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Bellaterra : May 6, 2015  
File number : **15/10088-585**  
Petitioner's reference : **COMENZA, S.L.**  
CIF: B-83900670  
Avda. Benigno Rivera, 100  
Pol. Industrial Ceao  
27007 – LUGO

## TEST REPORT

### **ISSUE REQUESTED:**

On 20 March 2015 LGAI-Applus received a Railing on which the following tests were to be performed:

- Horizontal outward push test, in accordance with section 3.2.2 of DB SUA-1 and section 3.2 of DB-SE-AE of the Spanish Technical Building Code.

### **TEST STANDARD USED:**

UNE 85-238-91: Railings. Test methods.

### **PRODUCT TESTED**

Test performed on a railing with the reference **GlassFit mod. CC-780**, with a length of 1200 mm and height of 1100mm above the surface, anchored at the base on two points with a separation of 700 mm, for upper mounting, formed by an 8+8 mm tempered laminated glass sheet with a length of 1200 mm and a height of 1040 mm anchored at the base by two points with a separation of 700 mm.

2 M12 threaded rods were delivered together with the railing, and a tube of FIS VS LOW SPEED 300T injection mortar, for chemical anchoring to the concrete surface.

The tested sample was delivered to the premises of APPLUS-Bellaterra and installed by laboratory staff.

**TEST DATE:** May 5, 2015.

**RESULTS:** See attached pages.

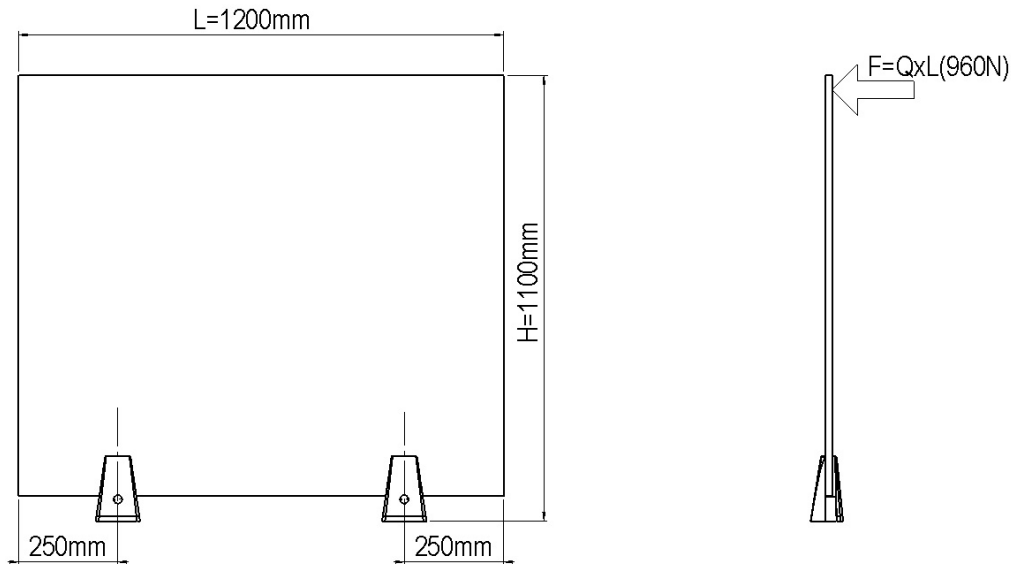
Responsible for Construction Materials  
LGAI Technological Center S.A.

Technician Responsible  
LGAI Technological Center S.A.

The results included in this document refer exclusively to the indicated materials and has been tested according to the specifications given.

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**SKETCH OF THE RAILING SUPPLIED BY THE PETITIONER:**



Horizontal load, equally distributed in accordance with the Spanish Technical Building Code (kN/m)	Q	0,8
Railing system length (m)	L	1,2
Total load applied to the railing system (kN)	F=QxL	0,96
Useful height of the railing (m)	H	1,1

A specification of the components and geometric definition of the tested railing are shown in the following table:

<b>RAILING COMPONENTS</b>	
Glass dimensions (length x width) (mm)	1200 x 1040
Type of glass and thickness	8+8 mm tempered laminated glass
Anchors	2 M12 threaded rods and FIS VS LOW SPEED 300T injection mortar for chemical anchoring
Total railing height (from ground level) (mm)	1100
Total railing width (mm)	1200
Type of surface to which the railing is anchored	Mass concrete

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**RESULTS:**

**Horizontal outward push test.**

**In accordance with section 3.2.2 of DB SUA-1 and section 3.2 of DB-SE-AE of the Spanish Technical Building Code.**

The upper edge of the railing was submitted to an outward static stress higher than the normal stress in use.

In this specific case, the petitioner asked for a force of 0.8 kN/m to be applied (0.96 kN), corresponding to the one requested for the following use categories pursuant to table 3.3 of section DB-SE-AE of the Spanish Technical Building Code:

Use category		Use subcategory		Horizontal force (kN/m)
A	Residential areas	A1	Homes and rooms in hospitals and hotels	0,8
		A2	Lumber rooms	
B	Office areas			
C	Public areas (except for surfaces belonging to categories A, B and D)	C1	Areas with tables and chairs	
		C2	Areas with fixed seats	
D	Commercial areas	D1	Commercial establishments	
		D2	Supermarkets, hypermarkets or large department stores	
G	Roofs accessible only for maintenance purposes	G1	Roofs with a slope less than 20° Light-weight purlin roofs (with no slab)	
		G2	Roofs with a slope greater than 40°	

According to section 3.2. DB SE-AE of the Spanish Technical Building Code, the structure of the railings, parapets, low walls or protective railings on terraces, viewpoints, balconies or stairs must be able to withstand an equally-distributed horizontal load that corresponds to their use category and subcategory.

The load is applied for a period of 3 minutes and then the permanent deformation of the railing is measured after eliminating the load at the centre of its length and at the height of the upper edge.

<b>HORIZONTAL OUTWARD LOAD (LOAD 0.8 KN/m)</b>	Deformation under load (mm): 56,96mm Residual deformation (mm): 1,86mm
	Under the use load, the railing presented no irregularities that could affect its functionality or stability.
<b>IT IS COMPLIANT with the requirements of section 3.2 DB SE-AE of the Spanish Technical Building Code.</b>	
For use categories /subcategories that require a resistance of up to 0.8 kN/m	

Likewise, the UNE 85238:1991 standard for railings indicates that the test is considered satisfactory if:

- after discharging the load of use, the railings, without pillars, have a residual deformation of no more than 1 mm in the case of ferrous materials and 3 mm in the case of other materials.
- the railing shows no irregularity when subject to the use load during the test that could affect its stability or resistance during use.

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## **CONCLUSIONS**

***The tested railing IS COMPLIANT WITH THE SPANISH TECHNICAL BUILDING CODE SPECIFICATIONS (DB SU-1 and DB SE-AE ) for the following uses (as set out in section 3.2 and table 3.3 of section DB-SE-AE of the Spanish Technical Building Code):***

- *A: Residential areas*
- *B: Office areas*
- *C1: Areas with tables and chairs accessible by the public*
- *C2: Areas with fixed seats accessible by the public*
- *D: Commercial areas*
- *G: Roofs accessible only for maintenance purposes*



Appearance after horizontal outward push

### **Quality Assurance Service**

Applus+, ensures that this work has been done within the requirements of our Quality System and Sustainability, having fulfilled the contractual and legal regulations.

As part of our improvement program, please let us pass on any comments they consider appropriate, contact the person responsible for signing that letter, or the Director of Quality of Applus+, at: [satisfaccion.cliente@appluscorp.com](mailto:satisfaccion.cliente@appluscorp.com)