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AUTHORITY

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DEPARTMENT OF THE ARMY
ARMY CONCEPT TEAM IN VIETNAM
APO San Francisco 96384

AVIB-CG

15 January 1968

SUBJECT: Final Report - Evaluation of Fire Retardant Flight Gloves
(NOMEX) (ACA-63/67I)

TO: Commanding General
United States Army Vietnam
ATTN: AVHGC-DST
APO 96375

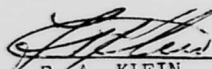
1. Reference: Letter, AVHGC-DH, Headquarters, US Army Vietnam, dated 23 February 1967, subject: Letter of Instruction.

2. In accordance with the provisions of reference 1 above, the attached final report is forwarded for review and transmittal to Department of the Army.

3. Request that a copy of the USARV and CINCUSARPAC forwarding indorsements be furnished Commanding Officer, ACTIV.

FOR THE COMMANDER:

1 Incl
as


F. A. KLEIN
CPT, AGC
Adjutant

FEB 12 1968

AVHGC-DST (15 Jan 68) 1st Ind
SUBJECT: Final Report - Evaluation of Fire Retardant Flight Gloves
(NOMEX) (ACA-63/67I)

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96375 30 JAN 1968

TO: Commander in Chief, United States Army, APO 96558

1. This headquarters concurs with the findings, conclusions, and recommendations contained in the attached report, except for the recommendations in para 8b, c and d.

a. There is an urgent need in RVN for the NOMEX (tested) gloves. Operational quantities should be provided as soon as possible.

b. Addition of the double layer of leather in the area of the thumb and forefinger may preclude an adequate sense of touch desired for helicopter pilots. If not properly applied the second layer may make the gloves uncomfortable and reduce the suitability and acceptability. The modified gloves should be tested prior to procurement in operational quantities.

c. After modification and testing in CONUS to determine the suitability and acceptability, the Fire Retardant Gloves should be considered for Army-wide use, if appropriate.

d. A basis of issue of two pairs of gloves per aviator is undesirable. Authority to stock the items at unit level should provide for timely distribution and reduce the quantity of items in the supply system.

2. Recommend that: a. The NOMEX Flight Gloves tested be procured for immediate issue on the basis of one per aviator and crewman in accordance with established supply directives.

b. Human engineering tests be conducted to determine a suitable modification to preclude excessive wear.

c. The modified Fire Retardant Gloves be considered for Army-wide use.

FOR THE COMMANDER:

1 Incl
as


JOHN V. GETCHELL
Captain, AGC
Assistant Adjutant General

DEPARTMENT OF THE ARMY
ARMY CONCEPT TEAM IN VIETNAM
APO San Francisco 96384

AVIB-AAD

15 January 1968

SUBJECT: Final Report - Evaluation of Fire Retardant Flight Gloves
(NOMEX) (ACA-63/671)

TO: Commanding General
United States Army Vietnam
ATTN: AVHGC-DST
APO 96375

1. REFERENCES

- a. Letter, AVIB-AAD/SS, Army Concept Team In Vietnam, 25 April 1967, subject: Recommendation for Flight Gloves, Fire Retardant (ENSURE).
- b. Message, USARV, unclas AVHGC-DST 38095, 5 June 1967, subject: Flight Gloves, Fire Retardant (ENSURE).
- c. Message, ACSFOR, unclas DA 819278, 14 June 1967, subject: Flight Gloves (ENSURE).
- d. Letter, XRE-CUC, US Army Natick Laboratories, 7 July 1967, subject: Gloves, Flying, Type GS/FRP-1.

2. PURPOSE

The purpose of this project was to determine user acceptance, ruggedness, comfort, and utility of the Navy NOMEX-backed fire retardant flight gloves in the Republic of Vietnam environment.

3. BACKGROUND

- a. Fire retardant flight gloves are required to protect Army aviators and flying crewmembers from flash fires. These gloves must protect the hands from burns, yet must be comfortable, not cause excessive perspiration, not hinder the sense of feel, and permit easy finger manipulation. A glove of this type was recently procured for Navy and Marine aviators under Navy Contract N-156-48249.

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(NOMEX) (ACA-63/67I)

b. An ACTIV recommendation for procurement of fire retardant flight gloves for Army aviators and flying crewmembers within Vietnam was submitted to USARV, ATTN: AVHGC, on 25 April 1967. In response, HQ USARV submitted an ENSURE requirement to Department of the Army on 5 June 1967. Three hundred pairs of the gloves were requested for evaluation by ACTIV. The message recommended that USAMC initiate action to determine the fire retardant qualities of the glove and that ACTIV be provided 300 pairs with which to determine ruggedness, comfort, and utility within the Vietnam environment.

4. OBJECTIVES

a. Objective 1 - User Acceptance

Determine whether aviators and crewmembers would accept and wear the flight gloves if available for issue.

b. Objective 2 - Ruggedness

Determine whether durability of the gloves is equal to or better than that of the present leather glove.

c. Objective 3 & 4 - Comfort and Utility

Determine whether the gloves are comfortable to the wearer, permit free finger manipulation and transmit adequate touch and control feel to the wearer.

d. Objective 5 - Recommendations

Provide recommendations concerning the desirability of future procurement and basis of issue.

5. DISCUSSION

a. Description of Materiel

The Navy NOMEX-backed flight gloves are constructed of a stretchable fire resistant polyamide fabric back and a soft cabretta leather palm. The fire resistant backing is provided in lieu of leather to increase protection against burns. The correct nomenclature will be Gloves, Flying, Summer, Type GS/FRP-1, with gray palm and NOMEX back.

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b. Evaluation Setting

(1) Environment

The evaluation was conducted by units stationed in the I, II, III, and IV Corps areas to provide a cross-section of conditions prevailing throughout Vietnam.

(2) Units

A minimum of four units, designated by HQ USARV, were utilized to complete the evaluation.

c. Methodology

(1) Distribution

The gloves were distributed proportionally among evaluating units and to selected personnel within ACTIV and the USARV Aviation Safety Office.

(2) Data Collection Methods

Data were collected by means of questionnaires, interviews, and evaluator observations.

(3) Analysis Methods

(a) A qualitative analysis was made of the information gained from 164 questionnaires, and from interviews, qualified opinion, and evaluator observations to determine if the gloves could withstand wear under field conditions and if the gloves were acceptable to the wearer. The percentages used in this report are based on the sampling provided by 164 questionnaires.

(b) A quantitative analysis was made of numerical data extracted from the questionnaires to ascertain how well the gloves withstood wear under field usage and the degree of comfort and utility afforded by the design, the fit, and the type of materiel.

d. Objective 1 - Acceptance

Ninety-two percent of the aviators and crewmembers (users) preferred the evaluated gloves over the present leather gloves and 99 percent would wear them in preference to the present leather gloves if procured and issued in Vietnam.

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e. Objective 2 - Durability

The gloves were worn on all types of missions and all types of Army aircraft in RVN. Ninety-six percent of the aviators and crewmembers stated that the gloves retained their shape and strength. Thirteen gloves were ripped or torn during the evaluation period. Launderability was considered an asset by those aviators who had washed their gloves. Overall opinion was that the NOMEX gloves were more durable, or at least as durable, when compared with the leather gloves.

f. Objective 3 - Comfort

(1) The evaluation gloves were furnished in sizes 7 through 11 and were issued to each user in the size nearest as possible to his normal size. Seventy-five percent of the aviators stated that the gloves fit well and conformed to the standard Army sizes. Ninety-four percent stated there was negligible or no irritation, itching, or scratching of the skin by the fabric. Sixty percent indicated there was less perspiration of the hands wearing the NOMEX gloves as compared with the issue leather gloves.

(2) After protracted wearing, absorption of sweat and in some instances laundering, 10 percent indicated that comfort was about the same, while 87 percent thought they were more comfortable than the issue gloves after comparable usage.

(3) The overall opinion of "comfortable" or "very comfortable" after sustained day to day operation, was supported by all the users.

g. Objective 4 - Utility

(1) Manipulation of the fingers was rated as very free by 90 percent of the users.

(2) Touch and control was rated as adequate by all but one of the users. Only 5 percent indicated that the gloves interfered with operation of the aircraft, i.e. manipulation of switches, knobs, and safety or parachute harness buckles.

h. Recapitulation (Favorable consideration)

- (1) Acceptance - 92 percent
- (2) Durability - 96 percent
- (3) Comfort - 100 percent
- (4) Utility - 90 percent

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6. FINDINGS

a. The gloves were as desirable as the present leather gloves, and the gloves were acceptable and preferred by 92 percent of the users.

b. They were equally as comfortable as the existing leather gloves.

c. They offered easier finger manipulation than the leather gloves.

d. Quality control could be improved: 6 pairs of gloves out of 300 were found to be cut and sewn improperly.

e. The leather portion between the thumb and forefinger wore out faster than the other parts after protracted use by helicopter pilots.

7. CONCLUSIONS

It is concluded that the gloves are equally as durable, comfortable, offer easier finger manipulation, and are not only acceptable but preferred over the leather gloves.

8. RECOMMENDATIONS

a. USARV take action to procure and issue the NOMEX flight gloves to air crewmembers in RVN.

b. These gloves be considered for use Army-wide by all aircraft crewmembers.

c. A double layer of leather be used on both left and right gloves in the area of the thumb and forefinger up to the first joint to compensate for wear, and that double stitching be used to sew the leather to the NOMEX material.

d. Basis of issue in RVN be two pairs per aviator and one pair per other air crewmember.

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13. ABSTRACT			
<p>This evaluation was conducted because of a requirement to afford protection to the hands of air crewmen who may become exposed to flash fires while in performance of their aircrew duties.</p> <p>Three hundred pairs of flight gloves composed of a combination of "NOMEX" material and Cabretta leather presently in use by the US Navy were selected. They were distributed on 21 August 1967 among a variety of units throughout Vietnam and used by aircrew members under various conditions and climate while performing duties as air crewmen in a variety of aircraft.</p> <p>A quantitative and qualitative analysis was made through the use of questionnaires to determine suitability, ruggedness, comfort, acceptance and utility. The evaluation was terminated on 20 Nov 67. The gloves proved to be superior for their intended purpose compared with the existing issue leather gloves and were preferred by the user. A recommendation for their use by all air crewmen in RVN was the result of the evaluation.</p>			

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