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SUPERSEDING
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MILITARY SPECIFICATION

COATING COMPOUND, BITUMINOUS SOLVENT TYPE, BLACK (FOR AMMUNITION)

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

1. SCOPE

*1.1 Scope. This specification covers an asphalt compound for coating the surfaces of ammunition cavities prior to filling with explosives. It provides for an additional composition of material suitable for use under air pollution regulation. (See 6.1 and 6.4.)

*1.2 Classification. The coating covered by this specification shall be of the following compositions and types, as specified (see 6.2).

Composition G - General use (all types)
- Type I - Low solids (for spray application)
- Type II - Medium solids (for spray or brush application)
- Type III - Heavy paste

Composition L - Limited use (all types)

*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

Federal

TT-N-95	Naphtha, Aliphatic
TT-P-143	Paint, Varnish, Lacquer, and Related Materials, Packaging, Packing and Marking of

STANDARDS

Federal

FED-STD-141	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling, and Testing

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-286	Propellants, Solid: Sampling, Examination and Testing

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

American Society for Testing and Materials

ASTM D 217	Test for Cone Penetration of Lubricating Grease

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa., 19103.)

3. REQUIREMENTS

*3.1 Qualification. The coating compound furnished under this specification shall be a product which is qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3). A change in formulation shall require requalification of the product.

3.2 Color. The color shall be black at a dry film thickness producing complete hiding and varying shades of brown in thinner film.

*3.3 Composition. The coating compound shall consist of one or more grades of natural or petroleum asphalts in a solvent and shall contain no drying oils, resins, or pigments.

*3.3.1 Solvent.

*3.3.1.1 Composition G. The solvent used in the formulation of the coating compound shall be a low boiling, fast evaporating aliphatic naptha conforming to TT-N-95.

3.3.1.2 Composition L. The solvent used in the formulation of the coating compound shall be the same as 3.3.1.1 except that it shall conform to the requirements of table I when tested as specified in 4.5.18.

Table I

CLASS L SOLVENT REQUIREMENTS

Material[1]	Maximum allowable percent by volume
(a) Solvents (hydrocarbons, alcohols, etc.) having an olefinic or cyclo-olefinic type of unsaturation	Negative test (less than 1%)
(b) A combination of any aromatic hydrocarbons having eight or more carbon atoms per molecule (except ethylbenzene)	8
(c) Ethylbenzene and toluene	20
(d) Total (b) and (c) above	20

[1]The test (a) for olefinic and cycloolefinic compounds will be negative for solvents containing less than 1% of these compounds.

3.4 Quantitative requirements. The coating compound shall conform to the quantitative requirements of table II when tested as specified in 4.5.

3.5 Qualitative requirements.

3.5.1 Storage properties. When tested as specified in 4.5.10, the coating compound shall show no livering, thickening, or settling.

3.5.2 Dilution stability (type II only). When tested as specified in 4.5.11, the coating compound shall remain stable and show no evidence of precipitation.

Table II

QUANTITATIVE REQUIREMENTS

Requirements	Minimum	Maximum
Total solids, percent by weight of compound:		
Type I	36	40
Type II	45	55
Type III	79	85
Water, percent by weight of compound	-	0.5
Mineral matter, percent by weight of compound	-	1.0
Manganese, percent by weight of compound	-	0.05
Lead, percent by weight of compound	-	0.02
Insoluble in CS_2, percent by weight of compound	-	0.5
Acidity (as H_2SO_4), percent by weight of compound	-	0.01
Alkalinity (as NaOH), percent by weight of compound	-	0.01
Viscosity:		
Type I - No. 4 Ford cup, seconds	15	28
Type II - No. 4 Ford cup, seconds	120	190
Type III - Penetration test value (see 4.5.8)	150	250
Drying time:		
Dust free		
Type I, minutes	-	5
Type II, minutes	-	5
Type III, hours	-	8
Free from after-tack		
Type I, hours	-	0.5
Type II, hours	-	1
Type III, hours	-	24

3.5.3 Brushing properties (type II only). The coating compound as packaged shall be capable of being brushed out to a smooth film, free from discontinuities or other defects when tested as specified in 4.5.12.

3.5.4 Spraying properties, appearance when dry (types I and II only). When tested as specified in 4.5.13, the coating compound shall have satisfactory spraying properties in every respect. The dry film shall present a smooth, glossy appearance, free from irregularities and rough particles.

3.5.5 Water resistance. A film of the coating compound prepared and tested as specified in 4.5.14 shall withstand immersion in distilled water without blistering, whitening, softening, or no more than a slight dulling.

3.5.6 Acid resistance. A film of coating compound prepared and tested as specified in 4.5.15 shall withstand the action of picric, sulfuric, nitric, and hydrochloric acids without disintegration, browning, or dulling. There shall be no etching of the metal underneath the coating compound.

3.5.7 Heat resistance. A film of coating compound prepared and tested as specified in 4.5.16 shall not sag or flow.

3.5.8 Flexibility. A film of coating compound prepared and tested as specified in 4.5.17 shall be tough and elastic and shall withstand bending without cracking or flaking.

*3.5.9 Reactivity. When subjected to the vacuum stability test as specified in 4.5.19, the reactivity of the compound with the following explosives shall not exceed 3.0 milliliters of gas over and above that generated by the controls:

(a) Baratol 67/33

(b) Composition A-3

(c) Composition B - type explosive (1)
Either Composition B-4, Composition B, or cyclotol

(d) Composition C-4

(e) Octol

(f) TNT or Tritonal (1)

(g) HBX-type explosive (1)
Either HBX-1, HBX-3, or H-6

(h) Minol-2.

3.5.10 Ignition. When tested as specified in 4.5.20, mixtures of the dried compound and the explosives listed in table III shall give ignition temperatures for consecutive tests at or above those shown.

Table III

IGNITION TEMPERATURE

Explosives	Minimum
Composition B	175° C
TNT	200° C
Composition A-3	190° C

*3.5.11 Workmanship. The asphaltic compound ingredients shall be processed in a manner that will produce the high quality material necessary to meet the requirements of this specification. The finished product shall be homogeneous and free from a foam-like texture on its surface or other defects that could adversely affect its intended use.

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.

*4.2 Classification of inspection. The inspection of the coating compound shall be classified as follows:

(a) Qualification inspection (see 4.3)
(b) Quality conformance inspection (see 4.4).

*4.3 Qualification inspection. The qualification inspection shall consist of a review for approval of the submitted manufacturer's reports and subjecting the qualification sample (4.3.1) to examination and testing to determine conformance to the requirements of this specification.

*4.3.1 Qualification samples. A test report from the manufacturer or a commercial laboratory showing the formula number of the compound, formulation and composition of the coating compound including the identification of ingredient samples by specific chemical name in addition to trade name, and laboratory data showing complete test results required by this specification except reactivity and ignition shall be forwarded to the activity responsible for the Qualified Products List before qualification samples are supplied (see 6.3). The qualification samples shall consist of four 1-quart samples of the compound, selected as required in accordance with methods 1011, 1021, and 1031 of FED-STD-141. The samples shall be forwarded to the Commanding Officer, Naval Ordnance Station, Indian Head, Md., 20640, Attention: Chemical Analysis Branch. Each sample submitted shall be plainly identified by securely attached durable tags marked with the following information:

(a) Sample for qualification inspection

(b) COATING COMPOUND, BITUMINOUS SOLVENT TYPE, BLACK (FOR AMMUNITION)

(c) Name and address of manufacturer

(d) Location and identification of the plant which produced the samples

(e) Manufacturer's identification

(f) Date of manufacture

(g) Submitted by (name) (date) for qualification inspection in accordance with the requirements of MIL-C-450C under authorization of (reference authorizing letter) (see 6.3).

*4.3.2 Retention of qualification. The supplier shall retain test data accumulated from performance of quality conformance inspections. Data collected during a 12-month interval shall be forwarded to the Naval Ordnance Station, Indian Head, at the end of each 12-month interval. The purpose of the collection and submittal of test data is to show continuing conformance of the product with the requirements of this specification. Failure to submit this periodic feedback of test data shall result in loss of qualification for that product. In addition, the supplier shall immediately notify the qualifying activity, the Naval Ordnance Station, Indian Head, Md., 20640, when his product no longer meets the qualification requirements of this specification or when production of the suppliers product has been terminated.

*4.4 Quality conformance inspection. For each inspection lot of material submitted for acceptance, quality conformance inspection shall consist of all the examinations and tests required in 4.5 except reactivity (4.5.19) and ignition (4.5.20). Failure of a test sample to comply with any of the requirements of this specification shall result in the rejection of the lot of material represented.

*4.4.1 Inspection lot. An inspection lot shall consist of the coating compound produced by one manufacturer, at one plant, from the same materials, and under essentially the same manufacturing conditions provided the operation is continuous. In the event the process is a batch operation, each batch shall constitute a lot (see 6.5).

*4.4.2 Sampling.

*4.4.2.1 For examination of preparation for delivery. Sampling for examination of preparation for delivery shall be conducted in accordance with MIL-STD-105.

*4.4.2.2 For tests. A 10-pound sample shall be taken at random from each lot in accordance with method 1021 of FED-STD-141.

4.4.3 Inspection procedure.

*4.4.3.1 For tests. The method of withdrawal and preparation of test samples shall be in accordance with method 1021 of FED-STD-141. Failure of any test sample to meet any test requirement shall be cause for rejection of the lot represented. Containers which have samples removed shall be shipped as part of the lot if the lot is accepted.

*4.4.3.2 For examination of preparation for delivery. Using the sample of filled containers selected in 4.4.2.2, adjust the sample to conform to MIL-STD-105, inspection level I, acceptable quality level 2.5 percent defective. Each filled and closed shipping container in the adjusted sample shall be a unit of sample. Sample containers shall be examined for compliance with all requirements of this specification in regard to contents, closure, damaged or leaking container, improper container, and marking.

*4.4.3.3 Examination of product. The coating compound shall be examined for conformance to the requirements of this specification with respect to color and workmanship.

4.5 Test methods.

4.5.1 Test conditions. The routine and referee testing conditions shall be in accordance with section 7 of FED-STD-141, except as otherwise specified herein.

4.5.2 The following tests shall be conducted in accordance with FED-STD-141 and as hereinafter specified (see Table IV).

4.5.3 Mineral matter. Transfer approximately 25 grams of the compound to a tared crucible; weigh accurately to 1 milligram. Evaporate the low boiling solvent on a hot plate and under a hood. Transfer the crucible with the viscous solid to a muffle furnace, and gradually ignite to a dull red heat in order to avoid spattering until the residue is free from carbon. Cool in a desiccator and weigh. From the weight of the residue in the crucible and the weight of the sample taken, calculate the percentage of mineral matter. Reserve the residue for manganese determination.

Table IV

INDEX

	Applicable method in FED-STD-141	Paragraph of this specification giving further references	Paragraph of this specification giving requirements
Total solids	4041	-	Table II
Water	4081	-	Table II
Mineral matter	-	4.5.3	Table II
Manganese	-	4.5.4	Table II
Lead	-	4.5.5	Table II
Insoluble matter	-	4.5.6	Table II
Acidity or alkalinity	-	4.5.7	Table II
Viscosity:			
Ford cup	4282	-	Table II
Penetration	-	4.5.8	Table II
Drying time	-	4.5.9	
Dust-free	4061	4.5.9.1	Table II
Free from after-tack	4061	4.5.9.2	Table II
Storage properties	-	4.5.10	3.5.1
Dilution stability	4203	4.5.11	3.5.2
Brushing properties	-	4.5.12	3.5.3
Spraying properties	4331	4.5.13	3.5.4
Water resistance	6011	4.5.14	3.5.5
Acid resistance	6081	4.5.15	3.5.6
Heat resistance	6051	4.5.16	3.5.7
Flexibility	6221	4.5.17	3.5.8
*Nonphotochemically reactive solvent	-	4.5.18	3.3.1.2
Reactivity	-	4.5.19	3.5.9
Ignition	-	4.5.20	3.5.10

4.5.4 Manganese. Dissolve the ash obtained from 4.5.3 in 10 milliliters (ml) of concentrated nitric acid and filter if necessary. Dilute to 100 ml with distilled water and transfer a 20-ml aliquot of the solution to a 250-ml beaker. Add 1 gram of lead peroxide and boil. Note if manganese is present by the development of a red coloration in the solution. If the presence of manganese is indicated, filter through asbestos and titrate the clean filtrate with N/10 oxalic acid until the red coloration disappears. Calculate the percentage of manganese in the sample as follows:

$$\text{Percentage of manganese} = \frac{5.495VN}{W}$$

where

V = milliliters of N/10 oxalic acid used
N = normality of oxalic acid
W = weight of sample in 4.5.3.

4.5.5 Lead. Transfer the remaining 80 ml portion of the solution obtained as described in 4.5.4 to a beaker and evaporate to 5 ml. Make the solution slightly alkaline with ammonium hydroxide. Acidify with acetic acid and add an excess. Bring to the boiling point and add 10 to 15 ml of a 10-percent solution of sodium or potassium dichromate. Boil the solution and allow to stand for 16 hours. Note if lead is present as indicated by a yellow precipitate. If lead is present, filter the solution through a tared Gooch crucible (or equivalent) and wash the precipitate with water and alcohol. Dry the crucible and contents at approximately 110° C (230° F) for 1 hour, cool, and weigh. Calculate the increase in weight of the crucible as lead in the sample as follows:

$$\text{Percent lead} = \frac{80.1A}{W}$$

where

A = weight of residue, grams
W = weight of original sample, grams.

4.5.6 Insoluble matter (in CS_2). Weigh accurately about 2 grams of the sample into a 150-ml beaker. Evaporate the volatile solvent on a steam bath. Add 50 ml of carbon disulfide and agitate until solids are broken up and all lumps disappear. Cover and set aside for 15 minutes. Filter through a tared Gooch crucible. Wash down the sides of the beaker and the Gooch crucible with a small portion of carbon disulfide until the filtrate is clear. Draw air through the Gooch crucible for about 10 minutes to remove the carbon disulfide. Dry the crucible and contents for about 20 minutes in an oven at 105° to 110° C. Cool and weigh. Calculate the percentage of matter insoluble in carbon disulfide as follows:

$$\text{Percentage of insoluble matter} = \frac{A \times 100}{W}$$

where

A = weight of residue
W = weight of sample.

4.5.7 Acidity or alkalinity. Shake 10 grams of the sample with 100 ml of distilled water for 5 minutes. Filter and titrate the filtrate with N/100 H_2SO_4 or N/100 NaOH as necessary, using phenolphthalein as an indicator. A blank shall be run on an equal volume of the water used.

4.5.8 Penetration (type III only). Determine the penetration test value of type III coating compound using the penetrometer and the penetrometer cone as described in ASTM D 217 with plunger assembly (total moving weight) weighing 150 grams. Take precautions in carrying out the following procedure to eliminate, as far as possible, error due to the volatilization of solvent and inclusion of air bubbles. Fill a cylindrical container, at least 3 inches in diameter, with the sample to a depth of at least 3 inches. Bring the sample to 77° ± 1° F and level the exposed surface. Level the penetrometer. Place the container on the penetrometer table so that the approximate center of the exposed surface lies beneath the tip of the cone. Adjust the height of the penetrometer table and plunger assembly until the tip of the cone just touches the surface of the sample. Release the plunger assembly and allow to remain free for 5 seconds. Calculate the penetration test value (depth of penetration expressed in tenths of millimeter). Raise the plunger assembly, level the exposed surface of the sample, and repeat the test as directed above. Report the average of 10 tests if the mean deviation of the first 5 values exceeds 3 percent.

4.5.9 Drying time. Determine drying time under referee conditions as specified in method 4061 using the film applicator specified in table V.

Table V

FILM APPLICATOR

Type	Film applicator (in.)	Gap clearance (in.)
I	0.0030	0.0060
II	0.0020	0.0040
III	To produce a 0.015-inch wet film thickness	

4.5.9.1 Dust-free. Determine dust-free time in accordance with paragraph 3.3, method 4061 and observe for compliance with table II.

4.5.9.2 Free from after-tack. Determine free-from-after-tack time in accordance with paragraph 3.7 of method 4061 and observe for compliance with table II.

4.5.10 Storage properties. Put approximately 4 ounces of the coating compound as packaged into an 8-ounce bottle. Stopper and allow to stand 24 hours at room temperature. Observe for compliance with 3.5.1.

4.5.11 Dilution stability (type II only). Reduce one part of the package material with one part of thinner conforming to TT-N-95 and observe for compliance with 3.5.2.

4.5.12 Brushing properties (type II only). Using a 1-1/2-inch brush, apply the packaged material quickly on a solvent-cleaned, 4- by 12-inch steel panel and observe for compliance with 3.5.3.

4.5.13 Spraying properties, appearance when dry (types I and II only). Spray the type I material as packaged. Reduce two volumes of the type II material with a maximum of one volume of thinner conforming to TT-N-95 and spray. Observe for compliance with 3.5.4.

4.5.14 Water resistance. Using a film applicator that will deposit a dry film thickness between 0.0009 and 0.0011 inch, draw down a 2-inch-wide film of the coating compound on a 3- by 5-inch steel panel that has been solvent cleaned with the petroleum napthaethylene glycol monoethyl ether mixture in accordance with method 2011. Air dry for 24 hours at 23° ± 1° C, coat all exposed metal surfaces with wax or other suitable coating and immerse for 18 hours in distilled water at 23° ± 1° C in accordance with method 6011. At the end of the test period, remove the panel and inspect for compliance with 3.5.5.

4.5.15 Acid resistance. Prepare 4 steel panels as in 4.5.14. Saturated picric acid, sulfuric acid (specific gravity, 1.30), nitric acid (specific gravity, 1.22), and hydrochloric acid (specific gravity, 1.09) shall be applied to the panels as in method 6081. Place 3 or 4 drops of acid on the test coating and cover with a watch glass approximately 1.5 inches in diameter. The watch glass shall be at least one-quarter inch from the coating edge. At the end of 6 hours rinse the acid from the panel and inspect for compliance with 3.5.6. Remove the coating compound from the panel and check for etching of the metal.

4.5.16 Heat resistance. Mask off half of a 3- by 5-inch steel panel and spray the coating compound on the uncovered portion to a dry film thickness between 0.0009 and 0.0011 inch. (Type II and type III compounds should be thinned with low boiling, fast evaporating petroleum naphtha to a suitable spraying viscosity.) Air dry for 24 hours at 23° ± 1° C, remove the masking tape and heat in an oven at approximately 100° C in a vertical position. The coated end of the panel shall be uppermost with the dividing line horizontal. At the end of 1 hour remove from the oven and examine for compliance with 3.5.7.

4.5.17 Flexibility. Determine flexibility in accordance with method 6221. Using a film applicator that will deposit a dry film thickness of 0.0009 to 0.0011 inch, draw down a 2-inch-wide film of coating compound on a flat tin plate cleaned with the petroleum napthaethylene glycol monoethyl ether mixture in accordance with method 2012. Air dry for 24 hours under referee conditions, bend over a 1/8-inch mandrel and examine for compliance with 3.5.8.

*4.5.18 Solvent analysis for Composition L coating compound.

4.5.18.1 Separation of volatile portion. Pour about 15 grams of coating material into a large test tube (22 x 175 millimeter (mm)). Add 10 ml of tricresyl phosphate and several antibumping stones or Berl saddles. Fit a 2-hole rubber stopper into the mouth of the test tube to accommodate a stopcock and a glass delivery tube (5-mm diameter) which is attached to another test tube (20 mm x 150 mm) to serve as receiver. The latter tube should have a side arm for attaching a vacuum pump. The glass delivery tube should reach 1 inch from the bottom of the receiver tube. Immerse the receiver in a dry ice-acetone bath. Preheat a silicone oil bath to 160° C. Raise the oil bath until the oil reaches the sample level. Reduce the pressure slowly to 10 mm of mercury. After all the solvent has distilled, carefully release the vacuum using the stopcock that is connected to the sample tube. Reserve the collected distillate for the aromatic solvent determination and qualitative test for olefinic compounds.

*4.5.18.2 Determination of aromatic hydrocarbons[1].

Apparatus: A gas chromatograph equipped with a thermal conductivity detector.

Chromatographic column: Pack 18 feet of 1/2-inch copper tubing with 35 percent by weight of N,N-bis(2-cyanoethyl) formamide on 60- to 80-mesh Chromosorb P. Resieve the packings before preparing the column. The column may be prepared in two 9-foot sections and joined together, if preferred.

Operating conditions:

Detector cell temperature, °C	300
Detector cell current, ma	150
Injection port temperature, °C	300

[1] If solvent conforms to TT-N-95a, toluene, ethyl benzene, and the xylene will be the only aromatic solvents present. Extraneous peaks emerging after benzene, which do not coincide with the above mentioned aromatics, are to be grouped together and calculated as C_8 and higher aromatic solvents. This would include any oxygenated solvents that may be present.

Helium flow at exit, cc/minute	110
Column temperature, °C	100

Procedure: Add 0.5 ml of internal standard (benzene) to 5 ml of the distillate and mix thoroughly. Inject about 3 microliters and chromatograph, observing the operating conditions listed above. Calculate the percent of aromatics as follows:

$$\text{percent toluene, v/v} = \frac{(\text{area of toluene peak})\ (1.017)\ *\ (10)\ **}{(\text{area of benzene peak})}$$

$$\text{percent ethylbenzene, v/v} = \frac{(\text{area of ethylbenzene peak})\ (1.054)\ *\ (10)\ **}{(\text{area of benzene peak})}$$

$$\text{percent } C_8 \text{ aromatics except ethylbenzene, v/v} = \frac{(\text{area of xylene isomer peaks})\ (1.04)\ *\ (10)\ **}{(\text{area of benzene peak})}$$

where

* is the correction factor for the detector response
** is the percentage of internal standard added.

*4.5.18.3 Tests for olefinic and cyclo-olefinic compounds. Take two test tubes and place 2 drops of the distillate in each. Dissolve the first sample in 1 ml of carbon tetrachloride and add 1 drop of 1 percent bromine in carbon tetrachloride. Shake and allow to set for 5 minutes. A positive test is indicated by the complete absence of yellow color when observed against a white background. Dissolve the second sample in 1 ml of acetone and add 1 drop of 1 percent permanganate solution (1 gram of potassium permanganate crystals in 95 ml of acetone and 5 ml of water). Shake and allow to set for 2 minutes. A positive test is indicated by the decolorization of the purple solution. The solvent is considered to fail the test for olefinic and cyclo-olefinic compounds if either of the above tests is positive (see 3.3.1.2 and 6.6).

4.5.19 Reactivity. Determine the reactivity of the compound in contact with the explosives listed in 3.5.9 using the vacuum stability test. Prepare the samples as specified in 4.5.19.1.

4.5.19.1 Preparation of samples. Pour on glass plates a sufficient amount of coating compound to provide 2.5(N + 2) grams of dried film (where N equals the number of explosives involved). Air dry the films under ambient conditions for 48 hours, then peel off with a sharp edged tool in strips approximately 1/2-inch wide. Suspend the strips on glass rods in an oven or cabinet with circulating air at 30° C (86° F), for another 48 hours. The strips are then removed

and cut into approximately 1/4-inch squares. (If an air circulating oven is not available, it will be satisfactory to place the suspended strips before a fan in a warm room for 48 hours. It is important that the room in which this operation is conducted is free from acid, alkaline, or other contaminating fumes.) Reduce the explosive materials to 12 mesh or finer by remote grinding or rasping, and dry for at least 24 hours in a desiccator over a desiccating agent. Keep both the coating film and the ground explosives dry in stoppered containers until ready for testing.

4.5.19.2 Calibration of apparatus. Calibrate the necessary number of vacuum stability test assemblies in accordance with figure 1, method 403.1.2 of MIL-STD-286.

4.5.19.3 Testing procedure. Use 2N + 1 (where N equals the number of explosives used) tubes similar to the heating tube portion of the apparatus shown in figure 1, method 403.1.2 of MIL-STD-286. For controls add 2.5 grams of the dried compound to each of two tubes and 2.5 grams of each explosive to additional individual tubes. Place uniform mixtures of 2.5:2.5 grams of the coating compound and each of the explosives specified in the test in single separate tubes. Uniform distribution or mixing is obtained by carefully layering alternate portions of the dried coating with the explosive. After the addition of each portion lightly tamp the mixture with a glass or metal rod to insure intimate contact of the materials. After all the samples have been prepared, connect the respective heating tubes with the capillary tubes as prescribed, and conduct the vacuum stability test according to method 403.1.2 of MIL-STD-286 at 100° ± 0.5° C (212° ± 1° F) for 48 hours. Make all readings at room temperature with the samples removed from the bath. Correct the readings of both the controls and the test samples to standard conditions of temperature and pressure, and check for compliance with 3.5.9.

4.5.19.4 Calculation of reactivity. Calculate the reactivity of each of the explosive materials with the coating compound for compliance with 3.5.9 as follows:

$$\text{Reactivity in milliliters gas} = X - (Y + Z)$$

where

X = milliliters of gas produced by the mixture of explosive material and coating compound

Y = milliliters of gas produced by the explosive material alone

Z = milliliters of gas produced by the coating compound alone.

*4.5.20 Minimum ignition temperature. Determine the ignition temperature in duplicate for mixtures of dried coating compound and the explosives listed in 3.5.9.

*4.5.20.1 Testing procedure. Mix 0.25 gram of the explosive to be tested with 0.25 gram of the dried film of the coating compound in a glass heat test tube. Heat the test tube containing the mixture at a rate of 5° to 10° C per minute in a wood's metal bath containing a standardized thermometer. Check the temperature at which fume-off or ignition occurs for compliance with 3.5.10. This test should be conducted behind a safety shield.

*4.5.20.2 Alternate testing procedure. Minimum ignition temperature for a 1:1 mixture of the dried coating compound and the explosive to be tested may be determined by instrumental methods using differential thermal analysis (DTA) or differential scanning calorimetry (DSC). From compounds of known reaction temperatures, such as ammonium nitrate or silver nitrate, construct a standard temperature curve, or calibrate the instrument as required, using a temperature programming rate of 10° to 15° C per minute. Follow the instrument manufacturer's recommended explosive sample size. Maintaining the same instrumental conditions, determine the minimum ignition temperature for the mixture of coating and explosive being tested. The ignition of the sample is indicated by a sharp and sometimes violent exothermic peak at or near the ignition temperature of the particular explosive in the sample. Relate the indicated ignition of the sample thermogram to the standard temperature curve to determine the actual ignition temperature. Check the ignition temperature for compliance with 3.5.10.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. The compound shall be packaged, packed, and marked in accordance with TT-P-143. The level of packaging shall be A or C, and the level of packing shall be A, B, or C, as specified (see 6.2). The compound shall be furnished in 1-quart or 1-gallon multiple friction top containers, in 5-gallon lug cover steel pails, or in 55-gallon drums as specified (see 6.2). Each container shall be marked with the qualification approval number.

6. NOTES

6.1 Intended use. This asphalt coating compound is intended for coating the interior surfaces of ammunition items such as bombs, shells, rockets, and mines prior to being filled with explosives.

*6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number and date of this specification
(b) Composition and type required
(c) Quantity in pounds (avoirdupois)
(d) Whether Level A or C packaging is required (see 5.1)
(e) Whether Level A, B, or C packing is required (see 5.1).

*6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products Lists is the Naval Ordnance Systems Command, Department of the Navy, Washington, D.C., 20360; however, information pertaining to qualification of products may be obtained from the Commanding Officer, Naval Ordnance Station, Indian Head, Md., 20640, Attention: Chemical Analysis Branch.

*6.4 Composition L coating compounds should be specified for use in areas with regulations controlling the emission of solvents into the atmosphere.

*6.5 Batch. A batch is defined as that quantity of material that has been manufactured by some unit chemical or physical mixing process intended to make the final product substantially uniform.

*6.6 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
Army—MU
Navy—OS
Air Force—84

Preparing activity:
Navy—OS
(Project No. 8030-0332)

Review activities:
Army—MR, MU
Navy—OS
Air Force—84, 69

User interest:
Army—EL
Navy—SH, MC

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a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

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