

STABILITY IS PROTECTION...



ENTERPRISE







## Introduction

We would like to introduce ourselves as a team of experienced professionals and technical people involved in manufacturing of specialized engineering products.

Our products are used in a large variety of industrial application, ranging from safety valve systems placed 3000 m below sea level to satellites in outer space. We specialize in Disc Springs as per DIN2093, DIN6796 with high quality spring steel grade 50CrV4(EN47), stainless steel grade SS301, SS304 & SS316, 17-7Ph, INC X-750 & INC X-718, sizes ranging from outer diameter 6 mm to 350 mm thickness 0.4 mm to 16 mm.

## We also manufacture

- Press Components.
- Machine Components.
- Industrial Products for Spares and Maintenance.
- Safe Lock Washer, Safety Washer, Contact Washer, Ball Bearing Disc Spring
- Sheet Metal Components.
- Coil Spring.

Our products are manufactured according to the specification and designs provided by the customers keeping in mind the stringent quality control. We are ready to cater OEM Spares as per customer's requirement.

## Quality

Quality assurance is of prime importance to us, hence only high quality products are being manufactured by adopting latest technology. We are committed for quality, reliability, competitive prices and timely delivery which make sense to select and use our products.

## Applications

Wind Mill  
 Power Station Construction  
 Valves  
 Spring-Actuated Brakes  
 Tool Clamping Components  
 Backlash Compensation  
 Energy Stores for Safety Systems  
 Overload Couplings  
 Slip Clutches  
 Piston Return Springs  
 Cableway Grip  
 Bolted Assemblies  
 Ball Bearing  
 Electrical  
 Flange Application

## User Profiles

Automobile Industries  
 Cement Plants  
 Chemical Plants  
 Defense Applications  
 Earth Moving Equipments  
 Engines and Equipments  
 Engines and Locomotives  
 Electrical Industries  
 Generator Industries  
 Heating Furnaces  
 Machine Tools Industries  
 Machine & Equipment Foundations  
 Press Tools Industries  
 Rectifiers  
 Railway  
 Steel Making Industries  
 Space Research Center  
 Textile Industries

## Disc Spring Washer

Disc Springs are conically formed angular discs which are loaded in the axial direction. They can be statically 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.

Disc Springs offer a well developed solution to many engineering problems through a unique combination of high force in a small space. Disc Springs can be used as single disc or arranged in stacks. A spring stack can consist of either single spring or parallel spring sets. Disc Springs and Belleville Washers are manufactured to DIN2093 and DIN6796. Disc spring stacks may be designed for extremely high loads where coil springs are not feasible at all. The standard disc springs shown are generally available from stock. We can make many special sizes to customer requirements. Engineering assistance is available upon request.

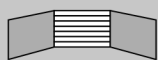
## Characteristics of Disc Spring Washer

- Wide range of load deflection characteristics such as straight line progressive and regressive.
- Flexibility in stack arrangement in order to achieve a desired performance.
- Stock is minimized as the individual spring sizes can be combined universally.
- Space Saving and Self damping (especially when stacked in parallel).
- No deformation or fatigue under normal loads, Longer fatigue life.
- Simplified inventory, and individual spring size can be used for a wide range of applications
- High energy storage capacity.
- Largely Self-damping, giving good shock absorption and energy dissipation.
- Efficient use of space and high spring force with small deflections.
- Adaptable to stacking in numerous configuration.
- Combination use as a modular spring element.
- Low maintenance cost and long service life.

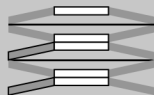
## Features of Disc Spring Washer

- Greater security of operation service, as failure of one disc spring element within a stack does not totally lead of failure of entire assembly.
- 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.
- Load, stack height and travel can be determined and changed as needed.

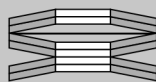
They can be used as single disc or on multiple stack combination to achieve desired deflection and characteristics.



Stacked in Parallel  
Total Deflection = Deflection of 1 disc  
Total Load = Load on 1 disc x No. of discs

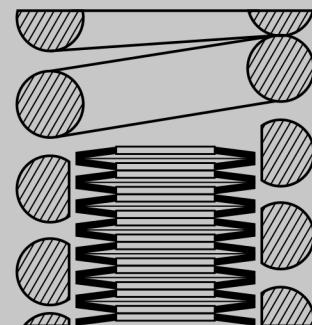


Series Total Deflection = Deflection of 1 disc x No. disc in stack  
Total Load = Load on 1 disc



Parallel Series Combinations can be designed to accommodate virtually any load of deflection and to obtain progressive or regressive characteristics.

## Comparison with Coil Springs

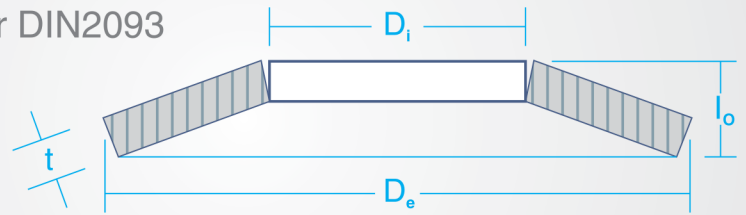


Where same load is achieved in less space



## Disc Spring As per DIN2093

$D_e$  : Outside Diameter  
 $D_i$  : Inside Diameter  
 $t$  : Thickness  
 $l_o$  : Overall Height  
 $F$  : Force (N)  
 $s$  : Deflection



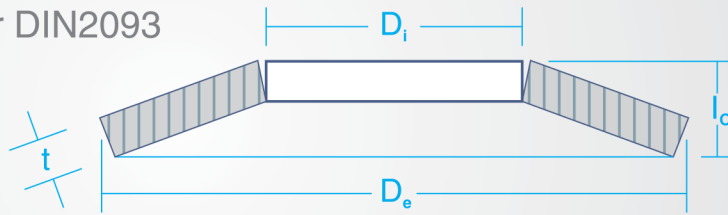
ITEM CODE	Metric Dimensions					Defl. $S=.75l_o$	Force N
	$D_e$	$D_i$	$t$	$h$	$l_o$		
UDS060303	6	3.2	0.3	0.15	0.45	0.11	119
UDS080302	8	3.2	0.2	0.2	0.4	0.15	26
UDS080303	8	3.2	0.3	0.25	0.55	0.19	104
UDS080304	8	3.2	0.4	0.2	0.6	0.15	186
UDS080305	8	3.2	0.5	0.2	0.7	0.15	357
UDS080402	8	4.2	0.2	0.25	0.45	0.19	39
UDS080403	8	4.2	0.3	0.25	0.55	0.19	118
UDS080404	8	4.2	0.4	0.2	0.6	0.15	210
UDS100303	10	3.2	0.3	0.35	0.65	0.26	98
UDS100304	10	3.2	0.4	0.3	0.7	0.23	179
UDS100305	10	3.2	0.5	0.25	0.75	0.19	279
UDS100404	10	4.2	0.4	0.3	0.7	0.23	189
UDS100405	10	4.2	0.5	0.25	0.75	0.19	294
UDS100406	10	4.2	0.6	0.25	0.85	0.19	502
UDS100502	10	5.2	0.25	0.3	0.55	0.23	58
UDS100504	10	5.2	0.4	0.3	0.7	0.23	209
UDS100505	10	5.2	0.5	0.25	0.75	0.19	325
UDS120404	12	4.2	0.4	0.4	0.8	0.3	178
UDS120405	12	4.2	0.5	0.35	0.85	0.26	284
UDS120406	12	4.2	0.6	0.4	1	0.3	557
UDS120505	12	5.2	0.5	0.4	0.9	0.3	350
UDS120506	12	5.2	0.6	0.35	0.95	0.26	506
UDS120605	12	6.2	0.5	0.35	0.85	0.26	326
UDS120606	12	6.2	0.6	0.35	0.95	0.26	552
UDS130505	12.5	5.2	0.5	0.35	0.85	0.26	272
UDS130603	12.5	6.2	0.35	0.45	0.8	0.34	151
UDS130605	12.5	6.2	0.5	0.35	0.85	0.26	293
UDS130607	12.5	6.2	0.7	0.3	1	0.26	660
UDS140703	14	7.2	0.35	0.45	0.8	0.34	123
UDS140705	14	7.2	0.5	0.4	0.9	0.3	279
UDS140708	14	7.2	0.8	0.3	1.1	0.23	797
UDS150504	15	5.2	0.4	0.55	0.95	0.41	176
UDS150505	15	5.2	0.5	0.5	1	0.38	278
UDS150506	15	5.2	0.6	0.45	1.05	0.34	407
UDS150507	15	5.2	0.7	0.4	1.1	0.3	555
UDS150605	15	6.2	0.5	0.5	1	0.38	289
UDS150606	15	6.2	0.6	0.45	1.05	0.34	424
UDS150607	15	6.2	0.7	0.4	1.1	0.3	578
UDS150807	15	8.2	0.7	0.4	1.1	0.38	666
UDS150808	15	8.2	0.8	0.4	1.2	0.3	982
UDS160804	16	8.2	0.4	0.5	0.9	38	154





## Disc Spring As per DIN2093

$D_e$  : Outside Diameter  
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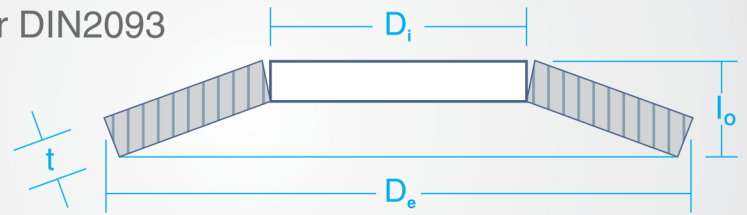
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	$D_e$	$D_i$	$t$	$h$	$l_o$		
UDS160806	16	8.2	0.6	0.45	1.05	0.34	410
UDS160807	16	8.2	0.7	0.45	1.15	0.34	637
UDS160808	16	8.2	0.8	0.4	1.2	0.3	825
UDS160809	16	8.2	0.9	0.35	1.25	0.26	1013
UDS180604	18	6.2	0.4	0.6	1	0.45	139
UDS180605	18	6.2	0.5	0.6	1.1	0.5	245
UDS180606	18	6.2	0.6	0.6	1.2	0.45	400
UDS180607	18	6.2	0.7	0.55	1.25	0.41	553
UDS180608	18	6.2	0.8	0.5	1.3	0.38	726
UDS180805	18	8.2	0.5	0.6	1.1	0.45	265
UDS180807	18	8.2	0.7	0.55	1.25	0.41	596
UDS180808	18	8.2	0.8	0.5	1.3	0.38	783
UDS180810	18	8.2	1	0.4	1.4	0.3	1181
UDS180904	18	9.2	0.45	0.6	1.05	0.45	214
UDS180907	18	9.2	0.7	0.5	1.2	0.38	566
UDS180910	18	9.2	1	0.4	1.4	0.3	1254
UDS200806	20	8.2	0.6	0.7	1.3	0.53	412
UDS200807	20	8.2	0.7	0.65	1.35	0.49	569
UDS200808	20	8.2	0.8	0.6	1.4	0.45	751
UDS200809	20	8.2	0.9	0.55	1.45	0.41	954
UDS200810	20	8.2	1	0.55	1.55	0.41	1294
UDS201005	20	10.2	0.5	0.65	1.15	0.49	254
UDS201008	20	10.2	0.8	0.55	1.35	0.41	748
UDS201009	20	10.2	0.9	0.55	1.45	0.41	1050
UDS201010	20	10.2	1	0.55	1.55	0.41	1425
UDS201011	20	10.2	1.1	0.45	1.55	0.34	1521
UDS201012	20	10.2	1.2	0.35	1.55	0.38	2477
UDS201015	20	10.2	1.5	0.3	1.8	0.23	2521
UDS221106	22.5	11.2	0.6	0.8	1.4	0.6	425
UDS221108	22.5	11.2	0.8	0.65	1.45	0.49	707
UDS221112	22.5	11.2	1	0.65	1.65	0.49	1335
UDS221112	22.5	11.2	1.25	0.5	1.75	0.38	1929
UDS230807	23	8.2	0.7	0.8	1.5	0.6	544
UDS230808	23	8.2	0.8	0.75	1.55	0.5	6719
UDS230809	23	8.2	0.9	0.7	1.6	0.53	919
UDS230810	23	8.2	1	0.7	1.7	0.53	1240
UDS231009	23	10.2	0.9	0.75	1.65	0.56	1058
UDS231010	23	10.2	1	0.7	1.7	0.53	1315
UDS231012	23	10.2	1.25	0.65	1.9	0.49	2310
UDS231210	23	12.2	1	0.6	1.6	0.45	1217
UDS231212	23	12.2	1.25	0.6	1.85	0.45	2331
UDS231215	23	12.2	1.5	0.6	2.1	0.38	3297
UDS251207	25	12.2	0.7	0.9	1.6	0.68	600





## Disc Spring As per DIN2093

$D_e$  : Outside Diameter  
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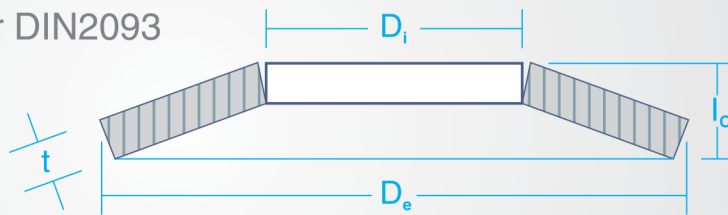


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UDS251209	25	12.2	0.9	0.7	1.6	0.53	862
UDS251210	25	12.2	1	0.8	1.8	0.6	1359
UDS251212	25	12.2	1.25	0.7	1.95	0.53	2214
UDS251215	25	12.2	1.5	0.55	2.05	0.41	2926
UDS281008	28	10.2	0.8	0.95	1.75	0.71	662
UDS281010	28	10.2	1	0.9	1.9	0.68	1130
UDS281012	28	10.2	1.25	0.8	2.05	0.6	1853
UDS281015	28	10.2	1.5	0.7	2.2	0.56	2723
UDS281210	28	12.2	1	0.95	1.95	0.71	1268
UDS281212	28	12.2	1.25	0.85	2.1	0.64	2083
UDS281215	28	12.2	1.5	0.75	2.25	0.56	3077
UDS281408	28	14.2	0.8	1	1.8	0.75	801
UDS281410	28	14.2	1	0.8	1.8	0.6	1107
UDS281412	28	14.2	1.25	0.85	2.1	0.64	2240
UDS281415	28	14.2	1.5	0.65	2.15	0.49	2841
UDS311608	31.5	16.3	0.8	1.05	1.85	0.79	687
UDS311612	31.5	16.3	1.25	0.9	2.15	0.68	1913
UDS311615	31.5	16.3	1.5	0.9	2.4	0.68	3230
UDS311617	31.5	16.3	1.75	0.7	2.45	0.53	3871
UDS311620	31.5	16.3	2	0.75	2.75	0.56	6173
UDS341412	34	14.3	1.25	1.15	2.4	0.86	1989
UDS341415	34	14.3	1.5	1.05	2.55	0.79	2984
UDS341615	34	16.3	1.5	1.05	2.55	0.79	3155
UDS341620	34	16.3	2	0.85	2.85	0.64	5783
UDS351809	35.5	18.3	0.9	1.15	2.05	0.86	832
UDS351812	35.5	18.3	1.25	1	2.25	0.75	1699
UDS351820	35.5	18.3	2	0.8	2.8	0.6	5187
UDS401412	40	14.3	1.25	1.4	2.65	1.05	1778
UDS401415	40	14.3	1.5	1.25	2.75	0.94	2542
UDS401420	40	14.3	2	1.05	3.05	0.79	4763
UDS401615	40	16.3	1.5	1.3	2.8	0.79	2140
UDS401620	40	16.3	2	1.1	3.1	0.83	5169
UDS401820	40	18.3	2	1.15	3.15	0.86	5656
UDS402010	40	20.4	1	1.3	2.3	0.98	1017
UDS402015	40	20.4	1.5	1.15	2.65	0.86	2621
UDS402020	40	20.4	2	1.1	3.1	0.83	5701
UDS402022	40	20.4	2.25	0.9	3.15	0.68	6500
UDS402025	40	20.4	2.5	0.95	3.45	0.71	9390
UDS452212	45	22.4	1.25	1.6	2.85	1.2	1891
UDS452217	45	22.4	1.75	1.3	3.05	0.98	3646
UDS452225	45	22.4	2.5	1	3.5	0.75	7716



## Disc Spring As per DIN2093

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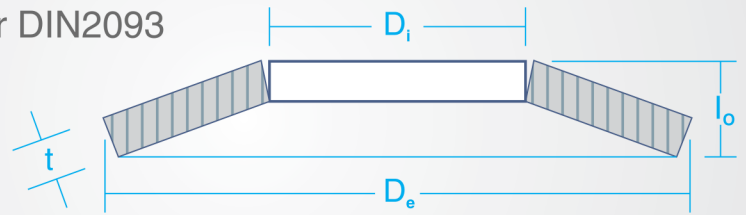
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	$D_e$	$D_i$	$t$	$h$	$l_o$		
UDS501812	50	18.3	1.25	1.6	2.85	1.2	1373
UDS501815	50	18.3	1.5	1.8	3.3	1.35	2603
UDS501820	50	18.3	2	1.5	3.5	1.13	4567
UDS501825	50	18.3	2.5	1.35	3.85	1.2	9305
UDS501830	50	18.3	3	1	4	1.05	13763
UDS502020	50	20.4	2	1.5	3.5	1.13	4687
UDS502025	50	20.4	2.5	1.35	3.85	1.01	7919
UDS502220	50	22.4	2	1.6	3.6	1.2	5222
UDS502225	50	22.4	2.5	1.4	3.9	1.05	8510
UDS502512	50	25.4	1.25	1.6	2.85	1.2	1550
UDS502515	50	25.4	1.5	1.6	3.1	1.2	2512
UDS502520	50	25.4	2	1.4	3.4	1.05	4762
UDS502522	50	25.4	2.25	1.5	3.75	1.13	7217
UDS502525	50	25.4	2.5	1.4	3.9	1.05	9063
UDS502530	50	25.4	3	1.1	4.1	0.83	11976
UDS562815	56	28.5	1.5	1.95	3.45	1.46	2622
UDS562820	56	28.5	2	1.6	3.6	1.2	4438
UDS562825	56	28.5	2.5	1.7	4.2	1.28	8978
UDS562830	56	28.5	3	1.3	4.3	0.98	11388
UDS602020	60	20.4	2	2.1	4.1	1.58	4727
UDS602025	60	20.4	2.5	1.8	4.3	1.35	7297
UDS602030	60	20.4	3	1.7	4.7	1.26	11569
UDS602525	60	25.5	2.5	1.9	4.4	1.43	8164
UDS602530	60	25.5	3	1.65	4.65	1.24	11768
UDS603025	60	30.5	2.5	2	4.5	1.35	8432
UDS603027	60	30.5	2.75	2	4.75	1.5	12356
UDS603030	60	30.5	3	1.7	4.7	1.28	13226
UDS603035	60	30.5	3.5	1.5	5	1.13	18153
UDS633118	63	31	1.8	2.35	4.15	1.76	4238
UDS633125	63	31	2.5	1.75	4.25	1.31	7189
UDS633130	63	31	3	1.8	4.8	1.35	12536
UDS633135	63	31	3.5	1.4	4.9	1.05	15025
UDS702520	70	25.5	2	2.5	4.5	1.88	4437
UDS703025	70	30.5	2.5	2.4	4.9	1.8	8031
UDS703030	70	30.5	3	2.1	5.1	1.58	11426
UDS703530	70	35.5	3	2.1	5.1	1.58	12287
UDS703540	70	35.5	4	1.8	5.8	1.35	23923
UDS704040	70	40.5	4	1.6	5.6	1.2	23351
UDS704050	70	40.5	5	1.2	6.2	0.9	33672
UDS713620	71	36	2	2.6	4.6	1.95	5144
UDS713625	71	36	2.5	2	4.5	1.5	6725



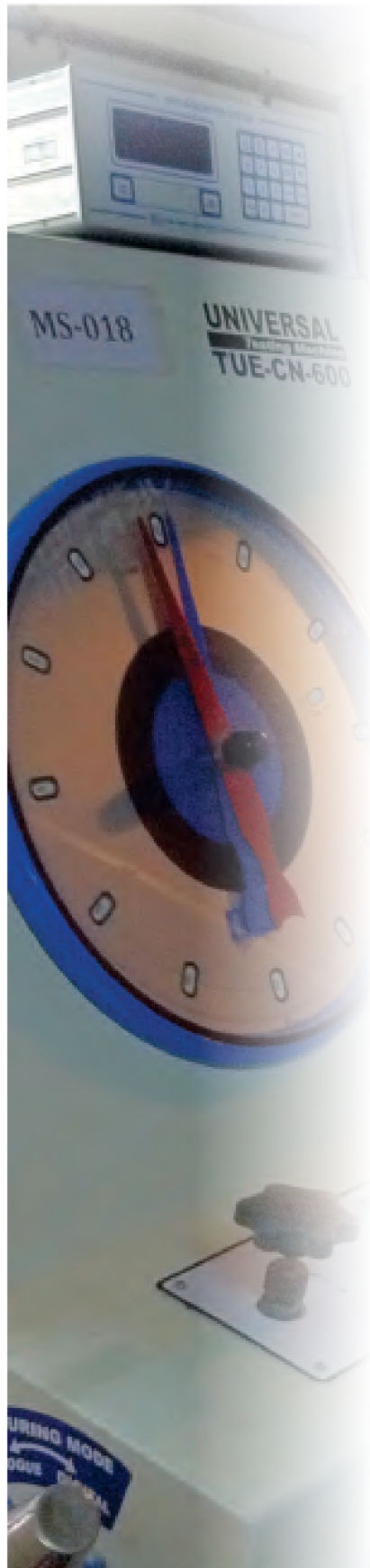


## Disc Spring As per DIN2093

$D_o$  : Outside Diameter  
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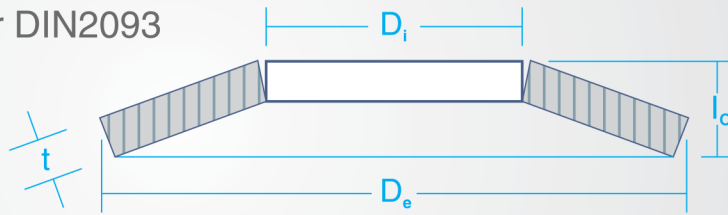
ITEM CODE	Metric Dimensions					Defl. $S=.75l_o$	Force N
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UDS713640	71	36	4	1.6	5.6	1.2	20355
UDS803125	80	31	2.5	2.8	5.3	2.1	7239
UDS803130	80	31	3	2.5	5.5	1.88	10352
UDS803140	80	31	4	2.1	6.1	1.58	19394
UDS803630	80	36	3	2.7	5.7	2.03	11919
UDS806340	80	36	4	2.2	6.2	1.65	21400
UDS804122	80	41	2.25	2.95	5.2	2.21	6613
UDS804130	80	41	3	2.3	5.3	1.73	10518
UDS804140	80	41	4	2.2	6.2	1.65	22874
UDS804150	80	41	5	1.7	6.7	2.4	7684
UDS904625	90	46	2.5	3.2	5.7	2.4	7684
UDS904635	90	46	3.5	2.5	6	1.88	14161
UDS904650	90	46	5	2	7	1.5	31354
UDS1004140	100	41	4	3.2	7.2	2.4	20251
UDS1004150	100	41	5	2.75	7.75	2.06	32361
UDS1005127	100	51	2.7	3.5	6.2	2.63	8609
UDS1005135	100	51	3.5	2.8	6.3	2.1	13070
UDS1005140	100	51	4	3	7	2.25	20674
UDS1005150	100	51	5	2.8	7.8	2.1	36339
UDS1005160	100	51	6	2.2	8.2	1.65	48022
UDS1125730	112	57	3	3.9	6.9	2.93	10489
UDS1125740	112	57	4	3.2	7.2	2.4	17752
UDS1125760	112	57	6	2.5	8.5	1.88	43707
UDS1254140	125	41	4	4.2	8.2	3.15	17346
UDS1255140	125	51	4	4.5	8.5	3.38	19847
UDS1255150	125	51	5	3.9	8.9	2.93	30669
UDS1255160	125	51	6	3.4	9.4	2.55	44307
UDS1256150	125	61	5	4	9	3	33965
UDS1256160	125	61	6	3.6	9.6	2.7	50722
UDS1256180	125	61	8	2.9	10.9	2.18	93577
UDS1256435	125	64	3.5	4.5	8	3.38	15416
UDS1256450	125	64	5	3.5	8.5	2.63	29808
UDS1256460	125	64	6	3.6	9.6	2.7	52155
UDS1256470	125	64	7	3	10	2.25	67216
UDS1256480	125	64	8	2.6	10.6	1.95	85926
UDS1257160	125	71	6	3.3	9.3	2.48	5127
UDS1257180	125	71	8	2.4	10.4	1.88	5494
UDS1257110	125	71	10	1.8	11.8	1.35	124124
UDS1407238	140	72	3.8	4.9	8.7	3.68	17195
UDS1407250	140	72	5	4	9	3	27920
UDS1407280	140	72	8	3.2	11.2	2.4	85251





## Disc Spring As per DIN2093

$D_e$  : Outside Diameter  
 $D_i$  : Inside Diameter  
 $t$  : Thickness  
 $l_o$  : Overall Height  
 $F$  : Force (N)  
 $s$  : Deflection



ITEM CODE	Metric Dimensions					Defl. $S=.75l_o$	Force N
	$D_e$	$D_i$	$t$	$h$	$l_o$		
UDS1506150	150	61	5	5.3	10.3	3.98	31041
UDS1506160	150	61	6	4.8	10.8	3.6	45456
UDS1507160	150	71	6	4.8	10.8	3.64	8155
UDS1507180	150	71	8	4	12	3	89851
UDS1508180	150	81	8	3.7	11.7	2.78	89352
UDS1508110	150	81	10	3	13	2.25	139128
UDS1608243	160	82	4.3	5.6	9.9	4.2	21843
UDS1608260	160	82	6	4.5	10.5	3.38	41008
UDS1608210	160	82	10	3.5	13.5	2.63	138331
UDS1809248	180	92	4.8	6.2	11	4.65	26442
UDS1809260	180	92	6	5.1	11.1	3.83	37252
UDS1809210	180	92	10	4	14	3	125417
UDS1809213	180	92	13	3.5	16.5	2.63	237883
UDS2008280	200	82	8	6.2	14.2	4.65	78034
UDS2008210	200	82	10	5.5	15.5	4.13	124995
UDS2008212	200	82	12	4.6	16.6	3.45	182737
UDS2009210	200	92	10	5.6	15.6	4.2	137688
UDS2009212	200	92	12	4.8	16.8	3.6	199269
UDS2009214	200	92	14	4.1	18.1	3.08	267227
UDS20010255	200	102	5.5	7	12.5	5.25	36111
UDS20010280	200	102	8	5.6	13.6	4.2	76378
UDS20010210	200	102	10	5.6	15.6	4.2	145357
UDS20010212	200	102	12	4.2	16.2	3.15	183020
UDS20010214	200	102	14	4.2	18.2	3.15	289181
UDS20011212	200	112	12	4.2	16.2	3.15	195830
UDS20011214	200	112	14	3.5	17.5	2.63	256758
UDS20011216	200	112	16	2.8	18.8	2.1	305100
UDS22511265	225	112	6.5	6.2	13.6	4.88	39775
UDS22511280	225	112	8	7.5	14.5	4.88	70749
UDS22511212	225	112	12	11.3	17	3.75	171016
UDS22511216	225	112	16	15	20.5		
UDS25010210	250	102	10	9.6	18	6	126387
UDS25010212	250	102	12	11.5	19	5.25	182962
UDS25012770	250	127	7	6.7	14.8	5.85	5.85
UDS25012710	250	127	10	9.4	17	5.25	104004
UDS25012712	250	127	12	11.3	19.3	5.48	210806
UDS25012714	250	127	14	13.1	19.6	4.2	248828
UDS25012716	250	127	16	15	21.8	4.35	383017





# DISC SPRINGS TOLERANCES

THICKNESS TOLERANCES		
	t or t' [mm]	Tolerance for t [mm]
Group 1	0.2 to 0.6	+0.02 /- 0.06
	> 0.6 to < 1.25	+0.03 /- 0.09
Group 2	1.25 to 3.8	+0.04 /- 0.12
	> 3.8 to 6.0	+0.05 /- 0.15
Group 3	> 6.0 to 16.0	+0.10 /- 0.10

For Springs in group 3 the tolerance is applied to the reduced thickness t'.

We use the thickness to ensure that springs loads are within tolerance and therefore will in some cases deviate from the above figures.

DIAMETER TOLERANCES			
	D <sub>e</sub> or D <sub>i</sub> [mm]	Permissible deviation in mm	
Over	3 to 6	0 /- 0.12	+0.12 / 0
Over	6 to 10	0 /- 0.15	+0.15 / 0
Over	10 to 18	0 /- 0.18	+0.18 / 0
Over	18 to 30	0 /- 0.21	+0.21 / 0
Over	30 to 50	0 /- 0.25	+0.25 / 0
Over	50 to 80	0 /- 0.30	+0.30 / 0
Over	80 to 120	0 /- 0.35	+0.35 / 0
Over	120 to 180	0 /- 0.40	+0.40 / 0
Over	180 to 250	0 /- 0.46	+0.46 / 0
Over	250 to 315	0 /- 0.52	+0.52 / 0
Over	315 to 400	0 /- 0.57	+0.57 / 0
Over	400 to 500	0 /- 0.63	+0.63 / 0

OVERALL HEIGHT TOLERANCES		
	t [mm]	Tolerance for $l$ [mm]
Group 1	< 1.25	+ 0.10 /- 0.05
Group 2	1.25 to 2.0	+ 0.15 /- 0.05
	> 2.0 to 3.0	+ 0.20 /- 0.10
	> 3.0 to 6.0	+ 0.30 /- 0.15
Group 3	> 6.0 to 16.0	+ 0.30 /- 0.30

To ensure the specified springs forces. DIN 2093 allows the overall height tolerances to be slightly exceeded.

LOAD TOLERANCES		
	t [mm]	Tolerance for F at the test length $l_p = l - 0.75 h_0$
Group 1	< 1.25	+ 25 % /- 7.5 %
Group 2	1.25 to 3.0	+ 15 % /- 7.5 %
	> 3.0 to 6.0	+ 10 % /- 5 %
Group 3	> 6.0 to 16.0	+ 5 % /- 5 %

With a single spring the spring force must be checked at the height (to - l) This should be carried out with the spring pressed between two lubricated, hardened, ground and polished plates. Measurements are always taken in loading direction.

Material	Magnetic Permeability	Thermal Conductivity	Field of use	Availability
Carbon Steel C80 / CK75	Very good	Low	C 80 is the most inexpensive spring steel for low stress applications.	Regular
Chromium-Vanadium steel 50CrV4	Very good	Low	50CrV4 is the most regularly used disc spring material. 50CrV4 offers the spring characteristics in the temperature range of -150°C to +150°C, due to high alloy content.	Always in stock
X10 Cr Ni 18-8 stainless steels (AISI 301/1.4310)	Low due to work hardening	Low	SS301 Disc Spring is used non-waterproof housing and subject to even lightly corrosive substances.	Always in stock
X5 Cr Ni 18-10 stainless steels (AISI 304/1.4301)	Low due to work hardening	Low	Disc Spring Washers requiring low elasticity and good corrosion resistance.	Always in stock
X6 Cr Ni MoTi 17-12-2 stainless steels (AISI 316 / 1.4401)	Low due to work hardening	Low	Disc Spring Washers is used in highly corrosive environments.	Always in stock
HEAT RESISTANT STEEL - X7 Cr Ni Al 17-7 (17-7 PH)	Good	Low	Disc Spring Washers in corrosive environments but for high temperatures.	Always in stock
Inconel X-750	Zero	Low	Disc Spring Washers, used in high temperature parts.	Always in stock
Inconel X-718	Zero	Low	Disc Spring Washers used in nuclear, aeronautical, space, very high temperature.	Always in stock
Beryllium copper CuBe 2	Zero	Very high	This alloys low modulus of elasticity enables the Disc Spring material to generate a significantly lower spring force when compared to other various materials	Very difficult





# Heavy Duty Safety Washers (HDS) - DIN6796



Heavy Duty Safety or Load Washers are manufactured as per DIN 6796 and are designed specifically for Heavy Duty Bolted sections.

Conical Spring Washers are spring elements whose role is to counteract the loss of force in screwed or bolted connections due to stress relaxation taking place in the components or to counteract heat expansion. These spring elements are compressed in the assembly.

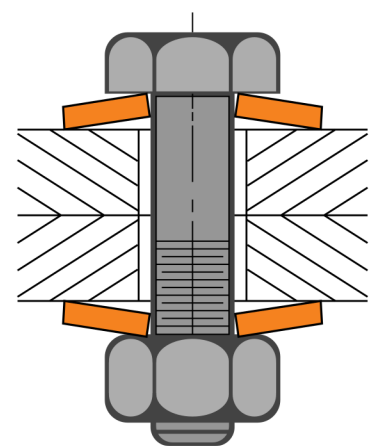
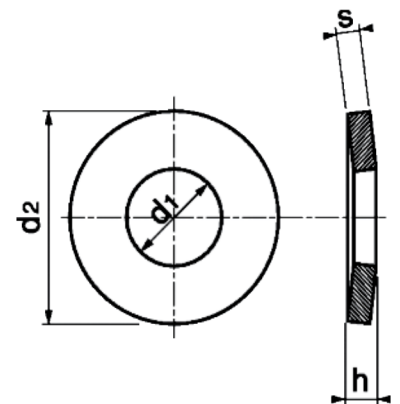
They are configured in accordance with bolts of the property class 8.8 to 10.9. Particularly when used in conjunction with short bolts, their function is to increase the elasticity of the overall assembly. In the case of relaxation of the connection, these elements maintain a creation minimum clamping force. However conical spring washers are not able to prevent parts unscrewing as a result of alternating transverse loads.

It should be noted that conical spring washers are extremely high-stressed components and are therefore only recommended for static application.

## STANDARD APPLICATIONS INCLUDE:

- Bus Bars in Transformers
- Automobile & Heavy construction
- Agriculture & Heavy Machineries
- Mining & Turbine construction

PART NO.	Outside Dia (De)	Inside Dia (Di)	Thickness (t)	Overall Height (Max) (io)	Approximate Force to Flat	Bolt Size
HD52204	5.0	2.2	0.40	0.60	628	2.0
HD62705	6.0	2.7	0.50	0.72	946	2.5
HD73206	7.0	3.2	0.60	0.85	1,320	3.0
HD83708	8.0	3.7	0.80	1.06	2,410	3.5
HD9431	9.0	4.3	1.00	1.30	3,770	4.0
HD115312	11.0	5.3	1.20	1.55	5,480	5.0
HD146415	14.0	6.4	1.50	2.00	8,590	6.0
HD1774175	17.0	7.4	1.75	2.30	11,300	7.0
HD18842	18.0	8.4	2.00	2.60	14,900	8.0
HD2310525	23.0	10.5	2.50	3.20	22,100	10.0
HD29133	29.0	13.0	3.00	3.95	34,100	12.0
HD351536	35.0	15.0	3.50	4.65	46,000	14.0
HD39174	39.0	17.0	4.00	5.25	59,700	16.0
HD421945	42.0	19.0	4.50	5.8	74,400	18.0
HD45215	45.0	21.0	5.00	6.4	93,200	20.0
HD492355	49.0	23.0	5.50	7.05	113,700	22.0
HD56256	56.0	25.0	6.00	7.75	131,000	24.0
HD602865	60.0	28.0	6.50	8.35	154,000	27.0
HD70317	70.0	31.0	7.00	9.2	172,000	30.0



## PLATING:

- Standard finish is self finish
- Alternative: Phosphate and oil, Mechanical Zinc plate, Deltatone



## Safelock Washer

Safelock Washers are used in pairs. Both Washers have Radial Teeth and are assembled opposite to each other.

Safelock Washers eliminate the use of adhesive for locking as it automatically secures the joints.

Safelock Washers can be used with Bolts and Threaded Holes. When using with Bolts and Nuts 1 Pair should be used on either side.

Safelock Washers are widely used in various industries such as Construction, Automotive, Mining, Oil & Natural Gas, Powerplants

1. When maximum safety is desired while tightening Nut/Bolt.
2. Avoids loosening due to vibration and heavy loads.
3. Perfect locking is achieved at any preload levels.
4. Easy to assemble and dismantle.

RANGE :- M3 to M130

MATERIAL :- High Quality Spring Steel (50crV4),  
Stainless Steel 304 & 316

PLATING :- Delta Protekt



## Contact Washer

RANGE :- M3 to M20

MATERIAL:- High Quality Spring Steel (50CrV4) & Stainless Steel



## Ball Bearing Disc Spring

TYPE:- Plain & Slotted

MATERIAL:- High Quality Spring Steel (50CrV4)



## Wave Washer

RANGE:- As Per DIN 137A & DIN 137B & also as per customers Specification

MATERIAL:- High Quality Spring Steel (50CrV4) & Stainless Steel 304 & 316



## Safety Serrated Washer

RANGE :- M3 to M40

MATERIAL:- High Quality Spring Steel (50CrV4) & Stainless Steel 304 & 316



## Coil Spring

TYPE:- Compression Spring, Tension Spring & As per customer specification

RANGE:- Wire Diameter 0.4mm to 50mm, All other specification as per customer requirement.

MATERIAL:- High Quality Spring Steel (50CrV4), Stainless Steel 304 & 316, Inconel X-750, Inconel X-718



## Sheet Metal Component

TYPE, RANGE & MATERIAL AS PER CUSTOMER SPECIFICATION



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