

Hardened Washers — Standard Tolerances



For circular washers, there are standard tolerances that its dimensions should adhere to. These tolerances are based on the ASTM standard F436, which outlines the specifications for washer dimensions. The tables below include these dimensions in both metric and imperial measurements.

As with most components, tolerances are needed to account for dimensional variations that may occur during manufacturing. It is important to account for them to ensure that components fit in the final product.

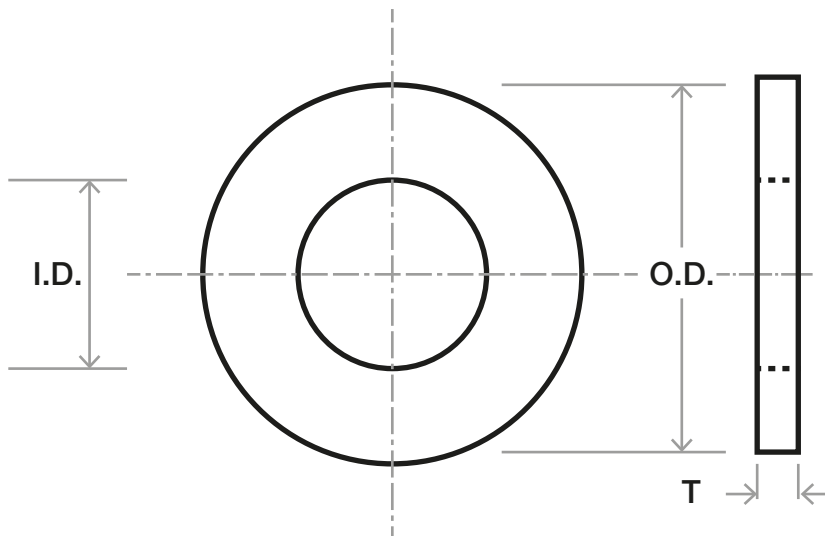
When it comes to washers, the internal diameter is important, as that is where the bolt or screw will go in. Hence, the tolerance on this would be stricter. With the external diameter, there can be a wider range in tolerance since it is not engaging with any other component. As washers are used under the head of a bolt or screw, their thickness would also be an important dimension.

The tolerances for the inner and outer diameters of the washers according to F436 is included in the table below.

Tolerances

Tolerance Dimensions in inches / mm	Nominal Sizes			
	Less than 1	1 to 1 ½	1 ½ to 3	Greater than 3
Inside Diameter, in	-0, +0.032	-0, +0.063	-0, +0.063	-0, +0.125
Inside Diameter, mm	-0, +0.813	-0, +1.600	0, +1.600	-0, +3.175
Outside Diameter, in	-/+ 0.032	-/+ 0.063	-/+ 0.063	-/+ 0.125
Outside diameter, mm	-/+ 0.813	-/+ 1.600	-/+ 1.600	-/+ 3.175

Measurement Guide





Imperial Chart

Inside Diam Tolerance, in		Outside Diam Tolerance, in		Nominal Size, in	Nominal	Inside Diameter, in		Outside Diameter, in			Thickness, in	
Minus	Plus	Minus	Plus			Min	Max	Nominal	Min	Max	Min	Max
0	0.032	-0.032	0.032	1.4	0.281	0.281	0.313	0.625	0.593	0.657	0.051	0.080
0	0.032	-0.032	0.032	5.16	0.344	0.344	0.376	0.688	0.656	0.72	0.051	0.080
0	0.032	-0.032	0.032	3.8	0.406	0.406	0.438	0.813	0.781	0.845	0.051	0.080
0	0.032	-0.032	0.032	7.16	0.469	0.469	0.501	0.922	0.890	0.954	0.051	0.080
0	0.032	-0.032	0.032	1.2	0.531	0.531	0.563	1.063	1.031	1.095	0.097	0.177
0	0.032	-0.032	0.032	9.16	0.625	0.625	0.657	1.188	1.156	1.22	0.110	0.177
0	0.032	-0.032	0.032	5.8	0.688	0.688	0.72	1.313	1.281	1.345	0.122	0.177
0	0.032	-0.032	0.032	3.4	0.813	0.813	0.845	1.468	1.436	1.5	0.122	0.177
0	0.032	-0.032	0.032	7.8	0.938	0.938	0.97	1.750	1.718	1.782	0.136	0.177
0	0.063	-0.063	0.063	1	1.063	1.063	1.126	2.000	1.937	2.063	0.136	0.177
0	0.063	-0.063	0.063	1 1/8	1.188	1.188	1.251	2.250	2.187	2.313	0.136	0.177
0	0.063	-0.063	0.063	1 1/4	1.375	1.375	1.438	2.500	2.437	2.563	0.136	0.177
0	0.063	-0.063	0.063	1 3/8	1.500	1.500	1.563	2.750	2.687	2.813	0.136	0.177
0	0.063	-0.063	0.063	1 1/2	1.625	1.625	1.688	3.00	2.937	3.06	0.136	0.177
0	0.063	-0.063	0.063	1 3/4	1.875	1.875	1.938	3.375	3.312	3.438	0.178	0.280
0	0.063	-0.063	0.063	2	2.125	2.125	2.188	3.750	3.687	3.813	0.178	0.280
0	0.063	-0.063	0.063	2 1/4	2.375	2.375	2.438	4.000	3.937	4.063	0.240	0.340
0	0.063	-0.063	0.063	2 1/2	2.625	2.625	2.688	4.500	4.437	4.563	0.240	0.340
0	0.063	-0.063	0.063	2 3/4	2.875	2.875	2.938	5.000	4.937	5.063	0.240	0.340
0	0.063	-0.063	0.063	3	3.125	3.125	3.188	5.500	5.437	5.563	0.240	0.340
0	0.125	-0.125	0.125	3 1/4	3.375	3.375	3.5	6.000	5.875	6.125	0.240	0.340
0	0.125	-0.125	0.125	3 1/2	3.625	3.625	3.75	6.500	6.375	6.625	0.240	0.340
0	0.125	-0.125	0.125	3 3/4	3.875	3.875	4	7.000	6.875	7.125	0.240	0.340
0	0.125	-0.125	0.125	4	4.125	4.125	4.25	7.500	7.375	7.625	0.240	0.340



Metric Chart

Inside Diameter Tolerance, mm		Outside Diameter Tolerance, mm		Nominal Size, in	Inside Diameter, mm			Outside Diameter, mm			Thickness, mm	
Minus	Plus	Minus	Plus		Nominal	Min.	Max.	Nominal	Min	Max	Min	Max
0	0.813	-0.813	0.813	1.4	7.137	7.137	7.950	15.875	15.062	16.688	1.295	2.032
0	0.813	-0.813	0.813	5.16	8.738	8.738	9.550	17.475	16.662	18.288	1.295	2.032
0	0.813	-0.813	0.813	3.8	10.312	10.312	11.125	20.650	19.837	21.463	1.295	2.032
0	0.813	-0.813	0.813	7.16	11.913	11.913	12.725	23.419	22.606	24.232	1.295	2.032
0	0.813	-0.813	0.813	1.2	13.487	13.487	14.300	27.000	26.187	27.813	2.464	4.496
0	0.813	-0.813	0.813	9.16	15.875	15.875	16.688	30.175	29.362	30.988	2.794	4.496
0	0.813	-0.813	0.813	5.8	17.475	17.475	18.288	33.350	32.537	34.163	3.099	4.496
0	0.813	-0.813	0.813	3.4	20.650	20.650	21.463	37.287	36.474	38.100	3.099	4.496
0	0.813	-0.813	0.813	7.8	23.825	23.825	24.638	44.450	43.637	45.263	3.454	4.496
0	1.600	-1.600	1.600	1	27.000	27.000	28.600	50.800	49.200	52.400	3.454	4.496
0	1.600	-1.600	1.600	1 1/8	30.175	30.175	31.775	57.150	55.550	58.750	3.454	4.496
0	1.600	-1.600	1.600	1 1/4	34.925	34.925	36.525	63.500	61.900	65.100	3.454	4.496
0	1.600	-1.600	1.600	1 3/8	38.100	38.100	39.700	69.850	68.250	71.450	3.454	4.496
0	1.600	-1.600	1.600	1 1/2	41.275	41.275	42.875	76.200	74.600	77.800	3.454	4.496
0	1.600	-1.600	1.600	1 3/4	47.625	47.625	49.225	85.725	84.125	87.325	4.521	7.112
0	1.600	-1.600	1.600	2	53.975	53.975	55.575	95.250	93.650	96.850	4.521	7.112
0	1.600	-1.600	1.600	2 1/4	60.325	60.325	61.925	101.600	100.000	103.200	6.096	8.636
0	1.600	-1.600	1.600	2 1/2	66.675	66.675	68.275	114.300	112.700	115.900	6.096	8.636
0	1.600	-1.600	1.600	2 3/4	73.025	73.025	74.625	127.000	125.400	128.600	6.096	8.636
0	1.600	-1.600	1.600	3	79.375	79.375	80.975	139.700	138.100	141.300	6.096	8.636
0	3.175	-3.175	3.175	3 1/4	85.725	85.725	88.900	152.400	149.225	155.575	6.096	8.636
0	3.175	-3.175	3.175	3 1/2	92.075	92.075	95.250	165.100	161.925	168.275	6.096	8.636
0	3.175	-3.175	3.175	3 3/4	98.425	98.425	101.600	177.800	174.625	180.975	6.096	8.636
0	3.175	-3.175	3.175	4	104.775	104.775	107.950	190.500	187.325	193.675	6.096	8.636

ⓘ The data provided in this document is for general guidance only and should not be solely relied upon when working to stringent specifications. We recommend consulting with qualified experts regarding any technical queries. This information may change without written notice.