Performance Oriented Packaging (POP) testing of the M621 Plastic Container (4H2).

The U.S. Army Armament Research, Development and Engineering Center (ARDEC), has tested the M621 plastic ammunition container to verify if an alternative closure is required for this container to meet or exceed the requirements of the United Nations "recommendation on the transport of dangerous goods". The boxes were tested by the U.S. Army Defense Ammunition Center and School (USADACS) by performing drop vibration and stacking tests. Five drops were performed from a height of 48 inches. (Flat-top, long side, short side, bottom and one corner). Package gross weight was 55 lbs. (Inert ammunition). The container met the requirements of 4H2.

The packaging for 25MM ammunition in the M621 Container is per SPI ADPLBO01 with added closure. Referenced SPI is attached.
Part I. Report Cover

A. Report Number: DODPOPIM/AYA/TR93004

B. Title: Performance Oriented Packaging (POP) testing of the plastic container M621 (inert) loaded with dummy ammunition, packaging group II.

   Responsible individual: Walter B. Holcombe
   Performing Activity:
   U.S. Army Ammunition Center and School
   ATTN: SICAC-DEV
   Savanna IL, 61074-9639

   Performing activity's reference: Test number
   Date: 23 Jan 93
   Report: Final

C. Sponsoring Organization:
   U.S. Army Armament Research, Development and Engineering Center, ATTN: SICAR-ESK
   Rock Island, IL 61299-7339
   Sponsor's reference: ATCCJ: Project ESK 5-91

D. Requesting Organization reference: Memorandum SICAR-ESK,
   4 October 1991—POP testing M621 plastic container.
1. Data Sheet

A. Exterior shipping container
   UN type: Plastic box  UN code: 4H2
   Drawing No: 12013879
   Date of Mfg: December 1989
   Material: Plastic
   Tare weight: 10 lbs.
   Dimensions: 14.3 inches L x 5.7 inches W x 13.87 inches H.
   Closure: Wire counter latch handle with lead seal.

B. Product: 25mm projectiles (various types) box
   Packing Drawing No: 12013850
   United Nations Identification (serial) number(s) UN 0321, UN 0328 and UN 0330
   UN packaging group: II
   Physical state: Solid
   Quantity per container: 33 each (2-belts of 15 each)
   Gross Weight: 62 lbs. 27 kg.

2. Background - This report contains the POP testing results performed on the M621 plastic container with 30 25mm dummy cartridges (maximum load) with wire latch closure and wire lead seals at each of the two closure lids.

3. Performance Oriented Packaging (POP) Tests:
   a. DROP - Box was dropped from a height of 1.2 meters (48 inches) in five different orientations on a flat steel plate reinforced by a hard concrete surface. The orientations were as follows:
      - bottom (lid)
      - top (lid)
      - side (long)
      - end (short side)
      - bottom corner-hinge end (worse case)
   b. LOOSE CARGO VIBRATION - Vibration tests were omitted at this time due to previous vibration testing conducted on the M621 container at the time of development (see test report "TECO: PROJECT NUMBER 1-ES-48R-621 & APG REPORT NO. APG-47-5742) on file at Engineering Support Directorate, SMCC, Rock Island Arsenal, Rock Island, IL.
   c. STACK TEST - A stack test was conducted to a height of 10 feet - 0 inches.

4. Results - The container passed the required POP tests. The minor damage which occurred during corner drop testing was minor and would not adversely effect the performance of the container in any way. The container is considered safe for international transportation in accordance with POP regulations.

5. Reference Material:
1. TEST TITLE: M021 25mm Plastic Container Performance Oriented Packaging (POP) Test

2. TEST NUMBER: DCDPOP Hein/AyA/TK93004

3. DATES OF TEST: 26 Jan 1993

4. TEST ENGINEER: Jason B. Bolberg

5. TEST OBSERVER(S): William Meyer USADACS SMCAC-DEV

6. TEST(S) CONDUCTED:
   a. Stacking test.
   b. Vibration test.
   c. Drop test.

7. TEST OBSERVATION(S):
   a. During the stacking test, two M021 25mm containers were subjected to 730 pounds compression to the upright standing container to simulate an equivalent 16-foot-high stacking height. One container was subjected to 1,060 pounds on its side to attempt to simulate a 'worst case' orientation. The 1,060-pound load was also used to simulate a 16-foot-high stacking height. No damage was noted during the stacking test.

   b. During the vibration test, three M021 containers were vibrated for 1 hour each at 250 revolutions per minute (rpm) to provide a .063-inch gap under the containers. Each container was oriented with a different face against the vibration table. No damage was noted during the vibration test.

   c. Five containers were then drop tested at 0 degrees Fahrenheit oriented to impact the top, bottom, wide side, narrow side, and a corner of the containers from a height of 3.0 feet. Only the corner drop showed some damage. This damage occurred to three out of eight hinge attachment points. One of the damaged attachment points failed completely, and two of the points had partial cracks. Damage did not functionally effect the container lid, nor did it cause any damage to the lid's seal.

8. TEST CONCLUSION(S): As tested, the M021 25mm container passed POP tests. The damage which occurred during the corner drop test was not enough to adversely affect the performance of the container.
APPLICABLE NSNs - Mo21 Plastic Container

1305-01-034-5183-A940
1305-01-105-4092-A967
1305-01-092-0428-A974
1305-01-094-1025-A975
1305-01-092-0429-A976
**SPECIAL PACKAGING INSTRUCTIONS**  
(AMCCOM Suppl 1 to AR 700-15)

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<th>2. SPI NO</th>
<th>3. REVISION</th>
<th>4. DATE</th>
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<td>ADPLB001</td>
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<th>5. PART OR DRAWING NO</th>
<th>6. FSCM</th>
<th>7. MIL-P-116 CLEANING, DRYING</th>
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<tr>
<td>FN 1201 3870</td>
<td>AMCCOM 59678</td>
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<tr>
<td>30/EA.</td>
<td>--</td>
<td>50 lbs.</td>
<td>13.75 x 13.25 x 5.25&quot;</td>
<td>1.19 x 1.15 x .48</td>
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<th>13. LEVEL A UNIT PACK REQUIREMENTS</th>
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<th>MIL-P-116 METHOD</th>
<th>STEPS</th>
<th>DRAWING OR SPECIFICATION</th>
<th>STYLE</th>
<th>TYPE</th>
<th>GRADE</th>
<th>CLASS</th>
<th>SIZE (INSIDE DIMENSIONS IN INCHES) AND REMARKS</th>
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<td></td>
<td>13.75'' x 13.25'' x 5.25''</td>
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<td>Load Seal</td>
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<td>8794342</td>
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<td>Closure</td>
<td>3</td>
<td>PPP-T-97</td>
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<td>1'' wide (as reqd)</td>
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<th>14a. LEVEL B: METHOD</th>
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<th>SEE NOTE</th>
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<td>14b. LEVEL C: METHOD</td>
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<td>SEE NOTE</td>
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15. INTERMEDIATE PACKAGING AND PACKING WILL BE IN ACCORDANCE WITH SPECIFICATION MIL-STD-2073-A OR AS OTHERWISE SPECIFIED HEREON.

16. MARKING WILL BE IN ACCORDANCE WITH MIL-STD-129.


18. TOLERANCES SHALL BE IN ACCORDANCE WITH MATERIAL SPECIFICATIONS. QUALITY PERFORMANCE AND TESTING REQUIREMENTS SHALL BE IN CONFORMANCE WITH MIL-P-116 OR AS OTHERWISE SPECIFIED HEREON.

19. NOTES/DRAWINGS

A. This SPI is designed to utilize one container (M621-plastic) without overpack for shipment of less than full pallet crate and applies to any NSN that is cataloged as being packed in this container.

B. The light box marking requirements in appendix G, paragraph 50.2 (b) of MIL-STD-129 applies to this package. Mark each container "LIGHT BOX" in orange.

C. The United Nations Markings, Performance Oriented Packaging are as follows:

1. UN Performance Oriented Packaging (POP) Markings are:

   ![UN Markings](image)

   * Enter the last 2 digits of the year packed. EG.: 86.

20. ITEM IDENTIFICATION CODE(S) | 21. ITEM SIZE | 22. ITEM WT | 23. APPROVED |
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<tr>
<td>M621 Plastic 25MM Container</td>
<td>8.63&quot; x 1.5&quot; Dia.</td>
<td>11.1 lbs</td>
<td>[Signature]</td>
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24. NOMENCLATURE

M621 Plastic 25MM Container

25. PAGE 1 OF 2 PAGES
** Use any applicable NSN that applies to the M621 container

Apply explosive label (1 reqd)

Tape (Tape maybe removed following shipment)

Apply lead seal two places 2 reqd.

NOMENCLATURE
Container, M621, Plastic for 30-25mm Ctg's