

**Best
Available
Copy**

2

AD-A275 085



DODPOPHM/USA/DOD/NADTR93107

PERFORMANCE ORIENTED PACKAGING TESTING
OF
PA60 SHIPPING AND STORAGE CONTAINER
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

Author:
Kerry J. Libbert
Mechanical Engineer

Performing Activity:
Naval Surface Warfare Center
Code 4045
Crane, Indiana 47522-5001

Date
November 1993

DTIC
SELECTE
JAN 14 1994
S B D

FINAL

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

DISTRIBUTION UNLIMITED

Sponsoring Organization:
Naval Surface Warfare Center
Code 4023
Crane, Indiana 47522-5001

1098 94-01511




94 1 13 007

Prepared by:


K. J. Libbert

Reviewed by:


R. F. Sanders

Reviewed by:


J. W. Puckett

Approved by:


D. N. Montgomery

REPORT DOCUMENTATION PAGE		Form Approved OMB No 0704-0188	
Public reporting burden of this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE November 1993	3. REPORT TYPE AND DATES COVERED POP Test	
4. TITLE AND SUBTITLE Performance Oriented Packaging Testing of PA60 Shipping and Storage Container for Packing Group II Solid Hazardous Materials		5. FUNDING NUMBERS	
6. AUTHOR(S) Kerry J. Libbert		8. PERFORMING ORGANIZATION REPORT NUMBER DODPOPHM/USA/DOD/NADTR93107	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center Plastics and Packaging Applications Branch (Code 4045) 300 Highway 361 Crane IN 47522-5001		10. SPONSORING/MONITORING AGENCY REPORT NUMBER Same as above	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center Special Purpose Munitions Branch (Code 4023) 300 Highway 361 Crane IN 47522-5001		11. SUPPLEMENTARY NOTES N/A	
12a. DISTRIBUTION/AVAILABILITY STATEMENT		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) Qualification tests were performed to determine whether the in-service PA60 Shipping and Storage Container could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 15 kg (33 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods, ST/SG/A-C.10/1 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178. The PA60 has conformed to the POP performance requirements; i.e., the box successfully retained its contents throughout the specified tests.			
14. SUBJECT TERMS POP Test of PA60 Shipping and Storage Container		15. NUMBER OF PAGES 7	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UL	19. SECURITY CLASSIFICATION OF ABSTRACT UL	20. LIMITATION OF ABSTRACT UL

INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the PA60 Shipping and Storage Container 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 objectives were to evaluate the adequacy of the container in protecting hazardous materials.

The PA60 is a steel container with a hinged lid and gasket seal. It is basically a taller version of the M2A1 ammunition box.

TESTS PERFORMED

1. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. One container was used for each drop orientation. The drop height was 1.2 meters and the drop sequence was as follows:

- a. Flat on Bottom
- b. Flat on Top
- c. Flat on Long Side
- d. Flat on Short Side
- e. One Corner

The test was performed at ambient temperature ($70^{\circ} \pm 20^{\circ}\text{F}$). The corner drop was performed on a corner of the lid near the latch. The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. Three different containers were used, each with a stack weight of 429 pounds. This represents the weight imposed on the bottom container of a sixteen-foot stack of like containers weighing 33 pounds. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.

3. Base Level Vibration Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. Three sample containers were loaded with steel rods and closed as for shipment. Each container was placed on a vibrating platform that had a vertical double-amplitude (peak-to-peak displacement) of one inch. The packages were constrained horizontally to prevent them from



Figure 1. PA60 ammunition container after corner drop test.

DEFENSE QUALITY INSPECTED 8

Acceptance For	
STP	<input checked="" type="checkbox"/>
DTIC	<input type="checkbox"/>
Un	<input type="checkbox"/>
Just	<input type="checkbox"/>
By	
Date	
Dist	
A-1	

falling off the platform, but were free to move vertically, bounce and rotate. The test was performed for one hour at a frequency that caused each point of the container bottom to be raised from the platform 1.6 mm. A 1.6 mm thick metal strip was passed between the bottom of the container and the platform.

PASS/FAIL

1. Drop Test

The criteria for passing the drop test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.603(f): A package is considered to successfully pass the drop test if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

2. Stacking Test

The criteria for passing the stacking test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.606: 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. Base Level Vibration Test

The criteria for passing the Base Level Vibration Test is outlined Title 49 CFR, Part 178, Subpart M, Sec. 178.608: Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

TEST RESULTS

1. Drop Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Base Level Vibration Test

Satisfactory.

DISCUSSION

1. Drop Test

After each drop the container was inspected for any damage which would be cause for rejection. The container was only slightly dented and scratched during the tests, and there was no spillage of contents. The PA60 subjected to the corner drop is shown in figure 1.

2. Stacking Test

Three containers were individually tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration to the container as a result of this test.

3. Base Level Vibration Test

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. All containers remained securely closed and there was no evidence of leakage of contents.

REFERENCE MATERIAL

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

DISTRIBUTION LIST

Commander
Crane Division
Naval Surface Warfare Center
Code 4045 and Code 4023
Crane, IN 47522-5000

Commanding Officer
Naval Weapons Station Earle
Code 50 and Code 50232
Colts Neck, NJ 07722-5000

Defense Technical Information Center (2 copies)
ATTN: DTIC/FDAC (Virginia Guidi)
Bldg. 5, Cameron Station
Alexandria, VA 22304-6145

Commander
U.S. Army Armament, Research, Development and Engineering
Center
SMCAR-ESK
Rock Island, IL 61299-7300

Defense General Supply Center
DDRV-TMPA (Dave Gay)
Richmond, VA 23297-5000

DATA SHEET

CONTAINER:	POP MARKING:
PA60 Shipping and Storage Container	(u) 4A2/Y15/S/** (n) USA/DOD/NAD
Type: 4A2	UN Code: 1.4S
Specification Number: Drawing 19203-9234843	Material: Steel
Gross Weight: 15 kg (33.0 pounds)	Dimensions: .30m L x .15m W x .34m H (12.00" L x 6.09" W x 13.36" H)
Closure (Method/type): Latch	Tare Weight: 3.2 kg (7.1 pounds)
Additional Description:	

PACKAGED COMMODITY:	
See Table I	
Proper Shipping Name: Initiators	
United Nations Number: 0454	
United Nations Packing Group: II	
Physical State: Solid	
Amount Per Container: See Table I	
Net Weight: Varies	

PACKAGED COMMODITY USED FOR TEST:	
Name: Steel rods	
Physical State: Solid	
Size : .15m L x .02m Dia (6.00"L x 1.00"Dia)	
Quantity : 26	
Net Weight: 11.8 kg (26.0 pounds)	
Dunnage: Polyethylene foam	

TABLE I

NALC OR DODIC	NSN	ITEM	PACKING DRAWING	# PER CNTR.	GROSS WT. (KG)
MM91	1375-01-379-5060	MK24-0 Initiator	6799279	100	6.1
MM92	1375-01-380-2930	MK25-0 Initiator	6799290	60	7.6
MM93	1375-01-379-5061	MK23-0 Initiator	6702800	100	6.1