# EVALUATION OF THE EXPERIMENTAL TNT EQUIVALENCE OF A PLASTIC EXPLOSIVE AND VALIDATION BY FINITE VOLUME SIMULATION

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## ABSTRACT

The experimental TNT equivalence for PG3, a plastic explosive with 89% RDX, has been evaluated. The objective was to obtain a reliable equivalency to TNT in a certain range of scaled distance to be able to perform subsequent simulations of explosively formed projectiles (EFPs). Six pressure sensors were placed at three distances (2, 4 and 8m), and spherical charges of 700, 1000 and 1400g were tested covering a range of 1.7 to 8.5 $m/kg^{1/3}$ scaled distance. Equivalents have been evaluated based on a total of 54 pressure signals, the arrival time and average shock velocity data, based on high-speed camera images. The uncertainty in the measurements of the different shock parameters has also been assessed. The equivalents have been calculated based on pressure, impulse, arrival time and shock velocity. A TNT equivalent value based on peak pressure of 1.37 has been obtained with an average measurement uncertainty value of 3.7%. The impulse-based TNT Equivalent obtained was 1.08 while the equivalent based on arrival time was 1.54. After the analysis, these experimental tests have been simulated using the finite volume code Viper::Blast to validate the evaluation methodology of the TNT equivalence based on pressure, impulse and arrival time. For this purpose, it has been verified that the experimental values are reached by introducing the energy and density parameters of PG3 and simulations have been carried out by varying the TNT parameters until the experimental values are reached. The calibration of the methodology allows the evaluation of equivalents based on different parameters without the need for testing.