



SURFACE VEHICLE STANDARD	J2655™	SEP2015
	Issued	2003-09
	Revised	2015-09
Superseding J2655 SEP2003		
(R) Fastener Part Standard - Washers and Lockwashers (Inch Dimensioned)		

RATIONALE

ASME B18.21.1 now includes flat washers and has superseded ASME B18.22.1. All references to ASME B18.22.1 have been changed to ASME B18.21.1.

Section 1: Added statement on Hazardous Materials.

Section 2: ASME B18.21.1 has superseded ASME B18.22.1.

Section 3: Definitions has been inserted as a new section and all subsequent sections renumbered.

Section 4 (previously Section 3): Hexavalent chromium is now prohibited in all coatings. Clarified salt spray corrosion protection requirements for electrodeposited coatings. A zinc flake performance coating, Designator F, in accordance with ISO 10683 is added to provide a wider selection of acceptable zinc coatings. ISO 10683 replaces ASTM F1137 which has deleted Types II and III and ASTM F1136 previously referenced herein. .

Figure 1 Field 5: Designator A Aluminum has been deleted due to misidentification of the coating. Designator C has been inactivated for new design. Designators F zinc flake, ZA zinc electroplate with clear topcoat and ZC zinc electroplate with yellow topcoat have been added. Designator Z now allows either Designators ZA or ZC to be furnished.

Table 5 Nominal Dimensions For Fender Washers are added.

Table 6 (previously 5): Corrected Field 4 Designators, G1 carbon steel, S1 and S2 stainless steel and C2 brass hardness to agree with production values. G1 retains a hardness max to prevent brittle material. Corrected designator G4 alloy steel to agree with standard material availability. Added designators C1 copper alloys and N7 and N8 nickel alloys. Coatings column heading is changed from "Recommended" to "Permitted."

Table 7 (previously 6): Corrected Field 4 designators S1 and S2 stainless steel hardness typographical error for toothed lock washers to agree with ASME. Added hardness value to designator C5 phosphor bronze for toothed lock washers. Added designator N7 and N8 nickel alloys.

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Section 5: Adds guidance for CRES 316, coatings and tab type lockwashers,

Appendix B Lock Plates and Tab Lock Washers based upon Navy designs is added to promote standardization.

Minor editorial changes, clarifications and corrections made throughout.

1. SCOPE

This SAE Part Standard covers selected inch dimensioned washers and lock washers manufactured in accordance with American Society for Mechanical Engineers dimensional standards. This SAE standard covers material most often used in ship systems and equipment but its use may be applied wherever washers of the covered materials are used. This standard permits the washers to be identified and ordered by a part identification number (PIN) as defined in this standard.

Appendix A provides a means of establishing PINs for non-standard flat washers.

Appendix B establishes standards for lock plates and tab lock washers often used in Navy designs.

Appendix C identifies other military and non-government standards for flat washers, helical and toothed lock washers. It identifies the materials covered by each standard with a comparison of those dimensions with those SAE J2655 washers.

1.1 Purpose

The purpose of this document is to assist the designer and other personnel in providing requirements and PIN for the most commonly used washers and lock washers. A PIN is normally required for all military applications and provides a useful means of communicating washer and lock washer requirements to suppliers and manufacturers in a very succinct manner.

1.2 Washer and Lock Washer PINs

This document provides PINs that can be used to identify washers and lock washers covered by this standard. The PIN identifies the configuration (shape), nominal diameters, special features (plating and coatings), and material.

1.3 Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this standard may involve the use of hazardous materials, this standard does not address the hazards that may be involved in such use. It is the responsibility of manufacturers and users to consult with appropriate authorities on the applicable health and environmental regulations regarding the handling, use and disposal of hazardous materials. For washers, some of the hazardous materials concerns are the application of the materials in platings (coatings), release of toxic vapors due to heat (for example, welding) and environmental regulations for disposal.

2. REFERENCES

2.1 Applicable Documents

The following documents form a part of this standard to the extent specified herein. The latest issue of the documents shall be used except in those cases where an invitation for bid or procurement contract specifically identifies the issues in effect on a particular date.

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.

SAE AMS 2412	Plating, Silver Copper Strike, Low Bake
SAE AMS 2485	Coating, Black Oxide
SAE AMS 2487	Anodic Treatment of Titanium and Titanium Alloys Solution pH 12.4 Maximum
SAE AMS 2488	Anodic Treatment - Titanium and Titanium Alloys - Solution pH 13 or Higher
SAE J2280	Ship Systems and Equipment - Fasteners - Selection and Identification Requirements

2.1.2 ASME Publications

Available from the American Society of Mechanical Engineers, 22 Law Drive, PO Box 2900, Fairfield, NJ 07007-2900, Tel: 973-882-1170, www.asme.org.

ASME B18.2.6	Fasteners for Use in Structural Applications
ASME B18.12	Glossary of Terms for Mechanical Fasteners
ASME B18.18	Inspection and Quality Assurance for High-Volume Machine Assembly Fasteners
ASME B18.21.1	Washers: Helical Spring-Lock, Tooth Lock and Plain Washers (Inch Series)

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM A342/A342M	Standard Test Methods for Permeability of Feebly Magnetic Materials
ASTM A380	Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment, and Systems
ASTM B580	Standard Specification for Anodic Oxide Coatings on Aluminum
ASTM B695	Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM D6779	Standard Classification System for and Basis of Specification for Polyamide Molding and Extrusion Materials (PA)
ASTM F436	Hardened Steel Washers
ASTM F1470	Fastener Sampling for Specified Mechanical Properties and Performance Inspection
ASTM F1789	Terminology for F16 Mechanical Fasteners
ASTM F1941	Electrodeposited Coatings on Threaded Fasteners (Unified Inch Screw Threads (UN/UNR))
ASTM F2329	Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

2.1.4 Department of Defense Publications

Available online at <http://quicksearch.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094

MIL-DTL-16232 Phosphate Coating, Heavy, Manganese or Zinc Base

QQ-N-286 Nickel-Copper-Aluminum Alloy, Wrought (UNS N05500)

2.1.5 International Standards Publications (ISO)

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org or from the ISO national member for your country. A list of members and their contact information is available at www.iso.org/iso/home/store

ISO 10683 Fasteners - Non-Electrolytically Applied Zinc Flake Coatings

ISO 16047 Fasteners - Torque/Clamp Force Testing

3. DEFINITIONS

3.1 For definition or terms used in this standard see ASME B18.12 and ASTM F1789. In the event of a conflict, the definitions in ASME B18.12 take precedence.

3.2 PIN - Represents **Part Identification Number**. See 4.2 for description of PINs.

4. REQUIREMENTS

4.1 SAE Washer Standards

This washer standard utilizes ASME dimensional standards for flat washers, helical spring lock washers and tooth type lock washers.

4.2 PINs for Selected Flat (Plain) Washers and Lock Washers

PINs are provided herein for selected washers and lock washers for the purpose of common logistics parts identification between designers, fastener manufacturers, construction and repair activities and equipment operators. PINs are provided for only those fastener configurations and materials most likely to be needed for ship systems and equipment. Figure 1 provides a PIN for selected washers and lock washers. The PIN consists of a number of fields in order as identified in Figure 1. (There are no blank spaces in the PIN.) The next to last field in the PIN, Field 4, designates the washer material and the last field, Field 5, if applicable designates the finish. Dimensions for various configuration washers are provided in Tables 1 through 4, B1 and B2 as identified below:

Table 1 - Nominal Dimensions for Round Flat Washers

Table 2 - Nominal Dimensions for Helical Spring Lock Washers

Table 3 - Nominal Dimensions for Tooth-Lock Washers

Table 4 - Nominal Dimensions for Internal/External Tooth Lock Washers

Table B1 – Tab Lock Washer Dimensions

Table B2 – Lock Plate Dimensions for ASME B16.5 Flanges

Tables 6 and 7 list the material designators for Field 4 of the PIN along with the UNS alloy number and hardness requirements. Tables 6 and 7 also list permitted finishes for Field 5 of the PIN.

Table B3 lists the material designators for Field 5 of the PIN along with the UNS alloy number and hardness requirements. Table B3 also lists permitted finishes for Field 6 of the PIN.

4.3 Dimensional Requirements

4.3.1 Thickness of Washers

The thickness of standard washers shall be in accordance with the applicable standard as identified in Figure 1. For non-standard washers the thickness shall be specified per Appendix A and shall be within the tolerances of Appendix A.

4.3.2 Diameters

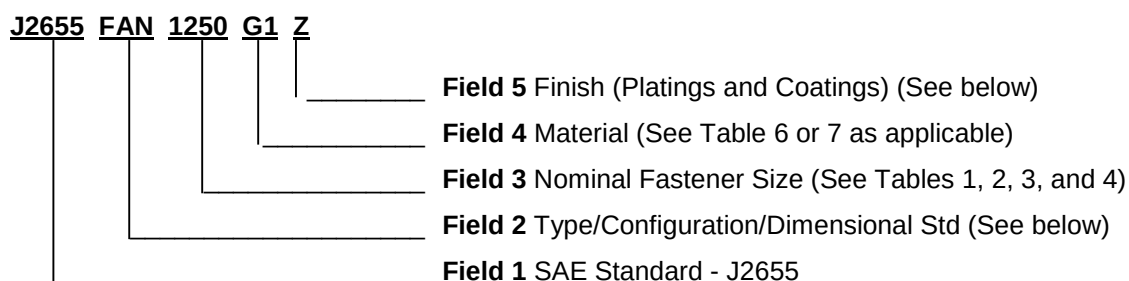
For standard washers, the internal and outside diameters shall be restricted to those identified in the applicable dimensional standards as identified in Figure 1. For non-standard washers, dimensions shall be as identified in Appendix A

4.3.2.1 Inside Diameter Profile

The inside diameter of a flat washer usually has three distinct profiles as a result of the punch press process. As the punch enters, there is some pushing in of the material; that results in a rounded corner section (A). As the punch advances, it creates an essentially parallel section until it approaches the exit point and a tapered breakout occurs (B). Dimensions given for inside diameters, and their accepted tolerances, apply to the parallel sections. At the break out side of the washer, the specified maximum inside diameter may be exceeded by a maximum of 25% of the specified thickness (See Figure 2). For information on selecting the inside diameter see 5.5.3.

4.3.3 Plating Thickness

Dimensions apply before plating or coating. Plating thickness is additive. See 4.5.4.



Field 1 - SAE J2655 Washer Part Standard

Field 2 - Type Product/Configuration/Dimensional Standard

FIGURE 1 - PINS FOR WASHERS AND LOCKWASHERS

**Field 2 Designator**

FAN - Washer, Round, Flat
FAW - Washer, Round, Flat
FBN - Washer, Round, Flat
FBR - Washer, Round, Flat
FBW - Washer, Round, Flat
FCR - Washer, Circular
FCE - Washer, Circular, Extra Thick
FCC - Washer, Circular, Clipped
FEN - Washer, Fender
BSB - Washer, Square, Beveled
BSC - Washer, Square, Beveled
 & Clipped

Dimensional Standard

ASME B18.21.1 Type A Narrow
 ASME B18.21.1 Type A Wide
 ASME B18.21.1 Type B Narrow
 ASME B18.21.1 Type B Regular
 ASME B18.21.1 Type B Wide
 ASTM F436* Hardened Steel
 ASTM F436* Hardened Steel
 ASTM F436* Hardened Steel
 ASME B18.21.1
 ASTM F436* Hardened Steel
 ASTM F436* Hardened Steel

Size Range

0.138 (No. 6) to 3.000
 0.250 to 1.500
 0.060 (No. 0) to 3.000
 0.060 (No. 0) to 3.000
 0.060 (No. 0) to 3.000
 0.250 to 4.000
 0.500 to 1.500
 0.250 to 4.000
 0.125 to 0.500
 0.500 to 1.500
 0.500 to 1.500

* - See 5.5.4 for information about similar B18.2.6 washers



LHR - Lock Washer, Helical Spring, Regular
LHH - Lock Washer, Helical Spring, Heavy
LHE - Lock Washer, Helical Spring, Extra Duty
LHC - Lock Washer, Helical Spring, High Collar

ASME B18.21.1
 ASME B18.21.1
 ASME B18.21.1
 ASME B18.21.1

No. 2 (.086) to 3.000
 No. 2 (.086) to 3.000
 No. 2 (.086) to 3.000
 No. 4 (.112) to 3.000



LTR - Lock Washer, Internal Tooth
LTH - Lock Washer, Internal Tooth, Heavy
LET - Lock Washer, External Tooth
LEC - Lock Washer, External Tooth,
 Countersunk

ASME B18.21.1
 ASME B18.21.1
 ASME B18.21.1
 ASME B18.21.1

No. 2 (.086) to 1.250
 0.250 to 0.875
 No. 3 (.099) to 1.000
 No. 4 (.112) to 0.500



LCA - Lock Washer, Internal/External Tooth (Narrow)*
LCB - Lock Washer, Internal/External Tooth (Regular)*
LCC - Lock Washer, Internal/External Tooth (Wide)*
LCD - Lock Washer, Internal/External Tooth (Extra-wide)*

ASME B18.21.1
 ASME B18.21.1
 ASME B18.21.1
 ASME B18.21.1

No. 10 (.190) to 0.625
 No. 4 (.112) to 0.625
 No. 4 (.112) to 0.625
 No. 4 (.112) to 0.625

*Narrow, Regular, Wide and Extra-wide designations not used in ASME B18.21.1

Field 3 - Nominal Fastener Size - The nominal fastener size is the nominal diameter (expressed in thousandths of an inch) of the externally threaded fastener with which the washer is intended to be used. See Table 1 (Round Flat Washers), Table 2 (Helical Spring Lock Washers), Table 3 (Tooth Lock Washers), and Table 4 (Internal/External Tooth Lockwashers) for applicable product to find the diameter in thousandths of an inch. Fender washers in accordance with ASME B18.21.1 shall use the designators listed in Table 5.

FIGURE 1 - PINS FOR WASHERS AND LOCKWASHERS (CONTINUED)

Examples: A washer for a No. 8 size screw with a nominal I.D. of 0.164 inches would have a Field 3 identification of 0164 while a washer for a 1/2 inch nominal diameter fastener would have a Field 3 identification of 0500. The identification is the nominal size of the externally threaded fastener and not the actual I.D. of the washer.

Field 4 - Material - See Table 6 (Plain Washers) and Table 7 (Lock Washers) for the two character Field 4 designators.

Field 5 - Finish (Coatings and Platings) - If no coating is required, leave Field 5 blank; otherwise designate the selected coating (as permitted by Table 6 or 7 as applicable) from the following list:

- B** = Black oxide (see 4.4.2)
- C** = Cadmium Electroplate (see 4.4.3) (Inactive for New Design, see 5.4.3)
- F** = Zinc Flake, Non-electrolytically applied, with topcoat (chromium prohibited) (see 4.4.5)
- G** = Zinc Coating - Mechanically deposited. See 4.4.4.)
- H** = Zinc Coating - Hot Dipped (see 4.4.8)
- M4** = Manganese Phosphate Coating with chemically converted Class 4 supplementary treatment (see 4.4.6)
- S** = Silver plating (see 4.4.7)
- Z** = Zinc Electroplate – Supplier may furnish either designation ZA or ZC (see 4.4.3)
- ZA** = Zinc Electroplate with clear topcoat (hexavalent chromium prohibited) (see 4.4.3)
- ZC** = Zinc Electroplate with yellow topcoat (hexavalent chromium prohibited) (see 4.4.3)
- Z4** = Zinc-Nickel Electroplate (hexavalent chromium prohibited) (see 4.4.3)

Note: Designators A, Z1, Z2 and Z3 are no longer used. See 5.4.4 for description and replacement guidance.

Example of PIN

The PIN used as example in Figure 1, **J2655FAN1250G1Z**, is as identified below:

The “J2655” indicates the standard for the applicable PIN. “FAN” is the round flat (plain) washer configuration. “1250” is the 1-1/4 inch nominal size from Table 1. “G1” is carbon steel material from Table 6. “Z” is zinc electroplate coating and supplier may furnish either designation ZA or ZC.

FIGURE 1 - PINS FOR WASHERS AND LOCKWASHERS (CONTINUED)

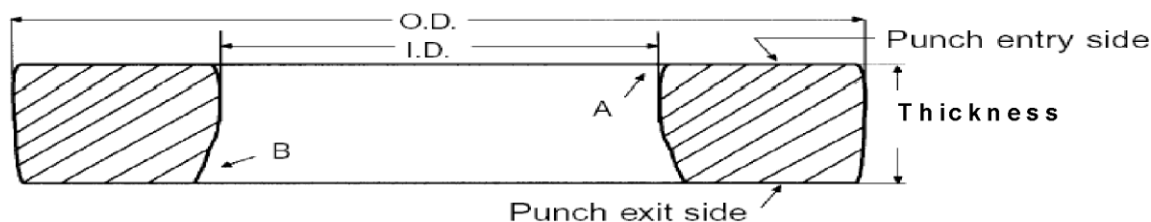


FIGURE 2 - WASHER PROFILE (EXAGGERATED FOR CLARITY)

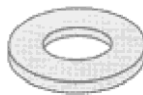


TABLE 1 - NOMINAL DIMENSIONS FOR ROUND FLAT (PLAIN) WASHERS

Nominal Washer Size ¹ /Diam.		Field 3	Type A Wide (Dimensions) ² FAW		Type A Narrow and Type B (Dimensions) ²				
					Type A Narrow FAN	All	Type B Narrow FBN	Type B Regular FBR	Type B Wide FBW
			ID	OD/Thk	OD/Thk	ID	OD/Thk	OD/Thk	OD/Thk
No. 0	0.060	0060				0.068	0.125/0.025	0.188/0.025	0.250/0.025
No. 1	0.073	0073				0.084	0.156/0.025	0.219/0.025	0.281/0.032
No. 2	0.086	0086				0.094	0.188/0.025	0.250/0.032	0.344/0.032
No. 3	0.099	0099				0.109	0.219/0.025	0.312/0.032	0.406/0.040
No. 4	0.112	0112				0.125	0.250/0.032	0.375/0.040	0.438/0.040
No. 5	0.125	0125				0.141	0.281/0.032	0.406/0.040	0.500/0.040
No. 6	0.138	0138			0.375/0.049	0.156	0.312/0.032	0.438/0.040	0.562/0.040
No. 8	0.164	0164			0.438/0.049	0.188	0.375/0.040	0.500/0.040	0.625/0.063
No. 10	0.190	0190			0.500/0.049	0.203 ³	0.406/0.040	0.562/0.040	0.734/0.063
No. 12	0.216	0216			0.562/0.065	0.234 ⁴	0.438/0.040	0.625/0.063	0.875/0.063
1/4	0.250	0250	0.312	0.734/0.065	0.625/0.065	0.281	0.500/0.063	0.734/0.063	1.000/0.063
5/16	0.312	0312	0.375	0.875/0.083	0.688/0.065	0.344	0.625/0.063	0.875/0.063	1.125/0.063
3/8	0.375	0375	0.438	1.000/0.083	0.812/0.065	0.406	0.734/0.063	1.000/0.063	1.250/0.100
7/16	0.438	0438	0.500	1.250/0.083	0.922/0.065	0.469	0.875/0.063	1.125/0.063	1.469/0.100
1/2	0.500	0500	0.562	1.375/0.109	1.062/0.095	0.531	1.000/0.063	1.250/0.100	1.750/0.100
9/16	0.562	0562	0.625	1.469/0.109	1.156/0.095	0.594	1.125/0.063	1.469/0.100	2.000/0.100
5/8	0.625	0625	0.688	1.750/0.134	1.312/0.095	0.656	1.250/0.100	1.750/0.100	2.250/0.160
3/4	0.750	0750	0.812	2.000/0.148	1.469/0.134	0.812	1.375/0.100	2.000/0.100	2.500/0.160
7/8	0.875	0875	0.938	2.250/0.165	1.750/0.134	0.938	1.469/0.100	2.250/0.160	2.750/0.160
1	1.000	1000	1.062	2.500/0.165	2.000/0.134	1.062	1.750/0.100	2.500/0.160	3.000/0.160
1-1/8	1.125	1125	1.250	2.750/0.165	2.250/0.134	1.188	2.000/0.100	2.750/0.160	3.250/0.160
1-1/4	1.250	1250	1.375	3.000/0.165	2.500/0.165	1.312	2.250/0.160	3.000/0.160	3.500/0.250
1-3/8	1.375	1375	1.500	3.250/0.180	2.750/0.165	1.438	2.500/0.160	3.250/0.160	3.750/0.250
1-1/2	1.500	1500	1.625	3.500/0.180	3.000/0.165	1.562	2.750/0.160	3.500/0.250	4.000/0.250
1-5/8	1.625	1625	1.750	3.750/0.180		1.750	3.000/0.160	3.750/0.250	4.250/0.250
1-3/4	1.750	1750	1.875	4.000/0.180		1.875	3.250/0.160	4.000/0.250	4.500/0.250
1-7/8	1.875	1875	2.000	4.250/0.180		2.000	3.500/0.250	4.250/0.250	4.750/0.250
2	2.000	2000	2.125	4.500/0.180		2.125	3.750/0.250	4.500/0.250	5.000/0.250
2-1/4	2.250	2250	2.375	4.750/0.220		2.375	4.000/0.250	5.000/0.250	5.500/0.375
2-1/2	2.500	2500	2.625	5.000/0.238		2.625	4.500/0.250	5.500/0.375	6.000/0.375
2-3/4	2.750	2750	2.875	5.250/0.259		2.875	5.000/0.250	6.000/0.375	6.500/0.375
3	3.000	3000	3.125	5.500/0.284		3.125	5.500/0.375	6.500/0.375	7.000/0.375

1. Only sizes in **bold** type are recommended for new design.

2. See ASME B18.21.1 for complete dimensions. ASME B18.21.1 uses the Narrow and Wide designations for flat (plain) washers only for sizes ¼ through 1-1/2 nominal diameters. Note: As indicated by the heavy dividing line, the I.D. dimensions for Type A Wide plain washers also apply to the Type A Narrow plain washers for nominal sizes 1-1/8 to 1-1/2.

3. The ID for Type A Narrow flat (plain) washer is 0.219 inches.

4. The ID for Type A Narrow flat (plain) washer is 0.250 inches.



TABLE 2 - NOMINAL DIMENSIONS FOR HELICAL SPRING LOCK WASHERS

Nominal Washer Size ¹ /Diam.	Field 3	Maximum Outside Diameter/Minimum Thickness (Inches) ²			
		Regular LHR	Heavy LHH	Extra Duty LHE	High Collar LHC
No. 2 0.086	0086	0.172/0.020	0.182/0.025	0.208/0.027	
No. 3 0.099	0099	0.195/0.025	0.209/0.031	0.239/0.034	
No. 4 0.112	0112	0.209/0.025	0.223/0.031	0.253/0.034	0.173/0.022
No. 5 0.125	0125	0.236/0.031	0.252/0.040	0.300/0.045	0.202/0.030
No. 6 0.138	0138	0.250/0.031	0.266/0.040	0.314/0.045	0.216/0.030
No. 8 0.164	0164	0.293/0.040	0.307/0.047	0.375/0.057	0.267/0.047
No. 10 0.190	0190	0.334/0.047	0.350/0.056	0.434/0.068	0.294/0.047
No. 12 0.216	0216	0.377/0.056	0.391/0.063	0.497/0.080	
1/4 0.250	0250	0.487/0.062	0.489/0.077	0.533/0.084	0.363/0.078
5/16 0.312	0312	0.583/0.078	0.593/0.097	0.619/0.108	0.457/0.093
3/8 0.375	0375	0.680/0.094	0.688/0.115	0.738/0.123	0.550/0.125
7/16 0.438	0438	0.776/0.109	0.784/0.133	0.836/0.143	0.644/0.140
1/2 0.500	0500	0.869/0.125	0.879/0.151	0.935/0.162	0.733/0.172
9/16 0.562	0562	0.965/0.141	0.975/0.170	1.035/0.182	
5/8 0.625	0625	1.073/0.156	1.087/0.189	1.151/0.202	0.917/0.203
3/4 0.750	0750	1.265/0.188	1.285/0.226	1.355/0.241	1.105/0.218
7/8 0.875	0875	1.459/0.219	1.489/0.266	1.571/0.285	1.291/0.234
1 1.000	1000	1.656/0.250	1.700/0.306	1.794/0.330	1.478/0.250
1-1/8 1.125	1125	1.847/0.281	1.903/0.345	2.013/0.375	1.663/0.313
1-1/4 1.250	1250	2.036/0.312	2.104/0.384	2.222/0.417	1.790/0.313
1-3/8 1.375	1375	2.219/0.344	2.301/0.422	2.429/0.458	2.031/0.375
1-1/2 1.500	1500	2.419/0.375	2.491/0.458	2.627/0.496	2.159/0.375
1-5/8 1.625	1625	2.553/0.389	2.694/0.458	2.784/0.496	
1-3/4 1.750	1750	2.679/0.389	2.820/0.458	2.902/0.526	2.596/0.469
1-7/8 1.875	1875	2.811/0.422	2.945/0.458	3.027/0.526	
2 2.000	2000	2.936/0.422	3.144/0.496	3.156/0.526	2.846/0.469
2-1/4 2.250	2250	3.221/0.440	3.398/0.496		3.345/0.508
2-1/2 2.500	2500	3.471/0.440	3.648/0.496		3.595/0.508
2-3/4 2.750	2750	3.824/0.458	3.910/0.526		4.095/0.633
3 3.000	3000	4.074/0.458	4.160/0.526		4.345/0.633

1. Only sizes in **bold** type are recommended for new design.

2. For complete dimensions see ASME B18.21.1.



TABLE 3 - NOMINAL DIMENSIONS FOR TOOTH-LOCK WASHERS

Nominal Washer Size ¹ /Diam.	Field 3	Maximum Outside Diameter/Maximum Thickness (Inches) ²			
		Internal Tooth LTR	Heavy Internal Tooth LTH	External Tooth LET	Countersunk 82° External Tooth LEC
No. 2 0.086	0086	0.200/0.016			
No.3 0.099	0099	0.232/0.016		0.235/0.016	
No. 4 0.112	0112	0.270/0.018		0.260/0.018	0.213/0.019
No. 5 0.125	0125	0.280/0.020		0.285/0.020	
No. 6 0.138	0138	0.295/0.022		0.320/0.022	0.289/0.021
No. 8 0.164	0164	0.340/0.023		0.381/0.023	0.322/0.021
No. 10 0.190	0190	0.381/0.024		0.410/0.024	0.354/0.025
No. 12 0.216	0216	0.410/0.027		0.475/0.027	0.421/0.025
1/4 0.250	0250	0.478/0.028	0.536/0.045	0.510/0.028	0.454/0.025
5/16 0.312	0312	0.610/0.034	0.607/0.050	0.610/0.034	0.599/0.028
3/8 0.375	0375	0.692/0.040	0.748/0.050	0.694/0.040	0.765/0.034
7/16 0.438	0438	0.789/0.040	0.858/0.067	0.760/0.040	0.867/0.045
1/2 0.500	0500	0.900/0.045	0.924/0.067	0.900/0.045	0.976/0.045
9/16 0.562	0562	0.985/0.045	1.034/0.067	0.985/0.045	
5/8 0.625	0625	1.071/0.050	1.135/0.067	1.070/0.050	
3/4 0.750	0750	1.245/0.055	1.265/0.084	1.260/0.055	
7/8 0.875	0875	1.410/0.060	1.447/0.084	1.410/0.060	
1 1.000	1000	1.637/0.067		1.620/0.067	
1-1/8 1.125	1125	1.830/0.067			
1-1/4 1.250	1250	1.975/0.067			

1. Only sizes in **bold** type are recommended for new design.
2. For complete dimensions see ASME B18.21.1.



TABLE 4 - NOMINAL DIMENSIONS FOR INTERNAL/EXTERNAL TOOTH LOCK WASHERS

Nominal Size ¹ /Diam.	Field 3	Maximum Outside Diameter/Maximum Thickness (Inches) ²			
		LCA	LCB	LCC	LCD
No. 4 0.112	0112		0.475/0.021	0.510/0.021	0.610/0.021
No. 5 0.125	0138		0.510/0.028	0.610/0.028	0.690/0.028
No. 6 0.138	0164		0.610/0.034	0.690/0.034	0.760/0.034
No. 8 0.164	0190	0.610/0.034	0.690/0.040	0.760/0.040	0.900/0.040
No. 10 0.190	0216	0.690/0.040	0.760/0.040	0.900/0.040	0.985/0.045
No. 12 0.216	0250	0.760/0.040	0.900/0.040	0.985/0.045	1.070/0.045
1/4 0.250	0312	0.900/0.040	0.985/0.045	1.070/0.050	1.155/0.050
5/16 0.312	0375	0.985/0.045	1.070/0.050	1.155/0.050	1.260/0.050
3/8 0.375	0438	1.070/0.050	1.155/0.050	1.260/0.055	1.315/0.055
7/16 0.438	0500	1.260/0.055	1.315/0.055	1.410/0.060	1.620/0.067
1/2 0.500	0562	1.315/0.055	1.430/0.060	1.620/0.067	1.830/0.067
9/16 0.562	0625	1.410/0.060	1.620/0.067	1.830/0.067	1.975/0.067

1. Only sizes in **bold** type are recommended for new design.

2. For complete dimensions see ASME B18.21.1.

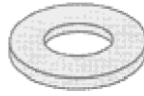


TABLE 5 - NOMINAL DIMENSIONS FOR FENDER WASHERS

Nominal Size ¹	Field 3 PIN Designator	Inside Diameter Basic	Outside Diameter Basic
1/8 X 5/8	0405	0.160	0.625
1/8 X 3/4	0406	0.160	0.750
5/32 X 7/8	0507	0.190	0.875
3/16 X 3/4	0606	0.190	0.750
3/16 X 1	0608	0.190	1.000
3/16 X 1-1/4	0610	0.190	1.250
3/16 X 1-1/2	0612	0.190	1.500
1/4 X 1	0808	0.285	1.000
1/4 X 1-1/4	0810	0.285	1.250
1/4 X 1-1/2	0812	0.285	1.500
1/4 X 1-3/4	0814	0.285	1.761
1/4 X 2	0816	0.285	2.000
5/16 X 7/8	1007	0.348	0.875
5/16 X 1	1008	0.348	1.000
5/16 X 1-1/4	1010	0.348	1.250
5/16 X 1-1/2	1012	0.348	1.500
5/16 X 1-5/8	1013	0.348	1.625
5/16 X 1-3/4	1014	0.348	1.750
5/16 X 2	1016	0.348	2.000
3/8 X 1-1/4	1210	0.410	1.250
3/8 X 1-1/2	1212	0.410	1.500
3/8 X 1-5/8	1213	0.410	1.625
3/8 X 1-3/4	1214	0.410	1.750
3/8 X 2	1216	0.410	2.000
1/2 X 1-1/4	1610	0.535	1.250
1/2 X 1-1/2	1612	0.535	1.500
1/2 X 1-3/4	1614	0.535	1.750
1/2 X 2	1616	0.535	2.000
1/2 X 2-1/2	1620	0.535	2.500

1. Basic thickness is 0.065. For complete dimensions see ASME B18.21.1.