

Bellaterra, December 28th, 2018

Test Report nº: **19/18635-0005**

Petitioner: **Q-RAILING EUROPE GMBH & CO. KG**
Marie Curie Straße, 8-14
D-46446 EMMERICH AM RHEIN (GERMANY)

TEST REPORT

1.- TESTED SAMPLES:

A railing for the protection of falls, of permanent use in building works formed by two lower profiles made of extruded aluminum and which must be firmly anchored to the building structure, a double laminated (tempered) glass unit inserted in the metal profiles. The system is fit to receive different thicknesses and laminated glass compositions.

The manufacturer distinguishes the models of its rails by families according to the section and dimensions of the metallic profile used, its type of placement on site and the possibility of adjustment in inclination, where appropriate.

The model that concerns us corresponds to the family:

EASY GLASS AIR

Which is intended for anchoring on the upper surface of the floor.

2.- TEST REQUESTED:

2.1.-) First, is requested the verification of the Spain mandatory standard for railings according the class of resistance named "Código Técnico de la Edificación (CTE) Documento Básico de Seguridad de Utilización y Accesibilidad, Sección SUA 1 Seguridad frente al riesgo de caídas, Apartado 3.2 Desniveles, características de las barreras de protección, Sub-apartado 3.2.2. Resistencia".

2.2.-) Second, also is requested the dynamic impact test for railings according the standard UNE 85-238-91: Barandillas. Métodos de ensayo

The results reflected in this report refer only to the sample tested and under the conditions indicated in the standards or test methods cited in this document. LGAI Technological Center, S.A. is not responsible for the documentation provided by the applicant.

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3.- RAILING IDENTIFICATION:

<p>SKETCH</p>	
<p>ALUMINIUM TYPE</p>	<p>Stainless steel AISI 316</p>
<p>ANCHORS TYPE</p>	<p>According to catalogue</p>
<p>SUPPORT TYPE</p>	<p>METAL BEAM</p>
<p>GLASS HEIGHT</p>	<p>1100 mm</p>

The railing profile must be firmly fixed to the building structure, either concrete or metal, with the anchors defined by the manufacturer and according to its assembly instructions, always checking the tightening torque. The tightening torque of the Q-DISC system must also be ensured according to the manufacturer's instructions with a specific tool.

4.- TESTS:

The tests were carried out on December, 11th, 2018.

4.1.- Resistance test with horizontal outward load:

The standard "Código Técnico de la Edificación (CTE) Documento Básico de Seguridad de Utilización y Accesibilidad, Sección SUA 1 Seguridad frente al riesgo de caídas, Apartado 3.2 Desniveles, características de las barreras de protección, Sub-apartado 3.2.2. Resistencia", specifies that the railings need to have a category of resistance according where are located.

The CTE, in the document DB-SE-AE (Seguridad Estructural, Acciones en la Edificación) specifies the use categories that appear in the following table with the required resistance.

The railing is tested with a lineal and horizontal load at the top of the banister in kN/m, and outwards during 3 minutes. At the end of the test, disorders in performance or stability are not allowed.

Use Categories		Use Sub-categories		Resistance kN/ml
A	Residential areas	A1	Houses and room areas in hospitals and hotels	0.8
		A2	Storage rooms	0.8
B	Administrative areas			0.8
C	Public access areas (except the A,B and D areas categories)	C1	Tables and chairs areas	0.8
		C2	Fixed seats areas	0.8
		C3	Areas without obstacles and free movement of people as public halls, administrative building, hotels, showrooms, museums, etc.	1.6
		C4	Fitness areas	1.6
		C5	Agglomeration areas, concert halls, stadiums, etc.	3.0
D	Mall areas, shopping centers	D1	Shops, commercial rooms	0.8
		D2	Supermarkets, hypermarket, department stores...	0.8
E	Traffic and parking areas for light vehicles (<30kN)			1.6
F	Terraces with private access only			1.6
G	Passable roof only for maintenance	G1	Roof with tilt, up to 20°	0.8
			Light roofs	
		G2	Roof with inclination of more than 40°	0.8

Those results obtained are shown in the following table:

Sistema	Mounting	Glass	Load kN/m	Maximum deflection mm.	Residual deflection mm.
Easy Glass AIR	On metal beam	8.8.2 (tempered)	0,8	29,8	3,0
		8.8.2 (tempered)	1,2	0,8 kN/m x safety factor 1,5	
		8.8.2 (tempered)	1,6	64,2	3,0
		8.8.2 (tempered)	2,4	1,6 kN/m x safety factor 1,5	

4.2.- Dynamic impact resistance test:

4.2.1.- Soft body dynamic test.

The test consists of submitting the filling element (in this case glass), to the action of the shock defined in section 9.2.3 of the UNE 85-238-91 standard with a soft body of large dimensions. For the impact, a cone hemispherical bag with a mass of 50 kg is used. The impact energy must be 600 J (0.5 kN x 1.20 m). The shock is made by the inner part of the element and the impact must occur in the geometric centre of the filling element.

4.2.2.- Dynamic hard body test.

It consists of subjecting the filling element (in this case glass), to the action of the shock of a hard body of solid steel of 0,5 Kg of mass and 50 mm of diameter. The impact energy must be 3.75 J (0.005 kN x 0.75 m). The impact must occur in the geometric centre of the filling element. The diameters of the fingerprints created are recorded and whether or not there is a fracture.

Impacts results:

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System	Mounting	Glass	Impact 600J	Impact 3,75 J
Easy Glass AIR	On metal beam	8.8.2 (tempered)	No Damage	No Damage

5.- CONCLUSIONS:

Considering that the most unfavourable cases of the family have been tested and taking into account that greater thickness of laminated and tempered glass provides more resistance, it can be concluded that according to the CTE the suitable models are:

System	Mounting	Glass	Resistance kN/m		
			0,8	1,6	3,0
Easy Glass PRIME Q-DISC	On metal beam	8.8.2 (tempered)	✓	✓	X

(X) = Profile not designed for this class.

These loads must to be compared with according the use categories of the CTE, related in this document.

Below we can see some pictures of the tests done.



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