MIL-C-45010A (MU)
26 SEPTEMBER 1963
SUPERSEDING
MIL-C-45010 (ORD)
21 NOVEMBER 1957

MILITARY SPECIFICATION

COMPOSITION C-4

1. SCOPE

1.1 Scope. This specification covers three classes of composition C-4, a military plastic explosive.

1.2 Classification. Composition C-4 shall be of the following classes (see 6.1):

Class 1—with a plasticity of 0.030 units, maximum.
Class 2—with a plasticity of 0.080 units, maximum.
Class 3—with a plasticity of 0.018 units, minimum.

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-P-14536—Polyisobutylene Binder.

STANDARDS

MILITARY

MIL-STD-105 —Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-109 —Quality Assurance Terms and Definitions.
MIL-STD-650 —Explosive: Sampling Inspection and Testing.
MIL-STD-1235 —Single and Multilevel Continuous Sampling Procedures and Tables for Inspection by Attributes.

DRAWINGS

ORDNANCE CORPS

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

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

3. REQUIREMENTS

3.1 Material. RDX complying with the requirements of MIL-R-398 Type A or B, shall be thoroughly and uniformly incorporated with a binder complying with the requirements of MIL-P-14536 to form a homogeneous composition having a soft, putty-like consistency (see 6.2).

3.1.1 *Granulation (Applicable to Class 3 only).* The RDX content shall consist of a mixture of 3 parts coarse to 1 part fine RDX.

3.1.1.1 Coarse RDX shall meet the following requirements.

98 ± 2 percent through a number 20 U.S. standard sieve.
90 ± 10 percent through a number 50 U.S. standard sieve.

35 ± 5 percent through a number 100 U.S. standard sieve.
18 percent maximum through a number 200 U.S. standard sieve.

3.1.1.2 Fine RDX shall comply with Class E of specification MIL-R-398.

3.2 Moisture. The moisture content shall not exceed 0.25 percent when tested as specified in 4.3.

3.3 Composition. The proportion of RDX and binder which comprise composition C-4 shall be such that, when tested in accordance with 4.3.2 the composition shall be as follows:

Class 1 and 2	
RDX	91.0 ± 1.0 percent
Polyisobutylene	9.0 ± 1.0 percent
Class 3	
RDX	90.5 ± 0.7 percent
Polyisobutylene	9.5 ± 0.7 percent

3.4 Insoluble particles. No particles shall be retained on a No. 40 sieve, and not more than five particles shall be retained on a number 60 sieve from a 50 gram (gm) portion of the sample when tested as specified in 4.3.3.

3.5 Plasticity. The plasticity of Composition C-4 Class 1 shall be 0.030 unit maximum; Class 3 shall be 0.018 unit minimum. Class 2 shall be 0.080 unit maximum, when tested as specified in 4.3.4.

3.6 Specific gravity (applicable to Class 2 only) Composition C-4 shall have a specific gravity of 1.50 minimum, when pressed into shape of an M5A1 Demolition Block and tested as specified in 4.3.5. In the event that the manufacturer of the Composition C-4 also manufactures composition C-4 demolition blocks the specific gravity test may be waived, and performed on the demolition block.

4. QUALITY ASSURANCE PROVISIONS

4.1 General quality assurance provisions. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements. Reference shall be made to Standard MIL-STD-109 in order to define the terms used herein. Inspection shall be performed in accordance with this specification and other specifications referenced in any of the contractual documents.

4.1.1 *Contractor quality assurance system.* If the contractor desires to utilize a quality assurance system, which is at variance with the quality assurance provisions of 4.2 and 4.3 and other documents referenced herein, he shall submit a written description of the system to the contracting officer for approval prior to initiation of production. It shall include a description covering controls for lot formation and identification, inspection to be performed, inspection stations, sampling procedures, methods of inspection, (measuring and testing equipment,) and provisions for control and disposition of non-conforming material. The written description will be considered acceptable when, as a minimum, it provides the quality assurance provisions required by the provisions of 4.2 and 4.3 and the other documents referenced herein. The contractor shall not be restricted to the inspection station or the method of inspection listed in this specification provided that an equivalent control is included in the approved quality assurance procedure. In cases of dispute as to whether certain procedures of the contractor's system provide equal assurance, the comparable procedure of this specification shall apply. The contractor shall notify the Government of, and obtain approval for, any changes to the written procedure that effects the degree of assurance required by this specification or other documents referenced herein.

4.1.2 *Submission of product.* At the time the completed lot of product is submitted to

the Government for acceptance the contractor shall supply the following information accompanied by a certificate which attests that the information provided is correct and applicable to the product submitted:

(a) A statement that the lot complies with all quality assurance provisions of the approved current written description of the system.
(b) Quantity of product inspected.
(c) Results obtained for all inspection performed shall be made available upon request by the Resident Ordnance Inspection.
(d) Specification number and date, together with an identification and date of changes.
(e) Certificates of analysis on all material procured directly by the contractor when such material is controlled by Government specifications listed in any of the contractual documents shall be made available upon request by the Resident Ordnance Inspection.
(f) Quantity of product in the lot.
(g) Date submitted.

The certificate shall be signed by a responsible agent of the certifying organization. The initial certificate submitted shall be substantiated by evidence of the agent's authority to bind his principal. Substantiation of the agent's authority will not be required with subsequent certificates unless, during the course of the contract, this authority is vested in another agent of the certifying organization.

4.1.3 *Government verification.* Using the contractor's written quality assurance procedure (see 4.1.1), this specification, and other contractual documents as a guide, the Government inspector shall verify all quality assurance operations performed by the contractor. Verification shall be in accordance with a or b as applicable, the decision being the responsibility of the procuring activity. In either case, the inspector shall also ascertain, prior to acceptance, that all quality assurance provisions of other specifications referenced in any of the contractual documents have been complied with. Deviations from prescribed or agreed upon procedures discovered by the Government inspector shall be brought to the attention of the supplier. Disposition of the product and remedial action shall be as directed by the Government inspector and depending on the nature of the deviation, may consist of lot rejection, screening, re-sampling, re-instruction of the supplier's employees, or other appropriate action:

(a) Verification at the point of manufacture shall be accomplished at unscheduled intervals in accordance with 4.1.3.1 and 4.1.
(b) Verification at the point of delivery shall be in accordance with 4.1.

4.1.3.1 *Surveillance.* Surveillance shall include, but is not limited to:

(a) Observation of procedures concerning lot formation and identification.
(b) Observation of sampling procedures and application of acceptance criteria.
(c) Determination that all required examinations and tests are performed in accordance with the prescribed procedures of this specification, or approved equivalents thereto.
(d) Review of procedures for control and disposition of non-conforming material.

4.2 Inspection provisions

4.2.1 *Lot formation.* A lot shall consist of Composition C-4, produced by one manufacturer, 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 Composition C-4 that has been subjected to the same unit chemical or physical process intended to make the final product homogeneous.

4.2.2 *Examination.* Sampling plans and procedures for the following classifications of defects shall be in accordance with Standard MIL-STD-105. Continuous sampling plans

in accordance with Standard 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 0.25 percent for each major defect and an AQL of 0.40 percent for each minor defect.

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

Categories	Defects	Method of inspection	Code No. (see 6.4)
Critical: None defined.			
Major:	AQL 0.40 percent		
101. Liner pierced or torn		Visual	01001
102. Liner improperly closed		Visual	01002
103. Foreign matter		Visual	01003
Minor: None defined.			

4.2.2.2 Sealed wooden box (see dwg. 7548644).

Categories	Defects	Method of inspection	Code No.
Critical: None defined.			
Major:	AQL 0.40 percent		
101. Box damaged		Visual	02001
102. Top improperly assembled		Visual	02002
103. Strapping broken or loose		Visual-Manual	02003
Minor:	AQL 1.50 percent		
201. Nail protruding		Visual	02004
202. Marking misleading or unidentifiable		Visual	02005
203. Strapping improperly assembled		Visual-Manual	02006

4.2.2.3 Sealed fiberboard carton (see dwg. 7548645).

Categories	Defects	Method of inspection	Code No.
Critical: None defined.			
Major:	AQL 0.40 percent		
101. Assembly torn or pierced		Visual	03001
102. DOD symbol misleading or unidentifiable		Visual	03002
103. Strapping broken or loose		Visual-Manual	03003
Minor:	AQL 0.40 percent		
201. Marking misleading or unidentifiable		Visual	03004

4.2.3 *Testing.* Samples shall be selected from each lot of Composition C-4 in such number and amount as to assure that the samples shall be representative of the lot. If the sample fails to comply with any of the requirements specified herein, the lot shall be rejected. The test shall be performed as specified in 4.3.

4.3 Test methods and procedures.

4.3.1 *Moisture.* The moisture content shall be determined in accordance with Standard MIL-STD-650 method 101.4.

4.3.2 Determination of composition.

4.3.2.1 RDX content (Code No. 04001).

4.3.2.1.1 *Titration method (non-aqueous).* An accurately weighed portion of approximately 1.5 gm. of the sample shall be added to a 50 milliliter (ml.) beaker. Twenty-five ml. of carbon tetrachloride shall be added and the beaker and contents transferred to a hot plate. The contents shall be swirled until all of the binder is dissolved as evidenced by the RDX crystals being separated. The beaker and contents shall be removed from the hot plate and cooled to room temperature. A fine porosity filter stick and suction shall be used to remove all of the carbon tetrachloride.

Fifty ml. of dimethylformamide shall be added to the beaker and the mixture stirred until all of the RDX is dissolved. The solution shall be transferred quantitatively to a 100 ml. volumetric flask and make up to volume with dimethylformamide. (A blank shall be run with dimethylformamide so that the blank is exposed to the air approximately the same amount of time as the sample.) Twenty ml. aliquots shall be withdrawn by pipette and transferred to a 100 ml. tall form beaker containing 5 drops of azoviolet indicator solution and a magnetic stirrer. The beaker shall be covered with a glass cover containing a hole in the center to admit a buret tip and titrated with 0.1 normal sodium methoxide solution to a green endpoint which persist for 30 seconds. The magnetic stirrer shall be employed in the course of this titration. The titration procedure shall be repeated for the blank. The percentage of RDX in the sample shall be calculated as follows:

$$\text{Percentage of RDX} = \frac{(A-B)\ (7.40)\ (N)}{W}$$

where:

A = volume of sodium methoxide used for the sample.
B = volume of sodium methoxide used for the blank.
N = normality of the sodium methoxide.
W = weight of the sample on a moisture free basis represented by the aliquot taken.

4.3.2.1.2 *Gravimetric method.* An accurately weighed portion of approximately 2 gm. shall be transferred to 100 ml. beaker. Approximately 35 ml. of carbon tetrachloride saturated with RDX shall be added to the beaker. The beaker and contents shall be heated on a steam-heated hot plate. The beaker shall be covered and the contents stirred occasionally until the binder has gone into solution as evidenced by the RDX content being separated (approximately 30 minutes). The beaker and contents shall be removed from the steam hot plate and cooled to room temperature. The contents shall be filtered using medium porosity glass crucible. The contents of the beaker shall be quantitatively transferred to the beaker and washed with three 10 ml. portions of carbon tetrachloride saturated with RDX. The residue shall be aspirated until the carbon tetrachloride has been completely removed. The crucible and contents shall be dried in steam oven maintained at 100 to 105 degrees Centigrade for one hour. The crucible shall be cooled in a desiccator and weighed. The percent RDX shall be calculated as follows:

$$\text{Percent RDX} = \frac{(A-B)\ 100}{W(1-M)}$$

where:

A = Weight of crucible and residue.
B = Tared weight of crucible.
M = Percent moisture expressed as a decimal.
W = Weight of sample.

4.3.3 *Determination of insoluble particles.* A weighed portion of approximately 50 gms. of the sample shall be placed in a 600 ml. beaker. A 400 ml. aliquot of petroleum ether shall be added and the sample heated on a steam bath until all lumps are broken down and all soluble material is dissolved. The solution shall be decanted through a small number 40 U.S. Standard sieve placed on a number 60 U.S. Standard sieve. The insoluble material shall be retained in the beaker. Acetone shall be added to the beaker and the beaker and contents warmed on a steam bath to dissolve the insoluble matter. This mixture shall be poured through the nest of sieves making sure all insoluble matter is transferred to the sieves. Any residue left on the sieve shall be washed with acetone. The sieves dried on a closed steam bath, and the particles of residue counted (Code No. 06001).

4.3.4 *Plasticity.* The plasticity shall be determined in accordance with Standard MIL-STD-650 method 211.2 (Code No. 07001).

4.3.5 *Specific gravity.*

4.3.5.1 *Apparatus.*

4.3.5.1.1 *Molds.* Any suitable mold may be used which will permit 2.50 ± 0.5 pounds of Composition C-4 to be pressed with a 5 ton load to form a block approximately 2 inches thick and the area of Composition C-4 supporting the load to be 22 square inches (see 6.6).

4.3.5.2 *Preparation for determination of specific gravity.* The mold, except for top cover, shall be assembled and a sheet of 5 to 10 mils thick cellophane or wax paper, cut to size, placed on the inside of the assembled mold. A weighed charge of 2.50 ± 0.5 pounds of Composition C-4 shall be placed in the mold and manually distributed uniformly in the mold. The ends of the cellophane or wax paper shall be folded over the charge. The top cover of the mold shall be placed over the charge. The loaded assembly shall be transferred to a hydraulic press (see 6.5) and the charge pressed using a load of five tons. A five-second dwell shall be used, the press retracted and the pressing operation repeated. The block shall be removed from the mold and the cellophane or wax paper shall be carefully removed from the pressed block. Any excess explosive shall be trimmed from the edges of the block. The block shall be stored at 25 ± 2 degree Centigrade for 15 minutes on a flat surface.

4.3.5.3 *Determination of specific gravity.* The block shall be weighed to the nearest .01 pound. A suitable container provided with an overflow pipe approximately one-half inch in length, shall be filled level with the overflow pipe with water at a temperature of 25 ± 5 degrees Centigrade. A suitable stopper shall be inserted in the overflow pipe. The block shall be placed carefully in the container so that it is completely submerged, care being taken to remove all air bubbles remaining on the surface of the block. A tared container shall be placed under the overflow pipe, the stopper carefully removed from the pipe, the water which overflows collected and weighed to the nearest .01 pound. The specific gravity shall be calculated as follows (Code No. 08001):

$$\text{Specific Gravity} = \frac{A}{B}$$

where:

A = weight of block.
B = weight of water displaced.

5. PREPARATION FOR DELIVERY

5.1 Packing (See 6.1).

5.1.1 *Level* A. Composition C-4 shall be packed and marked in accordance with dwg. 7548644.

5.1.2 *Level B.* Composition C-4 shall be packed and marked in accordance with dwg. 7548645.

5.1.3 *Level C.* Composition C-4 shall be packed and marked in accordance with dwg. 7548645.

6. NOTES

6.1 Intended use. Class 1 is intended for use in military demolition explosive. Class 2 is intended for pressing into M5A1 block. Class 3 is intended for use as extrudable explosive.

6.2 Composition C-4. Class 1, consisting of 61 percent RDX type A or B, Class A or B, 30 percent RDX type A or B, Class E, and 9 percent Polyisobutylene Binder has been found satisfactory. Composition C-r Class 2 consisting of 91 percent RDX type A or B, Class H, and 9 percent polyisobutylene, has been found satisfactory.

6.3 Ordering data. Procurement document should specify the following:

(a) Title, number and date of this specification.
(b) Class required.
(c) Packing required (see 5.1).

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

6.5 An 8 ton Denison hydraulic press has been found satisfactory.

6.6 When Composition C-4 is used to make demolition blocks at the manufacturing explosive works, the block prepared as specified in 4.3.5 may be wiped free of moisture, broken into small sections and included as bulk explosive in the production line for the blocks.

curement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:
Army—MU
Project Number 1375-A630

Preparing activity:
Army—MU

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 22-R255

INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.

SPECIFICATION

ORGANIZATION

CITY AND STATE

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO *(If "yes", in what way?)*

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

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

DATE

DD FORM 1 JAN 66 1426

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.

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