Accepted Manuscript

The post-breakage response of laminated heat-treated glass under in plane and out of plane loading

Laura Galuppi, Gianni Royer-Carfagni

PII: S1359-8368(17)32649-5

DOI: 10.1016/j.compositesb.2018.04.005

Reference: JCOMB 5613

To appear in: *Composites Part B*

Received Date: 2 August 2017

Revised Date: 27 March 2018

Accepted Date: 3 April 2018

Please cite this article as: Galuppi L, Royer-Carfagni G, The post-breakage response of laminated heat-treated glass under in plane and out of plane loading, *Composites Part B* (2018), doi: 10.1016/j.compositesb.2018.04.005.

The post-breakage response of laminated heat-treated glass under in plane and out of plane loading

Laura Galuppi[a], Gianni Royer-Carfagni[a,b,*]

[a] *Department of Engineering and Architecture, University of Parma, Parco Area delle Scienze 181/A, I-43100 Parma, Italy*

[b] *Construction Technologies Institute - Italian National Research Council (ITC-CNR), Via Lombardia 49, I-20098 San Giuliano Milanese, Milano, Italy*

Abstract

Any reliable use of glass for structural purposes cannot neglect that its breakage may be provoked by imponderable events, like impacts at critical spots or thermal shocks. Laminated glass, composed by glass plies sandwiching polymeric interlayer sheets, is used in architectural application thanks to its safe post-glass breakage response. When glass breaks, the interlayer retains the glass shards, and the cracked element maintain a certain residual load-bearing capacity, strongly influenced by the tension stiffening of the polymeric interlayer due to the adhesion with the glass shards, which depends upon the size of the shards and of the debonded zone. Here, we review the most recent experimental results on the post-glass breakage response of laminated heat-treated glass elements providing charts for the evaluation of such a stiffening effect. Based on this, simple formulas to analyze and interpret the experimental findings under both in-plane and out-of plane bending are proposed, providing analogies with the bending of bimodulus materials and the load-bearing

*Corresponding author

Email addresses: laura.galuppi@unipr.it (Laura Galuppi), gianni.royer@unipr.it (Gianni Royer-Carfagni)