

PRODUCT CATALOGUE

Unmatched **Quality**,
Unbeatable **Performance**



WINDSTON



WINDSTON SPRINGS PVT. LTD.

INFRASTRUCTURE & CUSTOMER SUPPORT

“WE BUILD ONLY THE INFRASTRUCTURE, PEOPLE BUILD THE ORGANIZATION!!!

WINDSTON SPRINGS is well equipped with all the required machinery and equipment to produce parts and components of varied metals in different forms and integration. A well facilitated Design-&-Development Department enables continuous manufacturing of high precision components for the engineering Industries, catering to both Indian and International customers. Our dedicated team of employees strive hard to utilize the resources in the most appropriate manner to achieve customer delight. We look forward to set up a new State-of-the-Art R&D Centre.

One of the most significant features of this Plant is its ability to carry out all operations and processes under one roof- carrying out advanced operations and processes by CNC machinery coupled with hi-integrated inspection and testing equipment to produce efficient, reliable, quality and hi-endurance engineering products.

It is spread over 4,800sq meter in Surendranagar District in the State of Gujarat, having Marketing & Registered office at Mumbai.

**“SUCCESS IS NEITHER MAGICAL NOR MYSTERIOUS ...
SUCCESS IS THE NATURAL CONSEQUENCE OF
CONSISTENTLY APPLYING BASIC FUNDAMENTALS
WITH DETERMINATION AND COMMITMENT”**

ISO 9001 COMPANY



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PHILOSOPHY

“DESIRE IS THE KEY TO MOTIVATION BUT IT’S DETERMINATION & COMMITMENT TO AN UNRELENTING PURSUIT OF OUR GOAL – A COMMITMENT TO EXCELLENCE THAT ENABLES US TO ATTAIN SUCCESS WE SEEK”

LEGACY

“HONOUR STATES THE WORTH ...
CONFIDENCE COMES FROM TRUST ...
SERVICE BRINGS SATISFACTION ...
COOPERATION PROVES THE QUALITY OF LEADERSHIP”

ABOUT US

“INDIVIDUAL COMMITMENT TO A GROUP EFFORT - THAT IS WHAT MAKES ... A TEAM WORK, A COMPANY WORK, A SOCIETY WORK, A CIVILIZATION WORK”



WINDSTON SPRINGS is a group of motivated individuals, talented designers and skilled workers, perfectly guided by able Management and visionary leadership. Having set high ambitions, they are cohesively marching towards their goal in perfect harmony.

WINDSTON SPRINGS stands strong and united in its endeavor to ensure the growth of every associated individual. This attitude and approach is also at the root of our ever-growing clientele.

VISION & MISSION

“VISION IS THE ART OF SEEING WHAT IS INVISIBLE TO OTHERS”



VISION:

“By 2025, whoever thinks of procuring a stamped part, must think of us only.”

MISSION:

WINDSTON SPRINGS is committed to establish itself as the most trusted manufacturer of critical hi-end Engineering parts with high quality at perfectly economical costs. Company foresees to stand as the brand of choice for the whole of the engineering world. It competes only with itself by raising its quality and service standards to the highest level. Company wishes to serve world by flourishing into a hub, creating job opportunities and influx of foreign economy.

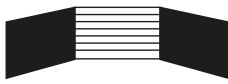
WHAT WE DO

“ALWAYS COMMITTED TOWARDS THE CREATIVITY IN THE DIRECTION OF EXCEEDING THE COSTUMER’S EXPECTATIONS ”

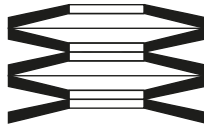
Concept and Characteristics of Disc Springs

Disc Springs are conically formed angular Discs which are loaded in the axial direction. They can be statistically loaded as well subject to continuous dynamic loads.

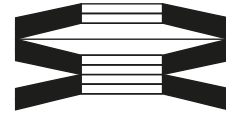
They can be used as single disc or in multiple stack combination to achieve desired deflections and characteristics.



STACKED IN PARALLEL :
 TOTAL DEFLECTION = Deflection of 1 disc
 TOTAL LOAD = Load on 1 disc x no. of discs



STACKED IN SERIES :
 TOTAL DEFLECTION = Deflection of 1 disc X no. discs in stack
 TOTAL LOAD = Load on 1 disc

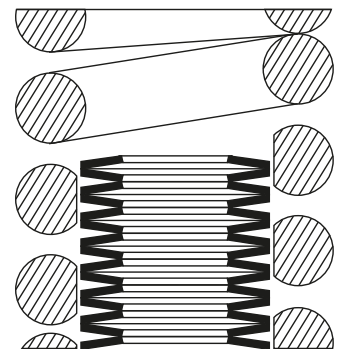


STACKED IN PARALLEL SERIES :
 COMBINATIONS = can be designed to accommodate virtually any load or deflection and to obtain progressive or regressive characteristics

Outstanding Features

- High Load with limited travel (small deflection)
- High Load to compress small design space so better space utilization compare to other springs. Longer service or fatigue life.
- Ability to function as a individual element or more often in group, in different group combination, so that stack or assembly of these Disc Springs operate axially.
- Greater security of operation service, as failure of one Disc Spring element within a stack does not totally lead of failure of entire assembly.
- Low maintenance cost as any of the failed Disc Spring in assembly could be easily replaced.
- Spring load achieved by reciprocally alternating disc.
- Axial load achieved by application of guide bolt or sleeve.
- High damping capacity through friction, which can be increased by parallel stacking.
- High endurance and fatigue strength.
- Load, stack height and travel can be determined and changed as needed.
- Exact determination of disc spring characteristic.

Comparison with coil Springs



Where same load is achieved in less space.

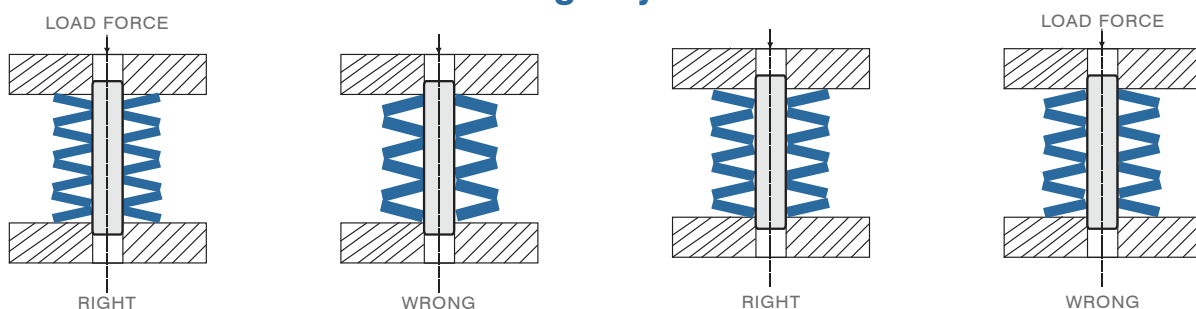
Reduced thickness for Disc Springs with bearing flats

In order to achieve a load p at $f = 0.75$ height with Disc Spring having bearing flats the thickness t is reduced to t' by the manufacturer. The reduction is approximately 94% of the nominal thickness. The table shown below is particularly significant for parallel stacking of Disc Spring with reduced thickness t' and must be taken into consideration.

t mm	7	8	10	12	14
t' mm	6.55	7.50	9.40	11.25	13.10

According to DIN 2093 Disc Springs with material thickness of 7 to 14 mm may be reduced as shown in above table.

Advisable stacking way as shown below.



Disc Springs Tolerances

(Applicable to DIN 2093 quality - all dimensions in mm)

Thickness			
Group	Thickness Range	+	-
1	0.20 up to 0.60	0.02	0.06
	over 0.60 to under 1.25	0.03	0.09
2	1.25 up to 3.80	0.04	0.12
	over 3.80 up to 6.00	0.05	0.15
3	over 6.00 up to 14.00	0.10	0.10

Overall Height			
Group	Thickness Range	+	-
1	under 1.25	0.10	0.05
	1.25 up to 2.00	0.15	0.08
2	over 2.00 up to 3.00	0.20	0.10
	over 3.00 up to 6.00	0.30	0.15
3	over 6.00 up to 14.00	0.30	0.30

Outside Diameter			
O/D Range	+	-	
3 up to 6	0.00	0.12	
over 6 up to 10	0.00	0.15	
over 10 up to 18	0.00	0.18	
over 18 up to 30	0.00	0.21	
over 30 up to 50	0.00	0.25	
over 50 up to 80	0.00	0.30	
over 80 up to 120	0.00	0.35	
over 120 up to 180	0.00	0.40	
over 180 up to 250	0.00	0.46	

Inside Diameter			
I/D Range	+	-	
3 up to 6	0.12	0.00	
over 6 up to 10	0.15	0.00	
over 10 up to 18	0.18	0.00	
over 18 up to 30	0.21	0.00	
over 30 up to 50	0.25	0.00	
over 50 up to 80	0.30	0.00	
over 80 up to 120	0.35	0.00	
over 120 up to 180	0.40	0.00	
over 180 up to 250	0.46	0.00	

Manufacturing Compromise

The manufacture need to have option on production for adjustment of Disc Springs dimension in order to able to adhere to the required load within allowable allowances.

Specified Measurement	Achieved by Adjustment of -
A given load and related height for the stressed spring	Overall Spring Height
Given load and related height	Overall Spring Height and Thickness

Spring Force / Load Tolerance			
Group	Thickness Range	Group force deviation at test height 0.75H	
		+	-
1	under 1.25	25%	7.5%
	1.25 up to 3.00	15%	7.5%
2	over 3.00 up to 6.00	10%	5%
	over 6.00 up to 14.00	5%	5%

Guide Clearance	
Outside / Inside Diameter	Total Clearance
up to 16	0.20
over 16 up to 20	0.30
over 20 up to 26	0.40
over 26 up to 31.5	0.50
over 31.5 up to 50	0.60
over 50 up to 80	0.80
over 80 up to 140	1.00
over 140 up to 250	1.60

NOTE : Whenever inside guiding are preferred, guide bolts should be harden to 55 / 60 HRC, also to be ground polished.

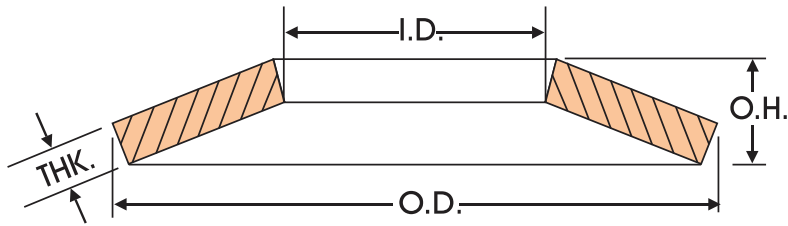
Concentricity Of Diameters			
O/D Range	Tolerance	DIN	
3 up to 6	0.15	2.IT 11	
over 6 up to 10	0.18		
over 10 up to 18	0.22		
over 18 up to 30	0.26		
over 30 up to 50	0.32		
over 50 up to 80	0.60	2.IT 12	
over 80 up to 120	0.70		
over 120 up to 180	0.80		
over 180 up to 250	0.92		

Disc Spring Hardness Range

To ensure good strength with as little relaxation as possible, the hardness of spring shall lie within range of 42 to 52 HRC for Disc Springs.

Conversion Table		
millimeters	=	inches X 25.40
inches	=	Millimeters ÷ 25.4
1 lb	=	.454 kg
1 kg	=	2.2 lbs.
1 psi	=	.0007 kg / mm ²
1 kg / mm ²	=	1422 psi
1 Newton (N)	=	.225 lbs. Force
1 lb Force	=	4.44 N
1 N / mm ²	=	.102 kg / mm ²
1 kg / mm ²	=	9.81 N / mm ² = 1422 psi

The numerical Value of the allowable production of the adjustment of Disc Spring dimension must be indicated on the drawing and are considered only for reference purposes.



DISC SPRING DIMENSIONS as per DIN 2093 Standard & Windston Series

DIN Series	Dimensions (mm)					Group	Spring Deflections in mm (s) and Spring Load in Newton (F)							
							0.25H		0.50H		0.75H		1.0H	
	O.D.	I.D.	THK.	O.H.	t`		F	S	F	S	F	S	F	S
	6.0	3.2	0.30	0.45	-	1	45	0.038	84	0.075	117	0.110	153	0.150
	8.0	3.2	0.20	0.40	-	1	12	0.050	20	0.100	26	0.150	30	0.200
	8.0	3.2	0.30	0.55	-	1	46	0.063	79	0.125	105	0.190	126	0.250
	8.0	3.2	0.40	0.60	-	1	69	0.050	130	0.100	186	0.150	238	0.200
	8.0	3.2	0.50	0.70	-	1	128	0.050	246	0.100	357	0.150	465	0.200
C	8.0	4.2	0.20	0.45	-	1	21	0.063	33	0.125	39	0.190	42	0.250
B	8.0	4.2	0.30	0.55	-	1	52	0.063	89	0.125	119	0.190	142	0.250
A	8.0	4.2	0.40	0.60	-	1	78	0.050	147	0.100	210	0.150	269	0.200
	10.0	3.2	0.30	0.65	-	1	51	0.088	82	0.175	98	0.260	108	0.350
	10.0	3.2	0.40	0.70	-	1	75	0.075	133	0.150	182	0.230	220	0.300
	10.0	3.2	0.50	0.75	-	1	104	0.063	195	0.125	282	0.190	357	0.250
	10.0	4.2	0.40	0.70	-	1	79	0.075	140	0.150	192	0.230	232	0.300
	10.0	4.2	0.50	0.75	-	1	110	0.063	206	0.125	297	0.190	377	0.250
	10.0	4.2	0.60	0.85	-	1	175	0.060	360	0.125	508	0.190	652	0.250
C	10.0	5.2	0.25	0.55	-	1	30	0.075	48	0.150	58	0.230	63	0.300
B	10.0	5.2	0.40	0.70	-	1	88	0.075	155	0.150	213	0.230	257	0.300
A	10.0	5.2	0.50	0.75	-	1	122	0.063	228	0.125	329	0.190	418	0.250
	12.0	4.2	0.40	0.80	-	1	85	0.100	141	0.200	178	0.300	206	0.400
	12.0	4.2	0.50	0.85	-	1	116	0.088	208	0.175	282	0.260	352	0.350
	12.0	4.2	0.60	1.00	-	1	224	0.100	405	0.200	557	0.300	694	0.400
	12.0	5.2	0.50	0.90	-	1	150	0.100	263	0.200	350	0.300	424	0.400
	12.0	5.2	0.60	0.95	-	1	196	0.088	361	0.175	502	0.260	641	0.350
	12.0	6.2	0.50	0.85	-	1	134	0.088	239	0.175	324	0.260	404	0.350
	12.0	6.2	0.60	0.95	-	1	214	0.088	394	0.175	547	0.260	699	0.350
	12.5	5.2	0.50	0.85	-	1	111	0.088	200	0.175	270	0.260	337	0.350
C	12.5	6.2	0.35	0.80	-	1	84	0.113	130	0.225	152	0.340	160	0.450
B	12.5	6.2	0.50	0.85	-	1	120	0.088	215	0.175	291	0.260	363	0.350
A	12.5	6.2	0.70	1.00	-	1	239	0.075	457	0.150	673	0.230	855	0.300
C	14.0	7.2	0.35	0.80	-	1	68	0.113	106	0.225	123	0.340	131	0.450
B	14.0	7.2	0.50	0.90	-	1	120	0.100	210	0.200	279	0.300	338	0.400
A	14.0	7.2	0.80	1.10	-	1	284	0.075	547	0.150	813	0.230	1040	0.300
	15.0	5.2	0.40	0.95	-	1	101	0.138	154	0.275	175	0.410	181	0.550
	15.0	5.2	0.50	1.00	-	1	133	0.125	221	0.250	280	0.380	321	0.500
	15.0	5.2	0.60	1.05	-	1	171	0.113	302	0.225	409	0.340	499	0.450
	15.0	5.2	0.70	1.10	-	1	214	0.100	395	0.200	555	0.300	704	0.400

DIN Series	Dimensions (mm)					Group	Spring Deflections in mm (s) and Spring Load in Newton (F)							
							0.25H		0.50H		0.75H		1.0H	
	O.D.	I.D.	THK.	O.H.	t'		F	S	F	S	F	S	F	S
	15.0	6.2	0.50	1.00	-	1	138	0.125	229	0.250	291	0.380	334	0.500
	15.0	6.2	0.60	1.05	-	1	178	0.113	314	0.225	426	0.340	519	0.450
	15.0	6.2	0.70	1.10	-	1	222	0.100	411	0.200	578	0.300	733	0.400
	15.0	8.2	0.70	1.10	-	1	256	0.100	474	0.200	666	0.300	844	0.400
	15.0	8.2	0.80	1.20	-	1	367	0.100	689	0.200	982	0.300	1261	0.400
C	16.0	8.2	0.40	0.90	-	1	84	0.125	131	0.250	155	0.380	165	0.500
B	16.0	8.2	0.60	1.05	-	1	172	0.113	304	0.225	412	0.340	503	0.450
	16.0	8.2	0.70	1.15	-	1	254	0.113	461	0.225	641	0.340	798	0.450
	16.0	8.2	0.80	1.20	-	1	308	0.100	579	0.200	825	0.300	1059	0.400
A	16.0	8.2	0.90	1.25	-	1	363	0.088	697	0.175	1004	0.260	1319	0.350
	18.0	6.2	0.40	1.00	-	1	85	0.150	126	0.300	139	0.450	137	0.600
	18.0	6.2	0.50	1.10	-	1	130	0.150	206	0.300	245	0.450	267	0.600
	18.0	6.2	0.60	1.20	-	1	191	0.150	317	0.300	400	0.450	462	0.600
	18.0	6.2	0.70	1.25	-	1	236	0.138	414	0.275	550	0.410	672	0.550
	18.0	6.2	0.80	1.30	-	1	286	0.125	523	0.250	733	0.380	912	0.500
	18.0	8.2	0.50	1.10	-	1	140	0.150	222	0.300	265	0.450	288	0.600
	18.0	8.2	0.70	1.25	-	1	255	0.138	446	0.275	594	0.410	725	0.550
	18.0	8.2	0.80	1.30	-	1	309	0.125	564	0.250	791	0.380	984	0.500
	18.0	8.2	1.00	1.40	-	1	425	0.100	814	0.200	1181	0.300	1537	0.400
C	18.0	9.2	0.45	1.05	-	1	121	0.150	186	0.300	214	0.450	223	0.600
B	18.0	9.2	0.70	1.20	-	1	233	0.125	417	0.250	572	0.380	699	0.500
A	18.0	9.2	1.00	1.40	-	1	451	0.100	865	0.200	1254	0.300	1631	0.400
	20.0	8.2	0.50	1.15	-	1	127	0.163	200	0.325	231	0.490	244	0.650
	20.0	8.2	0.60	1.30	-	1	214	0.175	342	0.350	413	0.530	453	0.700
	20.0	8.2	0.70	1.35	-	1	262	0.163	442	0.325	570	0.490	668	0.650
	20.0	8.2	0.80	1.40	-	1	315	0.150	557	0.300	751	0.450	921	0.600
	20.0	8.2	0.90	1.45	-	1	374	0.138	685	0.275	949	0.410	1201	0.550
	20.0	8.2	1.00	1.55	-	1	494	0.138	917	0.275	1288	0.410	1648	0.550
	20.0	10.2	0.40	0.90	-	1	55	0.130	84	0.250	99	0.380	106	0.500
C	20.0	10.2	0.50	1.15	-	1	141	0.163	219	0.325	254	0.490	268	0.650
B	20.0	10.2	0.80	1.35	-	1	304	0.138	547	0.275	745	0.410	929	0.550
	20.0	10.2	0.90	1.45	-	1	412	0.138	754	0.275	1045	0.410	1323	0.550
	20.0	10.2	1.00	1.55	-	1	544	0.138	1010	0.275	1418	0.410	1815	0.550
A	20.0	10.2	1.10	1.55	-	1	548	0.113	1050	0.225	1531	0.340	1976	0.450
	20.0	10.2	1.25	1.75	-	1	890	0.125	1708	0.250	2507	0.380	3222	0.500
	20.0	10.2	1.50	1.80	-	2	857	0.075	1695	0.150	2576	0.230	3340	0.300
C	22.5	11.2	0.60	1.40	-	1	240	0.200	370	0.400	425	0.600	444	0.800
B	22.5	11.2	0.80	1.45	-	1	306	0.163	533	0.325	710	0.490	855	0.650
A	22.5	11.2	1.25	1.75	-	2	693	0.125	1330	0.250	1952	0.380	2509	0.500
	23.0	8.2	0.70	1.50	-	1	279	0.200	448	0.400	544	0.600	602	0.800
	23.0	8.2	0.80	1.55	-	1	332	0.188	560	0.375	717	0.560	842	0.750
	23.0	8.2	0.90	1.60	-	1	391	0.175	687	0.350	925	0.530	1119	0.700
	23.0	8.2	1.00	1.70	-	1	507	0.175	909	0.350	1249	0.530	1536	0.700
	23.0	10.2	0.90	1.65	-	1	463	0.188	802	0.375	1055	0.560	1273	0.750
	23.0	10.2	1.00	1.70	-	1	538	0.175	964	0.350	1325	0.530	1629	0.700
	23.0	10.2	1.25	1.90	-	2	870	0.163	1627	0.325	2320	0.490	2955	0.650

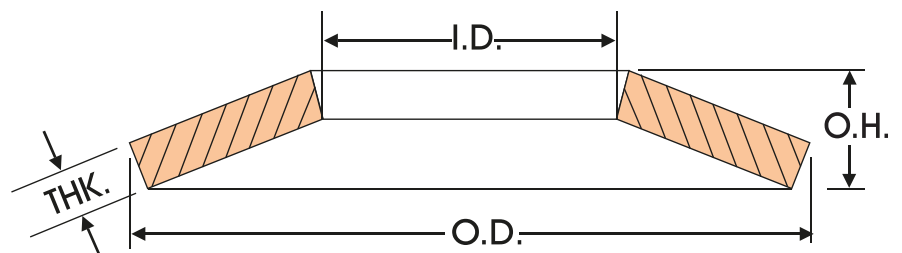
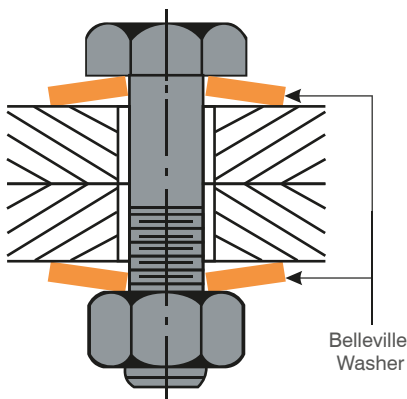
DIN Series	Dimensions (mm)					Group	Spring Deflections in mm (s) and Spring Load in Newton (F)							
							0.25H		0.50H		0.75H		1.0H	
	O.D.	I.D.	THK.	O.H.	t`		F	S	F	S	F	S	F	S
O	23.0	12.2	1.00	1.60	-	1	475	0.150	872	0.300	1217	0.450	1536	0.600
	23.0	12.2	1.25	1.85	-	2	863	0.150	1630	0.300	2331	0.450	3000	0.600
	23.0	12.2	1.50	2.00	-	2	1159	0.125	2250	0.250	3338	0.380	4320	0.500
	25.0	10.20	1.00	1.75	-	1	492	0.188	870	0.375	1168	0.560	1436	0.750
C	25.0	12.2	0.70	1.60	-	1	331	0.225	515	0.450	601	0.680	635	0.900
B	25.0	12.2	0.90	1.60	-	1	367	0.175	644	0.350	868	0.530	1050	0.700
	25.0	12.2	1.00	1.80	-	1	585	0.200	1021	0.400	1359	0.600	1647	0.800
	25.0	12.2	1.25	1.95	-	2	848	0.175	1573	0.350	2232	0.530	2814	0.700
A	25.0	12.2	1.50	2.05	-	2	1040	0.138	2007	0.275	2910	0.410	3821	0.550
	28.0	10.2	0.80	1.75	-	1	348	0.238	553	0.475	661	0.710	723	0.950
	28.0	10.2	1.00	1.90	-	1	512	0.225	872	0.450	1135	0.680	1337	0.900
	28.0	10.2	1.25	2.05	-	2	737	0.200	1339	0.400	1853	0.600	2322	0.800
	28.0	10.2	1.50	2.20	-	2	1003	0.175	1899	0.350	2745	0.530	3511	0.700
	28.0	12.2	1.00	1.95	-	1	590	0.238	992	0.475	1266	0.710	1482	0.950
	28.0	12.2	1.25	2.10	-	2	844	0.213	1519	0.425	2089	0.640	2590	0.850
	28.0	12.2	1.50	2.25	-	2	1149	0.188	2159	0.375	3065	0.560	3949	0.750
C	28.0	14.2	0.80	1.80	-	1	435	0.250	681	0.500	801	0.750	859	1.000
B	28.0	14.2	1.00	1.80	-	1	476	0.200	832	0.400	1107	0.600	1342	0.800
	28.0	14.2	1.25	2.10	-	2	907	0.213	1634	0.425	2246	0.640	2785	0.850
A	28.0	14.2	1.50	2.15	-	2	1033	0.163	1970	0.325	2854	0.490	3680	0.650
	31.5	12.2	1.00	2.10	-	1	587	0.275	951	0.550	1170	0.830	1309	1.100
	31.5	12.2	1.25	2.20	-	2	761	0.238	1343	0.475	1800	0.710	2207	0.950
	31.5	12.2	1.50	2.35	-	2	1033	0.213	1912	0.425	2697	0.640	3413	0.850
C	31.5	16.3	0.80	1.85	-	1	384	0.263	594	0.525	687	0.790	722	1.050
B	31.5	16.3	1.25	2.15	-	2	791	0.225	1409	0.450	1923	0.680	2359	0.900
	31.5	16.3	1.50	2.40	-	2	1260	0.225	2314	0.450	3249	0.680	4077	0.900
A	31.5	16.3	1.75	2.45	-	2	1391	0.175	2669	0.350	3905	0.530	5036	0.700
	31.5	16.3	2.00	2.75	-	2	2199	0.188	4239	0.375	6148	0.560	8054	0.750
	34.0	12.3	1.00	2.25	-	1	637	0.313	998	0.625	1175	0.940	1258	1.250
	34.0	12.3	1.25	2.35	-	2	815	0.275	1395	0.550	1825	0.830	2162	1.100
	34.0	12.3	1.50	2.50	-	2	1097	0.250	1982	0.500	2725	0.750	3397	1.000
	34.0	14.3	1.25	2.40	-	2	913	0.288	1546	0.575	1990	0.860	2347	1.150
	34.0	14.3	1.50	2.55	-	2	1224	0.263	2192	0.525	2997	0.790	3704	1.050
	34.0	16.3	1.50	2.55	-	2	1291	0.263	2313	0.525	3163	0.790	3908	1.050
	34.0	16.3	2.00	2.85	-	2	2097	0.213	4003	0.425	5803	0.640	7498	0.850
C	35.5	18.3	0.90	2.05	-	1	458	0.288	712	0.575	831	0.860	884	1.150
B	35.5	18.3	1.25	2.25	-	2	731	0.250	1277	0.500	1699	0.750	2059	1.000
A	35.5	18.3	2.00	2.80	-	2	1864	0.200	3576	0.400	5187	0.600	6747	0.800
	40.0	14.3	1.25	2.65	-	2	904	0.350	1459	0.700	1780	1.050	1984	1.400
	40.0	14.3	1.50	2.75	-	2	1114	0.313	1929	0.625	2550	0.940	3061	1.250
	40.0	14.3	2.00	3.05	-	2	1800	0.263	3363	0.525	4781	0.790	6096	1.050
	40.0	16.3	1.50	2.80	-	2	1224	0.325	2102	0.650	2758	0.980	3281	1.300
	40.0	16.3	2.00	3.10	-	2	1972	0.275	3663	0.550	5195	0.830	6580	1.100
	40.0	18.3	2.00	3.15	-	2	2182	0.288	4030	0.575	5642	0.860	7171	1.150
C	40.0	20.4	1.00	2.30	-	1	565	0.325	876	0.650	1018	0.980	1072	1.300
B	40.0	20.4	1.50	2.65	-	2	1109	0.288	1953	0.575	2616	0.860	3201	1.150

DIN Series	Dimensions (mm)					Group	Spring Deflections in mm (s) and Spring Load in Newton (F)							
							0.25H		0.50H		0.75H		1.0H	
	O.D.	I.D.	THK.	O.H.	t`		F	S	F	S	F	S	F	S
	40.0	20.4	2.00	3.10	-	2	2175	0.275	4041	0.550	5730	0.830	7258	1.100
A	40.0	20.4	2.25	3.15	-	2	2336	0.225	4481	0.450	6544	0.680	8456	0.900
	40.0	20.4	2.50	3.45	-	2	3351	0.238	6453	0.475	9359	0.710	12243	0.950
C	45.0	22.4	1.25	2.85	-	2	1041	0.400	1620	0.800	1891	1.200	2007	1.600
B	45.0	22.4	1.75	3.05	-	2	1524	0.325	2701	0.650	3659	0.980	4475	1.300
A	45.0	22.4	2.50	3.50	-	2	2773	0.250	5320	0.500	7716	0.750	10037	1.000
	50.0	18.4	1.25	2.85	-	2	757	0.400	1178	0.800	1375	1.200	1459	1.600
	50.0	18.4	1.50	3.30	-	2	1379	0.450	2184	0.900	2606	1.350	2837	1.800
	50.0	18.4	2.00	3.50	-	2	1918	0.375	3392	0.750	4586	1.130	5603	1.500
	50.0	18.4	2.50	4.10	-	2	3703	0.400	6733	0.800	9315	1.200	11673	1.600
	50.0	18.4	3.00	4.40	-	2	5043	0.350	9546	0.700	13688	1.050	17650	1.400
	50.0	20.4	2.00	3.50	-	2	1966	0.375	3478	0.750	4702	1.130	5745	1.500
	50.0	20.4	2.50	3.85	-	2	3008	0.338	5601	0.675	7902	1.010	10098	1.350
	50.0	22.4	2.00	3.60	-	2	2247	0.400	3924	0.800	5222	1.200	6329	1.600
	50.0	22.4	2.50	3.90	-	2	3261	0.350	6044	0.700	8510	1.050	10817	1.400
C	50.0	25.4	1.25	2.85	-	2	854	0.400	1328	0.800	1550	1.200	1646	1.600
	50.0	25.4	1.50	3.10	-	2	1242	0.400	2028	0.800	2512	1.200	2844	1.600
B	50.0	25.4	2.00	3.40	-	2	1949	0.350	3491	0.700	4762	1.050	5898	1.400
	50.0	25.4	2.25	3.75	-	2	2940	0.380	5249	0.750	7241	1.130	8997	1.500
	50.0	25.4	2.50	3.90	-	2	3473	0.350	6437	0.700	9063	1.050	11519	1.400
A	50.0	25.4	3.00	4.10	-	2	4255	0.275	8214	0.550	12044	0.830	15640	1.100
C	56.0	28.5	1.50	3.45	-	2	1458	0.488	2259	0.975	2621	1.460	2766	1.950
B	56.0	28.5	2.00	3.60	-	2	1910	0.400	3335	0.800	4438	1.200	5379	1.600
	56.0	28.5	2.50	4.20	-	2	3676	0.430	6550	0.850	9004	1.280	11160	1.700
A	56.0	28.5	3.00	4.30	-	2	4142	0.325	7895	0.650	11441	0.980	14752	1.300
	60.0	20.5	2.00	4.10	-	2	2318	0.525	3802	1.050	4737	1.580	5380	2.100
	60.0	20.5	2.50	4.30	-	2	3018	0.450	5379	0.900	7302	1.350	9006	1.800
	60.0	20.5	3.00	4.70	-	2	4449	0.425	8234	0.850	11615	1.280	14698	1.700
	60.0	25.5	2.50	4.40	-	2	3447	0.475	6081	0.950	8195	1.430	9997	1.900
	60.0	25.5	3.00	4.65	-	2	4495	0.413	8352	0.825	11803	1.240	15002	1.650
	60.0	30.5	2.50	4.30	-	2	3447	0.450	6145	0.900	8342	1.350	10289	1.800
	60.0	30.5	2.75	4.75	-	2	5125	0.500	9117	1.000	12360	1.500	11430	2.000
	60.0	30.5	3.00	4.70	-	2	5083	0.425	9407	0.850	13269	1.280	16792	1.700
	60.0	30.5	3.50	5.00	-	2	6591	0.375	12574	0.750	18225	1.130	23528	1.500
C	63.0	31.0	1.80	4.15	-	2	2364	0.588	3658	1.175	4237	1.760	4463	2.350
B	63.0	31.0	2.50	4.25	-	2	2942	0.438	5270	0.875	7179	1.310	8904	1.750
	63.0	31.0	3.00	4.80	-	2	4891	0.450	8981	0.900	12536	1.350	15825	1.800
A	63.0	31.0	3.50	4.90	-	2	5399	0.350	10359	0.700	15025	1.050	19545	1.400
	70.0	25.5	2.00	4.50	-	2	2408	0.625	3771	1.250	4441	1.880	4755	2.500
	70.0	30.5	2.50	4.90	-	2	3755	0.600	6297	1.200	8031	1.800	9360	2.400
	70.0	30.5	3.00	5.10	-	2	4676	0.525	8376	1.050	11453	1.580	14152	2.100
	70.0	35.5	3.00	5.10	-	2	5028	0.525	9007	1.050	12316	1.580	15218	2.100
	70.0	35.5	3.50	5.30	-	2	6077	0.450	11380	0.900	16180	1.350	20710	1.800
	70.0	35.5	4.00	5.80	-	2	8757	0.450	16634	0.900	23923	1.350	30919	1.800
	70.0	40.5	4.00	5.60	-	2	8391	0.400	16099	0.800	23351	1.200	30376	1.600
	70.0	40.5	5.00	6.20	-	2	11544	0.300	22728	0.600	33672	0.900	44495	1.200

DIN Series	Dimensions (mm)					Group	Spring Deflections in mm (s) and Spring Load in Newton (F)							
							0.25H		0.50H		0.75H		1.0H	
	O.D.	I.D.	THK.	O.H.	t ¹		F	S	F	S	F	S	F	S
C	71.0	36.0	2.00	4.60	-	2	2861	0.650	4432	1.300	5144	1.950	5426	2.600
B	71.0	36.0	2.50	4.50	-	2	2894	0.500	5054	1.000	6725	1.500	8152	2.000
A	71.0	36.0	4.00	5.60	-	2	7379	0.400	14157	0.800	20535	1.200	26712	1.600
	80.0	31.0	2.50	5.30	-	2	3678	0.700	5933	1.400	7239	2.100	8070	2.800
	80.0	31.0	3.00	5.50	-	2	4531	0.625	7847	1.250	10369	1.880	12451	2.500
	80.0	31.0	4.00	6.10	-	2	7319	0.525	13677	1.050	19447	1.580	24791	2.100
	80.0	36.0	3.00	5.70	-	2	5401	0.675	9196	1.350	11936	2.030	14106	2.700
	80.0	36.0	4.00	6.20	-	2	8163	0.550	15168	1.100	21400	1.650	27245	2.200
C	80.0	41.0	2.25	5.20	-	2	3698	0.738	5715	1.475	6611	2.210	6950	2.950
B	80.0	41.0	3.00	5.30	-	2	4450	0.575	7838	1.150	10539	1.730	12844	2.300
	80.0	41.0	4.00	6.20	-	2	8726	0.550	16213	1.100	22874	1.650	29122	2.200
A	80.0	41.0	5.00	6.70	-	2	11821	0.425	22928	0.850	33682	1.280	43952	1.700
C	90.0	46.0	2.50	5.70	-	2	4232	0.800	6585	1.600	7684	2.400	8157	3.200
B	90.0	46.0	3.50	6.00	-	2	5836	0.625	10416	1.250	14189	1.880	17487	2.500
A	90.0	46.0	5.00	7.00	-	2	11267	0.500	21617	1.000	31354	1.500	40786	2.000
	100.0	41.0	4.00	7.20	-	2	8714	0.800	15219	1.600	20251	2.400	24547	3.200
	100.0	41.0	5.00	7.75	-	2	12345	0.688	22937	1.375	33328	2.060	41201	2.750
C	100.0	51.0	2.70	6.20	-	2	4779	0.875	7410	1.750	8613	2.630	9091	3.500
B	100.0	51.0	3.50	6.30	-	2	5624	0.700	9823	1.400	13070	2.100	15843	2.800
	100.0	51.0	4.00	7.00	-	2	8673	0.750	15341	1.500	20674	2.250	25338	3.000
	100.0	51.0	5.00	7.80	-	2	13924	0.700	25810	1.400	36339	2.100	46189	2.800
A	100.0	51.0	6.00	8.20	-	2	17061	0.550	32937	1.100	48022	1.650	62711	2.200
C	112.0	57.0	3.00	6.90	-	2	5834	0.975	9038	1.950	10493	2.930	11064	3.900
B	112.0	57.0	4.00	7.20	-	2	7639	0.800	13341	1.600	17752	2.400	21518	3.200
A	112.0	57.0	6.00	8.50	-	2	15800	0.625	30215	1.250	43812	1.880	56737	2.500
	125.0	41.0	4.00	8.20	-	2	8501	1.050	13943	2.100	17346	3.150	19729	4.200
	125.0	51.0	4.00	8.50	-	2	10096	1.125	16265	2.250	19829	3.380	22060	4.500
	125.0	51.0	5.00	8.90	-	2	13063	0.975	22931	1.950	30705	2.930	37342	3.900
	125.0	51.0	6.00	9.40	-	2	17027	0.850	31514	1.700	44307	2.550	56254	3.400
	125.0	61.0	5.00	9.00	-	2	14615	1.000	25526	2.000	33965	3.000	41170	4.000
	125.0	61.0	6.00	9.60	-	2	19789	0.900	36336	1.800	50722	2.700	64028	3.600
	125.0	61.0	8.00	10.90	7.50	3	34434	0.725	65305	1.450	93765	2.180	120218	2.900
C	125.0	64.0	3.50	8.00	-	2	8514	1.125	13231	2.250	15422	3.380	16335	4.500
B	125.0	64.0	5.00	8.50	-	2	12238	0.875	21924	1.750	29950	2.630	37041	3.500
	125.0	64.0	6.00	9.60	-	2	20350	0.900	37360	1.800	52150	2.700	65840	3.600
A	125.0	64.0	8.00	10.60	7.50	3	31118	0.650	59520	1.300	85926	1.950	111056	2.600
	125.0	71.0	6.00	9.30	-	2	19538	0.825	36302	1.650	51304	2.480	65207	3.300
	125.0	71.0	8.00	10.40	7.40	3	30867	0.600	59149	1.200	85494	1.800	110547	2.400
	125.0	71.0	10.00	11.80	9.20	3	42963	0.450	84219	0.900	124124	1.350	163035	1.800
C	140.0	72.0	3.80	8.70	-	2	9514	1.225	14773	2.450	17201	3.680	18199	4.900
B	140.0	72.0	5.00	9.00	-	2	12014	1.000	20982	2.000	27920	3.000	33843	4.000
A	140.0	72.0	8.00	11.20	7.50	3	31903	0.800	59967	1.600	85251	2.400	108813	3.200
	150.0	61.0	5.00	10.30	-	2	15 292	1.325	25021	2.650	31059	3.980	35207	5.300
	150.0	61.0	6.00	10.80	-	2	19560	1.200	34161	2.400	45456	3.600	55098	4.800
	150.0	71.0	6.00	10.80	-	2	20721	1.200	36189	2.400	48155	3.600	58370	4.800
	150.0	71.0	8.00	12.00	7.50	3	35296	1.000	64684	2.000	89851	3.000	112487	4.000

DIN Series	Dimensions (mm)					Group	Spring Deflections in mm (s) and Spring Load in Newton (F)							
							0.25H		0.50H		0.75H		1.0H	
	O.D.	I.D.	THK.	O.H.	t`		F	S	F	S	F	S	F	S
O	150.0	81.0	8.00	11.70	7.50	3	34518	0.925	63876	1.850	89663	2.780	112942	3.700
	150.0	81.0	10.00	13.00	9.30	3	50088	0.750	96120	1.500	139128	2.250	180141	3.000
C	160.0	82.0	4.30	9.90		2	12162	1.400	18832	2.800	21843	4.200	23022	5.600
B	160.0	82.0	6.00	10.50	-	2	17203	1.125	30431	2.250	41051	3.380	50260	4.500
A	160.0	82.0	10.00	13.50	9.40	3	50547	0.875	96216	1.750	138564	2.630	178214	3.500
C	180.0	92.0	4.80	11.00	-	2	14646	1.550	22731	3.100	26442	4.650	27966	6.200
B	180.0	92.0	6.00	11.10	-	2	16558	1.275	28552	2.550	37533	3.830	44930	5.100
A	180.0	92.0	10.00	14.00	9.40	3	46850	1.000	88141	2.000	125417	3.000	160223	4.000
	180.0	92.0	13.00	16.50	12.10	3	85040	0.880	163400	1.750	238300	2.630	309500	3.500
	200.0	82.0	8.00	14.20	7.60	3	35029	1.550	60013	3.100	78034	4.650	92176	6.200
	200.0	82.0	10.00	15.50	9.60	3	51105	1.375	93357	2.750	129569	4.130	162061	5.500
	200.0	82.0	12.00	16.60	11.50	3	66924	1.150	127191	2.300	182737	3.450	235503	4.600
	200.0	92.0	10.00	15.60	9.50	3	55136	1.400	100014	2.800	137688	4.200	171214	5.600
	200.0	92.0	12.00	16.80	11.40	3	73913	1.200	139548	2.400	199269	3.600	255443	4.800
	200.0	92.0	14.00	18.10	13.10	3	95633	1.025	184092	2.050	267623	3.080	346888	4.100
C	200.0	102.0	5.50	12.50	-	2	19817	1.750	30882	3.500	36111	5.250	38423	7.000
B	200.0	102.0	8.00	13.60	7.50	3	33367	1.400	57955	2.800	76378	4.200	91252	5.600
	200.0	102.0	10.00	15.60	9.40	3	58757	1.400	106099	2.800	145357	4.200	179858	5.600
A	200.0	102.0	12.00	16.20	11.25	3	66983	1.050	127401	2.100	183020	3.150	235610	4.200
	200.0	102.0	14.00	18.20	13.10	3	103781	1.050	199476	2.100	289181	3.150	374993	4.200
	200.0	112.0	12.00	16.20	11.10	3	72257	1.050	136873	2.100	195830	3.150	251108	4.200
	200.0	112.0	14.00	17.50	12.90	3	91033	0.875	176156	1.750	257208	2.630	334227	3.500
	200.0	112.0	16.00	18.80	14.80	3	105268	0.700	206697	1.400	305100	2.100	401294	2.800
C	225.0	112.0	6.50	13.60	6.20	3	23582	1.775	37417	3.550	44594	5.330	48147	7.100
B	225.0	112.0	8.00	14.50	7.50	3	32870	1.625	55412	3.250	70788	4.880	82002	6.500
A	225.0	112.0	12.00	17.00	11.25	3	64497	1.250	120738	2.500	171016	3.750	217625	5.000
	225.0	112.0	16.00	20.50	15.00	3	128500	1.130	247100	2.250	360100	3.380	467800	4.500
	250.0	102.0	10.00	18.00	9.60	3	56867	2.000	97282	4.000	126387	6.000	149323	8.000
	250.0	102.0	12.00	19.00	11.50	3	73563	1.750	133130	3.500	182962	5.250	227317	7.000
C	250.0	127.0	7.00	14.80	6.70	3	26895	1.950	42527	3.900	50466	5.850	54284	7.800
B	250.0	127.0	10.00	17.00	9.40	3	51871	1.750	90206	3.500	119053	5.250	142462	7.000
	250.0	127.0	12.00	19.30	11.25	3	87633	1.825	156021	3.650	210942	5.480	257630	7.300
A	250.0	127.0	14.00	19.60	13.10	3	93239	1.400	175145	2.800	248828	4.200	317399	5.600
	250.0	127.0	16.00	21.80	15.00	3	140941	1.450	267295	2.900	383017	4.350	492058	5.800





These load washers have been specifically developed for high-strength bolts section such as those used in electrical industries on Bus Bar applications, Transformers, Transmission, Thyroids, Heat Exchangers, Rectifiers etc. They are widely used to compensate for developed looseness due to thermal expansion of bolted sections.

The loads of the washers have been matched to these bolts and are 70 to 90% of the bolt load in the flat state.

Regular Belleville Washer made from material 51CrV4 (50CrV4) or C60 Carbon Steel or similar. On customer request we also supply in Stainless Steel grade like SS301, SS304, SS316, 17-7 PH, Inconel X 750, Inconel 718 or Nimonic 90.

Available surface finish Phosphated, Electro Zinc Plating, Cadmium Plating, Xylon Coating, Mechanical Zinc Plating, Zinc Flake Coating.

Find below chemical composition of spring steel material grade which is normally used to manufacture Disc Spring, Belleville Washer, Serration Safety Washer, Wind-Lock Washer, Shims etc. after considering Standard Specification and customer requirement.

Heavy Duty Belleville Washer to DIN 6796

To Fit Bolt Dia. mm	ID	THK	OH		Approx Force to Flat N	Bolt Size Inches
			max	min		
mm	mm	mm			mm	mm
2	2.20	0.40	0.60	0.50	627	
2.5	2.70	0.50	0.72	0.61	948	
3	3.20	0.60	0.85	0.72	1,322	1/8"
3.5	3.70	0.80	1.06	0.92	2,412	
4	4.30	1.00	1.30	1.12	3,774	5/32"
5	5.30	1.20	1.55	1.35	5,482	3/16"
6	6.40	1.50	2.00	1.70	8,593	1/4"
7	7.40	1.75	2.30	2.00	11,303	
8	8.40	2.00	2.60	2.24	14,908	5/16"
10	10.50	2.50	3.20	2.80	22,108	3/8"
12	13.00	3.00	3.95	3.43	34,114	1/2"
14	15.00	3.50	4.65	4.04	46,017	9/16"
16	17.00	4.00	5.25	4.58	59,723	5/8"
18	19.00	4.50	5.80	5.08	74,431	
20	21.00	5.00	6.40	5.60	93,236	3/4"
22	23.00	5.50	7.05	6.15	113,746	7/8"
24	25.00	6.00	7.75	6.77	131,053	
27	28.00	6.50	8.35	7.30	154,063	1"
30	31.00	7.00	9.20	8.00	172,068	1 1/8"

For Bolting Washer other than DIN 6796 Standard size we supply in other customized sizes which is also available in Stock as per below mention sizes.

Below mentioned dimension in mm & single piece load at 75% of deflection Height.

To Fit Bolt Dia. mm	I.D.	THK.	O.H.	Load in N (On 75% Deflection)
8	8.4	2.5	2.74	11,527
10	11	2.0	2.40	7,819
10	11	3.0	3.30	19,149
12	13	2.5	2.95	11,174
12	13	3.5	3.95	25,074
14	15	3.0	3.58	16,854
14	15	4.0	4.60	32,648
16	17	3.5	4.12	22,818
16	17	4.5	5.10	40,839
18	19	5.0	5.65	46,754
20	21	5.5	6.25	59,252
22	23	6.0	6.80	72,957
24	25	6.5	7.40	82,492
27	28	7.0	8.05	94,608
30	31	7.5	8.70	112,050

WIND-LOCK WASHER

The *Wind-Lock* Washers of Windston ensure the ultimate fastening performance for bolt joints under extreme vibrations or dynamic loads.

Wind-Lock wedge locking system provide high quality anti-vibration security for the most demanding of bolted joint applications where high level of bolt security required. When the bolt is tightened, the external teeth of the *Wind-Lock* lock washers lodge themselves in an interlocking fashion with the respective mating surface.



Advantages & Features

- Best locking solution in the presence of vibrations and dynamic loads.
- Reusable without loss of performance & reduce maintenance cost by avoiding fastener failure.
- No need to regular maintenance i.e. no retightening required.
- Spring Steel material coated with Zinc Flake Coating which avoid risk of hydrogen embrittlement.
- User friendly system, as a washer assembled to delivered in pre-glued condition and no lubrication required.
- Standard Bolt Sizes available in stock.

Field of Applications



Mechanical Engineering



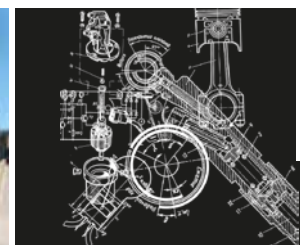
Wind Energy Technology



Agriculture & Construction Equipments



Railway



and many more

Materials

- Carbon steel 51CrV4 / C80 hardness 465-550 HV after hardening and tempering.
- Stainless Steel 316L according to EN10088-1.4404 surface hardness > - 550 HV 0.05 after surface hardening.
- Inconel 718 according to DIN 17444-2.4668, surface hardness > - 620 HV 0.05 after surface hardening.
- Other materials are Inconel 718 according to DIN 17444-2.4668, surface hardness > - 620 HV 0.05 after surface hardening.
- Other materials are available upon customer's request.

Surface Coating

- Zinc Flake Coating, red corrosion resistance min. 600 hours (Salt spray corrosion test according to ISO 9227)
- Other surface treatments according to minimum amount of orders.

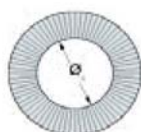
Wind-Lock Steel Washer

Dimension Chart

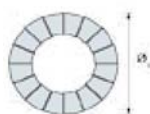
Part No.	Bolt Size		mm			Part No.	Bolt Size		mm		
	UNC	Metric	O.D.	I. D.	Thk.		UNC	Metric	O.D.	I. D.	Thk.
WL3	#5	M3	7.0	3.5	2.0	WL24		M24	39.0	25.4	3.5
WL3.5	#6	M3.5	7.6	4.0	2.0	WL24*		M24	48.5	25.4	4.5
WL3.5*	#6	M3.5	9.0	4.0	2.0	WL1"	1"		39.0	27.8	3.5
WL4	#8	M4	7.6	4.5	2.0	WL1"*	1"		48.5	27.8	4.5
WL4*	#8	M4	9.0	4.5	2.0	WL27		M27	42.0	28.5	6.0
WL5	#10	M5	9.0	5.5	2.0	WL27*		M27	48.5	28.5	6.0
WL5*	#10	M5	10.8	5.5	2.0	WL30	1 1/8"	M30	47.0	31.5	6.0
WL6		M6	10.8	6.6	2.0	WL30*	1 1/8"	M30	58.5	31.5	6.5
WL6*		M6	13.5	6.6	2.6	WL33	1 1/4"	M33	48.5	34.5	6.0
WL1/4"	1/4"		11.5	7.3	2.0	WL33*	1 1/4"	M33	58.5	34.5	6.5
WL1/4"*	1/4"		13.5	7.3	2.6	WL36	1 3/8"	M36	55.0	37.5	6.5
WL8	5/16"	M8	13.5	8.6	2.6	WL36*	1 3/8"	M36	63.0	37.5	6.5
WL8*	5/16"	M8	16.6	8.6	2.6	WL39	1 1/2"	M39	58.5	40.5	6.5
WL3/8"	3/8"		16.6	10.4	2.6	WL42		M42	63.0	43.3	6.5
WL3/8"*	3/8"		21.0	10.4	2.6	WL45	1 3/4"	M45	70.0	46.3	7.1
WL10		M10	16.6	10.8	2.6	WL48		M48	75.0	49.7	7.1
WL10*		M10	21.0	10.8	2.6	WL52	2"	M52	80.0	53.7	7.1
WL11	7/16"	M11	18.5	11.5	2.6	WL56	2 1/4"	M56	85.0	59.2	7.1
WL12		M12	19.5	13.1	2.6	WL60		M60	90.0	63.2	7.1
WL12*		M12	25.4	13.1	3.5	WL64	2 1/2"	M64	95.0	67.2	7.1
WL1/2"	1/2"		19.5	13.6	2.6	WL68		M68	100.0	71.2	9.6
WL1/2"*	1/2"		25.5	13.6	3.5	WL72		M72	105.0	75.2	9.6
WL14	9/16"	M14	23.0	15.3	3.5	WL76	3"	M76	110.0	79.2	9.6
WL14*	9/16"	M14	30.7	15.3	3.5	WL80	3 1/8"	M80	115.0	83.2	9.6
WL16	5/8"	M16	25.4	17.1	3.5	WL85		M85	120.0	88.2	9.6
WL16*	5/8"	M16	30.7	17.1	3.5	WL90		M90	130.0	92.5	9.6
WL18		M18	29.0	19.6	3.5	WL95		M95	135.0	97.5	9.6
WL18*		M18	34.5	19.6	3.5	WL100	4"	M100	145.0	103.5	9.6
WL3/4"	3/4"		30.7	20.1	3.5	WL105		M105	150.0	108.5	9.6
WL3/4"*	3/4"		39.0	20.1	3.5	WL110		M110	155.0	113.5	9.6
WL20		M20	30.7	21.5	3.5	WL115		M115	165.0	118.5	9.6
WL20*		M20	39.0	21.5	3.5	WL120		M120	170.0	123.5	9.6
WL22	7/8"	M22	34.5	23.5	3.5	WL125		M125	173.0	128.5	9.6
WL22*	7/8"	M22	42.0	23.5	4.5	WL130	5"	M130	178.0	133.5	9.6

* Special Size

Tolerance



Qi
WL3 to WL8
 Qi+/-0.1 mm
WL10 to WL42
 Qi+/-0.2 mm
WL45 to WL130
 Qi+0.5 / -0.0 mm



Qo
WL3 to WL24
 Qo+/-0.2 mm
WL27 to WL42
 Qo+/-0.3 mm
WL45 to WL130
 Qo+0.0mm /-2.0 mm



T
WL3 to WL42
 T: +/-0.25 mm
WL45 to WL130
 T: +/-0.75 mm

SERRATED SAFETY WASHERS

(RIB WASHERS)



The Serrated Safety Washer is based on the Disc Spring & Belleville Washer concept. The washer has the unique feature of radial serrations on both the concave and convex surfaces. When flattening load applied on the Serrated Safety Washer occurs with the tightening of the screw, the serrations crunch into the mating faces, thus preventing loosening of the screw caused by vibration.

The diameter for Serrated Washer are matched to screw dimensions. The outer diameter of washer is matched to the diameter of screw head. This allows using screw and bolt including recessed heads, except counter-sunk screw.

Windston Serration Washer available in two series WSPL-S & WSPL-VS. Serrated Safety Washer WSPL-S is suitable for normal requirement and available for bolt sizes M 1.6 to M36.

Serrated Safety Washer WSPL-VS extra stronger Serrated Safety Washer having higher thickness for higher pretensioning loads. In both series outside (OD) and inside diameters (ID) as well as the no. of serrations are same except thickness and height of washer.

Advantages of using Serrated Safety Washer :

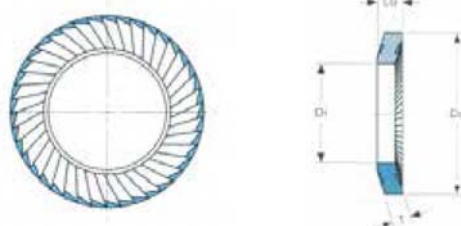
- The serrations lock the washers positively resisting vibration due to positive rib contact
- Concentric force transmission and uniform axial load eliminate bending torques and deformation of the bolt stem
- Available in wide variety of material grades and in different finishes to match customer need
- This washer is suitable for high safety requirement against loss of preload and loosening
- Extensive application and flexibility minimise stock as it always available in stock at Windston.

Available Material Grades :

Spring Steel according to DIN EN 10132-4 and on customer request also supply in Corrosion-resistant Stainless Steel 1.4310, Inconel etc.

Surface Treatments :

Regular supply in Natural finish but on customer request ready to supply in Phosphate, Mechanical Zinc Plated (Cr6-free), Zinc Flake Coatings, Electrolytic Plating etc.



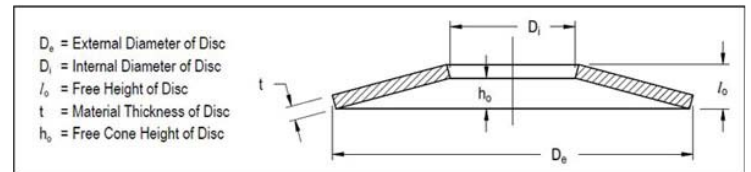
Dimension Table for Serrated Safety Washers (Rib Washers)

Type	For Bolts		Ordering Information			Lo (max.)	Lo (min.)
	Normal Size		Di	De	t		
	mm	inch				mm	mm
WSPL-S	1.6		1.7	3.2	0.40	0.65	0.45
WSPL-S	2.0		2.2	4.0	0.40	0.65	0.45
WSPL-S	2.5		2.7	4.8	0.50	0.95	0.55
WSPL-S	3.0	1/8"	3.2	5.5	0.50	0.95	0.55
WSPL-S	3.5		3.7	6.0	0.50	0.95	0.55
WSPL-S	4.0	5/32"	4.3	7.0	0.50	1.05	0.55
WSPL-S	5.0	3/16"	5.3	9.0	0.65	1.15	0.70
WSPL-VS	5.0	3/16"	5.3	9.0	1.00	1.35	1.05
WSPL-S	6.0		6.4	10.0	0.65	1.25	0.70
WSPL-VS	6.0		6.4	10.0	1.00	1.45	1.05
WSPL-S	6.35	1/4"	6.7	9.5	0.65	1.25	0.70
WSPL-S	7.0		7.4	12.0	0.75	1.35	0.80
WSPL-S	8.0	5/16"	8.4	13.0	0.75	1.45	0.90
WSPL-VS	8.0	5/16"	8.4	13.0	1.15	1.75	1.20
WSPL-S	10.0	3/8"	10.5	16.0	0.95	1.65	1.10
WSPL-VS	10.0	3/8"	10.5	16.0	1.50	2.05	1.55
WSPL-S	11.1	7/16"	11.6	15.9	0.95	1.65	1.10
WSPL-S	12.0		13.0	18.0	1.05	1.75	1.15
WSPL-VS	12.0		13.0	18.0	1.50	2.15	1.55
WSPL-S	12.7	1/2"	13.7	19.0	1.05	1.85	1.25
WSPL-S	14.0		15.0	22.0	1.15	2.05	1.35
WSPL-VS	14.0		15.0	22.0	1.50	2.25	1.65
WSPL-S	16.0	5/8"	17.0	24.0	1.35	2.15	1.55
WSPL-VS	16.0	5/8"	17.0	24.0	2.00	2.65	2.05
WSPL-S	18.0		19.0	27.0	1.50	2.35	1.75
WSPL-VS	18.0		19.0	27.0	2.00	2.75	2.15
WSPL-S	19.0	3/4"	20.0	30.0	1.50	2.55	1.90
WSPL-S	20.0		21.0	30.0	1.50	2.55	1.85
WSPL-VS	20.0		21.0	30.0	2.00	2.85	2.10
WSPL-S	22.0	7/8"	23.0	33.0	1.50	2.75	1.95
WSPL-VS	22.0	7/8"	23.0	33.0	2.00	3.05	2.30
WSPL-S	24.0		25.6	36.0	1.70	2.95	2.15
WSPL-VS	24.0		25.6	36.0	2.50	3.45	2.70
WSPL-S	25.4	1"	27.0	38.0	1.90	3.15	2.35
WSPL-VS	25.4	1"	27.0	38.0	2.55	3.45	2.95
WSPL-S	27.0		28.6	39.0	1.90	3.15	2.35
WSPL-VS	27.0		28.6	39.0	2.50	3.55	2.80
WSPL-S	30.0	1 1/8"	31.6	45.0	1.90	3.65	2.60
WSPL-VS	30.0	1 1/8"	31.6	45.0	2.50	3.85	3.05
WSPL-S	36.0	1 3/8"	38.0	54.0	2.55	4.25	3.20
WSPL-VS	36.0	1 3/8"	38.0	54.0	3.10	4.55	3.75

BALL BEARING WASHER

The preload disc spring are specially designed for use with radial ball bearings, they help to maintain portioning accuracy of the bearing with no end play. It also minimise vibration and shaft deflections. It is noted that correct preloading will also increase bearing rigidity and negate excessive running noise. Below mentioned all dimensions to suit most standard roller bearings, this range of plain bearing preload washer are manufactured from Carbon Steel (En10132.4) materail with a phosphate and oil finish.

DIMENSIONAL DESIGNATIONS



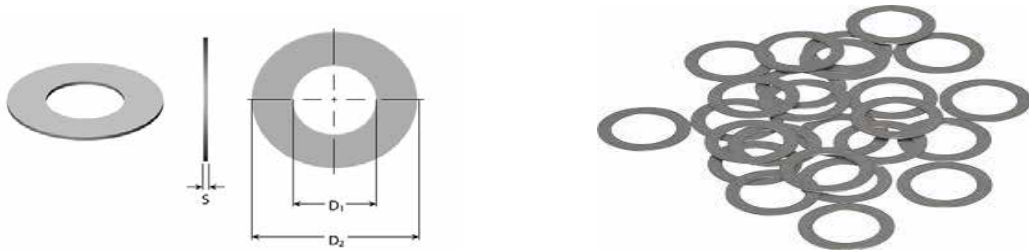
Ball Bearing Ref. No.	Outer Dia. (D_e)	Inner Dia. (D_i)	Thickness (t)	Total Height (l_o)	Cone Height (h_o)	Cone Height Thick. Ratio	Defl. (mm)	Force (N)
623	9.8	6.2	0.2	0.4	0.2	1.00	0.15	23
624	12.8	7.2	0.25	0.5	0.25	1.00	0.19	29
625	15.8	8.2	0.25	0.55	0.3	1.20	0.23	23
634								
626	18.8	9.2	0.3	0.65	0.35	1.17	0.26	31
635								
607	18.8	10.2	0.35	0.7	0.35	1.00	0.26	51
608	21.8	12.3	0.35	0.75	0.4	1.14	0.30	46
627								
609	23.7	14.3	0.4	0.9	0.5	1.25	0.38	81
6000	25.7	14.3	0.4	0.9	0.5	1.25	0.38	63
629								
6001	27.7	17.3	0.4	1	0.6	1.50	0.45	80
6200	29.7	17.4	0.4	1.1	0.7	1.75	0.53	83
6002	31.7	20.4	0.4	1.1	0.7	1.75	0.53	81
6201								
6300	34.6	20.4	0.4	1.1	0.7	1.75	0.53	61
6003	34.6	22.4	0.5	1.2	0.7	1.40	0.53	118
6202								
6301	36.6	20.4	0.5	1.3	0.8	1.60	0.60	110
6203	39.6	25.5	0.5	1.3	0.8	1.60	0.60	110
6004	41.6	25.5	0.5	1.4	0.9	1.80	0.68	113
6302								
6005	46.5	30.5	0.6	1.5	0.9	1.50	0.68	153
6204								
6303								
6205	51.5	35.5	0.6	1.5	0.9	1.50	0.68	135
6304								
6006	54.5	40.5	0.6	1.5	0.9	1.50	0.68	141
6007	61.5	40.5	0.7	1.8	1.1	1.57	0.83	176
6206								
6305								
6008	67.5	50.5	0.7	1.7	1	1.43	0.75	161
6306	71.5	45.5	0.7	2.1	1.4	2.00	1.05	185
6207	71.5	50.5	0.7	2.1	1.4	2.00	1.05	218
6009	74.5	55.5	0.8	1.9	1.1	1.38	0.83	211
6307	79.5	50.5	0.8	2.3	1.5	1.88	1.13	227
6010	79.5	55.5	0.8	2.3	1.5	1.88	1.13	263
6208								
6209	84.5	60.5	0.9	2.5	1.6	1.78	1.21	359
6308	89.5	60.5	0.9	2.5	1.6	1.78	1.20	288
6011	89.5	65.5	0.9	2.5	1.6	1.78	1.21	335
6210								

Ball Bearing Ref. No.	Outer Dia. (De)	Inner Dia. (Di)	Thickness (t)	Total Height (lo)	Cone Height (ho)	Cone Height Thick. Ratio	Load at 75% Defl.	
							Defl.(mm)	Force (N)
6012	94.5	75.5	1	2.2	1.2	1.20	0.91	325
6309	99	65.5	1	2.6	1.6	1.60	1.20	292
6013	99	70.5	1	2.6	1.6	1.60	1.20	332
6211								
6310	109	70.5	1.25	2.7	1.45	1.16	1.10	357
6014	109	75.5	1.25	2.7	1.45	1.16	1.09	398
6212								
6015	114	90.5	1.25	2.45	1.2	0.96	0.91	398
6311	119	75.5	1.25	2.8	1.55	1.24	1.16	320
6213	119	85.5	1.25	2.8	1.55	1.24	1.17	392
6016	124	90.5	1.25	3	1.75	1.40	1.32	445
6214								
6312	129	85.5	1.25	3.2	1.95	1.56	1.47	405
6017	129	95.5	1.25	3.2	1.95	1.56	1.47	500
6215								
6313	139	90.5	1.25	3.25	2.00	1.60	1.50	353
6018	139	101	1.25	3.25	2.00	1.60	1.51	429
6216								
6134	149	95.5	1.5	3.2	1.70	1.13	1.28	379
6020	149	106	1.5	3.2	1.70	1.13	1.28	450
6217								
6315	159	101	1.5	3.5	2.00	1.33	1.50	412
6021	159	111	1.5	3.5	2.00	1.33	1.50	477
6218								
6316	169	111	1.5	3.8	2.30	1.53	1.73	470
6022	169	121	1.5	3.8	2.30	1.53	1.73	546
6219								
6317	179	121	2	4.2	2.20	1.10	1.66	864
6024	179	126	2	4.2	2.20	1.10	1.66	928
6220								
6318	189	121	2	4.3	2.30	1.15	1.73	758
6221	189	131	2	4.3	2.30	1.15	1.73	858
6319	198	131	2	4.5	2.50	1.25	1.88	811
6026	198	141	2	4.5	2.50	1.25	1.88	922
6222								
6224	213	151	2.25	4.5	2.25	1.00	1.69	941
6320								
6030	223	161	2.25	4.6	2.35	1.04	1.76	942
6321								
6226	228	161	2.25	4.95	2.70	1.20	2.03	1036
6032	238	161	2.25	5.25	3.00	1.33	2.25	1020
6322								
6228	248	171	2.5	5	2.50	1.00	1.88	1004
6034	258	171	2.5	5.5	3.00	1.20	2.25	1106
6324								
6230	268	181	2.5	5.7	3.20	1.28	2.40	1154
6036	278	181	2.5	6	3.50	1.40	2.63	1154
6326								
6038	288	191	2.75	5.75	3.00	1.09	2.25	1145
6232								
6328	298	191	2.75	6.35	3.60	1.31	2.70	1306

* Please Note : Measurements are in millimeters. Load tolerance +/- 20% at 75h

Axial play resulting from manufacturing tolerances can be rigidly reduced by using various thicknesses of shim washers.

All required combinations in incremental steps of 0.1 mm can be used. In addition to DIN 988 specified components, these shim washers are also manufactured in thicknesses of 0.15 mm and 0.25 mm. Thicknesses from 1.1 to 1.9 mm are manufactured by special request only.



Applications:

- Compensation for axial play
- Mechanical engineering
- Automotive engineering
- Gear systems

Product Advantages

- Easy fitting and requires little space
- Easy and secure installation
- Economical Solution
- High Reliability

Shims PS Type :

Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness
PS3	3	6	0.10	-0.03	PS6	6	12	0.20	-0.04	PS9	9	15	0.30	-0.05
PS3	3	6	0.15	-0.04	PS6	6	12	0.25	-0.04	PS9	9	15	0.50	-0.05
PS3	3	6	0.20	-0.04	PS6	6	12	0.30	-0.05	PS9	9	15	1.00	-0.05
PS3	3	6	0.25	-0.04	PS6	6	12	0.50	-0.05	PS10	10	16	0.10	-0.03
PS3	3	6	0.30	-0.05	PS6	6	12	1.00	-0.05	PS10	10	16	0.15	-0.04
PS3	3	6	0.50	-0.05	PS7	7	13	0.10	-0.03	PS10	10	16	0.20	-0.04
PS3	3	6	1.00	-0.05	PS7	7	13	0.15	-0.04	PS10	10	16	0.25	-0.04
PS4	4	8	0.10	-0.03	PS7	7	13	0.20	-0.04	PS10	10	16	0.30	-0.05
PS4	4	8	0.15	-0.04	PS7	7	13	0.25	-0.04	PS10	10	16	0.50	-0.05
PS4	4	8	0.20	-0.04	PS7	7	13	0.30	-0.05	PS10	10	16	1.00	-0.05
PS4	4	8	0.25	-0.04	PS7	7	13	0.50	-0.05	PS11	11	17	0.10	-0.03
PS4	4	8	0.30	-0.05	PS7	7	13	1.00	-0.05	PS11	11	17	0.15	-0.04
PS4	4	8	0.50	-0.05	PS8	8	14	0.10	-0.03	PS11	11	17	0.20	-0.04
PS4	4	8	1.00	-0.05	PS8	8	14	0.15	-0.04	PS11	11	17	0.25	-0.04
PS5	5	10	0.10	-0.03	PS8	8	14	0.20	-0.04	PS11	11	17	0.30	-0.05
PS5	5	10	0.15	-0.04	PS8	8	14	0.25	-0.04	PS11	11	17	0.50	-0.05
PS5	5	10	0.20	-0.04	PS8	8	14	0.30	-0.05	PS11	11	17	1.00	-0.05
PS5	5	10	0.25	-0.04	PS8	8	14	0.50	-0.05	PS12	12	18	0.10	-0.03
PS5	5	10	0.30	-0.05	PS8	8	14	1.00	-0.05	PS12	12	18	0.15	-0.04
PS5	5	10	0.50	-0.05	PS9	9	15	0.10	-0.03	PS12	12	18	0.20	-0.04
PS5	5	10	1.00	-0.05	PS9	9	15	0.15	-0.04	PS12	12	18	0.25	-0.04
PS6	6	12	0.10	-0.03	PS9	9	15	0.20	-0.04	PS12	12	18	0.30	-0.05
PS6	6	12	0.15	-0.04	PS9	9	15	0.25	-0.04	PS12	12	18	0.50	-0.05

Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness
PS12	12	18	1.00	-0.05	PS17	17	24	1.00	-0.05	PS25	25	35	0.20	-0.04
PS13	13	19	0.10	-0.03	PS17	17	24	1.20	-0.07	PS25	25	35	0.25	-0.04
PS13	13	19	0.15	-0.04	PS18	18	25	0.10	-0.03	PS25	25	35	0.30	-0.05
PS13	13	19	0.20	-0.04	PS18	18	25	0.15	-0.04	PS25	25	35	0.50	-0.05
PS13	13	19	0.25	-0.04	PS18	18	25	0.20	-0.04	PS25	25	35	1.00	-0.05
PS13	13	19	0.30	-0.05	PS18	18	25	0.25	-0.04	PS25	25	35	1.20	-0.07
PS13	13	19	0.50	-0.05	PS18	18	25	0.30	-0.05	PS25	25	35	1.50	-0.07
PS13	13	19	1.00	-0.05	PS18	18	25	0.50	-0.05	PS25	25	36	0.10	-0.03
PS13	13	19	1.20	-0.07	PS18	18	25	1.00	-0.05	PS25	25	36	0.15	-0.04
PS14	14	20	0.10	-0.03	PS18	18	25	1.20	-0.07	PS25	25	36	0.20	-0.04
PS14	14	20	0.15	-0.04	PS19	19	26	0.10	-0.03	PS25	25	36	0.25	-0.04
PS14	14	20	0.20	-0.04	PS19	19	26	0.15	-0.04	PS25	25	36	0.30	-0.05
PS14	14	20	0.25	-0.04	PS19	19	26	0.20	-0.04	PS25	25	36	0.50	-0.05
PS14	14	20	0.30	-0.05	PS19	19	26	0.25	-0.04	PS25	25	36	1.00	-0.05
PS14	14	20	0.50	-0.05	PS19	19	26	0.30	-0.05	PS25	25	36	1.20	-0.07
PS14	14	20	1.00	-0.05	PS19	19	26	0.50	-0.05	PS25	25	36	1.50	-0.07
PS14	14	20	1.20	-0.07	PS19	19	26	1.00	-0.05	PS26	26	37	0.10	-0.03
PS15	15	21	0.10	-0.03	PS19	19	26	1.20	-0.07	PS26	26	37	0.15	-0.04
PS15	15	21	0.15	-0.04	PS20	20	28	0.10	-0.03	PS26	26	37	0.20	-0.04
PS15	15	21	0.20	-0.04	PS20	20	28	0.15	-0.04	PS26	26	37	0.25	-0.04
PS15	15	21	0.25	-0.04	PS20	20	28	0.20	-0.04	PS26	26	37	0.30	-0.05
PS15	15	21	0.30	-0.05	PS20	20	28	0.25	-0.04	PS26	26	37	0.50	-0.05
PS15	15	21	0.50	-0.05	PS20	20	28	0.30	-0.05	PS26	26	37	1.00	-0.05
PS15	15	21	1.00	-0.05	PS20	20	28	0.50	-0.05	PS26	26	37	1.20	-0.07
PS15	15	21	1.20	-0.07	PS20	20	28	1.00	-0.05	PS26	26	37	1.50	-0.07
PS15	15	22	0.10	-0.03	PS20	20	28	1.20	-0.07	PS28	28	40	0.10	-0.03
PS15	15	22	0.15	-0.04	PS20	20	28	1.50	-0.07	PS28	28	40	0.15	-0.04
PS15	15	22	0.20	-0.04	PS22	22	30	0.10	-0.03	PS28	28	40	0.20	-0.04
PS15	15	22	0.25	-0.04	PS22	22	30	0.15	-0.04	PS28	28	40	0.25	-0.04
PS15	15	22	0.30	-0.05	PS22	22	30	0.20	-0.04	PS28	28	40	0.30	-0.05
PS15	15	22	0.50	-0.05	PS22	22	30	0.25	-0.04	PS28	28	40	0.50	-0.05
PS15	15	22	1.00	-0.05	PS22	22	30	0.30	-0.05	PS28	28	40	1.00	-0.05
PS15	15	22	1.20	-0.07	PS22	22	30	0.50	-0.05	PS28	28	40	1.20	-0.07
PS16	16	22	0.10	-0.03	PS22	22	30	1.00	-0.05	PS28	28	40	1.50	-0.07
PS16	16	22	0.15	-0.04	PS22	22	30	1.20	-0.07	PS30	30	42	0.10	-0.03
PS16	16	22	0.20	-0.04	PS22	22	30	1.50	-0.07	PS30	30	42	0.15	-0.04
PS16	16	22	0.25	-0.04	PS22	22	32	0.10	-0.03	PS30	30	42	0.20	-0.04
PS16	16	22	0.30	-0.05	PS22	22	32	0.15	-0.04	PS30	30	42	0.25	-0.04
PS16	16	22	0.50	-0.05	PS22	22	32	0.20	-0.04	PS30	30	42	0.30	-0.05
PS16	16	22	1.00	-0.05	PS22	22	32	0.25	-0.04	PS30	30	42	0.50	-0.05
PS16	16	22	1.20	-0.07	PS22	22	32	0.30	-0.05	PS30	30	42	1.00	-0.05
PS17	17	24	0.10	-0.03	PS22	22	32	0.50	-0.05	PS30	30	42	1.20	-0.07
PS17	17	24	0.15	-0.04	PS22	22	32	1.00	-0.05	PS30	30	42	1.50	-0.07
PS17	17	24	0.20	-0.04	PS22	22	32	1.20	-0.07	PS30	30	42	2.00	-0.07
PS17	17	24	0.25	-0.04	PS22	22	32	1.50	-0.07	PS32	32	45	0.10	-0.03
PS17	17	24	0.30	-0.05	PS25	25	35	0.10	-0.03	PS32	32	45	0.15	-0.04
PS17	17	24	0.50	-0.05	PS25	25	35	0.15	-0.04	PS32	32	45	0.20	-0.04

Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness
PS32	32	45	0.25	-0.04	PS42	42	52	0.10	-0.03	PS50	50	62	1.20	-0.07
PS32	32	45	0.30	-0.05	PS42	42	52	0.15	-0.04	PS50	50	62	1.50	-0.07
PS32	32	45	0.50	-0.05	PS42	42	52	0.20	-0.04	PS50	50	62	2.00	-0.07
PS32	32	45	1.00	-0.05	PS42	42	52	0.25	-0.04	PS50	50	63	0.10	-0.03
PS32	32	45	1.20	-0.07	PS42	42	52	0.30	-0.05	PS50	50	63	0.15	-0.04
PS32	32	45	1.50	-0.07	PS42	42	52	0.50	-0.05	PS50	50	63	0.20	-0.04
PS32	32	45	2.00	-0.07	PS42	42	52	1.00	-0.05	PS50	50	63	0.25	-0.04
PS35	35	45	0.10	-0.03	PS42	42	52	1.20	-0.07	PS50	50	63	0.30	-0.05
PS35	35	45	0.15	-0.04	PS42	42	52	1.50	-0.07	PS50	50	63	0.50	-0.05
PS35	35	45	0.20	-0.04	PS42	42	52	2.00	-0.07	PS50	50	63	1.00	-0.05
PS35	35	45	0.25	-0.04	PS45	45	55	0.10	-0.03	PS50	50	63	1.20	-0.07
PS35	35	45	0.30	-0.05	PS45	45	55	0.15	-0.04	PS50	50	63	1.50	-0.07
PS35	35	45	0.50	-0.05	PS45	45	55	0.20	-0.04	PS50	50	63	2.00	-0.07
PS35	35	45	1.00	-0.05	PS45	45	55	0.25	-0.04	PS52	52	65	0.10	-0.03
PS35	35	45	1.20	-0.07	PS45	45	55	0.30	-0.05	PS52	52	65	0.15	-0.04
PS35	35	45	1.50	-0.07	PS45	45	55	0.50	-0.05	PS52	52	65	0.20	-0.04
PS35	35	45	2.00	-0.07	PS45	45	55	1.00	-0.05	PS52	52	65	0.25	-0.04
PS36	36	45	0.10	-0.03	PS45	45	55	1.20	-0.07	PS52	52	65	0.30	-0.05
PS36	36	45	0.15	-0.04	PS45	45	55	1.50	-0.07	PS52	52	65	0.50	-0.05
PS36	36	45	0.20	-0.04	PS45	45	55	2.00	-0.07	PS52	52	65	1.00	-0.05
PS36	36	45	0.25	-0.04	PS45	45	56	0.10	-0.03	PS52	52	65	1.20	-0.07
PS36	36	45	0.30	-0.05	PS45	45	56	0.15	-0.04	PS52	52	65	1.50	-0.07
PS36	36	45	0.50	-0.05	PS45	45	56	0.20	-0.04	PS52	52	65	2.00	-0.07
PS36	36	45	1.00	-0.05	PS45	45	56	0.25	-0.04	PS55	55	68	0.10	-0.03
PS36	36	45	1.20	-0.07	PS45	45	56	0.30	-0.05	PS55	55	68	0.15	-0.04
PS36	36	45	1.50	-0.07	PS45	45	56	0.50	-0.05	PS55	55	68	0.20	-0.04
PS36	36	45	2.00	-0.07	PS45	45	56	1.00	-0.05	PS55	55	68	0.25	-0.04
PS37	37	47	0.10	-0.03	PS45	45	56	1.20	-0.07	PS55	55	68	0.30	-0.05
PS37	37	47	0.15	-0.04	PS45	45	56	1.50	-0.07	PS55	55	68	0.50	-0.05
PS37	37	47	0.20	-0.04	PS45	45	56	2.00	-0.07	PS55	55	68	1.00	-0.05
PS37	37	47	0.25	-0.04	PS48	48	60	0.10	-0.03	PS55	55	68	1.20	-0.07
PS37	37	47	0.30	-0.05	PS48	48	60	0.15	-0.04	PS55	55	68	1.50	-0.07
PS37	37	47	0.50	-0.05	PS48	48	60	0.20	-0.04	PS55	55	68	2.00	-0.07
PS37	37	47	1.00	-0.05	PS48	48	60	0.25	-0.04	PS56	56	70	0.10	-0.03
PS37	37	47	1.20	-0.07	PS48	48	60	0.30	-0.05	PS56	56	70	0.15	-0.04
PS37	37	47	1.50	-0.07	PS48	48	60	0.50	-0.05	PS56	56	70	0.20	-0.04
PS37	37	47	2.00	-0.07	PS48	48	60	1.00	-0.05	PS56	56	70	0.25	-0.04
PS40	40	50	0.10	-0.03	PS48	48	60	1.20	-0.07	PS56	56	70	0.30	-0.05
PS40	40	50	0.15	-0.04	PS48	48	60	1.50	-0.07	PS56	56	70	0.50	-0.05
PS40	40	50	0.20	-0.04	PS48	48	60	2.00	-0.07	PS56	56	70	1.00	-0.05
PS40	40	50	0.25	-0.04	PS50	50	62	0.10	-0.03	PS56	56	70	1.20	-0.07
PS40	40	50	0.30	-0.05	PS50	50	62	0.15	-0.04	PS56	56	70	1.50	-0.07
PS40	40	50	0.50	-0.05	PS50	50	62	0.20	-0.04	PS56	56	70	2.00	-0.07
PS40	40	50	1.00	-0.05	PS50	50	62	0.25	-0.04	PS56	56	72	0.10	-0.03
PS40	40	50	1.20	-0.07	PS50	50	62	0.30	-0.05	PS56	56	72	0.15	-0.04
PS40	40	50	1.50	-0.07	PS50	50	62	0.50	-0.05	PS56	56	72	0.20	-0.04
PS40	40	50	2.00	-0.07	PS50	50	62	1.00	-0.05	PS56	56	72	0.25	-0.04

Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness
PS56	56	72	0.30	-0.05	PS75	75	95	0.15	-0.04	PS95	95	115	1.50	-0.07
PS56	56	72	0.50	-0.05	PS75	75	95	0.20	-0.04	PS95	95	115	2.00	-0.07
PS56	56	72	1.00	-0.05	PS75	75	95	0.25	-0.04	PS100	100	120	0.10	-0.03
PS56	56	72	1.20	-0.07	PS75	75	95	0.30	-0.05	PS100	100	120	0.15	-0.04
PS56	56	72	1.40	-0.07	PS75	75	95	0.50	-0.05	PS100	100	120	0.20	-0.04
PS56	56	72	2.00	-0.07	PS75	75	95	1.00	-0.05	PS100	100	120	0.25	-0.04
PS60	60	75	0.10	-0.03	PS75	75	95	1.20	-0.07	PS100	100	120	0.30	-0.05
PS60	60	75	0.15	-0.04	PS75	75	95	1.50	-0.07	PS100	100	120	0.50	-0.05
PS60	60	75	0.20	-0.04	PS75	75	95	2.00	-0.07	PS100	100	120	1.00	-0.05
PS60	60	75	0.25	-0.04	PS80	80	100	0.10	-0.03	PS100	100	120	1.20	-0.07
PS60	60	75	0.30	-0.05	PS80	80	100	0.15	-0.04	PS100	100	120	1.50	-0.07
PS60	60	75	0.50	-0.05	PS80	80	100	0.20	-0.04	PS100	100	120	2.00	-0.07
PS60	60	75	1.00	-0.05	PS80	80	100	0.25	-0.04	PS100	100	125	0.10	-0.03
PS60	60	75	1.20	-0.07	PS80	80	100	0.30	-0.05	PS100	100	125	0.15	-0.04
PS60	60	75	1.50	-0.07	PS80	80	100	0.50	-0.05	PS100	100	125	0.20	-0.04
PS60	60	75	2.00	-0.07	PS80	80	100	1.00	-0.05	PS100	100	125	0.25	-0.04
PS63	63	80	0.10	-0.03	PS80	80	100	1.20	-0.07	PS100	100	125	0.30	-0.05
PS63	63	80	0.15	-0.04	PS80	80	100	1.50	-0.07	PS100	100	125	0.50	-0.05
PS63	63	80	0.20	-0.04	PS80	80	100	2.00	-0.07	PS100	100	125	1.00	-0.05
PS63	63	80	0.25	-0.04	PS85	85	105	0.10	-0.03	PS105	105	130	0.10	-0.03
PS63	63	80	0.30	-0.05	PS85	85	105	0.15	-0.04	PS105	105	130	0.15	-0.04
PS63	63	80	0.50	-0.05	PS85	85	105	0.20	-0.04	PS105	105	130	0.20	-0.04
PS63	63	80	1.00	-0.05	PS85	85	105	0.25	-0.04	PS105	105	130	0.25	-0.04
PS63	63	80	1.20	-0.07	PS85	85	105	0.30	-0.05	PS105	105	130	0.30	-0.05
PS63	63	80	1.50	-0.07	PS85	85	105	0.50	-0.05	PS105	105	130	0.50	-0.05
PS63	63	80	2.00	-0.07	PS85	85	105	1.00	-0.05	PS105	105	130	1.00	-0.05
PS65	65	85	0.10	-0.03	PS85	85	105	1.20	-0.07	PS110	110	140	0.10	-0.03
PS65	65	85	0.15	-0.04	PS85	85	105	1.50	-0.07	PS100	110	140	0.15	-0.04
PS65	65	85	0.20	-0.04	PS85	85	105	2.00	-0.07	PS100	110	140	0.20	-0.04
PS65	65	85	0.25	-0.04	PS90	90	110	0.10	-0.03	PS100	110	140	0.25	-0.04
PS65	65	85	0.30	-0.05	PS90	90	110	0.15	-0.04	PS100	110	140	0.30	-0.05
PS65	65	85	0.50	-0.05	PS90	90	110	0.20	-0.04	PS100	110	140	0.50	-0.05
PS65	65	85	1.00	-0.05	PS90	90	110	0.25	-0.04	PS100	110	140	1.00	-0.05
PS65	65	85	1.20	-0.07	PS90	90	110	0.30	-0.05	PS120	120	150	0.10	-0.03
PS65	65	85	1.50	-0.07	PS90	90	110	0.50	-0.05	PS120	120	150	0.15	-0.04
PS65	65	85	2.00	-0.07	PS90	90	110	1.00	-0.05	PS120	120	150	0.20	-0.04
PS70	70	90	0.10	-0.03	PS90	90	110	1.20	-0.07	PS120	120	150	0.25	-0.04
PS70	70	90	0.15	-0.04	PS90	90	110	1.50	-0.07	PS120	120	150	0.30	-0.05
PS70	70	90	0.20	-0.04	PS90	90	110	2.00	-0.07	PS120	120	150	0.50	-0.05
PS70	70	90	0.25	-0.04	PS95	95	115	0.10	-0.03	PS120	120	150	1.00	-0.05
PS70	70	90	0.30	-0.05	PS95	95	115	0.15	-0.04	PS130	130	160	0.10	-0.03
PS70	70	90	0.50	-0.05	PS95	95	115	0.20	-0.04	PS130	130	160	0.15	-0.04
PS70	70	90	1.00	-0.05	PS95	95	115	0.25	-0.04	PS130	130	160	0.20	-0.04
PS70	70	90	1.20	-0.07	PS95	95	115	0.30	-0.05	PS130	130	160	0.25	-0.04
PS70	70	90	1.50	-0.07	PS95	95	115	0.50	-0.05	PS130	130	160	0.30	-0.05
PS70	70	90	2.00	-0.07	PS95	95	115	1.00	-0.05	PS130	130	160	0.50	-0.05
PS75	75	95	0.10	-0.03	PS95	95	115	1.20	-0.07	PS130	130	160	1.00	-0.05

Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness	Type	D1	D2	S	Tolerance on Thickness
PS140	140	170	0.10	-0.03	PS150	150	180	0.50	-0.05	PS170	170	200	0.25	-0.04
PS140	140	170	0.15	-0.04	PS150	150	180	1.00	-0.05	PS170	170	200	0.30	-0.05
PS140	140	170	0.20	-0.04	PS160	160	190	0.10	-0.03	PS170	170	200	0.50	-0.05
PS140	140	170	0.25	-0.04	PS160	160	190	0.15	-0.04	PS170	170	200	1.00	-0.05
PS140	140	170	0.30	-0.05	PS160	160	190	0.20	-0.04	PS160	160	190	1.00	-0.05
PS140	140	170	0.50	-0.05	PS160	160	190	0.25	-0.04	PS170	170	200	0.10	-0.03
PS140	140	170	1.00	-0.05	PS160	160	190	0.30	-0.05	PS170	170	200	0.15	-0.04
PS150	150	180	0.10	-0.03	PS160	160	190	0.50	-0.05	PS170	170	200	0.20	-0.04
PS150	150	180	0.15	-0.04	PS160	160	190	1.00	-0.05	PS170	170	200	0.25	-0.04
PS150	150	180	0.20	-0.04	PS170	170	200	0.10	-0.03	PS170	170	200	0.30	-0.05
PS150	150	180	0.25	-0.04	PS170	170	200	0.15	-0.04	PS170	170	200	0.50	-0.05
PS150	150	180	0.30	-0.05	PS170	170	200	0.20	-0.04	PS170	170	200	1.00	-0.05

Shims SS Type :

Type	ID	OD	Thk.	Tolerance on Thickness	Type	ID	OD	Thk.	Tolerance on Thickness
SS3	3	6	1.00	-0.05	SS40	40	50	2.50	-0.05
SS4	4	8	1.00	-0.05	SS42	42	52	2.50	-0.05
SS5	5	10	1.00	-0.05	SS45	45	55	3.00	-0.06
SS6	6	12	1.20	-0.05	SS45	45	56	3.00	-0.06
SS7	7	13	1.20	-0.05	SS48	48	60	3.00	-0.06
SS8	8	14	1.20	-0.05	SS50	50	62	3.00	-0.06
SS9	9	15	1.20	-0.05	SS50	50	63	3.00	-0.06
SS10	10	16	1.20	-0.05	SS52	52	65	3.00	-0.06
SS11	11	17	1.20	-0.05	SS55	55	68	3.00	-0.06
SS12	12	18	1.20	-0.05	SS56	56	70	3.00	-0.06
SS13	13	19	1.50	-0.05	SS56	56	72	3.00	-0.06
SS14	14	20	1.50	-0.05	SS60	60	75	3.00	-0.06
SS15	15	21	1.50	-0.05	SS63	63	80	3.00	-0.06
SS15	15	22	1.50	-0.05	SS65	65	85	3.50	-0.06
SS16	16	22	1.50	-0.05	SS70	70	90	3.50	-0.06
SS17	17	24	1.50	-0.05	SS75	75	95	3.50	-0.06
SS18	18	25	1.50	-0.05	SS80	80	100	3.50	-0.06
SS19	19	26	1.50	-0.05	SS85	85	105	3.50	-0.06
SS20	20	28	2.00	-0.05	SS90	90	110	3.50	-0.06
SS22	22	30	2.00	-0.05	SS95	95	115	3.50	-0.06
SS22	22	32	2.00	-0.05	SS100	100	120	3.50	-0.06
SS25	25	35	2.00	-0.05	SS100	100	125	3.50	-0.08
SS25	25	36	2.00	-0.05	SS105	105	130	3.50	-0.08
SS26	26	37	2.00	-0.05	SS110	110	140	3.50	-0.08
SS28	28	40	2.00	-0.05	SS120	120	150	3.50	-0.08
SS30	30	42	2.50	-0.05	SS130	130	160	3.50	-0.08
SS32	32	45	2.50	-0.05	SS140	140	170	3.50	-0.08
SS35	35	45	2.50	-0.05	SS150	150	180	3.50	-0.08
SS36	36	45	2.50	-0.05	SS160	160	190	3.50	-0.08
SS37	37	47	2.50	-0.05	SS170	170	200	3.50	-0.08

COIL SPRINGS

Windston Springs is a master in manufacturing of High Quality Springs as per the customer's requirements, more than a three decade. Over the years Windston acquired technical expertise and experience in the design and manufacturing of coil springs.

Windston has in-house all facilities for manufacturing & testing of coil springs. We manufacture all types of wire springs such as Compression, Tension, Torsion springs as per customer requirement. We give highest priority to Quality which starting from procurement of raw material to the final spring inspection stage before despatch of springs to customer.

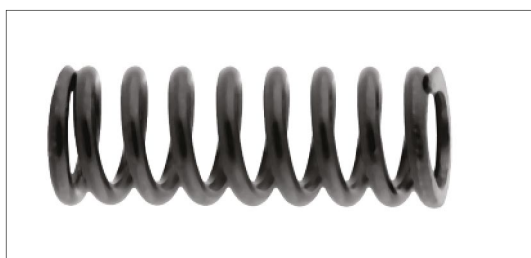
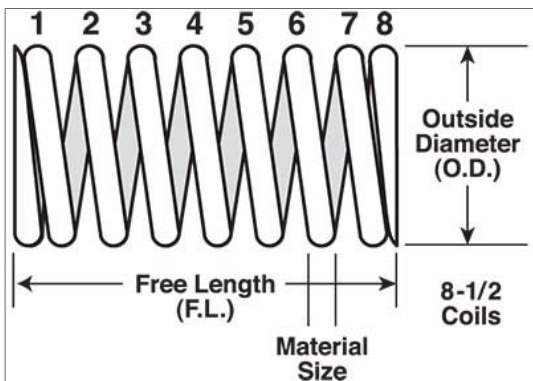
We manufactured Springs as per international standards like DIN, ASTM or IS, Customer satisfaction is a key to our growth as we manufacture springs strictly as per customer drawing or specification by ensuring quality at every stage of production process.

The State of the Art manufacturing plant is equipped with a range of automatic grinders, conveyor furnace, shotpeening, stragging machines, hardness tester & customized packaging for the best accuracy, consistency, durability & prompt service. We manufacture springs range from 7 mm to 30 mm wire diameter and supply to OEM regularly.

Regularly we manufacture springs in 50CrV4 (En47) grade and as per customer request we also supply in grade like stainless steel, Inconel, Nimonic etc.

We can provide various type of corrosion resistance surface treatment depnding on the customers requirements like phosphating, Electro Zinc Plating, Zinc Flake, Nicket, Tin, Chromium, Powder coating etc with Salt Spray Test if required.

After coating or surface treatment we also do hydrogens embrittlement process to avoid any brittleness and also get longer spring life.



VALVE PLATE & REED VALVE

Valve Plates, Spring Plates, Valve Assembly Finger Plates, Channel Springs & Valve Reeds.

Windston's offers a complete range of plate valve assemblies and internal components for air and process gas compressors, as well as refrigeration, marine and locomotive brake applications. Windston's product line includes slotted valve plates, discs, rings, damper plates, spring plates and helical or leaf springs. Valve assemblies are manufactured to any specification, including damped and undamped designs, as well as combination valves.

Compressor valves are the most critical parts of a piston compressors and are key to its overall availability. WINDSTON compressor valves not only operate fully automatically with high efficiency, they have a long service life and are optimized for process conditions. A variety of compressor valve designs are available for a multitude of applications, such as compressing air, hydrocarbons, industrial gases or refrigerants, for both lubricated and non-lubricated compressors in high and a low pressure operations.

Air & Gas Compressors as well as Pneumatic Compressor used in Refrigeration Industry, Industrial Gases handling, Food & Beverage Industry, Oil & Gas Industry, Natural Gas Handling, Air Separation Plants.

Windston's products can be 100% interchangeable with valves supplied by the custom – engineered for any application.



Compressor Valve Design & Engineering Technology

Your Benefit of The WINDSTON Valve at a Glance

- Supreme performance for high speed compressors
- Excellent flow efficiency for low horsepower consumption
- Best suited for changing operating conditions
- Long life even in difficult and contaminated conditions
- Proven in lubricated and non-lubricated operation
- Extended run-times, even in severe environment
- Superior materials for high resistance to corrosion and wear
- Highly qualified and experienced Engineers
- Hi-tech 3D CAD modelling system
- Finite Element Analysis Software
- Sophisticated Compressor Valve Dynamic Analysis Programme
- Unmatched reliability in air / gas service & other hostile application
- Custom - engineered for optimal efficiency and durability
- Backed by engineering expertise & custom valve dynamics program
- Aerodynamic flow for reduced power consumption
- Flexibility for improved efficiency and lower energy consumption
- Improve overall compression efficiency
- Vary capacity needs in stages
- Reduce energy consumption and help prolong driver life by eliminating compression ("loading") during start – up
- Reduce unloaded horsepower.



Automobile & Multi-Forming Parts :

For more than 3 decades now, Windston Springs is into the business of forming metal into specialised parts that contributes to Automobile and Engineering Industries. Scientifically creating these highly critical parts from toughest of the material like carbon steel, stainless steel, to mild steel a work of craft.

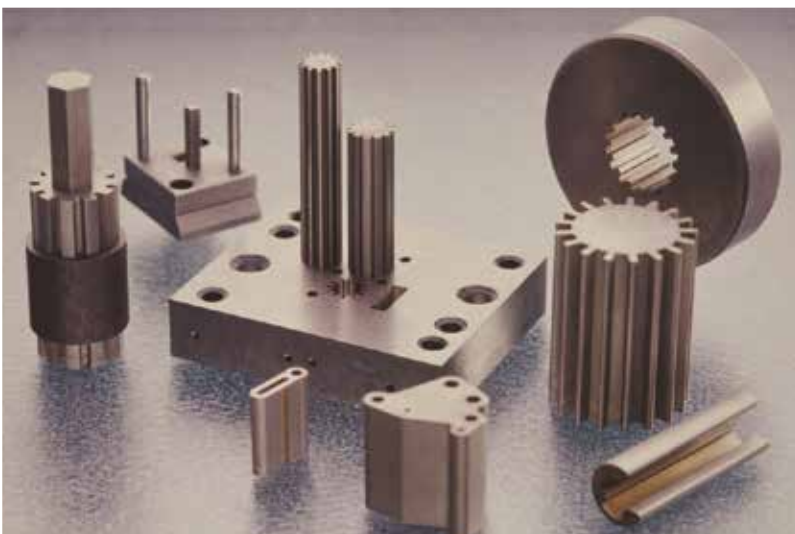
Complex metal-formed parts of high production batches with material of sheet thickness ranging from 0.3mm to 2 mm and wire diameters ranging from 0.6mm to 2 mm are produced on a wide range on advanced CNC Multi-forming Machines.





STATE-OF-THE-ART TOOL ROOM

When it comes to manufacturing complex tools, WINDSTON SPRINGS has an edge over most of the experienced tool makers on account of its speed, error-free, pin-sharp precision ... in producing Tools, Dies, Moulds, Jigs, Fixtures, etc.



Our Tool Room is equipped with a wide range of advanced machines like:

- CNC Turning Centers
- CNC Machining Centers (VMC)
- CNC E.D.M. Wire-cut Machines
- CNC E.D.M. Spark Erosion Machines
- Robotic Drilling Tapping Arms

These CNC Machines facilitate hi-speed production of complex Tools, Gauges, Jigs and Fixtures with high accuracy.

Tools are assembled by a team of highly experienced skilled Tool Makers.



We take enough care to promptly attend any unpredicted tool failure / tool breakdown. A team of dedicated “Skilled Tool Support Engineers” promptly attend by either replacing or repairing the tool. This team also ensures that adequate stock of tool spares, along with a set of parallel standby tools, are always available in ready condition to meet any such unpredicted eventuality. So customers of WINDSTON SPRINGS have never to worry regarding delay in their delivery schedules.

PRESS SHOP

WINDSTON SPRINGS is well equipped with a big team of the latest Metal-working, Hydraulic, Pneumatic and Mechanical Presses to perform a wide range of sheet metal operations.

These Presses are very well maintained to assure their robust condition for enhancing tool life and job accuracy.

These Presses are built with photoelectric sensors for safety of Operators.



MACHINE SHOP



There are a number of machined - component manufacturers, but our core competence lies in proving our skills time-&-again for producing parts that are very difficult to produce. These parts play very critical and vital roles that demand extremely tight tolerances that are practically difficult to achieve and routinely maintain.

These micro-precision machined components are processed with:

- High engineering skills;
- Outstanding systems;
- State-of-the-Art Measuring and Inspection facilities;
- Controlled environment;
- Relentless effort with strong dedication and commitment.



GRINDING & LAPPING SHOP

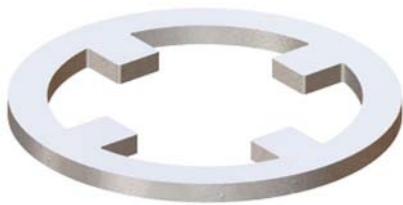
GRINDING & LAPPING SHOP

Unlike other manufacturers, WINDSTON SPRINGS does not subscribe to heavy removal of surface material during the course of grinding. Adequate amount of material is removed in each “GRINDING PASS” to retain physical & metallurgical characteristics, thereby making each component very stable and functional.

DEMAGNETIZATION:

At WINDSTON SPRINGS every ground component undergoes DEMAGNETIZATION to avoid:

- A. Rate of staining;
- B. Clinging of components to other parts causing production delays on assembly lines;
- C. Clinging of abrasive or dust particles to the bearing surface causing wear.



HEAT TREATMENT

CREATING STRONG METALLURGICAL DNA

Wide range of Heat Treatment facilities for Hardening & Tempering with advanced software to facilitate precise Heat-Treatment operations in controlled atmosphere to ensure components are built with excellent metallurgical and physical properties, incorporating strong genetic DNA to carry out long-lasting performance in adverse challenging conditions.

Our skilled and experienced team of Engineers produce the best of results during operations like: Through-hardening, Case-hardening, Stress-relieving, Fixture-tempering, Closed-tempering, Carbo-Nitriding and Carbonizing.



QA-TESTING LAB


“QUALITY CAN BE MEASURED A HUNDREDS OF TIMES DURING PRODUCTION, BUT CAN BE TESTED & PROVEN ONLY ON ROAD”

- Quality comes out of the best understanding of the product, its function, material and the extreme conditions it may need to sustain in.
- Vigilant Quality checks at all stages of production.
- Effective application of the Quality Management System.
- Improvement in Quality by training and motivating employees.
- Ensuring superior functionality, endurance and safety of the parent machine.
- Higher sustainability, strength and performance.
- Being conscious towards safety of the end-user.



WE ARE ... "WHAT THEY SPEAK OF US"





Risk comes from not knowing what you're doing.
Price is what you pay. Value is what you get.

(Warren Buffett)



WINDSTON SPRINGS PVT. LTD.

WINDSTON SPRINGS PVT. LTD. (SALES OFF.)

285, Park View, Opp. Napoo Garden, B.A.K. Marg,
Matunga, Mumbai - 400 019.

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E-mail : office.m@windstonsprings.com

mktg@windstonsprings.com

WINDSTON SPRINGS PVT. LTD. (WORKS)

Plot No. 1209, G.I.D.C., Phase III, Wadhwan City,
Surendranagar, Gujarat - 363 035.

Ph. : 02752 - 241 566 / 243 826 Fax : 243 609



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