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Twenty-Seventh Partial Report
on
Bombs and Associated Components

First Partial Report
on
Acceleration Test of Chemical Corps Munitions

Project No.: NPG-Re3c-321-1-52
No. of Pages: 6
Date: FEB 18 1952

RESTRICTED
SECURITY INFORMATION
NP 46499
23 October 1951
SECURITY INFORMATION

Straight tensile loading test of the Chemical Corps bomb E33 conducted on the acceleration wheel. Overall view showing acceleration wheel, E33 bomb, and the strut to which the bomb is attached (cables around bomb are safety cables).
Fore and aft acceleration test of the Charcoal Core, with FF3 conducted on the catapult and arresting gear unit. This view is approximately 30 degrees from the front shows the catapult car, accelerometer on top, and the FF3 box mounted on a Mk 51 bomb rack with sway strakes and a safety cable.
**TABLE I**

**TABULATED TEST DATA**

**1100 Pounds E-83 Bomb**

<table>
<thead>
<tr>
<th>Date</th>
<th>Acceleration</th>
<th>Deceleration</th>
<th>Direction</th>
<th>Remarks</th>
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<tr>
<td>10/23/51</td>
<td>9</td>
<td>--</td>
<td>Vertical (Centrifuge)</td>
<td>No Change</td>
</tr>
<tr>
<td>10/23/51</td>
<td>2.9</td>
<td>2.5</td>
<td>Fore and aft</td>
<td>No Change</td>
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<tr>
<td>10/23/51</td>
<td>3</td>
<td>--</td>
<td>Fore and aft</td>
<td>Inadvertent fast return</td>
</tr>
<tr>
<td>10/25/51</td>
<td>3.0</td>
<td>2.3</td>
<td>Fore and aft</td>
<td>No Change</td>
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<tr>
<td>10/25/51</td>
<td>3.4</td>
<td>2.4</td>
<td>Fore and aft</td>
<td>No Change</td>
</tr>
<tr>
<td>10/25/51</td>
<td>3.75</td>
<td>2.4</td>
<td>Fore and aft</td>
<td>No Change</td>
</tr>
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Acceleration Test of Chemical Corps Munitions

DISTRIBUTION

Bureau of Ordnance

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Re3c 1

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Office of Chief Chemical Corps, Army Chemical
Center, Edgewood, Maryland 3

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APPENDIX C
1. This is the first partial report on the acceleration tests of Chemical Corps Munitions. The purpose of this test was to determine if the E-83 experimental bomb would stand a vertical acceleration of 9 g's and a fore and aft acceleration of 3 g's. These tests were conducted under Task Assignment NPG Re3e-321-1-52. The E-83 bomb was subjected to a vertical acceleration of 9 g's and a maximum fore and aft acceleration of 3.75 g's. No failure of any of the components resulted from these tests.

a. It is concluded that the E-83 bomb will withstand a vertical acceleration of 9 g's and a fore and aft acceleration of 3.75 g's without damage to the bomb.
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PART B

INTRODUCTION

1. AUTHORITY:

These tests were authorized by reference (a) and conducted in accordance with reference (b).

2. REFERENCES:

a. BUORD conf ltr NPG-Re8o-BEK:flm 1 Ser 25779 of 18 September 1951
b. BUORD restr ltr NP9-ReJo-BEK:1k 1 of 17 October 1951

3. BACKGROUND:

The Army Chemical Center, Edgewood, Maryland requested, through the Bureau of Ordnance (Re3o), that acceleration tests be run by the Naval Proving Ground on certain Chemical Corps stores.

4. OBJECT OF TEST:

a. To determine if the Chemical Corps experimental bomb E-83 would withstand a vertical acceleration force of 9 g's without damage.

b. To determine if the Chemical Corps experimental bomb E-83 would withstand a fore and aft acceleration force of 3 g's without damage.

5. PERIOD OF TEST:

a. Date Project Letter 17 October 1951
b. Date Necessary Material Received 22 October 1951
c. Date Commenced Tests 23 October 1951
d. Date Tests Completed 25 October 1951

6. REPRESENTATIVES PRESENT:

D. M. Kone
K. J. Farmor
George A. Miller

Army Chemical Center
Army Chemical Center
Army Chemical Center
Acceleration Test of Chemical Corps Munitions

PART 2

DETAILS OF TEST

7. DESCRIPTION OF ITEM UNDER TEST:

The E-83 experimental bomb is a store weighing 1100 lbs. It is approximately 18 inch in diameter and approximately 70 inch in length. It is supported by suspension lugs 14 inches apart. These suspension lugs are bolted to the bomb body using four (4) 1/4-20 bolts per lug.

8. DESCRIPTION OF TEST EQUIPMENT:

a. The vertical acceleration test was performed on the large centrifuge wheel. This device consists of two horizontal plates connected by a vertical axle. It is about this vertical axis that the wheel rotates.

b. The fore and aft acceleration tests were conducted on a car traveling on a track, launched by a catapult Type F, Mk. 6 Mod. 1 and stopped by an arresting gear unit Mk. 4. Acceleration and deceleration data were obtained from a Waugh accelerometer mounted on the catapult car.

9. PROCEDURE:

a. The bomb was first mounted on the centrifuge wheel with its longitudinal axis parallel to the vertical axis of the wheel. In this position the centripetal acceleration of the bomb corresponds to a vertical acceleration of the bomb carried in normal flying attitude. The rotational velocity of the wheel was increased to 96.5 rpm which corresponds to a force of 9 g's on the bomb since its center of gravity is 3/4 inch from the center of rotation.

b. The bomb was mounted on a catapult car and the first catapult shot produced an acceleration of 2.9 g's. No damage was done to the bomb. An inadvertent fast return against the launching cable however, sheared all bolts holding the suspension lugs. The bolts were replaced and three more catapult shots were made with the bomb receiving a maximum acceleration of 3.75 g's. No damage was done to the bomb by these three catapult shots.
10. RESULTS AND DISCUSSIONS:

a. No changes were noted in the bomb after the 9 g vertical acceleration test on the centrifuge wheel.

b. Although the suspension lug bolts sheared on an inadvertent fast return after the first catapult shot, an examination of the sheared bolts showed them to be an extremely hard brittle structure having a Rockwell C hardness of 45 ± 2. It is not known what accelerations were encountered during this return because of the damping characteristics of the accelerometer, but it does point up the need for careful control of the heat treatment of vital strength parts such as the suspension lug bolts.

PART E

CONCLUSIONS

11. It is concluded that the Chemical Corps experimental bomb E-83 will withstand a peak acceleration of 9 g's vertically and 3.75 g's fore and aft without sustaining damage.

PART E

DISPOSITION OF MATERIAL

12. The E-83 experimental bomb was returned to the Army Chemical Center, Edgewood, Maryland.
The tests upon which this report is based were conducted by:

J. C. TALLEY, Ordnance Engineer,
Laboratory Services Division,
Aviation Ordnance Department

This report was prepared by:
L. P. MICHHELL, Lieutenant, USN,
Laboratory Services Division Officer
Aviation Ordnance Department

This report was reviewed by:
W. F. MILLER, Director of Research,
Aviation Ordnance Department
S. VAN MATER, Captain, USN,
Aviation Ordnance Officer,
Aviation Ordnance Department

APPROVED: IRVING T. DUKE
Rear Admiral, USN
Commander, Naval Proving Ground

C. T. MAURO
Captain, USN
Ordnance Officer
By direction