INCH-POUND

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23 June 1992
SUPERSEDING
MIL-C-38983(USAF)
22 June 1970

MILITARY SPECIFICATION

CARTRIDGE, IMPULSE, CCU-11/B

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

1. SCOPE

1.1 Scope. This specification describes the requirements for one type of cartridge designated as Cartridge, Impulse, CCU-11/B referred to herein as the cartridge. The cartridge is designed to provide a source of gas pressure within the BDU-38/B practice bomb for separation and deployment of the recovery parachute.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards 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

MILITARY

MIL-I-706	Iron Oxide, Ferric, Red Dry (Natural and Synthetic)
MIL-T-13405	Titanium, Technical: Powder
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: Commander, Indian Head Division, Naval Surface Warfare Center, Standardization Branch (Code 8420), 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 by sending a letter.

AMSC N/A FSC 1377

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
MIL-STD-810	Environmental Test Methods and Engineering Guidelines
MIL-STD-1168	Ammunition Lot Numbering
MIL-STD-45662	Calibration Systems Requirements

(Unless otherwise indicated, copies of federal and military specifications and standards are available from: 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 solicitation (see 6.2).

DRAWINGS

Naval Surface Warfare Center, Indian Head (CAGE CODE 98747)

69E14000	Cartridge, Impulse, CCU-11/B

(Application for copies should be addressed to: Commander, Indian Head Division, Naval Surface Warfare Center, Data Control Branch (Code 8410), Indian Head, MD 20640-5035.)

PUBLICATIONS

TRANSPORTATION PACKAGING ORDER (TPO)

TPO 00-191-5141	Cartridge, Parachute Deployment, CCU-11/B

(Application for copies of TPOs should be addressed to 00-ALC/PMDEE, Hill Air Force Base, Ogden, Utah 84056.)

CODE OF FEDERAL REGULATIONS (CFR)

49 CFR 100-199	Transportation

(Application for copies of CFRs should be addressed to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 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 takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.2.1.

3.2 Materials. All materials used in the manufacture of the cartridges shall conform strictly with the specifications referenced on the respective drawings unless specific approval in writing covering a departure therefrom has been obtained from the Navy cognizant field activity for cartridges prior to manufacture. When alternate materials or methods of manufacture are specified on the drawings, the bidder's selection shall be clearly stated in the proposal.

3.3 Primary components. For the purposes of this specification the ignition composition, ignition element, and main charge for the CCU-11/B are defined as the primary components. Only one lot of a primary component shall be used in a single cartridge lot. See 4.2.2.

3.3.1 Ignition composition.

3.3.1.1 Ingredients. The ingredients shall be 53 percent powdered titanium of the particle size conforming to MIL-T-13405 and 47 percent reagent grade ACS iron oxide conforming to MIL-I-706.

3.3.1.2 Blending procedure. Blending procedure for the above ingredients shall be controlled to satisfy all electrical and performance requirements when assembled in the CCU-11/B cartridge.

3.4 Cartridge inspection.

3.4.1 Visual inspection. Cartridges shall be free of the following defects: burrs, dents, bent connector pins, missing or damaged seals, or other defects which may prevent entry of the cartridge into the firing chamber, or affect resistance of the cartridge to moisture. Markings shall be correct and legible. See 4.5.1.

3.4.2 Drawing conformance. The CCU-11/B cartridge shall be manufactured in accordance with Drawing 69E14000 and all associated drawings. Cartridge components shall meet their respective drawing requirements. See 4.5.2.

3.4.2.1 Metal parts inspection. Metal parts shall conform to drawings and shall be free of metal defects. See 4.5.2.1.

3.4.3 Radiographic examination. Cartridges shall be radiographically examined for defects as specified in 4.5.3.

3.4.4 Bridge circuit resistance. The resistance in each bridge circuit shall be 1.1 ± 0.2 ohms. See 4.5.4.

3.4.5 Leakage. Cartridge leakage rate shall not exceed 10^{-4} cubic centimeters of air per second when tested in accordance with 4.5.5.

3.4.6 Power-current. The cartridge shall not fire when subjected to one watt of power for 5 minutes when tested in accordance with 4.5.6.

3.4.7 Static discharge. The cartridge shall not fire when subjected to an electrostatic discharge in accordance with 4.5.7. The cartridge shall perform properly when ballistically tested.

3.4.8 Stray voltage. The cartridge shall perform properly after subjection to stray voltage in accordance with 4.5.8.

3.4.9 Vibration. The cartridge shall perform properly after subjection to vibration in accordance with 4.5.9.

3.4.10 Temperature shock. The cartridge shall perform properly after being subjected to temperature shock in accordance with 4.5.10.

3.4.11 Impact shock. The cartridge shall perform properly after being subjected to an 8 foot drop in accordance with 4.7.11. The cartridge shall not fire and be safe to handle after being subjected to a 40 foot drop in accordance with 4.5.11.

3.4.12 Temperature and humidity cycling. The cartridge shall be capable of proper performance after subjection to temperature and humidity cycling in accordance with 4.5.12.

3.4.13 Post environmental inspection. Cartridges subjected to any inspection or test in this specification, excluding 40 foot drop and ballistic test, shall be capable of meeting all the requirements of this specification after a test is completed. See 4.5.13.

3.4.14 Ballistic performance. Cartridges shall meet the following requirements when ballistically tested in accordance with 4.5.14. The cartridge shall fire within 50 milliseconds, under all environmental conditions, when subjected to a direct current of 5 ± 0.05 amperes at 24 to 28 volts direct current.

3.4.14.1 Velocity. Each cartridge shall be capable of meeting the requirements given in table I. The cartridge shall accelerate a 105 ± 5 pound (lb) weight and an average velocity shall be determined over a 12 ± 0.05 inches distance beginning at 44.5 ± 0.05 inches of weight travel.

TABLE I. Velocity and actuation time requirements.

Temperature	Velocity	Actuation Time
- 65• ± 5• F	*	*
+ 70• ± 5• F	155 ± 20 feet/sec	200 ms, maximum
+ 325• ± 5• F	*	*

* Recorded for information only.

3.4.14.2 Plate shearing. Before motion of the weight occurs, shear rings retaining the weight shall be

sheared. The force to overcome the shear rings shall be 11,000 ± 2,000 lbs.

3.4.14.3 Maximum actuation time. The time from shear to tube separation shall not exceed 200 milliseconds (ms).

3.5 Workmanship. The cartridge, including all parts and accessories, shall be fabricated in a manner that will ensure that the criteria of appearances, fit, and adherence to tolerances, as specified on the drawings shall be observed. The cartridge or any assembly shall not contain chips, dirt, grease, oil, rust, corrosion, or other foreign material.

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) 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, not does it commit the Government to accept defective material.

4.2 Lots.

4.2.1 First article inspection. At the beginning of regular production, the contractor shall submit a first article sample to a Government approved facility for evaluation. The sample shall consist of 95 assembled cartridges and shall undergo the tests listed in table II, including 12 for vibration tests (to be selected from ballistic samples) and 10 sets of unassembled components for dimensional and visual examination. The sequence of testing and division of test samples shall be as indicated in table III. The first article sample shall be manufactured using the same materials, equipment, processes, and procedures as used in regular production. All parts and materials, including packaging and packing, shall be the same as used for regular production and shall be obtained from the same source of supply. When it becomes necessary to make a change in either the primer, propellant, or igniter lot after initial production, 12 assembled cartridges from the first production lot thereafter shall be tested in accordance with 4.5.9. The Government reserves the right to require new first article samples until such time as an acceptable sample is submitted (see 6.4).

TABLE II. First article and lot acceptance tests.

Test	Requirement	Test	FAT	LAT
Materials	3.2	4.2.2	X	X
Primary components	3.3	-	X	X
Ignition composition	3.3.1	-	X	X
Visual inspection	3.4.1	4.5.1	X	X
Drawing conformance	3.4.2	4.5.2	X	-
Metal parts examination	3.4.2.1	4.5.2.1	X	-
X-ray examination	3.4.3	4.5.3	X	X
Bridge circuit resistance	3.4.4	4.5.4	X	X
Leakage	3.4.5	4.5.5	X	X
Power-current test	3.4.6	4.5.6	X	X
Static discharge	3.4.7	4.5.7	X	-
Stray voltage	3.4.8	4.5.8	X	-
Vibration	3.4.9	4.5.9	X	X[1]
Temperature shock	3.4.10	4.5.10	X	-
Impact shock	3.4.11	4.5.11	X	-
Temperature and humidity	3.4.12	4.5.12	X	-
Post environmental inspection	3.4.13	4.5.13	X	X
Ballistic test	3.4.14	4.5.14	X	X
Workmanship	3.5	-	X	X

[1]Twelve cartridges shall be vibrated in accordance with 3.4.9 and 4.5.9.

4.2.2 Production lot. Cartridges required for all test purposes are 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. A cartridge lot shall consist of assemblies produced by a homogeneous process.

4.2.3 Sampling plan. The sample size for acceptance tests shall be in accordance with the contract. Sampling plans and procedures shall be in accordance with MIL-STD-105, general inspection level I. Twelve cartridges required for vibration testing shall be included in this sample size.

TABLE III. First article schedule and test plan.

Test Title	Cartridge Serial Numbers								
Visual inspection	1-95								
X-ray examination	1-95								
Bridge circuit resistance	1-95								
Leakage	1-95								
Power-current test	1-95								
Static discharge		46-51						85-90	
Stray voltage			52-57					85-90	
Vibration				58-63				85-90	
Temperature shock					64-69			85-90	
Impact shock						70-78[1]		85-90	
Temperature & Humidity							79-84	85-90	
Post-environmental inspection		46-51	52-57	58-63	64-69	70-75	79-84	85-90	
Ballistic test, -65• F	1-15	46-47	52-57	58-59	64-65	70-71	79-80	85-86	
Ballistic test, +70• F	16-30	48-49	54-55	60-61	66-67	72-73	81-82	87-88	
Ballistic test, +325• F	31-45	50-51	56-57	62-63	68-69	74-75	83-84	89-90	
Retained sample[2]									91-95

[1]Use S/N's 76, 77, and 78 for 40 foot drop test
[2]These units shall be retained and used for information, investigative, or for retest purposes

4.2.4 Acceptance criteria. All cartridges, either in a sample or the production lot represented, shall be capable of meeting all the requirements of this specification and the applicable drawings. When a sample cartridge fails to meet a specified requirement, it shall be cause for rejection or 100 percent screening of the lot represented. Any production lot units failing to meet specification or drawing requirements shall be rejected.

4.2.5 Rejection and retest. When any cartridge fails to meet a specified test, no cartridge on hand or later produced shall be accepted until the extent and cause of failure are determined. The cause of failure shall be corrected and a subsequent cartridge shall demonstrate compliance by passing the failed tests.

4.2.6 Defects in items already accepted. The investigation of a test failure could indicate that defects may exist in items already accepted. If so, the contractor shall fully advise the acquiring activity of all defects likely to be found and methods of correcting them.

4.3 Gages. The contractor shall provide gages as necessary to ensure that the material to which this specification applies will meet the dimensional requirements shown on the applicable drawings.

4.4 Acceptance tests. The acceptance tests shall consist of those indicated in table II. The sequence of tests shall be in the order indicated in table II.

4.4.1 Packing, packaging, and marking. Inspection shall be conducted in accordance with the inspection criteria on the applicable drawings as referenced in section 5.

4.5 Tests.

4.5.1 Visual inspection. Each cartridge in the production lot shall be visually inspected for the criteria given in 3.4.1.

4.5.2 Drawing conformance. Each cartridge in the first article sample or the acceptance sample shall be inspected to determine conformance with Drawing 69E14000 and applicable specifications.

4.5.2.1 Metal parts inspection. Metal parts shall be inspected for conformance to drawing requirements, presence of metal defects (cracks, splits, cold shuts, inclusions, burrs, or porosity), and plating defects.

4.5.3 Radiographic examination. Each cartridge in the first article sample and acceptance sample shall be radiographically examined in accordance with MIL-STD-453. The cartridge shall be x-rayed with the long axis of the cartridge perpendicular to the rays of the machine. All cartridges shall be arranged on trays or boards in consecutive numerical order and each radiograph plate shall be identified by date, cartridge part numbers, lot number, and range of serial numbers. The plates shall be examined to determine compliance with the requirements of Drawing 69E14000 and this specification.

4.5.4 Bridge Circuit Resistance. The resistance of each bridge circuit shall be measured within an accuracy of one percent using a test circuit which subjects the bridge circuit to a current of less than 50 milliamperes. This test shall apply to all cartridges in the production lot, first article sample, and lot acceptance sample.

4.5.5 Leakage. Each cartridge in the first article test sample or lot acceptance test sample shall be leak tested in a dry gas or dry air leak tester. Cartridges which exhibit leak rate in excess of 10^{-4} cubic centimeters of gas or air per second at a pressure differential of 1.0 ± 0.1 atmosphere shall be considered defective. If one or more cartridges of the acceptance test sample exhibit a leakage defect, then a 100 percent leak test of the production lot represented shall be required at no additional expense to the Government. Cartridges which exhibit a leak rate in excess of that specified above shall be rejected.

4.5.6 Power-current test. Each cartridge in the first article and acceptance test sample shall have a direct current of not less than one ampere supplying a minimum of one watt to each bridge circuit for a period of not less than 5 minutes. The two bridge circuits in each cartridge shall be tested in series circuit simultaneously. 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 root mean square of the test current. Test temperature is ambient. The cartridge shall not fire during the test and shall perform acceptably when ballistically tested.

4.5.7 Static discharge. Cartridges shall be tested and shall not fire when subjected to an electrostatic discharge of 150,000 ergs from a 500 ± 5 percent picofarad capacitor. The cartridge shall be tested across pairs of pins or leads in all combinations and between the shorted pins or leads (all pins or leads shorted to each other) and the case of the cartridge or ignition element. Electrical leads shall be attached to the ignition element body and the shorted contact pins. The cartridge shall perform acceptably when ballistically tested.

4.5.8 Stray voltage. Cartridges shall be subjected to 2000 pulses of direct current. Each pulse shall be 100 milliamperes. Duration of pulse shall be 300 ms at a rate of 2 pulses per second.

4.5.9 Vibration. Cartridge shall be subjected to vibration tests prescribed in MIL-STD-810, Method 514, Procedure I, except that table IV of this document shall apply as the time schedule for resonance dwell and sinusoidal cycle times and figure 1 of this document shall apply as the vibration test curve for the vibration test. The sample shall be divided into three equal quantities with one quantity conditioned to -65• F, one at room temperature, and one to +250• F. The conditioning time shall be a minimum of 1 hour longer than the time necessary to bring the cartridge to the required temperature. Each quantity shall then be vibrated in accordance with table IV at the temperature to which that quantity was conditioned.

TABLE IV. Vibration time schedule chart.

Number of Resonances	Total Resonance Dwell Time (Minutes)	Total Cycle Time (Minutes)
0	0	60
1	10	50
2	20	40
3	30	30
4	40	20

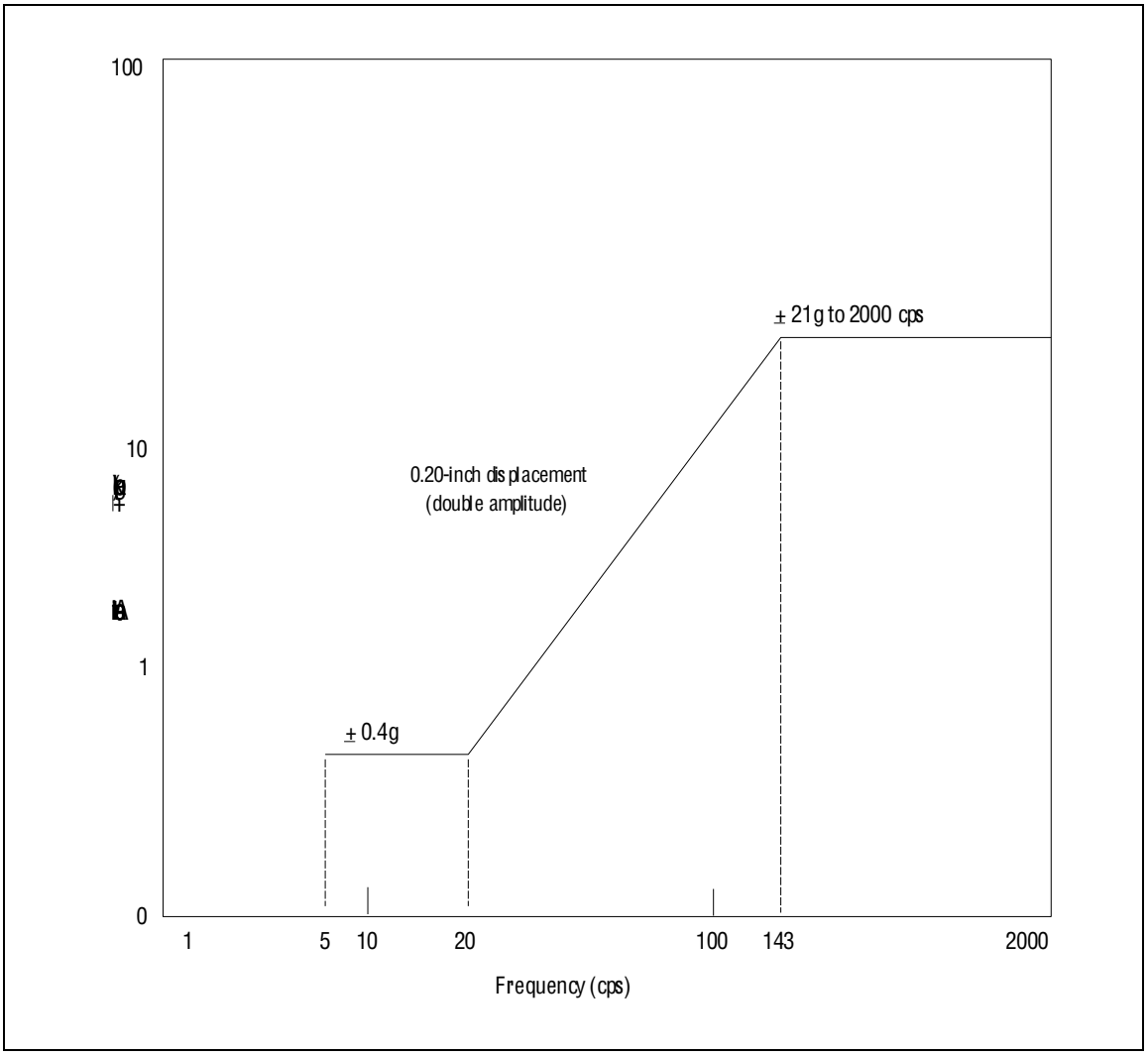

FIG
URE 1. Range curve for vibration.

4.5.10 Temperature shock. Cartridge sample shall be placed in a chamber maintained at a temperature of 250• F for 4 hours. Then within 5 minutes, the cartridges shall be transferred to a chamber at a temperature of -65• F for 4 hours. This is one cycle. There shall be three complete cycles. The exposure time at each extreme temperature shall not be less than 4 hours and may be extended overnight to prevent interruption of the phase schedule. After the third cycle, the cartridges shall be ballistically tested and meet all requirements.

4.5.11 Impact shock. Cartridge samples shall be dropped from a height of 8 feet onto a steel plate supported by concrete. Four cartridges shall impact nose down, four nose up, and four horizontally. These cartridges shall meet ballistic requirements when tested. Three cartridges shall be dropped 40 feet and land in any orientation. It is not required that the cartridges be usable after the drop test, but no cartridges are to fire during the test. Cartridges must be safe to handle and to dispose of after the test.

4.5.12 Temperature and humidity cycling. Cartridge sample shall be subjected to this test in accordance with MIL-D-81303.

4.5.13 Post environmental inspection. After the environmental test, the subjected cartridges shall be x-rayed, leak tested, resistance checked, and ballistically tested. Evidence of any disintegration of the ignition element, igniter, propellant, or derangement of any component or failure to meet bridge circuit resistance requirements shall be cause for rejection of the first article sample or the lot represented.

4.5.14 Ballistic tests. The test sample for ballistic testing shall be split into three equal groups for testing in accordance with table I. Cartridges subjected to environmental tests shall be conditioned and fired at +70• F. The cartridges shall be conditioned a minimum of 4 hours but less than 16 hours and fired in a Navy approved test fixture simulating the BDU-38/B Practice Bomb. Each cartridge shall be fired within 3 minutes after removal from conditioning. A record of velocity, stroke distances, ignition time, firing current, and firing voltage shall be taken with suitable instrumentation for each firing.

4.5.14.1 Criteria of Acceptability. The cartridge shall function and meet the requirements of 3.4.14.

4.6 Retest. There shall be no retests unless otherwise directed by the contracting officer.

4.7 Test conditions.

4.7.1 Standard conditions. Test conditions shall be as specified for each test given in section 4. If no conditions are stated, the following shall apply:

a. Temperature 21• ± 11• C (70• ± 20• F)
b. Relative humidity 90 percent or less

4.7.2 Test measurements.

4.7.2.1 Instruments. All measurements shall be made with instruments whose accuracy has been verified. All instruments and gages shall be calibrated and maintained in accordance with MIL-STD-45662.

4.7.2.2 Tolerances. The maximum allowable error on test condition instruments and measurements shall be as follows:

a. Temperature	± 2.78• C (5• F)
b. Relative humidity	± 5 percent
c. Vibration and shock amplitude	± 5 percent
d. Vibration frequency	± 5 percent
e. Current	± 1 percent
f. Resistance	± 1 percent

g. Time	± 2 percent
h. Pressure	± 3 percent
i. Force	± 5 percent
j. Velocity	± 5 percent
k. Distance	± 2 percent

5. PACKAGING

5.1 Preservation and packing. For all levels of shipment, cartridges shall be packaged as specified in TPO 00-191-5141.

5.2 Marking. Exterior containers shall be marked in accordance with MIL-STD-129. The nomenclature shall be "CARTRIDGE, IMPULSE, CCU-11/B". In addition to marking in accordance with MIL-STD-129, the exterior containers shall be marked in accordance with Code of Federal Regulations 49 CFR 173-194. The following specific warning shall appear on the exterior container "EXPLOSIVE POWER DEVICE, CLASS C, HANDLE CAREFULLY, KEEP FIRE AWAY."

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 cartridge is intended for use in the BDU-38/B Practice Bomb for separation and deployment of a recovery parachute.

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 and 2.1.2).

c. Whether a first article sample is required and location of test facility, if required (see 3.1).

d. Quality acceptance test facility (see 4.1).

e. First article test facility (see 4.2.1).

f. Sampling sizes for acceptance tests (see 4.2.3).

g. Safety precautions (see 6.6).

h. Items of data required for each first article and production lot (see 6.3).

6.3 Data. For the information of contractors and contracting officers, any of the data specified in applicable documents listed in Section 2 of this specification or referenced in lower-tier documents need not be prepared for the Government and shall not be furnished to the Government unless specified in the contract or purchase order.

6.4 First article. When a first article inspection is required, the contracting officer shall provide specific guidance to offerors that the items should be a first article sample. A first article sample is required from each supplier who has not produced the CCU-11/B Impulse Cartridge. If production has been interrupted for more than 6 months or changes are requested in production methods, a first article sample may be required. 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 requirements 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.

6.5 Safety precautions. The safety precautions requirements of the "Contractors' 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) 1-323.

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) should be made applicable.

6.6 Hazard notice. The cartridge described herein and certain of its components are flammable or explosive or both. Consequently, they present hazards in manufacture, handling, storage, and shipment. The contractor should recognize these hazards and take appropriate measures to guard and protect against fire, explosion, adverse environment, corrosive atmosphere, rough handling and electrically induced incidents.

6.7 Subject term (keyword) listing.

Storage Release Cartridge
Practice Bomb Release Cartridge

6.8 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.

Custodian
Air Force - 99

Preparing activity:
Navy - OS
(Project 1377-0D87)