



NATIONAL TEST REPORT  
(BS 6180 : 2011)

# **EASY GLASS<sup>®</sup>** **JULIET BALCONY** **MOD.6507 & 6508**

STAINLESS STEEL CAPRAILS & LED CAPRAILS

## TEST REPORT

**Lucideon Reference:** 154237 (QT38060/1/SL)/Ref. 2/Supp1

**Project Title:** Testing of Easy Glass Juliet Balcony System in Accordance with BS 6180:2011 In and About Buildings

**Client:** Q-railing Europe GmbH & Co.KG  
Marie-Curie-Strasse 8-14  
Emmerich am Rhein  
D-46446  
Germany

**For the Attention of:** Mr Samuel Hanna

**Author(s):** Miss Lisa Cobden

**Report Date:** 16 December, 2015

**Purchase Order No.:** N/A

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**Work Location:** Lucideon UK

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This report supersedes the report issued on 12.11.15.



Mr Dave Dix  
**Consultancy Team  
Reviewer**



Miss Lisa Cobden  
**Consultancy Team  
Project Manager**



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LSC/LMP/N15TRE29  
15.12.15

## 1 INTRODUCTION

Lucideon were commissioned by the client, Q-railing Europe GmbH and Co KG, to carry out load testing in accordance with BS 6180:2011 Barriers in and about buildings, to allow their balustrade system to be classified for use in accordance with the Code of Practice included within the standard.

The testing was carried out at Q-railing Europe GmbH and Co KG's facilities at 8-14 Marie-Curie Straße 46446 Emmerich am Rhein Germany.

This report summarises the test results obtained during the test programme and does not provide interpretation of those results.

## 2 TEST SAMPLES

The system tested was designated as Easy Glass Juliet Balcony System. The system incorporated two cap rails one being round with a diameter of 42.4 mm the second being LED square with dimensions 64 mm x 40 mm. The system is shown in the Figures included in the Appendix.

The system and glass was installed by Q-railing personnel.

## 3 TEST PROGRAMME

A horizontal line load was applied to the system at the following spans:

- 42.4 mm Round Hand Rail 8.76 mm Laminated Glass:
  - 2.80 m Span;
  - 2.40 m Span.
- 64 mm x 40 mm LED Square Hand Rail 8.76 mm Laminated Glass:
  - 2.50 m Span;
  - 2.60 m Span ;
  - 2.80 m Span.

## 4 TEST METHOD

The Juliet balcony system was fixed back to a reaction frame both top and bottom by means of appropriate side connectors and cap rails. Figures 1-5 show drawings of the relevant adapters and cap rails. A laminated glass panel having a thickness of 8.76 mm and appropriate width was fitted top and bottom into the cap rails.

A horizontal imposed line load was applied to the glass at a height of 1.1 m above the datum level of the floor and the deflection measured at the top central point of the panel 1.1 m above the datum level of the floor. The load was applied via a hydraulic ram and the deflection measured using a digital electronic displacement transducer (see Plate 1).



In addition a point load was applied to the centre point of the glass infill, as this was deemed the worst case scenario, via a hydraulic ram and 100 mm by 100 mm spreader plate. For the point load the linear voltage displacement transducer measured the deflection from the centre of the glass infill panel.

## 5 RESULTS

The tests were carried out in accordance with the guidance given in BS 6180 Barriers in and about buildings – Code of Practice. The standard states that the maximum allowable deflection for a free standing glass protective barrier panel is 25 mm.

Table 2 of BS 6180 Barriers in and about buildings – Code of Practice categorises parapets, barriers and balustrades for areas of use depending on the loads they have achieved under testing.

Load versus deflection curves for the balustrades are given in Charts 1 and 2.

The loads achieved by the Q-railing Europe GmbH and Co KG Juliet Balcony system tested under horizontal imposed line load to the maximum deflection of 25 mm are given in Table 1.

The loads achieved by the Q-railing Europe GmbH and Co KG Juliet Balcony system tested under point load are given in Table 2

All figures quoted in the Tables contain no safety factors and are direct loads as achieved by the system under test conditions.

Tables 3 to 5 summarise the suitability of the tested systems in accordance with Table 2 of BS 6180:2011.

**NOTE: The results given in this report apply only to the samples that have been tested.**

**END OF REPORT**

**Table 1** - Summary of Performance of Q-railing Europe GmbH and Co. KG Easy Glass Juliet Balcony System Tested under Horizontal Imposed Line Load

Cap Rail	Glass Span (m)	Imposed Line Load at 25 mm Deflection (kN/m)	Working Line Load for System (kN/m)	Deflection at Working Line Load for System (mm)
42.4 mm Round Hand Rail	2.40	1.12	0.74	16.48
	2.60*	0.92	0.74	15.03
	2.80	0.64	0.36	12.87
64 mm x 40 mm LED Square Hand Rail	2.50	1.54	1.50	24.10
	2.60	0.86	0.74	21.54
	2.80	0.83	0.74	22.07

\*Values estimated by interpolation of data

The load deflection characteristics for the Juliet balcony system using 42.4 mm Round Hand Rail and a 64 mm x 40 mm LED Square Hand Rail over a range of spans met a series of working line load values in accordance with BS 6180:2011. Therefore the system when used in combination with 48.3 mm Round Hand Rail and a 40 mm x 40 mm Square Hand Rail should perform in comparable way giving similar results to those seen when using the system with a 42.4 mm Round Hand Rail or a 64 mm x 40 mm LED Square Hand Rail.

**Table 2** - Summary of Performance of Q-railing Europe GmbH and Co. KG Easy Glass Juliet Balcony System Tested under Point Loads

System	Description	Working Point Load for System (kN)	Deflection at Working Point Load for System (mm)
42.4 mm Round Hand Rail	2.80 m span 8.76 mm Laminated Toughened Glass	1.5	20.32
64 mm x 40 mm LED Square Hand Rail	2.80 m span 8.76 mm Laminated Toughened Glass	1.5	20.32

Note: The load deflection characteristics for the Juliet balcony system using 8.76 mm glass panels (2 x 4 mm glass 0.76 mm foil) over a range of spans met a series of working line load values in accordance with BS 6180:2011. Therefore panels having the same thickness glass with a thicker foil of 1.52 mm should perform in comparable way to those incorporating a 0.76 mm foil.

**Table 3 - Summary of Suitability of Q-railing Europe Systems in Accordance with Table 2 of BS 6180:2011**

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Easy Glass Juliet Balcony System 42.4 mm Round Hand Rail		
			2.40 m Span	2.60 m Span	2.80 m Span
Domestic and residential activities	(i) all areas within or serving exclusively one single family dwelling including stairs, landings, etc but excluding external balconies and edges of roofs	0.36	✓	✓	✓
	(ii) other residential, i.e. houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.74	✓	✓	X
Offices and work areas not included elsewhere, including storage areas	(iii) light access stairs and gangways not more than 600 mm wide	0.22	✓	✓	✓
	(iv) light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	✓	✓	✓
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.74	✓	✓	X
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	X	X	X
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	X	X	X



Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Easy Glass Juliet Balcony System 42.4 mm Round Hand Rail		
			2.40 m Span	2.60 m Span	2.80 m Span
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	✓	✓	X
	(ix) external balconies including Juliette balconies and edges of roofs; footways and pavements within building cartilage adjacent to basement/sunken areas	0.74	✓	✓	X
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	X	X	X
	(xi) theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studios; footways or pavements greater than 3 m wide adjacent to sunken areas	3.00	X	X	X
	(xii) grandstands and stadia	(Note 1)	X	X	X
Retail areas	(xiii) all retail areas including public areas of banks/building societies or betting shops	1.50	X	X	X
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	(Note 2)	-	-	-
	(xv) horizontal loads imposed by vehicles	(Note 2)	-	-	-



**Table 4** - Summary of Suitability of Q-railing Europe Systems in Accordance with Table 2 of BS 6180:2011

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Easy Glass Juliet Balcony System 64 mm x 40 mm LED Square Hand Rail		
			2.50 m Span	2.60 m Span	2.80 m Span
Domestic and residential activities	(i) all areas within or serving exclusively one single family dwelling including stairs, landings, etc but excluding external balconies and edges of roofs	0.36	✓	✓	✓
	(ii) other residential, i.e. houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.74	✓	✓	✓
Offices and work areas not included elsewhere, including storage areas	(iii) light access stairs and gangways not more than 600 mm wide	0.22	✓	✓	✓
	(iv) light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	✓	✓	✓
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.74	✓	✓	✓
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	✓	X	X
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	✓	X	X



Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Easy Glass Juliet Balcony System 64 mm x 40 mm LED Square Hand Rail		
			2.50 m Span	2.60 m Span	2.80 m Span
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	✓	✓	✓
	(ix) external balconies including Juliette balconies and edges of roofs; footways and pavements within building cartilage adjacent to basement/sunken areas	0.74	✓	✓	✓
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	✓	X	X
	(xi) theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studios; footways or pavements greater than 3 m wide adjacent to sunken areas	3.00	X	X	X
	(xii) grandstands and stadia	(Note 1)	X	X	X
Retail areas	(xiii) all retail areas including public areas of banks/building societies or betting shops	1.50	✓	X	X
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	(Note 2)	-	-	-
	(xv) horizontal loads imposed by vehicles	(Note 2)	-	-	-

**Table 5 - Summary of Suitability of Q-railing Europe Systems in Accordance with Table 2 of BS 6180:2011**

Type of Occupancy for Part of the Building	Examples of Specific Use	A Point Load Applied to Part of the Infill (kN)	Easy Glass Juliet Balcony System	
			42.2M Round Hand Rail	64 mm x 40 mm LED Square Hand Rail
Domestic and residential activities	(i) all areas within or serving exclusively one single family dwelling including stairs, landings, etc but excluding external balconies and edges of roofs	0.25	✓	✓
	(ii) other residential, i.e. houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.50	✓	✓
Offices and work areas not included elsewhere, including storage areas	(iii) light access stairs and gangways not more than 600 mm wide	0.25	✓	✓
	(iv) light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.25	✓	✓
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.50	✓	✓
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	✓	✓
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	✓	✓
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.50	✓	✓
	(ix) external balconies including Juliette balconies and edges of roofs; footways and pavements within	0.50	✓	✓



Type of Occupancy for Part of the Building	Examples of Specific Use	A Point Load Applied to Part of the Infill (kN)	Easy Glass Juliet Balcony System	
			42.2M Round Hand Rail	64 mm x 40 mm LED Square Hand Rail
	building cartilage adjacent to basement/sunken areas			
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	✓	✓
	(xi) theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studios; footways or pavements greater than 3 m wide adjacent to sunken areas	1.50	✓	✓
	(xii) grandstands and stadia	(Note 1)	-	-
Retail areas	(xiii) all retail areas including public areas of banks/building societies or betting shops	1.50	✓	✓
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	(Note 2)	X	X
	(xv) horizontal loads imposed by vehicles	(Note 2)	X	X

*Note 1 – See requirements of the appropriate certifying authority*

*Note 2 – Clause 8.1.1 of BS 6180:2011 states that “glass should not be used for vehicle protection barriers”*



**Plate 1 - Generic Test Arrangement Line Load**

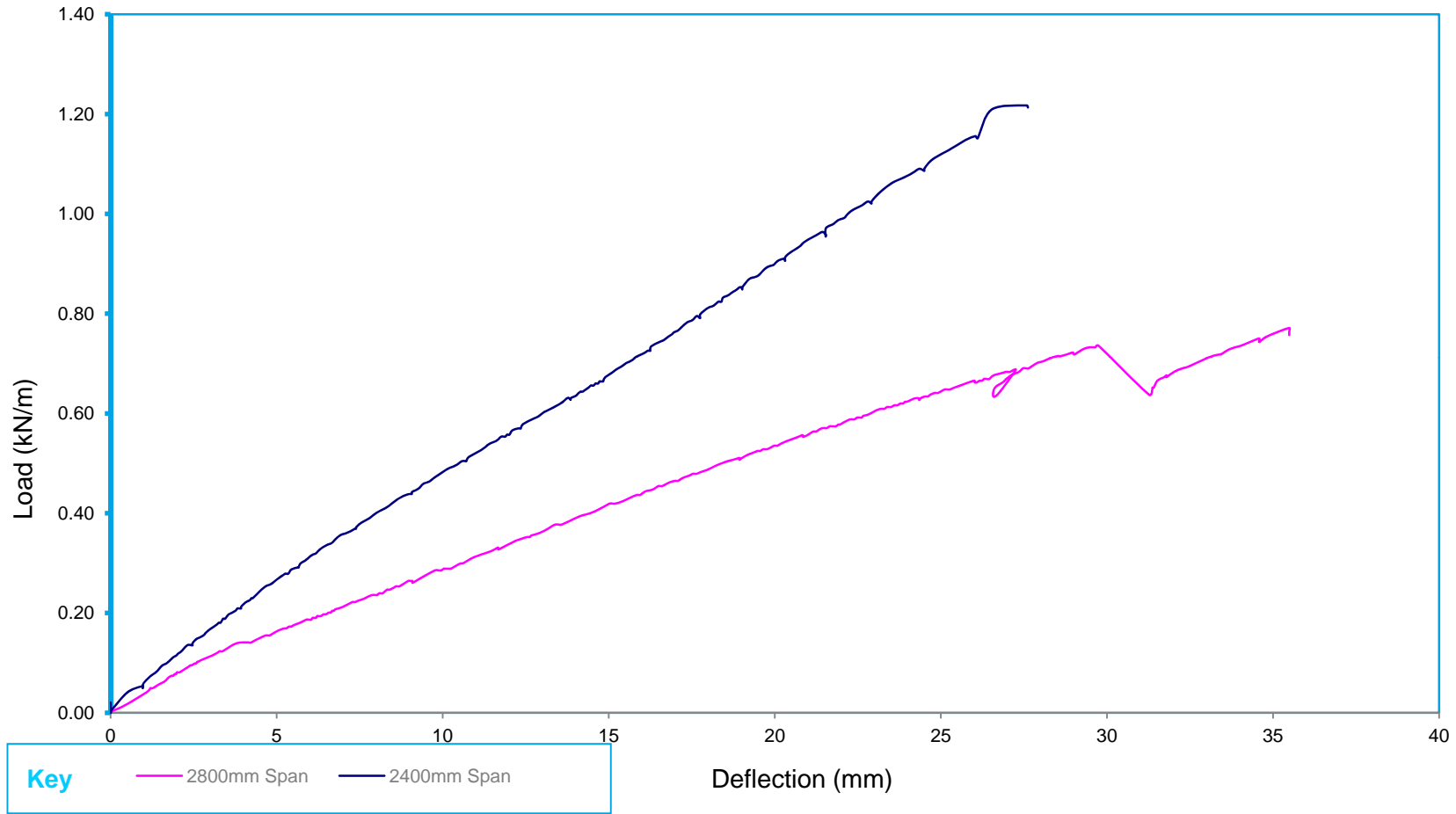


**Plate 2 – Internal Profile Square Hand Rail**

**Chart 1 - Load Deflection Curve for Q-railing Linear Line Load Juliet Balcony with 42.4 mm Diameter Round Hand Rail**



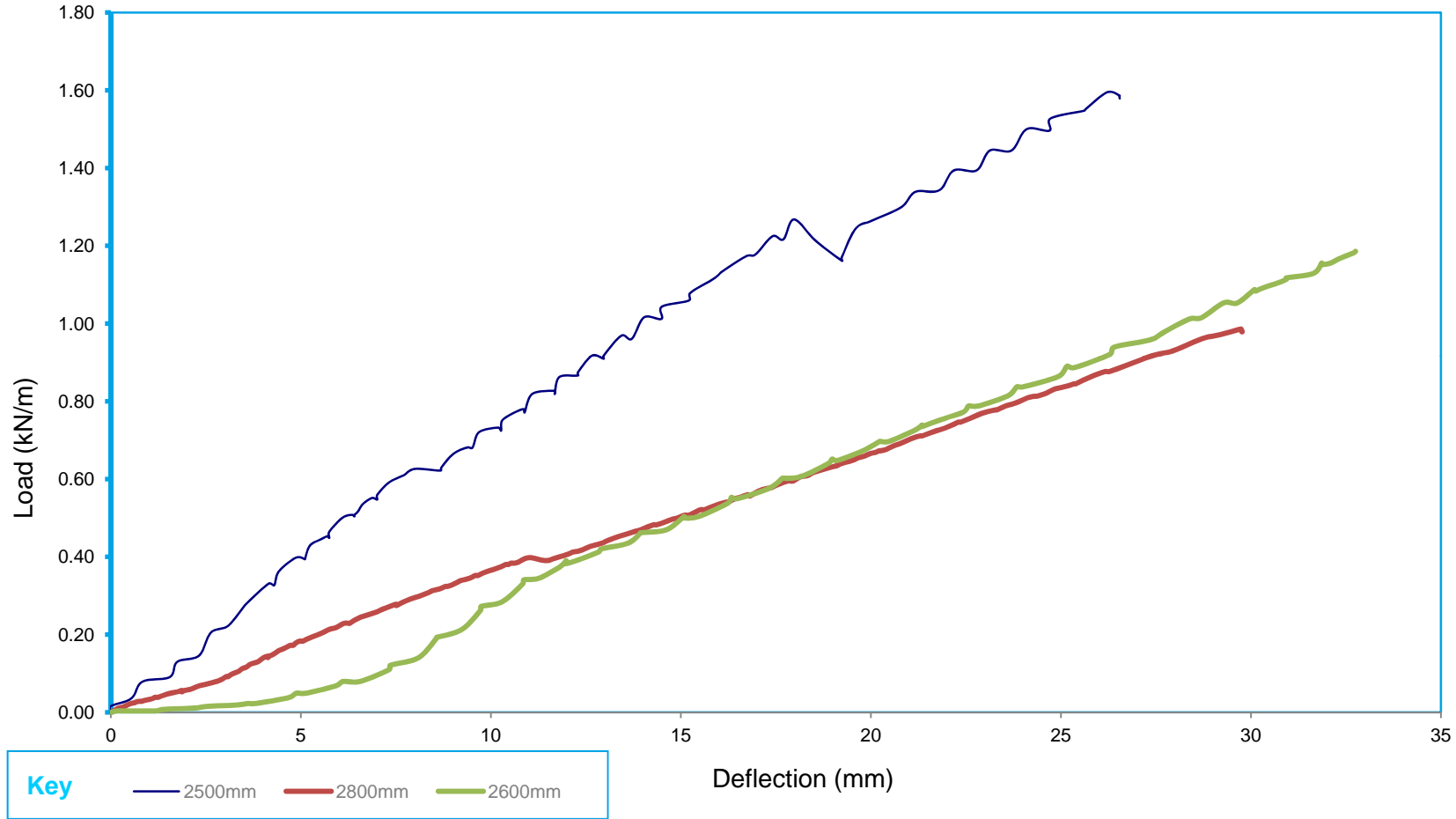
Test Report: 154237/Ref. 2/Supp1

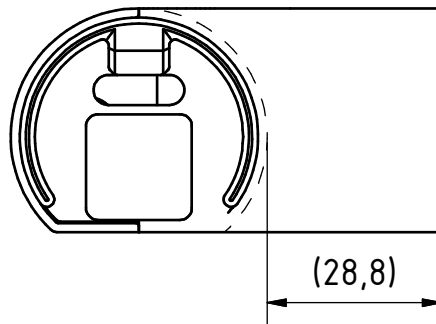
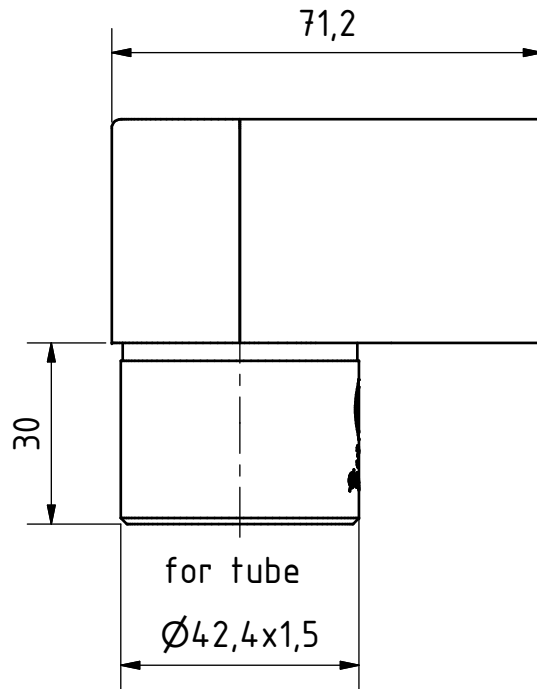




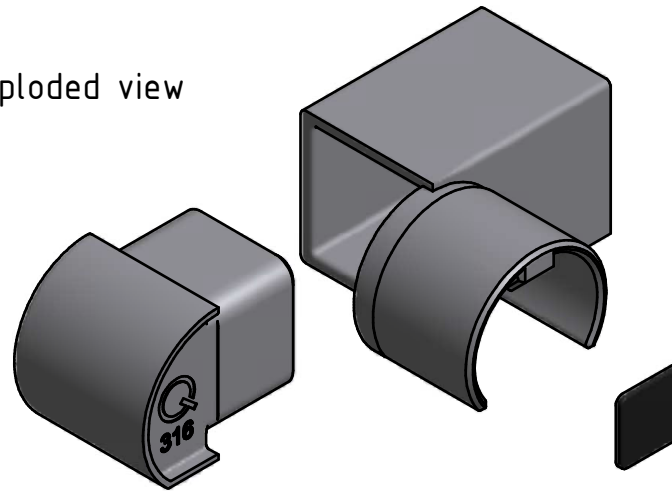
**Chart 2 - Load Deflection Curve for Q-railing Linear Line Load Juliet Balcony with 65 mm x 40 mm LED Cap Rail**

Test Report: 154237/Ref. 2/Supp1

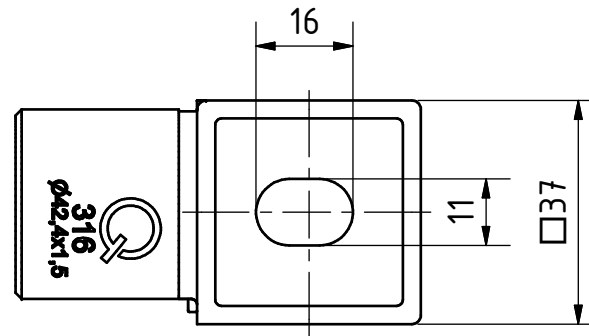
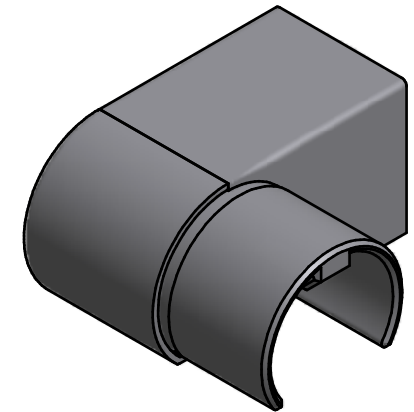




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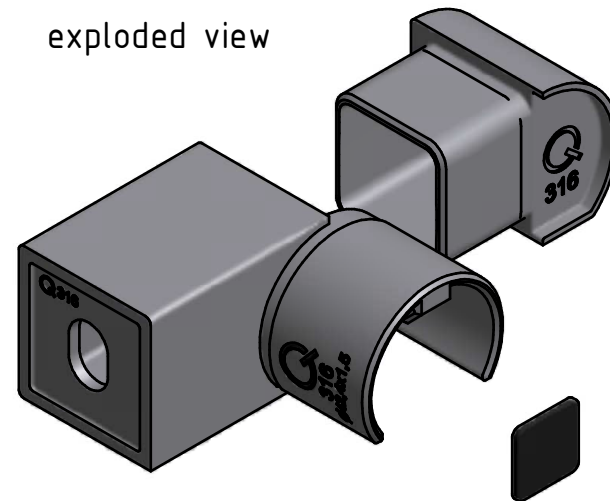
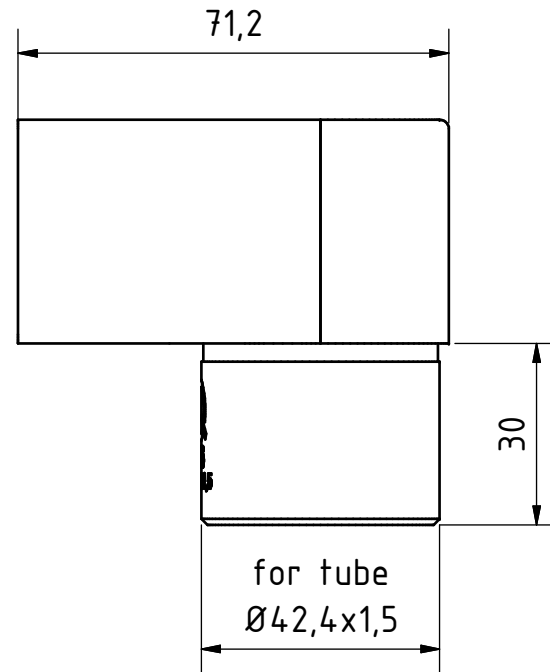


assembled view

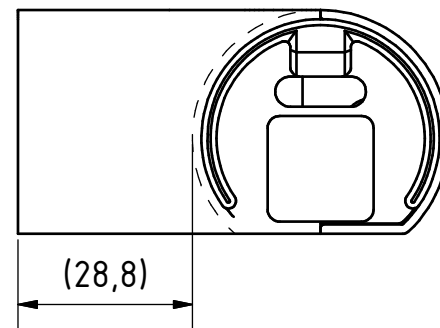
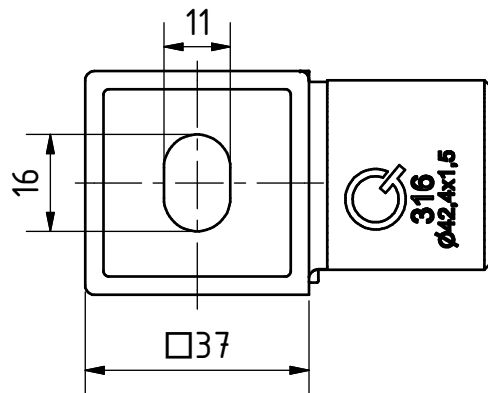
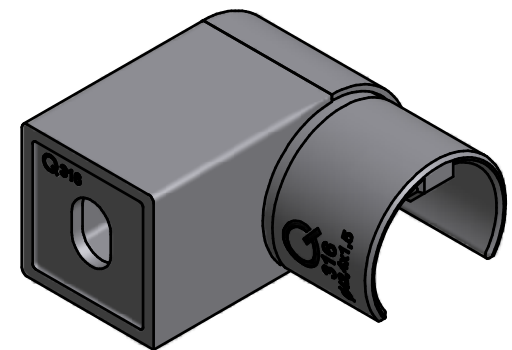


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Checked	21.10.2013	MBT					A4





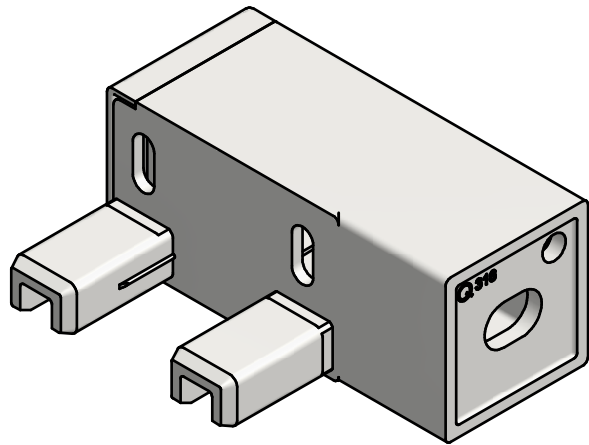
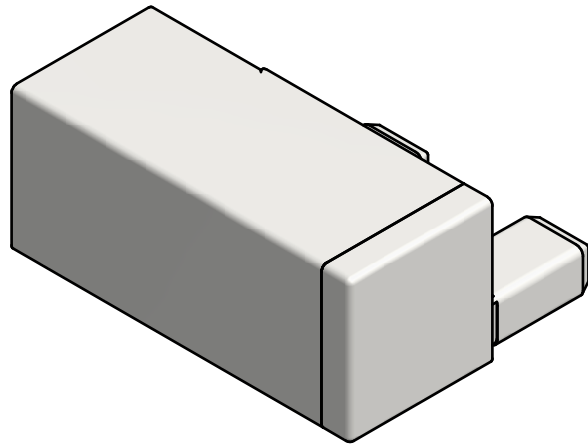
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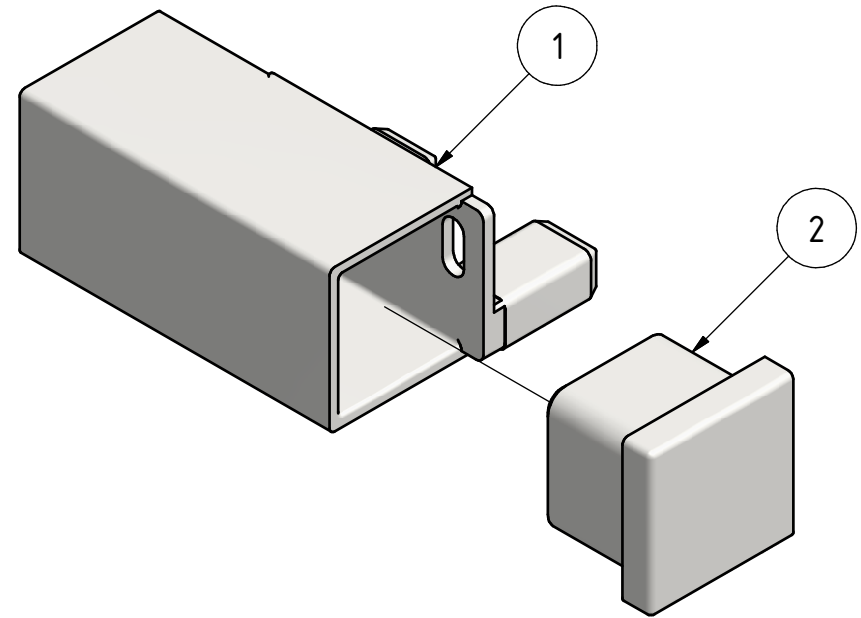
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### Assembly View



### Exploded View



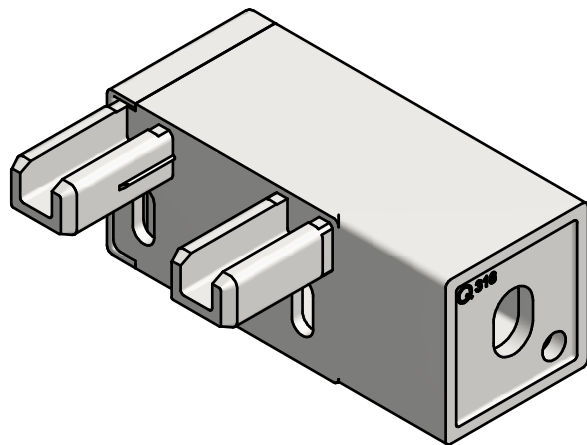
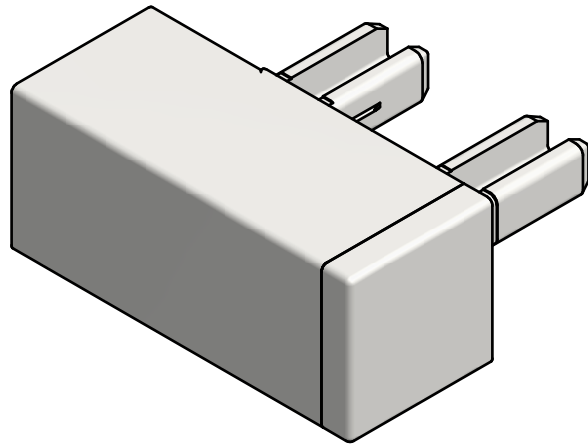
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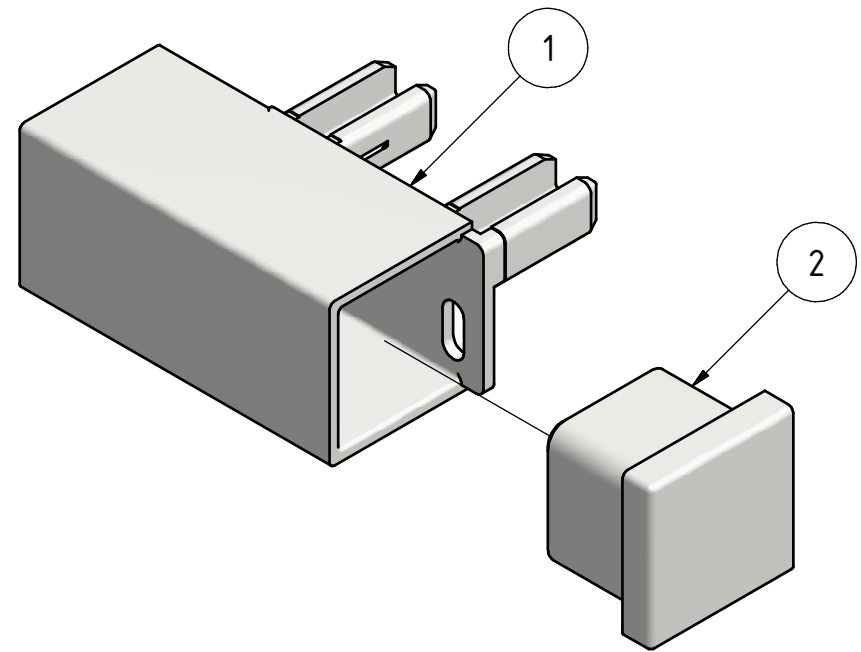
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Assembly View



Exploded View

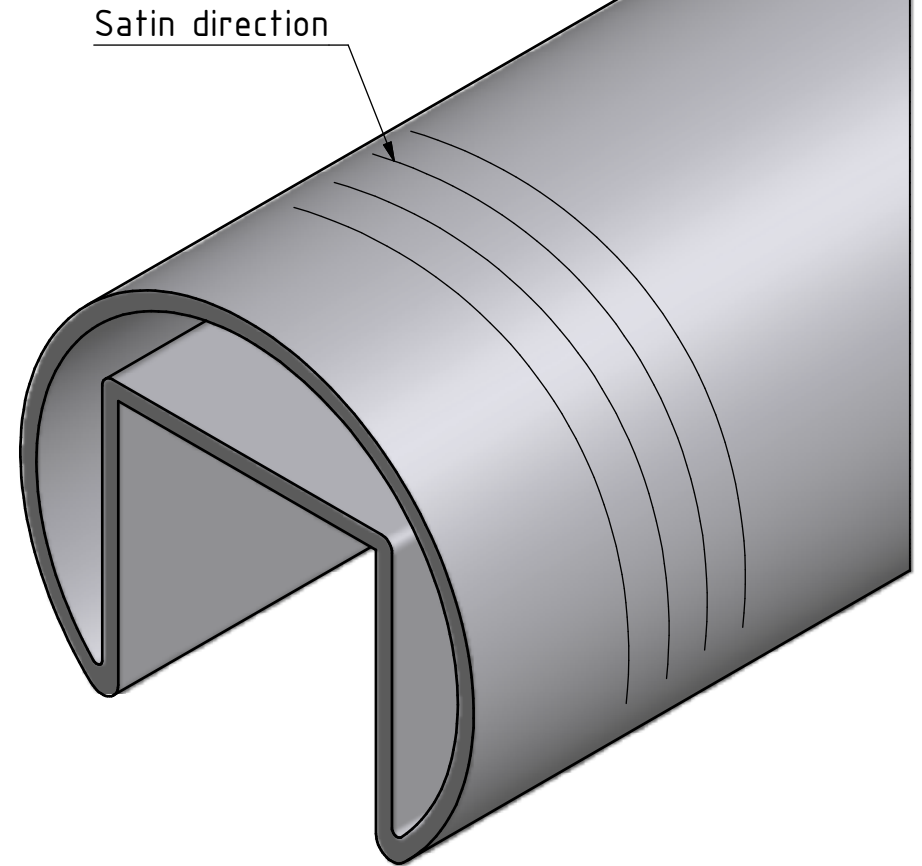
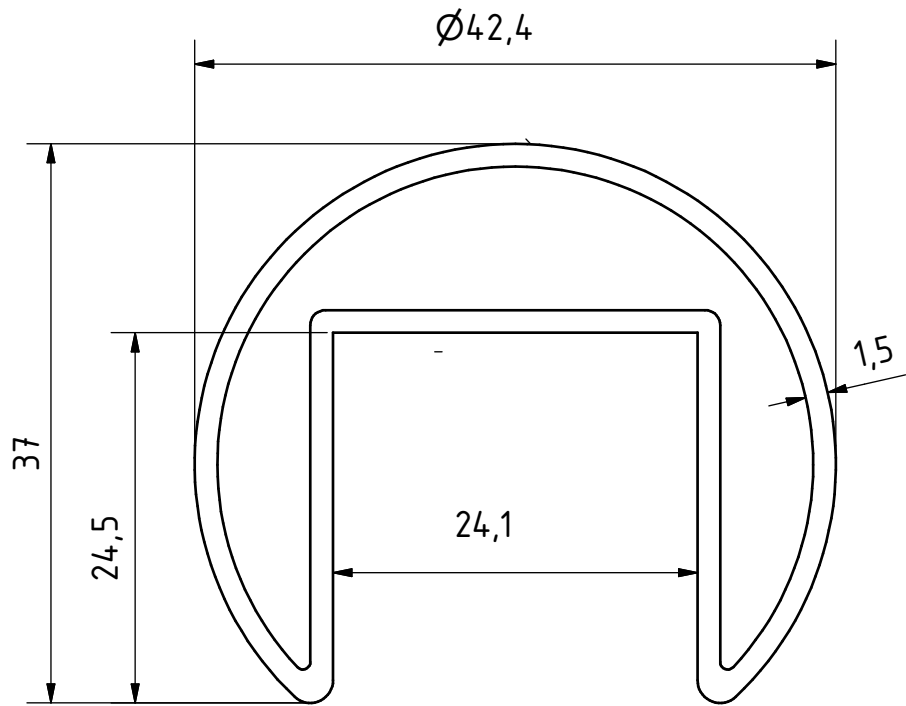


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				Description:									
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General tolerance according				A4									

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