

Epoxy Adhesive for Stainless-Steel and Glass Assembly: Case Study on the Glass Scaffolding “Réflexions”

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Abstract

Réflexions is a 12 m high, 4.6 m deep, and 4.6 m wide, sculpture conceived as a 3D glass scaffolding. Its ambition is to be modular and be easily assembled and dismantled, with connections that are designed to be fixed on-site. The scaffold consists of 1195 laminated glass bars each capped with an epoxy embedded stainless steel connector, to marry to 313 star-shaped nodes. This paper describes the cutting-edge epoxy bond and the process of the assessment of its capacity, through calculations and testing. The fully assembled structure has high redundancy and challenges the structural predictability of isostatic structures typically used in glass design. Even minor deviations in this kind of structure can result in multiple different outcomes, with different load distributions leading to higher local stress concentrations. The details and assembly process are designed to reduce the sensitivity to these different outcomes. For that, all possible eccentricities, and imperfections due to either fabrication, manufacturing, or erection on site had to be analysed, physically tested, and reduced to a minimum. Involving extensive testing and manufacturing knowledge, this paper focus on the design methodology of the project, examining how predicted behaviour both in the setup of the calculations and in the design of the node was controlled. The aim is to share knowledge on how to stay within the necessary risk margins and avoid unpredicted outcomes for glued connections.

The full paper is published in the Glass Performance collection of the Glass Structures & Engineering journal (Springer). A read-only version of the full paper is available via <https://rdcu.be/eu3pq>.

Keywords

Glass structure, Epoxy adhesive, Predictability, Testing, Connection detailing, Steel wax casting

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