

# FLAT WASHERS AND SPECIAL STAMPINGS

METALLIC AND NON-METALLIC



# **WCL** - One Of The Few True Fastening Specialists

**WCL** has one of the broadest, most diversified offerings of fastening components available from any single source.

We know what each fastener is designed to do and what its limitations are.

Our engineers will recommend the fastener best suited to your specific needs. They are not limited to justifying a certain product line.

**WCL** performance and integrity are confirmed by the leading fasteners makers who have chosen us to represent them. We are master distributors for:

Alliance Plastics Finishing Products Division  
Anillo Industries  
ITW Fastex  
ITW Shakeproof Assembly Components  
ITW Shakeproof Industrial Threaded Products

Rolex National Disk Spring  
Superior Washer and Gasket  
Tyton Company  
VIP - Volt Industrial Products



**WCL** assures product quality three ways:

1. We work only with manufacturers having outstanding quality programs and reputations
2. We have made a major investment in our Quality Inspection program to monitor the conformance of incoming parts to customer specifications and needs. We qualify parts from our manufacturers and processors to assure that all specifications are met.
3. We have developed a state-of-the-art control system to insure required lot traceability and certification on any part we sell.

**WCL - Competitively Priced Quality Fastening Components When You Want Them!**

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# Flat Washer Facts From WCL

## BULLETIN

### Materials & Shapes

Washers are made from virtually any metallic or non-metallic material that can be stamped; including low and high carbon steels, steel alloys, copper, phosphor bronze, titanium, aluminum, fibre, mica, mylar, rubber, nylon, teflon, phenolic and many more. I.D. and O.D. can be configured to provide any size and shape required. They can be round, square, rectangular, hexagonal, oval, or non-symmetrical. They can also have tabs, crowns, notches, and may be countersunk in a variety of degrees.

### Function & Cost

Commercially produced flat washers are designed to meet the needs of most applications relative to dimensional tolerances, hardness and surface conditions. Just about any special need can be met, but it should be remembered that the closer the tolerance, the greater the cost. Wherever possible, avoid specifying close tolerances or variations not warranted by the application.

### Plating

If it is necessary that a part be finished by the application of a coating such as cadmium, zinc, nickel, anodize, silver or gold, the correct required finish should be clearly defined to avoid unnecessary expense. If commercial plating thickness is acceptable, it should be so noted. If a special thickness or a post finish is required, it should be clearly described and specified as such.

### Hardness

Wherever possible, specify commercial quality, low carbon steel. This generally meets most application needs in the most economical manner. Only specify tempered material if special hardness is critical to the application. Tempers such as 1/4 or 3/4 hard in steel are more difficult to obtain and, therefore, more costly.

### Burrs

In the manufacturing process, small stamping burrs are produced. A "normal" stamping burr is defined as 10% of stock thickness, but not less than .0005". If this is acceptable, the drawing or specification should state "normal stamping burrs acceptable". One method normally used to reduce stamping burrs is tumbling or vibratory deburring. While this will not completely eliminate burrs, the process smooths and reduces the protrusions. Costly "burr free" specifications on prints should be avoided, if possible.

### Surface Finish

Wherever possible, accept the surface condition of the material from which the washer is stamped. To meet a specification for a smoother surface finish may require such costly secondary operations as grinding or lapping.

### Hardness Tolerance Range

As a general cost saving rule, keep tolerances as broad as possible. Specify, for example, a Rockwell "C" 45-50 rather than a Rockwell "C" 47-48 wherever it is acceptable. Case hardening tolerances should not be deeper than necessary (0.003" to 0.005" deep file hard is considered adequate for most applications).

### Ordering Quantities

There is an inverse relationship between quantity and price: the larger the production quantity, the lower the unit price. For economy, order the largest quantity possible. WCL may then schedule economical shipments of your parts in increments based on your anticipated needs and usage, rather than making a single delivery.

# GENERAL INFORMATION & REFERENCE SPECIFICATIONS

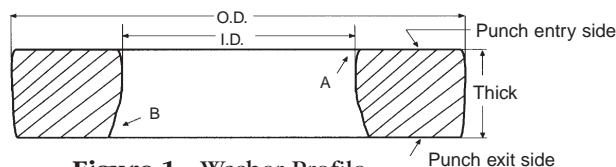
**FLAT WASHER AVAILABILITY** - The flat washers listed in this catalog represent only a small portion of the many that are available. The WCL inventory contains over 7000 different sizes, in different materials, etc. All of these cannot be listed here because of space limitations. Source tooling is available for many others not shown. Pages 29 and 30 show some of the more commonly used specials that are available, cross-referenced to appropriate ordnance numbers.

**QUALITY ASSURANCE** - WCL has a Quality Assurance Department and Program to confirm the integrity of all the products it sells. We represent only those manufacturers that have an outstanding reputation for consistently providing high quality parts, and we maintain complete procurement data and certifications from our suppliers and processors on pertinent Stock Reference items.

**SPECIFICATIONS, TESTING AND CERTIFICATIONS** - A detailed explanation of the test requirements called for under the various military specifications and a listing of the many certifications available through WCL, appear on pages 8 and 9. WCL can be an indispensable source for parts conforming to all MIL-SPEC requirements. If parts are not tested to MIL-SPEC requirements, they are not MIL-SPEC parts. If parts are not plated to MIL-SPEC requirements, they are not MIL-SPEC parts.

**NOMINAL DIMENSIONS** - Nominal dimensions are provided on all flat washers and are so identified. They are provided for reference only. Parts are produced to standard commercial tolerance and are appropriate for all commercial applications. With regards to thickness dimensions indicated, parts conform to stamping industry standards. WCL frequently stocks popular washer sizes in more than one thickness and this is indicated in the charts. For specific tolerances and thicknesses on other referenced parts, please contact WCL. Parts with special tolerances and thicknesses can be provided as specified.

**INSIDE DIAMETER PROFILE** - The inside diameter of a conventional flat washer traditionally has three distinct profiles as a result of the punch press process. As the punch enters, there is some pushing in of the material which results in a rounded corner section (A). Then, as the punch advances, it creates a substantially 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 1.)



**Figure 1 - Washer Profile**  
(Exaggerated for clarity)

**MATERIALS AND PLATING** - The charts on the following pages show the availability of washers in the more popular materials. Many of these washers are available in other non-ferrous materials and non-metals. In the appropriate materials availability columns, standard dash reference numbers are used for AN, MS and NAS parts as well as for some commercial parts to indicate the availability of these parts in the designated materials and finishes. For commercial parts, an "X" designation is used. (See figure 2.)

**METRIC WASHERS** - The many metric flat washers available from WCL are designated with an (M-) prefix for the metric screw or bolt size in the "Size" column. Metric washers are available in either DIN or ANSI/ASME B18.22M specifications and the relevant specification is indicated in the particular "Reference" column. (Example of M6 see Figure 2.) Material thicknesses on metric parts generally conform to conventional U.S. washer manufacturing tolerances unless the parts have been stamped from material produced to metric thickness.



# GENERAL INFORMATION & REFERENCE SPECIFICATIONS

**NAS 620** - washers are used to mount small items with vent radii and other interferences, most commonly found in electronic components. Stocked in steel, stainless steel, brass and aluminum.

**NAS 1149** - this new specification was introduced in 1992 to eventually replace the AN960 specification which is now classified, per revision 21, as “inactive for new design.” This means that on all new products NAS1149 washers may be specified. AN960 washers may continue to be ordered and used in the ongoing production or repair of already designed products. NAS1149 duplicates most of the AN960 parts, but additional, material options permit specification of Titanium and other special high strength alloy materials. Selected NAS1149 parts are referenced in the following charts as an indication of the availability of this series. WCL stocks many of these washers and can supply detailed information and prints when requested. Boeing is one particular used who requires this series. (See Figure 3).

Size	Nominal Dimensions			Reference Part Number	Steel Plated	AN-MS-NAS Dash Numbers						
	I.D.	O.D.	Thick			Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
5/8	.640	1.188	.063	AN960	1016	C1016	XC1016	B1016	961-1016	D1016	JD1016	KD1016
5/8	.640	1.188	.063	NAS1149	F1062P	C1063R	B1062H		D1063H	D1063J	D1063K	
5/8	.640	1.312	.010	STK STD	X							

Figure 3

**MS 15795** - designates general purpose washers and the Dash Numbers show Stainless Steel, Brass and Aluminum. Other materials are available, as well as conventional plated steel. Not specifically listed, but also available from stock are Copper (-500 series) and Nickel Copper alloy (-400 series). The NASM series supercedes the MS15795, but the part numbers remain the same.

**MS 27183** - specifies general purpose washers in Steel, grades 1008 through 1020 ASTM-A109, #4 temper with Cadmium II plating. This series is also available commercially with zinc and other finishes. MS27183 supersedes MS 15795-200 series.

**MS 51496** - these Army and Air Force customer numbers have a reduced outside diameter (narrow series) and are made from Stainless Steel, 20 HRC minimum, passivated, with a 2.0 magnetic permeability or less. This specification may be subject to modification by the Committee on MIL Specifications as a result of difficulties experienced in meeting some dimensional, material and hardness requirements.

**MS 9321 and MS 9549** - made from AMS 5510 stainless steel in a variety of sizes.

**MS 14151** - washers are made from Stainless Type 304 and are normally used in electrical and other non-corrosive applications.

**MS 16212** - specifies a medium series washer made from non-magnetic Stainless having minimum tensile strength of 50,000 psi.

**N 400, N 401, N 402** - this series of washers are General Electric reference numbers for flat washers. Many of these G.E. part numbers cross over to MS series, but have tighter tolerances. WCL supplies MS series to G.E.'s tighter tolerances.

**OTHER REFERENCED PART NUMBERS** - washers meeting other specific OEM references are also shown. These include Martin Marietta, Boeing, Ordnance, etc. WCL offers many other Mil Spec parts, see High Strength-Heat Treated and Non-Metallic sections for numbers that fall under these categories.

# MIL-SPEC TEST REQUIREMENTS

Any specifications for **MIL-SPEC** hardware (such as **AN**, **MS** and **NAS** parts) includes the tests that parts are required to pass to qualify as **MIL-SPEC** parts.

As a service to its valued customers, **WCL** offers the following as a general guide to test and certification requirements for the **MIL-SPEC** hardware items it sells.

## FLAT WASHERS

MIL-SPEC designations for flat washers include, but are not limited to, **AN960**, **MS15795**, **MS27183**, **NAS620**, and **NAS1252**. These are covered by military procurement specification **FF-W-92** which has, as minimum requirements.

1. Chemical analysis
2. Process certification on protective finish
3. Workmanship
4. Magnetic permeability (stainless steel only)

## HELICAL SPRING LOCKWASHERS

MIL-SPEC designations include, but are not limited to, **MS35338**, **MS35340**, **MS51848**, **NAS1640** and **NAS1676**. These are covered by military procurement specification **ASME B18.21.1** or **FF-W-84** which has some, or all, of the following.

1. Interlinking test
2. Free height test
3. Twist test
4. Pressure test
5. Hardness test
6. Chemical analysis (mill certification acceptable)
7. Magnetic permeability (on stainless steel)
8. Process certification on protective finish
9. Decarb test (on carbon steel)
10. Embrittlement test (electro plated)

## SPRING WASHERS - CURVED, WAVE AND BELLEVILLE

MIL-SPEC designations for spring washers include but are not limited to, **M12133/1** and **M12133/2** and are covered by military specification **MIL-W-12133** which has, as minimum requirements:

1. Chemical analysis
2. Process certification on protective coating and surface treatment
3. Inspection for cracks
4. Hardness test
5. Decarburization (carbon steel only)
6. Load Deflection
7. Permanent set
8. Repeated loading

## TOOTH LOCKWASHERS

MIL-SPEC designations for tooth lockwashers include, but are not limited to **MS35333**, **MS35335**, **MS35336**, **MS35790** and **MS45904**. These are covered by military procurement specification **ASME B18.21.1** or **FF-W-100** which has some or all of the following.

1. Hardness test
2. Process certification on protective finish
3. Chemical analysis
4. Compression and flattening test
5. Spread test
6. Twist test
7. Temper test
8. Decarb test (on carbon steel)
9. Embrittlement test (electro plated)

The above list provides a guide relating to the most popular types of MIL-SPEC washers. It should not be construed as a complete list of all military specifications and documents pertaining to washers or as a list of all tests or analysis that may be required.

Many OEM's also have special requirements (including testing) that must be met to be in compliance with their part specifications and purchase requirements.

Review all relevant documents carefully before requesting quotations to avoid unexpected costs for testing and analysis. When in doubt, discuss the requirements with your **WCL** sales associates.

Remember, if it has not been properly tested, it is not MIL-SPEC hardware.



## CERTIFICATIONS AVAILABLE

WCL Company maintains quality control per MIL-I-45208A and maintains certification on most parts for a minimum of seven years after date of purchase. Certifications on file at WCL Company are available for customer or government review, at our facility, upon reasonable request.

The following are some of the Certificates of Compliance and test results available from WCL Company for certifications on file.

TYPE	SOURCE
<b>CERTIFICATES OF COMPLIANCE</b>	<p>WCL Company - certifies part compliance with customers purchase order. Comes standard with every order. <span style="float: right;">No Charge</span></p> <p>In most cases, manufacturer's Certificates of Compliance can be supplied on request. Please note: WCL Company's suppliers have their own part numbers which may appear on certifications and may or may not be the same as Military and/or O.E.M. part numbers. <span style="float: right;">\$20.00</span></p>
<b>CHEMICAL AND HARDNESS TESTS</b>	<p>Test results can be provided on WCL letterhead as verified by our supplier or by independent laboratory test. <span style="float: right;">\$10.00</span></p> <p>Most results can also be provided on manufacturer's letterhead. <span style="float: right;">\$20.00</span></p>
<b>PROCUREMENT SPECIFICATION REQUIREMENTS</b>	<p>Compliance with procurement specification requirements, as tested by one or more of the following: our supplier, independent laboratory and/or WCL Quality Control Department, can be certified on WCL letterhead. <span style="float: right;">\$10.00</span></p> <p>Certification similar to the above, on manufacturer's letterhead, can be provided in most cases <span style="float: right;">\$30.00</span></p>
<b>PLATING</b>	<p>In most cases, copies of plating certifications from plating processors can be supplied on request. <span style="float: right;">\$10.00</span></p>
<b>MISCELLANEOUS</b>	<p>Not all tests and required certifications are listed above. If the test certification you require is not shown, check with your WCL sales representatives.</p>
<b>ORDERING INFORMATION</b>	<p>An example of a WCL part number reads as follows: FW-0266-0625-049-ST1-ZN1</p> <p><u>FW</u> <u>.266</u> <u>.625</u> <u>.049</u> <u>ST1</u> <u>ZN1</u>    MAT=Material    ST1=Commercial Steel Type I.D. O.D. THK. MAT FIN    FIN=Finish    ZN1=Zinc and Clear</p>

# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
000	.040	.090	.010	AVAILABLE		X						
M1	.043	.099	.012	DIN433 <sup>1</sup>								
M1	.043	.126	.012	DIN125A <sup>1</sup>								
M1.2	.051	.118	.012	DIN433 <sup>1</sup>								
M1.2	.051	.149	.012	DIN125A <sup>1</sup>								
00	.055	.156	.010	AVAILABLE		X						
0	.065	.099	.016	NAS620	0	C0	C0P		B0	A0		
0	.065	.125	.015	AVAILABLE		X		X				
0	.065	.125	.025	MS51496		P61						
0	.065	.166	.016	MS51496		P62						
0	.068	.188	.025	N402-	B32							
0	.068	.250	.025	TYPE B-W								
0	.075	.205	.020	AVAILABLE		X						
0	.075	.159	.023	AVAILABLE	X	X						
0	.078	.188	.020	MS15795		801	801B		901		701	
0	.078	.188	.020	MS27183	1							
0	.078	.250	.016	MS15795							744	
0	.078	.140	.016	AVAILABLE		X						
M1.6	.080	.152	.024	ANSI								
M1.6	.080	.191	.024	ANSI	X							
M1.6	.080	.230	.030	ANSI								
1	.084	.156	.025	TYPE B-N								
1	.084	.219	.025	N402-	B32							
1	.084	.281	.032	TYPE B-W								
M2	.086	.177	.012	DIN433 <sup>1</sup>								
M2	.086	.197	.020	DIN125A <sup>1</sup>								
2	.088	.118	.010	AVAILABLE								
2	.089	.149	.016	NAS620	2	C2	C2P		B2	A2		
2	.089	.187	.032	AVAILABLE		X		X*				
2	.089	.216	.020	AVAILABLE		X						
2	.094	.135	.011	MS51496		P79		X*				
2	.094	.158	.025	MS51496		P63						
2	.094	.188	.025	TYPE B-N	X	X*		X*		X*		
2	.094	.218	.020	MS15795	X*	844	844B	X*		X		
2	.094	.250	.020	MS15795	X*	802	802B		902	X*		702
2	.094	.250	.032	N402-	B33							
2	.094	.281	.020	AVAILABLE	X	X				X		
2	.094	.344	.032	TYPE B-W								
2	.094	.375	.035	AN940	13					X		
2	.094	.500	.062	MS15795						X*		
2	.094	.625	.021	AVAILABLE						X		

<sup>1</sup> These DIN specifications are provided for reference. Not a stocked item except where indicated by "X".

\* Indicates that this size is also available (in stock at time of catalog creation) in other thickness, please inquire.

# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
2	.094	.880	.032	AVAILABLE		X						
2	.099	.156	.020	AVAILABLE		X		X				
2	.099	.250	.016	AN960	2L	C2L	XC2L			D2L	JD2L	KD2L
2	.099	.250	.032	AN960	2	C2	XC2	B2		D2	JD2	KD2
2	.099	.312	.020	AVAILABLE				X				
M2	.101	.191	.030	ANSI		X		X*				
M2	.101	.230	.030	ANSI	X	X						
M2	.101	.308	.030	ANSI	X							
3	.102	.180	.016	NAS620	3L	C3L	C3LP		B3L	A3L		
3	.102	.180	.032	NAS620	3	C3	C3P		B3	A3		
3	.105	.156	.020	AVAILABLE		X						
2	.105	.190	.016	AVAILABLE		X						
3	.105	.205	.045	AVAILABLE		X						
3	.105	.250	.016	AN960	3L	C3L	XC3L			D3L	JD3L	KD3L
3	.105	.250	.032	AN960	3	C3	XC3	B3		D3	JD3	KD3
M2.5	.106	.197	.020	DIN433 <sup>1</sup>								
3	.106	.216	.025	MS51496		P64						
M2.5	.106	.256	.020	DIN125A <sup>1</sup>								
M2.5	.106	.315	.032	DIN9021B <sup>1</sup>								
3	.109	.187	.032	AVAILABLE								
3	.109	.219	.025	TYPE B-N	X							
3	.109	.281	.015	AVAILABLE	X	X		X*				
3	.109	.312	.032	N402-	B34							
3	.109	.380	.040	AVAILABLE								
3	.109	.406	.040	TYPE B-W								
4	.115	.209	.016	NAS620	4L	C4L	C4LP		B4L	A4L		
4	.115	.209	.032	NAS620	4	C4	C4L		B4	A4		
4	.115	.289	.025	AVAILABLE		X		X*	X*			
M3	.119	.236	.032	DIN1440 <sup>1</sup>								
4	.119	.250	.016	MS9549	X	04		X*				
4	.119	.250	.031	MS9321	X	04		X*		X		
4	.119	.375	.025	AVAILABLE	X*			X	X	X*		
4	.119	.432	.032	AVAILABLE	X							
4	.119	.469	.025	AVAILABLE	X							
M2.5	.121	.231	.030	ANSI								
M2.5	.121	.281	.020	AVAILABLE	X*	X						
M2.5	.121	.308	.030	ANSI	X*							
M2.5	.121	.387	.030	ANSI	X*							
4	.122	.175	.016	MS51496		P80				X		
4	.122	.175	.031	MS51496		P65						
4	.122	.190	.040	MS51496		P81						
4	.122	.253	.016	MS51496		P66						
4	.122	.253	.032	MS51496		P67		X		X*		

<sup>1</sup> These DIN specifications are provided for reference. Not a stocked item except where indicated by "X".

\* Indicates that this size is also available (in stock at time of catalog creation) in other thickness, please inquire.

# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
4	.125	.203	.032	AVAILABLE		X		X		X		
4	.125	.219	.020	AVAILABLE	X*							
4	.125	.250	.022	MS15795	X	803	803B		903	X*		703
4	.125	.250	.042	AVAILABLE		X		X*				
4	.125	.312	.016	AN960	4L	C4L	XC4L			D4L	JD4L	KD4L
4	.125	.312	.032	AN960	4	C4	XC4	B4	961-4	D4	JD4	KD4
4	.125	.312	.032	MS15795	X	804	B804	X	904			704
4	.125	.312	.032	MS27183	4							
4	.125	.375	.032	MS27183								
4	.125	.375	.032	MS27183	44							
4	.125	.375	.040	N402-	B35					X		
4	.125	.400	.006	AVAILABLE		X						
4	.125	.438	.040	TYPE B-W	X			X*				
M3	.126	.236	.020	DIN433 <sup>1</sup>								
M3	.126	.276	.020	DIN125A <sup>1</sup>								
M3	.126	.355	.032	DIN9021B <sup>1</sup>								
M3	.126	.355	.040	DIN7349 <sup>1</sup>								
5	.126	.415	.032	AVAILABLE		X						
5	.128	.238	.016	NAS620	5L	C5L	C5LP		B5L	A5L		
5	.128	.238	.032	NAS620	5	C5	C5P	X	B5	A5		
5	.130	.190	.092	AVAILABLE		X						
5	.130	.375	.040	AVAILABLE	X*	X						
5	.130	.500	.062	STK SPEC	X*							
5	.135	.250	.006	AVAILABLE	X*	X						
5	.135	.312	.016	MS9549		05		X*				
5	.135	.312	.031	MS9321	X	05						
5	.135	.312	.043	AN122578	X							
5	.135	.438	.047	AVAILABLE	X					X*		
5	.140	.250	.025	AVAILABLE	X*	X*		X*	X			
5	.140	.281	.032	MS27183	45			X*				
5	.140	.438	.016	NAS1149	FN516P	CN516R	CN516B	BN516H		DN516H	DN516J	DN516L
5	.140	.438	.032	NAS1149	FN532P	CN532R	CN532B	BN532H		DN532H	DN532J	DN532K
5	.140	.438	.042	AN960	5	C5	XC5	B5		D5	JD5	KD5
5	.141	.312	.028	MS15795	X			X	944			
5	.141	.406	.040	MS15795	X				945			
5	.141	.500	.040	TYPE B-W	X*	X						
M3	.141	.269	.030	ANSI	X	X	X	X	X	X		
M3	.141	.387	.040	ANSI	X*	X		X*				
M3	.141	.464	.047	ANSI		X						
6	.143	.267	.016	NAS620	6L	C6L	C6LP	X	B6L	A6L		
6	.143	.267	.032	NAS620	6	C6	C6P	X	B6	A6		
6	.145	.234	.032	AVAILABLE	X			X	X			
6	.145	.312	.032	AVAILABLE	X	X		X*	X*			

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
6	.145	.375	.042	1135998	BKO							
6	.145	.500	.025	AVAILABLE	X*	X						
6	.145	.750	.025	AVAILABLE		X		X*	X*		X*	
6	.149	.219	.010	AVAILABLE		X						
6	.149	.375	.016	AN960	6L	C6L	XC6L	X*		D6L	JD6L	KD6L
6	.149	.375	.032	AN960	6	C6	XC6	B6	961-6	D6	JD	KD6
6	.149	.406	.032	631865	ZN1							
6	.149	.480	.020	MS14151	X	1						
6	.149	.500	.062	AVAILABLE	X					X*		
6	.150	.312	.016	MS9549	X*	06		X				
6	.150	.312	.034	MS9321		06				X*		
6	.151	.279	.016	MS51496		P68		X*				
6	.151	.279	.032	MS51496	X*	P69						
6	.156	.250	.005	AVAILABLE	X*							
6	.156	.250	.016	MS27183	43	X				X*		
6	.156	.312	.035	MS15795	X*	805	805B	X	905			705
6	.156	.312	.035	MS27183	5	X						
6	.156	.375	.049	MS15795	X	806	806B	X	906			706
6	.156	.375	.049	MS27183	6							
6	.156	.375	.020	AVAILABLE	X	X		X*		X		
6	.156	.438	.040	N402-	B37	X		X		X*		
6	.156	.500	.032	AVAILABLE	X	X						
6	.156	.562	.040	TYPE B-W	X*							
6	.156	.750	.062	AVAILABLE	X							
6	.156	.812	.049	AVAILABLE	X							
6	.156	.900	.062	AVAILABLE	X							
6	.156	1.125	.062	AVAILABLE	X							
M4	.158	.315	.032	DIN1440 <sup>1</sup>								
6	.159	.375	.016	MS9549		07						
6	.159	.375	.043	MS9321	9320-07	07						
M3.5	.161	.348	.040	ANSI	X	X						
M3.5	.161	.387	.047	ANSI	X	X						
M3.5	.161	.583	.058	ANSI	X	X						
8	.164	.174	.032	NAS1252						8L*		
M4	.166	.265	.010	AVAILABLE	X*	X		X*				
M4	.169	.315	.020	DIN433 <sup>1</sup>								
M4	.169	.355	.032	DIN125A <sup>1</sup>								
M4	.169	.473	.040	DIN9021B <sup>1</sup>								
8	.169	.304	.016	NAS620	8L	C8L	C8LP		B8L	A8L		
8	.169	.304	.032	NAS620	8	C8	C8P		B8	A8		
8	.172	.281	.032	MS15795	X*	845	845B	X				
8	.172	.312	.032	MS15795	X	856	856B					
8	.172	.375	.032	AVAILABLE	X*	X		X*	X	X		

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
8	.172	.437	.032	AVAILABLE	X**	X			X	X		
8	.172	.515	.032	AVAILABLE	X							
8	.172	.875	.032	AN8013	1					X*	D1	
8	.172	1.000	.040	MS15795								745
8	.174	.265	.014	AVAILABLE	X							
8	.174	.375	.016	AN960	8L	C8L	XC8L	X		D8L	JD8L	KD8L
8	.174	.375	.032	AN960	8	C8	XC8	B8	961-8	D8	JD8	KD8
8	.174	.500	.042	AVAILABLE	X	*		X*	X*	X*		
8	.174	.550	.020	MS14151	X	6						
8	.180	.340	.032	AVAILABLE	X*	X		X				
8	.183	.370	.086	AVAILABLE	X			X*				
8	.184	.300	.025	AVAILABLE	X*	X				X*		
8	.184	.375	.016	MS9549		08		X*				
8	.184	.375	.050	MS9320	X	08						
8	.184	.375	.050	MS9321	08							
8	.188	.250	.010	AVAILABLE	X*	X						
8	.188	.281	.025	AVAILABLE	X	X		X		X		
8	.188	.312	.025	AVAILABLE	X*	X*		X*				
8	.188	.375	.016	AVAILABLE	X*	X				X*		
8	.188	.375	.049	MS15795	X*	807	807B		907			707
8	.188	.438	.049	MS15795	X	841	841B		941			741
8	.188	.500	.040	N402-	B38	X*						
8	.188	.500	.049	AN960	9	C9	XC9	B9		D9	JD9	KD9
8	.188	.500	.065	MS27183	46							
8	.188	.562	.049	TYPE A	X	X						
8	.188	.625	.063	TYPE B-W			X*					
8	.188	.750	.062	AVAILABLE	X	X		X*				
8	.188	1.000	.032	50-7N-						6-6-8		
8	.188	1.125	.032	50-7N-						6-6-9		
M4	.189	.387	.040	ANSI	X							
M4	.189	.464	.047	ANSI		X						
M4	.189	.622	.077	ANSI	X							
10	.190	.203	.032	NAS1252								10L
10	.190	.240	.015	5414088	ZN1							
10	.190	.260	.010	AVAILABLE		X						
10	.190	.312	.012	AVAILABLE		X		X*				
10	.190	.375	.010	AVAILABLE	X	X*		X*	X*			
10	.190	.438	.062	AVAILABLE	X	X*		X*	X*	X		
10	.195	.354	.032	NAS620	10L	C10L		B10L	A10L			
10	.195	.354	.063	NAS620	10	C10	C10P		B10	A10		
10	.195	.375	.010	AVAILABLE		X*		X	X*			
10	.195	.469	.016	NAS1587		3					D3	
10	.195	.750	.046	120789	ZN2							

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
10	.196	.531	.078	49374	ZN2	X						
10	.196	.625	.032	AVAILABLE	X							
M5	.197	.394	.032	DIN1440 <sup>1</sup>								
M5	.197	.788	.040	Car Body <sup>1</sup>								
10	.198	.364	.010	AVAILABLE		X						
10	.198	.615	.062	AVAILABLE	X							
10	.198	.625	.040	AVAILABLE	X*			X				*
10	.198	.719	.062	AVAILABLE	X	X						
10	.203	.312	.032	AVAILABLE	X			X*		X*		
10	.203	.375	.020	MS15795	X*	846	846B	X*	X*			
10	.203	.406	.040	MS15795	X	X			946			
10	.203	.438	.016	AN960		C10LL	XC10LL			D10LL	JD10LL	KD10LL
10	.203	.439	.032	AN960	10L	C10L	XC10L	X	X*	D10L	JD10L	KD10L
10	.203	.438	.063	AN960	10	C10	XC10	B10	961-10	D10	JD10	KD10
10	.203	.469	.049	TYPE A	X					X*		
10	.203	.500	.047	AVAILABLE	X	X*		X*		X*		
10	.203	.530	.062	AVAILABLE	X							
10	.203	.562	.032	MS15795	X	847	847B					
10	.203	.562	.040	N402-	B39	X*		X		X		
10	.203	.562	.063	MS15795	X	848	848B					
10	.203	.610	.020	MS14151		2						
10	.203	.625	.040	MS15795	X*	849	849B					
10	.203	.625	.064	MS15795	X	X				X		746
10	.203	.688	.040	MS15795						X		747
10	.203	.734	.035	MS15795	X	857	857B					
10	.203	.734	.063	TYPE B-W		X		X		X		
10	.203	.875	.063	AN970	3	C3						
10	.203	.953	.040	MS15795								748
10	.203	1.062	.020	MS15795		850	850B					
10	.203	1.188	.064	MS15795								749
10	.205	.360	.062	MS51496		P74						
10	.209	.333	.025	AVAILABLE	X	X		X*				
M5	.209	.374	.040	DIN433 <sup>1</sup>								
M5	.209	.384	.040	DIN125A <sup>1</sup>								
M5	.209	.591	.063	DIN9021B <sup>1</sup>								
10	.213	.438	.032	MS9549	X	09						
10	.215	.438	.062	MS9321		09						
M5	.216	.394	.040	DIN126	X							
10	.219	.312	.032	AVAILABLE	X	X*			X			
10	.219	.365	.032	MS27183	47	X*		X*				
10	.219	.438	.049	MS15795	X	808	808B		908			708
10	.219	.500	.049	MS15795	X*	842	842B	X*	942			742
10	.219	.625	.032	50-4-10-7-5	CD2							

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
M5	.224	.425	.047	ANSI	X			X				
M5	.224	.778	.077	ANSI	X							
12	.234	.438	.040	TYPE B-N	X					X		
12	.234	.625	.062	AN960	11	C11	XC11	B11		D11	JD11	KD11
12	.234	.875	.062	TYPE B-W								
M6	.236	.473	.062	DIN1440 <sup>1</sup>								
12	.250	.312	.012	AVAILABLE	X	X						
12	.250	.375	.016	AVAILABLE	X*							
12	.250	.438	.016	MS15795	X	X*		X*	948			
12	.250	.500	.049	MS15795	X	X*		X	949			
12	.250	.500	.065	TYPE A	X							
12	.250	.562	.032	MS27183	49							
12	.250	.562	.049	TYPE A	X	X						
12	.250	.562	.065	MS15795	X	809	809B		909			709
12	.250	.562	.065	MS27183	9							
12	.250	.625	.032	MS27183	50	X*		X				
12	.250	.938	.065	MS27183	48							
12	.250	1.000	.065	MS27183	51				X			
12	.250	1.250	.062	MS15795								750
12	.253	.325	.016	AVAILABLE	X	X*						
M6	.253	.433	.062	DIN433 <sup>1</sup>								
M6	.253	.493	.062	DIN125A <sup>1</sup>								
M6	.253	.670	.118	DIN7349 <sup>1</sup>								
M6	.253	.709	.062	DIN9021B <sup>1</sup>								
1/4	.253	.820	.062	139050	X							
1/4	.255	.407	.010	AVAILABLE		X*		X*				
1/4	.255	.427	.032	AVAILABLE	X*							
1/4	.255	.468	.032	NAS620	416L	C416L	C416LP		B416L	A416L		
1/4	.255	.468	.062	NAS620	416	C416	C416P		B416	A416		
1/4	.255	.531	.062	NAS1587	X	4						
1/4	.255	.750	.062	AVAILABLE	X*	X		X	X	X		
1/4	.260	.375	.062	AVAILABLE	X*			X*				
M6	.260	.493	.062	DIN126	X							
1/4	.260	.600	.040	AVAILABLE	X							
1/4	.265	.437	.032	AVAILABLE	X	X*		X*		X		
1/4	.265	.455	.062	MS51496		P76						
1/4	.265	.500	.016	AN960	X*					D416L	JD416L	KD416L
1/4	.265	.500	.032	AN960	416L	C416L	XC416L					
1/4	.265	.500	.063	AN960	416	C416	XC416	B416	961-416S	D416	JD416	KD416
1/4	.265	.562	.015	AVAILABLE	X*	X*		X*		X*		
1/4	.265	.680	.093	2744263	ZN1							
1/4	.265	.750	.032	AVAILABLE	X*	X*		X*				
1/4	.265	.750	.125	12650	CD1							

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
1/4	.265	1.125	.063	AN970	4C4		X		X			
1/4	.266	.412	.062	BACW10	P62S							
1/4	.266	.458	.036	MS15795		858	858B					
1/4	.266	.500	.109	MS15795					950			
M6	.266	.504	.058	ANSI	X							
1/4	.266	.625	.032	MS15795	X*	852	852B					
1/4	.266	.625	.049	TYPE A	X*			X*		X*		
1/4	.266	.688	.050	MS15795	X*	853	853B					
1/4	.266	1.375	.051	AN8013	2							D2
1/4	.270	.360	.025	MS51496		P84						
1/4	.270	.500	.062	AVAILABLE	X*	X				X*	X	
1/4	.270	.660	.063	BACW10	P70S							
1/4	.276	.500	.032	MS9549	X*	10						
1/4	.276	.500	.062	MS9320	X	10						
1/4	.281	.395	.032	AVAILABLE						X		
1/4	.281	.500	.062	TYPE B-N	X	X						
1/4	.281	.531	.032	MS15795								752
1/4	.281	.625	.062	MS15795	X	810	810B	X*	910			710
1/4	.281	.0625	.062	MS27183	10							
1/4	.281	.734	.062	MS27183	52							
1/4	.281	.750	.062	N402-	B41							
1/4	.281	1.000	.062	TYPE B-W	X*			X				
1/4	.281	1.500	.062	AVAILABLE	X*							
1/4	.296	.438	.032	MS15795		854	854B	X				
1/4	.308	.625	.045	AVAILABLE	X*							
1/4	.312	.500	.035	MS27183	54	X		X*	X*			
1/4	.312	.734	.062	MS15795	X	811	811B	X*	911			711
1/4	.312	.750	.062	MS16212	X*	11				X		
1/4	.312	.875	.062	MS27183	53			X				
1/4	.312	.900	.083	AVAILABLE	X							
1/4	.312	1.062	.062	MS15795				X*				753
1/4	.312	1.125	.062	22277476	ZN1							
M8	.315	.463	.020	AVAILABLE		X						
1/4	.315	.583	.051	AVAILABLE	X							
M8	.315	.630	.079	DIN1440 <sup>1</sup>								
5/16	.325	.500	.025	AVAILABLE	X*	X*		X*				
5/16	.325	.537	.025	AVAILABLE		X						
5/16	.325	.750	.048	AVAILABLE	X*	X*		X*		X		
5/16	.325	.870	.125	AVAILABLE	X	X*		X*				
5/16	.325	.944	.062	2760654	X							
5/16	.328	.562	.016	AN960						D516L	JD516L	KD516L
5/16	.328	.562	.020	AVAILABLE	X	X				X		
5/16	.328	.562	.032	AN960	516L	C516L	XC516L	X				

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
5/16	.328	.562	.020	AVAILABLE	X	X				X		
5/16	.328	.562	.032	AN960	516L	XC516L	X					
5/16	.328	.562	.062	AN960	516	C516	XC516	B516	961-516	D516	JD516	KD516
5/16	.328	.625	.046	AVAILABLE	X*	X		X*				
5/16	.328	1.080	.020	MS14151		4						
5/16	.328	1.375	.062	AN970	5	C5						
M8	.331	.591	.062	DIN433 <sup>1</sup>								
M8	.331	.670	.062	DIN125A <sup>1</sup>								
M8	.331	.827	.158	DIN7349 <sup>1</sup>								
M8	.331	.985	.079	DIN9021B <sup>1</sup>								
5/16	.338	.625	.032	MS9549		11		X				
5/16	.338	.625	.062	MS9321	X	11						
5/16	.338	.875	.160	AVAILABLE	X*							
5/16	.344	.500	.025	AVAILABLE	X*	X		X*		X		
5/16	.344	.531	.080	AVAILABLE	X							
5/16	.344	.593	.045	AVAILABLE	X							
5/16	.344	.625	.062	TYPE B-N	X			X				
5/16	.344	.688	.062	MS15795	X*	812	812B		912			712
5/16	.344	.875	.062	N402-	B42	X*		X				
M8	.355	.670	.062	DIN126	X							
5/16	.375	.500	.028	AVAILABLE	X*	X*		X				
5/16	.375	.625	.032	MS27183	56*	X*		X*	X*			
5/16	.375	.734	.065	TYPE A	X*							
5/16	.375	.734	.083	MS27183	55			X*	X*			
5/16	.375	.750	.065	MS16212	X*	12		X*				
5/16	.375	.875	.040	MS15795	X*	X			951			
5/16	.375	.875	.083	MS15795	X	813	813B		913			713
5/16	.375	1.000	.042	AVAILABLE	X*			X*				
5/16	.375	1.125	.065	TYPE A	X							
3/8	.380	.750	.125	AVAILABLE	X*	X						
3/8	.383	.687	.062	NAS1587		6						
3/8	.380	.562	.020	STD STD	X*			X*	X*	X		
3/8	.390	.625	.016	AN960	616LL	C616LL	XC616LL	X		D616L	JD616L	KD616L
3/8	.390	.625	.032	AN960	616L	C616L	XC616L					
3/8	.390	.625	.063	AN960	616	C616	XC6116	B616	961-616	D616	JD616	KD616
3/8	.390	.750	.032	8176103	X*							
3/8	.390	1.000	.062	4M36-	03003							
3/8	.390	1.080	.020	MS14151		5						
3/8	.390	1.125	.062	8014989	CD2							
3/8	.390	1.250	.062	AVAILABLE	X							
3/8	.390	1.625	.063	AN970	6	C6						
3/8	.390	1.875	.062	AN8013	3						D3	
3/8	.390	2.000	.125	AVAILABLE	X							

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
3/8	.401	.750	.032	MS9549	X*	12		X*				
3/8	.401	.750	.078	MS9321		12						
3/8	.403	.500	.018	AVAILABLE	X*							
3/8	.406	.688	.032	MS15795				952				
3/8	.406	.734	.063	TYPE B-N	X							
3/8	.406	.812	.065	MS15795	X*	814	814B		914			714
3/8	.406	.875	.063	MS27183	57							
3/8	.406	1.000	.063	N402-	B43							
3/8	.412	.625	.032	MS27183	58	X*				X		
M10	.414	.709	.063	DIN433	X	X		X	X			
M10	.414	.827	.079	DIN125A <sup>1</sup>								
M10	.414	1.182	.099	DIN9021B <sup>1</sup>								
M10	.433	.778	.095	ANSI	X	X						
M10	.433	.827	.079	DIN126 <sup>1</sup>								
M10	.433	1.093	.095	ANSI	X	X						
M10	.433	1.524	.118	ANSI	X	X						
3/8	.438	.550	.020	AVAILABLE		X						
3/8	.438	.567	.047	AVAILABLE	X*	X		X*				
3/8	.438	.687	.109	AVAILABLE	X*	X			X			
3/8	.438	.750	.083	MS16212	X*	13						
3/8	.438	.773	.062	MS21206	7							
3/8	.438	.875	.062	MS27183	60			X				
3/8	.438	1.000	.062	MS51412	7							
3/8	.438	1.000	.083	MS15795	X*	815	815B	615	915			715
3/8	.438	1.365	.083	MS27183	59							
3/8	.438	1.625	.062	MS27183	61							
7/16	.443	.683	.051	AN901						4A		
7/16	.446	.781	.062	NAS1587	X	7						
7/16	.453	.625	.032	AVAILABLE	X							
7/16	.453	.750	.016	AN960		C716LL	XC716LL			D716L	JD716L	KD716L
7/16	.453	.750	.032	AN960	716L	C716L	XC716L	X				
7/16	.453	.750	.062	AN960	716	C716	XC716	B716		D716	JD716	KD716
7/16	.453	1.000	.062	AVAILABLE	X							
7/16	.453	1.812	.109	AN970	7	C7						
7/16	.469	.734	.062	MS27183	62*							
7/16	.469	.875	.062	TYPE B-N	X*			X				
7/16	.469	.922	.062	MS15795	X*	816	816B		916			716
7/16	.469	1.125	.062	N402-	B44							
7/16	.469	1.469	.100	TYPE B-W	X							
7/16	.472	.625	.032	AVAILABLE	X	X		X				
M12	.472	.985	.118	DIN1440	X							
7/16	.484	.625	.023	AVAILABLE	X*							
7/16	.488	.787	.020	AVAILABLE		X						

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers								
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy			
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize	
7/16	.495	.618	.016	AVAILABLE	X								
7/16	.495	.750	.016	AVAILABLE	X*								
7/16	.500	1.125	.077	AVAILABLE	X								
7/16	.500	1.250	.083	MS15795	X*	817	817B		917				
7/16	.500	1.500	.035	AVAILABLE	X*								
7/16	.500	1.625	.083	TYPE A	X								
1/2	.505	.638	.020	AVAILABLE	X	X		X*					
1/2	.505	.745	.051	AN901						5A			
1/2	.505	1.155	.175	AVAILABLE	X								
1/2	.509	.875	.062	NAS1587	X	8		X					
1/2	.512	.691	.032	AVAILABLE	X			X		X*			
M12	.512	.788	.079	DIN433 <sup>1</sup>									
M12	.512	.946	.099	DIN125A <sup>1</sup>									
M12	.512	1.182	.236	DIN7349 <sup>1</sup>									
1/2	.515	.750	.032	AVAILABLE	X	X*							
1/2	.515	.875	.016	AN960	X*					D816L	JD816L	KD816L	
1/2	.515	.875	.032	AN960	816L	C816L	XC816L						
1/2	.515	.875	.063	AN960	816	C816	XC816	B816	961-816	D816	JD816	KD816	
1/2	.515	1.250	.188	AVAILABLE	*								
1/2	.515	2.000	.109	AN970	8	C8							
1/2	.526	1.000	.032	MS9549	X*	14							
1/2	.526	1.000	.109	MS9320	14	9321-14							
M12	.529	.944	.095	ANSI	X								
M12	.529	1.327	.118	ANSI	X								
M12	.529	1.721	.118	ANSI	X								
1/2	.531	1.000	.063	TYPE B-N	X								
1/2	.531	1.062	.095	MS15795	X	818	818B		918				718
1/2	.531	1.250	.100	MS15795	X	855	855B						
1/2	.531	1.500	.120	50-4-20-17-	12								
1/2	.531	1.750	.100	TYPE B-W	X*								
M12	.552	.946	.099	DIN126 <sup>1</sup>									
1/2	.562	.968	.049	MS15795	X				953				
1/2	.562	1.000	.093	AVAILABLE	X	X							
1/2	.562	1.125	.093	AVAILABLE	X	X							
1/2	.562	1.139	.071	BACW10	AKP9								
1/2	.562	1.250	.109	MS16212	X*	14		X*		X*			
1/2	.562	1.375	.109	MS15795	X	819	819B		919				719
1/2	.562	1.375	.109	MS51412	10		X		X*				
1/2	.562	1.500	.160	AVAILABLE	X*								
1/2	.568	.808	.051	AN901						6A			
9/16	.575	.940	.070	AVAILABLE	X								
9/16	.578	1.062	.016	AN960	X*					D916L	JD916L	KD916L	
9/16	.578	1.062	.032	AN960	916L	C916L	XC916L						

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
9/16	.578	1.062	.063	AN960	916	C916	XC916	B916		D916	JD916	KD916
9/16	.578	2.188	.125	AN970	9							
9/16	.588	.715	.032	AVAILABLE	X*							
9/16	.588	.938	.032	MS9549		15						
9/16	.588	1.125	.125	MS9320	15*	9321-15						
9/16	.594	.968	.100	MS15795								755
9/16	.594	1.125	.063	TYPE B-N	X*							
9/16	.594	1.156	.095	MS27183	20							
9/16	.594	1.469	.100	MS15795		843	843B		943			743
9/16	.620	1.000	.062	AVAILABLE	X*							
9/16	.620	1.125	.020	AVAILABLE		X						
5/8	.620	1.250	.130	AVAILABLE	X*	X						
5/8	.625	.875	.125	AVAILABLE	X*	X*				X*		
5/8	.625	1.312	.070	AVAILABLE	X					X*		
5/8	.630	.750	.015	AVAILABLE	X							
5/8	.630	.880	.062	BACW10P	251W							
5/8	.630	1.000	.032	AVAILABLE	X							
M16	.630	1.103	.118	DIN1440 <sup>1</sup>	X							
5/8	.630	1.250	.047	AVAILABLE	X							
5/8	.630	1.375	.080	AVAILABLE	X*					X		
5/8	.640	1.188	.016	AN960						D1016L	JD1016L	KD1016L
5/8	.640	1.188	.016	NAS1149	F1016P	C1016R	C1016B	B1016H		D1016H	D1016J	D1016K
5/8	.640	1.188	.032	AN960	1016L	C1016L	XC1016L					
5/8	.640	1.188	.032	NAS1149	F1032P	C1032R	C1032B	B1032H		D1032H	D1032J	D1032K
5/8	.640	1.188	.063	AN960	1016	C1016	XC1016	B1016	961-1016	D1016	JD1016	KD1016
5/8	.640	1.188	.063	NAS1149	F1062P	C1063R	C1063B	B1062B		D1063H	D1063J	D1063K
5/8	.640	1.312	.010	AVAILABLE	X							
5/8	.640	1.625	.047	AVAILABLE	X							
5/8	.640	2.375	.125	AN970	10	C10						
5/8	.651	1.000	.032	MS9549		16						
5/8	.651	1.250	.141	MS9320	16	9321-16						
5/8	.656	1.031	.106	8756545	X							
5/8	.656	1.250	.100	TYPE B-N	X*	X						
5/8	.656	1.312	.095	MS15795	X	820			920			
5/8	.656	1.312	.095	MS27183	21							
5/8	.656	2.125	.095	MS27183	63							
5/8	.656	2.250	.160	TYPE B-W	X							
M16	.670	1.064	.079	DIN433 <sup>1</sup>								
M16	.670	1.182	.118	DIN125A <sup>1</sup>								
5/8	.688	.812	.047	AVAILABLE		X		X		X		
5/8	.688	1.000	.020	AVAILABLE		X*						
5/8	.688	1.500	.134	MS16212	X*	15						
5/8	.688	1.750	.134	MS15795	X	821	821B		921			721

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
5/8	.688	1.750	.134	MS27183	22							
5/8	.700	.980	.062	AVAILABLE	X							
M16	.709	1.182	.118	DIN126 <sup>1</sup>								
5/8	.715	.937	.024	7766555	CD2							
5/8	.715	1.300	.131	AVAILABLE	X							
5/8	.750	1.250	.015	SHIMS	X*							
3/4	.755	1.000	.051	AN901						8A		
3/4	.755	1.125	.109	AVAILABLE	X	X*						
3/4	.755	1.500	.125	AVAILABLE	X	X						
3/4	.765	1.250	.062	NAS1587	X*	12						
3/4	.765	1.312	.016	AN960						D1216L	JD1216L	KD1216L
3/4	.765	1.312	.032	AN960	1216L	C1216L	XC1216L					
3/4	.765	1.312	.090	AN960	1216	C1216	XC1216	B1216		D1216	JD1216	KD1216
3/4	.765	1.375	.125	AVAILABLE	X*							
3/4	.776	1.188	.032	MS9549	X*	17						
3/4	.780	1.312	.029	7006236	CD2							
3/4	.780	1.625	.125	AVAILABLE	X							
3/4	.790	1.203	.079	AVAILABLE	X							
3/4	.812	1.000	.062	AVAILABLE	X							
3/4	.812	1.115	.032	AVAILABLE	X							
3/4	.812	1.375	.100	TYPE B-N	X							
3/4	.812	1.469	.134	MS15795		822	822B		922			722
3/4	.812	1.469	.134	MS27183	23							
3/4	.812	1.750	.148	MS16212		16						
3/4	.812	2.000	.148	MS15795	X*	823	823B		923			723
3/4	.812	2.000	.148	MS27183	24							
3/4	.821	1.250	.125	12297749	S							
M20	.827	1.300	.099	DIN433 <sup>1</sup>								
M20	.867	1.458	.118	DIN126 <sup>1</sup>								
M20	.865	1.524	.138	ANSI	X							
7/8	.875	1.125	.032	AVAILABLE	X							
7/8	.875	1.165	.021	AVAILABLE	X							
7/8	.875	1.562	.071	MS21206	14							
7/8	.880	1.036	.032	AVAILABLE		X						
7/8	.880	1.120	.051	AN901	X*					10A		
7/8	.890	1.250	.032	AVAILABLE		X*						
7/8	.890	1.375	.078	AVAILABLE	X					X*		
7/8	.890	1.500	.016	AN960	X					D1416L	JD1416L	KD1416L
7/8	.890	1.500	.032	AN960	1416L	C1416L	XC1416L					
7/8	.890	1.500	.090	AN960	1416	C1416	XC1416	B1416		D1416	JD1416	PD1416
7/8	.890	2.310	.042	11646725	CD2							
7/8	.901	1.275	.062	AVAILABLE		X						
7/8	.901	1.375	.032	MS9549		18						

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
7/8	.906	1.250	.010	SHIM	X							
7/8	.906	1.500	.032	8731389	CD2							
7/8	.938	1.750	.134	MS15795		824	824B		924			724
7/8	.938	1.750	.134	MS27183	25							
7/8	.938	2.000	.165	MS16212		17						
7/8	.938	2.250	.165	MS15795		825	825B		925			725
7/8	.938	2.250	.165	MS27183	26							
7/8	1.000	2.000	.090	50-4-18-32-	16							
1"	1.015	1.250	.012	AVAILABLE						X		
1"	1.015	1.750	.016	AN960						D1616L	JD1616L	KD1616L
1"	1.015	1.750	.032	AN960	1616L	C1616L	XC1616L					
1"	1.015	1.750	.090	AN960	1616	C1616	XC1616	B1616		D1616	JD1616	KD1616
1"	1.025	1.375	.080	AVAILABLE	X							
1"	1.026	1.562	.032	MS9549		19						
1"	1.062	1.425	.032	AVAILABLE	X							
1"	1.062	1.575	.083	AVAILABLE	X							
1"	1.062	1.671	.065	MS15795					954			
1"	1.062	1.750	.100	TYPE B-N	X							
1"	1.062	2.000	.134	MS15795	X	826	826B		926			726
1"	1.062	2.000	.134	MS27183	27							
1"	1.062	2.250	.165	MS16212		18						
1"	1.062	2.500	.165	MS15795	X*	827	827B		927			727
1"	1.062	2.500	.165	MS27183	28							
1"	1.068	1.370	.051	AN901	X					12A		
1-1/16	1.078	1.812	.016	AN960						D1716L	JD1716L	KD1716L
1-1/16	1.078	1.812	.032	AN960	1716L							
1-1/16	1.078	1.812	.090	AN960	1716	C1716	XC1716	B1716		D1716	JD1716	KD1716
1-1/16	1.125	1.625	.032	AVAILABLE	X*							
1-1/8	1.140	1.687	.062	AVAILABLE		X						
1-1/8	1.140	1.875	.016	AN960						D1816L	JD1816L	KD1816L
1-1/8	1.140	1.875	.032	AN960	1816L	C1816L	XC1816L					
1-1/8	1.140	1.875	.090	AN960	1816	C1816	XC1816	B1816		D1816	JD1816	KD1816
1-1/8	1.150	2.000	.125	AVAILABLE	X							
1-1/8	1.155	1.875	.120	18063408	X							
1-1/8	1.188	1.320	.225	AVAILABLE	X							
1-1/8	1.188	2.000	.100	TYPE B-N	X							
1-1/8	1.188	2.250	.134	AVAILABLE	X							
1-1/8	1.188	3.250	.160	TYPE B-W								
1-1/8	1.190	1.500	.062	AVAILABLE						X		
1-1/8	1.220	1.500	.125	AVAILABLE	X							
M30	1.221	2.206	.158	DIN125A <sup>1</sup>								
1-1/8	1.250	1.828	.032	AVAILABLE	X							
1-1/8	1.250	2.000	.090	AVAILABLE	X							

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# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
1-1/8	1.250	2.250	.125	50-4-20-40-	18							
1-1/8	1.250	2.500	.165	TYPE A		X						
1-1/8	1.250	2.750	.165	MS15795	X	828	828B		928			728
1-1/8	1.250	2.750	.165	MS27183	29							
1-1/4	1.265	2.000	.016	AN960						D2016L	JD2016L	KD2016L
1-1/4	1.265	2.000	.032	AN960	2016L							
1-1/4	1.265	2.000	.090	AN960	2016	C2016	XC2016	C2016		D2016	JD2016	KD2016
1-1/4	1.281	2.250	.125	50-4-20-41-	18							
M30	1.289	2.183	.179	ANSI	X							
M30	1.300	2.206	.158	DIN126 <sup>1</sup>								
1-1/4	1.320	2.875	.032	AVAILABLE						X		
1-5/16	1.328	1.562	.062	AVAILABLE		X						
1-5/16	1.328	2.062	.016	AN960						D2116L	JD2116L	KD2116L
1-5/16	1.328	2.062	.032	AN960	2116L							
1-5/16	1.328	2.062	.090	AN960	2116	C2116	XC2116	B2116		D2116	JD2116	KD2116
1-5/16	1.328	2.240	.125	AVAILABLE	X*							
1-5/16	1.375	1.625	.025	AVAILABLE		X						
1-5/16	1.375	2.000	.032	AVAILABLE	X							
1-5/16	1.375	2.500	.165	TYPE A-N	X							
1-5/16	1.375	3.000	.165	MS15795		829	829B		929			729
1-5/16	1.375	3.000	.165	MS27183	30							
1-3/8	1.406	2.500	.200	4183271	X							
1-3/8	1.500	2.100	.032	AVAILABLE	X							
1-3/8	1.500	3.125	.156	AVAILABLE	X							
1-3/8	1.500	3.250	.181	MS15795	X	830	830B		930			730
1-1/2	1.515	1.935	.125	AVAILABLE	X							
1-1/2	1.515	2.250	.016	NAS1149	F2416P	C2416R	C2416B	B2416H		D2416H	D2416J	D2416K
1-1/2	1.515	2.250	.032	NAS1149	F2432P	C2432R	C2432B	B2432H		D2432H	D2435J	D2432K
1-1/2	1.515	2.250	.090	NAS1149	F2490P	C2490R	C2490B	B2490H		D2490H	D2490J	D2490K
M36	1.521	2.577	.199	ANSI	X							
1-1/2	1.530	2.000	.141	12296711	X							
M36	1.537	2.600	.158	DIN126 <sup>1</sup>								
1-1/2	1.562	2.000	.125	4163564	X							
1-1/2	1.624	1.872	.062	AVAILABLE	X							
1-1/2	1.625	3.500	.181	MS15795		831	831B		931			731
1-1/2	1.625	3.500	.181	MS27183	32							
1-5/8	1.640	2.375	.016	NAS1149	F2616P	C2616R	C2616B	B2616H		D2616H	D2616J	D2616K
1-5/8	1.640	2.375	.032	NAS1149	F2632P	C2632R	C2632B	B2632H		D2632H	D2632J	D2632K
1-5/8	1.640	2.375	.090	NAS1149	F2690P	C2690R	C2690B	B2690H		D2690H	D2690J	D2690K
1-5/8	1.655	2.020	.062	AVAILABLE	X*	X*						
1-5/8	1.738	2.750	.062	7521048	X							
1-5/8	1.750	3.750	.180	MS15795		832	832B		932			732
1-5/8	1.750	3.750	.180	MS27183	33							

<sup>1</sup> These DIN specifications are provided for reference. Not a stocked item except where indicated by "X".

\* Indicates that this size is also available (in stock at time of catalog creation) in other thickness, please inquire.



# METALLIC FLAT WASHERS...AN-MS-NAS- STANDARDS

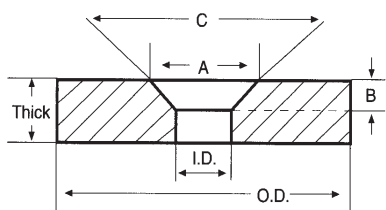
Hole Size	Nominal Dimensions			Reference Part Number	AN-MS-NAS Dash Numbers							
	I.D.	O.D.	Thick		Steel Plated	Stainless Steel		Brass		Aluminum Alloy		
						Pass.	Plated	Plain	Plated	Plain	Chem Treat	Anodize
1-5/8	1.773	2.000	.024	AVAILABLE		X				X		
M42	1.773	3.073	.276	DIN126 <sup>1</sup>								
1-3/4	1.875	4.000	.180	MS15795		833	833B		933			
1-3/4	1.875	4.000	.180	MS27183	34							
1-3/4	1.890	2.625	.032	AN960	3016L	C3016L	XC3016L	B3016L				
1-3/4	1.890	2.625	.090	AN960	3016	C3016	XC3016	B3016		D3016	JD3016	KD3016
1-3/4	1.940	2.236	.062	AVAILABLE	X							
1-7/8	2.000	2.750	.032	AVAILABLE	X							
1-7/8	2.000	2.875	.032	AVAILABLE					X			
1-7/8	2.000	4.250	.180	MS15795	X	834	834B		934			
1-7/8	2.000	4.250	.180	MS27183	35							
2"	2.062	3.062	.104	9152013	CD2							
2"	2.125	4.500	.180	MS15795		835	835B		935			
2"	2.125	4.500	.180	MS27183	36							
2-1/4	2.265	3.000	.032	AN960	3616L	C3616L	XC3616L	B3616				
2-1/4	2.265	3.000	.090	AN960	3616	C3616	XC3616	B3616		D3616	JD3616	KD3616
2-1/4	2.375	4.750	.220	MS27183	37							
2-1/2	2.515	3.250	.090	AN960	4016	C4016	XC4016	B4016		D4016	JD4016	KD4016
2-1/2	2.625	5.000	.238	MS27183	38							
2-7/8	2.968	3.395	.010	SHIM	X							
3"	3.155	3.500	.025	AVAILABLE								

1 These DIN specifications are provided for reference. Not a stocked item except where indicated by "X".



**Metallic Flat Washers**

# HIGH STRENGTH-HEAT TREATED, PLAIN AND COUNTERSUNK WASHERS



**MS 20002** - This specification replaced specification NAS 143 in 1954 and includes washers made from 4130 Chrome Molybdenum Steel. They are available with both flat and a 45° countersink, heat treated and

plated. They are primarily for use with 160,000 psi bolts.

**MS 17811** - these are case hardened 1020 steel thrust washers, available in 23 sizes from WCL. They are designed primarily for supporting end load thrust bearings. Call for information.

**MS 21206** - Washers available in this series are both plain and countersunk, made from Alloy Steel, heat treated and plated. They are normally used with MS21134 and MA 21297 bolts and with MS 21133 and MS 21804 nuts.

**MS 9320** - Washers are made from AMS 6350 Corrosion Resistant Steel with Diffused Cadmium Nickel Plate.

**NAS 1587** - Available both flat and with a 45° countersunk, these washers are made from Corrosive Resistant Steel with 75,000 psi, UTS min.

**10910174 Ordnance Washers** - This specification covers 46 various sizes of washers made from Alloy Steel, heat treated and Cadmium Plated for military use. All are stocked by WCL. These washers also account for many commercial applications.

**Available but not listed** - The following Double Countersunk 45° MS Series washers are available from WCL, but space limitations prevent their listing: MS 9482, MS 9768, MS 14155, and MS 14177. Also available but not shown are countersunk washers with 100° angles and other special configurations.

Many other sizes of unlisted hardened washers are also in stock. If not listed here, call WCL to check availability and get samples and a quotation.

Screw/Bolt Size	Nominal Dimensions			Countersunk Dimensions				MS-NAS Ordnance Dash Numbers		
	I.D.	O.D.	Thick	CTSK P/N	A CTSK I.D.	B CTSK Depth	C CTSK Degree	Reference Part Numbers	Steel Plated P/N	Stainless Steel P/N
3	.093	.187	.019					2W1G-6-6-	19	
3	.119	.250	.031					MS9320	04	
4	.124	.245	.040					ALLOY 4	X	
4	.135	.312	.031					MS9320	05	
5	.150	.312	.043					MS9320	06	
6	.159	.375	.043					MS9320	07	
8	.184	.375	.050					MS9320	08	
10	.193	.367	.062	C3	.285	.063	45°	MS21206	3	
10	.193	.377	.062					MS21299	3	
10	.195	.469	.032					NAS1587	3	
10	.213	.438	.062					MS9320	09	
1/4	.253	.465	.062	C4	.345	.063	45°	MS21206	4	
1/4	.253	.481	.062					MS21299	4	
1/4	.255	.485	.057					BACW10BP	4P	
1/4	.255	.531	.062	C4	.339	.078	45°	MS20002	4	
1/4	.256	.531	.062	4C	.339	.078	45°	NAS1587		4
1/4	.265	.500	.065					NAS1149	G0463P	
1/4	.276	.500	.062					MS9320	10	
1/4	.281	.500	.089					10910174	1	
1/4	.281	.625	.089					10910174	34	
1/4	.281	1.000	.089					10910174	20	
5/16	.316	.568	.062	C5	.407	.063		MS21206	5	
5/16	.319	.593	.062	C5	.401	.078	45°	MS20002	5	
5/16	.319	.593	.062	5C	.401	.078	45°	NAS1587		5
5/16	.328	.562	.063					NAS1149	G0563P	
5/16	.338	.625	.062					MS9320	11	
5/16	.343	.625	.062					10910174	17	
5/16	.343	.625	.104					10910174		
5/16	.343	.875	.119					10910174	19	
3/8	.378	.674	.062	C6	.502	.078	45°	MS21206	6	

# HIGH STRENGTH-HEAT TREATED, PLAIN AND COUNTERSUNK WASHERS

Screw/Bolt Size	Nominal Dimensions			Countersunk Dimensions				MS-NAS Ordnance Dash Numbers		
	I.D.	O.D.	Thick	CTSK P/N	A CTSK I.D.	B CTSK Depth	C CTSK Degree	Reference Part Numbers	Steel Plated P/N	Stainless Steel P/N
3/8	.383	.687	.062	C6	.489	.078	45°	MS20002	6	
3/8	.383	.687	.062	6C	.489	.078	45°	NAS1587		6
3/8	.390	.625	.063					NAS1149	G0663P	
3/8	.390	.937	.045					S6135-64028-	3	
3/8	.401	.750	.078					MS9320	12	
3/8	.406	.700	.158					10910174	33	
3/8	.406	.750	.119					10910174	3	
3/8	.406	.875	.134					10910174	22	
3/8	.406	1.125	.199					10910174	16	
7/16	.438	.922	.065					ASTM A-325	X	
7/16	.441	.778	.062	C7	.564	.078	45°	MS21206	7	
7/16	.446	.781	.062	C7	.550	.078	45°	MS20002	7	
7/16	.446	.781	.062	7C	.550	.078	45°	NAS1587		7
7/16	.453	.750	.063	7C	.550	.078	45°	NAS1149	G07636P	
7/16	.463	.875	.094					MS9320	13	
7/16	.468	.750	.119					10910174	26	
7/16	.468	.875	.119					10910174	4	
7/16	.468	.875	.250					10910174	35	
7/16	.482	.905	.290					12376084		
1/2	.501	.888	.062					4130	X	
1/2	.503	.893	.062	C8	.627	.078	45°	MS21206	8	
1/2	.509	.875	.062	C8	.612	.078	45°	MS20002	8	
1/2	.509	.875	.062	C8	.612	.078	45°	NAS1587		8
1/2	.515	.875	.063					NAS1149	G0863P	
1/2	.516	.875	.125					11678182		
1/2	.526	1.000	.109					MS9320	14	
1/2	.531	.875	.060					10910174	37	
1/2	.531	.875	.089					10910174	30	
1/2	.531	.875	.127					10910174	43	
1/2	.531	1.000	.134					10910174	5	
1/2	.531	1.500	.060					10910174	40	
1/2	.531	2.000	.209					10910174	28	
1/2	.562	1.500	.160					9152386	X	
9/16	.566	1.004	.062	C9	.689	.078	45°	NS21206	9	
9/16	.570	.968	.062	C9	.677	.078	45°	MS20002	9	
9/16	.570	.968	.062	C9	.677	.078	45°	NAS1587		9
9/16	.578	1.062	.063					NAS1149	G0963P	
9/16	.588	1.125	.125					MS9320	15	
9/16	.594	1.125	.164					10910174	6	
5/8	.626	1.182	.062					MS21299	10	
5/8	.629	1.120	.062	C10	.783	.078	45°	MS21206	10	
5/8	.638	1.062	.062	C10	.775	.078	45°	MS20002	10	
5/8	.638	1.062	.062	C10	.775	.078	45°	NAS1587		10
5/8	.640	1.188	.063	C10	.775	.078	45°	NAS1587	G1063P	
5/8	.651	1.250	.141					MS9320	16	
5/8	.656	1.000	.119					10910174	31	
5/8	.656	1.000	.250					10910174	21	
5/8	.656	1.250	.164					10910174	7	

# HIGH STRENGTH-HEAT TREATED, PLAIN AND COUNTERSUNK WASHERS

Screw/Bolt Size	Nominal Dimensions			Countersunk Dimensions				MS-NAS Ordnance Dash Numbers		
	I.D.	O.D.	Thick	CTSK P/N	A CTSK I.D.	B CTSK Depth	C CTSK Degree	Reference Part Numbers	Steel Plated P/N	Stainless Steel P/N
5/8	.656	1.250	.250					10910174	18	
5/8	.656	1.500	.089					10910174	44	
5/8	.656	1.750	.179					10941915	7	
5/8	.656	1.750	.250					10910174	38	
5/8	.656	2.500	.125					10910174	25	
5/8	.687	1.312	.093					A-325	X	
3/4	.754	1.345	.062	C12	.908	.078	45°	MS21206	X	
3/4	.765	1.250	.062	C12	.900	.078	45°	MS20002	12	
3/4	.765	1.250	.062	C12	.900	.078	45°	NAS1587		12
3/4	.765	1.312	.090					NAS1149	G1290P	
3/4	.765	1.380	.125					4130	X	
3/4	.776	1.500	.172					MS9320	17	
3/4	.780	1.500	.062					10910174	41	
3/4	.781	1.500	.093					10910174	24	
3/4	.781	1.500	.125					10910174	42	
3/4	.781	1.687	.250					10910174	23	
3/4	.812	2.000	.179					10910174	15	
3/4	.812	2.000	.194					10910174	8	
7/8	.879	1.567	.062	C14	1.033	.078	45°	MS21206	14	
7/8	.877	2.250	.187					MS17811	18	
7/8	.888	1.437	.062	C14	1.025	.078	45°	MS20002	14	
7/8	.888	1.437	.062	C14	1.025	.078	45°	NAS1587		14
7/8	.890	1.500	.090					NAS1149	G1490P	
7/8	.901	1.750	.203					MS9320	18	
7/8	.938	1.781	.194					10910174	9	
1"	1.015	1.625	.062	C16	1.150	.078	45°	MS2002	16	
1"	1.015	1.625	.062	C16	1.150	.078	45°	NAS1587		16
1"	1.015	1.750	.090					NAS1149	G1690P	
1"	1.020	1.720	.060					10910174	29	
1"	1.026	2.000	.234					MS9320	19	
1"	1.062	2.031	.209					10910174	10	
1-1/16	1.078	1.812	.090					NAS1149	G1890P	
1-1/8	1.145	1.875	.062	C18	1.275	.078	45°	MS20002	18	
1-1/8	1.145	1.875	.062	C18	1.275	.078	45°	NAS1587		18
1-1/4	1.265	2.000	.090					NAS1149	G2090P	
1-1/4	1.269	2.125	.062	C20	1.437	.094	45°	MS20002	20	
1-1/4	1.269	2.125	.094	C20	1.437	.094	45°	NAS1587		20
1-5/16	1.328	2.062	.090					NAS1149	G2190P	
1-3/8	1.395	2.313	.062	C22	1.562	.094	45°	MS20002	22	
1-1/2	1.515	2.500	.062	C24	1.687	.094	45°	MS20002	24	

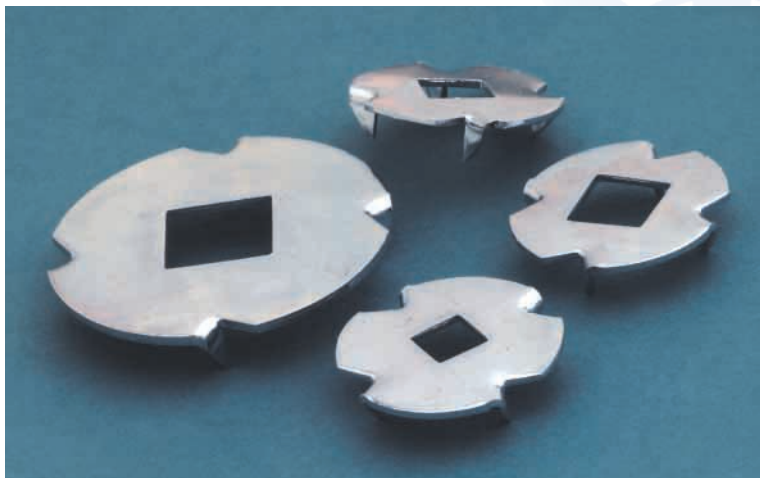
WCL Part Numbers - reference part example: 10910174-42 above is WCL part: FW-0781-1500-125-ST4-CD2

FW     .781     1.500     .025     ST4     CD2  
 Type   I.D.     O.D.     THK     MAT     FIN

FW = Flat Washer  
 MAT = material     ST4 = Alloy steel - QQ-S-635  
 FIN = Finish     CD2 = Cadmium QQ-P-416-Type2

Use Reference and/or MilSpec part numbers when needed. Specify hardness requirements as needed. See page 53 for a complete listing of materials, finishes and applicable WCL codes.

# TORQUE WASHER LINE

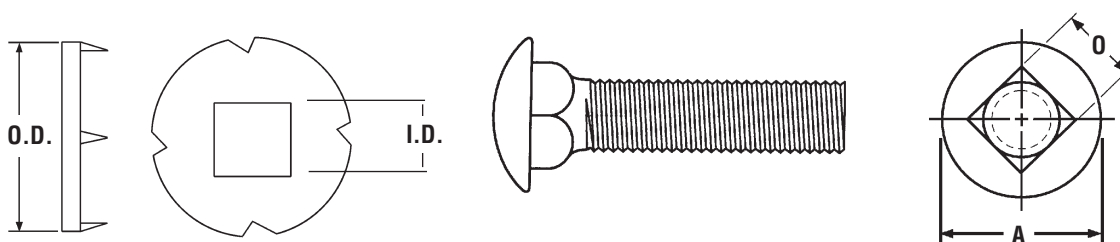


A complete line of unique square-holed Torque Washers is now available from WCL Company.

The square-holed washer is designed for use with a carriage bolt. Four bent prongs on the washer can be embedded in wood, plywood and other ductile materials, making the washer self-retaining during assembly. The finished square hole in the washer mates with the square shoulder on the carriage bolt. As the washer is fixed in place, the square shouldered bolt is

prevented from rotating. The washer also provides a smooth bearing surface and distributes the fastening load, preventing embedment in the soft material and the splitting and loss of holding power that can result.

WCL stocks Torque Washers with square inside diameters of 1/4", 5/16" and 3/8" in a 1" O.D. and a 1/2" square hole washer with a 1-3/4" O.D. Also available soon are 5/8" and 3/4" square hole with a 1-3/4" O.D.

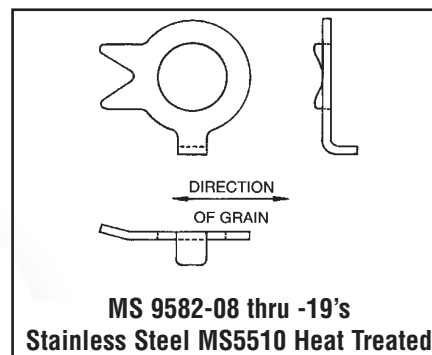
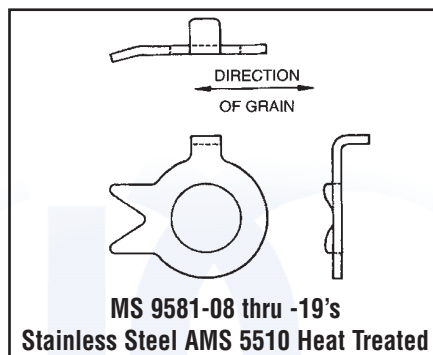
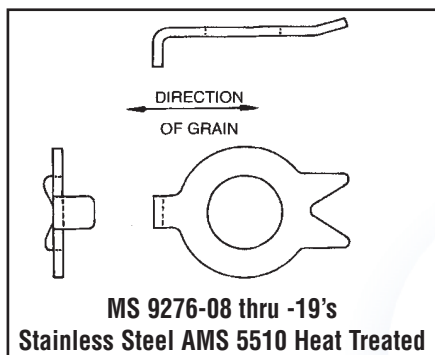
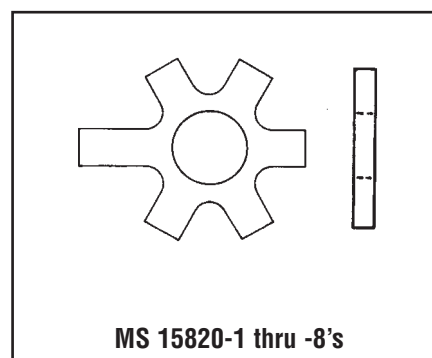
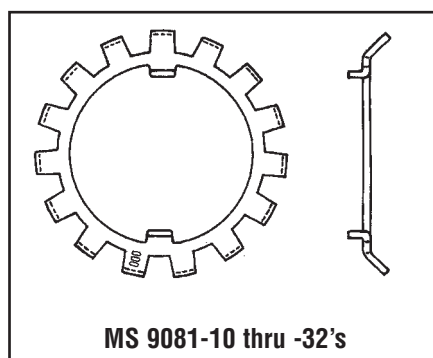
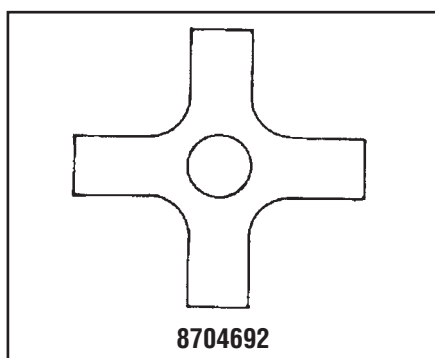
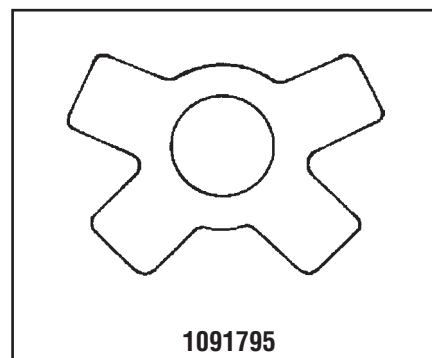
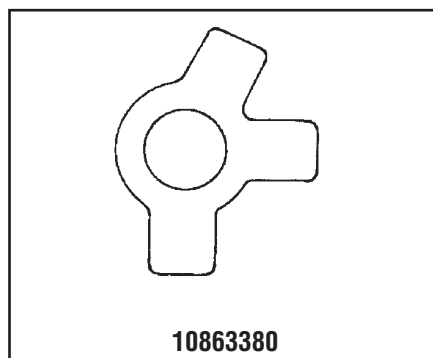
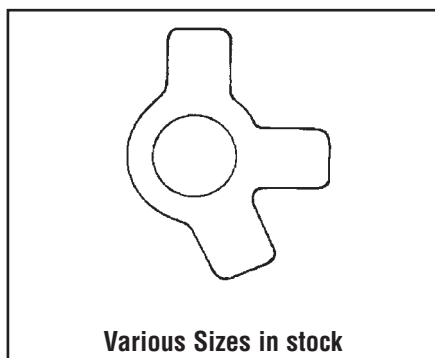
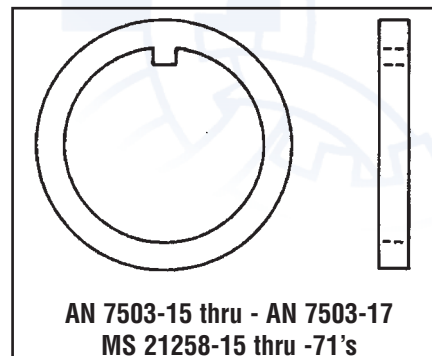
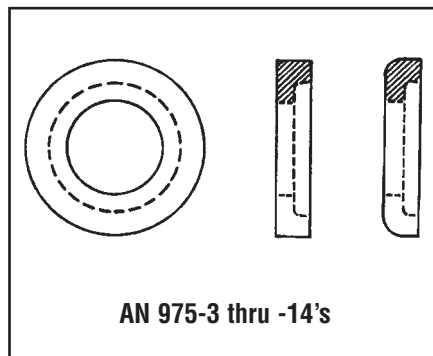
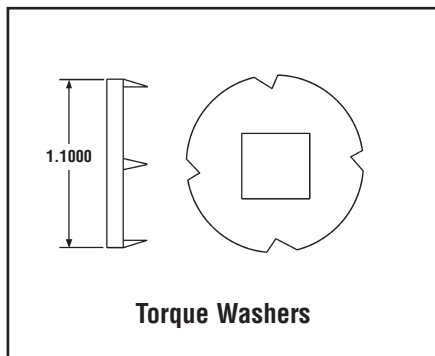


Part Number	Size	I.D.	O.D.	THK	Carriage Bolt Size	Head Diameter (A)		Square Width	
						Min.	Max.	Min.	Max.
WCL-TWZ4	1/4"	.270	1.10	18GA	1/4"	.563	.594	.245	.260
WCL-TWZ5	5/16"	.345	1.10	18GA	5/16"	.688	.719	.307	.324
WCL-TWZ6	3/8"	.405	1.10	18GA	3/8"	.782	.844	.368	.388
WCL-TWZ6H	3/8"	.405	1.75	16GA	3/8"	.782	.844	.368	.388
WCL-TWZ8	1/2"	.535	1.75	16GA	1/2"	1.032	1.094	.492	.515
WCL-TWZ10	5/8"	.655	1.75	16GA	5/8"	1.219	1.344	.616	.642
WCL-TWZ12	3/4"	.775	1.75	16GA	3/4"	1.469	1.594	.741	.768

# METALLIC SPECIAL WASHERS

Washers shown here represent the infinite variety of shapes and sizes available. Outer rims and inner rims can be individually formed: round, square, rectangular, oval, hexagonal, symmetrical and/or irregular, depending on need and function. Tabs or

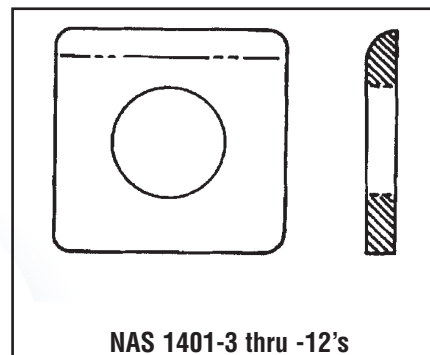
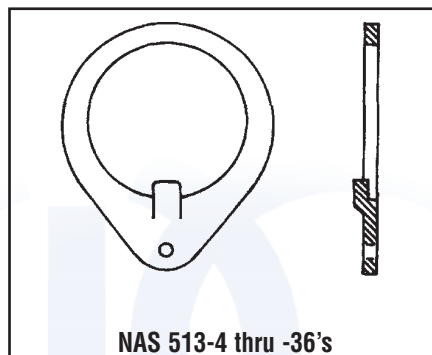
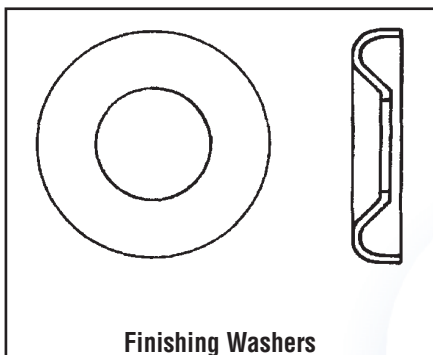
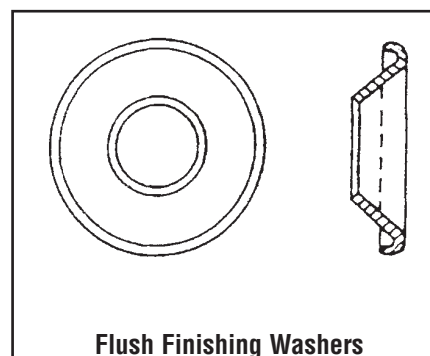
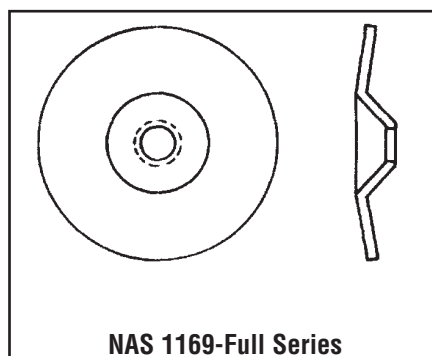
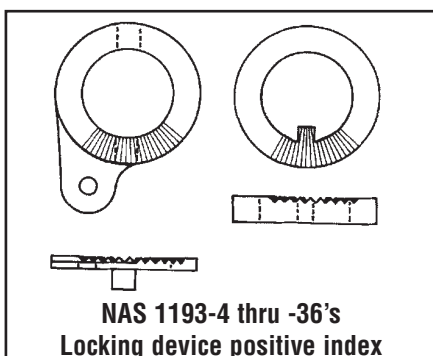
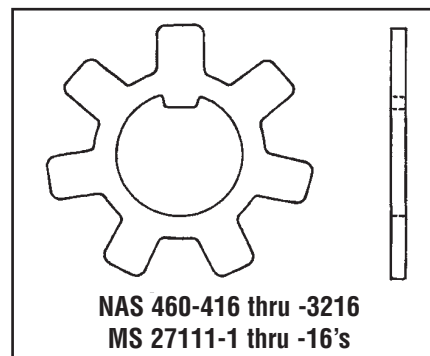
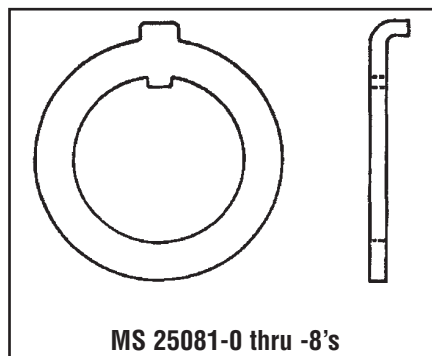
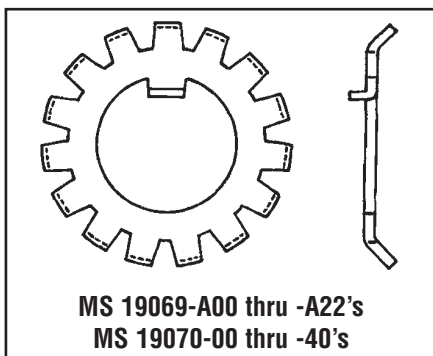
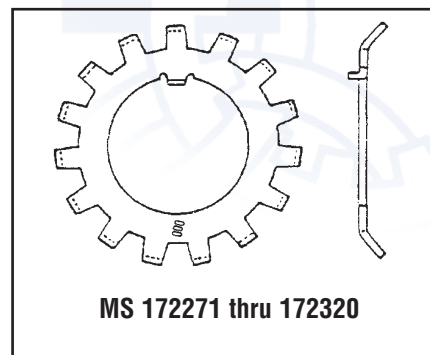
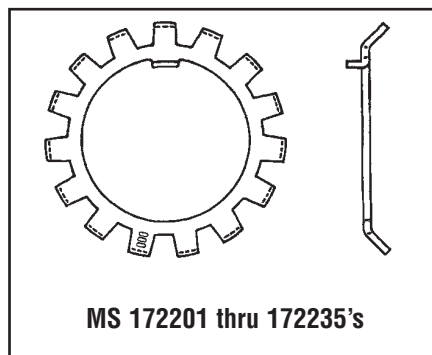
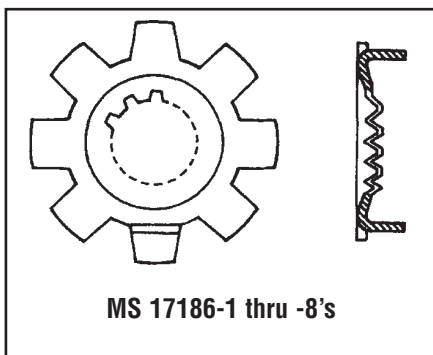
notches can be formed on the inner or outer rims. Tabs, and the washers themselves, can be bent or formed as needed. Among the flat washer and stamping configurations available, WCL offers many locking devices, washer rods, keys, dimples, radii and more.



# METALLIC FLAT WASHERS

The government specifications shown on the drawings relate to the basic shape represented. Dash numbers normally indicate washer size, material and finish. Detailed specifications and information on any other part numbers and styles are available on request.

Special flat washers can be made from the same range of materials and incorporate the same finish options as other flat washers. Remember, as O.D. tooling exists, changes in the size or configuration of the I.D. may often be made at nominal cost.



# NEOPRENE POLYMER FLAT WASHERS

**NEOPRENE POLYMER** is highly resistant to sun, ozone, weathering and aging. It performs well when exposed to oils, fuels and other chemicals. Washers made from this material are mainly used to prevent leaks and distribute pressure. **SILICONE RUBBER** washers are included in the following charts. This material

provides a combination of high strength, resilience, toughness, stability at high temperature ranges and resistance to a multitude of chemical elements. **METAL BONDED-Polymer** washers, bonded to Steel and Stainless Steel Conical Washers, are also available.

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1	.086	.329	.031	
2	.090	.200	.031	
3	.105	.250	.031	NAS1515-02L
3	.105	.250	.062	NAS1515-02
4	.125	.218	.020	70 SHORE
4	.125	.312	.031	NAS151-04L
4	.125	.312	.062	NAS151-04
4	.125	.500	.125	
4	.125	1.000	.062	
5	.140	.375	.032	
5	.145	.375	.062	
5	.145	.390	.062	NEOPRENE
6	.149	.375	.031	NAS151-06L
6	.149	.375	.062	NAS151-06
6	.149	.385	.031	
6	.149	.645	.031	
6	.149	.645	.062	
6	.155	.645	.042	
6	.160	.405	.071	
6	.165	.875	.125	
8	.174	.375	.031	NAS151-08L
8	.174	.375	.062	NAS151-08
8	.174	.440	.062	
8	.174	.440	.100	
8	.174	.515	.031	NEOPRENE
8	.180	.510	.031	
8	.180	.875	.075	
8	.187	.312	.062	
8	.187	.375	.031	50-14-1-6-3
8	.187	.500	.062	50-14-2-6-4
10	.203	.438	.031	NAS1515-D3L
10	.203	.438	.062	NAS1515-3
10	.203	.438	.094	NAS1515-3H
10	.203	.555	.062	
10	.203	.750	.125	
10	.218	1.000	.031	51-14-1-7-8
10	.220	.600	1.250	SPACER
12	.250	.345	.125	
12	.240	.500	.125	
1/4	.250	.500	.062	
1/4	.250	.500	.094	50-14-3-8-4
1/4	.250	.555	.125	

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1/4	.250	.625	.094	NEOPRENE
1/4	.250	1.000	.125	50-14-4-8-8
1/4	.265	.500	.031	NAS1515-4L
1/4	.265	.500	.062	NAS1515-4
1/4	.265	.500	.094	NAS1515-4H
1/4	.265	.687	.125	
1/4	.281	.500	.125	50-14-4-9-4
1/4	.281	.750	.125	BACW10P15R80
5/16	.312	.500	.062	
5/16	.312	.875	.094	SILICON RUBBER
5/16	.328	.562	.031	NAS1515-5L
5/16	.328	.562	.062	NAS1515-5
5/16	.328	.562	.094	NAS1515-5H
5/16	.342	1.625	.063	
5/16	.358	.825	.073	
3/8	.385	.750	.031	
3/8	.385	.750	.073	
3/8	.390	.625	.031	NAS1515-6L
3/8	.390	.625	.062	NAS1515-6
3/8	.390	.625	.094	NAS1515-6H
3/8	.390	1.105	.031	
3/8	.396	.615	.051	NEOPRENE
3/8	.430	.875	.125	
3/8	.435	.625	.105	
3/8	.435	.812	.062	
7/16	.453	.750	.031	NAS1515-7L
7/16	.453	.750	.062	NAS1515-7
7/16	.453	.750	.093	NAS1515-7H
7/16	.468	.875	.062	50-14-2-15-7
7/16	.485	.828	.250	
1/2	.500	.688	.062	SILICON SPONGE
1/2	.500	.750	.031	
1/2	.500	.750	.125	
1/2	.500	1.125	.125	
1/2	.500	1.500	.093	50-14-3-16-12
1/2	.500	2.000	.093	131CY
1/2	.515	.875	.031	NAS1515-8L
1/2	.515	.875	.062	NAS1515-8
1/2	.515	.875	.094	NAS1515-8H
1/2	.525	.600	.050	
1/2	.525	.700	.062	BACW10P8R40
1/2	.525	1.135	.140	



## NEOPRENE POLYMER FLAT WASHERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1/2	.545	.935	.062	COMP ASB
9/16	.578	1.062	.031	BACW10DPL916
9/16	.578	1.062	.062	NAS1515-9
9/16	.578	1.062	.094	NAS1515-9H
5/8	.625	.750	.062	
5/8	.640	1.188	.031	NAS1515-10L
5/8	.640	1.188	.062	NAS1515-10
5/8	.640	1.188	.094	NAS1515-10H
3/4	.750	.950	.062	
3/4	.765	1.312	.031	NAS1515-12L

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
3/4	.765	1.312	.062	NAS1515-12
3/4	.765	1.312	.094	NAS1515-12H
7/8	.812	1.210	.092	
7/8	.875	1.125	.062	50-14-2-28-9
7/8	.890	1.500	.062	NAS1515-14
1"	1.000	2.250	.125	50-14-4-32-18
1"	1.015	1.750	.062	NAS1515-16
1"	1.110	1.562	.125	
1-5/16	1.312	1.750	.062	50-14-2-42-14

## INSULATING FIBRE FLAT WASHERS

**FIBRE WASHERS** are made from insulating papers and boards such as: Vulcanized Fibre Boards, Fish Paper, High Density Bone, Rag Paper, etc. Commercial grade fibre per ASTM D710 is used in most of WCL's standard fibre washers. Washers are also available in Gasket materials as well as Duroids® and Friction Boards.

**NAS549** washers, most frequently used for electrical insulating, are made from fiber per MIL-F-1148 Grade CH form S. Other materials of this type are listed in the Phenolic washer section on page 36.

The suffix-"F" designates thrust washers most commonly used in electrical motors and plumbing applications.

**NAS70** washers shown here are made from vulcanized - grade CH form S. The DIN Standards are made of pressboard material.

**Other Part Numbers** - Non-government part numbers shown represent some of the many industry standards in use today.

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
0	.057	.444	.062	
0	.062	.251	.031	5602-51-32
0	.063	.312	.031	
M2	.086	.196	.011	DIN125A
2	.089	.203	.031	
2	.090	.220	.031	5602-201-32
2	.090	.250	.031	5602-1-32
2	.091	.285	.031	
2	.092	.321	.031	WHT
2	.093	.158	.031	5602-53-32
2	.093	.187	.031	F-2, BLK, RED
2	.093	.234	.016	RED
2	.093	.593	.062	XP
2	.098	.187	.031	
2	.098	.187	.047	
2	.098	.187	.062	
M2.3	.098	.236	.020	DIN125A
2	.098	.250	.031	NAS70V099-250
2	.098	.250	.047	

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
2	.098	.250	.062	
2	.098	.312	.031	
2	.098	.312	.047	
2	.098	.312	.062	
M2.5	.105	.250	.020	DIN125A
3	.105	.250	.031	NAS549-FL3
3	.105	.250	.062	NAS549-F3
3	.110	.250	.031	GRY, BLK, RED
3	.110	.250	.017	5602-9-17
3	.110	.250	.062	5602-9-62
M2.6	.110	.275	.020	DIN125A
3	.110	.600	.062	GRY
4	.115	.200	.016	5602-58-16-BLK
4	.115	.220	.032	BLK, BRN
4	.115	.250	.017	BLK
4	.115	.250	.031	5602-9-32
4	.115	.250	.062	5602-9-62
4	.120	.218	.031	5602-60-32
4	.120	.250	.027	RED

# INSULATING FIBRE FLAT WASHERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
4	.120	.250	.031	
4	.120	.250	.047	
4	.120	.250	.062	
4	.120	.312	.031	
4	.120	.312	.047	
4	.120	.312	.062	
4	.120	.375	.031	
4	.120	.375	.047	
4	.120	.375	.062	
4	.125	.250	.031	F-6, 5602-61-32
4	.125	.250	.062	F-5, 5602-61-62
M3	.125	.275	.020	DIN125A
4	.125	.312	.031	NAS549-FL4
4	.125	.312	.045	5602-10-45
4	.125	.312	.062	NAS549-F4
4	.125	.312	.125	5602-10-125
5	.132	.324	.031	5602-63-32
5	.136	.250	.062	5602-180-62
6	.140	.250	.016	5602-23-16
6	.140	.250	.031	
6	.140	.250	.047	
6	.140	.250	.062	
6	.140	.312	.031	
6	.140	.312	.047	
6	.140	.312	.062	
6	.140	.375	.031	
6	.140	.375	.047	
6	.140	.375	.062	
6	.140	.375	.093	5602-12-93
6	.140	.500	.050	5602-70-50
6	.140	.815	.225	RED
6	.144	.375	.031	NAS70V144-375
6	.144	.502	.031	5602-70-32
M3.5	.145	.312	.020	DIN125A
6	.145	.500	.062	RED
6	.145	.750	.051	5602-27-50
6	.145	.750	.062	5602-27-62
6	.150	.375	.032	NAS549-FL6
6	.150	.375	.062	NAS549-F6
6	.150	.750	.062	PLN
6	.155	.250	.062	BLK
6	.155	.312	.031	F-8 RED
6	.155	.312	.062	F-7 BLK
6	.155	.375	.031	RED BLK
6	.155	.375	.045	5602-14-45

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
6	.155	.251	.062	5602-30-62
6	.160	.500	.125	RED
6	.160	.535	.021	BLK
6	.165	.375	.031	5602-219-32
6	.165	.375	.062	6502-219-62
6	.165	.438	.016	RED
6	.165	.501	.125	
6	.165	.535	.022	5302-75-22
M4	.169	.354	.031	DIN125A
8	.171	.312	.031	
8	.171	.312	.147	
8	.171	.312	.062	
8	.171	.375	.031	
8	.171	.375	.047	
8	.171	.375	.062	
8	.171	.438	.031	
8	.171	.438	.047	
8	.171	.438	.062	
8	.173	.308	.032	5602-79-32
8	.173	.375	.016	5602-18-16
8	.175	.309	.062	6502-79-62
8	.175	.325	.031	5602-80-32
8	.175	.375	.031	NAS549-FL8
8	.175	.375	.016	5602-18-16
8	.175	.375	.062	NAS549-F8
8	.180	.365	.028	RED
8	.180	.758	.062	RED
8	.185	.505	.062	RED
8	.188	.312	.031	5602-82-32
8	.188	.312	.062	5602-82-62
8	.188	.375	.031	F-12, 9306, RED
8	.188	.375	.062	F-11, BLK
10	.191	.322	.031	5602-85-32
10	.191	.322	.062	5602-85-62
10	.191	.640	.031	5602-87-32
10	.191	.572	.108	RED
10	.196	.312	.032	
10	.196	.312	.047	
10	.196	.312	.062	
10	.196	.375	.032	
10	.196	.375	.047	
10	.196	.375	.062	
10	.196	.437	.032	F-168, 3130
10	.196	.437	.047	
10	.196	.437	.062	

# INSULATING FIBRE FLAT WASHERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
10	.196	.500	.032	
10	.196	.500	.047	
10	.196	.500	.062	
10	.196	.505	.093	5600-8-93
10	.202	.343	.032	210-0102-00
10	.202	.406	.032	5602-233-32
3/8	.389	.062	.625	NAS549-F616
3/8	.389	.625	.094	NAS549-FH616
3/8	.413	.753	.031	5602-144-32
M10	.413	.826	.078	DIN125A
7/16	.438	.670	.031	
7/16	.437	.687	.062	F-29, BLK
7/16	.453	.750	.031	NAS549-FL716
7/16	.453	.751	.062	NAS549-F716
7/16	.453	.751	.094	NAS549-FH716
1/2	.500	.625	.031	F-32, RED
1/2	.500	.625	.062	F-31, BLK
1/2	.500	.750	.031	F-34, GRY, BLK
1/2	.500	.750	.062	F-33, 9323, BLK
1/2	.505	.689	.032	5600-40-32
1/2	.515	.875	.031	NAS549-FL816
1/2	.515	.875	.062	NAS70V515-875
1/2	.515	.875	.064	NAS549-FH816
9/16	.562	.812	.031	F-37, RED
9/16	.562	.812	.062	F-36, BLK
9/16	.567	.817	.016	5600-48-16
9/16	.578	1.062	.031	NAS549-FL916
9/16	.578	1.062	.062	NAS549-F916
5/8	.625	.750	.031	F-39, 5602-270-32
5/8	.625	.750	.062	F-38, BLK
5/8	.625	.875	.032	F-41, GRY, RED
5/8	.625	.875	.062	F-40, 9330, BLK
5/8	.635	1.250	.031	RED
5/8	.640	1.188	.031	NAS549-FL1016
5/8	.640	1.188	.062	NAS549-F1016
5/8	.640	1.188	.094	NAS549-FH1016
5/8	.688	.937	.031	F-32, RED
5/8	.688	.937	.062	F-42, BLK

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
5/8	.692	.942	.062	5600-60-62
3/4	.750	1.000	.031	F-45, BLK, RED
3/4	.750	1.000	.062	F-44, BLK
3/4	.750	1.062	.031	F-47, RED
3/4	.750	1.062	.062	F-46, BLK
3/4	.755	1.005	.031	5600-64-32
3/4	.765	1.312	.031	NAS549-FL1216
3/4	.765	1.750	.062	NAS549-F1216
3/4	.765	1.750	.094	NAS549-FH1216
3/4	.765	1.750	.031	BLK
3/4	.795	1.015	.062	BLK
3/4	.800	.928	.031	RED
7/8	.812	1.125	.032	F-49
7/8	.812	1.125	.062	F-48
7/8	.875	1.187	.031	F-51
7/8	.875	1.187	.062	F-50, 9334
7/8	.875	1.312	.094	9335
7/8	.880	1.130	.031	5600-72-32
7/8	.890	1.500	.031	NAS549-FL1416
7/8	.890	1.750	.062	NAS549-F1416
7/8	.890	1.750	.094	NAS549-FH1416
7/8	.937	1.250	.031	F-53
7/8	.937	1.250	.062	F-52
1"	1.000	1.312	.031	F-55
1"	1.000	1.312	.062	F-54, 9336
1"	1.005	1.385	.032	GRY
1"	1.005	1.500	.062	GRY
1"	1.005	2.000	.032	RED
1"	1.015	1.750	.031	NAS549-FL1616
1"	1.015	1.750	.062	NAS549-F1616
1"	1.015	1.750	.094	NAS549-FH1616
1-3/16"	1.187	1.687	.062	RED
1-3/16"	1.187	2.060	.062	RED
1-1/4"	1.255	2.000	.032	RED
1-1/4"	1.255	2.250	.062	BLK
1-1/2"	1.505	2.250	.062	BLK
1-5/8"	1.682	2.140	.062	BLK
1-3/4"	1.755	2.250	.062	BLK

WCL Part Numbers - Example: FW-0765-1750-031-FB-BLK

<u>FW</u>	<u>.765</u>	<u>1.750</u>	<u>.031</u>	<u>FB</u>	<u>BLK</u>
Type	I.D.	O.D.	THK	MAT	FIN

FW = Flat Washer  
 FB = Fibre  
 BLK = Black

# PHENOLIC FLAT WASHERS

**PHENOLIC WASHERS** are stamped from various industrial laminates, such as Paper, Canvas, Linen, Glass Grades G-3, G-5, G-7, G-9 G-10 and G-11, and Glass Polyester - GPO 1, 2, and 3. These washers are laminated in several grades, including XP, Conolite, CEXXXP, CEF, LE, XXP and others, usually in the material color or black.

NAS549 electrical insulating washers are available in a variety of material: Fibre (F), Paper Phenolic (-), three types of Cotton Phenolic - FBM (M), FBG (B), FBE (E), Glass Melamine - GMF (P), and Glass Epoxy - GEB (G).

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1	.078	.240	.031	XP&CE
2	.093	.593	.062	XP-NAT
2	.094	.187	.031	XP-NAT
2	.094	.250	.016	EPOXY
2	.099	.250	.031	NAS70P099-250
3	.105	.250	.016	G-5
3	.105	.250	.031	NAS549-L3
3	.105	.250	.062	NAS549-3
3	.105	.312	.031	CEM
4	.115	.250	.031	CE-NAT
4	.115	.308	.071	
4	.115	.750	.062	GL
4	.120	.265	.125	
4	.121	.218	.016	GL
4	.121	.218	.063	GL
4	.125	.218	.016	
4	.125	.312	.031	NAS549-L4
4	.125	.312	.063	NAS549-4
4	.125	.375	.031	GL
4	.125	.625	.063	GL
4	.125	.625	.063	GL
4	.130	.420	.031	BACW10P303L
4	.136	.375	.068	
6	.140	.250	.031	GL
6	.140	.312	.031	CEF
6	.140	.330	.031	BACW10P37L
6	.144	.375	.031	NAS70P144-375
6	.147	.312	.045	
6	.147	.440	.031	
6	.149	.375	.031	NAS549-L6
6	.149	.375	.063	NAS549-6
6	.150	.500	.031	
6	.155	.250	.063	PHEN & GLS
6	.156	.375	.031	
8	.170	.375	.093	
8	.170	.500	.045	XP-NAT
8	.170	.688	.062	
8	.170	.875	.062	
8	.172	.375	.031	XP-NAT, CE
8	.174	.375	.031	NAS549-L8
8	.174	.375	.062	NAS549-8
8	.177	.375	.031	NAS70P177-375

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
8	.180	.465	.062	
8	.190	.500	.045	CE-NAT
8	.190	.640	.031	
8	.195	.440	.031	GLS
10	.196	.385	.020	XP-NAT
10	.203	.438	.031	NAS549-L10
10	.203	.438	.062	NAS549-10
10	.203	.500	.062	
10	.209	.438	.031	NAS70P209-438
10	.235	.550	.015	NAT
1/4	.250	.440	.031	BRN & BLK
1/4	.250	.625	.031	
1/4	.250	.750	.031	
1/4	.252	.437	.031	CE-NAT, CE-BLK
1/4	.252	.500	.031	XP & CE
1/4	.255	.375	.062	CE-NAT
1/4	.255	.515	.063	GLS
1/4	.260	.505	.031	GLS
1/4	.261	1.500	.031	NAS70P261-1500
1/4	.265	.500	.031	NAS549-L416
1/4	.265	.500	.062	NAS549-416
1/4	.265	.750	.031	
5/16	.313	.500	.031	CEF
5/16	.328	.563	.031	NAS549-L516
5/16	.328	.563	.031	NAS70P328-563
5/16	.328	.563	.063	NAS549-516
5/16	.340	.812	.063	
5/16	.340	.520	.015	BACW10P273L
5/16	.340	1.120	.031	BACW10P240L
5/16	.340	1.120	.063	BACW10P242L
3/8	.375	1.750	.063	
3/8	.375	1.250	.031	GL
3/8	.380	.645	.020	XP
3/8	.385	1.250	.063	
3/8	.390	.625	.031	NAS549-L616
3/8	.390	.625	.063	NAS70P390-625
3/8	.390	.625	.063	NAS549-616
3/8	.390	.625	.094	NAS549-H616
7/16	.453	.750	.031	NAS549-L716
7/16	.453	.750	.063	NAS70P453-750
7/16	.468	.800	.094	50-21-8
1/2	.468	.800	.094	CE-NAT1/2

## PHENOLIC FLAT WASHERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
	.515	.875	.031	NAS549-L816
1/2	.515	.875	.063	NAS549-816
1/2	.515	.875	.063	NAS70P515-875
1/2	.515	.875	.094	NAS549-H816
1/2	.515	1.000	.062	CE-NAT, F-56
9/16	.565	1.125	.062	CE-NAT, F-57
9/16	.578	1.062	.031	NAS549-L916
9/16	.578	1.062	.062	NAS549-916
5/8	.630	.937	.031	XP
5/8	.630	1.125	.062	CE-NAT, F-58

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
5/8	.640	1.188	.031	NAS549-L1016
5/8	.640	1.188	.062	NAS549-1016
5/8	.640	1.188	.094	NAS549-H1016
5/8	.688	1.250	.093	CE-NAT, F-60
3/4	.750	1.130	.031	PLN
3/4	.754	1.250	.062	CE-NAT, F-61
3/4	.765	1.312	.031	NAS549-L1216
3/4	.765	1.312	.032	NAS549-1216
7/8	.937	1.500	.062	PLN
1-1/4	1.270	1.880	.062	BACW10P27L



**Non - Metallic Flat Washers**

# THERMOPLASTIC - NYLON FLAT WASHERS AND SPACERS

The main advantages of **NYLON** as a washer material are its resistance to abrasion, repeated impacts, organic solvents, oils, gasoline and temperature extremes. It has good creep resistance (yielding to pressure) and ability to self-extinguish. **NYLON 6/6** is commonly used as punching grade stock and **NYLATRON G5®** is also popular for many applications. This special grade incorporates lubricating elements for better wear and has been heat stabilized. Washers are available to ASTM-D-4066, MIL-M-20693 and other specifications. Washers made from other **POLYIMIDES**, such as **DELRIN®** and **NOMEX** are also listed and many others are available.

**CHART REFERENCES** - Most standard part numbers used for Thermoplastics-Nylon washers are shown in the following charts. Where alternate part numbers are not shown, the washer material is indicated. For example, 6/6 is the most common nylon used for manufacturing purposes.

**MTW** - This symbol is used to indicated Motor Thrust Washers made from Nylatron for added lubricity, long wear and quiet performance in electric motors.

**Polyethylene**, to ASTM-D-1248, is a popular thermoplastic

material for washers used in conventional operating temperatures. It has good electrical properties and toughness, and thin grades have reasonable clarity.

**POLYPROPYLENE** is one of the most economical and popular forms of plastic used for flat washers today. Material characteristics include chemical resistance, living hinge, light weight, arc resistance, good dielectric strength and a flammability grade. Four grades are used; the General Purpose Grade has a UL #E31765A. The High Temperature Grade uses additives to sustain rigidity under high temperature condition. FR Grade is a flame retardant polypropylene with a UL rating of SE-0 (1/8" thick).

The Gasketing Grade, used for sealing, has a durometer of 90-95. Washers made from this versatile material are ideal for a variety of insulating and mechanical applications. These washers seal, reduce vibration and act as component guides.

**MYLAR® POLYESTER FILM** - EL and A series - Washers made from this material are used in such applications as: carriers in microfilm, magnetic tape, carbon ribbons and metallic yarn; electrical barriers for capacitors, motors, membrane switches and wire and cable; and as thermal barriers in wire and cable tapes.

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
0	.035	.101	.031	5610-214-03
0	.042	.312	.031	
0	.050	.109	.020	DELRIN
0	.063	.188	.021	MS51859-11
0	.063	.312	.031	5610-218-31
0	.063	.312	.090	FW312063090
0	.064	.122	.031	5610-50-31
0	.064	.190	.016	
0	.070	.250	.015	MTW-NYLATRON
0	.070	.281	.015	MTW-NYLATRON
0	.076	.156	.010	DELRIN
0	.076	.156	.021	MS51859-12
0	.076	.160	.016	5610-4-15
0	.077	.240	.031	
0	.077	.500	.031	
1	.079	.501	.031	
1	.085	.190	.016	
2	.090	.250	.032	FW250090032
2	.090	.250	.062	FW250090062
2	.090	.250	.093	FW250090093
2	.090	.250	.125	FW250090125
2	.091	.280	.021	
2	.093	.187	.021	5610-9-20
2	.093	.187	.031	DELRIN
2	.093	.187	.031	MS51859-1
2	.093	.245	.015	MS51859-13

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
2	.094	.193	.041	5610-9-40
2	.094	.218	.008	5610-6-8
2	.094	.218	.016	5610-6-15
2	.094	.218	.031	5610-6-31
2	.094	.218	.062	5610-6-62
2	.094	.230	.031	
2	.094	.255	.031	5610-11-31
2	.098	.187	.031	
2	.098	.187	.047	
2	.098	.187	.062	
2	.098	.223	.008	MYLAR
2	.098	.250	.031	
2	.098	.250	.062	
2	.098	.312	.031	
2	.098	.312	.062	
2	.098	.610	.062	POLYPROP
3	.100	.235	.010	ACETAL DELRIN
3	.105	.250	.022	
3	.105	.250	.031	NAS1515-H02L
3	.105	.250	.062	NAS1515-H02
3	.108	.247	.021	5610-8-20
3	.108	.528	.062	
3	.109	.218	.016	
3	.110	.271	.045	
4	.115	.185	.031	5610-230-31
4	.115	.200	.031	5610-51-31

# THERMOPLASTIC - NYLON FLAT WASHERS AND SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
4	.115	.250	.032	FW250115032
4	.115	.250	.062	FW250115062
4	.115	.250	.093	FW250115093
4	.115	.280	.021	15083-020
4	.115	.250	.125	FW25011525
4	.115	.280	.051	5610-17-50
4	.115	.280	.062	5610-16-62
4	.115	.290	.062	
4	.120	.220	.021	5610-19-20
4	.120	.250	.031	
4	.120	.250	.047	
4	.120	.250	.062	
4	.120	.280	.021	5610-21-20
4	.120	.280	.031	
4	.120	.280	.041	
4	.120	.280	.051	5610-21-50
4	.120	.280	.062	5610-21-62
4	.120	.285	.071	5610-21-70
4	.120	.312	.031	
4	.120	.312	.047	
4	.120	.312	.062	
4	.120	.375	.031	
4	.120	.375	.047	
4	.120	.375	.062	
4	.125	.228	.007	MYLAR
4	.125	.250	.016	FM-6593
4	.125	.250	.021	
4	.125	.250	.062	
4	.125	.271	.020	
4	.125	.281	.047	MS51859-2
M3	.125	.285	.020	DIN125A
4	.125	.310	.016	5610-10-15
4	.125	.312	.031	NAS151-H04L
4	.125	.312	.062	NAS1515-H04
4	.125	.343	.031	MS5189-14
4	.125	.354	.031	DIN9021, ISO7093
4	.125	.365	.006	
4	.125	.500	.100	FW500125100
4	.128	.187	.011	5610-233-10
4	.128	.187	.021	227-0008-004
4	.128	.245	.011	5610-55-10
4	.128	.312	.005	MYLAR
4	.128	.312	.052	
4	.128	.440	.021	5610-23-20
4	.130	.250	.093	FW250130093
4	.130	.375	.008	310-1011-00

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
4	.130	.375	.031	
4	.133	.250	.015	MTW-NYLATRON
4	.133	.281	.015	MTW-NYLATRON
4	.136	.250	.062	FM-2670, DELRIN
4	.136	.375	.031	5610-12-32
6	.140	.250	.031	
6	.140	.250	.047	
6	.140	.250	.062	
6	.140	.250	.080	FW250140080
6	.140	.260	.082	
6	.140	.267	.031	5610-244-31
6	.140	.285	.110	FW250140110
6	.140	.285	.118	FW250140118
6	.140	.290	.031	5610-248-31
6	.140	.290	.062	
6	.140	.312	.031	5610-35-31
6	.140	.312	.032	FW312140032
6	.140	.312	.047	MS51859-3
6	.140	.312	.047	FW312140047
6	.140	.312	.062	FW312140062
6	.140	.375	.031	
6	.140	.375	.047	
6	.140	.375	.062	
6	.140	.750	.051	5610-34-50
6	.140	.312	.093	FW312140093
6	.140	.312	.125	FW312140125
6	.143	.375	.091	5610-58-91
6	.144	.270	.031	5610-59-31
6	.144	.315	.062	
6	.147	.250	.091	5610-250-90
6	.147	.250	.220	FW250147220
6	.147	.500	.031	5610-41-31
6	.147	.500	.062	5410-41-62
6	.147	.643	.031	5610-60-31
6	.149	.375	.031	NAS1515-H06L
6	.149	.375	.062	NAS1515-H06
6	.150	.312	.025	5610-44-25
6	.150	.312	.031	5610-44-31
6	.150	.345	.031	
6	.150	.510	.062	
6	.156	.250	.021	MS51859-15
6	.156	.312	.031	FM-6594
6	.156	.312	.041	MS51859-3
6	.156	.375	.031	5610-45-31
6	.156	.443	.051	
6	.158	.281	.015	MTW-NYLATRON

# THERMOPLASTIC - NYLON FLAT WASHERS AND SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
6	.158	.343	.015	MTW-NYLATRON
6	.158	.375	.015	MTW-NYLATRON
6	.158	.406	.015	MTW-NYLATRON
6	.160	.250	.062	5610-46-62
6	.160	.490	.008	
6	.160	.562	.062	5610-48-62
6	.162	.312	.062	FW312162062
6	.165	.235	.010	ACETAL DELRIN
6	.165	.500	.011	210-0847-00
6	.165	.500	.014	
6	.165	.625	.062	
6	.165	1.250	.062	
M4	.169	.354	.031	DIN125A, ISO7089
M4	.169	.472	.039	DIN9021, ISO7093
8	.171	.312	.031	3127, 760-2526
8	.171	.312	.047	3167, 760-2547
8	.171	.312	.062	
8	.171	.340	.031	
8	.171	.375	.031	
8	.171	.375	.032	FW375171032
8	.171	.375	.047	
8	.171	.375	.062	FW375151062
8	.171	.437	.031	
8	.171	.437	.047	
8	.171	.437	.062	
8	.171	.515	.091	5610-61-90
8	.171	.375	.093	FW375151093
8	.171	.375	.125	FW375151125
8	.174	.375	.021	5610-18-20
8	.174	.375	.031	NAS1515-H08L
8	.174	.375	.062	NAS1515-H08
8	.175	.271	.025	
8	.178	.375	.020	
8	.180	.281	.031	MTW-NYLATRON
8	.180	.375	.015	MTW-NYLATRON
8	.180	.406	.015	MTW-NYLATRON
8	.182	.375	.008	MYLAR
8	.185	.362	.062	
8	.185	.437	.031	POLYETHYLENE
8	.185	.437	.031	5610-62-31
8	.185	.437	.041	5610-62-40
8	.187	.375	.015	5610-90-15
8	.187	.375	.032	FW375187032
8	.187	.375	.045	MS51859-4
8	.187	.375	.062	5610-90-92
8	.187	.390	.031	

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
8	.187	.437	.032	
8	.187	.437	.045	
8	.187	.500	.020	BLK VINAL PLASTIC
8	.187	.500	.093	FW500187093
8	.187	1.000	.250	167LN-0214-0000
8	.189	.281	.015	MTW-NYLATRON
8	.189	.343	.015	MTW-NYLATRON
8	.189	.375	.031	MTW-NYLATRON
8	.189	.406	.015	MTW-NYLATRON
8	.189	.437	.015	MTW-NYLATRON
8	.189	.625	.057	
8	.189	1.005	.031	
10	.190	.434	.125	FW434190125
10	.192	.312	.016	5610-96-15
10	.192	.375	.031	5606-4-31
10	.192	.438	.021	6/6
10	.192	.505	.015	5606-8-15
10	.194	.375	.032	FW375194032
10	.194	.375	.062	FW375194062
10	.194	.375	.093	FW375194093
10	.194	.375	.125	FW375194125
10	.194	.500	.125	FW500194125
10	.195	.312	.190	167LN-0550-0000
10	.196	.427	.031	6/6
10	.196	.312	.031	
10	.196	.312	.047	
10	.196	.312	.062	
10	.196	.375	.031	
10	.198	.375	.047	
10	.196	.375	.062	
10	.196	.437	.031	
10	.196	.437	.047	
10	.196	.437	.062	
10	.198	.500	.031	
10	.196	.500	.047	
10	.196	.500	.062	
10	.196	.550	.031	6/6
10	.196	.562	.031	MTW-NYLATRON
10	.200	.437	.062	FW437200062
10	.200	.450	.048	FW450200048
10	.201	.309	.031	5610-63-31
10	.201	.500	.041	6/6
10	.201	.562	.041	6/6
10	.203	.307	.011	6/6
10	.203	.437	.031	NAS1515-H3L
10	.203	.437	.041	6/6



# THERMOPLASTIC - NYLON FLAT WASHERS AND SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
10	.203	.437	.062	NAS1515-H3
10	.203	.437	.092	NAS1515-H3H
10	.203	.470	.041	5610-108-40
10	.203	.625	.500	167PB-0477-0000
10	.205	.307	.010	6/6
10	.205	.450	.041	6/6
10	.205	.465	.051	6/6
10	.205	.500	.091	5610-64-90
10	.205	.500	.510	167NN-0433-0000
10	.208	.280	.021	5610-109-20
M5	.208	.393	.039	DIN125A, ISO7089
M5	.208	.590	.062	DIN9021, ISO7093
10	.210	.300	.031	6/6
10	.210	.312	.031	5610-287-31
10	.210	.450	.041	6/6
10	.212	.370	.090	FW370212090
10	.214	.470	.041	6/6
10	.218	.375	.052	6/6
10	.218	.406	.011	210-1098-00
10	.218	.437	.015	MTW-NYLATRON
10	.218	.437	.031	6/6
10	.218	.437	.041	MS51859-5
10	.218	.437	.062	6/6
10	.218	.625	.041	MS51859-16
10	.218	.750	.187	167LN-2349-0000
10	.219	.500	.719	167NB-0654-0000
10	.220	.435	.078	FW435220078
10	.223	.375	.031	6/6
12	.225	.415	.050	FW415225050
12	.225	.437	.062	6/6
12	.225	.500	.041	6/6
12	.228	.375	.118	FW375228118A
12	.230	.440	.040	ABS
12	.237	.375	.031	MTW-NYLATRON
12	.237	.437	.031	MTW-NYLATRON
12	.250	.312	.031	6/6
12	.250	.350	.031	6/6
12	.250	.375	.020	6/6
12	.250	.375	.062	6/6
12	.250	.562	.260	167NN-0429-0000
12	.250	.610	.062	5610-290-62
12	.250	.625	.375	167NN-0657-0000
12	.250	.690	.041	6/6
12	.250	.750	.250	167PB-0580-0000
12	.250	.760	.125	167LN-0565-0000
1/4	.251	.452	.062	MTW-NYLATRON

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
M6	.251	.492	.062	DIN125A, ISO7089
1/4	.251	.500	.062	MTW-NYLATRON
1/4	.251	.562	.031	MTW-NYLATRON
1/4	.251	.687	.031	MTW-NYLATRON
M6	.251	.708	.062	DIN9021, ISO7093
1/4	.252	.375	.031	MTW-NYLATRON
1/4	.252	.406	.031	MTW-NYLATRON
1/4	.252	.437	.031	MTW-NYLATRON
1/4	.252	.472	.059	FW472252059
1/4	.252	.620	.060	FW620252065
1/4	.252	.625	.015	MTW-NYLATRON
1/4	.252	.752	.062	5610-69-62
1/4	.253	.437	.016	5606-12-15
1/4	.253	.437	.031	5606-12-31
1/4	.253	.443	.125	FW443253125
1/4	.253	.506	.041	5606-16-40
1/4	.253	.568	.062	5606-20-62
1/4	.253	.625	.250	167LN-2211-0000
1/4	.253	.687	.021	6/6
1/4	.253	.750	.062	167LN-2356-0000
1/4	.255	.330	.007	MYLAR
1/4	.255	.375	.021	5610-120-20
1/4	.255	.375	.062	5610-120-62
1/4	.255	.375	.115	FW375255115
1/4	.257	.500	.312	167NN-0468-0000
1/4	.257	.500	.031	5610-293-31
1/4	.257	.500	.032	FW500257032
1/4	.257	.500	.062	FW500257062
1/4	.257	.500	.093	FW500257093
1/4	.257	.500	.125	FW500257125
1/4	.257	.562	.062	5610-124-62
1/4	.257	.740	.062	RULON
1/4	.260	.437	.031	
1/4	.260	.437	.047	
1/4	.260	.437	.062	
1/4	.260	.500	.031	
1/4	.260	.500	.047	
1/4	.260	.500	.062	
1/4	.260	.562	.062	FM-2518
1/4	.260	.562	.562	167PB-0603-0000
1/4	.260	.600	.031	5610-125-31
1/4	.260	.625	.031	
1/4	.260	.625	.047	
1/4	.260	.625	.062	
1/4	.260	.688	.051	6/6
1/4	.260	.750	.031	

# THERMOPLASTIC - NYLON FLAT WASHERS AND SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1/4	.260	.750	.047	3185, 760-2557
1/4	.260	.750	.062	3220, 760-2574
1/4	.260	.880	.002	MYLAR
1/4	.265	.500	.031	NAS1515-H4L
1/4	.265	.500	.062	NAS1515-H4
1/4	.265	.500	.094	NAS1515-H4H
1/4	.269	.520	.015	MTW-NYLATRON
1/4	.275	.500	.062	6/6
1/4	.275	.562	.062	6/6
1/4	.281	.500	.045	6/6
1/4	.281	.562	.062	MS51859-17
1/4	.281	.325	.015	5610-302-15
1/4	.281	.409	.078	FW409281078
1/4	.281	.625	.062	5610-302-62
1/4	.281	.625	.045	MS51859-6
1/4	.281	.625	.062	FM-6597
1/4	.281	.875	.031	MS51859-18
1/4	.285	.493	.020	6/6
1/4	.286	.500	.103	167NN-0641-0000
1/4	.307	.490	.032	6/6
1/4	.312	.437	.062	167LN-0600-0000
1/4	.312	.437	.187	FW437312187
5/16	.314	.500	.031	MTW-NYLATRON
5/16	.314	.500	.062	MTW-NYLATRON
5/16	.314	.520	.015	MTW-NYLATRON
5/16	.314	.562	.015	MTW-NYLATRON
5/16	.314	.687	.031	MTW-NYLATRON
5/16	.315	.420	.031	6/6
5/16	.315	.507	.015	5606-24-15
5/16	.315	.507	.021	5606-24-20
5/16	.315	.615	.026	6/6
5/16	.315	.625	.031	MTW, 5610-307-31
5/16	.317	.500	.031	MS1848-19
5/16	.317	.500	.032	FW500317032
5/16	.317	.500	.062	FW500317062
5/16	.317	.500	.093	FW500317093
5/16	.317	.500	.125	FW500317125
5/16	.320	.438	.062	6/6
5/16	.320	1.500	.021	6/6
5/16	.325	.750	.015	6/6
5/16	.325	.500	.847	167BB-0518-0000
M8	.330	.669	.062	DIN125A, ISO7089
M8	.330	.985	.078	DIN125A, ISO7093
5/16	.328	.504	.045	210-1261-00

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
5/16	.328	.562	.031	NAS1515-H5L
5/16	.328	.562	.062	NAS1515-H5
5/16	.328	.562	.094	NAS1515-H5H
5/16	.330	.520	.016	5610-144-16
5/16	.338	.437	.015	MTW-NYLATRON
5/16	.339	.775	.315	FW775339315
5/16	.344	.625	.045	MS51859-7
5/16	.365	.750	.062	6/6
5/16	.365	1.125	.062	6/6
5/16	.375	.440	.062	6/6
5/16	.375	.500	.062	5610-76-62
5/16	.375	.625	.031	FM STD
5/16	.375	.750	.031	5610-77-31
5/16	.375	.750	.062	5610-77-62, 2679
5/16	.375	.875	.375	167NN-0631-0000
5/16	.375	1.000	.021	6/6
5/16	.376	.546	.484	167NN-0519-0000
3/8	.378	.630	.011	5606-28-10
3/8	.379	.812	.062	5610-149-62
3/8	.380	.625	.032	FW625380032
3/8	.380	.625	.062	FW625380062
3/8	.380	.625	.093	FW625380093
3/8	.380	.625	.125	FW625380125
3/8	.383	.684	.062	5610-81-62
3/8	.385	.500	.031	3145, 760-2537
3/8	.385	.500	.047	3190, 760-2558
3/8	.385	.500	.062	3225, 760-2575
3/8	.385	.625	.031	3354, 760-2517
3/8	.385	.625	.047	3191, 760-2559
3/8	.385	.625	.062	3226, 760-2515
3/8	.385	.750	.031	3146, 760-2538
3/8	.385	.750	.047	3192, 760-2560
3/8	.385	.750	.062	3227, 760-2516
3/8	.385	1.000	.031	3147, 760-2539
3/8	.385	1.000	.047	3193, 760-2561
3/8	.385	1.000	.062	3228, 760-2576
3/8	.390	.500	.021	6/6
3/8	.390	.615	.031	6/6
3/8	.390	.625	.016	BACW10P274G
3/8	.390	.625	.031	NAS1515-H6L
3/8	.390	.625	.062	NAS1515-H6
3/8	.390	.625	.094	NAS1515-H6H
3/8	.390	.750	.151	GOVT # - BLK
3/8	.390	.875	.031	# 101 NYLON

# THERMOPLASTIC - NYLON FLAT WASHERS AND SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
3/8	.400	.500	.062	
3/8	.406	.812	.047	MS51859-8
3/8	.406	1.000	.081	MS51859-20
3/8	.410	.730	.160	FM-MOLDED
M10	.413	.825	.078	DIN125A, ISO7089
M10	.413	1.181	.098	DIN9021, ISO7093
7/16	.437	.687	.062	MTW-NYLATRON
7/16	.440	.692	.016	5605-32-15
7/16	.443	.750	.032	FW750443032
7/16	.443	.750	.062	FW750443062
7/16	.443	.750	.093	FW750443093
7/16	.443	.750	.125	FW750443125
7/16	.453	.750	.031	NAS1515-H7L
7/16	.453	.750	.062	NAS1515-H7
7/16	.453	.750	.094	NAS1515-H7H
7/16	.455	1.000	.062	5610-162-62
7/16	.460	1.750	.031	MS51859-21
7/16	.475	.687	.062	MTW-NYLATRON
7/16	.469	.922	.047	MS51859-9
7/16	.482	.780	.031	6/6
7/16	.490	.745	.062	6/6
1/2	.500	1.125	.093	6/6
1/2	.503	.756	.032	5606-44-32
1/2	.505	.688	.025	210-1429-00
1/2	.505	.750	.032	FW75050532
1/2	.505	.750	.062	FW750505062
1/2	.505	.750	.093	FW50505093
1/2	.505	.750	.125	FW750505125
1/2	.505	.843	.031	MTW-NYLATRON
1/2	.505	.875	.031	5610-170-31
1/2	.505	1.000	.062	FM
1/2	.510	.906	.015	5610-173-15
M12	.511	.995	.098	DIN125A, ISO7089
M12	.511	1.575	.118	DIN125A, ISO7093
1/2	.515	.750	.062	
1/2	.515	.875	.031	NAS1515-H8L
1/2	.515	.875	.062	NAS1515-H8
1/2	.515	.875	.094	NAS1515-H8H
1/2	.516	.656	.011	5610-175-15
1/2	.530	1.062	.047	MS51859-10
1/2	.530	1.621	.021	MS51848-22
1/2	.535	1.000	.062	

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1/2	.535	1.250	.120	
1/2	.540	.732	.051	
1/2	.545	.760	.021	
9/16	.565	.818	.031	5606-48-31
9/16	.578	1.062	.031	NAS1515-H9L
9/16	.578	1.062	.062	NAS1515-H9
9/16	.578	1.062	.094	NAS1515-H9H
9/16	.605	1.595	.031	
9/16	.605	1.595	.062	
9/16	.625	1.062	.094	167NN-0583-0000
9/16	.628	.882	.031	5606-52-31
9/16	.629	1.125	.128	167NN-0579-0000
9/16	.630	.812	.062	5610-190-62
5/8	.640	1.188	.031	NAS1515-H10L
5/8	.640	1.188	.062	NAS1515-H10
5/8	.640	1.188	.094	NAS1515-H10H
5/8	.640	1.312	.062	5610-364-62
M16	.669	1.181	.118	DIN125A, ISO7089
5/8	.689	.812	.031	5610-199-31
5/8	.690	.943	.031	5606-60-31
5/8	.753	1.000	.062	5606-64-62
5/8	.755	1.125	.031	210-0922-00
5/8	.765	.250	.125	167LN-0565-0000
5/8	.765	1.312	.031	NAS1515-H12L
5/8	.765	1.312	.062	NAS1515-H12
5/8	.765	1.312	.094	NAS151-H12H
5/8	.767	1.317	.062	6/6
M20	.825	1.456	.118	DIN125A, ISO7089
7/8	.870	1.500	.031	6/6
7/8	.880	1.750	.062	6/6
7/8	.890	1.500	.031	NAS1515-H14L
7/8	.890	1.500	.062	NAS1515-H14
7/8	.890	1.500	.094	NAS1515-H14H
1"	1.005	1.940	.112	6/6
1"	1.015	1.750	.062	NAS1515-H16
1"	1.060	2.250	.054	12300137-PLASTIC
1-1/4	1.281	1.750	.031	5610-213-31
2-5/16	2.312	2.810	.125	12307267-2
2-5/16	2.312	2.810	.250	12307267-1
2-7/16	2.440	2.875	.406	12294962
2-7/16	2.440	3.060	.050	12297804-2
2-7/16	2.440	3.060	.115	12297804-1

## THERMOPLASTIC - NYLON FLAT WASHERS AND SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
5/8	.755	1.125	.031	210-0922-00
5/8	.765	.250	.125	167LN-0565-0000
5/8	.765	1.312	.031	NAS1515-H12L
5/8	.765	1.312	.062	NAS1515-H12
5/8	.765	1.312	.094	NAS151-H12H
5/8	.767	1.317	.062	6/6
M20	.825	1.456	.118	DIN125A, ISO7089
7/8	.870	1.500	.031	6/6
7/8	.880	1.750	.062	6/6
7/8	.890	1.500	.031	NAS1515-H14L
7/8	.890	1.500	.062	NAS1515-H14

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
7/8	.890	1.500	.094	NAS1515-H14H
1"	1.005	1.940	.112	6/6
1"	1.015	1.750	.062	NAS1515-H16
1"	1.060	2.250	.054	12300137-PLASTIC
1-1/4	1.281	1.750	.031	5610-213-31
2-5/16	2.312	2.810	.125	12307267-2
2-5/16	2.312	2.810	.250	12307267-1
2-7/16	2.440	2.875	.406	12294962
2-7/16	2.440	3.060	.050	12297804-2
2-7/16	2.440	3.060	.115	12297804-1

## THERMOPLASTICS - TEFLON FLAT WASHERS

**VIRGIN TEFLON**, due to the molecular structure of its resin, is almost universally inert. Washers made from this material are impermeable to most corrosive liquids, vapors and gasses, even at elevated temperatures or when under pressure or in a vacuum.

The material also has excellent electrical and dielectric properties. A tendency to creep or cold flow under compressive load, limits the use of these washers in mechanical applications.

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
0	.036	.201	.010	
0	.042	.135	.010	
0	.062	.201	.062	
0	.077	.156	.015	
2	.091	.250	.010	
3	.094	.312	.021	
3	.098	.185	.031	
3	.100	.220	.031	
3	.105	.250	.031	NAS1515-M02L
3	.105	.250	.062	NAS1515-M02
3	.110	.250	.031	
4	.120	.185	.015	
4	.120	.185	.021	
4	.122	.312	.011	
4	.125	.250	.005	
4	.125	.250	.031	

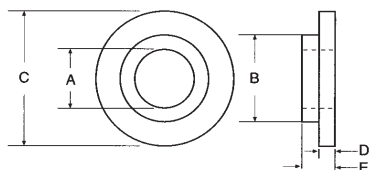
Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
4	.125	.312	.031	NAS1515-M04L
4	.125	.312	.062	NAS1515-M04
4	.130	.350	.025	
4	.130	.510	.015	
4	.130	.375	.015	
4	.130	.375	.062	
5	.135	.250	.032	
5	.135	.280	.015	
5	.135	.375	.002	
5	.140	.200	.050	BACW10P287TF
5	.142	.250	.062	
6	.149	.278	.015	
6	.149	.375	.031	NAS1515-M06L
6	.149	.375	.062	NAS1515-M06
6	.165	.500	.055	
6	.165	.800	.021	

# THERMOPLASTICS - TEFLON FLAT WASHERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
8	.170	.410	.021	
8	.174	.365	.021	
8	.174	.375	.010	
8	.174	.375	.031	NAS1515-M08L
8	.174	.375	.062	NAS1515-M08
8	.180	.235	.015	
8	.180	.235	.018	
8	.185	.235	.015	
8	.185	.235	.021	
8	.185	.271	.041	
8	.185	.620	.021	
8	.187	.281	.062	
8	.187	.625	.050	
10	.190	.275	.045	
10	.190	.500	.010	
10	.195	.220	.031	
10	.203	.270	.040	
10	.203	.438	.031	NAS1515-M3L
10	.203	.438	.062	NAS1515-M3
10	.203	.438	.093	NAS1515-M3H
12	.215	.330	.020	
12	.220	.365	.031	
12	.235	.505	.010	
1/4	.250	.281	.050	TEFLONSPACER
1/4	.250	.355	.015	
1/4	.250	.490	.005	
1/4	.250	.680	.008	
1/4	.255	.375	.031	
1/4	.255	.505	.016	
1/4	.255	.515	.031	
1/4	.255	.530	.016	
1/4	.255	.625	.016	
1/4	.260	.565	.020	
1/4	.265	.390	.020	
1/4	.265	.438	.010	
1/4	.265	.500	.031	NAS1515-M4L

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1/4	.265	.500	.062	NAS1515-M4
1/4	.265	.525	.010	
1/4	.265	.525	.031	
1/4	.275	.375	.052	
5/16	.312	.440	.031	
5/16	.312	.515	.031	
5/16	.312	.677	.016	
5/16	.312	.875	.020	
5/16	.316	.625	.020	
5/16	.316	.677	.062	
5/16	.325	.750	.010	
5/16	.325	.800	.020	
5/16	.328	.510	.016	BACW10P219F
5/16	.343	.562	.062	AMS3651
3/8	.385	.562	.020	
3/8	.390	.490	.100	BACW10P293TF
3/8	.390	.750	.062	350AS279
3/8	.405	.562	.020	
3/8	.405	1.000	.016	
7/16	.453	.750	.031	NAS1515-M7L
7/16	.453	.750	.062	NAS1515-M7
7/16	.460	.755	.034	
1/2	.515	.875	.031	NAS1515-M8L
1/2	.515	.875	.062	NAS1515-M8
1/2	.535	.645	.062	
1/2	.568	1.015	.031	
9/16	.578	1.062	.031	NAS1515-M9L
9/16	.578	1.062	.062	NAS1515-M9
5/8	.640	1.188	.031	NAS1515-M10L
5/8	.640	1.188	.062	NAS1515-M10
3/4	.765	1.312	.031	NAS1515-M12L
3/4	.765	1.312	.062	NAS1515-M12
7/8	.875	1.250	.062	
1"	1.015	1.750	.031	NAS1515-M16L
1-1/4	1.285	1.385	.031	

# NON-METALLIC SHOULDER WASHERS



**MIL-M-38527/09** series washers are frequently used as mounting pads for electrical/electronic components and hardware made from Teflon or Polyphenylene Sulfide.

Polymide (Natural Nylon) as per ASTM-B16. Shoulder washers made from Natural Nylon are used frequently with insulating screws, studs and rivets in transformers, appliances, automotive electrical parts and radio and TV components.

**94V2** rated shoulder washers, tubular spacers and molded flat spacers are available in customer-specified materials. These spacers seal, absorb vibration, act as component guides and are available in hundreds of length and diameter combination, just some of which are listed here.

**MIL-W-45595** - The shoulder washers/bushings in this series are made from

Screw Size	"A" I.D.	"B" Shoulder O.D.	"C" O.D.	"D" Washer Thickness	"E" Overall Thickness	Material	ALTERNATE Ref. No.
0	.000	.189	.382	.076	.074	NYLON	
0	.062	.100	.380	.050	.840	TEFLON	
1	.085	.130	.188	.065	.094	NYLON	5607-3
1	.090	.125	.248	.030	.050	NYLON	5607-4
2	.091	.155	.255	.050	.070	FIBRE	
2	.093	.122	.218	.025	.087	NYLON	M45595/1-01
2	.093	.152	.218	.062	.087	NYLON	9111-2763
2	.094	.185	.255	.045	.055	NYLON	5607-8
2	.095	.148	.220	.060	.088	NYLON	
3	.110	.166	.250	.030	.103	NYLON	
3	.112	.140	.280	.042	.125	POLY.	M38527/09-002S
3	.112	.150	.280	.042	.125	POLY.	M38527/09-004S
3	.112	.150	.280	.042	.185	POLY.	M38527/09-003S
3	.114	.150	.312	.045	.145	NYLON	5607-44
3	.114	.150	.312	.048	.083	NYLON	3
4	.115	.136	.200	.030	.060	TEFLON	5608-72
4	.115	.125	.235	.046	.140	TEFLON	401352-04
4	.115	.187	.250	.040	.073	FIBRE	
4	.115	.186	.278	.039	.080	NYLON	
4	.116	.143	.210	.034	.075	NYLON	5607-45
4	.116	.150	.250	.020	.050	NYLON	M45595/1-02
4	.118	.137	.250	.036	.106	NYLON	5607-50
4	.118	.150	.250	.046	.091	TEFLON	5608-9
4	.118	.145	.280	.047	.031	POLY.	M38527/09-006S
4	.118	.187	.281	.040	.080	NYLON	SW4
4	.120	.150	.254	.055	.143	NYLON	5607-53
4	.120	.187	.280	.039	.078	NYLON	
4	.120	.194	.315	.034	.064	PHENOLIC	5605-20
4	.122	.187	.281	.040	.080	TEFLON	M45595/2-04
4	.123	.199	.283	.045	.295	NYLON	SW283199123
4	.124	.195	.308	.040	.060	NYLON	
4	.125	.140	.252	.050	.142	NYLON	0101142-001
4	.125	.250	.562	.185	.243	TEFLON	5608-14
5	.136	.187	.313	.059	.093	FIBRE	5604-84
5	.137	.183	.319	.050	.080	FIBRE	
5	.138	.218	.345	.060	.117	NYLON	
6	.140	.187	.250	.031	.093	NYLON	M45595/1-03
6	.140	.170	.298	.050	.165	NYLON	

# NON-METALLIC SHOULDER WASHERS

Screw Size	"A" I.D.	"B" O.D.	"C" O.D.	"D" Washer Thickness	"E" Overall Thickness	Material	ALTERNATE Ref. No.
6	.140	.215	.325	.040	.080	NYLON	
6	.140	.204	.328	.031	.093	NYLON	M45595/1-04
5	.140	.200	.328	.030	.080	FIBRE	5604-16
6	.140	.240	.375	.031	.093	NYLON	M45595/1-05
6	.140	.248	.349	.047	.109	NYLON	SW349047248
6	.140	.238	.375	.060	.090	NYLON	
6	.140	.210	.375	.048	.072	PHENOLIC	
5	.141	.182	.312	.055	.078	FIBRE	
5	.141	.182	.312	.030	.078	FIBRE	5604-14
5	.141	.203	.375	.047	.078	FIBRE	210-0835-00
6	.144	.177	.312	.047	.031	POLY.	M38527/09-005S
6	.145	.220	.330	.040	.087	NYLON	
6	.146	.190	.312	.047	.031	POLY.	M38527/09-001S
6	.150	.250	.355	.040	.130	NYLON	SW355040250
6	.157	.217	.472	.079	.276	NYLON	MSW1224555R
6	.157	.236	.472	.079	.276	NYLON	MSW122456
6	.159	.194	.393	.047	.109	NYLON	SW393194159
6	.165	.255	.380	.033	.068	FIBRE	
8	.166	.250	.380	.065	.100	FIBRE	
8	.166	.245	.438	.060	.085	FIBRE	
8	.167	.246	.375	.031	.093	NYLON	M45595/1-06
8	.168	.205	.345	.062	.107	NYLON	
6	.168	.255	.375	.035	.070	NYLON	5607-18
8	.170	.250	.375	.062	.100	FIBRE	
8	.171	.250	.375	.032	.063	FIBRE	5604-18
8	.172	.312	.500	.078	.218	NYLON	SW500078312
8	.174	.250	.375	.050	.100	NYLON	SWB8
8	.190	.240	.375	.030	.062	FIBRE	5604-91
8	.193	.257	.375	.031	.062	NYLON	M45595/1-07
8	.193	.257	.375	.043	.078	NYLON	M45595/1-08
8	.193	.250	.375	.034	.080	NYLON	
8	.193	.252	.375	.042	.064	FIBRE	5604-21
8	.194	.240	.437	.062	.093	NYLON	SW437062240
8	.194	.250	.375	.047	.100	NYLON	M45595/1-09
10	.195	.236	.340	.042	.225	NYLON	90713411
10	.196	.303	.440	.040	.181	NYLON	SW440032303
10	.196	.308	.375	.031	.093	NYLON	M45595/1-10
10	.196	.250	.437	.027	.062	FIBRE	210-
10	.196	.254	.380	.065	.190	NYLON	SW380065254
10	.196	.255	.438	.032	.062	FIBRE	5604-54
10	.196	.264	.380	.197	.317	NYLON	SW380197264
10	.196	.277	.500	.125	.312	NYLON	SW500125277
10	.196	.300	.581	.120	.278	NYLON	SW581196300ZZ
10	.196	.303	.440	.040	.181	NYLON	SW440032303
10	.197	.240	.408	.062	.249	NYLON	SW408240197
10	.200	.275	.375	.030	.060	TEFLON	5608-21
10	.200	.282	.440	.050	.100	NYLON	
10	.200	.250	.440	.040	.075	FIBRE	

# NON-METALLIC SHOULDER WASHERS

Screw Size	"A" I.D.	"B" O.D.	"C" O.D.	"D" Washer Thickness	"E" Overall Thickness	Material	ALTERNATE Ref. No.
10	.205	.303	.375	.043	.127	TEFLON	5608-23
10	.215	.238	.408	.062	.256	NYLON	SW408215238
1/4	.250	.370	.600	.125	.250	NYLON	SW600125370
1/4	.250	.275	.377	.048	.098	NYLON	
1/4	.250	.312	.500	.031	.068	NYLON	M45595/1-11
1/4	.250	.308	.500	.031	.093	NYLON	M45595/1-12
1/4	.250	.312	.500	.030	.100	FIBRE	210-0904-00
1/4	.250	.432	.625	.027	.089	NYLON	
1/4	.250	.500	.750	.125	.187	NYLON	SW750125250
1/4	.255	.322	.625	.062	.249	NYLON	SW625322255
1/4	.255	.310	.510	.062	.203	NYLON	SW510308255
1/4	.255	.310	.750	.030	.057	NYLON	
1/4	.255	.365	.500	.031	.219	NYLON	SW500031375
1/4	.255	.372	.550	.062	.484	NYLON	SW550375255
1/4	.256	.355	.437	.060	.169	NYLON	SW437060355
1/4	.257	.422	.570	.135	.235	NYLON	SW570135257
1/4	.260	.340	.525	.057	.105	NYLON	
1/4	.265	.365	.500	.031	.093	NYLON	M45595/1-14
1/4	.285	.375	.562	.050	.080	FIBRE	5604-30
1/4	.287	.375	.555	.050	.080	NYLON	5607-30
1/4	.290	.387	.562	.031	.078	NYLON	M45595/1-15
1/4	.290	.375	.562	.029	.080	FIBRE	5604-30
1/4	.290	.375	.562	.045	.080	FIBRE	5604-30
1/4	.291	.350	.560	.033	.065	NYLON	
1/4	.308	.350	.428	.125	.172	NYLON	SW428125350
5/16	.315	.394	.555	.062	.065	NYLON	5607-40
5/16	.316	.355	.610	.063	.190	NYLON	
5/16	.316	.502	.620	.060	.210	NYLON	SW620210316
5/16	.317	.432	.625	.050	.112	NYLON	M45595/1-16
5/16	.317	.371	.750	.050	.081	NYLON	M45595/1-17
5/16	.320	.360	.620	.062	.687	NYLON	SW620062625
5/16	.320	.360	.620	.062	.437	NYLON	SW6200625375
5/16	.320	.405	.625	.066	.205	NYLON	SW625066405
3/8	.358	.482	.748	.059	.236	NYLON	SW748482358
3/8	.375	.500	.625	.065	.105	FIBRE	
3/8	.375	.500	.625	.055	.091	FIBRE	
3/8	.375	.500	.750	.031	.093	NYLON	M45595/1-18
3/8	.375	.500	.750	.070	.100	FIBRE	
3/8	.380	.500	.700	.038	.068	PHENOLIC	
3/8	.380	.505	.750	.125	.485	NYLON	SW750125500
3/8	.383	.500	.625	.060	.090	NYLON	
3/8	.385	.500	.625	.031	.075	NYLON	M45595/1-20
3/8	.385	.500	.625	.025	.075	FIBRE	5604-32
3/8	.385	.500	.625	.031	.093	NYLON	M45595/1-19
1/2	.500	.625	.750	.068	.095	PHENOLIC	
1/2	.500	.625	.765	.032	.065	NYLON	
1/2	.525	.590	.800	.045	.062	TEFLON	5608-36
9/16	.600	.375	.562	.027	.065	NYLON	



# NYLON STANDARD SPACERS

Nylon spacers may be molded or cut from bar stock, depending on thickness required. These spacers resist creep (yielding to pressure) and sustain required separation. They are also impact

resistant and relatively impervious to temperature extremes, organic solvents, oils and gasoline. For information on threaded hex spacers refer to WCL's Threaded Products catalog.

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Length	
2	.063	.187	.250	SSP187063250
2	.063	.187	.300	SSP187063300
2	.091	.187	.125	SP1
2	.091	.187	.187	SP3
2	.091	.187	.187	SP23
2	.091	.187	.250	SP5
2	.091	.187	.312	SP7
2	.091	.187	.375	SP9
2	.091	.187	.437	SP11
2	.091	.187	.500	SP13
2	.091	.187	.562	SP15
2	.091	.187	.625	SP17
2	.091	.187	.687	SP19
2	.091	.187	.750	SP21
2	.091	.187	.875	SP25
2	.091	.187	.937	SP27
2	.091	.187	1.000	SP29
2	.091	.188	.330	SSP188091330
2	.091	.250	.125	SP31
2	.091	.250	.187	SP35
2	.091	.250	.187	SP75
2	.091	.250	.250	SP39
2	.091	.250	.312	SP43
2	.091	.250	.375	SP47
2	.091	.250	.437	SP51
2	.091	.250	.500	SP55
2	.091	.250	.562	SP59
2	.091	.250	.625	SP63
2	.091	.250	.687	SP67
2	.091	.250	.750	SP71
2	.091	.250	.875	SP79
2	.091	.250	.937	SP83
2	.091	.250	1.000	SP87
4	.110	.250	.530	SSP250110530
4	.115	.187	.125	SP2
4	.115	.187	.187	SP4
4	.115	.187	.187	SP24
4	.115	.187	.250	SP6
4	.115	.187	.312	SP8
4	.115	.187	.375	SP10
4	.115	.187	.437	SP12
4	.115	.187	.500	SP14

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
4	.115	.187	.562	SP16
4	.115	.187	.625	SP18
4	.115	.187	.687	SP20
4	.115	.187	.750	SP22
4	.115	.187	.875	SP26
4	.115	.187	.937	SP28
4	.115	.187	.156	SSP187115156
4	.115	.187	.225	SSP187115225
4	.115	.187	1.000	SP30
4	.115	.250	.125	SP32
4	.115	.250	.187	SP36
4	.115	.250	.187	SP76
4	.115	.250	.250	SP40
4	.115	.250	.312	SP44
4	.115	.250	.375	SP48
4	.115	.250	.437	SP52
4	.115	.250	.500	SP56
4	.115	.250	.562	SP60
4	.115	.250	.625	SP64
4	.115	.250	.687	SP68
4	.115	.250	.750	SP72
4	.115	.250	.875	SP80
4	.115	.250	.937	SP84
4	.115	.250	1.000	SP88
4	.115	.312	.125	SP91
4	.115	.312	.187	SP95
4	.115	.312	.250	SP99
4	.115	.312	.375	SP107
4	.115	.312	.437	SP111
4	.115	.312	.500	SP115
4	.115	.312	.562	SP119
4	.115	.312	.625	SP123
4	.115	.312	.687	SP127
4	.115	.312	.750	SP131
4	.115	.312	.812	SP135
4	.115	.312	.875	SP139
4	.115	.312	.937	SP143
4	.115	.312	.937	SP103
4	.115	.312	1.000	SP147
4	.120	.187	.315	SSP316120315
4	.120	.187	.340	SSP316120340
4	.120	.187	.430	SSP316120430

# NYLON STANDARD SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Length	
4	.120	.250	.800	SSP250120800
4	.125	.216	.135	SSP216125135
4	.125	.375	.437	SSP375125437
4	.126	.310	.410	SSP310126410
4	.126	.197	.276	SSP197126276
4	.138	.236	.118	SSP9353
4	.138	.354	.374	SSP93595
6	.140	.250	.125	SP33
6	.140	.250	.160	SSP250140160
6	.140	.250	.187	SP37
6	.140	.250	.250	SP41
6	.140	.250	.312	SP45
6	.140	.250	.375	SP49
6	.140	.250	.437	SP53
6	.140	.250	.500	SP57
6	.140	.250	.562	SP61
6	.140	.250	.625	SP65
6	.140	.625	.250	SSP625140250
6	.140	.250	.150	SSP250115160
6	.140	.250	.687	SP69
6	.140	.250	.750	SP73
6	.140	.250	.187	SP77
6	.140	.250	.875	SP81
6	.140	.250	.937	SP85
6	.140	.250	1.000	SP89
6	.140	.312	.125	SP92
6	.140	.312	.187	SP96
6	.140	.312	.250	SP100
6	.140	.312	.375	SP108
6	.140	.312	.437	SP112
6	.140	.312	.500	SP116
6	.140	.312	.562	SP120
6	.140	.312	.625	SP124
6	.140	.312	.687	SP128
6	.140	.312	.750	SP132
6	.140	.312	.812	SP136
6	.140	.312	.875	SP140
6	.140	.312	.937	SP104
6	.140	.312	.937	SP144
6	.140	.312	1.000	SP148
6	.140	.375	.125	SP158
6	.140	.375	.187	SP161
6	.140	.375	.250	SP164
6	.140	.375	.312	SP167
6	.140	.375	.375	SP170
6	.140	.375	.437	SP173
6	.140	.375	.500	SP176

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
6	.140	.375	.562	SP179
6	.140	.375	.625	SP182
6	.140	.375	.687	SP185
6	.140	.375	.750	SP188
6	.140	.375	.187	SP191
6	.140	.375	.875	SP194
6	.140	.375	.937	SP197
6	.140	.375	1.000	SP200
6	.140	.500	.125	SP203
6	.140	.500	.187	SP208
6	.140	.500	.250	SP213
6	.140	.500	.312	SP218
6	.140	.500	.375	SP223
6	.140	.500	.437	SP228
6	.140	.500	.500	SP233
6	.140	.500	.562	SP238
6	.140	.500	.625	SP243
6	.140	.500	.687	SP248
6	.140	.500	.750	SP253
6	.140	.500	.187	SP258
6	.140	.500	.875	SP263
6	.140	.500	.937	SP268
6	.140	.500	1.000	SP273
6	.143	.252	.149	SSP250140149
6	.145	.500	.669	SSP500145669
6	.150	.250	.200	SSP250150200
6	.150	.250	.250	SSP250150250
6	.155	.250	.160	SSP250155160
6	.156	.500	.125	SSP500156125
6	.169	.236	.154	SSP6MM43M39M
8	.171	.250	.125	SP34
8	.171	.250	.187	SP38
8	.171	.250	.250	SP42
8	.171	.250	.312	SP46
8	.171	.250	.375	SP50
8	.171	.250	.437	SP54
8	.171	.250	.500	SP58
8	.171	.250	.562	SP62
8	.171	.250	.625	SP66
8	.171	.250	.650	SSP250171650
8	.171	.250	.687	SP70
8	.171	.250	.750	SP74
8	.171	.250	.187	SP78
8	.171	.250	.875	SP82
8	.171	.250	.937	SP86
8	.171	.250	1.000	SP90
8	.171	.312	.125	SP93

# NYLON STANDARD SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Length	
8	.171	.312	.187	SP97
8	.171	.312	.250	SP101
8	.171	.312	.937	SP105
8	.171	.312	.375	SP109
8	.171	.312	.437	SP113
8	.171	.312	.500	SP117
8	.171	.312	.562	SP121
8	.171	.312	.625	SP125
8	.171	.312	.687	SP129
8	.171	.312	.750	SP133
8	.171	.312	.812	SP137
8	.171	.312	.875	SP141
8	.171	.312	.937	SP145
8	.171	.312	1.000	SP149
8	.171	.375	.125	SP159
8	.171	.375	.187	SP162
8	.171	.375	.203	SSP375171203
8	.171	.375	.250	SP165
8	.171	.375	.312	SP168
8	.171	.375	.375	SP171
8	.171	.375	.437	SP174
8	.171	.375	.500	SP177
8	.171	.375	.562	SP180
8	.171	.375	.625	SP183
8	.171	.375	.687	SP186
8	.171	.375	.750	SP189
8	.171	.375	.187	SP192
8	.171	.375	.875	SP195
8	.171	.375	.937	SP198
8	.171	.375	1.000	SP201
8	.171	.500	.125	SP204
8	.171	.500	.187	SP209
8	.171	.500	.187	SP259
8	.171	.500	.250	SP214
8	.171	.500	.312	SP219
8	.171	.500	.375	SP224
8	.171	.500	.437	SP229
8	.171	.500	.500	SP234
8	.171	.500	.562	SP239
8	.171	.500	.625	SP244
8	.171	.500	.687	SP249
8	.171	.500	.750	SP254
8	.171	.500	.875	SP264
8	.171	.500	.937	SP269
8	.171	.500	1.000	SP274
8	.180	.400	.140	SSP400180140
8	.187	.312	.187	SSP312187187

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
8	.187	.312	.215	SSP312187215
10	.192	.250	.145	SSP250192145
10	.192	.625	.250	SSP625192250
10	.192	.375	.156	SSP375192156
10	.192	.375	.187	SSP375191217
10	.194	.375	.937	SP199
10	.194	.375	1.000	SP202
10	.194	.312	.125	SP94
10	.194	.312	.187	SP98
10	.194	.312	.250	SP102
10	.194	.312	.937	SP106
10	.194	.312	.375	SP110
10	.194	.312	.437	SP114
10	.194	.312	.500	SP118
10	.194	.312	.562	SP122
10	.194	.312	.625	SP126
10	.194	.312	.687	SP130
10	.194	.312	.750	SP134
10	.194	.312	.812	SP138
10	.194	.312	.875	SP142
10	.194	.312	.937	SP146
10	.194	.312	1.000	SP150
10	.194	.375	.125	SP160
10	.194	.375	.187	SP163
10	.194	.375	.187	SP193
10	.194	.375	.250	SP166
10	.194	.375	.312	SP169
10	.194	.375	.375	SP172
10	.194	.375	.437	SP175
10	.194	.375	.500	SP178
10	.194	.375	.562	SP181
10	.194	.375	.625	SP184
10	.194	.375	.687	SP187
10	.194	.375	.750	SP190
10	.194	.375	.875	SP196
10	.194	.500	.125	SP205
10	.194	.500	.187	SP210
10	.194	.500	.187	SP260
10	.194	.500	.250	SP215
10	.194	.500	.312	SP220
10	.194	.500	.312	SSP500194312
10	.194	.500	.375	SP225
10	.194	.500	.437	SP230
10	.194	.500	.500	SP235
10	.194	.500	.562	SP240
10	.194	.500	.625	SP245

# NYLON STANDARD SPACERS

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Length	
10	.194	.500	.750	SP255
10	.194	.500	.875	SP265
10	.194	.500	.937	SP270
10	.194	.500	1.000	SP275
10	.194	.500	.687	SP251
10	.195	.750	.750	SSP750195750
10	.196	.380	.940	SSP380196940
10	.209	.620	.187	SSP620209187
10	.219	.375	.250	SSP375219250
10	.219	.500	.125	SP206
10	.219	.500	.187	SP211
10	.219	.500	.250	SP216
10	.219	.500	.312	SP221
10	.219	.500	.375	SP226
10	.219	.500	.437	SP231
10	.219	.500	.500	SP236
10	.219	.500	.562	SP241
10	.219	.500	.625	SP246
10	.219	.500	.687	SP250
12	.219	.500	.187	SP261
12	.219	.500	.719	SSP500219719
12	.219	.500	.750	SP256
12	.219	.500	.875	SP266
12	.219	.500	.937	SP271
12	.219	.500	1.000	SP276
12	.220	.748	.252	SSP748220252
12	.222	.313	.238	SSP313222238
12	.222	.379	.906	SSP379222906
12	.236	.354	.224	SSP657
1/4	.250	.562	.562	SSP562250562
1/4	.250	.625	.375	SSP625250375
1/4	.250	.625	.625	SSP625250625
1/4	.250	.625	.640	SSP625250640
1/4	.250	.750	.312	SSP750250312
1/4	.257	.500	.125	SP207
1/4	.257	.500	.187	SP212
1/4	.257	.500	.187	SP262

Screw Size	Nominal Dimensions			Alternate Part Number
	I.D.	O.D.	Thick	
1/4	.257	.500	.197	SSP500257197
1/4	.257	.500	.250	SP217
1/4	.257	.500	.312	SP222
1/4	.257	.500	.359	SSP500257359
1/4	.257	.500	.375	SP227
1/4	.257	.500	.437	SP232
1/4	.257	.500	.500	SP237
1/4	.257	.500	.562	SP242
1/4	.257	.500	.625	SP247
1/4	.257	.500	.687	SP252
1/4	.257	.500	.750	SP257
1/4	.257	.500	.875	SP267
1/4	.257	.500	.937	SP272
1/4	.257	.500	1.000	SP277
1/4	.257	.750	1.000	SSP7502571
1/4	.260	.625	.250	SSP625260250
1/4	.280	.500	.250	SSP500280250
1/4	.300	.500	.187	SSP500300187
5/16	.312	.687	.250	SSP687312250
5/16	.314	.590	.359	SSP590314359
5/16	.314	.750	.313	SSP750314313
5/16	.317	.500	.337	SSP500317337
5/16	.320	.437	.187	SSP437320187
5/16	.325	.480	1.250	SSP480325125
5/16	.326	.480	.250	SSP480325250
5/16	.343	1.000	.125	SSP1000343125
5/16	.343	1.000	.312	SSP1343312
5/16	.344	1.000	.1875	SSP13441875
5/16	.350	.750	.685	SSP750350685
3/8	.375	.218	1.187	SSP218375113
3/8	.375	1.000	.625	SSP1375625
3/8	.379	.560	.562	SSP560379315
3/8	.382	.750	.437	SSP750382437
3/8	.403	.750	.312	SSP750403312
1/2	.510	.750	.188	SSP750101188
9/16	.669	1.457	.315	SSP1457669315
9/16	1.000	1.500	.500	SSP151500

# PLATING AND MATERIAL SPECIFICATIONS

CODE	MATERIAL DESCRIPTION
AL	Aluminum QC-A-250/4 & 5
AL 1	5052 Aluminum
ASB	Asbestos
ASB/R	Compressed Asbestos w/ Rubber
BAK	Bakelite
BC	Beryllium Copper QQ-C-533
BKV	Black Vinyl
BR	Brass QQ-B-613
BR1	Brass 1/4 Hard
BR2	Brass 1/2 Hard
BR3	Brass Full Hard
BZ1	Bronze ASTM B590
BZ2	Bronze Phosphor QQ-B-750
BZ3	Bronze Silicon QQ-C-591
CEA	Cellous Acctate
CEM	Phenolic (Hi-Temp) "CEM-1"
CO	Copper QQ-C-576
CO1	Copper 1/2 HD ASTM B152
CRK	Cork
DEL	Delrin "Acctal"
FB	Fibre MIL-F-1148(CH)
FB1	Vulcanized Fibre
FL	Felt
GL	Glass Epoxy MIL-P-18177-GEE
GLS	Glassene
GM	Glass Melamine MIL-P-15037-GME
GS	Glass Silicon MIL-P-997-GSG
INC	Inconel AMS 5596/5597/5662
KA	Kapton MIL-P-46112
LED	Lead
MI	Mica HH-1-536
MO1	K-Monel QQ-N-286
MO2	Monel 400 AMS-4544
MO3	Monel MIL QQ-N-281

CODE	MATERIAL DESCRIPTION
MY	MYLAR MIL-1-631
NE	NEOPRENE MIL-R-6855
NT	Nylatron LP410 A Type 6/6 SWR
NY	Nylon LP 410 A Type 6/6
PH1	Phenolic MIL-P-15035 FBG
PH2	Phenolic MIL-P-15035 FBE
PH3	Phenolic MIL-P-3115 PBE
PH4	Phenolic MIL-P-15047 NPG
PL	Polyethylene MIL-P-22035
PP	Polypropylene
PUF	Polyurethane Foam
RUL	Rulon
SP	Silicon Sponge
SS1	Stainless Steel T 310/QQ-S-766
SS10	Stainless Steel T 303/QQ-S
SS11	Stainless Steel AMS 5525/5735
SS2	Stainless Steel T 302/QQ-S-766
SS3	Stainless Steel T 304/QQ-S-766
SS4	Stainless Steel T 316/QQ-S-766
SS5	Stainless Steel T 410/QQ-S-766
SS6	Stainless Steel T 420 FED STD
SS7	Stainless Steel 17-7PH SS
SS8	Stainless Steel T 321
SS9	Stainless Steel T 317L
ST1	Carbon Steel QQ-S-698
ST2	Spring Steel QQ-S-777
ST3	Alloy Steel QQ-626
ST4	Alloy Steel QQ-S-635
ST5	Alloy Steel QQ-S-700
ST6	Alloy Steel AMS 4130
ST7	Alloy Steel AMS 6350
ST8	Alloy Steel AMS 6437/6485
ST9	Carbon Steel AISI 1020
TF	Teflon AMS 3651

# PLATING AND MATERIAL SPECIFICATIONS

CODE	PLATING DESCRIPTION
ADH	Adhesive Backing
ALO	Alodine Per MIL-C-5541
AN1	ANO MIL-A-8625 TY I, II, CL 1
AN2	ANO MIL-A-8625 TY II, CL 2
BDY	Blue Dye
BGE	Beige Dye
BKA	Black Anodize
BKC	Black Chem MIL-F-495
BKE	Black Enduron
BKO	Black Oxide MIL-C-13924
BLK	Black Color
BLU	BLUE Color
BNY	Black Nylon
BRP	Brass Plated
BIN	Bright Tin
CD1	Cadmium QQ-P-416 Type 1
CD2	Cadmium QQ-P-416 Type 2
CD3	Cad and Black Chromate
CD4	Cad and Olive Drab
CD5	Cad 2 and Blue Dye
CD6	Cad/Red Irr
CD7	Cad 2 and Green Dye
CD8	Cad 2 and Yello Dye
CF1	Chemical Film MIL-C-5541
CF3	Chemical Film MIL-C-5541 T3
CHR	Chrome QQ-C-320
CMF	Chemical Film MIL-C-5541

CODE	PLATING DESCRIPTION
COP	Copper
DFL	Dry Film Lubricant
DNC	Difused Nickel Cad
GAL	Galvanized
GLD	Gold MIL-G-45204
GRN	Green Color
GRY	Gray Color
HSD	Hot Solder Dip
HID	Hot Tin Dip
NIC	Nickel QQ-N-290
NIE	Nickel Electroless
NNY	Natural Nylon
ODY	Orange Dye
OLV	Olive Drab
PAS	Passive QQ-P-35C
PDY	Purple Dye
AHO	Phoscoat MIL-P-16232
PLN	Plain Material - No Finish
RED	Red Color
SIL	Silver QQ-S-365
TIN	Tin MIL-T-10727 Type 1 Dull
TOC	Tin Over Copper
WHT	White Color
YEL	Yellow Color
ZN1	Zinc QQ-Z-325 Type 1
ZN2	Zinc QQ-Z-325 Type 2
ZN3	Zinc and Phosphate

# FASTENERS IN STOCK AT WCL



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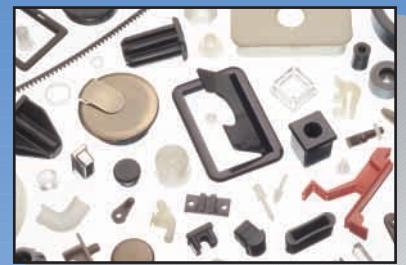
Standoffs



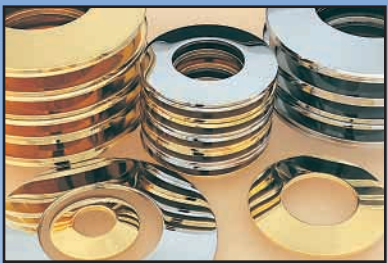
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Belleville Disc Springs



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Spring Washers



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