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April 1993

**PERFORMANCE ORIENTED PACKAGING TESTING
OF
CONTAINER, SHIPPING AND STORAGE,
MK 37 MOD 0, MK 287 MODS 0, 1, AND MK 764 MOD 0
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 Mk 37 Mod 0 Shipping and Storage Container (LD 269069) 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 SIDEWINDER Rocket Motor weighing 46 kg (100 pounds)). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 2 kg (4 pounds) were added. Gross weight of the loaded container was 63 kg (137 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 287 Mods 0, 1 (Drawing #1516486) and Mk 764 Mod 0 (Drawing #5972149) Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601g(4), Variation 4.			
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INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 37 Mod 0 Shipping and Storage Container (LD 269069) 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 SIDEWINDER Rocket Motor weighing 46 kg (100 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 2 kg (4 pounds) were added. Gross weight of the loaded container was 63 kg (137 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 287 Mods 0, 1 (Drawing #1516486) and Mk 764 Mod 0 (Drawing #5972149) Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601g(4), Variation 4.

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 1,057 kg (2,329 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 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.

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DISCUSSION

1. **Base Level Vibration Test**

The input vibration frequency was 4 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

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

POP MARKING:	
UN 4A1/Y63/S/**/USA/DOD/NAD	
**YEAR LAST PACKED OR MANUFACTURED	
Nomenclature: Mk 37 Mod 0 Shipping and Storage Container	
Type: 4A1	NSN: 8140-00-563-0205
Drawing Number or P/N: LD 269069	Outer Packaging Material: Steel
Dimensions: 77" L x 8.2" W x 6.75" H	Tested Gross Weight: 63 kg (137 pounds)
Closure (Method/Type): 5/8" strapping, removable cover	Tested Tare Weight: 15 kg (33 pounds)
Additional Description:	
PACKAGED COMMODITY:	
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 Package: See table 1	Flash Point: N/A
Net Weight: See table 1	
PACKAGED COMMODITY USED FOR TEST:	
Name: Simulated SIDEWINDER Rocket Motor	Physical State: Solid
Consistency: N/A	Density/Specific Gravity: N/A
Test Pressure (Liquids Only): N/A	Tested Net Weight: 48 kg (104 pounds)
Additional Description:	
The net weight includes the current maximum commodity weight plus an additional 2 kg (4 pounds).	

N/A = Not Applicable

TABLE 1
Commodities Approved for Shipping in the
Mk 37 Mod 0 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Document Number	Haz Class/Div	UN Number	Units/ Package	Total Net Weight kg (lb)	Total Gross Weight kg (lb)
N/A	N/A	Mk 36 Mod 8	1331110	1.3C	0186	1	46 (100)	61 (133)
N/A	N/A	Mk 36 Mod 9	1331110	1.3C	0186	1	45 (99)	60 (132)
N/A	N/A	Mk 36 Mod 10	1331110	1.3C	0186	1	45 (99)	60 (132)
N/A	N/A	Mk 36 Mod 11	1331110	1.3C	0186	1	45 (99)	60 (132)

Mk 287 Mods 0, 1 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Document Number	Haz Class/Div	UN Number	Units/ Package	Total Net Weight kg (lb)	Total Gross Weight kg (lb)
V380	1337-01-090-9294	Mk 36 Mod 8	1331110	1.3C	0186	1	46 (100)	61 (133)
V884	1337-01-131-7860	Mk 36 Mod 9	1331110	1.3C	0186	1	45 (99)	60 (132)
V887	1337-01-145-9360	Mk 36 Mod 10	1331110	1.3C	0186	1	45 (99)	60 (132)
V888	1337-01-145-1963	Mk 36 Mod 11	1331110	1.3C	0186	1	45 (99)	60 (132)

Mk 764 Mod 0 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Document Number	Haz Class/Div	UN Number	Units/ Package	Total Net Weight kg (lb)	Total Gross Weight kg (lb)
VH09	1377-01-326-1359	Mk 112 Mod 1 RAM Rocket Motor	5972149	1.3C	0186	1	39 (86)	53 (116)

N/A = Not Assigned