A critical flaw size approach for predicting the strength of bolted glass connections

The use of bolted connections in glass installations is common place in contemporary architecture. However, it is difficult to predict the load bearing capacity of these connections accurately due to the several factors that influence the strength of glass in the region of the bolt hole, namely: the complex stress state, the inherent strength of glass and the magnitude of residual thermal stresses. This paper proposes a critical flaw size approach for bolted connections. The approach uses a numerical tempering model and nonlinear finite element analysis to determine the sizes of the critical flaws around the bolt hole, from destructive tests on bolted glass components subjected to in-plane loading. The critical flaw sizes determined by this approach agree with the flaw sizes obtained from optical microscopy. These flaw sizes are subsequently used to plot lifetime prediction curves for the bolted connections that are useful for real-world applications. © 2013 Elsevier Ltd.

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