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

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Naval Surface Warfare Center
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Performance Oriented Packaging Testing of PA60 Shipping and Storage Container for Packing Group II Solid Hazardous Materials

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.
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° ± 20°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.
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

DISTRIBUTION LIST

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DATA SHEET

CONTAINER: PA60 Shipping and Storage Container
POP MARKING: 4A2/Y15/S/**

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
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<th>NALC</th>
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<th>ITEM</th>
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