



# AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.

400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

## AMS 7330

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Revised

### RETAINING RINGS, STEEL, CORROSION RESISTANT Spiral Wound

#### 1. SCOPE:

1.1 Type: This specification covers uniform-cross-section, spiral retaining rings made of corrosion-resistant steel.

1.2 Application: Primarily for retaining bearings and springs in housings and on shafts and for retaining shafts in housings for use up to 400° F (204° C).

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., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

##### 2.1.1 Aerospace Material Specifications:

AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys

AMS 2350 - Standards and Test Methods

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings

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

ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

##### 2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

#### 3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

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|            | min   | max   |
|------------|-------|-------|
| Carbon     | --    | 0.15  |
| Manganese  | --    | 2.00  |
| Silicon    | --    | 1.00  |
| Phosphorus | --    | 0.040 |
| Sulfur     | --    | 0.030 |
| Chromium   | 17.00 | --    |
| Nickel     | 7.00  | --    |
| Molybdenum | --    | 0.75  |
| Copper     | --    | 0.75  |

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

### 3.2 Fabrication:

3.2.1 Rings shall be wound as a spiral of two or more turns from strip of uniform cross section and rounded edges, cold worked sufficiently to meet the requirements of 3.3 on the finished rings.

3.2.2 Passivation: When specified, finished rings shall be passivated by immersion in one of the following solutions at the temperature and for the time shown, rinsing, and drying:

- (a) 20 - 50% by volume of nitric acid at 70° - 90° F (21.1° - 32.2° C) for 30 - 40 minutes.
- (b) 20 - 25% by volume of nitric acid plus 2 - 3% by weight of sodium dichromate operated at 70° - 90° F (21.1° - 32.2° C) for 30 - 40 min., at 120° - 130° F (48.9° - 54.4° C) for 20 - 30 min., or at 145° - 155° F (62.8° - 68.3° C) for 10 - 15 minutes.

### 3.3 Properties:

3.3.1 Hardness: Shall be as follows, or equivalent, determined in accordance with ASTM E18:

| Nominal Material Thickness |                           | Hardness          |
|----------------------------|---------------------------|-------------------|
| Inch                       | (Millimetres)             |                   |
| 0.008 to 0.015, incl       | (0.20 to 0.38, incl)      | 83.0 - 86.0 HR15N |
| Over 0.015 to 0.022, incl  | (Over 0.38 to 0.56, incl) | 64.0 - 69.5 HR30N |
| Over 0.022 to 0.047, incl  | (Over 0.56 to 1.19, incl) | 72.0 - 74.9 HRA   |
| Over 0.047 to 0.062, incl  | (Over 1.19 to 1.57, incl) | 39.8 - 48.5 HRC   |

3.3.2 Performance: Using mandrels having grooves conforming to the dimensions and tolerances for which the rings were designed, rings shall be capable of being inserted in the groove and removed five times without showing indications of cracks, excessive permanent set or distortion, or other conditions detrimental to use of the rings. Distortion or permanent set when external rings are expanded or internal rings are compressed by 10% of the nominal free diameter shall be considered failure.

3.4 Quality: Rings shall be sound, clean, uniform in quality and condition, free from hanging burrs and slivers, gouges, porosity, cracks, scale, and other conditions detrimental to the serviceability of the rings.

3.4.1 Edges shall be regular, uniform, and smooth and free from dents, nicks, and other irregularities.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of rings 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 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the rings conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to composition (3.1), fabrication (3.2), and hardness (3.3.1) requirements are classified as acceptance or routine control tests.

4.2.2 Qualification Tests: Tests to determine conformance to performance (3.3.2) requirements are classified as qualification or periodic control tests.

4.3 Sampling:

4.3.1 Acceptance Tests:

4.3.1.1 Composition: Sampling shall be in accordance with AMS 2371 on the strip from which rings are made. Sampling of finished rings is not required.

4.3.1.2 Hardness: At least five rings from each lot. A lot shall be all rings of the same part number made in one continuous production run and presented for inspection at one time.

4.3.2 Qualification Tests: Sampling shall be as agreed upon by purchaser and vendor.

4.4 Reports: The vendor of the rings shall furnish with each shipment three copies of a report stating that the rings conform to all technical requirements of this specification. This report shall include the purchase order number, material specification number, part number, and quantity.

4.5 Resampling and Retesting: If any specimen used in the above tests fails to meet the 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 the specified requirements shall be cause for rejection of the rings represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Rings of each different part number shall be packed in separate containers. Containers shall be clearly and legibly marked to show the following information:

RETAINING RINGS, STEEL, CORROSION RESISTANT  
AMS 7330  
PART NUMBER \_\_\_\_\_  
PURCHASE ORDER NUMBER \_\_\_\_\_  
MANUFACTURER'S IDENTIFICATION \_\_\_\_\_  
QUANTITY \_\_\_\_\_

5.2 Packaging: Containers shall be prepared for shipment in accordance with commercial practice to assure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

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