

Test Report 08048

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Qualification Test of Prototype Container, Shipping and Storage, for Expended F/A-18 Fuel Cell No. 4

**Prepared by
Richard J. Nicholl**

**Prepared for
Naval Inventory Control Point-Phila
700 Robbins Avenue
Philadelphia, Pennsylvania 19111-5098**



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Naval Surface Warfare Center, Indian Head Division Detachment Earle, Colts Neck, New Jersey 07722-5023**


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Shipping and Storage, for
Expended F/A-18 Fuel Cell No. 4**

**Contract N/A
NSN Not Assigned
Tech-Source, Inc. (P/N None Supplied)**

ABSTRACT

This report documents the qualification tests performed on a prototype container intended for the shipping and storage of one expended F/A-18 Fuel Cell No. 4. The container is a modified version of the "Clip-Lok Box," which is a commercially available product, designed and manufactured by Tech-Source, Inc., Anderson, South Carolina. Testing was conducted on 9-14 July 2008 at the Naval PHST (Packaging, Handling, Storage, and Transportation) Center in accordance with selected requirements of MIL-STD-648D, under the direction of NAVICP-Phila (Naval Inventory Control Point-Phila), Philadelphia, Pennsylvania. Based on the test results, the prototype container has met the specified requirements.

Prepared by:


RICHARD J. NICHOLL
Mechanical Engineer

Reviewed by:

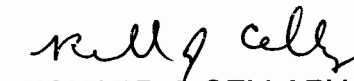

RICHARD J. CELLARY
Test and Evaluation Supervisor

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List of Symbols, Abbreviations, and Acronyms

°	degree (angle)
°F	degree Fahrenheit
±	plus or minus
×	multiplied by
lb	pound
ft/s	foot per second
F/A	fighter/attack
Inc.	Incorporated
JMIC	Joint Modular Intermodal Container
MIL-STD	Military Standard
NAVICP-Phila	Naval Inventory Control Point-Philadelphia
No.	Number
NSN	National Stock Number
P/N	Part Number
PHST	Packaging, Handling, Storage, and Transportation
Rev.	Revision
S/N	Serial Number

INTRODUCTION

This report documents the qualification tests performed on a prototype container intended for the shipping and storage of one expended F/A-18 Fuel Cell No. 4. The container is a modified version of the “Clip-Lok Box,” which is a commercially available product, designed and manufactured by Tech-Source, Inc., Anderson, South Carolina. Testing was conducted on 9-14 July 2008 at the Naval PHST (Packaging, Handling, Storage, and Transportation) Center in accordance with selected requirements of MIL-STD-648D, under the direction of NAVICP-Phila (Naval Inventory Control Point-Phila), Philadelphia, Pennsylvania.

DESCRIPTION

1. Container for Expended F/A-18 Fuel Cell No. 4

The container is constructed of six 3/4-inch thick plywood panels, assembled to form a rectangular box. The base panel is the top part of a 5-inch high pallet-like support structure configured with nine wood blocks and three 54-3/8 x 4 x 3/4-inch runners (3 blocks per runner). The support structure provides 4-way forklift/pallet truck entry capability. The plywood panels are held together with 2-inch wide steel clips (28 total clips). All internal container surfaces are lined with 1/2-inch thick polyethylene foam. The black elastomeric coating on the external surfaces (trade name: Aristocoat) is intended to reduce moisture intrusion, prevent splintering, and extend the container's life. The coating is applied to all external surfaces with the exception of all downward facing surfaces of the support structure. (See [figures 1, 2, and 3.](#))



Figure 1. Container (Closed View)



Figure 2. Container (Panels Prior to Assembly)



Figure 3. Steel Clip Securing the Lid to the Base

2. Packaged Commodity

The container is intended for the shipping and storage of one expended F/A-18 Fuel Cell No. 4.

3. Test Commodity

One expended F/A-18 Fuel Cell No. 4 (P/N 74-580179-115 Rev E, S/N 0098) was used for testing. (See [figure 4](#).)



Figure 4. Test Commodity

4. Dimensions and Weights

The overall dimensions and weights of the tested container and test commodity are as follows:

Container Dimensions (inches)	
Length	64-1/2
Width	54-3/8
Height	28-7/8
Stacking Height	28-7/8

Weights (pounds)	
Empty Container	252
Test Commodity	89
Gross Weight	341

Test Commodity Dimensions (inches)	
Length	60
Width	50
Height	23

NOTE: The test commodity is irregularly shaped and the dimensions provided are external envelope dimensions.

PRELIMINARY INSPECTION

1. Inspection

The container was assembled using the base support, four side panels, one top panel and 28 clips. A visual inspection of the container was performed prior to testing.

RESULTS:

Conforms. The container was assembled by two workers without difficulty. No defects or misalignments were observed.

MAJOR EQUIPMENT AND INSTRUMENTATION

Table 1 lists the major equipment and instrumentation used throughout the test program.

Table 1. Major Equipment and Instrumentation

Item	Manufacturer	Model No.	Serial No.
Forklift Truck 6000 lb Capacity	Hyster	E60XL	C108G10869L
Pallet Truck	Rol-Lift	T402748	G43505
Digital Floor Scale	Cardinal	738	9411-75

1. Calibration

All instrumentation calibration was current at the time of testing and traceable to the National Institute of Standards and Technology.

2. Instrumentation Locations

Electronic measurement of shock and/or vibration levels was not required during this test program.

TEST PROCEDURES AND RESULTS

The tests were performed in accordance with requirements of MIL-STD-648D as directed by NAVICP-Phila. All tests were performed at ambient temperatures (70 ± 20 °F), unless otherwise indicated.

1. Form and Fit Test

The test commodity was installed in the container. The container cover was then placed on and secured to the base with 10 steel clips.

RESULTS:

Conforms. This operation was easily accomplished with two workers. No difficulties or interferences were observed.

2. 18-Inch Free-Fall Drop Test

The loaded container (base down) was raised to a height of 18 inches and allowed to free fall onto an unyielding steel surface. (See [figure 5](#).)

RESULTS:

Conforms. No damage or permanent deformation to the commodity or the container was observed.



Figure 5. 18-inch Free-Fall Drop Test

3. Edgewise Drop Test

One edge of the loaded container was placed on a 6-inch block. The opposite edge was raised to a height of 32 inches and allowed to free fall onto an unyielding steel surface. Two adjacent edges were dropped in this manner. (See [figure 6.](#))

RESULTS:
Conforms. No damage or permanent deformation to the commodity or the container was observed.



Figure 6. Edgewise Drop Test

4. Cornerwise Drop Test

Two adjacent corners of the loaded container were raised to heights of 6 and 12 inches, respectively. The corner diagonally opposite the 12-inch block was raised to a height of 32 inches and allowed to free fall onto an unyielding steel surface. Two diagonally opposite corners were dropped in this manner. (See [figure 7](#).)

RESULTS:

Conforms. No damage or permanent deformation to the commodity or the container was observed.



Figure 7. Cornerwise Drop Test

5. Incline Impact Test (With Timber)

The loaded container was placed on the carriage of a CONBUR incline-impact machine. The carriage was raised to a predetermined point on a 10° track, calibrated to obtain a velocity of 7 ft/s upon impact with an unyielding abutment. All four sides were impacted in this manner. (See [figure 8](#).)

RESULTS:

Conforms. No damage or permanent deformation to the commodity or the container was observed.



Figure 8. Incline Impact Test (With Timber)

NOTE: During the drop and impact tests, some minor shifting of the side panels was observed. This shifting left up to 1/4-inch gaps at some of the corner and bottom edges after the shock event. However, when the clips retaining the cover to the base were removed, the container shifted back into alignment without worker assistance. (See figures 9 and 10).

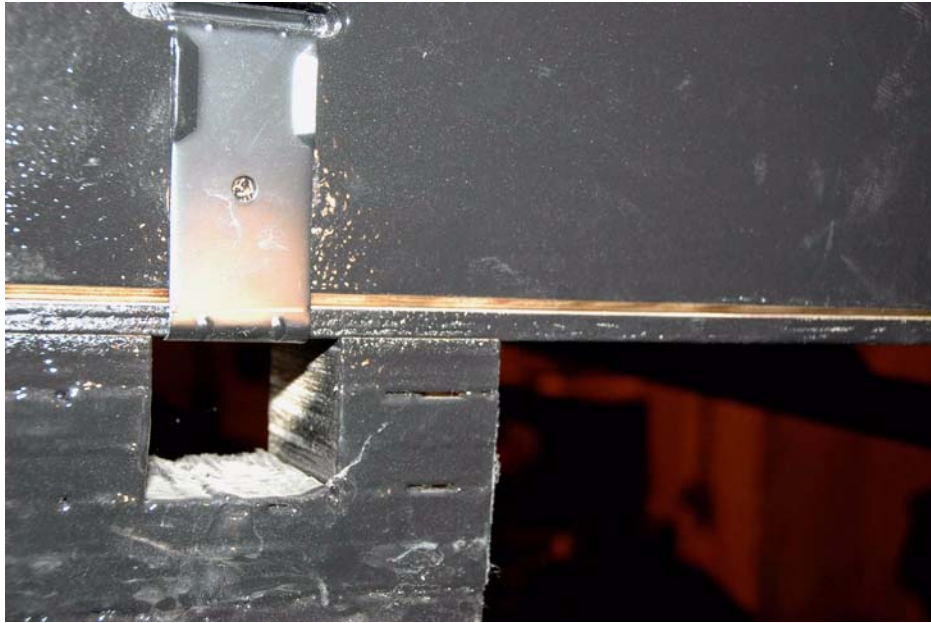


Figure 9. Misalignment of Panels Near Base After Cornerwise Drop



Figure 10. Misalignment of Panels Near Base After Incline Impact Test

6. Load Test (Stacking)

The loaded container was placed on a flat level surface. A weight of 5,337 pounds loaded in a JMIC (Joint Modular Intermodal Container) container was centered on the container cover and held in place for a period of 1 hour. (See [figure 11](#)).



Figure 11. Load Test (Stacking)

RESULTS:

Conforms. No damage or permanent deformation to the commodity or the container was observed.

7. Forklift/Pallet Truck Entry Capability

The container was lifted and maneuvered, in turn, by a 6,000-pound capacity electric forklift and a 4,000-pound capacity manual pallet truck.

RESULTS:

Conforms. The container was easily lifted and maneuvered by both the forklift and the pallet truck. The container was successfully handled from all four sides.



CONCLUSIONS

Based on the test results, the prototype container for the shipping of one expended F/A-18 Fuel Cell No. 4, has met the selected requirements of MIL-STD-648D, as directed by NAVICP Philadelphia.