AD720935

26 May 1970

Materiel Test Procedure 10-2-205
General Equipment Test Activity

DDC
MAR 31 1971
C

U. S. ARMY TEST AND EVALUATION COMMAND
COMMODITY ENGINEERING TEST PROCEDURE

CLOTHING, COMBAT VEHICLE CREWMEN

1. OBJECTIVE*

This document provides test methodology and techniques necessary to determine the technical performance and safety characteristics of combat clothing for vehicle crewmen and associated equipment as described in Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), and Technical Characteristics (TC), and to determine the item's suitability for service tests.

2. BACKGROUND

A requirements exists for a single all-weather garment that would be capable of being worn by combat vehicle crewmen when worn over or under clothing. Because of the bulk and nonspecificity in design, present combat clothing issued to combat vehicle crewman inhibits their effectiveness. Vehicle, equipment, and weapons protrusions surround crewmen who are required to fight from cramped compartments for extended periods of time under all weather conditions. The garment must have a retrieving strap and a pistol pocket.

3. REQUIRED EQUIPMENT

a. Tape, textile measuring.
b. Weighing Scales.
c. Standard Uniforms, and other equipment, as required for use, and comparison with the test item, as:

1) Footwear, handwear, headgear (Combat vehicle crewman's helmet, face protective devices) and other items of specified organizational clothing and equipment (.45 Caliber Pistol).
2) CB protective items.
3) Other foot, hand, or face coverings as required for seasonal complementary or combat use.
4) Load carrying equipment (field pack).

d. Analytical Balance, accuracy ± 0.01 gram.
e. Direct Reading Balance, accuracy ± 0.05 ounce.
f. Color Comparison Standards for color fastness test.
g. Photograph Equipment (color and black and white), for still, and motion pictures.
h. Meteorological Equipment to obtain ambient temperature, relative humidity, and wind direction and speed.

---

*This MTP is intended to be used as a basic guide in preparing actual test plans for the subject equipment. Specific criteria and test procedures must be determined only after careful appraisal of pertinent QMR's, SDR's, TC's and any other applicable documents.

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
Springfield, Va 22151

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

i. Environmental Chamber(s) and Facilities capable of meeting the indicated specifications:

1) Rain test chamber, per Method 506 of MIL-STD-810.
2) Temperature test chamber (-80°F, 155°F)

j. Materiel Analysis Laboratories.
k. Modified Fabric Course, including several combat vehicles, as required.
l. Fixed Laundry, as required.
m. Combat Effectiveness Test Course.

4. REFERENCES

A. AR 70-38, Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions.
B. USAMC Regulation 310-6, Quality Assurance Publications.
C. USAMC Regulation 385-12, Safety Verification of Army Materiel.
D. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing.
E. USATECOM Regulation 70-23, Equipment Performance Report.
F. USATECOM Regulation 700-1, Value Engineering.
G. AMCP 706-134, Maintenance Guide for Design.
H. USAGETA Document, Human Factors Evaluation Data for General Equipment (HEDGE).
I. MIL-M-19595, Magnetic Effects Limits for Non-Magnetic Equipment Used in Proximity of Magnetic Influence Ordnance.
J. MIL-STD-129, Marking for Shipment and Storage.
K. MIL-STD-810, Environmental Test Methods.
L. FED-STD-751, Stitches, Seams, and Stitchings.
M. FED TEST METHOD STD 191, Textile Test Methods.
N. FED-SPEC DDC-L-20, Label; for Clothing, Equippage, and Tentage.
O. TM 700-8400-1, Fitting of Uniform.
P. Am. Assn. of Textile Chemists and Colorists (AATCC), Method No. 76 - 1964 (Static Electricity).
Q. Am. Soc. for Testing and Materials (ASTM) Designation B117-64, Standard Method of Salt Spray (Fog) Testing.
R. MTP 8-2-136, Impregnating Set, Clothing, Field.
S. MTP 10-2-500, Physical Characteristics.
T. MTP 10-2-501, Operator Training and Familiarization.
U. MTP 10-2-505, Human Factors Evaluation.
V. MTP 10-2-507, Maintenance Evaluation.
W. MTP 10-2-508, Safety.
X. MTP 10-2-509, Combat Effectiveness Test.
Y. MTP 10-2-511, Quality Assurance.
Z. MTP 10-2-512, Reliability.

5. SCOPE

BLANK PAGE

5.1 SUMMARY

This document describes the preparation and methods for evaluating the technical performance characteristics of the armor crewmen uniform. The following evaluations are required:

a. Preparation for Test - A determination of the condition and physical characteristics of the test item on arrival. Also, to ensure that the test item is complete, and that the material and construction conform to the applicable requirements, including resistivity to external and/or internal pressure and to forces that could cause separation, tearing, or stretching; magnetic effects; resistance to POL wetting, corrosion, and static electricity generation. The procedures provide operator training and familiarization in major areas of the tests and a determination in the physical condition of the participants.

b. Sizing and Fitting - A determination of the sizing and fitting characteristics of the test item as related to wear with standard task-oriented clothing and equipment.

c. Donning and Doffing - An evaluation of the design of the test item for the ease and safety of putting on, and removing the uniform from the body in conjunction with standard task-oriented clothing and equipment.

d. Functional Suitability Test - An evaluation of the test item's suitability to be worn by armored vehicle crewman in and around armored vehicles, including a comparison of the test uniform with the standard utility uniform, and a determination of the test item's durability.

e. Compatibility - A determination of the test item's compatibility with related clothing and other equipment, while performing tasks as required, in accordance with the technical characteristics.

f. Combat Effectiveness Test - A study to determine the test item's effect on the individual soldier's combat effectiveness.

g. Waterproofness and Launderability - A determination of the water-repelling and launderability characteristics of the test item, as required to meet the technical characteristics.

h. Environmental Tests - An evaluation to determine the effects of exposure of the test item to various controlled conditions, consisting of low temperature tests, and high temperature and humidity tests.

i. Safety - A determination of the safety characteristics of the test item.

j. Maintenance - An evaluation to determine and appraise the test item's maintenance characteristics and requirements, a verification and appraisal of its malfunctions, and evaluation of the test item's associated publications and other common and special support elements (maintenance test package), an appraisal of the test item's design for maintainability (AMCP 706-134: accessibility, ease of maintenance, standardization, and interchangeability), an evaluation of component and system durability and reliability, and the calculation of indicators which express the effects of appropriate preceding aspects.

k. Human Factors Evaluation - A determination of the adequacy of uniform design and configuration in terms of overall suitability and compatibility with specified mission requirements.

l. Chemical, Biological and Radiological Tests - A determination of the CBR protective capability of the test item when properly impregnated.

m. Value Analysis - A determination of the test item's unnecessary, costly, or "nice-to-have" features, as stated in USATECOM Regulation 700-1.

n. Quality Assurance - A review to determine and evaluate defects in material and workmanship.

5.2 LIMITATIONS

None

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Pretest Inspection

On receipt of the test item package(s), perform the following:

a. Visually inspect the test item packaging and record:

1) Evidence of damage or deterioration.
2) Identification marking, in accordance with MIL-STD-129, and any special marking specified, including:

a) Manufacturer
b) Date of manufacture
c) Number and date of contract
d) Type of uniform

b. Weigh and measure the test item package(s), and record the following:

1) For each shipping package:

a) Contents
b) Weight
c) Length, width, and height
d) Cubage

2) For entire test package (if more than one shipping package):

a) Total weight
b) Total cubage

c. Unpack the test item, and record the type and adequacy of packing material in the shipping container.

d. Visually inspect to ascertain that the test item is free of irregularities and other defects, and record the following:

1) Any evidence of defects in:

   a) Manufacturing
   b) Material
   c) Workmanship

2) Evidence of damage, wear, and/or deterioration
3) Existence of shortages in test package
4) Deviations in markings from FED. SPEC DDD-L-20
5) Physical condition of uniforms, including evidence of:

   a) Mildew.
   b) Broken slide fasteners, deteriorated or cracked rubber and leather components.
   c) Permanent set, cracks, or breaks at folds.
   d) Rust on metal fasteners.
   e) Oil or grease on surface.

6) Evidence of any hazard, for inclusion in the safety evaluation

e. Photograph the test item or packaging as appropriate.

6.1.2 Physical Characteristics

Determine and record the physical characteristics of each test item and/or test item material in accordance with applicable sections of MTP 10-2-500, and the following:

a. Dimensions.
b. Weight of uniform.
c. Physical specifications and material characteristics of test item fabric, as described in the applicable methods of FEDERAL TEST METHOD STANDARD NO. 191; note any defects, or inability to meet applicable requirements:

1) Weight per unit area, per Method 5041.
2) Number of wales and courses per inch in knit cloth, per Method 5070.
3) Acidity or alkalinity (pH) of water extract from textile, per Method 2810 (colorimetric), or 2811 (electrometric).
4) Colorfastness to laundering, per Method 5610 (cotton/linen), or 5614 (wool/rayon/other).
5) Breaking strength and elongation, per Method 4108 (webbing), or 5100 (woven cloth).
6) Adhesion of plied fabric, per Method 5950.
7) Adhesion of seams, per Method 5960 (cemented), or 5962 (strapped).
8) Adhesion of coating (water resistance), per Method 5972.
9) Resistance to blocking, per Method 5872.
10) Flex and abrasion resistance, per Method 5300.
11) Flame resistance, per Method 5903.

NOTE: The uniform material must be flame resistant and not flame-treated.

12) Tear strength, per Method 5132 (pendulum), 5134 (torque), or 5136 (trapezoid).
13) Water resistance of Winter Uniform only, per Method 5504 (spray), or 5514 (hydrostatic).
14) Permeability to air, per Method 5450.

d. Magnetic effects data, as described in the applicable sections of MIL-M-19595, and evidence of inability to meet specified limits.

e. Resistance of winter uniform to POL wetting by performing the following:

1) Place a small amount of POL on a smooth horizontal surface of the test item. Record the location, and type of POL.
2) Measure and record the reflectance at an angle under light.
3) Repeat step 2 after one minute.
4) Repeat steps 1, 2, and 3 for a total of 3 locations per uniform.

NOTE: A specified loss of reflectance will be taken as evidence of wetting. Evidence of wetting at any location will be considered a test failure.

f. Resistance of test item metal components to corrosion, by performing the standard method of salt spray (fog) testing as described in the applicable sections of ASTM B 117-64.

g. Resistance of fabric to generation of static electricity, by subjecting a specimen to static electricity test as specified in AATCC Method No. 76-1964. Record the dielectric constant, and dissipation factor.

h. Method of fastening the test item, i.e., buttons, zippers, hooks, snaps, nylon pile hook and loop combination (velors), etc.

i. Number of pieces per set, i.e., one piece or two pieces.

NOTE: Assign an identification (code) number to each uniform or part. For two piece uniforms code the upper torso garments on the rear inside neck seam and code the lower torso garments on the front inside waistband to the left of the fly to ensure that each set is kept together at all times.

6.1.3 Medical Examination

Prior to the initiation of the test, the test participants shall undergo physical examinations to determine the following:

a. Their physical fitness to participate in the testing
b. The presence of any dermatological condition
c. The cause of any skin irritation or rash

6.1.4 Operator Training and Familiarization

Determine the test data subject to the applicable portions of MTP 10-2-501 and the following:

a. Test personnel shall receive familiarization in the following areas:

1) Test objective and procedures
2) Operational performance
3) Maintenance
4) Safety
5) Human Factors
6) Value analysis

b. Record the following:

1) Data collected as described in the applicable sections of MTP 10-2-501.
2) Any deficiencies regarding the technical manuals, such as inadequacy for training purposes.

6.2 TEST CONDUCT

NOTE: All equipment failures shall be reported in accordance with USATECOM Regulation 70-23.

Test personnel shall observe all normal safety precautions governing the operation of the test item and test equipment.

6.2.1 Sizing and Fitting

Determine the sizing and fitting characteristics of the test item (summer, and winter uniforms) as related to wear with standard seasonal clothing, as applicable (within specified weather range) by performing the following:

a. Obtain and record the following measurements for each test subject (participant), using procedures as described in TM 700-8400-1 and other appropriate documents:

1) Height
2) Weight
3) Chest
4) Arm
5) Hip
6) Inseam
7) Shoulder (width and depth)

b. Using the measurements obtained in step a, and the test item manufacture sizings, select and record the appropriate sizes as determined for each test participant.

NOTE: 1. The test item shall be provided in sizes which will fit a range from the 5th to the 95th percentile of troops with reasonably good fit both before and after laundering.
2. Each issuing size of liners shall be designed to fit any shape body without tension when worn over the applicable apparel.

c. Each participant will be fitted in each test item selected in step b and the following recorded for each participant:

1) Type of fit per TM 700-8400-1.
2) Difficulty in preparation for use and/or making adjustments or inadequacies of instructions on preparation and adjustments.
3) Evidence of incompatibility with standard warm/cold weather clothing and equipment.

d. Photograph each participant to show the front, sides, and rear of each test item selected for issue.

6.2.2 Donning and Doffing

NOTE: A time study may be conducted if required by the Test Directive

a. A minimum of five test participants shall don and doff the test item a minimum of three times, over clothing appropriate to the uniform, using the following procedures, unless otherwise directed:

1) Donning sequence:

a) As applicable, remove outergarments, i.e., field jacket, fatigues, boots, headgear, and gloves.
b) Don the liner for winter uniform.
c) Don the uniform.

2) Doffing:

a) Doff the uniform
b) Doff the liner for winter uniform.

b. Record the following for each participant:

1) Time required to don and doff the uniforms, if appropriate
2) Overgarments doffed in order to don the test item
3) Any difficulties encountered as related to donning and doffing
4) Size of uniforms and liners used during the evaluation

c. Upon completion of the donning and doffing exercise, interview each participant and record his opinions regarding the ease and safety of donning and doffing the test item with respect to the following as applicable:

1) Suitability of fastenings and adjustments.
2) Ability to effect fastenings and adjustments.
3) Ease of donning and doffing over clothing and other equipment, as specified.

d. Record any apparent difficulties observed by the recorder.

6.2.3 Functional Suitability Test

Determine the functional suitability and durability of the test item by performing the following:

NOTE: Test personnel wearing standard uniforms shall perform the procedures of paragraph 6.2.3.1 and 6.2.3.2 for comparison purposes.

6.2.3.1 Functional Suitability

a. A minimum of two test participants for each task to be performed by personnel who normally wear combat vehicle crewmen's clothing shall don the test item with standard seasonal clothing (within specified weather range) and standard equipment and perform their normal duties for a minimum of 4 hours or as directed by the test director.

b. Test personnel shall repeat the procedures of step a wearing CB protective items when applicable.

c. At the completion of the test period test personnel shall be questioned concerning the following and their comments recorded:

1) Ability to perform functions without test item interference.
2) Freedom of movement.
3) Discomfort caused by the test item.
4) Difficulties encountered as a direct result of the test item, i.e., buttons or pockets hooking into objects.

6.2.3.2 Durability

a. Prepare a "Modified Fabric Course" as described in Appendix A, to include several combat vehicles.

b. A minimum of ten test participants shall don the specified test item with standard seasonal clothing (within specified weather range), and traverse the Modified Fabric Course. Record the identification number, and type (Summer, or Winter uniform) for each test item.

NOTE: 1. Wear the test item according to the specified schedule.
2. Observers and recorders shall be stationed at various locations along the course during testing to ensure that participants properly traverse the course and to observe the freedom of movement while wearing the test item.

c. At the completion of each traversal or after each obstacle, as appropriate, observers will inspect each test item and report any failure to the project leader for determination of serviceability for future use.

NOTE: 1. Generally, a failure is defined as a hole, separation of fabric, or rip of 1/4-inch or more in size.
2. The decision for withdrawal of any test item from the test will be made by the project leader.

d. Test personnel shall perform a minimum of one traversal, wearing CB protective items when directed by the test director.

e. Perform the following when a test item is withdrawn from testing:

1) Record the length of time and the number of traversals the test item was worn, and reason for withdrawal (completion, or failure, or rendered unserviceable).
2) Record failure data as follows:

a) Location of failure
b) Description of failure (material, design failure, etc.)
c) Cause

f. At the completion of each day's test:

1) Record the following for each days testing:

a) Ambient temperature (maximum, minimum, and average)
b) Relative humidity
c) Wind direction and speed (to include maximum gusts)
d) Precipitation

2) Determine and record the total number of hours of testing.
3) Question each test participant about the design characteristics of the test item and record their comments. Typical questions which shall be answered are:

a) Ability to perform functions without test item interference.
b) Compatibility with other garments.
c) Adverse effects on the participants.
d) Discomfort caused by the test item.
e) Suitability of straps, pistol pocket, etc.
f) When applicable, ability to effect closure adjustments while wearing handware.
g) Whether or not the test item rides up while being worn.

6.2.3.3 Medical Examination

At the completion of each day's test activity, and at any time a test participant complains of discomfort the medical examination of paragraph 6.1.3

shall be repeated and pertinent data recorded.

NOTE: Any incident of skin irritation resulting from the test item shall be supported by colored photographs.

6.2.4 Compatibility Test

Determine and record the compatibility of the test item, during all testing with emphasis on the procedures of paragraph 6.2.3, as regards test item use or interference with:

a. Standard footwear, handwear, headwear and other head and face protective devices.
b. CB protective items and their protective capabilities.
c. Seasonal complementary or combat foot, hand or face coverings.

6.2.5 Combat Effectiveness Test

Determine the effect of the test item on the ability of the individual soldier to perform his duties as described in the applicable sections of MTP 10-2-509.

6.2.6 Waterproofness and Launderability Test

6.2.6.1 Rain Test

a. Measure and record the dry weight of the test item (winter uniform), and subject the test item to the rain conditions of Method 506 of MIL-STD-810.
b. At the completion of the rain exposure test:

1) Visually inspect the test item and record any water damage
2) Weigh the test item to determine moisture gain

6.2.6.2 Launderability

Upon completion of the rain exposure test of paragraph 6.2.6.1, launder the test item(s), using all means available, and perform the following for each method of laundering:

NOTE: 1. Prior to laundering, the literature provided with the test item shall be checked to ensure that there are no restrictions or specific method(s) required.
2. Do not detach any components.

a. Record the ease of laundering.
b. Record difficulties encountered during laundering.
c. Visually inspect the test item for and record evidence of deterioration and/or damage.
d. Subject each laundered test item to the sizing and fitting procedures of paragraph 6.2.1 and record evidence of shrinkage.

6.2.7 Environmental Tests

6.2.7.1 Low Temperature Test

Place a minimum of three winter uniforms in a test chamber and perform the following:

a. Reduce the chamber temperature of -80°F. (-62.2°C.). Maintain it at -80°F. for a period of 72 hours, and then visually inspect the test items and record any damages.

b. Raise the chamber temperature to -65°F. (-53.9°C.) and maintain this temperature until stabilization is reached. If stabilization is attained in less than 24 hours, maintain the temperature for a complete 24-hour interval. At completion of the period of exposure, visually inspect the test items and record damages.

NOTE: Checks shall be accomplished within fifteen minutes of removing the test items from the chamber.

c. Increase the chamber temperature to 70°F. (21.1°C.) or as specified and visually inspect the test items and record damages.

6.2.7.2 High Temperature Test

Place a minimum of three summer uniforms in a test chamber and perform the following:

a. Adjust the chamber to a temperature of 155°F. (88.3°C.) and an absolute humidity of 13 grains/ft., and maintain these conditions for a minimum of four hours, then visually inspect the test items and record any damages.

b. Adjust the chamber to a temperature of 120°F. (48.9°C.) and a relative humidity of no greater than 15% and maintain these conditions for a minimum of 24 hours. Visually inspect the test items and record any damages.

c. Adjust the chamber to + 70°F. (21.1°C.) or as specified, and visually inspect the test items and record any damages.

6.2.7.3 Verification After Exposure

At the completion of the low, or high temperature test, verify the suitability of the test items by repeating applicable procedures of the following tests:

a. Verify the fit as described in paragraph 6.2.1 above.

b. Verify the suitability of fastenings as described in paragraph 6.2.2 above.

c. Verify the durability as described in paragraph 6.2.3.2 above.

6.2.8 Safety

Provide information for a Safety Release Statement in accordance with

USATECOM Regulation 385-6, obtained as follows:

a. Perform applicable procedures of MTP 10-2-508.
b. Throughout the conduct of the test, determine and record the following:

1) Any dangerous or unsafe condition or any condition that might present a safety hazard including:

a) Cause of the hazard.
b) Steps taken to alleviate any such hazard.
c) Any difficulty regarding safety precautions normally taken during testing procedures.

2) The safety features incorporated into test item design, and any evidence of inadequacy of the features, such as those for quick doffing in case of emergency.
3) Evidence of any inadequacy of warning instructions and markings.
4) Any dangerous or unsafe features on test item.
5) Suggestions to improve the existing safety precautions.

6.2.9 Maintenance

Evaluate the maintenance-related factors of the test item as described in MTP 10-2-507 and MTP 10-2-512 with emphasis on the following:

a. Organizational (O), Direct Support (F), and General Support (H) Maintenance requirements.
b. Operator through General Support Maintenance Literature.
c. Repair parts.
d. Tools.
e. Test and handling equipment.
f. Calibration and maintenance facilities.
g. Personnel skill requirements.
h. Maintainability.
i. Reliability.
j. Availability.

6.2.10 Human Factors Evaluation

Throughout the test, evaluate the effectiveness and characteristics of the man-item interaction as related to human factors by performing the applicable sections of MTP 10-2-505 and the following:

a. Prepare checklists to evaluate the human factor characteristic using Human Factors Evaluation Data for General Equipment (HEDGE) for the Class IV C Materiel including the following:

1) User's comfort while wearing test item and his ability to

perform required tasks with minimal restrictions.
2) Ease of donning and doffing.
3) Ease of removing in emergency situations.
4) Fit snugly at openings for winter uniform.
5) Ease of using fastening systems.

b. Evaluation of the tasks of step a shall include but not be limited to the following:

1) Title of task conducted
2) Adequacy of instructions furnished
3) Compatibility of uniforms with the tasks performed
4) Human factors design deficiency revealed by particular test

c. Record the following:

1) Test subject's comments regarding his comfort while wearing test item and his ability to perform required tasks with minimal restrictions.
2) Noted inadquacies of test item design affecting ease of test item operation.
3) Recommendation to improve man-item effectiveness.

6.2.11 Chemical, Biological and Radiological Tests

Determine the test item's ability, when properly impregnated, to withstand the effects of radiological, biological and chemical agents as described in the applicable sections of MTP 8-2-136.

6.2.12 Value Analysis

Throughout all tests, the test item shall be examined for any unnecessary, costly, "nice-to-have" features as described in USATECOM Regulation 700-1. Perform the following:

a. During operation of the test item, observe for features which could be eliminated without compromising performance, reliability, durability or safety.

b. Question test personnel regarding features of the test item which could be eliminated without decreasing the functional value of the test item or decrease man-item effectiveness.

c. Record the following:

1) Non-functional, costly, or "nice-to-have" features of the test item.
2) Test personnel comments and opinions regarding features which could be eliminated in accordance with criteria of USATECOM Regulation 700-1.

6.2.13 Quality Assurance

Determine the quality of the test item as described in the applicable sections of MTP 10-2-511.

6.3 TEST DATA

6.3.1 Preparation for Test

6.3.1.1 Pre-Test Inspection

a. Record the following:

1) Evidence of package damage or deterioration.
2) Identification markings, including:

a) Manufacturer
b) Date of manufacture
c) Number and date of contract
d) Type of uniform

3) For each shipping package:

a) Contents
b) Weight, in pounds
c) Overall dimensions, in feet and inches, of:

(1) Length
(2) Width
(3) Height

d) Cubage, in cubic feet

4) For entire test item package (if more than one shipping package):

a) Total weight, in pounds
b) Total cubage, in cubic feet

5) Type and adequacy of packing material.
6) Any evidence of defects in:

a) Manufacturing
b) Material
c) Workmanship

7) Evidence of damage, wear, or deterioration.
8) Existence of shortages.
9) Deviations in marking from FED. SPEC DDD-L-20.
10) Evidence of deficiencies in physical condition.
11) Evidence of any hazard.

b. Retain all photographs.

6.3.1.2 Physical Characteristics

Record the following:

a. Data collected as described in the applicable sections of MTP 10-2-500.

b. For each test item size:

1) Type uniform (winter, summer)
2) Size as indicated by the manufacturer
3) Dimensions
4) Weight in ounces

c. For each test conducted as described in FED Test Method STD 191, as applicable:

1) Material tested (cotton, linen, wool, rayon, etc.).
2) Type construction (woven fabric, webbing, etc.).
3) Test performed and method used (weight/unit area-5041, tear strength-5132, etc.).
4) Data as collected for each test performed.

d. Magnetic effects data collected as described in the applicable sections of MIL-M-19595, including:

1) Description of each metal component, and uniform
2) Evidence of inability to meet specified limits

e. For resistance to POL wetting, winter uniform only:

1) Location of each specimen on uniform
2) Evidence of wetting

f. Corrosion resistance data collected as described in the applicable sections of ASTM B 117-64 (salt spray or fog testing) including:

1) Description of each metal component, and uniform
2) Amount of corrosion

g. For resistance to generation of static electricity, as described in AATCC Method No. 76-1964:

1) Description of specimen, and uniform
2) Dielectric constant
3) Dissipation factor

h. For each type uniform:

1) Type uniform (winter, summer)
2) Method of fastening (button, zippers, etc.)
3) Number of pieces (1, 2)

6.3.1.3 Medical Examination

Record the following for all test personnel:

a. Physical fitness
b. Presence of dermatological condition
c. Cause of any skin irritation or rash

6.3.1.4 Operator Training and Familiarization

Record the following:

a. Data collected as described in the applicable sections of MTP 10-2-501.

b. Any deficiencies regarding the technical manuals, such as inadequacy for training purposes.

6.3.2 Test Conduct

6.3.2.1 Sizing and Fitting

a. Record the following:

1) Identity of each participant, and the following measurements, per TM 700-8400-1:

a) Height
b) Weight
c) Chest
d) Arm
e) Hip
f) Inseam
g) Shoulder width
h) Shoulder depth

2) For each participant of step 1 above:

a) Identity of test item (summer, winter).
b) For each size selected for try-on, and for issue to participant:

(1) Size
(2) Type of fit, per TM 700-8400-1
(3) Any difficulty in preparation for use
(4) Any difficulty in making adjustments
(5) Evidence of any incompatibility with standard warm/cold weather clothing and equipment.

b. Retain all photographs.

6.3.2.2 Donning and Doffing

a. Record the following for each participant:

1) Time required to don and doff the uniforms, if appropriate.
2) Overgarments doffed in order to don the test item.
3) Any difficulties encountered as related to donning and doffing.
4) Size of uniforms and liners used during the evaluation.
5) Subjective opinions of participant regarding the ease and safety of donning and doffing the test item with respect to the following, if applicable:

a) Suitability of fastenings and adjustments.
b) Ability to effect fastenings and adjustments.
c) Ease of donning and doffing over clothing and other equipment, as specified.

b. Record apparent difficulties observed by the recorder

6.3.2.3 Functional Suitability Test

6.3.2.3.1 Functional Suitability -

Record the following for each position:

a. Uniform worn (winter, summer)
b. Task of participant (gunner, maintenance, etc.)
c. Hours of operation
d. Test personnel comments on:

1) Ability to perform functions without test item interference.
2) Freedom of movement.
3) Discomfort caused by test item.
4) Difficulties encountered due to test item (snagging pockets, buttons, etc.).

6.3.2.3.2 Durability -

a. Record the following for each test item:

1) Test item's identification number.
2) Type of test item (summer, or winter).
3) Observers reports pertaining to possible serviceability failures.
4) After withdrawal from testing:

a) Reasons for withdrawal (failure, test completed)
b) Length of testing time, in hours
c) Number of traversals
d) Failure data:

(1) Location of failure

(2) Description of failure
(3) Cause of failure

5) At the completion of each day's test:

a) Participants comments
b) Total number of hours of testing
c) For ambient temperature, in degrees F:

(1) Maximum
(2) Minimum
(3) Average

d) Relative humidity, in percent
e) Wind direction and speed, in mph (including maximum gusts)
f) Precipitation

b. Retain all photographs

6.3.2.3.3 Medical Inspection

Record the following for each test participant after each day's testing:

a. Activity performed (simulated task, traverse modified fabric course).
b. Physical fitness.
c. Presence of new dermatological condition.

6.3.2.4 Compatibility Test

Record test item incompatibility with the following, if any:

a. Standard footwear, handwear, headwear and other head and face protective devices.
b. CB protective items and their protective capabilities.
c. Seasonal complementary or combat foot, hand or face coverings.

6.3.2.5 Combat Effectiveness Test

Record data collected as described in the applicable sections of MTP 10-2-509.

6.3.2.6 Waterproofness and Launderability

6.3.2.6.1 Rain Test -

Record the following:

a. Weight of test item, in ounces:

1) Before exposure to rain test
2) After exposure

b. Evidence of any water damage

6.3.2.6.2 Launderability Test

Record the following for each laundering method used:

a. Method of laundering
b. Ease of laundering
c. Difficulties encountered
d. Evidence of any damage, deterioration and/or shrinkage

6.3.2.7 Environmental Tests

6.3.2.7.1 Low Temperature Tests -

Record the following for each test item:

a. Test item identification number
b. Damages incurred at temperature of -80°F
c. Damages incurred at temperature of -65°F
d. For temperature of 70°F:

1) Temperature in degrees F
2) Damages incurred

6.3.2.7.2 High Temperature Tests -

Record the following for each test item:

a. Test item identification number
b. Damages incurred at temperature of +155°F
c. Damages incurred at temperature at +120°F
d. For temperature of 70°F:

1) Temperature in degrees F
2) Damages incurred

6.3.2.7.3 Verification After Exposure -

Record data collected as described in the applicable procedures of the following tests:

a. Type of fit, as in paragraph 6.2.1 above
b. Suitability of fastenings, as in paragraph 6.2.2 above
c. Durability of test item, as in paragraph 6.2.3.2 above

6.3.2.8 Safety

Record the following:

a. Data collected as described in the applicable sections of MTP 10-2-508.

b. Any dangerous or unsafe condition or any condition that might present a safety hazard including:

1) Cause of the hazard.
2) Steps taken to alleviate any such hazard.
3) Any difficulty regarding safety precautions normally taken during testing procedures.

c. The safety features incorporated into test item design, and any evidence of inadequacy of the features, such as those for quick doffing in case of emergency.

d. Evidence of any inadequacy of warning instructions and markings.

e. Any dangerous or unsafe features on test item.

f. Suggestions to improve the existing safety precautions.

6.3.2.9 Maintenance

Record data collected as described in the applicable section of MTP 10-2-507 and MTP 10-2-512.

6.3.2.10 Human Factors Evaluation

a. Record the following:

1) Data collected as described in the applicable sections of MTP 10-2-505.
2) Test subject's comments regarding his comfort while wearing test item and his ability to perform required tasks with minimal restrictions.
3) Noted inadequacies of test item design affecting ease of test item operation.
4) Recommendation to improve man-item effectiveness.

b. Retain completed checklists

6.3.2.11 Chemical, Biological and Radiological Tests

Record data collected as described in the applicable sections of MTP 8-2-136.

6.3.2.12 Value Analysis

Record the following:

a. Non-functional, costly, or "nice-to-have" features of test item.

b. Test personnel comments and opinions regarding features which could be eliminated in accordance with criteria of USATECOM Regulation 700-1.

6.3.2.13 Quality Assurance

Record data collected as described in the applicable section of MTP 10-2-511.

6.4 DATA REDUCTION AND PRESENTATION

Data obtained during the conduct of the test shall be summarized, making use of photographs and charts as appropriate. Test data for each uniform tested shall be obtained, summarized, and evaluated as required including comparisons indicating the effects of temperature, water exposure and laundering on test item fit and components.

Data obtained for each physical characteristic test shall be evaluated as required by the appropriate Federal Specification and be compared with the technical performance characteristics specified in the SDR or other developmental criteria.

In addition to charts and photographs, presentation shall include narrative reports on all phases of the test.

A Safety Release Recommendation shall be submitted in accordance with USATECOM Regulation 385-6 based on the data collected related to safety.

APPENDIX A

THE MODIFIED FABRIC COURSE

The modified fabric course differs from the cotton fabric course, described below, used by the General Equipment Test Activity at Fort Lee, Virginia in that only the 11 sand prones and three sand crawls are used.

The Cotton Fabric Course, a quarter of a mile long, is a very arduous course. Consisting of twenty-nine obstacles, it simulates practically every physical situation in which our Armed Forces may ever be compelled to operate.

The purpose of this course is to determine the durability of material to be used in cotton uniforms. Trousers receive the greatest wear of any garment subjected to this course. Consequently, to obtain rapid, reliable results, test materials are fabricated into specially designed trousers for testing purposes.

Test participants covering the course hit prone into a sand cover point, crawl across a section of railroad track, slide down a steep slope, and drop into a slit trench. They monkey crawl a tree trunk, hit prone into sand and gravel pits, climb log hurdles, and crawl over rock parapet. The participants crawl over a log-sand cover point, through concrete culverts, under a low-wire entanglement, and over road and tank trap obstacles.

Cotton fabrics thus tested and approved are used in the manufacture of new cotton uniforms. As a result, the most durable military clothing of today will be even tougher tomorrow.

The Recommended Cotton Fabric Course consists of the following sequence: three sand cover points, railroad embankment revetment, railroad track, embankment slide, stone wall cover point, sand cover point, sand cover point, sand cover point, slit trench, monkey crawl, sand cover point, gravel crawl, sand crawl, log road block, sand cover point, sand cover point, sand crawl, low-wire entanglement log-sand cover point, deep trench, two concrete culverts, sand cover point, crawl over rock parapet, sand crawl, low wire entanglement, log cover point, and tank trap obstacles.

THIS PAGE INTENTIONALLY LEFT BLANK

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

U. S. Army Test and Evaluation Command Materiel Test Procedure 10-2-205, Commodity Engineering Test Procedure, - "Clothing, Combat Vehicle Crewmen."

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

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

6. REPORT DATE 26 May 1970	7a. TOTAL NO. OF PAGES 26	7b. NO. OF REFS 26
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 10-2-205 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) ----------	

10. DISTRIBUTION STATEMENT
[redacted]

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

13. ABSTRACT

This Engineering Test Procedure describes test methods and techniques for evaluating the technical performance and characteristics of Clothing for Combat Vehicle Crewmen, and for determining their suitability to be subjected to test for military service use by the U. S. Army. The evaluation is related to criteria expressed in applicable Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), Technical Characteristics (TC), or other appropriate design in requirements and specifications.

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

UNCLASSIFIED
Security Classification

A-31408

Preceding page blank

UNCLASSIFIED
Security Classification

KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Engineering Test						
Clothing for Combat Vehicle Crewmen						
Combat Vehicle Crewmen Clothing						
Test Procedures						
Test Methods and Techniques						

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

UNCLASSIFIED
Security Classification
A-31408