

**MIL-W-21338A**

15 JANUARY 1970  
SUPERSEDING  
MIL-W-21338  
30 June 1959

MILITARY SPECIFICATION

WASHERS, KEY RETAINING,  
BALL AND ROLLER BEARINGS

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope - This specification covers the procurement requirements for retaining key washers for use in assemblies with ball and roller bearings.

1.2 Classification - The washers shall be of the following types and classes, as specified (see 6.2):

Types:

- \* Type I - Regular series
  - Class 1 - Carbon steel
  - Class 2 - Corrosion resisting steel
- \* Type II - Light series
  - Class 1 - Alloy steel

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

FSC 5310

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## SPECIFICATIONS

Federal

- \* QQ-P-35 Passivation Treatment for Austenitic, Ferritic, and Martensitic Corrosion-Resisting Steel (Fastening Devices)
- QQ-P-416 Plating, Cadmium (Electrodeposited)

Military

- \* MIL-H-3982 Hardware (Fasteners and Related Items) Packaging and Packing for Shipment and Storage of
- MIL-P-16232 Phosphate Coating, Heavy, Manganese or Zinc Base (for Ferrous Metals)

## STANDARDS

Federal

- FED-STD-66 Steel; Chemical Composition and Hardenability
- Fed. Test Method Std. No. 151 Metals: Test Methods

Military

- MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-109 Quality Assurance Terms and Definitions
- MIL-STD-130 Identification Marking of U.S. Military Property
- MS19069 Washers, Key Retaining, Ball and Roller Bearing, Light Series
- MS19070 Washers, Key Retaining, Ball and Roller Bearing, Regular Series

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bids or request for proposal shall apply.

United States of America Standards Institute

- \* USAS B46.1 Surface Texture, Roughness, Waviness, and Lay

(Application for copies should be addressed to the United States of America Standards Institute, 10 East 40th Street, New York, New York 10016.)

3. REQUIREMENTS

- \* 3.1 Materials - Materials used in the manufacture of washers shall be homogeneous in structure, free from laminations, inclusion of nonmetallic impurities, and such other defects as would render the material unsuitable for its intended purpose and shall be in accordance with 3.1.1, 3.1.2, or 3.1.3, as applicable.
  - \* 3.1.1 Carbon steel - Type I, Class 1 washers shall be made from carbon steel conforming to FED-STD-66 Steel Nos. 1005 to 1035, inclusive.
    - 3.1.2 Corrosion-resisting steel - Type I, Class 2 washers shall be fabricated from corrosion-resisting steel conforming to FED-STD-66 Steel Nos. 302, 303, or 304.
  - \* 3.1.3 Alloy steel - Type II, Class 1 washers shall be made from an alloy steel conforming to FED-STD-66 Steel No. 8735.
- \* 3.2 Surface roughness - Surface roughness of Types I and II washers shall not be greater than a minimum roughness height rating of 250. Surface roughness shall be interpreted in accordance with the provisions of USAS B46.1.
- \* 3.3 Tolerances - Tolerances for Types I and II washers shall be plus or minus 0.010 inch for linear dimensions and plus or minus 2 degrees for angular dimensions.
- \* 3.4 Design, sizes, and dimensions - Unless otherwise specified in the contract or order, washers shall conform to the designs, sizes, dimensions, and other requirements specified herein.
- \* 3.5 Tangs - The tangs shall be equally spaced, uniform and symmetrical with respect to size, shape, and angle.
- \* 3.6 Bending - Washers shall be capable of being bent without fracture, as specified in test method 4.4.1.

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- \* 3.7 Protective coating and treatment - Unless otherwise specified in the contract or order (see 6.2), washers shall be plated, coated, or treated in accordance with 3.7.1, 3.7.2, or 3.7.3.

3.7.1 Cadmium plating - Cadmium plating shall be in accordance with QQ-P-416, Type II, Class C.

3.7.2 Phosphate coating - Phosphate coating shall be in accordance with MIL-P-16232, Type II without supplementary finish.

- \* 3.7.3 Passivation - Corrosion-resistant steel shall be passivated in accordance with QQ-P-35.

3.7.3.1 Other methods of passivation may be substituted in lieu of 3.7.3 only upon prior approval of the procuring activity.

3.8 Hardness -

3.8.1 Carbon steel - The hardness of carbon steel washers in the annealed condition shall be Rockwell B50 minimum to Rockwell B81 maximum.

3.8.2 Corrosion-resisting steel - Corrosion-resisting steel washers shall be in the annealed condition and at a hardness of 70 Rockwell B minimum to 90 Rockwell B maximum.

3.8.3 Alloy steel - The hardness of alloy steel washers in the normalized condition shall be Rockwell B92 minimum.

3.9 Identification marking - Each washer shall be permanently and legibly marked with the manufacturer's name or trademark and part number in accordance with the provisions of MIL-STD-130.

3.10 Workmanship - Workmanship shall be in accordance with high grade commercial practice governing this type of item. Washers shall be free from burrs, sharp edges, cracks, or any other defects which will adversely affect their serviceability.

#### 4. QUALITY ASSURANCE PROVISIONS

- \* 4.1 Responsibility for inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the

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inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

- \* 4.1.1 Inspection terms - The definitions of terms used in this section shall be in accordance with MIL-STD-109.
- \* 4.2 Classification of inspection - The inspection requirements specified herein are classified as quality conformance inspections (see 4.3).
- \* 4.3 Quality conformance inspection - Quality conformance inspection shall consist of all the examinations and tests specified herein.
  - 4.3.1 Sampling -
    - 4.3.1.1 Inspection lot - A lot shall consist of all the washers of the same type, class, and size submitted for quality conformance inspection at one time.
    - \* 4.3.1.2 Sampling for quality conformance tests - Unless otherwise specified, sampling for Composition, Hardness and Bending tests shall be in accordance with Inspection Level S-2 of MIL-STD-105. Disposition of the lot shall be in accordance with the criteria for the acceptable quality level (AQL) 10.0 percent defective of MIL-STD-105 for each test.
    - \* 4.3.1.3 Sampling for examination of the end item - Unless otherwise specified, sampling for the following examinations shall be in accordance with Inspection Level II of MIL-STD-105:
      - (a) Visual and dimensional examination (see 4.3.2.1).
      - (b) Examination for packaging, packing and marking (see 4.3.2.2).
  - 4.3.2 Examination of the end item -
    - \* 4.3.2.1 Visual and dimensional examination - Sample washers selected in accordance with 4.3.1.3 shall be visually and dimensionally examined in accordance with the requirements of 3.2 through 3.5, 3.7, 3.9, and 3.10, and the contract or order. The AQL shall be 2.0 defects per 100 units.
    - \* 4.3.2.2 Examination for packaging, packing and marking - The inspector shall ascertain that packaging, packing, and marking of washers and the marking of containers is in accordance with the requirements of this specification and the contract or order.
- 4.4 Test methods -

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- \* 4.4.1 Bending - Sample washers selected in accordance with 4.3.1.2 shall be capable of being bent back 180° (degrees) flat, either way of grain, over a radius equal to 1/2 the stock thickness, without fracture.
  - \* 4.4.2 Composition and hardness - Sample washers selected in accordance with 4.3.1.2 shall be tested for composition and hardness for conformance with 3.1 and 3.8 respectively. The test procedures for composition and hardness shall be as outlined in Fed. Test Method Std. No. 151, or the manufacturer's certificate on composition and hardness will be acceptable.
- 4.5 Rejected lot - A rejected lot may be resubmitted for Government acceptance in accordance with the provisions of MIL-STD-105.

## 5. PREPARATION FOR DELIVERY

- \* 5.1 Preservation, packaging, and packing - Washers shall be preserved and packaged Level A or C, and packed Level A, B, or C of MIL-H-3982. The level of protection shall be as specified in the contract or order (see 6.2).

## 6. NOTES

6.1 Intended use - Retaining key washers covered by this specification are intended for use with slotted retaining nuts in securing and locking ball and roller bearings in position on shafts against shaft shoulders. This specification covers the requirements for MS19069 to MS19070.

- \* 6.2 Ordering data - Procurement documents should specify the following:
  - (a) Title, date, and number of this specification.
  - (b) Type, class, and size of washer required (see 1.2 and 3.4).
  - (c) Protective finish required (see 3.7).
  - (d) Whether preservation shall be Level A or Level C (see 5.1).
  - (e) Whether packaging shall be Level A or Level C (see 5.1).
  - (f) Whether packing shall be Level A, Level B, or Level C (see 5.1).
- \* 6.3 The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government

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assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

**Custodians:**

Army - AT  
Navy - OS  
Air Force - 11

**Preparing activity:**

Navy - OS  
Project No. 3110-0209

**Review activities:**

Army - WC, MU, AV, MI  
Navy - OS, SH  
Air Force - 11, 84

**User activities:**

Army - GL  
Navy - YD, MC, AS  
Air Force -



SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
<p style="text-align: center;"><b>INSTRUCTIONS</b></p> <p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).</p>		
SPECIFICATION		
<b>MIL-W-21338A      WASHERS, KEY RETAINING, BALL AND ROLLER BEARINGS</b>		
ORGANIZATION (Of submitter)		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO      IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED (Printed or typed name and activity)		DATE