CLASSIFICATION OF EXPLOSIVES

MASTER

G. T. West

DEVELOPMENT DIVISION

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Normal Process Development
Endeavor No. 216

Mason & Hanger-Silas Mason Co., Inc.
Portex Plant
P. O. BOX 647
AMARILLO, TEXAS 79177
806-335-1581

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ABSTRACT

Sufficient supplies were purchased to test ten explosives using the NOL Card Gap Test as described in Department of the Army Technical Bulletin TB 700-2 (Explosives Hazard Classification Procedures) dated 19 May 1967. A calibration series was fired using pressed TNT (density = 1.626 Mg/m³). The estimated 50% point was 158 cards.

INTRODUCTION

The goal of this project is the implementation at Pantex Plant of certain tests required by the U. S. Department of Transportation for the classification of explosives. Tests to be conducted include the NOL Card Gap (Large-Scale) Test, the Ignition and Unconfined Burning Test and the Detonation Test.

Selected explosives will be submitted to these tests as required. Data will be presented to the USERDA with a recommended classification for each explosive.

DISCUSSION

A recent notice of proposed regulation has indicated that certain agencies (including the USERDA) will be authorized to classify explosives developed and used within their agencies. Tests and procedures are described in Department of the Army Technical Bulletin TB 700-2 (Explosives Hazard Classification Procedures), published 19 May 1967. Tests specified in that document are:

1. Bureau of Explosives Impact Test
2. The Detonation Test
3. Ignition and Unconfined Burning Test
4. Thermal Stability Test
5. Card Gap Test

Versions of Tests 1 and 4 already exist at Pantex. Tests 2, 3 and 5 will be done as described in TB 700-2 with slight or no modifications.

An NOL Card Gap "calibration" series was performed on pressed TNT. Assembly and modifications are shown in Fig. 1.

The TNT parts were machined to give a good slip fit, due to the variations in inside diameter and straightness of the commercial steel tubing. An SE-1 detonator was substituted for the Engineers Special Blasting Cap (J-2). Simple stacked 2 x 4 lumber was used for the shot stand. All other parts of the assembly were as specified in TB 700-2.

Fig. 1. Card Gap Test

Although the TB 700-2 procedure states that "known" explosives need not be started at zero gap this series was done using the full procedure so that those conducting the tests might become more familiar with the entire procedure.

Data for the series are shown below in Table I. The density of the twelve TNT parts used ranged from 1.624 Mg/m³ to 1.628 Mg/m³, with an average of 1.626 Mg/m³ and a 95% confidence interval of 0.001 Mg/m³.

Table I. NOL Card Gap Test Data for Pressed TNT

<u>Shot Number</u>	<u>Number of Cards</u>	<u>Result</u>
1	0	GO
2	8	GO
3	16	GO
4	32	GO
5	64	GO
6	128	GO
10	144	GO
11	152	GO
12	156	GO
9	160	NO GO
8	192	NO GO
7	256	NO GO

The estimated 50% card gap is 158 cards. While this is considerably lower than predicted from previously published data(1) it is emphasized that a different booster (50/50 Pentolite, rather than tetryl) was specified by TB 700-2. Boosters used were purchased by federal stock number (1375-991-8891) through the U. S. Naval Supply Depot. Density information is being obtained for these pellets.

There was no difficulty in distinguishing between GO and NO GO. A GO produces a well-defined hole, approximately 5 cm in diameter, completely through the 9.5 mm thick witness plate. A NO GO produces only very slight warping of the plate. No fractures were noted in the witness plate after the "most violent" NO GO.

CONCLUSIONS, COMMENTS, FUTURE WORK

The NOL card gap test, as specified in Department of the Army Technical Bulletin TB 700-2 is operational at Pantex Plant and will be used to provide a basis for the recommendation of classification of new explosives. Other tests to be implemented include the detonation test and the ignition and unconfined burning test.

(1) "Explosives-Effects and Properties," NOLTR 65-218, 21 February 1967.

Pressed TNT has been tested using the specified procedure with a resulting 50% value of 158 cards at a density of 1.626 Mg/m³.

The detonation test, ignition and unconfined burning test and the card gap test will soon be conducted on pure pressed TATB and pressed RX-03-BB.