

1. SCOPE

This standard covers helical spring lock washers of the following series and selection is made from the dimensional tables to suit design requirements: Regular (REG), Heavy (HVY), Extra Duty (XDY), and Hi-Collar (HIC).

It should be noted that the word "lock" appearing in the names of the products in this standard is a generic term historically associated with their identification and is not intended to imply an indefinite permanency of fixity in attachments where they are used.

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3. GENERAL

Lock washers covered in this standard are intended for automotive and general industrial application and conform with American National Standard B18.21.1 unless otherwise specified.

4. RELATED DOCUMENTS

4.1 RELATED STANDARDS

ANSI B18.21.1—Lock Washers (Inch Series)

STPA020—Fastener Finishes and Material Specifications

MAT0310—Zinc Plating

4.2 REPLACED DOCUMENTS

Case F-012—Spring Lockwashers (General Specifications)

Case F-013—Spring Lockwashers – Regular – Preferred

Case F-014—Spring Lockwashers – Steel – Non Preferred

Case F-015—Spring Lockwashers – Special and Light Series

FNHA-1-B-560—Lock Washer Helical Spring Zn Cr Plated

AUTHOR	APPROVED BY	ECO	PART NUMBER
A KHAN	27AUG20 P TUPEK	27AUG20 35321106	87366990

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5. REQUIREMENTS

5.1 WASHER SECTION

The section of finished washers shall be slightly trapezoidal in shape with thickness at the inner periphery greater than the thickness at the outer periphery by an amount varying from a minimum of 0.0005 in. to a maximum of 0.001 in per 0.0156 in. of the minimum section width.

5.2 CORNERS

The corners at the outer and inner peripheries of washer shall be rounded sufficiently to avoid checks. However the radius at corners shall not exceed the equivalent of 15% of the minimum width of the washer section and need not necessarily be tangent to the face of the washer section.

5.3 COILING

Washers shall be coiled so that height is approximately equivalent to twice the thickness of the washer thickness. The gap and relationship of severed ends shall be such as to prevent washers tangling and ensure that washers will compress flat.

5.4 MATERIAL

Lockwashers shall be made from carbon steel lock washer wire meeting the following limits for decarburization:

Diameter of Round Wire or Sections of Equivalent Area	Max. Depth of Free Ferrite	Max. Total Affected Depth (Free ferrite plus partial decarburization)
Up to .140, incl	.002	.006
Over .140 to .250, incl	.003	.010
Over .250 to .375, incl	.004	.008
Over .375 to .500, incl	.006	.015

Electroplated washers are subjected to hydrogen embrittlement, and shall be suitable treated or baked in such a manner as to obviate such embrittlement. Plating on washers may be applied by a mechanical plating process to avoid the risk of hydrogen embrittlement.

Also, lock washers shall be heat treated to a hardness of 38 to 46 HRC (372 to 458 HV) or equivalent.

5.5 FINISH

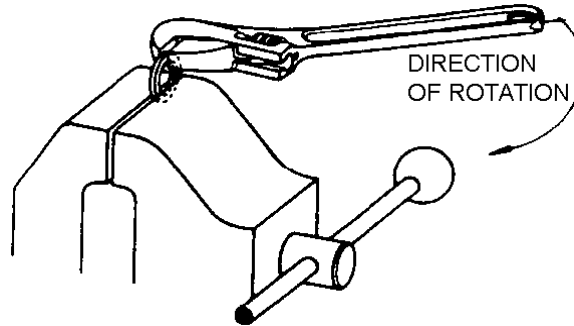
Flat washers will be furnished in accordance with MAT0310 and STPA020.

5.6 EMBRITTLEMENT TEST FOR PLATED WASHERS

Plated carbon steel washers shall not fracture after having been compressed flat between hardened and ground steel plates for a period of 48 hours.

5.7 TWIST TEST

The washer shall be gripped in vise jaws having sharp edges. The ends of the washers shall be free and an axis passing through the slot shall be parallel to and slightly above the top of the vise. A 90° segment of the free end of the washer shall be gripped in wrench jaws as shown in illustration below.

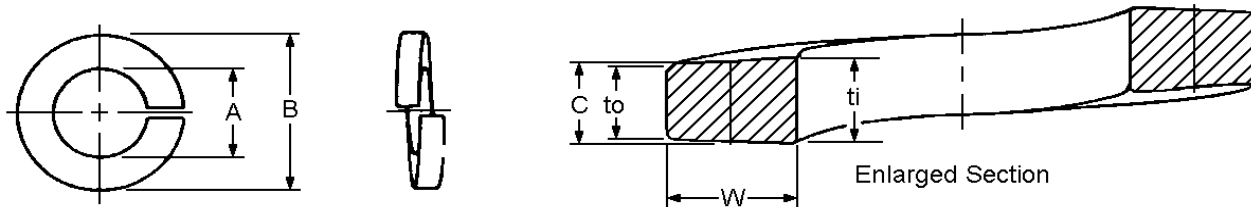


Edges of the wrench jaws shall be sharp and in a plane parallel to the vise. Movement of the wrench in a direction that increases the free height of the spring lock washer shall twist carbon steel washers through an angle of 90° and corrosion resistant steel and non-ferrous washers through an angle of 45° without sign of fracture. When the washer fractures at a greater degree of twist, the structure at the point of fracture shall show a fine grain, and the washer up to the instant of fracture shall deliver a tough springy reaction.

Suppliers shall perform the necessary test for sample approval for initial lots. After this approval, suppliers are not required to perform the specific tests, but ascertain that their product will conform to the specification limits. These specified requirements will be used to reconcile any disputed values.

6. CROSS REFERENCE

For cross reference listing of company part numbers, go to [CNH Catalogue](#).

TABLE 1: Dimensions of Regular Helical Spring Lock Washers


Nominal Washer Size		A		B	C	W
		Inside Diameter		Outside Diameter	Mean Section Thickness $(t_i + t_o)/2$	Section Width
		Max.	Min.	Max.	Min.	Min.
#2	(.086)	.094	.088	.172	.020	.035
#3	(.099)	.107	.101	.195	.025	.040
#4	(.112)	.120	.114	.209	.025	.040
#5	(.125)	.133	.127	.236	.031	.047
#6	(.138)	.148	.141	.250	.031	.047
#8	(.164)	.174	.167	.293	.040	.055
#10	(.190)	.200	.193	.334	.047	.062
#12	(.216)	.227	.220	.377	.056	.070
1/4	(.250)	.260	.252	.487	.062	.109
5/16	(.312)	.322	.314	.583	.078	.125
3/8	(.375)	.385	.377	.680	.094	.141
7/16	(.438)	.450	.440	.776	.109	.156
1/2	(.500)	.512	.502	.869	.125	.171
9/16	(.562)	.574	.564	.965	.141	.188
5/8	(.625)	.641	.628	1.073	.156	.203
11/16	(.688)	.704	.691	1.170	.172	.219
3/4	(.750)	.766	.753	1.265	.188	.234
13/16	(.812)	.832	.816	1.363	.203	.250
7/8	(.875)	.894	.878	1.459	.219	.266
15/16	(.938)	.958	.941	1.556	.234	.281
1	(1.000)	1.024	1.003	1.656	.250	.297
1-1/16	(1.062)	1.087	1.066	1.751	.266	.312
1-1/8	(1.125)	1.153	1.129	1.847	.281	.328
1-3/16	(1.188)	1.217	1.192	1.943	.297	.344
1-1/4	(1.250)	1.280	1.254	2.036	.312	.359
1-5/16	(1.312)	1.334	1.317	2.133	.328	.375
1-3/8	(1.375)	1.408	1.379	2.219	.344	.391
1-7/16	(1.438)	1.472	1.442	2.324	.359	.406
1-1/2	(1.500)	1.534	1.504	2.419	.375	.422
1-3/4	(1.750)	1.789	1.758	2.679	.389	.424
2	(2.000)	2.039	2.008	2.936	.422	.427

Standard Part

Spring Lock Washers Inch

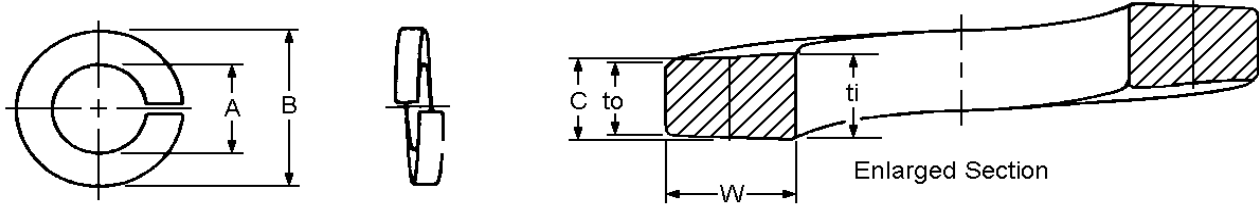
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TABLE 2: Regular Helical Spring Lock Washers

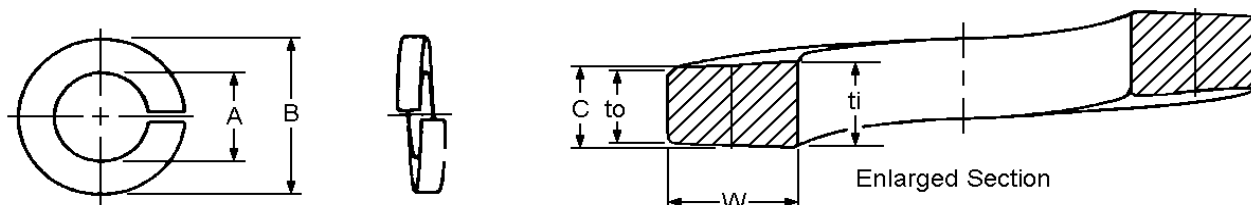
Washer Size	Nominal ID	Material	Finish	Part Number
#6 (0.138)	0.145	CST	ZND	87276
#8 (0.164)	0.170	CST	ZND	87812
#10 (0.190)	0.196	CST	ZND	80684
#10 (0.190)	0.196	SST	PLN	84576086
#12 (0.216)	0.224	CST	ZND	9602225
1/4 (0.25)	0.256	CST	ZND	80682
1/4 (0.25)	0.256	SST	PLN	47787131
5/16 (0.3125)	0.318	CST	DAC	90418978
5/16 (0.3125)	0.318	CST	ZND	80681
5/16 (0.3125)	0.318	CST	PHC	116120
3/8 (0.375)	0.381	CST	ZND	80680
3/8 (0.375)	0.381	CST	PHC	115093
3/8 (0.375)	0.381	SST	PLN	280681
7/16 (0.4375)	0.445	CST	ZND	81547
7/16 (0.4375)	0.445	CST	PHC	115314
1/2 (0.5)	0.507	CST	DAC	90332765
1/2 (0.5)	0.507	CST	PHC	116121
1/2 (0.5)	0.507	CST	PLN	87326976
1/2 (0.5)	0.507	CST	ZND	80679
9/16 (0.5625)	0.569	CST	ZND	280248
5/8 (0.625)	0.634	CST	DOR	87310424
5/8 (0.625)	0.634	CST	ZND	86729275
11/16 (0.6875)	0.697	CST	ZND	80131045
3/4 (0.75)	0.759	CST	ZND	87340
3/4 (0.75)	0.759	CST	PLN	87613309
3/4 (0.75)	0.759	CST	PHC	131207
7/8 (0.875)	0.884	CST	ZND	87341
1	1.009	CST	ZND	87342
1-1/8 (1.125)	1.137	CST	ZND	88695
1-1/4 (1.25)	1.263	CST	ZND	84086
1-3/8 (1.375)	1.389	CST	ZND	86511262
1-1/2 (1.5)	1.519	CST	ZND	86511263
1-3/4 (1.75)	1.774	CST	ZND	51200012

TABLE 3: Dimensions of Heavy Helical Spring Lock Washers


Nominal Washer Size		A		B	C	W
		Inside Diameter		Outside Diameter	Mean Section Thickness $(t_i + t_o) / 2$	Section Width
		Max.	Min.	Max.	Min.	Min.
#2	(.086)	.094	.088	.182	.025	.040
#3	(.099)	.107	.101	.209	.031	.047
#4	(.112)	.120	.114	.223	.031	.047
#5	(.125)	.133	.127	.252	.040	.055
#6	(.138)	.148	.141	.266	.040	.055
#8	(.164)	.174	.167	.307	.047	.062
#10	(.190)	.200	.193	.350	.056	.070
#12	(.216)	.227	.220	.391	.063	.077
1/4	(.250)	.260	.252	.489	.077	.110
5/16	(.312)	.322	.314	.593	.097	.130
3/8	(.375)	.385	.377	.688	.115	.145
7/16	(.438)	.450	.440	.784	.133	.160
1/2	(.500)	.512	.502	.879	.151	.176
9/16	(.562)	.574	.564	.975	.170	.193
5/8	(.625)	.641	.628	1.087	.189	.210
11/16	(.688)	.704	.691	1.186	.207	.227
3/4	(.750)	.766	.753	1.285	.226	.244
13/16	(.812)	.832	.816	1.387	.246	.262
7/8	(.875)	.894	.878	1.489	.266	.281
15/16	(.938)	.958	.941	1.590	.284	.298
1	(1.000)	1.024	1.003	1.700	.306	.319
1-1/16	(1.062)	1.087	1.066	1.803	.326	.338
1-1/8	(1.125)	1.153	1.129	1.903	.345	.356
1-3/16	(1.188)	1.217	1.192	2.001	.364	.373
1-1/4	(1.250)	1.280	1.254	2.104	.384	.393
1-5/16	(1.312)	1.344	1.317	2.203	.403	.410
1-3/8	(1.375)	1.408	1.379	2.301	.422	.427
1-7/16	(1.438)	1.472	1.442	2.396	.440	.442
1-1/2	(1.500)	1.534	1.504	2.491	.458	.458

TABLE 4: Heavy Helical Spring Lock Washers

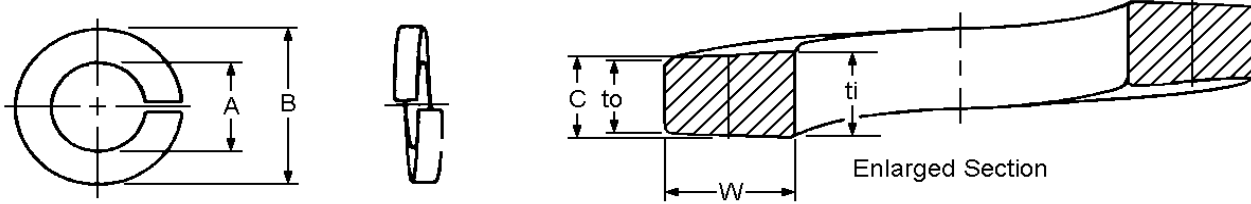
Washer Size	ID	Material	Finish	Part Number
3/8 (0.375)	0.381	CST	PHC	123920
3/8 (0.375)	0.381	CST	ZND	87613307
1/2 (0.5)	0.507	CST	PHC	123174
1/2 (0.5)	0.507	CST	ZND	87613308
5/8 (0.625)	0.634	CST	ZND	131140
3/4 (0.75)	0.759	CST	ZND	131142
1-1/2 (1.5)	1.514	CST	ZND	84156983

TABLE 5: Dimensions of Extra-Duty Helical Spring Lock Washers


Nominal Washer Size		A		B	C	W
		Inside Diameter		Outside Diameter	Mean Section Thickness ($t_i + t_o$)/2	Section Width
		Max.	Min.	Max.	Min.	Min.
#2	(.086)	.094	.088	.208	.027	.053
#3	(.099)	.107	.101	.239	.034	.062
#4	(.112)	.120	.114	.253	.034	.062
#5	(.125)	.133	.127	.300	.045	.079
#6	(.138)	.148	.141	.314	.045	.079
#8	(.164)	.174	.167	.375	.057	.096
#10	(.190)	.200	.193	.434	.068	.112
#12	(.216)	.227	.220	.497	.080	.130
1/4	(.250)	.260	.252	.533	.084	.132
5/16	(.312)	.322	.314	.619	.108	.143
3/8	(.375)	.385	.377	.738	.123	.170
7/16	(.438)	.450	.440	.836	.143	.186
1/2	(.500)	.512	.502	.935	.162	.204
9/16	(.562)	.574	.564	1.035	.182	.223
5/8	(.625)	.641	.628	1.151	.202	.242
11/16	(.688)	.704	.691	1.252	.221	.260
3/4	(.750)	.766	.753	1.355	.241	.279
13/16	(.812)	.832	.816	1.458	.261	.298
7/8	(.875)	.894	.878	1.571	.285	.322
15/16	(.938)	.958	.941	1.684	.308	.345
1	(1.000)	1.024	1.003	1.794	.330	.366
1-1/16	(1.062)	1.087	1.066	1.905	.352	.389
1-1/8	(1.125)	1.153	1.129	2.013	.375	.411
1-3/16	(1.188)	1.217	1.192	2.107	.396	.431
1-1/4	(1.250)	1.280	1.254	2.222	.417	.452
1-5/16	(1.312)	1.344	1.317	2.327	.438	.472
1-3/8	(1.375)	1.408	1.379	2.429	.458	.491
1-7/16	(1.438)	1.472	1.442	2.530	.478	.509
1-1/2	(1.500)	1.534	1.504	2.627	.496	.526

TABLE 6: Extra-Duty Helical Spring Lock Washers

Washer Size	ID	Material	Finish	Part Number
7/16 (0.4375)	0.445	CST	PLN	9421096

TABLE 7: Dimensions of Hi-Collar Helical Spring Lock Washers


Nominal Washer Size		A		B	C	W
		Inside Diameter		Outside Diameter	Mean Section Thickness ($t_i + t_o$)/2	Section Width
		Max.	Min.	Max.	Min.	Min.
#4	(.112)	.120	.114	.173	.022	.022
#5	(.125)	.133	.127	.202	.030	.030
#6	(.138)	.148	.141	.216	.030	.030
#8	(.164)	.174	.167	.267	.047	.042
#10	(.190)	.200	.193	.294	.047	.042
1/4	(.250)	.260	.252	.363	.078	.047
5/16	(.312)	.322	.314	.457	.093	.062
3/8	(.375)	.385	.377	.550	.125	.076
7/16	(.438)	.450	.440	.644	.140	.090
1/2	(.500)	.512	.502	.733	.172	.103
5/8	(.625)	.641	.628	.917	.203	.125
3/4	(.750)	.766	.753	1.105	.218	.154
7/8	(.875)	.894	.878	1.291	.234	.182
1	(1.000)	1.024	1.003	1.478	.250	.208
1-1/8	(1.125)	1.153	1.129	1.663	.313	.236
1-1/4	(1.250)	1.280	1.254	1.790	.313	.236
1-3/8	(1.375)	1.408	1.379	2.031	.375	.292
1-1/2	(1.500)	1.534	1.504	2.159	.375	.292
2	(2.000)	2.039	2.008	2.846	.469	.383

TABLE 8: Hi-Collar Helical Spring Lock Washers

Washer Size	ID	Material	Finish	Part Number
#10	0.200	CST	ZND	87682414
3/8 (0.375)	0.381	CST	ZND	86588857
1/2 (0.5)	0.507	CST	ZND	9602210