



MESSAGE IMPORTANT

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Since the use of this information and the conditions by which the products are used are beyond the control of Boulons Plus, it is the obligation of the purchaser/user to determine the correct and safe selection and conditions of use of all commercial fasteners.

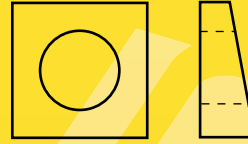
Pictorial Table of Contents



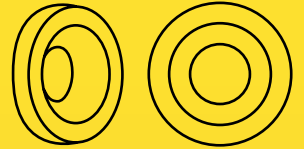
USS FLAT Washers
Page D-1



SAE FLAT Washers
Page D-2



Square Beveled Washers
Page D-3



Countersunk Finishing Washers
Page D-3



Fender Washers
Page D-4



Round, Structural Washers
Page D-5



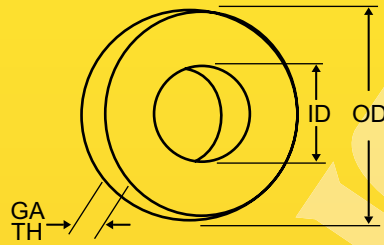
Regular Helical Spring Lock Washer
Page D-6



High-Collar Helical Spring Lock Washer
Page D-7



USS Flat



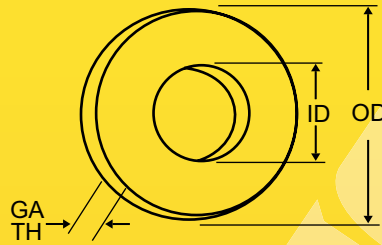
USS LOW CARBON WASHERS TYPE A/W

ASME B18.22.1

Bolts Size	OD			ID			TH			Approximate Number per 50 Pounds
	Outside Diameter			Inside Diameter			Thickness			
	Nominal	Max	Min	Nominal	Max	Min	American Standard (Gauge)	Max	Min	
3/16	9/16	0.577	0.557	1/4	0.265	0.245	18 (3/64)	0.065	0.036	18050
1/4	3/4	0.749	0.727	5/16	0.327	0.307	16 (1/16)	0.080	0.051	7450
5/16	7/8	0.950	0.868	3/8	0.390	0.370	14 (5/64)	0.104	0.064	4350
3/8	1	1.030	0.993	7/16	0.453	0.433	14 (5/64)	0.104	0.064	3350
7/16	1-1/4	1.280	1.243	1/2	0.515	0.495	14 (5/64)	0.104	0.064	2050
1/2	1-3/8	1.405	1.368	9/16	0.577	0.557	12 (7/64)	0.132	0.086	1300
9/16	1-1/2	1.499	1.462	5/8	0.640	0.620	21 (7/64)	0.132	0.086	1100
5/8	1-3/4	1.780	1.743	11/16	0.718	0.681	10 (9/64)	0.160	0.108	650
3/4	2	2.030	1.993	13/16	0.842	0.805	9 (5/32)	0.177	0.122	455
7/8	2-1/4	2.280	2.243	15/16	0.968	0.931	8 (11/64)	0.192	0.136	325
1	2-1/2	2.530	2.493	1-1/16	1.092	1.055	8 (11/64)	0.192	0.136	265
1-1/8	2-3/4	2.780	2.743	1-1/4	1.280	1.243	8 (11/64)	0.192	0.136	225
1-1/4	3	3.030	2.993	1-3/8	1.405	1.368	8 (11/64)	0.192	0.136	190
1-3/8	3-1/4	3.295	3.240	1-1/2	1.545	1.490	7 (3/16)	0.213	0.153	150
1-1/2	3-1/2	3.545	3.490	1-5/8	1.670	1.615	7 (3/16)	0.213	0.153	130
1-5/8	3-3/4	3.795	3.740	1-3/4	1.795	1.740	7 (3/16)	0.213	0.153	115
1-3/4	4	4.045	3.990	1-7/8	1.920	1.865	7 (3/16)	0.213	0.153	100
1-7/8	4-1/4	4.295	4.240	2	2.045	1.990	7 (3/16)	0.213	0.153	90
2	4-1/2	4.545	4.490	2-1/8	2.170	2.115	7 (3/16)	0.213	0.153	79
2-1/4	4-3/4	4.795	4.740	2-3/8	2.420	2.365	5 (7/32)	0.248	0.193	60
2-1/2	5	5.045	4.990	2-5/8	2.670	2.615	4 (15/64)	0.280	0.210	52
2-3/4	5-1/4	5.315	5.240	2-7/8	2.940	2.865	3 (1/4)	0.310	0.228	45
3	5-1/2	5.565	5.490	3-1/8	3.190	3.115	2 (5/32)	0.327	0.249	43



SAE Flat



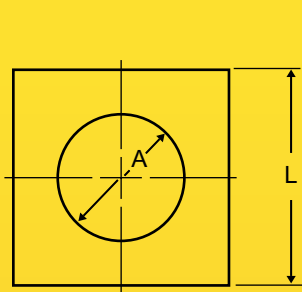
SAE WASHERS TYPE A/N

ANSI B18.22.1
(R 1998)

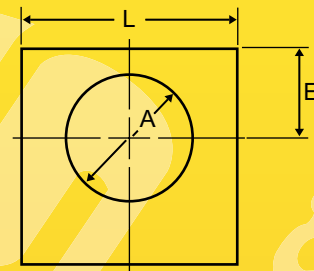
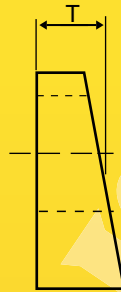
Bolts Size	OD			ID			TH			Approximate Number per 50 Pounds
	Outside Diameter			Inside Diameter			Thickness			
	Nominal	Max	Min	Nominal	Max	Min	American Standard (Gauge)	Max	Min	
4	5/16	0.320	0.307	1/8	0.133	0.120	(1/32)	0.040	0.025	83300
6	3/8	0.390	0.370	5/32	0.164	0.151	18 (3/64)	0.065	0.036	39500
8	7/16	0.453	0.433	3/16	0.196	0.183	18 (3/64)	0.065	0.036	29500
10	1/2	0.515	0.495	7/32	0.227	0.214	18 (3/64)	0.065	0.036	22750
12	9/16	0.577	0.557	1/4	0.265	0.245	16 (1/16)	0.080	0.051	14700
1/4	5/8	0.640	0.620	9/32	0.296	0.276	16 (1/16)	0.080	0.051	11100
5/16	11/16	0.703	0.681	11/32	0.359	0.339	16 (1/16)	0.080	0.051	9750
3/8	13/16	0.827	0.805	13/32	0.419	0.401	16 (1/16)	0.080	0.051	7000
7/16	59/64	0.937	0.915	15/32	0.484	0.464	16 (1/16)	0.080	0.051	5500
1/2	1-1/16	1.092	1.055	17/32	0.546	0.526	13 (3/32)	0.121	0.074	2800
9/16	1-3/16	1.186	1.149	19/32	0.609	0.589	13 (3/32)	0.121	0.074	2250
5/8	1-5/16	1.342	1.305	21/32	0.686	0.649	13 (3/32)	0.121	0.074	1850
3/4	1-1/2	1.499	1.462	13/16	0.842	0.805	10 (9/64)	0.160	0.108	1050
7/8	1-3/4	1.780	1.743	15/16	0.968	0.931	10 (9/64)	0.160	0.108	775
1	2	2.030	1.993	1-1/16	1.092	1.055	10 (9/64)	0.160	0.108	585
1-1/8	2-1/4	2.280	2.243	1-1/4	1.280	1.243	10 (9/64)	0.160	0.108	460
1-1/4	2-1/2	2.530	2.493	1-3/8	1.405	1.368	9 (5/32)	0.192	0.136	335
1-3/8	2-3/4	2.780	2.743	1-1/2	1.530	1.493	9 (5/32)	0.213	0.136	275
1-1/2	3	3.030	2.993	1-5/8	1.655	1.618	9 (5/32)	0.213	0.136	230



Square Beveled



SQUARE BEVELED



CLIPPER SQUARE BEVELED

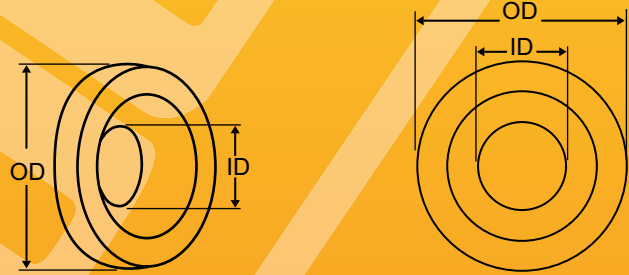
HARDENED BEVELED WASHERS WITH SLOPE OR TAPER IN THICKNESS 1:6

ASME B18.2.6
2003

Nominal ³ Washer Size	Nominal ³	A			Minimum ² Side Length	T Thickness	E Nominal ⁵ Edge Distance
		Inside Diameter					
		Nom	Plus	Minus			
1/2	0.5000	0.531	0.0313	0	1.750	0.313	0.438
5/8	0.6250	0.688	0.0313	0	1.750	0.313	0.547
3/4	0.7500	0.813	0.0313	0	1.750	0.313	0.656
7/8	0.8750	0.938	0.0313	0	1.750	0.313	0.766
1	1.0000	1.125	0.0313	0	1.750	0.313	0.875
1-1/8	1.1250	1.250	0.0313	0	2.250	0.313	0.984
1-1/4	1.2500	1.375	0.0313	0	2.250	0.313	1.094
1-3/8	1.3750	1.500	0.0313	0	2.250	0.313	1.203
1-1/2	1.5000	1.625	0.0313	0	2.250	0.313	1.313

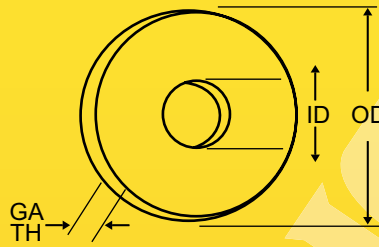
- NOTES:**
- 2. Nonclipped washer may be rectangular providing neither side dimension is less than L, and one side may be longer than that of the L min included in the table.
 - 3. Nominal washer sizes are intended for use with comparable nominal bolt diameters.
 - 5. Clipped edge E shall not be closer than 0.875 times the nominal bolt diameter from the center of the washer.

Countersunk Finishing



COUNTERSUNK FINISHING WASHERS

Screw Size	OD	ID		Overall Height
	Outside Diameter	Max	Min	
#4	3/8	0.150	0.120	3/32
#6	15/32	0.200	0.170	5/64
#8	17/32	0.210	0.180	7/64
#10	19/32	0.265	0.235	7/64
#12	21/32	0.289	0.259	1/8
1/4	25/32	0.335	0.305	5/32
5/16	15/16	0.409	0.373	3/16
3/8	1-1/8	0.460	0.425	1/4

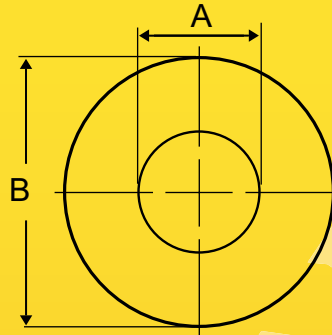
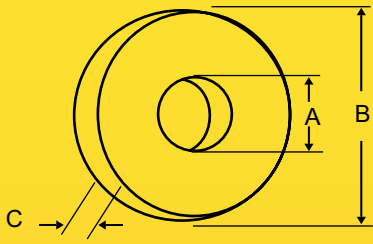


FENDER WASHERS

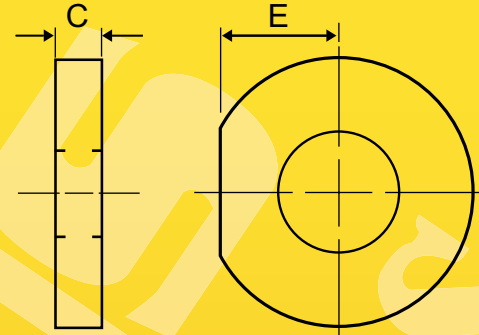
Bolt Size	ID	OD	TH		Approximate Number per 50 Pounds Steel
	Inside Diameter (+0, -.010)	Outside Diameter (+0, -.010)	Max	Min	
10	7/32	11/16	0.080	0.051	---
10	7/32	3/4	0.080	0.051	---
10	7/32	7/8	0.080	0.051	5000
10	7/32	1	0.080	0.051	3500
10	7/32	1-1/4	0.080	0.051	3000
1/4	9/32	1	0.080	0.051	3750
1/4	9/32	1-1/4	0.080	0.051	2300
1/4	9/32	1-1/2	0.080	0.051	1550
5/16	11/32	1-1/4	0.080	0.051	2400
5/16	11/32	1-1/2	0.080	0.051	1600
3/8	13/32	1-1/4	0.080	0.051	2350
3/8	13/32	1-1/2	0.080	0.051	1650
3/8	13/32	2	0.080	0.051	1000
1/2	17/32	1-1/4	0.080	0.051	3000
1/2	17/32	1-1/2	0.080	0.051	2000
1/2	17/32	2	0.080	0.051	950



Hardened Steel Washers



CIRCULAR



CLIPPER CIRCULAR

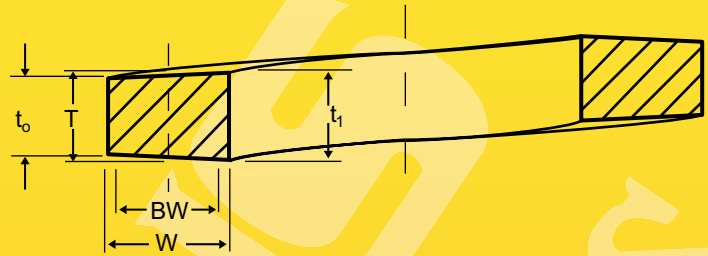
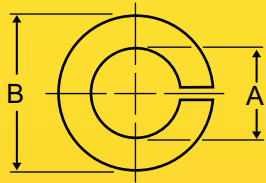
ASTM F436 ROUND STRUCTURAL WASHERS

ASTM F436
2000

Bolt Size	B		C		E
	Outside Dia, in.	Inside Dia, in.	Thickness, in.		
	Nom	Nom	Min	Max	Minimum Edge Distance, in.
1/4	5/8	9/32	0.051	0.080	7/32
5/16	11/16	11/32	0.051	0.080	9/32
3/8	13/16	13/32	0.051	0.080	11/32
7/16	59/64	15/32	0.051	0.080	13/32
1/2	1-1/16	17/32	0.097	0.177	7/16
5/8	1-5/16	11/16	0.122	0.177	9/16
3/4	1-15/32	13/16	0.122	0.177	21/32
7/8	1-3/4	15/16	0.136	0.177	25/32
1	2	1-1/8	0.136	0.177	7/8
1-1/8	2-1/4	1-1/4	0.136	0.177	1
1-1/4	2-1/2	1-3/8	0.136	0.177	1-3/32
1-3/8	2-3/4	1-1/2	0.136	0.177	1-7/32
1-1/2	3	1-5/8	0.136	0.177	1-5/16
1-3/4	3-3/8	1-7/8	0.178	0.28	1-17/32
2	3-3/4	2-1/8	0.178	0.28	1-3/4
2-1/4	4	2-3/8	0.24	0.34	2
2-1/2	4-1/2	2-5/8	0.24	0.34	2-3/16
2-3/4	5	2-7/8	0.24	0.34	2-13/32
3	5-1/2	3-1/8	0.24	0.34	2-5/8
3-1/4	6	3-3/8	0.24	0.34	2-7/8
3-1/2	6-1/2	3-5/8	0.24	0.34	3-1/16
3-3/4	7	3-7/8	0.24	0.34	3-5/16
4	7-1/2	4-1/8	0.24	0.34	3-1/2



Regular Helical Spring Lock



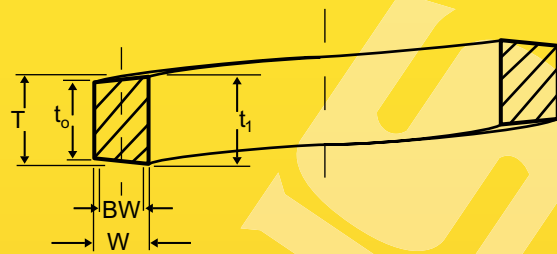
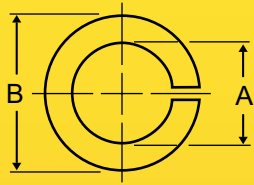
REGULAR HELICAL SPRING LOCK WASHERS

ASME B18.21.1
1999

Nominal Washer Size	A		B		T		W		BW	
	Inside Diameter		Outside Diameter		Mean Section Thickness $(t_1+t_0)/2$		Section Width		Bearing Width	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
#2	0.0860	0.094	0.088	0.172	0.020	0.035	0.024			
#3	0.0990	0.107	0.101	0.195	0.025	0.040	0.028			
#4	0.1120	0.120	0.114	0.209	0.025	0.040	0.028			
#5	0.1250	0.133	0.127	0.236	0.031	0.047	0.033			
#6	0.1380	0.148	0.141	0.250	0.031	0.047	0.033			
#8	0.1640	0.174	0.167	0.293	0.040	0.055	0.038			
#10	0.1900	0.200	0.193	0.334	0.047	0.062	0.043			
#12	0.2160	0.227	0.220	0.377	0.056	0.070	0.049			
1/4	0.2500	0.260	0.252	0.487	0.062	0.109	0.076			
5/16	0.3125	0.322	0.314	0.583	0.078	0.125	0.087			
3/8	0.3750	0.385	0.377	0.680	0.094	0.141	0.099			
7/16	0.4375	0.450	0.440	0.776	0.109	0.156	0.109			
1/2	0.5000	0.512	0.502	0.869	0.125	0.171	0.120			
9/16	0.5625	0.574	0.564	0.965	0.141	0.188	0.132			
5/8	0.6250	0.641	0.628	1.073	0.156	0.203	0.142			
11/16	0.6875	0.704	0.691	1.170	0.172	0.219	0.153			
3/4	0.7500	0.766	0.753	1.265	0.188	0.234	0.164			
13/16	0.8125	0.832	0.816	1.363	0.203	0.250	0.175			
7/8	0.8750	0.894	0.878	1.459	0.219	0.266	0.186			
15/16	0.9375	0.958	0.941	1.556	0.234	0.281	0.197			
1	1.0000	1.024	1.003	1.656	0.250	0.297	0.208			
1-1/16	1.0625	1.087	1.066	1.751	0.266	0.312	0.218			
1-1/8	1.1250	1.153	1.129	1.847	0.281	0.328	0.230			
1-3/16	1.1875	1.217	1.192	1.943	0.297	0.344	0.241			
1-1/4	1.2500	1.280	1.254	2.036	0.312	0.359	0.251			
1-5/16	1.3125	1.344	1.317	2.133	0.328	0.375	0.262			
1-3/8	1.3750	1.408	1.379	2.219	0.344	0.391	0.274			
1-7/16	1.4375	1.472	1.442	2.324	0.359	0.406	0.284			
1-1/2	1.5000	1.534	1.504	2.419	0.375	0.422	0.295			
1-5/8	1.6250	1.663	1.633	2.553	0.389	0.424	0.297			
1-3/4	1.7500	1.789	1.758	2.679	0.389	0.424	0.297			
1-7/8	1.8750	1.914	1.883	2.811	0.422	0.427	0.299			
2	2.0000	2.039	2.008	2.936	0.422	0.427	0.299			
2-1/4	2.2500	2.293	2.262	3.221	0.440	0.442	0.309			
2-1/2	2.5000	2.543	2.512	3.471	0.440	0.442	0.309			
2-3/4	2.7500	2.793	2.762	3.824	0.458	0.491	0.344			
3	3.0000	3.043	3.012	4.074	0.458	0.491	0.344			



High-Collar Helical Spring Lock



HIGH-COLLAR HELICAL SPRING LOCK WASHERS

ASME B18.21.1
1999

Nominal Washer Size	A		B		T		W		BW	
	Inside Diameter		Outside Diameter		Mean Section Thickness $(t_1+t_0)/2$		Section Width		Bearing Width	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
#4	0.1120	0.120	0.114	0.173	0.022	0.022	0.015			
#5	0.1250	0.133	0.127	0.202	0.030	0.030	0.021			
#6	0.1380	0.148	0.141	0.216	0.030	0.030	0.021			
#8	0.1640	0.174	0.167	0.267	0.047	0.047	0.029			
#10	0.1900	0.200	0.193	0.294	0.047	0.047	0.029			
1/4	0.2500	0.260	0.252	0.363	0.078	0.078	0.033			
5/16	0.3125	0.322	0.314	0.457	0.093	0.093	0.043			
3/8	0.3750	0.385	0.377	0.550	0.125	0.125	0.053			
7/16	0.4375	0.450	0.440	0.644	0.140	0.140	0.063			
1/2	0.5000	0.512	0.502	0.733	0.172	0.172	0.072			
5/8	0.6250	0.641	0.628	0.917	0.203	0.203	0.087			
3/4	0.7500	0.766	0.753	1.105	0.218	0.218	0.108			
7/8	0.8750	0.894	0.878	1.291	0.234	0.234	0.127			
1	1.0000	1.024	1.003	1.478	0.250	0.250	0.146			
1-1/8	1.1250	1.153	1.129	1.663	0.313	0.313	0.165			
1-1/4	1.2500	1.280	1.254	1.790	0.313	0.313	0.165			
1-3/8	1.3750	1.408	1.379	2.031	0.375	0.375	0.204			
1-1/2	1.5000	1.534	1.504	2.159	0.375	0.375	0.204			
1-3/4	1.7500	1.789	1.758	2.596	0.469	0.469	0.268			
2	2.0000	2.039	2.008	2.846	0.469	0.469	0.268			
2-1/4	2.2500	2.293	2.262	3.345	0.508	0.508	0.356			
2-1/2	2.5000	2.543	2.512	3.595	0.508	0.508	0.356			
2-3/4	2.7500	2.793	2.762	4.095	0.633	0.633	0.443			
3	3.0000	3.043	3.012	4.345	0.633	0.633	0.443			

