Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

# AEROSPACE MATERIAL SPECIFICATION

AMS 3087E
Superseding AMS 3087D
Issued 5-1-44
Revised 1-15-77

## COMPOUND, INSULATING AND SEALING
Silicone

1. SCOPE:

1.1 Form: This specification covers a highly viscous, non-melting, heat-stable silicone sealing compound.

1.2 Application: Primarily for sealing joints in high tension electrical connections, aircraft engine ignition systems, and electronic equipment and as a lubricant for components fabricated from elastomers. Compound is not recommended for use on silicone rubber parts subject to temperatures in excess of 150°C (300°F) and is to be avoided on or near any surfaces which subsequently are to be painted or adhesive bonded.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D70 - Specific Gravity of Semi-Solid Bituminous Materials
ASTM D149 - Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies
ASTM D150 - A-C Loss Characteristics and Dielectric Constant (Permittivity) of Solid Electrical Insulating Materials
ASTM D217 - Cone Penetration of Lubricating Grease
ASTM D257 - D-C Resistance or Conductance of Insulating Materials
ASTM D495 - High-Voltage, Low-Current, Arc Resistance of Solid Electrical Insulating Materials
ASTM D1478 - Low-Temperature Torque of Ball Bearing Greases

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.3 Military Specifications:

MIL-M-14 - Molding Plastics and Molded Plastic Parts, Thermosetting
MIL-E-480 - Enamel, Baking, Phenol- or Urea-Formaldehyde
MIL-I-631 - Insulation, Electrical, Synthetic-Resin Composition, Nonrigid
MIL-C-3702 - Cable, Power, Electrical, Ignition, High Tension
MIL-I-24092 - Insulating Varnish, Electrical, Impregnating, Solvent Containing

2.3.4 Military Standards:

MIL-STD-417 - Rubber Composition, Vulcanized General Purpose, Solid (Symbols and Tests)
MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a smooth, homogeneous mixture of silicone fluid and suitable additives, having the consistency of a medium-heavy grease.

3.2 Properties: The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with the methods listed. All tests shall be conducted at room temperature unless otherwise specified. All electrical tests shall be conducted on samples conditioned for 24 hr ± 0.5 at 23°C ± 2 (73°F ± 4) and 50% ± 5 relative humidity prior to testing.

3.2.1 General Characteristics:

3.2.1.1 Compound shall be translucent and light gray in color.

3.2.1.2 Compound shall wet and adhere to both metallic and nonmetallic surfaces.

3.2.1.3 Compound shall be relatively insoluble in, and highly resistant to the action of, water, alcohols, glycols, and glycerine.

3.2.1.4 Compound shall be neutral in pH as indicated by lack of reaction on litmus paper.

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| 3.2.2 Consistency: | | ASTM D217 |
| Unworked | 200 - 240 | |
| Worked, max | 280 | |
| Worked, after 24 hr ± 0.5 at 205°C ± 5 (401°F ± 9), max | 310 | |
| 3.2.3 Specific Gravity at 25°/25°C (77°/77°F) | 0.98 - 1.05 | 4.5.1 |
| 3.2.4 Dielectric Constant at 1000 Hz, max | 3.2 | ASTM D150 |
| 3.2.5 Dissipation Factor at 1000 Hz, max | 0.0035 | ASTM D150 |
| 3.2.6 Dielectric Strength, min | | |
| 0.010 in. (0.25 mm) thick specimens | 500 V per mil (19,700 V/mm) | 4.5.2 |
| 0.050 in. (1.27 mm) thick specimens | 300 V per mil (11,800 V/mm) | |
| 3.2.7 Volume Resistivity, min | | 4.5.3 |
| At 23°C ± 2 (73°F ± 4) | $1.0 \times 10^{13}$ Ω cm | |
| At 175°C ± 3 (347°F ± 5) | $1.0 \times 10^{12}$ Ω-cm | |
| 3.2.8 Arc Resistance, min | 80 sec | 4.5.4 |
| 3.2.9 Low-Temperature Stability | Shall not crack | 4.5.5 |

| | | | |
|---|---|---|---|
| 3.2.10 | Low-Temperature Torque, max | | 4.5.6 |
| ø | Starting Torque | 5000 g-cm | |
| | Running Torque | 1000 g-cm | |
| 3.2.11 | High-Temperature Stability | Shall not melt or become brittle | 4.5.7 |
| ø 3.2.11.1 | Loss by Evaporation, max | 2% | |
| 3.2.11.2 | Flow, max | 10% | |
| 3.2.12 | Solubility in Water, Change in Weight | 0 to 0.10% | 4.5.8 |
| 3.2.13 | Effect on Metals | No corrosion | 4.5.9 |
| 3.2.14 | Effect on Nonmetals | No damage | 4.5.10 |
| ø 3.2.15 | Flammability | Non-burning | 4.5.11 |

3.3 Quality: The compound shall be uniform in consistency and appearance and free from lumps, cakes, abrasives, and foreign materials.

4. QUALITY ASSURANCE PROVISIONS:

4.1 ø Responsibility for Inspection: The vendor of the compound shall supply all samples and shall be responsbile for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to perform such confirmatory tests as he deems necessary to ensure that the compound conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 ø Acceptance Tests: Tests to determine conformance to the following requirements are classified as acceptance tests and shall be performed on each batch of product:

| Requirement | Paragraph Reference |
|---|---|
| Consistency | 3.2.2 |
| Dielectric Strength, 0.050 in, (1.27 mm) thick only | 3.2.6 |
| Arc Resistance | 3.2.8 |
| Low-Temperature Torque | 3.2.10 |
| High-Temperature Stability | 3.2.11 |
| Flammability | 3.2.15 |

4.2.2 ø Periodic Tests: Tests to determine conformance to the following requirements are classified as periodic tests and shall be performed on 1 batch in every 10 batches.

| Requirement | Paragraph Reference |
|---|---|
| Dielectric Constant | 3.2.4 |
| Dissipation Factor | 3.2.5 |
| Effect on Metals | 3.2.13 |
| Effect on Nonmetals | 3.2.14 |

4.2.3 Qualification Tests: Tests to determine conformance to all technical requirements of this specification are classified as qualification tests and may be the basis for approval of the compound (See 4.4.1).

4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, qualification test material shall be submitted to the cognizant qualification agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Sufficient material shall be taken from each batch to perform all required tests in triplicate.

4.4 Approval:

4.4.1 Sample compound shall be approved by purchaser before compound for production use is supplied, unless such approval be waived. Results of tests on production compound shall be essentially equivalent to those on the approved sample.

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production compound which are essentially the same as those used on the approved sample compound. If any change is necessary in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material and processing and, when requested, sample compound. Production compound made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

4.5.1 Specific Gravity: Shall be determined in accordance with ASTM D70, except that pycnometer and compound shall be heated to 110°C ± 3 (230°F ± 5) in a vacuum oven, and the oven evacuated several times to remove entrained air before filling pycnometer with water. After filling with water, pycnometer and contents shall be immersed in boiling water for 1 hr ± 0.1 to remove air bubbles adhering to surface of compound.

4.5.2 Dielectric Strength: Shall be determined in air at 23°C ± 2 (73°F ± 4) and 50% ± 5 relative humidity in accordance with ASTM D149, short time method except that 1/2-in. (12.7-mm) hemispherical electrodes shall be pressed into the compound in order to form the specified electrode gap.

4.5.3 Volume Resistivity: Shall be determined in accordance with ASTM D257 between flat, parallel plates on compound carefully spread and smoothed to provide an air-free layer of uniform thickness. Sample shall have reached thermal equilibrium at the test temperature, which can be assumed to have occurred after 24 hr ± 0.5 at 23°C ± 2 (73°F ± 4) and after 4 hr ± 0.25 at 175°C ± 3 (347°F ± 5).

4.5.4 Arc Resistance: Shall be determined in accordance with ASTM D495 except that sample shall consist of a 1/8-in. (3.2-mm) thickness of compound spread on a glass plate and the electrodes just touching the surface of the compound.

4.5.5 Low-Temperature Stability: A sample, placed in a clean open container, cooled to -55°C ± 1 (-67°F ± 2), and maintained at that temperature for not less than 24 hr, shall retain its appearance and shall not crack or harden noticeably, a slight increase in stiffness being permitted.

4.5.6 Low-Temperature Torque: Shall be determined in accordance with ASTM D1478 at -55°C ± 1 (-67°F ± 2) with a 60-min. ± 1 running time.

4.5.7 High-Temperature Stability:

4.5.7.1 Loss by Evaporation: Approximately 10 g of compound shall be weighed into a 60-mesh screen cone approximately 2-3/32 in. (53.2 mm) in diameter at the open end by 1-3/16 in. (30.2 mm) high, soldered along the seam, and having a 0.040-in. (1.02-mm) diameter hole drilled through the tip. The cone shall be suspended in a clean, weighted 100-$cm^3$ beaker; the assembly shall be weighed, placed in an air oven, and maintained at 200°C ± 5 (392°F ± 9) for 24 hr ± 0.5. The assembly shall be removed, cooled in a desiccator, and reweighed. The weight loss, as a percentage of the weight of compound originally placed in the cone, is the percentage loss by evaporation.