ISTITUTO GIORDANO

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Organismo Europeo notificato n. 0407

TEST REPORT No. 294030

Place and date of issue: Bellaria-Igea Marina - Italia, 27/04/2012

Customer: BTS ALÜMİNYUM METAL ve PVC SAN. ve TİC.LTD.ŞTİ Mermerciler San. Sit. 7.Cad. No:6 - BEYLIKDÜZÜ / İSTANBUL - Türkiye

Date testing requested: 02/05/2012

Order number and date: 56214, 02/05/2012

Date sample received: 30/03/2012

Date of testing: 17/04/2012

Purpose of test: Resistance to horizontal static loading of a railing in accordance with standard NF P01-013:1988 and resistance to dynamic impact in accordance with standard NF P08-301:1991 and standard UNI 10807:1999

Place of testing: Istituto Giordano S.p.A. - Via Erbosa, 72 - 47043 Gatteo (FC) - Italia

Origin of sample: sampled and supplied by the Customer

Identification of sample received: No. 2012/0679

Name of sample*

The test sample is called "C50 - HANDRAIL SYSTEM MADE OF GLASS AND ALUMINUM".

(*) according to that stated by the Customer

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Description of sample*

The test sample consists of an aluminum and glass railing, customs code 76169990, with the following dimensions:

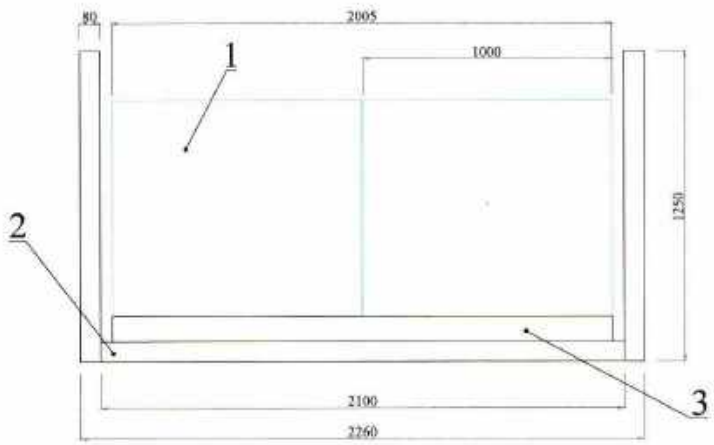
- overall width = 2500 mm;
- overall height = 1000 mm.

The sample is made up of:

- 2 panels of laminated tempered glass 8+8+1,50;
- glass support, length 150 mm and height 100 mm, consisting in 4 aluminum profiles and 1 aluminum profile, length 300 mm and height 100 mm;
- aluminum frame.

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

SAMPLE DRAWING



Key

Symbol	Description
1	Laminated and tempered glass, overall thickness 16 mm (8+8+1,50) and width 1000 mm
2	Aluminum support for glass
3	Iron "U" shape

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(*) according to that stated by the Customer

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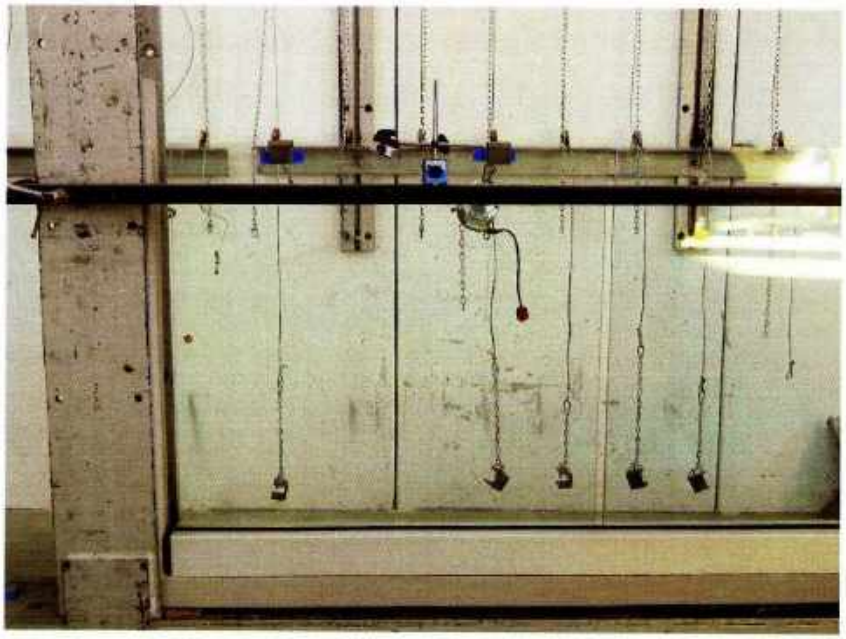
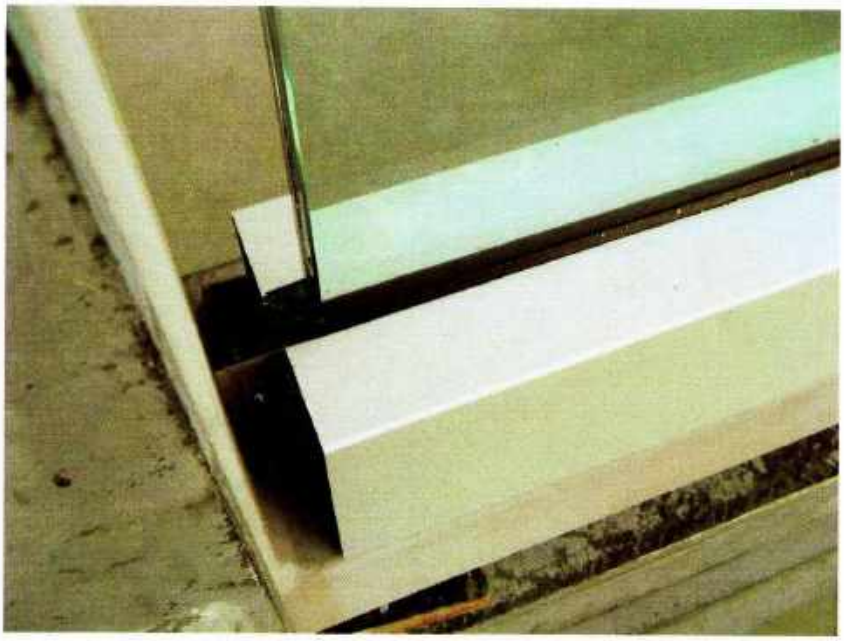


Sample photograph.



Close-up.

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Normative references

Test was carried out according to the requirements of the following standards:

- NF P01-013:1988 dated August 1988 "Essais des garde-corps. Méthodes et critères";
- 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";
- UNI 10807:1999 dated 31/011999 "Ringhiere, balaustre o parapetti prefabbricati - Determinazione della resistenza meccanica ai carichi dinamici".

Test apparatus

Resistance to static loading

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

- steel frame simulating actual mounting of the sample to the floor;
- set of weights;
- electronic displacement transducer for measuring deflection complete with calibration report issued by Istituto Giordano S.p.A.;
- AEP 2500 kg loading unit;
- measuring tape.

Resistance to dynamic load

The test was performed using a sphero-conical bag, diameter 400 mm and height 600 mm, filled with hardened solid glass spheres, diameter 3 mm, until reaching 50 kg overall mass, and suspended by an inextensible cable of negligible mass so that when hanging at rest it makes contact with the sample at the desired point of impact.

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Test method

Whilst secured just to the floor, the sample underwent the following tests:

- 1,0 kN/m horizontal static preloading on handrail, totaling 1,3 kN;
- removal of load;
- 1,0 kN/m horizontal static preloading on the upper edge of the glass, totaling 1,3 kN, with recording of deformation;
- horizontal static safety loading on the upper edge of the glass with coefficient of 1,7 for aluminum, totaling 2,21 kN, with recording of deformation;
- verification of maximum permanent set "a" after removal of safety load using the following equation:

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

where: X = height of sample from fixing point;

- dynamic load with 50 kg soft body impact and energy of 600 J (0,50 kN times drop height of 1,20 m);
- dynamic load with 50 kg soft body impact and energy of 150 J (0,50 kN times drop height of 0,30 m).

Environmental conditions at the time of testing

Room temperature	22 ± 2 °C
Relative humidity	45 ± 5 %

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Test results

Horizontal static load

The load was applied at two symmetrical points, a quarter and three-quarters of the way along the upper edge of the glass, whilst deformation was measured halfway along the overall length.

Applied load (clause 2.2.1.2 of standard NF P01-013) [kN]	**Deformation whilst loaded at the handrail midpoint** [mm]	**Permanent set at the handrail midpoint** [mm]	**Maximum allowable permanent set "a"**
1,30	65	1,59	8
2,21	112	3,99	8
PASS permanent set at the handrail midpoint ≤ a			

Sample photograph while testing

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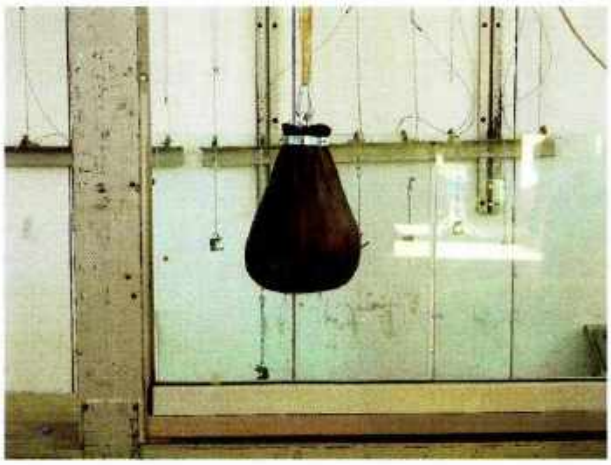
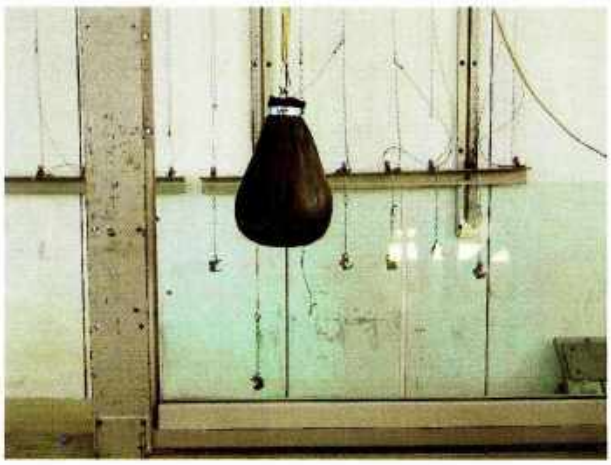
50 kg soft body impact (NF P01-013:1988)

Impact area	Drop height [m]	Energy [J]	Result
centre of the glass	1,2	600	no damage*
midpoint of the upper edge of the glass	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 P01-013:1988.
No sample performance loss was witnessed.



Sample photograph after impact at the centre of the glass



Sample photograph after impact at the midpoint of the upper edge of the glass

Dynamic load with 50 kg soft body according to standard UNI 10807:1999

Impact area	Drop height [m]	Energy [J]	Result
centre of the glass	0,3	150	no sample performance loss was witnessed
midpoint of the upper edge of the glass	0,3	150	no sample performance loss was witnessed

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Findings

In accordance with the test performed, the results obtained and the provisions of standard NF P01-013:1988, the test sample made up of an aluminum and glass railing, called "C50 - HANDRAIL SYSTEM MADE OF GLASS AND ALUMINUM", submitted by the company BTS ALÜMİNYUM METAL ve PVC SAN. ve TİC.LTD.ŞTİ Mermerciler San. Sit. 7.Cad. No:6 - BEYLIKDÜZÜ / İSTANBUL - Türkiye, results

Test	Use	Outcome
horizontal static load	public	compliant
dynamic impact with 50 kg soft body	//	compliant

In accordance with the test performed, the results obtained and the provisions of standard UNI 10807:1999, the test sample made up of an aluminum and glass railing, called "C50 - HANDRAIL SYSTEM MADE OF GLASS AND ALUMINUM", submitted by the company BTS ALÜMİNYUM METAL ve PVC SAN. ve TİC.LTD.ŞTİ Mermerciler San. Sit. 7.Cad. No:6 - BEYLIKDÜZÜ / İSTANBUL - Türkiye, results

Test	Use	Outcome
dynamic impact with 50 kg soft body	public	compliant

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

This test report alone shall not be considered a certificate of conformity.

Test Technician
(Geom. Roberto Porta)

Head of Security and Safety Laboratory
(Geom. Roberto Porta)

Managing Director
L'AMMINISTRATORE DELEGATO
Rag. Angelini Cav. Rosalba