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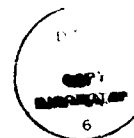
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6. AUTHOR(S) Eric C. Wu				
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13. ABSTRACT (Maximum 200 words) Qualification tests were performed to determine whether the in-service Mk 34 Mod 0 Shipping and Storage Container could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 31.7 kg (70 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register, Vol. 55 on 21 Dec 90. The container has conformed to the POP performance requirements; i.e., the container successfully retained its contents throughout the specified tests.				
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**PERFORMANCE ORIENTED PACKAGING TESTING
OF
CONTAINER, SHIPPING AND STORAGE, MK 34 MOD 0**

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6 May 1991

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INTRODUCTION

The Mk 34 Mod 0 Shipping and Storage Container tested contained two inert warhead sections weighing 56 pounds, and an additional 5.5 pounds of sand. The overall weight of the loaded container was 70 pounds. This test is representative of the worst case loading of the Mk 34 Mod 0 Shipping and Storage Container. This Performance Oriented Packaging (POP) test was performed to ascertain whether this standard container (Packing Group II) would meet the requirements as 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 Federal Register 49 CFR Final Rule. Due to unavailability, the number of containers used was less than the number required by the UN recommendation. This has been approved by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

The objective of these tests was to ensure that the sample container could withstand conditions of transportation outlined by the UN requirements.

TESTS PERFORMED

1. Base Level Vibration Test

This test was performed in accordance with paragraph 178.608 of the Performance Oriented Packaging Standards, Final Ruling, published in the Federal Register, Vol. 55, No. 246, December 21, 1990. One Mk 34 Mod 0 Shipping and Storage Container loaded with two Mk 8 Mod 4 Warheads was placed on the repetitive shock platform. The container was restricted from leaving the table 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 an hour at an input frequency of 3.67 Hz.

2. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. The container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (9.8 feet). One container configuration was tested. A stacked weight of 1,405 pounds, which represented the weight of an additional 20 containers, was used for the test. The test was performed for 24 hours. After the specified time, the weight was removed and the container examined.

3. Drop Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3. One container was used throughout the test. The 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

All tests were performed at ambient temperature of $+70 \pm 20$ °F.

PASS/FAIL (UN CRITERIA)

1. Base Level Vibration Test (FINAL RULING CRITERIA)

The criteria for passing the base level vibration test is outlined in paragraph 178.608 of the Title 49 CFR Final Ruling and states the following: "immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test.

2. Stacking Test (UN CRITERIA)

The criteria for passing the stacking test is outlined in paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "... no test sample should leak. No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

3. Drop Test (UN CRITERIA)

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle; e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs."

TEST RESULTS

1. Base Level Vibration Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Drop Test

Satisfactory.

DISCUSSION

1. Base Level Vibration Test

Immediately after the vibration test was completed, the container was removed from the platform, turned on its side and observed for any evidence of leakage. There was no leakage of the container contents as a result of this test.

2. Stacking Test

The container was visibly checked after the 24-hour period was over. There was no leakage, of the contents, or distortion/deterioration of the container as a result of this test.

3. Drop Test

After each drop, the container was inspected for any damage which would be a cause for rejection. Final inspection indicated damage was minimal with only minor denting noted. The container remained intact and serviceable upon completion of the tests.

REFERENCE MATERIAL

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6

B. Title 49 CFR 107, et al., Performance Oriented Packaging Standard; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule, Federal Register, Vol. 55, No. 246 of December 21, 1990

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TEST DATA SHEET

DATA SHEET:	
Container: Mk 34 Mod 0 Shipping and Storage Container	
Type: 4B2	Container P/N or NSN: NSN 8140-00-563-0199
Specification Number: LD 251369	Material: Cast/Folded Aluminum
Capacity: 31.76 kg (70 pounds)	Dimensions: 6.3" H x 12-3/4" W x 15-1/4" L
Closure (Method/Type): Removable Cover	Tare Weight: 3.85 kg (8.5 pounds)
Additional Description: Also as part of test product 5.5 pounds of sand bag was used	
PRODUCT: See table	
Name: See table	NSN(s): See table
United Nations Number: See table	
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: 2 Flash Point: N/A	
Net Weight: See table	
TEST PRODUCT:	
Name: Mk 8 Mod 4 Inert Warheads	Physical State: Solid
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: 2	Gross Weight: 25.40 kg (56 pounds)

TABLE 1

NALC	NSN	Type	Packing Drawing	UN Code	UN Number	#/ Cntr	Weight (lb)
V076	1336-00-658-9705	Mk 2 Mod 0	LD 251369	1.1E	0094	2	25
V371	1336-00-706-9518	Mk 8 Mod 2	LD 251369	1.1D	0286	2	25
V529	1336-00-911-1500	Mk 8 Mod 3	LD 251369	1.1D	0286	2	25
V499	1336-01-020-4946	Mk 8 Mod 4	LD 251369	1.1D	0286	2	25
V398	1336-01-079-9712	Mk 54 Mod 1	LD 251369	1.1D	0286	2	25
	1336-01-032-2833	Mk 8 (Inert)					
V387	1336-00-611-4301	Warhead, Practice					

MK 34 MOD 0 SHIPPING AND STORAGE CONTAINER

POP MARKING

UN 4B/Y32/S//USA/DOD/NAD**

**** YEAR MANUFACTURED OR LAST PACKED**

ENCLOSURE (2)