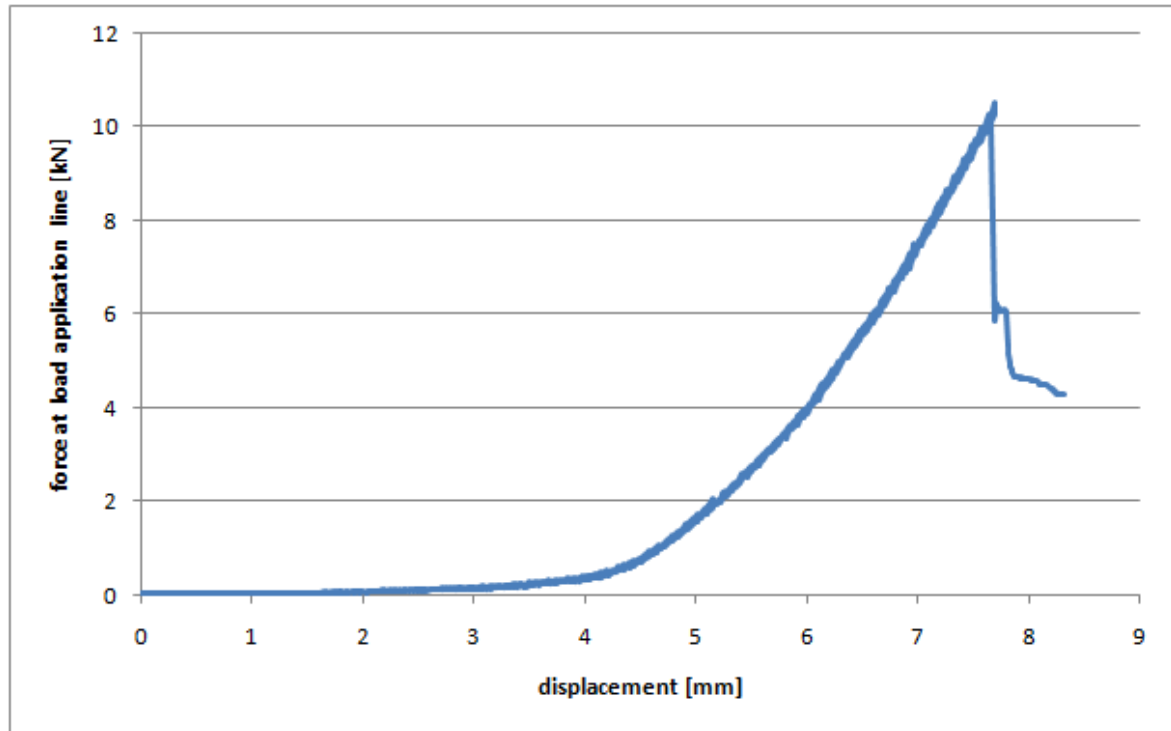


Test No.	II-E-5		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	E		
faces	Steel 0,50mm		
core	Mineral wool 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	400 mm	a	100 mm
height h ₁	301 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	100 mm	g	800 mm
thickness of cutting d ₂	71 mm	α	1,089 °
ultimate load at line of load application			10,52 kN
ultimate stress of compressed face			55,4 N/mm ²
Failure mode	buckling of the compressed face		
Remarks			

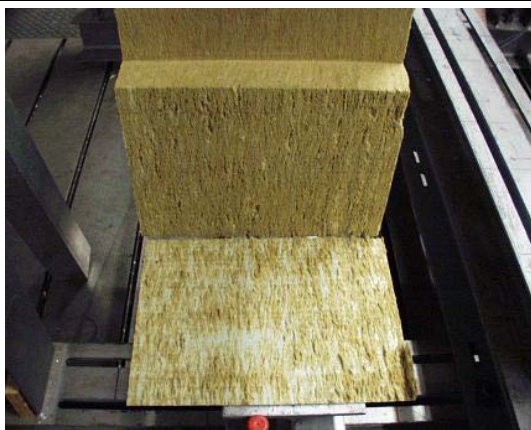


Test No.

II-E-5

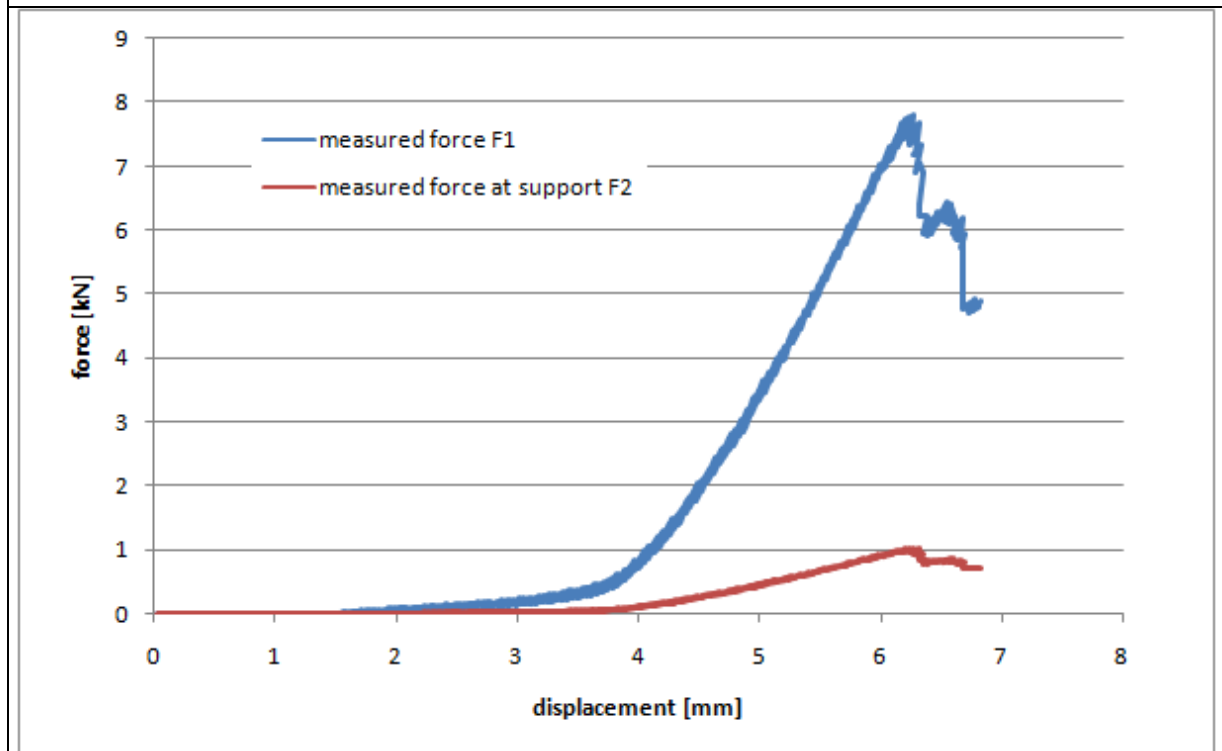


Failure of the stressed face



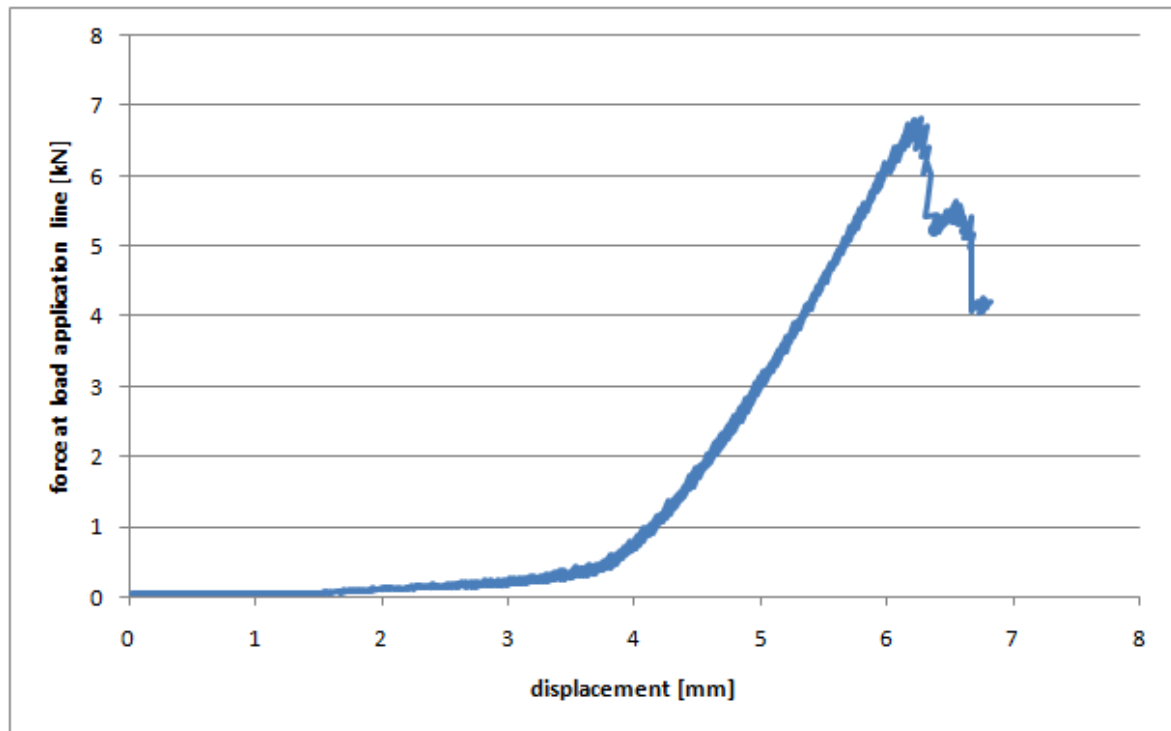
Compound between core and face

Test No.	II-E-6		
type of test	test on corner details, introduction of load by contact		
load introduction	steel sheet		
type of panel	E		
faces	Steel 0,50mm		
core	Mineral wool 100 mm		
stressed face	top side of production		
Measured dimensions:			Dimensions of test set up
width b	400 mm	a	100 mm
height h ₁	303 mm	e	100 mm
thickness D	100 mm	f	400 mm
height of cutting h ₂	98 mm	g	800 mm
thickness of cutting d ₂	71 mm	α	1,719 °
ultimate load at line of load application			6,82 kN
ultimate stress of compressed face			35,9 N/mm ²
Failure mode	buckling of the compressed face		
Remarks			



Test No.

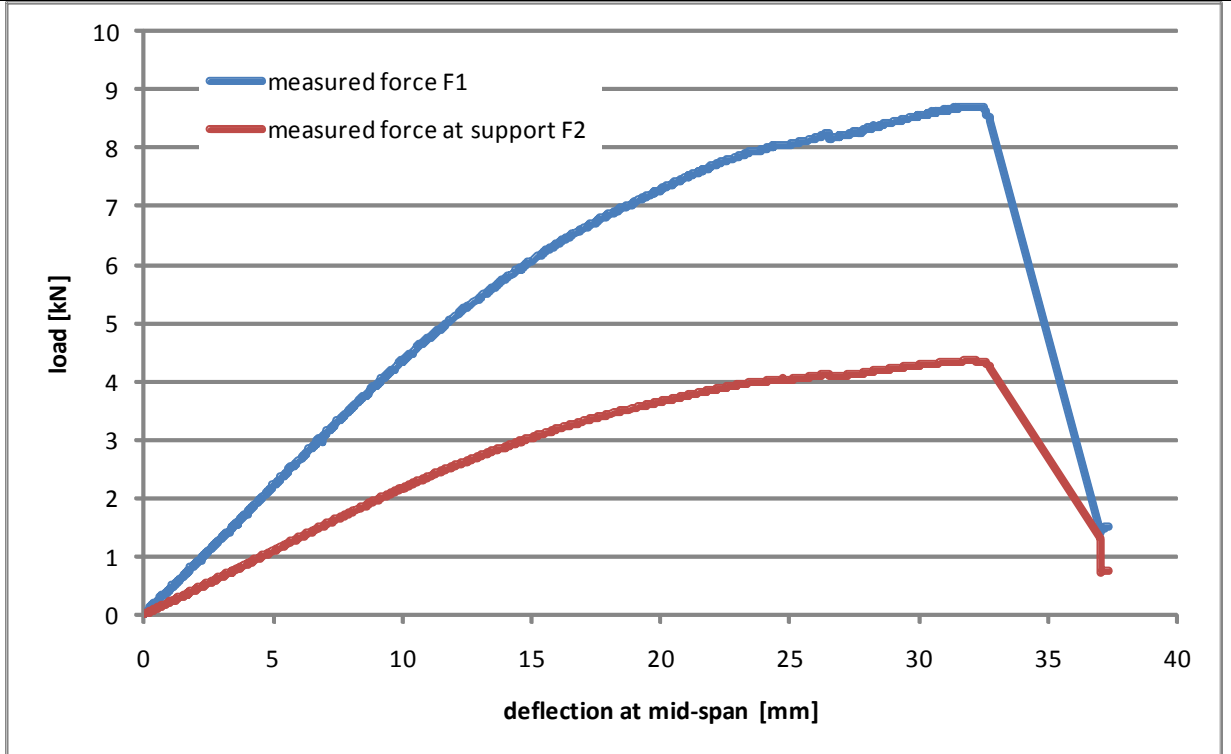
II-E-6



Failure of the stressed face

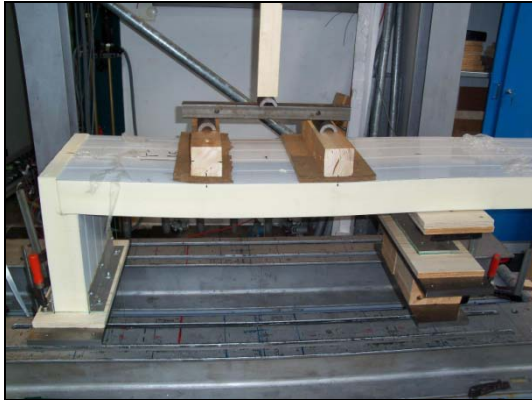


Compound between core and face

Test No.		IIIa-A-2																																		
type of test	single span test with glued corner detail																																			
introduction of load	two line loads																																			
type of panel	A																																			
faces	0,50 mm steel																																			
core	100 mm PU																																			
stressed face	top side of production																																			
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																																		
width b	396 mm	length l	1499 mm																																	
height h ₁	302 mm	with b	379 mm																																	
thickness D	97 mm	thickness D	102 mm																																	
height of cutting h ₂	101 mm																																			
thickness of cutting d ₂	47 mm																																			
ultimate load F ₁	8,72 kN																																			
ultimate load at support F ₂	4,36 kN																																			
Failure mode	shear failure of the ceiling panel																																			
Remarks																																				
 <table border="1"> <caption>Approximate data points from the load-deflection graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F₁ [kN]</th> <th>Measured force at support F₂ [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>5</td><td>2.5</td><td>1.5</td></tr> <tr><td>10</td><td>4.5</td><td>2.5</td></tr> <tr><td>15</td><td>6.0</td><td>3.2</td></tr> <tr><td>20</td><td>7.2</td><td>3.8</td></tr> <tr><td>25</td><td>8.0</td><td>4.1</td></tr> <tr><td>30</td><td>8.5</td><td>4.3</td></tr> <tr><td>32</td><td>8.7</td><td>4.4</td></tr> <tr><td>35</td><td>6.0</td><td>3.0</td></tr> <tr><td>37</td><td>1.5</td><td>0.8</td></tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]	0	0	0	5	2.5	1.5	10	4.5	2.5	15	6.0	3.2	20	7.2	3.8	25	8.0	4.1	30	8.5	4.3	32	8.7	4.4	35	6.0	3.0	37	1.5	0.8
Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]																																		
0	0	0																																		
5	2.5	1.5																																		
10	4.5	2.5																																		
15	6.0	3.2																																		
20	7.2	3.8																																		
25	8.0	4.1																																		
30	8.5	4.3																																		
32	8.7	4.4																																		
35	6.0	3.0																																		
37	1.5	0.8																																		

Test No.

IIIa-A-2



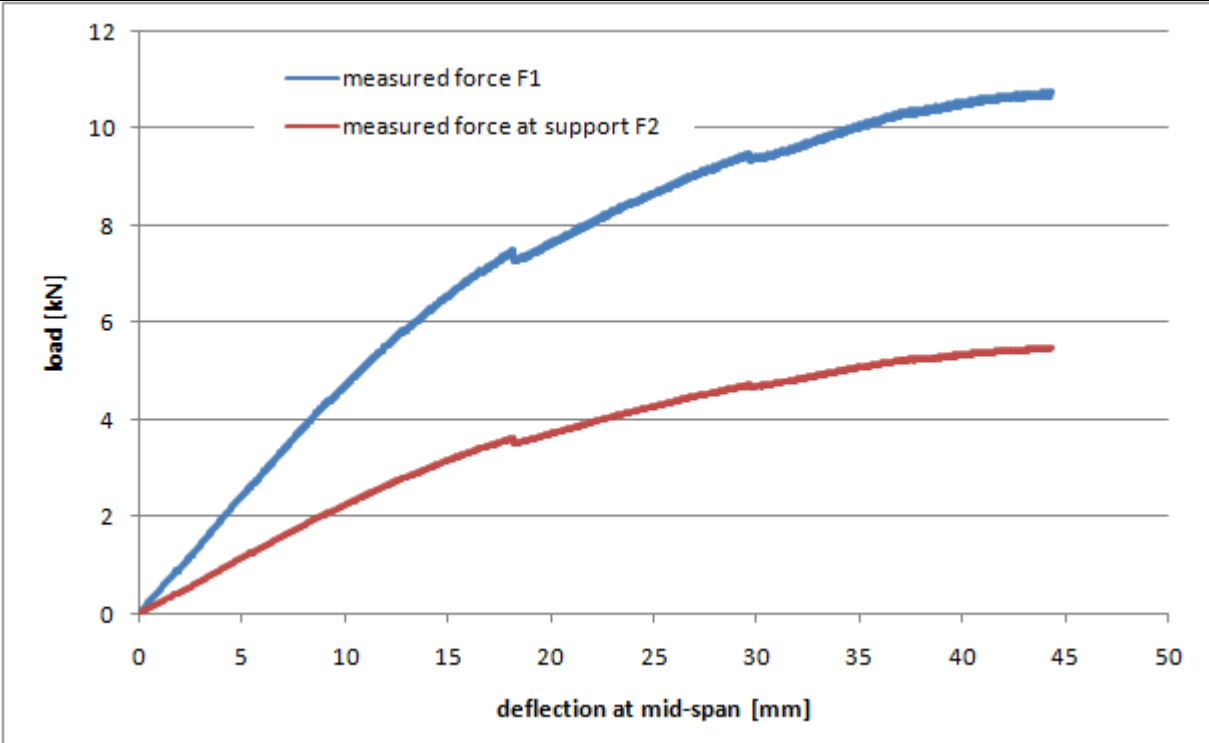
test set-up



shear failure of the ceiling panel

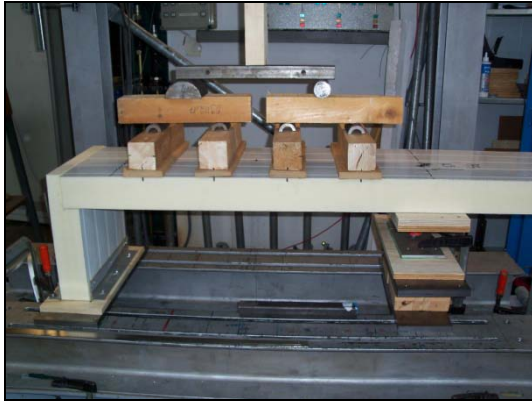


shear failure of the ceiling panel

Test No.		IIIa-A-3																																		
type of test	single span test with glued corner detail																																			
introduction of load	two line loads																																			
type of panel	A																																			
faces	0,50 mm steel																																			
core	100 mm PU																																			
stressed face	top side of production																																			
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																																		
width b	397 mm	length l	- mm																																	
height h ₁	301 mm	with b	- mm																																	
thickness D	97 mm	thickness D	- mm																																	
height of cutting h ₂	102 mm																																			
thickness of cutting d ₂	50 mm																																			
ultimate load F ₁	10,791 kN																																			
ultimate load at support F ₂	5,50 kN																																			
Failure mode	failure of glued corner detail																																			
Remarks																																				
 <table border="1"> <caption>Approximate data points from the load-deflection graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F₁ [kN]</th> <th>Measured force at support F₂ [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>5</td><td>2.5</td><td>1.0</td></tr> <tr><td>10</td><td>4.5</td><td>2.0</td></tr> <tr><td>15</td><td>6.5</td><td>3.0</td></tr> <tr><td>20</td><td>7.5</td><td>3.5</td></tr> <tr><td>25</td><td>8.5</td><td>4.0</td></tr> <tr><td>30</td><td>9.5</td><td>4.5</td></tr> <tr><td>35</td><td>10.0</td><td>4.8</td></tr> <tr><td>40</td><td>10.5</td><td>5.0</td></tr> <tr><td>45</td><td>10.8</td><td>5.5</td></tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]	0	0	0	5	2.5	1.0	10	4.5	2.0	15	6.5	3.0	20	7.5	3.5	25	8.5	4.0	30	9.5	4.5	35	10.0	4.8	40	10.5	5.0	45	10.8	5.5
Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]																																		
0	0	0																																		
5	2.5	1.0																																		
10	4.5	2.0																																		
15	6.5	3.0																																		
20	7.5	3.5																																		
25	8.5	4.0																																		
30	9.5	4.5																																		
35	10.0	4.8																																		
40	10.5	5.0																																		
45	10.8	5.5																																		

Test No.

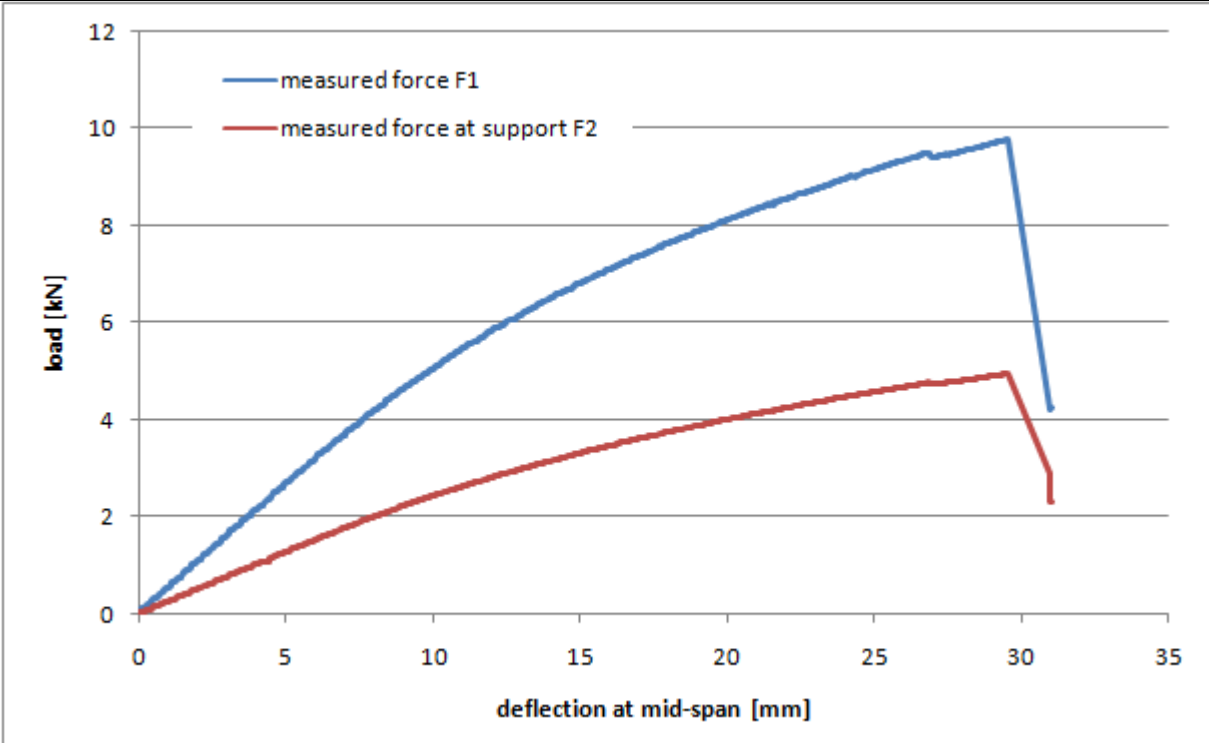
IIIa-A-3



test set-up

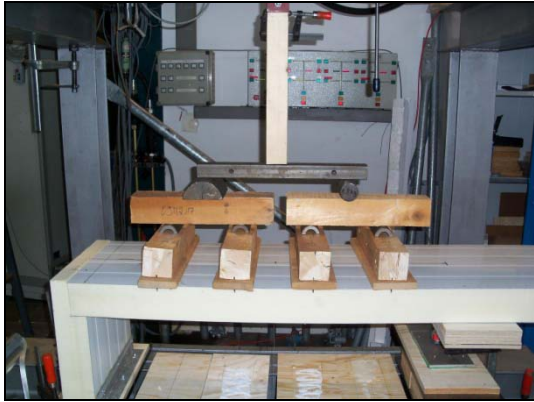


failure of glued corner detail

Test No.		IIIa-A-4																												
type of test	single span test with glued corner detail																													
introduction of load	two line loads																													
type of panel	A																													
faces	0,50 mm steel																													
core	100 mm PU																													
stressed face	top side of production																													
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																												
width b	395 mm	length l	- mm																											
height h ₁	301 mm	with b	- mm																											
thickness D	96 mm	thickness D	- mm																											
height of cutting h ₂	101 mm																													
thickness of cutting d ₂	48 mm																													
ultimate load F ₁	9,77 kN																													
ultimate load at support F ₂	4,96 kN																													
Failure mode	shear failure of the ceiling panel																													
Remarks																														
 <table border="1"> <caption>Approximate data points from the load vs deflection graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F₁ [kN]</th> <th>Measured force at support F₂ [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>5</td><td>2.5</td><td>1.5</td></tr> <tr><td>10</td><td>4.5</td><td>2.5</td></tr> <tr><td>15</td><td>6.5</td><td>3.5</td></tr> <tr><td>20</td><td>8.0</td><td>4.0</td></tr> <tr><td>25</td><td>9.0</td><td>4.5</td></tr> <tr><td>30</td><td>9.8</td><td>5.0</td></tr> <tr><td>31</td><td>4.2</td><td>2.5</td></tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]	0	0	0	5	2.5	1.5	10	4.5	2.5	15	6.5	3.5	20	8.0	4.0	25	9.0	4.5	30	9.8	5.0	31	4.2	2.5
Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]																												
0	0	0																												
5	2.5	1.5																												
10	4.5	2.5																												
15	6.5	3.5																												
20	8.0	4.0																												
25	9.0	4.5																												
30	9.8	5.0																												
31	4.2	2.5																												

Test No.

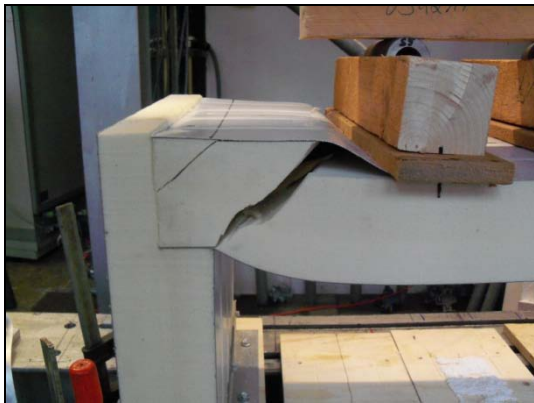
IIIa-A-4



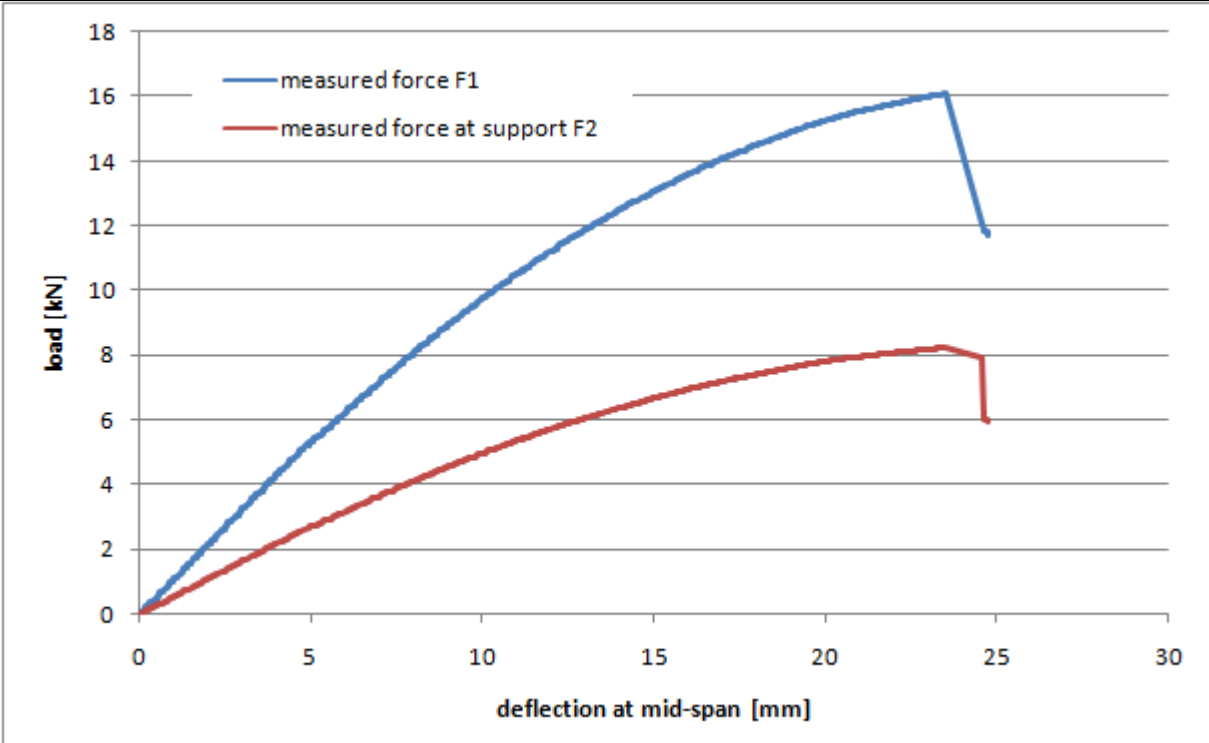
test set-up



corner detail during the test

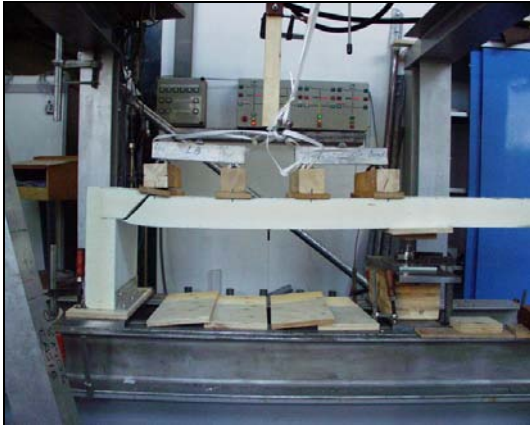


shear failure of the ceiling panel

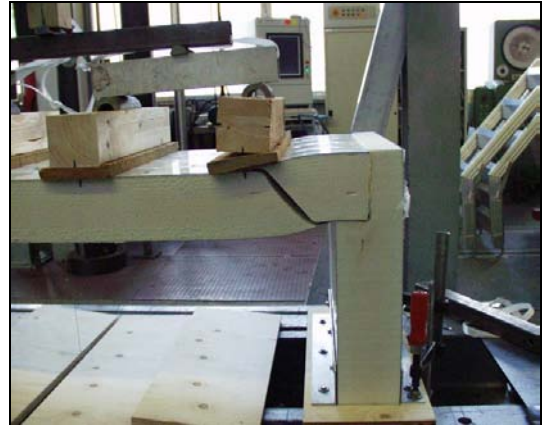
Test No.		IIIa-B-1																									
type of test	single span test with glued corner detail																										
introduction of load	two line loads																										
type of panel	B																										
faces	0,75 mm steel																										
core	100 mm PU																										
stressed face	top side of production																										
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																									
width b	400 mm	length l	1495 mm																								
height h ₁	297 mm	with b	400 mm																								
thickness D	99 mm	thickness D	99 mm																								
height of cutting h ₂	100 mm																										
thickness of cutting d ₂	50 mm																										
ultimate load F ₁	16,07 kN																										
ultimate load at support F ₂	8,22 kN																										
Failure mode	shear failure of the ceiling panel																										
Remarks																											
 <table border="1"> <caption>Approximate data points from the load vs deflection graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F₁ [kN]</th> <th>Measured force at support F₂ [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>5</td><td>5</td><td>3</td></tr> <tr><td>10</td><td>10</td><td>5</td></tr> <tr><td>15</td><td>13</td><td>6.5</td></tr> <tr><td>20</td><td>15</td><td>7.5</td></tr> <tr><td>24</td><td>16</td><td>8</td></tr> <tr><td>25</td><td>12</td><td>6</td></tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]	0	0	0	5	5	3	10	10	5	15	13	6.5	20	15	7.5	24	16	8	25	12	6
Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]																									
0	0	0																									
5	5	3																									
10	10	5																									
15	13	6.5																									
20	15	7.5																									
24	16	8																									
25	12	6																									

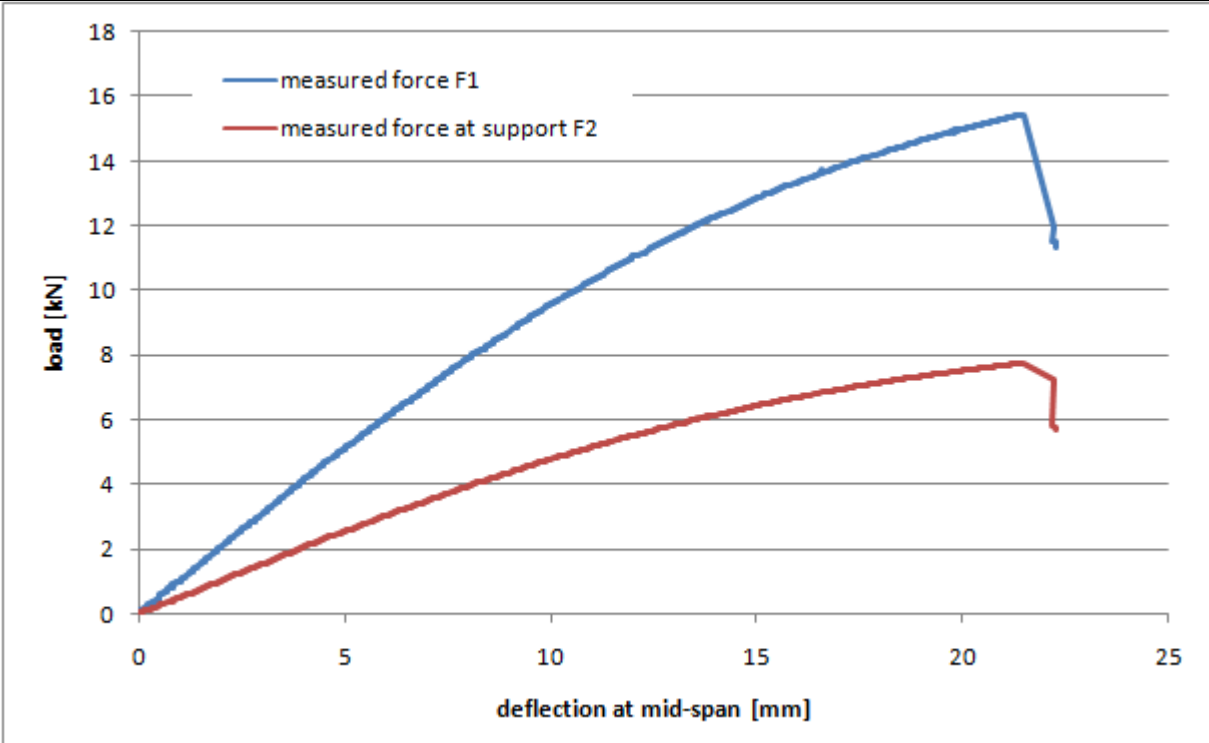
Test No.

IIIa-B-1



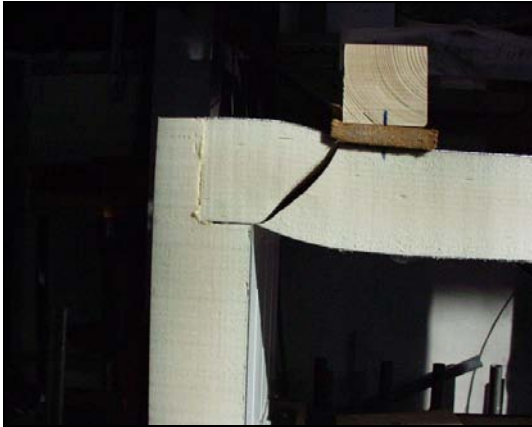
failure of the ceiling panel



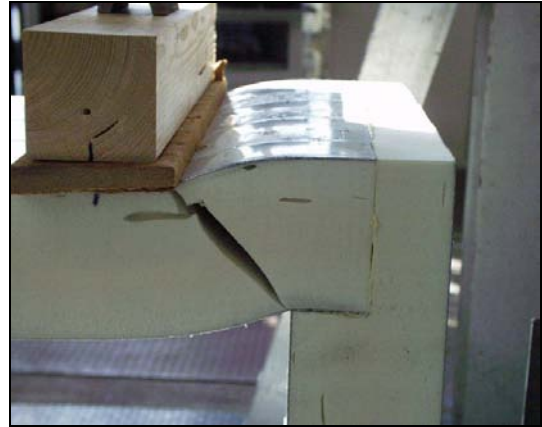
Test No.		IIIa-B-3																									
type of test	single span test with glued corner detail																										
introduction of load	two line loads																										
type of panel	B																										
faces	0,75 mm steel																										
core	100 mm PU																										
stressed face	top side of production																										
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																									
width b	400 mm	length l	1497 mm																								
height h_1	304 mm	with b	400 mm																								
thickness D	99 mm	thickness D	101 mm																								
height of cutting h_2	101 mm																										
thickness of cutting d_2	52 mm																										
ultimate load F_1	15,44 kN																										
ultimate load at support F_2	7,72 kN																										
Failure mode	shear failure of the ceiling panel																										
Remarks																											
 <table border="1"> <caption>Graph Data: Load vs Deflection</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F_1 [kN]</th> <th>Measured force at support F_2 [kN]</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>5</td> <td>~5.0</td> <td>~2.5</td> </tr> <tr> <td>10</td> <td>~9.5</td> <td>~4.5</td> </tr> <tr> <td>15</td> <td>~13.0</td> <td>~6.0</td> </tr> <tr> <td>20</td> <td>~15.0</td> <td>~7.5</td> </tr> <tr> <td>22 (Peak)</td> <td>15.44</td> <td>7.72</td> </tr> <tr> <td>23</td> <td>~11.5</td> <td>~5.5</td> </tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F_1 [kN]	Measured force at support F_2 [kN]	0	0	0	5	~5.0	~2.5	10	~9.5	~4.5	15	~13.0	~6.0	20	~15.0	~7.5	22 (Peak)	15.44	7.72	23	~11.5	~5.5
Deflection at mid-span [mm]	Measured force F_1 [kN]	Measured force at support F_2 [kN]																									
0	0	0																									
5	~5.0	~2.5																									
10	~9.5	~4.5																									
15	~13.0	~6.0																									
20	~15.0	~7.5																									
22 (Peak)	15.44	7.72																									
23	~11.5	~5.5																									

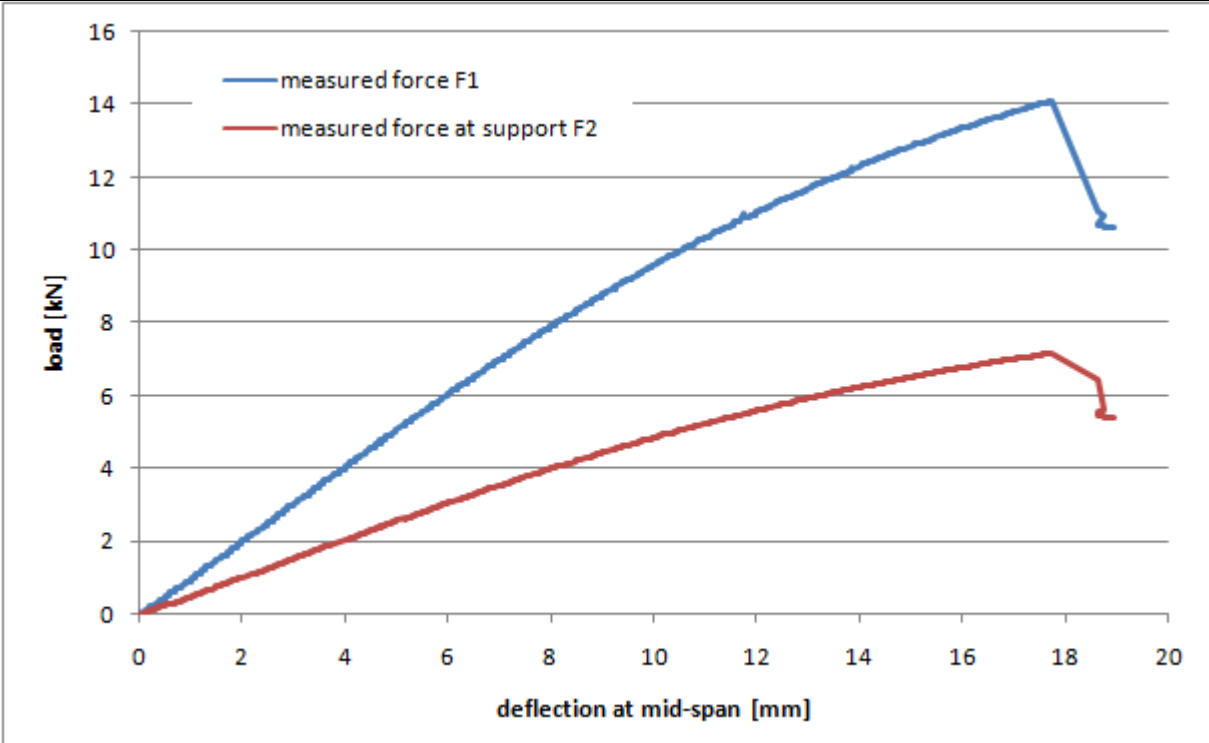
Test No.

IIIa-B-3



shear failure of the ceiling panel



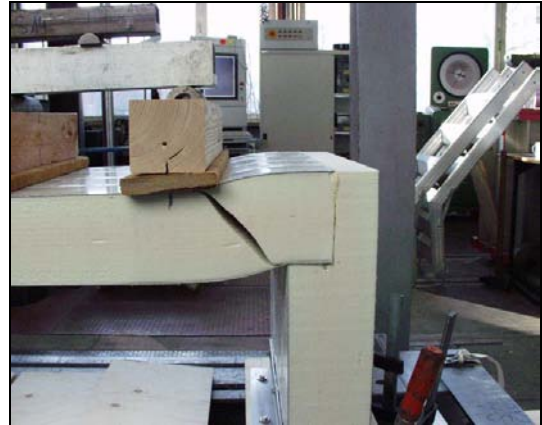
Test No.		IIIa-B-4																																								
type of test	single span test with glued corner detail																																									
introduction of load	two line loads																																									
type of panel	B																																									
faces	0,75 mm steel																																									
core	100 mm PU																																									
stressed face	top side of production																																									
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																																								
width b	400 mm	length l	1505 mm																																							
height h_1	300 mm	with b	399 mm																																							
thickness D	99 mm	thickness D	101 mm																																							
height of cutting h_2	100 mm																																									
thickness of cutting d_2	50 mm																																									
ultimate load F_1	14,09 kN																																									
ultimate load at support F_2	7,17 kN																																									
Failure mode	shear failure of the ceiling panel																																									
Remarks																																										
 <p>The graph plots load in kilonewtons (kN) on the y-axis (0 to 16) against deflection at mid-span in millimeters (mm) on the x-axis (0 to 20). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). Both series show a linear increase in load with deflection until they reach a peak, after which they drop sharply. The peak for F1 is at approximately 18 mm deflection with a load of 14.09 kN. The peak for F2 is at approximately 18 mm deflection with a load of 7.17 kN.</p> <table border="1"> <caption>Approximate data points from the graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F1 [kN]</th> <th>Measured force at support F2 [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>2</td><td>2.0</td><td>1.0</td></tr> <tr><td>4</td><td>4.0</td><td>2.0</td></tr> <tr><td>6</td><td>6.0</td><td>3.0</td></tr> <tr><td>8</td><td>8.0</td><td>4.0</td></tr> <tr><td>10</td><td>10.0</td><td>5.0</td></tr> <tr><td>12</td><td>12.0</td><td>6.0</td></tr> <tr><td>14</td><td>13.0</td><td>6.5</td></tr> <tr><td>16</td><td>13.5</td><td>6.8</td></tr> <tr><td>18</td><td>14.09</td><td>7.17</td></tr> <tr><td>18.5</td><td>10.5</td><td>6.5</td></tr> <tr><td>19</td><td>10.0</td><td>5.5</td></tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F1 [kN]	Measured force at support F2 [kN]	0	0	0	2	2.0	1.0	4	4.0	2.0	6	6.0	3.0	8	8.0	4.0	10	10.0	5.0	12	12.0	6.0	14	13.0	6.5	16	13.5	6.8	18	14.09	7.17	18.5	10.5	6.5	19	10.0	5.5
Deflection at mid-span [mm]	Measured force F1 [kN]	Measured force at support F2 [kN]																																								
0	0	0																																								
2	2.0	1.0																																								
4	4.0	2.0																																								
6	6.0	3.0																																								
8	8.0	4.0																																								
10	10.0	5.0																																								
12	12.0	6.0																																								
14	13.0	6.5																																								
16	13.5	6.8																																								
18	14.09	7.17																																								
18.5	10.5	6.5																																								
19	10.0	5.5																																								

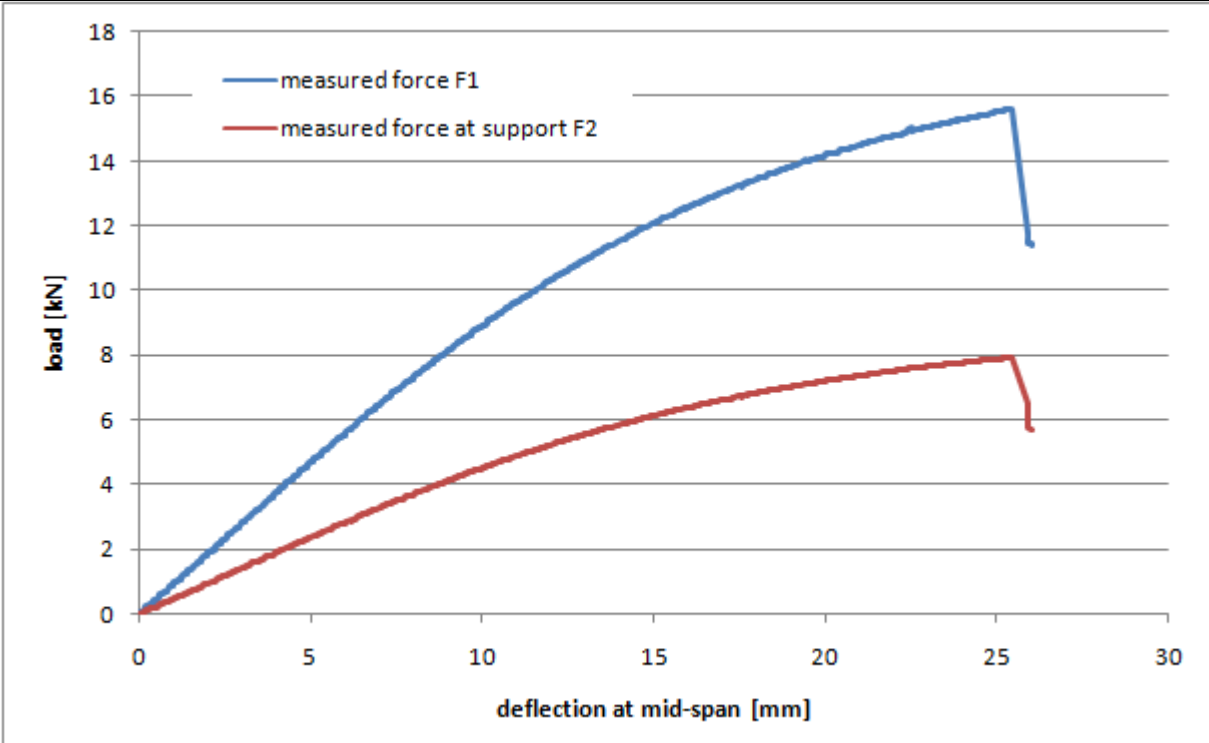
Test No.

IIIa-B-4



failure of the ceiling panel



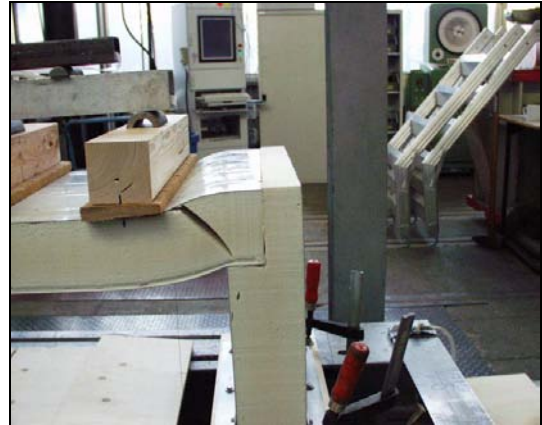
Test No.		IIIa-B-5																												
type of test	single span test with glued corner detail																													
introduction of load	two line loads																													
type of panel	B																													
faces	0,75 mm steel																													
core	100 mm PU																													
stressed face	top side of production																													
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																												
width b	400 mm	length l	1504 mm																											
height h_1	300 mm	with b	399 mm																											
thickness D	99 mm	thickness D	98 mm																											
height of cutting h_2	100 mm																													
thickness of cutting d_2	49 mm																													
ultimate load F_1	15,59 kN																													
ultimate load at support F_2	7,94 kN																													
Failure mode	shear failure of the ceiling panel																													
Remarks																														
 <table border="1"> <caption>Approximate data points from the load vs deflection graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F_1 [kN]</th> <th>Measured force at support F_2 [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>5</td><td>4.5</td><td>2.5</td></tr> <tr><td>10</td><td>8.5</td><td>4.5</td></tr> <tr><td>15</td><td>12.0</td><td>6.0</td></tr> <tr><td>20</td><td>14.0</td><td>7.0</td></tr> <tr><td>25</td><td>15.0</td><td>7.5</td></tr> <tr><td>25.6 (Peak)</td><td>15.59</td><td>7.94</td></tr> <tr><td>26</td><td>11.5</td><td>5.5</td></tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F_1 [kN]	Measured force at support F_2 [kN]	0	0	0	5	4.5	2.5	10	8.5	4.5	15	12.0	6.0	20	14.0	7.0	25	15.0	7.5	25.6 (Peak)	15.59	7.94	26	11.5	5.5
Deflection at mid-span [mm]	Measured force F_1 [kN]	Measured force at support F_2 [kN]																												
0	0	0																												
5	4.5	2.5																												
10	8.5	4.5																												
15	12.0	6.0																												
20	14.0	7.0																												
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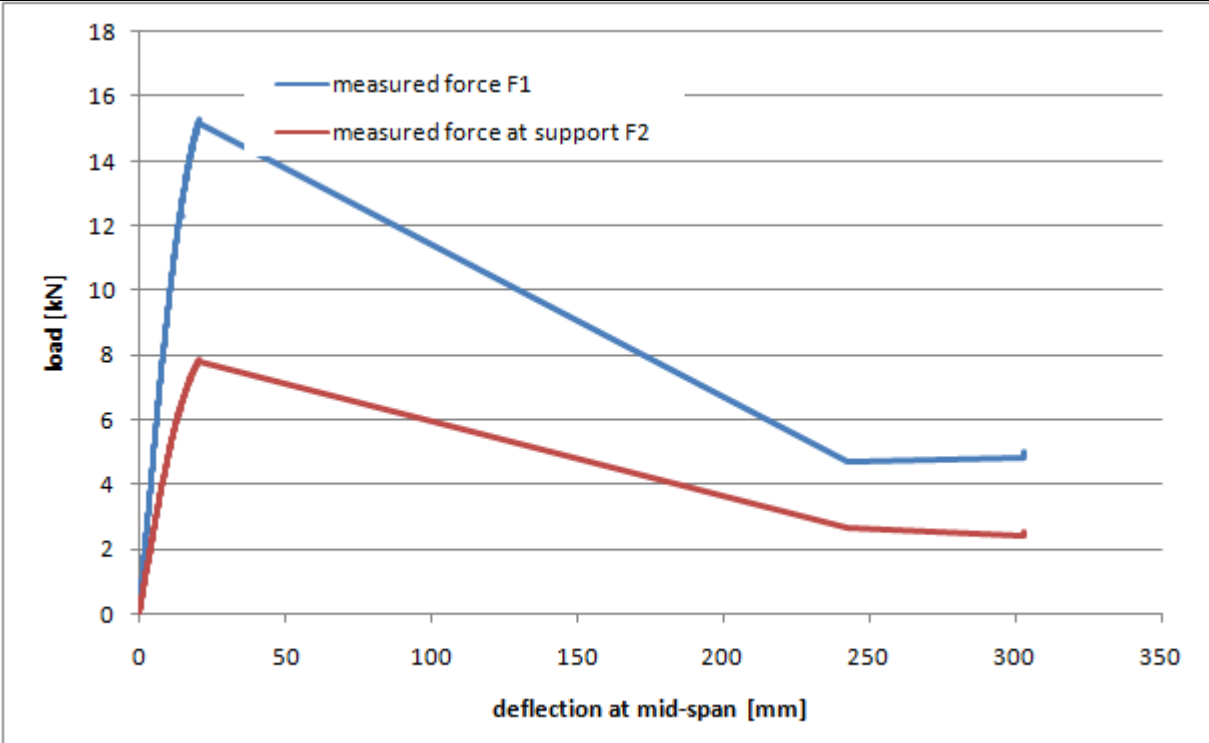
Test No.

IIIa-B-5



shear failure of the ceiling panel



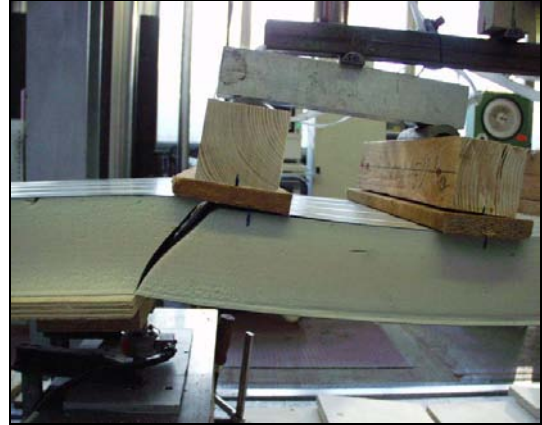
Test No.		IIIa-B-6																												
type of test	single span test with glued corner detail																													
introduction of load	two line loads																													
type of panel	B																													
faces	0,75 mm steel																													
core	100 mm PU																													
stressed face	top side of production																													
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																												
width b	400 mm	length l	1489 mm																											
height h ₁	300 mm	with b	400 mm																											
thickness D	99 mm	thickness D	99 mm																											
height of cutting h ₂	100 mm																													
thickness of cutting d ₂	50 mm																													
ultimate load F ₁	15,29 kN																													
ultimate load at support F ₂	7,88 kN																													
Failure mode	shear failure of the ceiling panel																													
Remarks																														
 <table border="1"> <caption>Approximate data points from the load vs deflection graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F₁ [kN]</th> <th>Measured force at support F₂ [kN]</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>20</td> <td>15.29</td> <td>7.88</td> </tr> <tr> <td>50</td> <td>12.5</td> <td>7.0</td> </tr> <tr> <td>100</td> <td>10.0</td> <td>6.0</td> </tr> <tr> <td>150</td> <td>8.0</td> <td>5.0</td> </tr> <tr> <td>200</td> <td>6.5</td> <td>4.0</td> </tr> <tr> <td>250</td> <td>5.0</td> <td>3.0</td> </tr> <tr> <td>300</td> <td>5.0</td> <td>2.5</td> </tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]	0	0	0	20	15.29	7.88	50	12.5	7.0	100	10.0	6.0	150	8.0	5.0	200	6.5	4.0	250	5.0	3.0	300	5.0	2.5
Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]																												
0	0	0																												
20	15.29	7.88																												
50	12.5	7.0																												
100	10.0	6.0																												
150	8.0	5.0																												
200	6.5	4.0																												
250	5.0	3.0																												
300	5.0	2.5																												

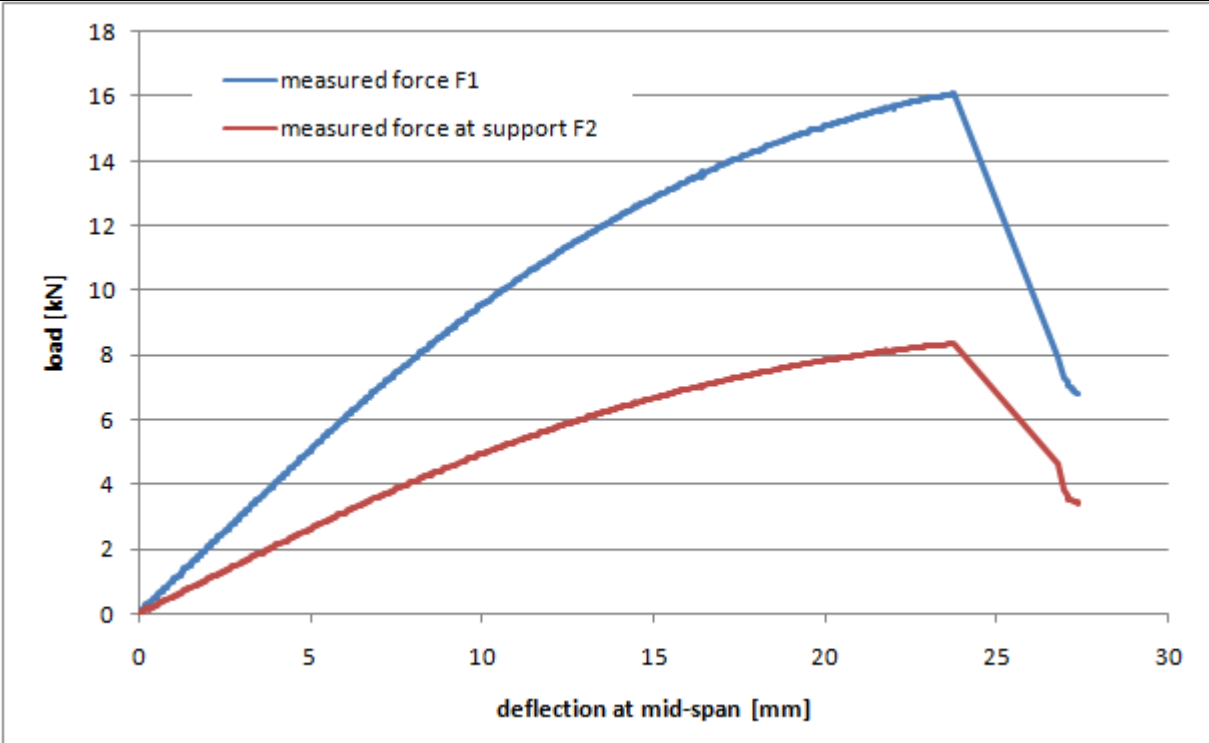
Test No.

IIIa-B-6



shear failure of the ceiling panel



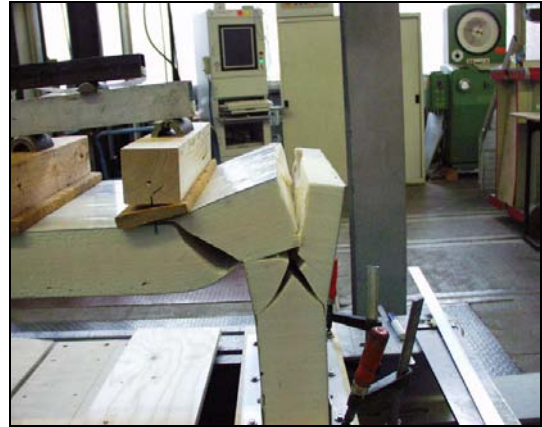
Test No.		IIIa-B-7																												
type of test	single span test with glued corner detail																													
introduction of load	two line loads																													
type of panel	B																													
faces	0,75 mm steel																													
core	100 mm PU																													
stressed face	top side of production																													
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																												
width b	400 mm	length l	1497 mm																											
height h ₁	293 mm	with b	399 mm																											
thickness D	100 mm	thickness D	101 mm																											
height of cutting h ₂	101 mm																													
thickness of cutting d ₂	50 mm																													
ultimate load F ₁	16,11 kN																													
ultimate load at support F ₂	8,39 kN																													
Failure mode	shear failure of the ceiling panel																													
Remarks																														
 <table border="1"> <caption>Approximate data points from the load vs deflection graph</caption> <thead> <tr> <th>Deflection at mid-span [mm]</th> <th>Measured force F₁ [kN]</th> <th>Measured force at support F₂ [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>5</td><td>5.0</td><td>2.5</td></tr> <tr><td>10</td><td>9.5</td><td>4.5</td></tr> <tr><td>15</td><td>13.0</td><td>6.5</td></tr> <tr><td>20</td><td>15.0</td><td>7.5</td></tr> <tr><td>24</td><td>16.1</td><td>8.4</td></tr> <tr><td>27</td><td>7.0</td><td>4.5</td></tr> <tr><td>28</td><td>3.5</td><td>3.5</td></tr> </tbody> </table>				Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]	0	0	0	5	5.0	2.5	10	9.5	4.5	15	13.0	6.5	20	15.0	7.5	24	16.1	8.4	27	7.0	4.5	28	3.5	3.5
Deflection at mid-span [mm]	Measured force F ₁ [kN]	Measured force at support F ₂ [kN]																												
0	0	0																												
5	5.0	2.5																												
10	9.5	4.5																												
15	13.0	6.5																												
20	15.0	7.5																												
24	16.1	8.4																												
27	7.0	4.5																												
28	3.5	3.5																												

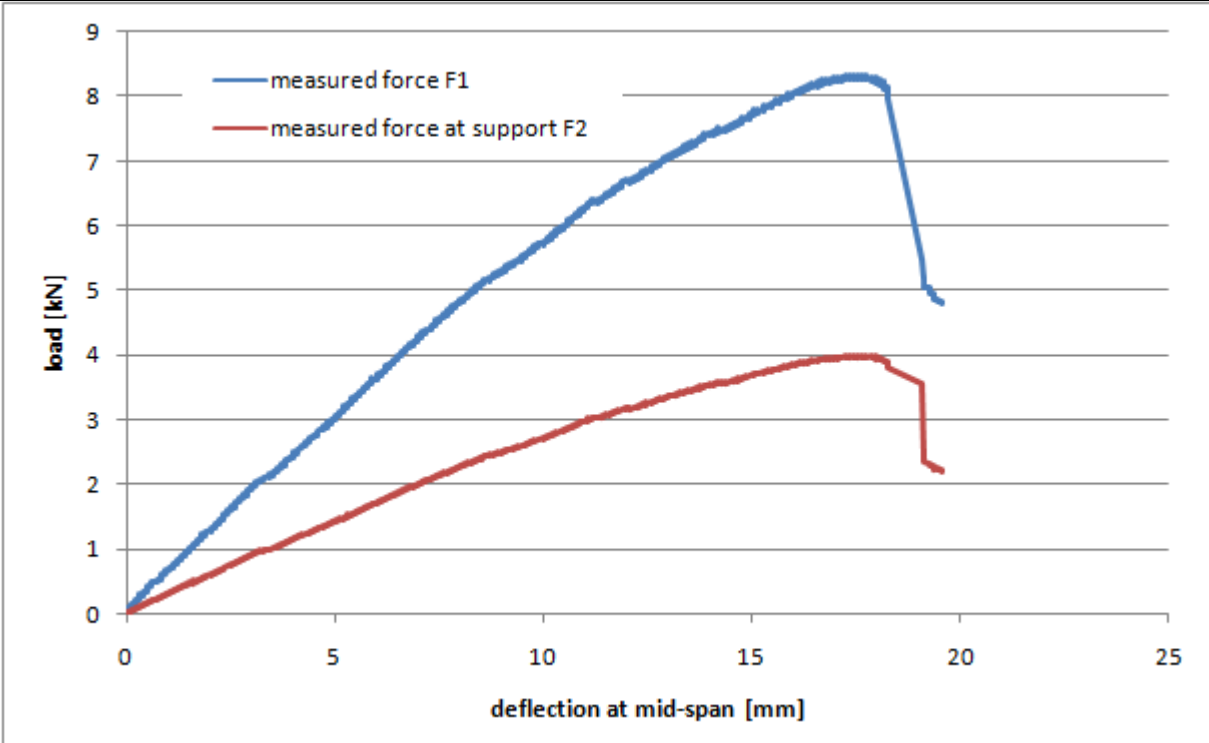
Test No.

IIIa-B-7



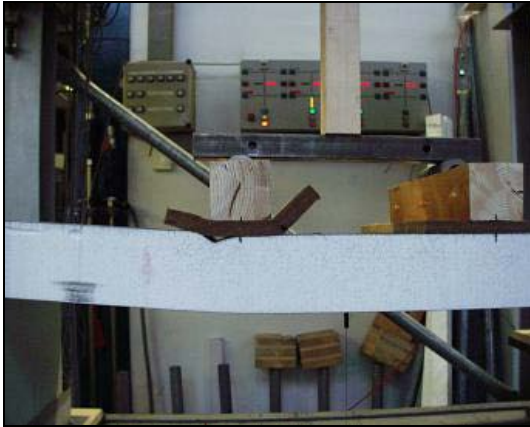
shear failure of the ceiling panel



Test No.		IIIa-C-2	
type of test	single span test with glued corner detail		
introduction of load	two line loads		
type of panel	C		
faces	0,60 mm steel		
core	100 mm EPS		
stressed face	top side of production		
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:	
width b	299 mm	length l	1498 mm
height h_1	281 mm	with b	399 mm
thickness D	99 mm	thickness D	99 mm
height of cutting h_2	101 mm		
thickness of cutting d_2	69 mm		
ultimate load F_1	8,34 kN		
ultimate load at support F_2	3,99 kN		
Failure mode	failure of the ceiling panel at load introduction		
Remarks			
 <p>The graph plots load in kilonewtons (kN) on the y-axis (0 to 9) against deflection at mid-span in millimeters (mm) on the x-axis (0 to 25). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). Both series show a linear increase in load with deflection until approximately 18 mm. At this point, the blue line reaches a peak of 8.34 kN and then drops sharply to about 4.8 kN at 19 mm. The red line reaches a peak of 3.99 kN and then drops to about 2.2 kN at 19 mm. The failure occurs at approximately 18 mm deflection.</p>			

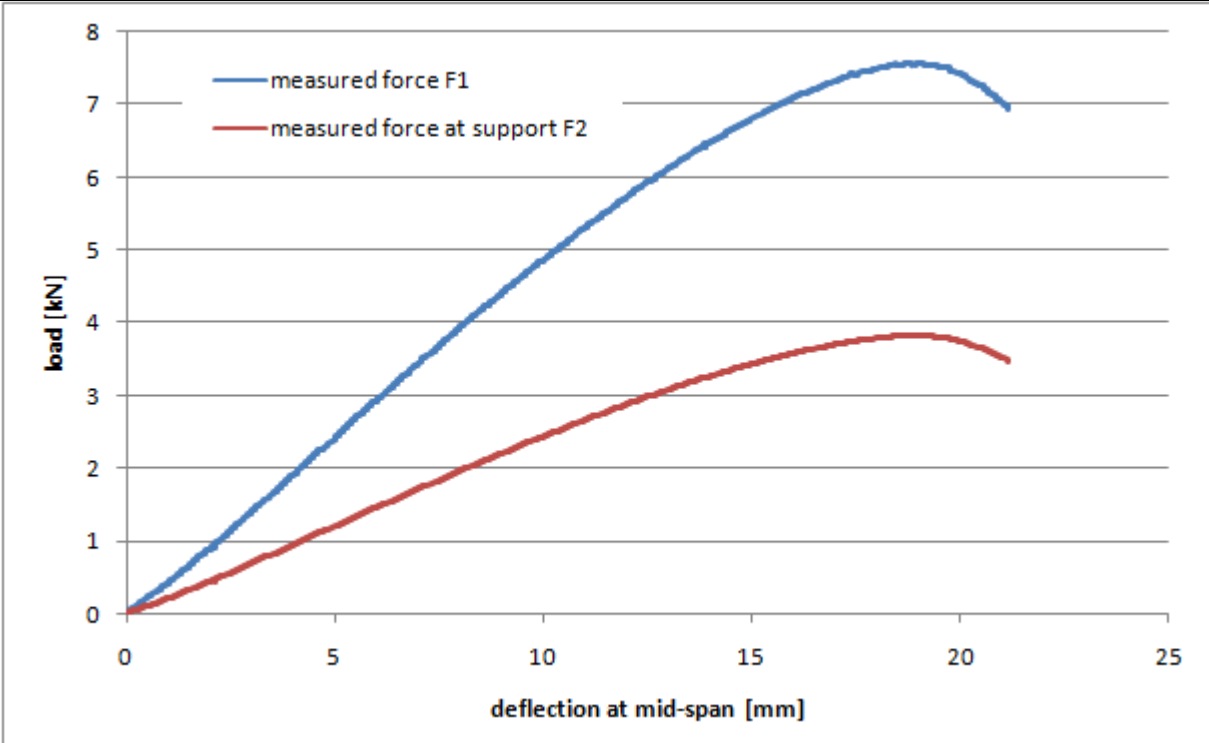
Test No.

IIIa-C-2



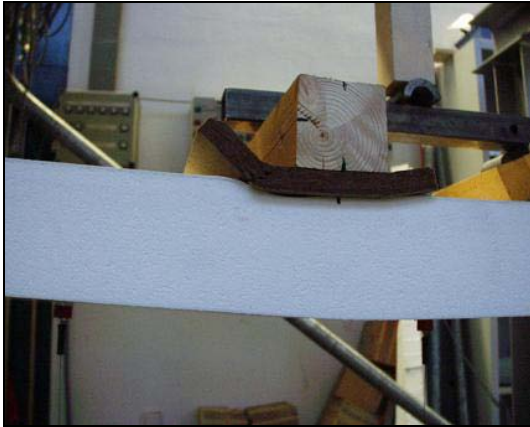
failure at load introduction



Test No.		IIIa-D-2	
type of test	single span test with glued corner detail		
introduction of load	two line loads		
type of panel	D		
faces	1,8mm GFRP		
core	100 mm EPS		
stressed face	top side of production		
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:	
width b	298 mm	length l	1499 mm
height h_1	299 mm	with b	379 mm
thickness D	102 mm	thickness D	102 mm
height of cutting h_2	99 mm		
thickness of cutting d_2	70 mm		
ultimate load F_1	7,56 kN		
ultimate load at support F_2	3,83 kN		
Failure mode	failure of the ceiling panel at load introduction		
Remarks			
 <p>The graph plots load in kilonewtons (kN) on the y-axis (0 to 8) against deflection at mid-span in millimeters (mm) on the x-axis (0 to 25). Two curves are shown: a blue line for 'measured force F1' and a red line for 'measured force at support F2'. Both curves show a non-linear, concave-down relationship. The blue curve reaches a peak of 7.56 kN at a deflection of 20 mm. The red curve reaches a peak of 3.83 kN at a deflection of 20 mm. Both curves show a slight decrease in load after their respective peaks.</p>			

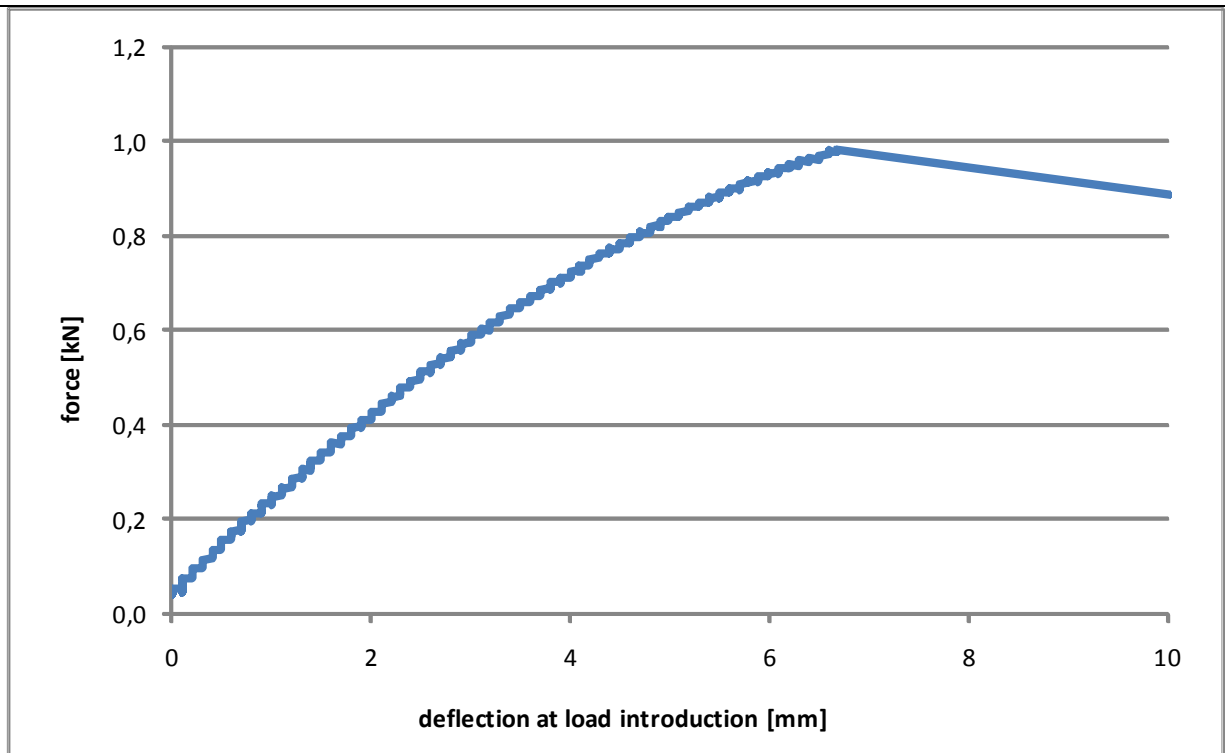
Test No.

IIIa-D-2



failure at load introduction



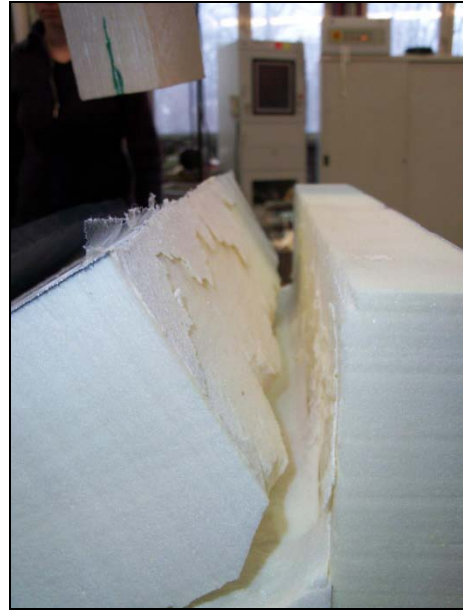
Test No.	IIIb-A-1																											
type of test	cantilever test with glued corner detail																											
type of panel	A																											
faces	0,50 mm steel																											
core	100 mm PU																											
stressed face	top side of production																											
distance between load and compressed face of the wall panel	100 mm																											
Measured dimensions of the wall panel:	Measured dimensions of the ceiling panel:																											
width b	397 mm	length l	752 mm																									
height h_1	304 mm	width b	400 mm																									
thickness D	95 mm	thickness D	96 mm																									
height of cutting h_2	101 mm																											
thickness of cutting d_2	49 mm																											
ultimate load	0,986 kN																											
ultimate moment (inkl. self weight of ceiling panel)	0,11 kNm																											
Failure mode	failure of glue																											
Remarks																												
 <table border="1"> <caption>Approximate data points from the force-deflection graph</caption> <thead> <tr> <th>Deflection [mm]</th> <th>Force [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.0</td></tr> <tr><td>1</td><td>0.16</td></tr> <tr><td>2</td><td>0.32</td></tr> <tr><td>3</td><td>0.48</td></tr> <tr><td>4</td><td>0.64</td></tr> <tr><td>5</td><td>0.80</td></tr> <tr><td>6</td><td>0.92</td></tr> <tr><td>6.5</td><td>0.986</td></tr> <tr><td>7</td><td>0.95</td></tr> <tr><td>8</td><td>0.92</td></tr> <tr><td>9</td><td>0.90</td></tr> <tr><td>10</td><td>0.88</td></tr> </tbody> </table>			Deflection [mm]	Force [kN]	0	0.0	1	0.16	2	0.32	3	0.48	4	0.64	5	0.80	6	0.92	6.5	0.986	7	0.95	8	0.92	9	0.90	10	0.88
Deflection [mm]	Force [kN]																											
0	0.0																											
1	0.16																											
2	0.32																											
3	0.48																											
4	0.64																											
5	0.80																											
6	0.92																											
6.5	0.986																											
7	0.95																											
8	0.92																											
9	0.90																											
10	0.88																											

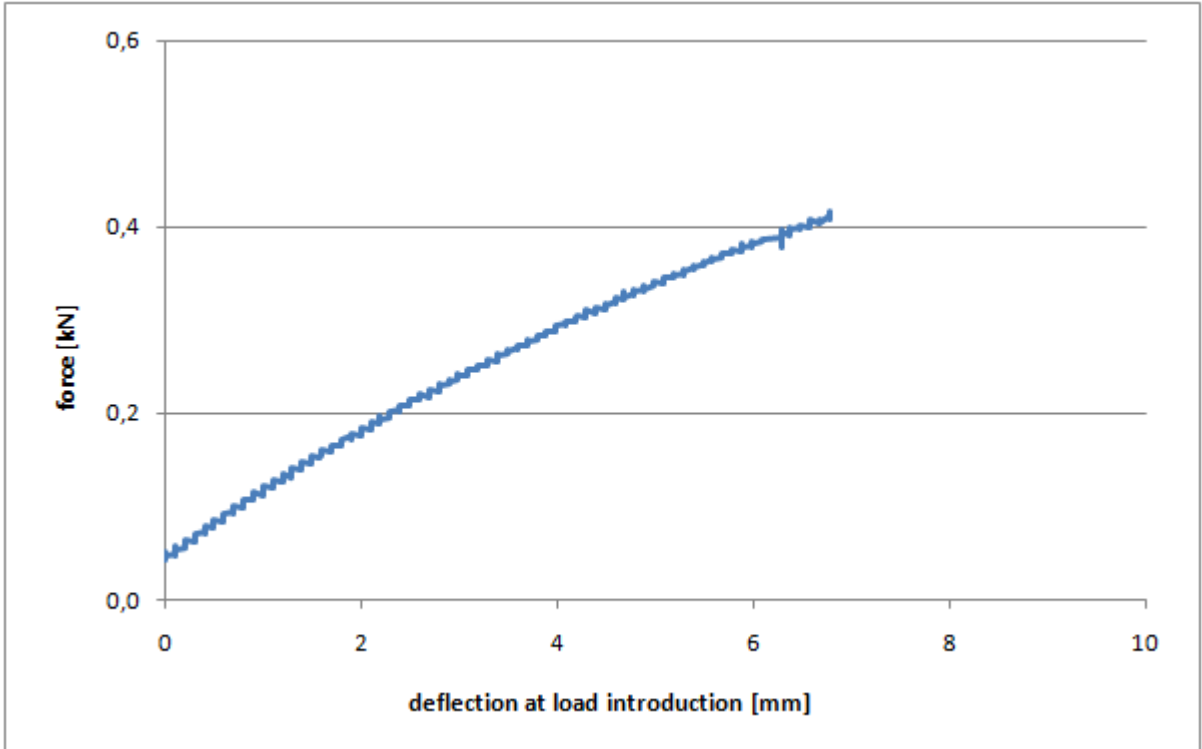
Test No.

IIIb-A-1



failure of glue



Test No.		IIIb-A-2	
type of test	cantilever test with glued corner detail		
type of panel	A		
faces	0,50 mm steel		
core	100 mm PU		
stressed face	top side of production		
distance between load and compressed face of the wall panel	200 mm		
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:	
width b	396 mm	length l	1496 mm
height h ₁	297 mm	width b	400 mm
thickness D	97 mm	thickness D	96 mm
height of cutting h ₂	102 mm		
thickness of cutting d ₂	49 mm		
ultimate load	0,416 kN		
ultimate moment	0,13 kNm		
Failure mode	failure of glue		
Remarks			
 <p>The graph plots force in kilonewtons (kN) on the y-axis against deflection at load introduction in millimeters (mm) on the x-axis. The y-axis ranges from 0.0 to 0.6 with major ticks every 0.2. The x-axis ranges from 0 to 10 with major ticks every 2. A series of blue data points shows a linear relationship, starting at (0, 0) and ending at approximately (6.5, 0.416). A small vertical tick mark on the data line at approximately 6.5 mm deflection indicates the ultimate load.</p>			

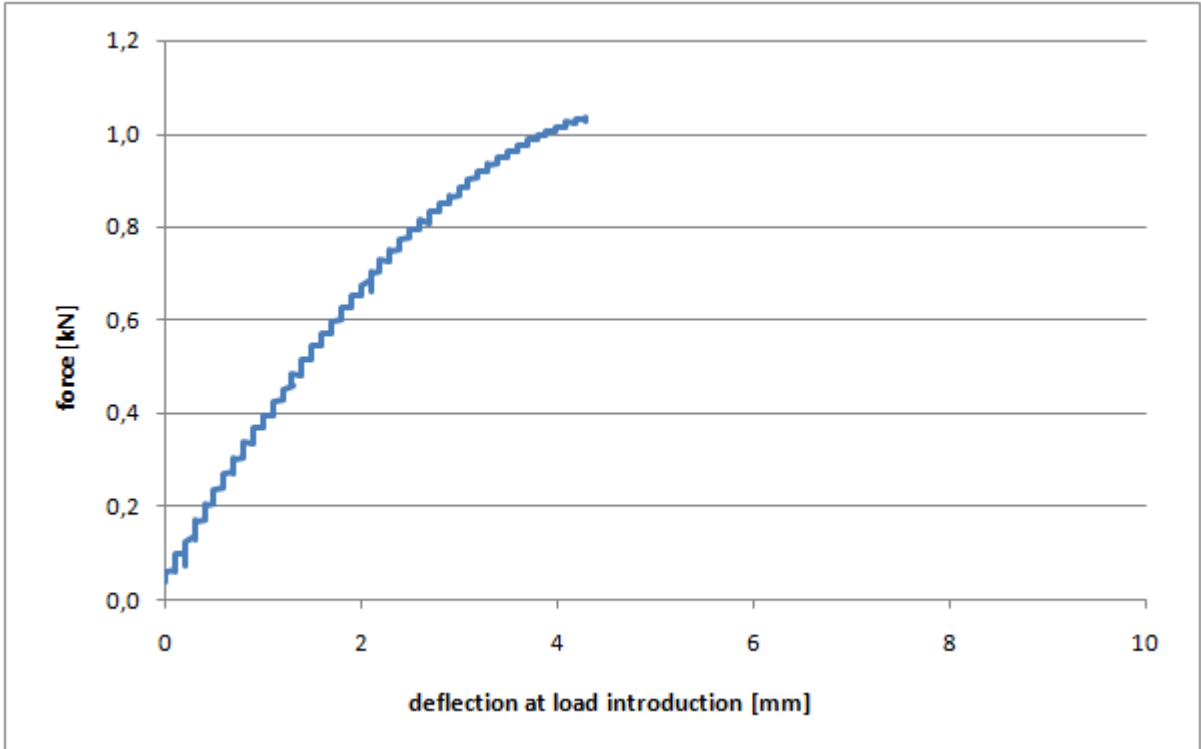
Test No.

IIIb-A-2



failure of glue



Test No.		IIIb-C-2	
type of test	cantilever test with glued corner detail		
type of panel	C		
faces	0,60 mm steel		
core	100 mm EPS		
stressed face	top side of production		
distance between load and compressed face of the wall panel	100 mm		
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:	
width b	299 mm	length l	752 mm
height h_1	295 mm	width b	399 mm
thickness D	99 mm	thickness D	100 mm
height of cutting h_2	85 mm		
thickness of cutting d_2	70 mm		
ultimate load	1,035 kN		
ultimate moment	0,12 kNm		
Failure mode	failure of core material and glue		
Remarks			
 <p>The graph plots force in kilonewtons (kN) on the y-axis against deflection at load introduction in millimeters (mm) on the x-axis. The y-axis ranges from 0.0 to 1.2 with major ticks every 0.2. The x-axis ranges from 0 to 10 with major ticks every 2. The data points form a smooth, upward-sloping curve that starts at the origin (0,0) and reaches a peak force of approximately 1.035 kN at a deflection of about 4.2 mm. The curve shows a non-linear relationship, with the slope decreasing as deflection increases.</p>			

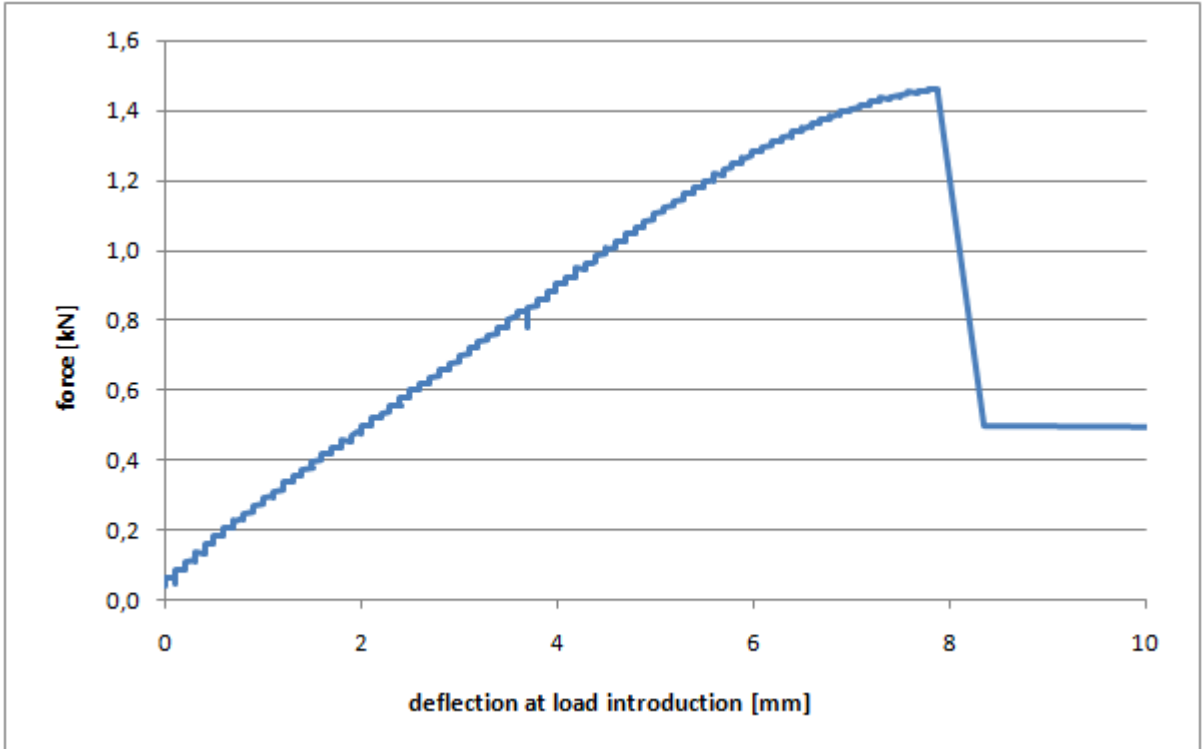
Test No.

IIIb-C-2



failure of core material and glue



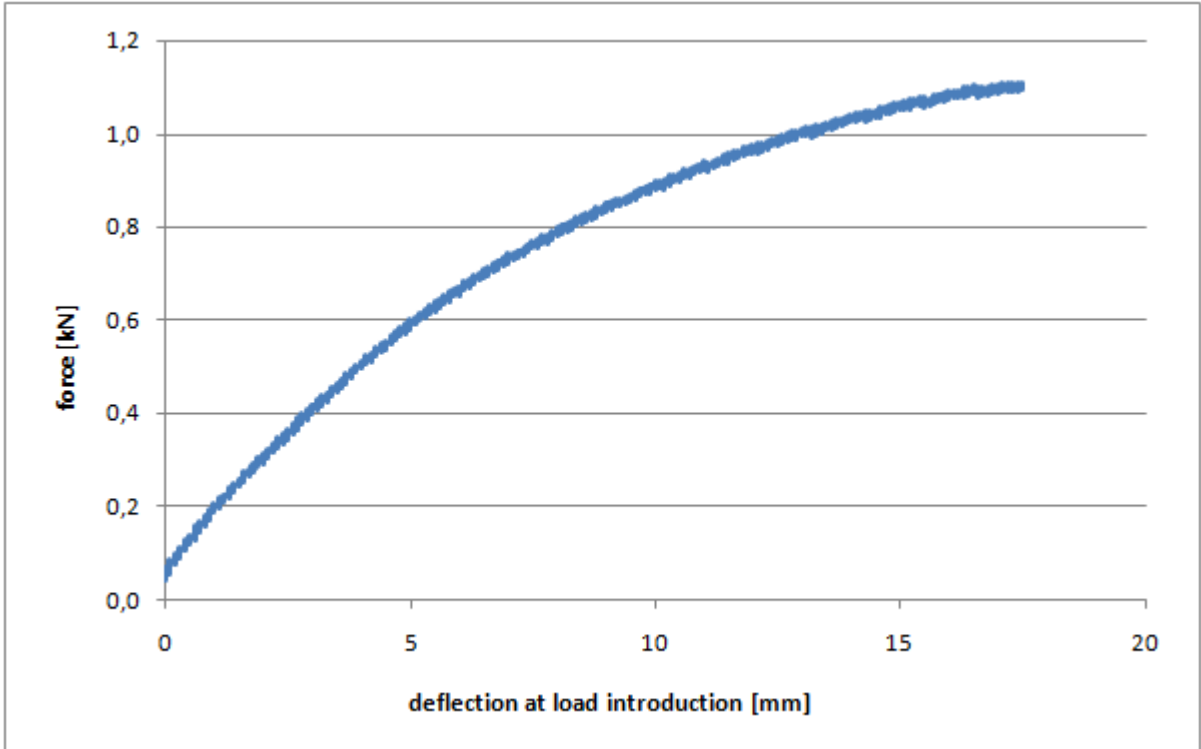
Test No.		IIIb-C-3	
type of test	cantilever test with glued corner detail		
type of panel	C		
faces	0,60 mm steel		
core	100 mm EPS		
stressed face	top side of production		
distance between load and compressed face of the wall panel	100 mm		
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:	
width b	299 mm	length l	1498 mm
height h ₁	281 mm	width b	399 mm
thickness D	99 mm	thickness D	100 mm
height of cutting h ₂	101 mm		
thickness of cutting d ₂	69 mm		
ultimate load	1,459 kN		
ultimate moment	0,20 kNm		
Failure mode	failure of core material		
Remarks			
 <p>The graph shows the relationship between force and deflection. The y-axis represents force in kN, ranging from 0.0 to 1.6. The x-axis represents deflection at load introduction in mm, ranging from 0 to 10. The data points form a curve that rises linearly from the origin to a peak force of approximately 1.45 kN at a deflection of 8 mm. After this peak, the force drops sharply to about 0.5 kN and remains constant for the remainder of the test.</p>			

Test No.

IIIb-C-3



failure of core material

Test No.		IIIb-C-4	
type of test	cantilever test with glued corner detail		
type of panel	C		
faces	0,60 mm steel		
core	100 mm EPS		
stressed face	top side of production		
distance between load and compressed face of the wall panel	200 mm		
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:	
width b	299 mm	length l	747 mm
height h ₁	282 mm	width b	398 mm
thickness D	100 mm	thickness D	99 mm
height of cutting h ₂	99 mm		
thickness of cutting d ₂	71 mm		
ultimate load	1,108 kN		
ultimate moment	0,23 kNm		
Failure mode	failure of core material		
Remarks			
 <p>The graph plots force in kilonewtons (kN) on the y-axis against deflection at load introduction in millimeters (mm) on the x-axis. The y-axis ranges from 0.0 to 1.2 with major ticks every 0.2. The x-axis ranges from 0 to 20 with major ticks every 5. A blue data series shows a non-linear, increasing relationship, starting at the origin (0,0) and reaching a peak force of approximately 1.1 kN at a deflection of about 17 mm. The curve exhibits a slight downward slope as it approaches its maximum value.</p>			

Test No.

IIIb-C-4



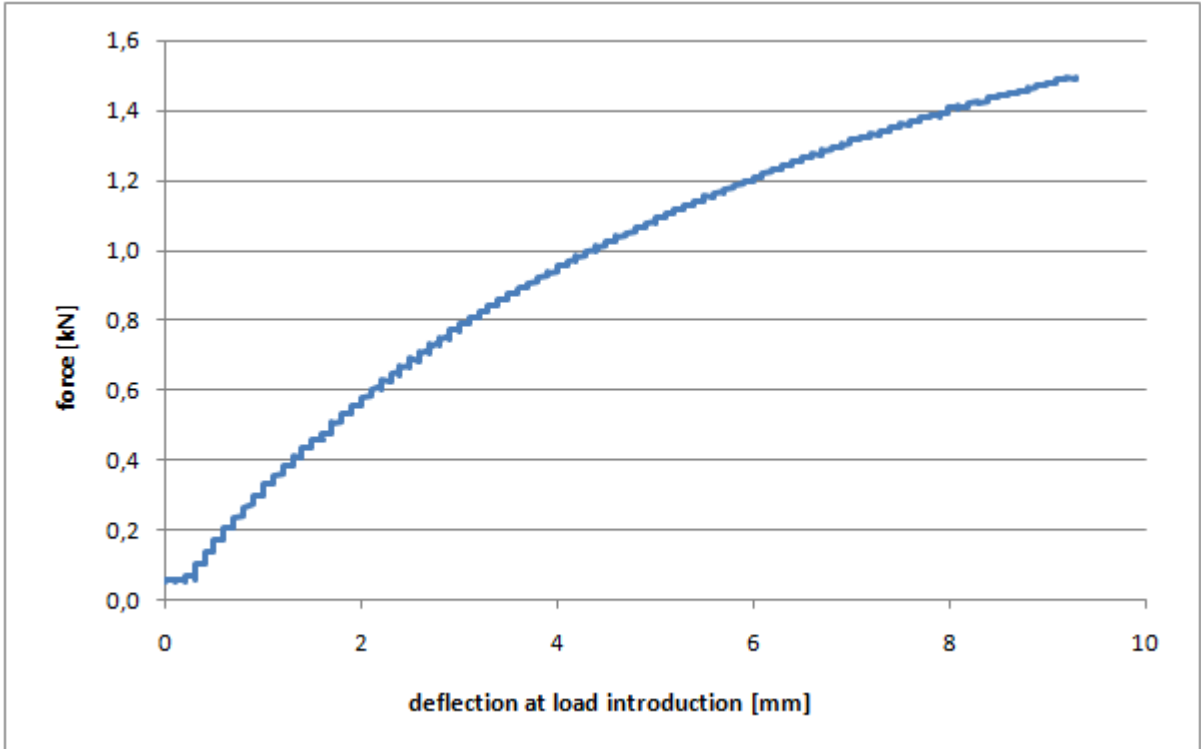
test set-up



failure of core material



failure of core material

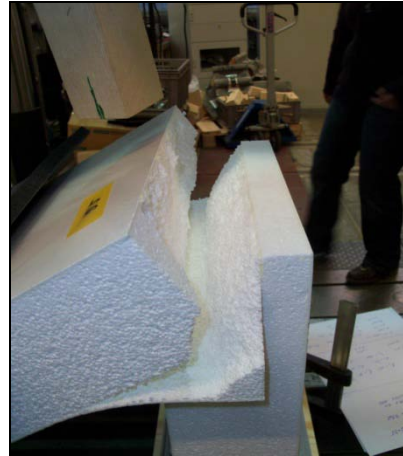
Test No.		IIIb-D-2																							
type of test	cantilever test with glued corner detail																								
type of panel	D																								
faces	1,8mm GFRP																								
core	100 mm EPS																								
stressed face	top side of production																								
distance between load and compressed face of the wall panel	100 mm																								
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:																							
width b	297 mm	length l	748 mm																						
height h ₁	300 mm	width b	380 mm																						
thickness D	102 mm	thickness D	102 mm																						
height of cutting h ₂	100 mm																								
thickness of cutting d ₂	70 mm																								
ultimate load	1,493 kN																								
ultimate moment	0,16 kNm																								
Failure mode	failure of core material																								
Remarks																									
 <table border="1"> <caption>Approximate data points from the force-deflection graph</caption> <thead> <tr> <th>Deflection [mm]</th> <th>Force [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.0</td></tr> <tr><td>1</td><td>0.2</td></tr> <tr><td>2</td><td>0.4</td></tr> <tr><td>3</td><td>0.6</td></tr> <tr><td>4</td><td>0.8</td></tr> <tr><td>5</td><td>1.0</td></tr> <tr><td>6</td><td>1.2</td></tr> <tr><td>7</td><td>1.3</td></tr> <tr><td>8</td><td>1.4</td></tr> <tr><td>9</td><td>1.5</td></tr> </tbody> </table>				Deflection [mm]	Force [kN]	0	0.0	1	0.2	2	0.4	3	0.6	4	0.8	5	1.0	6	1.2	7	1.3	8	1.4	9	1.5
Deflection [mm]	Force [kN]																								
0	0.0																								
1	0.2																								
2	0.4																								
3	0.6																								
4	0.8																								
5	1.0																								
6	1.2																								
7	1.3																								
8	1.4																								
9	1.5																								

Test No.

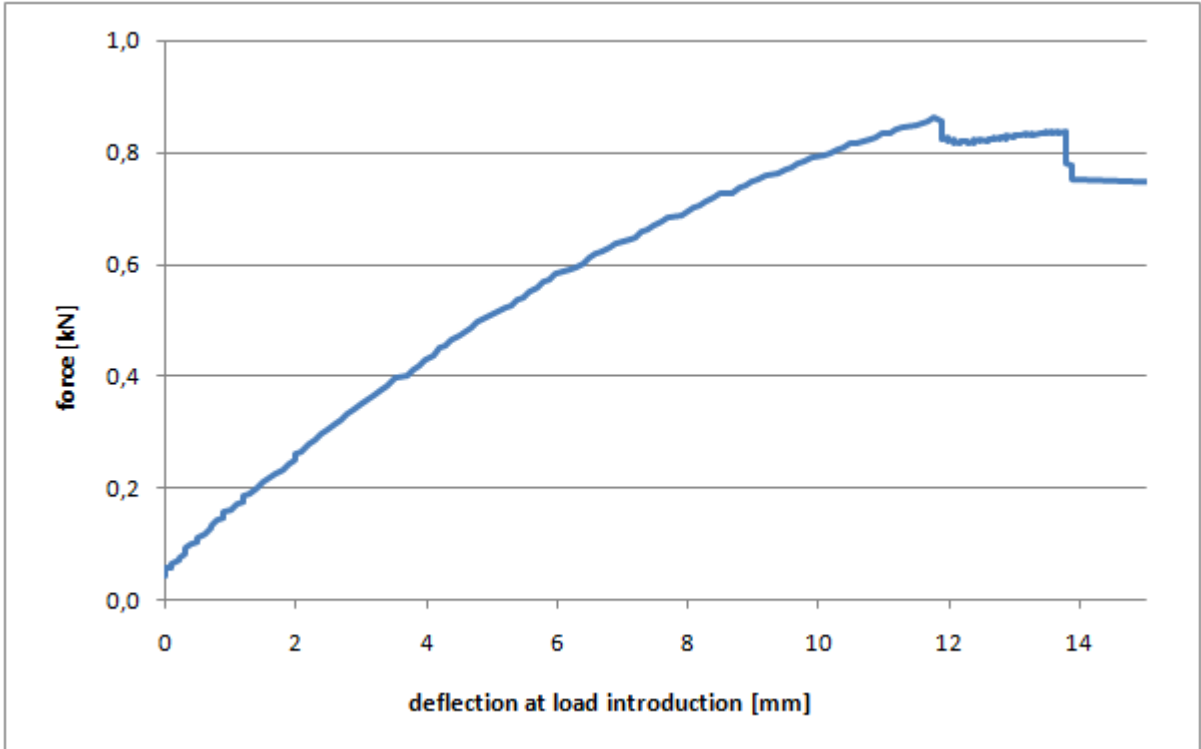
IIIb-D-2



failure of core material

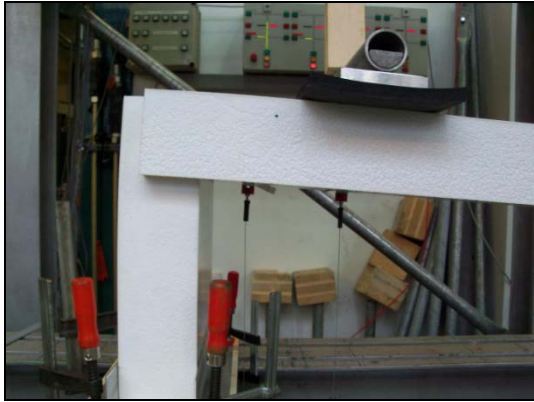


failure of core material

Test No.		IIIb-D-3	
type of test	cantilever test with glued corner detail		
type of panel	D		
faces	1,8mm GFRP		
core	100 mm EPS		
stressed face	top side of production		
distance between load and compressed face of the wall panel	200 mm		
Measured dimensions of the wall panel:		Measured dimensions of the ceiling panel:	
width b	299 mm	length l	749 mm
height h ₁	300 mm	width b	379 mm
thickness D	102 mm	thickness D	101 mm
height of cutting h ₂	100 mm		
thickness of cutting d ₂	70 mm		
ultimate load	0,862 kN		
ultimate moment	0,18 kNm		
Failure mode	failure of core material		
Remarks			
 <p>The graph shows the relationship between force and deflection. The y-axis represents force in kN, ranging from 0.0 to 1.0. The x-axis represents deflection at load introduction in mm, ranging from 0 to 14. The curve starts at (0,0) and rises to a peak of approximately 0.86 kN at 12 mm deflection. After the peak, there is a small drop in force to about 0.82 kN at 13 mm, followed by a further drop to approximately 0.75 kN at 14 mm deflection.</p>			

Test No.

IIIb-D-3



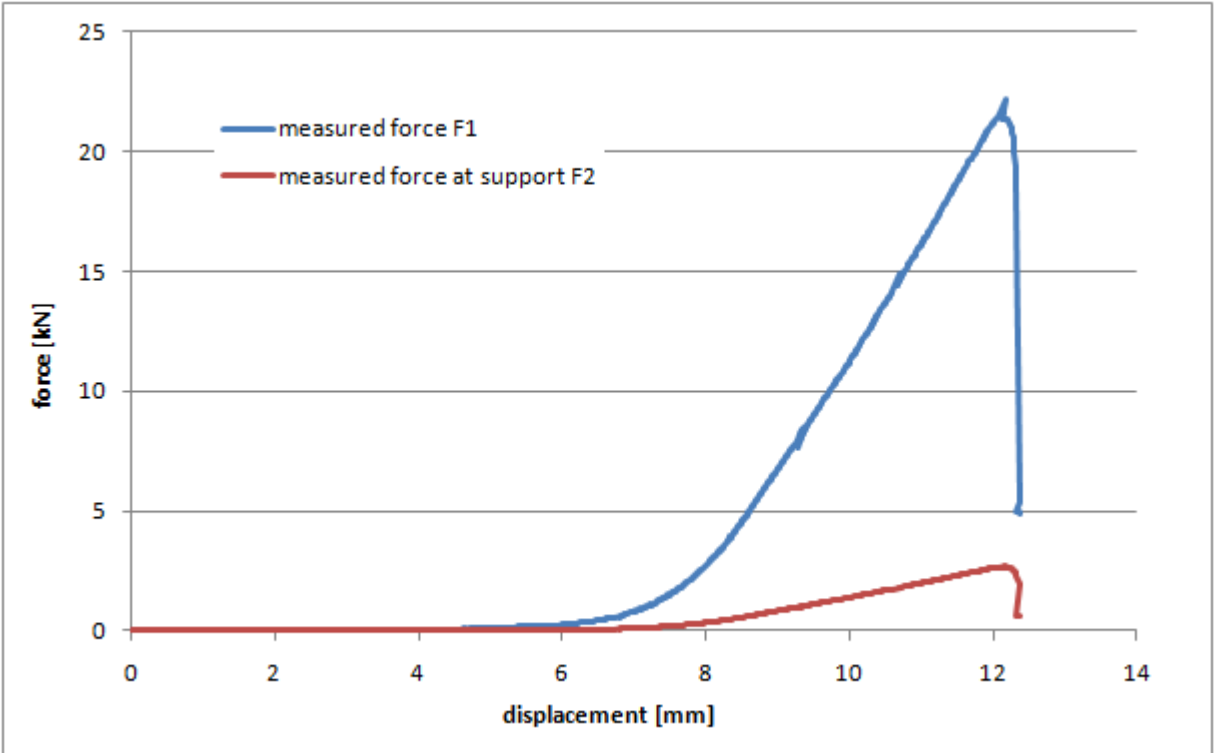
test set-up



failure of core material

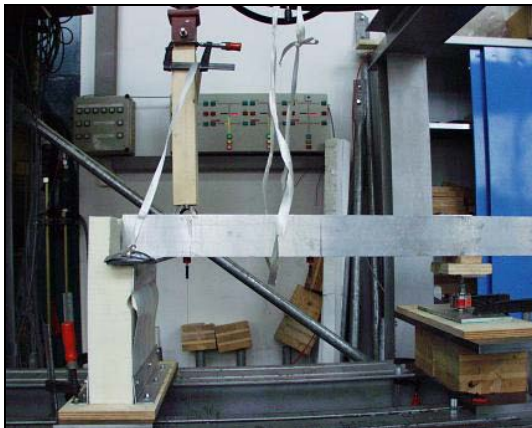
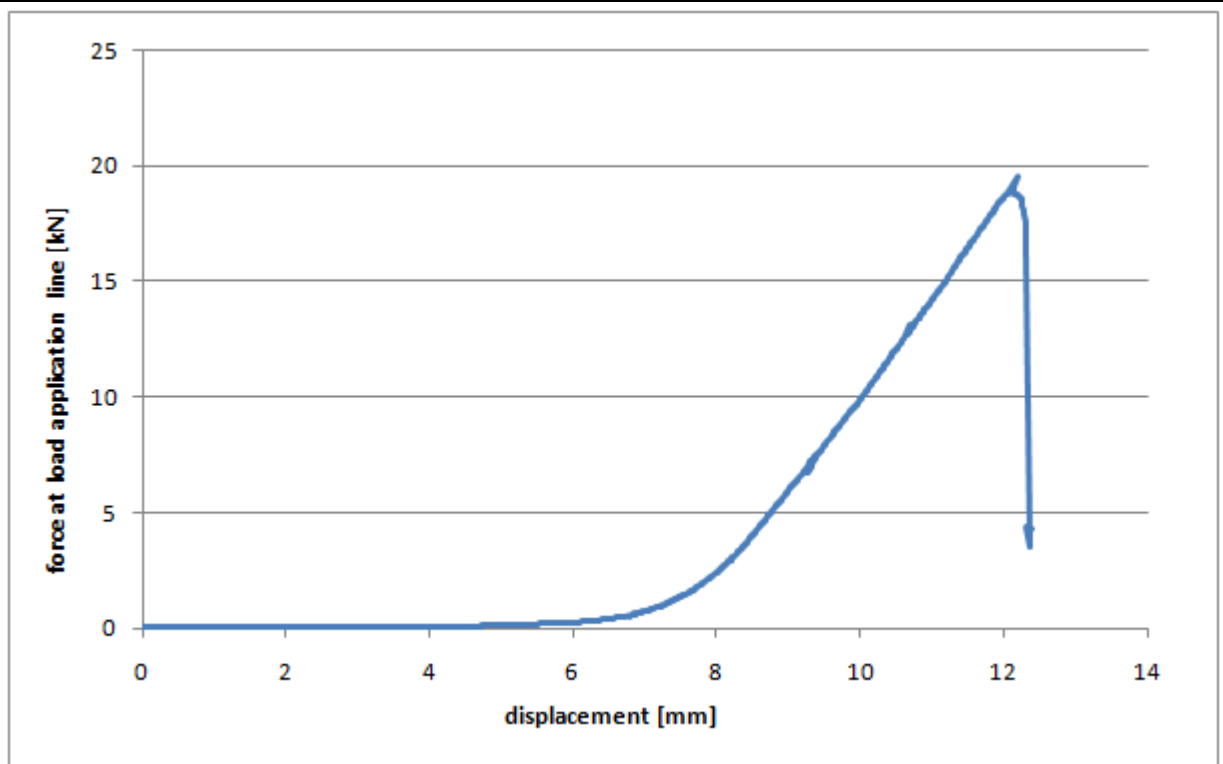


failure of core material

Test No.	IVa-A-1	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions of the wall panel:		
width b	399 mm	
height h_1	302 mm	
thickness D	95 mm	
height of cutting h_2	99 mm	
thickness of cutting d_2	49 mm	
ultimate load at line of load application	19,55 kN	
ultimate stress of the compressed face	103,4 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph plots force in kilonewtons (kN) on the y-axis (0 to 25) against displacement in millimeters (mm) on the x-axis (0 to 14). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). F1 starts at 0, remains near 0 until about 6 mm, then rises steeply to a peak of approximately 22 kN at 12.5 mm, before dropping sharply to 0. F2 starts at 0, remains near 0 until about 6 mm, then rises gradually to a peak of approximately 3 kN at 12.5 mm, before dropping to 0.</p>		

Test No.

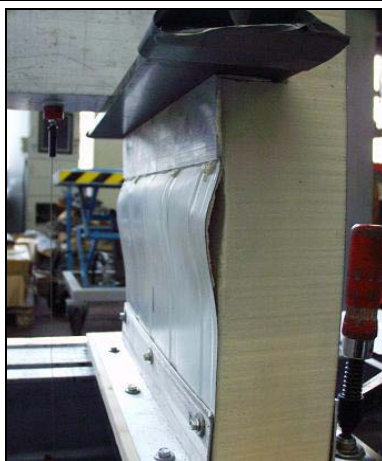
IVa-A-1



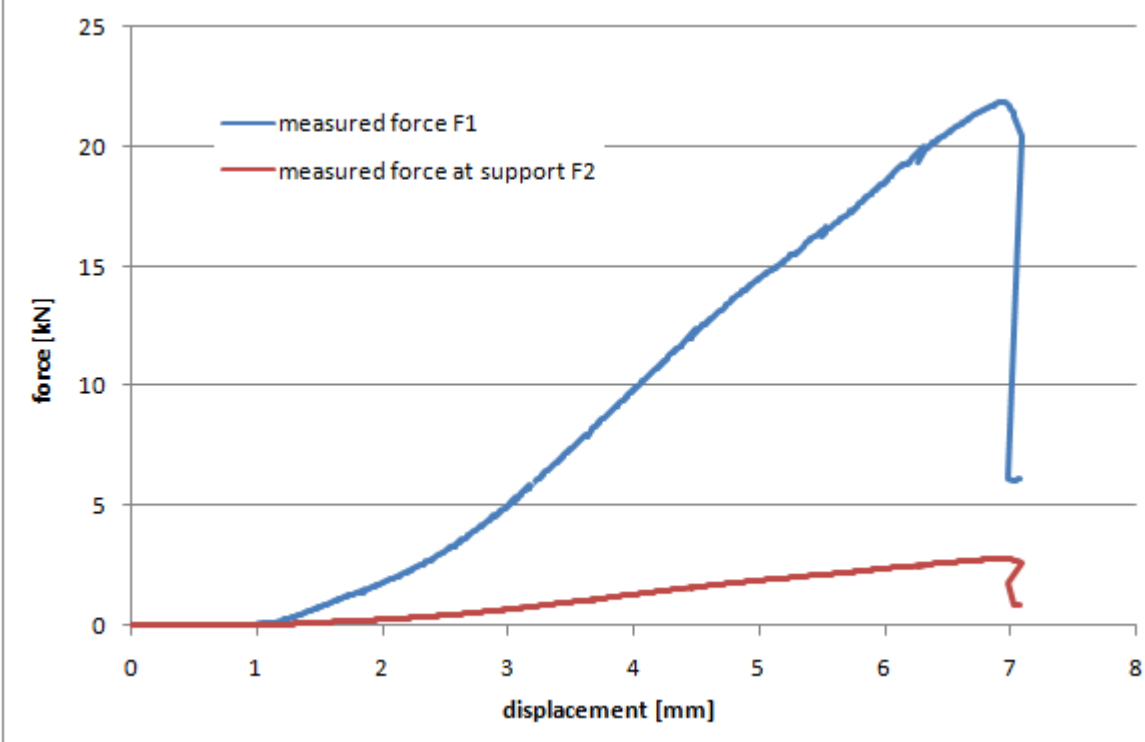
test set-up



buckling of the compressed face

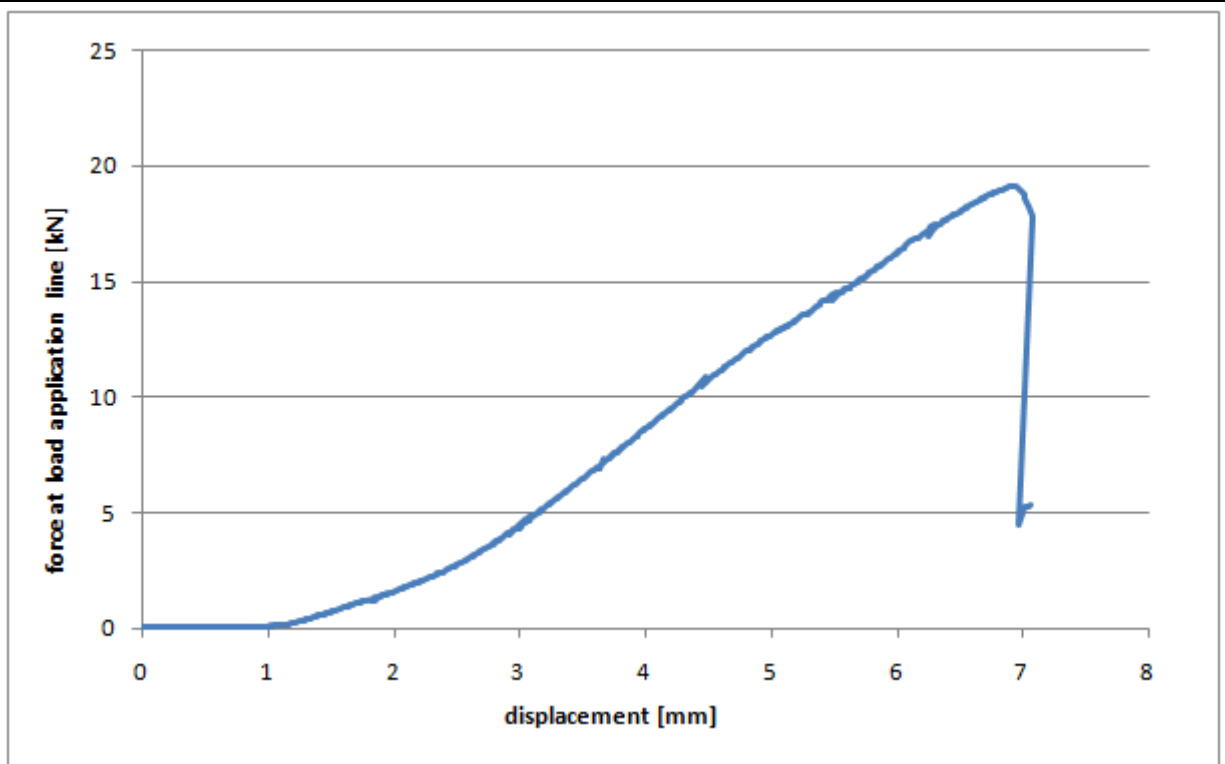


buckling of the compressed face

Test No.	IVa-A-2	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions of the wall panel:		
width b	401 mm	
height h ₁	302 mm	
thickness D	95 mm	
height of cutting h ₂	99 mm	
thickness of cutting d ₂	47 mm	
ultimate load at line of load application	19,08 kN	
ultimate stress of the compressed face	100,4 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph displays two force-displacement curves. The blue curve, labeled 'measured force F1', shows a non-linear increase in force from 0 kN at 0 mm displacement to a peak of approximately 22 kN at 7 mm displacement, followed by a sharp drop. The red curve, labeled 'measured force at support F2', shows a much lower, nearly linear increase in force from 0 kN at 0 mm displacement to a peak of approximately 3 kN at 7 mm displacement, also followed by a sharp drop. The x-axis is labeled 'displacement [mm]' and ranges from 0 to 8. The y-axis is labeled 'force [kN]' and ranges from 0 to 25.</p>		

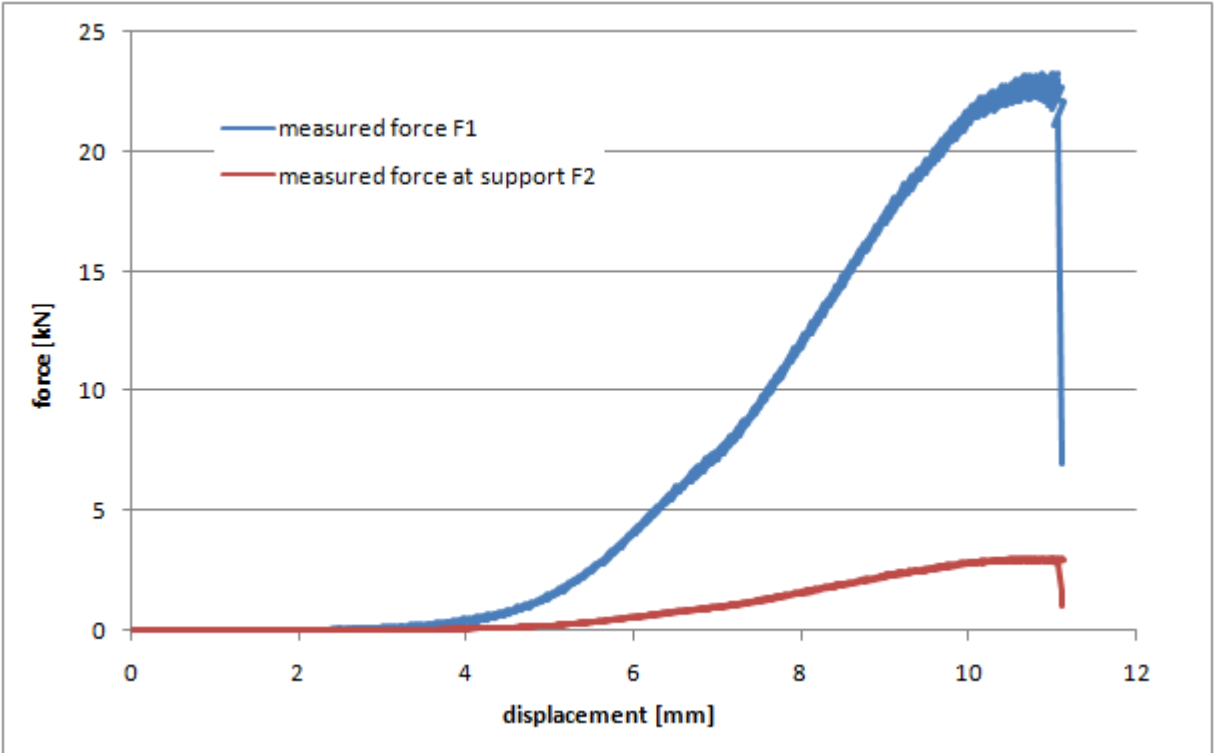
Test No.

IVa-A-2



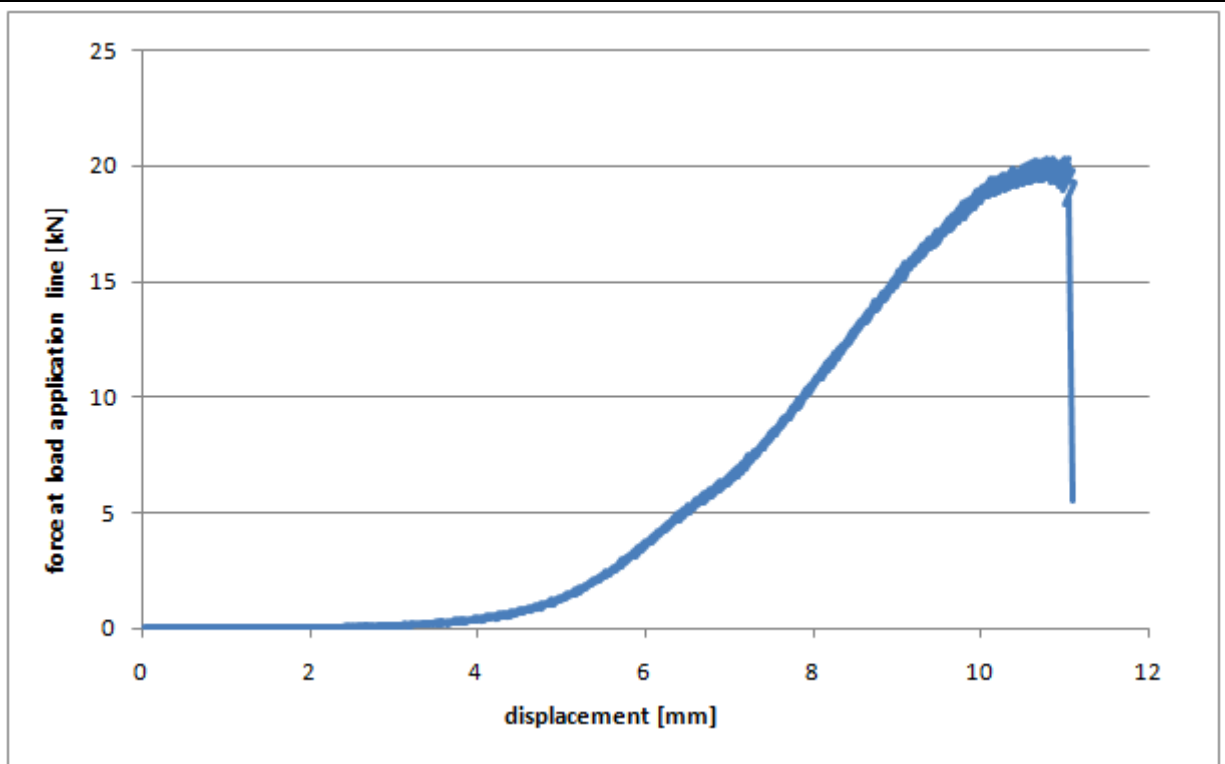
failure of the compressed face



Test No.	IVa-A-3	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	303 mm	
thickness D	94 mm	
height of cutting h_2	100 mm	
thickness of cutting d_2	46 mm	
ultimate load at line of load application	20,32 kN	
ultimate stress of the compressed face	107,2 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph displays two force-displacement curves. The blue curve, labeled 'measured force F1', shows a non-linear increase in force from 0 kN at 0 mm displacement to a peak of approximately 20.3 kN at a displacement of about 11 mm. After the peak, there is a sharp vertical drop in force. The red curve, labeled 'measured force at support F2', shows a much lower force, increasing from 0 kN at 0 mm displacement to a peak of approximately 3 kN at the same displacement of 11 mm, followed by a sharp drop.</p>		

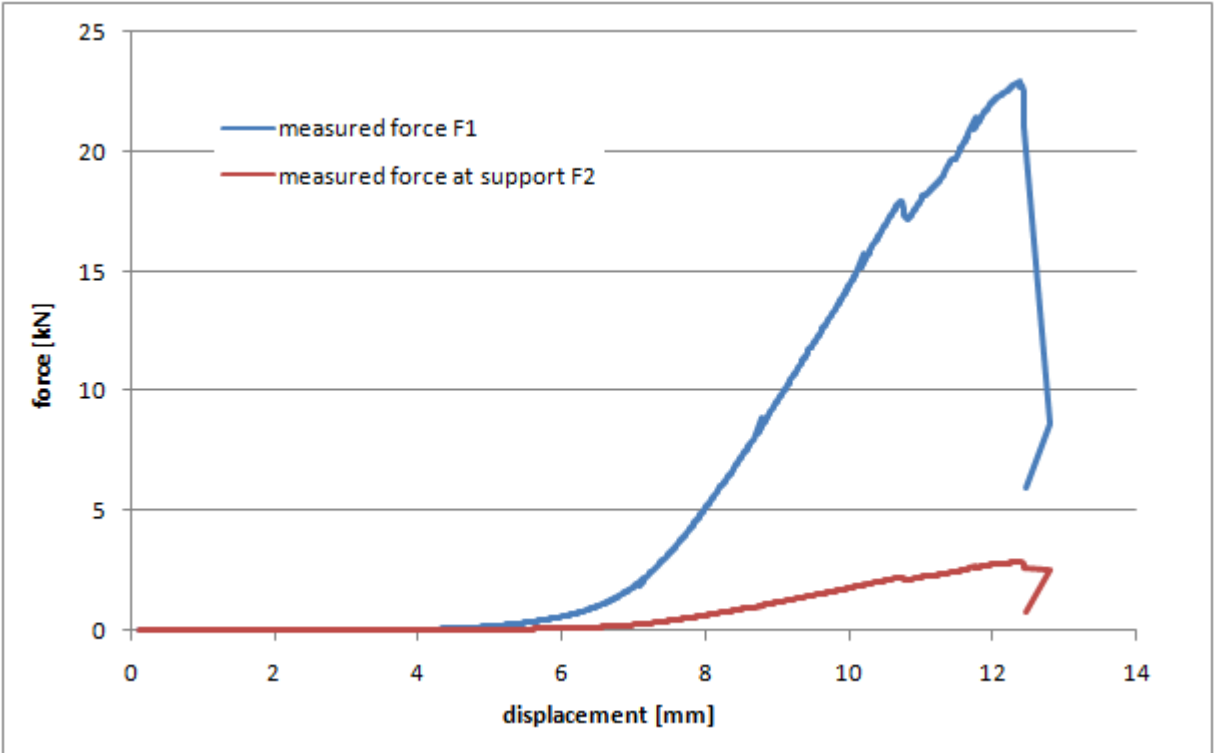
Test No.

IVa-A-3



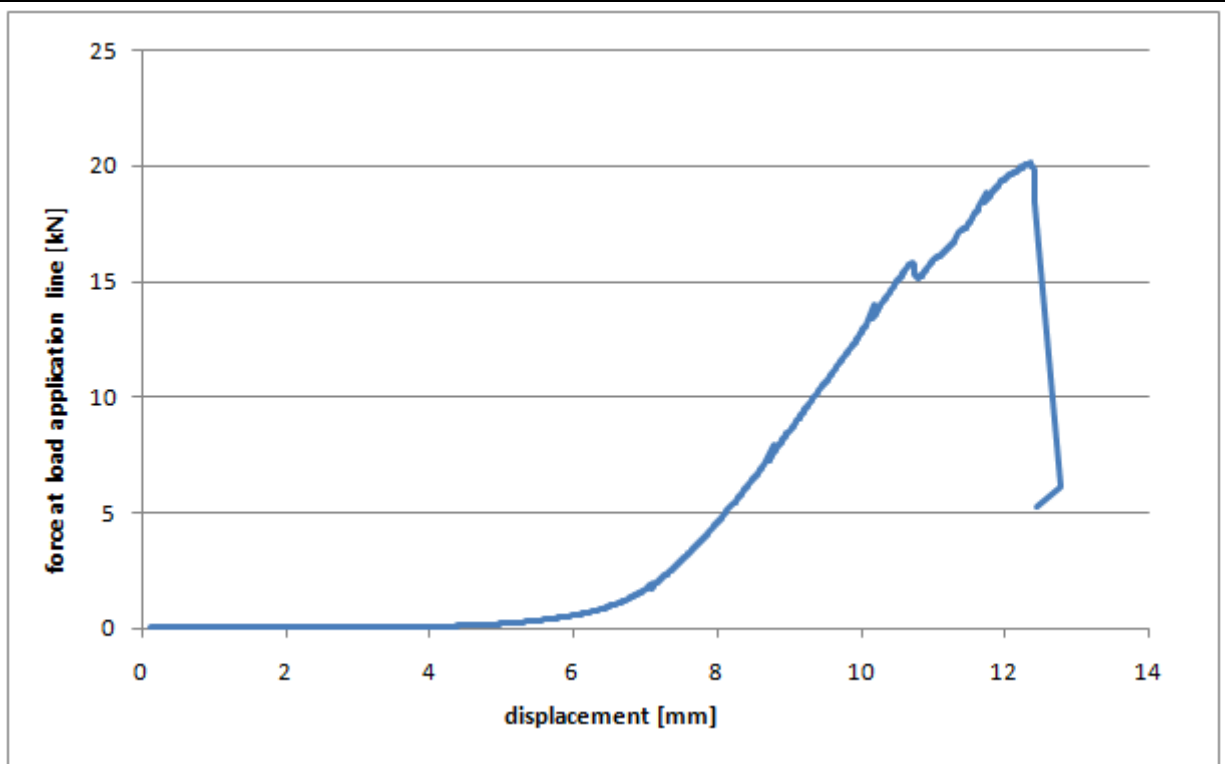
failure of the compressed face



Test No.	IVa-A-4	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	-	
Measured dimensions of the wall panel:		
width b	401 mm	
height h_1	- mm	
thickness D	- mm	
height of cutting h_2	- mm	
thickness of cutting d_2	- mm	
ultimate load at line of load application	20,10 kN	
ultimate stress of the compressed face	105,7 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph displays two force-displacement curves. The blue curve, labeled 'measured force F1', shows a non-linear increase in force from 0 kN at 0 mm displacement to a peak of approximately 23 kN at a displacement of about 12.5 mm, followed by a sharp drop. The red curve, labeled 'measured force at support F2', shows a much lower force, increasing linearly to a peak of about 3 kN at the same displacement of 12.5 mm before dropping.</p>		

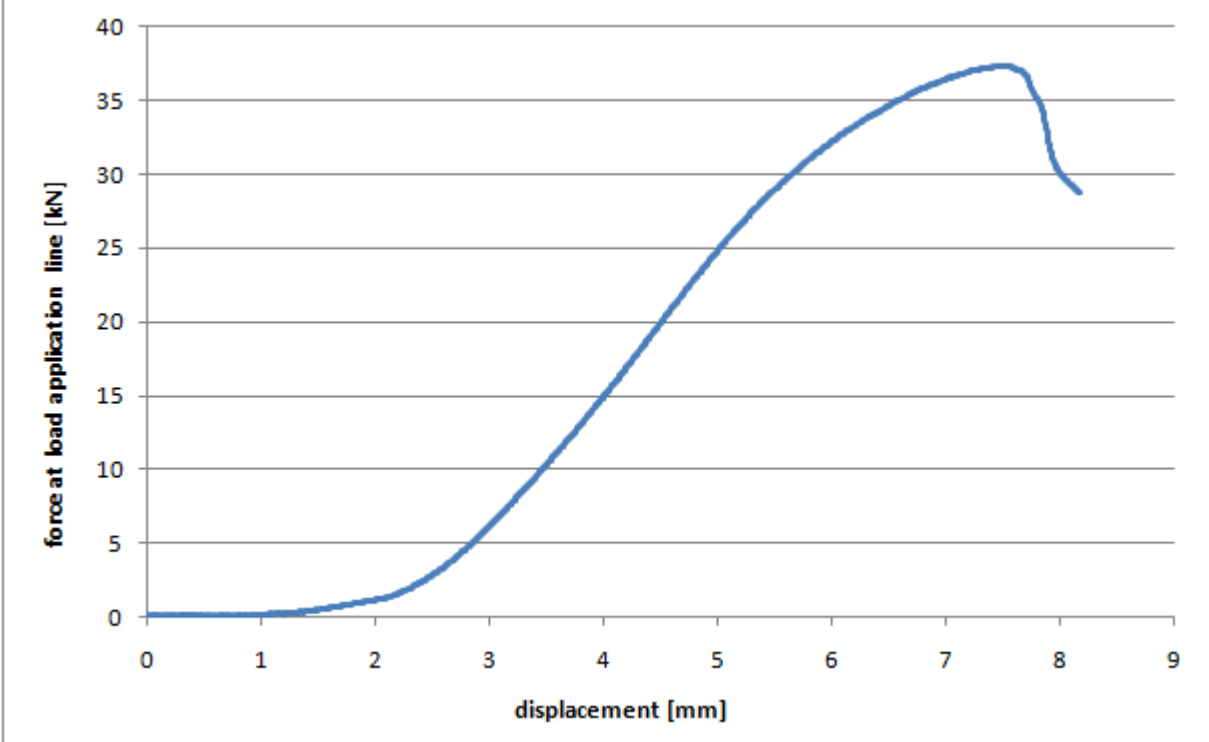
Test No.

IVa-A-4



failure of the compressed face



Test No.	IVa-B-1																									
type of test	test with improved corner detail																									
introduction of load	steel sheet																									
type of improvement	glued aluminium angel																									
type of panel	B																									
faces	0,75 mm steel																									
core	100 mm PU																									
stressed face	-																									
Measured dimensions of the wall panel:																										
width b	399 mm																									
height h ₁	297 mm																									
thickness D	99 mm																									
height of cutting h ₂	103 mm																									
thickness of cutting d ₂	52 mm																									
ultimate load at line of load application	37,34 kN																									
ultimate stress of the compressed face	122,8 N/mm ²																									
Failure mode	failure of the lower end																									
Remarks																										
 <table border="1"> <caption>Approximate data points from the force-displacement graph</caption> <thead> <tr> <th>displacement [mm]</th> <th>force at load application line [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td></tr> <tr><td>1</td><td>0.5</td></tr> <tr><td>2</td><td>1.5</td></tr> <tr><td>3</td><td>5.0</td></tr> <tr><td>4</td><td>15.0</td></tr> <tr><td>5</td><td>25.0</td></tr> <tr><td>6</td><td>32.0</td></tr> <tr><td>7</td><td>36.0</td></tr> <tr><td>7.5</td><td>37.34</td></tr> <tr><td>8</td><td>30.0</td></tr> <tr><td>8.2</td><td>29.0</td></tr> </tbody> </table>			displacement [mm]	force at load application line [kN]	0	0	1	0.5	2	1.5	3	5.0	4	15.0	5	25.0	6	32.0	7	36.0	7.5	37.34	8	30.0	8.2	29.0
displacement [mm]	force at load application line [kN]																									
0	0																									
1	0.5																									
2	1.5																									
3	5.0																									
4	15.0																									
5	25.0																									
6	32.0																									
7	36.0																									
7.5	37.34																									
8	30.0																									
8.2	29.0																									

Test No.

IVa-B-1



test set-up



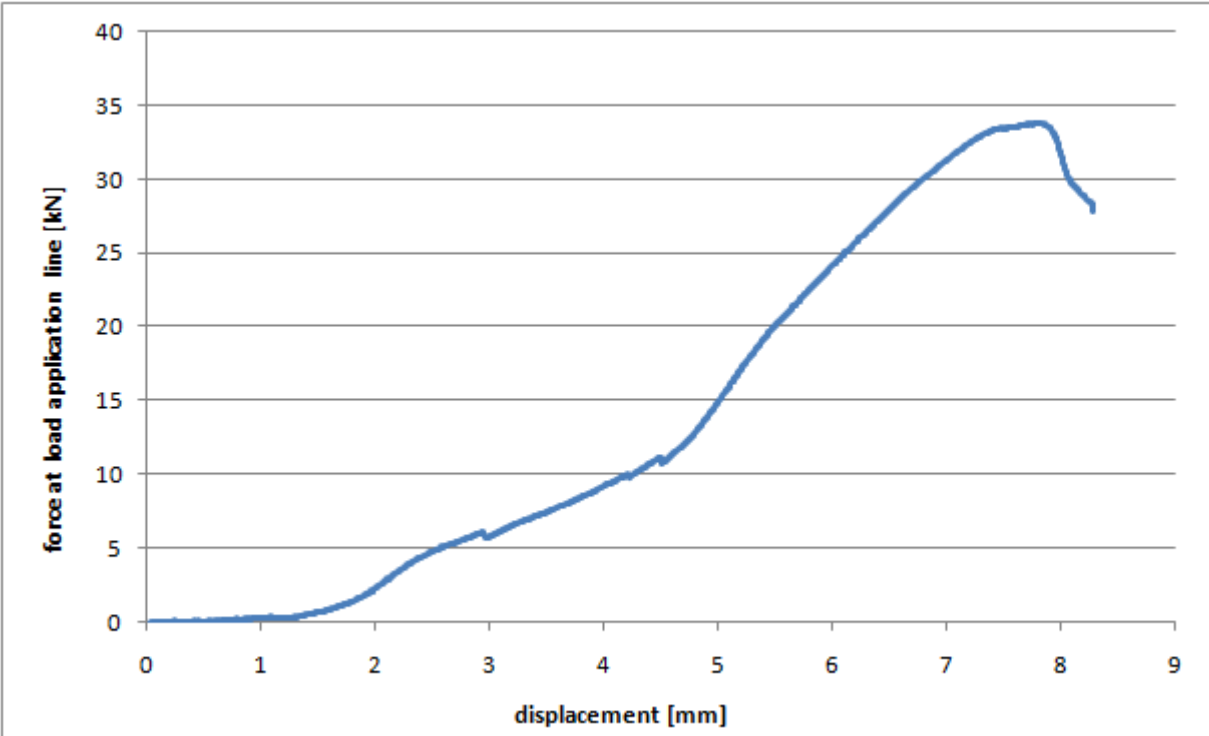
deformation prior to failure



failure at the lower end



bond between face and core

Test No.	IVa-B-2																							
type of test	test with improved corner detail																							
introduction of load	steel sheet																							
type of improvement	glued aluminium angel																							
type of panel	B																							
faces	0,75 mm steel																							
core	100 mm PU																							
stressed face																								
Measured dimensions of the wall panel:																								
width b	399 mm																							
height h ₁	299 mm																							
thickness D	99 mm																							
height of cutting h ₂	101 mm																							
thickness of cutting d ₂	50 mm																							
ultimate load at line of load application	33,84 kN																							
ultimate stress of the compressed face	111,3 N/mm ²																							
Failure mode	failure of the lower end																							
Remarks																								
 <table border="1"> <caption>Approximate data points from the force-displacement graph</caption> <thead> <tr> <th>displacement [mm]</th> <th>force at load application line [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td></tr> <tr><td>1</td><td>0.5</td></tr> <tr><td>2</td><td>2.5</td></tr> <tr><td>3</td><td>5.5</td></tr> <tr><td>4</td><td>9.5</td></tr> <tr><td>5</td><td>15.5</td></tr> <tr><td>6</td><td>24.5</td></tr> <tr><td>7</td><td>31.5</td></tr> <tr><td>8</td><td>34.0</td></tr> <tr><td>8.5</td><td>28.0</td></tr> </tbody> </table>			displacement [mm]	force at load application line [kN]	0	0	1	0.5	2	2.5	3	5.5	4	9.5	5	15.5	6	24.5	7	31.5	8	34.0	8.5	28.0
displacement [mm]	force at load application line [kN]																							
0	0																							
1	0.5																							
2	2.5																							
3	5.5																							
4	9.5																							
5	15.5																							
6	24.5																							
7	31.5																							
8	34.0																							
8.5	28.0																							

Test No.

IVa-B-2



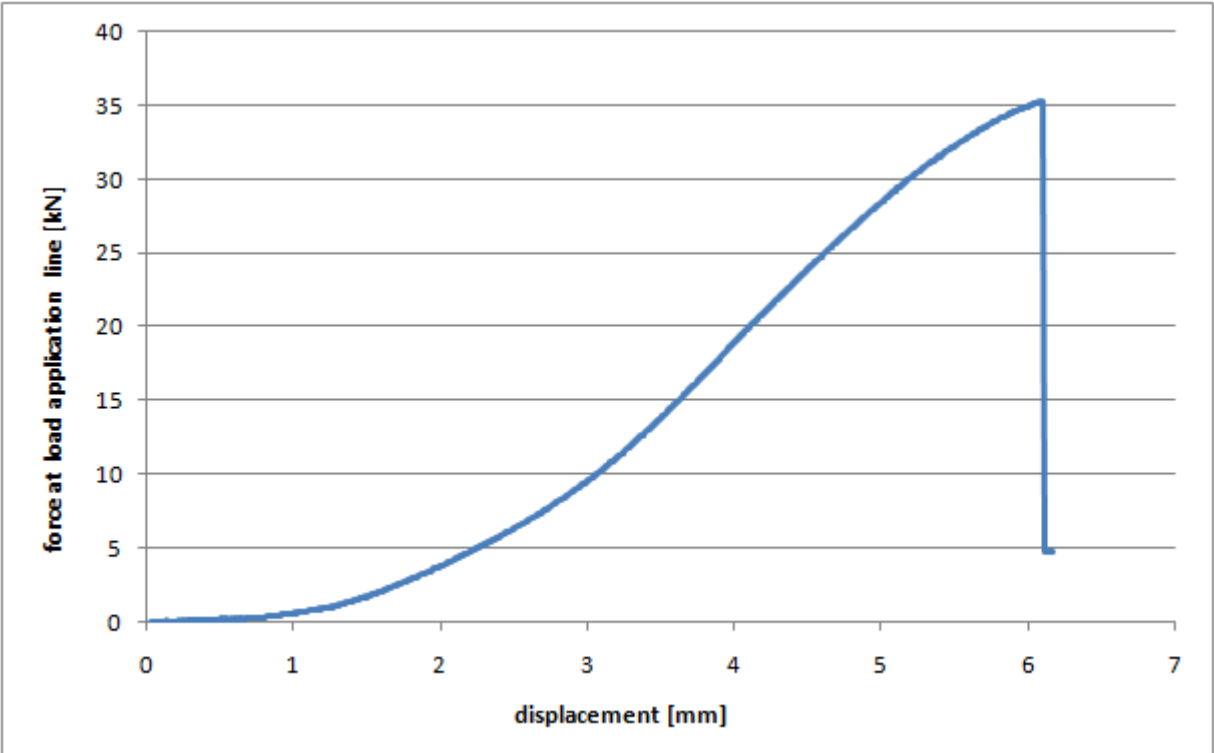
failure at the lower end



failure at the lower end



bond between face and core

Test No.	IVa-B-3	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face		
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	301 mm	
thickness D	99 mm	
height of cutting h_2	103 mm	
thickness of cutting d_2	50 mm	
ultimate load at line of load application	35,29 kN	
ultimate stress of the compressed face	115,8 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph plots force at load application line [kN] on the y-axis (0 to 40) against displacement [mm] on the x-axis (0 to 7). The curve starts at (0,0) and rises to a peak of 35.29 kN at approximately 6.1 mm displacement. After the peak, the force drops sharply to about 5 kN at 6.2 mm displacement.</p>		

Test No.

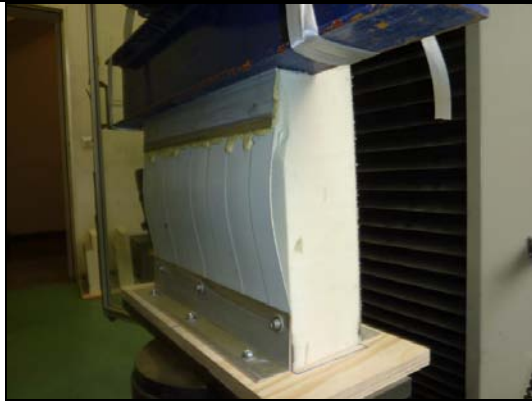
IVa-B-3



deformation prior to failure



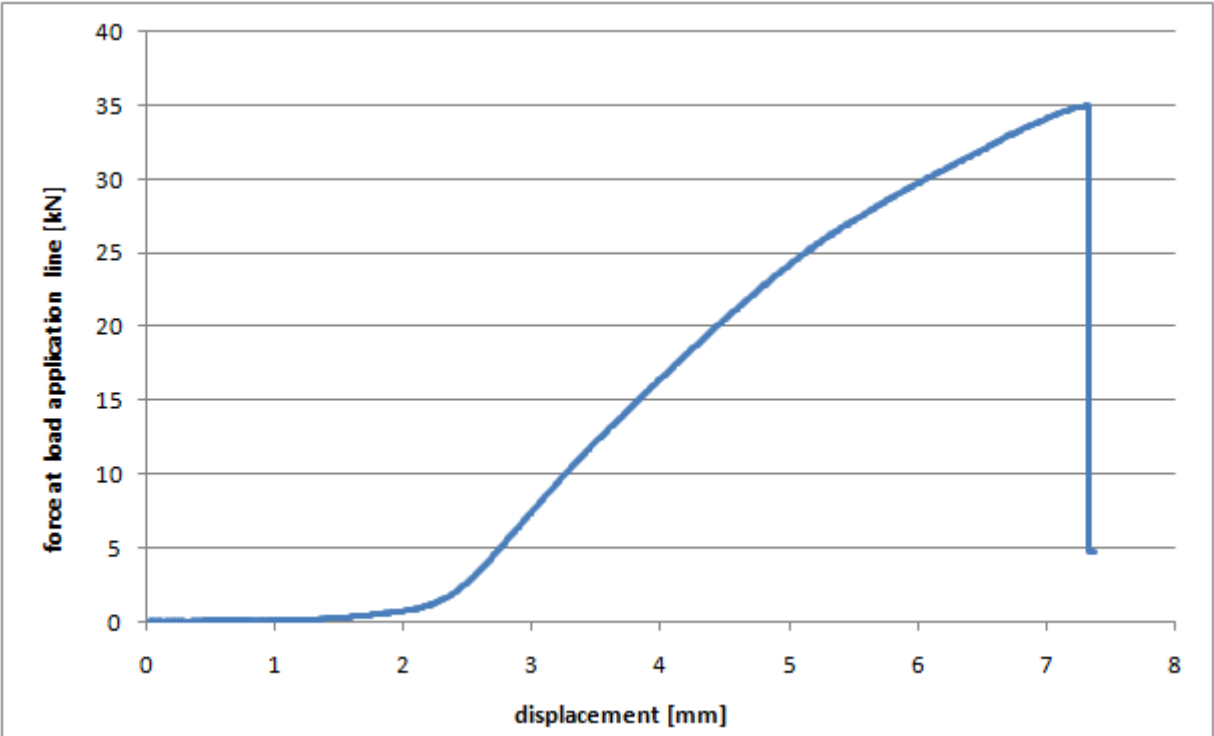
failure of the compressed face



failure of the compressed face



bond between face and core

Test No.	IVa-B-4	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	B	
faces	0,75 mm steel	
core	100 mm PU	
stressed face		
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	301 mm	
thickness D	99 mm	
height of cutting h_2	101 mm	
thickness of cutting d_2	54 mm	
ultimate load at line of load application	34,98 kN	
ultimate stress of the compressed face	114,8 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph plots force at load application line [kN] on the y-axis (0 to 40) against displacement [mm] on the x-axis (0 to 8). The curve starts at (0,0), remains near zero until about 2 mm, then rises steeply to a peak of approximately 35 kN at 7.5 mm displacement. After the peak, the force drops sharply to about 5 kN at 7.6 mm displacement.</p>		

Test No.

IVa-B-4



deformation prior to failure



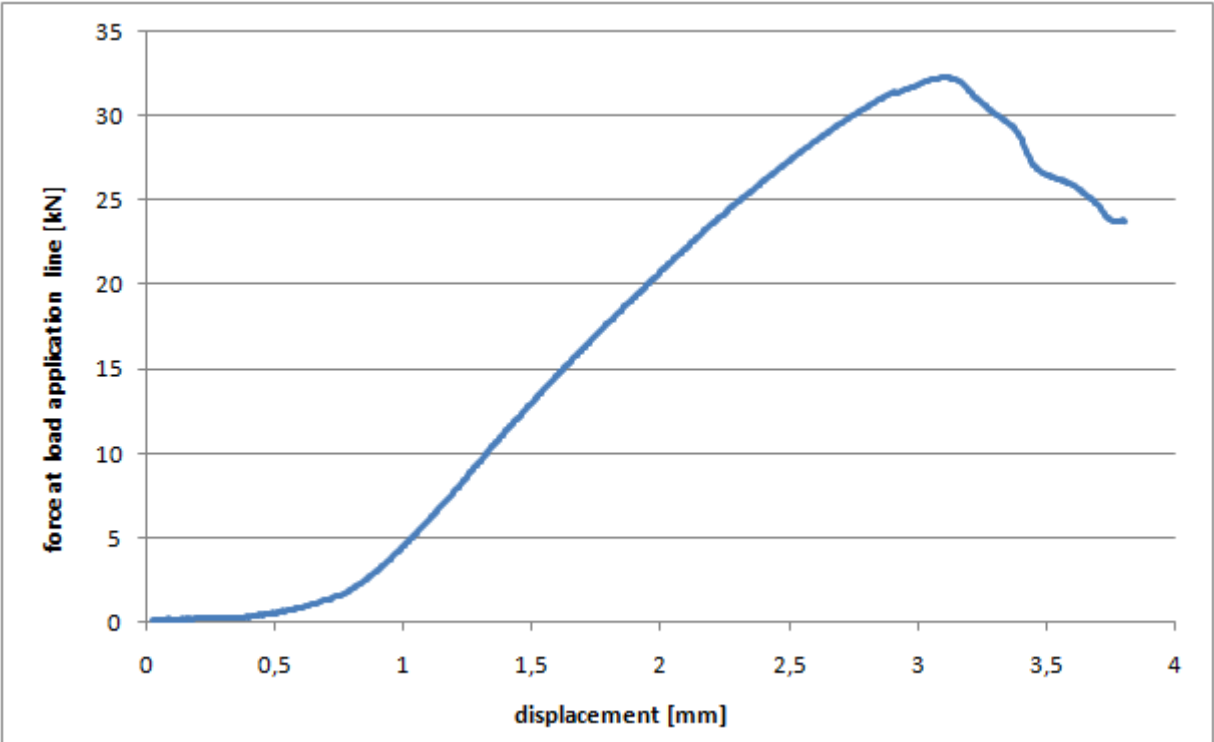
failure of the compressed face



failure of the compressed face



bond between face and core

Test No.	IVa-B-5																							
type of test	test with improved corner detail																							
introduction of load	steel sheet																							
type of improvement	glued aluminium angel																							
type of panel	B																							
faces	0,75 mm steel																							
core	100 mm PU																							
stressed face																								
Measured dimensions of the wall panel:																								
width b	400 mm																							
height h_1	302 mm																							
thickness D	99 mm																							
height of cutting h_2	103 mm																							
thickness of cutting d_2	50 mm																							
ultimate load at line of load application	32,29 kN																							
ultimate stress of the compressed face	105,9 N/mm ²																							
Failure mode	failure of the lower end																							
Remarks																								
 <table border="1"> <caption>Approximate data points from the force-displacement graph</caption> <thead> <tr> <th>displacement [mm]</th> <th>force at load application line [kN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td></tr> <tr><td>0.5</td><td>0.5</td></tr> <tr><td>1.0</td><td>4.0</td></tr> <tr><td>1.5</td><td>12.0</td></tr> <tr><td>2.0</td><td>20.0</td></tr> <tr><td>2.5</td><td>27.0</td></tr> <tr><td>3.0</td><td>31.0</td></tr> <tr><td>3.1</td><td>32.3 (peak)</td></tr> <tr><td>3.5</td><td>27.0</td></tr> <tr><td>3.8</td><td>24.0</td></tr> </tbody> </table>			displacement [mm]	force at load application line [kN]	0	0	0.5	0.5	1.0	4.0	1.5	12.0	2.0	20.0	2.5	27.0	3.0	31.0	3.1	32.3 (peak)	3.5	27.0	3.8	24.0
displacement [mm]	force at load application line [kN]																							
0	0																							
0.5	0.5																							
1.0	4.0																							
1.5	12.0																							
2.0	20.0																							
2.5	27.0																							
3.0	31.0																							
3.1	32.3 (peak)																							
3.5	27.0																							
3.8	24.0																							

Test No.

IVa-B-5



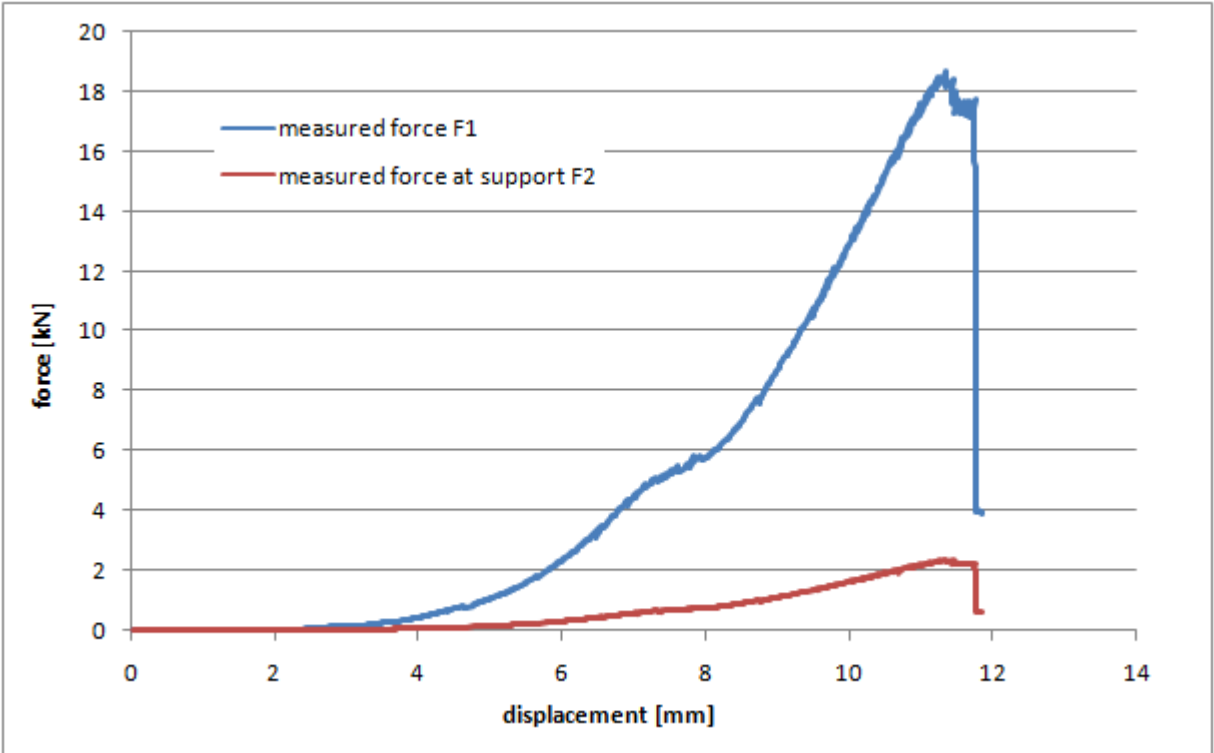
failure at the lower end



failure at the lower end

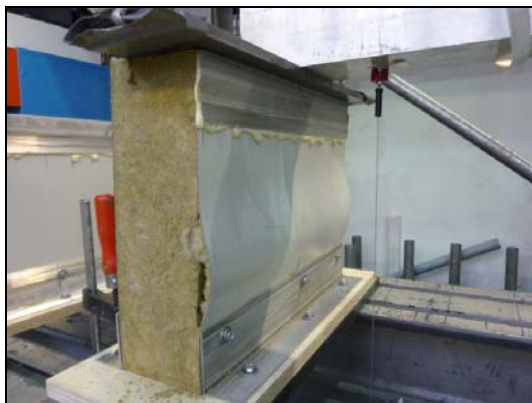
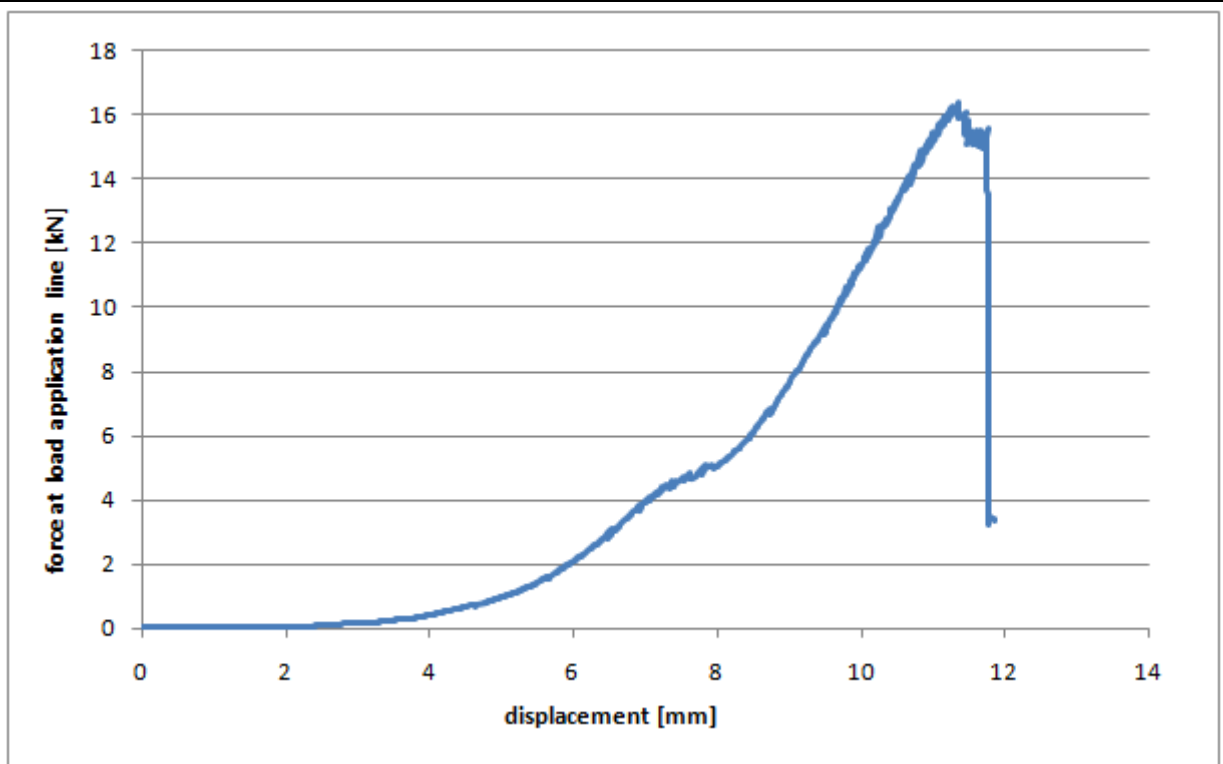


bond between face and core

Test No.	IVa-E-1	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	303 mm	
thickness D	100 mm	
height of cutting h_2	2,5 mm	
thickness of cutting d_2	2,5 mm	
ultimate load at line of load application	16,37 kN	
ultimate stress of the compressed face	86,2 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph displays two force-displacement curves. The blue curve, labeled 'measured force F1', shows a non-linear increase in force from 0 kN at 0 mm displacement to a peak of approximately 18.5 kN at 11.5 mm displacement, followed by a sharp drop to 4 kN at 12 mm. The red curve, labeled 'measured force at support F2', shows a similar non-linear increase to a peak of approximately 2.5 kN at 11.5 mm displacement, followed by a sharp drop to 0.5 kN at 12 mm. The x-axis is labeled 'displacement [mm]' and ranges from 0 to 14. The y-axis is labeled 'force [kN]' and ranges from 0 to 20.</p>		

Test No.

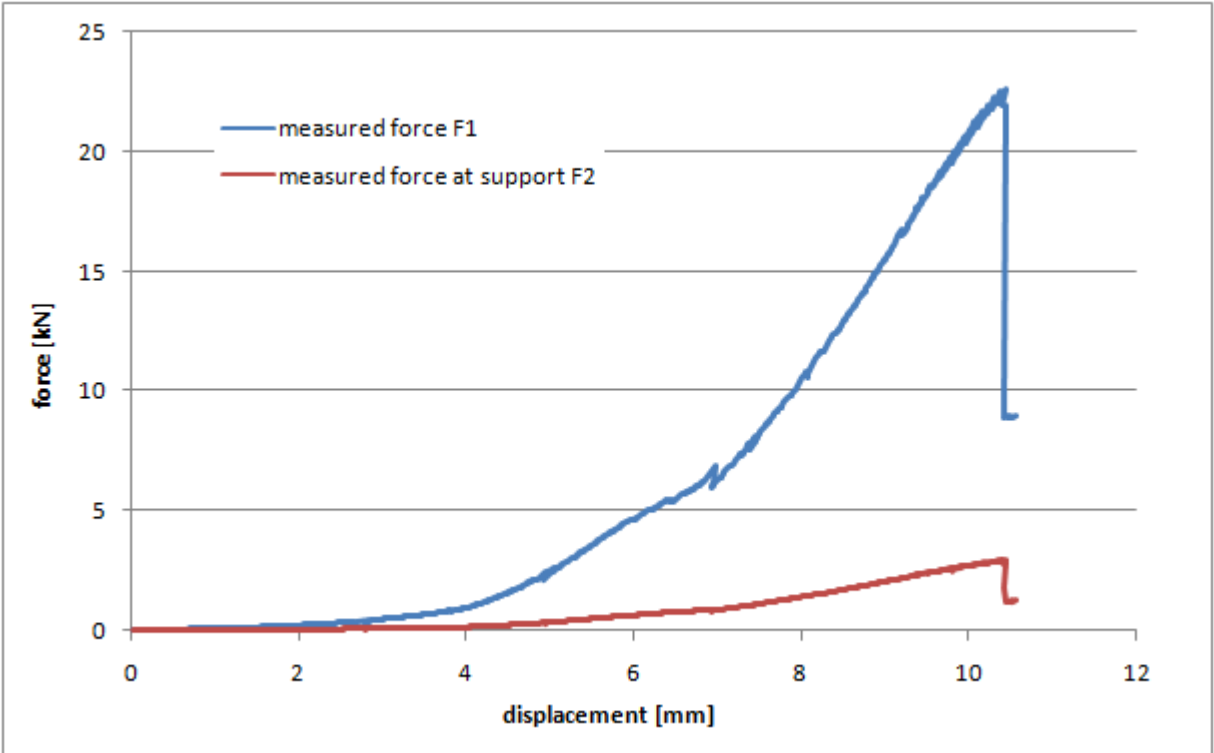
IVa-E-1



buckling of the compressed face

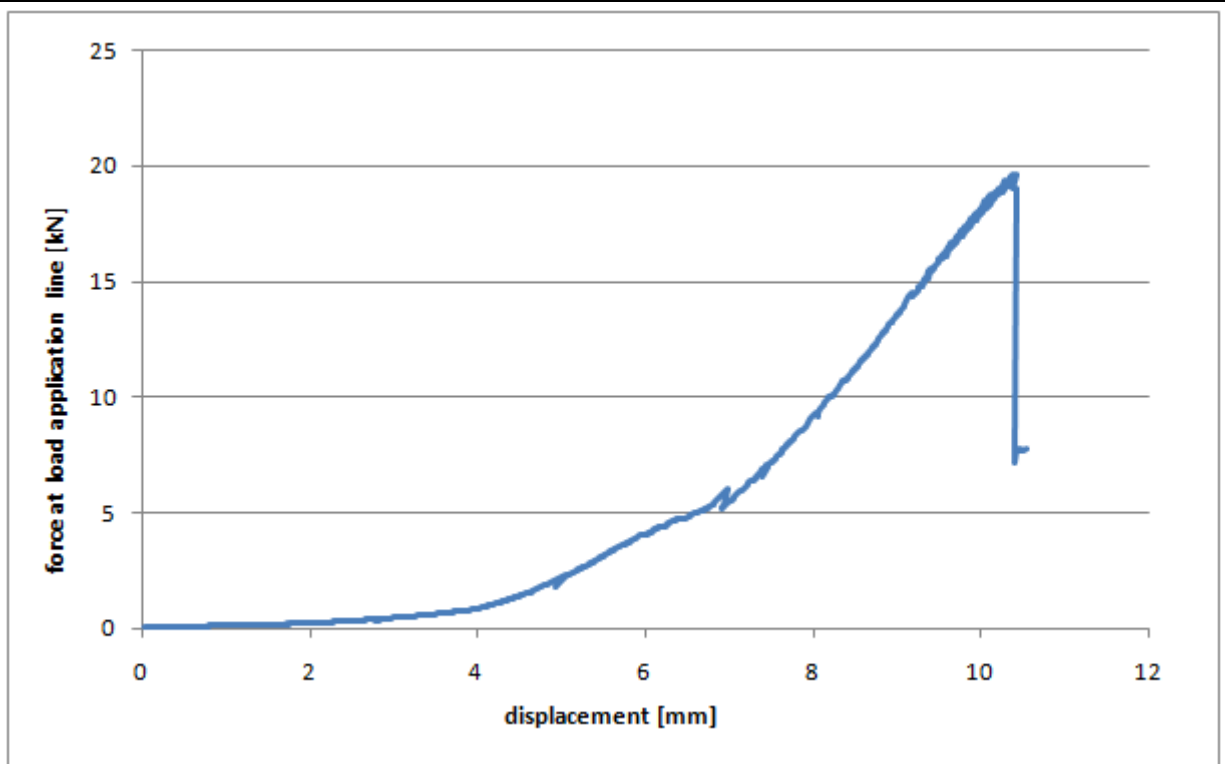


buckling of the compressed face

Test No.	IVa-E-2	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	301 mm	
thickness D	100 mm	
height of cutting h_2	3 mm	
thickness of cutting d_2	2,5 mm	
ultimate load at line of load application	19,66 kN	
ultimate stress of the compressed face	103,5 N/mm ²	
Failure mode	failure of the lower end	
Remarks		
 <p>The graph displays two force-displacement curves. The blue curve, labeled 'measured force F1', shows a non-linear increase in force from 0 kN at 0 mm displacement to a peak of approximately 22 kN at a displacement of about 10.5 mm, followed by a sharp drop. The red curve, labeled 'measured force at support F2', shows a much lower force, increasing linearly from 0 kN at 0 mm to a peak of about 3 kN at 10.5 mm, also followed by a sharp drop. The x-axis ranges from 0 to 12 mm, and the y-axis ranges from 0 to 25 kN.</p>		

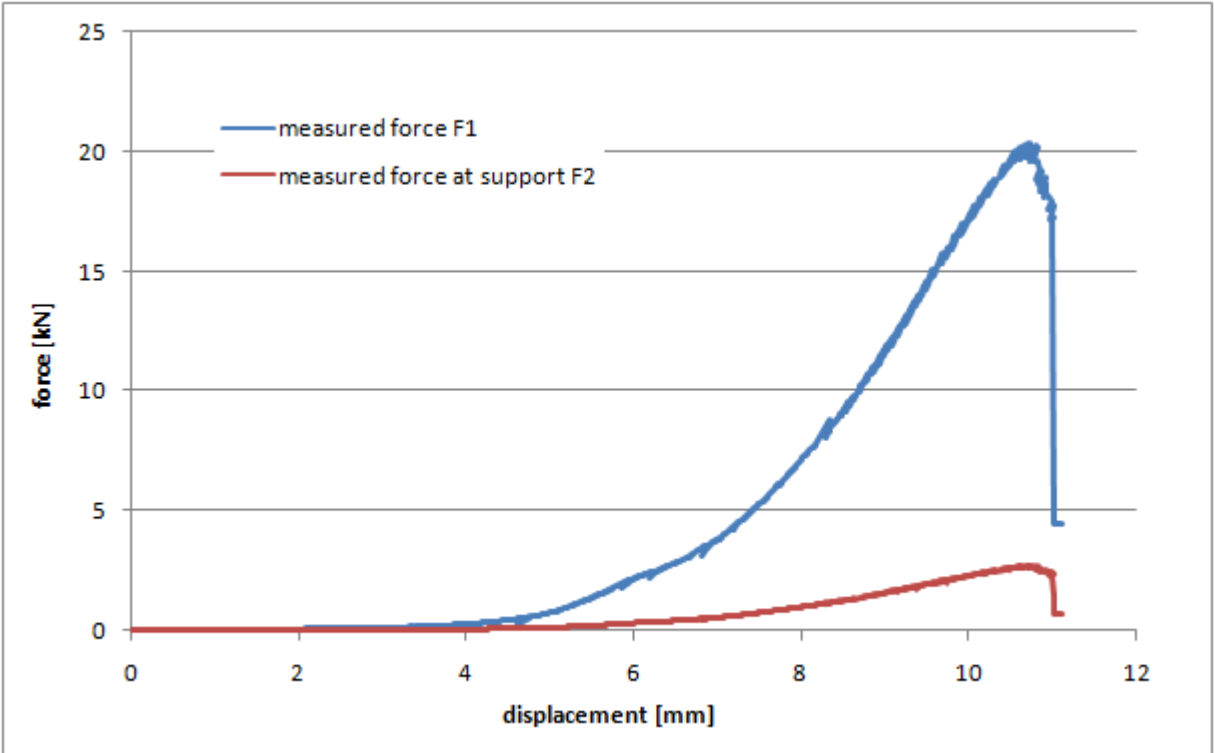
Test No.

IVa-E-2



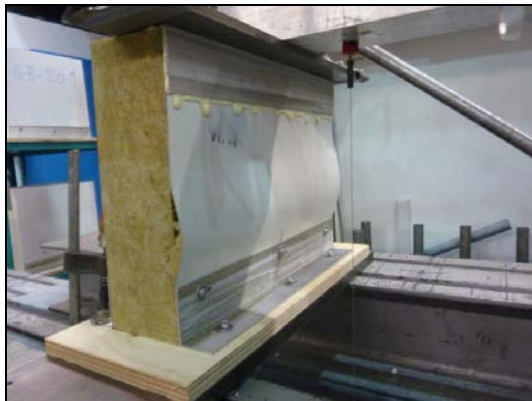
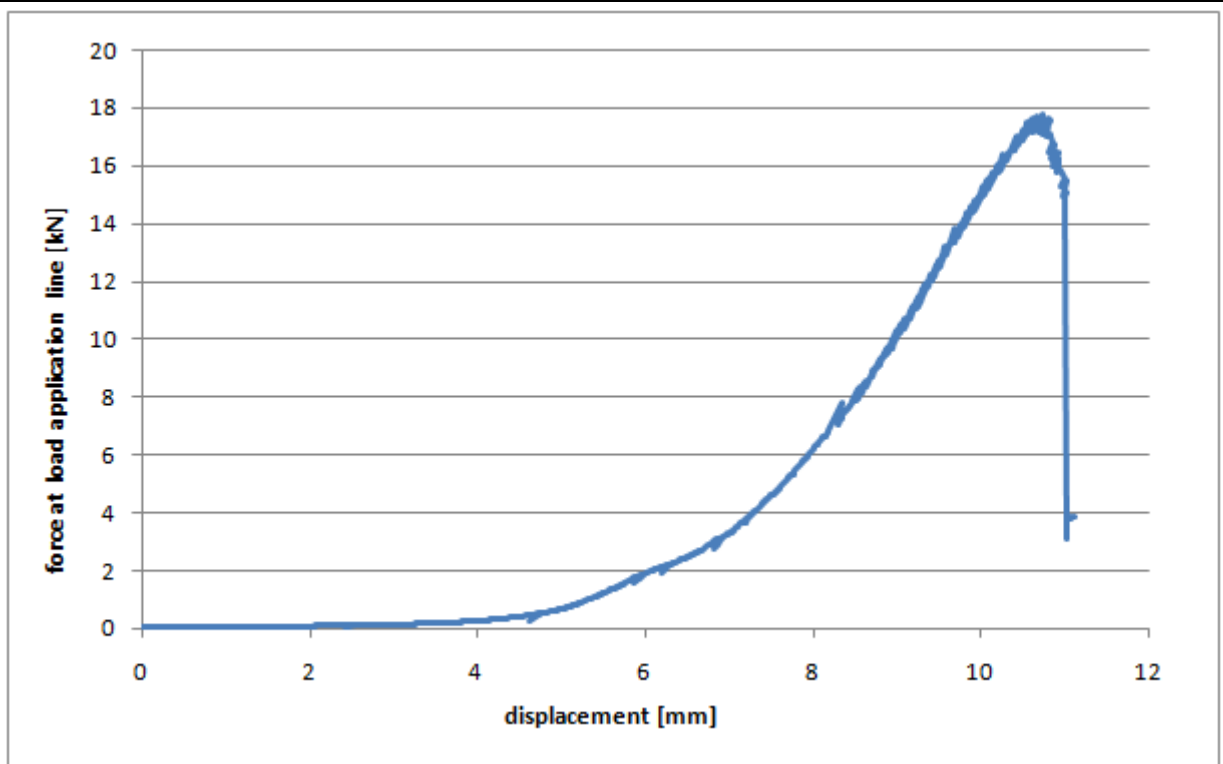
failure of the lower end



Test No.	IVa-E-3	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	302 mm	
thickness D	100 mm	
height of cutting h_2	2 mm	
thickness of cutting d_2	2 mm	
ultimate load at line of load application	17,76 kN	
ultimate stress of the compressed face	93,5 N/mm ²	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph plots force in kilonewtons (kN) on the y-axis (0 to 25) against displacement in millimeters (mm) on the x-axis (0 to 12). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). F1 starts at 0, remains near 0 until 4 mm, then rises to a peak of approximately 20 kN at 11 mm displacement before dropping sharply. F2 starts at 0, remains near 0 until 4 mm, then rises to a peak of approximately 3 kN at 11 mm displacement before dropping sharply.</p>		

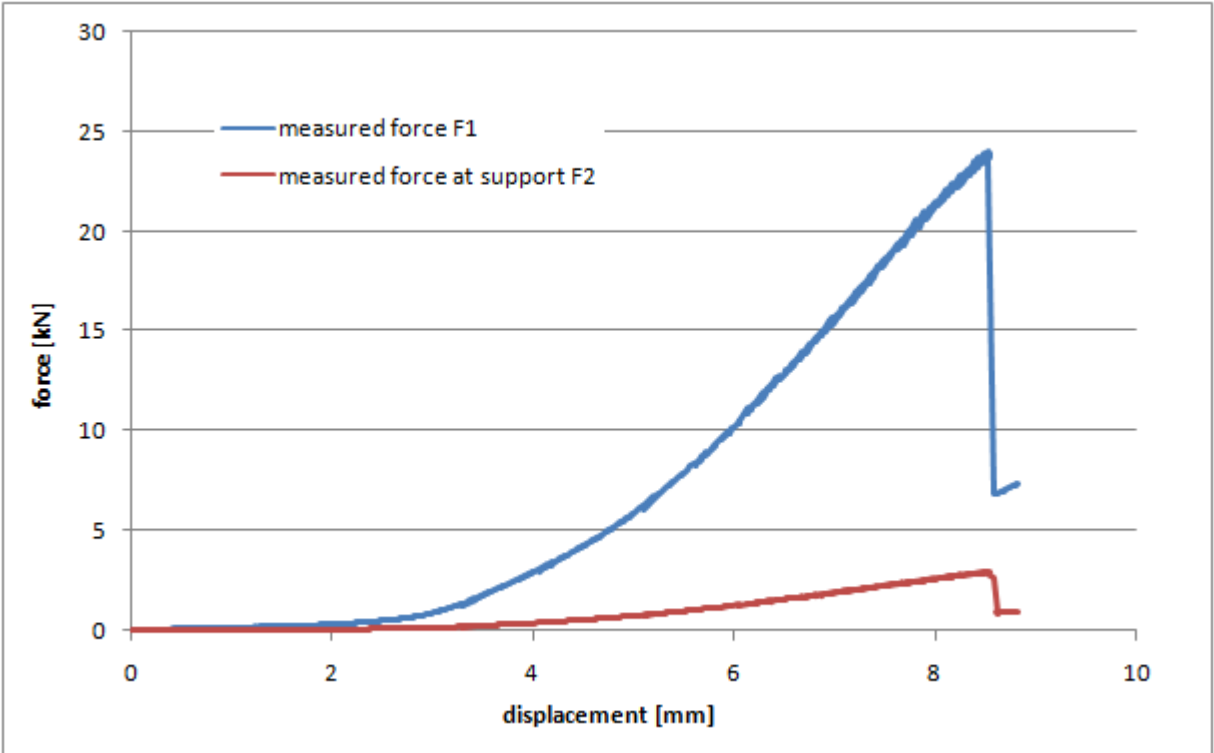
Test No.

IVa-E-3



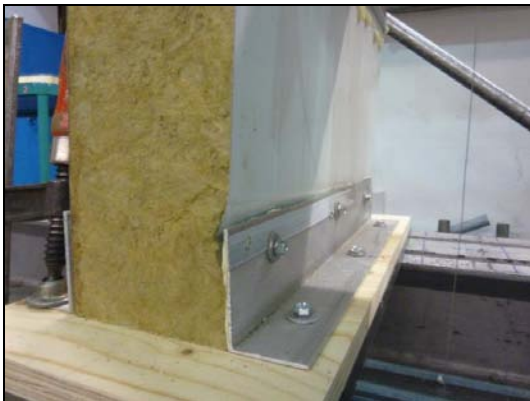
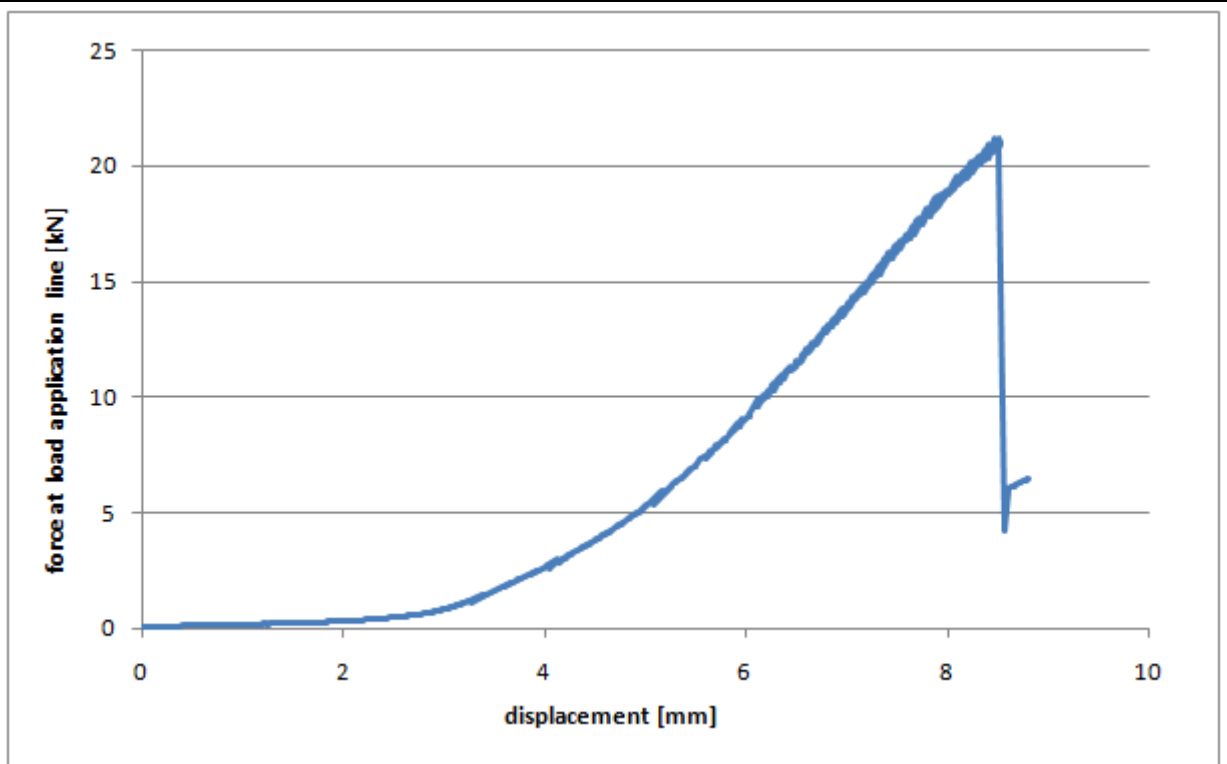
buckling of the compressed face



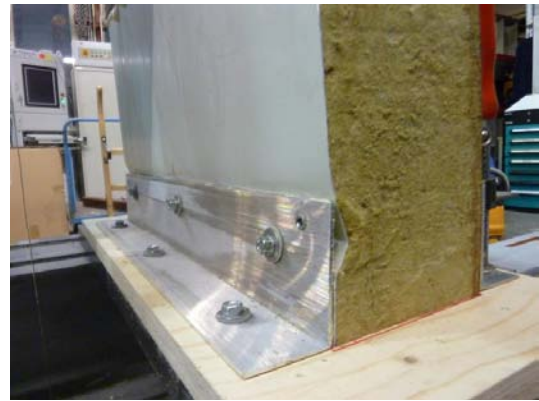
Test No.	IVa-E-4	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	glued aluminium angel	
type of panel	E	
faces	0,50 mm steel	
core	100 mm Mineral wool	
stressed face	-	
Measured dimensions of the wall panel:		
width b	400 mm	
height h ₁	300 mm	
thickness D	99,5 mm	
height of cutting h ₂	2,5 mm	
thickness of cutting d ₂	2,5 mm	
ultimate load at line of load application	21,15 kN	
ultimate stress of the compressed face	111,3 N/mm ²	
Failure mode	failure of the lower end	
Remarks		
 <p>The graph plots force in kilonewtons (kN) on the y-axis (0 to 30) against displacement in millimeters (mm) on the x-axis (0 to 10). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). F1 starts at 0, begins to rise around 2 mm, reaches a peak of approximately 24 kN at 8.5 mm displacement, and then drops sharply to about 7 kN. F2 remains near 0 until 4 mm, then rises to a peak of about 3 kN at 8.5 mm displacement before dropping to 1 kN.</p>		

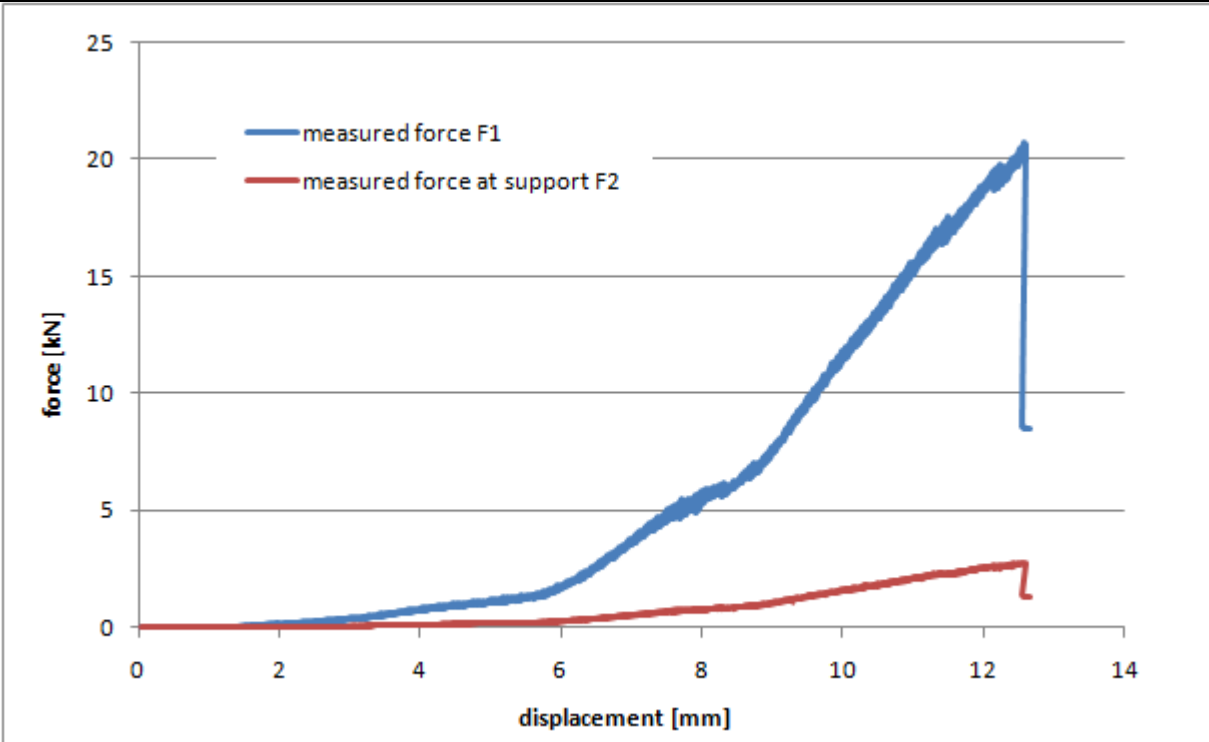
Test No.

IVa-E-4



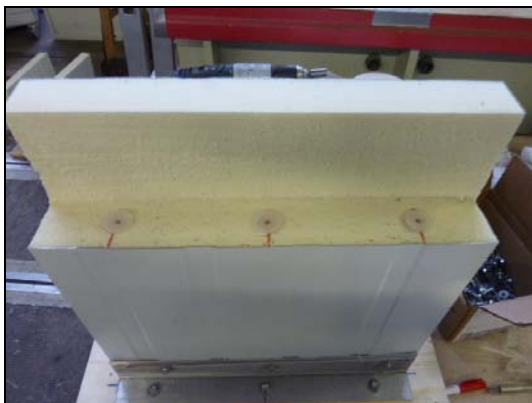
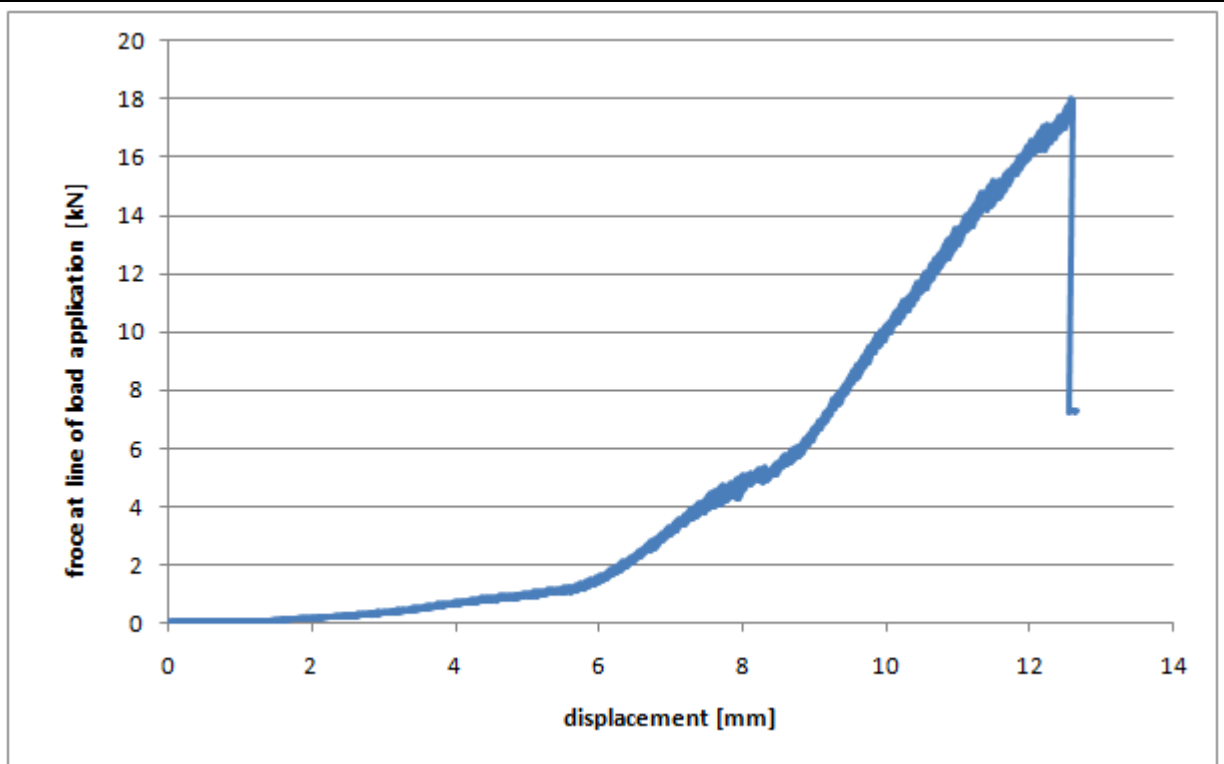
failure of the lower end



Test No.	IVb-A-1	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	3 dowels FID 50	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	302 mm	
thickness D	96 mm	
height of cutting h_2	99 mm	
thickness of cutting d_2	49 mm	
ultimate load at line of load application	18,02 kN	
Failure mode	cripling of the compressed face	
Remarks		
 <p>The graph shows two force-displacement curves. The blue curve, labeled 'measured force F1', starts at (0,0) and rises to a peak of approximately 20.5 kN at a displacement of about 12.5 mm, before dropping sharply. The red curve, labeled 'measured force at support F2', starts at (0,0) and rises to a much lower peak of approximately 2.5 kN at the same displacement of 12.5 mm.</p>		

Test No.

IVb-A-1



arrangement of dowels

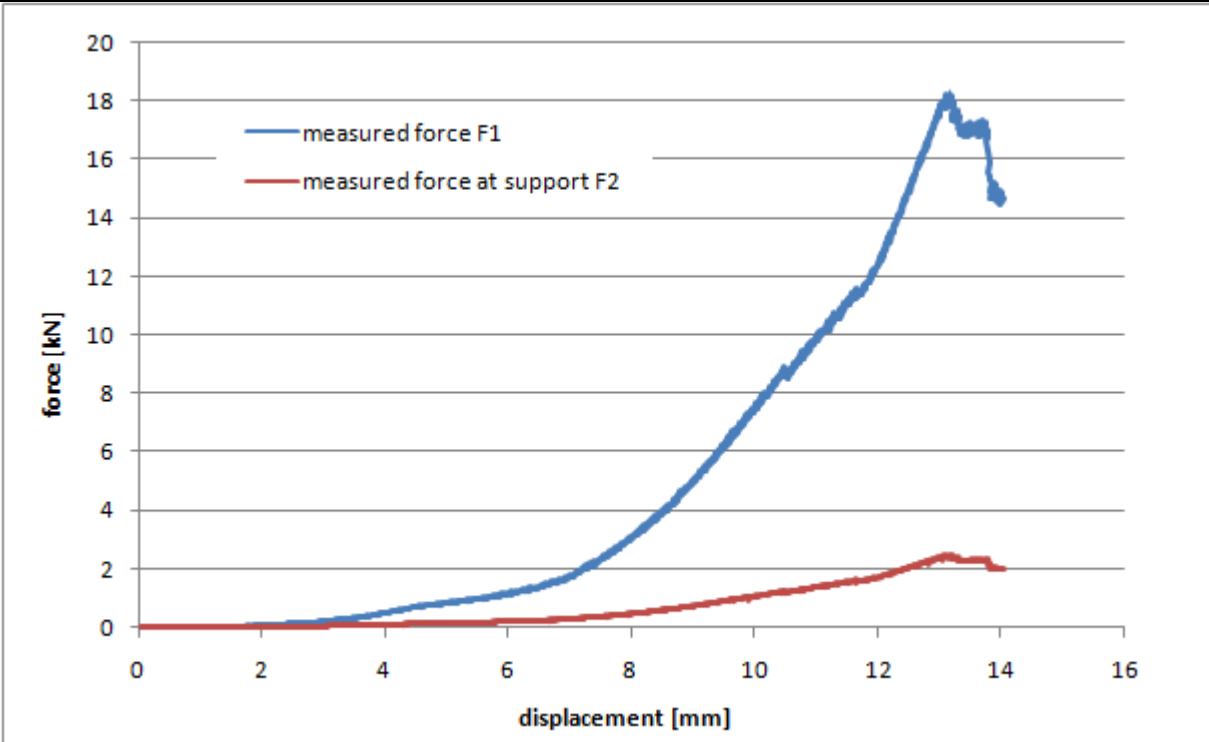


bond between face and core



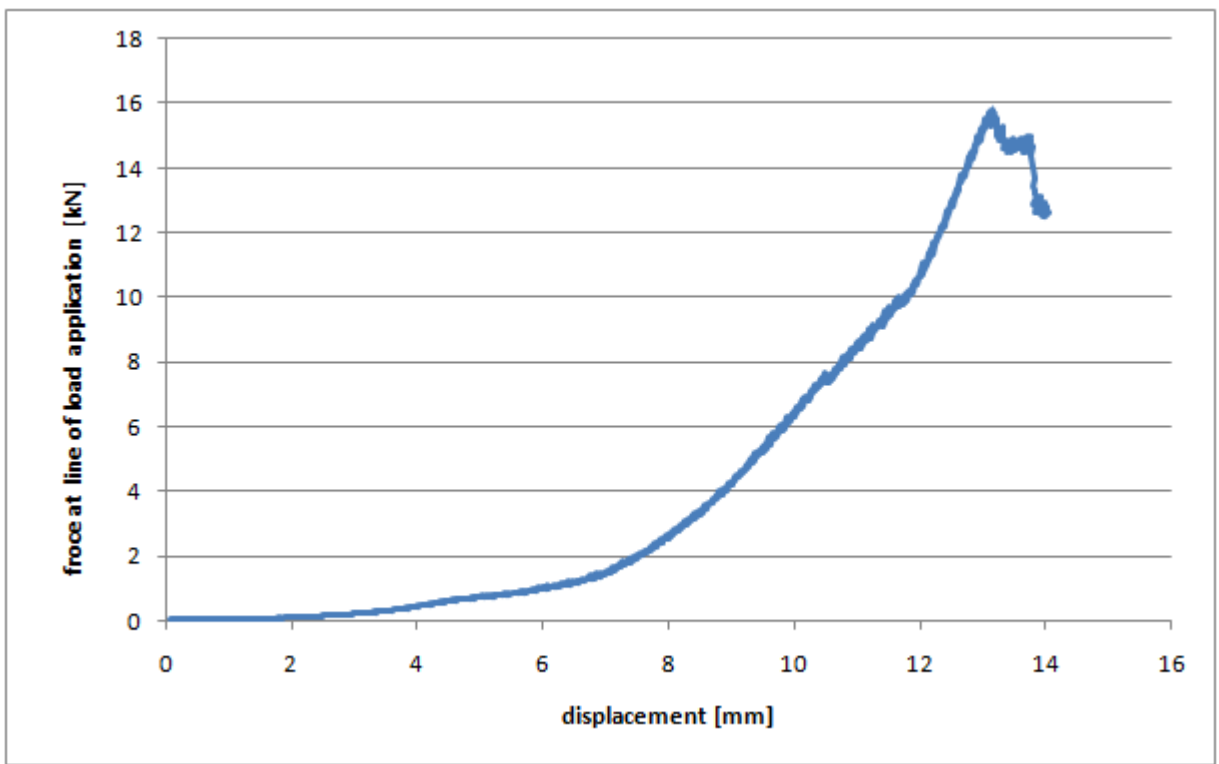
failuer of the compressed face



Test No.	IVb-A-2	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	3 dowels FID 50	
type of panel	A	
faces	0,50 mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions of the wall panel:		
width b	399 mm	
height h_1	303 mm	
thickness D	95 mm	
height of cutting h_2	100 mm	
thickness of cutting d_2	49 mm	
ultimate load at line of load application	15,88 kN	
Failure mode	failure of the lower end	
Remarks		
 <p>The graph plots force in kilonewtons (kN) on the y-axis (0 to 20) against displacement in millimeters (mm) on the x-axis (0 to 16). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). F1 starts at 0, remains low until about 6 mm, then rises steeply to a peak of 15.88 kN at approximately 13.5 mm displacement, before dropping. F2 remains very low throughout, peaking at about 2.5 kN at 13.5 mm displacement.</p>		

Test No.

IVb-A-2



arrangement of dowels



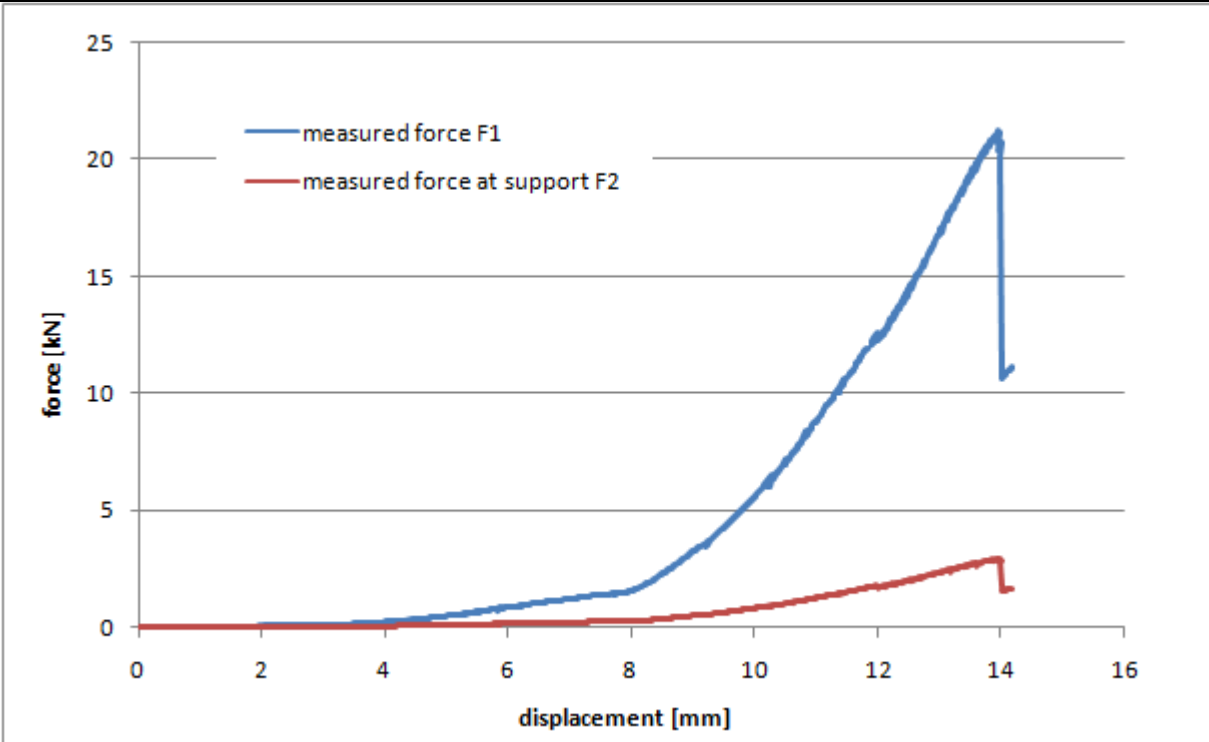
failure of the lower end



failure of the lower end

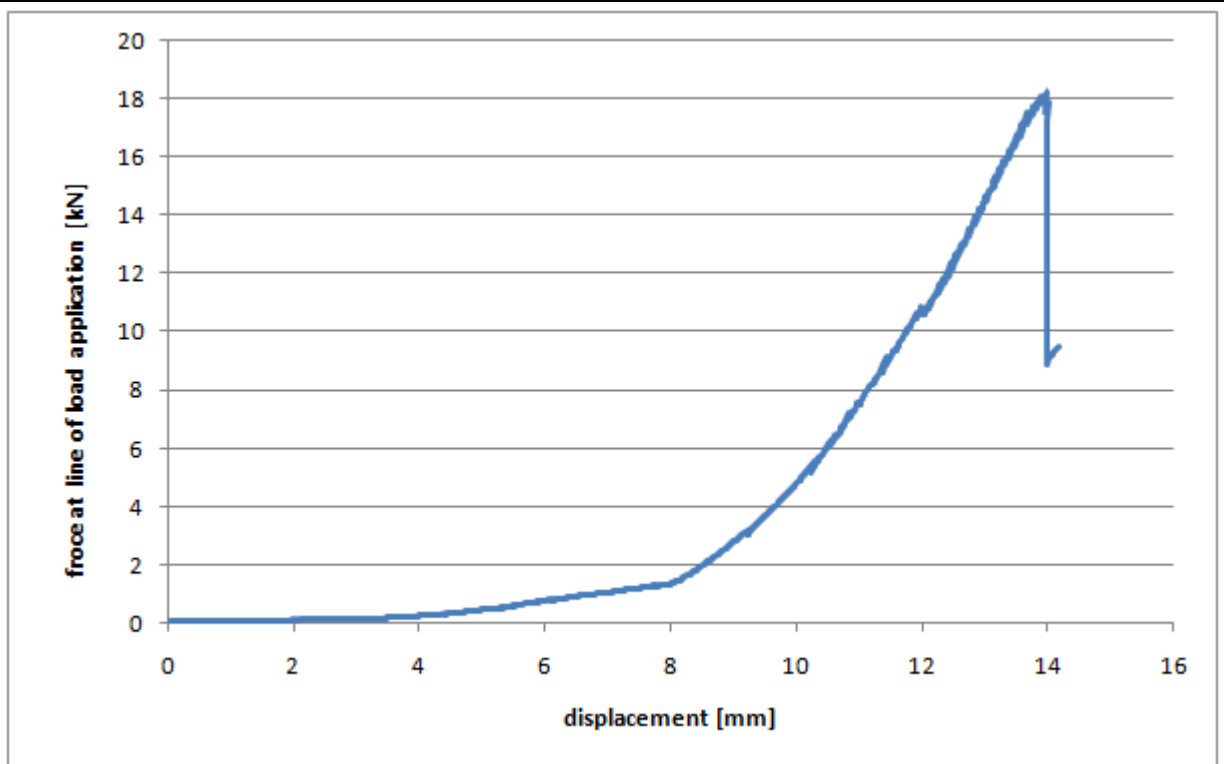


bond between face and core

Test No.	IVb-A-3
type of test	test with improved corner detail
introduction of load	steel sheet
type of improvement	3 dowels FID 50
type of panel	A
faces	0,50 mm steel
core	100 mm PU
stressed face	top side of production
Measured dimensions of the wall panel:	
width b	399 mm
height h_1	303 mm
thickness D	96 mm
height of cutting h_2	100 mm
thickness of cutting d_2	48 mm
ultimate load at line of load application	18,30 kN
Failure mode	cripling of the compressed face
Remarks	
 <p>The graph plots force in kilonewtons (kN) on the y-axis (ranging from 0 to 25) against displacement in millimeters (mm) on the x-axis (ranging from 0 to 16). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). Both series show a non-linear increase in force with displacement. F1 reaches a peak of approximately 21 kN at a displacement of 14 mm, followed by a sharp drop. F2 reaches a much lower peak of approximately 3 kN at the same displacement of 14 mm, also followed by a sharp drop.</p>	

Test No.

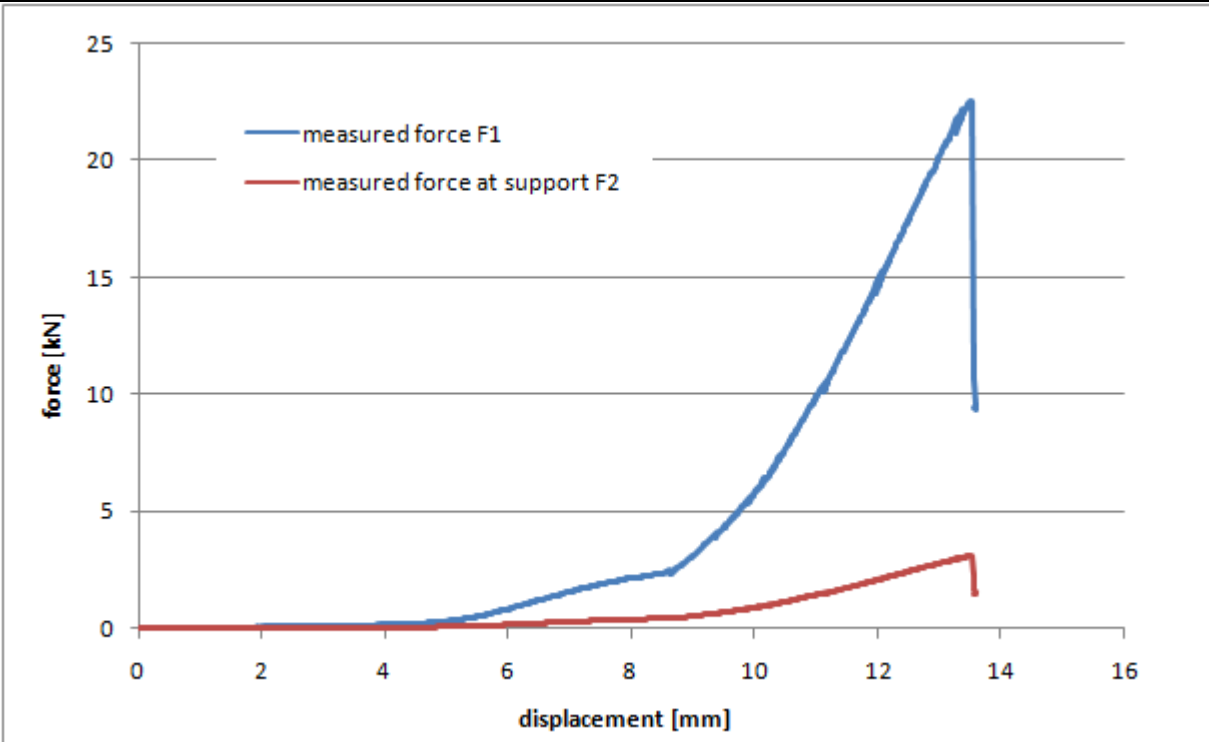
IVb-A-3



cripling of the compressed face

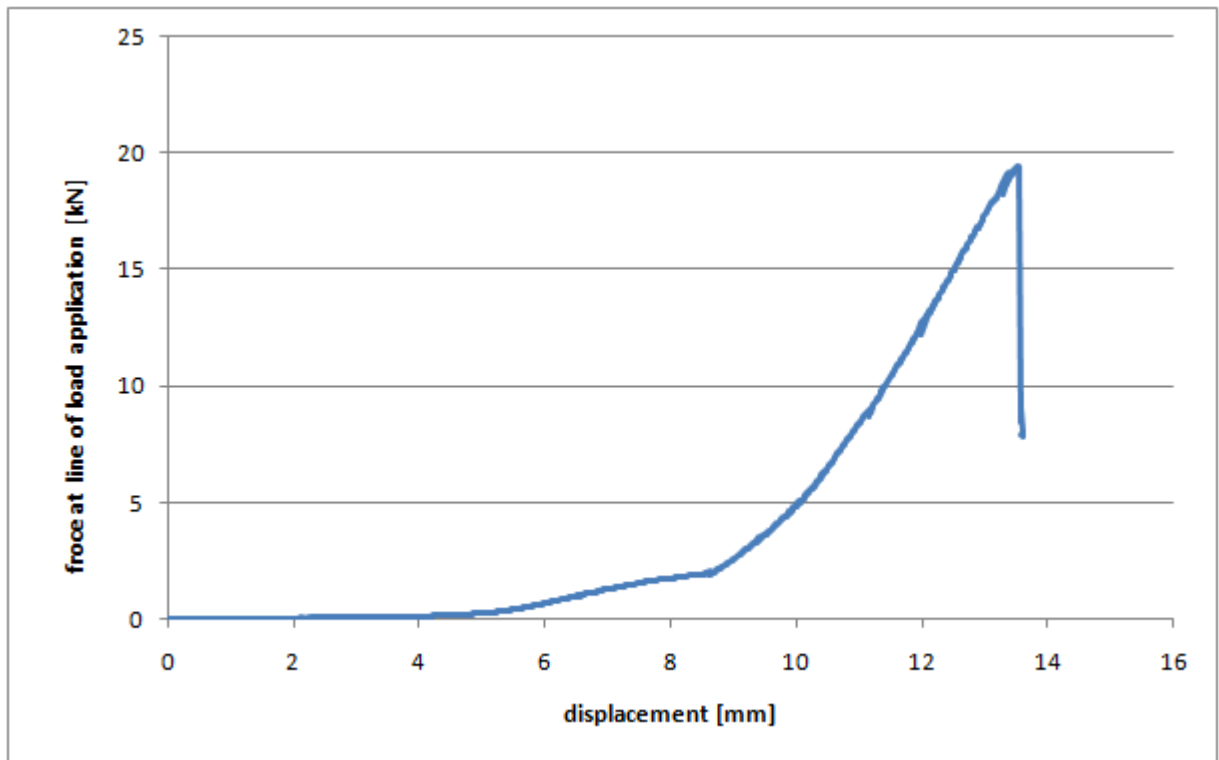


bond between face and core

Test No.	IVb-A-4	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	3 dowels W-ID 95	
type of panel	A	
faces	0,5mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	302 mm	
thickness D	96 mm	
height of cutting h_2	101 mm	
thickness of cutting d_2	48 mm	
ultimate load at line of load application	19,43 kN	
Failure mode	cripling of the compressed face	
Remarks		
 <p>The graph displays two force-displacement curves. The blue curve, labeled 'measured force F1', represents the force at the line of load application. It starts at 0 kN at 0 mm displacement, remains near zero until about 4 mm, then rises gradually to about 2.5 kN at 8 mm. From 8 mm, it increases more steeply, reaching a peak of approximately 22.5 kN at a displacement of about 13.5 mm. After the peak, the force drops sharply to about 9 kN. The red curve, labeled 'measured force at support F2', represents the force at the support. It follows a similar trend but at a much lower magnitude, reaching a peak of about 3 kN at the same displacement of 13.5 mm before dropping to about 1.5 kN.</p>		

Test No.

IVb-A-4



arrangement of dowels

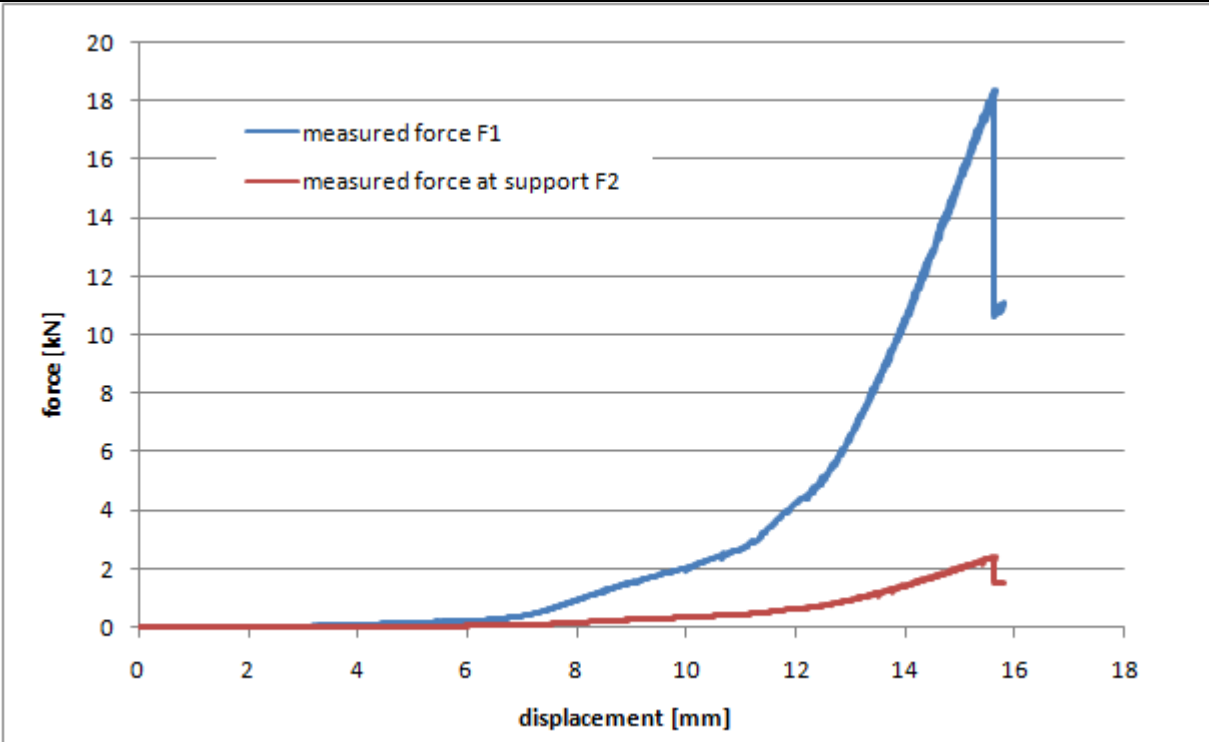


bond between face and core



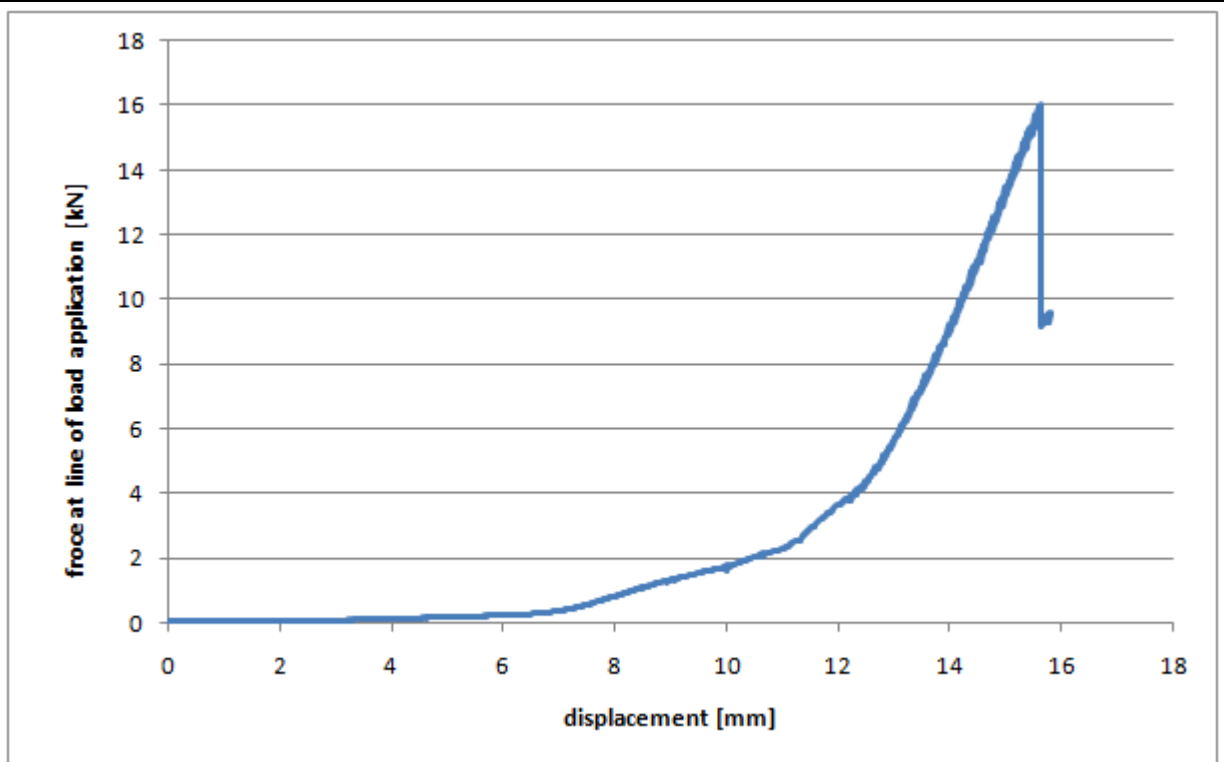
failure of the compressed face



Test No.	IVb-A-5	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	3 dowels W-ID 95	
type of panel	A	
faces	0,5mm steel	
core	100 mm PU	
stressed face	top side of production	
Measured dimensions of the wall panel:		
width b	400 mm	
height h_1	300 mm	
thickness D	97 mm	
height of cutting h_2	99 mm	
thickness of cutting d_2	48 mm	
ultimate load at line of load application	16,02 kN	
Failure mode	cripling of the compressed face	
Remarks		
 <p>The graph shows two force-displacement curves. The blue curve, labeled 'measured force F1', starts at the origin and remains near zero until about 6 mm displacement, then rises to a peak of approximately 18 kN at 15.5 mm displacement before dropping sharply. The red curve, labeled 'measured force at support F2', also starts at the origin and remains near zero until about 6 mm displacement, then rises to a much lower peak of approximately 2.5 kN at 15.5 mm displacement.</p>		

Test No.

IVb-A-5



arrangement of dowels

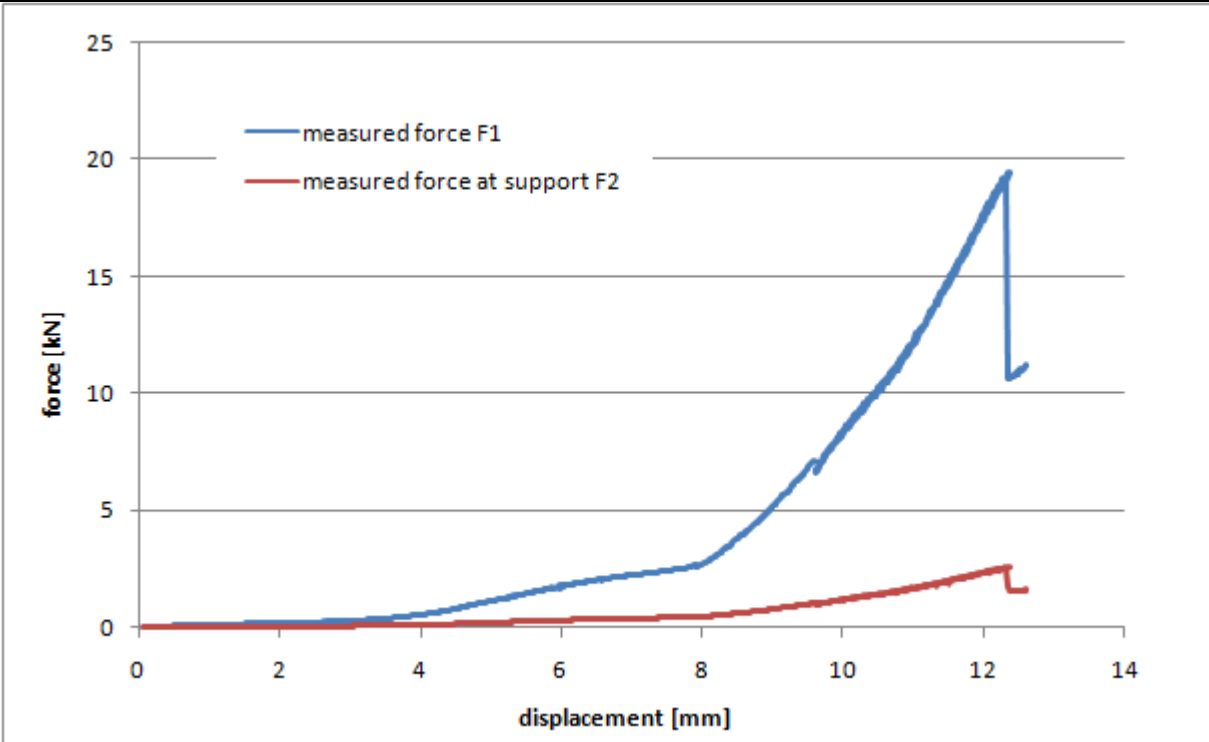


bond between face and core



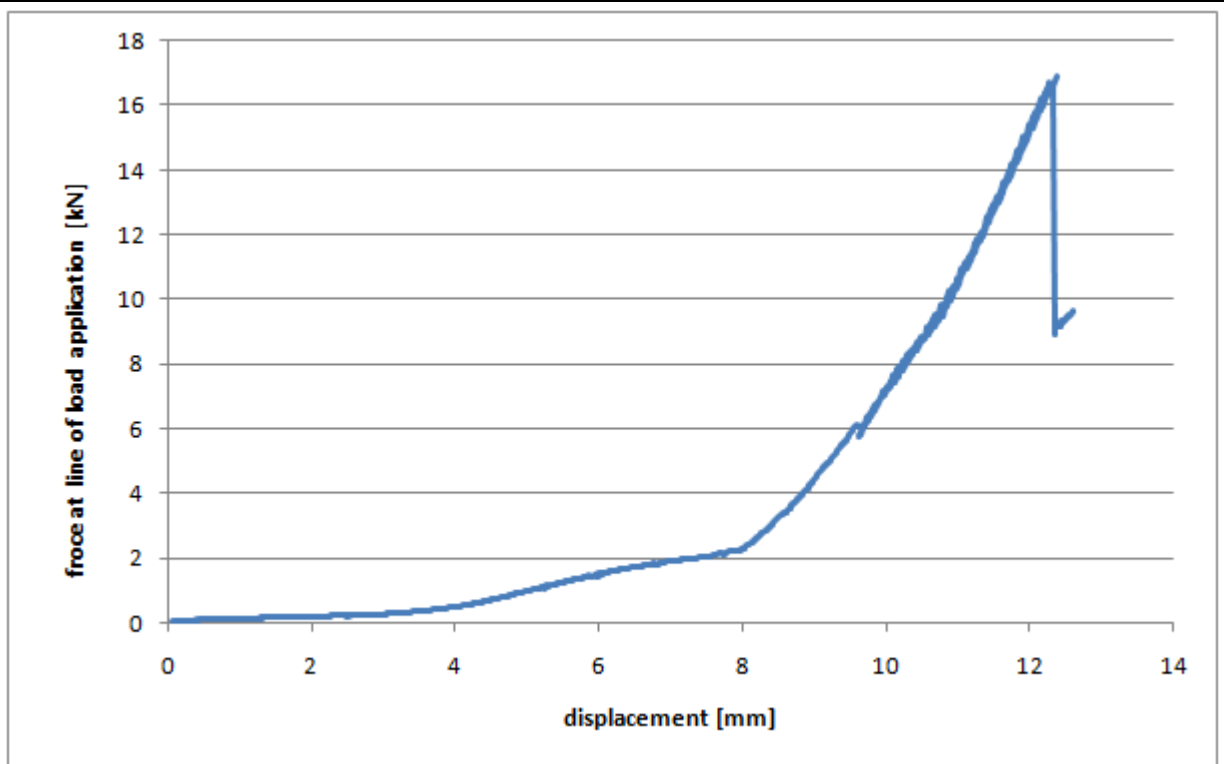
failure of the compressed face



Test No.	IVb-A-6
type of test	test with improved corner detail
introduction of load	steel sheet
type of improvement	3 dowels W-ID 95
type of panel	A
faces	0,5mm steel
core	100 mm PU
stressed face	top side of production
Measured dimensions of the wall panel:	
width b	399 mm
height h_1	296 mm
thickness D	96 mm
height of cutting h_2	100 mm
thickness of cutting d_2	50 mm
ultimate load at line of load application	16,91 kN
Failure mode	cripling of the compressed face
Remarks	
 <p>The graph plots force in kilonewtons (kN) on the y-axis (ranging from 0 to 25) against displacement in millimeters (mm) on the x-axis (ranging from 0 to 14). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). F1 shows a non-linear increase, reaching a peak of approximately 19.5 kN at a displacement of about 12.5 mm, followed by a sharp drop. F2 shows a much lower, more linear increase, peaking at approximately 2.5 kN at the same displacement of 12.5 mm.</p>	

Test No.

IVb-A-6



arrangement of dowels

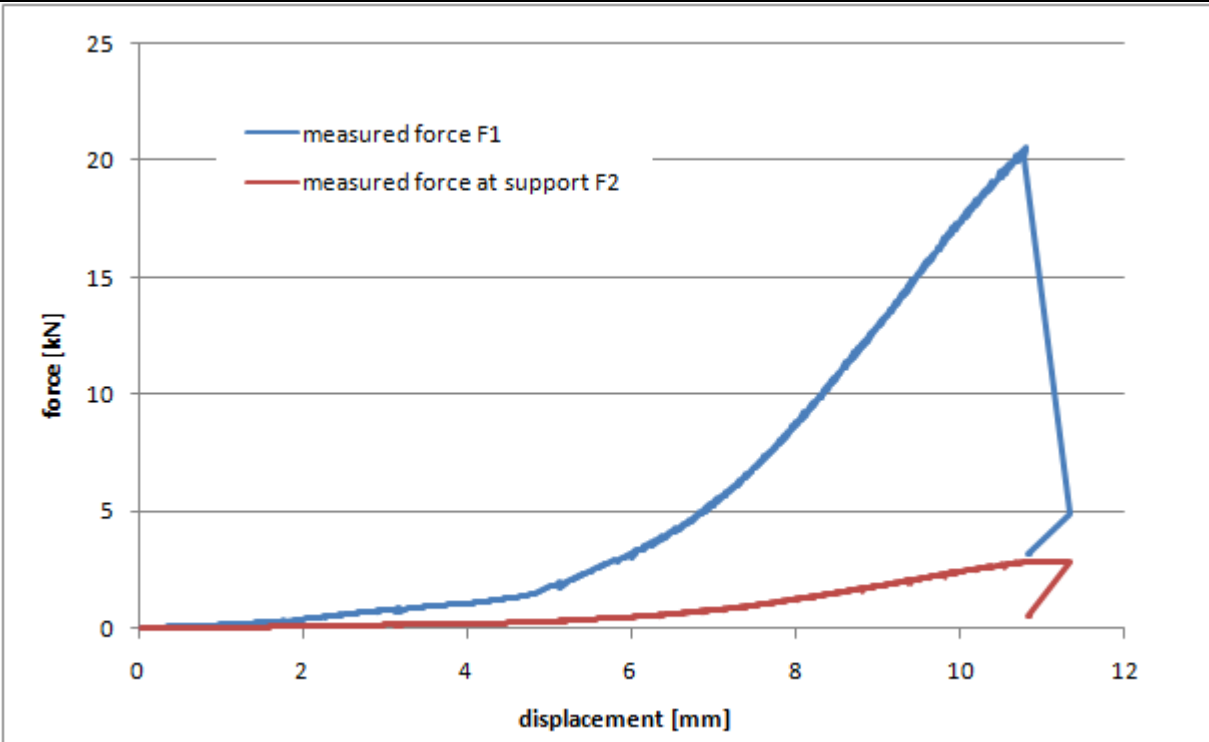


bond between face and core



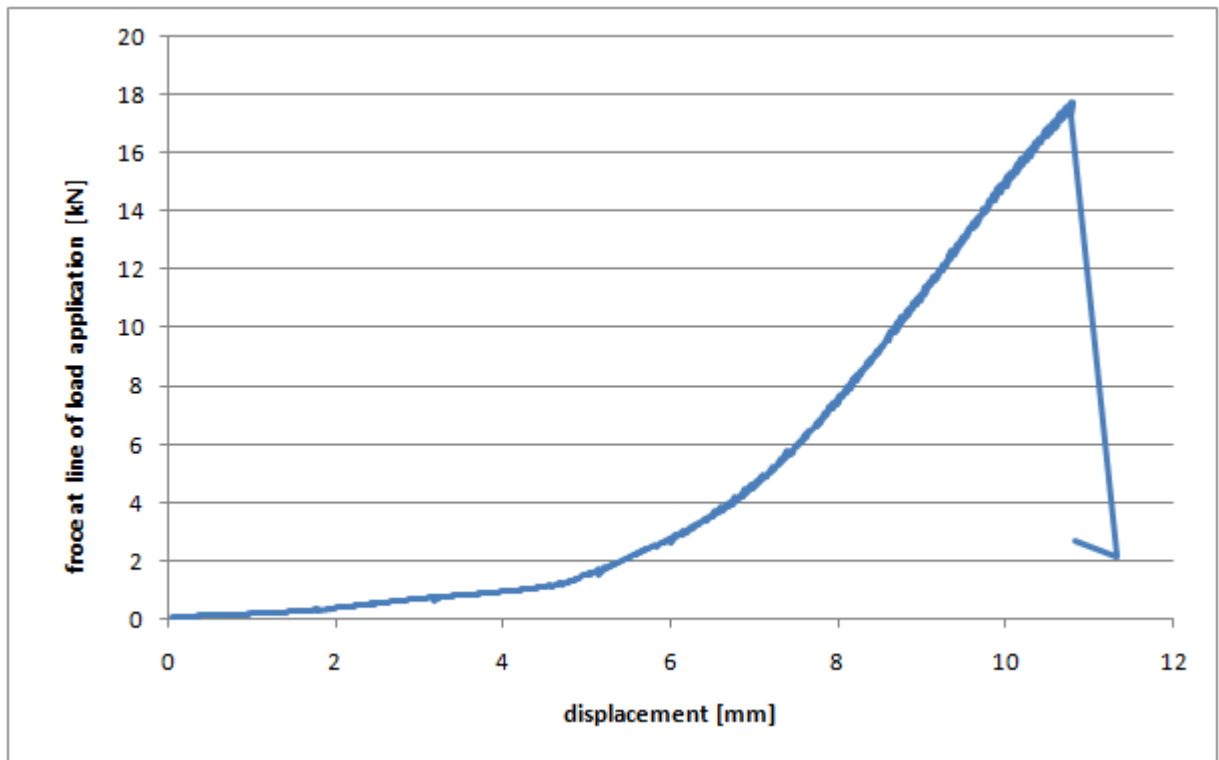
cripling of the compressed face



Test No.	IVb-D-1	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	3 dowels FID 50	
type of panel	D	
faces	1,8 mm GFRP	
core	100 mm EPS	
stressed face	top side of production	
Measured dimensions of the wall panel:		
width b	298 mm	
height h_1	299 mm	
thickness D	102 mm	
height of cutting h_2	100 mm	
thickness of cutting d_2	70 mm	
ultimate load at line of load application	17,75 kN	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph plots force in kilonewtons (kN) on the y-axis (0 to 25) against displacement in millimeters (mm) on the x-axis (0 to 12). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). F1 starts at 0, remains low until about 4 mm, then rises steeply to a peak of approximately 20.5 kN at 11 mm displacement, before dropping sharply to about 5 kN at 11.5 mm. F2 starts at 0, remains very low until about 6 mm, then rises gradually to a peak of approximately 3 kN at 11 mm displacement, before dropping to about 1 kN at 11.5 mm.</p>		

Test No.

IVb-D-1



arrangement of dowels

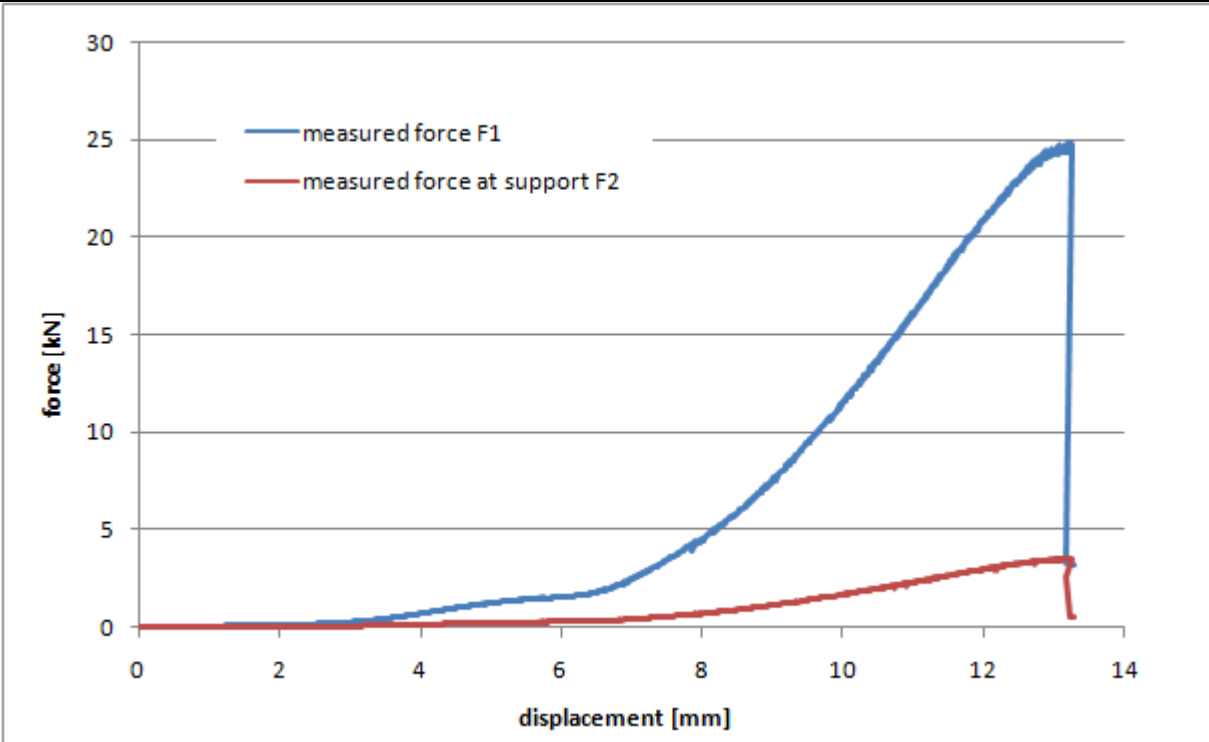


bond between face and core



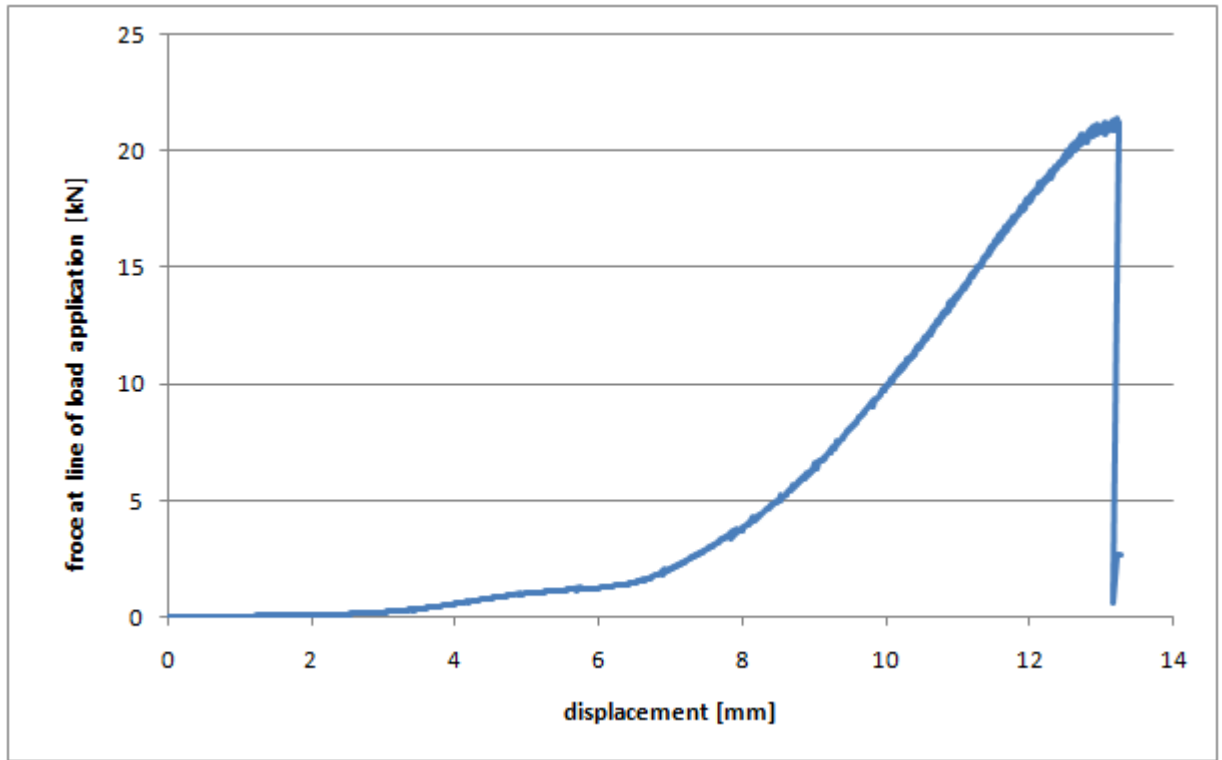
failure of the compressed face



Test No.	IVb-D-2	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	3 dowels FID 50	
type of panel	D	
faces	1,8 mm GFRP	
core	100 mm EPS	
stressed face	top side of production	
Measured dimensions of the wall panel:		
width b	299 mm	
height h_1	299 mm	
thickness D	102 mm	
height of cutting h_2	100 mm	
thickness of cutting d_2	70 mm	
ultimate load at line of load application	21,41 kN	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph plots force in kilonewtons (kN) on the y-axis (0 to 30) against displacement in millimeters (mm) on the x-axis (0 to 14). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). The blue line shows a non-linear increase, reaching a peak of 21.41 kN at approximately 13.2 mm displacement, followed by a sharp drop. The red line shows a much lower, nearly linear increase, reaching about 3.5 kN at the same displacement.</p>		

Test No.

IVb-D-2



arrangement of dowels

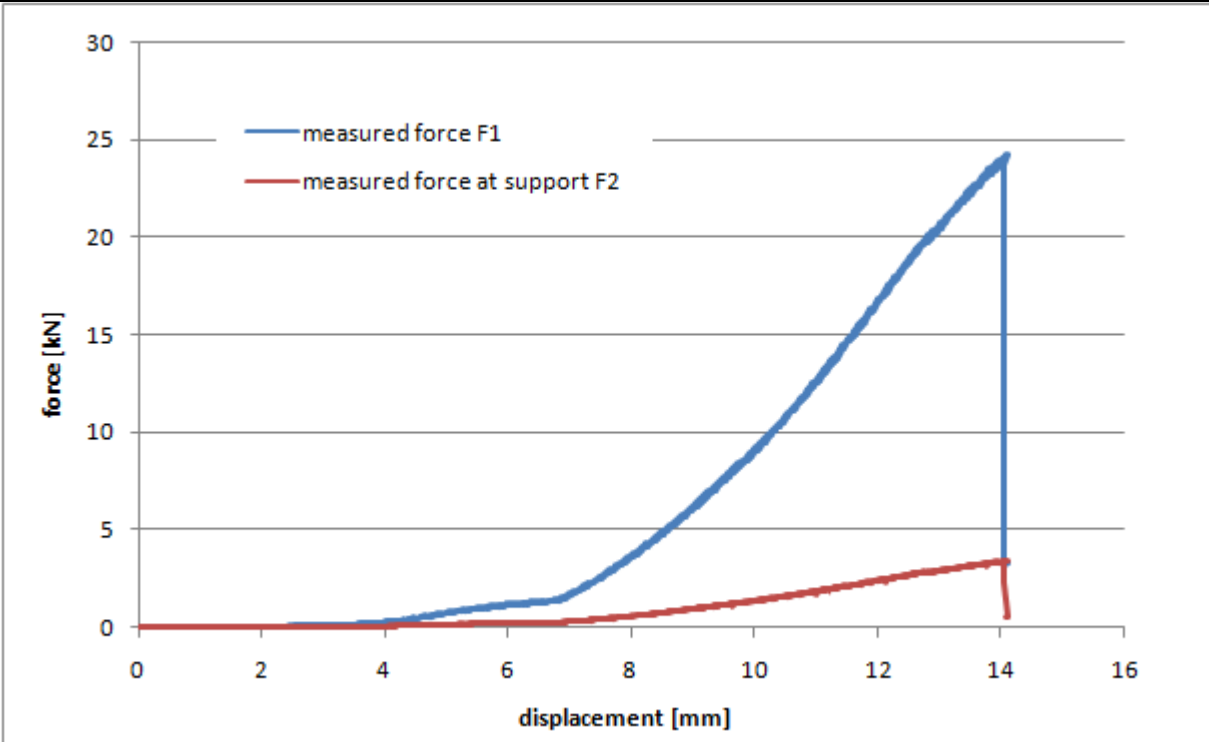


bond between face and core



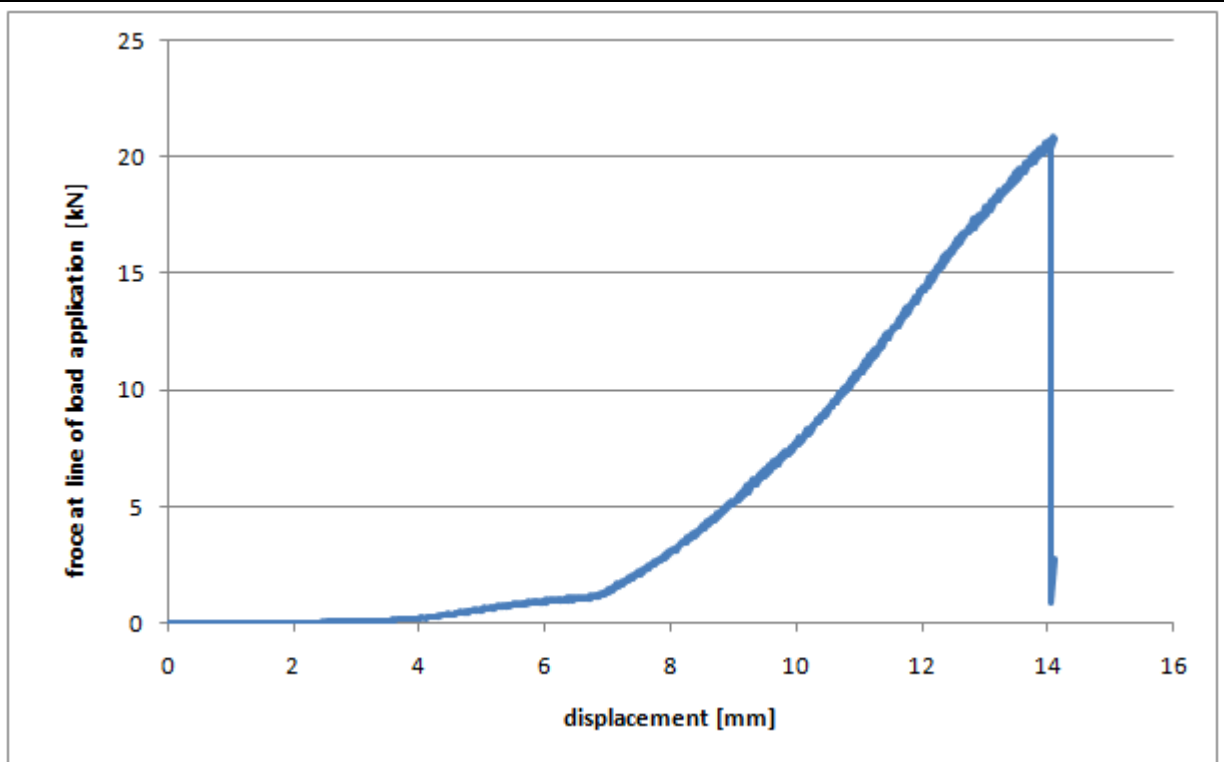
failure of the compressed face



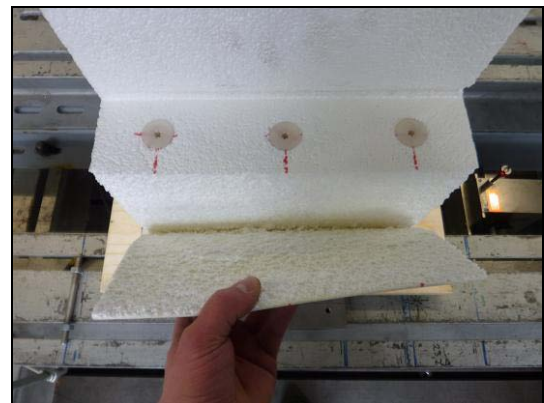
Test No.	IVb-D-3	
type of test	test with improved corner detail	
introduction of load	steel sheet	
type of improvement	3 dowels FID 50	
type of panel	D	
faces	1,8 mm GFRP	
core	100 mm EPS	
stressed face	top side of production	
Measured dimensions of the wall panel:		
width b	299 mm	
height h_1	300 mm	
thickness D	102 mm	
height of cutting h_2	99 mm	
thickness of cutting d_2	70 mm	
ultimate load at line of load application	20,91 kN	
Failure mode	buckling of the compressed face	
Remarks		
 <p>The graph plots force in kilonewtons (kN) on the y-axis (0 to 30) against displacement in millimeters (mm) on the x-axis (0 to 16). Two data series are shown: 'measured force F1' (blue line) and 'measured force at support F2' (red line). F1 starts at 0, remains near 0 until 4 mm, then rises steeply to a peak of approximately 24 kN at 14 mm displacement, before dropping sharply to 0. F2 starts at 0 and rises gradually to a peak of approximately 3.5 kN at 14 mm displacement, then drops to 0.</p>		

Test No.

IVb-D-3



arrangement of dowels



bond between face and core

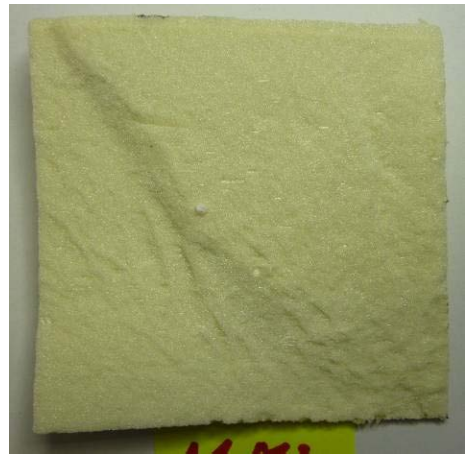


failure of the compressed face


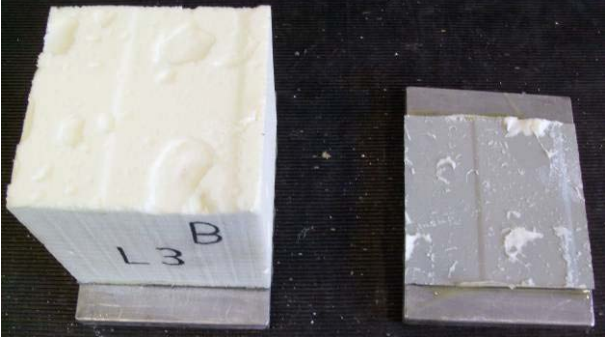

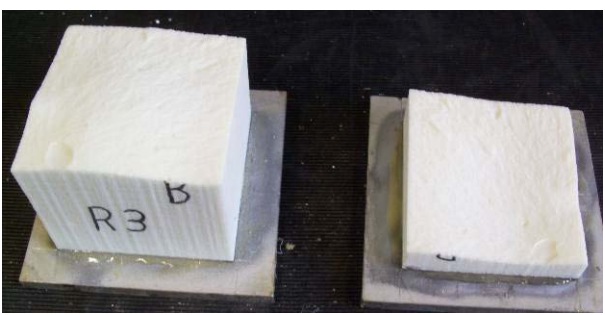




tensile test

panel type A



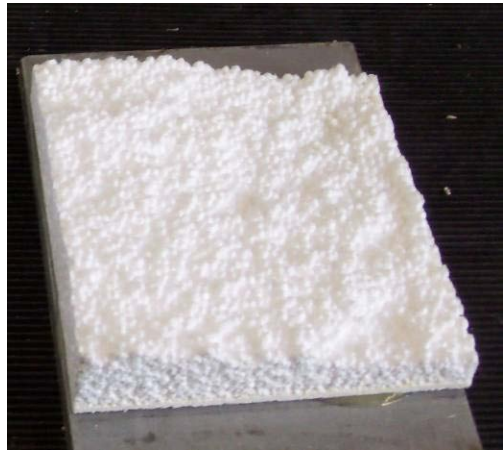


tensile test	panel type B
 <p>Two views of a tensile test specimen labeled M1A. The left view shows the specimen's profile with a central core and outer skins. The right view shows the specimen after a tensile test, exhibiting a diagonal fracture line across the core.</p>	 <p>Two views of a tensile test specimen labeled L3B. The left view shows the specimen's profile. The right view shows the specimen after a tensile test, exhibiting a diagonal fracture line across the core.</p>
 <p>Two views of a tensile test specimen labeled M3B. The left view shows the specimen's profile. The right view shows the specimen after a tensile test, exhibiting a diagonal fracture line across the core.</p>	 <p>Two views of a tensile test specimen labeled R3B. The left view shows the specimen's profile. The right view shows the specimen after a tensile test, exhibiting a diagonal fracture line across the core.</p>
 <p>Two views of a tensile test specimen labeled L2B. The left view shows the specimen after a tensile test, exhibiting a diagonal fracture line across the core. The right view shows the specimen's profile.</p>	 <p>Two views of a tensile test specimen labeled M2B. The left view shows the specimen after a tensile test, exhibiting a diagonal fracture line across the core. The right view shows the specimen's profile.</p>

tensile test	panel type C
	
	
	

tensile test

panel type D



tensile test

panel type E

