1. AGENCY USE ONLY (Leave blank) | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED
---|---|---
| | 04/93 | POP Test (04/93)

4. TITLE AND SUBTITLE
Performance Oriented Packaging Testing of Container, Shipping and Storage, Mk 729 Mod 0, Mk 740 Mod 0, and Mk 741 Mod 0 for Packing Group II Solid Hazardous Materials

5. FUNDING NUMBERS
DODPOPHM/USA/DOD/NADTR93004

6. AUTHOR(S)
Dennis M. Kotun

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Packaging, Handling, Storage and Transportability Center
Naval Weapons Station Earle
Colts Neck, NJ 07722-5023

8. PERFORMING ORGANIZATION REPORT NUMBER
DODPOPHM/USA/DOD/NADTR93004

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Program Executive Office, Undersea Warfare
ATTN: B. J. Silvey, PMO406F1
2531 Jefferson Davis Hwy NC-3
Washington, DC 20362-5169

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
93-08699

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release

13. ABSTRACT (Maximum 200 words)
This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Mk 729 Mod 0 Shipping and Storage Container (Drawing #5619402) meets the Packing Group II requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The packaged commodity used for the test was a simulated Mk 122 Mod 0 Warhead weighing 74 kg (163 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 31 kg (68 pounds) were added. Gross weight of the loaded container was 133 kg (293 pounds). The test results indicate that the container has conformed to the POP requirements.

In addition, due to their similarities in design, size, and weight, this test is considered representative of qualification testing for the Mk 740 Mod 0 (Drawing #5624153) and Mk 741 Mod 0 (Drawing #5624152) Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.

14. SUBJECT TERMS
POP Test of Mk 729 Mod 0, Mk 740 Mod 0, and Mk 741 Mod 0 Shipping and Storage Containers

15. NUMBER OF PAGES
7

17. SECURITY CLASSIFICATION OF REPORT
UNCLASSIFIED

18. SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

19. SECURITY CLASSIFICATION OF ABSTRACT
UNCLASSIFIED

20. LIMITATION OF ABSTRACT
UL
PERFORMANCE ORIENTED PACKAGING TESTING
OF CONTAINER, SHIPPING AND STORAGE,
MK 729 MOD 0, MK 740 MOD 0, AND MK 741 MOD 0
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

Author:
Dennis M. Kotun
Mechanical Engineering Technician

Performing Activity:
Packaging, Handling, Storage and Transportability Center
Naval Weapons Station Earle
Colts Neck, New Jersey 07722-5023

April 1993

FINAL

DISTRIBUTION UNLIMITED

Sponsoring Organization:
Program Executive Office
Undersea Warfare (PMO406F1)
Washington, DC 20362-5169
INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 729 Mod 0 Shipping and Storage Container (Drawing #5619402) meets the Packing Group II requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The packaged commodity used for the test was a simulated Mk 122 Mod 0 Warhead weighing 74 kg (163 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 31 kg (68 pounds) were added. Gross weight of the loaded container was 133 kg (293 pounds).

Due to unavailability only one container was used for testing. This is less than the number required by the regulations. Approval for this deviation has been granted by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

In addition, due to their similarities in design, size and weight, this test is considered representative of qualification testing for the Mk 740 Mod 0 (Drawing #5624153) and Mk 741 Mod 0 (Drawing #5624152) Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.

TESTS PERFORMED

1. Base Level Vibration Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. The container was placed on a repetitive shock platform which has a vertical linear motion of 1-inch double amplitude. Movement of the container was restricted during vibration in all but the vertical direction. The frequency of the platform was increased until the container left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour.

2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. The container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a minimum height of 3 meters (including the test container). A weight of 399 kg (879 pounds) was stacked on the test container. The test was performed for 24 hours. The weight was then removed and the container examined.

3. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Six drops were performed from a height of 1.2 meters (4 feet) in the following orientations (three drops for each orientation):
a. Horizontally.

b. Diagonally on the edge between the cover assembly and the top ring of the container.

PASS/FAIL

1. **Base Level Vibration Test**

   The criteria for passing the base level vibration test is outlined in Title 49 CFR, Sec. 178.608(c): No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

2. **Stacking Test**

   The criteria for passing the stacking test is outlined in Title 49 CFR, Sec. 178.606(d): No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

3. **Drop Test**

   The criteria for passing the drop test is outlined in Title 49 CFR, Sec. 178.603(f): A package is considered to successfully pass the drop tests if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

TEST RESULTS

1. **Base Level Vibration Test**

   Satisfactory.

2. **Stacking Test**

   Satisfactory.

3. **Drop Test**

   Satisfactory.
DISCUSSION

1. Base Level Vibration Test

   The input vibration frequency was 3.5 Hz. Immediately after the vibration test was completed, the container was removed from the platform, turned on its side and inspected. No unfavorable distortion or deterioration was observed.

2. Stacking Test

   The container was inspected after the 24-hour period was over. No unfavorable distortion or deterioration was observed.

3. Drop Test

   After each drop, the container was inspected. The simulated Mk 122 Mod 0 Warhead was completely retained by the container.

REFERENCE MATERIAL


B. Bureau of Explosives Tariff No. BOE 6000K Hazardous Materials Regulations of the Department of Transportation by Air, Rail, Highway, Water including Specifications for Shipping Containers.

DISTRIBUTION LIST

Defense Technical Information Center (2 copies)
ATTN: DTIC/FDA
Bldg. 5, Cameron Station
Alexandria, VA 22304-6145

DLA Depot Operations Support Office
Bldg. 32F, DGSE
ATTN: Dave Gay
Richmond, VA 23297-5000

Commander
Naval Surface Warfare Center
ATTN: Crane Division (Code 4053)
Crane, IN 47522-5000
## TEST DATA SHEET

### POP MARKING:

**UN 1A2/Y133/S/** USA/DOD/NAD**

**YEAR LAST PACKED OR MANUFACTURED**

<table>
<thead>
<tr>
<th>Nomenclature: Mk 729 Mod 0 Shipping and Storage Container</th>
<th>NSN: 8140-01-306-3343</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: 1A2</td>
<td>Outer Packaging Material: Steel</td>
</tr>
<tr>
<td>Drawing Number or P/N: 5619402</td>
<td>Gross Weight: 133 kg (293 pounds)</td>
</tr>
<tr>
<td>Dimensions: 37.75&quot; H x 20&quot; Dia</td>
<td>Tare Weight: 28 kg (62 pounds)</td>
</tr>
<tr>
<td>Closure (Method/Type): Removable Cover w/Locking Ring</td>
<td>Additional Description:</td>
</tr>
</tbody>
</table>

### PACKAGED Commodity:

<table>
<thead>
<tr>
<th>Name: See table 1</th>
<th>NSN(s): See table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Nations Number: See table 1</td>
<td>物理状态: Solid</td>
</tr>
<tr>
<td>United Nations Packing Group: II</td>
<td>密度/相对密度: N/A</td>
</tr>
<tr>
<td>Physical State (Solid, Liquid, or Gas): Solid</td>
<td>重量: See table 1</td>
</tr>
<tr>
<td>Vapor Pressure (Liquids Only): N/A At 50 °C: N/A At 55 °C: N/A</td>
<td>沸点: N/A</td>
</tr>
<tr>
<td>Consistency/Viscosity: N/A</td>
<td>密度/相对密度: N/A</td>
</tr>
<tr>
<td>Amount per Package: See table 1</td>
<td>熔点: N/A</td>
</tr>
<tr>
<td>Net Weight: See table 1</td>
<td>其他描述:</td>
</tr>
</tbody>
</table>

### PACKAGED Commodity USED FOR TEST:

<table>
<thead>
<tr>
<th>Name: Simulated Mk 122 Mod 0 Warhead</th>
<th>Physical State: Solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistency: N/A</td>
<td>密度/相对密度: N/A</td>
</tr>
<tr>
<td>Test Pressure (Liquids Only): N/A</td>
<td>重量: 105 kg (231 pounds)</td>
</tr>
<tr>
<td>Additional Description: The net weight includes the current maximum commodity weight plus an additional 31 kg (68 pounds).</td>
<td></td>
</tr>
</tbody>
</table>

N/A = Not Applicable
### Table 1
Commodities Approved for Shipping in the
Mk 729 Mod 0 Shipping and Storage Container

<table>
<thead>
<tr>
<th>NALC/N</th>
<th>NSN</th>
<th>Commodity Nomenclature</th>
<th>Packing Document Number</th>
<th>Haz Class/Div</th>
<th>UN Number</th>
<th>Units/Package</th>
<th>Total Net Weight kg (lb)</th>
<th>Total Gross Weight kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T628</td>
<td>1356-01-272-7800</td>
<td>Warhead, Mk 122 Mod 0 t/Mk 50 Torpedo</td>
<td>5619403</td>
<td>1.1D</td>
<td>0221</td>
<td>1</td>
<td>74 (163)</td>
<td>102 (225)</td>
</tr>
</tbody>
</table>

### Mk 740 Mod 0 Shipping and Storage Container

<table>
<thead>
<tr>
<th>NALC/N</th>
<th>NSN</th>
<th>Commodity Nomenclature</th>
<th>Packing Document Number</th>
<th>Haz Class/Div</th>
<th>UN Number</th>
<th>Units/Package</th>
<th>Total Net Weight kg (lb)</th>
<th>Total Gross Weight kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T096</td>
<td>1356-01-273-1260</td>
<td>Fleet Exercise System Assembly</td>
<td>5624145</td>
<td>1.3C</td>
<td>0275</td>
<td>1</td>
<td>54 (120)</td>
<td>79 (174)</td>
</tr>
</tbody>
</table>

### Mk 741 Mod 0 Shipping and Storage Container

<table>
<thead>
<tr>
<th>NALC/N</th>
<th>NSN</th>
<th>Commodity Nomenclature</th>
<th>Packing Document Number</th>
<th>Haz Class/Div</th>
<th>UN Number</th>
<th>Units/Package</th>
<th>Total Net Weight kg (lb)</th>
<th>Total Gross Weight kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW16</td>
<td>1356-01-272-2371</td>
<td>Boiler Assembly</td>
<td>5624144</td>
<td>9-</td>
<td>3090</td>
<td>1</td>
<td>31 (69)</td>
<td>54 (119)</td>
</tr>
</tbody>
</table>