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PERFORMANCE ORIENTED PACKAGING TESTING
OF
PA92 METAL AMMO CONTAINER
FOR
PACKING GROUP II
SOLID EXPLOSIVE MATERIALS

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Performing Activity:

NAVAL WEAPONS SUPPORT CENTER
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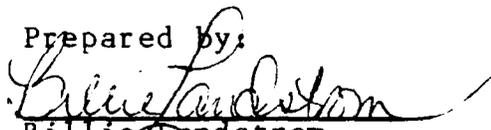
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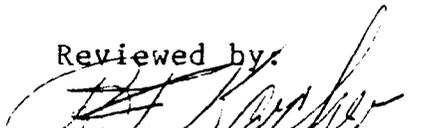
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FIELD	GROUP	SUB-GROUP	PACKAGING, POP Test, PA92 Metal Ammo Container, HM-181A Test		
19 ABSTRACT (Continue on reverse if necessary and identify by block number) Qualification tests were performed to determine whether the reuseable PA92 Metal Ammo Container meets the Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods. The container loaded to a gross weight of 86 pounds successfully met the requirements and retained its contents throughout the test.					
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INTRODUCTION

The PA92 Metal Ammo Container with a dummy load of 55 pounds enclosed, and an overall weight of 86 pounds, was tested to ascertain whether this standard container would meet the requirements of Performance Oriented Packaging (POP) as specified by the United Nations (UN) Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A Base Level Vibration Test was also conducted in accordance with the proposed rulings specified in the Department of Transportation's (DOT) Performance Oriented Packaging Standards HM-181, and Requirements for Explosives HM-181A. The objectives were to evaluate the adequacy of the container in protecting explosive materials which are secured with appropriate dunnage.

TESTS PERFORMED

1. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.6. Four different containers were used, each subjected to a stack weight of 1,702 pounds (16 feet). The test was performed for 24 hours. After the allowed time, the weight was removed and the containers examined. Any leakage, deterioration, or distortion which could adversely affect transport, reduce strength or cause instability in stacks of packages was considered cause for rejection.

2. Drop Test

This test was performed in accordance with ST/SG/AC.10/1 Chapter 9, Paragraph 9.7.3. Six different containers were used, three for each drop. The drops were performed from a height of 4 feet. The first drop (using three different containers) was conducted in a manner that would allow the container to strike the test surface diagonally on the chime of the lid or top. The second drop (using the other three samples) allowed the container to strike the test surface on the bottom chime or edge. This test was performed at ambient, $+70 \pm 20^{\circ}\text{F}$ temperature. The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

3. Base Level Vibration Test

This test was performed in accordance with Part 173, Appendix C, Docket No. HM-181, Notice No. 87-4, Federal Register/ Vol. 52, No. 215/Friday, November 6, 1987/Proposed Rules. Four sample containers were filled and closed for shipment using inert 2.75" warheads. Two containers were loaded with simulated M267 Practice 2.75" Warheads. The other two containers were loaded with simulated M257 Rocket Flare 2.75" Warheads. Each container was placed on a vibrating platform with a vertical amplitude (peak-to-peak displacement) of one inch. The container was not

restrained during vibration except by a fence attached to the test surface to prevent it from falling off the table. Each container was tested for 60 minutes in its normal shipping position. The vibratory input to the container was at a frequency that caused the container to be raised from the vibrating platform to such a degree that a piece of material of approximately 1/16" (1.6mm) thickness could be passed between the bottom of the container and the platform.

PASS/FAIL (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 show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

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."

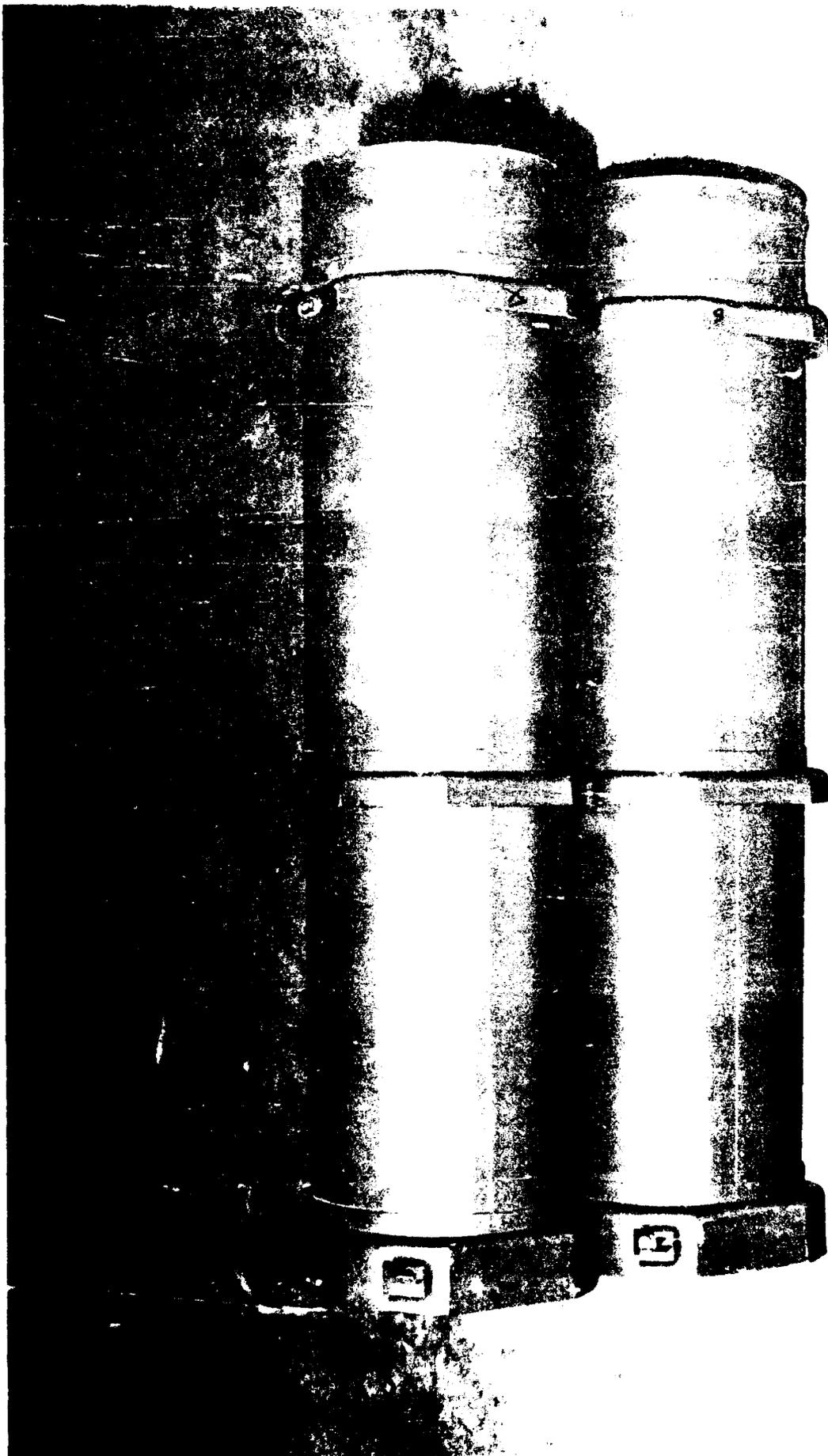
PASS/FAIL (HM-181 CRITERIA)

The criteria for passing the Base Level Vibration Test is outlined in Part 173, Appendix C, Paragraphs 4 and 5, Docket No. HM-181, Notice No. 87-4, Federal Register/Vol. 52, No. 215/ Friday, November 6, 1987/Proposed Rules, 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."

TEST RESULTS

- 1. **Stacking Test**
Satisfactory.
- 2. **Drop Test**
Satisfactory, see Figure 1.
- 3. **Base Level Vibration Test**
Satisfactory with no leakage.

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DISCUSSION

1. Stacking Test

The stacking test was performed with a load of 1,700 pounds for 24 hours. Each container was visibly checked after the 24 hour period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

2. 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, particularly on the edge or chime impacted, Figure 2. All six containers remained intact and serviceable on completion of the tests. The standard wire seal (Drawing 19200-8794342) used to secure the container also remained intact during the entire test. An internal pressure test at the end of the series of drops was conducted and the container still maintained an internal pressure of 3.00 PSIG for 30 minutes.

3. Base Level Vibration Test

Immediately after the vibration test was completed, each container was removed from the platform and observed for any evidence of leakage. The latch remained intact and there was no evidence of leakage or loss of contents.



FIGURE 2 - SLIGHT BUCKLING OF SIDEWALL OF CONTAINER AFTER A DROP FROM A HEIGHT OF FOUR FEET.

REFERENCE MATERIAL

United Nations "Recommendation on the Transportation of Dangerous Goods", ST/SG/AC.10/1, Revision 6

Docket No. HM-181, Notice No. 87-4, Federal Register/Vol. 52, No. 215/Friday, November 6, 1987/Performance Oriented Packaging Standards; Proposed Rulemaking

Docket No. HM-181A; Notice No. 90-5, Federal Register/Vol. 55, No. 85/Wednesday, May 2, 1990/Requirements for Explosives; Proposed Rulemaking

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TEST DATA SHEET

Container: PA92 Metal Ammo Container	
Type: IA2	UN Code: See Table
Specification Number: DWG 19200-9331197	Material: Steel
Capacity: 39 kg (86.0 pounds)	Dimensions: .94 m (L) x .23 m (W) x .23 m (H) (36.88" L x 9.24" W x 9.24" H)
Closure (Method/type): Removable lid	Tare Weight: 12.71 kg (28.00 pounds)
Additional Description: This is a reusable steel shipping and storage container [NSN 8140-01-024-4328] with a removable cover.	

PRODUCT(S): See Table	
Name: See Table	
United Nations Number: See Table	
United Nations Packing Group: II	
Physical State: 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: Four warheads	
Net Weight: See Table	

TEST PRODUCT(S):	
Name: Inert 2.75" Warheads	Physical State: Solid
Size: Various lengths x 2.75" Diameter	Quantity: Four (4) Warheads
Density/Specific Gravity: N/A	
Dunnage: PPP-C-1752 Foam Polyethylene	
Gross Weight: 39 kg (86.0 lbs.)	

TABLE I

DODIC OR NALC	NSN	HM ITEM	TYPE	PACKING DWG	HAZARD CLASS	UN NO.	WGT KG
D662	1320-01-231-7231	M188A1	CHG	9331255	1.3C	0242	32.69
H813	1340-01-330-6687	M257	FLARE	3235AS200	1.3G	0335	32.87
H823	1340-01-313-5515	M261	HE	3097AS200	1.1D	0286	38.32
H873	1340-01-313-5516	M267	PRAC	3096AS200	1.3G	0016	38.32