

Abstract Submitted
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Analytic Determination of Product Isentrope for an Ammonium Nitrate-Aluminum Explosive ERIC ANDERSON, MARK SHORT, SCOTT JACKSON, Los Alamos National Laboratory — Ammonium nitrate mixed with aluminum powder forms a non-ideal explosive often referred to as Ammonal. Non-ideal detonation can result in significant energy release behind the detonation sonic surface that does not contribute to the detonation velocity, but may affect the expansion energy of the product gases. In this work, we use scaled cylinder expansion tests to characterize both the diameter effect and product energy variation with scale for Ammonal. The results of two scaled cylinder tests with 50.8-mm and 72.6-mm inner diameters are compared to prior data at other scales. We find that cylinder wall velocity increases with increasing charge diameter and also with increasing charge length. We also use the analytic method of Jackson [Proc. Combust. Inst., Vol. 35, 2015, pg.1997-2004] to compute the isentropes of the partially-reacted product states in all tests to demonstrate the charge-size dependence of Ammonal and quantify the potential energy of the product state for each condition.

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