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

AEROSPACE MATERIAL SPECIFICATION

AMS 3332B
Superseding AMS 3332A
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SILICONE RUBBER
Extreme Low Temperature Resistant
15-30

1. SCOPE:

1.1 Form: This specification covers an extreme-low-temperature-resistant silicone rubber in the form of sheet, strip, and molded shapes.

1.2 Application: Primarily for rubber-like parts required to operate or seal at temperatures from -75° to +230°C (-103° to +446°F) compounded especially for operation at extreme low temperatures. Silicone rubber is resistant to deterioration by weathering and by high-aniline-point petroleum-base oils and remains flexible over the temperature range noted. This material is not normally suitable for use in contact with low-aniline-point petroleum-base fluids, including fuels, due to excessive swelling.

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
AMS 2810 - Identification and Packaging, Elastomeric Products

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

ASTM D297 - Chemical Analysis of Rubber Products
ASTM D395 - Compression Set of Vulcanized Rubber
ASTM D412 - Tension Testing of Vulcanized Rubber
ASTM D471 - Change in Properties of Elastomeric Vulcanizates Resulting from Immersion in Liquids
ASTM D573 - Accelerated Aging of Vulcanized Rubber by the Oven Method
ASTM D624 - Tear Resistance of Vulcanized Rubber
ASTM D797 - Young's Modulus in Flexure of Elastomers at Normal and Subnormal Temperatures
ASTM D2137 - Low-Temperature Impact Test for Brittleness Determination of Flexible Polymeric Materials or Fabrics Coated Therewith, or Both
ASTM D2240 - Indentation Hardness of Rubber and Plastics by Means of a Durometer

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

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

Printed in U.S.A.

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a compound based on a silicone rubber, suitably cured to produce a product Ø meeting the requirements of 3.2.

3.2 Properties: The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable:

3.2.1 As Received:

3.2.1.1 Ø	Hardness, Durometer "A" or equiv.	15 - 30	ASTM D2240
3.2.1.2	Tensile Strength, min	400 psi (2.76 MPa)	ASTM D412, Die B or C
3.2.1.3	Elongation, min	350%	ASTM D412, Die B or C
3.2.1.4	Tear Resistance, min	30 lb per in. (5.25 kN/m)	ASTM D624, Die B
Ø 3.2.1.5	Specific Gravity	Qualification Value ±0.03	ASTM D297

3.2.2 Petroleum Lubricating Oil Resistance: (Immediate Deteriorated Properties)

ASTM D471
Medium: ASTM Oil No. 1
Temperature: 175° C ± 3 (347° F ± 5.4)
Time: 70 hr ± 0.5

3.2.2.1	Hardness Change, Durometer "A" or equiv.	-10 to +5
3.2.2.2	Tensile Strength Change, max	-50%
3.2.2.3	Elongation Change, max	-20%
3.2.2.4	Volume Change	0 to +25%
3.2.2.5	Decomposition	None
3.2.2.6	Surface Tackiness	None

3.2.3 Dry Heat Resistance:

ASTM D573
Temperature: 225° C ± 3 (437° F ± 5.4)
Time: 24 hr ± 0.5

3.2.3.1	Hardness Change, Durometer "A" or equiv.	-5 to +10
3.2.3.2	Tensile Strength Change, max	-15%
3.2.3.3	Elongation Change, max	-20%
3.2.3.4	Bend (flat)	No cracking or checking

3.2.4 Compression Set:			ASTM D395, Method B Temperature: 175°C ± 3 (347°F ± 5.4) Time: 22 hr ± 0.5
3.2.4.1	Percent of Original Deflection, max	60	
3.2.5 Low Temperature Resistance:			
3.2.5.1	Brittleness	Pass	ASTM D2137, Method A Temperature: -80°C ± 3 (-112°F ± 5.4)
3.2.5.2	Young's Modulus, max	1,000 psi (6.90 MPa)	ASTM D797 Temperature: -75°C ± 3 (-103°F ± 5.4) Time: 5 hr ± 0.2

3.2.6 Weathering: When specified, the product shall have weather resistance acceptable to the purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.2.7 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metal shall not be considered objectionable.

3.3 Quality: The product shall be uniform in quality and condition, clean, smooth, as free from foreign material as commercially practicable, and free from imperfections detrimental to fabrication, appearance, or performance of parts.

3.4 Tolerances: Unless otherwise specified, the following tolerances shall apply:

3.4.1 Sheet and Strip:

TABLE I

Nominal Thickness Inches	Tolerance, Inch plus and minus
Up to 0.125, incl	0.016
Over 0.125 to 0.500, incl	0.032
Over 0.500	0.047

TABLE I (SI)

Nominal Thickness Millimetres	Tolerance, Millimetres plus and minus
Up to 3.18, incl	0.41
Over 3.18 to 12.70, incl	0.79
Over 12.70	1.19

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to the following requirements are classified as acceptance or routine control tests and shall be performed on each lot of material:

Test	Paragraph Reference
Hardness, as received	3.2.1.1
Tensile Strength, as received	3.2.1.2
Elongation, as received	3.2.1.3
Specific Gravity	3.2.1.5
Brittleness	3.2.5.1

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

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

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

4.3.1 A lot shall be all product from the same batch of compound processed in one continuous run and submitted for vendor's inspection at one time.

4.3.2 A batch shall be the quantity of compound run through a mill or mixer at one time.

4.4 Approval:

4.4.1 Sample material shall be approved by purchaser before material for production use is supplied, unless such approval be waived. Results of tests on production material 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 material which are essentially the same as those used on the approved sample material. 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 material. No production material made by the revised procedure shall be shipped prior to receipt of reapproval.

4.5 Reports:

4.5.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests made on the product to determine conformance to the acceptance test requirements and stating that the product conforms to the other technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, vendor's compound number, form or part number, and quantity.

4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, supplier's compound number, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.