Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 7240D
Superseding AMS 7240C
Issued 3-13-40
Revised 10-15-79

UNS G10600

WASHERS, SPRING LOCK
Carbon Steel

1. SCOPE:

1.1 Type: This specification covers plain helical lock washers fabricated from heat treated carbon steel.

1.2 Application: Primarily for use with threaded fasteners; not recommended for use at temperatures higher than 450°F (230°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, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2259 - Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2350 - Standards and Test Methods
AMS 2400 - Plating, Cadmium

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

ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E350 - Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

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

2.3.1 Federal Standards:

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

2.3.2 Military Standards:

MIL-STD-414 - Sampling Procedures and Tables for Inspection by Variables for Percent Defective
MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E350, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser :

	min	max
Carbon	0.55	0.88
Manganese	0.60	0.90
Silicon	0.15	0.35
Phosphorus	---	0.040
Sulfur	---	0.050
Nickel	---	0.25
Chromium	---	0.10
Molybdenum	---	0.08
Copper	---	0.35

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2259.

3.2 Condition: Hardened, tempered, and plated.

3.3 Fabrication:

3.3.1 Helix: Washers shall be coiled so that the free height is approximately twice the thickness of the washer section. Gap and relationship of the severed ends shall be such as to prevent the washers tangling.

3.3.2 Finish: Washers shall be plated in accordance with AMS 2400.

3.4 Properties: Washers shall conform to the following requirements:

3.4.1 Hardness: Shall be 45 - 53 HRC, determined in accordance with ASTM E18, after removing the plating and any decarburization.

3.4.2 Temper: After the first compression to flat, the free height of a washer shall be not less than 0.66 times the original free height. Subsequent compressions to flat shall not further reduce this free height by more than 0.005 in. (0.13 mm) but the free height after ten compressions to flat shall be not less than 0.66 times the original free height.

3.4.3 Toughness: A portion of washer shall be firmly gripped in vise jaws having sharp edges. Ends of washer shall be free and an axis passing through the slot shall be parallel to top of vise. An equal portion of washer shall be gripped in wrench jaws. Edges of wrench jaws shall be sharp and in a plane parallel to top of vise. Free portion of washer, between the grip of vise and wrench, shall be approximately 25% of washer diameter. Movement of wrench in the direction that increases the free height of the washer shall twist the lock washer through 90 deg without evidence of fracture. When a washer fractures because of twist, the structure at the point of fracture shall show a fine grain; the washers shall deliver, at the instant of fracture, a tough, springy, reactive shear.

3.5 Quality: The flat faces and the inner and outer periphery of the washers shall be smooth and free from knurling, serrations, die marks, and deep scratches; however, slight feed marks are permissible. The ends at the gap shall not have cutting edges at the contact surfaces. Washers shall have rounded edges and shall be free from internal and external imperfections detrimental to their performance.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of washers 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 ensure that the washers conform to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each lot.

4.3 Sampling: Shall be in accordance with the following; a lot shall be all washers of the same part number presented for vendor's inspection at one time:

4.3.1 Composition: One sample per lot.

4.3.2 Other Requirements: In accordance with MIL-STD-414 to an AQL of 3.5%.

4.4 Reports: The vendor of washers shall furnish with each shipment three copies of a report stating that the washers conform to the technical requirements of this specification. This report shall include the purchase order number, this specification number and its revision letter, contractor or other direct supplier of the material, part number, nominal size, and quantity.

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

5. PREPARATION FOR DELIVERY:

5.1 Identification and Packaging:

5.1.1 Washers of each different part number shall be packaged in separate containers.

5.1.2 Each container shall be marked to show not less than the following information:

WASHERS, SPRING LOCK, CARBON STEEL
AMS 7240D
PART NUMBER_____
LOT NUMBER_____
PURCHASE ORDER NUMBER_____
QUANTITY_____
MANUFACTURER'S IDENTIFICATION_____

5.1.3 Containers of washers shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the washers to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.1.4 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.1.1 and 5.1.3 will be acceptable if it meets the requirements of Level C.

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

7. REJECTIONS: Washers not conforming to this specification or to authorized modifications will be subject to rejection.