



Designation: ~~F844 – 07a (Reapproved 2013)~~ F844 – 19

Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use¹

This standard is issued under the fixed designation F844; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

~~This standard has been approved for use by agencies of the U.S. Department of Defense.~~ This standard has been approved for use by agencies of the U.S. Department of Defense.

1. ~~Scope~~ Scope*

1.1 This specification covers round and miscellaneous shape steel plain (flat) washers furnished in an unhardened condition.

1.2 ~~The~~ These washers are intended for general use bolt, nut, and stud applications to provide increased bearing surface, spacing, and to prevent galling.

1.3 Unless otherwise specified, ~~the~~ washers are furnished with dimensions conforming to ~~B18.22.1, B18.21.1, Type A, Tables 1A and Tables 1B.~~ Table 11.

1.4 Hardened washers for use with heat-treated structural bolts are covered by Specifications ~~F436F436/F436M and F436M.~~

1.5 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

~~A29/A29M~~ Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought

~~A568/A568M~~ Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for

~~A751~~ Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

~~B633~~ Specification for Electrodeposited Coatings of Zinc on Iron and Steel

~~B695~~ Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

~~D3951~~ Practice for Commercial Packaging

~~F436F436/F436M~~ Specification for Hardened Steel Washers Inch and Metric Dimensions

~~F436M~~ Specification for Hardened Steel Washers (Metric)

¹ This specification is under the jurisdiction of Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.02 on Steel Bolts, Nuts, Rivets and Washers. Current edition approved Nov. 1, 2013Dec. 1, 2019, Published January 2014December 2020. Originally approved in 1983. Last previous edition approved in 20072013 as ~~F844 – 07a~~F844 – 07a(2013). DOI: ~~10.1520/F0844-07AR13~~10.1520/F0844-19.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

F606/F606M Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets

F1470 Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

F1941/F1941M Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric

F2329/F2329M Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

2.2 *ASME Standards:*³

~~B18.22.1~~**B18.21.1** ~~Plain Washers~~Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

B18.24 Part Identifying Number (PIN) Code System Standard for B18 Fastener Products

2.3 *Military Specification:*

DOD-P-16232 Phosphate Coating for Ferrous Metals⁴

2.4 *Federal Specification:*

QQ-P-416 Plating, Cadmium (Electrodeposited)⁴

3. Ordering Information

3.1 Orders for washers under this specification shall include:

3.1.1 Quantity (number of pieces of same item and size).

3.1.2 Name of item (steel plain washers).

3.1.3 Size (Nominal inside diameter and thickness. Include outside diameter, when required).

3.2 The following requirements are optional and may be specified when required:

3.2.1 Dimensions if other than ~~B18.22.1~~**B18.21.1**, Type A.

3.2.2 Finish if other than oiled (see 4.3 through 4.3.6).

3.2.3 Chemical composition, if required (see 5.1.2).

3.2.4 Hardness, if required (see 6.2).

~~3.2.5 Shipment lot Testing, if required (see 9.2).~~

3.2.5 Test Reports, if required (see Section 12).

3.2.6 Marking, if required (see 14.1).

3.2.7 For establishment of a part identifying system, see ASME B18.24.

4. Materials and Manufacture

4.1 ~~Material—The washers~~Washers shall be punched from hot-rolled, hot-rolled and pickled, or cold-rolled steel; or shall be machined from bar stock or tubing; or shall be forged at the manufacturer's option.

4.2 ~~Burr Removal—The washers~~Washers shall be tumbled, vibrated, or otherwise processed to minimize burrs.

4.3 *Protective Finishes:*

4.3.1 *Unprotected Washers*—Unless otherwise specified, ~~the washer~~washers shall be furnished plain, with no protective finish other than oil to minimize rusting.

³ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁴ Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil/>

4.3.2 Zinc Coatings, Hot-Dip and Mechanically Deposited:

4.3.2.1 When zinc-coated washers are required, the purchaser shall specify the zinc-coating process, such as “hot dip,” “mechanically deposited,” or “no preference.” When “no preference” is specified, the supplier shall furnish washers with either finish as described in 4.3.2.2 or 4.3.2.3.

4.3.2.2 When “hot-dip” is specified, the washers shall be zinc-coated by hot dipping in accordance with the requirements of Specification ~~F2329~~F2329/F2329M.

4.3.2.3 When “mechanically deposited” is specified, the washers shall be zinc-coated by mechanical deposition in accordance with the requirements of Class 55 of Specification **B695**.

~~4.3.2.4 When “no preference” is specified, the supplier shall furnish either a hot-dip zinc coating in accordance with Specification F2329, or a mechanically deposited zinc coating in accordance with Specification B695, Class 55.~~

4.3.3 *Cadmium Plating*—Cadmium plated washers shall be cadmium plated by electrodeposition and yellow chromate treated in accordance with Federal Specification QQ-P-416, Type II, Class 3.

4.3.4 Zinc Plating, Electroplated and Mechanically Deposited:

4.3.4.1 When zinc plated washers are required, the purchaser shall specify the zinc plating process such as “electroplating” or “mechanical plating” or “no preference”. When “no preference” is specified, the supplier shall furnish washers with either finish as described in 4.3.4.2 or 4.3.4.3.

4.3.4.2 When “electroplating” is specified, the ~~washer~~washers shall be zinc plated by electrodeposition in accordance with Specification ~~B633~~F1941/F1941M, Class ~~Fe/Zn 5, Type HFe/Zn 5A or 5AN~~, unless otherwise specified. See Specification ~~B633~~F1941/F1941M for other thickness classes and finish types.

4.3.4.3 When “mechanical plating” is specified, the ~~washer~~washers shall be zinc plated by mechanical deposition in accordance with Specification **B695**, Class ~~5, Type HFe/Zn 5A or 5AN~~, unless otherwise specified. See Specification **B695** for other thickness classes and finish types.

~~4.3.4.4 When “no preference” is specified, the supplier, at his option, shall furnish either an electroplated finish in accordance with Specification B633, Class Fe/Zn 5, Type H, or a mechanically plated finish in accordance with Specification B695, Class 5, Type H.~~

4.3.5 *Phosphate Coating*—Phosphate coated washers shall be coated in accordance with Military Specification DOD-P-16232, Type Z, Class 2.

4.3.6 *Other Coatings*—Other protective coatings shall be as specified by the ~~purchaser~~purchaser in the inquiry and purchase order.

5. Chemical Composition

5.1 Composition Limits:

5.1.1 ~~The washers~~Washers shall be steel, and unless otherwise specified, shall have no specified chemical composition requirements.

5.1.2 When required, the ~~washers shall be specified to conform to specific chemical requirements.~~purchaser shall provide specific chemical compositions in the inquiry and purchase order, and when so provided, washers shall conform to such compositions.

5.2 *Manufacturer’s Analysis*—When specific chemical requirements have been specified and test reports are required, the manufacturer shall make individual analyses of randomly selected washers from the product to be shipped and report the results to the purchaser. In addition, if heat and lot identities have been maintained, the analysis of the raw material from which the fasteners have been manufactured shall, at the option of the manufacturer, be reported instead of product analysis.

5.3 *Product Analysis*—When specific chemical requirements have been specified, the purchaser reserves the right to conduct