# TEST REPORT

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| **Lucideon Reference:** | 175307 (QT-48711/1/GMB)/Ref. 1 |
| **Project Title:** | Testing of Concorde Glass Balustrade Systems in Accordance with BS 6180:2011 |
| **Client:** | Concorde Glass Ltd<br>Linx House, Golf Road<br>Enterprise Road<br>Mablethorpe<br>Lincolnshire<br>LN12 1NB |
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## 1 INTRODUCTION

Lucideon Limited were commissioned by the client, Concorde Glass Ltd, 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 Lucideon's facilities, Queens Road, Penkhull, Stoke on Trent.

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

## 2 TEST SAMPLES

Three systems were tested and designated as:

- Post with Handrail Support – No Saddle
- Post with Saddle and Handrail
- Spigots.

The systems and glass were installed by Concorde Glass personnel.

## 3 TEST PROGRAMME

A horizontal line load was applied to the system using the following glazed sections:

- Post with Handrail Support – No Saddle
  - 10 mm Toughened Glass
  - 12 mm Toughened Glass.
- Post with Saddle and Handrail Support
  - 12 mm Toughened Glass.
- Post with Without Handrail Support
  - 10 mm Toughened Glass.
- Spigots
  - 15 mm Toughened Glass.

## 4 TEST PREPARATION

### 4.1 Post Systems

The post system was bolted to the top of a concrete block, which was fixed to the floor of the test facility. Where 10 mm toughened glass was used the system was mechanically fixed using two 100 mm M8 bolts per base. Where 12 mm toughened glass was used the system was chemically fixed using M10 bolts.

The appropriate thickness glass panel was fitted into the system using the four glass D-clamps.

The system configurations can be found in Figures 1, 2 and 4.

### 4.2 Spigot System

The Spigot adapters were bolted to the top of the concrete block, which was fixed to the floor of the test facility. Two spigots were fixed per metre and 800 mm centres using two bolts per adaptor. A glass panel of appropriate width and thickness was fitted into the adapters using the glass clamping system.

The system configuration can be found in Figure 3.

## 5 TEST METHOD

A horizontal imposed line load was applied to the system 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. The exception to this was the posts without handrail system where the horizontally imposed line load was applied at a height of 950 mm above the datum level of the floor. The load was applied via a hydraulic ram and the deflection measured using a linear voltage displacement transducer (see Plate 1).

A point load was applied to the centre point of the infill panel. The standard deems that the point load should be applied at the position likely to cause most deflection and the centre point was deemed to be the worst case scenario. The load was applied via a hydraulic ram and 50 mm by 50 mm spreader plate with deflection measured using a linear voltage displacement transducer.

A Uniformly Distributed Load (UDL) was applied to the infill by means of a 700 mm x 600 mm panel. The load was applied via a hydraulic ram with deflection measured using a linear voltage displacement transducer.

In all tests the load was measured using a calibrated load cell and the data recorded using calibrated data logger.

## 6 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.

The loads achieved by the Concorde Glass systems tested under horizontal imposed line load to the maximum deflection of 25 mm are given in Table 1.

The loads achieved by the Concord Glass systems tested under uniformly distributed load to the maximum deflection of 25 mm are given in Table 2.

The loads achieved by the Concord Glass systems tested under point load to the maximum deflection of 25 mm are given in Table 3.

All figures quoted in Tables 1-3 contain no safety factors and are direct loads as achieved by the system under test conditions.

Table 4-6 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 6** - Summary of Suitability of Concorde Glass Spigot System with 15mm Toughened Glass in Accordance with Table 2 of BS 6180:2011

| Type of Occupancy or Part of the Building | Examples of Specific Use | Horizontal Uniformly Distributed Line Load (kN/m) | Spigots 15 mm Toughened Glass |
|---|---|---|---|
| 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 |
| Areas with tables or fixed seating | (vii) restaurants and bars | 1.50 | X |
| 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 |
| | (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 |
| | (xii) grandstands and stadia | (Note 1) | - |
| Retail areas | (xiii) all retail areas including public areas of banks/building societies or betting shops | 1.50 | X |
| Vehicular | (xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs | 1.50 (Note 2) | X |