

TNT EQUIVALENCE OF C-4 AND PE4: A REVIEW OF TRADITIONAL SOURCES AND RECENT DATA

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ABSTRACT

Since standard engineering-level blast models are typically developed to predict airblast parameters (pressure and impulse) from TNT bursts, prediction of airblast from other materials uses an equivalence factor by which an equivalent TNT weight is computed and used in the source term of the model. This approach is widespread in the industry and has been codified in numerous manuals, books, and papers.

A recent effort co-sponsored by TSWG (U.S.) and FSTD (Singapore) collected and compiled equivalence data for a wide variety of explosive materials (both military grade as well as home-made) into a single software tool named STREET. The database thus assembled provides a comprehensive and expandable repository for equivalence data. Two of the main achievements in STREET are the consideration of equivalence as a function of scaled standoff (rather than a scalar), and the documentation of uncertainty in the estimated value.

In this paper, we consider specifically the manual- and test-derived data related to Composition C-4, and as a first step, we draw some judgments regarding the equivalence implicit in blast curves provided by UFC 3-340-02, for both pressure and impulse.

Next, we consider PE4, which is similar in composition to C-4 and is used widely in the UK. A significant body of blast data for this explosive has been generated, from which equivalence is computed and is compared to the available data for C-4, with a view towards determining whether these two materials can in fact be considered as a single explosive (with two alternate names).

Finally, considering the combined data for both C-4 and PE4, new curve fits are provided that represent the pressure and impulse equivalence of the C-4/PE4 material (and its uncertainty) as a function of scaled standoff.