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19. ABSTRACT (Continue on reverse if necessary and identify by block number) <b>This report covers the annual retest of POP Requirements of M592 Metal Container used as shipping container for 30mm cartridges. The M592 contains 30mm cartridges of different types, quantities and weights. Tests were conducted using additional test weight in order to insure shipping container integrity.</b>			
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ANNUAL RETEST OF  
PERFORMANCE ORIENTED PACKAGING REQUIREMENTS  
OF  
M592 METAL CONTAINER USED FOR  
PACKAGING 30MM CARTRIDGES  
FOR  
PACKING GROUP II

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Performing Activity

SMCAR - AEP  
U. S. Army Armament Research, Development  
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October 1993 - October 1994

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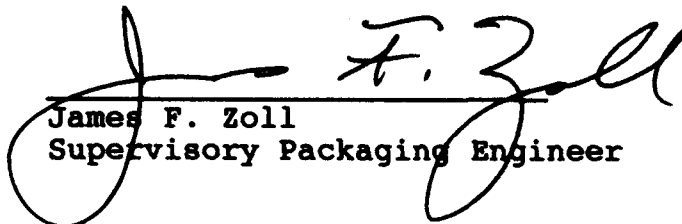
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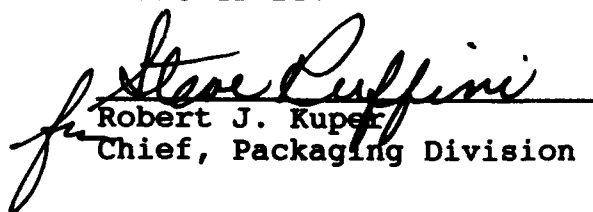
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## INTRODUCTION

The Department of Transportation (DOT) per CFR 49, Parts 100-179, dated 1 October 91, requires that hazardous materials should be packed in a container that passes the Performance Oriented Packaging (POP) tests. Furthermore, these tests are to be repeated on an annual basis for items in production.

The M592 metal container, part no. 10542565, is being used as shipping container for 30MM cartridges. This box contains a maximum gross weight of 66 kgm.

POP tests were conducted using additional weight (76 kg test weight) to insure container integrity. The tests were conducted in accordance with the referenced sections of CFR 49 and are valid only when the approved 30MM cartridges are packed in the M592 container for the DOD (see Table). The M592 container was tested previously and certified for 50 Kg of gross weight of Packing Group II Items. This report represents the annual retest of the M592 POP certification.

## TESTS PERFORMED

### 1. Drop Test

Section 178.603 of CFR 49 specifies that one box each should be used for each drop orientation. Five (5) boxes were used for five different orientations. Containers were tested to Packing Group II requirements.

One box each was dropped from a height of 1.2 meters (3.9 ft.) in the following orientations: flat on bottom, flat on top, flat on long-side, flat on short-side and on a corner.

### 2. Vibration Test

Three (3) boxes were placed on the vibrating platform and vibrated for a duration of one hour. The boxes were unrestrained except horizontally to prevent them from falling off of the platform. The peak-to-peak displacement was one inch and the frequency was 4.6 Hertz/sec. This frequency was sufficient enough to allow the package to become completely airborne, enabling a 1/16 inch (.16 cm) thick piece of strapping material to be slid underneath the package during testing.

### 3. Stacking Test

Section 178.606 of CFR 49 requires that the minimum height of the stack including the test sample must be 3.0 meters (10 ft). Three test samples are required.

A 3.0 meter stack height of samples is equivalent to 1,204, lbs. (547 kg) of stack weight. Three different test samples were each subjected to a stack weight of 1,204 lbs for a period of 24 hours. The samples were then inspected and examined for any damage or distortion.

#### PASS/FAIL (DOT CRITERIA)

A package for explosives is considered to successfully pass the drop tests if for each sample tested, no rupture of the packaging occurs.

A packaging passes the vibration test if there is no rupture or leakage from any of the packages.

A test sample passes the stacking test when no test sample leaks. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength or cause instability in stacks of packages.

#### TEST RESULTS

##### 1. Drop Test - Result: pass, no spillage.

The first four drops did not do any damage on any of the four boxes. On the edge drop, the box was dented on the edge, but there was no spillage.

##### 2. Vibration Test - Result: pass, no spillage or damage.

All three boxes were removed from the platform after one hour vibration. Each of the boxes was turned on its side and inspected for any damage and leakage. The packages were all tightly intact and showed no evidence of deterioration.

3. Stacking Test - Result: pass, no evidence of distortion.

The stacking test was performed with the use of a forklift to apply a dead load of 1,204 lbs on top of each of the three boxes. Each of the boxes adequately supported the applied load. No evidence of box distortion was noted.

REMARK

Based on the successful POP testing outlined in this report, the following POP symbol:

last two digits of  
year packed

(u  
n) 4A1/Y66/S/□□  
USA/DOD/AYD

shall be applied to containers manufactured in accordance with drawing 10542565 when used to package the NSN's listed in the Table for 30MM cartridges packed from October 1993 through October 1994.

REFERENCE MATERIAL

1. Federal Register, "49 CFR Part 107, 1 Oct 91
2. MIL-S-50312

## TEST DATA

## DATA

## Container:

Type: Box  
Model No.: M592  
UN Code: 4A1  
Spec No.: MIL-S-50312  
Material: Metal  
Capacity: 34.5 liters

Dimensions

Inside: 43.97 cm x 21.99 cm x 35.68 cm  
(17 1/4 + 1/16 in x 8 5/8 + 1/32 in x 13 63/64 + 1/16 in)

Outside: 47.23 cm x 24.13 cm x 37.07 cm  
(18 19/32 in x 9 1/2 in x 14 19/32 in)

Weight(empty) : 9.5 kg (21.0 lbs)  
Closure (Method/Type): Removable Lid

## PRODUCTS:

Identification No.: See Table  
UN Packing Group : II  
Physical State : Solid  
Amount/Container : See Table

## TEST MATERIALS:

Name: Simulated Weights and Sand  
Physical State: Solid  
Size : 10 in (L) x 3 in (W) x 3 in (H)  
or 2 in dia x 7/8 in thick  
or granulated sand  
Quantity : Twelve (12) lead weights  
or lead tablets  
or 167 lbs  
Dunnage : Fiberboard  
Gross Weight : 167 lbs (76 kg)

TABLE

Line No.	DODIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/BX	KG/BX
1	B118	1305-01-268-7274	30MM	TP	1.4C	0339	110	50
2	B020	01-278-1138	30MM	TP	1.4C	0339	110	50
3	B023	01-278-1142	30MM	HEDP	1.2E	0321	110	50
4	B133	01-268-7273	30MM	DMY	N/A	N/A	110	50
5	B137	01-270-7800	30MM	TP	1.4C	0339	110	50
6	B140	01-268-7275	30MM	HEDP	1.2E	0321	110	50
7	B143	01-276-6606	30MM	HEDP	1.2E	0321	110	50
8	B146	01-276-6610	30MM	TP	1.4C	0339	110	50
9	B020	01-278-1137	30MM	TP	1.4C	0339	143	65
10	B021	01-279-6177	30MM	TP	1.4C	0339	110	50
11	B022	01-278-1139	30MM	TP	1.4C	0339	110	50
12	B024	01-278-1140	30MM	HEDP	1.2E	0321	103	47
13	B118	01-079-5386	30MM	TP	1.4C	0339	134	61
14	B119	01-077-2932	30MM	TP	1.4C	0339	134	61
15	B120	01-078-5505	30MM	TP	1.4C	0339	134	61
16	B124	01-081-1636	30MM	HEI	1.2E	0321	98	44
17	B125	01-081-3341	30MM	HEI	1.2E	0321	134	61
18	B130	01-155-3197	30MM	HEDP	1.2E	0321	98	44
19	B131	01-152-0421	30MM	HEDP	1.2E	0321	98	44
20	B137	01-266-9572	30MM	TP	1.4C	0339	110	50



TABLE

Line No.	DODIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/BX	KG/BX
21	B138	1305-01-266-9571	30MM	TP	1.4C	0339	103	47
22	B139	01-266-9570	30MM	TP	1.4C	0339	103	47
23	B140	01-266-9569	30MM	HEDP	1.2E	0321	134	61
24	B141	01-266-9568	30MM	HEDP	1.2E	0321	103	47
25	B142	01-266-9567	30MM	HEDP	1.2E	0321	103	47
26	B143	01-276-6605	30MM	HEDP	1.2E	0321	134	61
27	B144	01-276-6607	30MM	HEDP	1.2E	0321	103	47
28	B145	01-276-6608	30MM	HEDP	1.2E	0321	110	50
29	B146	01-276-6609	30MM	TP	1.4C	0339	143	65
30	B147	01-277-8018	30MM	TP	1.4C	0339	103	47
31	B148	01-276-6611	30MM	TP	1.4C	0339	110	50
32	B148	01-276-6612	30MM	HEDP	1.2E	0321	143	65
33	B149	01-278-1141	30MM	HEDP	1.2E	0321	131	59

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**DATE:**

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