

P62 Debris Analysis of Scaled Earth Covered Magazine Test

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Abstract:

In the attempt to study the mitigating effects of earth cover on the structural breakup and the hazards related to concrete debris throw, a test series with six detonations of high explosives inside 1/5th scaled earth covered structures was performed under various loading densities and earth cover thicknesses. Concrete debris were collected along principle axes and analysed. Through the debris number density analysis, the mitigating effects of the earth cover to reduce the Inhabited Building Distance (IBD), that is defined by the distance where the debris density falls below 1 lethal debris per 56m², did not seem significant. However, the debris mass distribution analysis revealed that the debris produced from earth covered structures were much smaller than those from non-earth covered structures. Post-test observations indicated that the earth cover changed the response and failure mechanisms of a RC structure. Instead of pulverising, the earth covered structures in the trial failed at the connections while preserving the majority of the structural components. Thus, the change in failure mechanism could explain the significant difference in the debris characteristics and distribution. The difference was especially obvious for the structure which has a low explosive loading density of 2.5kg/m³. The earth embankments, which were not dispersed, captured the walls and maintained largely the integrity of the structure. This contributed to a massive reduction in debris hazard.

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