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Qualification tests were performed to determine whether the in-service Mk 7 Mod 0 Smokeless Powder Jerrican could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 69.8 kg (154 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 and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register, Vol. 55 on 21 Dec 90. The jerrican has conformed to the POP performance requirements; i.e., the jerrican successfully retained its contents throughout the specified tests.  
  
In addition, due to their similarities in size and weight, this test is considered representative of qualification testing for the Mk 7 Mods 1, 2, 3 Smokeless Powder Jerricans as per the variation in the Federal Register (21 Feb 91) and page 52724, para 178.601h of the Final Rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register, Vol. 55.

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POP Test of Mk 7 Mods 0, 1, 2, 3 Smokeless Powder Jerricans

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**PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
MK 7 MODS 0, 1, 2, 3 SMOKELESS POWDER JERRICANS  
FOR  
PACKING GROUP II  
SOLID HAZARDOUS MATERIALS**

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17 June 1991

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## **INTRODUCTION**

The Mk 7 Mod 0 Smokeless Powder Jerrican tested, contained a simulated load of 117 pounds of sand representing the worst case of loading. Overall weight of each jerrican was 154 pounds. This Performance Oriented Packaging (POP) test was performed to ascertain whether this standard container (Packing Group II) would meet the requirements as specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9, and Federal Register 49 CFR Final Rule. A base level vibration test was also conducted in accordance with the final rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register, Volume 55.

The objectives of these tests were to minimize the risk of personnel or environmental exposure to the hazards associated with the contents in the advent of a transportation or handling accident.

In addition, due to their similarities in size and weight, this test is considered representative of qualification testing for the Mk 7 Mods 1, 2, 3 Smokeless Powder Jerricans as per the variation in the Federal Register (21 February 1991) and page 52724, paragraph 178.601h of the Final Rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register, Volume 55.

## **TESTS PERFORMED**

### **1. Base Level Vibration Test**

This test was performed in accordance with paragraph 178.608 of the Performance Oriented Packaging Standards, Final Ruling, published in the Federal Register, Vol. 55, No. 246, December 21, 1990. Three jerricans were placed on the repetitive shock platform. The jerricans were restrained during vibration in all but the vertical direction. The frequency of the platform was increased until the jerricans left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour at a frequency of 3.67 Hz.

### **2. Stacking Test**

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. Three jerricans were used for this test. Each jerrican was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (including the test samples). A weight of 2,160 pounds was stacked on each sample jerrican. The test was performed for 24 hours. After the allowed time, the weight was removed and the jerricans were examined.

### **3. Drop Test**

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3, as a box-type container which is a more severe case than a jerrican-type container. Five jerricans were used as required. The drops were performed from a height of 1.2 meters (4 feet) impacting the following surfaces:

- a. Flat bottom
- b. Flat top
- c. Flat on long side
- d. Flat on short side
- e. One corner

This test was performed at an ambient temperature,  $70 \pm 20$  °F.

#### **PASS/FAIL (UN CRITERIA)**

##### **1. Base Level Vibration Test (FINAL RULING CRITERIA)**

The criteria for passing the base level vibration test is outlined in paragraph 178.608 of the Title 49 CFR Final Ruling and states the following: "immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test.

##### **2. Stacking Test (UN CRITERIA)**

The criteria for passing the stacking test is outlined in paragraph 9.7.6.3 of ST/SG/A-C.10/1 and states the following: "... no test sample should leak. No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

##### **3. Drop Test (UN CRITERIA)**

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle: e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs."

**TEST RESULTS**

- 1. **Base Level Vibration Test**  
Satisfactory.
- 2. **Stacking Test**  
Satisfactory.
- 3. **Drop Test**  
Satisfactory.

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**DISCUSSION**

1. **Base Level Vibration Test**

Immediately after the vibration test was completed, each jerrican was removed from the platform, turned on its side and observed for any evidence of leakage. There was no leakage to the jerricans as a result of this test.

2. **Stacking Test**

Each jerrican was visibly checked after the 24-hour period was over. There was no leakage, distortion, or deterioration to any of the jerricans as a result of this test.

3. **Drop Test**

After each drop, the jerricans were inspected for any damage which would be a cause for rejection. Final inspection indicated damage was minimal with only minor denting noted but no leakage was found. The jerricans remained intact and serviceable upon completion of the tests.

**REFERENCE MATERIAL**

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6

B. Title 49 CFR 107. et al.. Performance Oriented Packaging Standard; Changes to Classification. Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative: Final Rule. Federal Register, Vol. 55, No. 246 of December 21, 1990

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**TEST DATA SHEET**

<b>DATA SHEET:</b>	
<b>Container:</b> Mk 7 Mod 0 Smokeless Powder Jerrican	
<b>Type:</b> 3A2	<b>Container P/N or NSN:</b> NSN 8140-00-038-9872
<b>Specification Number:</b> Drawing 138439	<b>Material:</b> Galvanized Steel
<b>Gross Weight:</b> 69.8 kg (154 pounds)	<b>Dimensions:</b> 28.375" H x 9.75" W x 16.25" L
<b>Closure (Method/Type):</b> Detachable Cover, Turn Latch	<b>Tare Weight:</b> 16.8 kg (37 pounds)
<b>Additional Description:</b> Mod 1 Dwg 593131, Mod 2 Dwg 1350557, Mod 3 Dwg 1380388	
<b>PRODUCT:</b> See table	
<b>Name:</b> See table	<b>NSN(s):</b> See table
<b>United Nations Number:</b> See table	
<b>United Nations Packing Group:</b> II	
<b>Physical State (Solid, Liquid, or Gas):</b> Solid	
<b>Vapor Pressure (Liquids Only):</b> N/A <b>At 50 °C:</b> N/A <b>At 55 °C:</b> N/A	
<b>Consistency/Viscosity:</b> N/A	<b>Density/Specific Gravity:</b> N/A
<b>Amount Per Container:</b> See table	<b>Flash Point:</b> N/A
<b>Net Weight:</b> See table	
<b>TEST PRODUCT:</b> Sand	
<b>Name:</b> Sand	<b>Physical State:</b> Solid
<b>Consistency:</b> N/A	
<b>Density/Specific Gravity:</b> N/A	
<b>Test Pressure (Liquids Only):</b> N/A	
<b>Amount Per Container:</b> N/A	<b>Net Weight:</b> 53.1 kg (117 pounds)

TABLE 1

Mk 7 Mods 0, 1, 2, 3 Smokeless Powder Jerricans

DODIC	NSN	Type	Packing Drawing	UN Code	UN Number	Weight (lb) w/o Cntr	Weight (lb) w/Cntr
N/A	1376-01-055-2783	76mm SPDN	138439 593131 1350557 1380388	1.3C	0161	100 100 110 110	141 141 154 154
N/A	1376-01-132-9160	5"/54 SPCF	138439 593131 1350557 1380388	1.3C	0161	100 100 110 110	141 141 154 154



**MK 7 MODS 0, 1, 2, 3  
SMOKELESS POWDER JERRICANS  
POP MARKING**

**UN 3A2/Y70/S/\*\*\*/USA/DOD/NAD**

**\*\* YEAR LAST PACKED OR MANUFACTURED**