MILITARY SPECIFICATION

RDX/ESTANE (PBX-0280) MOLDING POWDER (FOR USE IN AMMUNITION)

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

1. SCOPE

1.1 Scope.-This specification covers a high-energy solid explosive composed of RDX and a polyurethane resin which acts as a binder and desensitizer for the RDX (see 6.3).

1.2 Classification.-The RDX/Polyurethane molding powder shall be of the following types, as specified (see 6.1):

Type I - Coarse
Type II- Fine

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

MILITARY

MIL-R-398 - RDX
MIL-A-48078- Ammunition, Standard Quality Assurance Provisions, General Specification for

STANDARDS

MILITARY

MIL-STD-650 - Explosive: Sampling Inspection and Testing

FSC: 1376

DRAWINGS

U.S. ARMY

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

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

2.2 Other 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

ASTM Procedure E300 - 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 Materials.-The molding powder shall be a free-flowing off-white to light brown material in the form of small agglomerates consisting of grains of RDX (complying with Type II of MIL-R-398, three parts Class 7 to one part Class 5) surrounded and held together by a rubber-like binder (see 6.4).

3.2 Bulk density.-The bulk density of the molding powder shall be 0.75 grams (g) per cubic centimeter (cc), minimum, when determined as specified in 4.5.1.

3.3 Volatiles.-The moisture and other volatiles content of the molding powder shall be 0.10 percent, maximum, when determined as specified in 4.5.2.

3.4 Composition.-The composition of the molding powder shall be as specified in TABLE I, when determined as specified in applicable paragraphs of 4.5.3.

TABLE I

Constituent	Percent by Weight	Applicable Paragraphs
RDX	95.0 ± 0.5	4.5.3.1
Binder	5.0 ± 0.5	4.5.3.2

3.5 Vacuum Stability Test (120°C).-The volume of gas evolved from 5 grams of the molding powder heated at 120°C for 40 hours in the 120°C Vacuum Stability Test shall not exceed 0.8 milliliter, when determined as specified in 4.5.4.

3.6 Granulation.-The granulation of the applicable type of molding powder shall be as specified in TABLE II, when determined as specified in 4.5.5.

TABLE II

U.S. Standard Sieve No.	Cumulative Percent Retained	
	Type I	Type II
4	--	0
18	0	50 max.
30	--	95 min.
50	5 max.	-
60	98 min.	99 min.
80	99 min.	-

3.7 Workmanship.-The material shall be free from metal or wooden particles, paper and other foreign material.

3.8 First article testing.-The specification makes provisions for first article testing. Submission of first article quantity by the contractor shall be as specified in the contract (see 6.1).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection and Standard Quality Assurance.-Unless otherwise specified herein or in the contract, the provisions of MIL-A-48078 shall apply and are hereby made a part of this detail specification.

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.-Prior to initiation of regular production 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 two (2) pounds of molding powder obtained by sampling as described in 4.4.3. The samples shall be obtained from a production batch which has been produced by the contractor using the same production processes, procedures and equipment as will be used in fulfilling the contract. All materials shall be obtained from the same sources of supply as will be used in regular production.

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 4.4.2 and 4.5 of this specification.

4.3.3 Rejection.-See MIL-A-48078.

4.4 Quality Conformance Inspection

4.4.1 Inspection Lot Formation.-Inspection lots shall comply with the lot formation provisions of MIL-A-48078. For the material covered by this specification, a lot shall consist of one or more batches of molding powder produced by one manufacture in accordance with the same specification or same specification revision under one continuous set of operating conditions. Each batch shall consist of that quantity of molding powder that has been subjected to the same unit chemical or physical mixing process intended to make the final product homogeneous.

4.4.2 Examination.-Unless otherwise specified in the Classification of Defects and test tables, sampling plans for the major and minor defects shall be in accordance with MIL-STD-105, Inspection Level II (see MIL-A-48078, paragraph 4.4.2).

CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER 7548644, 7548645
4.4.2.1	Box, fiberboard or wooden				NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major B					
131.	Foreign matter		0.40%	-	Visual
132.	Liner pierced or torn		0.40%	-	Visual
133.	Liner improperly closed		0.40%	-	Visual
Minor					
201.	Type of liner incorrect		0.65%	-	Visual

NOTES:

SARPA-QA FORM 2567 FEB 74 4810

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-R-48878 (PA)

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.2	Closed boxes, wooden				7548644
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major B					
131.	Top improperly assembled		0.40%	-	Visual/Manual
132.	Box damaged		0.40%	-	Visual
133.	Lot number misleading or unidentifiable		0.40%	-	Visual
134.	Strapping missing, broken, or loose		0.40%	-	Visual/Manual
135.	Contents leaking from container		0.40%	-	Visual
Minor					
201.	Strapping improperly assembled		0.65%	-	Visual/Manual
202.	Marking misleading or unidentifiable		0.65%	-	Visual
203.	Nail protruding		0.65%	-	Visual
204.	Contents shift considerably when box is transported		0.65%	-	Visual

NOTES:

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-R-48878 (PA)

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.3	Sealed fiberboard box				7548645
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major B					
131.	Assembly torn or pierced		0.40%	-	Visual
132.	Lot number misleading or unidentifiable		0.40%	-	Visual
Minor					
201.	Stitches missing or loose		0.65%	-	Visual
202.	Marking misleading or unidentifiable		0.65%	-	Visual
203.	Banding strips missing, broken or improperly applied		0.65%	-	Visual/Manual
204.	Contents shift within the box		0.65%	-	Manual

NOTES:

SARPA-QA FORM 2567 FEB 74 4810

4.4.3 Sampling for test 4.5.1 through 4.5.5.-Approximately 500 grams of molding powder shall be selected from each batch to be sampled using ASTM Procedure E300 for solids. Samples shall be selected for inspection in accordance with MIL-STD-1235, CSP-1 Plan, AQL 6.5 percent using a batch as a unit of product. 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 last 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 percent inspection until "i" successive batches are accepted as required by MIL-STD-1235. The classification of defects shall be as given in Table III.

TABLE III
CLASSIFICATION OF DEFECTS

Category	Defect
Bulk Density	Major B
Volatiles	Major B
Composition	Major B
Vacuum Stability Test	Major B
Granulation	Major B

4.4.4 Inspection Equipment.-The government reserves the right to inspect the contractor's equipment and determine that he has available and utilizes correctly, measuring and test equipment of the required accuracy and precision and that the instruments are of the proper type and range to make measurements of the required accuracy. Commercial inspection equipment, shall be employed where applicable for all tests and examinations specified in 4.4 and 4.5. The contractor is responsible for assuring proper calibration procedures are followed. Government approval of all inspection equipment is required prior to its use for acceptance purposes (see 6.5).

4.5 Test Methods and Procedures (see 6.6)

4.5.1 Bulk density.-The bulk density of the molding powder shall be determined in accordance with Method 201.3 of the latest revision of MIL-STD-650.

4.5.2 Volatiles.-Transfer approximately 30 grams of the sample to a pre-dried accurately weighed 100 mm by 15 mm Petri dish and determine the weight of the dish and contents to the nearest milligram. Place the dish in a vacuum oven maintained at 100°C and heat under vacuum for two hours. Place the dish in a desiccator and let it cool to room temperature. Weigh the dish and determine the loss in weight(1). Calculate the volatiles content as follows:

$$\text{Percent volatiles} = \frac{A \times 100}{B}$$

Where:

A = loss in weight, in grams, to the nearest milligram
B = original weight of the sample, in grams, to the nearest milligram

(1) Save the dried sample for use in the composition determination

4.5.3 Composition

4.5.3.1 RDX Content

4.5.3.1.1 Reagent.-Prepare RDX-saturated chloroform by adding excess RDX to reagent grade chloroform; stirring the resultant slurry at least two hours at room temperature. The chloroform is stored over the excess RDX and filtered before use.

4.5.3.1.2 Procedure.-Place approximately 5 grams of dried sample, weighed to the nearest 0.1 mg, into a 250 ml beaker and add 150 ml of saturated chloroform. Stir for thirty minutes. Rinse down the wall of the beaker and stir for fifteen additional minutes. Remove stirrer, washing off any residue with 10 ml of saturated chloroform. Transfer the slurry into a tared medium porosity Gooch crucible which has been connected to a vacuum filtering flask. Carefully rinse any residue remaining in the beaker into the crucible, using three 5 ml portions of the saturated solvent. Wash the residue on crucible with three 20 ml portions of saturated chloroform. Remove the crucible from the filtering flask and wash all discernable residue from beneath the frit with unsaturated chloroform. Dry for one hour in a vacuum oven at 60 ± 2°C, then cool in a desiccator. Weigh the crucible and its contents and calculate the percentage of RDX as follows:

$$\% \text{ RDX} = \frac{100\ (A - B)}{W}$$

Where:

A = Weight of crucible and residue, in grams
B = Tare weight of crucible, in grams
W = Weight of sample, in grams

This analysis will be run in triplicate. The average of the three determinations will be reported as percent RDX.

4.5.3.2 Binder Content.-Subtract the value reported as percent RDX from 100 to obtain the percent binder.

4.5.4 Vacuum Stability Test.-The vacuum stability test at 120°C shall be determined in accordance with Method 503.1 of the latest revision of MIL-STD-650.

4.5.5 Granulation.-The granulation of the molding powder shall be determined in accordance with Method 204.1 of the latest revision of MIL-STD-650.

5. PREPARATION FOR DELIVERY

5.1 Packing

5.1.1 Level A.-Packing shall be in accordance with Drawing 7548644 as specified for PBX.

5.1.2 Level B and C.-Packing shall be in accordance with Drawing 7548645 as specified for PBX.

5.2 Marking.-Marking shall be in accordance with Drawings 7548644 and 7548645 as applicable.

6. NOTES

6.1 Ordering data.-Procurement documents shall specify the following:

a. Type required (see 1.2)
b. Title, number and date of this document.
c. Description sheets shall be prepared for each lot in accordance with MIL-STD-1171.
d. Provisions for submission of first article samples.

6.2 Inspection code numbers.-The five digit code numbers assigned to the inspection herein are to facilitate future data collection and analysis by the Government.

6.3 Intended use.-The material covered in this specification is intended to be used for application as an explosive where high energy and good thermal stability are needed in ammunition items.

6.4 A binder which has been found satisfactory for this composition is Estane 5703F1. This product is manufactured by the B. F. Goodrich Chemical Company. The material is a poly (ester-urethane) elastomer. Material to be used in the manufacture of this explosive shall conform to Los Alamos Scientific Laboratory Specification 13Y101031. Use of any other materials shall require prior approval of Picatinny Arsenal, ATTN: SARPA-QA-A-P.

6.5 Submission of Inspection Equipment Designs for Approval.- See MIL-A-48078. Submit equipment designs, as required, to Commander Picatinny Arsenal, ATTN: SARPA-QA-T, Dover, New Jersey 07801.

6.6 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, New Jersey 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.

Custodian:
Army-PA

Preparing Activity:
Army-PA

Project Number: 1376-A057.

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

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4. REMARKS

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