INCH-POUND

MIL-B-71154 (AR)
01 November 1993

MILITARY SPECIFICATION

BODY, 60MM, FOR CARTRIDGE, PRACTICE, M766

This specification is approved for use by the U.S. Army Armament Munitions and Chemical Command, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements and quality assurance provisions for manufacture and acceptance of Body, Projectile, 60MM, for use in Cartridge, Practice M766.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 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-A-48078 - Ammunition, Standard Quality Assurance Provisions, General Specification for

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document, should be addressed to: Commander, U.S. Army ARDEC, ATTN: SMCAR-BAC-S, Picatinny Arsenal, NJ 07806-5000 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 1315

STANDARDS

MILITARY

MIL-STD-109 - Quality Assurance Terms and Definitions
MIL-STD-1169 - Packaging, Packing and Marking for Shipment of Inert Ammunition Components

(Unless otherwise indicated, copies of federal and Military specifications, standards and handbooks 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 document to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DRAWINGS (See 6.5)

U.S. ARMY ARMAMENT, RESEARCH, DEVELOPMENT AND ENGINEERING CENTER (ARDEC)

12953565 - Body, Painted

(Copies of other Government documents, drawings, and publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Non-Government publications. The following document(s) 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).

ASTM Method E-8 - Tension Testing of Metallic Materials

Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among the technical groups and using Federal Agencies.

2.3 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. (See contract provisions for additional precedence criteria).

3. REQUIREMENTS

3.1 Materials. Materials shall be in accordance with the applicable drawings and specifications. Projectiles shall be free of defects such as cracks, splits, porosity, shrinkage, cold shuts, pipe-type defects, planar defects, and inclusions.

3.2 Components and assemblies. The components and assemblies shall comply with all requirements specified on drawing 12953565 and associated drawings and with all requirements specified in applicable specifications and standards.

3.3 Mechanical properties. Mechanical properties shall be in accordance with the requirements of the applicable drawings and specifications.

3.4 First article. When specified in the contract or purchase order (see 6.2), a sample shall be subjected to first article inspection in accordance with the technical provisions herein (see 4.3).

3.5 Workmanship. The projectiles shall be free from dirt, chips, grease and other foreign matter. There shall be no cracks, scratches, dents, gouges, holes, porous areas, distortion, or undesirable characteristics which would in any way detract from usability of the product for its intended purpose. Parts and assemblies shall be free from all contaminants and damage after cleaning.

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 (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 the specifications 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 inspections 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.

4.1.2 General provisions. Unless otherwise specified herein, the provisions of MIL-A-48078 apply and form a part of this specification. Reference shall be made to MIL-STD-109 to define quality assurance terms used herein.

4.2 Classification of inspections. The following types of inspections shall be conducted on this item:

a. First Article Inspection (see 4.3)

b. Quality Conformance Inspection (see 4.4)

4.3 First article inspection.

4.3.1 Submission. The contractor shall submit a first article sample as designated by the contracting officer for evaluation in accordance with provisions of 4.3.2. The first article sample shall consist of the components in the quantities indicated in Table I.

4.3.2 Inspections to be performed. See MIL-A-48078 and Table I specified herein.

4.3.3 Rejection. See MIL-A-48078.

TABLE I. First article inspection

CLASSIFICATION OF CHARACTERISTICS

MIL-B-71154 (AR)

PARAGRAPH	TITLE		SHEET 1 OF 1	DRAWING NUMBER
	Body 60MM			See below
				NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Body, 60MM (dwg. 12954576) Examination for defects	10	3.2	4.4.2.1
	Body, Painted (dwg. 12953565) Examination for defects	10	3.2	4.4.2.2

NOTES:

AMSMC Form 1570b, 1 Jul 89 Replaces 1570, 1 Feb 85, which may not be used.

4.4 Quality conformance inspection.

4.4.1 Inspection lot formation. Inspection lots shall comply with the lot formation provisions of MIL-A-48078.

4.4.2 Examinations and tests.

a. Classification of characteristics. Quality conformance examinations and tests are specified in the following Classification of Characteristics paragraphs. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements utilizing as a minimum the conformance criteria specified herein. Where cited herein, attributes sampling inspection shall be conducted in accordance with TABLE II below, using the inspection levels cited in the Classification of Characteristics paragraphs:

TABLE II. Attributes sampling inspection.

	INSPECTION LEVELS					
LOT SIZE	I	II	III	IV	V	VI
2 to 8	*	*	*	*	5	3
9 to 15	*	*	*	13	5	3
16 to 25	*	*	*	13	5	3
26 to 50	*	*	32	13	5	3
51 to 90	*	*	32	13	5	3
91 to 150	*	125	32	13	13	5
151 to 280	*	125	32	13	13	5
281 to 500	*	125	32	32	20	8
501 to 1200	*	125	80	50	20	13
1201 to 3200	1250	125	80	50	32	13
3201 to 10000	1250	125	125	50	32	13
10001 to 35000	1250	315	125	80	50	13
35001 to 150000	1250	315	125	80	50	13
150001 to 500000	1250	500	200	125	50	13
500001 and above	1250	500	200	125	50	13

Number under inspection levels indicate sample size; asterisks (*) indicate one hundred percent inspection. If sample size exceeds size, perform one hundred percent inspection. Accept on zero and reject on one or more for all inspection levels.

b. Alternative quality conformance provisions. Unless otherwise specified herein or provided for in the contract, alternative quality conformance procedures, methods or equipment, such as statistical process control, tool control, variables sampling or other types of sampling plans, etc., may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the provisions herein. Prior to applying such alternative procedures, methods or equipment, the contractor shall describe them in a written proposal submitted to the Government for evaluation (see 6.6). When required, the contractor shall demonstrate that the effectiveness of each proposed alternative is equal to or better than the specified quality conformance provision(s) herein. In case of dispute as to whether the contractor's proposed alternative(s) provides equivalent assurance, the provisions of this specification shall apply. All approved alternative provisions shall be specifically incorporated into the contractor's quality program or inspection system, as applicable.

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.1	Body, 60MM	1 OF 3	12953576
			NEXT HIGHER ASSEMBLY 12953565

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined			
Major				
101	Hardness test	25 (a)	3.3	4.5.2.1
102	Tensile test	4 (b)	3.3	4.5.3
103	Pitch diameter of forward thread	III	3.2	Gage
104	Diameter of vent holes	III	3.2	Gage
105	Bourrelet diameter	III	3.2	Gage
106	Distance from from front face to fin boom mating flange face	III	3.2	Gage
107	Pitch diameter of rear thread	III	3.2	Gage
108	Projected runout of pitch diameter of rear thread to rear face and diameter	III	3.2	Gage
109	True position of forward vent holes to rear flange and rear pitch diameter	III	3.2	Gage
110	True position of rear vent holes to rear flange and rear pitch diameter	III	3.2	Gage
111	Diametral relief from bourrelet aft of obturator groove	III	3.2	Gage
112	Distance from front face to obturator groove	III	3.2	Gage
113	Diameter of obturator groove	III	3.2	Gage
114	Runout of obturator groove to bourrelet	III	3.2	Gage

NOTES:
a. The sample is 25 per mill heat or month (See 4.5.2.1).
b. The sample is 4 (See 4.5.3).

QUALITY CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 2 OF 3	DRAWING NUMBER 12953576
4.4.2.1	Body, 60MM		NEXT HIGHER ASSEMBLY 12953565

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Major				
115	Diameter of rear vent holes	III	3.2	Gage
116	Total weight of body	100%	3.2	Gage
117	Width of obturator groove at first basic depth	III	3.2	Gage
118	Width of obturator groove at second basic depth	III	3.2	Gage
119	Perpendicularity of obturator groove surface to bourrelet	III	3.2	Gage
120	Diameter of rear taper at 3 basic lengths	III	3.2	Gage
121	Runout between rear taper aft fin mating surface flange and rear thread	III	3.2	Gage
122	Wall thickness at rear taper under min	III	3.2	Gage
123	Inside diameter at 2 basic lengths	III	3.2	Gage
124	Length of forward effective thread under min	III	3.2	Gage
125	Location of forward vent holes	III	3.2	Gage
126	Minor diameter of forward thread	III	3.2	Gage
127	Major diameter of rear thread	III	3.2	Gage
128	Runout of rear taper to rear face and bourrelet	III	3.2	Gage
129	Runout of forward ogive to forward face and forward pitch diameter	III	3.2	Gage
130	Location of rear vent holes	III	3.2	Gage

NOTES:

QUALITY CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 3 OF 3	DRAWING NUMBER 12953576
4.4.2.1	Body, 60MM		NEXT HIGHER ASSEMBLY 12953565

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Major (cont'd)				
131	Projected runout of pitch diameter of forward thread to bourrelet and forward face diameter and front face	III	3.2	Gage
132	Forward taper at 2 basic lengths	III	3.2	Gage
133	Distance from aft face to fin boom mating flange face	III	3.2	Gage
134	Diameter of dud plug through holes	III	3.2	Gage
135	Location of dud plug through holes	III	3.2	Gage
136	Diameter of dud plug hole counter-bores under min	III	3.2	Gage
137	Depth of dud plug hole counterbores	III	3.2	Gage
138	True position of dud plug holes to dud plug hole counterbores	III	3.2	Gage
Minor				
201	Evidence of sharp edges or corners (except as indicated)	V	3.2	Visual
202	Surface finish improper	V	3.2	Visual
203	Poor workmanship	V	3.5	Visual

NOTES:

QUALITY CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER 12953565
4.4.2.2	Body, Painted		NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined			
Major				
101	Outside diameter of body over max after painting	III	3.2	Gage
102	Obturator groove over max after painting	III	3.2	Gage
Minor				
201	Projectile body painting defective	V	3.2	Visual
202	Evidence of poor workmanship	V	3.5	Visual

NOTES:

4.4.3 Testing. See 4.5.

4.4.4 Inspection equipment. The inspection equipment required to perform the examinations and tests prescribed herein is described in the "Paragraph Reference/Inspection Method" column in the tables starting with paragraph 4.4.2.1. The contractor shall submit for approval inspection equipment designs in accordance with the terms of the contract. See Section 6 of MIL-A-48078 and 6.3 herein.

4.5 Methods of inspection.

4.5.1 Materials, components and processes. Compliance with all requirements of Section 3 of this specification shall be ascertained by current and continuing examination of inspection and test data to determine that all components and materials have been inspected and tested and found to comply with their respective drawing and specification requirements, and that all specified manufacturing processes have been followed.

4.5.1.1 Visual and mechanical inspection. The visual and mechanical inspections shall verify compliance with requirements of Sections 3 and 5 of this specification in accordance with 4.4.2 herein and Table I.

4.5.2 Hardness test.

4.5.2.1 Requirement. Each basic melt ladle, whichever is the smaller, 25 projectiles shall be randomly selected and tested for relative hardness. Projectiles shall be tested in the zone where the obturating band groove will later be machined. The hardest and softest projectiles from this group shall be subjected to tension testing in accordance with 4.5.3.

4.5.2.2 Test procedure. The test shall be performed using any automated hardness tester which will produce accurate repeatable results with readings for an acceptable projectile between 25-80 percent of the full scale capability of the test equipment. Operating procedures shall be as specified by the applicable equipment manual, standard ASTM test methods and the following subject to approval by the Government representative:

a. The hardness tester calibration shall be tested at start up, at least one each four hours of continuous operation, and after a layoff of three or more hours.

b. The body shall be fixtured so that no rocking, shifting or deflection of the body will occur during the test.

c. The hardness tester shall not produce indentations deeper than 25 percent of the indentor ball diameter or wall thickness of the projectile in that zone.

d. Hardness readings shall be taken at least ten indentor ball diameters apart. At least two readings shall be taken per projectile and averaged. Impressions shall be completely removed on final machining.

4.5.3 Tensile test. Two specimens each shall be fabricated from the hardest and softest projectiles from the hardness test in 4.5.2. The specimens shall be the largest round specimens obtainable in conformance with the proportions shown in ASTM-E8, except that the grip areas may be less than full round sections. The tensile specimens may be fabricated prior to machining the obturator grooves. The center of the tensile test specimens shall be from the center or rear of the zone where the obturating band groove would normally be located. All specimens must meet or exceed the minimum tensile strength requirements shown on drawing 12953576. The failure of any specimen to meet the tensile requirements of the drawing shall be cause for rejection of all projectiles from that month or basic melt ladle of steel. If one basic melt ladle is projected to be used in the manufacture of projectile bodies for several months, the total number of tensile specimens expected should be tested at the start of that basic melt ladle's use.

5. PACKAGING

5.1 Packing. The projectiles shall be packaged in containers in accordance with the best current standards of industry so that they will arrive in prime condition and can be stored in such a manner as to remain in that condition.

5.2 Marking. In addition to any special marking required by the contract, unit packages, intermediate packages, and shipping containers shall be marked in accordance with the requirements of MIL-STD-1169.

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 inert projectile is designed to be used on the M766, 60MM practice mortar cartridge.

6.2 Acquisition requirements.

a. See MIL-A-48078

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. Provisions for submission of first article sample.

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied to the contract.

Reference Paragraph	DID Number	DID Title
4.5.3	DI-QCIC-81200	Quality Inspection Test Demonstration and Evaluation Report

6.4 Submission of contractor inspection equipment designs for approval. Submit copies of designs as required to: Commander, U.S. Army ARDEC, ATTN: SMCAR-QAT-I, Picatinny Arsenal, NJ 07806-5000. This address will be specified on the Contract Data Requirements List, DD Form 1423 in the contract.

6.5 Drawings. Drawings listed in Section 2 of this specification under the heading U.S. Army Armament, Research Development and Engineering Center (ARDEC) may also include drawings prepared by, and identified as ARRADCOM, Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under the cognizance of ARDEC.

6.6 Submission of alternative quality conformance provisions. All contractor proposed alternative quality conformance provisions will be submitted to the Government for evaluation/approval as directed by the contracting activity.

6.7 Subject term (key word) listing.

Hardness testing
Tensile testing
Workmanship criteria

Custodian:
Army-AR

Preparing activity:
Army-AR

(Project 1315-AE16)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL–B–71154 (AR)	931101

3. DOCUMENT TITLE: BODY, 60MM, FOR CARTRIDGE, PRACTICE, M766

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets if needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable) / e. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)
U.S ARMY ARDEC STANDARDIZATION OFFICE	(1) Commercial: 201–724–6675 (2) AUTOVON: DSN–880–6675
c. ADDRESS (Include Zip Code) ATTN: SMCAR–BAC–S PICATINNY ARSENAL, NJ 07806–5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041–3466 Telephone (703) 756–2340 AUTOVON 289–2340

DD Form 1426, OCT 89 — *Previous editions are obsolete.* — 198/290