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PERFORMANCE ORIENTED PACKAGING TESTING
OF
POLYSTYRENE FOAM CONTAINER
FOR VARIOUS SUBMARINE LOCATION MARKERS

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FINAL

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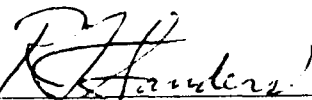
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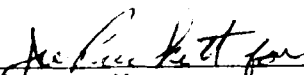
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INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the polystyrene foam shipping and storage container for five Submarine Location Markers meets the Packing Group II requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The objectives were to evaluate the adequacy of the container in protecting the hazardous materials.

The container consists of two identical halves held together by glass filament tape. The open container, with inert markers in place is shown in Figure 1. Figure 2 shows the container closed for shipment, as it was tested.

TESTS PERFORMED

1. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. One container was used for each drop orientation. The drop height was 1.2 meters and the drop sequence was as follows:

- a. Flat on Bottom
- b. Flat on Top
- c. Flat on Long Side
- d. Flat on Short Side
- e. One Corner

The test was performed at ambient temperature ($70^{\circ} + 20^{\circ}\text{F}$). The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. Three different containers were used, each with a stack weight of 815 pounds. This represents the weight imposed on the bottom container of a sixteen-foot stack of like containers weighing 22 pounds. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.

3. Base Level Vibration Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. Three sample containers were loaded with inert signals and closed as for shipment. Each container was placed on a vibrating platform that had a vertical double-amplitude (peak-to-peak displacement) of one inch. The

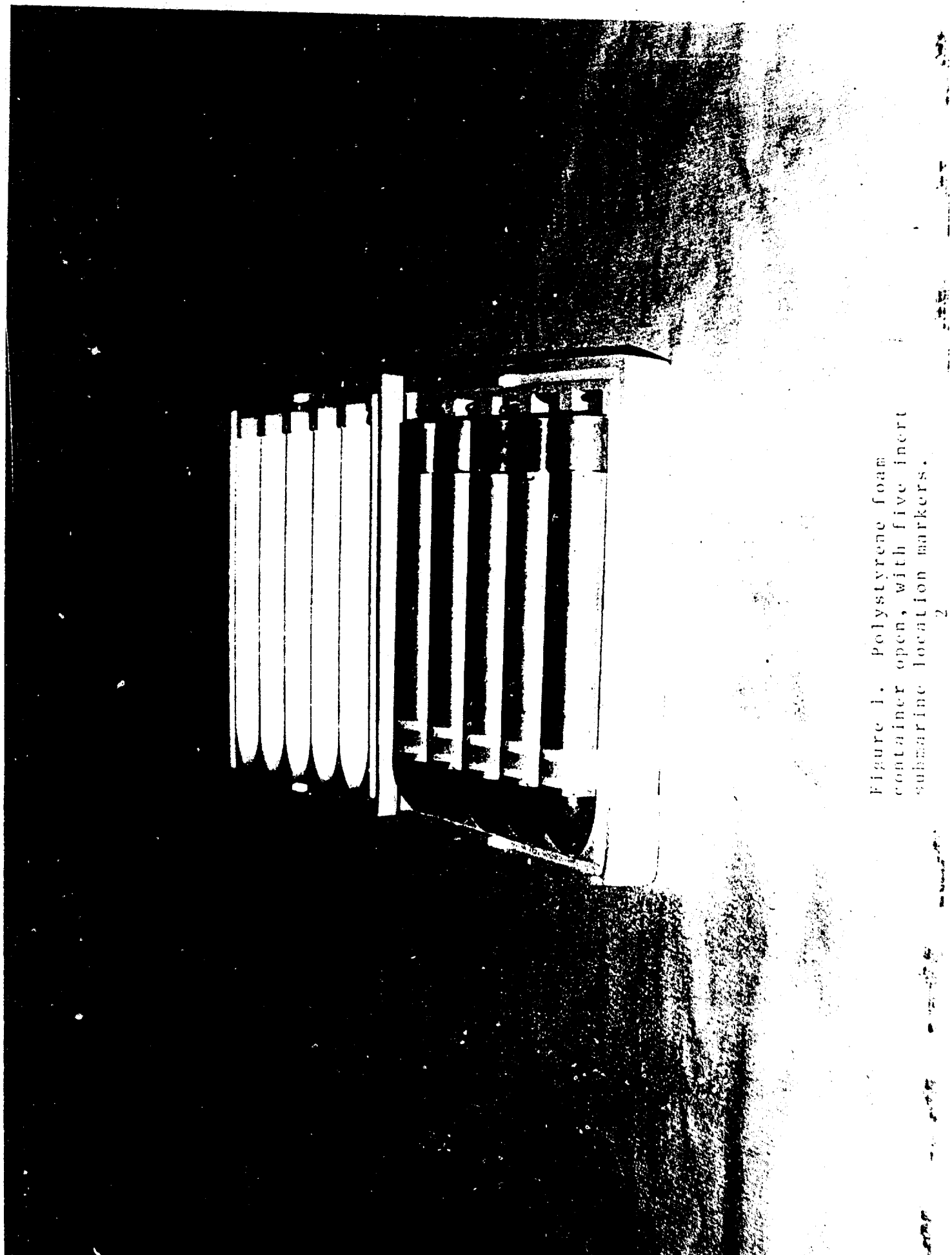


Figure 1. Polystyrene foam
container open, with five inert
submarine location markers.

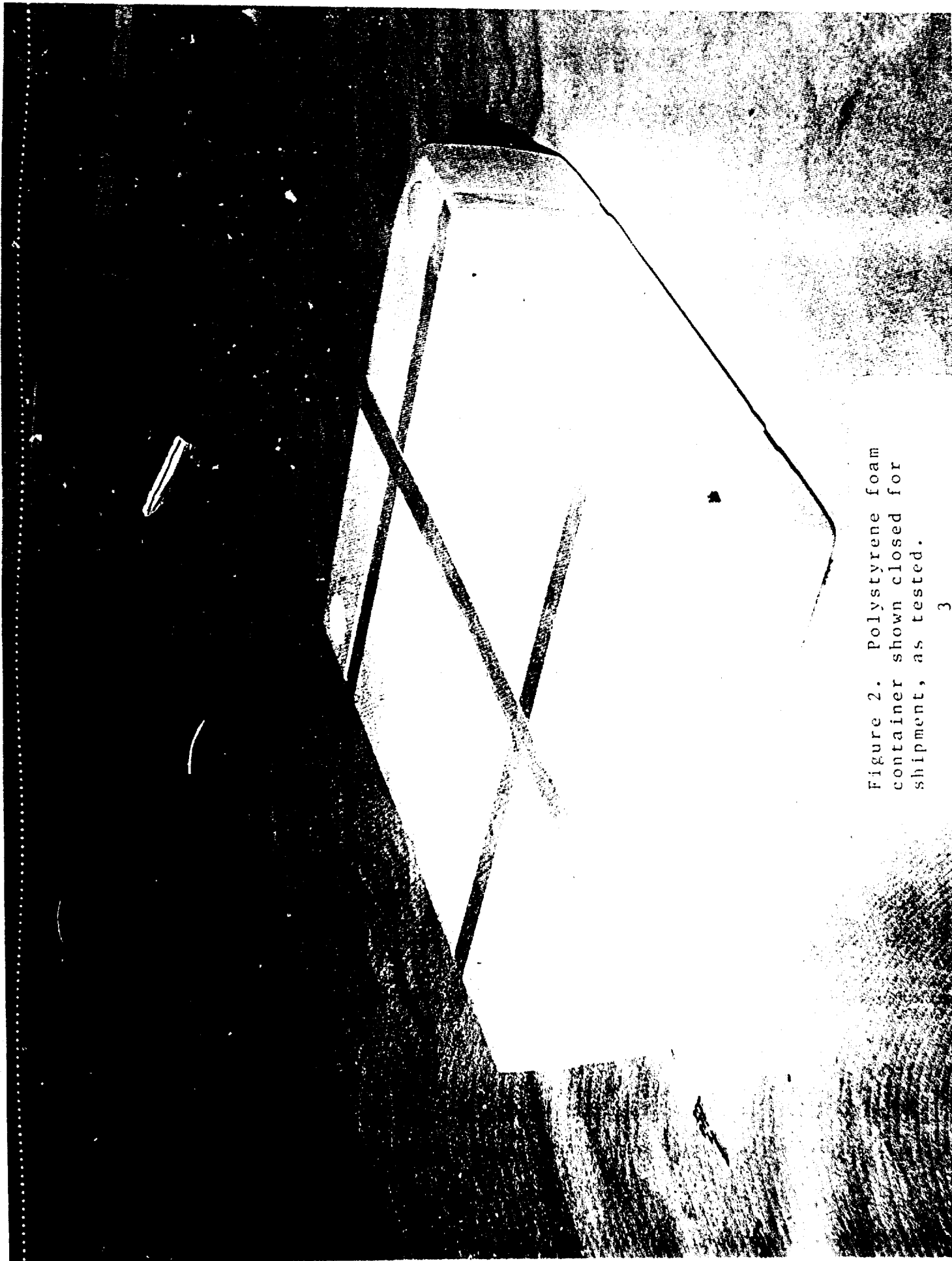


Figure 2. Polystyrene foam container shown closed for shipment, as tested.

packages were constrained horizontally to prevent them from falling off the platform, but were free to move vertically, bounce and rotate. The test was performed for one hour at a frequency that caused each point of the container bottom to be raised from the platform 1.6 mm. A 1.6 mm thick metal strip was passed between the bottom of the container and the platform.

PASS/FAIL

1. Drop Test

The criteria for passing the drop test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.603(f): A package is considered to successfully pass the drop test if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

2. Stacking Test

The criteria for passing the stacking test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.606: No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

3. Base Level Vibration Test

The criteria for passing the Base Level Vibration Test is outlined Title 49 CFR, Part 178, Subpart M, Sec. 178.608: Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

TEST RESULTS

1. Drop Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Base Level Vibration Test

Satisfactory.

DISCUSSION

1. Drop Test

After each drop the container was inspected for any damage which would be cause for rejection. The corner drop flattened the impact corner of the container, but there was no spillage of contents.

2. Stacking Test

Three containers were individually tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration to the container as a result of this test.

3. Base Level Vibration Test

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. All containers remained securely closed and there was no evidence of leakage of contents.

REFERENCE MATERIAL

Code of Federal Regulations Title 49 CFR, Parts 107-178.

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DATA SHEET

CONTAINER:

Polystyrene Foam Container for
Five Submarine Location Markers

POP MARKING:

4H1/Y10/S/**
USA/DOD/NAD

Type: 4H1

UN Code: 1.3G

Specification Number:
MIL-P-19644

Material:
Polystyrene Foam

Gross Weight:
10 kg
(22.0 pounds)

Dimensions:
.55m L x .47m W x .13m H
(21.62" L x 18.62" W x 5.00" H)

Closure (Method/type):
Glass Filament Tape

Tare Weight:
.8 kg
(1.8 pounds)

Additional Description: Container consists of two
identical halves in accordance with Drawing 10001-
1332211.

PACKAGED COMMODITY: Submarine Location Marker

MK 21 Mod 0, L213, 1370-00-715-2412

MK 22 Mod 0, L212, 1370-00-715-2409

MK 23 Mod 0, L211, 1370-00-715-2411

MK 24 Mod 0, L210, 1370-00-715-2410

Proper Shipping Name: Signals, Distress

United Nations Number: 0195

United Nations Packing Group: II

Physical State: Solid

Amount Per Container: 5

Net Weight: 7.7 kg (17.0 pounds)

PACKAGED COMMODITY USED FOR TEST:

Name: Inert Signals

Physical State: Solid

Size : .47m L x .08m Dia
(18.61"L x 3.36"Dia)

Quantity : 5

Net Weight: 9.2 kg (20.2 pounds)