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TEST REPORT No. 347961

Place and date of issue: Bellaria-Igea Marina - Italia, 27/12/2017

Customer: AKOS DIŞ TICARET LIMITED ŞIRKETI - Fevzi Çakmak Mahallesi, Ayyıldız Caddesi No: 4 - 42050 KARATAY - KONYA - Turkey

Date test requested: 01/11/2017

Order number and date: 74808, 06/11/2017

Date sample received: 08/11/2017

Test date: 15/12/2017

Purpose of test: resistance to horizontal static loading in accordance with standard NF P01-013:1988 and resistance to dynamic impact with a 50 kg soft body in accordance with standard NF P08-301:1991 and UNI EN 14019:2016 of a railing

Test site: Istituto Giordano S.p.A. - Strada Erbosa Uno, 72 - 47043 Gatteo (FC) - Italia

Origin of sample: sampled and supplied by the Customer

Identification of sample received: No. 2017/2558

Sample name*

The test sample is called “ALUSMART A10 SERIE”.

(*) according to that stated by the Customer

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Description of sample*

The test sample consists of a glass railing with the following characteristic:

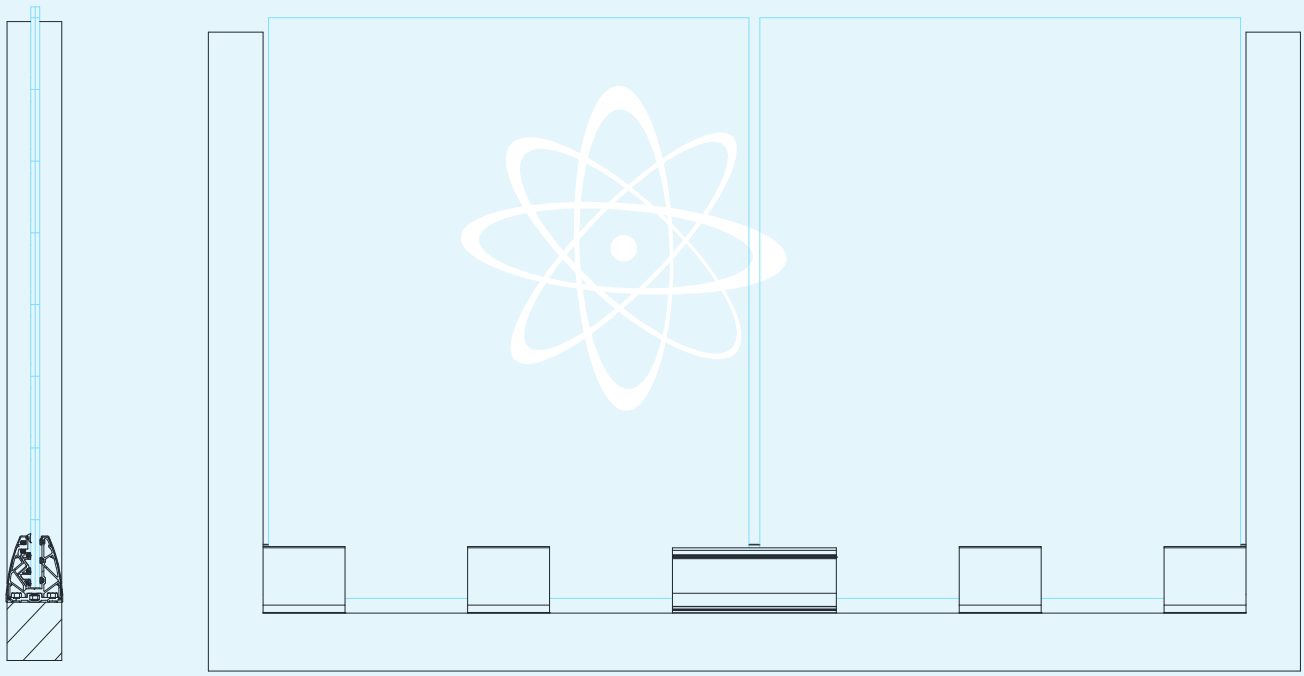
– measured overall width = 1760 mm;

– overall height = 1020 mm.

The glass sheet consists of a laminated glass 88.4 (PVB).

Further details of sample specifications can be seen in Customer-supplied schematic drawings shown hereafter.

SAMPLE ELEVATION AND VERTICAL SECTION



(*) according to that stated by the Customer

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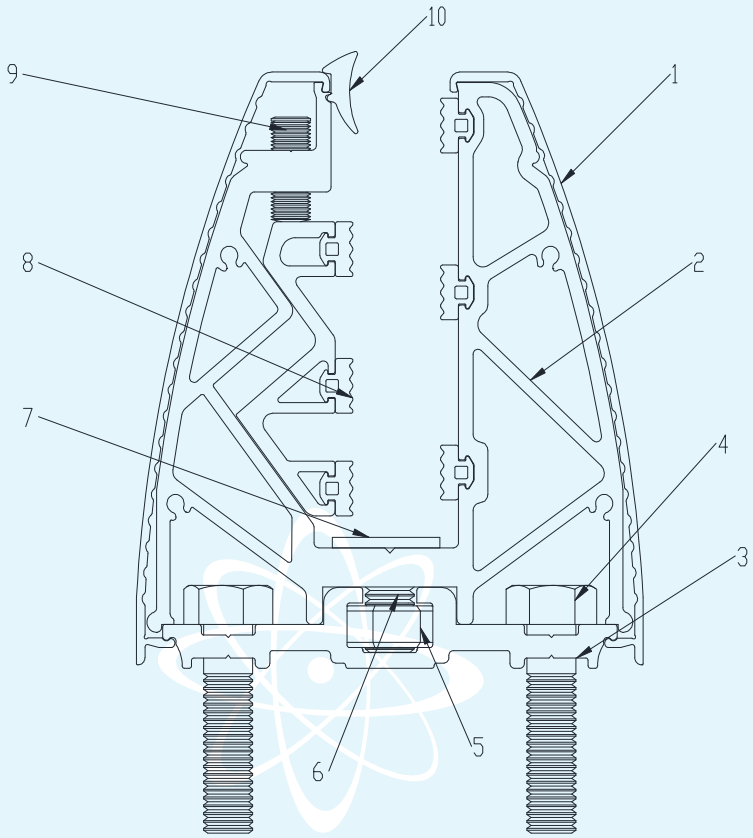
VERTICAL SECTION



Key

Symbol	Code	Description
1	2986	cover profile
2	500-101 / 500-102	glass base set 15 cm / 30 cm
3	2987	base line profile
4	500-014	8 metric anchor 15 cm
5	10-002-009	nut
6	10-001-018	screw
7	10-002-010	plastic for bottom of glass
8	10-002-007	rubber for glass holder
9	10-001-017	M8 / 25 mm stay bolt
10	500-001	rubber

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Photograph of the sample

Normative references

The test was carried out in accordance with the requirements of the following standards:

- NF P01-013:1988 dated August 1988 "Essais des garde-corps. Méthodes et critères" *("Railing tests. Methods and criteria")*;
- NF P08-301:1991 dated April 1991 "Ouvrages verticaux des constructions - Essais de résistance aux chocs - Corps de chocs - Principe et modalités générales des essais de choc" *("Vertical building elements - Impact resistance tests - Impact bodies - Impact test principle and general methods")*;
- UNI EN 14019:2016 dated 21/07/2016 "Facciate continue - Resistenza all'urto - Requisiti prestazionali" *("Curtain Walling - Impact resistance - Performance requirements")*, except for the drop heights.

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Test apparatus

Resistance to static loading

The following equipment was used to carry out the resistance to static loading test:

- steel frame simulating actual installation of the sample on the floor (apparatus in-house identification code: EDI048);
- set of steel masses for static load test;
- 3 GEFRAN S.p.A. electronic displacement transducer model "PZ-34-S150" for measuring deflection, (apparatus in-house identification codes: FT451/1, FT451/2 and FT451/3);
- Mitutoyo IDF Digimatic Indicator complete with calibration report issued by Istituto Giordano S.p.A.;
- AEP Transducers 100 kg load cell (apparatus apparatus in-house identification code: EDI107);
- metric ruler (apparatus in-house identification code: EDI083);
- digital thermo-hygrometer (apparatus in-house identification code: EDI111).

Resistance to dynamic load

The following equipment was used to carry out the resistance to dynamic load test:

- impactor (apparatus in-house identification code: EDI012) complying with standard UNI EN 12600:2004 dated 01/09/2004 "Glass in building - Pendulum test - Impact test method and classification for flat glass", overall mass 50 kg;
- spheroconical bag, diameter 0,40 m and height 0,60 m, filled with hardened glass beads, diameter 3 mm, until reaching a total mass of 50 kg (apparatus in-house identification code: EDI062).

Test method

The sample, secured to the floor, was subjected to the following test.

Outward horizontal static loading (without uprights)

With just underside secured to the floor, the sample was subjected to a load distributed uniformly over three points on the handrail in accordance with figure 2 "Garde-corps sans potelets, ancrés au niveau de l'appui" *("Railings without posts anchored at the base")* of standard NF P01-013:

- 1,3 kN preload applied gradually until reaching the present value and maintained for 3 min;

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- removal of load and resetting of gauge;
- 1,3 kN horizontal static load applied gradually until reaching the present value and maintained for 60 s, following which deflection whilst loaded was measured;
- removal of load and recording of permanent deflection after 3 min;
- 2,21 kN horizontal static safety load with aluminum coefficient 1,7, applied and maintained for 5 min, following which deflection whilst loaded was measured;
- removal of safety load and recording of permanent deflection after 3 min and verification of permissible permanent deflection “a” in mm following removal of safety load using the following equation:

$$a \leq \frac{8 \cdot X}{1000}$$

where: X = height of sample from fixing point in mm.

Resistance to dynamic loading

With just underside secured to the test rig, the sample underwent in sequence:

- impact in accordance with standard NF P08-301:1991, with energy of 600 J (0,50 kN × 1,20 m);
- impact and classification in accordance with standard UNI EN 14019:2016, with energy of 475J (0,50 kN × 0,95 m).

All impacts were made by releasing the impactors so that they fall from a specified height with a pendulum movement and without initial velocity. The impactors were hung by an inextensible pendulum wire of negligible mass so that when at rest they made contact with the point of intended impact. After each impact, the impactors were prevented from hitting the sample again after bouncing.

Environmental conditions at the time of testing

Room temperature	(20 ± 2) °C
Relative humidity	(43 ± 5) %

Test observers

The test was attended by Mr. Osman Özgül for Akos.

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Test results

Resistance to outward horizontal static loading of handrail

Applied load (clause 2.2.1.2 of standard NF P01-013) [kN]	**Deflection whilst loaded** [mm]	**Permanent deflection** [mm]	**Maximum permanent deflection**** [mm]	**Result**
1,30	32	1	//	//
2,21*	67	1	8	pass

(*) safety load with aluminum coefficient 1,7;

(**) permissible permanent deflection “a” calculated in accordance with 2.2.1.2.4 “Déformation admissible des garde-corps métalliques” *(“Permissible deflection of metal railings”)* of standard NF P01-013.

Photograph of the sample during resistance to horizontal static loading test

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Dynamic loading in accordance with standard NF P08-301:1991

Impact area	Drop height [m]	Energy [J]	Result
centre of infill	1,2	600	no damage*

(*) No falling fragments that could cause personal injury were found below.

No gaps were formed between the bars of sufficient size to allow the passage of the gauge specified in figure 7 of standard NF P01-013.

No sample performance loss compared to design specifications was witnessed.

Photograph of the sample after impact

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Dynamic loading in accordance with standard UNI EN 14019:2016.

Impact area	Drop height [mm]	Energy [J]	Result
on the upper edge of the glass	950	475	no damage (*)
centre of infill	950	475	no damage (*)

(*) No falling fragments that could cause personal injury were found below.

Findings

According to the test performed, and according to what indicated in standards NF P01-013, NF P08-301 and UNI EN 14019:2016, the test sample, comprising a glass railing, called “ALUSMART A10 SERIE” and submitted by the company AKOS DIŞ TICARET LIMITED ŞIRKETI - Fevzi Çakmak Mahallesi, Ayyıldız Caddesi No: 4 - 42050 KARATAY - KONYA - Turkey, obtains the results reported in the following table.

Test	Use	Result
Outward horizontal static loading	Private (1,3 kN)	Compliant
Dynamic impact NF P08-301:1991	//	Compliant
Dynamic impact UNI EN 14019:2016	//	Compliant (class I5)

The results given refer exclusively to the test sample itself and are only valid under the same conditions in which testing was carried out.

Test Technician
(Dott. Andrea Bruschi)

Head of
Security and Safety Laboratory
(Dott. Andrea Bruschi)

Chief Executive Officer
(Dott. Nazario Giordano)