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Performance Oriented Packaging Testing of Tank, Cartridge, 3"/50, Mk 5 Mods 0, 1, 2 for Packing Group II Solid Hazardous Materials

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6. AUTHOR(S)

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This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Mk 5 Mod 1 3"/50 Cartridge Tank 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 load weighing 13 kg (28 pounds). This represents the current maximum commodity weight. Gross weight of the loaded tank was 16 kg (35 pounds). The test results indicate that the tank 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 5 Mods 0, 2 3"/50 Cartridge Tanks as per the variation in Title 49 CFR, Sec. 178.601(h).

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POP Test of Mk 5 Mod 1 3"/50 Cartridge Tank

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January 1993

PERFORMANCE ORIENTED PACKAGING TESTING OF TANK, CARTRIDGE, 3"/50, MK 5 MODS 0, 1, 2 FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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April 1993

FINAL

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INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 5 Mod 1 3"/50 Cartridge Tank (BUORD Drawing 300428) 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 load of sand weighing 13 kg (28 pounds). This represents the current maximum commodity weight. Gross weight of the loaded tank was 16 kg (35 pounds). The tanks were identified as #1 through #6.

In addition, due to their similarities in design, size and weight, this test is considered representative of qualification testing for the Mk 5 Mod 0 (BUORD Drawing 159241) and Mk 5 Mod 2 (BUORD Drawing 1380699) 3"/50 Cartridge Tanks as per the variation in Title 49 CFR, Sec. 178.601(h).

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 tanks #1 through #3 were placed on a repetitive shock platform which has a vertical linear motion of 1-inch double amplitude. Movement of the tanks were restricted during vibration in all but the vertical direction. The frequency of the platform was increased until the tanks 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. Tanks #1 through #3 were used for this test. Each tank was positioned horizontally and subjected to a force applied to its stacking features equivalent to the total weight of identical tanks stacked to a minimum height of 3 meters (including the test tank). A weight of 325 kg (717 pounds) was stacked on each test tank. The test was performed for 24 hours. The weight was then removed and the tanks 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 tank #1, #2, and #3.

b. Diagonally on the edge between the cover assembly and the top ring of the tank using tank #4, #5, and #6.

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 3.83 Hz. Immediately after the vibration test was completed, each tank was removed from the platform, turned on its side and inspected. No unfavorable distortion or deterioration was observed.

2. Stacking Test

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

3. Drop Test

After each drop, the tanks were inspected. The contents were completely retained by the tank.

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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Crane, IN 47522-5000

TEST DATA SHEET

POP MARKING: UN 1B2/Y16/S/**/USA/DOD/NAD **YEAR LAST PACKED OR MANUFACTURED	
Nomenclature: Mk 5 Mod 1 3"/50 Cartridge Tank	
Type: 1B2	**NSN:** NSN 8140-00-714-9119
Drawing Number or P/N: BUORD Drawing 300428	**Outer Packaging Material:** Aluminum
Dimensions: 6.35" Dia x 37" L	**Gross Weight:** 16 kg (35 pounds)
Closure (Method/Type): Removable Cover	**Tare Weight:** 3 kg (7 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: Sand	**Physical State:** Solid
Consistency: N/A	**Density/Specific Gravity:** N/A
Test Pressure (Liquids Only): N/A	**Net Weight:** 13 kg (28 pounds)
Additional Description: The net weight represents the current maximum commodity weight.	

N/A = Not Applicable

TABLE 1
Commodities Approved for Shipping in the Mk 5 Mods 0, 1, 2 3"/50 Cartridge Tank

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Document Number	Haz Class/Div	UN Number	Units/ Package	Total Net Weight (lb)	Total Gross Weight (lb)
C136	1315-00-555-7391	Ctg, 3"/50, VT	See Note/ OR-68/41	1.2E	0321	1	28	32
C137	1315-00-555-7426							
C140	1315-00-555-7201							
C141	1315-00-555-7393							
C143	1315-00-039-1682							
C150	1315-00-351-2751							
C150	1315-00-766-3734							
C151	1315-00-364-4681							
C151	1315-00-766-3732							
C152	1315-00-364-4664							
C152	1315-00-766-3733							
C153	1315-00-351-2752							
C153	1315-00-766-3731							
C205	1315-00-766-3720							
C207	1315-00-294-1751							
C207	1315-00-294-1752							
C207	1315-00-766-3753							
C208	1315-00-766-3725							
C208	1315-00-767-8240							
C355	1315-00-294-1636							
C355	1315-00-328-7943							
C355	1315-00-766-3727							
C356	1315-00-766-3728							
C356	1315-00-766-3730							
C162	1315-00-039-1571	Ctg, 3"/50, VT-NF	*	1.2G	0015	*	*	*
C162	1315-00-620-3505							
C162	1315-00-620-3507							
C164	1315-00-039-1660							
C164	1315-00-555-7161							
C164	1315-00-620-3509							
C319	1315-00-294-2460							
C319	1315-00-766-3722							
C320	1315-00-294-1779							
C320	1315-00-766-3717							
C373	1315-00-225-5345							
C373	1315-00-225-5347							
C373	1315-00-977-6207							
C375	1315-00-225-5346							
C375	1315-00-225-5348							
C375	1315-00-977-6208							

* Same information in first NSN applies.

NOTE: The packing drawings for each tank are as follows:
Mk 5 Mod 0 - BUORD Drawing 159241
Mk 5 Mod 1 - BUORD Drawing 300428
Mk 5 Mod 2 - BUORD Drawing 1380699

TABLE 1
Commodities Approved for Shipping in the Mk 5 Mods 0, 1, 2 3"/50 Cartridge Tank (Continued)

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Document Number	Haz Class/Div	UN Number	Units/ Package	Total Net Weight (lb)	Total Gross Weight (lb)
C172 C305 C305	1315-00-930-5830 1315-00-294-2454 1315-01-142-3062	Ctg, 3"/50, Illum	*	1.2G	0171	*	*	*
C178 C178 C179 C179 C338 C338 C341 C341	1315-00-039-1487 1315-00-039-1517 1315-00-039-1499 1315-00-039-1546 1315-00-766-3743 1315-00-962-8624 1315-00-766-3752 1315-00-962-8625	Ctg, 3"/50, BL&P	*	1.2C	0328	*	*	*
C348 C218 C296 C347	1315-00-039-1735 1315-00-786-3739 1315-00-294-1843 1315-00-039-1737	Ctg, 3"/50, HC	*	1.2E	0321	*	*	*
C212 C215	1315-00-766-3747 1315-00-766-3745	Ctg, 3"/50, AP	*	1.2E	0321	*	*	*
C299 C302	1315-00-294-1725 1315-00-294-2131	Ctg, 3"/50, AA	*	1.2E	0321	*	*	*
C306 C306 C306 C306 C307 C307 C307 C321 C321 C322 C322	1315-00-140-4479 1315-00-136-5440 1315-00-364-4857 1315-01-017-0890 1315-00-136-5441 1315-00-140-4480 1315-00-364-4882 1315-00-141-0233 1315-00-328-7917 1315-00-141-0234 1315-00-328-7928	Ctg, 3"/50, HE-IR	*	1.2E	0321	*	*	*
C338 C341	1315-00-294-1611 1315-00-766-3750	Ctg, 3"/50, BL-T	*	1.2C	0328	*	*	*
C349	1315-00-328-7950	Ctg, 3"/50, HE-PD	*	1.2E	0321	*	*	*
N/A N/A N/A	1315-01-068-2403 1315-01-092-1135 1315-01-136-3621	Ctg, 3"/50, HE Subassy	*	1.1E	0169	*	*	*
N/A N/A	1315-01-163-3428 1315-01-166-0831	Ctg, 3"/50, Spotting Subassy	*	1.2G	0015	*	*	*