

AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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Revised

R I N G S, P I S T O N
Centrifugally Cast
Alloy Cast Iron

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

2. COMPOSITION:

Total Carbon	2.85 - 3.50
Silicon	1.00 - 1.65
Manganese	0.50 - 1.00
Phosphorus	0.30 max
Sulphur	0.12 max
Nickel	0.75 - 1.50
Chromium	0.20 - 0.40
Molybdenum	0.35 - 0.65

3. CONDITION: All rings shall be made from centrifugally cast sleeves, conforming to the chemical composition of section 2 above, which have been annealed, quenched and tempered conforming to the physical properties specified in paragraph 4(a) below.

4. PHYSICAL PROPERTIES: (a) Test specimens prepared and tested according to paragraphs (c) and (d) below shall conform to the following physical properties:

Tensile Strength, psi	95,000 min
Modulus of Elasticity, psi	22,000,000 min
Impact Value, Izod, in-lb	10 min
Hardness, Rockwell	C 30-37

(b) Finished rings shall have hardness of Rockwell C' 30-37.

(c) Tensile test blanks shall be cut longitudinally from representative finish heat treated sleeves and machined into test specimens not smaller than the cross-section of the machined piston ring.

(d) Modulus of elasticity and Izod impact blanks shall be cut longitudinally from the same representative finish heat treated sleeves and machined to a rectangular cross-section of 0.140 x 0.260 inches. The Izod specimen shall be unnotched. In conducting modulus tests, steadily increasing load shall be applied to the 0.260 inch face; in conducting impact tests, weight shall strike the 0.260 inch face.

(e) It shall be the vendor's responsibility to prepare and test the specimens, to supply piston rings which have the specified properties, and to furnish similar test specimens to purchaser upon request.

5. MICROSTRUCTURE: Microstructure of rings shall consist of a tempered acicular matrix with finely dispersed, elongated particles of cementite. Graphite shall be present as temper carbon with fine nodules predominating; free ferrite shall be absent.

6. QUALITY: (a) Finished rings shall be of uniform quality and condition, sound, clean, and free from defects detrimental to performance of parts.
- (b) Rings shall be subject to inspection by any method which will reveal defects.
7. FINISH: Sides shall be ground or lapped. Periphery shall be turned smooth, unless otherwise specified on drawing.
8. CIRCULARITY: The diameter through the gap shall exceed the diameter 90° from the gap by not less than 0.0025 inch per inch of nominal ring diameter when finished ring is held around periphery by a flexible steel band 0.0025 - 0.0035 inch thick and of width approximately equal to that of ring and whose inside circumference is equal to the nominal outside circumference of ring plus or minus 0.003 inch.
9. LIGHT-TIGHTNESS OF PERIPHERY: When finished ring is placed in a circular gage whose inside diameter is equal to nominal outside diameter of ring plus or minus 0.0005 inch, the portion of periphery on each side of the gap equal to 20% of the nominal outside diameter of the ring shall be light-tight. The space between the balance of ring periphery and inside diameter of gage shall be not greater than 0.0005 inch at any point and not less than 85% of the periphery of the ring shall be light-tight. Intermittent or fuzzy light shall be considered the same as light-tight.
10. FLATNESS: When weight of not more than 0.50 lb per inch of nominal outside diameter of ring is applied to a ring supported in a gage having the same nominal diameter plus 0.001 inch minus 0.000 inch and having the same interior angle as the nominal angle between side face and periphery of ring, the ring shall show, by light gage, bluing, or other acceptable method, at least line contact around not less than 85% of the side face of ring. This contact may be anywhere between the inside and outside circumference and may vary between these limits on any one ring. This contact shall indicate ring side faces are not wavy.
11. HEAT STABILITY: Finished rings, when heated at 600°F for 1 hour and cooled to room temperature, while confined in a retaining ring having inside diameter equal to the nominal outside diameter of ring plus and minus 0.001 inch, shall retain not less than 90% of the original free gap opening.
12. CORROSION PREVENTION: Each ring shall be completely coated on all surfaces with a suitable corrosion-preventive compound which will adequately protect rings from corrosion during shipment and storage. Compound shall be easily removed by vapor degreasing or by petroleum solvents.
13. APPROVAL: A vendor shall not begin to supply piston rings to this specification until samples have been approved by purchaser and, after approval, no changes are to be made without his permission. Examination of incoming shipments shall prove the workmanship and finish on the rings to be essentially equal to that on the approved samples.