Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE MATERIAL SPECIFICATION

AMS 3249

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Revised

SYNTHETIC RUBBER
Ethylene Propylene Type, Hydrazine-Base-Fluid Resistant
75 - 85

1. SCOPE:

1.1 Form: This specification covers an ethylene propylene type rubber in the form of sheet, strip, tubing, molded shapes, and extrusions.

1.2 Application: Primarily for seals, gaskets, and diaphragms for use at temperatures from -55 to +70 C (-67 to +158 F) in hydrazine-base fluids.

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., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2810 - Identification, Natural and Synthetic Rubber Materials
AMS 5647 - Steel Bars, Forgings, Tubing and Rings, Corrosion Resistant, 18Cr - 8Ni (304L)

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

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 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, Pennsylvania 19120.

2.3.1 Military Specifications:

MIL-P-26536 - Propellant, Hydrazine

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a compound based on an ethylene propylene elastomer, suitably cured to produce a product meeting all technical requirements of this specification.

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. 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 shall be supplied upon request. This strip shall be prepared from 1 in. ± 1/16 (25.4 mm ± 1.6) OD by 0.075 in. ± 0.008 (1.90 mm ± 0.20) thick wall tubing which shall be mechanically split and flattened into a strip while being extruded and then cured in the same manner as production material.

3.2.1	As Received:		
3.2.1.1	Hardness, Durometer "A" or equiv.	80 ± 5	ASTM D2240
3.2.1.2	Tensile Strength, min	1600 psi (11.0 MPa)	ASTM D412
3.2.1.3	Elongation, min	100%	ASTM D412
3.2.2	Hydrazine Resistance: (Immediate Deteriorated Properties)		4.4.1
3.2.2.1	Hardness Change, Durometer "A" or equiv.	-5 to 0	
3.2.2.2	Tensile Strength Change, max	10%	
3.2.2.3	Elongation Change, max	10%	
3.2.2.4	Volume Change, max	3%	
3.2.2.5	Compatibility, max (Greater Than Control Container)	5 psi (34.5 kPa)	4.4.2
3.2.3	Compression Set:		4.4.2
	Percent of original deflection, max	20	

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	1/64
Over 0.125 to 0.500, incl	1/32
Over 0.500	3/64

TABLE I (SI)

Nominal Thickness Millimeters	Tolerance, Millimeters Plus and Minus
Up to 3.18, incl	0.4
Over 3.18 to 12.70, incl	0.8
Over 12.70	1.2

3.4.2 Tubing:

3.4.2.1 Diameter:

TABLE II

Nominal OD or ID (not both), Inches	Tolerance, Inch Plus and Minus	Ovality, % (See 3.4.2.1.1)
Up to 0.500, incl	0.020	10
Over 0.500 to 1.000, incl	0.030	15
Over 1.000	4%	15

TABLE II (SI)

Nominal OD or ID (not both), Millimeters	Tolerance, Millimeter Plus and Minus	Ovality, % (See 3.4.2.1.1)
Up to 12.70, incl	0.51	10
Over 12.70 to 25.40, incl	0.76	15
Over 25.40	4%	15

3.4.2.1.1 Ovality applies to tubing ordered in straight lengths with wall thickness of 1/16 in. (1.6 mm) and over, and shall be computed from the difference of the minor and major axis diameter measurements, taken at the same transverse plane on the tube, expressed as a percentage of the nominal diameter.

3.4.2.2 Wall Thickness:

TABLE III

Nominal Wall Thickness Inches	Tolerance, Inch Plus and Minus
Up to 0.063, excl	0.005
0.063 and over	10%

TABLE III (SI)

Nominal Wall Thickness Millimeters	Tolerance, Millimeter Plus and Minus
Up to 1.60, excl	0.13
1.60 and over	10%

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 4.6. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure 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:

Property	Paragraph
Hardness, as received	3.2.1.1
Tensile Strength, as received	3.2.1.2
Elongation, as received	3.2.1.3
Volume Change in Hydrazine	3.2.2.4

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 shall be the basis for approval (See 4.5) of the compound.

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

4.3.1 A lot is defined as all product from the same batch of compound processed in one continuous run and submitted for the 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 Test Methods:

4.4.1 Hydrazine Resistance: Testing shall be performed in accordance with ASTM D471, with the following exceptions: The pyrex glass test tubes shall be capable of withstanding 500 psi (3448 kPa) pressure and shall be mechanically sealed and fitted with a 0 - 50 psi (0 - 345 kPa) pressure gage. Air and moisture shall be excluded from the test tubes. The elastomer specimens should be cleaned of surface contamination using absolute isopropyl alcohol prior to hydrazine immersion. For each test, 150 ml of MIL-P-26536 hydrazine propellant shall be used. The sealed test tubes shall be exposed for 96 hr at 70 C ± 3 (158 F ± 5.4). At the end of the test exposure, tensile, elongation, and volume increase specimens shall be removed from the test tubes and dried in vacuum for 1 hr, followed by air drying for 24 hr at room temperature.

4.4.1.1 Compatibility with Hydrazine: By observation of the pressure gage on the hydrazine resistance test tubes (See 4.4.1), the compatibility of the rubber will be measured. A control test tube of the same configuration as used in 4.4.1, containing 150 ml of MIL-P-26536 hydrazine propellant but without the rubber specimens, shall also be subjected to the test conditions specified in 4.4.1. The maximum pressure difference observed between the rubber test specimen tube and control test tube shall be the measure of compatibility.

4.4.2 Compression Set: Testing shall be performed in accordance with ASTM D395, Method B, with the following exceptions: The compression set plates and test container shall be fabricated from AMS 5647 material. Test containers shall be mechanically sealed during the test duration. The elastomer specimens should be cleaned of surface contamination using absolute isopropyl alcohol prior to hydrazine immersion. Completely immerse the compression set plates, with test specimens, in the test container containing MIL-P-26536 hydrazine propellant. The sealed container shall be exposed for 96 hr at 70 C ± 3 (158 F ± 5.4). Following test exposure, the specimens shall be removed from the compression set plates and dried in vacuum for 1 hr, followed by air drying for 24 hr at room temperature before measurement for calculation of compression set.

4.5 Approval:

4.5.1 Sample material 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 samples.