

25 August 1969

Materiel Test Procedure 8-2-085
Deseret Test Center

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

SMOKE POTS

AD720980

1. OBJECTIVE

The objective of this commodity engineering Materiel Test Procedure (MTP) is to establish uniform procedures for determining and evaluating the technical performance of smoke pots, 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 test items in the hands of Army troops and the suitability of item for service testing.

2. BACKGROUND

Smoke pots are portable containers filled with an agent capable of producing large quantities of screening smoke. There are two types: floating and nonfloating.

Smoke pots are sufficiently effective to be used as the main smoke generating sources during small-area screening operations. In large-area screening operations they are particularly useful as void fillers. In order to extend the smoke generating time, the pots are used in stacked or end-to-end configurations.

Because of their relatively small size and weight, smoke pots permit the smoke generator battalions to respond rapidly and flexibly to changes in tactical and weather situations.

3. REQUIRED EQUIPMENT

a. Facilities:

- 1) Suitable area for dissemination of smoke
- 2) Environmental test chambers offering controlled:
 - a) Temperature and humidity (-80°F, + 160°F, 95%RH)
 - b) Salt fog
 - c) Dust
 - d) Pressure-altitude
 - e) Sunshine
 - f) Fungus
 - g) Rain

b. Meteorological Equipment:

- 1) Temperature recording equipment
- 2) Anemometers

DDC
RECEIVED
APR 1 1971
C

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
Springfield, Va. 22151

-1-

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

26

3) Humidity recording equipment

- c. Smoke Observation and Sampling Equipment
- d. First Aid and Medical Supplies
- e. Photographic Equipment (color and black-and-white):
 - 1) Still camera and film
 - 2) Motion-picture cameras and film
- f. Photomicrographic Equipment
- g. Helicopters
- h. Control smoke pots, if required

4. REFERENCES

- A. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing
- B. MIL-STD-331, Fuzes and Fuze Components
- C. MIL-STD-810B, Environmental Test Methods
- D. USAMC Pam 706-134, Engineering Design Handbook. Maintainability Guide for Design
- E. MTP 7-1-002, Air Portability and Airdrop Service Testing
- F. MTP 7-2-509, Airdrop Capability of Materiel
- G. MTP 7-2-515, Air Transport (Suitability of Equipment for)
- H. MTP 8-2-500, Receipt Inspection
- I. MTP 8-2-503, Rough Handling and Surface Transport
- J. MTP 8-2-512, Leak Testing of Agent-Filled Munitions and Containers
- K. MTP 8-2-513, Dissemination Characteristics, CB Munitions/Dissemination Devices

5. SCOPE

5.1 SUMMARY

The subtests outlined in this MTP provide general procedures for determining the technical performance of the test items. Specific testing requirements and procedures will be dictated by the performance and characteristics criteria for the test item.

The following procedures shall be performed on a selective basis as required to determine if the test item meets the criteria established:

NOTE: Although the details are described in successive paragraphs, the sequence may be modified in the test plan except that receipt inspection must be performed first, safety tests next and outdoor performance test last. Subtests deemed most likely to cause failure should be performed first (after receipt inspection and safety tests) so that the developing agency may have the earliest possible notice of deficiency.

BLANK PAGE

a. Receipt Inspection - An inspection of the test items, as received, to (1) determine their physical characteristics and conditions, (2) locate any defects they might have, 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 hazards, if any, which must be included in the Safety Release Recommendation required by reference 4A (USATECOM Regulation 385-6).

c. Simulated Environmental Testing - A study to determine the effects of cyclic storage, 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. Dissemination Characteristics - A study to determine if the test item meets the established criteria for dissemination of its chemical agent fill.

h. Leak Testing - A study to determine if the test item leaks when subjected to standard conditions.

i. Maintenance Aspects - A study to determine the maintenance required if the components have been damaged by leakage, etc, and to evaluate the test item design from the standpoint of maintainability.

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

k. Agent-hardware Compatibility - A study to determine if the chemical agent fill and casing are compatible.

l. Human Factors Aspects - A study to determine whether or to what extent the demands of human engineering have been met in the design of the test item.

5.2 LIMITATIONS

None

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Prescheduling Conditions

a. Smoke observation and sampling equipment must be available at a suitable test site.

b. 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 commencing testing 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.

6.1.1 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 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 munitions, all test personnel must constantly consider not only the hazards which may be encountered during normal conditions, but also 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 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

The test item will be subjected 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 smoke pot containers and record the following:
 - 1) Damage (broken seals, dents, punctures, etc.)

- 2) Evidence of ignited smoke pots
- 3) Rust or corrosion of metal
- 4) Illegible or missing markings
- 5) Incorrect labeling

b. Test item inspection

- 1) Visually inspect a random sample of test items, and record all deficiencies, specifically the following:
 - a) Missing components
 - b) Incorrect assembly of components
 - c) Body cracks or open body seams

NOTE: If the body of a smoke pot is split open at a seam or crack and the agent filling can be seen, determine if the filling is cracked or agglomerated.

- d) Other deterioration of the smoke pot body
 - e) Corrosion of metal parts
 - f) Loose or missing closure or filling plugs
 - g) Nomenclature markings
- 2) Determine whether any of a random sample of the test items show evidence of leakage by performing the procedure described in paragraph 6.2.8.

c. Determine and record the following:

- 1) Length, width, height, and weight of the packaged test item.
- 2) Length and diameter or width and height and weight of a random sampling of ready-to-operate test items.

- d. Serially number and identify each test item to be used
- e. Photograph the defective test items

6.2.2 Safety Evaluation

Determine the safety of the test item by performing the following procedures:

NOTE: The procedures to follow will be used to verify the safety aspects included in the safety statement prepared by the developing agency.

6.2.2.1 Forty-Foot Drop Test

- a. Subject a minimum of 5 test item containers (cases of test items as packaged for shipment) to the 40-foot drop test of Test 103, reference 4B (MIL-STD-331).
- b. At the completion of the drop test, perform the following:

- 1) Record the number of test items that ignited.
- 2) Visually inspect the test items, and record any damage or deformation.
- 3) Disassemble the test items, and record if ignition or burning has taken place.
- 4) Photograph damage and evidence of burning.

6.2.2.2 Five-Foot Drop Test

a. Subject a minimum of 10 test items, packed in their individual containers, with ignition elements, to the 5-foot drop test of Test 111, reference 4B (MIL-STD-331).

b. At the completion of the drop test, perform the following:

- 1) Record the number of test items that ignited.
- 2) Visually inspect the test items, and record any damage or deformation.
- 3) Disassemble the test items, and record if ignition or burning has occurred.
- 4) Photograph damage and evidence of burning.

c. If test plan and safety statement permit, repeat steps a and b with unpacked smoke pots (removed from their individual containers).

6.2.2.3 Safety Statement Verification and Safety Release Recommendation

a. Perform additional checks as required to verify all the safety aspects included in the safety statement prepared by the developing agency.

b. Collect data to be included in the safety release recommendation required by reference A (USATECOM Regulation 385-6).

6.2.3 Simulated Environmental Testing

6.2.3.1 Cyclic Storage

a. Subject a minimum of five test items in their packing container to cycles of climatic extremes. A cycle shall consist of three weeks duration as follows: Successive one week test at humid, low temperature, and high temperature. Chamber conditions for each climatic condition are as follows:

- 1) Humid Storage. The chamber shall be maintained at $113^{\circ}\text{F} \pm 2^{\circ}\text{F}$ and 85% R.H. for the duration of the test.
- 2) Low Temperature Storage. The chamber shall be maintained at $-65^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for the duration of the test.
- 3) High Temperature Storage. The chamber shall be maintained at $160^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for the duration of the test.

b. Subject the test item to a minimum of three such cycles, or more if specified. Upon completion of each cycle, the container and contents shall be examined for damage.

6.2.3.2 Extreme Temperature Tests

Unless obviated by design requirements, the test item shall be subjected to the following temperature tests:

6.2.3.2.1 Low Temperature Tests - Place a minimum of 12 test items which have successfully passed the leak test of paragraph 6.2.8 in a test chamber, and perform the following:

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

b. Raise the chamber temperature to -53.9°C (-65°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 temperatures 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) Remove 1/3 of the test items, and verify operability as described in paragraph 6.2.10.

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

c. Increase the chamber temperature to 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 6.2.8.
- 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.10.

6.2.3.2.2 High Temperature Tests - Place a minimum of 16 test items which have successfully passed the leak test of paragraph 6.2.8 in a temperature chamber, and perform the following:

a. Adjust the temperature of the chamber to 71°C (160°F), and a relative humidity not in excess of 15 percent, and maintain these conditions for a minimum of 48 hours, then visually inspect the test items and record any damage.

b. 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. Then perform the following:

- 1) Visually inspect the test items, and record any damage.
- 2) Remove 1/2 of the test items, and perform the following:
 - a) Subject 1/2 of the test items to the leak test procedures of paragraph 6.2.8.

- b) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.10.
- c. Adjust the chamber to local ambient temperatures and humidity, and perform the following:

- 1) Visually inspect the test items, and record any damage.
- 2) Subject 1/2 of the test items to the leak test procedures of paragraph 6.2.8.
- 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.10.

6.2.3.3 Fungus Test

a. Subject a minimum of 10 test items with ignition elements to the fungus test of Procedure I, Method 508, reference 4C (MIL-STD-810B).

b. At the completion of the cycling period, perform the following:

- 1) Visually inspect the items, and record any signs of fungus.
- 2) Disassemble 1/2 of the test items, and inspect the components for the presence of fungus.
- 3) Verify the operability of the test items by subjecting the remaining test items the procedures of paragraph 6.2.10.

6.2.3.4 Humidity Test

a. Subject a minimum of 10 test items, with ignition elements, to the humidity cycling of Procedure I, Method 507, reference 4C (MIL-STD-810B).

b. At the completion of the cycling period, perform the following:

- 1) Visually inspect the items, and record any signs of corrosion.
- 2) Disassemble 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 6.2.10.

6.2.3.5 Dust Test

a. Subject a minimum of 10 test items, with ignition elements, to exposure conditions of Procedure I, Method 610, reference 4C (MIL-STD-810B).

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

- 1) Visually inspect the test items, and record any surface damage noted.
- 2) Disassemble 1/2 of the test items, and inspect the components for damage and presence of dust.
- 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.10.

6.2.3.6 Sunshine Test

a. Subject a minimum of 10 test items, with ignition elements, to the

sunshine conditions of Procedure I, Method 505, reference 4C (MIL-STD-810B).

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

- 1) Visually inspect the test items, and record surface damage noted, such as deterioration of natural rubber and plastics.
- 2) Subject 1/2 of the test items to the leak test of paragraph 6.2.8.
- 3) Verify the operability of the test items by subjecting the remaining items to the procedures of paragraph 6.2.11.

6.2.3.7 Water Immersion Tests

a. Subject a minimum of 3 cases of test items, with ignition elements to the tests described under Procedure I, Method 512, reference 4C (MIL-STD-810B). (If design requirements establish depth of water, water temperature, or time of immersion different from the standard procedures, the test plan will so state.) Record the following, as applicable:

- 1) Presence of bubbling
- 2) Immersion time to bubbling
- 3) Test conditions

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

- 1) Disassemble 1/3 of the test items, and inspect their components for evidence of water penetration.
- 2) Subject 1/3 of the test items to the leak test procedures of paragraph 6.2.8.
- 3) Subject the remaining test items to the operability test of paragraph 6.2.10.

c. If circumstances permit, repeat steps a and b with a minimum of 15 unpacked test items, with ignition elements.

6.2.3.2 Salt Fog Test

a. Subject a minimum of 15 test items, with ignition elements, to the procedures of Procedure I, Method 509, reference 4C (MIL-STD-810B).

b. At the completion of the salt fog spray exposure, perform the following:

- 1) Rinse the test items with clear water.
- 2) Visually inspect the test items for the presence of corrosion.
- 3) Disassemble 1/3 of the test items, and inspect their components for evidence of water penetration and corrosion.
- 4) Subject 1/3 of the test items to the leakage test of paragraph 6.2.8.
- 5) Verify the operability of the test items by subjecting the remaining items to the procedures of paragraph 6.2.10.

6.2.3.9 Rain Test

- a. Subject a minimum of 15 test items, with ignition elements, to the rain conditions of Procedure I, Method 506, reference 4C (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 6.2.8.
- 4) Verify the operability of the test item by subjecting the remaining items to the procedures of paragraph 6.2.10.

6.2.4 Rough Handling and Surface Transport Tests

6.2.4.1 Handling and Transportation Test

- a. Subject a minimum of 10 test items, with ignition elements, packaged in their original containers, to the following procedures of MTP 8-2-503, including the following:

- 1) Shock Procedure of paragraph 6.2.2.1, a.2
- 2) Vibration Procedure of paragraph 6.2.2.2, a.3 and 6.2.2.2.a.4

- 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/or deformation.
- 3) Subject 1/2 of the test items to the leak test of paragraph 6.2.8.
- 4) Verify the operability of the test item by subjecting the remaining items to the procedures of paragraph 6.2.10.

6.2.4.2 Vibration Test

- a. Subject a minimum of 10 test items, with ignition elements, in a ready-to-operate condition, to the procedures of equipment category g (shipment by common carrier). Procedure XI, Method 514, reference 4C (MIL-STD-810B).

- b. At the completion of testing, repeat the procedures of paragraph 6.2.4.1.b.

6.2.4.3 Shock Test

- a. Subject a minimum of 10 test items, with ignition elements, in a ready-to-operate condition, to each applicable transit test of Procedure II, Method 516, reference 4C (MIL-STD-810B).

- b. At the completion of each transit test performed, repeat the procedures of paragraph 6.2.4.1.b.

6.2.3 Air Transportability

Determine the effects of changes of pressure-altitude, vibration, and loading and unloading from an aircraft as follows.

6.2.5.1 Loading and Unloading

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 reference F (MTP 7-1-002).

a. Load a suitably determined number of test items, in their shipping containers, aboard a typical cargo aircraft or simulated aircraft, using 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) Any 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

6.2.5.2 Simulated Flight Test

a. Subject a minimum of 10 test items, with ignition elements, in their shipping containers, to the following simulated conditions simultaneously:

- 1) Ambient pressure at altitude of 50,000 ft (or maximum altitude at which the test item must be capable of being flown, if stated in design requirements).
- 2) Flight vibration conditions as described in procedures for equipment class g (shipment by common carrier) of Procedure X, Method 514, reference 4C (MIL-STD-810B). The test level shall be in accordance with Curve AB, Figure 514-6, and Time Schedule IV of Table 514-II in the referenced Procedure.

b. At completion of the simulated altitude and vibration test, subject the test items to the procedures of paragraph 6.2.4.1.b.

6.2.6 Airdrop Capability

Subject a minimum of 10 test items, packaged in their original containers, to the applicable sections of MTP 7-2-509, as follows:

a. Rig the test containers, with accelerometers attached, in appropriate airdrop containers, and drop the containers from typical aircraft as instructed by the referenced MTP. Record the following:

- 1) Aircraft type(s) used
- 2) Aircraft airspeed
- 3) Altitude
- 4) Air delivery system trajectory
- 5) Meteorological conditions
- 6) Impact velocities
- 7) Deceleration magnitude at impact in g's

b. Conduct visual coverage of the airdrop test procedures with still and motion cameras.

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

- 1) Examine the test item's packaging for breaks, undone blottings, etc.
- 2) Examine the test items for damage and deformation.
- 3) Subject 1/2 of the test items to the leakage test of paragraph 6.2.8.
- 4) Verify the operability of the test items by subjecting the remaining test items to the procedures of 6.2.10.

6.2.7 Dissemination Characteristics

NOTE: This particular subtest is essentially nonreproducible because of the variability of the many atmospheric conditions which affect dissemination characteristics. It is recommended that a control group of current standard items of a similar nature be tested and observed simultaneously with the test items to permit comparison of performance.

a. Determine the dissemination characteristics of test items as described in the applicable sections of MTP 8-2-513.

b. In addition to the data collected above, record the following:

- 1) Description of sampling techniques.
- 2) Results of sampling and analysis.
- 3) Description of smoke screen and dispersion characteristics.
- 4) Lighting relationship of observers (cameras), smoke screen, and illumination source.
- 5) Light meter readings of incident and reflected light from cloud and from background.
- 6) Type of background (trees, rock, water, etc) and color.
- 7) Type of surface in foreground and beneath smoke screen (soil, rock, water, grass, etc) and color.
- 8) Meteorological data consisting of:

- a) Temperature and temperature gradient
- b) Barometric pressure
- c) Wind speed and direction
- d) Relative humidity
- e) Cloud conditions

c. Obtain motion pictures of the testing from initial functioning to final screen dispersion.

6.2.8 Leak Testing

Determine if the test item leaks as described in the applicable section of MTP 8-2-512 after completing the following subtests:

- a. Extreme temperature test (paragraph 6.2.3.2)
- b. Sunshine test (paragraph 6.2.3.6)
- c. Water immersion tests (paragraph 6.2.3.7)
- d. Salt fog test (paragraph 6.2.3.8)
- e. Rain test (paragraph 6.2.3.9)
- f. Rough handling and surface transport tests (paragraph 6.2.4)
- g. Simulated flight test (paragraph 6.2.5.2)
- h. Airdrop capability test (paragraph 6.2.6)

6.2.9 Maintenance Aspects

a. Determine the maintainability of test items in accordance with reference 4D (USAMC Pam 706-134).

b. Determine and record the following; as applicable:

- 1) Ease of maintenance
- 2) Need for special tools or skills
- 3) Interchangeability of components
- 4) Adequacy and accuracy of the maintenance instructions provided by the manufacturer
- 5) Maintenance category of the test item

c. Obtain and retain in the test file motion pictures showing assembly and disassembly of test items and any repair operations performed.

6.2.10 Operational Reliability

- NOTE: 1. Reliability tests will be conducted in accordance with current Army standard practices unless the test item has exceptional characteristics as noted in its QMR, SDR, TC, or other design requirement documents.
2. The test site will meet all safety requirements for munitions testing and will be of sufficient area to ensure that the smoke clouds are confined to the test site.
 3. The test item undergoing operational reliability testing shall have previously been subject to the following procedures:

MTP 8-2-085
25 August 1969

- a. Simulated environmental tests (paragraph 6.2.3)
 - b. Rough handling surface transportation tests paragraph 6.2.4)
 - c. Simulated flight tests (paragraph 6.2.5.2)
 - d. Airdrop capability (paragraph 6.2.6)
- a. Record the following for all operability tests:
- 1) Nomenclature and description of smoke pot
 - 2) Type of agent fill
 - 3) Quantity of agent fill, if required
 - 4) Change in weight of smoke pot
 - 5) Malfunction (i.e. interrupted emission, dud, other)
 - 6) Meteorological data
- b. Obtain photographs and motion pictures for all tests.
- c. Determine test item operability as described in the following procedures, as applicable.

6.2.10.1 Ignition Tests

Subject the test item to ignition and perform the following, as applicable:

- a. For matchhead ignition:
 - 1) Describe matchhead arrangement and method of operation
 - 2) Record the following:
 - a) Number of strokes of scratcher block to obtain ignition
 - b) Difficulties encountered
 - c) Delay time
 - d) Smoke emission time
- b. For fuze ignition:
 - 1) Record fuze nomenclature and method of operation
 - 2) Ignite the fuzes and record
 - a) Delay time
 - b) Smoke emission time
 - c) Difficulties encountered
- c. For electric squib ignition:
 - 1) Record procedures and material used to obtain electrical ignition
 - 2) Ignite the smoke pot and record the following:
 - a) Delay time

- b) Smoke emission time
 - c) Difficulties encountered
- d. For electric fuze:
- 1) Record fuze nomenclature and describe method of operation
 - 2) Describe electrical connections:
 - a) Type of wire
 - b) Type and number of batteries
 - c) Ignition voltage
 - 3) Ignite the fuze and record the following:
 - a) Delay time
 - b) Smoke emission time
 - c) Difficulties encountered
- e. For chain ignition:
- 1) Record the following configuration used (stacked or end-to-end).
 - 2) Nomenclature and number of pots in chain.
 - 3) Method of initial ignition.
 - 4) Smoke emission time per pot.
 - 5) Difficulties encountered.
 - 6) Time required to set up and ignite.

6.2.10.2 Helicopter (Simulated Drop)

a. Drop the test item from a helicopter travelling at normal speed and operating altitude, over loose earth in calm air without precipitation and record the following:

- 1) Altitude from which dropped.
- 2) Speed of helicopter.
- 3) Method of ignition of smoke pot.
- 4) Effect of drop on smoke emission (i.e. interrupted, shortened, other).

b. At the completion of emission inspect the smoke pot and record any damages incurred.

c. Repeat the procedure of steps a and b with the helicopter flying over the following terrain:

- 1) Packed earth
- 2) Water

6.2.11 Agent-Hardware Compatibility

a. Remove agent from smoke pot, and cross-section the pot.

- b. Clean fill from the inner wall of the smoke pot.
- c. Inspect the inner surface of the smoke pot for, and record the presence of corrosion, pitting, rust, peeling paint, or other evidence of injury by the agent fill.
- d. Use photomicrographic techniques to compare the surfaces of the emptied smoke pot casing with same surfaces of an unfilled pot obtained from the manufacturer. Record any differences.
- e. Determine the purity of the agent fill removed from the test item, and compare with the initial purity of the agent as required by the production specification.

6.2.12 Human Factors Aspects

During conduct of the operability tests observations shall be made relative to the human factors engineering characteristics of the test item and the following recorded:

- a. Ease of handling
- b. Adequacy and simplicity of instructions
- c. Special skills required
- d. Special training required

6.3 TEST DATA

6.3.1 Receipt Inspection

- a. Record the following:
 - 1) Data collected as described in the applicable sections of MTP 8-2-500.
 - 2) For the test item containers:
 - a) Damage or deterioration (broken seals, dents, punctures, rust, corrosion).
 - b) Evidence of ignited smoke pots.
 - c) Illegible, incorrect or missing markings and labelling.
 - 3) For the test item:
 - a) Damage or deficiencies
 - b) Leakage data collected as described in paragraph 6.2.8
- b. Retain all photographs

6.3.2 Safety Evaluation

6.3.2.1 40 Foot Drop Test

- a. Record the following for each test item:
 - 1) Test item identification number

- 2) Occurrence of ignition, if applicable
- 3) Damage or deformation incurred
- 4) Internal evidence of burning or ignition

b. Retain all photographs

6.3.2.2 5 Foot Drop Test

a. Record the following for each test item:

- 1) Test item condition (packaged, unpackaged)
- 2) Test item identification number
- 3) Occurrence of ignition
- 4) Damage or deformation incurred
- 5) Internal evidence of burning or ignition

b. Retain all photographs

6.3.3 Simulated Environmental Tests

6.3.3.1 Cyclic Storage

Record the following for each cycle for each test item:

- a. Test item identification number
- b. Cycle number
- c. Damage to:
 - 1) Container
 - 2) Test item

6.3.3.2 Extreme Temperature Tests

6.3.3.2.1 Low Temperature Tests

Record the following for each test item, as applicable:

- a. Test item identification number
- b. For temperature of -80°F :
 - 1) Damages incurred
- c. For minimum operating temperature
 - 1) Test temperature in $^{\circ}\text{F}$
 - 2) Damages incurred
 - 3) Operability data collected as described in paragraph 6.2.10
- d. For ambient temperature:
 - 1) Temperature in $^{\circ}\text{F}$

- 2) Test item damage
- 3) Leakage data collected as described in paragraph 6.2.8
- 4) Operability data collected as described in paragraph 6.2.10

6.3.3.2.2 High Temperature Tests -

Record the following for each test item, as applicable:

- a. Test item identification number
- b. For temperature of 160°F
 - 1) Damages incurred
- c. For temperature of 120°F
 - 1) Damages incurred
 - 2) Leakage data collected as described in paragraph 6.2.8
 - 3) Operability data collected as described in paragraph 6.2.10
- d. For ambient temperature:
 - 1) Temperature in °F
 - 2) Humidity in %
 - 3) Damages incurred
 - 4) Leakage data collected as described in paragraph 6.2.8
 - 5) Operability data collected as described in paragraph 6.2.10

6.3.3.3 Fungus Test

Record the following for each test item:

- a. Test item identification number
- b. Presence of fungus on:
 - 1) Test item
 - 2) Test item components
- c. Operability data collected as described in paragraph 6.2.10

6.3.3.4 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 6.2.10

6.3.3.5 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 6.2.10

6.3.3.6 Sunshine Test

Record the following:

- a. Test item identification number
- b. Damage to:
 - 1) External surface
 - 2) Test item components
- c. Leakage data collected as described in paragraph 6.2.8
- d. Operability data collected as described in paragraph 6.2.10

6.3.3.7 Water Immersion Tests

Record the following for each test item, as applicable:

- a. Test item identification number
- b. During immersion:
 - 1) Depth of water over container, in inches
 - 2) Water temperature, in °F.
 - 3) Presence of bubbling, if any
 - 4) Immersion time to bubbling, if any, in minutes
 - 5) Total immersion time, in minutes
- c. For the test item:
 - 1) Presence of corrosion:
 - a) Test item
 - b) Test item components
 - 2) Presence of water penetration
 - 3) Leakage data collected as described in paragraph 6.2.8
 - 4) Operability data collected as described in paragraph 6.2.10

6.3.3.8 Salt Fog Test

Record the following for each test item, as applicable:

- 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 6.2.8
- e. Operability data collected as described in paragraph 6.2.10

6.3.3.9 Rain Test

Record the following for each test item, as applicable:

- 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 6.2.8
- e. Operability data collected as described in paragraph 6.2.10

6.3.5 Air Transportability

6.3.5.1 Loading/Unloading

Record the following:

- a. Type of aircraft used or simulated
- b. Shipping container:
 - 1) Length, width and height, in inches
 - 2) Weight, in pounds
 - 3) Material
- c. Equipment used in loading
- d. Difficulties encountered while loading
- e. Damage incurred to the container while loading
- f. Equipment used in unloading
- g. Difficulties incurred in unloading
- h. Damage incurred to the container while unloading

6.3.5.2 Simulated Flight Test

Record the following for each test item, as applicable:

- a. Altitude simulated, in feet

- b. Test item identification number
- c. For test item shipping container:
 - 1) Presence of cracks, breaks, etc.
 - 2) Undone binding, if applicable
- d. For test item individual package:
 - 1) Presence of cracks, breaks, etc.
 - 2) Undone binding, if applicable
- e. Damage and deformation to the test item's exterior
- f. Leakage data collected as described in paragraph 6.2.8
- g. Operability data collected as described in paragraph 6.2.10

6.3.6 Airdrop Capability Tests

- a. Record the following for each test item:
 - 1) Test item identification
 - 2) Aircraft used
 - 3) Aircraft airspeed
 - 4) Aircraft altitude
 - 5) Air conditions (calm, turbulent, etc.)
 - 6) Air delivery system trajectory
 - 7) Test item impact velocity, in fps
 - 8) Force of impact, in g's
 - 9) For test item package:
 - a) Presence of cracks, breaks, etc.
 - b) Undone binding
 - 10) For air test items:
 - a) Damage or deformities
 - b) Leakage data collected as described in paragraph 6.2.8
 - c) Operability data collected as described in paragraph 6.2.10
- b. Retain all motion and still pictures

6.3.7 Dissemination Characteristics

- a. Record the following:
 - 1) Test item identification number.
 - 2) Data collected as described in the applicable sections of MTP 8-2-513.
 - 3) Description of sampling techniques.
 - 4) Results of sampling and analysis.
 - 5) Description of smoke screen and dispersion characteristics.

- 6) Lighting relationship of observers (cameras), smoke screen, and illumination source.
- 7) Light meter readings of incident and reflected light from cloud and from background.
- 8) Type of background (trees, rock, water, etc) and color.
- 9) Type of surface in foreground and beneath smoke screen (soil, rock, water, grass, etc.) and color.
- 10) Meteorological data consisting of:
 - a) Temperature in °F.
 - b) Vertical temperature gradient in °F/ft
 - c) Barometric pressure in inches Hg
 - d) Wind speed in fps
 - e) Wind direction
 - f) Relative humidity in percent
 - g) Cloud conditions

b. Retain all motion pictures

6.2.8 Leak Testing

Data shall be collected as described in the applicable sections of MTP 8-2-512.

6.3.9 Maintenance Aspects

a. Record the following:

- 1) Ease of maintenance
- 2) Special tools required for maintenance
- 3) Interchangeability of components
- 4) Adequacy and accuracy of maintenance instructions provided
- 5) Maintenance category

b. Retain all photographs

6.3.10 Operational Reliability

a. Record the following for each operational test performed:

- 1) Test item identification number
- 2) Nomenclature and description of smoke pot
- 3) Type of agent fill
- 4) Quantity of agent fill, if required
- 5) Change in weight of smoke pot
- 6) Type of malfunction, if any
- 7) Meteorological data

b. Retain all photographs and motion pictures

6.3.10.1 Ignition Tests

Record the following:

a. For matchhead ignition:

- 1) Matchhead arrangement
- 2) Method of operation
- 3) Scratcher block strokes required to obtain ignition
- 4) Difficulties encountered in ignition
- 5) Ignition delay time in seconds
- 6) Smoke emission time in minutes

b. For fuze ignition:

- 1) Fuze nomenclature
- 2) Method of operation
- 3) Ignition delay time in seconds
- 4) Smoke emission time in minutes
- 5) Difficulties encountered

c. For electric squib ignition:

- 1) Procedures and material used to obtain electrical ignition
- 2) Ignition delay time in seconds
- 3) Smoke emission time in minutes
- 4) Difficulties encountered

d. For electric fuze:

- 1) Fuze nomenclature
- 2) Method of operation
- 3) For electrical connections:
 - a) Type of wire
 - b) Type and number of batteries
 - c) Ignition voltage
- 4) Ignition delay time in seconds
- 5) Smoke emission time in minutes
- 6) Difficulties

e. For chain ignition:

- 1) Configuration used (stacked or end-to-end)
- 2) Nomenclature and number of pots in chain
- 3) Method of initial ignition
- 4) Smoke emission time per pot, in minutes
- 5) Difficulties encountered
- 6) Time required to; in seconds:
 - a) Set up
 - b) Ignite

6.3.10.2 Helicopter/Simulated Drop

Record the following for each drop:

- a. Altitude of drop in feet
- b. Speed of helicopter in mph
- c. Method of smoke pot ignition
- d. Effect of drop on smoke emission
- e. Type terrain of drop (loose earth, packed earth, water)
- f. Damages incurred due to drop

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
- 3) Effects of fill on casing surface
- 4) Effects of test item components on agent fill

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

6.3.12 Human Factors Aspects

Record the following:

- a. Ease of handling
- b. Adequacy of simplicity of instructions
- c. Special skills required
- d. Special training required

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 Receipt Inspection

- a. Data collected as a result of this procedure will 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 will be presented in tabular form.
- c. Results of the leak subtest shall be presented in narrative or other convenient form.
- d. Photographs and X-ray pictures shall be used to substantiate results.

6.4.2 Safety Evaluation

a. A Safety Release Recommendation as required by USATECOM Regulation 385-6 will be forwarded to the U. S. Army Test and Evaluation Command within 30 days of the beginning of the test. The Safety Release Recommendation will describe special safety considerations or hazards to personnel and materiel, including developmental types of equipment as well as standard components used in assemblage of items 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 will be presented in tabular or other suitable form.

b. The results of the operational check tests performed at the conclusion of the various environmental tests will be presented in narrative or other suitable form.

6.4.4 Rough Handling and Surface Transport Tests

a. Rough handling and surface transport data will 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 Test

Data will 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 Tests

a. The results of the subtest will be presented as prescribed in MTP 7-2-509 and shall include the following:

- 1) Type of aircraft
- 2) Airspeed, altitude, and meteorological conditions
- 3) Packaging material condition after test
- 4) Maximum force, in g's, on opening of parachute and on impact

b. Present narrative comments and data regarding ease or difficulty encountered in accomplishing airdrop. Present photographs as required to indicate results of airdrop.

c. Present data on operation and performance of the test item after airdrop capability subtest.

MTP 8-2-085
25 August 1969

6.4.7 Dissemination Characteristics

- a. The results of this subtest will be presented as prescribed in MTP 8-2-513.
- b. Drawings, tables, charts, photographs, or other means of presentation will be included to report sampling techniques, sampling results, etc.
- c. Narrative comments will be included, as required.

6.4.8 Leak Testing

- a. The results of leak testing will be presented as prescribed in MTP 8-2-512.
- b. Narrative comments, photos, etc., shall be included as required.

6.4.9 Maintenance Aspects

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

6.4.10 Operational Reliability Test

Data derived from this subtest will be presented in narrative form supplemented by drawings, photographs, charts, tables, graphs, or any other suitable means of displaying information. The report will 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.

6.4.11 Agent-Hardware Compatibility

Data from this subtest will be presented in narrative form and will clearly indicate whether a riot agent 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.

6.4.12 Human Factors Aspects

- a. Data from this subtest will 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 will be presented.

ACCESSION NO.	CPSTI	WRITE SECTION	<input checked="" type="checkbox"/>	
	JOC	DIFF SECTION	<input type="checkbox"/>	
	UNANNOUNCED		<input type="checkbox"/>	
	JUSTIFICATION			
BY	DISTRIBUTION/AVAILABILITY CODES			
	DIST. AVAIL. REG. OR SPECIAL			
	A			