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

FLAMETHROWERS, PORTABLE

1. OBJECTIVE

The objective of this Materiel Test Procedure (MTP) is to establish uniform procedures for determining and evaluating the technical performance of portable flamethrowers in terms of the criteria established by applicable Qualitative Materiel Requirements (QMR's), Small Development Requirements (SDR's), Technical Characteristics (TC's), and other design requirements and specifications. These procedures will also permit evaluation of the relative safety of the test items in the hands of Army troops and the suitability of the items for service testing.

2. BACKGROUND

As a weapon, flame causes damage and destruction to men, equipment, and fortifications. It depletes the oxygen in enclosed spaces and has great psychological impact on enemy personnel. It has successfully reduced positions that had resisted other forms of attack.

The portable flamethrower is a close-range ground assault weapon employed to assist infantry units in attacking fortifications and strong-points. It is used both in street fighting and in jungle fighting. The portable flamethrower is normally employed as special equipment by assault rifle squads or teams.

The portable flamethrower has a short range and a limited duration of fire. Wind, terrain, and type of fuel (thickened or unthickened) determine to a great extent its effective range. Its accuracy with thickened fuel enables it to penetrate small openings and to ricochet from wall to wall inside fortifications. Unthickened fuel produces a billowing, short-range, short-burning-time flame which considerably reduces a flamethrower's tactical applications.

3. REQUIRED EQUIPMENT

a. Meteorological equipment to measure and record:

- 1) Temperature
- 2) Wind direction and speed
- 3) Relative humidity

- b. Appropriate test site
- c. Suitable fuel for flamethrowers
- d. Protective equipment (mask, gloves, overgarment)
- e. Laboratory facilities
- f. Photographic equipment (color, black and white)

- 1) Still
- 2) Motion picture

- g. Type cargo aircraft or simulated equivalent
- h. Environmental chambers for:
 - 1) Temperature - humidity testing
 - 2) Fungus testing
 - 3) Dust testing
 - 4) Sunshine testing
 - 5) Water immersion testing
 - 6) Salt fog testing
 - 7) Rain testing
- i. Fire fighting equipment
- j. First aid equipment
- k. Accelerometers

4. REFERENCES

- A. AR 70-38, Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions.
- B. MIL-STD-810B, Environmental Test Methods.
- C. MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment and Facilities.
- D. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing.
- E. USAMC Pamphlet 706-134, Engineering Design Handbook: Maintainability Guide for Design.
- F. Woodson, W. E., and Conover, D. J., Human Engineering Guide for Equipment Designers, 2nd Edition, Berkeley: University of California Press, 1964.
- G. MTP 7-1-002, Air Portability and Airdrop Service Testing.
- H. MTP 7-2-509, Airdrop Capability of Materiel (General).
- I. MTP 7-2-515, Air Transport (Suitability of Equipment for).
- J. MTP 8-2-500, Receipt Inspection.
- K. MTP 8-2-503, Rough Handling and Surface Transport.
- L. MTP 8-2-512, Leak Testing of Agent-Filled Munitions and Containers.

5. SCOPE

5.1 SUMMARY

The procedures required in this MTP are divided into a series of subtests. The sequence may be modified by the test plan. The receipt inspection subtest must be performed first to ascertain the condition of test items as received from their manufacturer; the safety tests should be performed next to reveal any unforeseen hazards; the outdoor performance tests should be performed last. In preparing the test plan, consideration should be given to the number of test items available, their susceptibility to damage, time, availability of facilities, reliability and confidence limits set by QMR's and SDR's, and budget limitations. Tests deemed most likely to cause failure should be performed first so that the developing agency may have the earliest possible notice of the deficiency.

The following subtests comprise the complete procedures:

a. Receipt inspection - An inspection of the test items as received to (1) determine their physical characteristics and conditions, (2) locate any defects, and (3) identify damage received during transport. During this inspection the test items will also be serially numbered for subsequent identification.

b. Safety evaluation - The objective of this procedure is to check the safety statement issued by the developing agency and to identify the safety hazards, if any, which must be included in the safety release recommendation required by reference 4D (USATECOM Regulation 385-6).

c. Simulated environmental testing - A study to determine the effects of extreme temperatures, fungus, humidity, dust, sunshine, and fresh and salt water on the test item.

d. Rough handling and surface transport - A study to determine the effects of rough handling and surface transport on the physical and operational characteristics of the test item.

e. Air transportability - A study to determine the effects of air transport conditions on the physical and operational characteristics of the test item.

f. Airdrop capability - A study to determine the effects on the test item resulting from its being subjected to airdrop conditions.

g. Leak testing - A study to determine if the test item leaks when subjected to standard leak tests and conditions.

h. Operational reliability - A study to determine if the test item meets specified reliability criteria.

i. Maintenance aspects - A study to determine the maintenance required and to evaluate the test item design from the standpoint of maintainability.

j. Human factors aspects - A study to determine whether the equipment can be used effectively by Army personnel.

k. Agent-hardware compatibility - A study to determine if the item and its fuel are compatible.

5.2 LIMITATIONS

None

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Prescheduling Conditions

a. A suitable test site must be available with fire fighting and first aid equipment immediately available.

b. A meteorological forecast must be available before the conduct of each outdoor subtest to prevent wasted effort in unsuitable weather.

6.1.2 Safety Statement

The test officer will ensure that a safety statement has been received from the developing agency before testing is commenced and that it is understood by all test personnel. The safety statement includes information pertaining to the test item's operational limitations and specifies hazards peculiar to the item or components which are to be tested.

6.1.3 Safety Procedures

a. Test plans and procedures will ensure performance in the safest manner consistent with accomplishing the mission. Plans will include safety procedures, precautions, protections, and emergency procedures as necessary. Technical information on the hazards and safety characteristics of the test item as provided by the safety statement and other pertinent information will be included. Such information will include an evaluation of potential hazards, analysis of risks, limitations, and precautions, including special test equipment and techniques that should be incorporated in test plans and procedures.

b. One specific individual will be charged with responsibility for safety. He will be familiar with the construction and operation of the test item and its critical components, will have full knowledge of the hazards and safety aspects of the test, will review test procedures for evaluation of hazards, and will recommend control measures.

c. All personnel who participate in or observe the tests will be briefed on the proper test methods and procedures.

d. When dealing with flamethrowers, all test personnel must be conscious not only of the hazards which may be encountered during normal conditions, but also of those which could be encountered under the worst conditions of malfunctioning, accidents, or emergencies.

e. A record will be kept of any injuries suffered by test personnel during testing, regardless of how minor they may be and regardless of their relevance to testing.

6.1.4 Security

Security considerations will be determined and provided for as applicable to each of the procedures described in this MTP.

6.1.5 Logistical Requirements

Prior to the conduct of any subtest, the test officer will ensure that all logistical requirements are satisfied.

6.2 TEST CONDUCT

6.2.1 Receipt Inspection

Subject the test item to the applicable procedures of MTP 8-2-500 following its arrival at the test site, with emphasis on the following:

a. Visually inspect the package/crate and record the following:

1) Damage (undone binding, dents, punctures, etc.)

- 2) Corroded or mildewed parts
- 3) Illegible or missing markings
- 4) Incorrect labeling

b. Measure and record the external dimensions and weight of the packaged test item.

c. Unpack the test item and serially number and identify each test item to be used.

d. Visually inspect the test item and record all deficiencies, specifically the following:

- 1) Missing components.
- 2) Incorrect assembly of components.
- 3) Body cracks or deformations.
- 4) Corrosion of metal parts.
- 5) Missing or outdated inspection records for pressure rating tests of tanks, hose, etc.
- 6) Missing manuals, repair parts, etc.

e. Measure and record the external dimensions and weight of the ready-to-operate test item.

f. Subject the test item to the leak test procedures of paragraph 6.2.7.

g. Verify the operability of the test item by subjecting it to the procedures of paragraph 6.2.8.

h. Photograph:

- 1) A complete test item, including packages, showing scale
- 2) Any defective test items

6.2.2 Safety Evaluation

NOTE: This test will be conducted in accordance with all the safety SOP's and local regulations pertaining to safety, plus special provisions applicable or peculiar to the specific item or class of items.

Determine the test item's safety by performing the following:

a. Observe the handling and use of the test item in accordance with existing instructions, directives, and similar guidance. Record any hazardous conditions.

b. Observe for, and record any information for inclusion in the safety release described in reference 4D (USATECOM Regulation 385-6).

c. Perform additional checks as required to verify all the safety aspects included in the safety statement. Record deficiencies and recommended inclusions.

d. In addition, perform the following:

- 1) Record types of fire fighting equipment which are applicable for type of fuel used.

- 2) Record type of gas to be used in pressurizing tanks.
- 3) Calibrate pressure gage and regulator.
- 4) Verify that the developing agency has pressure-checked the pressure equipment.
- 5) Verify that all safety devices on the flamethrower are in operable condition.

6.2.3 Simulated Environmental Testing

6.2.3.1 Extreme Temperature Tests

Unless otherwise directed, the fully fueled and pressurized test item will be subjected to the following tests:

NOTE: Current types of ignition cylinders normally are not removed from their sealed containers until just prior to use. They are not to be installed in the flame gun for the extended chamber tests unless so specified by the QMR, SDR, or instructions from the developing agency. A record will be kept indicating at which point the ignition cylinder was installed during a subtest.

6.2.3.1.1 Low-temperature Tests - Place a minimum of 6 test items which have successfully passed the leak test of paragraph 6.2.7 in a temperature chamber and perform the following:

- a. Measure and record tank pressure.
- b. Reduce the chamber temperature to -45.6°C (-50°F), maintain it at -45.6°C for a period of 72 hours and then perform the following:
 - 1) Visually inspect the test items and record any damage
 - 2) Measure tank pressure and record change
- c. Raise the chamber temperature to -26°C (-14.8°F) or the test item's minimum operating temperature as established by design requirements, and maintain this temperature until stabilization is reached. If stabilization is attained in less than 24 hours, maintain temperature for a complete 24-hour interval. Perform the following:

NOTE: Stabilization, unless otherwise specified, is considered to be reached when the temperature of the test item does not change more than 2°C (3.6°F) per hour.

- 1) Visually inspect the test items, and record damage.
- 2) Record any change in tank pressure.
- 3) Remove 1/3 of the test items from the chamber and perform the leak test of paragraph 6.2.7.
- 4) Verify the operability of the test items by subjecting them to the procedures of paragraph 6.2.8.
- 5) Obtain photographs as required.

NOTE: Operability checks should be accomplished within 15 minutes of removing the test items from the chamber.

d. Remove the remaining test items from the chamber and allow the test items to stabilize at local ambient temperature, and perform the following:

- 1) Visually inspect the test items and record damage.
- 2) Obtain photographs as required.
- 3) Subject 1/2 of the test items to the leak test procedures of paragraph 6.2.7.
- 4) Verify the operability of the remaining items by subjecting them to the procedures of paragraph 6.2.8.

6.2.3.1.2 High-Temperature Tests - Place a minimum of 8 test items which have successfully passed the leak test of paragraph 6.2.7 in a temperature chamber and perform the following:

a. Measure and record tank pressure.

b. Adjust the temperature of the chamber to 68.3°C (155°F) and a relative humidity of 15 percent, and maintain these conditions for a minimum of 4 hours; and perform the following:

- 1) Visually inspect the test items and record damage
- 2) Measure tank pressure and record change

c. Adjust the chamber to a temperature of 48.9°C (120°F) and a relative humidity of no more than 15 percent and maintain these conditions for a minimum of 24 hours, and perform the following:

- 1) Visually inspect the test items and record any damage.
- 2) Measure tank pressure and record change.
- 3) Remove 1/2 of the test items from the chamber and perform the following:
 - a) Subject 1/2 of the test items to the leak test procedures of paragraph 6.2.7.
 - b) Verify the operability of the remaining test items by subjecting them to the procedures of paragraph 6.2.8.
 - c) Obtain photographs as required.

d. Remove the remaining test items from the chamber, and allow the test items to stabilize at local ambient temperature and perform the following:

- 1) Visually inspect the test items and record damage.
- 2) Subject 1/2 of the test items to the leak test procedures of paragraph 6.2.7.
- 3) Verify the operability of the remaining test items by subjecting them to the procedures of paragraph 6.2.8.
- 4) Disassemble one of the test items and inspect gaskets and other components for deterioration.

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6.2.3.2 Fungus Test

- a. Subject a minimum of 4 test items to the fungus test of Procedure I, Method 508, reference 4B (MIL-STD-810B).
- b. At the completion of the exposure period, perform the following:
 - 1) Visually inspect the items, and record any signs of corrosion.
 - 2) Disassemble 1/2 of the test items and record if any fungus growth is visible on the test item and/or components.
 - 3) Verify the operability of the test item by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.3 Humidity Test

- a. Subject a minimum of 4 test items to the humidity cycling of Procedure I, Method 507, reference 4B (MIL-STD-810B).
- b. At the completion of the cycling period, perform the following:
 - 1) Visually inspect the items and record signs of corrosion.
 - 2) Disassembly 1/2 of the test items and inspect the components for corrosion and/or deterioration.
 - 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.4 Dust Test

- a. Subject a minimum of 4 test items to the exposure conditions of Procedure I, Method 510, reference 4B (MIL-STD-810B).

NOTE: The 16-hour holding period in step 2 of Method 510 will be omitted.

- b. At the completion of the exposure period, perform the following:
 - 1) Visually inspect the test items and record surface damage.
 - 2) Disassemble 1/2 of the test items and inspect the components for presence of dust.
 - 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.5 Sunshine Test

- a. Subject a minimum of 4 test items to the sunshine conditions of

Procedure I, Method 505, reference 4B (MIL-STD-810B).

- b. Measure and record tank pressure.
- c. At the completion of the exposure period, perform the following:
 - 1) Measure tank pressure and record change.
 - 2) Visually inspect the test items and record surface damage, such as deterioration of natural rubber and plastics.
 - 3) Subject 1/2 of the test items to the leak test procedures of paragraph 6.2.7.
 - 4) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.6 Water Immersion Tests

a. Subject a minimum of 4 test items, fully crated, to the water immersion tests of Procedure I, Method 512, reference 4B (MIL-STD-810B). (If design requirements establish depth of water, water temperature, or time of immersion different from the standard procedure, the test plan will so state.)

b. At the completion of the immersion test, remove two of the test items from their containers, and perform the following:

- 1) Examine the test items for evidence of water penetration.
- 2) Subject the remaining test items to the operability test of paragraph 6.2.8.

6.2.3.7 Salt Fog Test

a. Subject a minimum of 6 test items to the salt fog exposure of Procedure I, Method 509, reference 4B (MIL-STD-810B).

b. At the completion of the exposure, perform the following:

- 1) Rinse the test items with clear water.
- 2) Visually inspect the test item for the presence of corrosion.
- 3) Disassemble 1/3 of the test items and inspect the components for evidence of water penetration and corrosion.
- 4) Subject 1/3 of the test items to the leakage test of paragraph 6.2.7.
- 5) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.8 Rain Test

a. Subject a minimum of 6 test items to the rain conditions of Procedure I, Method 506, reference 4B (MIL-STD-810B).

b. At the completion of the rain exposure, perform the following:

- 1) Visually inspect the test items for the presence of corrosion.
- 2) Disassemble 1/3 of the test items and inspect the components for evidence of water penetration and corrosion.
- 3) Subject 1/3 of the test items to the leakage test of paragraph 6.2.7.

- 4) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.4 Rough Handling and Surface Transport Tests

a. Subject a minimum of 4 test items packaged in their original containers, to the following procedures of MTP 8-2-503:

- 1) The vibration test of paragraph 6.2.2.2a.3
- 2) The shock test of paragraph 6.2.2.1a.2

b. At the completion of testing, perform the following:

- 1) Examine the test item's packaging for cracks, breaks, undone binding, etc.
- 2) Examine the test items for damage and deformation.
- 3) Subject 1/2 of the test items to the leak test of paragraph 6.2.7.
- 4) Verify the operability of the test item by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.5 Air Transportability

Determine the ease of loading and unloading aircraft as described in the applicable sections of MTP 7-2-515 or as follows:

NOTE: Background information on air transportability is contained in MTP 7-1-002.

a. Load the test items in their shipping containers aboard a typical cargo aircraft or simulated aircraft, using current standard loading equipment, and record the following:

- 1) Type of aircraft used (or simulated).
- 2) Shipping container length, width, height, weight, and material.
- 3) Equipment used for loading.
- 4) Difficulties encountered while loading.
- 5) Method of tiedown.
- 6) Damage sustained by the shipping container during loading.

b. Unload the test items from the aircraft or simulated aircraft, and record the following:

- 1) Equipment used in unloading
- 2) Difficulties encountered while unloading
- 3) Damage sustained by the shipping container during unloading

6.2.6 Airdrop Capability

6.2.6.1 Free Fall Test

NOTE: Perform the following prior to conducting the procedures of paragraph 6.2.6.2.

Subject a minimum of 4 test items, packaged in their original containers, to a free fall drop test.

a. Using a crane with a quick release hook raise the test item, over a specified type surface, to the height specified in the test plan.

b. Release the test item and perform the following:

- 1) Examine the test item's packaging for breaks, undone bindings, etc.
- 2) Examine the test item for damage and deformation.
- 3) Verify the operability of the test item by subjecting it to the procedures of paragraph 6.2.8.

6.2.6.2 Airdrop Container Tests

Subject a minimum of 4 test items packaged in their original container to the applicable sections of MTP 7-2-509 with emphasis on the following:

a. Rig the test container with attached accelerometers in an appropriate airdrop container and drop from typical aircraft as instructed in MTP 7-2-509. Record the following:

- 1) Aircraft type(s) used
- 2) Aircraft airspeed
- 3) Altitude above ground
- 4) Meteorological conditions
- 5) Impact velocities
- 6) Deceleration magnitude at impact in g's

b. Cover the airdrop test procedures with still and movie cameras.

c. At completion of the test, perform the following:

- 1) Examine the test item's packaging for breaks, undone bindings, etc.
- 2) Examine the test items for damage and deformation.
- 3) Subject the test items to the leak test of paragraph 6.2.7.
- 4) Verify the operability of the test items by subjecting them to the procedures of 6.2.8.

6.2.7 Leak Testing

a. Using procedures as described in the applicable portions of MTP 8-2-512 determine if the test item leaks after completing the following sub-tests:

- 1) Receipt inspection (paragraph 6.2.1)
- 2) Simulated environmental testing (paragraph 6.2.3)
- 3) Rough handling and surface transport tests (paragraph 6.2.4)

4) Airdrop capability test (paragraph 6.2.6)

b. Photograph any evidence of damage, leakage or other failings that have a bearing on the evaluation of the test item.

c. When leakage is noted, make local repairs if possible, and retest the item. Record the following:

- 1) Location of leakage
- 2) Repairs made
- 3) Effectiveness of repairs

6.2.8 Operational Reliability

- NOTE: 1. Testing will be in accordance with the conditions and instructions in the test criteria, technical manuals, and other applicable instructions, as required by the QMR, SDR, or TC.
2. The test items undergoing operational testing shall have been subjected previously to the following test procedures:

- a) Simulated environmental testing (paragraph 6.2.3).
- b) Rough handling and surface transport tests (paragraph 6.2.4).
- c) Air transportability test (paragraph 6.2.5).
- d) Airdrop capability test (paragraph 6.2.6).

a. Select a suitable test site. The test site must meet all safety requirements and be of sufficient area to ensure that the flame fuel is confined to the test site.

b. Photograph the test item, auxiliary equipment, and flaming operations.

c. Record the following for each test item:

- 1) Test item identification number
- 2) Meteorological data:
 - a) Ambient temperature
 - b) Relative humidity
 - c) Wind direction and speed
- 3) Fuel data:
 - a) Type of fuel thickener
 - b) Age of fuel
 - c) Fuel mixing and transferring equipment

4) Preliminary preparations:

- a) Fueling and pressurizing methods.
- b) Gas pressure.
- c) Description of ignition cylinder and method of

installation.

d) Preparation time before weapon can be fired.

d. Operate the test items as indicated in applicable SDR's, QMR's or TC's.

e. Record the following for each test item:

1) Firing data:

- a) Duration of sustained burst
- b) Duration of shortest possible burst
- c) Range
- d) Final pressure in tank
- e) Flame description

2) Postoperative procedures

f. At the completion of operational tests, record the following:

- 1) Total number of test items tested
- 2) Number of nonfunctioning test items
- 3) Number of malfunctioning test items
- 4) Reason for nonfunctioning or malfunctioning, if known

6.2.9 Maintenance Characteristics

NOTE: Background information on checking a test item to determine its maintenance aspects is contained in reference 4E (USAMC Pamphlet 706-134).

a. Inspect the test item for deficiencies which will require replacement of components before the item can be tested. Photograph all deficiencies.

b. Inspect the maintenance package for completeness and record any deficiencies.

c. Perform preoperative maintenance tasks in accordance with the test item maintenance manuals, instructions, etc.

d. Record the time and personnel required to perform scheduled and unscheduled maintenance tasks throughout the period of testing.

e. Determine the accuracy and evaluate the adequacy of the test item maintenance package.

f. Note special tools and equipment which are required.

g. Note which maintenance procedures require special skills and the level of personnel training that is required.

h. Evaluate the test item design from maintainability standpoint, including as applicable:

- 1) Use of standardized parts
- 2) Corrosion resistant material and coatings
- 3) Minimum adjustments prior to firing
- 4) Simplified lubrication procedures and schedules
- 5) Adequacy of safety devices

- 6) Long-term storage life of components
- 7) Other

i. Record the following:

- 1) Test item down time (cumulative)
- 2) Time taken between repairs and reasons, if appropriate
- 3) Frequency of repairs
- 4) Nomenclature of repair parts used

6.2.10 Human Factors Aspects

NOTE: Background information on human factors engineering testing is available in reference 4F (Woodson and Conover) and Part I, reference 4C (MIL-STD-1472).

During conduct of the operational tests, observations will be made on the human factors engineering characteristics of the test item. Observe and record the following:

- a. Carrying strap adequacy.
- b. Ease of handling.
- c. Ease of carrying.
- d. Ease of operation.
- e. Level of operating skill required.
- f. Compatibility with clothing and other equipment.
- g. Ease of handling item when wearing protective clothing, gloves, etc. (including cold-weather clothing).
- h. Adequacy and simplicity of operating instructions.
- i. Factors causing frequent complaints from operators.

6.2.11 Agent-Hardware Compatibility

- a. Empty, disassemble, and clean the flamethrower.
- b. Inspect all inside surfaces for evidence of corrosion, pitting, rust, peeling paint, or other damage caused by the fuel. Record findings.
- c. Use photomicrographic techniques to compare the inside surfaces of the empty flamethrower with same surface of an unused flamethrower as obtained from the manufacturer. Record differences.

6.3 TEST DATA

6.3.1 Receipt Inspection

a. Record the data collected as described in applicable sections of MTP 8-2-500 and the following:

- 1) For the test item package:
 - a) Indications of damage (undone binding, dents, punctures, etc.)
 - b) Corroded or mildewed parts

- c) Illegible or missing markings
- d) Incorrect labeling
- e) Length, width, height, in feet and inches
- f) Weight, in pounds

2) For the test item:

- a) All deficiencies to the test item, specifically the following:

- (1) Missing components.
- (2) Incorrect assembly of components.
- (3) Body cracks or deformations.
- (4) Corrosion of metal parts.
- (5) Missing or outdated inspection records for pressure rating tests of tanks, hose, etc.
- (6) Missing manuals, repair parts, etc.
- (7) Height, width and length, in feet and inches.
- (8) Weight, in pounds.

3) Leakage data collected as described in paragraph 6.2.7.

4) Operability data collected as described in paragraph 6.2.8.

b. Retain all photographs.

6.3.2 Safety Evaluation

Record the following:

a. Hazardous features:

- 1) Physical
- 2) Operational
- 3) Action taken to reduce or eliminate

b. Data collected for inclusion in safety release recommendation

c. Deficiencies in safety devices

d. Types of fire fighting equipment

e. Type of gas used in pressurizing tanks

6.3.3 Simulated Environmental Testing

6.3.3.1 Extreme Temperature Tests

6.3.3.1.1 Low-Temperature Tests -

a. Record the following for each test item, as applicable:

- 1) Test item identification number
- 2) For temperature of -45.6°C (-50°F):
 - a) Damages incurred
 - b) Tank pressure before test

- c) Any change in tank pressure during and after test
- 3) For temperature at -26°C (-14.8°F) or test item minimum operating temperature.
 - a) Damages incurred
 - b) Any change in tank pressure during and/or after test
 - c) Leakage data collected as described in paragraph 6.2.7
 - d) Operability data collected as described in paragraph 6.2.8
- 4) For ambient temperature:
 - a) Damages incurred
 - b) Leakage data collected as described in paragraph 6.2.7
 - c) Operability data collected as described in paragraph 6.2.8
 - d) Temperature in $^{\circ}\text{C}$

b. Retain all photographs.

6.3.3.1.2 High-Temperature Tests -

a. Record the following for each test item, as applicable:

- 1) Test item identification number
- 2) For temperature of 68.3°C (155°F):
 - a) Damages incurred
 - b) Tank pressure before and after test
 - c) Any change in tank pressure
- 3) For temperature of 48.9°C (120°F):
 - a) Damages incurred
 - b) Any change in tank pressure
 - c) Leakage data collected as described in paragraph 6.2.7
 - d) Operability data collected as described in paragraph 6.2.8
- 4) For ambient temperature:
 - a) Damages incurred
 - b) Leakage data collected as described in paragraph 6.2.7
 - c) Operability data collected as described in paragraph 6.2.8
 - d) Temperature in $^{\circ}\text{C}$
 - e) Evidence of damage to gaskets and other components

b. Retain all photographs.

6.3.3.2 Fungus Test

Record the following for each test item:

- a. Test item identification number
- b. Presence of fungus growth on:
 - 1) Test item
 - 2) Test item components
- c. Operability data collected as described in paragraph 6.2.8

6.3.3.3 Humidity Test

Record the following for each test item:

- a. Test item identification number
- b. Evidence of corrosion on:
 - 1) Test item
 - 2) Test item components
- c. Operability data collected as described in paragraph 6.2.8

6.3.3.4 Dust Test

Record the following for each test item

- a. Test item identification number
- b. Damage to:
 - 1) External surface
 - 2) Test item components
- c. Presence of dust on test item components
- d. Operability data collected as described in paragraph 6.2.8

6.3.3.5 Sunshine Test

Record the following for each test item:

- a. Test item identification number
- b. Damage to:
 - 1) External surface
 - 2) Test item components
- c. Leakage data collected as described in paragraph 6.2.7
- d. Operability data collected as described in paragraph 6.2.8
- e. Tank pressure before test
- f. Any change in tank pressure during and/or after test

6.3.3.6 Water Immersion Tests

Record the following for each test item:

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- a. Test item identification number
- b. Operability data collected as described in paragraph 6.2.8
- c. Evidence of water penetration

6.3.3.7 Salt Fog Test

Record the following for each test item:

- a. Test item identification number
- b. Evidence of corrosion:
 - 1) Test item
 - 2) Test item components
- c. Evidence of water penetration
- d. Leakage data collected as described in paragraph 6.2.7
- e. Operability data collected as described in paragraph 6.2.8

6.3.3.8 Rain Test

Record the following for each test item:

- a. Test item identification number
- b. Presence of corrosion:
 - 1) Test item
 - 2) Test item components
- c. Evidence of water penetration
- d. Leakage data collected as described in paragraph 6.2.7
- e. Operability data collected as described in paragraph 6.2.8

6.3.4 Rough Handling and Surface Transport Tests

Record the following for each test item:

- a. Test item identification number
- b. Data collected as described in applicable sections of MTP 8-2-503
- c. Damage to the test item package (cracks, breaks, etc.)
- d. Damage and deformation to test item exterior
- e. Leakage data collected as described in paragraph 6.2.7
- f. Operability data as described in paragraph 6.2.8

6.3.5 Air Transportability

Record the following:

- a. Data collected as described in applicable sections of MTP 7-2-515
- b. Type of aircraft used or simulated
- c. Shipping container:

- 1) Length, width and height, in inches
 - 2) Weight, in pounds
 - 3) Material
- d. Equipment used in loading
 - e. Difficulties encountered while loading
 - f. Damage incurred to the package while loading
 - g. Method of tie down
 - h. Equipment used in unloading
 - i. Difficulties incurred in unloading
 - j. Damage incurred to the package while unloading

6.3.6 Airdrop Capability

6.3.6.1 Free Fall Test

Record the following:

- a. Test item identification number
- b. Height of fall in feet and inches
- c. Type of surface (metal, wood, etc.)
- d. For test item package:
 - 1) Packaging material used
 - 2) Presence of cracks, breaks, etc.
 - 3) Undone binding
- e. For test item:
 - 1) Damage or deformities
 - 2) Operability data collected as described in paragraph 6.2.8

6.3.6.2 Airdrop Container Tests

- a. Record the following for each test item:
 - 1) Data collected as described in applicable sections of MTP 7-2-509
 - 2) Test item identification number
 - 3) Altitude in feet
 - 4) For test shipping container:
 - a) Presence of cracks, breaks, etc.
 - b) Undone binding, if applicable
 - 5) Damage and deformation to the test item's exterior
 - 6) Leakage data collected as described in paragraph 6.2.7
 - 7) Operability data collected as described in paragraph 6.2.8
 - 8) Aircraft type(s) used
 - 9) Aircraft airspeed in mph
 - 10) Meteorological conditions
 - 11) Impact velocity, in fps

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12) Accelerometer data

b. Retain all photographs

6.3.7 Leak Testing

a. Record the following:

- 1) Location of leakage
- 2) Repairs made
- 3) Effectiveness of repairs

b. Retain all photographs

6.3.8 Operational Reliability

a. Record the following:

1) For each test item performance

- a) Test item identification number
- b) Meteorological data:

- (1) Ambient temperature
- (2) Relative humidity
- (3) Wind direction and speed

c) Fuel data:

- (1) Type of fuel thickener
- (2) Age of fuel
- (3) Fuel mixing and transferring equipment

d) Preliminary preparations:

- (1) Fueling and pressurizing methods.
- (2) Gas pressure.
- (3) Description of ignition cylinder and method of installation.
- (4) Preparation time before weapon can be fired.

e) Firing data:

- (1) Duration of sustained burst
- (2) Duration of shortest possible burst
- (3) Range (maximum possible, minimum safe)
- (4) Final pressure in tank
- (5) Flame description

f) Postoperative procedures

2) At the completion of operational tests:

- a) Total number of test items tested
- b) Number of tests
- c) Number of nonfunctioning test items
- d) Number of malfunctioning test items
- e) Reason for nonfunctioning or malfunctioning, if known

b. Retain all photographs

6.3.9 Maintenance Characteristics

a. Record the following:

- 1) Any deficiencies:
 - a) In maintenance package
 - b) Of test item requiring component replacement
- 2) The time and personnel required to perform scheduled and unscheduled maintenance.
- 3) Special tools required
- 4) Features of design enhancing maintenance by personnel of average skill.
- 5) Component interchangeability.
- 6) Adequacy and accuracy of maintenance documentations.
- 7) Adequacy of safety devices.
- 8) Maintenance category of the test item.
- 9) Nomenclature of repair parts used.
- 10) Test item down time (cumulative).
- 11) Time taken between repairs and reasons, if appropriate.
- 12) Frequency of repairs.

b. Retain all photographs

6.3.10 Human Factors Aspects

Record the following:

- a. Carrying strap adequacy.
- b. Ease of handling and operating the test item.
- c. Ease of handling test item when wearing protective clothing, gloves (including cold-weather clothing).
- d. Ease of carrying.
- e. Level of operating skill required.
- f. Compatibility with field clothing and equipment.
- g. Adequacy and simplicity of operating instructions.
- h. Factors causing frequent complaints from operators.

6.3.11 Agent-Hardware Compatibility

a. Record the following for each test item:

- 1) Test item identification number
- 2) Presence of the following on the test item inner surface:
 - a) Corrosion
 - b) Pitting
 - c) Rust
 - d) Peeling paint
 - e) Other damage caused by fuel
- 3) Effects of fill on flamethrower surface

- b. Retain all photographs
- c. Retain all laboratory analysis

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 Receipt Inspection

- a. Data collected as a result of this procedure shall be presented as indicated in the applicable portions of MTP 8-2-500.
- b. The description of the test item, number of items tested, and conditions upon receipt shall be presented in tabular form.
- c. Photographs shall be used to substantiate results.
- d. The results of the leak and operational check tests shall be presented in narrative or other convenient form.

6.4.2 Safety Evaluation

- a. A Safety Release Recommendation as required by USATECOM Regulation 385-6 shall be forwarded to the U. S. Army Test and Evaluation Command within 30 days of the beginning of the test. The Safety Release Recommendation shall describe special safety considerations or hazards to personnel and materiel, including development types of equipment as well as standard components used in assemblage of item being tested.
- b. Report data and comments relative to the safety hazards observed during any phase of testing.
- c. Report comments relative to suggested safety improvements.

6.4.3 Simulated Environmental Testing

- a. The results of the subtests conducted shall be presented in tabular or other suitable form.
- b. The results of the leak and/or operational check tests performed at the conclusion of the various environmental tests shall be presented in narrative or other suitable form.

6.4.4 Rough Handling and Surface Transport Tests

- a. Rough handling and surface transport data shall be presented as prescribed in MTP 8-2-503.
- b. Vibration and shock data will be presented in tabular form to

indicate test times, distances dropped, shock levels, vibration frequencies, etc., and significant findings of the test. Include photographs of damage.

c. Present data on operation of test item after subjection to rough handling and surface transport conditions, vibration and shock.

6.4.5 Air Transportability

Data shall be presented in summary form as indicated in the applicable portions of MTP 7-1-002, MTP 7-2-515 and other pertinent testing instructions.

6.4.6 Airdrop Capability

a. Present the results of the free fall test in narrative form.

b. The results of the airdrop container subtest shall be presented as prescribed in the applicable portions of MTP 7-2-509.

6.4.7 Leak Testing

a. The results of leak testing shall be presented as prescribed in MTP 8-2-512.

b. Narrative comments, photos, etc., shall be included as required.

6.4.8 Operational Reliability

Data derived from this subtest shall be presented in narrative form supplemented by drawings, photographs, charts, tables, graphs or any other suitable means of displaying information. The report shall clearly conclude whether the test item meets the reliability criteria established in applicable specifications. Recommendations relative to further testing and methods to overcome malfunctions will also be included.

6.4.9 Maintenance Characteristics

Data from this subtest shall be presented in narrative form. The report shall be supplemented by photos, drawings, or other devices to substantiate the conclusions and recommendations.

6.4.10 Human Factors Aspects

a. Data from this subtest shall be presented in tabular, narrative or other suitable form supplemented by photographs and graphic or art presentations as required.

b. A summary of comments regarding shortcomings and recommended improvements, shall be presented.

6.4.11 Agent-Hardware Compatibility

Data from this subtest shall be presented in narrative form and shall clearly indicate whether a type of fuel has an effect on the test item, its components or vice versa. The report will be supplemented by photographs, drawings or other devices required to support the conclusions.

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