

PERFORMANCE OF BLAST-DAMAGED STEEL CONNECTIONS IN PROGRESSIVE COLLAPSE ANALYSIS

J. M. H. Puryear, K. A. Marchan, D. J. Stevens & D. A. Sunshine

*Protection Engineering Consultants, 4203 Gardendale,
Suite C112, San Antonio, TX 78229, USA*

In many progressive collapse scenarios, damage to at least some connections from blast loading of the structure is likely. To account for the effect of blast damage on connection performance, revisions to the rotational acceptance criteria for modeling steel connections in progressive collapse analysis are proposed, based on analysis of ten field tests of blast-damaged and non-blast-damaged connections, representing five connection types. The effect of blast damage on connection performance is discussed, and the proposed revisions are compared with rotational acceptance criteria currently used in progressive collapse analysis. Analysis of the field test data also showed that both damaged and undamaged connections had significantly less elastic stiffness than assumed in current modeling practice. As a result, reduced stiffness values are recommended. Finally, the effect of axial resistance on energy-absorbing capacity of the connections is discussed.