INCH-POUND
MIL-STD-2105A (NAVY)
8 March 1991
SUPERSEDING
DOD-STD-2105 (NAVY)
9 September 1982

# MILITARY STANDARD

## HAZARD ASSESSMENT TESTS FOR NON-NUCLEAR MUNITIONS

AMSC N6037

AREA SAFT

**DISTRIBUTION STATEMENT A:** Approved for public release; distribution is unlimited.

## FOREWORD

1. This military standard is approved for use by the Naval Sea Systems Command, Department of the Navy and is available for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Ordnance Station, Standardization Branch (3730), Indian Head, MD 20640-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

3. This document presents a compendium of the basic tests required for the assessment of explosive safety and insensitive munitions (IM) characteristics. Historically, these tests have been conducted as either mandatory or supplemental tests to assess munition safety. The establishment of the IM Program has led to reclassification of the tests and assignment of acceptance criteria to them. This standard contains pass/fail criteria for tests described.

4. In order to best utilize limited resources, testing should be conducted to provide a valid assessment of munition safety and insensitivity, while minimizing test redundancy. To this end, tests required by other system safety program directives may be considered as substitutes for specific tests where there is no compromise of stringency. This standard is a synthesis of the test and analysis phases of the total system safety program (as required by MIL-STD-882, "System Safety Program Requirements") and specific IM test requirements.

5. This standard contains a description of basic assessment tests which experience has shown to provide information for evaluating the explosive safety and insensitive munitions characteristics of non-nuclear munition systems. Also included is a list of factors to be considered in performing the hazard analyses required by MIL-STD-882. The results of these analyses form the basis for identifying required supplemental tests, the descriptions of which are to be developed or selected from other test document sources.

6. Program managers and munition developers should be aware that additional testing may be required to assess the tactical and logistical vulnerability and survivability of the given weapon system against the probable threats to which the system may be subjected. Accordingly, program managers and munition developers will conduct a threat assessment to determine if compliance with the standard IM tests is adequate to meet the intent of the IM Program of weapon systems' tactical and logistical survivability. If the assessment indicates that system unique threats pose additional vulnerability or survivability problems, then specific IM tests will be devised, conducted and satisfied for the munition to be classified as an insensitive munition.

7. Program managers are responsible for planning and executing a hazard assessment test program. The hazard assessment test program includes a test plan based on a realistic life cycle environmental profile. Program managers should establish safety design goals for the test plan and these goals should be approved by the Weapon Systems Explosive Safety Review Board (WSESRB). Program managers should generate a test report for submission to the WSESRB.

8. The WSESRB should review the test plan and test report. The WSESRB should examine the results of the hazard assessment test program to ensure that safety and insensitive munitions requirements are met. The WSESRB should produce a final recommendation for or against service use of the weapon system.

CONTENTS

## CONTENTS

Paragraph | Page

CONTENTS

CONTENTS

# 1. SCOPE

**1.1 Scope.** This standard covers tests and test procedures for assessment of explosive safety and insensitive munitions (IM) characteristics for all non-nuclear munitions, munition subsystems and explosive devices.

**1.2 Purpose.** The purpose is to provide a framework for the development of a consolidated explosive safety and IM assessment test program for non-nuclear munitions. The tests are to characterize the munitions and provide the Weapon Systems Explosive Safety Review Board (WSESRB) information with which to make a decision.

**1.3 Application.** This standard applies to all non-nuclear munitions (i.e., all-up missiles, rockets, pyrotechnics), munitions subsystems (e.g., warheads, fuzes, propulsion units, safe and arm devices, pyrotechnic devices, chemical payloads), and other explosive devices.

# 2. APPLICABLE DOCUMENTS

## 2.1 Government documents.

**2.1.1 Specifications, standards, and handbooks.** The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

| | |
|---|---|
| QQ-C-576 | Copper Flat Products with Slit, Slit and Edge-Roller, Sheared, Sawed, or Machined Edges (Plate, Bar, Sheet, and Strip) |

MILITARY

| | |
|---|---|
| MIL-C-401 | Composition B |
| MIL-E-14970 | Explosive Composition A-5 |

STANDARDS

MILITARY

| | |
|---|---|
| MIL-STD-331 | Fuze and Fuze Components, Environmental and Performance Tests for |
| MIL-STD-453 | Inspection, Radiographic |
| MIL-STD-810 | Environmental Test Methods and Engineering Guidelines |
| MIL-STD-1670 | Environmental Criteria and Guidelines for Air-Launched Weapons |

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from: Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

**2.2 Non-Government publications.** The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

| | |
|---|---|
| ASTM B152 | Copper Sheet, Strip, Plate, and Rolled Bar, Standard Specification for (DoD adopted) |

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

| | |
|---|---|
| EIA 170 | Electrical Performance Standards - Monochrome Television Studio Facilities |
| EIA 330 | Electrical Performance Standards for Closed Circuit Television Camera 525/60 Interlaced 2:1 |

(Application for copies should be addressed to the Electronic Industries Association, 2001 Eye Street, NW, Washington, DC 20006.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

**2.3 Order of precedence.** In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. DEFINITIONS

**3.1 Explosive.** An explosive is a solid or liquid substance (or a mixture of substances) which is in itself capable, by chemical reaction of producing gas at such temperature, pressure and speed, of causing damage to the surroundings. Included are pyrotechnic substances even when they do not evolve gases. The term explosive includes all solid and liquid materials variously known as high explosives, propellants, together with igniter, primer, initiation and pyrotechnic (e.g., illuminant, smoke, delay, decoy flare and incendiary) compositions.

**3.2 All-up-round (AUR).** Refers to the completely assembled munition as intended for delivery to a target or configured to accomplish its intended mission. This term is identical to the term all-up-weapon.

**3.3 Exudation.** A discharge or seepage of material. The material may be either a component of a chemical payload or a component of an explosive/propellant payload.

**3.4 Explosive reaction levels.**

a. **Detonation Reaction (Type I).** The most violent type of explosive event. A supersonic decomposition reaction propagates through the energetic material to produce an intense shock in the surrounding medium, e.g., air or water, and very rapid plastic deformation of metallic cases, followed by extensive fragmentation. All energetic material will be consumed. The effects will include large ground craters for munitions on or close to the ground, holing/plastic flow damage/fragmentation of adjacent metal plates, and blast overpressure damage to nearby structures.

b. **Partial Detonation Reaction (Type II).** The second most violent type of explosive event. Some, but not all of the energetic material reacts as in a detonation. An intense shock is formed; some of the case is broken into small fragments; a ground crater can be produced, adjacent metal plates can be damaged as in a detonation, and there will be blast overpressure damage to nearby structures. A partial detonation can also produce large case fragments as in a violent pressure rupture (brittle fracture). The amount of damage, relative to a full detonation, depends on the portion of material that detonates.

c. **Explosion Reaction (Type III).** The third most violent type of explosive event. Ignition and rapid burning of the confined energetic material builds up high local pressures leading to violent pressure rupturing of the confining structure. Metal cases are fragmented (brittle fracture) into large pieces that are often thrown long distances. Unreacted and/or burning energetic material is also thrown about. Fire and smoke hazards will exist. Air shocks are produced that can cause damage to nearby structures. The blast and high velocity fragments can cause minor ground craters and damage (breakup, tearing, gouging) to adjacent metal plates. Blast pressures are lower than for a detonation.

d. **Deflagration Reaction (Type IV).** The fourth most violent type of explosive event. Ignition and burning of the confined energetic materials leads to nonviolent pressure release as a result of a low strength case or venting through case closures (leading port/fuze wells, etc.). The case might rupture but does not fragment; closure covers might be expelled, and unburned or burning energetic material might be thrown about and spread the fire. Pressure venting can propel an unsecured test item, causing an additional hazard. No blast or significant fragmentation damage to the surroundings; only heat and smoke damage from the burning energetic material.

e. **Burning Reaction (Type V).** The least violent type of explosive event. The energetic material ignites and burns, non-propulsively. The case may open, melt or weaken sufficiently to rupture nonviolently, allowing mild release of combustion gases. Debris stays mainly within the area of the fire. This debris is not expected to cause fatal wounds to personnel or be a hazardous fragment beyond 50 feet.

f. **Propulsion (Type VI).** A reaction whereby adequate force is produced to impart flight to the test item in its least restrained configuration as determined by the life cycle analysis.

**3.5 Weapon Systems Explosive Safety Review Board (WSESRB).** A board chartered by the Chief of Naval Operations to assess the explosives safety of weapon systems. The Board is chaired by the Naval Sea Systems Command and its membership is drawn from all the Naval Systems Commands.

**3.6 Weapon system.** A munition and those components and equipment required for its operation and support.

**3.7 Munition.** An assembled ordnance item that contains explosive material(s) and is configured to accomplish its intended mission.

**3.8 Munition subsystem.** An element of an explosive system that contains explosive material(s) and that, in itself, may constitute a system.

**3.9 Explosive device.** An item that contains explosive material(s) and is configured to provide quantities of gas, heat, or light by a rapid chemical reaction initiated by an energy source usually electrical or mechanical in nature.

**3.10 Hazardous fragment.** For personnel, a hazardous fragment is a piece of the reacting weapon, weapons system or container having an impact energy of 58 foot-pounds (ft-lb) or greater.

**3.11 Sympathetic detonation.** The detonation of a munition or an explosive charge induced by the detonation of another like munition or explosive charge.

**3.12 Bare round or configuration.** A munition with no external protection or shielding from the environment such as a container, barrier or shield.

**3.13 Threat hazard assessment.** An evaluation of the munition life cycle environmental profile to determine the threats and hazards to which the munition may be exposed. The assessment includes threats posed by friendly munitions, enemy munitions, accidents, handling, etc. The assessment shall be based on analytical or empirical data to the extent possible.

# 4. GENERAL REQUIREMENTS

**4.1 General.** A hazard assessment test program shall comprise a master test plan generated in concert with an environmental profile.

**4.1.1 Master test plan.** A master test plan shall be developed (see 6.3). The master test plan shall be based on the life cycle environmental profile. The master test plan shall include provisions for the conduct and sequence of all tests and any environmental conditioning as illustrated on figure 1. The WSESRB shall review and concur with the master test plan prior to conduct of the tests.

**4.1.2 Environmental profile.** A life cycle environmental profile shall be developed using the guidance available in other documents for establishing such profiles, e.g., MIL-STD-1670 for air launched weapons. The profile shall establish the environmental conditions and limits the munitions will encounter throughout the life cycle, i.e., temperature, humidity, vibration. The environmental profile shall be used in performing the threat hazard assessment and shall be cited in the master test plan. The WSESRB shall review and concur with the environmental profile prior to conduct of the tests. Also, the threat hazard assessment shall be submitted to the WSESRB for approval.

**4.2 Test parameters.** The safety and sensitivity characteristics of the item shall be determined under conditions that simulate or duplicate the hazards of credible normal, abnormal or combat situation(s) identified by the threat hazard assessment (see 6.3). The test parameters shall be selected to reflect maximum stress levels forecast.

**4.2.1 Test item temperature.** Unless otherwise specified, all test items shall be at 77 $\pm$ 18°F.

**4.3 Passing criteria.** Passing criteria for the basic tests are in section 5. Failure to meet all predetermined test criteria is not necessarily grounds for automatic rejection of that weapon system for service use.

**4.4 Hazard assessment test report.** A hazard assessment test report shall be developed (see 6.3). The hazard assessment test report shall contain detailed information specified herein (see section 5) and shall be consistent with the master test plan (see 4.1.1). It shall address rationale for deviations from the test plan, include test item configuration and identification, test date, test results, and safety and vulnerability related conclusions that may be drawn from the test results. The test results shall be described using the definitions of section 3.

**4.5 Hardware.** The item to be tested shall either be production hardware or a design equivalent to production hardware. When the item differs from production hardware, the test plan shall so indicate.

**4.6 Test equipment.** Test equipment or test fixtures used shall not interfere with the test stimulus being imposed on the test item. Unless otherwise specified, tolerances of test conditions and instrumentation calibrations shall be in accordance with MIL-STD-810.

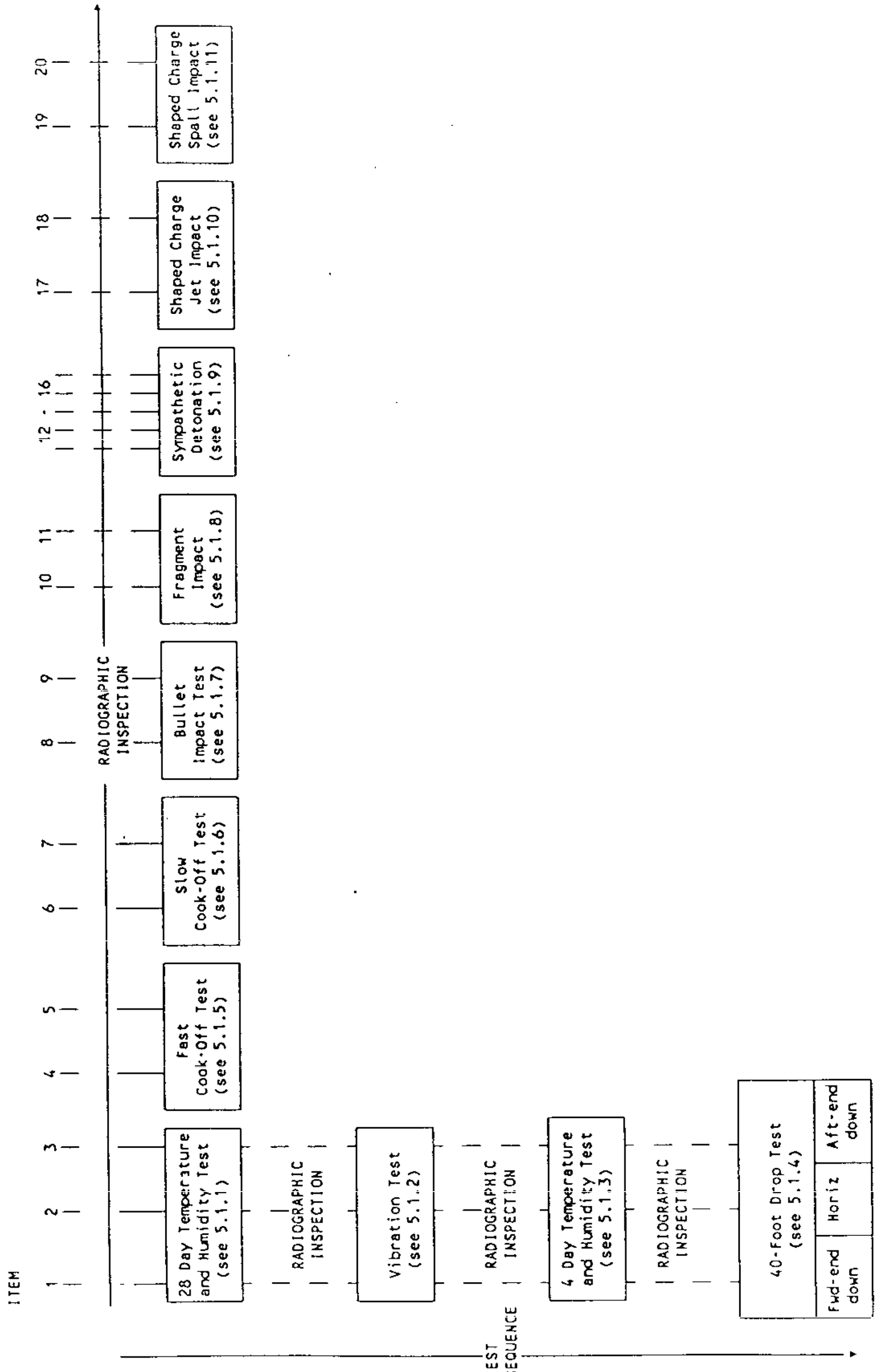



FIGURE 1. "Typical" item number and test sequence.

**4.7 Configuration.** The test item configuration shall be the same as the configuration of the item in the life cycle phase being duplicated by the test. Temperature and humidity, bullet impact, fragment impact, slow cook-off, shaped charge jet and shaped charge jet spall impact tests may be done on the major munition subsystem level. For fast cook-off, the warhead and propulsion section may be tested separately in a simulated AUR configuration. The electronic or other sections not containing explosives shall be mechanically, geometrically and thermally simulated for any test. The test item configuration to be used shall be specified in detail in the test plan and approved by the WSESRB. Test items shall be mounted so they do not affect the munition response to the given test.

**4.8 Pre-test examination.** Prior to the test, the test item shall undergo visual and radiographic inspection, in accordance with MIL-STD-453, to assure that no unusual conditions exist that might invalidate the tests. All unit safety mechanisms and devices shall be set or otherwise adjusted to a safe condition. Photographs of the test setup shall be taken (see 6.3). Photographs of the test setup shall include identification information (MK, MOD, test facility, date, etc.) in the field of view.

**4.9. Post-test requirements.** If appropriate and safe, the test item shall undergo visual and radiographic inspection, in accordance with MIL-STD-453, after the test to determine its structural integrity. Post-test and pre-test radiographic examination results shall be compared for evidence of test item deterioration. A complete description of significant post-test remains of the munition is required. The location (distance from original test position), dimensions and weight of each significant recovered part shall be documented on the appropriate test data sheet. The explosive reaction level (Type I, II, etc.) (see 3.4) shall be reported on the test data sheet. The data sheets shall be provided with the test report (see 6.3). Photographs of the test remains shall be taken (see 6.3). Photographs of the test remains shall include identification information (MK, MOD, test facility, date, etc.) in the field of view.

**4.10 Photographic requirements.** The photographic media to be used shall be selected from the following (see 6.3):

**4.10.1 Still photograph coverage.** Still photography shall be done on black and white and color negative films (2-1/4 X 2-1/4 inch format or larger). Original negatives with two matching proof prints shall be provided. When negative color material is used, the original color negative and one matching positive color transparency shall be included. All negatives shall be placed in negative preservers.

**4.10.2 Video coverage.** The video quality shall be as described in EIA-170 and EIA-330. The video media shall be a video tape recorder utilizing cartridge-type 3/4" magnetic video tape. Normal speed video coverage shall have a frame rate of 18 to 30 frames per second. High speed video coverage shall have a frame rate of 400 frames per second, minimum.

**4.10.3 Motion picture coverage.** Motion picture coverage shall utilize professional quality 16mm footage. All footage shall be unedited. Ektachrome Commercial Type 7252 or equal raw stock shall be used whenever possible. Alternate stocks shall be Types 7241 or 7242 (or equal). Normal speed motion picture coverage shall have a frame rate of 18 to 30 frames per second. High speed motion picture coverage shall have a frame rate of 400 frames per second, minimum. The sympathetic detonation test shall be recorded using high speed motion picture cameras capable of photographing 32,000 images per second, minimum.

**4.10.4 Instrumentation photography.** Instrumentation photography shall utilize professional quality 16mm color positive film with a time base recorded on the film preferably in the sprocket area rather than the image area. Video tape closed circuit color television shall also be used.

**4.10.5 Sound photography.** The media of 4.10.2, 4.10.3 and 4.10.4 shall utilize synchronous sound recording.

## 5. DETAILED REQUIREMENTS

**5.1 Basic tests.** The following safety and IM tests shall be considered, as a minimum, as part of the test program. Rationale for not conducting any test or for varying from the prescribed test methods shall be presented to the WSESRB for approval prior to executing the test program.

**5.1.1 28-day temperature and humidity test.**

**5.1.1.1 Description of test.** The 28-day temperature and humidity test consists of exposing the test item to alternating 24-hour periods (no period lasting less than 24 hours) of high and low temperatures at fixed relative humidity levels for a total of 672 hours (28 days). The temperature range and relative humidity shall be derived from the environmental profile of 4.1.2.

**5.1.1.2 Test procedure.** Test procedures shall be developed (see 6.3). The test procedures shall reflect the temperature and humidity conditions measured or forecast. Each test item shall be visually examined prior to testing and the appropriate critical dimensions recorded. Test items shall be radiographically examined in accordance with MIL-STD-453 to determine material condition. A minimum of three units shall be tested.

**5.1.1.2.1 Test equipment.** Equipment shall be capable of producing the temperatures and humidity over the time spans as specified in 5.1.1.1. Equipment design shall be such that it will not obstruct the free flow of air in contact with the item under test. Separate equipment is recommended for each test environment extreme specified.

**5.1.1.2.2 Temperature cycling.** The test shall commence by subjecting the test item to either the high or low temperature environment for the specified 24-hour period. At the end of this period, the test item shall be transferred to the other environment. Test item transfer time shall not exceed 30 minutes. At the end of each high and low temperature cycle change, the test item shall be inspected for damage and the exudate (if any) collected for chemical analysis. Testing and inspections shall continue for the number of periods specified for the test.

**5.1.1.2.3 Test interruptions.** Interruptions of the test shall be held to a minimum. If the test is interrupted by slack labor periods (weekends, holiday, etc.), the last test environment encountered prior to the slack period shall be maintained during the slack period.

**5.1.1.3 Instrumentation.** The temperature and humidity levels shall be continuously monitored and recorded.

**5.1.1.3.1 Photography.** Still photographs shall be used to record the condition of the test item and test setup prior to and after the test (see 6.3).

**5.1.1.4 Passing criteria.** These criteria are based on the final observation.

a. No reaction of the explosive.

b. No exudation of the explosive.

c. Rocket motor propellant and pyrotechnic candles shall not crack or separate from case lining in a manner which would create a hazardous condition in handling or use.

d. All safety devices shall remain in the safe position.

e. The structural integrity of the item shall not be compromised by corrosion, loosening of joints or other physical distortions.

**5.1.1.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3).

**5.1.2 Vibration test.**

**5.1.2.1 Description of test.** The vibration test consists of exposing the test item to the most severe vibration environment that it will normally encounter during the logistic cycle.

**5.1.2.1.1 Vibration orientation.** Vibration test shall be conducted along the appropriate mutually perpendicular axes, and may consist of one or a combination of the following: random vibration, vibration cycling and resonant dwell.

**5.1.2.1.2 Vibration schedule.** Vibration schedule shall be selected from the environmental profile of 4.1.2.

**5.1.2.1.3 Changes in vibration schedule.** Changes in the selected schedule of vibration levels, frequency ranges, and time duration of the test can be effected by the program manager or the procuring activity with the approval of the WSESRB.

**5.1.2.1.4 Test temperatures.** Vibration tests shall be conducted at low and elevated temperatures rather than ambient temperature if the anticipated environment so dictates.

**5.1.2.2 Test procedures.** Test procedures shall be developed (see 6.3). Test procedures shall reflect vibration modes and temperatures anticipated in the item's environment. A minimum of three items which have undergone testing in accordance with 5.1.1 shall be tested. Vibration environments as specified in MIL-STD-810 shall be considered including one or more of the following:

**5.1.2.2.1 Transportation vibration.** If the item is always containerized when transported, then the item shall be vibrated in the container. Vibrate the item in the normal configuration as shipped. The item may be vibrated in the bare configuration if it can be shown that testing in the bare configuration produces an equivalent environment.

**5.1.2.2.2 Aircraft vibration.** The item shall be vibrated in the configuration utilized for aircraft combat carriage.

**5.1.2.2.3 Shipboard vibration.** The item shall be vibrated in its shipboard stowage configuration. Should the item be carried on a launcher, then the item shall be vibrated in that configuration also.

**5.1.2.3 Instrumentation.** Recordings of the test equipment inputs and test item responses are required. Temperature recordings are required.

**5.1.2.3.1 Photography.** Still photographs shall be used to record the condition of the test item and setup prior to and after the test (see 6.3).

**5.1.2.4 Passing criteria.** These criteria are based on the final observation.

a. No reaction of the explosive.

b. No exudation of the explosive.

c. Rocket motor propellant and pyrotechnic candles shall not crack or separate from case lining in a manner which would create a hazardous condition in handling or use.

d. All safety devices shall remain in the safe condition.

e. The structural integrity of the item shall not be compromised by corrosion, loosening of joints or other physical distortions.

**5.1.2.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3).

**5.1.3 4-day temperature and humidity test.**

**5.1.3.1 Description of test.** The 4-day temperature and humidity (T&H) test is a 4-day version of the 28-day temperature and humidity test and consists of exposing the item to alternating 24-hour periods of temperature range and relative humidity as derived from the environmental profile of 4.1.2. All data relative to the 28-day T&H test is required for the 4-day T&H test (see 5.1.1 and 6.3). A minimum of three items which have undergone testing in accordance with 5.1.1 and 5.1.2 shall be tested.

**5.1.3.2 Test interruptions.** Interruptions of the test shall be held to a minimum. If the test is interrupted by slack labor periods (weekends, holiday, etc.), the last test environment encountered prior to the slack period shall be maintained during the slack period.

**5.1.3.3 Passing criteria.** These conditions are based on the final observation.

a. No reaction of the explosive.

b. No exudation of the explosive.

c. Rocket motor propellant and pyrotechnic candles shall not crack or separate from case lining in a manner which would create a hazardous condition in handling or use.

d. All safety devices shall remain in the safe condition.

e. The structural integrity of the item shall not be compromised by corrosion, loosening of joints or other physical distortions.

**5.1.3.4 Documentation.** A data sheet shall be developed documenting the test results (see 6.3).

**5.1.4 40-foot drop test.**

**5.1.4.1 Description of test.** The 40-foot (12-meter) drop test is a field test designed to evaluate the safety response of the test item to the stress loads associated with a free-fall impact onto a striking plate in various attitudes. The 40-foot drop test procedures governed by other documents, e.g., MIL-STD-331, may be utilized if suitable and approved by the WSESRB.

**5.1.4.2 Test procedures.** The item shall be dropped 40 feet (measured from the lowest point of the item to the point of impact) complying with each of the orientations specified in 5.1.4.2.1.

**5.1.4.2.1 Impact surface and orientation.** The test consists of free-fall drops of the environmentally preconditioned items (see figure 1) in the configuration of the item in the life cycle phase being duplicated by the test (one drop per item) onto the striking plate. The striking plate shall be made of steel with a minimum thickness of 3 inches and a Brinell hardness of not less than 200. It shall have a reasonably smooth surface and a length and width of at least one and one-half times the maximum dimensions of the unit being tested. The plate shall be solidly supported over its horizontal plane and bearing surface by a concrete or crushed stone foundation. The foundation shall have a minimum thickness of 24 inches. The item impact attitudes for each drop are:

a. Longitudinal axis horizontal
b. Longitudinal axis vertical (aft-end down)
c. Longitudinal axis vertical (forward-end down).

**5.1.4.2.2 Guidance.** One or more guiding devices may be used to assure that the item impacts at the desired striking angle. These devices shall not decrease the striking velocity of 50 feet/second (ft/s) by more than 5 ft/s, nor shall they impede the item rebound after impact.

**5.1.4.2.3 Examination and documentation.** The item shall be examined, and damage documented. A safety waiting period prescribed by the test activity shall be observed after each drop. All safety precautions shall be observed while handling the dropped item.

**5.1.4.3 Instrumentation.** Photographic or other instrumentation shall be utilized to verify striking velocity. Recommended instrumentation for the test includes high speed motion picture photography/video (frame rate of 400 frames per second, minimum), normal speed motion picture photography/video (frame rate of 18 to 30 frames per second) or video tape closed circuit color television (see 6.3). Still photographs shall be used to record the condition of the test item and setup prior to and after the test (see 6.3).

**5.1.4.4 Passing criteria.** No reaction of the explosives in the item. No rupture of the test item which dislodges or disrupts explosive material. The item shall be safe to handle and be disposed by normal EOD procedures.

**5.1.4.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3).

**5.1.5 Fast cook-off test.**

**5.1.5.1 Description of test.** The fast cook-off test consists of engulfing the test item in the flame envelope of a liquid fuel fire and recording its reaction as a function of time.

**5.1.5.2 Test procedure.**

**5.1.5.2.1 Fuel basin.** The fuel basin shall be large enough to ensure complete engulfment of the item by the fire for the duration of the test. Complete engulfment can be provided if the fuel basin dimensions are at least 10 feet larger than the dimensions of the munition.

**5.1.5.2.2 Test configuration.** The item shall be tested in the configuration in the logistic phase being duplicated by the test. Items configured with rocket motors shall be restrained to avoid launching due to a propulsive reaction. The restraining and suspension method shall not interfere with heating of the item. A minimum of two items shall be tested.

**5.1.5.2.3 Position.** The item shall be positioned so that its horizontal center line is 36 inches above the surface of the fuel or in the attitude most probable in the weapons life cycle environment. Methods shall be employed to prevent the test item from falling into and being quenched by the fuel.

**5.1.5.2.4 Fuel.** Sufficient hydrocarbon fuel, e.g., JP-4, JP-5, JP-8, JET A-1, shall be used to insure that the item reacts while engulfed in the fire. The quantity of fuel required is a function of the size of the test site and the characteristics of the item being tested.

**5.1.5.2.5 Flame temperature rise time.** The time until flame temperature, as measured by any two thermocouples defined in 5.1.5.2.7, reaches 1000°F shall be recorded.

**5.1.5.2.6 Average flame temperature.** An average flame temperature of at least 1600°F as measured by all valid thermocouples defined in 5.1.5.2.7 at the test item without contribution of the burning ordnance will be considered a valid test. This temperature is determined by averaging the temperature from the time the flame reaches 1000°F until all ordnance reactions are completed.

**5.1.5.2.7 Thermocouples.** Four thermocouples with time constants of 2.0 seconds or less shall be located 4 to 8 inches outside the ordnance skin for each item tested. The thermocouples shall be positioned on each end and side of the ordnance skin in a horizontal plane through the ordnance center line. Thermocouple readings shall be recorded at least once every second until the test is completed.

**5.1.5.3 Instrumentation.** Measurement of the fire flame temperature as a function of time is required. Internal munition temperatures may be required. Bore pressure measurements may be taken on propulsion units to aid in determining thrust.

**5.1.5.3.1 Photography.** Still photographs shall be used to record the condition of the test item and test site prior to and after the test (see 6.3). The cook-off event shall be recorded using video or motion picture sound photography (see 6.3).

**5.1.5.4 Passing criteria.** No reaction more severe than burning.

**5.1.5.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3).

**5.1.6 Slow cook-off test.**

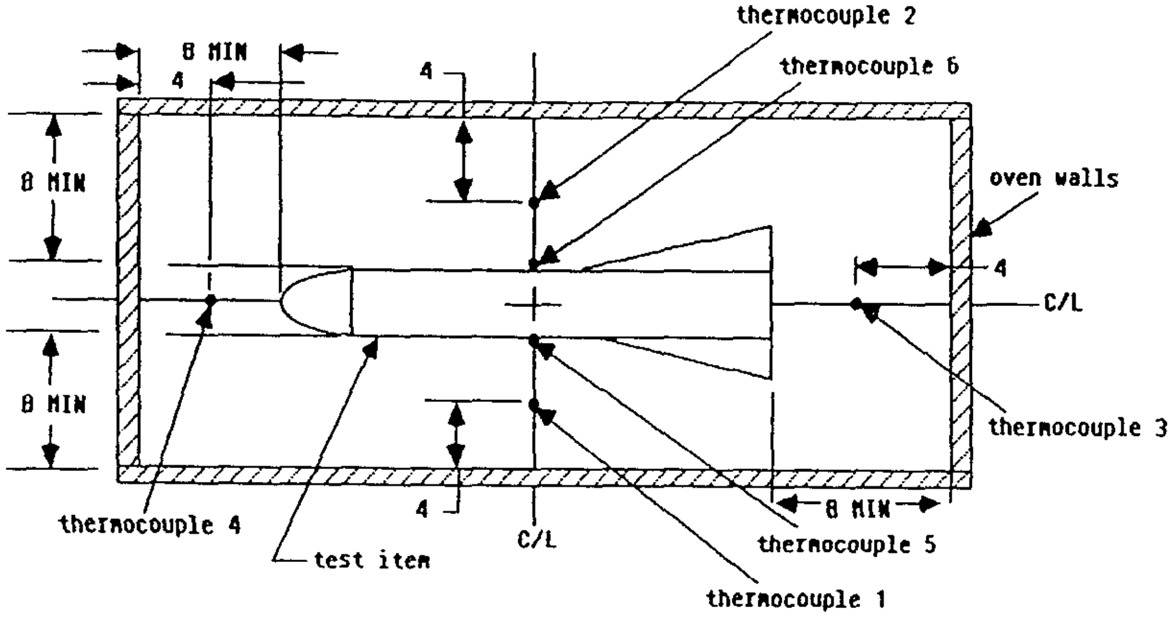
**5.1.6.1 Description of test.** The slow cook-off test (SCO) is used to determine the reaction temperature and to measure the overall response of major munition subsystems to a gradually increasing thermal environment.

**5.1.6.2 Test procedures.** The test consists of subjecting the test item to a gradually increasing temperature at a rate of 6 F° per hour until reaction occurs. The test item may be preconditioned at the munition's upper environmental temperature limit for eight hours prior to the start of the test. Temperatures and elapsed test time shall be observed and measured continuously. A minimum of two items shall be tested.

**5.1.6.2.1 Test equipment.** Test equipment shall be capable of providing a controlled thermal environment and of increasing the oven air temperature, with the test item inside the oven, at a rate of 6°F per hour throughout the temperature operating range. Its design shall minimize hot spots and ensure by circulation (or other means) a uniform thermal environment to the item under test. The oven shall be designed to minimize the possibility of secondary reactions such as those caused by exudate contacting the heating element(s). A means of relief shall be provided for the increased air pressure that will be generated by the test due to heating. A minimum of eight inches separation distance between all outer surfaces of the test item and the inner walls of the oven is required. Oven materials, wall thickness, etc., shall be designed to minimize confinement of the test item reaction. Figure 2 provides a typical oven sketch with thermocouple locations.

**5.1.6.3 Instrumentation.**

**5.1.6.3.1 Temperature recording.** Temperature recording devices (permanent record type) shall be used to record temperatures. A minimum of four oven internal air temperature-measuring thermocouples shall be installed. These thermocouples shall be located as shown in figure 2. Either thermocouple number 1 or 2 in figure 2 may be used as the oven control thermocouple. A minimum of two test item reaction temperature thermocouples shall be attached to the test item external surface located as shown in figure 2 (thermocouples 5 and 6). Thermocouple sampling rates shall be at least once per minute.




Plan View

Notes: All dimensions are in inches; all measurements are taken from internal oven walls.

FIGURE 2. "Typical" slow cook-off oven with thermocouple locations.

**5.1.6.3.2 Witness plates.** Steel witness plates positioned beneath the test item shall be used to provide evidence of the test item reaction.

**5.1.6.3.3 Photography.** Still photographs shall be used to record the condition of the test item and test site prior to and after the test (see 6.3). The cook-off event shall be recorded using video or motion picture sound photography (see 6.3).

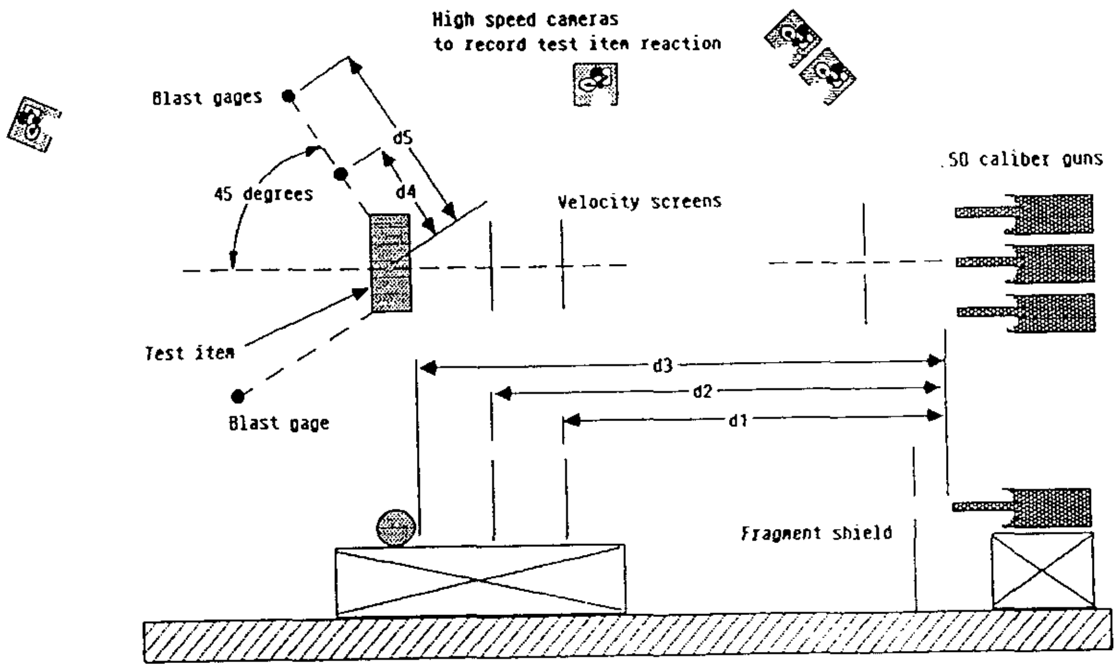
**5.1.6.4 Passing criteria.** No reaction more severe than burning.

**5.1.6.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3).

**5.1.7 Bullet impact test.**

**5.1.7.1 Description of test.** The bullet impact test is conducted to determine the reaction of the test item when impacted by at least three .50 caliber type M2 armor-piercing (AP) projectiles at a velocity of 2,800 ± 200 ft/s.

**5.1.7.2 Test procedure.** Figure 3 provides a schematic of a typical test configuration. The locations of instrumentation (blast gages, cameras, etc.) are provided for information only. The exact positions and types of equipment used should be selected by the test activity based on the size of the test item and its expected response. The firing interval shall be 50 ± 10 milliseconds (ms). A minimum of two test items shall be tested with the bullets impacting the largest quantity of explosives in one test item and the bullets aimed at the most shock-sensitive location of the other test item.




Notes:

d1 = Distance to first velocity screen
d2 = Distance to second velocity screen
d3 = Distance to test item
d4 = Distance to first blast gage
d5 = Distance to second blast gage(s)

**FIGURE 3. "Typical" bullet impact test configuration.**

### 5.1.7.3 Instrumentation.

**5.1.7.3.1 Airblast overpressure.** Measurement of the airblast overpressure produced by the test item is optional. If gages are used, they shall be capable of recording the pressure as a function of time and have sufficient frequency response to adequately follow the pressure history if the energetic material detonates. The gages should be calibrated to record the peak pressure expected from the detonation of the test item energetic material.

**5.1.7.3.2 Witness plates.** Steel witness plates positioned beneath the test item shall be used to provide evidence of the test item reaction.

**5.1.7.3.3 Bullet velocity.** The bullet impact velocity shall be measured using high-speed motion picture cameras, electronic velocity screens, or other means. The system used shall be accurate to measure bullet velocity to within ± 50 ft/s.

**5.1.7.3.4 Photography.** High-speed motion picture photography, motion picture sound photography or video shall be used to record the test item reaction (see 6.3). The type of film used, exposure, and frame rates should be selected by the test activity to provide the resolution necessary to obtain the required data. Still photographs of the test item shall be taken before and after the test (see 6.3).

**5.1.7.4 Passing criteria.** No reaction more severe than burning.

**5.1.7.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3). The data sheet shall be provided with the final report.

**5.1.8 Fragment impact test.**

**5.1.8.1 Description of test.** The fragment impact test is conducted to determine the response of the test item to the impact of two to five one-half inch, 250 grain, mild-steel cubes traveling at 8,300 ± 300 ft/s.

**5.1.8.2 Test procedure.** Figure 4 presents an example of the test configuration. The projector should produce fragments traveling at 8,300 ± 300 ft/s, with an impact of at least two fragments but no more than five upon the test item. A minimum of two items shall be tested with fragments aimed at the largest quantity of explosives in one test item and fragments aimed at the most shock-sensitive location of the other test item.

**5.1.8.3 Instrumentation.**

**5.1.8.3.1 Airblast overpressure.** Measurement of the airblast overpressure produced by the test item is optional. The measurement may not be meaningful if an explosive launching charge is used to accelerate the fragments. If gages are used, they shall be capable of recording the pressure as a function of time and have sufficient frequency response to adequately follow the pressure history if the energetic material detonates. The gages should be calibrated to record the peak pressure expected from the detonation of the test item energetic material.

**5.1.8.3.2 Witness plates.** Steel witness plates positioned beneath the test item shall be used to provide evidence of the test item reaction. A witness plate placed behind the test item may be useful in determining the fragment pattern achieved.

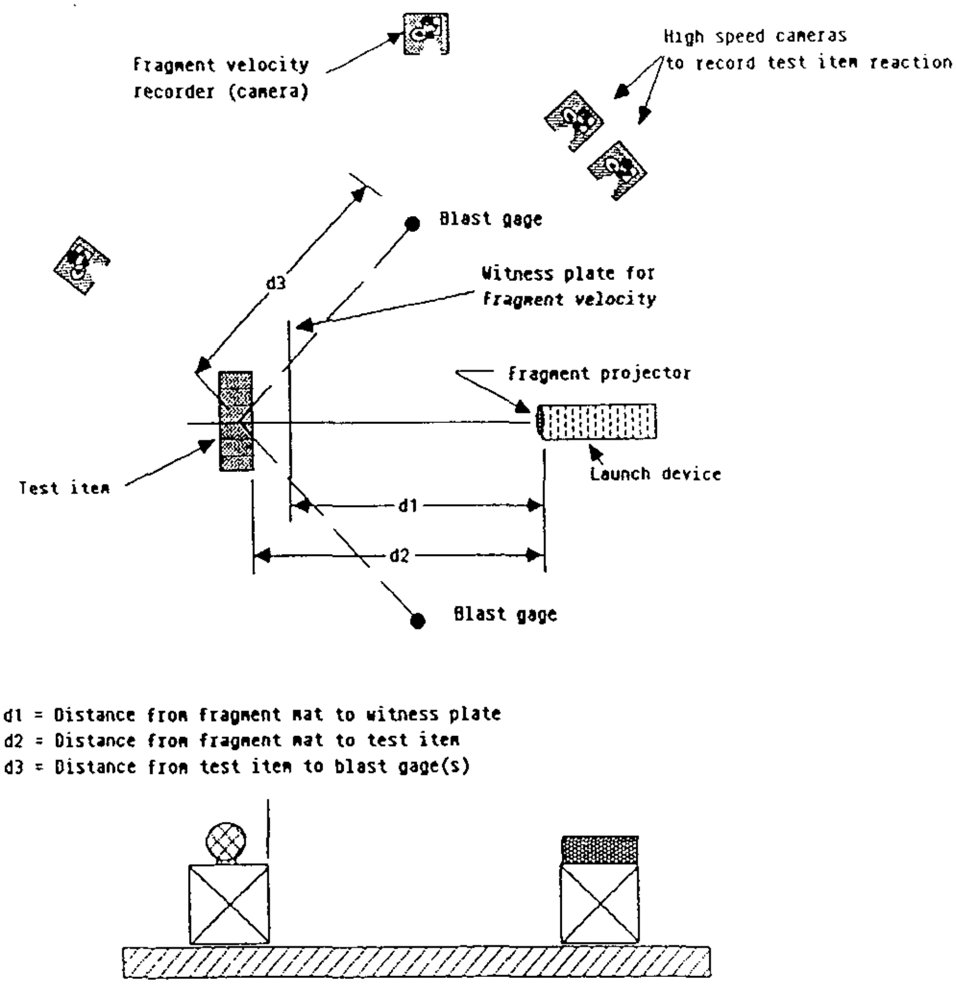



**FIGURE 4.** "Typical" fragment impact test setup.

**5.1.8.3.3 Fragment velocity.** The fragment impact velocity shall be measured using high speed motion picture cameras, electronic velocity screens, or other means. The system used shall be accurate to measure fragment velocity within 300 ft/s.

**5.1.8.3.4 Photography.** High-speed motion picture photography, motion picture sound photography or video shall be used to record the test item reaction (see 6.3). Still photographs of the test item shall be taken before and after the test (see 6.3).

**5.1.8.4 Passing criteria.** No reaction more severe than burning. The reaction violence of the test item loaded with inert energetic material simulant may be subtracted from the reaction violence of the actual test item.

**5.1.8.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3). The data sheet shall be provided with the final test report.

**5.1.9 Sympathetic detonation test.**

**5.1.9.1 Description of test.** The sympathetic detonation tests consists of detonating one munition (donor) adjacent to one or more like munitions (acceptors). The objective is to evaluate the likelihood that a detonation reaction may be propagated from one unit to another within a group or stack of munitions. Applicability of the test should be determined based upon the threat hazard assessment (see 3.13). Generally, the test is applicable for munitions containing explosive warheads. However, the test may also be applicable for munitions that do not contain explosive warheads but that do incorporate other detonable components, e.g., rocket motors containing DOD Class/Division 1.1 propellant.

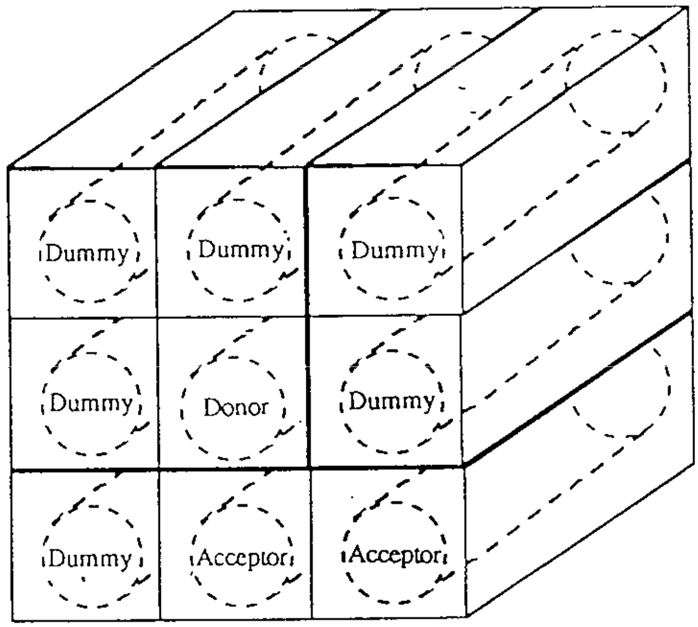
**5.1.9.2 Test procedure.**

**5.1.9.2.1 Test setup.** The test setup shall be designed based upon the threat hazard assessment. The test setup should replicate the packaging conditions and stowage arrangement for the logistics life cycle phase deemed to pose the greatest threat of sympathetic detonation. The test setup shall incorporate one or more acceptors positioned (relative to the donor) at location(s) deemed most vulnerable to sympathetic detonation. Where appropriate, the test setup shall also incorporate simulated (or dummy) units to provide additional confinement of the donor and the acceptor(s) as illustrated on figure 5.

**5.1.9.2.2 Test item configuration.** The test item configuration shall comply with the requirements of 4.7 except that components containing only non-detonable explosives may be simulated in both the donor and the acceptor(s) using inert components of equivalent structure.

**5.1.9.2.3 Donor initiation.** The donor may be initiated using an external stimulus that simulates initiation by the threat stimuli most likely to cause detonation of the test item as determined by the threat hazard assessment. Alternatively, if the test item is designed to detonate when functioned, e.g., fragmentation warheads, the donor may be initiated using its normal booster system or a booster charge of similar power. For items that are not designed to detonate, e.g., rocket motors, the donor may be initiated axisymmetrically using a booster charge of sufficient size/output to ensure sustained, stable detonation of the explosive. The donor may be modified to accommodate the required booster provided the modifications are not expected to have a significant effect on the fragmentation or blast of the item.

**5.1.9.3 Instrumentation.** The test design shall incorporate sufficient instrumentation to ensure that the test results can be assessed conclusively. As a minimum, the test design shall incorporate airblast overpressure and either motion picture photography or witness plates.




NOTE: For illustrative purposes only; packaging, arrangement of test items, and number and placement of acceptors shall be determined based upon the threat hazard assessment.

**FIGURE 5.** Sample arrangement of test items for sympathetic detonation test.

**5.1.9.3.1 Motion picture photography.** High-speed motion picture cameras (32,000 images/s minimum) may be used to record the reaction(s) of the acceptor(s) (see 6.3). The film type and exposure should be selected to minimize the possibility of overexposure, i.e., washout, caused by the intense light emitted during the detonation of the donor. The placement of the camera(s) shall be selected to minimize the possibility of obscuration of the acceptor(s) by the expanding gas cloud following detonation of the donor.

**5.1.9.3.2 Witness plates.** Steel witness plates may be placed beneath the test items to provide rough indications of the shock pressure within each acceptor relative to the shock pressure within the donor. Alternatively, steel witness plates may be placed adjacent to the test items to provide rough indications of the size and velocity of the fragments/debris ejected by each acceptor relative to that of the donor. The placement of each witness plate shall be such that (a) it does not shield the acceptor(s) from the donor and (b) it does not focus the fragmentation/blast of the donor.

**5.1.9.3.3 Airblast overpressure.** Pressure gages may be used to measure the air shock produced by the reactions of the test items. The pressure measurement system shall be capable of recording overpressure as a function of time with a minimum frequency response of 20 kHz. Transducers shall be placed along each of two mutually perpendicular axes as illustrated on figure 6. The transducers shall be mounted flush with the ground surface or in elevated fixtures with the sensing face of each transducer parallel to the direction of flow. The mounting fixtures shall be designed to minimize flow disturbances. Baseline overpressure data shall be obtained by conducting a calibration test firing using either a single test item (if available) or an explosive charge of approximately the same yield as the donor test item. The setup for the calibration test shall be identical to the actual test setup with respect to test item mounting, transducer placement, and sensitivity and response of the measurement system.

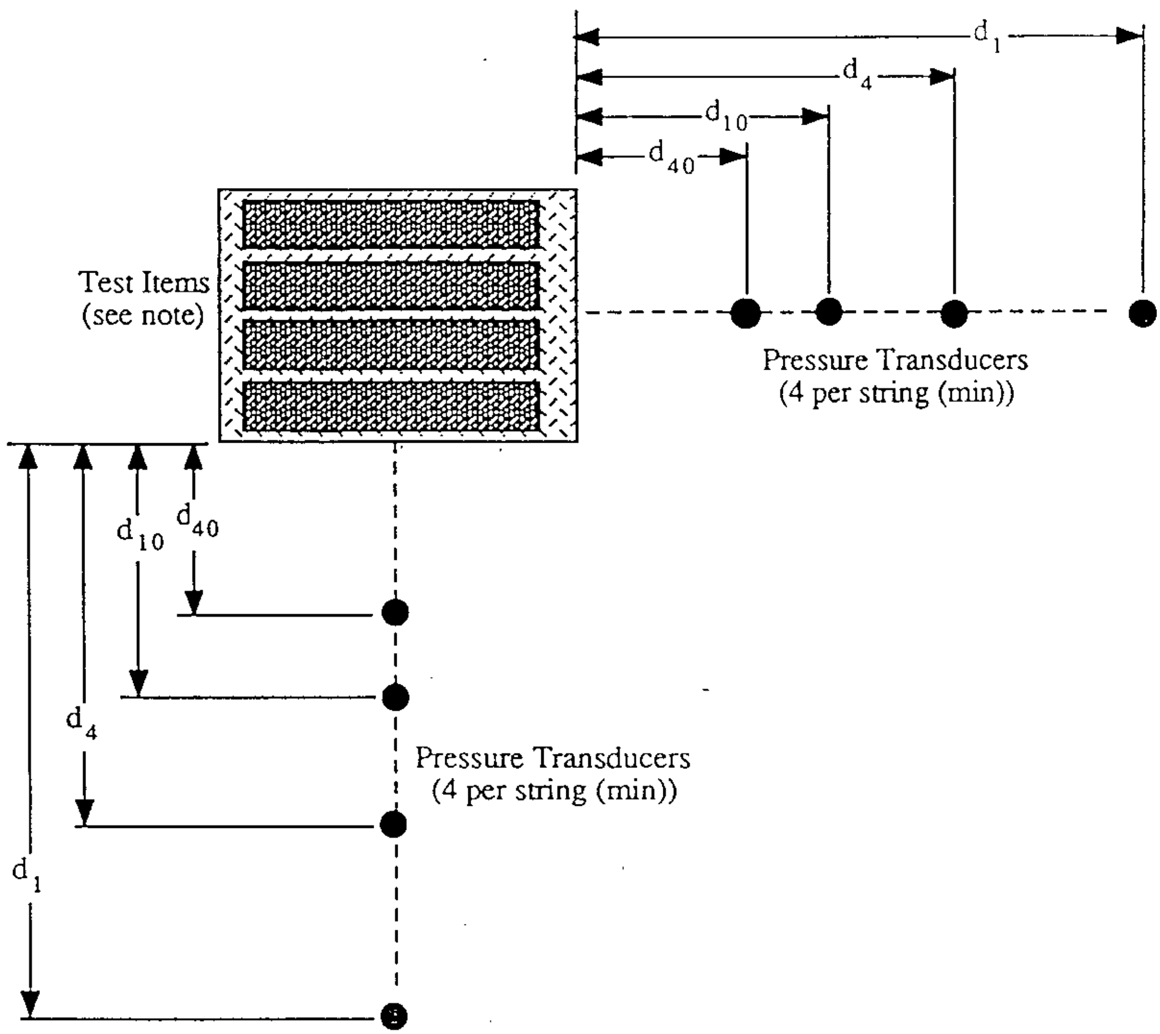
**5.1.9.4 Passing criteria.** No detonation of any acceptor. For ordnance stored in containers, there shall be no acceptor weapon detonations in any other container.

**5.1.9.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3). The data sheet shall be provided with the final test report.

**5.1.10 Shaped charge jet impact test.**

**5.1.10.1 Description of test.** The shaped charge jet impact test is conducted to determine the reaction of the test item when impacted by the jet of a M42/M46 grenade, representative of a top attack or an 81-mm precision shaped charge (or both), representative of a hand-held HEAT attack. The determination of the applicability of this test and of which jet to use shall be based on the threat hazard assessment.

**5.1.10.2 Test procedure.** Test procedures shall be developed (see 6.3). Figure 7 provides a schematic of a typical test configuration. The munition shall be tested in the transport/storage or operational use configurations (or both), including shielding, which reflect credible threats. Tests shall be done with either the M42/M46 grenade body load assembly or the 81-mm precision shaped charge. The exact positions and types of equipment used should be selected by the test activity based on the size of the test item and its expected response. The 81-mm shaped charge should be fired from a standoff of two cone diameters from the outer surface of the shielding material, or from the outer surface of the test item if no shielding is used. The 81-mm shaped charge shall be initiated in a manner that ensures proper formation of the shaped charge jet. The M42/M46 grenade has a built in standoff distance, which should be used. The shaped charge should be aimed to impact the item so the jet passes through the greatest possible length of energetic material. If, however, the energetic material contains a cavity, such as the center of a rocket motor, the jet should be aimed to pass through this cavity. The booster should be avoided. A minimum of two test items shall be used.




$d_{40}$ = Distance at which peak airblast overpressure is expected to be approximately 40 pounds per square inch gage (psig) if all test items detonate.

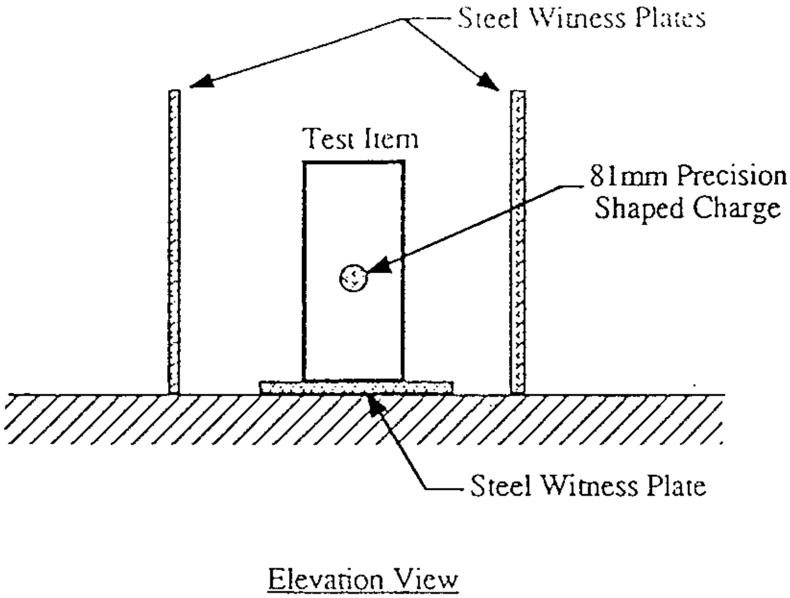
$d_{10}$ = Distance at which peak airblast overpressure is expected to be approximately 10 psig if all test items detonate.

$d_4$ = Distance at which peak airblast overpressure is expected to be approximately 4 psig if all test items detonate.

$d_1$ = Distance at which peak airblast overpressure is expected to be approximately 1 psig if all test items detonate.

NOTE: For illustrative purposes only; packaging, arrangement of test items, and number and placement of acceptors shall be determined based upon the threat hazard assessment.

FIGURE 6. Sample placement of pressure transducers for sympathetic detonation test (plan view).



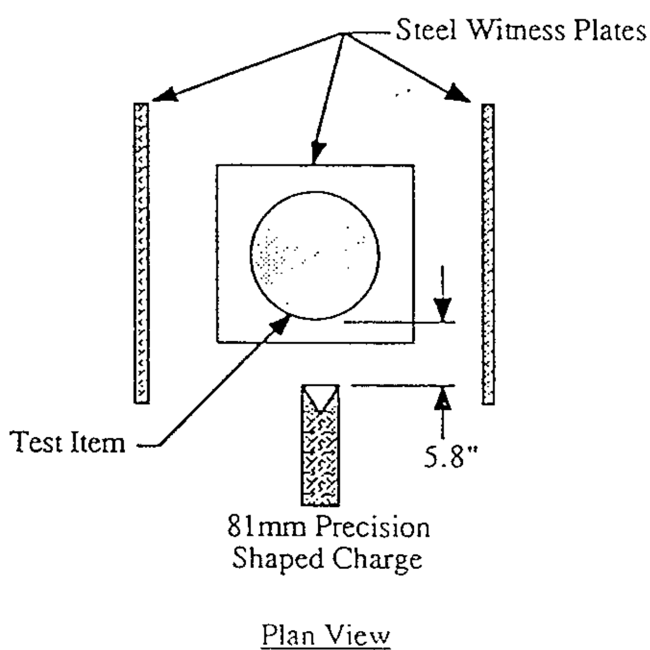




**FIGURE 7. "Typical" shaped charge impact test configuration.**

**5.1.10.3 Shaped charge description.**

**5.1.10.3.1 81-mm shaped charge description.** The 81-mm precision shaped charge shall be configured as follows:

| | |
|---|---|
| Explosive fill: | 1.8 pounds of Composition B conforming to MIL-C-401 |
| Cone angle: | 42° |
| Dimensions: | Height of cone = 3.7 inches<br>Outside diameter = 3.2 inches<br>Inside diameter = 2.91 inches<br>Wall thickness = 0.075 inch |
| Liner description: | Oxygen-free copper conforming to ASTM B152 with a temper of OS025<br>Grain size < 50 microns after stress relief<br>No shear forming<br>Deep drawn anneal |
| Body: | Standard 90-mm M371E1 recoilless rifle round |

**5.1.10.3.2 M42/M46 grenade description.** The M42/M46 grenade shall be configured as follows:

| | |
|---|---|
| Explosive fill: | 30 grams of Composition A-5 conforming to MIL-E-14970 |
| Cone angle: | Trumpet with a 3-inch radius |
| Dimensions: | Height of cone = 1.3 inches<br>Outside diameter = 1.315 inches<br>Inside diameter = 1.237 inches<br>Wall thickness = 0.075 inch |
| Liner description: | Copper strip, cold-rolled, soft annealed, conforming to QQ-C-576<br>Electrolytic tough pitch<br>Grain size < ASTM grain size 8<br>Non-earring quality with suppressed cube texture |
| Body: | M42/M46 body load assembly (without fuze) |

**5.1.10.4 Instrumentation.**

**5.1.10.4.1 Airblast overpressure.** Measurement of the airblast overpressure produced by the test item may be used to provide evidence of the test item reaction. The gages shall be capable of recording the pressure as a function of time and have sufficient frequency response to adequately follow the pressure history if the energetic material detonates. The gages should be calibrated to record the peak pressure expected from the detonation of the test item energetic material. If the amount of energetic material in the test item is not much greater than the explosive in the shaped charge, it may be necessary to use baffles to delay the pressure wave from the shaped charge so that the pressure wave from the item may be distinguished.

**5.1.10.4.2 Witness plates.** Steel witness plates capable of withstanding the detonation of the test item shall be placed under and on two opposite sides of the test item as witnesses to the degree of reaction.

**5.1.10.4.3 Photography.** High-speed motion picture photography, motion picture sound photography or video shall be used to record the test item reaction (see 6.3). The type of film used, exposure, and frame rates should be selected by the test activity to provide the resolution necessary to obtain the required data. Still photographs of the test item and test setup shall be taken before and after the test (see 6.3).

**5.1.10.5 Passing criteria.** There shall be no detonation as a result of the shaped charge jet impact.

**5.1.10.6 Documentation.** A data sheet shall be developed documenting the test results (see 6.3). The data sheet shall be provided with the final report.

**5.1.11 Spall impact test.**

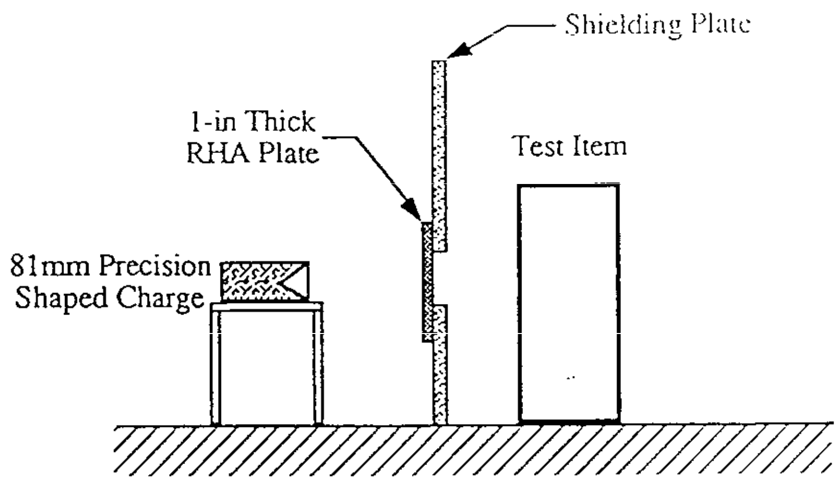
**5.1.11.1 Description of test.** The spall impact test is conducted to determine the response of munitions to the impact of hot spall fragments. Applicability of the test should be determined based upon the threat hazard assessment.

**5.1.11.2 Test procedure.**

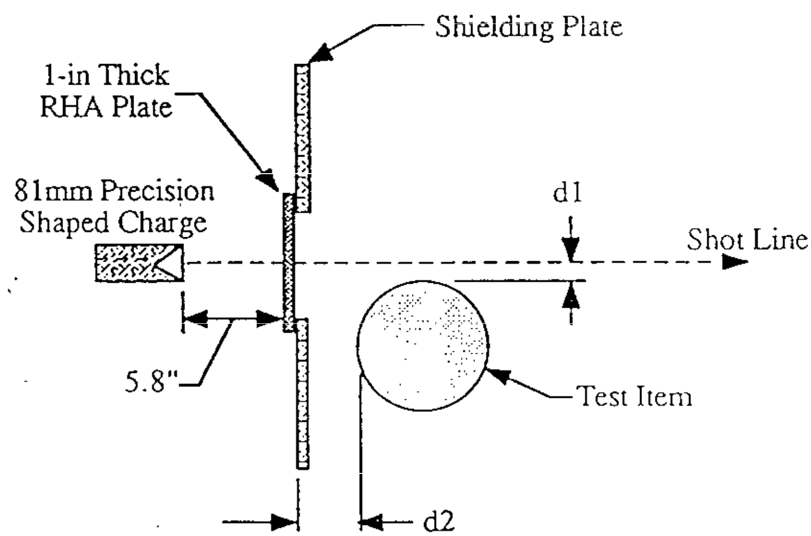
**5.1.11.2.1 Test setup.** A typical test setup is illustrated on figure 8. The spall fragments are produced by impacting a 1-inch thick rolled homogeneous armor (RHA) plate with the shaped charge jet of an 81-mm precision shaped charge. The standoff distance between the shaped charge and the RHA plate shall be 5.8 inches. The placement of the test item behind the RHA plate shall be selected so that it is impacted by spall fragments only. A minimum of 4 spall fragments/10 $in^2$ of presented area (up to 40 fragments total) shall impact the test item. The test activity is responsible for calibrating the test setup to determine the placement of the test item (d1 and d2 of figure 8) that will provide the required areal hit density.

**5.1.11.2.2 Test item configuration.** The test item configuration shall be a bare munition subsystem. A minimum of two test items shall be used.

**5.1.11.3 Instrumentation.** Closed-circuit video, real time motion picture photography (with sound) or both shall be used to document the test events (see 6.3).




Elevation View




Plan View

**FIGURE 8. "Typical" spall impact test configuration.**

**5.1.11.4 Passing criteria.** No sustained burning shall occur as a result of the spall impact test.

**5.1.11.5 Documentation.** A data sheet shall be developed documenting the test results (see 6.3). The data sheet shall be provided with the final test report.

**5.2 Additional tests.** In addition to the basic tests of 5.1, tests are to be developed or selected from other test document sources to form the test plan to assess the safety of the weapon system as determined by the system safety program. The following is a non all-inclusive list of factors that should be considered in performing the hazard analyses required as the basis for developing the test plan.

Acceleration
Accidental Release
Acoustical
Aerodynamic Heating
Atmospheric Lightning
Altitude
Catapult and Arrested Landing
Double Feed of Ammunition
Drop
Dust
Electromagnetic Radiation
Electromagnetic Pulse
Electrostatic Discharge
Explosive Atmosphere
Faulty Unit
Flooding
Fungus
HERO - Hazards of Electromagnetic Radiation to Ordnance
Hot Gun Cook-Off
Humidity
Jettison
Jolt
Jumble
Leak Detection - Halogen-helium
Leakage - Immersion
Muzzle Impact/Impact Safe Distance
Pressurization
Radiography
Rain
Salt Fog
Shock
Solar Radiation - Sunshine
Space Simulation - Unmanned Test
Static Detonator Safety
Time to Airburst
Toxicity
Vibration

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful but is not mandatory.)

**6.1 Intended use.** The tests described herein are used to assess the safety and insensitive munitions characteristics of non-nuclear ordnance.

**6.2 Issue of DODISS.** When this standard is used in acquisition, the applicable issue of the DODISS must be cited in the solicitation (see 2.1.1 and 2.2).

**6.3 Data requirements.** The following Data Item Descriptions (DIDs) must be listed, as applicable, on the Contract Data Requirements List (DD Form 1423) when this standard is applied on a contract, in order to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

| Reference Paragraph | DID Number | DID Title |
|---|---|---|
| 4.1.1 | DI-T-30714 | Master Test Plan/Program Test Plan |
| 4.1.1 | DI-NDTI-80603 | Test Procedure |
| 4.2 | DI-SAFT-81124 | Threat Hazard Assessment |
| 4.4 | DI-SAFT-81125 | Hazard Assessment Test Report |
| 4.8, 4.9, 4.10, 5.1.1.3.1, 5.1.2.3.1, 5.1.3.1, 5.1.4.3, 5.1.5.3.1, 5.1.6.3.3, 5.1.7.3.4, 5.1.8.3.4, 5.1.9.3.1, 5.1.10.4.3, 5.1.11.3 | DI-SAFT-81126 | Photographic Requirements |
| 5.1.1.2, 5.1.2.2, 5.1.9.2, 5.1.10.2 | DI-NDTI-80603 | Test Procedure |
| 5.1.1.5, 5.1.3.4 | DI-SAFT-81127 | Temperature and Humidity Test Data |
| 5.1.2.5 | DI-SAFT-81128 | Vibration Test Data |
| 5.1.4.5 | DI-SAFT-81129 | Forty (40) Foot Drop Test Data |
| 5.1.5.5 | DI-SAFT-81130 | Fast Cook-off Test Data |
| 5.1.6.5 | DI-SAFT-81131 | Slow Cook-off Test Data |
| 5.1.7.5 | DI-SAFT-81132 | Bullet Impact Test Data |
| 5.1.8.5 | DI-SAFT-81133 | Fragment Impact Test Data |
| 5.1.9.5 | DI-SAFT-81134 | Sympathetic Detonation Test Data |
| 5.1.10.6 | DI-SAFT-81135 | Shaped Charge Jet Impact Test Data |
| 5.1.11.5 | DI-SAFT-81136 | Spall Impact Test Data |

The above DIDs were those cleared as of the date of this standard. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DIDs are cited on the DD Form 1423.

**6.4 Subject term (key word) listing.**

Bullet impact test
Drop test
Fast cook-off test
Fragment impact test
Humidity test
Insensitive munitions
Munitions, insensitive
Safety test
Shaped charge jet impact test
Slow cook-off test
Spall impact test
Sympathetic detonation test
Temperature test
Vibration test

**6.5 Changes from previous issue.** Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Navy - OS

Preparing activity
Navy -OS
(Project SAFT-0024)

Review activities:
Navy - AS

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

| I RECOMMEND A CHANGE: | 1. DOCUMENT NUMBER MIL-STD-2105A(NAVY) | 2. DOCUMENT DATE *(YYMMDD)* 910308 |
|---|---|---|

3. DOCUMENT TITLE
**HAZARD ASSESSMENT TESTS FOR NON-NUCLEAR MUNITIONS**

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

| a. NAME *(Last, First, Middle Initial)* | b. ORGANIZATION | |
|---|---|---|
| c. ADDRESS *(Include Zip Code)* | d. TELEPHONE *(Include Area Code)*<br>(1) Commercial<br>(2) AUTOVON<br>*(If applicable)* | 7. DATE SUBMITTED *(YYMMDD)* |

8. PREPARING ACTIVITY

| a. NAME | b. TELEPHONE *(Include Area Code)* | |
|---|---|---|
| **Commanding Officer**<br>**Naval Ordnance Station** | (1) Commercial<br>**(301)743-4510** | (2) AUTOVON<br>**364-4510** |
| c. ADDRESS *(Include Zip Code)*<br>**Code 3730**<br>**Indian Head, MD 20640-5000** | IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:<br>Defense Quality and Standardization Office<br>5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466<br>Telephone (703) 756-2340 AUTOVON 289-2340 | |