

MIL-C-82597A(OS)

8 August 1975

~~MIL-C-82597(OS)~~

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MILITARY SPECIFICATION

COMPOUND, ELECTRICALLY CONDUCTIVE

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

1. SCOPE

1.1 This specification covers the requirements for procurement of a special purpose, electrically conductive compound for use with certain underwater ordnance.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

QQ-P-35	Passivation Treatments for Corrosion Resisting Steel
QQ-S-766	Steel Plates, Sheets, and Strip-Corrosion Resisting

MILITARY

MIL-P-21929	Plastic Material, Cellular Polyurethane, Foam-In-Place, Rigid (2 and 4 pounds per cubic foot)
MIL-P-46124	Plastic Molding and Extrusion Material, Ionomer Resins

STANDARDS

Federal

FED-STD-791	Lubricants, Liquid Fuels, and Related Products, Methods of Testing
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FSC-5975

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Military

MIL-STD-129	Marking for Shipment
MIL-STD-202	Test Method of Electronic and Electrical Component Parts

(Copies of specifications, standards, 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 documents form 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)

D92-66	Flash and Fire Points by Cleveland Open Cup
D217-65T	Cone Penetration of Lubricating Grease
* D270-65	Sampling Petroleum and Petroleum Products
D1092-62	Apparent Viscosity of Lubricating Greases

(Application for copies should be addressed to the American society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19013.)

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

3. REQUIREMENTS

3.1 GENERAL

* 3.1.1 Preproduction sample. Unless otherwise specified in the contract or order (see 6.2), a preproduction sample of conductive compound shall be manufactured using the methods and procedures proposed for production. The sample will be tested as specified in 4.3 for the purpose of determining, prior to production, that the contractor's production methods are capable of producing material that will meet the requirements of this specification.

3.1.2 Materials. The materials used in the manufacture of this compound shall consist of components of a grade and quality which will formulate a

compound that will conform to all requirements of this specification.

3.1.3 Conflicting requirements. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall apply.

3.2 Performance requirements and product characteristics

3.2.1 Corrosive effect

3.2.1.1 Metals. The compound shall produce no attack, as indicated by decomposition or pitting, on corrosion-resisting steel when tested in accordance with 4.6.1.1.

3.2.1.2 Non-metals. The compound shall produce no evidence of stress cracking, crazing, hardening, swelling, shrinkage, or deterioration on non-metallic materials such as ionometric type polyolefin, and polyurethane foam when tested in accordance with 4.6.1.2.

3.2.1.3 Galvanic. The compound shall not increase the galvanic corrosion characteristics of corrosion resisting steel when tested in accordance with 4.6.1.3.

3.2.2 Flash point. The compound shall not flash at temperatures less than 149°C (300°F) when tested in accordance with 4.6.2.

3.2.3 Consistency

3.2.3.1 Viscosity. The apparent viscosity of the compound at the specified temperatures and shear rates shall be within the following limits when tested in accordance with 4.6.3.1

<u>Temperature</u>	<u>Shear Rate (Sec⁻¹)</u>	<u>Viscosity (Poise)</u>	
		MAX	MIN
(0° ± 1°C) 32° ± 2°F	50	400	200
(0° ± 1°C) 32° ± 2°F	20	900	400
(32° ± 3°C) 90° ± 5°F	50	400	200
(32° ± 3°C) 90° ± 5°F	20	900	400

3.2.3.2 Worked penetration. The worked penetration of the compound at 25 ± 1°C (77 ± 2°F) shall be 285 ± 50 when tested in accordance with 4.6.3.2.

* 3.2.4 Temperature stability. The compound shall be capable of withstanding a low temperature extreme of -40°C (-40°F) and a high temperature

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extreme of 54°C (130°F) when tested in accordance with 4.6.4 without showing evidence of crystallization or deterioration. After exposure, the compound shall continue to meet the requirements of 3.2.2, 3.2.3, 3.2.5 and 3.2.6.

3.2.5 Separation. The compound shall not lose more than 4.0 percent of its weight when tested in accordance with 4.6.5.

3.2.6 Electrical resistivity. The resistivity of the compound $25 \pm 1^\circ\text{C}$ ($77 \pm 2^\circ\text{F}$) shall be 5 to 38 ohm-centimeters when tested in accordance with 4.6.6.

3.2.7 Workmanship. The compound shall be smooth, homogeneous, and free from lumps, abrasives, dirt, water, and other foreign materials. The standards of workmanship exhibited in any approved preproduction sample, subject to any qualification stated in the Government's notice of approval, shall be determinative of the requirements of the contract relative to workmanship insofar as not specifically covered by applicable specifications.

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 Inspections. The inspection requirements specified herein are classified as follows:

- (a) Preproduction Inspection (See 4.3)
- (b) Quality Conformance Inspection (See 4.4)
- (c) Periodic Production Inspection (See 4.5)

* 4.3 Preproduction Inspection. Unless otherwise specified, a sample of compound (eight pounds minimum) shall be forwarded to an activity specified by the procuring activity for preproduction inspection (see 6.2). The preproduction inspection shall consist of all tests specified in 4.6. Portions of the sample may be reused for various tests except that those portions used for separation and flash point determinations may not be reused. Failure to meet any requirement of this specification shall be grounds for rejection of the sample. Approval of the preproduction sample shall not apply if any component is changed in type, grade or quantity prior to or during production.

* 4.4 Quality Conformance Inspection. The quality conformance inspection shall consist of the lot and the batch acceptance tests.

* 4.4.1 Lot Acceptance Tests. From each lot submitted for acceptance, a sample of not less than 3 pounds shall be obtained and tested in accordance with 4.6.3 and 4.6.5. Samples shall be obtained in accordance with the grease sampling method of ASTM D270-65 (section 37) and shall be representative of the batches comprising the lot. Failure of the samples to meet the consistency requirements of 3.2.3 or the separation requirement of 3.2.5 shall be cause for rejection of the entire lot.

(a) Lot. For inspection purposes, a lot shall consist of 2000 pounds or less of compound manufactured from the same order of raw materials, and may consist of one or more batches.

* 4.4.2 Batch Acceptance Tests. A sample of approximately 2 ounces avoirdupois (one ounce minimum) shall be obtained from each batch and tested in accordance with 4.6.6. Failure of any sample to meet the requirement of 3.2.6 shall be cause for rejection of that entire batch.

(a) Batch. For inspection purposes, a batch shall consist of the quantity of compound manufactured in one operation and shall be equal to or smaller than a lot.

* 4.5 Periodic Production Inspection. When specified in the contract or order (see 6.2), a periodic production sample of 8 pounds shall be obtained from every fourth lot in accordance with 4.4.1 and forwarded to an activity designated by the procuring activity for periodic production inspection. Testing and evaluation shall be as specified for the pre-production inspection of 4.3.

4.6 Test procedures

4.6.1 Corrosive effect

4.6.1.1 Metals. The metals used shall be corrosion-resisting steel, Classes 304 and 316, per QQ-S-766. The steel strips shall be passivated in accordance with QQ-P-35, Type I. The strips shall be partially coated with the compound to enable a comparison to be made between the coated and uncoated portions. The coated strips shall be placed in a convection current air oven and held at a temperature of $54 \pm 3^{\circ}\text{C}$ ($130 \pm 5^{\circ}\text{F}$). After a period of 70 hours in the oven, the strips shall be removed, cooled, and wiped clean with a dry, lintless cloth. There shall be no evidence of pitting or deterioration of the metal. Minor discoloration of the metal will be permissible.

4.6.1.2 Non-metals. Specimens of ionomeric type polyolefin, MIL-P-46124 Type V, Class 1, and polyurethane foam, MIL-P-21929, Class 1, shall be coated with the compound and tempered similar to 4.6.1.1. There shall be no evidence of cracking, crazing, hardening, swelling, shrinkage, or

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deterioration of the material that can be attributed to the application of the compound.

4.6.1.3 Galvanic. A strip of corrosion resisting steel as described in 4.6.1.1 shall be partially coated with the compound. The coated and uncoated portions shall be completely immersed in seawater, or a 2 percent saline solution, at a temperature of $32 \pm 3^{\circ}\text{C}$ ($90 \pm 5^{\circ}\text{F}$) for a period of 30 days. There shall be no deterioration of the compound or increase in corrosion of the coated portion when compared to the uncoated portion.

4.6.2 Flash point. Flash point shall be determined in accordance with ASTM D92-66.

4.6.3 Consistency

4.6.3.1 Apparent viscosity. The apparent viscosity of the compound, at the temperatures and shear rates specified in 3.2.3.1, shall be determined in accordance with ASTM D1092-62.

4.6.3.2 Worked penetration. The worked penetration values of the compound shall be determined in accordance with ASTM D217-67T.

* 4.6.4 Temperature stability. Individual samples of the compound shall be conditioned in temperature chambers maintained at $-40 \pm 3^{\circ}\text{C}$ ($-40 \pm 5^{\circ}\text{F}$) and $54 \pm 3^{\circ}\text{C}$ ($130 \pm 5^{\circ}\text{F}$), respectively, for 48 hours. At the conclusion of this period, each sample shall be allowed to return to ambient temperature, examined for evidence of crystallization or deterioration, then retested in accordance with 4.6.2, 4.6.3, 4.6.5 and 4.6.6. Any evidence of crystallization or deterioration or failure to meet any requirement shall be cause for rejection of both samples.

4.6.5 Separation. The amount of separation of the compound shall be determined in accordance with FED-STD-791, Method 321.2, except that the temperature of the test shall be $54 \pm 3^{\circ}\text{C}$ ($130 \pm 5^{\circ}\text{F}$) and the test duration shall be 48 hours.

4.6.6 Electrical resistivity. A sample of the compound shall be placed in a suitable fixture and the resistance measured in accordance with MIL-STD-202, Method 303. The cross-sectional area and volume of compound used for this test is optional; however, precise interpolation must be made to translate the measured value to the equivalent resistivity of ohm-centimeters. Care must be taken in preparing the sample to insure that there are no voids or air pockets. The resistivity shall be within the limits specified in 3.2.6.

5. PREPARATION FOR DELIVERY

5.1 Packaging and packing. Requirements for packaging and packing shall be as specified by the procuring activity in the contract or purchase order (see 6.2)

5.2 Marking. Unless otherwise specified in the contract or purchase order (see 6.2), the container shall be marked with the date (month and year) of manufacture and in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The compound described in this specification is used in the manufacture of certain underwater ordnance as a restraining media for adjacent windings of a communication wire in a wire coil and to provide an electrically conductive coating throughout the entire length of wire in the coil.

6.2 Ordering data. Procurement documents should specify the following:

6.2.1 Procurement requirements

- (a) Title, number, and date of this specification
- * (b) When a preproduction sample is not required (see 3.3.1, 4.3 and 6.2.3)
- (c) Quantity required (pounds)
- * (d) When periodic production inspection is required (see 4.5)
- * (e) Assigned activity for preproduction and periodic production inspections (see 4.3 and 4.5)
- (f) Type and size of containers (see 5.1 and 6.4)
- * (g) Markings, if other than as specified (see 5.2)
- (h) Exceptions to this specification

* 6.2.2 Contract data requirements. Any data required for delivery in connection with this document shall be specified on a DD Form 1423 incorporated into the contract. Such data will be delivered as identified on completed (numbered) DIDs (Data Item Descriptions/DD Form 1664) which will be documented in the applicable ADL (Authorized Data List).

6.2.3 Waiver of preproduction sample. Invitations for bids should provide that the Government reserves the right to waive the requirements for samples for preproduction inspection as to those bidders offering a product which has been previously procured or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending procurement.

6.3 Safety precautions

6.3.1 Electrical hazard. The material described herein is electrically conductive. Care should be taken to keep all electrical heads, cables, connectors, switches, outlet boxes, and other electrical equipment clean of this material.

6.4 Specific gravity. For ordering information only, the specific gravity is approximately 1.043 at 60/60 degrees F.

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6.5 Composition. A product which has been developed and tested to meet the requirements of this specification was compounded as follows: Approximately a seven-to-one (7:1) mixture by weight of silicone damping fluid (100 centistokes nominal viscosity) and conductive acetylene black (100 percent compressed grade). This paragraph in no way limits other compositions from being used, provided all other requirements of this specification are adhered to.

* 6.6 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 responsibility whatsoever for any inaccuracies in these notations. Bidders and suppliers 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.

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Project No. 5975-N525

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