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AD

16 USATECOM PROJECT NO. 7-7-0862-02  
7-7-0862-02

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9 FINAL LETTER REPORT.

6 TROPIC SERVICE TEST OF REDESIGNED CAP FOR CONTAINER, WATER, PLASTIC, 5-GALLON.

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U S ARMY  
GENERAL EQUIPMENT TEST ACTIVITY  
FORT LEE, VIRGINIA

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DEPARTMENT OF THE ARMY  
UNITED STATES ARMY TROPIC TEST CENTER  
FORT CLAYTON, CANAL ZONE

IN REPLY REFER TO:

STETC-TE-CE

10 APR 1968

SUBJECT: Letter Report, Tropic Service Test of Redesigned Cap for Container, Water, Plastic, 5-Gallon, RDT&E Project No. Unknown, USATECOM Project No. 7-7-0862-02

Commanding Officer  
US Army General Equipment Test Activity  
ATTN: STEGE-ST-F  
Fort Lee, Virginia 23801

1. REFERENCES

- a. Test Plan, Integrated Engineering and Service Test of Container, Water, Plastic, 5-Gallon, USATECOM Project No. 7-7-0862-01/02/03/04/05, US Army General Equipment Test Activity, Fort Lee, Virginia, April 1967.
- b. Letter, AMSTE-GE, HQ USATECOM, dated 26 May 1967, subject: Test Directive (Amendment), Integrated Engineering/Service Test of Container, Water, Plastic, 5-Gallon, USATECOM Project No. 7-7-0862-01/02/03/04/05.
- c. Letter, STEGE-ST-F, US Army General Equipment Test Activity, dated 7 September 1967, subject: Amendment to Plan of Test of Integrated Engineering and Service Test of Container, Water, Plastic, 5-Gallon, USATECOM Project No. 7-7-0862-01/02/03/04/05.

2. BACKGROUND

- a. US Army Tropic Test Center was directed to conduct a tropic service test of the redesigned cap for Container, Water, Plastic, 5-Gallon, on 6 June 1967 (Reference 1b). The test was conducted from 5 July 1967 to 5 November 1967.
- b. During testing of the Container, Water, Plastic, 5-Gallon, it was found that it did not meet the Military Characteristic, which states the container shall incorporate a means to fill canteens without waste of water. To overcome this situation the cap was redesigned.

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c. The redesigned cap is made of a material which contains two (2) percent (%) carbon black; it incorporates a small molded-in and capped opening; and an air vent to prevent air locking and surging when pouring into canteens. See Figure 2, Inc 3.

d. A test sample of eighty-five ~~475~~ 5-gallon plastic water containers with redesigned caps (~~see Figure 1, Inc 2~~) were service tested in the humid tropic environment of the Canal Zone and the Rio Hato Training Area in the Republic of Panama for a period of four ~~(4)~~ months. Apportionment of experimental items is tabulated below:

<u>GROUP</u>	<u>NO.</u>	<u>USE</u>
A	10	Storage only
B	15	Storage (Max) and Transportation (Min)
C	60	Storage (Min) and Troop Use (Max)

e. The cap on the standard 5-gallon, steel, water container was used as a control item during all phases of the service test. The performance of the test item was compared with that of the control item.

### 3. OBJECTIVES

a. "To determine if the redesigned cap satisfies the requirement to fill canteen without waste of water." (Reference 1b).

b. "To determine if the redesigned cap has any adverse effect from the standpoint of overall test objectives." (Reference 1b).

### 4. SUMMARY OF RESULTS

#### a. Initial Inspection and Pre-Operational Check.

The test items were inspected for shipping damage and construction defects. The redesigned caps were placed on the container. The containers were filled with water and inverted for twenty-four (24) hours to check for leakage.

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(1) Results:

(a) Of 85 test containers, seventeen had test caps that leaked around the vent cap screw.

(b) On all test items, locking device was not aligned with latch stud in a secure position (approximately 250 degrees misaligned in a clockwise direction).

(c) Inside diameter of all cap retainer rings were too large allowing excessive play and insufficient tension on lock lug.

(2) Analysis

(a) Air vent cap retaining pin is too flexible. This caused slight leakage. However, leakage at the air vent cap screw was minimal and occurred when container was inverted. Leakage due to air vent cap retaining pin is classified as a shortcoming. (See Incl 5).

(b) The excessive clearance between the retaining ring and pouring neck and rotated locking ring was not classified as a shortcoming or deficiency. The threads of the screw on cap were sufficient to hold test item in place and caused no adverse effect, even though the locking device could not be used.

b. Storage

Group A (see paragraph 2d) and 10 standard items were placed in an uncovered storage area. All containers were inspected monthly for deterioration and biotic attack.

(1) Results:

(a) No adverse effects of atmosphere and/or biotic attack were noted on the test items. Rust, corrosion, and fading were observed on the standard caps and containers after thirty days of storage. In addition, the gaskets pulled loose from the top of the standard containers and were unserviceable due to deterioration. No deterioration due to the tropical environment, such as mildew, rot, or color fading was observed on the test items.

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(b) No shrinkage or expansion of either the test item or standard item was observed.

(c) It was virtually impossible to stack the plastic container whether full or empty with the redesigned cap in a stable vertical stack. This was due to the container itself and not the redesigned cap. However, they can be stacked very easily in horizontal stacks. The standard container was easily stacked both horizontally and vertically.

(d) Slight leakage occurred in all the horizontally stacked test items. Reason for leakage explained in paragraph 4a(2)(a). No leakage observed in standard items.

(2) Analysis:

(a) The test items were superior to the standard items in resisting deteriorating effects of the tropic environment.

(b) The test items are not as stackable as the standard items.

c. Operational Suitability

Test items in Group C (see paragraph 2d) were issued to units of the US Army Forces Southern Command for use during tactical exercises.

(1) Results:

(a) The standard containers were easier to fill because the closure stayed in place when opened. Also, due to the closeness or crowded condition in the transportation pattern (upright), the standard containers were easier and more convenient to open.

(b) The plastic containers w/redesigned caps were more difficult to fill because the cap would not stay in place after being opened. In addition, more hand space is required when opening and closing the test item due to the screw on and screw off closure.

(c) The plastic container with redesigned cap was preferred by test personnel over the standard container for pouring water into a canteen or a canteen cup without waste.

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(2) Analysis:

(a) The test items were preferred by test participants for pouring water without waste into canteens. (See paragraph 3a).

(b) The standard items are more suitable for filling of the five gallon containers.

d. Durability

Seventy-five (75) test items and 75 control items were subjected to normal handling and usage under field conditions during operational suitability subtest. Prior and subsequent to each use, the test items were inspected for (1) seam leaks, (2) incapacitating dents or distortions, and (3) fading. Data reflecting durability was supplemented by results of storage inspections.

(1) Results:

(a) No failures such as splits or breaks occurred on the seams of the redesigned cap.

(b) Twelve air vent cap retaining pins fell out of the vent cap screw. See Figure 2, Incl 3.

(c) No tears or cuts occurred on the redesigned cap during the test period.

(d) All standard containers were corroded and faded after thirty (30) days of testing. All the gaskets on the standard items deteriorated during the test period.

(e) All standard items required painting after completion of test.

(f) Thirteen (13) redesigned caps leaked around the vent cap cover and, on several occasions the vent cap cover was torn from the vent cap screw.

(2) Analysis:

Except for the vent cap and air vent retaining pins the test items were superior to the standard items.

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5. CONCLUSIONS

Except for the air vent retaining pin the redesigned cap was superior to the standard cap with respect to storage characteristics, durability, reliability, maintainability, and operational suitability.

6. RECOMMENDATION

That the redesigned cap for the Container, Water, Plastic, 5-Gallon be considered suitable for US Army use when the shortcoming stated in Incl 5 is corrected.

FOR THE COMMANDER:

  
**DONALD K. HARDEN**  
**CPT, USA**  
**Admin Officer**

6 Incl

1. Solar Radiation Chart
2. Fig 1
3. Fig 2
4. Daily Rainfall
5. Deficiencies & Shortcomings
6. Maint Eval

Copy furnished:  
CG, USATECOM  
ATTN: AMSTE-GE

SOLAR RADIATION CHART

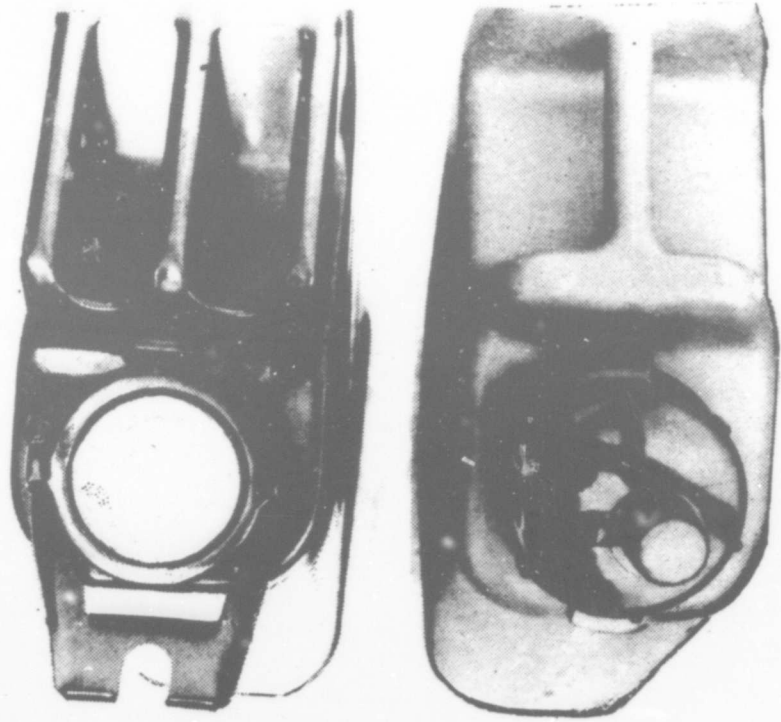
Station: Panama Canal Zone  
Site: Gun Hill

Solar Radiation in Langley (measured with Vertical Eppley)

DAILY TOTAL

MONTH	MEAN	MAX	MIN
Jul 67	353	589	177
Aug 67	323	514	115
Sep 67	363	562	168

Solar Radiation data for the months of October thru 4  
November 1967 are not available.



TOP-VIEW

Figure 1. Cap-Standard 5-Gallon  
Steel Water Can.

Container Water, Plastic,  
5-Gallon w/redesigned cap.



Figure 2. Air Vent Cap retaining pin detached from the vent cap and vent cap stud.



DEFICIENCIES AND SHORTCOMINGS

1. DEFICIENCIES

<u>Deficiency</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
None	N/A	N/A

2. SHORTCOMINGS

<u>Shortcoming</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
The vent cap pin is too flexible.	N/A	NONE

### MAINTENANCE EVALUATION

There are no maintenance requirements for the plastic container other than those associated with the normal cleaning procedure of food service equipment. No rust, corrosion or chipping of paint existed nor was gasket replacement needed as on the steel container.