ISTITUTO GIORDANO

LAB N° 0021 L

TEST REPORT No. 372402

Customer

BAROS VISION Ltd

Ulitsa Vladaya, 7 - 4000 PLOVDIV - Bulgaria

Item*

railing named "RAILING SYSTEM BV 9900 TOP MOUNTING"

Activity

resistance to outward horizontal static loading and resistance to dynamic impact with a 50 kg soft body in accordance with standards NF P01-013:1988 and NF P08-301:1991

Results

Test	Result
outward horizontal static loading for use public (1,0 kN/m)	**compliant**
dynamic impact with 50 kg soft body	**compliant**

(*) according to that stated by the customer.

Bellaria-Igea Marina - Italy, 22 June 2020

Chief Executive Officer
(Dott. Arch. Sara Lorenza Giordano)

Firmato digitalmente da SARA LORENZA GIORDANO

Order:
84271

Item origin:
sampled and supplied by the customer

Identification of item received:
2020/1039/A dated 25 May 2020

Activity date:
10 June 2020

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

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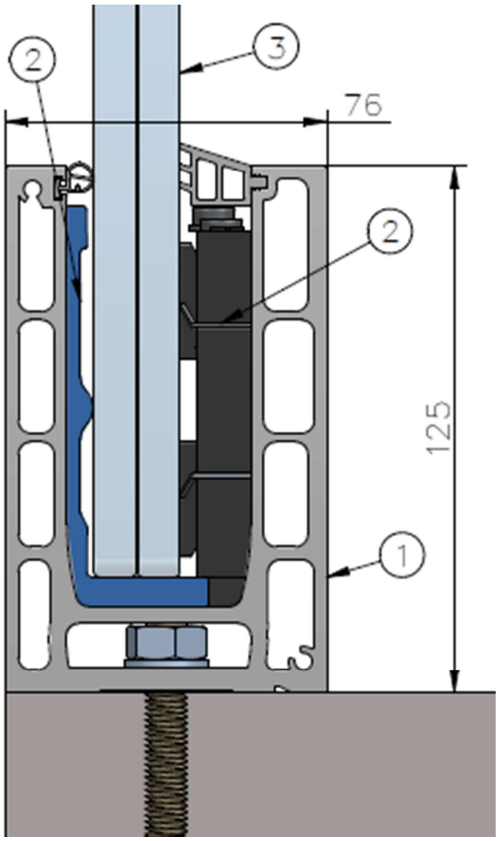
Description of item*

The item under examination consists of laminated tempered glass railing with aluminium structure, having the following characteristics:

Overall width	1000 mm
Overall height from floor	1100 mm
Glass type	laminated glass 88.2 (tempered + PVB +tempered)
Dimensions of glass	1000 mm × 1073 mm
Nominal thickness of glass	16,76 mm
Nominal section of aluminium profile	76 mm × 125 mm

Further details of item specifications can be seen in customer-supplied schematic drawing shown below.

CROSS SECTION OF ALUMINIUM PROFILE SUPPLIED BY THE CUSTOMER



Code	Description
1	Aluminium profile BV 9900
2	Adjustable mechanism made of PVC
3	Glass 88.2 (tempered with PVB)

(*) according to that stated by the customer; Istituto Giordano declines all responsibility for the information and data provided by the customer that may influence the results.

Photograph of the item

Normative references

Document	Title
NF P01-013:1988	Essais des garde-corps. Méthodes et critères *(Railing tests. Methods and criteria)*
NF P08-301:1991	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")*

Apparatus

Resistance to outward horizontal static loading

Description	In-house identification code
Steel frame simulating actual installation of the item on the floor	EDI048
No. 3 Gefran digital displacement transducers "PZ-34-S150", range of measurement 0 ÷ 150 mm	FT451/1, FT451/2 and FT451/3
Mitutoyo IDF Digimatic Indicator	//
AEP Transducers load cell "TS", range of measurement 0 ÷ 1 kN	EDI107
Würth telescopic measuring rod "mEssfix", range of measurement 0 ÷ 5000 mm and resolution 0,1 mm	EDI083
La Crosse Technology digital thermo-hygrometer "WS8009"	EDI111

Resistance to dynamic impact

Description	In-house identification code
Steel frame simulating actual installation of the item on the floor	EDI048
Soft body consisting of 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 and suspended by an inextensible cable of negligible mass so that when hanging at rest it makes contact with the item at the desired point of impact	EDI062

Method

Test was carried out using detailed internal procedure PP083 in its current revision at testing date.
The item, secured to the floor, was subjected to the following test.

Resistance to outward horizontal static loading

With just underside secured to the floor, the item 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 P01-013:1988:

- preload of 0,7 kN applied gradually until reaching the present value and maintained for 3 min;
- removal of load and resetting of gauge;
- horizontal static load of 1,3 kN (1 kN/m) 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;
- horizontal static safety load of 2,21 kN with coefficient of 1,7 for aluminium, 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 following removal of safety load using the following equation:

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

where: a = permissible permanent deflection following removal of safety load in mm.
X = height of item from fixing point in mm.

Resistance to dynamic impact

With just underside secured to the floor, the item was subjected to a dynamic load with energy of 600 J (0,50 kN × 1,20 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 item again after bouncing.

Environmental conditions

Temperature	(23 ± 2) °C
Relative humidity	(53 ± 5) %

Results

Resistance to outward horizontal static loading

Applied load* [kN]	**Deflection whilst loaded** [mm]	**Permanent deflection** [mm]	**Maximum permanent deflection**** [mm]	**Result**
1,30	87	2,4	//	**//**
2,21***	150	4,5	8,8	**pass**

(*) in accordance with clause 2.2.1.2 "Description de l'essai" *("Description of the test")* of standard NF P01-013:1988.

(**) permissible permanent deflection "a" calculated in accordance with clause 2.2.1.2.4 "Déformation admissible des garde-corps métalliques" *("Permissible deflection of metal railings")* of standard NF P01-013:1988.

(***) safety load with coefficient of 1,7 for aluminium.

Photograph of the item during resistance to outward horizontal static loading test

Resistance to dynamic impact

Impact area	Drop height [m]	Energy [J]	Result
center of the glass	1,2	600	**no damage***
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 item performance loss compared to design specifications was witnessed.

Photograph of the item after impact in the center of the glass

Findings

Test	Result*
outward horizontal static loading for use public (1,0 kN/m)	**compliant**
dynamic impact with 50 kg soft body	**compliant**

(*) the compliance has been determined on the basis of values obtained by measurements during testing in line with clause 2.6 of ILAC-G8:03/2009 "Guidelines on the reporting of compliance with specification", having satisfied the requirements on measurements and equipment defined in the reference normative.

Chief Test Technician
(Dott. Andrea Bruschi)

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