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QUALIFICATION TESTING OF REDESIGNED F-15/F-4 600 GALLON 1/1

BI-PAC FUEL TANK CONTAINER(U) AIR FORCE PACKAGING

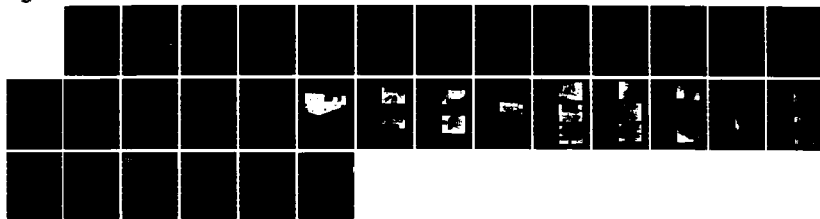
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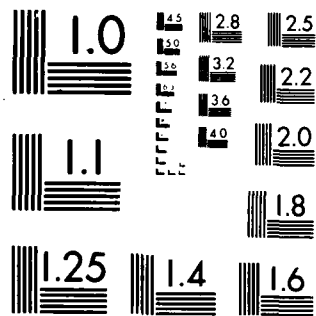
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Report No. 86-R-06
AFPEA Project No. 85-P-129

AD-A173 968

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QUALIFICATION TESTING OF REDESIGNED
F-15/F-4 600 GALLON BI-PAC
FUEL TANK CONTAINER

HQ AFLC/DSTZ
AIR FORCE PACKAGING EVALUATION AGENCY
Wright-Patterson AFB OH 45433-5999

August 1986

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SUMMARIZES

In 1985 the F-15/F-4 600 Gallon Bi Pac Container was redesigned. Modifications were incorporated into contract F09063-83-C-1178. Qualification tests were conducted on two production containers in accordance with Federal Test Method Standard No. 101 and Military Standard 648. This test report summarizes the results of the tests and recommends modifications which should be included in current and future production contracts.

The redesigned F-15/F-4 600 Gallon Bi Pac Fuel Tank Container did not pass all of the required tests. Design changes are recommended to ensure the integrity of the containers and the fuel tanks during shipment and storage.

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INTRODUCTION

BACKGROUND: In January 1985 the AFLC LOC/TL directed that action be taken to make the F-15/F-4 Bi Pac a universal container for the shipment and storage of F-15/F-4 600 gallon fuel tanks. To meet this requirement and to correct already identified container deficiencies the F-15/F-4 Bi Pac was redesigned and modifications were incorporated into contract F09603-83-C-1178. Warner Robins Air Logistics Center (WR-ALC/MMT/DSTD) Robins AFB GA 31098 requested assistance from the Air Force Packaging Evaluation Agency (AFPEA) to perform a series of design qualification tests on the first two F-15/F-4 600 Gallon Bi-Pac Fuel Tank production containers.

PURPOSE: The purpose of this project was to perform tests to qualify the design of the F-15/F-4 600 Gallon Bi Pac Fuel Tank container.

TEST SPECIMENS: Simulated transportation and handling tests were performed on two F-15/F-4 600 Gallon Bi-Pac Fuel Tank Containers as requested by WR-ALC/MMT/DSTD (see figure 1). The tests were performed at the Air Force Packaging Evaluation Agency and the 3246 Test Wing, Eglin AFB FL, on containers Serial No (S/N) 001 and 002 between 17 Dec 85 and 31 Jan 86. Physical and general information on both containers was recorded as follows:

- a. Manufacturer: Advanced Composite Technology (ACT)
- b. Contract No.: F09603-83-C-1178
- c. National Stock No.: 8145-01-025-9738
- d. Dimensions (inches): Outside- 272LX85WX47H (inches)
- e. Weight (pounds):

Gross: Container S/N 001 - 1352 pounds when loaded with two F-4 Standard (STD) Configuration External Fuel Tanks (see figure 2).

Container S/N 002 - 1399 pounds when loaded with two F-4 high performance (HP) Configuration External Fuel Tanks (see figure 3).

Container: S/N 001 - 762 pounds
S/N 002 - 765 pounds

TEST OUTLINE AND TEST EQUIPMENT

In general, the tests were performed on both containers in conformance with appropriate methods of Federal Test Method Standard Number (FTMS No.) 101C and consisted of those tests detailed in table 1, Container Test Plan. Container (S/N 002) was considered the primary test container because its lip/edge construction differs from container (S/N 001) and will be the construction used during the production manufacturing process.

TEST PROCEDURE AND RESULTS

INCOMING INSPECTION

Test No. 1: The containers, as received, were visually inspected. The exterior and interior surfaces, markings, hardware, cushioning, and restraint bars were inspected for manufacturing imperfections. The containers were also checked for dimensional compliance.

Results: The containers were received in excellent condition. Visual inspection revealed no defects. It was noted that only two of the stacking board's four quick release pins can be retained in the stowed position. The lanyards used to attach the pins are long enough to permit the pins to impact the tanks if they are not in a stowed position. The two stacking board pins which are not stowed could abrade the tanks during transit. The results of this test were acceptable.

NESTABILITY

Test No. 2: The containers were nested to determine if they met the design requirement of nesting to 75 percent of the containers height.

Results: The containers are nestable within 75 percent of the container height. However, there is no physical stop to prevent settling of the containers as the load increases, resulting in an interference fit when the containers are nested. This condition could cause physical damage to the shell of the containers, and makes it very difficult to unnest the containers. The results of this test were unacceptable.

ROUGH HANDLING TEST (Ambient Temperature)

Test No. 3A: The cornerwise drop (rotational) test was conducted in accordance with FTMS No. 101, Method 5005.1. The height of the drop was 15 inches.

Results: Visual inspection revealed that neither the container nor its contents were damaged during the cornerwise drop sequence. A maximum of 11.0 Gs was obtained during the tests. On cornerwise drop three (corner 3), the quick release pins on one side of the stacking boards in corner 2 and 3 partially disengaged but resealed themselves when the container was placed back in a level position (see figure 4). The results of the test were acceptable.

Test No. 3B: The edgewise drop (rotational) test was conducted in accordance with FTMS No. 101, Method 5008.1. The height of the drop was 15 inches.

Results: Visual inspection revealed that neither the container nor its contents were damaged during the edgewise drop sequence. A maximum of 15 Gs was obtained during the tests. On one edgewise drop two quick release pins were partially disengaged (see figure 5). On two of the four edgewise drops, one release pin was partially disengaged. In all cases the quick release pins reengaged when the container was placed back in a level position. The results of the test were acceptable.

VIBRATION TESTS

Test No. 4A: The vibration test was conducted in accordance with FTMS No. 101C, Method 5019.1. The test container (S/N 002) was loaded with two F-4 HP fuel tanks (see figure 6).

Results: 1. The tabs on the container restraint bar assembly had received minor wear and were bent during vibration.

2. The painted surface of the F-4 HP fuel tank was abraded due to whipping of the lanyard that attaches the restraint bar to the container.

3. Most of the screws which hold the lanyards in place were loose.

4. One quick release pin which attached the restraint bar to the fuel tank would not function after it was removed. The pin was exercised, re-inserted and testing continued. The pin did not malfunction again.

5. The results of this test were unacceptable.

Test No. 4B: The vibration test was conducted in accordance with FTMS No. 101C, Method 5019.1. The containers were vibrated stacked two high (see figure 7). Container (S/N 001) loaded with two STD F-4 fuel tanks was the the bottom container. Container

(S/N 002) loaded with two F-4 HP fuel tanks was the top container.

Results: 1. The tabs on container (S/N 001) restraint bar received minor wear and were bent during this vibration sequence. The tabs on container (S/N 002) restraint bar received additional wear and were bent further during this vibration sequence (see figure 8 & 9).

2. The F-4 HP tanks in container (S/N 002) received additional abrasion from the lanyards and the STD F-4 tanks in container (S/N 001) were also damaged by the lanyards.

3. Most of the screws used to secure the lanyards were loose.

4. The results of this test were unacceptable.

PENDULUM IMPACT TEST

Test No. 5A: Container (S/N 002) loaded with two F-4 HP fuel tanks was subjected to the pendulum-impact test. This test was conducted in accordance with FTMS No 101, Method 5012. The vertical drop height was nine inches and the impact velocity was seven feet per second. The containers were impacted on each end (two impacts per container).

Results: Container (S/N 002). During the first impact (side 1-2), neither the container nor the tank was damaged. During second impact (side 3-4), the fuel tanks penetrated the end wall of the container and the nose of one of the fuel tanks was dented (see figure 10 & 11). A maximum of 11 Gs was obtained during the tests. The results of the test were unacceptable

Test No. 5B: Container (S/N 001) loaded with two STD F-4 fuel tanks was subjected to the pendulum impact test conducted in accordance with FTMS No. 101 method 5012.

Results: Container (S/N 001). During the first impact (side 3-4, record box end), neither the container nor the tank was damaged. During the second impact (side 1-2), the fuel tanks penetrated the end wall of the container and the nose of one of the fuel tanks was dented. A maximum of 11 Gs was obtained during the test. The results of the test were unacceptable (see figure 12).

SUPERIMPOSED LOAD TEST (Ambient temperature)

Test No. 6: The superimposed load test was conducted in accordance with FTMS No 101, Method 5016.1. The containers were stacked two high. Container (S/N 001) loaded with two F-4 HP

tanks was the top container. An additional weight of 7273 pounds was placed on the top container (see figure 13-15).

Results: The stacking boards on the bottom container (S/N 002) deflected and lifted off the sides of the container 1/8 to 1/4 inch. There was a bow of 1/4 inch at each of the four corner panels on the 272 inch sides of both containers. These deflections were not permanent and disappeared when the weights were removed from the containers at the end of the test. The results of this test were acceptable.

MECHANICAL HANDLING TEST

Test No. 7A and 7B: The fork lift handling test was conducted in accordance with FTMS No. 101, Method 5011.1 para 6.2. The test container (S/N 002) was loaded with two F-4 HP fuel tanks and repeated with containers S/N 001 and S/N 002 loaded and stacked two high.

Results: Visual inspection revealed no damage to the container. The results of these tests are acceptable.

Test No. 7C: The hoisting with single sling test was conducted in accordance with MIL-STD-648 Para 5.8.5. The container was lifted by one lift ring and left hanging for one hour (See figure 16). As a safety test the container was also lifted by one tiedown ring (see figure 17).

Results: When hoisted by one lift ring the tanks rotated downward and the bottom fuel tank rested against the side wall of the container. Visual inspection revealed no damage to the container or to its contents. The results of the test are acceptable.

Test No. 7D: The pushing test was conducted in accordance with FTMS No 101, Method 5011.1 para 6.5. The test container (S/N 002) was loaded with two F-4 HP fuel tanks.

Results: Visual inspection revealed no damage to the containers. The results of the test are acceptable.

TIEDOWN STRENGTH TEST

Test No. 8: The tiedown strength test was conducted in accordance with MIL-STD-648 para 5.8.4.

Results: The container met or exceeded all conditions required by MIL-STD-648 and MIL-A-841. The results of the tests are acceptable (see attachment 1).

ROUGH HANDLING TEST (High/Low Temperature +140 Degree Fahrenheit/-40 Degree Fahrenheit)

Test No. 9A: The high/low temperature cornerwise drop (rotational) test was conducted in accordance with FTMS No. 101, method 5005.1. The drop height was 15 inches.

Results: Visual inspection revealed no damage to the container or its contents. The results of the test were acceptable.

Test No. 9B: The high/low temperature edgewise (rotational) test was conducted in accordance with FTMS No. 101, method 5008.1. The drop height was 15 inches.

Results: Visual inspection revealed no damage to the container. The results of the test were acceptable.

SUPERIMPOSED LOAD TEST (High Temperature +120 Degree Fahrenheit)

Test No. 10: The high temperature superimposed load test was conducted in accordance with FTMS No. 101, method 5016.1. The containers were stacked two high. Container (S/N 001) loaded with two F-4 HP tanks was the top container. An additional weight of 7273 pounds was placed on the top container.

Results: Visual inspection revealed no damage to the container. The results of the test were acceptable.

INTERFACE TESTS

Test No. 11: In addition to the tests specified in the Container Test Plan (Table 1), several interface tests were conducted.

Results: These tests show that the redesigned containers will nest inside the current containers (see figure 18), can be stacked interchangeably with the current containers (see figure 19), and that the Bi-Pac container cover can be used with the redesigned Bi-Pac container (see figure 20).

CONCLUSIONS:

1. In general the redesigned F-15/F-4 600 Gallon Fuel Tank Bi Pac Container is superior to those currently in the system.
2. The two stacking board pins which are not stowed could abrade tanks during shipment.

3. A physical stop is required to prevent an interference fit when containers are nested.
4. The lanyards which attach the restraint bars to the container will abrade the tanks during transit.
5. The screws which hold the lanyards in place, became loose during the vibration tests.
6. The tabs on the container restraint bar were bent during vibration and the pendulum impact test.
7. During the pendulum impact test, penetration of the containers (S/N 001 and S/N 002) and damage to the tanks occurred on the second impact. A review of the video tape indicates that on both container/tank configurations the already deformed restraint bar tabs (deformed during vibration tests) permitted increased lateral and upward movement of the tanks causing the bars to twist. This twisting resulted in increased restraint bar tab deformation on each impact.
8. Implementation of recommendations 5, 6, and 7 should eliminate the possibility of damage to the fuel tanks due to impact without compromising the integrity of the container.

RECOMMENDATION

It is recommended that the following modifications be included in current and future contracts:

1. A second set of quick release pin holes should be drilled in each stacking board so that the quick release pins can be secured when the stacking boards are in the stowed position (see attachment 2).
2. A twelve inch high physical restraint is required to prevent overnesting of the containers.
3. An adhesive such as "loctite" should be applied to the lanyard attachment screws to ensure that they do not loosen and eventually back out.
4. The two lanyards which attach the restraint bars to the container should be eliminated (ACT Drawing No. 809074 Assy, Bi-Pac Container Item No. 15).
5. The restraint bar tab thickness should be changed from 0.120 to 0.188 inches. The 0.120 inch restraint bar tabs deformed

during vibration and pendulum impact testing. Under the same test conditions, previous testing has shown that a 0.188 inch thick restraint bar tab does not deform.

6. To ensure that the tanks are not damaged during shipment, a four inch diameter hole should be cut two places on each 85 inch end of the container. Locate center of holes as detailed in attachment 3.

7. Increase thickness of the four 6.0 X 10.0 X.5 inch thick end cushions (ACT Drawing No. 809074 Assy, Bi-Pac Container Item No. 14) to one inch.

TABLE I

AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan)					AFPEA PROJECT NUMBER 85-129		
CONTAINER SIZE (L X W X D)(INCHES) INTERIOR: EXTERIOR:			WEIGHT (LBS) GROSS: ITEM:		CUBE (CU. FT.)	QUANTITY	DATE
272" X 85" X 48"						2	6 Sep 85
ITEM NAME F-15/F-4 600 Gallon Bi-Pac				MANUFACTURER Advanced Composite Technology			
CONTAINER NAME Bi-Pac, NSN 1560-01-017-0858FX					CONTAINER COST N/A		
PACK DESCRIPTION Fiberglass Construction							
CONDITIONING Ambient to be conducted at HQ AFLC/DSTZ							
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO's	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION			
1.	<u>INCOMING INSPECTION</u>	Visual inspection of container shell, restraint system and contents to certify condition of containers upon arrival.	N/A	N/A			
2.	<u>NESTABILITY</u>	Nestable to within 75% of container height.	N/A	N/A			
3.	<u>ROUGH HANDLING TESTS</u>						
a.	FTMS No. 101C Method 5005.1	Cornerwise-drop (rotational) test, 15 inch drop height.	One drop each corner of container base (four drops).	Tri-axial accelerometer			
b.	FTMS No. 101C Method 5008.1	Edgewise-drop (rotational) test, 15 inch drop height.	One drop each corner of container base (four drops).	Tri-axial accelerometer			
c.	FTMS No. 101c Method 5012	Pendulum-impact test, 9 inch drop height, 7 fps impacts	One impact to each end (two impacts). Container 1 loaded w/two F-15 or F-4 high performance 600 gallon fuel tanks. Repeated with container 2 loaded w/two F-4 std fuel tanks.	Tri-axial accelerometer High-speed video recorder.			
COMMENTS:							
PREPARED BY: EILEEN FOLEY, Mech Engr, AFPEA				APPROVED BY: RALPH ZYNDA, Ch, Design Branch AFPEA			

AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan)					AFPEA PROJECT NUMBER 85-129	
CONTAINER SIZE (L X W X D)(INCHES) INTERIOR:		WEIGHT (LBS) GROSS:		CUBE (CU. FT.)	QUANTITY	DATE
272" X 85" X 48"					2	6 Sep 85
ITEM NAME F-15/F-4 600 Gallon Bi-Pac				MANUFACTURER Advanced Composite Technology		
CONTAINER NAME Bi-Pac, NSN 1560-01-017-858FX				CONTAINER COST N/A		
PACK DESCRIPTION Fiberglass Construction						
CONDITIONING Ambient to be conducted at HQ AFLC/DSTZ						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO's	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION		
4.	<u>SUPER-IMPOSED LOAD TEST</u> FTMS No. 101C Method 5016.1	Containers stacked two high with an additional load of **** lbs, one hour.	As required by test. The top container shall be loaded with two F-15 or F-4 high performance 600 gallon fuel tanks.	N/A		
5.	<u>VIBRATION TESTS</u>					
a.	FTMS No. 101C Method 5019.1	One inch double amplitude within the range of 3 to 5 Hz, two hours.	As required by test.	N/A		
b.	FTMS No. 101C Method 5019.1	One inch double amplitude within the range of 3 to 5 Hz, two hours.	Stacked two high the top container shall be loaded with two F-15 or F-4 high performance 600 gallon fuel tanks.	N/A		
6.	<u>MECHANICAL HANDLING TEST</u>					
a.	FTMS No. 101C Method 5011.1 para 6.2	Forklift handling.	As required by test.	N/A		
b.	FTMS No. 101C Method 5011.1 para 6.2	Forklift handling.	Stacked two high as required by test.	N/A		
COMMENTS:						
PREPARED BY: EILEEN FOLEY, Mech Engr, AFPEA				APPROVED BY: RALPH ZYNDA, Ch, Design Branch, AFPEA		

AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan)					AFPEA PROJECT NUMBER 85-129		
CONTAINER SIZE (L X W X D)(INCHES) INTERIOR: 272" X 85" X 48"			WEIGHT (LBS) GROSS: ITEM:		CUBE (CU. FT.)	QUANTITY 2	DATE 6 Sep 86
ITEM NAME F-15/F-4 600 Gallon Bi-Pac				MANUFACTURER Advanced Composite Technology			
CONTAINER NAME Bi-Pac, NSN 1560-01-017-0858FX					CONTAINER COST N/A		
PACK DESCRIPTION Fiberglass Construction							
CONDITIONING Ambient to be conducted at HQ AFLC/DSTZ							
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO's	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION			
c.	MIL-STD-648 Para 5.8.5	Hoisting w/single sling.	Hoist for one hour each using one outer, then one inner lift tiedown ring.	(special equipment boom crane)			
d.	FTMS No. 101C Method 5011.1 Para 6.5.	Pushing test.	As required by test.	N/A			
e.	FTMS No. 101C Method 5011.1 Para 6.6	Towing test.	As required by test.	N/A			
7.	<u>TIEDOWN STRENGTH TEST</u> MIL-STD-648 Para 5.8.4	Foreward 3 X gross wt aft 1½ X gross wt Lateral 1½ X gross wt Up 2 X gross wt Down 4½ X gross wt	As required by test.	Load cells and data terminal monitor			
NOTES: 1. The same container is to be subjected to tests 1 through 7. It is to be loaded with two F-15 or F-4 high performance tanks with the following exceptions: Test 4 and Test 5b - Container to be loaded with two F-4 standard 600 gallon tanks and it is to be the bottom container. 2. A second container is to be loaded as specified and subjected to tests 3c, 4, 5b, and 6b. 3. Tests are to be conducted in the order specified. **** Load to be determined after weight of first article container is established.							
COMMENTS:							
PREPARED BY: EILEEN FOLEY, Mech Engr, AFPEA				APPROVED BY: RALPH ZYNDA, Ch, Design Branch, AFPEA			

AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan)					AFPEA PROJECT NUMBER 85-129	
CONTAINER SIZE (L X W X D)(INCHES)		WEIGHT (LBS)		CUBE (CU. FT.)	QUANTITY	DATE
INTERIOR:	EXTERIOR:	GROSS:	ITEM:			
	272" X 85" X 48"				2	6 Sep 86
ITEM NAME F-15/F-4 600 Gallon Bi-Pac				MANUFACTURER Advanced Composite Technology		
CONTAINER NAME Bi-Pac NSN 1560-01-017-0858FX				CONTAINER COST N/A		
PACK DESCRIPTION Fiberglass Construction						
CONDITIONING High/Low Temperature to be conducted at Eglin AFB FL						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO's	TEST TITLE AND PARAMETERS		CONTAINER ORIENTATION	INSTRUMENTATION	
8.	ROUGH HANDLING TEST					
a.	FTMS No. 101C Method 5005.1	Cornerwise-drop (rotational) test. Two drops at -40 degrees plus/minus 5 degrees Fahrenheit and two drops made at +140 degrees plus minus 5 degrees Fahrenheit, 15 inch drop height.		Diagonal corners dropped at low temperature, the opposite diagonal corners used for high temperature.	N/A	
b.	FTMS No. 101C Method 5006.1	Edgewise-drop (rotational) test. Two drops at -40 degrees plus/minus 5 degrees Fahrenheit and two drops made at +140 degrees, plus/minus 5 degrees Fahrenheit, 15 inch drop height.		Aft end and side used for low temp. then fwd end and other side used for high temp.	N/A	
9.	SUPER IMPOSED LOAD TEST					
	FTMS No. 101C Method 5016.1	Test performed at 120 degrees plus/minus 5 degrees Fahrenheit and 90 percent relative humidity for 168 hours		Containers stacked two high with additional load of ** lbs. The top container is to be loaded with two F-15 or F-4 high performance 600 gallon fuel tanks.	N/A	
NOTES: ** load to be determined after weight of first article container is established. The same container is to be subjected to test 1 and 2. It is to be loaded with two F-15 or F-4 high performance 600 gallon fuel tanks for test 1a and 1b. It is to be loaded with two standard F-4 600 gallon fuel tanks for test 2 and it is to be the bottom container.						
COMMENTS						
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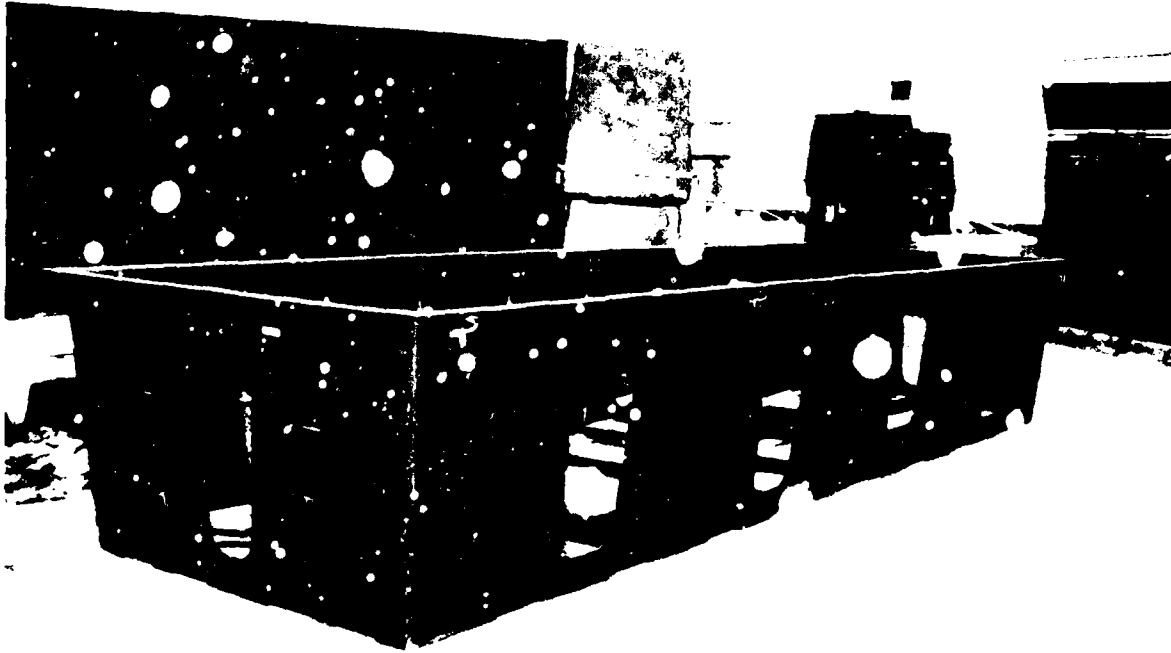


Figure 1. F-4/F-15 600 Gallon Fuel Tank Bi-Pac Container (NSN 8145-01-02509738).

Figure 2. F-4 600 Gallon
Standard Fuel Tanks
stowed in Bi-Pac
Container.

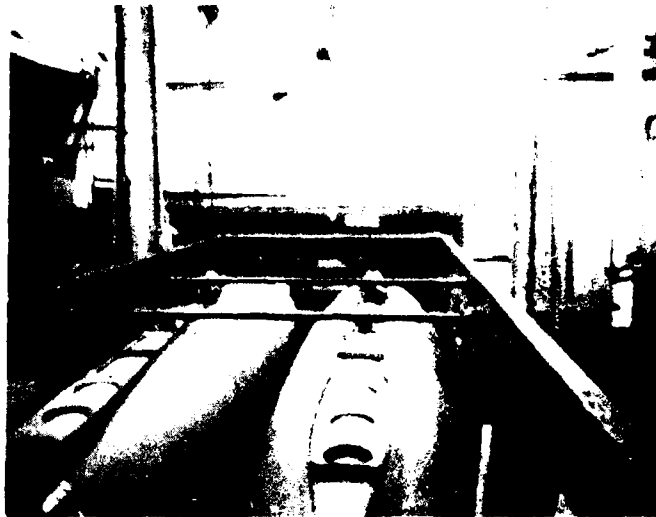


Figure 3. F-4 600 Gallon High
Performance Fuel
Tanks stowed in
Bi-Pac Container.

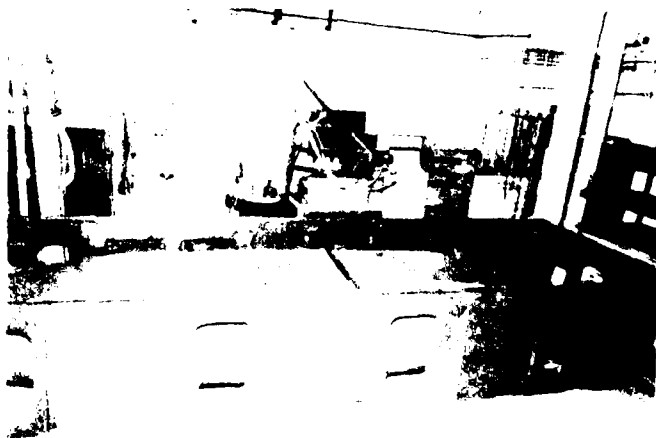


Figure 4. Container set up for cornerwise drop test.

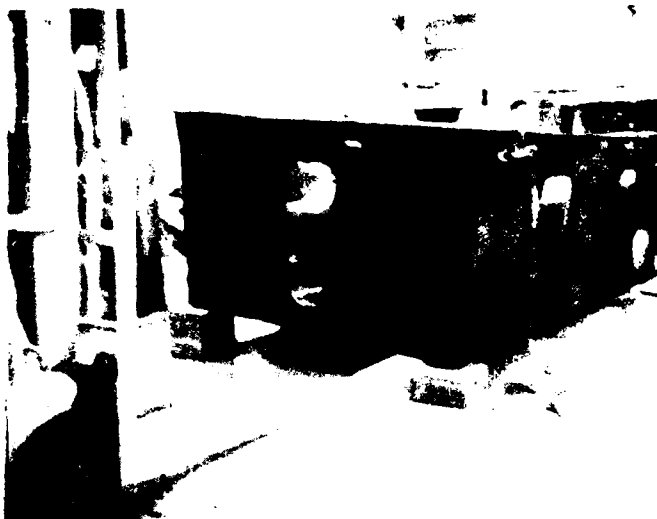


Figure 5. Quick Release Pin partially disengaged after edgewise drop.



Figure 6. Container S/N 002 on vibration table.

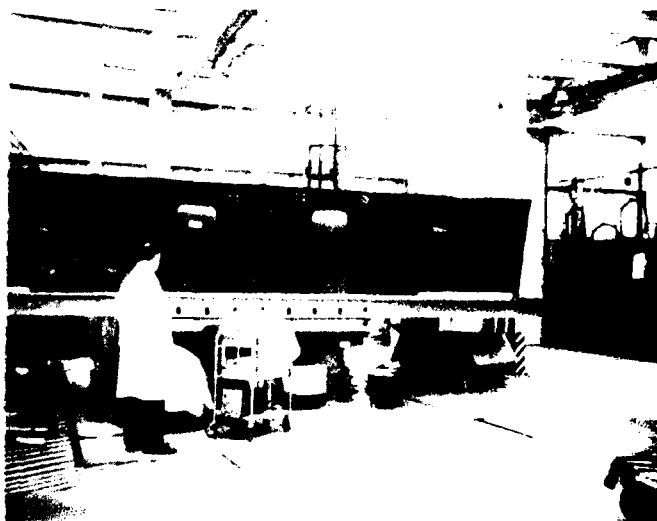


Figure 7. Containers S/N 001 and S/N 002 on vibration table, stacked two high.

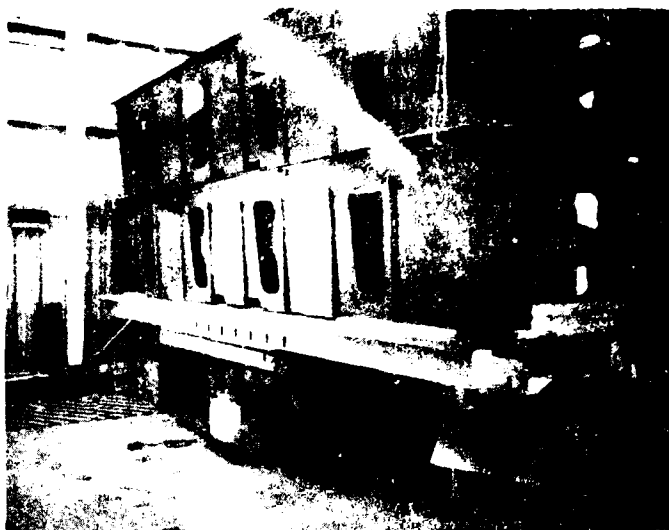


Figure 8. Container S/N 002. Deformation of restraint bar tabs after vibration test, stacked two high.

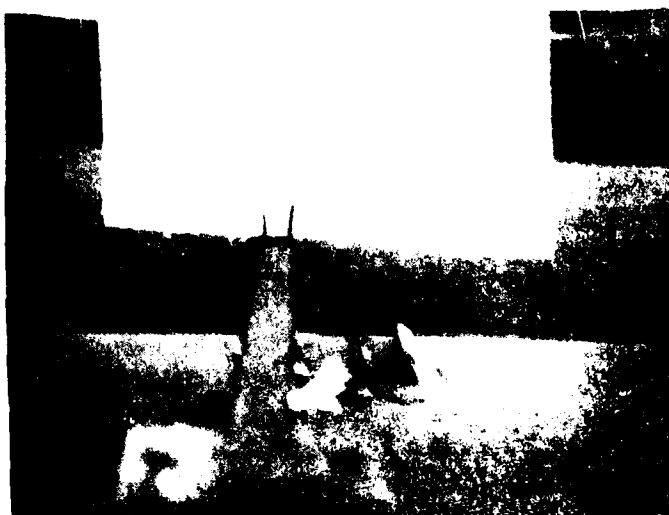


Figure 9. Container S/N 002. Wear on restraint bar tabs after vibration test, stacked two high.



Figure 10. Damage sustained by container S/N 002 during pendulum impact test.



Figure 11. Damage to container S/N 002 during pendulum impact test. Damage was minor but the nose of the fuel tank was dented.

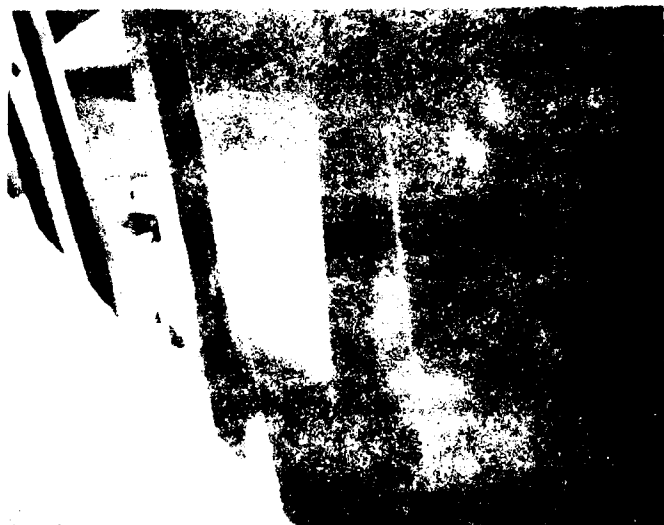


Figure 12. Container S/N 001 Deformation of restraint bar tabs after pendulum impact test.



Figure 13. Superimposed load test
front view.



Figure 14. Superimposed load test
side view.



Figure 15. Superimposed load test
view of stacking
boards.

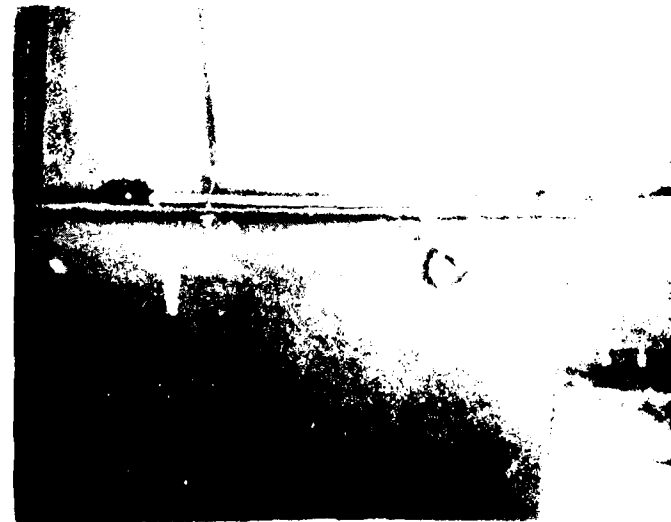


Figure 16. Container suspended by
lift ring, rear view.



Figure 17. Container suspended by
lift ring, front view.



Figure 18. Redesigned container
nested in container
design currently in
system.

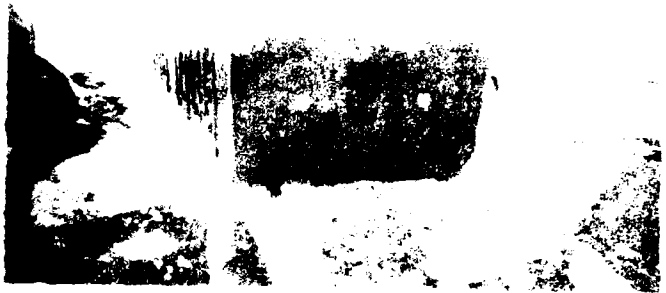


Figure 19. Redesigned container
stacked on container
currently in system.



Figure 20. Container cover
interface with
redesigned container.



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DEPARTMENT OF THE AIR FORCE
AIR FORCE WRIGHT AERONAUTICAL LABORATORIES (AFSC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

REPLY TO
ATTN OF: FIBT

10 January 1986

SUBJECT: Fuel Tank Shipping Container Tie-Down Test.

TO: AFLC/DSTZD (Ms Eileen Foley)

1. The F-15/F-4 600 gallon fuel tank Bi-Pac Container was static tested to verify that the tie-downs conformed to MIL-STD-648 and to MIL-A-8421-F.

2. MIL-STD-648, Paragraph 5.8.4, requires that the loading of shipping containers be at an angle of 45 degrees downward from the vertical and simultaneously 45 degrees outward from the container surface. The loading should be in accordance with MIL-A-8421F.

3. MIL-A-8421F, Paragraph 3.3.4, requires the equipment to withstand, without loss of serviceability, the following loads:

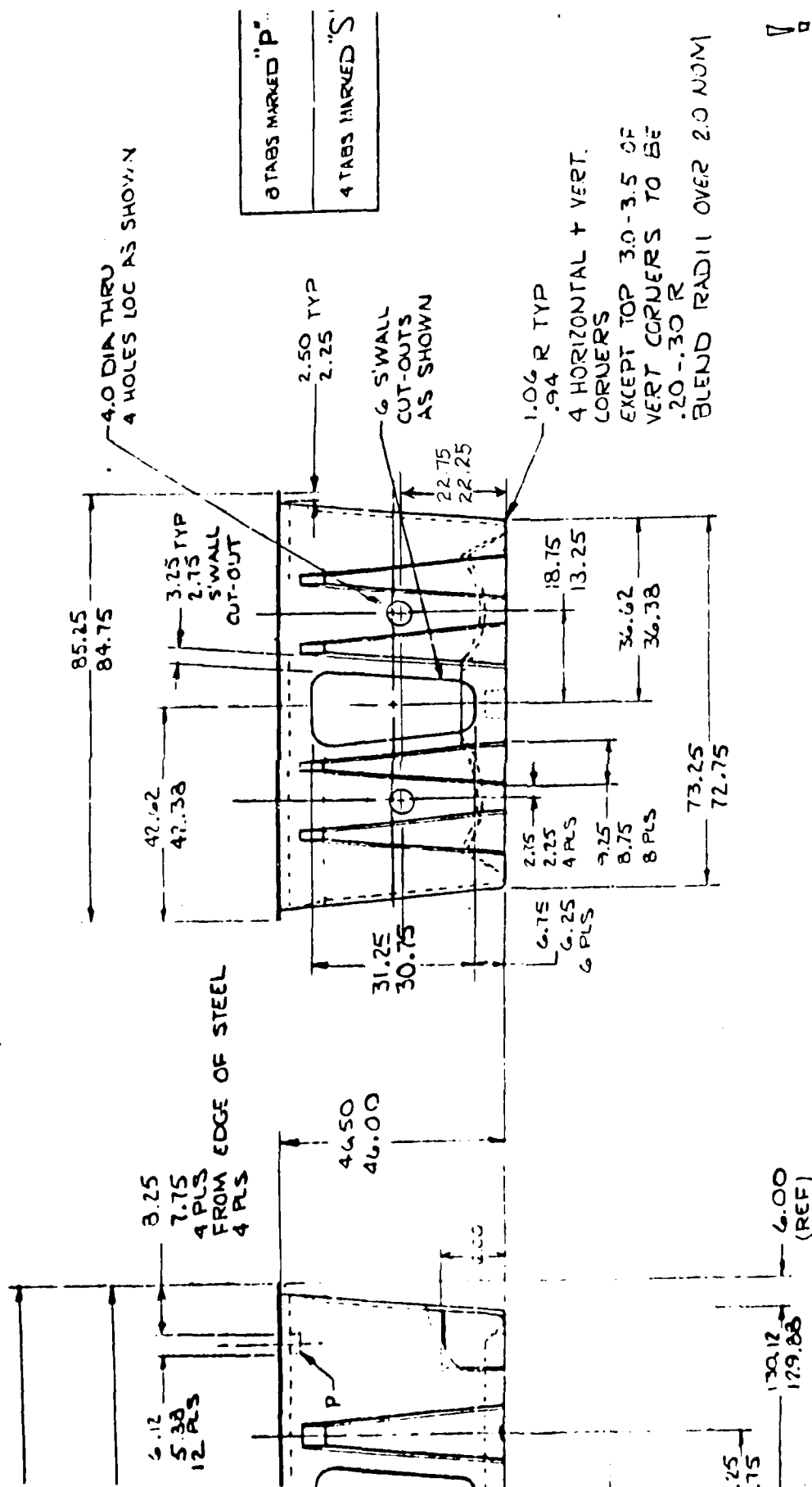
Fore-Aft	3g
Lateral	1 1/2g
Up	2g
Down	4 1/2g

4. The container was loaded to the above conditions simultaneously. A load of 4,200 pounds was applied, in accordance with MIL-STD-648. The 4,200 pounds loading resulted in a 3g fore-aft loading, a 3g lateral loading, and an 8.49g vertical downward loading. A separate vertical upward load was not applied, however, due to symmetry of the tie-downs, when the downward load was applied, the container would have withstood a 2g upward load. No loss of serviceability occurred.

5. The fuel tank shipping container met or exceeded all conditions required by MIL-A-8421F and was tested in accordance with MIL-STD-648. A test report will be distributed. If you have any further questions, please call Lt John V. Anselmo at 52318.

Sanford Lustig
SANFORD LUSTIG
Chief, Structures Test Branch
Structures and Dynamics Division

Atch 2



LOCATION OF HOLES IN CONTAINER ENDS

END

12-86

DTIC