This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Mk 480 Mod 0 Shipping and Storage Container meets the Packing Group II requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The container's contents consisted of a simulated load of steel rods weighing 4.3 kg (9.5 pounds). Gross weight of the loaded container was 14 kg (31 pounds). The test results indicate that the container has conformed to the POP requirements.
PERFORMANCE ORIENTED PACKAGING TESTING
OF
CONTAINER, SHIPPING AND STORAGE, MK 480 MOD 0
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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June 1992

FINAL

DISTRIBUTION UNLIMITED

Sponsoring Organization:
Naval Sea Systems Command (PMS-422)
Department of the Navy
Washington, DC 20362-5101
INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 480 Mod 0 Shipping and Storage Container (Packing Group II) meets the requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The container's contents consisted of a simulated load of steel rods weighing 4.3 kg (9.5 pounds). Gross weight of the loaded container was 14.2 kg (31.5 pounds).

Due to unavailability only two containers were 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. The containers were identified as #1 and #2.

TESTS PERFORMED

1. Base Level Vibration Test

   This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. Container #1 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. Container #2 was used for this test. 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 56.8 kg (125.2 pounds) was stacked on each 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 using container #1.

   b. Diagonally on the edge between the cover assembly and the top ring of the container using container #2.
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 3.6 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 contents were completely retained by the container.

**REFERENCE MATERIAL**


C. 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)
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ATTN: DDRV-TMPA, D. Gray
Richmond, VA 23219

Crane Division (Code 5053)
Naval Surface Warfare Center
Crane, IN 47522-5000
## DATA SHEET:

<table>
<thead>
<tr>
<th>Container:</th>
<th>Mk 480 Mod 0 Shipping and Storage Container</th>
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<tbody>
<tr>
<td>Type:</td>
<td>1A2</td>
</tr>
<tr>
<td>P/N or NSN:</td>
<td>8140-00-027-9488</td>
</tr>
<tr>
<td>Specification Number:</td>
<td>MS27684-23</td>
</tr>
<tr>
<td>Material:</td>
<td>Steel</td>
</tr>
<tr>
<td>Gross Weight:</td>
<td>14 kg (31 pounds)</td>
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<tr>
<td>Dimensions:</td>
<td>21.25&quot; H x 15&quot; W</td>
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<tr>
<td>Closure (Method/Type):</td>
<td>Ring</td>
</tr>
<tr>
<td>Tare Weight:</td>
<td>9.5 kg (22 pounds)</td>
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<tr>
<td>Additional Description:</td>
<td>Cylindrical Steel Drum</td>
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## PRODUCT:

<table>
<thead>
<tr>
<th>Name:</th>
<th>See table</th>
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<tbody>
<tr>
<td>NSN(s):</td>
<td>See table</td>
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<tr>
<td>United Nations Number:</td>
<td>See table</td>
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<tr>
<td>United Nations Packing Group:</td>
<td>II</td>
</tr>
<tr>
<td>Physical State (Solid, Liquid, or Gas):</td>
<td>Solid</td>
</tr>
<tr>
<td>Vapor Pressure (Liquids Only):</td>
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<tr>
<td>Consistency/Viscosity:</td>
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<td>Amount Per Container:</td>
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<tr>
<td>Net Weight:</td>
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## TEST PRODUCT:

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<tr>
<th>Name:</th>
<th>Steel Rods (5 Units)</th>
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<tr>
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<td>Consistency:</td>
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</tr>
<tr>
<td>Test Pressure (Liquids Only):</td>
<td>N/A</td>
</tr>
<tr>
<td>Amount Per Container:</td>
<td>N/A</td>
</tr>
<tr>
<td>Net Weight:</td>
<td>4.3 kg (9.5 pounds)</td>
</tr>
<tr>
<td>Additional Description:</td>
<td>4</td>
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</table>
### TABLE 1
Products Approved for Shipping in the Mk 480 Mod 0 Shipping and Storage Container

<table>
<thead>
<tr>
<th>NALC/DODIC</th>
<th>NSN</th>
<th>Product Nomenclature</th>
<th>Packing Drawing Number</th>
<th>Haz Class/Div</th>
<th>UN Number</th>
<th>Units/Cntr</th>
<th>Total Net Weight (lb)</th>
<th>Total Gross Weight (lb)</th>
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<tbody>
<tr>
<td>V242</td>
<td>1336-00-060-8776</td>
<td>Safe &amp; Arming Device, Mk 17/0</td>
<td>2643307</td>
<td>1.4S</td>
<td>0349</td>
<td>5</td>
<td>9.5</td>
<td>31.5</td>
</tr>
</tbody>
</table>
MK 480 MOD 0
SHIPPING AND STORAGE CONTAINER
POP MARKING

UN 1A2/Y14/S/**/USA/DOD/NAD

** YEAR LAST PACKED OR MANUFACTURED