

CBS - A COMPACT BLAST SIMULATOR

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ABSTRACT

Testing structural response to air blast loading can be performed in a confined environment known as a Large Blast Simulator (LBS). A blast wave load of about $[P+, T+] = [1 \text{ MPa}, 100 \text{ ms}]$ requires an LBS facility some 100 m long. For reduced-scope testing of a single structural element, such as a clamped plate, we propose to employ a Compact Blast Simulator (CBS), emulating the dynamic load history, albeit not the actual blast-structure interaction of an air blast wave. The key idea is to mount the test plate as the end wall of a load chamber, where a high-pressure gas inflow is fed through an opening, quickly raising the pressure to the desired level $P+$. Following that short "load phase", a "venting phase" is triggered by rupture of a diaphragm, and the gradual outflow produces a test-load pressure history analogous to that of a blast wave.

To increase the lateral extent of the device, it can be mounted in a cluster-like configuration of cubic "unit cells", analogous to the end wall-mounted driver of the LBS 501 facility that consists of a 100 high-pressure tank cluster (Klomfass-et-al. [2]).