MIL-C-82724
9 February 1983
SUPERSEDING
WS 19775
6 September 1978

MILITARY SPECIFICATION

CARTRIDGE, IMPULSE, CCU-44/B

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

1. SCOPE

1.1 Scope. This specification covers the CCU-44/B Impulse Cartridge. (See 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-P-116	Preservation, Methods of
MIL-D-81303	Design and Evaluation of Cartridges for Stores Suspension Equipment

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/Documentation Division (524), Indian Head, MD 20640 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-453	Inspection, Radiographic

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.

DRAWINGS

NAVAL SEA SYSTEMS COMMAND

DL 5184850	Cartridge, Impulse, Assembly CCU-44/B
5184831	Ignition Element Loaded Assembly
5184834	Header, Glass Seal Assembly
5184839	Propellant, Double Base
5184845	Cartridge Case and Ignition Element Assembly Modified
5184851	Cartridge, Impulse, CCU-44/B Packaging Assembly
5184852	Container, Inner Assembly

UNITED STATES AIR FORCE AIR LOGISTICS COMMAND

TPO 01-063-3164	Packaging Assembly, CCU-44/B (80 Pack)
TPO 01-063-3165	Packaging Assembly, CCU-44/B (10 Pack)

NAVAL AIR SYSTEMS COMMAND

DL 838AS123	Closed Bomb Assembly for Ignition Elements Used for Stores Release Cartridges

NAVAL ORDNANCE STATION, INDIAN HEAD

34353	Variable Volume Test Fixture

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PUBLICATIONS

NAVAL SEA SYSTEMS COMMAND

OP 5	Ammunition and Explosives Ashore
WR-43	Preparation of Quality Assurance Provisions

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the Contracting Officer.)

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

CODE OF FEDERAL REGULATIONS

49 CFR 100-199	Transportation

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402. Orders for the above publication should request the latest edition and supplements thereto.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), the contractor shall furnish sample units for first article inspection and approval (see 4.4).

3.2 Conformance to documents. The CCU-44/B impulse cartridge shall be manufactured in accordance with the drawings and documents listed on DL 5184850. All materials used in the manufacture of the cartridges shall conform with the specifications referenced on the respective drawings unless specific approval in writing covering a departure therefrom has been obtained from the Naval cognizant field activity for cartridges prior to manufacture.

3.3 Primary components. For the purpose of this specification, the header glass seal assembly (Drawing 5184834), the ignition element loaded assembly (Drawing 5184831), and the main propellant charge (Drawing 5184839) are defined as primary components.

3.3.1 Header glass seal assembly. The header glass seal assembly shall be manufactured in accordance with the drawings listed on DL 5184850 and undergo the tests listed in 4.7.1.

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3.3.2 Ignition element. The ignition element shall be manufactured in accordance with the drawings listed on DL 5184850 and shall meet the following requirements when tested as specified in 4.7.2.

3.3.2.1 Ignition delay time. Ignition delay time shall not exceed 10 milliseconds (see 6.3.5).

3.3.2.2 Time to maximum pressure. The time to maximum pressure shall not exceed 25 milliseconds (see 6.3.6).

3.3.2.3 Maximum pressure. The minimum allowable value of maximum pressure shall be 2,000 psi.

3.3.3 Propellant charge.

3.3.3.1 Quantity. All propellant charges shall conform to Drawing 5184839. Charges shall be determined by weight rather than volume measurements.

3.3.3.2 Smokeless powder, handling and loading. Do not subject smokeless powder to unnecessary handling or exposure to the atmosphere. The handling and loading of smokeless powder exposed to the atmosphere shall be performed only under conditions that do not permit the relative humidity to exceed 75 percent.

3.3.3.3 Smokeless powder, condition. The smokeless powder utilized shall exhibit no evidence of decomposition.

3.4 Cartridge inspection.

3.4.1 Visual inspection. Cartridges shall be free of visual defects such as, but not limited to burrs, dents, deep scratches, split or cracked crimp, defective sealant application around crimp, chipped surfaces, or other defects which may prevent entry of the cartridge into the firing chamber, or affect the environmental stability of the cartridge.

3.4.2 Bridge circuit resistance. The resistance of the bridge circuit of each completly assembled cartridge, when measured electrically, shall be not less than .95 ohm nor more than 1.25 ohms (see 4.7.3.2).

3.4.3 Leakage. Cartridge leakage rate shall not exceed 10^{-4} cc of gas or air per second (see 4.7.3.3).

3.4.4 Radiographic examination. Cartridges shall be free of imperfections in components of assembly as verified by radiographic examination of all first article and production samples of 3.1, 3.3.2 and 3.5.

3.5 Ballistic requirements. Cartridges from each first article and production lot shall be capable of propelling a 475 pound mass horizontally when fired in the variable volume test fixture (Drawing 34353) at an initial volume of 3.7 cubic inches and shall meet the requirements listed below (see 4.7).

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3.5.1 Ignition delay time. Ignition delay time shall not exceed 10 milliseconds (see 6.3.5).

3.5.2 Time to maximum thrust. The time to maximum thrust shall not exceed 30 milliseconds (see 6.3.7).

3.5.3 Thrust. The upper limit of thrust shall be 11,500 lbf and the lower limit shall be 9,000 lbf.

3.5.4 Velocity. The upper limit of velocity shall be 29 ft/sec and the lower limit shall be 22 ft/sec. (see 6.3.8).

3.5.5 Misfire. There shall be no misfires.

3.6 Change in propellant lot. Whenever a change occurs in the propellant lot, test firings shall be conducted in accordance with 4.8. No cartridge shall produce results outside the limits specified in 3.5.1 through 3.5.4 and no cartridge shall fail to meet the requirement of 3.5.5.

3.7 Packaging, packing and marking. The packaging and packing of cartridges and the container markings shall be in accordance with section 5 (see 4.6.3).

3.8 Workmanship. Cartridges shall be constructed and finished in a manner to assure compliance with all requirements of this specification. Particular attention should be directed to dimensions, finishes and assembly operations.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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 4.6)

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.7 and 4.8.

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4.4 First article inspection. First article inspection shall be performed after award of contract and prior to production at a location acceptable to the Government. First article inspection shall be performed on sample units which have been produced with equipment and procedures normally used in production. First article approval is valid only on the contract under which it is granted, unless extended by the Government to other contracts.

4.4.1 Sample size. Unless otherwise specified (see 6.2), 25 header glass assemblies, 25 loaded ignition element assemblies and 94 cartridge assemblies shall be submitted for first article inspection.

4.4.2 Inspection routine.

4.4.2.1 Header glass seal assembly. The header glass seal assembly shall be tested as specified in 4.7.1.

4.4.2.2 Ignition element loaded assemblies. The ignition element loaded assemblies shall be loaded into modified cartridge cases conforming to Drawing 5184845 and tested as specified in 4.7.2.

4.4.2.3 Cartridge assembly. The cartridges shall undergo the tests of 4.7.3 following environmental exposure as described in MIL-D-81303. Tolerance on temperatures shall be ± 5° F. The environmental exposures shall be as follows: temperature and humidity (18), vibration (12), 20 "g" shock (12), 6-foot drop (6), 70° F (12), -65° F (12), and 200° F (12). The number in parentheses denotes number of cartridges. Temperature conditioning at the extremes shall be no less than 6 hours and no more than 24 hours. Firings shall be conducted in the variable volume test fixture (Drawing 34353). No cartridge shall produce results outside the limits of 3.5.1 through 3.5.4 and no cartridge shall fail to meet the limits of 3.5.5.

4.4.3 Failures. The failure of any cartridge to meet the requirements as stated above shall cause rejection of the first article sample. If more than 5 cartridges fail the leak test specified in 4.7.3.3 the first article sample shall be rejected.

4.5 Classification of characteristics. The characteristics verified by the tests and examinations herein are classified as Critical, Major or Minor in accordance with WR-43. Tests and examinations that verify critical characteristics are identified by the symbol (C) and major characteristics by the symbol (M). The number following the classification symbol indicates the serial number of test or examination. Tests and examinations which are not annotated with a classification code are classified minor.

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4.6 Quality conformance inspection. Quality conformance inspection shall consist of verification of the characteristics classified on the drawings of DL 5184850 and the following:

Item	Nature of requirement verification	Applicable paragraphs	Classification (WR-43)
Primary components	Single lot	3.3, 4.6.1	(M 101)
Header, glass seal	Acceptance	3.3.1, 4.7.1	(M 102)
Ignition element	Acceptance	3.3.2, 4.7.2	(M 103)
Propellant charge	Type & weight	3.3.3	(M 104)
Smokeless powder	Condition	3.3.3.3, 4.7.3.5	(M 105)
Cartridge	Visual	3.4.1, 4.7.3.1	(M 106)
Cartridge	Bridge circuit resistance	3.4.2, 4.7.3.2	(M 107)
Cartridge	Leakage	3.4.3, 4.7.3.3	(M 108)
Ignition element	Power current	4.7.2.1	(M 109)
Cartridge	Ballistic	3.5, 4.7.2.2	(M 110)
Cartridge	Ballistic (change in propellant lot)	3.6, 4.9	(M 111)
Cartridge	Packaging, packing, & marking	3.7, 4.6.3	(M 112)

4.6.1 Lot size. Unless otherwise specified in the contract the cartridge production lot size shall be 5,000 minimum to 20,000 maximum. Cartridges required for all test purposes shall be randomly selected from the production lot and will not be applied as a part of the quantity specified for delivery by the contract. Only primary components from a single lot shall be used in a production lot of cartridges; however, one primary component production lot may be used in more than one cartridge production lot. Cartridges selected for the ballistic tests shall be delivered to the activity designated by the contracting agency.

4.6.2 Sampling. Unless otherwise specified, and when applicable, the sampling plans and procedures used in the determination of the acceptability of products submitted by a supplier shall be in accordance with the provisions of MIL-STD-105 inspection level I with all functional testing conducted with the criteria accept 0 reject 1 and the leak test conducted at an AQL of 2.5. In addition, 10 cartridges shall be randomly selected from each lot and retained for investigative purposes.

4.6.3 Packaging, packing and marking. Quality conformance inspection shall be conducted in accordance with the inspection criteria on the applicable drawings referenced in Section 5.

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4.7 First article tests.

4.7.1 Header glass seal assembly. The header glass seal assembly shall be inspected for conformance to the requirements of Drawing 5184834. The header glass seal assembly shall undergo the tests listed below and meet the requirements specified on Drawing 5184834.

4.7.1.1 Dead load. The header glass seal assembly shall be capable of supporting a 300 pound dead load as detailed on Drawing 5184834.

4.7.1.2 Header integrity test. The header glass seal assembly shall be capable of withstanding 30,000 ± 500 psi hydrostatic pressure as detailed on Drawing 5184834.

4.7.1.3 Dielectric withstanding voltage. The header glass seal assembly shall meet the requirements of the dielectric withstanding voltage test as detailed on Drawing 5184834.

4.7.2 Ignition element assembly. After visual, radiographic and leakage inspections, the ignition element assemblies shall undergo the tests listed below in the sequence given. The ignition elements, installed in modified cartridge cases, shall be conditioned at 70° ± 5° F for a minimum of 4 hours prior to testing.

4.7.2.1 Power-current test. Each ignition element in the first article test sample shall have a direct current of not less than one ampere supplying a minimum of one watt applied to the bridge circuit for a period of at least 5 minutes. The test current shall be regulated throughout the period of application to within 2 percent. If a rectified current is used, the ripple content shall not exceed 5 percent rms of the test current. Test temperature is ambient and the sample or lot is rejected if a cartridge fires during the 5 minute period.

4.7.2.2 Ballistic test. After conditioning, the sample shall be installed into the ignition element test chamber (DL 838AS123). The sample shall be fired by application of 4.0 ± 0.1 amp and shall meet the requirements of 3.3.2.

4.7.3 Cartridge assembly.

4.7.3.1 Visual inspection. Examine all cartridges visually and reject those having any of the defects of 3.4.1.

4.7.3.2 Bridge circuit resistance. Conformance with the bridge circuit resistance of 3.4.2 shall be ascertained on all completely assembled cartridges by means of a test circuit which limits the bridge circuit current to 25 milliamperes, maximum. A safety chamber shall be used to protect the operator during the application of current. A suitable instrument which is known to be accurate within one percent in the range of resistance

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specified shall be used to determine whether or not the requirement is being met. Units which fail to meet the requirements of 3.4.2 shall be rejected. The results of bridge circuit resistance measurements shall not be affected by the resistance of the test circuit and connector.

4.7.3.3 Leakage. Each assembled cartridge in the sample represented shall be leak tested in a dry gas or dry air leak tester. Cartridges which exhibit a leak rate in excess of 10^{-4} cc/sec of air or gas at a pressure differential of 0.5 ± 0.05 atmosphere shall be considered defective. The sample shall be accepted if the requirement of 3.4.3 has been met at an AQL of 2.5 MIL-STD-105 inspection Level I.

4.7.3.4 Radiographic examination. All cartridges in the first article or production test samples shall be radiographically examined in accordance with MIL-STD-453; any observable imperfections in the assembly shall be cause for cartridge rejection. The cartridges shall be positioned on their sides for the most revealing exposure. All cartridges shall be identified with serial numbers prior to examination. The cartridge serial numbers shall be in consecutive order beginning with the number 001 in each production lot. The cartridges shall be arranged on trays or boards in consecutive numerical order, and each radiograph shall carry a permanent identification of the cartridges displayed thereon. The radiograph identification shall include the complete lot number, as stamped on the cartridges, and the span of serial numbers displayed. If any assembly or loading defects are noted then the contractor must 100 percent X-ray the represented lot and submit X-rays to the cartridge design activity for review (see 6.2.2). Discontinuities in serial numbers shall be identified on the X-ray. Defective cartridges found by the vendor shall be clearly identified on the X-ray and those defectives removed from the production lot. The serial numbers shall be pen or ink stamped on the cartridges with approximately 1/8 inch-high characters. The serial numbers shall be located apart from the other cartridge markings. When screening of the production lot by X-ray review is required, it shall be at the expense of the contractor.

4.7.3.5 Smokeless powder, condition. Smokeless powder shall be inspected in accordance with the applicable paragraphs of OP 5. Evidence of decomposition shall be cause for rejection.

4.7.3.6 Ballistic testing. After successfully completing the above tests the cartridges shall be conditioned as specified in 4.4.2.3. Cartridges shall be removed from the conditioning chamber and installed into the variable volume test fixture (Drawing 34353). The cartridges shall be fired, at an initial free volume of 3.7 cubic inches, by application of 4.0 ± 0.1 amps within 5 minutes after removal from the conditioning cabinet. If this time is exceeded, the cartridges shall be removed from the test fixture and reconditioned for 1 hour minimum at the specified temperature.

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4.8 Quality conformance tests.

4.8.1 Cartridge inspection. Before undergoing any functional testing the sample shall be tested in accordance with 4.7.3.1 through 4.7.3.5.

4.8.2 Ballistic testing. The cartridges shall be grouped into two equal sections with one group conditioned at -65° ± 5° F and the other group conditioned at +200 ± 5° F for 4 hours minimum and 24 hours maximum. If the sample size is an odd number, the odd cartridge shall be conditioned at -65° F. The cartridges shall then be functionally tested in accordance with 4.7.3.6. The lot shall be accepted if the requirements of 3.4 and 3.5 have been met with an accept 0 reject 1 criteria.

4.9 Change in propellant lot. Whenever a change in propellant lot occurs, the charge weight shall be verified by firing 36 cartridges which have been temperature conditioned for a minimum of 4 hours and a maximum of 24 hours (12 at -65° F, 12 at 70° F, and 12 at 200° F). Results of these firings shall meet the requirements of 3.6.

4.10 Retest. There shall be no retests.

4.10.1 Test failure. If test failure is attributable to an assignable cause, excluding the test cartridge, the original test results should be discarded and that portion of the test reconducted.

5. PACKAGING

5.1 Preservation and packaging. For definitions of packaging levels, see 6.3.

5.1.1 Level A. Level A packaging shall be used for packaging of all production lots for service use. Specific packaging shall be as specified by the procuring activity as follows: ten cartridges packaged per TPO 01-063-3165; eighty packaged per TPO 01-063-3164; sixty packaged per Drawing 5184852; or 480 packaged per Drawing 5184851.

5.1.2 Level B. Not applicable.

5.1.3 Level C. When directed by the procuring activity, those cartridges which are intended for expenditure in first article sample testing and for production lot acceptance tests shall be packaged in accordance with Method III of MIL-P-116 and with 49 CFR 171-178.

5.2 Packing. For definitions of packing levels, see 6.3.

5.2.1 Level A. Level A packing shall be used for packing of all production lots for service use (see 5.1.1).

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5.2.2 Level B. Not applicable.

5.2.3 Level C. When directed by the first article procuring activity, cartridges intended for expediture in sample testing and packaged in accordance with 5.1.3 shall be packed to afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. Shipping containers shall be in accordance with 49 CFR 171-178.

5.3 Markings.

5.3.1 Special markings. Marking of exterior containers shall be in accordance with 49 CFR 171-178.

5.3.2 Normal markings. Unless otherwise specified in the contract or order, the marking information on unit packages and shipping containers shall be as specified on TPO's 01-063-3165 and 01-063-3164 or Drawings 5184852 and 5184851. The specified marking information shall be applied to the containers in accordance with the applicable provisions of MIL-STD-129.

6. NOTES

6.1 Intended use. The CCU-44/B impulse cartridge is intended to eject stores from aircraft.

6.2 Ordering data. Acquisition documents should specify the following:

6.2.1 Acquisition requirements.

a. Title, number, and date of this specification.

b. Whether first article inspection is required and, if so, specify the test activity (see 4.4).

c. Special sample size, if other than as specified in 4.4.1.

d. Production lot size and test activity (see 4.6.1).

e. That the safety precaution requirements of the "Contractors' Safety Manual for Ammunition, Explosives, and Related Dangerous Material," DOD 4145.26M are applicable. NOTE: 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, "OP 5, are applicable.

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6.2.2 Data requirements. When this specification is used in an acquisition which incorporate a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DAR 7-104.9 (n) (2) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs.

Paragraph no.	Data requirements	Applicable DID no.	Options
4.7.3.4	X-ray	-	-

(Copies of DID's required by contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

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

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

6.3.2 Level C packaging. The degree of preservation and packaging which will afford adequate protection against corrosion, deterioration and physical damage during shipment from supply source to the first receiving activity for immediate use. This level may conform to supplier's commercial practice when such meets the requirements of this level.

6.3.3 Level A packing. The degree of packing which will afford adequate protection during shipment, handling, indeterminate storage and world-wide redistribution.

6.3.4 Level C packing. The degree of packing which will afford protection against damage during direct domestic shipment from the supply source to the first receiving activity for immediate use. This level in general will conform to applicable carrier rules and regulations and may be the supplier's commercial practice when such meets the requirement of this level.

6.3.5 Ignition delay. Ignition delay is the time from application of current to first indication of continuous thrust or pressure on the thrust or pressure vs time trace.

6.3.6 Time to maximum pressure. Time to maximum pressure is the time from application of current to the point of maximum pressure on the pressure time trace.

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6.3.7 Time to maximum thrust. Time to maximum thrust is the time from application of current to the point of maximum thrust on the thrust vs time trace.

6.3.8 Velocity. Velocity is defined as velocity at end of stroke.

Custodians:
Navy - OS
Air Force - 99

Review Activities:
Navy - AS
Air Force - 70

Preparing Activity:
Navy - OS

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