MIL-C-440C
25 November 1974
SUPERSEDING
MIL-C-440B
5 July 1961

MILITARY SPECIFICATION

COMPOSITION A-3 AND A-4

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

1. SCOPE

1.1 Scope. This specification covers two high explosives for use in ammunition. (see 6.4)

1.2 Classification. The explosives shall be designated by the following compositions (see 6.1).

Composition A-3
Composition A-4

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-R-398 - RDX
MIL-W-20553- Wax, Desensitizing

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes (ABC-STD-105)

FSC: 1376

MIL-STD-109 - Inspection Terms and Definitions
MIL-STD-650 - Explosive: Sampling, Inspection and Testing
MIL-STD-1168- Lot Numbering of Ammunition
MIL-STD-1235- Single and Multilevel Continuous Sampling Procedures and Tables for Inspection by Attributes

DRAWINGS

U. S. ARMY

7548644 - Box, Packing for High Explosive, Assembly Details, Packing and Marking
7548645 - Box, Packing, Reusable, Collapsible for High Explosives, Assembly, Details, Packing and Marking

(Copies of specifications, standards, drawings and publications, required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer).

2.2 Publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS PUBLICATION

ASTM Designation E300-70 - Recommended Practice for Sampling Industrial Chemicals

(Application for copies of ASTM Standards should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103).

3. REQUIREMENTS

3.1 Material. Compositions A-3 and A-4 shall consist of RDX crystals, complying with the requirements of MIL-R-398, Type II, coated with desensitizer, complying with the requirements of MIL-W-20553.

3.2 Foreign matter. The finished composition shall be free of visible impurities and foreign matter, when examined as specified in 4.5.1.

3.3 Moisture. The moisture content of the compositions shall not exceed 0.1 percent, when determined as specified in 4.5.2.

3.4 Ingredients. The ingredients shall be as specified in Table I, on a moisture free basis, when determined as specified in the applicable sub-paragraph of 4.5.3.

TABLE I

Ingredient	Composition A-3 Percent	Composition A-4 Percent
RDX	91.0 ± 0.7	97.0 ± 0.5
Desensitizer	9.0 ± 0.7	3.0 ± 0.5

3.5 Acidity. The acid content, as acetic acid, shall not exceed 0.02 percent, when determined as specified in 4.5.4.

3.6 Insoluble particles. There shall be no insoluble particles retained on a United States (U.S.) Standard Number (No.) 40 sieve and not more than 5 insoluble particles retained on a U.S. Standard No. 60 sieve when determined as specified in 4.5.5.

3.7 Granulation. The composition shall comply with granulation requirements specified in Table II, when determined as specified in 4.5.6.

TABLE II

Through U.S. sieve No.	Composition A-3 Percent		Composition A-4 Percent	
	Min.	Max.	Min.	Max.
6	100	...	100	...
50	...	...	...	95
100	...	5	...	25

3.8 Bulk Density. The material shall have a minimum bulk density in accordance with the contract or purchase order when determined as specified in 4.5.7 (see 6.2).

3.9 First article testing. This specification makes provisions for first article testing. Submission of first article quantity by the contractor shall be as specified in the contract.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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. Reference shall be made to MIL-STD-109 in order to define the terms used herein.

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

a. First Article Inspection (see 4.3)
b. Quality Conformance Inspection (see 4.4)
c. Preparation for Delivery Inspection (see 4.4.2 and 5)

4.3 First Article Inspection

4.3.1 Submission. Prior to initiation of regular production the contractor shall submit a first article sample consisting of 2 lbs of each composition in accordance with instructions issued by the Contracting Officer for evaluation in accordance with paragraph 4.3.2. All samples submitted shall have been produced by the contractor using the same production processes, procedures, and equipment as will be used in fulfilling the contract. All materials, including packaging and packing, shall be obtained from

the same sources of supply as will be used in regular production. The sample shall be accompanied by certificates of analysis. A first article quantity, or portion thereof, as directed by the Contracting Officer, shall also be submitted whenever there is a lapse in production for a period in excess of 90 days, or whenever a change occurs in manufacturing process, material used, drawing, specification or source of supply as to significantly affect product uniformity as determined by the Government. Prior to submission, the contractor shall inspect the sample to the degree necessary to assure that it conforms to the requirements of the contract and submit a record of this inspection with the sample. A sample containing known defects will not be submitted unless specifically authorized by the Contracting Officer.

4.3.2 Inspections to be performed. The sample will be subjected by the Government to any or all of the examinations or tests specified in 4.4 and 4.5 of this specification and any or all requirements of the applicable drawings.

4.3.3 Rejection. If any sample fails to comply with any of the applicable requirements, the first article quantity shall be rejected. The Government reserves the right to terminate its inspection upon any failure of a sample to comply with any of the stated requirements.

4.4 Quality Conformance Inspection

4.4.1 Lot formation. A lot shall consist of one or more batches of high explosives of one composition designation only, produced by one manufacturer, in accordance with the same specification, or same specification revision, under one continouous set of operating conditions. Each batch shall consist of that quantity of high explosive that has been subjected to the same unit chemical or physical mixing process intended to make the final product homogeneous. In addition, each lot shall contain:

a. RDX, Type II, from one manufacturer only.

b. Desensitizer from one interfix lot number, from one manufacturer only.

4.4.2 Examination. Sampling plans and procedures for the following classification of defects shall be in accordance with MIL-STD-105. Continuous sampling plans, in accordance with MIL-STD-1235 may be used if approved by the procuring activity. Also, at the option of the procuring activity, AQL's and sampling plans may be applied to the individual characteristics listed using an AQL of 0.40 percent for each major defect and an AQL of 0.65 percent for each minor defect.

4.4.2.1 Wooden box or fiberboard box, prior to closing (see drawing(dwg.) 7548644 and 7548645).

Categories	Defects	Method of Inspection
Critical:	None defined.	
Major:	AQL 1.00 percent	
101.	Foreign matter	Visual
102.	Liner pierced or torn	Visual
103.	Liner improperly closed	Visual
Minor:	AQL 0.65 percent	
201.	Type of liner incorrect	Visual

4.4.2.2 Sealed wooden boxes (see dwg. 7548644)

Categories	Defects	Method of Inspection
Critical:	None defined.	
Major:	AQL 1.50 percent	
101.	Box damaged	Visual
102.	Lot number misleading or unidentifiable	Visual
103.	Board broken or split	Visual
104.	Strapping missing, broken or loose	Visual/ Manual
105.	Top improperly assembled	Visual/ Manual

Minor:	AQL 1.50 percent	
201.	Nail protruding	Visual
202.	Marking misleading or unidentifiable	Visual
203.	Strapping improperly assembled	Visual/ Manual

4.4.2.3 Sealed fiberboard box (see dwg. 7548645).

Categories	Defects	Method of Inspection
Critical:	None defined.	
Major:	AQL 1.00 percent	
101.	Assembly torn or pierced	Visual
102.	Lot number misleading or unidentifiable	Visual
103.	Strapping or banding strips broken, missing, or loose	Visual/ Manual
Minor:	AQL 1.50 percent	
201.	Marking misleading or unidentifiable	Visual
202.	Stitches missing or loose	Visual/ Manual
203.	Strapping or banding straps improperly assembled	Visual/ Manual

4.4.3 Sampling for test 4.5.1 through 4.5.7. Approximately 300 grams of the composition shall be selected from each batch to be sampled using ASTM Procedures E300-70 for solids. Samples shall be selected for inspection in accordance with MIL-STD-1235, CSP-1 Plan, Inspection Level II, AQL 6.5%. If any sample fails to meet any test requirement the batch represented by the sample shall be rejected. All batches produced between the time that the batch was tested and accepted and the batch which failed shall be tested in accordance with the applicable methods given in paragraph 4.5. If any of these batches fail to meet any of the

test requirements, that batch shall also, be rejected. In addition, after any failure of a batch the contractor will return to 100% inspection until "i" successive batches are accepted as required by MIL-STD-1235. The classification and code number shall be as given in Table III.

TABLE III
CLASSIFICATION OF DEFECTS

Property	Type of Defect	Test Paragraph
Moisture, %	Major	4.5.2
RDX Content, %	Major	4.5.3
Desensitizer, %	Major	4.5.3
Acidity	Major	4.5.4
Insoluble Particles	Major	4.5.5
Granulation	Major	4.5.6
Bulk Density	Major	4.5.7

4.4.4 Inspection equipment. For the performance of all tests and examinations specified in 4.4 and 4.5, commercial inspection equipment should be employed. The contractor shall have available, and utilize correctly, this equipment and is charged with the responsibility of insuring that proper calibration procedures are followed. Government approval of all inspection equipment is required prior to its use for acceptance purposes.

4.5 Test Methods and Procedures (see 6.3)

4.5.1 Determination of foreign matter. Take approximately 10-20 grams of the material and spread the composition out on a clean sheet of white paper and examine visually for the presence of visible impurities and extraneous foreign matter.

4.5.2 Determination of Moisture Content

4.5.2.1 Special Solvent. The special solvent shall consist of equal volumes of anhydrous methanol and benzene thoroughly mixed. If necessary the solvents shall be dried by distillation.

4.5.2.2 Procedure (Karl Fisher Method). Determine the moisture content in accordance with Method 101.4 of MIL-STD-650.

4.5.3 Determination of Ingredients

4.5.3.1 RDX content (see 6.5). A medium porosity glass filtering crucible shall be cleaned with hot benzene followed by a final rinse of acetone. The crucible shall be back filtered with acetone and be free flowing. The crucible shall be dried, weighed on an analytical balance, and held in the oven at 60-70°C until used. A weighed portion of sample shall be placed in a 150 ml beaker with a magnetic stirring bar, and 60 ml of aliphatic naphtha solvent shall be added. The beaker shall be covered with a watch glass and placed on a magnetic stirrer hot plate (or equivalent) maintaining the temperature of the solution between 80 and 90°C and stirring for 30 minutes. The hot plate shall be checked for proper temperature by keeping on it a thermometer in a 400 ml beaker containing 100 ml of solvent. The top of the beaker shall be covered with aluminum foil and the solvent temperature shall be maintained within specified range. During the filtration operation the previously prepared crucible and contents shall be kept at about 60-70°C. This is to prevent wax from coming out of solution and clogging the crucible. This may be accomplished by use of a heat gun or other commercially available equipment. The top of the solvent wax shall be decanted through the crucible and the RDX remaining in the beaker (and on the stirring bar) shall be washed with warm aliphatic naptha solvent and transferred quantitatively to the crucible using a wash bottle. No more than 40 ml of aliphatic naptha solvent shall be used to effect the transfer. If necessary, rinse beaker with hexane to remove those RDX crystals that cling to sides of beaker. During filtration, the crucible shall not be aspirated dry until the final wash in order to prevent the wax from freezing-out on the crucible. The crucibles shall be rinsed twice with 10 ml portions of hexane. The RDX shall be stirred with hexane before applying vacuum. The crucible and contents shall be dried for 15 minutes in 90-105°C oven or until constant weight is obtained. The percentage of RDX shall be calculated as follows:

$$\text{Percent RDX} = \frac{100A}{W-(MW)}$$

Where:

A = increase in weight of filtering crucible, gms.
W = weight of sample, gms.
M = percent moisture in material, expressed as a decimal (see 4.5.2)

4.5.3.2 Desensitizer. The percentage of desensitizer shall be calculated on a moisture free basis by subtracting from 100 percent the percentage of RDX obtained as specified in 4.5.3.1.

4.5.4 Acidity. A 6 gm specimen shall be weighed accurately and transferred to a 100 ml beaker. A 25 ml portion of benzene shall be added and the beaker and contents covered with a watch glass and heated on a steam bath until the desensitizer coating on the RDX crystals has completely dissolved. The benzene solution shall be decanted carefully into a clean small beaker, covered with a watch glass, and kept warm. Seventy five ml of acetone shall be added to the RDX crystals remaining in the 400 ml beaker, covered and heated on a steam bath until all of the crystals are in solution. The benzene solution shall then be poured carefully, back into the acetone solution, the small beaker shall be washed thoroughly with about 5 ml of benzene, and this shall be added to the acetone mixture. The two solutions shall be heated a little to mix them thoroughly and then, while stirring, 200 ml of cool distilled water shall be added. The solution shall be titrated with 0.05N NaOH solution, using either methyl red or bromothymol blue as an indicator. A blank determination shall be made using the same amounts of the reagents. The percentage of acidity as acetic acid shall be calculated as follows:

$$\text{Percent acidity} = \frac{6.005\ (V-v)N}{W-(MW)}$$

Where:

V = ml NaOH used in titrating specimen.
v = ml NaOH used in blank.
N = normality of NaOH solution.
W = gm of specimen.
M = percent moisture in materials, expressed as a decimal (see 4.5.2)

4.5.5 Insoluble Particles. Determine the insoluble particles in accordance with Method 106.1 of MIL-STD-650.

4.5.6 Granulation. Determine the granulation in accordance with Method 204.1 of MIL-STD-650.

4.5.7 Bulk Density. Determine the bulk density in accordance with Method 201.1.1 of MIL-STD-650.

5. PREPARATION FOR DELIVERY

5.1 Packing

5.1.1 Level A.Unless otherwise specified, Composition A-3 and A-4 shall be packed in accordance with drawing 7548644.

5.1.2 Level C. Unless otherwise specified, Composition A-3 and A-4 shall be packed in accordance with drawing 7548645.

5.2 Marking. Marking shall be in accordance with drawing 7548644 or 7548645.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification.
b. Levels of protection required (see 5.1)
c. Composition required (see 1.2)
d. Bulk density required.
e. Acceptance and description sheets - Acceptance and description sheets shall be prepared for each lot in accordance with MIL-STD-1171.
f. Provisions of submission of first article samples (see 4.3)

6.2 Bulk Density

6.2.1 Army Procurement. Composition A-3 procured for Army use should have a minimum bulk density of 0.77 gm/cc.

6.2.2 Navy Procurement. Composition A-3 procured for Navy use should have a minimum bulk density of 0.81 gm/cc.

6.3 Prior approval of the Contracting Officer is required for use of equivalent test methods. A description of the proposed method should be submitted thru the Contracting Officer to: Commander, ATTN: SARPA-QA-A-P, Picatinny Arsenal, Dover, N.J., 07801. This description should include but not be limited to the procedures used, the accuracy and precision of the method, test data to demonstrate the accuracy and precision and drawings of any special equipment required.

6.4 *Intended Use.* Compositions A-3 and A-4 furnished under this specification are intended to be used as high energy explosive fillers in press loaded ammunition.

6.5 Equivalent Methods. The following methods submitted by Holston Defense Corp are considered equivalent methods:

6.5.1 RDX and Wax - Method No. C-36

6.5.2 Moisture Content. Analytical Standard No. I-7.

CUSTODIANS:
Army-PA
Navy-OS
Air Force-70

REVIEW ACTIVITIES:
Army-PA
Navy-OS
Air Force-70

PREPARING ACTIVITY:
Army-PA

Project Number: 1376-0110

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. 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. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

   ☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 68 WHICH MAY BE USED