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INTERNATIONAL
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 7310H

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Superseding AMS 7310G

Submitted for recognition as an American National Standard

RINGS, PISTON, CAST IRON
As Cast

1. SCOPE:

1.1 Form:

This specification covers piston rings fabricated from cast iron.

1.2 Application:

These rings have been used typically as compression rings, oil scraper rings, and dual oil control rings in aircraft engines, but usage is not limited to such applicatio ns.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The applicable issue of referenced publications shall be the issue in effect on the date of the purchase order.

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 247 Evaluating the Microstructure of Graphite in Iron Castings
ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 351 Chemical Analysis of Cast Iron - All Types

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

(R) Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 351, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Total Carbon	3.50	3.90
Silicon	2.20	3.10
Manganese	0.40	0.80
Phosphorus	0.30	0.80
Sulfur	--	0.13

3.1.1 Alloying elements may be added, with the approval of purchaser, to produce a high quality iron meeting the requirements of 3.3 and 3.4.

3.2 Fabrication:

(R) Rings shall be machined from castings in the as-cast condition.

3.2.1 Finish: Sides of rings shall be ground or lapped. Periphery shall be turned smooth.

3.3 Properties:

Rings shall conform to the following requirements:

3.3.1 Finished Rings:

3.3.1.1 Hardness: Shall be 97 to 104 HRB, or equivalent (See 8.2), determined in accordance with ASTM E 18.

3.3.1.2 Microstructure: Shall be free from abnormal segregation. Matrices shall be essentially fine pearlite with no appreciable amounts of massive cementite, determined in accordance with ASTM A 247. Both phosphide eutectic and graphite shall be evenly distributed and the latter shall be present primarily in the form of randomly oriented flakes.

3.3.1.3 Circularity: The diameter through the gap shall exceed the diameter 90 degrees from the gap by not less than 0.0025 inch per inch (0.0025 mm/mm) of nominal ring diameter when finished ring is held around its periphery by a flexible steel band 0.0045 to 0.0055 inch (0.114 to 0.140 mm) thick and of a width approximately equal to that of the ring and whose inside circumference is equal to the nominal outside circumference of the ring ±0.003 inch (±0.08 mm).

3.3.1.4 Light-Tightness of Periphery: When finished ring is placed in a circular gage whose ID is equal to the nominal OD of the ring ±0.0005 inch (±0.013 mm), the portion of the 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 the ring periphery and ID of gage shall be not greater than 0.0005 inch (0.013 mm) 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.

3.3.1.5 Flatness: When weight of not more than 0.50 pound per inch (9 kg/m) of nominal ring OD is applied to a ring supported in a gage having the same nominal diameter +0.001 inch (+0.025 mm), -0.000, and having the same interior angle as the nominal angle between side face and periphery of ring, the ring shall show at least line contact around not less than 85% of the side face of the ring, determined by light gage, bluing, or other method acceptable to purchaser. 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 that ring side faces are not wavy.

3.4 Quality:

Rings, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the rings.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of rings shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the rings conform to specified requirements.

4.2 Classification of Tests:

4.2.1 (R) All technical requirements are acceptance tests and preproduction tests and shall be performed prior to or on the first-article shipment of a ring to a purchaser, on each melt or lot as applicable, when a change in material or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing:

(R) Shall be in accordance with the following; a lot shall be all rings of the same size or part number, from the same melt of iron, and presented for vendor's inspection at one time:

4.3.1 Composition: One or more samples from each melt. If composition is determined on the melt, a chilled pencil-type specimen is preferred for carbon determinations but other types of samples of proven accuracy may be used. If composition is determined on rings or ring castings, a solid sample cut from the ring or casting shall be used.

4.3.2 Hardness: One or more rings of each part number in each shipment.

4.3.3 Dimensional Requirements: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample rings shall be approved by purchaser before rings for production use are supplied, unless such approval be waived by purchaser.

4.4.2 Vendor shall use manufacturing procedures, processes, and methods of inspection on production rings which are essentially the same as those used on the approved sample rings. If necessary to make any change in manufacturing procedures or processes, vendor shall submit for reapproval a statement of the proposed changes in operations and, when requested, sample rings. Production rings made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports:

(R) The vendor of castings shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements. This report shall include the purchase order number, lot number, AMS 7310H, and part number.

4.6 Resampling and Retesting:

If any specimen used in the above tests fails to meet specified requirements, disposition of the rings may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet specified requirements shall be cause for rejection of the rings represented. Results of all tests shall be reported.