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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
Establishes guidance for evaluating the technical performance and safety aspects of smoke and incendiary grenades. Describes procedures for test preparation, receipt inspection, safety, environmental effects, hazardous operations, air transportability, functioning and reliability, human factors engineering, and maintenance. Discusses data reduction and presentation. Limited to testing smoke and incendiary grenades.

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US ARMY TEST AND EVALUATION COMMAND

TEST OPERATIONS PROCEDURE

DRSTE-RP-702-107 July 1984
*Test Operations Procedure 8-2-552
AD No.

GRENADES, HAND OR FIXTURE LAUNCHED, SMOKE/INCENDIARY

1. SCOPE. This Test Operations Procedure (TOP) establishes procedures and guidance for evaluating the technical performance and safety aspects of smoke and incendiary grenades. These procedures include: test preparation, receipt inspection, safety tests, untreated control tests, environmental effects, hazard tests, air transportability, functioning and reliability, human factors engineering, and maintenance aspects. The data reduction and presentation requirements for reporting the results of the testing are described. This TOP does not include procedures for determining dissemination characteristics of smoke and is not applicable to burning-type colored smoke and riot-control grenades. The determination of dissemination characteristics of smoke grenades is addressed in TOP 8-2-557[1]. (Developers should consider environmental field tests of new items to determine functionability after storage in extreme environments. US Army Test and Evaluation Command's (TECOM) Arctic, Desert, and Tropic Test Centers have a unique capability for such tests.)

*This TOP supersedes MTP 8-2-091, dated 25 August 1969.

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[1]Superscript numbers match reference numbers in Appendix C.

2. FACILITIES AND INSTRUMENTATION

2.1 Facilities

Facility	Requirements
Launcher	A device with which to launch the ammunition during service or as stated in the requirements document. Unless otherwise specified, use Launcher, Grenade, Ammunition Peculiar Equipment 1922M1, as listed in TM 43-0001-47[2].
Firing Range	An area sufficient in size to accommodate space and distance requirements for specific tests.
Ammunition Storage and Shop Facilities	Igloos for storage of grenades and shop space for assembly, disassembly, and physical measurements of test grenades.
Fire-Fighting Facilities	Equipment capable of fighting fires generated by incendiary materials.
Chemical Laboratory	Laboratory capable of analyzing smoke and incendiary material.
Nondestructive Laboratory	Laboratory capable of revealing metallurgical defects using magnetic, sonic, hardness, and other testing techniques described in TOPs 3-2-806[3] and 3-2-807[4].
Rough-Handling Equipment	Drop tower, vibrating, bounce, and impact facilities, described in TOPs 4-2-601[5] and 4-2-602[6].
Environmental Chambers	Control temperature from 71°C (160°F)* to -46°C (-50°F) and induce relative humidity (RH) from 2 to 100 percent, as required by the climatic design types of AR 70-38[7], or as specified in the test criteria provided by the materiel developer.

*Fahrenheit-Celsius conversions are based on those of AR 70-38[7].

Environmental Chambers (cont'd)

a. Temperature/humidity	As described in MIL-STD-810[8], Method 507.2, Procedures I, II, and III.
b. Salt fog	As described in MIL-STD-810[8], Method 509.2.
c. Rain	As described in MIL-STD-810[8], Method 506.2, Procedure I.
d. Sand and Dust	As described in MIL-STD-810[8], Method 510.2, Procedures I and II.
e. Low pressure (altitude)	As described in MIL-STD-810[8], Method 500.2, Procedure I.
f. Solar radiation (Sunshine)	As described in MIL-STD-810[8], Method 505.2, Procedures I and II.
g. Fungus	As described in MIL-STD-810[8], Method 508.3.
h. Leakage (Immersion)	As described in MIL-STD-810[8], Method 512.2, Procedure I.

2.2 Instrumentation

Instrument	Requirements and Maximum Error of Measurement
Meteorological Equipment	
a. Temperature	±0.5°C (0.9°F)
b. RH	±2 percent
c. Wind velocity	±0.4 m/sec (0.9 mph)
d. Wind direction	±2.0 degrees
Photooptical Equipment	
a. High-speed still camera	±1 part in 0.001 sec
b. Motion-picture camera	
Weighing Scales	Item weight up to 45 kg (99 lb) ±0.1 percent
Stopwatch	±0.001 sec

3. PREPARATION FOR TEST

3.1 Safety Assessment Report (SAR). Before a test begins, ensure that a SAR is received from the materiel developer. The SAR must include handling precautions, limitations, training needed, and other considerations to be observed during the test.

3.2 Environmental Impact. Ensure that environmental effects of the test are assessed IAW Paragraph 2-16, AR 70-10[9]. Identify any environmental impact data requirements to be satisfied during test conduct.

3.3 Detailed Test Plan (DTP). Receive/complete a DTP before test initiation.

3.4 Launcher. Ensure that there are sufficient grenade launchers to support the munition to be tested. Visually inspect all components for defects.

3.5 Ammunition. Ensure that the test item is received in sufficient quantities to support the requirements of the test.

3.6 Facilities and Equipment. Ascertain that resources are available and scheduled by the test agency to permit accomplishment of the test with minimum interference and delay.

3.7 Instruments. Calibrate all instruments and check for serviceability.

3.8 Training. Complete all training necessary for handling the test items.

4. TEST CONTROLS

4.1 Temperature Limitations. State maximum, minimum, and average temperature required [±2°C (3.6°F)] for chemical storage, laboratory vibration, detonating conditions, and operations required for test items and equipment using AR 70-38[7] ambient information with modifications to offset the effects of platform environment. Record to the nearest 0.5°C.

4.2 Meteorological Conditions. State meteorological restrictions, including temperature, wind direction and speed, visibility, and other parameters for the test item being ignited or detonated.

4.3 Physical Measurements. Record dimensions of the test item to the nearest 0.2 mm (0.01 in) and record weight to the nearest 5 gm (0.01 lb).

4.4 Test Sequence. Conduct tests in optimum sequence to make the most cost-effective and timely use of facilities, equipment, instruments, and personnel. Conduct receipt inspection and safety subtests first. The sequence of other tests should be based upon a continued risk analysis and an estimate of the test conditions under which it is suspected that the test item may not perform satisfactorily.

a. Fungus testing must be conducted after salt fog and dust tests since salt may affect germinating fungal growth and dust can provide nutrients.

b. Immersion tests should be conducted after structural tests to verify structural integrity and resistance to water.

5. PERFORMANCE TESTS. The categories of performance tests for evaluating smoke and incendiary grenades are as follows: receipt inspection, safety tests, untreated control tests, environmental effects, hazard tests, air transportability, functioning and reliability, human factors engineering, and maintenance aspects. Typical subtests for each category are described below, and may be tailored where ever appropriate.

5.1 Receipt Inspection. Conduct the receipt inspection and all storage, handling, and testing operations IAW DARCOMR 385-100[10]. Use procedures in TOP 8-2-500[11] with emphasis on the following:

5.1.1 Data Required

5.1.1.1 Packaging Inspection

a. Record the following (when applicable) (Appendix B, pages B-3 through B-12) for each container, using the forms provided in Appendix B:

(1) Damage to container

(a) Type of container

(b) Evidence of damage or deterioration

(c) Means used to secure, assemble, and protect the container

(2) External evidence of spillage, leakage, corrosion, or other damage to contents

(3) Adequacy and legibility of markings

(a) Identification

(b) Surface shipment

(c) Storage

(d) Air shipment (if applicable)

(4) Presence and adequacy of unpacking instructions

(5) Presence and accuracy of packing list

(6) Physical characteristics

(a) Weight

(b) Length, width, and height

b. Retain all photographs.

5.1.1.2 Grenade Inspection. Record the following for each grenade, using the form provided in Appendix B:

a. Identification markings

(1) Type, model, serial number, and lot number, as appropriate for each test item

(2) Date of manufacturer

b. Results of inspection of items for evidence of:

(1) Deficiencies in manufacture and assembly

(2) Crushing

(3) Cracking

(4) Breaking

(5) Leaking

(6) Spilling

(7) Corrosion

(8) Contamination with foreign material

5.1.1.3 Damaged or Deficient Items. Record the following for each test item, using the form provided in Appendix B:

a. Nature of the damage or deficiency

b. Results of radiographs

c. Indications of internal damage after disassembly

5.1.2 Method

5.1.2.1 Packaging Inspection

a. Visually inspect the shipping container for the following, photographing when appropriate:

(1) Physical damage to container such as broken seals, dents, and punctures

(2) Evidence of ignited or detonated grenades

(3) Identification markings, including:

(a) Type and model of test item

(b) Name of contractor

(c) Number and date of contract

(d) Date of manufacture

(4) Adequacy and legibility of markings for:

(a) Identification

(b) Surface shipment

(c) Air shipment (if applicable)

(d) Storage

(5) Unpacking instructions attached to or stenciled on the shipping container

(6) Packing list attached to exterior of shipping container

b. Measure each shipping container and note the following:

(1) Weight

(2) Length, width, and height

(3) Volume

5.1.2.2 Grenade Inspection and Serialization

a. Uncrate or unpackage the grenades IAW the manufacturer's instructions.

b. Note the type of packaging and materials used and any undue effort required to remove the grenades.

c. Inventory the contents, match against the shipping document, and record discrepancies.

d. Visually inspect all intermediate packaged and unpackaged items and record evidence of crushing, cracking, leaking, corrosion, or other damage.

e. Visually inspect random samples of the test items and record all deficiencies such as:

(1) Missing arming pin. Suitable precautions [e.g., Explosive Ordnance Disposal (EOD) render safe procedures] must be taken with any grenade which has a missing arming pin, because it may ignite or explode upon being removed from its individual container.

(2) Incorrect assembly of arming pins

(3) Inverted arming sleeves

(4) Open body seams or other cracks. If the grenade is cracked or split, inspect the grenade fill to determine whether it is also cracked or agglomerated.

(5) Corrosion of metal parts

(6) Loose or missing closure or filler plugs

(7) Absence of nomenclature markings

f. Mark each test item (damaged or undamaged) with a test item identification number (TIIN) which will be used as the primary identification for each item throughout testing. This number will be cross referenced to all other identifying numbers (manufacturer's, developer's, other) born by the test item.

5.1.2.3 Damaged or Deficient Items

a. For all damaged or deficient items:

(1) Before proceeding with the unpacking, photograph the damage or deficiency.

(2) Mark each item for identification (see above) and segregate it, pending receipt of disposition instructions.

b. For all damaged items:

(1) Radiograph each grenade as described in MTP 8-2-509[12] to determine whether any internal deficiencies exist.

(2) Disassemble, if appropriate, and record indications of internal damage (safety may require remote disassembly).

5.2 Safety Tests. These tests are conducted as part of the safety verification, required by AR 385-16, as supplemented[13]. Information is provided on test item safety as it relates to storage, transportation, rough handling, and exposure to temperature and humidity extremes.

5.2.1 12.2-M (Forty-Foot) Drop Test

5.2.1.1 Data Required

a. Record (Appendix B, page B-13) the following for each test item:

(1) TIIN

(2) Condition of item

(3) Type and apparent extent of damage or deformation

(4) For the disassembled item:

(a) Evidence of damage or corrosion

(b) Evidence of crushed, cracked, or ruptured components

b. Retain all photographs.

5.2.1.2 Method. Drop a representative number of test items with fuze elements, as packaged for bulk shipment, 12.2 m (40 ft) onto a steel plate emplaced on concrete, as described in TOP 4-1-601[5]. Upon completion of the test, perform the following:

a. Unpack and inspect the grenades for damage or deterioration.

b. Note evidence of any exploding, burning, or fuze detonation.

c. X-ray test items and containers, as appropriate.

d. Disassemble test items, as appropriate, and note condition.

e. Photograph any damage, deformation, or evidence of malfunctioning.

5.2.2 1.5-M (Five-Foot) Drop Test

5.2.2.1 Data Required. Record data (Appendix B, page B-13) indicated in Paragraph 5.2.1.1, above.

5.2.2.2 Method. Subject a representative number of unpackaged test items, with fuze elements, to the 1.5-m (5-ft) drop tests described in MTP 4-2-602[6]. For each grenade, perform the steps described in Paragraph 5.2.1.2, above.

5.2.3 Loose Cargo

5.2.3.1 Data Required. Record data (Appendix B, page B-13) indicated in Paragraph 5.2.1.1, above.

5.2.3.2 Method. Subject a representative number of unpackaged test items, with fuze elements, to the transportation of unsecured loose cargo by combat vehicle or truck test, described in TOP 4-2-602[6]. For each test item, perform the steps described in Paragraph 5.2.1.2, above.

5.2.4 Airdrop

5.2.4.1 Data Required. Record data (Appendix B, page B-13) indicated in Paragraph 5.2.1.1, above.

5.2.4.2 Method. Subject a representative number of packaged test items to the simulated air delivery of material described in applicable sections of TOP 7-2-509[14]. Perform the steps listed in Paragraph 5.2.1.2, above.

5.3 Untreated Control Tests. These tests are conducted in order to establish a performance base line. This provides information as to test item performance before being subjected to the various treatments. There are three performance tests: static (for either smoke or incendiary grenades), simulated human dynamic test, and human dynamic test. For each of these tests the grenades are to be preconditioned (temperature and RH only) to one or more of the operational conditions of Table 2.1, AR 70-38[7].

5.3.1 Static Smoke Grenade Test

5.3.1.1 Data Required. Record the following, using the static test functioning and meteorological data forms in Appendix B (Pages B-14 and B-17):

a. Total number of grenades tested

b. TIIN of each grenade

c. Operability of the test item, including:

(1) Fuze delay

(2) Ignition delay

(3) Burning time

(4) Use procedures described in TOP 8-2-557[1].

(5) Force necessary to withdraw safety pin

(6) Force being exerted when failure occurred, if the fuze safety failed during extraction

(7) Occurrences of:

(a) Duds

(b) Flaming, together with relative location and duration

(c) Exploders

(d) Flameouts

(8) Weight of unburned particles

(9) Results of analysis of samples taken from duds, flamers, exploders, and flameouts

d. Noise levels and blast overpressure of functional item at 10 and 15 m from point of ignition or detonation

e. Temperature and RH ranges at which preconditioned

f. Subtests previously undergone (by subparagraph number)

g. Meteorological data, including temperature, RH, wind speed, and direction

NOTE: Retain all photographs.

5.3.1.2 Method

a. Position the test item for static firing. Attach a lanyard to the safety ring (or devise a suitable procedure for remote removal of the safety pin) and fire the grenade.

b. Observe the functioning characteristics of each test item, including fuze delay, ignition delay, burn time, and smoke cloud dimensions and duration.

c. Measure the force necessary to withdraw the fuze safety, or the force which produces failure if the fuze safety failed during extraction.

d. Note any occurrences of:

(1) Duds

(2) Flamers (measure and record the relative location and duration of flaming)

(3) Exploders (evidence of seam rupture, followed by forceful explosion of agent mixture and turnout)

(4) Flameouts

e. Extract samples of fill from duds, flamers, exploders, and flameouts for analysis.

f. Obtain photographic coverage of test item functioning.

5.3.2 Static Incendiary Grenade Test

5.3.2.1 Data Required. Record (1) modifications made to the grenade, (2) composition and thickness of test metals used, (3) diameter of the hole made in the metal samples, and (4) data required in Paragraph 5.3.1.1. Use the static test functioning characteristics and meteorological data forms provided in Appendix B (pages B-14 and B-17) to record the data.

5.3.2.2 Method. Modify the incendiary grenade for electrical or explosive ignition as prescribed by the developing agency or current field manuals. Attach the test item with metal fastenings to metals of various composition (such as steel and cast iron) and thicknesses. Function the items as indicated in Paragraph 5.3.1.2.

5.3.3 Simulated Human Dynamic Test

5.3.3.1 Data Required. Record (Appendix B, pages B-15 and B-17) method of activation and tossing, incident angle of release, distance hurled, and the data required in Paragraph 5.3.1.1.

5.3.3.2 Method. Launch the test items using a weapon launcher or suitable catapult. Hurl the grenades 45±5 meters with an incident angle of release of 45±5 degrees, measured from the grenade trajectory to the ground.

5.3.4 Human Dynamic Test

5.3.4.1 Data Required. Record (Appendix B, pages B-16 and B-17) the method used to activate and toss the grenades together with the data required in Paragraph 5.3.1.1.

5.3.4.2 Method. Activate grenades of functioning by humans according to the appropriate field or technical manual. Have test personnel toss the activated grenades underhand, overhand, or sidearm, as required in the test plan.

5.4 Simulated Environmental Effects. These tests are conducted to determine the effects of various simulated environmental conditions on the test items. Tests designed for this purpose are detailed in the following paragraphs.

5.4.1 Chamber Storage

5.4.1.1 Data Required. Record the following (Appendix B, page B-19) for each storage condition:

a. TIIN

b. Extent of damage or deterioration to:

(1) Container

(2) Test item

5.4.1.2 Method. Subject a representative number of packaged and unpackaged test items to storage for nine weeks, as follows:

Storage Conditions	Temperature
Controlled Ambient	23±2°C (73±3.6°F)
Basic Cold	-33°C (-28°F)
Variable High Humidity (Basic)	63°C (145°F) and 19 percent RH
Basic Hot	63°C (145°F)

After nine weeks, visually examine the packaging and grenades for damage or deterioration.

5.4.2 Cyclic Storage

5.4.2.1 Data Required. Record the following (Appendix B, page B-19) for each cycle:

a. Cycle number

b. TIIN

c. Extent and nature of damage to:

(1) Container

(2) Test item

5.4.2.2 Method

a. Subject a representative number of the packaged test items to cycles of climatic extremes. A cycle is 21 days with successive seven-day exposures to warm, cold, and hot temperatures. Chamber settings for each climatic condition are:

(1) Warm storage. Maintain the temperature at 45±3°C (113±5°F) and RH at 85±5 percent for the first seven days of cycle.

(2) Cold storage. Maintain the temperature at -54±3°C (-65±5°F) with RH not controlled for the second seven days of cycle.

(3) Hot storage. Maintain the temperature at 71±3°C (160±5°F) and RH at 15±5 percent.

b. Subject the items to a minimum of three such cycles. Upon completion of each cycle, examine the packaging and contents and note any damage or discrepancies.

5.4.3 Rain

5.4.3.1 Data Required. Record the following (Appendix B, page B-19) for each test item:

a. TIIN

b. Evidence of water penetration

c. Presence of corrosion on the test item or components

5.4.3.2 Method. Subject a representative number of packaged or unpackaged elements, to the tailored rain conditions of MIL-STD-810[8], Method 506.2. After the test, unpack, disassemble, and examine for moisture penetration and corrosion.

5.4.4 Solar Radiation

5.4.4.1 Data Required. Record the following (Appendix B, page B-19) for each test item:

a. TIIN

b. Evidence of fading or degradation of colors and markings

c. Deterioration of materials, especially rubber and plastics

d. Cracking or peeling of painted surfaces

5.4.4.2 Method. Subject a representative number of packaged or unpackaged grenades to tailored values of solar radiation IAW MIL-STD-810[8], Method 505.2. After the test, unpack, disassemble, and visually inspect all items for damage or deterioration.

5.4.5 Humidity

5.4.5.1 Data Required. Record the following (Appendix B, page B-19) for each test item:

a. TIIN

b. Evidence of moisture penetration

c. Deterioration of materials

d. Damage in the form of corrosion or rust

5.4.5.2 Method. Subject a representative number of packaged or unpackaged test items, with fuze elements, to tailored temperature and humidity conditions of MIL-STD-810[8], Method 507.2. After the test, unpack, disassemble, and inspect the test items for moisture penetration, deterioration of materials, and rust or corrosion.

5.4.6 Fungus

5.4.6.1 Data Required. Record the following (Appendix B, page B-19) for each test item:

a. TIIN

b. Evidence of fungal growth (include location, extent, and type)

c. Fading or degradation of colors or markings

d. Cracking or peeling of painted surfaces

e. Deterioration of rubber, plastics, or other materials

5.4.6.2 Method. Based on the tailoring process, subject a representative number of packaged and unpackaged test items, with fuze elements, to fungus as described in MIL-STD-810[8], Method 508.3. After the test, unpack, disassemble, and inspect all test items for damage and fungal growth.

5.4.7 Salt Fog

5.4.7.1 Data Required. Record the following (Appendix B, page B-19) for each test item:

a. TIIN

b. Presence of salt or moisture

c. Damage from corrosion or rust

d. Evidence of deterioration

5.4.7.2 Method. Subject a representative number of packaged and unpackaged test items, with fuze elements, to a salt fog for a period tailored to item requirements, as outlined in MIL-STD-810[8], Method 509.2. After the test, unpack, disassemble, and inspect the items for salt or moisture penetration, corrosion, and deterioration.

5.4.8 Dust

5.4.8.1 Data Required. Record the following (Appendix B, page B-19) for each test item:

a. TIIN

b. Evidence of dust penetration (include location and extent)

5.4.8.2 Method. Subject a representative number of packaged and unpackaged grenades to dust, with conditions tailored to item requirements as indicated in MIL-STD-810[8], Method 510.2. Upon completion of the test, unpack and disassemble the test items and inspect all components for dust penetration.

5.4.9 Leakage (Immersion)

5.4.9.1 Data Required. Record the following (Appendix B, page B-21) for each test item:

a. TIIN

b. During immersion:

(1) Depth of water above the container or test item

(2) Water temperature

(3) Evidence of air escaping from the test item

(4) Time from immersion to when air begins to escape

(5) Total immersion time

c. After immersion, evidence of moisture penetration and corrosion

5.4.9.2 Method. Immerse a representative number of packaged and unpackaged munitions, with fuze elements under condition tailored IAW MIL-STD-810[8], Method 512.2, as amended by the test item design requirements. After immersion, unpack and disassemble the test items and inspect all components for moisture penetration.

5.4.10 Altitude

5.4.10.1 Data Required. Record the following (Appendix B, page B-19) for each test item:

a. TIIN

b. Degradation effects caused by leakage or rupture

5.4.10.2 Method. Subject a representative number of packaged or unpackaged grenades to low temperatures and low pressures, tailored as outlined in MIL-STD-810[8], Method 500.2. After the test, unpack, disassemble, (if applicable) and inspect the grenades.

5.5 Hazard Tests. These tests are designed to provide information pertaining to possible hazards associated with storing, handling, transporting, and firing the test items.

5.5.1 Small-Arms Fire Vulnerability. Determine the ability of test items to resist ignition and leakage when subjected to small-arms fire. Conduct these tests with the grenade bare, loaded into launcher, and packaged in shipping container.

5.5.1.1 Data Required. Record the following for each test item, using the form in Appendix B, page B-23:

a. TIIN

b. Method of suspension

c. Caliber of round and type of weapon

d. Firing pattern (angle of fire and distance from target)

e. Evidence of ignition and deterioration of test items ignited

f. Evidence of leakage of grenade fill

g. Retain all photographs.

5.5.1.2 Method. Subject a representative number of grenades, with fuze elements, to small-arms fire of the caliber most likely to be encountered in combat. Suspend test items at various angles (bare, loaded into launcher, and packaged in shipping container) to detect vulnerability of the test items and fuze elements to small-arms penetration. Use a high-speed camera to document the test.

5.5.2 Electromagnetic Vulnerability. Determine the vulnerability of test items which are electrically fired to electromagnetic radiation.

5.5.2.1 Data Required. Record the following (Appendix B, page B-25) for each test item:

a. TIIN

b. Nature and extent of the electromagnetic interference

5.5.2.2 Method. Subject a representative number of electrically-fired test items to the provisions of TOP 6-2-508[15] and observe the extent to which electromagnetic emissions affect the test items.

5.5.3 Electrostatic Susceptibility. Determine the susceptibility of test items which are electrically fired to initiation by personnel-borne static discharge. Both MIL-STD-1512[16] and MIL-I-23659C[17] have test methods for electrostatic susceptibility. While the method of MIL-STD-1512 has been selected, we suggest a review of MIL-I-23659C, particularly Paragraphs 3.4.3.2.2, 3.4.3.4.2 and 4.4.3.2, before proceeding.

5.5.3.1 Data Required. Record the following (Appendix B, page B-26) for each test item:

a. TIIN

b. Whether the item ignited or detonated

5.5.3.2 Method. Subject a representative number of electrically-fired test items to the provisions of MIL-STD-1512[16], Method 205, modified as follows:

a. Test assembled grenades (not initiators) remotely, with suitable barricade(s) to protect test personnel.

b. Test pin-to-pin, pin-to-case, and case-to-case.

c. Note occurrence of ignition and/or detonation.

5.5.4 Susceptibility to Sympathetic Ignition or Detonation

5.5.4.1 Data Required. Record (Appendix B, pages B-27 and B-28) the following:

a. Description of the test site

b. TIIN

c. Nomenclature and identification number of munitions which were purposely ignited or detonated

d. Nomenclature and identification number of munitions which were sympathetically ignited or detonated

e. Radial and angular positions between items ignited or detonated purposely and items detonated sympathetically

f. Nomenclature and identification number of items ignited or detonated as a result of the external heat test

g. Time between detonations or ignitions

h. Retain all photographs.

5.5.4.2 Method. If not accomplished by the materiel developer, subject a representative number of packaged test items to the provisions of TB 700-2[18] and obtain data upon which to base hazard classifications for storage and transportation of explosives.

5.5.5 Leakage

5.5.5.1 Data Required. Record (Appendix B, page B-24) the following:

a. TIIN

b. Nature and quantity of the fill material which leaked from the grenade

5.5.5.2 Method. Subject a representative number of the test items to the provisions of (Paragraph 6.2.2) MTP 8-2-512[19] and observe the extent (if any) of leakage of the fill material from the grenade.

5.5.6 Decontamination

5.5.6.1 Data Required. Record the following (Appendix B, page B-29) for each test item:

a. TIIN

b. Type of decontaminating agent(s) used

c. Method(s) of decontamination used

d. Evidence of damage or corrosion resulting from the decontamination process

e. Adverse effects of decontamination on test item performance

5.5.6.2 Method. Subject a representative number of the packaged and unpackaged test items to the procedures contained in MTP 8-2-510[20] and evaluate the ease with which the test item can be decontaminated after exposure to chemical and biological agents.

5.6 Air Transportability. These tests are designed to evaluate the air transportability of the test item.

5.6.1 Simulated Flight Test

5.6.1.1 Data Required. Record the following (Appendix B, page B-30) for each test item:

a. TIIN

b. Altitude simulated

c. Evidence of damage to shipping containers and content

5.6.1.2 Method. Subject a representative number of packaged test items in shipping containers to:

a. Atmospheric pressure of 4570 m (15,000 ft)

b. Vibration with conditions tailored as described in MIL-STD-810[8], Method 514.3, for vibration environment category 1.

5.7 Functioning and Reliability. These tests are designed to determine the functioning and operational reliability of the test items. Use serviceable munitions from nondestructive tests [safety (except 12.2 m and airdrop), environmental effects, and air transportability)], to obtain the data required. Precondition grenades with respect to temperature and humidity for a minimum of 24 hours before firing, in accordance with Table 2.1, AR 70-38[7]. Examples of functioning temperatures and humidities are: basic (variable high humidity) [26 to 35°C (78 to 95°F)], 74 to 100 percent RH; cold [-37 to -46°C (-35 to -50°F)], RH tending toward saturation; hot-humid [31 to 41°C (88 to 105°F)], 59 to 88 percent RH; and hot-dry [32 to 49°C (90 to 120°F)], 3 to 8 percent RH. Use a test site large enough to confine smoke clouds and incendiary materials.

5.7.1 Static Smoke Grenade Test

5.7.1.1 Data Required. Record data indicated in Paragraph 5.3.1.1, above.

5.7.1.2 Method. Use method indicated in Paragraph 5.3.1.2, above.

5.7.2 Static Incendiary Grenade Test

5.7.2.1 Data Required. Record data indicated in Paragraph 5.3.2.1, above.

5.7.2.2 Method. Use method indicated in Paragraph 5.3.2.2, above.

5.7.3 Simulated Human Dynamic Test

5.7.3.1 Data Required. Record data indicated in Paragraph 5.3.3.1, above.

5.7.3.2 Method. Use method indicated in Paragraph 5.3.3.2, above.

5.7.4 Human Dynamic Test

5.7.4.1 Data Required. Record data indicated in Paragraph 5.3.4.1, above.

5.7.4.2 Method. Use method indicated in Paragraph 5.3.4.2, above.

5.8 Human-Factors Engineering

5.8.1 Data Required. Throughout the conduct of all tests and subtests required in the test plan, determine the man/test item compatibility and user reaction to the test items. Identify all inconveniences encountered in handling and using the test item and accompanying instructional materials. Record the following specific aspects (Appendix B, pages B-33 and B-34, also see note 1, page B-31) with respect to compatibility and reaction:

a. Any difficulties encountered during uncrating and unpackaging test items, removing items from containers, assembling items, and repacking and resealing containers.

b. Ease of identifying items and components in daylight, darkness, and blackouts.

c. Conformance of the test item's design to qualitative requirements, particularly whether it is as compact and light as possible; commensurate with functional characteristics.

d. Need for special tools or special handling.

e. Simplicity and adequacy of operating instructions.

f. Reactions of test personnel when throwing or launching test items in various launching modes.

g. Need for operator hearing protection.

h. Compatibility with field clothing and equipment, particularly with protective clothing and cold-regions clothing

i. Skin irritation or other effects caused by grenade fills

5.8.2 Method. Observe all factors applicable to evaluating each of the specific aspects described in Paragraph 5.8.1.

5.9 Maintenance Aspects

5.9.1 Data Required

a. Record (Appendix B, page B-33) the following, supplemented by photos, drawings, or other data, to substantiate findings:

(1) Nomenclature of any special tools required for maintenance

(2) Description of special skills required for maintenance

(3) List of discrepancies or inadequacies noted in maintenance manuals and instructions

(4) Technician's comments on complexity and time involved in each maintenance task

b. Report inadequacies or suggested improvements on DA Form 2028, IAW TECOM Supplement 1 to AR 750-1[21].

5.9.2 Method. Evaluate the maintainability of the test items IAW TECOM Supplement 1 to AR 750-1[21]. If applicable, accomplish the following:

a. Determine whether any specialized skills or tools are required for maintenance.

b. Assess adequacy and accuracy of maintenance manuals and instructions, and the ease with which they are understood by personnel to whom they apply.

6. DATA REDUCTION AND PRESENTATION

6.1 Data Collection. Collate all data collected during the test, reduce to statistical terms, and arrange in a concise, workable form.

6.2 Data Analysis. Analyze the reduced data to determine whether:

a. Test objectives were satisfied

b. Test items met established criteria

c. Test item fills a military need and is recommended for field use

d. Any adverse effects are anticipated in handling, storing, transporting, and functioning the test item in the field

e. Hazards categorized IAW MIL-STD-882[23] are deficiencies, shortcomings, or acceptable, as appropriate, IAW TOP 1-1-012[24].

6.3 Data Presentation. Present results in narrative form, supplemented as needed with figures, tables, charts, and photographs. Identify the appropriate individuals when results are presented as the personal opinions or judgments of test personnel.

6.4 Actions. Based on the data collected relating to safety, accomplish the following IAW AR 385-16, as supplemented[13]:

a. Before development test (DT) or operational test (OT) personnel exposure, submit a recommended safety release to HQ, TECOM, ATTN: DRSTE-ST.

b. Include a safety confirmation in the narrative required by Paragraph 6.3, above.

NOTE: Recommended changes to this publication should be forwarded to Commander, US Army Test and Evaluation Command, ATTN: DRSTE-ME, Aberdeen Proving Ground, MD 21005. Technical information may be obtained from the preparing activity: Commander, US Army Dugway Proving Ground, ATTN: MT-DA-T, Dugway, UT 84022. Additional copies are available from the Defense Technical Information Center, Cameron Station, Alexandria, VA 22314. This document is identified by the accession number (AD No.) printed on the first page.

APPENDIX A. CHECKLIST

	Required	N/A	Accomplished
1. Receive TECOM Test Execution Directive*.....	_____	___	_____
2. Appoint project officer.....	_____	___	_____
3. Initiate project log.....	_____	___	_____
4. Establish project file.....	_____	___	_____
5. Receive/complete DTP.....	_____	___	_____
6. Distribute DTP to support organizations.....	_____	___	_____
7. Ensure that necessary facilities and instruments are available.....	_____	___	_____
8. Preparation for test.....	_____	___	_____
a. Receive SAR from developer*.....	_____	___	_____
b. Safety officer appointed; name logged.....	_____	___	_____
c. Complete safety review.....	_____	___	_____
d. Security procedures approved.....	_____	___	_____
e. Environmental Assessment received.....	_____	___	_____
f. Complete review of DTP and references.....	_____	___	_____
g. Adequate logistical support available....	_____	___	_____
h. Complete personnel training.....	_____	___	_____
9. Test conduct			
a. Receipt inspection.....	_____	___	_____
b. Safety tests.....	_____	___	_____
c. Simulated environmental effects tests....	_____	___	_____

*Must be received before testing commences.

	Required	N/A	Accomplished
d. Hazard tests			
e. Air transportability tests			
f. Functioning and reliability tests			
g. Human factors engineering			Ongoing
h. Maintenance aspects			Ongoing
10. Compile data and photographs			

APPENDIX B. DATA COLLECTION SHEETS

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Receipt Inspection (Exterior Shipping Container) Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

1. Exterior Shipping Container

Complete subparagraphs a through g (below) for each container:

a. Type: ___ Cardboard, ___ Metal, ___ Wood, ___ Other. Explain _____

_____

_____

b. Damage: ___ Yes, ___ No.

c. Type of Damage: ___ Broken, ___ Contaminated with foreign materiel, ___ Corroded, ___ Cracked, ___ Crushed, ___ Dented, ___ Leaking, ___ Punctured, ___ Spilled, ___ Other. Explain _____

_____

_____

d. Leak test required? ___ Yes, ___ No. Results _____

_____

e. Closure: ___ Bolts, ___ Hooks, ___ Nails, ___ Screws, ___ Strapping, ___ Tape, ___ Other. Explain _____

_____

f. Marking: ___ Adequate, ___ Illegible, ___ Legible, ___ IAW MIL-STD-129[9], ___ IAW TM 38-250[10]. Comments: _____

_____

_____

Receipt Inspection (Exterior Shipping Container) (Cont'd) Date _____

g. Marking information:

NSN: _____

Nomenclature: _____

Type: _____ Model: _____

Serial No.: _____ Date of Manufacture: _____

Name of Manufacturer: _____

Name of Contractor: _____ Contract No. _____

Contract Date: _____

Weight: _____ Cube: _____

h. Physical data:

Length (cm) _____ Height (cm) _____

Width (cm) _____ Cube (m^3) _____

Weight (kg) _____

NOTE: a. Dimensions to the nearest x.x. cm; weights to the nearest x.x kg.

b. Precision specified should be comparable to that specified for test items; that is, if individual items are weighed to one gram and there are one thousand items in one shipping container, the shipping container should be weighed to the nearest kilogram.

Submitted by: _____ _____
(Signed) (Printed)

Receipt Inspection (Shipping Container Unpacking) Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

2. Shipping Container Unpacking

a. Number of intermediate packages: _____

b. Leakage test required? ___ Yes, ___ No. Results of leakage test:

_____

_____

c. Intermediate packages inventoried against packing list? ___ Yes,

___ No. Explain _____

_____

d. Packing List: ___ Yes, ___ No. List is deficient as follows: _____

_____

_____

e. Unpacking Instructions: ___ Yes, ___ No. Instructions are deficient as follows: _____

_____

f. Storage Instructions: ___ Yes, ___ No. Instructions are deficient as follows: _____

_____

g. Blocking: ___ Yes, ___ No.

(1) Type: ___ Plastic, ___ Wood, ___ Other. Describe _____

_____

Receipt Inspection (Shipping Container Unpacking) (Cont'd) Date _____

(2) Condition: ___ Apparently as Shipped, ___ Broken, ___ Dislodged, ___ Other. Describe _____

_____

h. Bracing: ___ Yes, ___ No.

Type: ___ Plastic, ___ Wood, ___ Other. Describe _____

_____

_____

i. Cushioning material: ___ Yes, ___ No. Describe type and condition:

_____

_____

Submitted by: _____ _____
(Signed) (Printed)

Receipt Inspection (Intermediate Packages) Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

3. Intermediate Packages. Complete a through e (below) for each package:

a. Type: ___ Cardboard, ___ Metal, ___ Wood, ___ Other. Explain _____

_____

b. Leakage test required? ___ Yes, ___ No. Results of leakage tests:

_____

_____

c. Damage: ___ Yes, ___ No.

d. Type of Damage: ___ Broken, ___ Contaminated with foreign material, ___ Corroded, ___ Cracked, ___ Crushed, ___ Dented, ___ Leaking, ___ Punctured, ___ Spilled, ___ Other. Explain _____

_____

_____

NOTE: Segregate damaged packages/items without further unpacking and perform inspections/test of Paragraph 5.1.4, basic.

NOTE: Do not open interior packages at this time.

e. Markings: ___ Number legible, ___Number IAW MIL-STD-129[9], ___ Number IAW TM 38-250[10], ___ Comment: _____

_____

Receipt Inspection (Intermediate Packages) (Cont'd) Date _____

f. Marking Information:

NSN _____

Nomenclature _____

Type _____ Model _____

Serial No. _____ Date of Manufacture _____

Name of Manufacturer _____

Weight _____ Cube _____

g. Physical Data:

Length (cm) _____ Height (cm) _____

Width (cm) _____ Cube (m^3) _____

Weight (kg) _____

NOTE: a. Dimensions to the nearest x.x cm; weights to the nearest x.x kg.

b. "x.x" should be of the same accuracy as the most stringent subtest of the basic DTP.

Submitted by: _____ _____
(Signed) (Printed)

Receipt Inspection (Test Items) Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

4. Test Items. Complete subparagraphs a through g for each item:

a. Number per shipping container? _____

b. Damage: ___ Yes, ___ No.

c. Leakage test required? ___ Yes, ___ No. Results of leakage test:

_____

_____

d. Type of damage: ___ Broken, ___ Contaminated with foreign material, ___ Corroded, ___ Cracked, ___ Crushed, ___ Dented, ___ Leaking, ___ Punctured, ___ Spilled, ___ Other. Explain _____

_____

e. Markings: Color _____, Legibility _____, Number IAW MIL-STD-129[9] _____, Number IAW TM 38-250[10] _____

f. Marking Information:

NSN _____

Nomenclature _____

Type _____ Model _____

Serial No. _____ Date of Manufacture _____

Name of Manufacturer _____

Weight _____ Cube _____

g. Check items to ensure that they are properly assembled: ___ Yes, ___ No. Explain _____

Receipt Inspection (Test Items) (Cont'd) Date _____

h. Physical Data:

Length (cm) _____ Height (cm) _____

Width (cm) _____ Cube (m^3) _____

Weight (kg) _____ Other significant dimensions (describe): _____

For projectiles:

Center of gravity (radial) _____

Center of gravity (longitudinal) _____

Moments of inertia _____

Ring gage all projectiles: ___ Go, ___ No-Go **(If no-go, DO NOT FIRE!)**

Inspect fuse wells for exudate of explosive material.

NOTE: a. Dimensions to the nearest x.x cm; weights to the nearest x.x kg.

b. "x.x" should be of the same accuracy as the most stringent subtest of the basic DTP.

i. Brief Description of Item: Diagram(s) of Item:

_____

_____

_____

_____

j. Repeat steps g and h with the item in the operating or ready-for-use configuration, using additional sheets for data and photographing, as appropriate.

k. Repeat step g and h with the item packed in transit cases or otherwise prepared for local transportation.

Submitted by: _____ _____
(Signed) (Printed)

Receipt Inspection (Damage Assessment and Control) Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

5. Damaged Items. Package damage: ___ Broken, ___ Contaminated with foreign material, ___ Corroded, ___ Cracked, ___ Crushed, ___ Dented, ___ Leaking ___ Punctured, ___ Spilled, ___ Other. Explain _____

_____

Briefly describe damage: _____

_____

6. Item Damage: ___ Broken, ___ Contaminated with foreign material, ___ Corroded, ___ Cracked, ___ Crushed, ___ Dented, ___ Leaking, ___ Punctured, ___ Spilled, ___ Other. Explain _____

_____

_____

Briefly describe damage: _____

_____

7. Judgement: ___ Item is judged by tester to be so slightly damaged that troops in the field would overlook or consider damage negligible and use the item.

___ Item is judged to be damaged beyond above criterion.

8. Radiographic examination: ___ No damage, ___ Damaged. Briefly describe damage: _____

_____

___ Remove from test because _____

Receipt Inspection (Damage Assessment and Control) (Cont'd) Date _____

9. Check items to be sure they are properly assembled: ___ Yes, ___ No.

Explain _____

_____

10. Inspection of disassembled components: ___ No damage, ___ Damaged.

Briefly describe damage: _____

_____

11. Control Information:

a. Calibration check of measuring equipment? ___ Yes, ___ No.
Explain _____

_____

b. Photographs? ___ Yes, ___ No. Explain _____

_____

Legible scale? ___ Yes, ___ No. Explain _____

_____

c. Radiographs? ___ Yes, ___ No. Explain _____

_____

_____

Submitted by: _____ _____
(Signed) (Printed)

Safety Tests

Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

(Check One)
1. ___ 12.2-m drop (40 ft) 3. ___ Loose cargo
2. ___ 1.5 m-drop (5 ft) 4. ___ Airdrop

TIIN	Condition of Item	Type and Extent of Damage	Disassembled Items		Remarks
			Damage or Corrosion	Crushed, Cracked, or Ruptured Components	

Submitted by: _____ (Signed) _____ (Printed)

Static Test Functioning Characteristics Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

Check One: ___ Smoke Grenade ___ Incendiary Grenade

TIIN	Fuze/Ignition Delay (Sec)	Burn Time (Sec)	Flame Time (Sec)	Smoke Cloud		Safety Pin Force	Remarks
				Dimensions (Length/Height)	Duration (Sec)		

NOTES: (1) These test items were preconditioned at ___ ± ___ °C and ___ ± ___ percent relative humidity.
(2) They have undergone the subtests of Para(s) ___, ___, and ___.
(3) For Incendiary grenades: (a) Modifications _____, (b) Test metal composition _____ and thickness _____, and (c) Diameter of hole _____.

Submitted by: _____ _____
(Signed) (Printed)

Simulated Human Dynamic Test Functioning Characteristics Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TIIN	Incident Release Angle	Distance Hurled (Ft)	Landing Surface	Fuze/ Ignition Delay (Sec)	Burn Time (Sec)	Flame Time (Sec)	Smoke Cloud		Remarks
							Dimensions (Length/Height)	Duration (Sec)	

NOTES: (1) These test items were preconditioned at ___ ± ___ °C and ___ ± ___ percent relative humidity.
(2) They have undergone the subtests of Para(s) ___, ___, and ___.

Submitted by: _____ _____
(Signed) (Printed)

Human Dynamic Test Functioning Characteristics Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TIIN	Manner Thrown	Distance Thrown (Ft)	Landing Surface	Fuze/ Ignition Delay (Sec)	Burn Time (Sec)	Flame Time (Sec)	Smoke Cloud		Remarks
							Dimensions (Length/Height)	Duration (Sec)	

NOTES: (1) These test items were preconditioned at ___ ± ___ °C and ___ ± ___ percent relative humidity.
(2) They have undergone the subtests of Para(s) ___, ___, and ___.

Submitted by: _____ _____
(Signed) (Printed)

Surface Meteorological Data Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TECOM Project No:					Date:			
Project Officer:					Location:			
TIIN	Time	Wind Speed (m/s) Average	Wind Speed (m/s) Gusts	Wind Direction (az from N)	Weather Sky Cover (tenths)	Visibility (mi)	Ambient Temperature (°C)	Relative Humidity (%)

Submitted by: _____ _____
(Signed) (Printed)

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Simulated Environmental Effects

Date _____

TECOM Project No. _____

Subtest Paragraph No.** _____

Project Officer _____

Place _____

Applied Environment _____ (Chamber Storage, Rain, Dust, Etc.)

Cycle No. _____ (If Appropriate)

	Extent and Nature of Damage or Deterioration*				
	Packaged Grenades		Unpackaged Grenades		
TIIN	Package	Grenade	Item Number	Grenade	Remarks

* If additional space is required, turn page.
**Describe test tailoring, over.

Submitted by: _____ (Signed) _____ (Printed)

Simulated Environmental Effects (Cont'd) Date _____

TIIN	Remarks

**This subtest was tailored as follows: _____

_____

_____

_____

Leakage (Immersion) Test Date _____

TECOM Project No. _____ Subtest Paragraph No.* _____

Project Officer _____ Place _____

(These items were most recently subjected to the _____ Test, TOP Subpara No. _____.)

TIIN	Corrosion		Water Penetration
	Test Item	Components	

*This subtest was tailored as follows: _____

Leakage (Immersion) Test (Cont'd) Date _____

(If operability tests are called for, use Data Collection Sheets, herewith.)

Have photographs been taken of all items showing evidence of damage?

___ Yes ____ No If "No", explain _____

_____

_____

List TIIN of all items showing no damage _____

_____

During immersion record:

Depth of water over container (cm) _____

Water temperature (°C) _____

Presence of bubbling, if any _____ (Yes or No)

Immersion time to bubbling, if any (min) ____

Total immersion time (min) _____

Remarks _____

_____

_____

_____

_____

_____

Submitted by: _____ (Signed) _____ (Printed)

Small-Arms Vulnerability Test

Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

Check One: ___ Grenade Bare ___ Grenade Loaded into Launcher
___ Grenade Packaged in Shipping Container

Grenade		Small-Arms Round	Grenade Orientation	Striking Point on Grenade	Ignition	Comments
TIIN	Type					

Submitted by: _____ _____
(Signed) (Printed)

Leak Test Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TIIN	Leakage (Y or N)	Noted After Subtest(s) No.	Leakage	
			Estimated Quantity (g)	Nature

Submitted by: _____ _____
(Signed) (Printed)

Electromagnetic Vulnerability Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TIIN	Ignited	Detonated	Remarks

Submitted by: _____ _____
(Signed) (Printed)

Electrostatic Susceptibility Test Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TIIN	Tested			Ignition	Detonation	Comments
	Pin-to-Pin	Pin-to-Case	Case-to-Case			

Submitted by: _____ _____
(Signed) (Printed)

Susceptibility to Sympathetic Ignition or Detonation Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

1* TIIN	2 or 3		4 or 5		6	7 or 8		9	10 Remarks
	I	D	P	S	SK	I	D	TI	

Submitted by: _____ _____
(Signed) (Printed)

*Over: Column heading identification numbers.

Susceptibility to Sympathetic Ignition or Detonation (Cont'd) Date _____

Column Number	Explanation
1	TIIN
2	Ignited, or
3	Detonated (check one)
4	Purposely, or
5	Sympathetically (check one)
6	Identification of separate sketch which shows radial or angular relationship between items ignited or detonated purposely and items ignited or detonated sympathetically. Several items will often be shown on one sketch, if so, identify by TIIN. If necessary, more than one view (e.g., plan and evaluation) may be shown in one sketch.
7	Ignited, or
8	Detonated as a result of external heat test (check one)
9	Time interval between ignitions or detonation (minutes and seconds)
10	Remarks

* * * *

Description of test site _____

Decontamination Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TIIN	Type Decontamination	Decontamination Method	Evidence of Damage or Corrosion*

*Adverse effects of decontamination as indicated by functioning and reliability test (narrative): _____

_____

_____

_____

Submitted by: _____ _____
(Signed) (Printed)

NOTE: Comments based on data generated by these grenades during conduct of the subtests of Paragraph 5.3.

Air Transportability Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

TIIN	Evidence of Damage to		
	Packaged Grenades		Bare Grenades
	Container	Grenade	Grenade

Submitted by: _____ _____
(Signed) (Printed)

Data Collection Sheets for:

1. Human Factors:

a. Record end-of-test interviews using DCSs, this Appendix, pages B-33 and B-34.

b. Record other human factor data on DCSs provided in TOP 1-2-610[22], with particular emphasis on pages A-21 through A-24; B-9 and B-10, B-29 and B-30, B-37 through B-40; C-3 through C-6, C-73 through C-80, and C-83 through C-90.

2. Maintenance

Record data on locally-prepared DCSs, using a narrative format, supplemented by photos, drawings, interview sheets, and sketches.

NOTE: When drafting DCSs for local use, sketches, etc., in connection with the implementation of this TOP, include at least the following identifying information on each sheet:

Below the heading, above the data:

Date _____

TECOM Project No. _____ Subtest Paragraph No. __ __

Project Officer _____ Place _____

Below the data, above the page number:

Submitted by: _____ _____
(Signed) (Printed)

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End-of-Test Questionnaire Date _____

TECOM Project No. _____ Subtest Paragraph No. _____

Project Officer _____ Place _____

1. Please rate the grenade you tested on a scale of one (1) to eleven (11) for each of the factors on the list below.

Factor	Unsatisfactory		Below Average		Average		Above Average		Excellent	
	1	2	3	4	5	6	8	9	10	11
A Safety										
B Ease of Use										
C Tactical Use										
D Portability										
E										

2. Did you consider the grenade unsafe to use? Yes ___ No ___

If "Yes", please explain, _____

End-of-Test Questionnaire (Cont'd) Date _____

3. While using the grenade, did you have any problems because of bad design of the grenade? Yes ___ No ___ If "Yes", please explain _____

_____

_____

_____

_____

What would you suggest to correct these problems? _____

_____

_____

_____

4. Any other comments? _____

_____

_____

_____

_____

_____

APPENDIX C. REFERENCES

1. TOP 8-2-557, Smoke/Obscurant, Grenades, Screening Effectiveness.

2. TM 43-0001-47, Army Equipment Data Sheet, Ammunition Peculiar Equipment.

3. TOP 3-2-806, Metallurgical and Mechanical Tests of Materials, 10 January 1973.

4. TOP 3-2-807, Nondestructive Testing of Materials, 11 September 1972.

5. TOP 4-2-601, Drop Tower Tests for Munitions, 1 April 1979.

6. TOP 4-2-602, Rough Handling Tests, 1 April 1979.

7. AR 70-38, Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions, 1 August 1979.

8. MIL-STD-810, Environmental Test Methods and Engineering Guidelines, 19 July 1983.

9. AR 70-10, Test and Evaluation During Development and Acquisition of Materiel, 29 August 1975.

10. DARCOM R 385-100, Safety Manual, 17 August 1981, with current changes.

11. TOP 8-2-500, Receipt Inspection of Chemical-Biological (CB) Materiel.

12. MTP 8-2-509, Radiography, 31 January 1968.

13. AR 385-16, System Safety Engineering and Management, 1 December 1980, as supplemented.

14. TOP 7-2-509, Airdrop, 5 April 1979.

15. TOP 6-2-508, Vulnerability, Electromagnetic, 12 September 1977.

16. MIL-STD-1512, Electroexplosive Subsystems, Electrically Initiated, Design Requirements, and Test Methods, 21 March 1972.

17. MIL-I-23659, Initiators, Electric, General Design Specification for, 31 August 1972.

18. TB 700-2, Explosive Hazard Classification Procedures, September 1982.

19. MTP 8-2-512, Leak Testing of Chemical Agent-Filled Munitions and Containers, 1 November 1977.

20. MTP 8-2-510, Decontamination, 30 September 1967.

21. TECOM Supplement 1, to AR 750-1, Army Materiel Maintenance Concepts and Policies, 1 April 1978, as supplemented.

22. TOP 1-2-610, Human Factors Engineering, 20 December 1977.

23. MIL-STD-882, System Safety Program Requirements, 28 June 1977.

24. TOP 1-1-012, Classification of Deficiencies and Shortcomings, 1 April 1979.

APPENDIX D. ABBREVIATIONS

AR - army regulation

DA - Department of the Army

DARCOM - US Army Materiel Development and Readiness Command

DT - development test

DTP - detailed test plan

EOD - Explosive Ordnance Disposal

IAW - in accordance with

MIL-I - military specification-initiator

MIL-STD - military standard

mph - miles per hour

MTP - Materiel Test Procedure

NSN - national stock number

OT - user or operational test

RH - relative humidity

SAR - safety assessment report

TB - technical bulletin

TECOM - US Army Test and Evaluation Command

TIIN - test item identification number

TM - technical manual

TOP - Test Operations Procedure