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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report covers the annual retest of POP Requirements of M548 Metal Container used as shipping container for small caliber ammunition, Pyrotechnic items and mortar fuzes. The M548 contains various small arms ammunition, Pyrotechnic items and mortar fuzes of different quantities and weights. Tests were conducted using containers with additional test weight in order to insure shipping container integrity.

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ANNUAL RETEST OF
PERFORMANCE ORIENTED PACKAGING REQUIREMENTS
OF

M548 METAL CONTAINER USED FOR
PACKAGING SMALL CALIBER AMMUNITION
PYROTECHNIC ITEMS AND MORTAR FUZES

DTIC QUALITY INSPECTED 6

FOR
PACKING GROUP II

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Performing Activity

SMCAR - AEP
U. S. Army Armament Research, Development
and Engineering Center
Picatinny Arsenal, New Jersey 07806-5000

October 1993 - October 1994

FINAL

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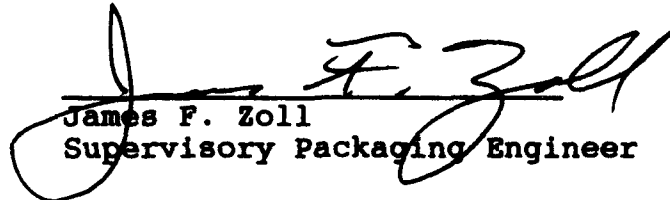
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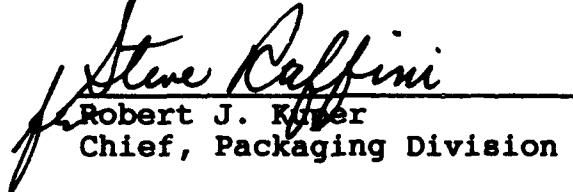
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INTRODUCTION

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 M548 metal container, part no. 7258943, is being used as shipping container for small caliber ammunition such as 7.62mm, 20mm and 40mm. It is also used for pyrotechnic items and mortar fuzes. This box contains a maximum gross weight of 75 kg.

POP tests were conducted using additional weight to insure (81 kg test weight) container integrity. The tests were conducted in accordance with the referenced sections of CFR 49 and are valid only when the approved items are packed in the M548 container for the DOD (see Table). The M548 container was tested previously and certified for 81 Kg of gross weight of Packing Group II Items. This report represents the annual retest of the M548 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 1,283, lbs. (583 kgm) of stack weight. Three different test samples were each subjected to a stack weight of 1,283 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 clamp near the edge where the box was dropped snapped open, 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 1,283 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/Y81/S/[]
USA/DOD/AYD

shall be applied to containers manufactured in accordance with drawing 7258943 when used to package the NSN's listed in Tables A to E for items packed from October 1993 through October 1994.

REFERENCE MATERIAL

1. Federal Register, "49 CFR Part 107, 1 Oct 91
2. MIL-S-23389

TEST DATA

DATA

Container:

Type: Box
Model No.: M548
UN Code: 4A1
Spec No.: MIL-S-23389
Material: Metal
Capacity: 29.5 liters

Dimensions

Inside: 43.82 cm x 18.89 cm x 35.64 cm
(17 1/4 in x 7 7/16 in x 14 1/32 in)

Outside: 47.23 cm x 21.07 cm x 37.07 cm
(18 19/32 in x 8 19/64 in x 14 19/32 in)

Weight(empty) : 9.1 kg (20.0 lbs)
Closure (Method/Type): Removable Lid

PRODUCTS:

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

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 178 lbs
Dunnage : Fiberboard
Gross Weight : 178 lbs (81 kg)

TABLE A

Line No.	DODIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/BX	KG/BX
1	I305	1370-01-342-6872	SIGNAL	IIJUM	1.3G	0195	81	37
2	I306	01-343-1966	SIGNAL	IIJUM	1.3G	0195	81	37
3	I307	01-345-4300	SIGNAL	IIJUM	1.3G	0195	81	37
4	I311	01-343-1965	SIGNAL	IIJUM	1.3G	0195	81	37
5	I312	01-341-5159	SIGNAL	IIJUM	1.3G	0195	81	37
6	I314	01-341-6282	SIGNAL	IIJUM	1.3G	0195	81	37
7	I323	01-342-2842	SIGNAL	SNOKE	1.3G	0195	81	37
8	I324	01-341-6283	SIGNAL	SNOKE	1.3G	0195	81	37

TABLE B

Line No.	DODIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/BK	KG/BK
1	A163	1305-00-143-8486	7.62MM	B/TR	1.4S	0012	124	56
2	A164	00-935-9247	7.62MM	B	1.4S	0012	124	56
3	A165	00-926-3942	7.62MM	B/TR	1.4S	0012	124	56
4	A168	00-152-3292	7.62MM	B/TR	1.4S	0012	124	56

TABLE C

Line No.	DODIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/EX	KG/EX
1	B568	1310-00-471-3615	40MM	HE	1.2E	0321	59	27
2	B542	01-159-8043	40MM	HE	1.1E	0006	65	29
3	B576	01-159-3184	40MM	PRAC	1.4C	0339	65	29
4	B584	01-218-7069	40MM	TP	1.4C	0339	62	28

TABLE D

Line No.	DODIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/BX	KG/BX
1	A652	1305-00-157-4886	20MM	TP-T	1.4C	0339	98	44
2	A653	00-143-7034	20MM	HEI/TP-T	1.2E	0321	98	44
3	A653	00-152-3658	20MM	HEI/TP-T	1.2E	0321	98	44
4	A654	00-078-8220	20MM	TP/TP-T	1.4C	0339	98	44
5	A654	00-400-7667	20MM	TP/TP-T	1.4C	0339	98	44
6	A655	00-926-4058	20MM	HEI/TP-T	1.2E	0321	98	44
7	A657	00-926-4060	20MM	HEI/TP-T	1.2E	0321	98	44
8	A658	00-152-3662	20MM	HEI/HEI-T	1.2E	0321	98	44
9	A658	00-783-5482	20MM	HEI/HEI-T	1.2E	0321	98	44
10	A660	00-169-1880	20MM	HEI/API	1.2E	0321	98	44
11	A663	00-182-3157	20MM	HEI/HEI-T	1.2E	0321	98	44
12	A664	00-182-3158	20MM	TP/TP-T	1.4C	0339	98	44
13	A665	00-182-3250	20MM	HEI/HEI-T	1.2E	0321	98	44
14	A700	01-010-0258	20MM	TP	1.4C	0339	98	44
15	A701	01-011-6324	20MM	HEI	1.2E	0321	98	44
16	A786	00-926-3943	20MM	API-T	1.2G	0009	98	44
17	A792	00-152-3659	20MM	HEI-T	1.2E	0321	98	44
18	A792	00-401-1536	20MM	HEI-T	1.2E	0321	98	44
19	A792	00-926-9279	20MM	HEI-T	1.2E	0321	98	44
20	A796	00-143-6922	20MM	HEI/HEI-T	1.2E	0321	98	44
21	A801	00-400-7664	20MM	HEI/TP-T	1.2E	0321	98	44
22	A802	00-239-5937	20MM	TP/TP-T	1.4C	0339	98	44

TABLE D

Line No.	DDIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/BX	KG/BX
23	A852	1305-00-144-5527	20MM	HEI	1.2E	0321	98	44
24	A854	00-497-9782	20MM	TP	1.4C	0339	98	44
25	A854	00-935-2085	20MM	TP	1.4C	0339	98	44
26	A875	00-169-8805	20MM	APIT	1.4G	0300	98	44
27	A884	00-301-1589	20MM	API	1.4G	0300	98	44
28	A884	00-850-3986	20MM	API	1.4G	0300	98	44
29	A894	00-144-5545	20MM	TP	1.4C	0339	98	44
30	A894	00-892-2161	20MM	TP	1.4C	0339	98	44
31	A894	00-935-6060	20MM	TP	1.4C	0339	98	44
32	A896	00-169-1784	20MM	TP/TP-T	1.4C	0339	98	44
33	A918	00-849-4535	20MM	API	1.4G	300	98	44
34	A919	00-182-3081	20MM	HEI	1.2E	0321	98	44
35	A919	00-892-4321	20MM	HEI	1.2E	0321	98	44
36	A926	00-180-9268	20MM	TP	1.4C	0339	98	44
37	A954	00-892-2162	20MM	HEI	1.2E	0321	98	44
38	A655	00-522-3707	20MM	HEI/TP-T	1.2E	0321	98	44
39	A656	00-926-4059	20MM	TP/TP-T	1.4C	339	98	44
40	A777	00-935-6160	20MM	TP	1.4C	0339	99	45
41	A852	00-935-6059	20MM	HEI	1.2E	0321	101	46
42	A889	00-756-1675	20MM	TP	1.4C	0339	101	46
43	A896	00-926-9421	20MM	TP/TP-T	1.4C	0339	101	46
44	A926	00-965-0559	20MM	TP	1.4C	0339	99	45
45	A953	1305-00-889-2043	20MM	HEI	1.2E	0321	101	46

TABLE D

Line No.	DDIC or NALC	NSN	HM Item	Type	HC	UN No.	IBS/BX	KG/BX
46	A651	01-118-9930	20MM	TP-T	1.4C	0339	166	75
47	A651	00-522-3700	20MM	TP-T	1.4C	0339	166	75
48	A651	00-785-2829	20MM	TP-T	1.4C	0339	166	75
49	A659	00-935-6171	20MM	HEI-T	1.2E	0321	166	75
50	A659	01-118-9929	20MM	HEI-T	1.2E	0321	166	75
51	A769	00-143-6919	20MM	HEI	1.2E	0321	133	60
52	A770	00-143-6918	20MM	HEI	1.2E	0321	133	60
53	A791	00-926-9278	20MM	HEI-T	1.2E	0321	166	75
54	A813	00-143-7050	20MM	APT	1.2G	0009	133	60
55	A814	00-143-7049	20MM	API	1.2G	0009	133	60
56	A833	00-180-9270	20MM	INC/AP-T	1.2E	0321	133	60
57	A834	00-180-9271	20MM	HEI/AP-T	1.2E	0321	133	60
58	A835	00-143-7176	20MM	HEI	1.2E	0321	133	60
59	A836	00-143-7177	20MM	HEI	1.2E	0321	133	60
60	A846	00-143-7167	20MM	INC	1.2G	0009	133	60
61	A865	00-112-0491	20MM	HEI/HEI-T	1.2E	0321	133	60
62	A865	00-112-0494	20MM	HEI/HEI-T	1.2E	0321	133	60
63	A866	00-112-0492	20MM	HEI/HEI-T	1.2E	0321	133	60
64	A866	00-112-0493	20MM	HEI/HEI-T	1.2E	0321	133	60
65	A890	00-935-9104	20MM	HEI	1.2E	0321	166	75
66	A891	00-752-8114	20MM	TP	1.4C	0339	147	67
67	A891	01-116-4560	20MM		1.4C	0339	147	67
68	A892	00-935-2019	20MM	HPT	1.4C	0339	166	75

TABLE E

Line No.	DODIC or NALC	NSN	HM Item	Type	HC	UN No.	LBS/HX	KG/HX
1	N288	1390-01-268-7283	Fuze	PD	1.2D	0409	66	30
2	N342	01-268-9155	Fuze	PD	1.2D	0409	71	32
3	N658	01-240-9257	Fuze	PD	1.2D	0409	71	32
4	N660	01-259-0661	Fuze	PD	1.2D	0409	66	30