

INCH- POUND

MIL-DTL-32083A (OS)
14 September 2004
SUPERSEDING
MIL-DTL-32083 (OS)
10 May 2001

DETAIL SPECIFICATION

CARTRIDGE, FIRE EXTINGUISHER, MK 272 MOD 0

This specification 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 defense

1. SCOPE

1.1 Scope. This specification covers the requirements for the manufacture and acceptance of the MK 272 Mod 0 Fire Extinguisher Cartridge, referred to herein as the “cartridge.”

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1168 Ammunition Lot Numbering and Ammunition Data Card

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://www.dodssp.daps.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

Comments, suggestions, or questions on this document should be addressed to Commander, Indian Head Division, Naval Surface Warfare Center, Technical Information Branch (Code 4230), 101 Strauss Avenue, Indian Head, Maryland 20640-5035, or emailed to pennam@ih.navy.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

AMSC N/A

FSC 1377

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2.2.2 Other Government documents, drawings, and publications. The following Government drawings form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation (see 6.2).

DRAWINGS

NAVAL SEA SYSTEMS COMMAND (CAGE Code 53711)

DL7263959

MK 272 MOD 0 Cartridge Shipping Assembly

(Application for copies should be addressed to the Commander, Indian Head Division, Naval Surface Warfare Center, Documentation Branch (Code 4230), 101 Strauss Avenue, Indian Head, MD 20640-5035.)

2.3 Non-Government publications. The following document 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 E 1742 Standard Practice for Radiographic Examination

(Copies of this document are available online at <http://www.astm.org/cgi-bin/SoftCart.exe/STORE/standardsearch.shtml?L+mystore+afpt6301+1062008944> or from the American Society for Testing and Materials Customer Service, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

2.4 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 6.3), a sample shall be subjected to first article inspection in accordance with 4.2.1.

3.2 Primary components. Only one lot of primary components shall be used in each lot of fire extinguisher cartridges, although a primary component lot may be used in more than one fire extinguisher cartridge lot. The ignition and output charges are considered primary components.

3.3 Cartridge production. The cartridges shall be manufactured in accordance with Drawing 7263959 and the documents listed thereon. Each cartridge shall meet the requirements of 3.3.2. Failure of any cartridge to meet the applicable requirements of 3.3 shall result in rejection of that unit.

3.3.2 Cartridge inspection.

3.3.2.1 Visual inspection. Cartridges shall not exhibit inadequate or illegible descriptive markings or serial numbers, dents, deep scratches, or other defects which may prevent proper installation or function when inspected in accordance with 4.3.1.

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3.3.2.2 Radiographic inspection. Cartridges shall show proper assembly, presence of parts, and sealing when examined radiographically in accordance with 4.3.2.

3.3.2.3 Leakage. Cartridges shall not exhibit a leak rate in excess of 1×10^{-5} cubic centimeters per second (cm^3/sec) of air when tested in accordance with 4.3.3.

3.3.2.4 Insulation Resistance. Cartridges shall exhibit an insulation resistance of 20 megohms minimum when tested in accordance with 4.3.4.

3.3.2.5 Electrostatic Discharge. Cartridges shall not fire, dud, or be damaged when tested in accordance with 4.3.5.

3.3.2.6 Bridgewire resistance. Cartridges shall exhibit a bridgewire resistance between 0.90 and 1.10 ohms when tested in accordance with 4.3.6.

3.4 Environmental requirements. Cartridges shall be capable of meeting all requirements of 3.4.1 through 3.4.3.

3.4.1 Vibration. There shall be no evidence of deformation or derangement of components. The cartridge shall not auto ignite, shall be safe to handle, and shall meet the requirements of 3.3.2.2 through 3.3.2.6 following vibration testing in accordance with 4.3.7.

3.4.2 Temperature, humidity, altitude cycling (THA). The cartridges shall meet the requirements of 3.3.2.2 through 3.3.2.6 after being exposed to the THA cycle in accordance with 4.3.8.

3.4.3 Shock. The cartridges shall meet the requirements of 3.3.2.2 through 3.3.2.6 following shock testing in accordance with 4.3.9.

3.4.4 Ballistic requirements. Cartridges from each production and first article lot shall meet the requirements of 3.4.4.1 through 3.4.4.4 when tested in accordance with 4.3.10.

3.4.4.1 No fire. Cartridges shall not fire, dud or otherwise be damaged when tested in accordance with 4.3.10.1

3.4.4.2 Function. The cartridge shall fire when tested in accordance with 4.3.10.2

3.4.4.3 Indent. The cartridge shall indent the dent block .018 inches minimum when tested in accordance with 4.3.10.2.1.2.

3.4.4.4 Misfire. There shall be no misfires.

4. VERIFICATION

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

- a. First article inspection (see 4.2.1)
- b. Production inspection (see 4.2.2)
- c. Lot acceptance inspection (see 4.2.3)

4.2 Types of inspections.

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4.2.1 First article inspection. Before entering into quantity production, an acceptable first article sample of 63 cartridges shall be prepared using the same procedures and methods proposed for the production lot. A first article sample acceptable for functional and environmental testing shall be defined as a sample which has met the applicable requirements of 3.2 through 3.4 of this specification. Sixty cartridges shall be expended in the tests listed in table I, and three shall be retained for investigative purposes. The contractor shall deliver the cartridges to the activity designated by the contracting agency for tests. Any damage inflicted by the environmental treatments, which would adversely affect the performance of the item in service application shall cause rejection of the first article sample. Any further production prior to notification by the contracting agency of first article sample acceptability shall be at the contractor's risk. Failure of any cartridge to comply with the requirements of section 3 shall be cause for rejection of the first article represented.

TABLE I First Article Test Plan

Test Sequence	Requirement paragraph	Test paragraph	Cartridge Groups						Total
			I	II	III	IV	V	VI	
Visual	3.3.2.1	4.3.1	6	6	12	12	12	12	60
Radiographic	3.3.2.2	4.3.2	6	6	12	12	12	12	60
Leakage	3.3.2.3	4.3.3	6	6	12	12	12	12	60
Insulation Resistance	3.3.2.4	4.3.4	6	6	12	12	12	12	60
Electrostatic Discharge	3.3.2.5	4.3.5	6	6	12	12	12	12	60
Resistance	3.3.2.6	4.3.6	6	6	12	12	12	12	60
Shock	3.4.3	4.3.9	6						6
Vibration	3.4.1	4.3.7		6					6
Temperature Humidity Altitude	3.4.2	4.3.8			12				12
Radiographic	3.3.2.2	4.3.2	6	6	12				24
Leakage	3.3.2.3	4.3.3	6	6	12				24
Insulation Resistance	3.3.2.4	4.3.4	6	6	12				24
Resistance	3.3.2.6	4.3.6	6	6	12	12	12	12	60
Functional Test	3.4.4	4.3.10	6	6	12	12	12	12	60

4.2.2 Production inspection. All production cartridges manufactured under contract shall be inspected and screened to requirements specified in 3.2 through 3.3.2.6. Any unit failing to meet the requirements listed in 3.2 through 3.3.2.6 shall be rejected and removed from the lot.

4.2.3 Lot acceptance inspection. Lot acceptance inspection shall consist of the examinations and tests specified in table II. Failure of any sample cartridge to comply with the requirements listed in table II shall be cause for rejection of the lot represented.

4.2.3.1 Sample size. A random sample from each production lot, including the retained sample for investigative purposes, shall be selected in accordance with table III for lot acceptance inspection. Test sample cartridges and cartridges retained for investigative purposes shall not be applied as part of the quantity specified for delivery by the contract or purchase order.

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TABLE II Lot acceptance inspections and tests

Inspection/Test	Test Paragraph	Quantity
Visual	4.3.1	All
Radiographic	4.3.2	All
Leak	4.3.3	All
Resistance	4.3.6	All
Functional Test	4.3.10	All

TABLE III lot acceptance sampling

Lot Size	Test Sample Size	Retained Sample Size
2 to 25	3	3
26 to 50	8	3
51 to 90	13	3
91 to 150	20	3
151 to 280	32	3
280 to 500	50	3

4.3 Inspections and tests.

4.3.1 Visual inspection. Each cartridge shall be visually examined. Cartridges that do not meet the requirements of 3.3.2.1 shall be rejected.

4.3.2 Radiographic examination. Radiographic examination of cartridges shall include x-ray in accordance with ASTM E 1742. All cartridges shall be identified with serial numbers beginning with 001 prior to examination. The cartridges shall be arranged on trays or boards in consecutive numerical order with any missing serial numbers identified on the radiographic plate. The cartridges shall be positioned for the most revealing exposure with the long axis perpendicular to the radiographic beam. Each radiograph shall carry a permanent identification of the items displayed thereon in a 4 x 6 inch region maximum. The radiographic identification shall include the drawing number, the complete lot number in accordance with MIL-STD-1168, the contract number, and the span of serial numbers displayed. Radiographs of the entire production lot shall accompany the ballistic sample to the activity conducting the tests (see 6.2). Defective cartridges found during radiographic review are to be marked on the radiographic plate and removed from the production lot.

4.3.3 Leak test. Each cartridge produced shall be leak tested in a dry gas leak tester to determine conformance with 3.3.1.2. Cartridges that do not meet the requirements of 3.3.2.3 shall be rejected.

4.3.4 Insulation Resistance. An direct current of 500 ± 25 volts shall be applied between pins A and B shorted together and the cartridge case for 15 ± 1 seconds using an appropriate test meter. The positive lead shall be connected to the pins. Cartridges that do not meet the requirements of 3.3.2.4 shall be rejected.

4.3.5 Electrostatic Discharge. Discharge from $500 \pm 5\%$ pico farad capacitor charged to 25000 ± 500 volts through a $5000 \pm 5\%$ ohm resistor in a 5 micro henry total inductance series circuit shall be applied between pins A and B. A second discharge shall be applied between the pins A and B shorted together and the case of the cartridge. The test shall be conducted in both polarities. Cartridges that do not meet the requirements of 3.3.2.5 shall be rejected.

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4.3.6 Bridgewire resistance. Each cartridge shall be screened for proper bridgewire resistance by use of a resistance bridge or other suitable test circuit. Cartridges that do not meet the requirements of 3.3.2.6 shall be rejected.

4.3.7 Vibration. The cartridges shall be installed in a suitable vibration test. The cartridges shall be vibrated in three mutually perpendicular axes. The cartridges shall be subjected to sinusoidal vibration at 70°F along axis I to the levels shown in Figure 1 for sixty minutes. The frequency shall be logarithmically swept from 5 to 2000 Hz and return to 5 Hz in approximately 20 minutes. After completion of vibration along axis I, the test shall be repeated along axes II and III. After completion of vibration at +70°F, the vibration procedure shall be repeated at +200°F. After completion of vibration at +200°F, the vibration procedure shall be repeated at -65°F.

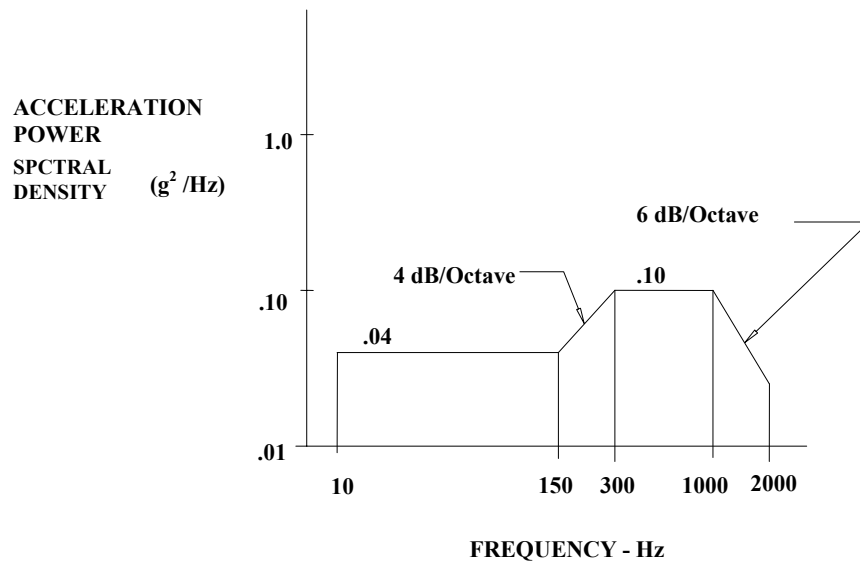


Figure 1 Vibration Test Level

4.3.8 Temperature, Humidity and Altitude Cycling (THA). The cartridges shall be supported on screen trays so that all areas are exposed to the prescribed atmospheric conditions at all times. During weekdays the cycling scheduling is as follows:

Monday	0800	Place test items in a chamber maintained at +70°F at 50 percent relative humidity (RH).
	1200	Raise chamber temperature to +160°F and the RH to 95 percent. The chamber temperature shall reach +160°F at 95 percent RH not later than 1300.
	1600	Remove test items from above chamber and immediately place in a chamber maintained at -65°F at a pressure altitude of 70,000 feet (0.65 psi).

This schedule shall be followed for a total of 4 weeks (28 days) except that on the first and third weekends the cartridges are soaked at -65°F and ambient pressure, and on the second and fourth weekends the

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cartridges are soaked at 160°F at 95% RH. The weekend soak shall be from 1200 on Friday until 0800 on Monday.

4.3.9 Shock. The cartridges shall be installed in a suitable shock test fixture for the test. Three shocks shall be applied in each direction of three mutually perpendicular axes. The shock pulse waveform shall be a terminal peak sawtooth as shown in Figure 2. The peak amplitude A was 20 g and, the duration D was 11 milliseconds.

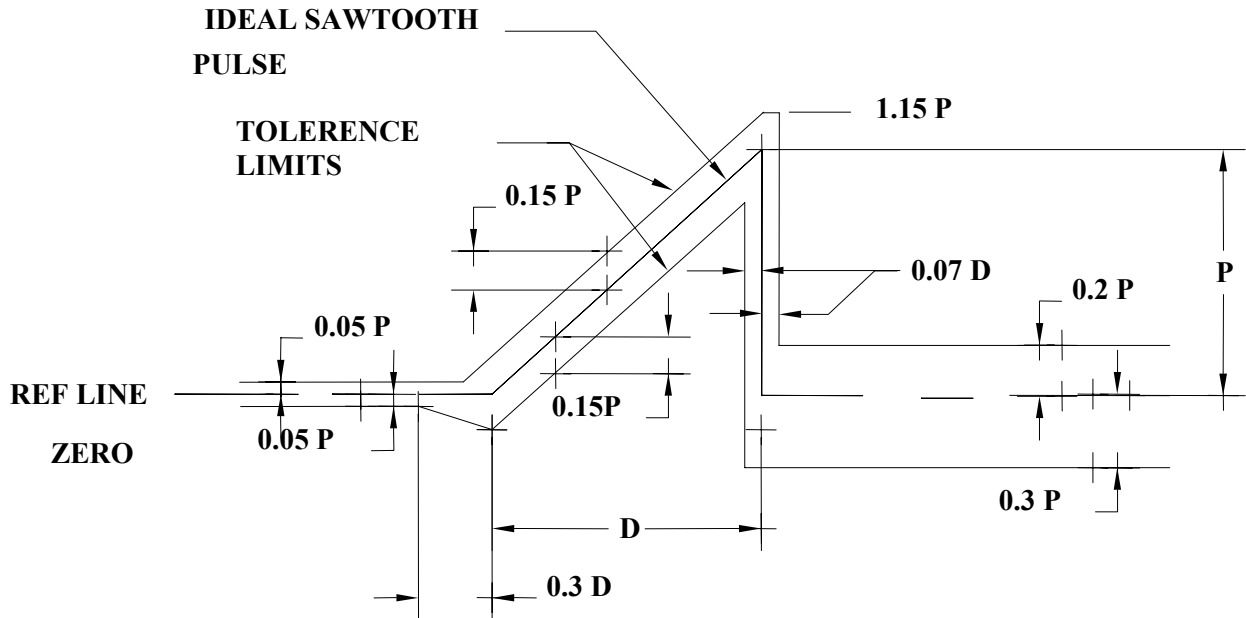


Figure 2 Shock Pulse Configuration

4.3.10 Functional test

4.3.10.1 No fire. A direct current of 1 ampere minimum with an associated power of one watt minimum shall be applied to the bridgewire for 5 minutes minimum. Failure to meet the requirements of 3.4.4.1 shall be cause for rejection of the lot.

4.3.10.2 Ballistic test. Cartridges shall be temperature conditioned at $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for 1 hour minimum. The cartridges shall be fired in a test fixture, Drawing 838AS185 within 3 minutes after removal from temperature conditioning. Firing shall be by applying a $3.5 +0.5, -0.0$ ampere, 10 millisecond pulse to the bridgewire. The dent block shall be made from aluminum alloy 2024T-351. Any cartridge not fired within 3 minutes after removal it shall be re-conditioned before test firing. The re-exposure way be performed as many times as necessary to complete the required ballistic test. Instrumentation shall be provided to measure and record the function time (milliseconds). The production lot shall be accepted if the sample fulfills the acceptance criteria of 4.3.10.2.1.

4.3.10.2.1 Acceptance criteria.

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4.3.10.2.1.1 Function time. The lot shall be acceptable with respect to function time if the ballistic sample meets the requirements of 3.4.4.2. The acceptance number of defects is zero and the rejection number of defects is one.

4.3.10.2.1.2 Indent. The lot shall be acceptable with respect to indent if the ballistic sample meets the requirements of 3.4.4.3. The acceptance number of defects is zero and the rejection number of defects is one.

4.3.10.2.1.3 Misfire. A cartridge that does not fire under the conditions specified in 3.4.4 shall be considered defective and the lot considered unacceptable, unless the misfire is clearly attributable to faulty test equipment or procedure.

4.3.10.3 Retests. There shall be no retests.

4.3.10.4 Test failure. If test failure is attributable to an assignable cause, excluding the test cartridge, the original test results shall be discarded and that test re-conducted.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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 fire extinguisher cartridge provides power to initiate the emergency fire extinguisher system for the Air Cushioned Landing Craft. The cartridge output ruptures a frangible disk in the fire extinguisher bottle allowing the fire extinguishing agent to flow into distribution manifolds. The cartridge covered by this specification was developed solely for use in the above system and therefor has no commercial application.

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 2.2.1, 2.2.2, and 2.3).
- c. Whether first article inspection is required and, if so, specify the test activity (see 3.1 and 4.2.1).
- d. Directions for shipping radiographs of entire production lot and marriage log (report indicating cartridge serial number to initiator serial number), along with the ballistic sample to the activity conducting the production lot acceptance tests (see 4.2.2 and 4.2.3).

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- e. That the safety precaution requirements of the "DOD Contractors' Safety Manual for Ammunition and Explosives," DOD 4145.26-M, are applicable and should be specified in the contract as required by Federal Acquisition Regulation (FAR) 23.3. 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.

6.3 First article. When a first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item should be a first article sample or a sample selected from the first production items (see 3. 1), and the number of items to be tested as specified in 4.2.1. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examination, approval of first article test results, and disposition of first articles. Limitations 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 Subject term (keyword) list.

Cartridge
Detonator
Fire Extinguisher Cartridge

6.5 Changes from previous issue. Marginal notations are not used to identify changes with respect to the previous issue because of the extensiveness of the changes. The changes in this revision were authorized by ECP 045210A061.

Preparing activity
Navy OS
(Project 1377-0231)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at www.dodssp.daps.mil.