

EFFECT OF MAGAZINE GEOMETRY AND LOADING DENSITY ON BLAST LOADS FROM EARTH-COVERED MAGAZINES

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Explosive safety assessments of earth-covered magazines (ECMs) need reliable methods of predicting the blast load on an acceptor ECM in the event of an explosion at an adjacent potential explosive site (PES). Such methods are currently available in the community through the Blast Effects Calculator (BEC) tool released by the Department of Defense Explosive Safety Board (DDESB). BEC provides pressure and impulse as a function of scaled standoff in the three cardinal directions from the PES: front, side, and rear.

In a recent study for the Canadian Directorate of Architectural and Engineering Services (DAES), BakerRisk and ACTA evaluated the applicability of the BEC curves for pressure and impulse from an ECM to the specific geometry of the Canadian long-span ECM (CLSECM) which is one of flat-roofed reinforced concrete construction. This was done by isolating experimental data from flat-roofed tests alone and comparing to the BEC curves. We further evaluated the effect of variations in loading density (ratio of charge weight to magazine volume) by looking at data from a series of tests in which different loading densities were tested in the same geometry.

The results indicate that the geometry of the ECM (flat-roofed vs. arched) is not a significant factor in determining blast loads, that in fact the same curves are applicable as well to one as to the other. The data does show a correlation between loading density and blast, but it is relatively minor in magnitude. Additional research would be needed to quantify this relationship, including more refined testing.