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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3382

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Submitted for recognition as an American National Standard

TETRAFLUOROETHYLENE/PROPYLENE RUBBER
Hydraulic Fluid and Synthetic Oil Resistant
75 - 90

1. SCOPE:

1.1 Form:

This specification covers two classes (durometers) of tetrafluoroethylene/propylene rubber in the form of extrusions, sheet, strip, and molded shapes.

1.2 Application:

These products have been used typically for components requiring continuous operation in dry air, hydraulic fluids, and synthetic engine oils at temperatures from -5 to +232 °C (+23 F to 450 °F) or in high pH chemical decontamination solutions, but usage is not limited to such applications.

1.3 Classes:

Product is classified as follows:

Class 1 - 70 to 80 Durometer "A" hardness
Class 2 - 85 to 95 Durometer "A" hardness

1.3.1 The class supplied shall be the class ordered.

1.4 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 the necessary precautionary measures to ensure the health and safety of all personnel involved.

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 2279 Tolerances, Rubber Products
MAM 2279 Tolerances, Metric, Rubber Products
AMS 2810 Identification and Packaging, Elastomeric Products
AMS 3021 Reference Fluid for Testing Di-ester (Polyol) Resistant Materials
AS1241 Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 297 Rubber Products - Chemical Analysis
ASTM D 395 Rubber Property - Compression Set
ASTM D 412 Rubber Properties in Tension
ASTM D 471 Rubber Properties - Effect of Liquids
ASTM D 518 Rubber Deterioration - Surface Cracking
ASTM D 573 Rubber - Deterioration in an Air Oven
ASTM D 1149 Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimens)
ASTM D 1329 Evaluating Rubber Property - Retraction at Low Temperature (TR Test)
ASTM D 2137 Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics
ASTM D 2240 Rubber Property - Durometer Hardness

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a compound, based on a tetrafluoroethylene/propylene elastomer, suitably cured to produce a product meeting the requirements of 3.2, either specified and tested as Class I or Class II.

3.2 Properties:

The product shall conform to the requirements shown in Table 1, 3.2.13, and 3.2.14; tests shall be performed on the product supplied and, except as otherwise specified herein, in accordance with specified methods, insofar as practicable.

TABLE 1 - Properties

Paragraph	Property	Requirement Class I	Requirement Class II	Test Method
3.2.1	Hardness, Durometer "A" or equivalent	75 ± 5	90 ± 5	ASTM D 2240
3.2.2	Tensile Strength, minimum	1800 psi (12.4 MPa)	2000 psi (13.8 MPa)	ASTM D 412, Die B or C
3.2.3	Elongation, minimum	220%	100%	ASTM D 412, Die B or C
3.2.4	Specific Gravity	Preproduction Value ± 0.02		ASTM D 297
3.2.5	Synthetic Lubricant Resistance: (Immediate Deteriorated Properties)			ASTM D 471 AMS 3021 175 °C ± 3 (347 °F ± 5) 70 hours ± 0.5
3.2.5.1	Hardness Change, Durometer "A" or equivalent, maximum	-20	-20	
3.2.5.2	Tensile Strength Change, maximum	-30%	-30%	
3.2.5.3	Elongation Change, maximum	-20%	-20%	
3.2.5.4	Volume Change, maximum	+30%	+25%	
3.2.6	Oil Resistance:			ASTM D 471 ASTM Reference Oil #3 150 °C ± 3 (302 °F ± 5) 70 hours ± 0.5
3.2.6.1	Hardness Change, Durometer "A" or equivalent	0 to -12	0 to -12	
3.2.6.2	Tensile Strength Change, maximum	-20%	-25%	

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement Class I	Requirement Class II	Test Method
3.2.6.3	Elongation Change, maximum	-20%	-20%	
3.2.6.4	Volume Change, maximum	+15%	+15%	
3.2.7	Hydraulic Fluid Resistance:			ASTM D 471 AS1241, Type IV, Class I 100 °C ± 3 (212 °F ± 5) 70 hours ± 0.5
3.2.7.1	Hardness Change, Durometer "A" or equivalent, maximum	-20	-30	
3.2.7.2	Tensile Strength Change, maximum	-35%	-35%	
3.2.7.3	Elongation Change, maximum	-20%	-25%	
3.2.7.4	Volume Change, maximum	+30%	+25%	
3.2.8	Dry Heat Resistance:			ASTM D 573 250 °C ± 3 (482 °F ± 5 70 hours ± 0.5
3.2.8.1	Hardness Change, Durometer "A" or equivalent	±3	±3	
3.2.8.2	Tensile Strength Change maximum	-25%	-25%	
3.2.8.3	Elongation Change, maximum	-25%	-25%	
3.2.8.4	Weight Loss, maximum	+5%	+5%	
3.2.9	Alkaline Fluid Resistance:			ASTM D 471 50 % Sodium Hydroxide 100 °C ± 3 (212 °F ± 5) 70 hours ± 0.5
3.2.9.1	Hardness Change, Durometer "A" or equivalent	±2	±2	
3.2.9.2	Tensile Strength Change, maximum	±6%	±6%	
3.2.9.3	Elongation Change, maximum	-5%	-5%	
3.2.9.4	Volume Change, maximum	+4%	+4%	

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement Class I	Requirement Class II	Test Method
3.2.10	Compression Set: Percent of Original Deflection, maximum	40%	45%	ASTM D 395, Method B 175 °C ± 3 (347 °F ± 5) 22 hours ± 0.5
3.2.11	Long-Term Compression Set: Percent of Original Deflection, maximum	50%	55%	ASTM D 395, Method B 175 °C ± 3 (347 °F ± 5) 168 hours ± 1.0
3.2.12	Low-Temperature Resistance:			
3.2.12.1	Temperature Retraction TR_{10} point, maximum	+4 °C (+39 °F)	+4 °C (+39 °F)	ASTM D 1329
3.2.12.2	Brittle Point, maximum	-35 °C (-31 °F)	-35 °C (-31 °F)	ASTM D 2137, Method A

3.2.13 Weather Resistance: The product shall show no evidence of cracking when tested in accordance with ASTM D 1149 for seven days at 40 °C ± 1 (104 °F ± 4). Test specimens shall be prepared and mounted in accordance with ASTM D 518, Method B.

3.2.14 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, determined by a procedure acceptable to purchaser. Discoloration of metal shall not be considered objectionable.

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 internal imperfections detrimental to usage of the product.

3.4 Tolerances:

Shall conform to all applicable requirements of AMS 2279 or MAM 2279.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing 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.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Test for requirements shown in Table 2 are acceptance tests and shall be performed on each lot.

TABLE 2 - Acceptance Test Requirements

Requirement	Paragraph Reference
Hardness	3.2.1
Tensile Strength	3.2.2
Elongation	3.2.3
Specific Gravity	3.2.4
Compression Set	3.2.10

4.2.2 Periodic Tests: Tests for requirements shown in Table 3 are periodic tests and shall be performed at least every six months unless another frequency of testing is specified by purchaser.

TABLE 3 - Periodic Test Requirements

Requirement	Paragraph Reference
Volume Change in Synthetic Lubricant	3.2.5.4
Volume Change in Hydraulic Fluid	3.2.7.4
Weight Loss in Dry Heat	3.2.8.4

4.2.3 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the product to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

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

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.

4.3.1.1 If specimens cannot be prepared from the product, ASTM test specimens prepared from the same batch and state of cure shall be used. When the product supplied is an extrusion of such shape that suitable test specimens cannot be cut from the product, a separate flat strip test sample, from the same production lot, shall be supplied upon request. This strip shall be prepared from tubing 1.000 inch ± 0.063 (25.40 mm ± 1.60) in OD by 0.075 inch ± 0.008 (1.90 mm ± 0.20) in wall thickness, mechanically slit and flattened into a strip while being extruded, and cured in the same manner as production product. When the product is a molded shape from which test specimens cannot be cut, a slab 6 inches (152 mm) square by 0.075 inch ± 0.008 (1.90 mm ± 0.20) thick, molded from the same batch of compound, shall be supplied upon request.

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

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

4.3.1.4 When a statistical sampling plan has been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.5 shall state that such plan was used.

4.3.2 For Periodic and Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

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