

Test Report



Number	17-000810-PR11 (PB-K99-05-en-01)
Owner (Client)	ALUMINCO S.A. Megali Rahi 32011 Inofita Viotias Greece
Product	Safety Railings
Designation	Shipping name: Slim Line 88.4PVB
Details	Overall dimensions (W x H) 2000 mm x 1200 mm; Profiles Aluminium Profil; item-No: F85-1B65; Glass dimensions (W x H) 958 mm x 1187 mm; Glass configuration 8 mm HSG / PVB Film 1.52 mm / 8 mm HSG; Thickness 17.51 mm
Special features	Bottom-sided linear bearing
Order	Testing of Safety Rails
Contents	The test report contains a total of 10 pages and annexe (5 pages).
Note	Replaces Test Report: no. 17-000810-PR11 PB-K99-05-en dated 22.06.2018. The test report shall only be published in its unabbreviated form. The "Guidance Sheet for the Use of ift Test Documents" applies.

1 Execution

1.1 Sampling and product description

The following details have been presented to ift:

Sampler: ALUMINCO S.A., 32011 Inofita Viotias (Greece)

Evidence: ift Rosenheim did not receive a sampling report.

Date of delivery: 14.05.2018

Description: For product identification the specimen tested is described/represented in the Annex. Material specifications, item numbers and other company-specific descriptions are details provided by the client and will be checked for plausibility by ift.

Test specimen no.: 17-000810-PK08 / WE: 45896-001

1.2 Basic documents of the procedures

NF P 01-013:1988-08

Railings test – Methodes and criteria

1.3 Short description of the procedures

1.3.1 Static horizontal outward test

The railings shall be subjected to a static horizontal outward force (F) at the level of the handrail. The force shall be applied progressively and without impact up to the maximum value specified and then maintained for a specific period. The test shall include three stages. In the first stage the application of a preliminary load is used to determine the starting point for the measurements. The second stage shall consist of forces which are normally applied to railings when in use, the third to forces to which railings will not normally be subjected and which is carried out in the nature of a safety test.

Point of application and magnitude of the load applied:

Taking into account the true height of the railings under test the force applied to the handrail shall be determined so as to create a moment at the anchorage points which is equal to the moment resulting from application of the loads 1m above the normal floor level. In the case of continuous railings this force shall be the product of the unit load and the length of the unit tested.

The values which are to be used shall be as follows:

- a. On private premises
 1. In the case of a length of floor ≥ 3.25 m: 0.4 kN/m
 2. In the case of a length of floor < 3.25 m: an overall load of 1.30 kN uniformly distributed over the length of the railing.
- b. In public places: 1.00 kN/m
- c. On grandstands: 1.70 kN/m
 except in line with the stairways serving the terraces or grandstands and the open ends of terraces for which the value of 1 kN/m shall apply.

The load (F) shall be applied at the top of the supporting bar over surfaces not exceeding 50 mm at three points located in line with the central support and at a distance of $0.4 L$ from each end upright, L being the distance between two successive uprights (see Fig. 1).

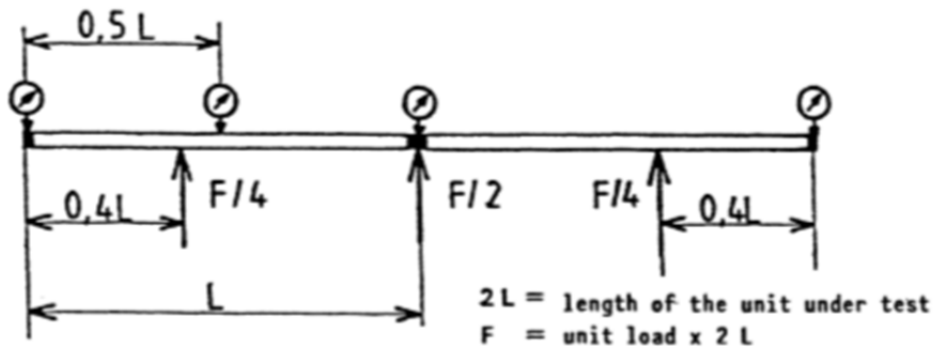


Fig. 1 Schematic diagram for the outward test

In the first stage a load corresponding to the operating load for which the railings are tested shall be applied for 3 minutes. After the load has been removed the detectors shall be reset to zero. The second stage is then held with the same operating load for 3 minutes and the deformation measured.

The safety load shall be obtained by applying an incremental coefficient of:

- 1.5 in the case of steel
- 1.7 in the case of aluminium alloys

to the operating load F

The safety load shall be applied for fifteen minutes and the deformation of the railings shall then be measured.

Once the load has been removed the residual deformation shall be determined following a waiting time of three minutes.

The value “a” of the permitted residual deformation after the safety load has been removed shall satisfy the following inequalities:

- if $\sigma_e < 1,1 \sigma_{eg}$ $a \leq \frac{8x}{1000}$
- if $1,3 \sigma_{eg} > e > 1,1 \sigma_{eg}$ $a \leq 0,008x * 1,1 \frac{\sigma_{eg}}{\sigma_e}$

x being the distance lying between the top of the handrail and the anchorage point for the railings (see Fig. 2),

σ_e being the elastic limit measured on the testpiece taken from the top part of the handrail of the railings tested, and

σ_{eg} being the minimum guaranteed elastic limit

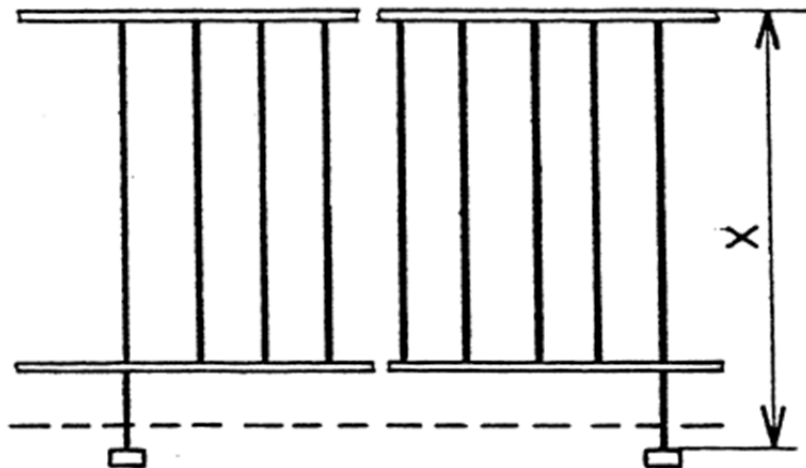


Fig. 2 Distance X

1.3.2 Static horizontal inward test

This test consists of subjecting the railings unit to the effect of static horizontal force exerted on the handrail at the centre of the span between two uprights or two anchorages which is directed inwards.

The test shall consist of two stages:

In the first stage the application of a preliminary load of 0.2 kN per cross-member is used to determine the starting point for the measurements. The total load of 0.4 kN per cross-member or span shall be applied.

The force shall be applied at the top of the handrail halfway along each span. It shall be exerted horizontally, perpendicular to the handrail and inwards (see Fig. 3).

A gauge placed in line with the point of application of the force on the handrail shall be used to detect deformation. The preloading of 0.2 kN per span shall be applied and maintained for 3 minutes. The gauge shall be set to zero after the load has been removed.

Testing of Safety Rails

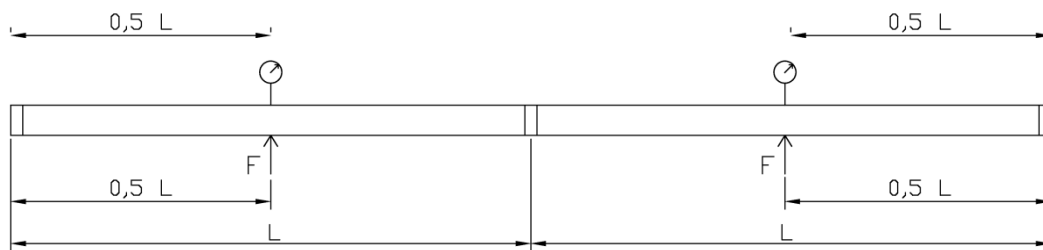


Fig. 3 Static horizontal inward test

The load of 0.4 kN on each span shall then be applied. The deformation of the handrail under the load shall be measured after it has been applied for 1 minute. The load shall then be removed and the residual deformation shall be measured.

The value “a” of the permitted residual deformation after removed shall satisfy the following inequality:

$$a \leq \frac{8x}{1000}$$

1.3.3 Static vertical test

The railings unit shall be held by the feet of its uprights or attachment posts, lower attachment points or supports under conditions equivalent to the conditions of use.

The vertical load V exerted on the railings shall distributed equally and simultaneously on two points at the level of the handrail situated symmetrically between consecutive uprights and at a distance apart of 300 mm between axes (see Fig. 4)

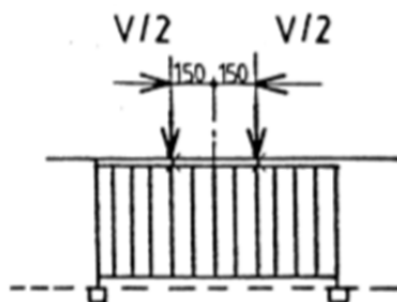


Fig. 4 vertical test

The test shall consist of two stages:

In the first stage the starting point for the measurements shall be determined after a vertical load of 0.20 kN has been applied. The load shall be removed without any waiting time. The starting point for measurements shall then be determined.

In the second stage a force of 1,00 kN shall be applied for fifteen minutes to the top of the handrail. Once the load has been removed the residual deformation shall be determined following a waiting time of three minutes.

The permitted residual deformation shall be a maximum of 3 mm regardless of the material.

Testing of Safety Rails

2 Detailed results

Static horizontal outward test according NF P 01-013, Chapter 2.2.1

Project-No.	17-000810-PR11
Basis	NF P 01-013:1988-08 Railings test - Methods and criteria
Test equipment	Pst/020619 - Geländerprüfstand
Test specimen	Slim Line 88.4PVB
Test specimen No.	45896-001
Date of test	13.06.2018
Test engineer in charge	Stefan Hehn
Test engineer	Stefan Hehn

Implementation of tests

Deviations There have been no deviations from the test method as specified in the standard/basis.

Ambient conditions

Temperature 23,3 °C Air humidity 65,9 %

The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Test procedure according NF P 01-013, Chapter 2.2.1.2.1

3a) On private premises:

length of floor ≥ 3.25 m: 0.4 kN/m

length of floor < 3.25 m: load of 1.30 kN

- Test sample: 2L = 2000 mm

F = 1.30 kN with a specimen height of 1000 mm

$$F = 1.30 * \frac{1000}{x}$$

x = the distance lying between the top of the handrail and the anchorage point of the railings

x = 1200 mm

F = 1.08 kN

- Test under safety load:

Factor 1.7 in the case of aluminium alloys

F = 1.84 kN

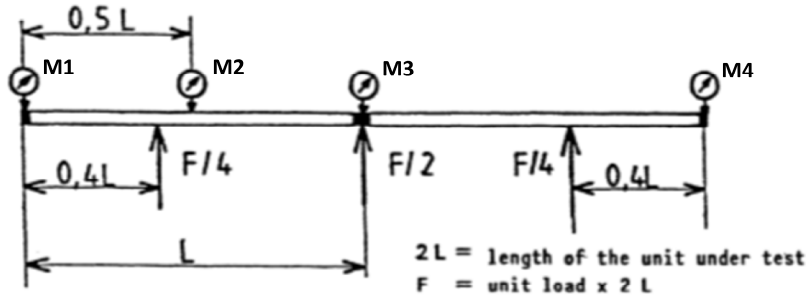
- Requirement for the deformation according NF P 01-013, Chapter 2.2.1.2.4

$$a \leq \frac{8x}{1000}$$

$$a \leq 9.6 \text{ mm}$$



Testing of Safety Rails



Load F [kN]		Time [min.]	Deformation (a) removed Load [mm]				Requirement
			M1	M2	M3	M4	
1st stage	1.08	3	set to zero	set to zero	set to zero	set to zero	no requirement
2nd stage	1.08	3	2.97	3.63	3.69	3.14	no requirement
safety test	1.84	15	6.12	6.12	6.65	5.95	no requirement
without load		3	2.48	3.36	3.81	3.75	≤ 9.6 mm



Testing of Safety Rails

Static horizontal inwards test according NF P 01-013, Chapter 2.2.2

Project-No. 17-000810-PR11
 Basis NF P 01-013:1988-08
 Railings test - Methods and criteria
 Test equipment Pst/020619 - Geländerprüfstand
 Test specimen Slim Line 88.4PVB
 Test specimen No. 45896-001
 Date of test 13.06.2018
 Test engineer in charge Stefan Hehn
 Test engineer Stefan Hehn

Implementation of tests
 Deviations There have been no deviations from the test method as specified in the standard/basis.

Ambient conditions Temperature 23,3 °C Air humidity 65,9 %
 The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

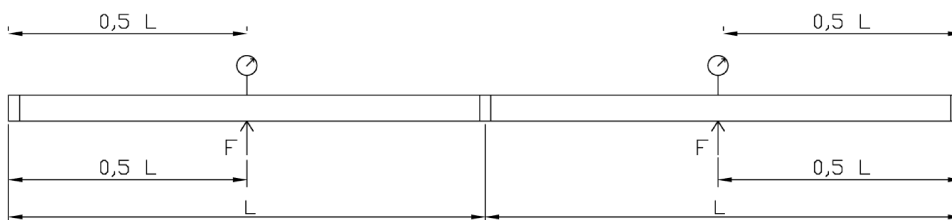
Requirement for the deformation according NF P 01-013, Chapter 2.2.2.3

$$a \leq \frac{15x}{1000}$$

x = the distance lying between the top of the handrail and the anchorage point of the railings

x = 1200 mm

a ≤ 18 mm



Load F [kN]	Time [min.]	Deformation (a) removed Load [mm]		Requirement
		M1	M2	
0.2	3	set to zero	set to zero	no requirement
0.4	1	2.9	3.0	≤ 18 mm

Testing of Safety Rails

Static vertical test according NF P 01-013, Chapter 2.2.3

Project-No. 17-000810-PR11
 Basis NF P 01-013:1988-08
 Railings test - Methods and criteria
 Test equipment Pst/020619 - Geländerprüfstand
 Test specimen Slim Line 88.4PVB
 Test specimen No. 45896-001
 Date of test 13.06.2018
 Test engineer in charge Stefan Hehn
 Test engineer Stefan Hehn

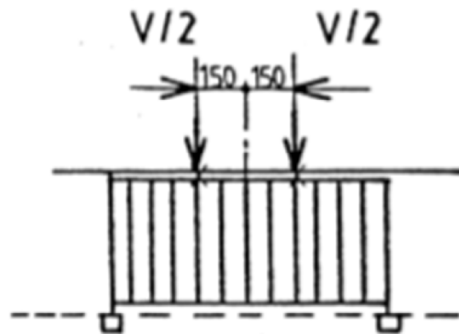
Implementation of tests
 Deviations There have been no deviations from the test method as specified in the standard/basis.

Ambient conditions Temperature 23,3 °C Air humidity 65,9 %
 The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Requirement for the deformation according NF P 01-013, Chapter 2.2.3.5

$a \leq 3 \text{ mm}$



Load V [kN]	Time [min.]	Deformation (a) removed Load [mm]	Requirement
0.2	0	set to zero	no requirement
1.0	15	0	no requirement
without load	3	0	$\leq 3 \text{ mm}$

Testing of Safety Rails

3 Summary

3.1 Result

Static test	Requirements	Results	Evaluation
outward	$a \leq 9.6 \text{ mm}$	3.8 mm	fulfilled
inward	$a \leq 18.0 \text{ mm}$	3.0 mm	fulfilled
vertical	$a \leq 3.0 \text{ mm}$	0.0 mm	fulfilled

3.2 Instructions for use

This test/evaluation does not allow any statement to be made on further characteristics of the present structure regarding performance and quality, in particular the effects of weathering and ageing and possible pre-vious defects.

The test was performed according to standard and the details for identification of the test specimen are complete; on the basis of this Test Report an "ift-Nachweis" (Evidence) can be issued.

ift Rosenheim

13.07.2018



Frank Zirbel, Dipl.-Ing. (FH)
 Deputy Head of Testing Department
 Security/Safety Testing



Stefan Hehn, Dipl.-Ing. (FH)
 Operating Testing Officer
 Material Testing

Nr./no 17-000810-PR11 PB-K99-05-en-01

Die Beschreibung des geprüften Probekörpers dient der normkonformen Identifizierung des Produkttyps, für den die festgestellten Werte gelten. Alternativ zur vorgegebenen tabellarischen Datenerfassung kann die Beschreibung auch in Form von technischen Zeichnungen, Verarbeitungsrichtlinien, Stücklisten etc. erfolgen. Zusätzliche Produktdetails bitte ergänzen.

Die Angaben sind Voraussetzung für die Erstellung eines ift-Nachweises. Nur bei Angabe aller in diesem Dokument angeforderten Daten ist ggf. eine nachträgliche Gutachtliche Stellungnahme möglich. Alle Angaben des Auftraggebers werden vom ift auf Plausibilität geprüft; ggf. festgestellte Abweichungen und/oder ergänzende Feststellungen werden dokumentiert.

The description of the specimen to be tested serves to identify, in conformity with the standards, the product type, for which the values determined will apply. Alternatively to the specified tabulated data collection, the description may also be made by technical drawings, processing instructions, parts lists, etc. Please supplement additional product details.

The details are the precondition for issuing the "ift-Nachweis". Only upon provision of all requested data subsequently requested Expert Statements may be issued. All details provided by the client will be checked for plausibility by ift, any deviations observed and/or additional findings will be documented.

Wareneingang-Nr.: 45896

ID of goods received :

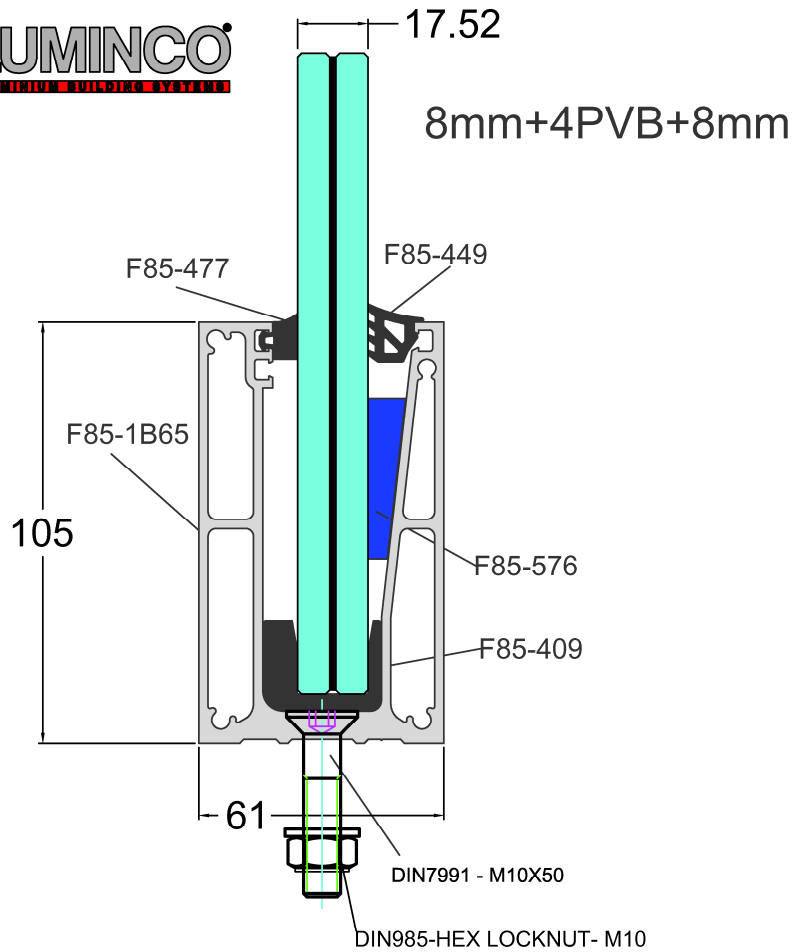
Alle Maßangaben in mm
All dimensions in mmNicht Zutreffendes bitte löschen.
Please delete non-appropriate.ift Mitarbeiter: Stefan Hehn
ift staff member :

Eigenschaft Characteristic	Angaben des Auftraggebers (unverändert) Information provided by client (unchanged)
Produkt / Bauart / Komponente Product / design / component	Safety Railing
Hersteller Manufacturer	ALUMINCO
Bezeichnung / Typ / Art.-Nr. Designation / type / item no.	Slim Line 88.4PVB
Außenmaß (BxH) Overall dimensions (WxH)	2000 mm x 1200 mm
Material Material	Aluminium-Profil; Laminated safety glass
Besonderheiten Special features	Bottom-sided linear bearing with Profile item-No: F85 1B65
Verglasung Glazing	
Hersteller Manufacturer	Information is stored at the ift
Lieferbezeichnung / Typ / Art.-Nr. Designation / type / item no.	Tempered Laminated Glass
Abmessung (B x H) Dimensions (W x H)	958 mm x 1187 mm
Gesamtdicke Thickness	17.51 mm
Aufbau Configuration	8 mm HSG / 1.52 mm PVB / 8 mm HSG
Einbau Glas Incorporation glazing	2 laminated glass; one-sided linear bearing; U-profile at the bottom of the aluminium profile; F85-409
Glaseinstand¹ Edge cover ¹	92 mm
Verklotzung Blocking	ABS Plastic wedge F85-576; at a distance of 80 mm from the outside and further in a grid of 200 mm

Nr./no 17-000810-PR11 PB-K99-05-en-01

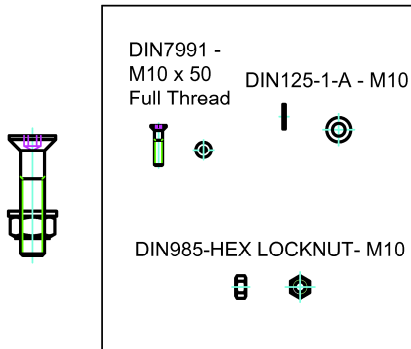
Eigenschaft Characteristic	Angaben des Auftraggebers (unverändert) Information provided by client (unchanged)
Folie (VSG) Film (LSG)	
Hersteller Manufacturer	Information is stored at the ift
Material Material	PVB
Gesamtdicke Total thickness	1.52 mm
Aufbau Configuration	4 x 0.38 mm
Verglasungsdichtung außen External glazing gasket	
Hersteller Manufacturer	Information is stored at the ift
Lieferbezeichnung / Typ / Art.-Nr. Designation / type / item no.	Item-No.: F85-477
Material Material	TPE
Verglasungsdichtung innen Internal glazing gasket	
Hersteller Manufacturer	Information is stored at the ift
Lieferbezeichnung / Typ / Art.-Nr. Designation / type / item no.	Item-No.: F85-449
Material Material	EPDM
Anschluss an die Tragkonstruktion Fixing to the support structure	
Hersteller Manufacturer	Information is stored at the ift
Material Material	Stainless Steel A2
Schraubenanzahl / -typ / -dimension Number of screws / type / dimensions	DIN7991 – M10x50 + DIN985-HEX LOCKNUT – M10
Anzahl Number	8 St.
Ankerabstand Anchor distance	250 mm
Abstand von der Ecke Distance from corner	125 mm

8mm+4PVB+8mm



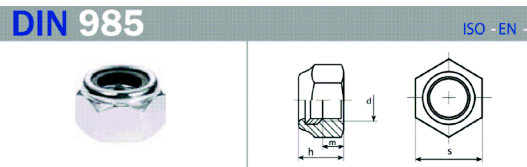
DIN7991 - M10 x 50 Full Thread

DIN125-1-A - M10



DIN985-HEX LOCKNUT- M10

DIN 985 ISO - EN -



Prevailing torque type hexagon nuts with nylon insert

	M3	M4	M5	M6	M7	M8	M10	M12	M14	M16	M18
d	0,5	0,7	0,8	1	1	1,25	1,5	1,75	2	2	2,5
p	5,5	7	8	10	11	13	17/16*	19/18*	22/21*	24	27
s	4	5	5	6	7,5	8	10	12	14	16	18,5

	M20	M22	M24	M27	M30	M33	M36	M39	M42	M45	M48
d	2,5	2,5	3	3	3,5	3,5	4	4	4,5	4,5	5
p	30	32/34*	36	41	46	50	55	60	65	70	75
s	20	22	24	27	30	33	36	39	42	45	48

Test Report

no. 17-000810-PR11 (PB-K99-05-en-01) dated 13.07.2018

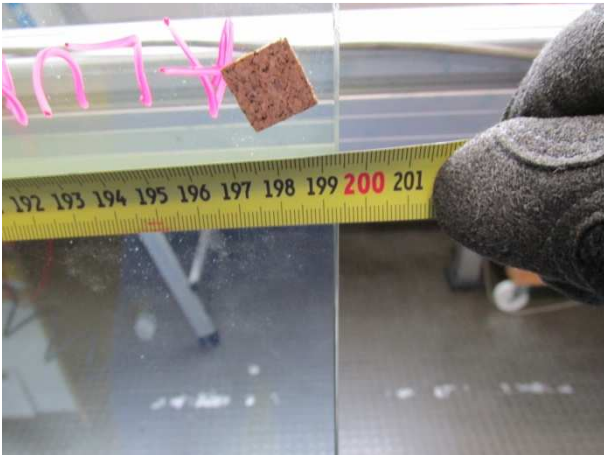
owner (client) ALUMINCO S.A., 32011 Inofita Viotias (Greece)



Picture 1 View of the test specimen



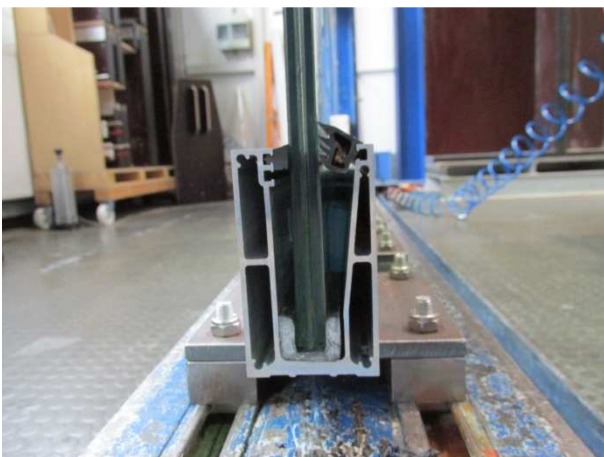
Picture 2 Height of the specimen body



Picture 3 Width of the specimen body



Picture 4 Thickness of the laminated glass



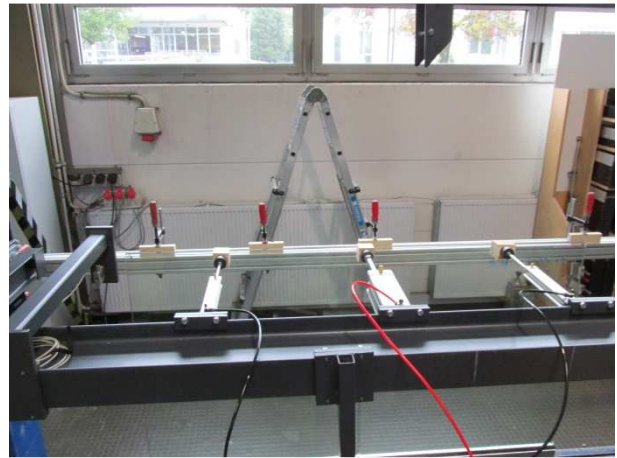
Picture 5 Cross section of the profile



Picture 6 Edge cover



Picture 7 Two Glasses in one Profile



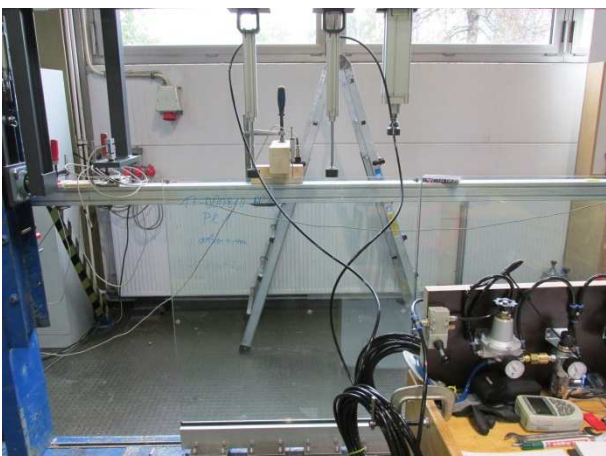
Picture 8 Static horizontal outward test



Picture 9 Deformation under load



Picture 10 Static horizontal inward test



Picture 11 Static vertical test