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Performance Oriented Packaging Testing of Container, Shipping and Storage, for the Mk 4 Mod 0 Training Limpet Assembly for Packing Group II Solid Hazardous Materials

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13. ABSTRACT (Maximum 200 words)

This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Shipping and Storage Container for the Mk 4 Mod 0 Training Limpet Assembly, 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 one inert Mk 4 Mod 0 Training Limpet Assembly weighing 31 kg (68 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 3 kg (7 pounds) were added for a total net weight of 34 kg (75 pounds). Gross weight of the loaded container was 53 kg (117 pounds). The test results indicate that the container has conformed to the POP requirements.

14. SUBJECT TERMS

POP Test of Shipping and Storage Container for the Mk 4 Mod 0 Training Limpet Assembly

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PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
CONTAINER, SHIPPING AND STORAGE, FOR THE  
MK 4 MOD 0 TRAINING LIMPET ASSEMBLY  
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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September 1992

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## **INTRODUCTION**

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Shipping and Storage Container for the Mk 4 Mod 0 Training Limpet Assembly 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 one inert Mk 4 Mod 0 Training Limpet Assembly weighing 31 kg (68 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 3 kg (7 pounds) were added for a total net weight of 34 kg (75 pounds). Gross weight of the loaded container was 53 kg (117 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.

## **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 318 kg (702 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. Five drops were performed from a height of 1.2 meters (4 feet), impacting the following surfaces:

- a. Flat bottom.
- b. Flat top.

- c. Flat on long side.
- d. Flat on short side.
- e. One corner.

**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 packages 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 3.3 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 assembly was retained by the container.

## REFERENCE MATERIAL

A. Code of Federal Regulations, Title 49 CFR, Parts 107-178.

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.

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TEST DATA SHEET

<b>FOP MARKING:</b>	
UN 4C/Y53/S/**/USA/DOD/NAD	
**YEAR LAST PACKED OR MANUFACTURED	
Container: Shipping and Storage Container for the Mk 4 Mod 0 Training Limpet Assembly	
Type: 4C	Container P/N or NSN: NSN 1351-00-536-4500
Drawing Number: 6537744	Outer Packaging Material: Wood
Dimensions: 33.50" L x 18.25" W x 17.25" H	Gross Weight: 53 kg (117 pounds)
Closure (Method/Type): 3/4" steel strapping; latch w/lead wire seal	Tare Weight: 19 kg (42 pounds)
Additional Description:	
<b>PACKAGED COMMODITY:</b>	
Name: See table 1	NSN(s): See table 1
United Nations Number: See table 1	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A      At 50 °C: N/A      At 55 °C: N/A	
Consistency/Viscosity: N/A	Density/Specific Gravity: N/A
Amount Per Container: See table 1	Flash Point: N/A
Net Weight: See table 1	
<b>PACKAGED COMMODITY USED FOR TEST:</b>	
Name: Mk 4 Mod 0 Training Limpet Assembly	Physical State: Solid
Consistency: N/A	Density/Specific Gravity: N/A
Test Pressure (Liquids Only): N/A	Net Weight: 34 kg (75 pounds)
Additional Description:	
The net weight includes the current maximum commodity weight plus an additional 3 kg (7 pounds).	

N/A = Not Applicable

TABLE 1  
Commodities Approved for Shipping in the  
Shipping and Storage Container for the  
Mk 4 Mod 0 Training Limit Assembly

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
MWS2	1351-00-536-4500	Assembly, Limpet, Training, Mk 4 Mod 0	6537744	1.1D	0137	1	68	110