UNCLASSIFIED

AD NUMBER

AD867361

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to U.S. Gov't. agencies and their contractors; Critical Technology; 26 NOV 1969. Other requests shall be referred to Army Test and Evaluation Command, Aberdeen Proving Ground, MD 21005.

AUTHORITY

USATECOM ltr dtd 14 Dec 1970

THIS PAGE IS UNCLASSIFIED

AD 867361

U. S. ARMY TEST AND EVALUATION COMMAND
ENVIRONMENTAL TEST PROCEDURE

ARCTIC ENVIRONMENTAL TEST OF CLOTHING AND SLEEPING EQUIPMENT

1. OBJECTIVE

The objective of the procedures outlined in this MTP is to provide a means of evaluating the suitability of clothing and sleeping equipment in arctic winter environmental conditions.

2. BACKGROUND

Engineering tests of equipment are conducted to determine the characteristics and performance of the equipment under various conditions of operation, and to ensure their compliance with specified requirements. Testing in a natural arctic winter environment is used to substantiate or supplement data obtained from simulated tests conducted during the Engineer Design and Engineering Test phase. Testing in the arctic winter environment generally is not authorized until data from simulated environmental tests provides reasonable assurance that the test item will function satisfactorily when subjected to the conditions that would be encountered in the arctic.

3. REQUIRED EQUIPMENT

a. Test and comparison equipment as required.
b. Appropriate arctic winter uniforms and individual field equipment.
c. Vehicles as required.
d. Support aircraft.
e. Drop zone.
f. Parachutists adjustable individual equipment containers, as required.
g. Meteorological support instrumentation.
h. Photographic equipment (black and white or color).
i. Weapons and ammunition as required.
j. Any general and special tools, and other ancillary items required for repairs or maintenance on the test item.

4 REFERENCES

A. AR 70-8, Human Factors and Social Sciences Research.
B. AR 70-10, Army Materiel Testing.
C. AR 705-5, Army Research and Development.
D. AR 705-15, Operations of Materiel Under Extreme Conditions of Environment.
E. USATECOM Regulation 705-2, Documenting, Test Plans and Reports.
F. FM 31-70, Basic Cold Weather Manual.
G. MTP 10-4-008, Load Carrying Equipment.
H. MTP 10-4-500, Arctic Preoperational Inspection, Physical Characteristics, Human Factors, Safety and Maintenance Evaluation.

Reproduced by the CLEARINGHOUSE for Federal Scientific & Technical Information Springfield Va. 22151

This doc... tr... u...

Army Test & Evaluation Cmd
ATTN: AMSTE-TS / APO 98733

5. SCOPE

5.1 SUMMARY

The procedures outlined in this MTP are designed to determine and evaluate the functioning characteristics of clothing and sleeping equipment under arctic winter environment conditions.

The specific tests to be performed and their intended objectives are listed below:

a. Preoperational Inspection and Physical Characteristics - The objective of this subtest is to determine:

1) If the test and comparison (control) items are in proper condition for testing.
2) If the test items physical characteristics conform to applicable criteria.

b. Functional and Operational Suitability - The objective of this subtest is to determine the suitability of the test items by subjecting them to arctic usage, which will reveal the test items operational durability and portability characteristics in relationship to the applicable Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), Technical Characteristics (TC), or other requirements and documentation.

c. Aerial Delivery - The objective of this subtest is to determine the suitability of the test items for parachute operations under arctic winter environmental conditions.

d. Human Factors Evaluation and Safety - The objective of this subtest is to determine whether the test items are acceptable to the wearer/user under arctic winter environmental conditions.

e. Maintenance Evaluation - The objective of this subtest is to determine whether the test items meet maintenance and maintainability requirements as defined by QMR, SDR, TC or other established criteria.

5.2 LIMITATIONS

The procedures described in this MTP are limited to the testing of clothing and sleeping equipment under arctic winter environmental conditions.

6. PROCEDURES

6.1 PREPARATION FOR TEST

a. Arctic winter environmental tests are normally scheduled from October through March (6 months). Tests, test comparison (control) and support items should be delivered to the arctic test center prior to 1 October.

b. TDY personnel will be used to augment assigned personnel and will be trained to the degree that they are as proficient on the individual items as the troops who will use the item.

c. Ensure that all test personnel are familiar with the required technical and operational characteristics of the item under test, such as stipulated in Qualitative Materiel Requirements (QMR), Small Development

Requirements (SDR), and Technical Characteristics (TC), and record this criteria in the test plan.

d. Review all instructional material issued with the test item by the manufacturer, contractor, or government, as well as reports of previous tests conducted on the same type of items, and familiarize all test personnel with available references.

e. Record the grade, MOS, background, and training of all test personnel and ensure that all personnel receive new equipment training (NET) as required.

f. Record the following information:

1) Nomenclature, serial number(s), and manufacturer's name of the test items.

g. Select test items having an accuracy ideally at least 10 times greater than that of the function to be measured.

h. Prepare record forms for systematic entry of data, chronology of test, and analysis in final evaluation.

i. Prepare adequate safety precautions to provide safety for personnel and equipment, and ensure that all safety SOP's are observed throughout the test.

j. Record the prevailing meterological conditions during the test conduct, to include:

1) Temperature
2) Humidity, relative or absolute
3) Temperature gradient
4) Atmospheric pressure
5) Precipitation
6) Solar radiation
7) Wind speed and direction
8) Frequency of readings
9) Source of data

k. Outfit assigned personnel in appropriate winter clothing as described in MTP 10-4-500, and with individual field equipment (as directed) during all testing.

6.2 TEST CONDUCT

NOTE: The following procedures may be conducted concurrently with MTP 10-4-008 (Load Carrying Equipment) or similar MTP's where clothing and sleeping equipment may be used and transported.

6.2.1 Preoperational Inspection and Physical Characteristics

Upon receipt, carefully inspect all test and comparison items and their shipping or packaging containers for completeness, damage and general condition in accordance with the applicable sections of MTP 10-4-500.

6.2.2 Functional and Operational Suitability

6.2.2.1 Clothing

a. Conduct this subtest in ambient air temperatures ranging from 0°F to the lowest available temperature.

b. Conduct the clothing phase of this subtest 25% of the testing time in 0°F to -25°F, 50% in -25°F to -45°F, and 25% in -45°F to the lowest available temperature.

c. Direct the test personnel to wear the test and comparison items (as instructed) with individual field gear and dressed in appropriate arctic winter uniform to accomplish the following:

1) Snowshoe 16 miles through dense, snow-covered brush.
2) Snowshoe 12 miles over snow-covered (cross-country) terrain.
3) Ski 100 miles over cross-country ski trails.
4) Vehicular marches:

   a) 100 miles cross-country in tracked vehicles
   b) 100 miles on secondary roads in wheeled vehicles

5) Four (4) four-day field training exercises consisting of attack, defense, patrol and retrograde operations which shall require individual soldiers of the platoon/squad to use all TO & E equipment as well as special equipment issued for use under arctic winter environmental conditions.

d. Direct a mortar squad (or gun crew) from the Indirect Fire branch of the Infantry, Airborne and Individual Equipment test division to wear the test and comparison items during preparation for and testing of indirect fire weapons and munition.

e. Complete the comparison-compatibility form (Appendix A) at the completion of each subtest sequence.

f. Complete the opinion form (Appendix B) at the completion of each subtest sequence.

g. Record the following data:

1) Damage attributed to test items because of environmental effects.
2) Difficulties encountered in wearing or transporting the test item.
3) Meterological conditions at test site.
4) Water repellant qualities of test items.
5) Damage attributed to wear only, discounting environmental effects.
6) Insulating qualities.

6.2.2.2 Sleeping Equipment

a. Conduct this subtest in ambient air temperatures of 0°F to the lowest available temperature.

b. Inspect each test and comparison item for loose, damaged or

missing parts, and place in the best possible serviceable condition.

c. Place the test and comparison items in the prescribed carrying case or on prescribed equipment.

d. Direct test personnel to carry the test and comparison items (as instructed) with individual field gear and dressed in appropriate arctic winter uniform to accomplish the following:

1) Repeat steps 6.2.2.1, c 1 through 5.

e. Direct soldiers to sleep with test and comparison items in the following shelters:

1) Ten-man arctic tents.
2) Improvised shelters:

a) Poncho
b) Single Lean-to
c) Double Lean-to
d) Tree pit
e) Snow wall, hole, cave, as described in FM 31-70.

f. Repeat steps 6.2.2.1, e, f.

g. Record the following data:

1) Damage attributed to test items because of environmental effects.
2) Problems encountered while transporting the test item.
3) Meterological conditions at test site.
4) Damage attributed to use and handling of test item.
5) Rapid exit from the test item.
6) Comfort qualities.
7) Type shelters used.

6.2.3 Aerial Delivery

a. Inspect each test and comparison item before each jump. Note any deficiencies in the test log.

b. Direct test personnel (parachutists) to prepare test items in accordance with appropriate technical manuals.

c. Subject all test items to three parachute jumps.

d. Repeat steps b and c using comparison items.

e. Inspect each test and comparison item after each jump.

f. Complete the comparison-compatibility form (Appendix A).

g. Complete the opinion form (Appendix B).

h. Record the following data:

1) Results of pre and post jump inspections.
2) Meterological conditions at test site.
3) Compatibility with parachute equipment.
4) Malfunctions of test and comparison items.
5) Method used for attachment of items to parachutists.

6.2.4 Human Factors Evaluation and Safety

a. Conduct all Human Factors and Safety Tests in accordance with the applicable sections of MTP 10-4-500.

b. Conduct these tests concurrently with the operational tests (Functional and Operational Suitability).

6.3 TEST DATA

All test data to be recorded will be as specified in the individual subtests of this MTP.

6.4 DATA REDUCTION AND PRESENTATION

Processing of raw test data shall, in general, consist of organizing, marking for identification and correlation, and grouping the test data according to test title.

Specific instructions for the reduction and presentation of individual test data are outlined in succeeding paragraphs.

6.4.1 Preoperational Inspection and Physical Characteristics

Preoperational inspection and physical characteristics data shall be reduced and presented in accordance with MTP 10-4-500.

6.4.2 Functional and Operational Suitability

Examine the recorded data and evaluate the suitability of the test item in arctic environment by determining the following:

a. If the test item has characteristics that are equal to or surpass those of the comparison items.

b. If the test items provide environmental protection greater than the comparison items.

c. If the test items are compatible with other items of clothing, individual equipment, and oversnow equipment.

d. If the test items meet or exceed the appropriate specifications contained in QMR, TC's and SDR's.

Prepare a comprehensive report on the finding of the above evaluations.

6.4.3 Aerial Delivery

The suitability of the item under test for airborne operations under arctic winter environmental conditions shall be determined by comparison with previously accepted items of like nature and specifications. The damage to and/or malfunctions of the items attributed to parachute jumps or environmental effects shall be compared with item specifications contained

in appropriate QMR's and TC's.

6.4.4 Human Factors Evaluation and Safety

Human Factors and Safety data shall be reduced and presented in accordance with MTP 10-4-500, in addition determine the ease of donning and doffing the test item while wearing cold-wet and cold-dry hand wear.

6.4.5 Maintenance Evaluation

Maintenance data shall be reduced and presented in accordance with MTP 10-4-500.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX-A

(EXTRACT PORTIONS NEEDED FOR TEST)

COMPARISON-COMPATIBILITY FORM

GENERAL: This form is to be completed by each individual after each day's use of the test or control item.

NAME: _____ DATE: _____

TEMPERATURE RANGE: _____

1. What type of exercise were you participating in?

☐ March ☐ Bivouac ☐ Airborne ☐ Tactical Exercise

Ski _____ Attack _____
Snowshoe _____ Defense _____
Foot _____ Patrol _____
Vehicular _____ Other _____
Type Parachute _____

2. Which did you wear/use?

Test Standard

3. Which outer/inner garment did you wear?

Pile Cap	Steel Helmet	Undershirt, Winter
Field Jacket w/Parka Hood	Field Trousers	Suspenders
w/Liner Yes No	w/Liner Yes No	Boots, VB
Parka w/Hood	O. G. Shirt	Boots, Mtn. & Ski
w/Liner Yes No	Drawers, Winter	Parka w/Hood and Over-whites w/Liner Yes No

4. What problems or difficulties did you encounter while wearing/using the _____

Poor Stability	Restricted Hearing	Moisture
Restricted Vision	Restricted Talking	Tight
Restricted Breathing	Snow, Ice or Frost	Loose

Restricted Smelling Cold Too Warm

Uncomfortable Restricted Movement

Other _____
(problem)

Other _____
(problem)

_____

5. I wore the _____ in conjunction with the following equipment:

Skis Loadcarrying Equipment

Snowshoes Other _____

Weapon-M14, M16, M79, M60 or other _____ _____

Other _____

Rucksack _____

6. I wore the _____ in or on:

M-116 2 1/2 Ton Other _____

M-113 1/4 Ton Other _____

Tank Aircraft

7. The _____ was or was not compatible with the following equipment:

Equipment	Was	Was Not
_____		
_____		
_____		

ETC.

Why was the item not compatible with _____

_____

_____

_____

8. I utilized the following type shelter:

10 Man Tent	Snow Hole
Mtn Tent	Snow Cave
Lean-to	Snow Wall
Double Lean-to	Tree-pit
Wigwam	Other _____

9. Did you have any problems donning or doffing the _____?

Yes No

Which hand wear did you have on?

Arctic Mitten	Black/White Leather	Bare Hand
Anti-contact	Trigger Finger	

10. Which do you like best?

Test Standard

Explain why _____

_____

_____

11. Is the test_____ More suitable than standard?

As suitable as standard?

Less suitable than standard?

Unknown?

12. I have the following comments:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(Signature)

_____

(Rank)

APPENDIX B

GENERAL: This form will be filled out by each individual at the conclusion of each field exercise, parachute jump and at the completion of the test.

NAME: _____ DATE: _____

_____
(Exercise No. or period of time)

TEMPERATURE RANGE: _____

1. Check the _____ you wore/used during the period:

☐ Test ☐ Standard

2. Write your opinion of the _____ you used:

TEST: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

STANDARD: _____

_____

_____

_____

_____

_____

_____

3. Rank by number your order of preference:

   Test _____

   Standard _____

4. Explain why you like the _____ rated no. 1.

_____

_____

_____

_____

_____

_____

_____
(Signature)

_____
(Rank)

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1 ORIGINATING ACTIVITY (Corporate author) US Army Test and Evaluation Command (USATECOM) Aberdeen Proving Ground, Maryland 21005	2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP ----------

3 REPORT TITLE
US Army Test and Evaluation Command Materiel Test Procedure 10-4-005, Environmental Test Procedure - "Arctic Environmental Test of Clothing and Sleeping Equipment."

4 DESCRIPTIVE NOTES (Type of report and inclusive dates)
Final

5 AUTHOR(S) (First name, middle initial, last name)
----

6 REPORT DATE 26 November 1969	7a. TOTAL NO. OF PAGES 16	7b. NO. OF REFS 8
8a CONTRACT OR GRANT NO DA-18-001-AMC-1045(R) b. PROJECT NO AMCR 310-6 c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) MTP 10-4-005 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) ----------	

10 DISTRIBUTION STATEMENT
This document is subject to special export controls and each transmittal to foreign governments or foreign nationals,-WITH THE EXCEPTION OF AUSTRALIA, CANADA, AND UNITED KINGDOM,-may be made only with prior approval of HQ,USATECOM.

11 SUPPLEMENTARY NOTES ----------	12. SPONSORING MILITARY ACTIVITY Headquarters US Army Test and Evaluation Command Aberdeen Proving Ground, Maryland 21005

13 ABSTRACT

This Environmental Test Procedure describes test methods and techniques for evaluating the functioning characteristics of Clothing and Sleeping Equipment under Arctic winter environment conditions. Evaluation is related to the criteria established by Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), Technical Characteristics (TC), or other applicable design requirements or specifications.

DD FORM 1 NOV 65 1473 (PAGE 1)
S/N 0101-807-6811

UNCLASSIFIED
Security Classification

A-31409

UNCLASSIFIED
Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Environmental Test						
Arctic Winter Environmental Test						
Clothing and Sleeping Equipment						
Test Procedures						
Test Methods and Techniques						

DD FORM 1 NOV 65 1473 (BACK)
S/N 0101-807-6821

UNCLASSIFIED
Security Classification