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11. TITLE (Include Security Classification)
Performance Oriented Packaging Testing of Cartridge, Linked 25mm Ammunition, 30 rounds Single Opening Metal Container, PA125 (UNCLASSIFIED)

12. PERSONAL AUTHOR(S)
Gregory Farbanish, GS 12 Mechanical Engineer

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FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Performance Oriented Packaging, POP, 25mm linked ammo PA125 Container

19. ABSTRACT (Continue on reverse if necessary and identify by block number)
This report contains the testing and test results performed on PA125 steel shipping and storage container in accordance with or exceeding 49 CFR part 107 subpart M (178.600 Et. Al.) for linked 25mm ammunition. The PA125 pack is submitted for performance oriented packaging certification.

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20. DISTRIBUTION / AVAILABILITY OF ABSTRACT
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21. ABSTRACT SECURITY CLASSIFICATION
Unclassified

22a. NAME OF RESPONSIBLE INDIVIDUAL
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22b. TELEPHONE (Include Area Code)
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22c. OFFICE SYMBOL
SMCAR-AEP

I REPORT NUMBER DOD POP HM TR/AYD 92-002

II TITLE: PERFORMANCE ORIENTED PACKAGING TESTING OF CARTRIDGE,
25MM LINKED AMMUNITION, 30 ROUNDS, SINGLE OPENING
METAL CONTAINER, PA125

AUTHOR: GREGORY FARBANISH

PERFORMING ACTIVITY: ARDEC

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PICATINNY ARSENAL, NJ 07806-5000
ATTN: SMCAR-AEP

DATE: 92-04-13

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1. DATA:

CONTAINER:

TYPE: BOX, METAL
UN CODE: 4A1
SPECIFICATION NUMBER: MIL-C-70998
MATERIAL: STEEL
CAPACITY: 14.1 LITERS
DIMENSIONS: 36.4cm x 35.2cm x 14.5cm (14.34" x 13.87" x 5.70")
GROSS WEIGHT: 28 KG (61.6 LBS)

PRODUCT:

NAME: 25MM LINKED APDS-T M791 AMMUNITION
DRAWING NUMBER: 12013533
UNITED NATIONS NUMBER: 0328
UNITED NATIONS PACKING GROUP: II
UNITED NATIONS NOMENCLATURE: CARTRIDGES FOR WEAPONS, INERT
PROJECTILE
PHYSICAL STATE: SOLID
AMOUNT PER CONTAINER: 30 ROUNDS W/ LINKS
NSN: 1305-01-356-9838

NAME: 25MM LINKED HEI-T M792 AMMUNITION
DRAWING NUMBER: 12013230
UNITED NATIONS NUMBER: 0321
UNITED NATIONS PACKING GROUP: II
UNITED NATIONS NOMENCLATURE: CARTRIDGES FOR WEAPONS
PHYSICAL STATE: SOLID
AMOUNT PER CONTAINER: 30 ROUNDS W/ LINKS
NSN: 1305-01-356-0188

NAME: 25MM LINKED TP-T M793 AMMUNITION
DRAWING NUMBER: 12013224
UNITED NATIONS NUMBER: 0328
UNITED NATIONS PACKING GROUP: II
UNITED NATIONS NOMENCLATURE: CARTRIDGES FOR WEAPONS, INERT
PROJECTILE
PHYSICAL STATE: SOLID
AMOUNT PER CONTAINER: 30 ROUNDS W/ LINKS
NSN: 1305-01-356-0189

NAME: 25MM LINKED TPDS-T M910 AMMUNITION
DRAWING NUMBER: 12556500
UNITED NATIONS NUMBER: 0328
UNITED NATIONS PACKING GROUP: II
UNITED NATIONS NOMENCLATURE: CARTRIDGES FOR WEAPONS, INERT
PROJECTILE
PHYSICAL STATE: SOLID
AMOUNT PER CONTAINER: 30 ROUNDS W/ LINKS
NSN: 1305-01-350-5265

NAME: 25MM LINKED APFSDS-T M919 AMMUNITION
DRAWING NUMBER: 9391187
UNITED NATIONS NUMBER: 0328
UNITED NATIONS PACKING GROUP: II
UNITED NATIONS NOMENCLATURE: CARTRIDGES FOR WEAPONS, INERT
PROJECTILE
PHYSICAL STATE: SOLID
AMOUNT PER CONTAINER: 30 ROUNDS W/ LINKS
NSN: 1305-01-348-0192

2. BACKGROUND:

THIS REPORT CONTAINS THE TESTING AND TEST RESULTS PERFORMED IAW OR EXCEEDING SUBPART M (178.600 ET.AL.) OF 49 CFR PART 107 ON LINKED 25MM AMMUNITION PACKED IN A STEEL BOX, MANUFACTURED IN ACCORDANCE WITH MIL-C-70998. THIRTY (30) LINKED CARTRIDGES (TWO BELTS OF FIFTEEN ROUNDS EACH) WERE PACKED IN A PA125 SHIPPING AND STORAGE CONTAINER ACCORDING TO DRAWING 12929427. THIS PACK IS SUBMITTED FOR PERFORMANCE ORIENTED PACKAGING CERTIFICATION.

3. TEST:

a. STACKING TEST: THE CONTAINER IS TO BE MARKED FOR 28 KG (62 LBS). THE STACK TEST, BRIEFLY, CONSISTED OF AN EQUIVALENT APPROXIMATE LOAD OF 3.0 M (10 FEET) OF FILLED CONTAINERS STACKED ONE ON TOP OF ANOTHER FOR A 24 HOUR PERIOD. THE TEST WAS REQUIRED TO BE PERFORMED ON THREE CONTAINERS. SINCE THE CONTAINER HEIGHT IS APPROXIMATELY 13 5/8" TALL, 10 FEET EQUATES TO APPROXIMATELY 9 CONTAINERS (INCLUDING THE BOTTOM CONTAINER) OR A STACK LOAD OF 558 LBS. PRELOADING THE APPARATUS WITH 50 LBS AND TESTING 3 CONTAINERS SIDE BY SIDE, A MINIMUM NET LOAD OF 1724 LBS WAS REQUIRED. THE ACTUAL TEST PERFORMED CONSISTED OF A 2000 LB LOAD ON 3 CONTAINERS FOR A 48 HOUR PERIOD EXCEEDING THE ABOVE MINIMUM REQUIREMENTS. NO VISIBLE BUCKLING OCCURRED.

b. DROP TEST: EACH OF SIX CONTAINERS (INCLUDING THE THREE FROM ABOVE) WERE DROPPED SIX TIMES AT A HEIGHT OF 1.2 METERS (4 FT) IN THE FOLLOWING ORIENTATIONS: TOP, BOTTOM, LARGE FACE SIDE, SMALL SIDE, BOTTOM EDGE AND TOP CORNER. IN ADDITION, EACH CONTAINER WAS DROPPED ONCE ON ONE OF THE SIX ORIENTATIONS LISTED ABOVE AT A HEIGHT OF 2.1 METERS (7 FEET). EACH DROP PERFORMED IMPACTED ON A STEEL REINFORCED CONCRETE SURFACE. THE NUMBER OF DROPS, TOP CORNER DROP, NUMBER OF CONTAINERS, AND THE SEVEN FOOT DROP ALL EXCEED THE UN REQUIREMENTS IN TERMS OF CONTAINER RUGGEDNESS. CONTAINER REMAINED INTACT AFTER DROP TESTS WITH NO SPILLAGE OF THE CONTENTS.

c. VIBRATION TEST (TRANSPORTATION - SECURED CARGO): TWO FULL PALLETS (84 CONTAINERS) OF PA125'S LOADED WITH 25MM AMMUNITION WERE VIBRATED IN ACCORDANCE WITH MIL-STD-810E, METHOD 514.4, CATEGORY I - BASIC TRANSPORTATION. THE PALLETS EXPERIENCED VIBRATIONS IN THE LONGITUDINAL, VERTICAL AND TRANSVERSE AXES AT SPECIFIED TEMPERATURE EXTREMES. THIS WAS TO SIMULATE SHIPPING THE AMMUNITION AS SECURED CARGO BY LAND, SEA, OR AIR. THE VIBRATION CONSISTED OF: 120 MINUTES PER EACH OF THE THREE AXES OF THE WHEELED VEHICLE SPECTRA; 48 MINUTES PER AXIS OF THE TWO WHEELED TRAILER SPECTRA; AND 60 MINUTES PER AXIS OF THE M548 TRACKED VEHICLE

SPECTRA. UPON COMPLETION OF THE VIBRATION, THE CONTAINERS WERE CHECKED FOR SEAL INTEGRITY. CONTAINER CONTENTS REMAINED INTACT AFTER SECURE CARGO TEST (SEE LOOSE CARGO TEST, PARAGRAPH 3.d).

d. VIBRATION TEST (TRANSPORTATION - LOOSE CARGO): FORTY-FOUR INDIVIDUAL, TEMPERATURE CONDITIONED (22 CONTAINERS CONDITIONED AT EACH TEMPERATURE EXTREME), PA125 SHIPPING AND STORAGE CONTAINERS LOADED WITH 25MM AMMUNITION WERE SIMULTANEOUSLY VIBRATED IN THE THREE ORTHOGONAL AXES IN ACCORDANCE WITH MIL-STD-810E, METHOD 514.4, CATEGORY III - LOOSE CARGO TRANSPORT. THIS TEST IS CONDUCTED TO SIMULATE THE UNRESTRAINED COLLISION OF THE CONTAINERS WITH THE BED AND SIDES OF THE TRANSPORT VEHICLE, AS WELL AS WITH THE OTHER CARGO. THE CONTAINERS WERE PLACED ON A PLYWOOD COVERED BED WITH OSCILLATING MOVEMENT IN A 1.0 INCH ORBITAL PATH AT 300 REVOLUTIONS PER MINUTE. THE DURATION OF THE TEST WAS 45 MINUTES, WHICH REPRESENTS A SCENARIO OF 240 KM OF TRUCK TRANSPORTATION OVER VARIOUS ROAD PROFILES. FOLLOWING THE VIBRATION, A SAMPLE OF BOXES WERE TESTED FOR WATERPROOFNESS IN ACCORDANCE WITH THE LEAKAGE TEST PROCEDURES. CONTAINER CONTENTS REMAINED INTACT AFTER LOOSE CARGO TEST. NOTE: THE VIBRATION TEST FOR SECURED CARGO (PAR. 3.c) INFORMATION IS SUBMITTED IN LIEU OF THE POP REQUIREMENTS OF A ONE HOUR "LOOSE CARGO" TEST; WHEREAS ONLY A 45 MINUTE LOOSE CARGO WAS PERFORMED. GIVEN THE QUANTITY OF CONTAINERS TESTED AND COMBINING BOTH VIBRATION TESTS, CONTAINER PERFORMANCE EXCEEDED THE POP REQUIREMENTS FOR LOOSE CARGO.

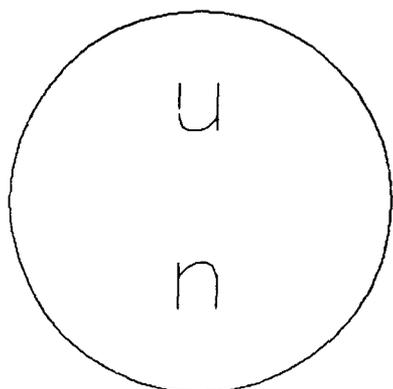
4. RESULTS:

THE CONTAINERS PASSED ALL TESTS AS ADMINISTERED. NONE OF THE CONTENTS WERE DISCHARGED FROM THE CONTAINERS. THE CONTAINERS AND THEIR CONTENTS ARE CONSIDERED SAFE FOR INTERNATIONAL TRANSPORTATION IN ACCORDANCE WITH PERFORMANCE ORIENTED PACKAGING REGULATIONS.

5. REFERENCED MATERIAL:

- A. FEDERAL REGISTER, "49 CFR PART 107, 1991"
- B. US ARMY ARDEC PACKAGING DIVISION AED REPORT NO. 91-03
"TEST REPORT FOR SEALING PERFORMANCE OF 25MM PA125 CONTAINER"
- C. MILITARY STANDARD, MIL-STD-810E, ENVIRONMENTAL TEST METHODS AND ENGINEERING GUIDELINES

6. BASED ON THE ABOVE EQUIVALENT POP TESTING, THE FOLLOWING POP SYMBOL HAS BEEN APPLIED TO CONTAINERS MANUFACTURED IAW DRAWING 12929427 AND MIL-C-70998.



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LAST TWO
DIGITS OF
YEAR PACKED