AEROSPACE STANDARD

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Superseding AS7240

Washers, Spring Lock, Carbon Steel, Procurement Specification for

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature. This standard has been stabilized.

STABILIZED NOTICE

This document has been declared "Stabilized" by the SAE E-25 General Standards for Aerospace and Propulsion Systems Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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WARNING

This document includes cadmium as a plating material. The use of cadmium has been restricted and/or banned for use in many countries due to environmental and health concerns. The user should consult with local officials on applicable health and environmental regulations regarding its use.

1. SCOPE

1.1 Type

This procurement 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. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS 2259 Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels

AMS 2400 Plating, Cadmium

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM E 350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

2.1.3 ANSI Publications

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI/ASQC Z1.9 Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming

2.1.4 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, http://assist.daps.dla.mil/quicksearch/.

MIL-STD-2073 Standard Practice for Military Packaging

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

2.2 Unit Symbols

°F - degree, Fahrenheit

°C - degree, Celsius

% - percent (1% = 1/100)

mm - millimeter

in - inch

3. TECHNICAL REQUIREMENTS

3.1 Material

3.1.1 Chemical Composition

Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E 350, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

TABLE 1

	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

3.1.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS 2259.

3.1.2 Condition

Hardened, tempered, and plated.

3.2 Fabrication

3.2.1 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.

3.2.2 Finish

Washers shall be plated in accordance with AMS 2400.

3.3 Properties

Parts shall conform to the following requirements:

3.3.1 Hardness

Shall be 45 - 53 HRC, determined in accordance with ASTM E 18, after removing the plating and any decarburization

3.3.2 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.

3.3.3 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° 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.