AERONAUTICAL MATERIAL SPECIFICATIONS

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AMS 7312B

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PISTON RINGS, CENTRIFUGALLY CAST IRON

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

2. COMPOSITION:

Total Carbon	2.85 - 3.5
Manganese	0.50 - 1.0
Silicon	0.95 - 1.45
Phosphorus	0.50 max
Sulfur	0.10 max

3. CONDITION: Rings shall be made from centrifugally cast sleeves which have been annealed and normalized.

4. TECHNICAL REQUIREMENTS:

4.1 Test Specimens:

4.1.1 Physical Test Specimens: Tensile test blanks shall be cut longitudinally from representative sleeves after normalizing and machined into test specimens having cross section not smaller than the cross section of the finished ring. Modulus of elasticity blanks shall be cut longitudinally from the same sleeves after normalizing and machined to rectangular cross section of 0.140 x 0.260 inch.

4.1.2 Chemical Analysis Specimens: For carbon determinations performed on the melt, a chilled pencil type specimen is preferred, but other type samples of proven accuracy are acceptable. For carbon determinations performed on castings, a solid sample cut from the casting shall be used.

4.2 Physical Properties: Test specimens prepared as in 4.1.1 shall conform to the following requirements; in conducting modulus tests, steadily increasing load shall be applied to the 0.260 in. face:

Tensile Strength, psi	70,000 min
Modulus of Elasticity, psi	17,000,000 min
Hardness, Rockwell B	95 - 105

4.3 Hardness: Finished rings shall have hardness of Rockwell B 95 - 105 or equivalent.

4.4 Microstructure of Rings: Shall consist of temper carbon nodules in a uniform pearlitic matrix. Primary graphite shall exist only as small isolated areas. Small amounts of free ferrite associated with the graphite will not be considered objectionable. Any particles of free cementite shall be small and isolated.

4.5 Finish: Sides of rings shall be ground or lapped. Periphery shall be turned smooth, unless otherwise specified on drawing.

4.6 Circularity: The diameter through the gap shall exceed the diameter 90 deg from the gap by not less than 0.0025 in. per inch of nominal ring diameter when finished ring is held around periphery by a flexible steel band 0.0045 - 0.0055 in. thick and of width approximately equal to that of ring and whose inside circumference is equal to the nominal outside circumference of ring ±0.003 inch.

4.7 Light-Tightness of Periphery: When finished ring is placed in a circular gage whose ID is equal to nominal OD of ring ±0.0005 in., the portion of periphery on each side of the gap equal to 20% of the nominal OD of the ring shall be light-tight. The space between the balance of ring periphery and ID of gage shall be not greater than 0.0005 in. 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.

4.8 Flatness: When weight of not more than 0.50 lb per inch of nominal OD of ring is applied to a ring supported in a gage having the same nominal diameter +0.001 in., -0.000 in., 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 the 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.

4.9 Heat Stability: Finished rings, when heated at 600 F for 1 hr and cooled to room temperature while confined in a retaining ring having ID equal to the nominal OD of ring ±0.001 in., shall retain not less than 90% of the original free gap opening.

5. QUALITY: Parts shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to their performance.

6. REPORTS:

6.1 Unless otherwise specified, the vendor, before the first shipment, shall furnish for each purchase order three copies of a statement that the piston rings will conform to the chemical composition and physical properties specified. This report shall include the purchase order number, material specification number, and part number.

6.2 Unless otherwise specified, the vendor shall furnish to the purchaser's Materials Laboratory one copy of a weekly cumulative laboratory report showing the chemical composition and physical properties of typical sleeves cast during the period.

7. PROTECTIVE TREATMENT: Rings shall be protected during shipment and storage by a coating of suitable corrosion preventive compound which is readily removable by washing in hydrocarbon solvents.

8. APPROVAL:

8.1 To assure adequate performance characteristics, sample rings shall be approved by purchaser before rings for production use are supplied, unless such approval be waived.