NOT MEASUREMENT SENSITIVE

MIL-STD-1316D
NOTICE 1
30 JULY 1993

MILITARY STANDARD

FUZE DESIGN, SAFETY CRITERIA FOR

TO ALL HOLDERS OF MIL-STD-1316D:

1. Make the following pen and ink change:

Page 2, paragraph 2.1.1, SPECIFICATIONS, MILITARY. Change the title of "MIL-I-23659" to "Initiators, Electrical, General Design Specification For."

2. THE FOLLOWING PAGES OF MIL-STD-1316D HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
3	30 July 1993	3	9 April 1991
4	30 July 1993	4	9 April 1991
13	30 July 1993	13	9 April 1991
14	9 April 1991	14	REPRINTED WITHOUT CHANGE

3. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

4. Holders of MIL-STD-1316D will verify that page changes and additions indicated above have been entered. This Notice will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each Notice is to be retained by stocking points until the Military Standard is completely revised or cancelled.

5. Vertical lines are used in this Notice to denote changes (additions, modifications, corrections, deletions) from the basic standard. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the basic standard.

AMSC N/A FSC 13GP

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NOTICE 1

Custodian
Army – AR
Navy – OS
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Review activities
Army – MI
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Air Force – 18, 99

Preparing activity:
Army – AR

(Project 13GP–0032)

MIL-STD-1512	– Electroexplosive Subsystems, Electrically Initiated, Design Requirements and Test Methods
MIL-STD-1751	– Safety and Performance Tests for Qualification of Explosives
MIL-STD-1757	– Lightning Qualification Test Techniques for Aerospace Vehicles and Hardware
MIL-STD-1795	– Lightning Protection of Aerospace Vehicles and Hardware
DOD-STD-2167	– Defense System Software Development
DOD-STD-2169	– High Altitude Electromagnetic Pulse (HEMP) Environment

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

2.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitations.

NAVY WEAPON SPECIFICATIONS

WS-4660	– Dipam Explosive
WS-5003	– HNS Explosive
WS-12604	– Explosive, Plastic-Bonded Molding Powder (PBXN-6)
WS-32972	– Material Specification for HNS-IV

OTHER PUBLICATIONS

ADA-086259 Vol. 4	– Joint Services Safety and Performance Manual for Qualification of Explosives for Military Use.

(Unless otherwise indicated, copies of Navy Weapon Specifications are available from Officer-In-Charge, Naval Surface Warfare Center, Dahlgren Division Detachment White Oak, ATTN: Code R10, 10901 New Hampshire Avenue, Silver Spring, MD 20903-5000.)

2.2 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, in which case the exception will be identified in the text and cited in the solicitation.

3.1 General. The definitions of MIL-STD-444 generally apply to the munition terms in this standard and the definitions of ADA-086259 apply to the explosive terms. For interpretation of this standard, the following specific definitions apply:

3.2 Armed. A fuze is considered armed when any firing stimulus can produce fuze function.

a. A fuze employing explosive train interruption (see 5.3.3) is considered armed when the interrupter(s) position is ineffective in preventing propagation of the explosive train at a rate equal to or exceeding 0.5 percent at a confidence level of 95 percent.

b. A fuze employing a non-interrupted explosive train (see 5.3.4) is considered armed when the stimulus available for delivery to the initiator equals or exceeds the initiator's maximum no-fire stimulus (MNFS).

3.3 Arming delay. The time elapsed, or distance traveled by the munition, from launch to arming (see 3.27 and 4.2.2).

3.4 Assembled fuze. The completed fuze with all component parts put together; a fuze requiring no added components or parts to prepare it for installation into the munition in which it is to function. Assembling the fuze is the process of putting the parts and components together.

3.5 Booster and lead explosives. Booster and lead explosives are compounds or formulations, such as those explosives listed in table I of 5.3.2, which are used to transmit and augment the detonation reaction.

3.6 Common mode failures. Multiple failures that result from, or are caused by, seemingly unrelated failures or an adverse environment. Examples include the failure of two gates on a single digital integrated circuit due to loss of the ground lead to the chip or failure of two transistors due to exposure to a high temperature environment.

3.7 Credible environment. An environment that a device may be exposed to during its life cycle (manufacturing to tactical employment, or eventual demilitarization). These include extremes of temperature and humidity, electromagnetic effects, line voltages, etc. Combinations of environments that can be reasonably expected to occur must also be considered within the context of credible environments.

3.8 Credible failure mode. A failure mode resulting from the failure of either a single component or the combination of multiple components, that has a reasonable probability of occurring during a fuzing system's life cycle.

3.9 Dud. A munition which has failed to function, although functioning was intended.

3.10 Enabling. The act of removing or activating one or more safety features designed to prevent arming, thus permitting arming to occur subsequently.

TABLE I. Approved explosives

Explosive	Specification
Comp A3	MIL-C-440
Comp A4	MIL-C-440
Comp A5	MIL-E-14970
Comp CH6	MIL-C-21723
PBX 9407	MIL-R-63419
PBXN-5	MIL-E-81111
PBXM-6	WS-12604
DIPAM	WS-4660
HNS Type 1 or Type 2 Gr A	WS-5003
HNS-IV	WS-32972
*Tetryl	MIL-T-339
*Tetryl Pellets	MIL-P-46464

*No longer manufactured; not for use in new developments.

5.3.3 Explosive train interruption.

a. When an element of the explosive train contains explosive material other than allowed by 5.3.2, at least one interrupter (shutter, slider, rotor) shall functionally separate it from the lead and booster explosives until the arming sequence is completed as a consequence of intentional launch. The interrupter(s) shall be directly locked mechanically in the safe position by at least two independent safety features. These safety features shall not be removed prior to initiation of the launch cycle.

b. If the primary explosive is positioned such that omission of the interrupter will prohibit explosive train transfer, a single interrupter locked by the two independent safety features is acceptable.

c. If the primary explosive is positioned such that safety is dependent upon the presence of an interrupter, the design shall include positive means to prevent the fuze from being assembled without the properly positioned interrupter.

d. The effectiveness of interruption for the fuze explosive train in its configuration prior to initiation of the arming sequence shall be determined numerically in accordance with the Primary Explosive Component Safety Test of MIL-STD-331. If the explosive train interruption is removed progressively after intentional initiation of the launch sequence, the relationship between interrupter position and its effectiveness shall be established by a progressive arming test conducted in accordance with the Primary Explosive Component Safety Test, using a test strategy given by the Projectile Fuze Arming Distance Test of MIL-STD-331. The chosen test strategy and results shall be presented and justified to the appropriate service safety authority.

5.3.4 Non-interrupted explosive train control. Explosive train interruption is not required when the explosive train contains only explosive materials allowed by 5.3.2. One of the following methods of controlling fuze arming shall be employed:

a. For systems using techniques for accumulating all functioning energy from the post-launch environment, the fuze shall not permit arming until verification, by the fuze, of a proper launch, and attainment of the required arming delay. Accumulation of any functioning energy shall not occur until as late in the arming cycle as operational requirements permit.

b. For systems using techniques that do not accumulate all functioning energy from the post-launch environment, at least two independent energy interrupters, each controlled by an independent safety feature shall prevent arming until proper launch is verified by the fuze and the required arming delay is attained. Additionally, the fuze shall not be capable of arming in cases of the absence, or malfunction, of any and all energy interrupters.

5.3.4.1 Electrical initiator sensitivity. The initiators for an electrically fired non-interrupted explosive train shall:

a. Meet the appropriate characteristics listed for Class B initiators of MIL-I-23659.

b. Not exhibit unsafe degradation when tested in accordance with MIL-STD-1512.

c. Not be capable of being detonated by any electrical potential of less than 500 volts.

d. Not be capable of being initiated by any electrical potential of less than 500 volts, when applied to any accessible part of the fuzing system after installation into the munition or any munition subsystem.

5.4 Sterilization. Fuzing systems shall incorporate a sterilization feature based on its applicability to system requirements.

5.4.1 Sterilization of torpedoes and sea mines. Fuze systems for torpedoes and sea mines shall provide for sterilization after safe jettison, after specified events and time, or when the munition is no longer capable of functioning reliably.

5.5 Fail-safe design. Fuzing systems shall incorporate fail-safe design features based on their applicability to system requirements.

5.6 Self-destruction. Fuzing systems shall incorporate a self-destruct feature which initiates munition destruction, based on applicability to system requirements. Self-destruction shall not be initiated or enabled prior to launch and attainment of the proper arming delay.

5.7 Fuze setting. If fuze setting is safety critical (e.g., arming time, function time, or proximity broadcast turn-on time), uncontrolled alteration of the set value shall be prevented.