AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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Revised

SYNTHETIC RUBBER
Hot Oil and Coolant Resistant - Low Swell (55-65)

1. ACKNOWLEDGMENT: A vendor must mention this specification number in all quotations and when acknowledging purchase orders.

2. FORM: Sheet, strip, tubing, extrusions, molded shapes, or as ordered.

3. APPLICATION: The compound shall be suitable for oil and coolant line hose, packings, bushings, grommets, and seals.

4. QUALITY: (a) It shall be uniform in quality, free from foreign materials or imperfections, tough and not easily torn by hand. It shall resist the solvent and swelling actions of hot lubricating oils and coolants.

(b) Parts must be smooth and free from flash.

(c) If rings have a vulcanized joint, the joint section must have the same strength and size as the solid section.

5. REQUIREMENTS: (a) Physical Properties: This material shall possess the following physical properties as received:

Shore Durometer "A" Hardness	60 ± 5
Tensile Strength, lb per sq in.	1500 min
Elongation, %	300 min

All tensile tests required by this and succeeding paragraphs shall conform to ASTM D412-41, except that tensile strengths after all aging tests shall be based on the original unaged cross sectional area.

(b) Oil Aging: Tests shall be conducted in accordance with ASTM D471-40T, except that physical properties after aging shall be determined immediately after removal from the oil. Test conditions shall be as follows:

Medium	SAE-ASTM Rubber Processing Oil Viscosity 150 ± 10 secs. at 100°F Aniline Point 159° ± 3°F
Temperature	300° ± 2°F
Time	70 hours

After aging, the surface shall neither be tacky nor show signs of decomposition. The Shore Durometer "A" hardness change shall be within the limits of -5 to +25 points. The tensile strength shall have decreased by not more than 50% and the elongation by not more than 70% from the values found for the material as received. The volume change shall be within the limits of +5 to +40%.

(c) Oil Aging: Tests shall be conducted in accordance with ASTM D471-40T, except that physical properties after aging shall be determined immediately after removal from the oil. Test conditions shall be as follows:

Medium	Aircraft Engine Lubricating Oil Viscosity 100 ± 5 or 120 ± 5 secs. at 210°F Viscosity Index 95 min. Aniline Point 250° ± 10°F
Temperature	300° ± 2°F
Time	70 hours

After aging, the surface shall neither be tacky nor show signs of decomposition. The Shore Durometer "A" hardness change shall be within the limits of -10 to +10 points. The tensile strength shall have decreased by not more than 50% and the elongation by not more than 50% from the values found for the material as received. The volume change shall be within the limits of +3 to +15%.

(d) Coolant Aging: Tests shall be conducted in accordance with ASTM D471-40T, except that physical properties after aging shall be determined immediately after removal from the coolant. Test conditions shall be as follows:

Medium	Ethylene Glycol 97% Water 3%
Temperature	300° ± 2°F
Time	70 hours

After aging, the surface shall neither be tacky nor show signs of decomposition. The Shore Durometer "A" hardness change shall be within the limits of -15 to +15 points. The tensile strength shall have decreased by not more than 25% and the elongation by not more than 50% from the values found for the material as received. The volume change shall be within the limits of +3 to +25%.

(e) Oven Aging: Tests shall be conducted in accordance with ASTM D573-41 for 70 hours at 212° ± 2°F. After aging, the surface shall be neither hard nor brittle, and the specimens shall withstand bending 180° flat. The Shore Durometer "A" hardness change shall be within the limits of 0 to +10 points. The tensile strength shall have decreased by not more than 25% and the elongation by not more than 40% from the values found for the material as received.

(f) Compression Set: Tests shall be conducted in accordance with ASTM D395-40T, Method B, under the following conditions:

Time	70 hours
Temperature	212° ± 2°F
Compression, To	70% of original thickness

(1) The maximum compression set shall be 55% when expressed as a percentage of the original deflection.

(2) The maximum compression set shall be 17% when expressed as a percentage of the original thickness.

(g) Cold Aging: The cold resistance of the material shall be determined by the SAE-ASTM Bent Loop Method, which is as follows:

(1) The specimen, a strip 4" x $\frac{1}{4}$" x .075", shall be aged in accordance with the Aircraft Engine Lubricating Oil aging requirements, as described in paragraph 5(c) of this specification. It is then placed in a loop position between jaws 2" wide and $2\frac{1}{2}$" apart. Each end of the specimen shall not extend more than $\frac{1}{4}$" into each jaw clamp. After exposure to cold dry air for the specified time and temperature, the jaws are rapidly brought together until they are 1" apart.

Medium	Dry Air
Time	5 hours
Temperature	-40°F

After this test the specimen shall show no signs of cracking.

(2) A similar test of the material as received shall also be made and the specimen shall show no signs of cracking after the test.

6. SAMPLES: Sampling procedures shall conform to ASTM D15-41. When the form in which the material is furnished is unsuitable for the proper preparation of the test specimens required, the vendor shall furnish sufficient material for such specimens from production run materials which he guarantees to be of equal quality to the material supplied.

7. TOLERANCES: Unless otherwise specified on the drawing or purchase order, the following tolerances apply; all dimensions are in inches.

(a) Sheet and Strip:

Nominal Thickness	Tolerance plus or minus
1/8 and less	1/64
over 1/8 to 1/2, incl.	1/32
over 1/2	3/64

(b) Tubing and Molded Hose:

Nominal Wall Thickness	Tolerance plus or minus
Less than 1/16	0.005
1/16 and over	10%

(c) Extrusions and Molded Parts: Sections may be as much as plus or minus 0.005 inch outside of drawing limits provided the cross sectional area is within the limits given by the drawing dimensions.

8. REPORTS: Unless otherwise specified, the vendor shall furnish three copies of a notarized report of the results of tests to determine conformance to this specification. This report shall include the purchase order number, material specification number, vendor's compound number, percentages and specific type of synthetic or synthetics used, part number and quantity.