SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3310

Issued MAR 1997
Reaffirmed JUN 2007

Rubber, Silicone
Flame Retardant, Low Smoke Density, High Strength
65 - 75 Durometer
Color White

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

1. SCOPE:

1.1 Form:

This specification covers a silicone elastomer in the form of molded sheet and shapes, color coded white in accordance with ARP1527.

1.2 Application:

This elastomer has been used typically for parts in pressurized aircraft compartment interiors such as grommets, tube supports, clamp cushions, bushings and seals where flame resistance, low smoke density and non-toxic gas generation are required, but usage is not limited to such applications. Each application should be considered separately.

1.3 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
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SAE WEB ADDRESS: **http://www.sae.org**

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2810 Identification and Packaging, Elastomeric Products

ARP1527 Color Coding - Elastomers for Tube Clamp Cushions

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM D 297 Rubber Products, Chemical Analysis
ASTM D 395 Rubber Property - Compression Set
ASTM D 412 Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 471 Rubber Property - Effect of Liquids
ASTM D 573 Rubber - Deterioration in an Air Oven
ASTM D 624 Tear Strength of Conventional Vulcanized Rubbers and Thermoplastic Elastomers
ASTM D 1329 Evaluating Rubber Property - Retraction at Low Temperature (TR Test)
ASTM D 2240 Rubber Property-Durometer Hardness
ASTM E 162 Surface Flammability of Materials Using a Radiant Heat Energy Source
ASTM E 662 Specific Optical Density of Smoke Generated by Solid Materials Using a Radiant

2.3 Federal Aviation Regulations:

Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Federal Aviation Regulations - Part 25, Fire Protection, Section 25.853 - Compartment Interiors

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a silicone rubber compound suitably cured to produce a product meeting the requirements of paragraph 3.2 of this specification and not contain any fabric reinforcement unless otherwise specified.

3.1.1 Product shall be color coded white in accordance with ARP1527.

3.1.2 The test fluids used for soak testing shall be the two commercially available, low density, phosphate ester hydraulic fluids that meet AS1241, Type IV, Class 1, Grade A requirements. Fluid soak tests shall be performed in each fluid independently. Test requirements will remain the same for all test fluids.

3.2 Properties:

The product shall conform to the requirements shown in Table 1; tests shall be performed on the product supplied and in accordance with the ASTM methods, insofar as practicable.

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.2.1	Hardness, Durometer “A”	65 to 75	ASTM D 2240
3.2.2	Tensile Strength, min	6.90 MPa (1000 psi)	ASTM D 412
3.2.3	Elongation, min	300%	ASTM D 412
3.2.4	Tear Strength, min	263 kN/m (150 lbf/in)	ASTM D 624 (Die "B" with grain)
3.2.5	Specific Gravity	Qualification Value ±0.03	ASTM D 297
3.2.6	Tension Set, max	12%	ASTM D 412 Specimen held at 200% elongation for 10 minutes, allowed 5 minutes ± 0.5 for recovery prior to measurement. Use die "C"
3.2.7	Compression Set		ASTM D 395, Method B
3.2.7.1	Percent of Original Deflection, max	30	Temperature: 100 °C ± 3 (212 °F ± 5) Time: 70 hours + 0.5
3.2.8	Dry Heat Resistance		ASTM D 573 Temperature: 200 °C ± 3 (392 °F ± 5) Time: 70 hours ± 0.5
3.2.8.1	Hardness Change, Durometer "A"	0 to +10	ASTM D 2240
3.2.8.2	Tensile Strength, min	5.52 MPa (800 psi)	ASTM D 412
3.2.8.3	Elongation, min	135%	ASTM D 412
3.2.8.4	Tear Strength, min	21.0 kN/M (120 lbf/in)	ASTM D 624, Die "B" with grain
3.2.8.5	Volume Change, %	-5 to 0	ASTM D 471

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Method
3.2.9	Retraction at Low Temperature		
3.2.9.1	TR-10 Temperature, °C (°F), max	-54 (-65)	ASTM D 1329
3.2.10	Hydraulic Fluid Resistance		ASTM D 471 Medium: AS1241, Type IV, Class 1, Grade A Temperature: 70 °C ± 3 (158 °F ± 5) Time: 70 hours ± 0.5
3.2.10.1	Hardness Change, Durometer "A"	-20 to 0	ASTM D 2240
3.2.10.2	Tensile Strength, min	5.52 MPa (800 psi)	ASTM D 412
3.2.10.3	Elongation, min	250%	ASTM D 412
3.2.10.4	Tear Strength, min	21.0 kN/M (120 lbf/in)	ASTM D 412, Die “B” with grain
3.2.10.5	Volume Change, %	0 to +30	ASTM D 471
3.2.11	Flammability		
3.2.11.1	60 Second Vertical Ignition		FAR 25.853 Appendix F
3.2.11.1.1	Flame Time, Seconds, max	15	
3.2.11.1.2	Burn Length, mm, max	152 mm (6)	
3.2.11.1.3	Burn Time of Drippings, Seconds, max	3	
3.2.11.2	30 Second, 45 Degree Ignition		FAR 25.853 Appendix F
3.2.11.2.1	Flame Time, Seconds, max	15	
3.2.11.2.2	Glow Time, Seconds, max	10	
3.2.11.2.3	Flame Penetration Time	None	
3.2.11.3	15 Second Horizontal Ignition		FAR 25.853 Appendix F

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Method
3.2.11.3.1	Burn Rate, mm/s max	1.06 mm/s (2.5 in/min)	
3.2.12	Smoke Generation on Combustion		
3.2.12.1	Flaming Exposure: Specific Optical Density, DS, 4 minutes, max	200	FAR 25.853 Appendix F ASTM E 662
3.2.13	Toxic Gas Generation on Combustion		Limits are a Consensus of Commercial Aircraft Manufacturers. AMINCO/NBS Smoke Density Chamber, Cat. No. 4-5800B, Instruction Manual 941-B
3.2.13.1	Flaming Exposure after 4 minutes		
	CO, ppm, max	3500	
	HF, ppm, max	50	
	HCl, ppm, max	500	
	NO_x, ppm, max	100	
	SO_2, ppm, max	100	
	HCN, ppm, max	150	
3.2.14	Surface Flammability		ASTM E 162
3.2.14.1	Flame Spread Index	Report	

3.3 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, smooth, as free from foreign material as commercially practicable, and free from imperfections detrimental to usage of the product.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of the product shall supply all samples and shall be responsible for all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification. The manufacturer may use their own facilities or any commercial laboratory acceptable to the cognizant agency assurance organization.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Conformance to the requirements shown in Table 2 are acceptance tests, and shall be performed on each lot:

TABLE 2 - Acceptance Tests

Test	Paragraph Reference
Hardness	3.2.1
Tensile Strength	3.2.2
Elongation	3.2.3
Specific Gravity	3.2.5
Compression Set	3.2.7
Flammability	3.2.11

4.2.2 Preproduction Tests: All technical requirements are production tests, and shall be performed prior to or on the initial shipment of a product by the manufacturer to a purchaser, when a change in material and/or processing, requires reapproval, as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient product shall be taken at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure, or if not specified therein, not less than three. When the product supplied is of such shape that suitable test specimens cannot be cut from the product, a separate, flat strip test sample shall be supplied upon request.

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

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

4.4 Approval:

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