

## Tests of Glass Banister Panels with Embedded Laminated Connections

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### Abstract

Trends in modern architecture are heading towards a complete transparency of structures, which makes glass a very popular building material. However, achieving a completely transparent look of a structure may be problematic mainly due to glass elements connections. The connections must be capable of bearing all stresses performing during the lifetime period and meet high aesthetical standards at the same time. An embedded laminated point connection represents a progressive glass fixing systems. An ongoing research of the Czech Technical University in Prague is focused on the characteristics of this type of connection. Within this research, a set of real-scale laminated banister panels with two sets of embedded point connections was tested. The experiment showed the way of collapse and a short-term resistance of a laminated glass panel with two sets of embedded point connections under vertical loads.

**Keywords:** glass connection; laminated glass; laminated connection; embedded connection; banister panels

### 1 Introduction

Modern architecture often works with glass facades, roofs, banisters or columns. In order to achieve as much transparent look as possible, various bolted and adhesive connections were developed in recent decades.

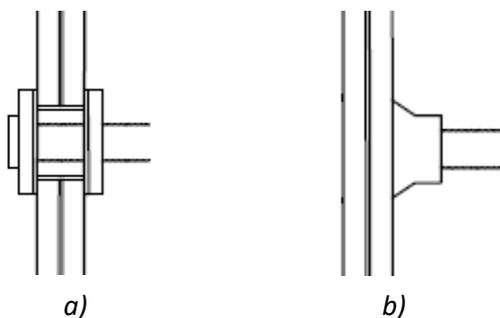


Figure 1. Mechanical bolt (a) and adhesive (b) point connections

The connections are the most problematic part of a glass structure design as the trends require minimizing the surface of the connection.

The point fixing systems can be divided into three groups – mechanical (Figure 1a), adhesive (Figure 1b) and laminated (Figure 2).

#### 1.1 Mechanical point fixing system

The oldest point connection is based on the stainless steel bolts. Plastic or rubber pads are used to prevent a direct contact between the steel and the glass parts. This type of a fixing system suffers from the need of a drilling process and from the uneven distribution of stresses in the bolt-hole area. [1]

#### 1.2 Adhesive point fixing system

More recently, adhesive connections started to be used in constructions. In case of point adhesive