

Polymer Adhesives with Enhanced Properties Suitable for Assembling of Structural Glass

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ABSTRACT

Polymer adhesives designed for structural use is becoming more and more favourable and feasible for steel-glass load bearing connections since their properties were improved according to requirements of engineering point of view. Assembling of glass elements, or bonding of glass to steel members brings significant advantage in many factors like uniformly distributed stress contraction, low self-weight, absence of holes in glass etc. Every adhesive, given to be used in a joint with real load bearing role, has to be carefully tested and investigated before its practical use and safe static evaluation of overall structure with load bearing semi-rigid adhesively bonded joint. Main interest of civil engineers is focused on strength and stiffness, particularly on possible elongation of tested polymer. Reputable adhesive producers are familiar with these required properties and their own research and development do the best to produce adhesives, with improved material properties in every new generation of adhesive. There is a new generation of acrylic adhesive on the market, which shows significantly better properties in comparison with previous one. 5 years ago, material tests of previous generation of the same adhesive were performed. Main problems for modelling of the older version were the changeability of the stiffness during the range of load and relatively low possible elongation at break. New technology shows nearly bi-lingual stress-strain diagram with stiffer initial part (close to elastic behaviour), achieves higher strength and possible elongation at break. These characteristics bring save and economic design of adhesively bonded connection closer to civil engineers without advanced knowledge of finite element software. The paper deals with the explanation of polymer adhesive behaviour, describes structural interaction between assembled members and provides theories for hand calculation of bonded joint between steel and glass, which shows real load bearing role and transfer internal forces between connected members.

REFERENCES

- [1] Haldiman, M., Luible, A., Overend, M. (2008), *Structural Engineering Documents 10 - Structural Use of Glass*, IABSE, Zürich, Switzerland, ISBN 978-3-85748-119-2.
- [2] Machalická, M., Eliášová, M. (2012), "Influence of Various Factors on Mechanical Properties of Adhesive Joint in Glass Structures". *Proceedings of the Conference on Architectural and Structural Applications of Glass (Challenging Glass 3)*, Delft, Netherlands, June 2012, pp. 267-279, IOS Press BV, ISBN 978-1-61499-060-4.