ISTITUTO GIORDANO

LAB N° 0021 L

TEST REPORT No. 378567

Customer

PCA S+A - PAPADOPOULOS OVEE

Industrial Area of Thessaloniki, Block 38 - 57022 SINDOS - Greece

Item*

railing with glass infill named "M17 88.4 PVB"

Activity

resistance to horizontal linear static load and dynamic load in accordance with standard UNI 11678:2017/EC 1-2017/EC 2-2020

Results

Test	Reference document	Requirement	Result
horizontal linear static load	UNI 11678:2017 and D.M. 17 January 2018	1,0 kN/m	**compliant**
hard body dynamic load	UNI 11678:2017	1020 mm	**compliant**
semi-rigid body dynamic load	UNI 11678:2017	700 mm	**compliant****

(**) compliant with the intended use indicated in table 5 "Altezze di caduta in funzione della destinazione d'uso" *("Fall heights depending on the intended use")* of the UNI 11678:2017 standard relating to the height of fall adopted.

(*) according to that stated by the customer.

Bellaria-Igea Marina - Italy, 22 December 2020

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

Firmato digitalmente da SARA LORENZA GIORDANO

Order:
86421

Item origin:
sampled and supplied by the customer

Identification of item received:
2020/2836/A dated 17 December 2020

Activity date:
21 December 2020

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

Contents **Page**

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Head of Security and Safety Laboratory:
Dott. Andrea Bruschi

Compiler: Paolo Bonito
Reviewer: Dott. Andrea Bruschi

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Registro Imprese della Romagna - Forlì-Cesena e Rimini n. 00 549 540 409

Description of item*

The item consists of a glass/aluminum railing without handrail with the following characteristics:

Measured overall width	1100 mm
Measured effective height	1100 mm

The glass type is laminated glass, overall nominal thickness 17,52 mm, made of:

- tempered glass, nominal thickness 8 mm;
- PVB, , nominal thickness 1,52 mm;
- tempered glass, nominal thickness 8 mm.

Further details of item specifications in annex "A".

Photograph of the item

(*) according to that stated by the customer, apart from characteristics specifically stated to be measurements; Istituto Giordano declines all responsibility for the information and data provided by the customer that may influence the results.

Normative references

Document	Title
standard UNI 11678:2017	Vetro per edilizia - Elementi di tamponamento in vetro aventi funzione anticaduta - Resistenza al carico statico lineare ed al carico dinamico - Metodi di Prova *(Glass in building - Glass infill panels serving as safety parapet - Resistance to horizontal static linear load and dynamic load - Test methods)*
EC 1-2017 UNI 11678:2017	//
EC 2-2020 UNI 11678:2017	//
D.M. 17 January 2018 of the Ministry of Infrastructure and Transport	Aggiornamento delle «Norme tecniche per le costruzioni» *(Update of «Technical standards for construction»)*

Equipment

Resistance to horizontal linear static load

Description	In-house identification code
test rig simulating actual mounting of the item on the floor slab	EDI048
No. 3 Gefran "PZ-34-S150" linear displacement transducers, measuring range 0-150 mm	FT451/1, FT451/2 and FT451/3
AEP Transducers "TS" load cell with "DFI" digital force indicator, measuring range 100-1000 N	EDI104
Borletti "CDEP15" digital calliper gauge, measuring range 0-150 mm and resolution 0,01 mm	EDI066
tungsten-carbide cone-shaped hammer, mass 75 g	//
Mitutoyo Corporation "TD-S551D1 216-452" digital tape measure, measuring range 0-5,5 m	FT364

Resistance to dynamic load

Description	In-house identification code
test rig simulating actual mounting of the item on the floor slab	EDI048
hard body comprising a tempered-steel ball complying with clause 6.3.1 "Impattatore" *("Impactor")* of UNI 11678:2017 standard, total mass 1 kg	EDI009
Istituto Giordano dual-tyre semi-rigid body complying with clause 6.4.1 "Impattatore" *("Impactor")* of UNI 11678:2017 standard, total mass 50 kg	EDI012
Würth "mEssfix" telescopic measuring rod, measuring rang 0 ÷ 5000 mm and resolution 0,1 mm	EDI083
round steel block, diameter 100 mm	//

Method

The test was carried out using detailed internal procedure PP083 in the current revision at the time of testing, according to the method specified by standard UNI 11678:2017 for group 1 functional configuration, using the load values of 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")* given in clause 3.1.4 "Sovraccarichi" *("Overloads")* of annex of D.M. 17 January 2018.
Just the underside of the item was fixed to the test rig in order to reproduce actual installation conditions.

Test procedure

Normative references	Activity	Description
clause 5 "Determinazione della resistenza al carico statico lineare" *("Determination of resistance to linear static load")* of UNI 11678:2017 standard	horizontal linear static load	Three linear displacement transducers were positioned in such a way as to measure the relative displacement of the infill panel top edge (two at the ends and one at the mid-point between them) before performing the following test sequence: – preload, representing 30 % of the maximum working load, for 5 min; – preload removal and linear displacement transducer set to zero; – maximum working load for 5 min and recording of deflection; – load removal and recording of permanent deformation after 15 min; – ultimate load of for 5 min and load removal; – induced breakage of a directly-loaded glass panel; – collapse load, representing 30 % of the maximum working load, for 1 min.
clause 6 "Determinazione della resistenza meccanica a carico dinamico" *("Determination of mechanical resistance under dynamic load")* of UNI 11678:2017 standard	dynamic load	– 1 kg hard body impacts; – 50 kg semi-rigid body impacts.

Environmental conditions

Atmospheric pressure	(1010 ± 50) mbar
Temperature	(16 ± 2) °C
Relative humidity	(55 ± 5) %

Results

Resistance to horizontal linear static load

Load step	Load [kN/m]	Duration [min]	Deflection at the measuring points A [mm]	B [mm]	C [mm]	Maximum permissible deflection [mm]	Effect
preload	0,3	5	//	//	//	//	no damage
working load	1,0	5	94,8	96,4	95,2	≤ 100	no damage
load removal	0,0	//	6,3	6,3	6,3	≤ 10	//
ultimate limit state	1,5	5	//	//	//	//	no damage
breakage of laminated glass panel inner pane							
collapse load after breakage	0,3	1	//	//	//	//	no collapse

Photograph of item during resistance to ultimate limit state loading test

Photograph of item subjected to post-breakage load

Resistance to dynamic load

Impact type	Impact area	Drop height [mm]	Impact energy [J]	Effect
hard body	100 mm from top edge at mid-width	1020	10	no glass fragmentation
	at centre of infill	1020	10	no glass fragmentation
	near to a fixing point	1020	10	no glass fragmentation
semi-rigid body	100 mm from top edge at mid-width	700	600	no glass fragmentation
	at centre of infill	700	600	no glass fragmentation
	250 mm from the corner along the bisectors	700	600	no glass fragmentation

Photograph of item after hard-body impact in the centre of glass

Photograph of item after semi-rigid impact in the centre of glass

Findings

Test	Reference document	Requirement	Result*
horizontal linear static load	UNI 11678:2017 and D.M. 17 January 2018	1,0 kN/m	**compliant**
hard body dynamic load	UNI 11678:2017	1020 mm	**compliant**
semi-rigid body dynamic load	UNI 11678:2017	700 mm	**compliant****

(*) compliant with normative requirements determined on the basis of values obtained by measurement, in line with clause 2.6 of guidelines ILAC-G8:03/2009 "Guidelines on the reporting of compliance with specification", having met the requirements specified in standard UNI 11678:2017 regarding measurements and equipment.

(**) compliant with the intended use indicated in table 5 "Altezze di caduta in funzione della destinazione d'uso" *("Fall heights depending on the intended use")* of the UNI 11678:2017 standard relating to the height of fall adopted.

As requested by k) of clause 7 "Rapporto di prova" *("Test Report")* of UNI 11678:2017 standard, it is hereby declared that: "Questo rapporto di prova non rappresenta una valutazione di idoneità all'uso né un certificato di conformità del prodotto. I risultati ottenuti si riferiscono unicamente all'oggetto sottoposto a prova e descrivono il comportamento del prodotto nelle specifiche condizioni di prova" *("This test report does not represent type approval or certification of the product. The results obtained refer exclusively to the test item and describe product behaviour under the specified test conditions")*.

Chief Test Technician
Dott. Andrea Bruschi)

Andrea Bruschi

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

Andrea Bruschi

ANNEX "A"
TO TEST REPORT No. 378567

Customer

PCA S+A - PAPADOPOULOS OVEE

Industrial Area of Thessaloniki, Block 38 - 57022 SINDOS - Greece

Item*

railing with glass infill
named "M17 88.4 PVB"

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schematic drawings relating to the item provided by the customer

(*) according to that stated by the customer.

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This annex consists of 4 pages.

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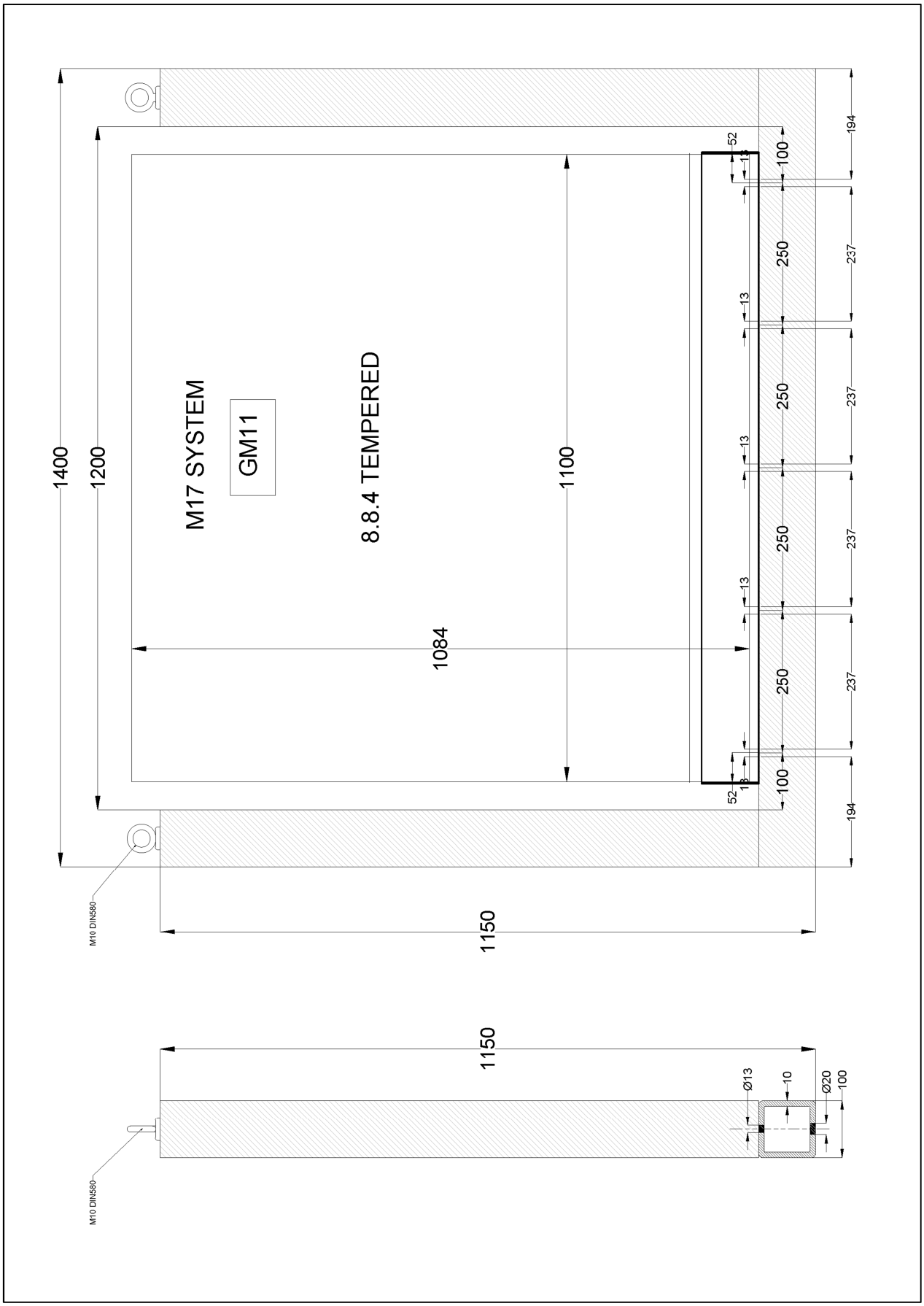
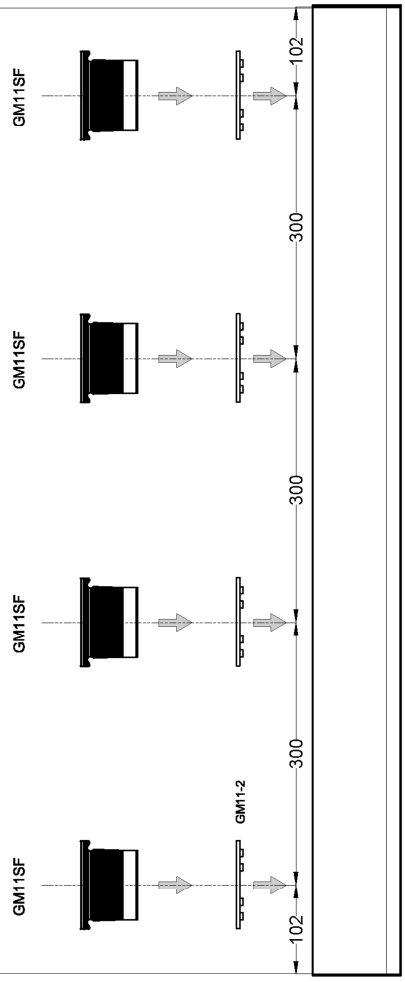

M17 SYSTEM
GM11
8.8.4 TEMPERED
1400
1200
1100
1084
1150
1150
52
13
100
250
237
194
M10 DIN580
M10 DIN580
Ø13
10
Ø20
100

M17 SYSTEM

GM11

8.8.4 TEMPERED



M17 RAILING SYSTEM

8+8 GLASS