TEST REPORT No. 379540

Customer

BAROS VISION Ltd

Asenovgradsko Shose - 4000 PLOVDIV - Bulgaria

Item*

railing named
"RAILING SYSTEM BV 6500 L TOP MOUNTING"

Activity

resistance to horizontal linear static load according to D.M. 17 January 2018 and standard UNI 10806:1999 and resistance to dynamic load according to standards UNI 10807:1999, NF P01-013:1988 and UNI EN 14019:2016

Results

Test	Normative reference	Requirement	Result
horizontal linear static load	D.M. 17 January 2018	3,0 kN/m	**compliant**
dynamic load	UNI 10807:1999	300 mm	**compliant**
	NF P01-013:1988	1200 mm	**compliant**
	UNI EN 14019:2016	950 mm	**compliant**

(*) according to that stated by the customer.

Bellaria-Igea Marina - Italy, 29 January 2021

Chief Executive Officer
(Dott. Nazario Giordano)

Firmato digitalmente da NAZARIO GIORDANO

Order:
86999

Item origin:
sampled and supplied by the customer

Identification of item received:
2021/0176/C dated 26 January 2021

Activity date:
28 January 2021

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

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Chief Test Technician:
Dott. Andrea Bruschi
Head of Security and Safety Laboratory:
Dott. Andrea Bruschi

Compiler: Paolo Bonito
Reviewer: Dott. Andrea Bruschi

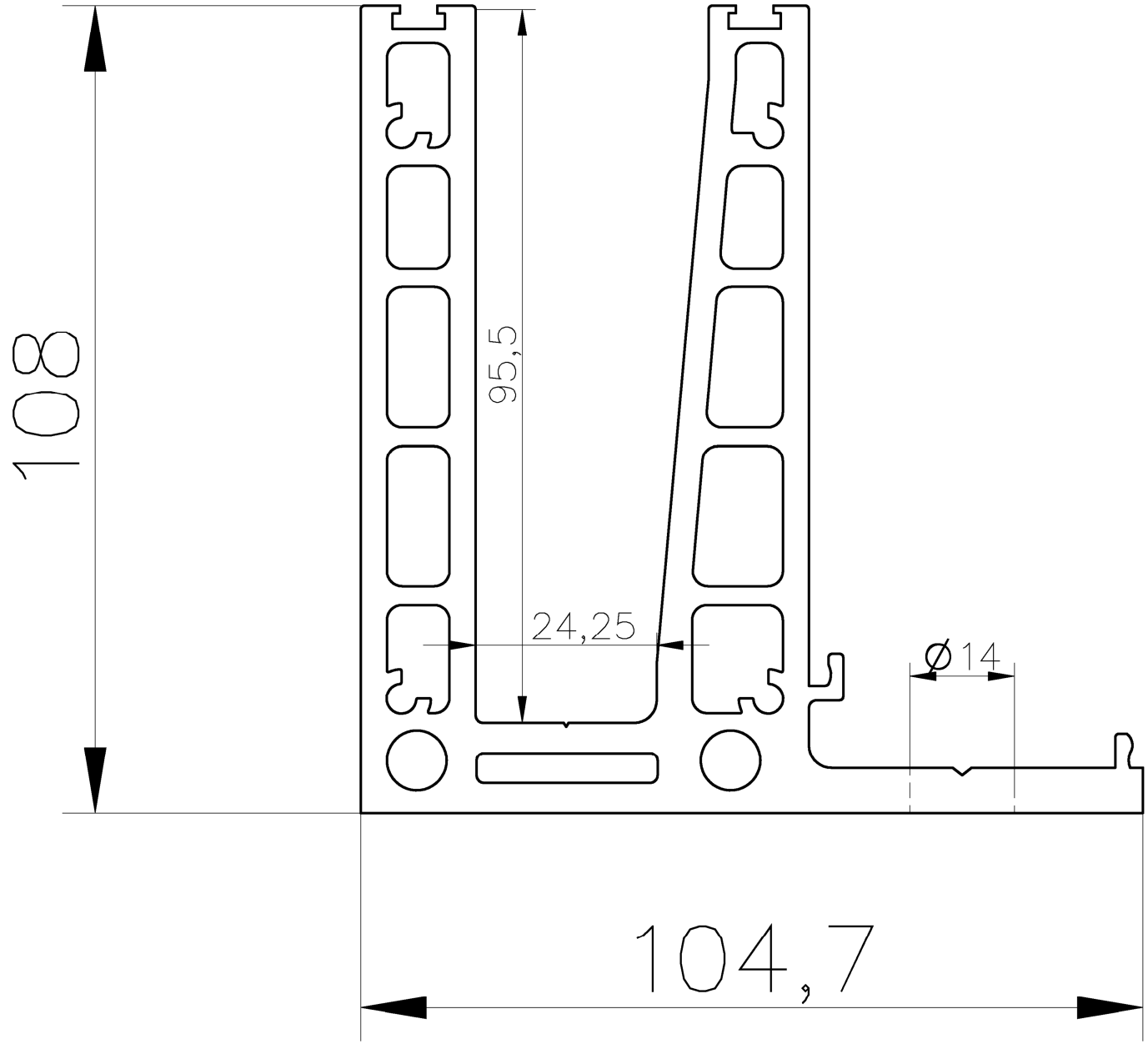
Description of item*

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

Overall width	1000 mm
Overall height from floor	1250 mm
Glass type	laminated glass 1010.2 (tempered + PVB + tempered)
Dimensions of glass	1000 mm × 1230 mm
Nominal thickness of glass	20,76 mm
Nominal section of aluminium profile	104,7 mm × 108 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



(*) 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

Resistance to horizontal linear static load

Document	Title
D.M. 17 January 2018* of Ministry of Infrastructure and Transport	Aggiornamento delle «Norme tecniche per le costruzioni» *(Update to the «Technical standards for construction»)*
standard UNI 10806:1999	Ringhiere, balaustre o parapetti prefabbricati - Determinazione della resistenza meccanica ai carichi statici distribuiti *(Prefabricated railing systems - Determination of the mechanical strength under distributed static loads)*

(*) D.M. = Ministerial Decree.

Resistance to dynamic load

Standard	Title
UNI 10807:1999	Ringhiere, balaustre o parapetti prefabbricati - Determinazione della resistenza meccanica ai carichi dinamici *(Prefabricated railing systems - Determination of the mechanical strength under dynamic load)*
NF P01-013:1988	Essais des garde-corps - Méthodes et critères *(Railing tests - Methods and criteria)*
UNI EN 14019:2016	Facciate continue - Resistenza all'urto - Requisiti prestazionali *(Curtain walling - Impact resistance - Performance requirements)*

Apparatus

Resistance to horizontal linear static load

Description	In-house identification code
steel frame simulating actual installation of the item on the floor	EDI048
pneumatic equipment for the simulation of the static load	//
no. 3 Gefran digital displacement transducers "PZ-34-S150", range of measurement 0-150 mm	FT451/1, FT451/2 and FT451/3
AEP Transducers load cell "TS" with digital indicator "DFI", range of measurement 100-1000 N	EDI104
Borletti digital electronic gauge "CDEP15", range of measurement 0-150 mm and resolution 0,01 mm	EDI066
Mitutoyo Corporation digital meter "TD-S551D1 216-452", range of measurement 0-5,5 m	FT364

Resistance to dynamic load

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	EDI062
Istituto Giordano double pneumatic impactor complying with standard UNI EN 12600:2004 "Vetro per edilizia - Prova del pendolo - Metodo della prova di impatto e classificazione per il vetro piano" *("Glass in building - Pendulum test - Impact test method and classification for flat glass")*, total mass 50 kg	EDI012
Würth telescopic measuring rod "mEssfix", range of measurement 0-5000 mm and resolution 0,1 mm	EDI083

Method

Test was carried out using detailed internal procedure PP083 in its current revision at testing date.

Resistance to horizontal linear static load

The test was performed according to the test method required by standard UNI 10806:1999, but using the book values of the table 3.1.II "Valori dei sovraccarichi per le diverse categorie d'uso delle costruzioni" *("Overload values for the different categories of use of buildings")* shown in the clause 3.1.4. "Sovraccarichi" ("*Overload*") of the annex to the D.M. 17 January 2018.

The bottom side of the item was frontally fixed to the steel frame simulating the actual installation of the item.

The three digital displacement transducers were positioned on the item in order to read the relative displacement of the upper edge of the glazing, two at the ends of the object (points "A" and "C") and one in the middle between them (point "B").

The item was subjected to operative horizontal linear static load apportioned as defined by the Costumer, on the upper edge of the glazing.

It was applied a preload in a progressive manner, on the horizontal direction towards the outside, amounting to 50 % of the expected load for the test, keeping it for 5 min.

After removal of the preload, it was registered the position of the upper edge of the plate (at the ends and in the midpoint of the upper edge) with respect to a fixed reference of the test bench so as to detect the relative displace-

ment during and after the application of the load. Then it has been proceeded to the application of the test load in a progressive manner (with a time of not less than 5 s).
Once reached the test load, it was maintained for at least 15 min, recording then the deformation under load. Afterward the load was progressively removed down to zero. The residual deformations were recorded after a wait of at least 5 min.
In particular it has been carried out the following test sequence:

- pre-load equal to 50 % of the load defined by the customer;
- removal of the preload and detection of the initial position of the edge of the plate;
- application of the load defined by the customer for 15 min and recording the deformations under load;
- load removal and registration of residual deformation after 5 min.

Subsequently the load has been increased according to customer's specifications in order to check the maximum load.

Resistance to dynamic load

With both bottom and sides secured to the test rig, the item underwent in sequence:

- impact test according to standard UNI 10807:1999;
- impact test according to standard NF P01-013:1988;
- impact test according to standard UNI EN 14019:2016.

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	(14 ± 2) °C
Relative humidity	(55 ± 5) %

Results

Resistance to horizontal linear static load

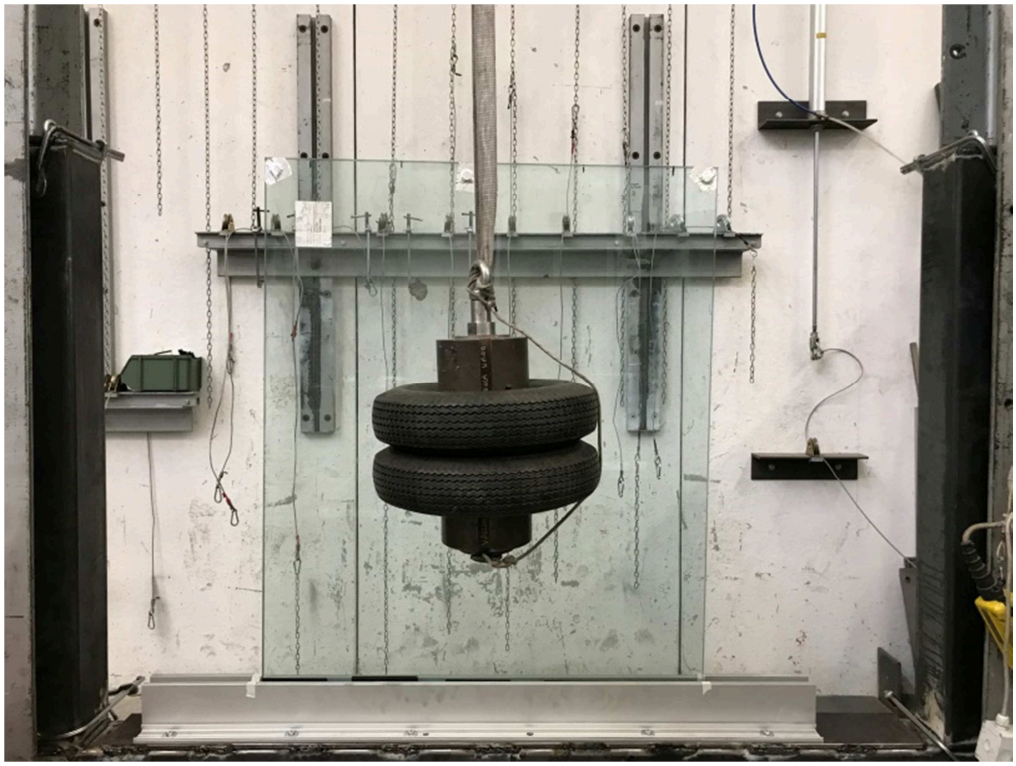
Applied load	Deflection whilst loaded			Permanent deflection			Result
	in point "A"	in point "B"	in point "C"	in point "A"	in point "B"	in point "C"	
[kN/m]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
3,0	91	90	91	4,8	4,6	4,8	no damage

Resistance to dynamic load

Standard	Impact area	Drop height [mm]	Nominal energy [J]	Result
UNI 10807:1999	centre of glazing	300	150	no damage
NF P01-013:1988	centre of glazing	1200	600	no damage
UNI EN 14019:2016	centre of infill	950	466	no damage

Photograph of the item undergoing horizontal linear static load

Photograph of the item after impact on the centre of the glazing with dynamic load according to standards UNI 10807:1999 and NF P01-013:1988



Photograph of the item after impact on the centre of the glazing with dynamic load according to standard UNI EN 14019:2016

Findings

Test	Normative reference	Requirement	Result*
horizontal linear static load	D.M. 17 January 2018	3,0 kN/m	**compliant**
dynamic load	UNI 10807:1999	300 mm	**compliant**
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(*) the compliance has been determined on the basis of values obtained by measurements during testing in line with clause 4.2.1 "Decision Rules" of ILAC-G8:09/2019 "Guidelines on Decision Rules and Statements of Conformity", 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)