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**RESISTANCE OF BI-STEEL® TO IN-CONTACT
AND CLOSE-PROXIMITY HIGH EXPLOSIVE DETONATIONS**

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ABSTRACT

Conventionally reinforced concrete panels have poor resistance to in-contact explosions, normally resulting in tensile spalling from the back face or total breach. The section depth required to prevent breach can be reduced by use of a charge stand-off screen. However, it is often impractical and uneconomic to incorporate large charge stand-off distances sufficient to reduce section depth significantly. Tensile spalling can be eliminated by using a steel plate attached to the back face of a panel. There are obvious benefits in using a construction system with significantly better resistance to in-contact or close proximity explosions.

Bi-Steel® is a steel-concrete-steel composite consisting of two outer steel plates attached to one another by an array of friction welded bar connectors. The void between the panels is normally filled with structural concrete. The result is confinement of the concrete and a rear steel face plate – ideal for performance against in-contact and close-proximity explosions.

To demonstrate performance, Bi-Steel has been tested against a wide range of explosive charges, ranging from a few pounds to tonnes of high explosive at close range ($<2.5\text{lb/ft}^{1/3}$).

Testing of Bi-Steel has demonstrated good resistance to in-contact and close proximity explosions. This paper presents the results of some of these tests and discusses the response mechanisms of Bi-Steel, which includes both success and failure of panels.