

INCH-POUND

MIL-I-82877
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 SUPERSEDING
 WS 33113
 22 January 1992

MILITARY SPECIFICATION

IGNITION ELEMENT, PVU-15/B

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the requirements for the PVU-15/B ignition element (see 6.1).

2. APPLICABLE DOCUMENTS**2.1 Government documents.**

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification 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

PPP-T-60	Tape: Packaging, Waterproof
PPP-B-566	Boxes, Folding, Paperboard

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Indian Head Division, Naval Surface Warfare Center, Standardization Branch (Code 3730), 101 Strauss Avenue, Indian Head, MD 20640-5035 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or sending a letter.

AMSC N/A

FSC 1377

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

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PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-C-1797	Cushioning Material, Resilient, Low Density, Unicellular, Polypropylene Foam

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MIL-P-116	Preservation, Methods of
MIL-B-117	Bags, Sleeves and Tubing
MIL-L-3055	Lead Azide
MIL-S-8660	Silicone Compound, NATO Code Number S-736
MIL-D-16791	Detergent, General Purpose (Liquid, Nonionic)
MIL-I-23659	Initiators, Electric, General Design Specification for

STANDARDS

MILITARY

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-453	Inspection, Radiographic

(Unless otherwise indicated, copies of federal and military specifications and standards are available from the Standardization Documents Order Desk, Building 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 specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

NAVAL SEA SYSTEMS COMMAND (CAGE Code 53711)

DL 6261381	Ignition Element, PVU-15/B
DL 6610182	Test Fixture For PVU-15/B

(Application for copies should be addressed to: Commanding Officer, Naval Ordnance Station, Crane Division, Naval Surface Warfare Center, Attention Code 802, Louisville, KY 40214-5001.)

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PUBLICATIONS

CODE OF FEDERAL REGULATIONS (CFRs)

49 CFR 100-199 Transportation

(Copies of CFRs are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.)

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 shall take precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. Unless otherwise specified in the contract or order (see 6.2), a first article sample (see 6.3) shall be submitted for testing (see 4.4).

3.2 Conformance to documents. The PVU-15/B ignition element covered by this specification shall be manufactured in accordance with DL 6261381 and all documents listed thereon.

3.3 Product characteristics.

3.3.1 Materials. All materials used in the manufacture of the ignition elements shall conform strictly to the specifications referred to on the respective drawings unless specific approval in writing covering a departure therefrom has been obtained from the cognizant Navy design activity prior to manufacture. When alternate materials or methods of manufacture are specified on the drawings, the bidder's selections shall be clearly stated in the proposal.

3.3.2 Primary components. For the purpose of this specification, the propellant, RDX, Drawing 6261706, Powder, Lead Azide, Type I, MIL-L-3055, Powder, ZKV Ignition, Drawing 6261707, are defined as primary components. There shall be only one production lot of each primary component used in the same lot of ignition elements.

3.3.3 Bridge circuit resistance. The bridge circuit resistance of each ignition element when measured in accordance with 4.6.2 shall not be less than 0.11 ohm nor more than 0.15 ohm.

3.3.4 Radiographic. Ignition elements shall be free of imperfections in components or assembly when inspected as specified in 4.6.3.

3.3.4.1 Serial number identification. Ignition elements shall be permanently and legibly identified by serial numbers (see 4.6.3).

3.3.5 Leakage. Ignition elements shall not exhibit a leak rate in excess of 1×10^{-5} cubic centimeters per second of air at a pressure differential of 1 ± 0.1 atmosphere when tested according to 4.6.4.

3.3.6 No-fire. The ignition element shall not fire during the no-fire test (see 4.6.5) and shall then meet the requirements of 3.5 when functionally tested.

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3.3.7 Electrostatic discharge. The ignition element shall not fire when subjected to a simulated human electrostatic discharge (see 4.6.6) and meet the requirements of 3.5 after the electrostatic discharge test when functionally tested (see 4.6.10).

3.3.8 Non-shorting. The ignition element shall not short when subjected to the non-shorting test of 4.6.11.

3.4 Environmental requirements.

3.4.1 Impact shock operation. The ignition element shall meet the functional requirements of 3.5 after the impact shock operation test (see 4.6.7).

3.4.2 Temperature, humidity and altitude cycling. The ignition element shall meet the leak rate requirement of 3.3.4 and the functional requirements of 3.5 at 70 degrees Fahrenheit (°F) only after temperature, humidity and altitude cycling (see 4.6.8).

3.4.3 Vibration. The ignition element shall not initiate, suffer damage, or subsequently fail to meet the functional requirements of 3.5 after vibration (see 4.6.9).

3.5 Functional requirements.

3.5.1 Ignition delay time. The elapsed time from first indication of 5 ± 0.1 amperes current in the ignition element bridgewire to the first indication of slug movement must fall in the range of 0.005 to 0.040 second.

3.5.2 Maximum travel time. The ignition element shall provide sufficient energy to enable the slug (see 4.6.10) to travel 36 ± 0.5 inches in 10.71 milliseconds (maximum) when functionally tested at cold ($-89 \pm 5^\circ\text{F}$), ambient ($+70 \pm 5^\circ\text{F}$) and hot ($+250 \pm 5^\circ\text{F}$) temperatures.

3.6 Workmanship. Ignition elements shall be free of defects such as burrs, contaminations, sharp edges, rust, foreign matter or other defects which could adversely affect ballistic performance. Surface coatings, where specified, shall be continuous except for light scratches which do not expose base metal.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4).
- b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be performed as specified in the applicable methods of inspection specified in 4.6.

4.4 First article inspection. The first article sample shall consist of 75 ignition elements which have been produced using the same materials, equipment, processes and procedures and the same source of supply as will be used in regular production. First article inspection shall be performed at a facility designated in the contract or order (see 6.2). First article inspection shall be performed on 61 samples as specified in table I and 14 samples shall be retained for investigative purposes. Failure of any ignition element shall be cause for rejection of the first article sample.

TABLE I. First article inspection.

Test sequence	Sample Number								Test Method
	1-5	6-10	11-16	17-34	35-46	47-51	52-56	57-61	
Visual examination	X	X	X	X	X	X	X	X	4.6.1
Resistance	X	X	X	X	X	X	X	X	4.6.2
Radiographic	X	X	X	X	X	X	X	X	4.6.3
Leakage	X	X	X	X	X	X	X	X	4.6.4
No-fire	X								4.6.5
Electrostatic discharge		X							4.6.6
Impact shock operation			X						4.6.7
Temperature/humidity/altitude				X					4.6.8
Vibration					X				4.6.9
Radiographic			X	X	X				4.6.3
Resistance			X	X	X				4.6.2
Leakage				X					4.6.4
Functional, -89°F						X			4.6.10
Functional, +70°F	X	X	X	X	X		X		4.6.10
Functional, +250°F								X	4.6.10
Non-shorting							X	X	4.6.11

4.5 Quality conformance inspection. Quality conformance inspection shall consist of the tests specified in table II.

TABLE II. Quality conformance inspection.

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Test	Test method	Number of samples
Visual	4.6.1	All samples
Resistance	4.6.2	All samples
Radiographic	4.6.3	All samples
Leakage	4.6.4	All samples
Functional at -89°F, +70°F, and +250°F	4.6.10	1/3 sample at each temperature

4.5.1 Lot size. The production lot size shall be as specified in the contract (see 6.2). The minimum lot size shall be 51 units and the maximum lot size shall be 500 units.

4.5.2 Sampling. Unless otherwise specified (see 6.2), sampling shall be in accordance with table III. The additional retained sample shall be for investigative purposes.

TABLE III. Quality conformance sample size.

Lot Size	Test Sample	Retained Sample
51-90	12	3
91-150	21	3
151-280	32	6
281-500	50	6

4.6 Methods of inspection.

4.6.1 Visual examination. Each ignition element shall be visually examined for compliance to the requirements of 3.2, 3.3.2 and 3.6.

4.6.2 Resistance test. The bridge circuit resistance test shall be performed on each ignition element by applying a current of no more than 50 milliamperes to the ignition element circuit. A suitable instrument known to be accurate within 4×10^{-4} ohms shall be used to determine if the ignition element meets the requirement of 3.3.3. Any ignition element not meeting resistance requirements shall be considered defective. Defective ignition elements shall be discarded.

4.6.3 Radiographic examination. All assembled ignition elements shall be radiographically examined in accordance with MIL-STD-453. Any observable imperfections in components or assembly shall be cause for rejection. The ignition elements shall be positioned for the most revealing exposure with the long axis of each assembly perpendicular to the rays of the X-ray machine. All ignition elements shall be identified with serial numbers prior to examination. The serial numbers shall be in consecutive order and each radiograph shall carry a permanent identification of the cartridges displayed thereon. The radiograph identification shall include item nomenclature, the complete lot number assigned to that lot,

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and the span of serial numbers displayed. Each serial number shall be marked on the case by pen or ink stamp. Any missing serial numbers are to be identified on the X-rays. Radiographs of the entire production lot shall accompany the ballistic sample to the activity conducting the production lot acceptance tests (see 6.2). Defective assemblies found during X-ray review shall be marked on the X-ray prior to shipment and removed from the production lot.

4.6.4 Leakage test. All sample ignition elements shall be tested with a dry gas leak tester of sufficient sensitivity to ascertain whether the ignition element meets the requirements of 3.3.5. Failure of any ignition element subjected to the leakage test shall require 100 percent screening on leakage for the entire production lot. Defective ignition elements shall be discarded.

4.6.5 No-fire test. The ignition elements shall be tested at standard test conditions. A direct current of 2 ± 0.04 amperes shall be applied to the ignition element circuit for a duration of 5 ± 0.05 minutes to determine if the ignition element meets the requirement of 3.3.6.

4.6.6 Electrostatic discharge test. The ignition elements shall be subjected to a simulated human body electrostatic discharge of $25,000 \pm 500$ volts in accordance with MIL-I-23659 to ascertain whether the ignition element meets the requirements of 3.3.7. The simulated human body electrostatic discharge shall be applied only in the pin to pin mode. Failure of any ignition element subjected to the electrostatic discharge test shall require rejection of the production lot represented.

4.6.7 Impact shock operation. Six ignition elements from the first article sample shall be dropped from a height of 8 feet onto a 2-inch thick steel plate embedded in concrete as follows: (1) two ignition elements with the closure disc facing up, (2) two ignition elements with the closure disc facing down, and (3) two ignition elements with the long axis parallel to the ground.

4.6.8 Temperature, humidity and altitude cycling. The temperature, humidity and altitude cycling shall be in accordance with MIL-I-23659. After temperature, humidity and altitude cycling, the ignition elements shall be fired at $+70 \pm 5^\circ\text{F}$ (see 3.4.2).

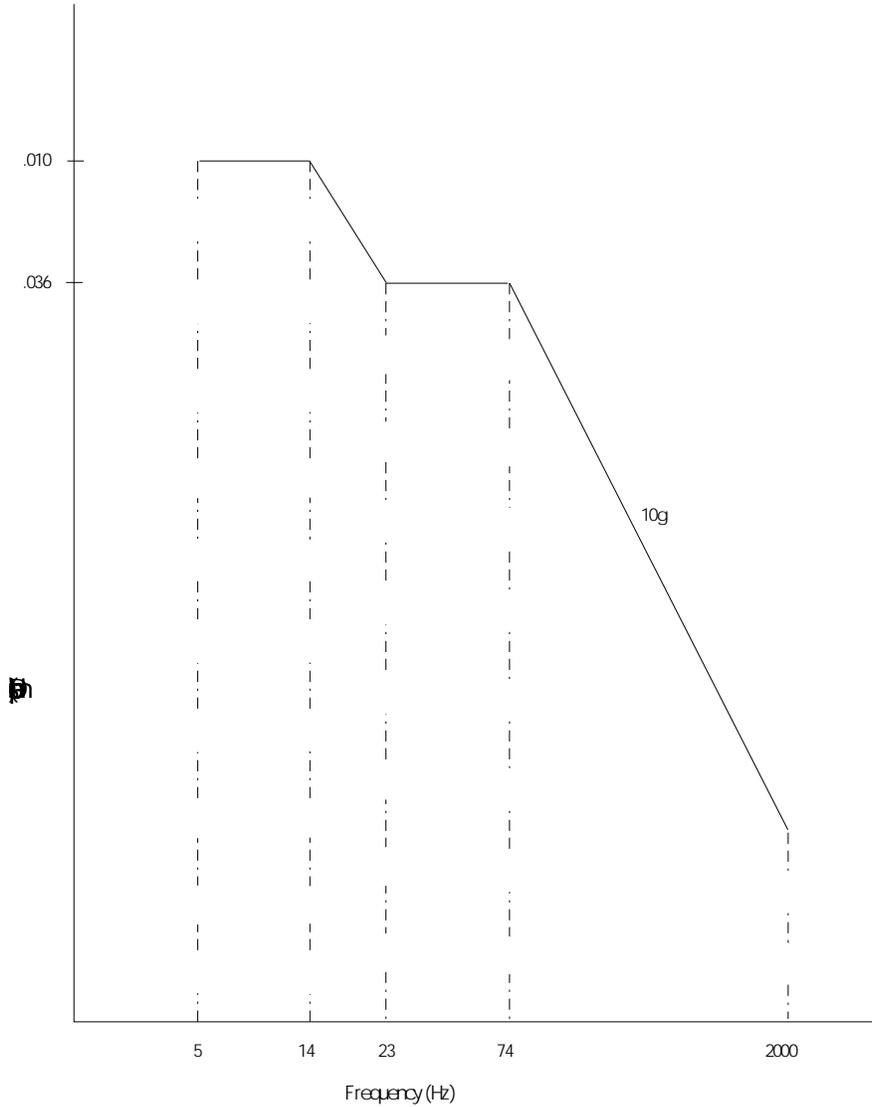
4.6.9 Vibration. Twelve ignition elements from the first article sample shall be subjected to sinusoidal vibration along each of the mutually perpendicular axes. The vibration test levels are specified on figure 1. Test times shall be 1 hour per axis. This test shall be performed at three different temperatures ($-65 \pm 5^\circ\text{F}$, $+70 \pm 5^\circ\text{F}$, and $+200 \pm 5^\circ\text{F}$), so that each ignition element will experience 9 hours total vibration time (see 3.4.3).

4.6.10 Functional test. Sample ignition elements shall be conditioned for a period of 12 to 24 hours at $-89 \pm 5^\circ\text{F}$, $+70 \pm 5^\circ\text{F}$, or $+250 \pm 5^\circ\text{F}$ as specified in tables 1 and 2. The ignition elements shall be fired within 3 minutes after removal from the conditioning chamber. If any ignition element is not fired within 3 minutes after removal, it should be returned to $70 \pm 5^\circ\text{F}$ for a period of not less than 4 hours prior to reconditioning. The test ignition elements shall be fired in the reusable test fixture fabricated and assembled in accordance with Drawing 6610182. Ensure the ignition element is completely threaded into the reusable test fixture. Lubricate slug and O-ring with MIL-S-8660 lubricant before each firing. The ignition element shall be electrically initiated with a direct current of 5 ± 0.1 amperes. The time the slug takes to travel 36 ± 0.5 inches from the face of the block shall be measured to determine if the requirements of 3.5 are met. After each firing, replace O-ring and shear pin with new ones. Monitor degradation of slug after each firing, if the slug does not conform to Drawing 6610178, discard the used

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slug and replace with a new one conforming to Drawing 6610178. Retooling of a used slug is not permitted. Use MIL-D-16791 detergent with fresh water and wire brush to clean bore of the test block after each firing. Apply compressed air to bore after cleaning with brush and detergent.

4.6.1
0.1
Criteria of acceptability. All ignition elements subjected to the functional



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test of 4.6.10 shall meet the requirements of 3.5. A failure of any ignition element to meet any one of these requirements shall result in rejection of the lot represented. The failure of any ignition element to fire shall result in rejection of the lot represented.

4.6.10.2 Test failure. If the test failure is attributable to an assignable cause, excluding the test ignition elements, original test results shall be discarded and that part of the test reconducted.

4.6.10.3 Retest. There shall be no retests except as defined and allowed in 4.6.10.2.

4.6.11 Non-shorting test. After functional testing, the fired ignition elements shall be placed in a test chamber with the pressure reduced to 0.16 pounds per square inch. A 28 ± 2 volt direct current power supply shall be applied to the terminal pins of the ignition elements to determine if they meet the requirement of 3.3.7. Failure of any ignition element subjected to the non-shorting test shall require rejection of the production lot represented.

5. PACKAGING

5.1 Packaging and packing. Packaging and packing shall be Level A or C as specified in 5.1.1 and 5.1.2. In addition, Level A or C packaging and packing shall be in accordance with MIL-P-116, Method IA-14.

5.1.1 Level A. Level A packaging and packing shall be used for packaging and packing of all production lots for service use. For an explanation of terms see 6.4.

5.1.1.1 Wrapping. Wrap each cartridge with one thickness of cushioning conforming to PPP-C-1797 and fasten with tape conforming to PPP-T-60.

5.1.1.2 Inner container. Package two ignition elements in a container, size 3 X 3 X 2 inches, conforming for PPP-B-566. Add extra cushioning to achieve a tight fit. Close container, blunt corners, and place in a bag, size 6 X 8 inches, conforming to MIL-B-117. Remove excess air and hermetically seal.

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FIGURE 1. Sinusoidal vibration test level, PVU-15/B Ignition Element.

5.1.1.3 Outer container. Place twenty-four ignition element kits (two ignition elements each) packaged as specified in 5.1.1.1 and 5.1.1.2 in a wood box conforming to PPP-B-621, Style 4, Class 2, Grade A. Use material as specified in PPP-C-1797 or equal, to fill voids and ensure a tight fit. Close and reinforce box according to PPP-B-621.

5.1.2 Level C. Minimum packaging and packing for those ignition elements intended for expenditure in first article and production lot acceptance tests shall be level C.

5.2 Marking.

5.2.1 Special marking. Marking of outer containers shall be in accordance with 49 CFR 171-178.

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5.2.2 Normal marking. In addition to any special markings required by the contract or order, unit packages, intermediate packages, and shipping containers shall be marked in accordance with MIL-STD-129 and shall include the following:

Inner container marking

- a. NSN 1377-00-870-9296-MY92
- b. Cartridge kit
- c. Bomb ejection MLU-12/C

Outer container marking

- a. NSN 1377-00-870-9296-MY92
- b. Cartridge kits, bomb ejection MLU-12/C
- c. 24
- d. 20 Lbs. .61 cube
- e. Contract or purchase order number

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 PVU-15/B ignition element is intended for use in the MHU-29/C clip-in subassembly. This ignition element replaces the MLU-11/C bomb ejection cartridge.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).
- c. Whether first article inspection is required, (see 3.1).
- d. The agency that is to perform the inspections (see 4.1 and 4.6.3).
- e. Inspection conditions, if other than as specified (see 4.3).
- f. Production lot size (see 4.5.1).
- g. Sampling plan if other than as specified (see 4.5.2).
- h. That the safety precaution requirements of the Contractor's Safety Manual for Ammunition, Explosives, and Related Dangerous Material (DoD 4145.26M) are applicable and should be specified in the contract as required by the Federal Acquisition Regulation (FAR) 23.3. NOTE:

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When this specification is used as part of the description of work to be accomplished by a Government activity, the safety precaution requirements of Ammunition and Explosives Ashore (OP5) are applicable.

6.3 First article. When a first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, standard production item from the contractor's current inventory (see 3.1) and the number of items to be tested as specified in 4.4. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Definitions. For the purpose of this specification, the following definitions apply.

6.4.1 Level A packaging. The degree of preservation and packaging that will afford adequate protection against corrosion, deterioration and physical damage during shipment, handling, indeterminate storage and world-wide redistribution.

6.4.2 Level C packaging. The degree of preservation and packaging that will afford adequate protection against physical damage and deterioration during favorable conditions of shipment, handling, and storage. This level may conform to contractor's commercial practice when such meets the requirements of this level.

6.4.3 Level A packing. The degree of packing that will afford adequate protection against corrosion, deterioration and physical damage during shipment, handling, indeterminate storage and world-wide redistribution.

6.4.4 Level C packing. The degree of packing that will afford adequate protection against corrosion, deterioration and physical damage during favorable conditions of shipment, handling, and storage. This level may conform to contractor's commercial practice when such meets the requirements of this level.

6.5 Subject term (key word) listing.

Lead Azide powder
MLU-U/C cartridge
RDX propellant
ZKV ignition powder

Custodian:

Preparing Activity:

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Navy - OS
Air Force - 70

Navy - OS
(Project Number 1377-0E05)