AD-A134 578 QUALIFICATION TESTING CNU-263/E MAVERICK MISSILE CONTAINER(U) AIR FORCE PACKAGING EVALUATION AGENCY WRIGHT-PATTERSON AFB OH E J KOWALSKI SEP 83 1/

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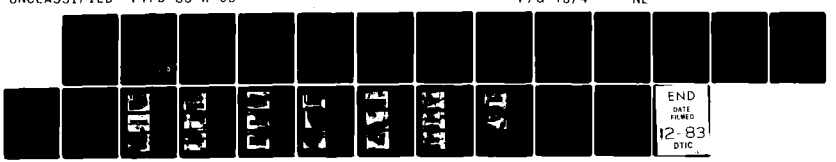

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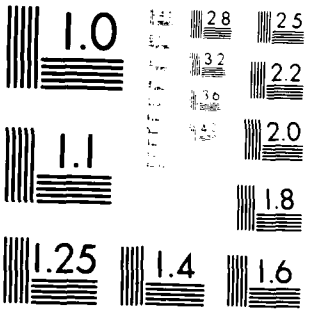

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PTPD Report No. 83-R-05
AFPEA Report No. 83-P7-132

EDWARD J. KOWALSKI

Mechanical Engineer
Design Division
HQ AFALD/PTPD

AUTOVON 787-3362
Commercial (513) 257-3362

QUALIFICATION TESTING

CNU-263/E MAVERICK MISSILE CONTAINER

HQ AFALD/PTP
AIR FORCE PACKAGING EVALUATION AGENCY
Wright-Patterson AFB OH 45433

September 1983

100

NOTICE

AFPEA PROJECT NO. 83-P7-132

TITLE: Qualification Testing CNU-263/E Maverick Missile Container

ABSTRACT

The Government of Switzerland is procuring AGM-65B Maverick Missiles from Hughes Aircraft thru the U.S. Government. The Maverick Missile containers CNU-263/E used for transporting/storage of the AGM-65B, will be fabricated by the Government of Switzerland.

The Air Force Packaging Evaluation Agency, WPAFB OH was requested by the Government of Switzerland to furnish services for qualification testing of a production prototype container.

Tests were conducted in accordance with Federal Test Method Standard No. 101, Military Standard-648, and Military Standard-810.

Results of all the tests are acceptable. The production type containers CNU-263/E will give adequate protection to the AGM-65B Maverick Missile during transportation/storage.

PREPARED BY:
EDWARD J. KOWALSKI, Mech Engr
Design Division
AF Packaging Evaluation Agency

REVIEWED BY:
RALPH LYNDA
Chief, Design Division
AF Packaging Evaluation Agency

PUBLICATION DATE:
02 SEP 1983

APPROVED BY:
JACK E. THOMPSON
Director, Air Force Packaging
Evaluation Agency

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INTRODUCTION

Background: The Government of Switzerland is procuring AGM-65B Maverick Missiles through the US Government, from Hughes Aircraft, Tucson, Arizona. Missile containers, CNU-263/E used for transporting and storage of the AGM-65E missile will be manufactured by the Government of Switzerland. The Air Force Packaging Evaluation Agency (AFPEA) was requested to furnish services for qualification testing of the prototype container.

Purpose: The purpose of this project was to determine if the prototype container CNU-263/E will protect its contents, the AGM-65B Maverick Missile, during transportation and storage.

Test Specimen: One CNU-263/E Maverick Missile container, serial number CH-001, fabricated from fiberglass materials (resin transfer molded) by Siegfried Peyer AG Switzerland CH-8832 Woolerau was furnished by the Government of Switzerland for testing.

Test Outline and Test Equipment

Tests were conducted in accordance with the AFPEA container test plan, project number 83-P7-132 Amend 1, dated 26 July 1983 (Table I). Test methods and procedures used were as outlined in Federal Test Method Standard No. 101, Military Standard-648, and Military Standard-810. Instrumentation and equipment used are annotated in each test procedure. The container shall limit transmission of shocks to the contents to a maximum of 40Gs resultant force.

Test Procedure and Results

Test No. 1: The container, as received, was visually inpsected. The exterior and interior surfaces, markings, hardware, cushioning, strapping, and container seal were inspected for material and manufacturing imperfections.

Results: Results of the visual inspection are annotated in Table II. Slight damage was noted to the gel-coat on one of the forklift pockets and no provision was noted for a security seal. Figure 1 illustrates overwrap of paper fiberboard and wooden skid removed from the container. Figure 2 illustrates packaging of the strapping assemblies and the restraint assembly as received from the fabricator. Workmanship of the container is rated as excellent.

Test No. 2: An AGM-65/E inert Maverick Missile was mounted in the CNU-263/E container (figure 3). The container T-bolts were torqued to 45 inch pounds and the container was tested for pressure and vacuum leaks. Pressure and vacuum tests were performed at 1.00 psig. The failure criteria for each test was 0.025 psig for a 30-minute period (figure 4).

Results: At the end of the 30-minute pressure/vacuum test period, the results were as follows:

Pneumatic Pressure Test - 0.0162 psig.
Vacuum Test - 0.0220 psig

The results of the tests are acceptable.

Test No. 3: Figure 5 illustrates the container placed on a L.A.B. Corporation, Skaneateles, NY, Vibration Test Machine (LNVH), Type 5000-96B, serial number 56801. The container was placed on, but not fastened to the platform. Restraining blocks were attached to the platform to prevent the container from moving off the platform. A clearance of approximately 1/2 inch in all directions was used on the restraint blocks to allow free movement of the container during the 1/2 hour test period. With the container in position, the platform was vibrated until the container raised from the platform (1/16 inch feeler clearance between bottom of container and platform) for a maximum platform acceleration of 1G. The test was instrumented with a tri-axial accelerometer and was conducted at the ambient temperature.

Results: A maximum of 3Gs was obtained during the 1/2 hour test period of the repetitive shock test. The results of the test are acceptable.

Test No. 4: This test was conducted with the same procedure as test No. 3, except a superimposed load of two additional containers were placed on top of the original test container. Figure 6 illustrates the strapping of the three containers also, the tie-down of the containers to the platform.

Results: A maximum of 3Gs was obtained during the 1/2 hour test period of the superimposed load repetitive shock test. The results of the test are acceptable.

Test No. 5: Figure 7 illustrates the container as placed on the platen of a high capacity (50,000 pound) Compression Tester, Testing Machine, Inc., Amityville, NY model No. 17-24-2. A 2199 pound compression load was applied to the test container for a period of one hour. The test was observed for deflection, permanent deformation, and structural failure of the container cover and base assembly. The test was conducted at the ambient temperature.

Results: Inspection during and after the test did not reveal any damage to the container. Results of the test are acceptable.

Test No. 6: Figures 8, 9, and 10 illustrate the mechanical handling tests conducted with a 4,000 pound capacity hard rubber tired electric operated forklift truck. The tests included a one high, two high, and a three high container transport. The container(s) were lifted clear and transported on the forklift truck forks across a hard pavement for a distance of 100 feet. Parallel pairs of 1x3 inch lumber were laid flatwise on the pavement across the path of the forklift truck. The container(s) were carefully observed for any damage during the travel and stopping operations. Figures 11 and 12 illustrates the towing test. A strap was attached to the towing rings and the container was towed first from the end position and then from the side position across a hard pavement for a distance of 100 feet. The container was observed during travel for any damage that may have occurred.

Results: From inspection, no visual damage was noted to the container during the mechanical handling or the towing tests. Results of the tests are acceptable.

Test No. 7: Figure 13 illustrates the hoisting/tie-down provisions test. A 2565 pound load was placed on the test container. The test container was raised off the floor and held in that position for one hour. A leak test was performed at the end of the hoisting/tie-down test.

Results: Inspection during and after the hoisting/tie-down test did not reveal any damage to the container. At the end of the 30 minute pressure/vacuum test period, the results of the leak test were as follows:

Pneumatic Pressure Test - 0.000 psig.
Vacuum Test ---------- 0.013 psig.

The results of the tests are acceptable.

Test No. 8: The conductive path test was performed by checking the DC OHM resistance from each terminating and breaking point from the missile skin to the external ground.

Results: The conductive path test measured 0.0068 DC OHM resistance. Results of the test are acceptable.

Test No. 9: Figure 14 illustrates the cover handle pull test. A calibrated scale was used to measure the 300 pound pull applied to the handles. The load was applied from several different angles to compensate for various methods of lifting the cover assembly.

Results: Visual inspection revealed no physical damage to the handles or cover of the test container. The results of the test are acceptable.

Test No. 10: An internal pressure of 1.50 psig was applied to the container for a test period of 15 minutes. The test container was tested for structural failure and permanent deformation of the lower and upper shells, and also for any structural failure around the handles and hoisting/tie-down rings.

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

Test No. 11: Figure 15 illustrates the test container in a test position in the rain/wind chamber. The test was conducted at simulated rainfall at a rate of 2 and 5 inches per hour and a horizontal wind velocity of 40 miles per hour. The test container was placed in the chamber at a 30 degree angle for a test period of 30 minutes. At the end of the 30 minute test period, the container was placed at a 330 degree angle for an additional test period of 30 minutes. At the end of the one hour test period, the container was removed from the chamber rotated 180 degrees, placed in the chamber and the test continued for an additional one hour period using the same test procedure. At the conclusion of the rain/wind exposure the test container was removed from the chamber, the moisture was removed from the exterior surface, and the container opened for inspection.

Results: Visual inspection revealed no water entry to the interior of the test container. The results of the test are acceptable.

Test No. 12: Figure 16 illustrates the cornerwise-drop (rotational) test. The height of drop on each of the four corners was at 20 inches. The drop height of 20 inches was based on the length dimension and not the weight of the test specimen. The test specimen was instrumented for the drop tests. One corner of the container was supported on a 12-inch block height. The opposite corner, same end, was supported on a 6-inch block height. The unsupported end

of the container was then raised so that the lower corner (6-inch support side) was at 20 inches from the floor. The electric quick release hook (L.A.B. Corporation, Skaneateles, NY, serial No. 5090208, 6,000 pound capacity) was energized and the test container allowed to fall on a concrete surface.

Results: Visual inspection of the test container revealed no damage. A maximum of 14.4Gs was obtained during the tests. The results of the tests are acceptable.

Test No. 13: Figures 17 and 18 illustrate the edgewise-drop (rotational) test. The height of drop on each of the four edges was at 20 inches. The drop height of 20 inches was based on the length dimension and not the weight of the test specimen. The test specimen was instrumented for the drop tests. The edge of the container was supported on a 6-inch block height. The unsupported edge was then raised so that the height was 20 inches from the floor. The electric quick release hook (L.A.B. Corporation, Skaneateles, NY, serial No. 5090208, 6,000 pound capacity) was energized and the test container allowed to fall on a concrete surface.

Results: Visual inspection of the test container revealed no damage. A maximum of 16.4Gs was obtained during the tests. The results of the tests are acceptable.

Test No. 14: Figures 19 and 20 illustrate the pendulum-impact test. The instrumented test container was placed on a platform and the end/side to be impacted was placed beyond the front end of the platform so that it could impact against a bumper. The platform was pulled back to a vertical drop height of 9 inches and released to swing freely so that the end/side of the container impacted against the bumper. A drop height of 9 inches results in a velocity of 7 feet per second at impact.

Results: Visual inspection of the test container revealed no damage. A maximum of 13.7Gs was obtained during the tests. The results of the tests are acceptable.

Test No. 15: Pressure and vacuum tests were performed on the test container. Pressure and vacuum tests were performed at 1.00 psig. The failure criteria for each test was - 0.035 psig for a 30-minute period (Figure 4).

Results: At the end of the 30-minute pressure/vacuum test period, the results were as follows:

Pneumatic Pressure Test - 0.000 psig.
Vacuum Test ---------- 0.022 psig.

The results of the tests are acceptable.

Conclusion: From the results obtained, the container CNU-763/E submitted by Siegfried Peyer AG Switzerland will give adequate protection to the AGM-65E Maverick Missile during shipment/storage. The resultant maximum 16.4Gs was below the limit of 40Gs. The lower and upper flanges and the gasket are a major improvement over the original design of the container. Craftsmanship is considered excellent.

Recommendations: The following are recommendations for use in the assembly/disassembly of the CNU-763/E Maverick Missile containers during the storage of AGM-65E Maverick Missiles:

1. CAUTION, when removing cover assembly, Dwg A-35204-2, S. Peyer LTD., CH, DO NOT place closure flange of cover assembly on floor. Turn cover assembly 180 degrees and place top of cover assembly on floor to prevent damage to flange surface, and also prevent accumulation of debris on the silicone compound (Figure 2).

2. CAUTION, prior to assembly of container, wipe cover and base assembly flanges with lint-free material to remove any contaminants that may have accumulated.

3. CAUTION, examine vulcanized joint of gasket, Dwg A-35210-2, S. Peyer LTD CH, joint shall have smooth surfaces for good sealing properties.

4. CAUTION, apply coating of G.E. silicone dielectric compound MIL-S-8660, GE Part No. G-624, NSN 6850-00-880-7616, prior to assembly of container.

5. CAUTION, torque T-bolts, Dwg 35218-2, S. Peyer LTD. CH, to 45 inch pounds. Container WILL NOT pressure/vacuum seal, if correct torque is not maintained.

TABLE I

AIR FORCE PACKAGING EVALUATION AGENCY
(Container Test Plan)

AFPEA PROJECT NUMBER: 83-P7-132 AMEND 1

CONTAINER SIZE (L X W X D)(INCHES) INTERIOR	EXTERIOR	WEIGHT (LBS) GROSS	ITEM	CUBE (CU. FT.)	QUANTITY	DATE
	[illegible] x 38" x 30"	[illegible]	460	54	1	26 Jul [illegible]

ITEM NAME: AGM-65B Maverick Missile

MANUFACTURER: Swiss

CONTAINER NAME: [illegible]

CONTAINER COST: N/A

PACK DESCRIPTION: Fiberglass construction

CONDITIONING: As noted in test plan

TEST NO.	REF STD SPEC AND TEST METHOD OR PROCEDURE NOs	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION

[illegible] a dummy load shall be [illegible] weight, mass, center of gravity, [illegible] load, shall be in [illegible] be used, in all the test [illegible] specified herein, and it shall be [illegible] additional ones are required for stacking/[illegible] The [illegible] container(s) shall be assembled, [illegible] for all test, except where specific modification [illegible] weight simulated configured [illegible] be [illegible] except where specified. The sequence [illegible] be in accordance with the approved test plan as shown below. [illegible] , paragraph 3.2.6 of General [illegible] consist of tri-axial accelerometers [illegible] a location corresponding to the item center-of-gravity with axes [illegible] , and transverse [illegible] , shall be banded together as in a stacking configuration. The bands shall pass through the forklift pocket of the pallet/container.

COMMENTS

PREPARED BY: [signature] EDWARD T. COMAS, [illegible] Engr, AFPEA

APPROVED BY: [signature] RALPH LYNDA, Chief, Design Division, AFPEA

AFALD [illegible] 4

TABLE I

AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan)					AFPEA PROJECT NUMBER 83-P7-132 AMEND 1	
CONTAINER SIZE (L X W X D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE 26 Jul 83
ITEM NAME: AGM-65B Maverick Missile		MANUFACTURER:				
CONTAINER NAME: CNU-263/E		CONTAINER COST:				
PACK DESCRIPTION: Fiberglass construction						
CONDITIONING:						

TEST NO.	REF STD SPEC AND TEST METHOD OR PROCEDURE NO's	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
1.		Visual inspection before start of test.		
2.	Fed-Std-101 Method 5009.1	Leaks in Containers. Relief valve replaced with a pressure tight valve. Pneumatic. Pressure Test - 1.0 psig Vacuum Pressure - 1.0 psig Failure Criteria Test - 0.025 psig in 30 minutes	As required	er anometer
3.	Mil-Std-648 Sec. 5.2.2 and Fed-Std-101 Sec. 5019.1	Vibration (Repetitive Shock) Test. 3 to 5 Hz or 1G whichever is less for not less than 1/2 hr.		Tri-axial Accelerometer
4.	Mil-Std-648 Sec. 5.2.2.1	Vibration (Repetitive Shock) Test with Superimposed Load. May use untested container 1/2 hr.	Superimposed load equal to three like containers high, rigidly attached to exciter	Tri-axial Accelerometer
5.	Fed-Std-101 Method 5016.1 Mil-Std-648 Sec. 5.7.2	Superimposed-Load Test (Stackability with dunnage). Load on bottom container shall be limited to three loaded containers for a safety factor of 2. Test for 1 hr.	On a flat rigid floor	Yes
6.	Fed-Std-101 Method 5011.1 Sec. 6.2 & 6.6	Mechanical Handling Test. Sec. 6.2 - Forklift Handling Test. Lift container(s) off ground with tines, then carry	One high and one wide then repeat, two high and one wide then repeat,	N/A

COMMENTS:

PREPARED BY	APPROVED BY:
EDWARD J. KOWALSKI, Mech Engr, AFPEA	RALPH ZYNDA, Chief, Design Division, AFPEA

AIR FORCE PACKAGING EVALUATION AGENCY

(Container Test Plan)

AFPEA PROJECT NUMBER

CONTAINER SIZE (L X W X D)(INCHES) INTERIOR	EXTERIOR	WEIGHT (LBS) GROSS	ITEM	CUBE (CU FT.)	QUANTITY	DATE

ITEM NAME

MANUFACTURER

CONTAINER NAME

CONTAINER COST

PACK DESCRIPTION

CONDITIONING

TEST NO	REF STD SPEC AND TEST METHOD OR PROCEDURE NOs	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
				Ohmmeter

COMMENTS

PREPARED BY	APPROVED BY
[illegible] POWALSKI, Mech Engr, AFPEA	RALPH SYNDA, Chief, Design Division, AFPEA

AFALD [illegible] 4

TABLE I

AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan)					AFPEA PROJECT NUMBER 83-P7-132 AMEND 1	
CONTAINER SIZE (L X W X D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS.	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE 26 Jul 83
ITEM NAME: AGM-65B Maverick Missile				MANUFACTURER:		
CONTAINER NAME: CNU-263/E				CONTAINER COST:		
PACK DESCRIPTION: Fiberglass construction						
CONDITIONING:						

TEST NO.	REF STD SPEC AND TEST METHOD OR PROCEDURE NO's	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRU-MENTATION
8. (CONT'D)		point from the missile skin to an external ground.		
9.		Cover Handle Pull Test 300 lb. Pull in every direction that service loads are possible.		N/A
10.	Mil-Std-648 Sec 5.6.2	Pressure Test 1.5 psig		Water Manometer
11.	Mil-Std-810 Method 506.1, Procedure I	Rain with Wind Source. Total test duration of not less than 2 hours.	As required	N/A
12.	Fed-Std-101 Method 5005.1	Cornerwise-Drop (Rotational) Test from 20" height.	One drop on each corner (total 4 drops)	Tri-axial Accelerometer
13.	Fed-Std-101 Method 5008.1	Edgwise-Drop (Rotational) Test from 20" height.	One drop on each edge (total 4 drops)	Tri-axial Accelerometer
14.	Fed-Std-101 Method 5012	Pendulum-Impact Test (7 ft/sec) from 9" height.	One impact to each side & each end (total 4 impacts)	N/A
15.		Perform test #2 Pneumatic Leak Test after test #14.		

COMMENTS:

PREPARED BY:	APPROVED BY:
EDWARD J. KOWALSKI, Mech Engr, AFPEA	RALPH ZYNDA, Chief, Design Division, AFPEA

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TABLE II

Visual Inspection
CNU-263/E Container - AGM-65B Maverick Missile

Requirement	Accept	Reject	Remarks
Weight 264 pounds	X		
Base Section/Cover Section	X		
Forklift Pockets	X		Gel-coat slight damage, side of pocket
Stacking Interface	X		
Hoisting/Tie-Down Provisions	X		
Desiccant Port	X		
Humidity Indicator	X		
Pressure Equalizing Valve	X		
Electrical Grounding Connector	X		
Records Receptacle	X		
Security Seal			No security seal
Weldments	X		
Identification/Markings	X		
Human Performance	X		
Closure Hardware	X		
Container Seal	X		
Cushioning	X		
Strapping	X		
Workmanship	X		Excellent

Figure 1. CNU-263/E Maverick Missile Container, Serial No. CH-001 fabricated by S. Peyer LTD. CH.

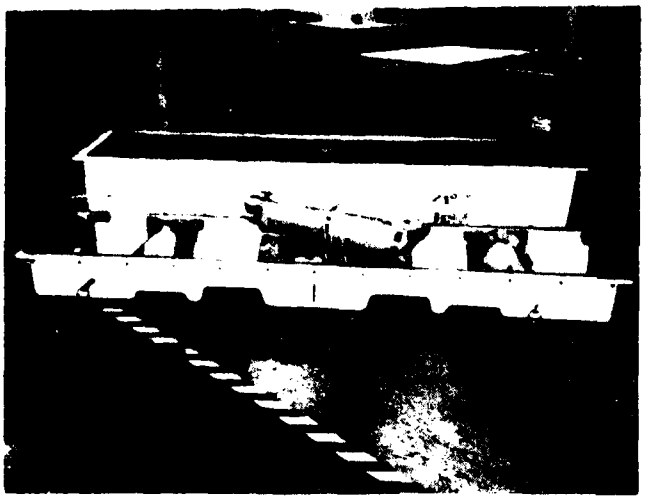

Figure 2. Figure illustrates packaging of strapping and restraint assemblies.

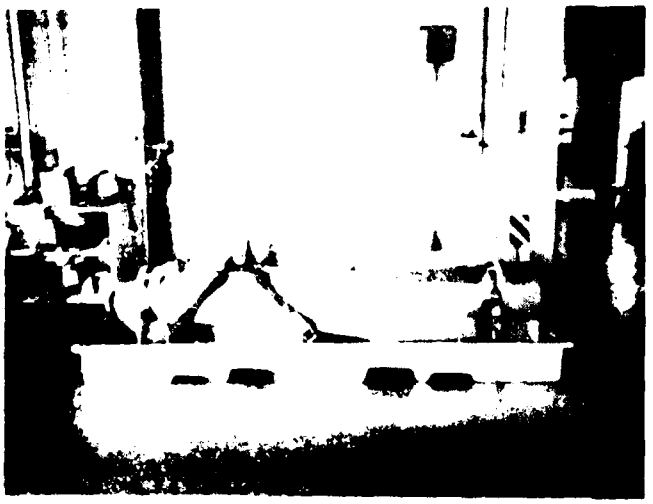

Figure 3. AGM-65E inert Maverick Missile assembled for container testing.

Figure 4. Pressure/vacuum container leak test.

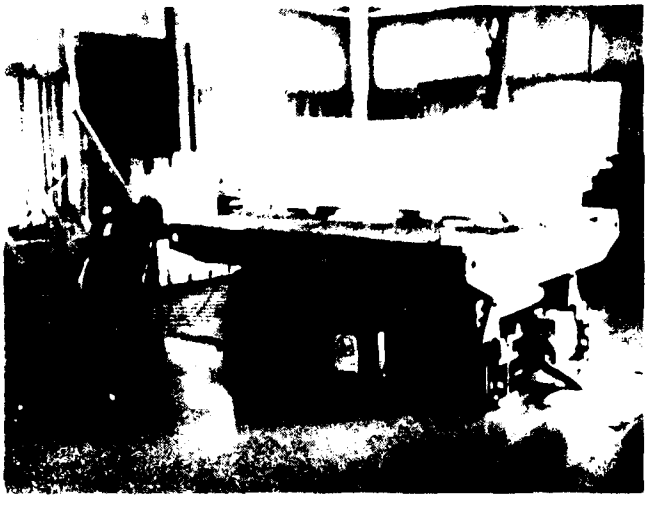

Figure 5. Vibration (repetitive shock) test.

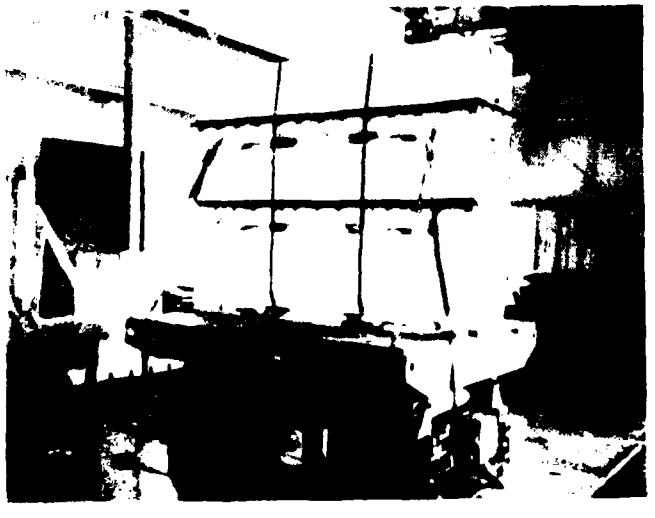

Figure 6. Vibration (repetitive shock) test with superimposed load.

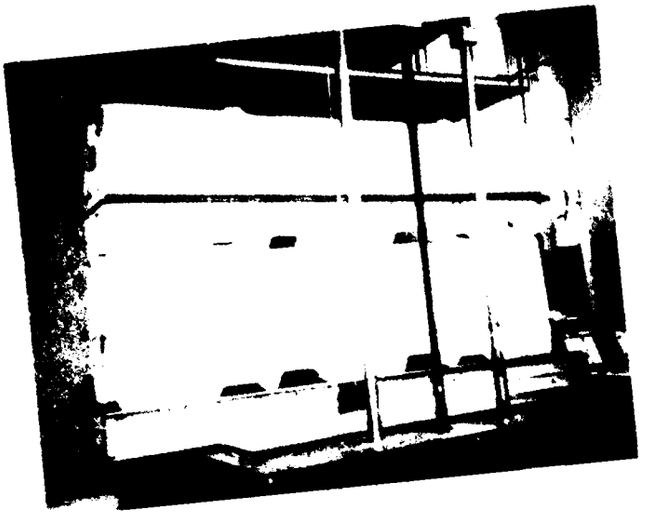

Figure 7. Superimposed-Load test.

Figure 8. Forklift handling test.

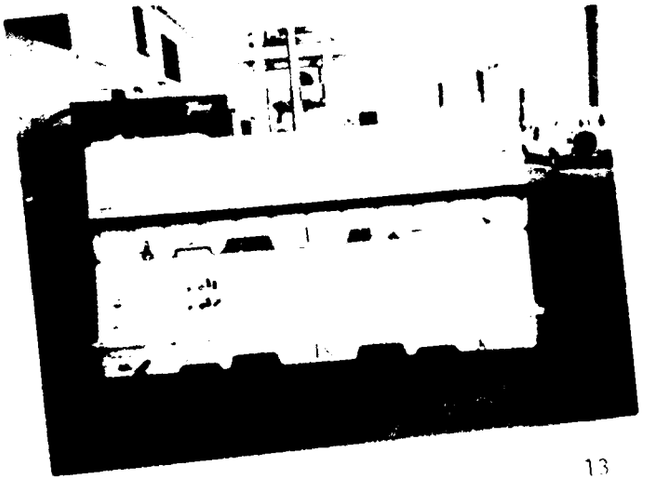

Figure 9. Forklift handling test.

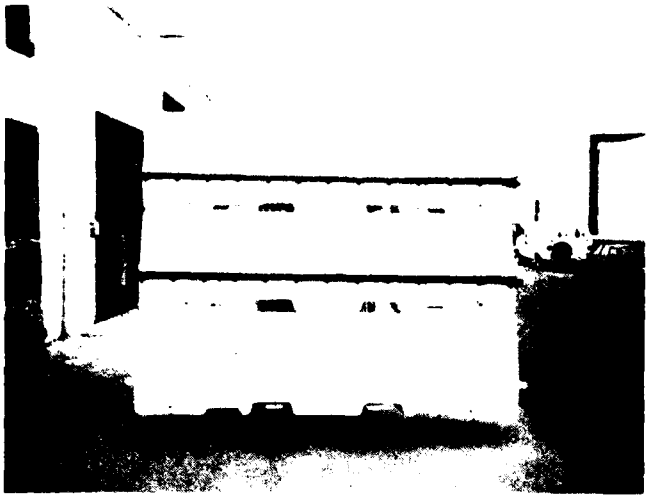

Figure 10. Forklift handling test.

Figure 11. Towing ring test from end position.

Figure 12. Towing ring test from side position.

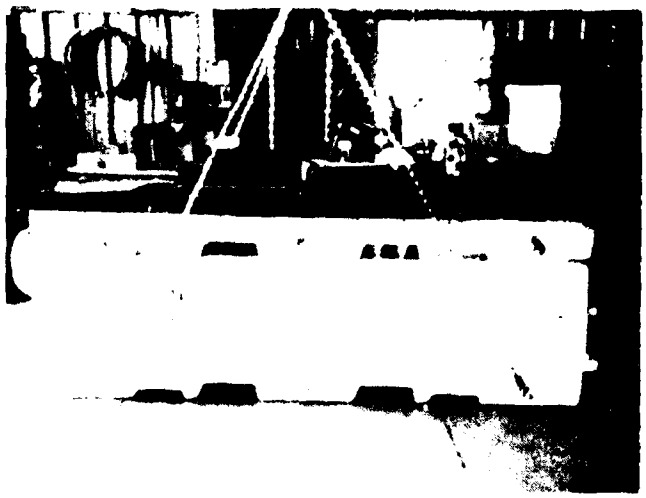

Figure 13. Hoisting/tie-down provisions test.

Figure 14. Cover handle pull test.

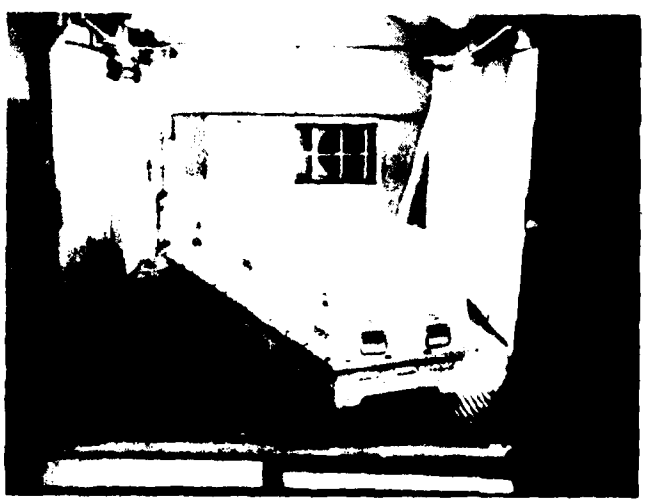

Figure 15. Rain/wind test.

Figure 16. Cornerwise-drop (rotational) test, container end.

Figure 17. Edgewise-drop (rotational) test, container end.

Figure 18. Edgewise-drop (rotational) test, container side.

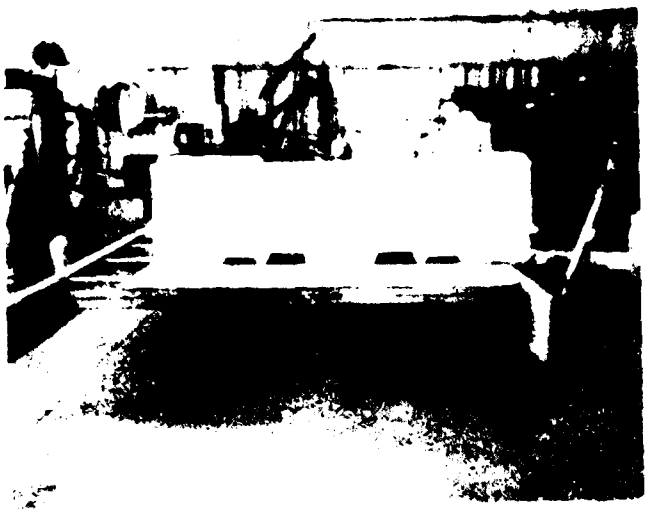

Figure 19. Pendulum-impact test, container end.

Figure 20. Pendulum-impact test, container side.

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