



UTILITY SPRINGS

UTILITY SPRINGS

SERVICE WE DELIVER AND QUALITY YOU CAN DEPEND ON

DAYTON LAMINA is a leading manufacturer of die and mold components supplied globally to the metalstamping and parts forming industry. Backed by years of tool and die experience, quality and innovation are some of the reasons why our brands are respected throughout the world. We have taken the lead role in creating and bringing new products to customers and helping them find solutions that improve their operations. Based on the capabilities we offer, we can help you to meet the demands of quick deliveries, technical support, quality products and competitive prices. **DAYTON LAMINA** and its broad distribution channels and direct sales personnel will assist you in any way to make your product a better and more profitable one.

Whether standard or customized products, with our years of experience, customers can be sure the products they receive will meet their expectations for reliability and dependable performance. We understand the demanding schedules of die builders and production personnel and have developed efficient manufacturing processes to shorten product lead times as well as put inventory on our shelves so you can have it in your facility when you need it.

Included in our full line offering are both inch and metric size die components that are designed to die standards including ISO, NAAMS, JIS and many automotive and appliance manufacturers' standards. The complete product offering includes:

▶ **Punches, Die Buttons, & Retainers (Inch & Metric)**

- Versatile & VersaPlus®
- Kommercial & TuffPunch®
- Ball Lock
- "To Print" specials
- Die details

▶ **DAYSet® Compound Tooling Solution**

▶ **Posi-Strip™ Self-contained punch stripping system**

▶ **DAYStrip® Punch stripping system**

▶ **DAYLube™ NanoCeramic Lubricating Grease**

▶ **Urethane Products**

- Headed punch strippers, backing/retaining plates
- Headless punch strippers
- Sheets, bars, & rods
- Springs/tubes

▶ **Posi-Bend™ & Accu-Bend™ Rotary Benders**

▶ **Air Presses**

▶ **Cams**

- Aerial & die mount cams
- Box cams
- Roller cams
- Wide cams
- Slim cams

▶ **Die Accessories**

▶ **Guide Posts & Bushings**

- Plain & ball bearing styles
- Steel, bronze, bronze-plated and self-lubricating bushings
- Cage Stopper End Caps
- Special pins, bushings and retainers

▶ **Hydraulics**

- Electronic die setters
- Die separators
- Drill & tap equipment
- Hydraulic motors

▶ **In-Die Tapping Units**

▶ **Lamina-Bronze Components**

- Custom Plating

▶ **Mold Components**

- Bronze plated & self-lubricating bushings
- Leader pins
- Bronze & bronze plated wear strips & ways

▶ **Springs**

- Diemax™ L inch series die springs
- Diemax™ XL series ISO die springs
- JIS series die springs
- MaxLife® inch and ISO metric die springs
- Custom heavy duty springs
- Marsh Mellow® springs
- Formathane® urethane
- Utility & disc springs

▶ **Wear Product**

- Plates, strips, gibs & blocks
- Steel, bronze, bronze-plated and self-lubricating materials

IN STOCK

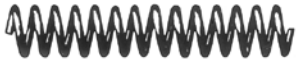
UTILITY SPRINGS



COMPRESSION SPRINGS • STEEL FIXTURE								
INCHES X 25.4 = mm LBS. X .454 = kg								
O.D. Inches	Max. Rod Dia.	Length Inches	Part Number	Wire Dia.	Comp. rate per Inch Lbs.	Total Coils	Type of Ends	No. per Box**
.078	.047	.53	020-074 (G-74)	.012	4.87	17	Plain	12
.078	.047	.56	020-073 (G-73)	.011	3.87	18	Plain	
.108	.062	.81	020-076 (G-76)	.018	12.50	16	Plain	
.110	.062	.91	020-075 (G-75)	.018	9.25	22	Plain	25
.120	.078	.62	020-125 (G-125)	.016	6.60	13	Squared	
.120	.075	.75	020-126 (G-126)	.016	5.30	18	Squared	
.170	.141	.21	020-077 (G-77)	.012	.75	7	Plain	12
.178	.141	10.00	020-056 (G-56)	.014	.03	138	Plain	25
.180	.125	.75	020-127 (G-127)	.022	8.60	11	Squared	
.180	.125	1.00	020-128 (G-128)	.022	6.80	14	Squared	
.180	.125	1.12	020-129	.022	6.00	15	Squared	12
.180	.125	1.25	020-130	.022	5.30	17	Squared	
.185	.156	.93	020-084 (G-84)	.012	.03	19	Plain	
.240	.188	10.00	020-055 (G-55)	.022	.25	112	Plain	25
.240	.172	1.00	020-131	.026	7.80	11	Squared	
.240	.172	1.25	020-132	.026	6.10	14	Squared	
.240	.172	1.50	020-133	.026	5.10	15	Squared	12
.280	.188	1.25	020-080 (G-80)	.040	18.00	15	Plain	
.281	.234	2.06	020-098 (G-98)	.020	.25	5	Squared	
.282	.188	1.31	020-079 (G-79)	.040	17.00	13	Plain	25
.300	.250	10.00	020-054 (G-54)	.022	.03	101	Squared	
.313	.250	.87	020-085 (G-85)	.0254 Ph. Bronze	2.25	7	Squared	
.315	.266	1.96	020-081 (G-81)	.022	.56	23.5	Squared	12
.315	.250	2.43	020-083 (G-83)	.0285 Brass	.87	23	Squared	
.325	.250	2.43	020-082 (G-82)	.032 Brass	1.31	23	Squared	
.340	.250	2.50	107-103 (WA-103)	.042	8.00	24	Sq. & Gr.	25
.345	.250	1.00	107-100 (WA-100)	.042	20.00	10.5	Sq. & Gr.	
.345	.250	1.50	107-101 (WA-101)	.042	14.00	15	Sq. & Gr.	
.345	.250	2.00	107-102 (WA-102)	.042	12.00	19.5	Sq. & Gr.	12
.350	.250	3.00	107-104 (WA-104)	.042	6.00	29	Sq. & Gr.	
.360	.281	1.50	020-134	.035	7.30	10	Squared	
.360	.281	1.75	020-135	.035	6.20	11	Squared	25
.360	.281	2.00	020-136	.035	5.40	13	Squared	
.360	.250	12.00	020-053 (G-53)	.0475	2.25	92	Plain	
.369	.281	.78	020-086 (G-86)	.042 Brass	7.37	9	Sq. & Gr.	12
.375	.266	11.50	020-052 (G-52)	.0475	2.25	88	Plain	
.380	.250	2.12	020-094 (G-94)	.063	42.00	18.5	Sq. & Gr.	
.385	.281	2.03	020-088 (G-88)	.0475	11.00	19	Sq. & Gr.	25
.440	.328	2.00	020-093 (G-93)	.054	13.00	17	Squared	
.440	.344	2.56	020-071 (G-71)	.041	2.62	26	Squared	
.440	.328	2.62	020-089 (G-89)	.0475	6.00	20	Sq. & Gr.	12
.460	.328	2.00	107-107 (WA-107)	.062	32.00	14.5	Sq. & Gr.	
.465	.344	2.50	020-090 (G-90)	.054	12.00	17	Sq. & Gr.	
.465	.328	1.50	107-106 (WA-106)	.062	42.00	11	Sq. & Gr.	25
.465	.328	2.50	107-108 (WA-108)	.062	25.00	17	Sq. & Gr.	
.465	.328	3.00	107-109 (WA-109)	.062	24.00	20	Sq. & Gr.	
.470	.328	1.00	107-105 (WA-105)	.062	58.00	8	Sq. & Gr.	12
.473	.344	3.50	107-110 (WA-110)	.062	18.00	24	Sq. & Gr.	
.495	.360	2.50	020-091 (G-91)	.0625	18.00	16	Sq. & Gr.	
.500	.344	.96	020-060 (G-60)	.072 Ph. Brass	52.00	6.5	Sq. & Gr.	25
.505	.406	2.06	020-092 (G-92)	.048	5.50	16	Squared	
.518	.375	12.00	020-051 (G-51)	.0625	2.75	73	Plain	
.532	.313	1.03	020-059 (G-59)	.1055	210.00	7	Sq. & Gr.	12
.575	.484	2.15	020-069 (G-69)	.041	3.12	8.5	Squared	

**Springs priced and sold individually, but may also be ordered in a box of this quantity.

Specials Quoted Upon Request



UTILITY SPRINGS

IN STOCK

COMPRESSION SPRINGS • STEEL FIXTURE								
INCHES X 25.4 = mm LBS. X .454 = kg								
O.D. Inches	Max. Rod Dia.	Length Inches	Part Number	Wire Dia.	Comp. rate per Inch Lbs.	Total Coils	Type of Ends	No. per Box**
.581	.438	1.00	107-111 (WA-111)	.072	74.00	6	Sq. & Gr.	12
.585	.438	3.00	107-115 (WA-115)	.072	20.00	15	Sq. & Gr.	
.588	.438	2.50	107-114 (WA-114)	.072	26.00	13	Sq. & Gr.	
.590	.438	4.00	107-117 (WA-117)	.072	16.00	19.5	Sq. & Gr.	
.594	.438	1.50	107-112 (WA-112)	.072	34.00	8	Sq. & Gr.	
.594	.438	2.00	107-113 (WA-113)	.072	32.00	11.25	Sq. & Gr.	
.600	.438	3.50	107-116 (WA-116)	.072	18.00	17.5	Sq. & Gr.	
.615	.438	2.84	020-068 (G-68)	.080	30.00	13.5	Sq. & Gr.	12
.620	.500	11.50	020-050 (G-50)	.054	1.00	60	Plain	6
.690	.469	4.06	020-067 (G-67)	.1055	58.00	18.5	Sq. & Gr.	12
.735	.563	12.00	020-049 (G-49)	.080	3.80	55	Plain	3
.755	.532	2.60	020-072 (G-72)	.1055	66.40	11	Sq. & Gr.	12
.850	.688	1.09	020-070 (G-70)	.080 Brass	22.00	4.5	Sq. & Gr.	
.860	.578	2.59	020-066 (G-66)	.135	154.00	10	Sq. & Gr.	
.870	.672	3.06	020-064 (G-64)	.0915	21.80	12	Sq. & Gr.	3
.870	.640	12.00	020-047 (G-47)	.1055	8.00	48	Plain	
.875	.625	2.03	020-065 (G-65)	.1205	110.00	8	Sq. & Gr.	12
.875	.703	10.00	020-048 (G-48)	.080	3.25	36	Plain	3
.920	.750	2.03	020-063 (G-63)	.080	16.00	8	Sq. & Gr.	12
1.000	.750	2.56	020-062 (G-62)	.1205	56.00	9.5	Sq. & Gr.	
.28X.16	.125	.50	020-078 (G-78)	.013	.87	8	Squared	
.53X.28	.125	.90	020-087 (G-87)	.072 Ph. Bronze	56.00	6	Squared	
.53X1.03X.86	.421	3.50	020-061 (G-61)	.051	1.20	13	Sq. & Gr.	
.62X.75	.453	1.00	020-058 (G-58)	.080 Brass	31.00	5.5	Sq. & Gr.	
.66X.94	.531	.93	020-057 (G-57)	.057 Ph. Bronze	6.00	5	Squared	

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Order by part number



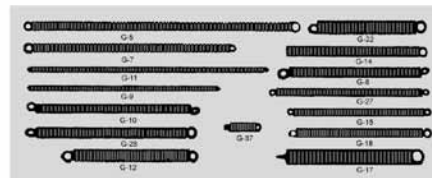
EXTENSION SPRINGS • STEEL FIXTURE										
INCHES X 25.4 = mm LBS. X .454 = kg										
O.D. Inches	Length Inches	Part Number	Wire Dia.	Coils	Approx. Initial Tension Lbs.	Rate Lbs./Inch	Max. Ext.	Max Safe Load Lbs.	Types of Ends	No. per Box**
.120	.62	020-137	.016	27	.06	3.70	.641	2.04	Full Loops	25
.120	.75	020-138	.016	34	.31	2.50	.714	2.07	Full Loops	
.120	.88	020-139	.016	44	.19	2.20	.990	2.07	Full Loops	
.156	2.06	020-035 (G-35)	.020 Brass	90	.25	.50	1.180	1.75	Full Loops	12
.156	6.62	020-011 (G-11)	.0258	232	1.50	.81	4.000	6.75	Full Loops	
.172	9.06	020-008 (G-8)	.0256	302	1.50	1.00	5.500	7.50	Full Loops	
.180	1.00	020-140	.022	32	.19	2.80	1.238	3.50	Full Loops	25
.180	1.12	020-141	.022	36	.31	2.40	1.344	3.50	Full Loops	
.180	1.25	020-142	.022	42	.04	2.20	1.700	3.50	Full Loops	
.187	1.00	020-042 (G-42)	.014	70	.12	.18	4.000	.87	Plain Ends	12
.234	1.12	020-040 (G-40)	.020	34	.50	.75	2.380	2.25	Full Loops	
.240	1.37	020-143	.026	39	.06	1.80	2.450	4.27	Full Loops	
.240	1.50	020-144	.026	42	.22	1.60	2.540	4.27	Full Loops	25
.240	1.75	020-145	.026	53	.25	1.37	3.177	4.27	Full Loops	
.250	4.00	020-020 (G-20)	.0286	118	.25	.81	1.500	4.00	Full Loops	12

**Springs priced and sold individually, but may also be ordered in a box of this quantity.

EXTENSION SPRING ASSORTMENT

020-835 R-35

- (2) G-5 (2) G-9 (2) G-12 (2) G-8 (2) G-18
- (2) G-7 (2) G-10 (2) G-22 (2) G-27 (2) G-17
- (2) G-11 (2) G-28 (2) G-14 (2) G-15 (2) G-37



UTILITY SPRINGS



EXTENSION SPRINGS • STEEL FIXTURE											
O.D. Inches	Length Inches	Part Number	Wire Diameter	Coils	Approx. Initial Tension Lbs.	Rate Per Inch Lbs.	Max. Ext.	Max. Safe Load Lbs.	Types of Ends	No. per Box**	
.250	5.34	020-018 (G-18)	.041	118	5.50	5.00	3.000	17.00	Full Loops	12	
.250	5.75	020-017 (G-17)	.0286	181	.62	.44	2.250	4.50	Full Loops		
.265	6.12	020-016 (G-16)	.0348	153	1.75	1.10	5.500	9.25	Full Loops, side		
.296	1.12	020-039 (G-39)	.040Brass	14.5	.50	3.80	.310	5.00	Dbl. Loops		
.296	5.75	020-015 (G-15)	.0475	108	2.00	3.60	3.500	17.00	Full Loops, side		
.312	5.00	020-026 (G-26)	.041	106	.75	1.60	4.950	11.25	Full Loops		
.328	6.50	020-010 (G-10)	.0348	162	1.25	.50	9.000	6.25	Dbl. Loops, Side		
.343	1.44	020-037 (G-37)	.0475	17	4.37	15.00	.375	17.50	Full Loops		
.343	5.37	020-027 (G-27)	.0475	103	1.12	2.60	3.620	24.00	Full Loops		
.343	8.12	020-007 (G-7)	.0475	158	2.18	1.60	7.500	16.25	Full Loops		
.359	10.00	020-005 (G-5)	.054	193.5	1.50	2.30	8.000	20.00	Full Loops	25	
.360	1.50	020-146	.037	25	.19	3.40	2.385	7.80	Full Loops		
.360	1.75	020-147	.037	29	.38	2.60	2.700	7.83	Full Loops		
.360	2.00	020-148	.037	36	.56	2.20	3.268	7.80	Full Loops		
.370	3.25	020-019 (G-19)	.041	66	1.50	1.90	4.000	8.00	Half Loops		
.370	5.50	020-014 (G-14)	.054	90	2.00	4.00	3.250	15.50	Full Loops		
.370	10.00	020-006 (G-6)	.0475	193.5	2.00	1.10	8.500	11.50	Full Loops		
.440	5.25	020-028 (G-28)	.0625	74	3.00	6.50	4.000	58.00	Full Loops		
.440	6.44	020-009 (G-9)	.048	118.5	2.00	1.10	7.500	10.50	Dbl. Loops		
.480	4.50	020-022 (G-22)	.0625	57.5	1.00	6.20	3.000	17.00	Full Loops		12
.500	1.62	020-034 (G-34)	.080	11	28.00	64.00	.620	67.00	Half Loops		
.500	10.00	020-004 (G-4)	.0625	144	4.50	1.87	8.500	20.50	Full Loops		
.530	5.25	020-025 (G-25)	.0625	49	3.75	5.00	4.000	21.75	Swiv. Loops		
.550	5.62	020-012 (G-12)	.080	58.5	4.00	10.00	2.620	31.00	Full Loops		
.560	5.50	020-013 (G-13)	.080	55	9.00	10.50	2.940	38.00	Half Loops		
.620	10.00	020-003 (G-3)	.072	118.5	2.44	2.10	9.500	21.50	Full Loops		
.680	4.00	*020-099 (G-99)	.1055	30.5	9.00	34.00	1.530	58.00	Half Loops		
.720	2.00	020-095 (G-95)	.105	9	11.00	80.00	.530	57.00	Full Loops		
.720	4.00	020-024 (G-24)	.1055	26	24.00	12.50	2.120	82.00	Half Loops	12	
.740	4.06	020-023 (G-23)	.0625	45	1.50	1.40	6.500	12.00	Full Loops		
.750	2.59	020-032 (G-32)	.1055	13	12.25	46.00	.810	44.00	Full Loops		
.750	2.66	020-033 (G-33)	.080	18.5	2.25	10.30	4.000	47.00	Full Loops		
.810	10.00	020-002 (G-2)	.072	119	4.12	.75	21.000	23.12	Full Loops		
.870	6.00	*020-029 (G-29)	.1205	38.5	8.00	18.50	2.380	68.20	Half Loops		
.870	10.00	020-001 (G-1)	.0915	94	4.38	2.50	11.000	30.50	Full Loops		3
1.000	8.50	020-031 (G-31)	.1055	65	9.00	6.00	8.500	41.00	Half Loops		
1.060	8.00	*020-030 (G-30)	.135	49	13.00	24.00	5.000	45.00	Half Loops		6
1.120	10.00	*020-100 (G-100)	.148	59	8.00	14.00	6.000	95.00	Half Loops		
1.250	12.00	*020-101 (G-101)	.162	65	31.00	15.00	7.400	112.00	Half Loops		
1.370	14.00	*020-102 (G-102)	.177	70	14.00	14.00	8.750	130.00	Half Loops		
1.560	16.00	*020-103 (G-103)	.207	70	32.00	16.00	9.000	175.00	Half Loops		
1.250	7.62	020-104	.207	26	61.00	94.00	2.468	281.82	Full Loops	2	
1.812	8.19	020-105	.250	22	61.00	68.00	4.189	341.56	Full Loops		
.297	16.00	020-152	.041	15.30	2.94	.69	14.583	12.43	Full Loops	12	
.344	16.00	020-153	.048	15.125	3.19	1.06	14.445	16.72	Full Loops		
.375	16.00	020-154	.054	15.310	3.50	1.50	13.724	21.45	Full Loops		
.422	16.00	020-155	.063	15.150	5.00	2.25	11.903	29.58	Full Loops		
.438	16.00	020-156	.072	15.375	4.08	3.90	9.950	40.97	Full Loops		

**Springs priced and sold individually, but may also be ordered in a box of this quantity.

MACHINERY BRAKE & SHEAR SPRINGS

* The following part numbers identify certain standard springs described in the table above that are of oil-tempered carbon steel and specially suited to heavy duty-extension spring use. G - 29, G - 30, G - 99, G - 100, G - 101, G - 102, and G - 103 are *flagged with an asterisk to simplify finding them.*

Specials Quoted Upon Request

UTILITY SPRINGS



This is the baby of our general maintenance assortment. So when a larger stock of springs are not needed, have our midget assortment in its enameled steel case ready in each department for quick application. Kit contains 105 of 18 different extension & compression springs.

105 MIDGET SPRINGS ASSORTMENT • NO. 020-801

O.D. Inches	Length Inches	Part Number	Wire Diameter	Coils	Appr. Initial Tension Lbs.	Rate Per Inch Lbs.	Max. Ext.	Max. Safe Load Lbs.	Type of Ends	Asst. Qty.	No. per Box**
.187	1.00	020-042 (G-42)	.014	70.0	.12	.18	4.000	87.00	Plain Ends	5	12
.234	1.12	020-040 (G-40)	.020	34.0	.50	.75	2.380	2.25	Full Loops	5	
.156	2.06	020-035 (G-35)	.020 Brass	90.0	.25	.50	1.180	1.75	Full Loops	10	
.370	3.25	020-019 (G-19)	.041	66.0	1.50	1.90	4.000	8.00	Half Loops	9	
.250	4.00	020-020 (G-20)	.0286	118.0	.25	.81	1.500	4.00	Full Loops	10	
.480	4.50	020-022 (G-22)	.0625	57.5	1.00	6.20	3.000	17.00	Full Loops	5	
.440	5.25	020-028 (G-28)	.0625	74.0	3.00	6.50	4.000	58.00	Full Loops	5	
.550	5.62	020-012 (G-12)	.080	58.5	4.00	10.00	2.620	31.00	Full Loops	4	
.250	5.75	020-017 (G-17)	.0286	181.0	.62	.44	2.250	4.50	Full Loops	10	
.440	6.44	020-009 (G-9)	.048	118.5	2.00	1.10	7.500	10.50	Dbl. Loops	5	
.328	6.50	020-010 (G-10)	.0348	162.0	1.25	.50	9.000	6.25	Dbl Loop, side	10	
O.D. Inches	Max. Rod Dia.	Length Inches	Part Number	Wire Diameter	Comp. Rate Per Inch Lbs.	Total Coils	Type of Ends	Asst. Qty.	No. per Box**		
.369	.281	.78	020-086 (G-86)	.042 Brass	7.37	9.0	Sq. & Gr.	6	12		
.282	.188	1.31	020-079 (G-79)	.040	17.00	13.0	Plain	5			
.315	.266	1.96	020-081 (G-81)	.022	.56	23.5	Squared	5			
.53x1.03x.86	.421	3.50	020-061 (G-61)	.051	1.20	13.0	Sq. & Gr.	4			
.875	.703	10.00	020-048 (G-48)	.080	3.25	36.0	Plain	1		3	
.375	.266	11.50	020-052 (G-52)	.0475	2.25	88.0	Plain	3		12	
.620	.500	11.50	020-050 (G-50)	.054	1.00	60.0	Plain	3	6		

**Springs priced and sold individually, but may also be ordered in a box of this quantity.



For the small compression spring requirements, these 12 engineered sizes in quantities of 25 each make this assortment the perfect helper.

300 COMPRESSION SPRINGS ASSORTMENT • NO. 020-802

O.D. Inches	Max. Rod Diameter	Length Inches	Part Number	Wire Diameter	Comp. Rate per Inch Lbs.	Total Coils	Type of Ends	No. per Box**
.120	.078	.62	020-125	.016	6.60	13	Squared	25
	.075	.75	020-126	.016	5.30	18		
.180	.125	.75	020-127	.022	8.60	11		
	.125	1.00	020-128	.022	6.80	14		
	.125	1.12	020-129	.022	6.00	15		
	.125	1.25	020-130	.022	5.30	17		
.240	.172	1.00	020-131	.026	7.80	11		
	.172	1.25	020-132	.026	6.10	14		
	.172	1.50	020-133	.026	5.10	15		
.360	.281	1.50	020-134	.035	7.30	10		
	.281	1.75	020-135	.035	6.20	11		
	.281	2.00	020-136	.035	5.40	13		

**Springs priced and sold individually, but may also be ordered in a box of this quantity.

Schnorr Disc Springs

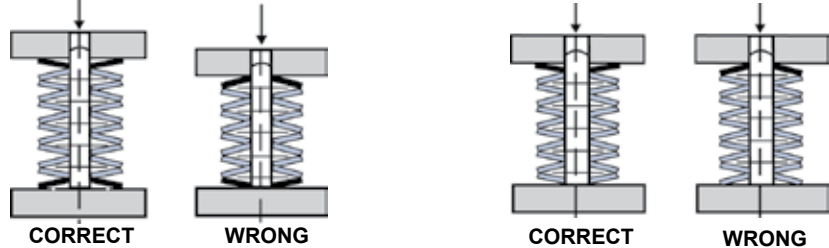
Guiding the Disc Spring

Disc springs arranged in stacks require a guide to prevent lateral movement under load. Guides may be located on the inside diameter D_i or in the outside diameter D_o of the springs, but the internal guide is to be preferred. The following values are recommended for the clearance between the guide surface and the inside or outside diameter if the spring: (chart lists values).

Using close tolerance for the guides, the clearance can be reduced a little since the inside diameter does not reduce during the stroke when the edges are at right angles to the flank. See para. 6.6.

If possible, and particularly on dynamic application, the guide rod and end thrust faces should be case hardened to a minimum of RC 55. The guide surface should be turned

to a fine finish, or better still, ground. Additionally, lubrication with a molybdenum based high pressure grease is recommended.



DISC SPRINGS MAY BE USED SINGLY OR IN COMBINATION

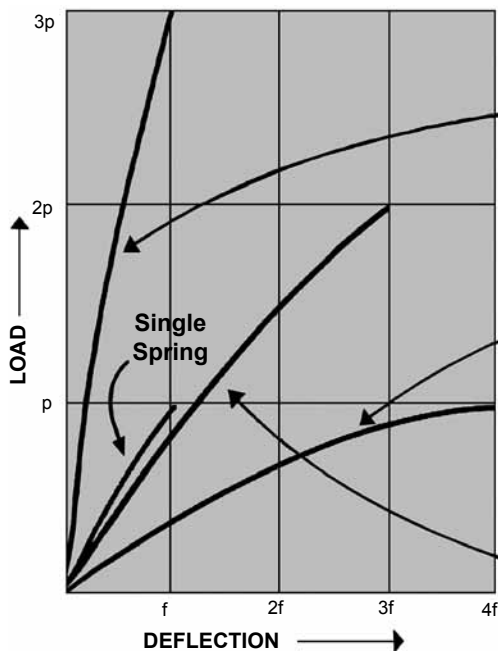
When disc springs are used in stacks, effort should be made to keep the stacks as short as possible. As the length increases so does the friction and therefore the deflection of the individual discs becomes unequal, with the greatest deflection being at the moving end. As a guide it is recommended that the stack length be restricted to approximately 3 times the outside diameter of the disc, and the largest disc diameter be used.

To ensure stackability the end springs should have their outside diameter in contact with the abutment faces. This is only possible of course with an even number of disc springs.

It is necessary to have the inside diameter in contact when the abutment faces are just a little larger than inside diameter of the disc springs.

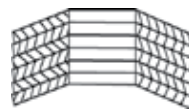
DIAMETER D_i or D_o		CLEARANCE =
over 16.0	up to 16.0	0.2
over 16.0	up to 20.0	0.3
over 20.0	up to 28.0	0.4
over 26.0	up to 31.0	0.5
over 31.5	up to 50.0	0.6
over 50.0	up to 80.0	0.8
over 80.0	up to 140.0	1.0
over 140.0	up to 250.0	1.6

Not more than 2 or 3 discs should normally be used in parallel for multiple stacks, especially under dynamic conditions where considerable heat is generated.



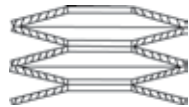
Spring Stacking – Linear or Regressive Curve

Stack of Springs in PARALLEL



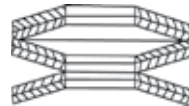
LOAD: Single spring load multiplied by the number of springs in parallel.
DEFLECTION: Same as for the single spring.

Single Springs Stacked in SERIES



LOAD: Same as for the single spring.
DEFLECTION: Single spring deflection multiplied by the number of springs in series.

Springs Stacked in SERIES – PARALLEL



LOAD: Single spring load multiplied by the number of springs in each parallel set.
DEFLECTION: Single spring deflection multiplied by the number of sets in the stack.

Schnorr Corporation has specialized in the manufacture of disc springs for more than 50 years. During this period of extraordinary technical development many applications have been found for Schnorr disc springs because of their unique characteristics and advantages.

Original **SCHNORR DISC SPRINGS** offer a number of benefits with particular mention for the following features:

1. Load/deflection curves of straight, progressive, or regressive character according to the design requirements.
2. The simple adjustment of the springs stack length by the addition or removal of individual discs, thus altering the spring stack characteristic.
3. An efficient use of space and high spring forces with small deflections.
4. Self-demanding, particularly with parallel stacking.
5. No setting or fatigue under normal loads.
6. Long service life.
7. A large range of possible applications for individual spring sizes simplifies stock-keeping.

Term and Symbols

- D—Outside diameter in millimeters/inch
- d—Inside diameter in millimeters/inch
- P—Spring load
- h—Formed height of unloaded single disc in millimeters/inch
- OH—Overall height of unloaded single disc in millimeters/inch
- f—Deflection in millimeters/inch
- t—Thickness of a single disc in millimeters/inch

Material for Disc Springs

The most important characteristic of a spring is its ability to absorb elastic deformations caused by outside loads. Because of their high load/deflection ratios disc springs are especially suitable for storing energy, dissipating shock loads, suspending moving masses, and for load measurement.

It is preferable to make a spring as small as possible, so special materials are used which are highly elastic, or which possess high tensile strength and a high elastic limit.

They should also have sufficient plastic deformation ability beyond the elastic limit to permit the manufacture of cold worked springs, as well as to minimize failure of springs under unexpectedly high loads.

The Design & Manufacturing of Disc Springs

According to the Standard DIN 2093, there are three different groups of execution:

- Group 1: under 1.25mm
- Group 2: from 1.25 to 6.0mm
- Group 3: over 6 up to 16mm

Schnorr manufactures the three groups as follows:

- Group 1: Cold formed
- Group 2: Cold formed, outside and inside diameters turned, corners on inner edge radiused.
- Group 3: Hot formed, springs turned all over, contact surfaces formed, all corners radiused, and material thickness reduced.

Tolerance

Allowable variations are laid down in Din 2093. The tolerances on disc spring diameters are H 12/h 12. The permissible tolerance for the spring force F at $s=0.75 h_0$ is given in the following table:

GROUP	SPRING THICKNESS	PERMISSIBLE DEVIATION FOR THE SPRING FORCE F AT THE TEST LENGTH $1_0 = 0.75 h_0$	
	mm	%	
1	under 1.25	+25	-7.5
	1.25 to 3.00	+15	-7.5
2	over 3.00 to 6.00	+10	-5.0
	over 6.00 to 16.00	+ 5	-5.0

The spring force must be measured on a single disc exactly as specified in the standard.

The following table gives the tolerance for the over all height OH according to DIN 2093

GROUP	SPRING THICKNESS	PERMISSIBLE DEVIATION FOR 1_0	
	mm	mm	
1	under 1.25	+0.10	-0.05
	1.25 to 2.00	+0.15	-0.08
2	over 2.00 to 3.00	+0.20	-0.10
	over 3.00 to 6.00	+0.30	-0.15
3	over 6.00 to 16.00	+0.30	-0.30

Since these tolerances were computed for disc sizes specified in DIN 2093 certain limitations must be imposed for other discs in which the dimensional ratios differ from the standard springs. This also applies in the case of "K" disc springs.

Heat Treatment

All our springs are austempered. This method of heat treatment is particularly effective for springs, as it gives the maximum toughness and therefore considerable durability.

According to DIN 2093 the hardness should be RC 42-52 and in manufacture the optimum value is selected with regard to spring size and tensile stress.

Pre-setting

After heat treatment each disc spring is scragged, i.e., pressed flat at least once. By doing so the spring is preset in such a way that the overall height OH stays within the permissible tolerance after being subject to loads up to 1.5, the maximum force at $f=h$.

Surface Protection

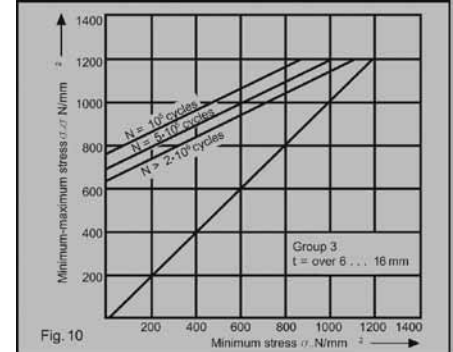
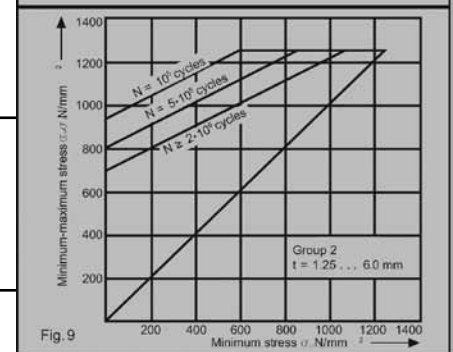
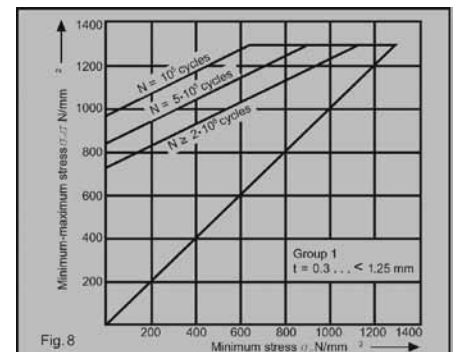
Unless stated, all our disc springs are supplied Phosphated or oil blackened before oil dipping. The Phosphated surface is preferred for the better protection it provides over oil blackening. Deposition of a metal coating on the surface is also possible. The most frequently used material is Zinc with a final passivation in Chrome solution. Unfortunately, current methods of electronically depositing metal coating from aqueous solutions cause hydrogen embrittlement which cannot be completely avoided in cases of higher tensile steels. This is the case with disc springs and safety washers. Schnorr therefore introduced a mechanical plating process which proves to be very successful over a number of years where no Hydrogen embrittlement occurs.

Since the method is carried out in a drum it is possible only with larger quantities and limitation of an external diameter up to approximately 80mm. Zinc and Cadmium are lower than steel on the electrochemical table and therefore a self protecting effect occurs in the case of surface damage.

A Chemical Nickel plating surface treatment is also possible ie, the Durni-Coat process. With this method embrittlement is also avoided to a large extent. Because of the greater hardness of the nickel layer, durability under dynamic loading comes into question. In the event of damage, no self protection occurs since nickel lies higher than steel in the electrochemical table. Further advice on specific applications can be obtained from our engineers.

Surface Working

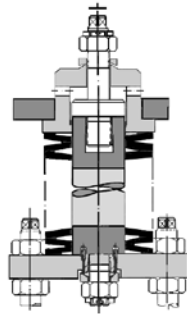
Surface working, especially by shot-peening, has proved to be beneficial for disc springs subjected to dynamic loads. The result may increase the working life far in excess for the values shown in Figs 8,9 and 10. However, as shot-peening reduces the internal tensile stresses arising from scragging, shot-peening or other methods of surface working are not recommended for discs carrying static loads.



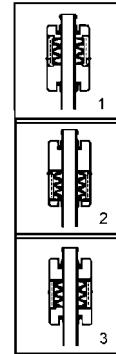
TYPICAL DISC SPRING APPLICATIONS

Shown here are just a few examples that show the versatility of Schnorr Disc Springs in industrial product. Contact our sales representatives or design engineers for assistance on your specific spring application.

- Spring
- Die Spring
- Lock Washer
- Sealing Gaskets
- Shock Loading/Absorption
- Vibration Control
- Thermal Expansion

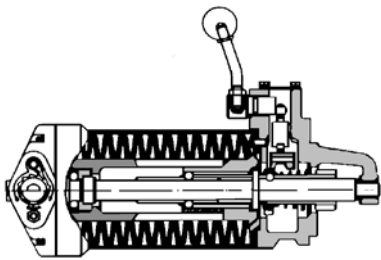


This picture shows M.A.N. steam turbine condensers weighing several hundred tons being supported by a very small number of discs arranged in 3 stacks.

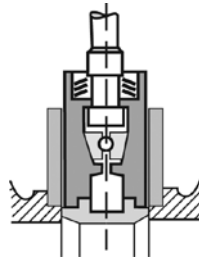


This disc spring stack is used in a pile-driving machine. The operation is shown in three typical phases.

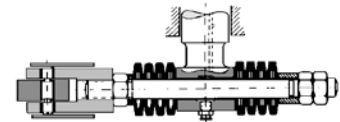
1. Initial position
2. Impact - the springs are compressed progressively from top to bottom carried out by pneumatic assistance.
3. Return to initial position also assisted by pneumatics.



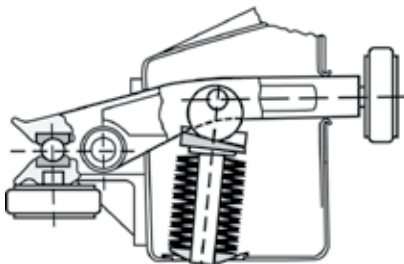
Sectional view of the starter showing the general arrangement of components. The windingspindle with ratchet is on the left.



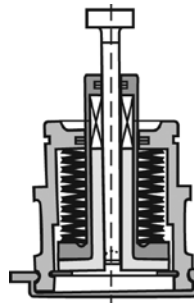
Improvement of sealing performance applies to closing the gate until the cone engages. The springs compress and the wedge forces the side plate into close water-tight contact with the valve faces.



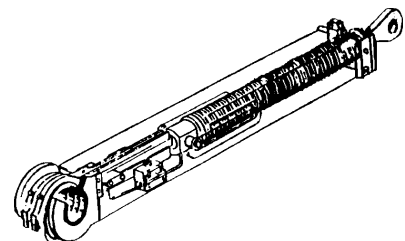
This illustration shows a shear pin assembly to a main shaft. To protect the shear pin from transient shock overload while working the connection link is fitted with double acting SCHNORR disc spring stack.



A spring with almost a "zero" rate is used for a negligible amount of force variance despite the differences in the cable diameter. Should one disc of the stack fracture, the clamping force would barely be affected and the unit would still be operational.



This device maintains a working clearance, while aircraft adjuster friction materials wear, to ensure constant fluid displacement during operation. The force/travel curve of the springs within the confines of such small assemblies must match the hydraulic pressure and friction bushings. The rate and accuracy of Schnorr Disc Springs make them ideal for these purposes.



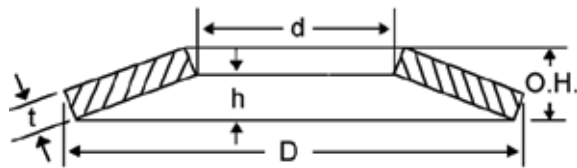
The Demag unit shown is a standard device on all cranes used to automatically compensate for load and angle. Note the small size of the disc spring stack when tremendous working loads are considered.

Disc Springs Inch Series



EN (NEWTON) = 0.102 KG INCHES X 25.4 = M
= 0.225 LB LBS. X .454 = KG

Part Number	SIZE mm			SIZE Inch					Load P - in lb., Deflection f in inch								# Bag
	O.D. D	I.D. d	Matl. t	O.D. D	I.D. d	Matl. t	Travel h	Overall Hgt. O.H.	f = 0.25 h		f = 0.50 h		f = 0.75 h		Flat = h		
									P	f	P	f	P	f	P	f	
DSZ010	9.53	4.960	0.40	.375	.195	.016	.012	.028	23	.003	41	.006	55	.008	68	.012	175
DSZ020	12.70	6.550	0.50	.500	.258	.020	.016	.035	35	.004	61	.008	82	.012	89	.016	150
DSZ030	12.70	6.550	0.60	.500	.258	.024	.016	.038	55	.004	100	.008	137	.012	171	.016	
DSZ040	17.46	9.700	0.60	.687	.382	.024	.020	.043	44	.005	75	.010	100	.015	120	.020	
DSZ050	17.46	9.700	0.70	.687	.382	.028	.020	.047	83	.005	113	.010	154	.015	180	.020	125
DSZ060	19.05	8.137	0.70	.750	.320	.028	.024	.051	61	.006	108	.012	138	.018	166	.024	
DSZ070	19.05	8.137	0.80	.750	.320	.031	.024	.055	78	.006	138	.012	184	.018	225	.024	
DSZ080	19.05	9.700	0.80	.750	.382	.031	.022	.053	74	.006	133	.011	181	.017	224	.022	75
DSZ090	19.05	9.700	0.90	.750	.382	.035	.022	.057	101	.006	185	.011	256	.017	322	.022	
DSZ100	25.40	11.310	0.90	1.000	.445	.035	.031	.067	90	.008	154	.016	201	.023	239	.031	
DSZ110	25.40	11.310	1.00	1.000	.445	.039	.031	.071	117	.008	204	.018	272	.023	330	.031	50
DSZ120	25.40	11.310	1.25	1.000	.445	.049	.026	.075	163	.007	304	.013	430	.020	549	.028	
DSZ121	28.00	13.000	1.00	1.100	.512	.039	.035	.075	119	.009	204	.018	264	.026	313	.035	
DSZ122	28.00	13.000	1.25	1.100	.512	.049	.033	.083	190	.008	342	.017	470	.025	585	.033	50
DSZ123	28.00	13.000	1.50	1.100	.512	.059	.028	.087	248	.007	470	.014	672	.021	866	.028	
DSZ130	34.92	16.175	1.25	1.375	.637	.049	.045	.094	189	.011	337	.023	434	.034	511	.045	40
DSZ140	34.92	16.175	1.50	1.375	.637	.059	.043	.102	288	.011	511	.022	693	.032	853	.043	
DSZ150	34.92	16.175	2.00	1.375	.637	.079	.031	.110	406	.008	781	.016	1130	.023	1480	.031	30
DSZ160	38.10	19.350	1.50	1.500	.762	.059	.055	.114	378	.014	638	.028	820	.041	963	.055	25
DSZ170	38.10	19.350	2.00	1.500	.762	.079	.043	.122	539	.011	1000	.022	1420	.032	1810	.043	
DSZ180	38.10	19.350	2.50	1.500	.762	.098	.035	.134	760	.008	1470	.018	2150	.026	2810	.035	
DSZ190	50.80	25.800	2.00	2.000	1.016	.078	.059	.138	476	.015	843	.030	1140	.044	1390	.059	15
DSZ200	50.80	25.800	2.50	2.000	1.016	.098	.059	.157	824	.015	1510	.030	2110	.044	2660	.059	
DSZ210	50.80	25.800	3.00	2.000	1.016	.118	.047	.165	1020	.012	1960	.024	2840	.035	3700	.047	
DSZ220	60.33	25.800	2.00	2.375	1.016	.079	.079	.157	508	.020	840	.040	1060	.059	1220	.079	10
DSZ230	60.33	25.800	2.50	2.375	1.016	.098	.079	.177	832	.020	1450	.040	1930	.058	2330	.079	
DSZ240	60.33	25.800	3.00	2.375	1.016	.118	.063	.181	964	.016	1800	.032	2540	.047	3250	.063	



Disc Spring Terminology and Symbols

- D** Outside Diameter (Inch or MM)
- d** Inside Diameter (Inch or MM)
- P** Load (Newtons or Pounds)
- OH** Overall Height (Inch or MM)
- h** Formed Height of Disc (total travel to flat) (Inch or MM)
- f** Deflection (Inch or MM)
- t** Thickness of Material (Inch or MM)

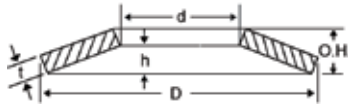
Disc Springs



EN (NEWTON) = 0.102 KG INCHES X 25.4 = M
= 0.225 LB LBS. X .454 = KG

PART NUMBER		O.D. D	I.D. d	MATL. t	O/A HGT O.H.	[f = 0.25 h]		[f = 0.50 h]		[f = 0.75 h]		[Flat f = h]		# Bag		
						Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	Load P	Defl. f			
DSM0063203	mm	6.000	3.200	0.300	0.450	45	0.038	84	0.075	119	0.113	153	0.150	250		
	Inch	0.236	0.126	0.012	0.018	10	0.001	19	0.003	27	0.004	35	0.006			
DSM0083202	mm	8.000	3.200	0.200	0.400	12	0.050	20	0.100	26	0.150	30	0.200			
	Inch	0.315	0.126	0.008	0.016	3	0.002	5	0.004	6	0.006	7	0.008			
DSM0083203	mm	8.000	3.200	0.300	0.550	46	0.063	79	0.125	104	0.188	126	0.250			
	Inch	.0315	0.126	0.012	0.022	10	0.002	18	0.005	24	0.007	28	0.010			
DSM0083204	mm	8.000	3.200	0.400	0.600	69	0.050	130	0.100	185	0.150	238	0.200			
	Inch	0.315	0.126	0.024	0.016	16	0.002	29	0.004	42	0.006	54	0.008			
DSM0084202	mm	8.000	4.200	0.200	0.450	21	0.063	33	0.125	39	0.188	42	0.250			
	Inch	0.315	0.165	0.008	0.018	5	0.002	8	0.005	9	0.007	9	0.010			
DSM0084203	mm	8.000	4.200	0.300	0.550	52	0.063	147	0.100	210	0.150	269	0.200			
	Inch	0.315	0.165	0.012	0.022	18	0.002	33	0.004	47	0.006	61	0.009			
DSM0084204	mm	8.000	4.200	0.400	0.600	78	0.050	89	0.125	118	0.188	142	0.250			
	Inch	0.315	0.165	0.016	0.024	18	0.002	20	0.005	27	0.007	32	0.010			
DSM0103203	mm	10.000	3.200	0.300	0.650	51	0.088	82	0.175	98	0.263	108	0.350		250	
	Inch	0.394	0.126	0.012	0.026	12	0.003	18	0.007	22	0.010	24	0.014			
DSM0103204	mm	10.000	3.200	0.400	0.700	75	0.075	133	0.150	179	0.225	220	0.300			
	Inch	0.394	0.126	0.016	0.028	17	0.003	30	0.006	40	0.009	50	0.012			
DSM0103205	mm	10.000	3.200	0.500	0.750	104	0.063	195	0.125	279	0.188	357	0.250			
	Inch	0.394	0.126	0.020	0.030	23	0.002	44	0.005	63	0.007	81	0.010			
DSM0105202	mm	10.000	5.200	0.250	0.550	30	0.075	48	0.150	58	0.225	63	0.300			
	Inch	0.394	0.205	0.010	0.022	7	0.003	11	0.006	13	0.009	14	0.012			
DSM0105204	mm	10.000	5.200	0.400	0.700	88	0.075	155	0.150	209	0.225	257	0.300			
	Inch	0.394	0.205	0.016	0.028	20	0.003	35	0.006	47	0.009	58	0.012			
DSM0105205	mm	10.000	5.200	0.500	0.750	122	0.063	228	0.125	325	0.188	418	0.250			
	Inch	0.394	0.205	0.020	0.030	27	0.002	52	0.005	73	0.007	94	0.010			
DMS0124204	mm	12.000	4.200	0.400	0.800	85	0.100	141	0.200	178	0.300	206	0.400	200		
	Inch	0.472	0.165	0.016	0.031	19	0.004	32	0.008	40	0.012	46	0.016			
DSM0124205	mm	12.000	4.200	0.500	0.850	116	0.088	208	0.175	284	0.263	352	0.350			
	Inch	0.472	0.165	0.020	0.033	26	0.003	47	0.007	64	0.010	79	0.014			
DSM0124206	mm	12.000	4.200	0.600	1.000	224	0.100	405	0.200	557	0.300	694	0.400			
	Inch	0.472	0.165	0.024	0.039	51	0.004	91	0.008	126	0.012	157	0.016			
DSM0125205	mm	12.000	5.200	0.500	0.900	150	0.100	263	0.200	350	0.300	424	0.400			
	Inch	0.472	0.205	0.020	0.035	34	0.004	59	0.008	79	0.012	96	0.016			
DSM0125206	mm	12.000	5.200	0.600	0.950	196	0.088	361	0.175	506	0.263	641	0.350			
	Inch	0.472	0.205	0.024	0.037	44	0.003	82	0.007	114	0.010	145	0.014			
DSM0126205	mm	12.000	6.200	0.500	0.850	134	0.088	239	0.175	326	0.263	404	0.350			
	Inch	0.472	0.244	0.020	0.033	30	0.003	54	0.007	74	0.010	91	0.014			
DSM0126206	mm	12.000	6.200	0.600	0.950	214	0.088	394	0.175	552	0.263	699	0.350			
	Inch	0.472	0.244	0.024	0.037	48	0.003	89	0.007	125	0.010	158	0.014			
DSM0135205	mm	12.500	5.200	0.500	0.850	111	0.088	200	0.175	272	0.263	337	0.350		200	
	Inch	0.492	0.205	0.020	0.033	25	0.003	45	0.007	61	0.010	76	0.014			
DSM0136203	mm	12.500	6.200	0.350	0.800	84	0.113	130	0.225	151	0.338	160	0.450			
	Inch	0.492	0.244	0.014	0.031	19	0.004	29	0.009	34	0.013	36	0.018			
DSM0136205	mm	12.500	6.200	0.500	0.850	120	0.088	215	0.175	293	0.263	363	0.350			
	Inch	0.492	0.244	0.020	0.033	27	0.003	49	0.007	66	0.010	82	0.014			
DSM0136207	mm	12.500	6.200	0.700	1.000	239	0.075	457	0.150	660	0.225	855	0.300			
	Inch	0.492	0.244	0.028	0.039	54	0.003	103	0.006	149	0.009	193	0.012			
DSM0147203	mm	14.000	7.200	0.350	0.800	68	0.113	106	0.225	123	0.338	131	0.450	200		
	Inch	0.551	0.283	0.014	0.031	15	0.004	24	0.009	28	0.013	29	0.018			
DSM0147205	mm	14.000	7.200	0.500	0.900	120	0.100	210	0.200	279	0.300	338	0.400			
	Inch	0.551	0.283	0.020	0.035	27	0.004	47	0.008	63	0.012	76	0.016			
DSM0147208	mm	14.000	7.200	0.080	1.100	284	0.075	547	0.150	797	0.225	1040	0.300			
	Inch	0.551	0.283	0.031	0.043	64	0.003	124	0.006	180	0.009	235	0.012			
DSM0155204	mm	15.000	5.200	0.400	0.950	101	0.138	154	0.275	176	0.413	181	0.550			200
	Inch	0.591	0.205	0.016	0.037	23	0.005	35	0.011	40	0.016	41	0.022			
DSM0155205	mm	15.000	5.200	0.500	1.000	133	0.125	221	0.250	278	0.375	321	0.500			
	Inch	0.591	0.205	0.020	0.039	30	0.005	50	0.010	63	0.015	72	0.020			
DSM0155206	mm	15.000	5.200	0.600	1.050	171	0.113	302	0.225	407	0.338	499	0.450			
	Inch	0.591	0.205	0.024	0.041	39	0.004	68	0.009	92	0.013	113	0.018			
DSM0155207	mm	15.000	5.200	0.700	1.100	214	0.100	395	0.200	555	0.300	704	0.400			
	Inch	0.591	0.205	0.028	0.043	48	0.004	89	0.008	125	0.012	159	0.016			
DSM0156205	mm	15.000	6.200	0.500	1.000	138	0.125	229	0.250	289	0.375	334	0.500			
	Inch	0.591	0.244	0.020	0.039	31	0.005	52	0.010	65	0.015	75	0.022			
DSM0156206	mm	15.000	6.200	0.600	1.050	178	0.113	314	0.225	423	0.338	519	0.450			
	Inch	0.591	0.244	0.024	0.041	40	0.004	71	0.009	96	0.013	117	0.018			
DSM0156207	mm	15.000	6.200	0.700	1.100	222	0.100	411	0.200	578	0.300	733	0.400			
	Inch	0.591	0.244	0.028	0.043	50	0.004	93	0.008	130	0.012	165	0.016			

Disc Springs



EN (NEWTON) = 0.102 KG INCHES X 25.4 = M
= 0.225 LB LBS. X .454 = KG

PART NUMBER		O.D. D	I.D. d	MATL. t	O/A HGT O.H.	[f = 0.25 h]		[f = 0.50 h]		[f = 0.75 h]		[Flat f = h]		# Bag
						Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	
DSM0158207	mm	15.000	8.200	0.700	1.100	256	0.100	474	0.200	666	0.300	844	0.400	200
	Inch	0.591	0.323	0.028	0.043	58	0.004	107	0.008	150	0.012	191	0.016	
DSM0158208	mm	15.000	8.200	0.800	1.200	367	0.100	689	0.200	982	0.300	1260	0.400	
	Inch	0.591	0.323	0.031	0.047	83	0.004	156	0.008	222	0.012	285	0.016	
DSM0168204	mm	16.000	8.200	0.400	0.900	84	0.125	131	0.250	154	0.375	165	0.500	
	Inch	0.630	0.323	0.016	0.035	19	0.005	30	0.010	35	0.015	37	0.020	
DSM0168206	mm	16.000	8.200	0.600	1.050	172	0.113	304	0.225	410	0.338	503	0.450	
	Inch	0.630	0.323	0.024	0.041	39	0.004	69	0.009	93	0.013	113	0.018	
DSM0168207	mm	16.000	8.200	0.700	1.150	254	0.113	461	0.225	637	0.338	798	0.450	
	Inch	0.630	0.323	0.028	0.045	57	0.004	104	0.009	144	0.013	180	0.018	
DSM0168208	mm	16.000	8.200	0.800	1.200	308	0.100	579	0.200	825	0.300	1060	0.400	
	Inch	0.630	0.323	0.031	0.047	70	0.004	131	0.008	186	0.012	239	0.016	
DSM0168209	mm	16.000	8.200	0.900	1.250	363	0.088	697	0.175	1010	0.263	1320	0.350	
	Inch	0.630	0.323	0.035	0.049	82	0.003	157	0.007	229	0.010	298	0.014	
DSM0186204	mm	18.000	6.200	0.400	1.000	85	0.150	126	0.300	139	0.450	137	0.600	
	Inch	0.709	0.244	0.016	0.039	19	0.006	28	0.012	31	0.018	31	0.024	
DSM0186205	mm	18.000	6.200	0.500	1.100	130	0.150	206	0.300	245	0.450	267	0.600	
	Inch	0.709	0.244	0.020	0.043	29	0.006	46	0.012	55	0.018	60	0.024	
DSM0186206	mm	18.000	6.200	0.600	1.200	191	0.150	317	0.300	400	0.450	462	0.600	
	Inch	0.709	0.244	0.024	0.047	43	0.006	72	0.012	90	0.018	104	0.024	
DSM0186207	mm	18.000	6.200	0.700	1.250	236	0.138	414	0.275	553	0.413	672	0.550	
	Inch	0.709	0.244	0.028	0.049	53	0.005	93	0.011	125	0.016	152	0.022	
DSM0186208	mm	18.000	6.200	0.800	1.300	286	0.125	523	0.250	726	0.375	912	0.500	
	Inch	0.709	0.244	0.031	0.051	65	0.005	118	0.010	164	0.015	206	0.020	
DSM0188205	mm	18.000	8.200	0.500	1.100	140	0.150	222	0.300	265	0.450	288	0.600	
	Inch	0.709	0.323	0.020	0.043	32	0.006	50	0.012	60	0.018	65	0.024	
DSM0188207	mm	18.000	8.200	0.700	1.250	255	0.138	446	0.275	596	0.413	725	0.550	
	Inch	0.709	0.323	0.028	0.049	57	0.005	101	0.011	135	0.016	164	0.022	
DSM0188208	mm	18.000	8.200	0.800	1.300	309	0.125	564	0.250	783	0.375	984	0.500	
	Inch	0.709	0.323	0.031	0.051	70	0.005	127	0.010	177	0.015	222	0.020	
DSM0188210	mm	18.000	8.200	1.000	1.400	425	0.100	814	0.200	1180	0.300	1540	0.400	
	Inch	0.709	0.323	0.039	0.055	96	0.004	184	0.008	267	0.012	347	0.016	
DSM0189204	mm	18.000	9.200	0.450	1.050	121	0.150	186	0.300	214	0.450	223	0.600	
	Inch	0.709	0.362	0.018	0.041	27	0.006	42	0.012	48	0.018	50	0.024	
DSM0189207	mm	18.000	9.200	0.700	1.200	233	0.125	417	0.250	566	0.375	699	0.500	
	Inch	0.709	0.362	0.028	0.047	53	0.005	94	0.010	128	0.015	158	0.020	
DSM0189210	mm	18.000	9.200	1.000	1.400	451	0.100	865	0.200	1250	0.300	1630	0.400	
	Inch	0.709	0.362	0.039	0.055	102	0.004	195	0.008	283	0.012	368	0.016	
DSM0208206	mm	20.000	8.200	0.600	1.300	214	0.175	342	0.350	412	0.525	453	0.700	
	Inch	0.787	0.323	0.024	0.051	48	0.007	77	0.014	93	0.021	102	0.028	
DSM0208207	mm	20.000	8.200	0.700	1.350	262	0.163	442	0.325	569	0.488	668	0.650	
	Inch	0.787	0.323	0.028	0.053	59	0.006	100	0.013	128	0.019	151	0.026	
DSM0208208	mm	20.000	8.200	0.800	1.400	315	0.150	557	0.300	751	0.450	920	0.600	
	Inch	0.787	0.323	0.031	0.055	71	0.006	126	0.012	170	0.018	208	0.024	
DSM0208209	mm	20.000	8.200	0.900	1.450	374	0.138	685	0.275	954	0.413	1200	0.550	
	Inch	0.787	0.323	0.035	0.057	84	0.005	155	0.011	215	0.016	271	0.022	
DSM0208210	mm	20.000	8.200	1.000	1.550	494	0.138	917	0.275	1290	0.413	1650	0.550	
	Inch	0.787	0.323	0.039	0.061	111	0.005	207	0.011	292	0.016	372	0.022	
DSM0201005	mm	20.000	10.200	0.500	1.150	141	0.163	219	0.325	254	0.488	268	0.650	
	Inch	0.787	0.402	0.020	0.045	32	0.006	49	0.013	57	0.019	61	0.026	
DSM0201008	mm	20.000	10.200	0.800	1.350	304	0.138	547	0.275	748	0.413	929	0.550	
	Inch	0.787	0.402	0.031	0.053	69	0.005	123	0.011	169	0.016	210	0.022	
DSM0201009	mm	20.000	10.200	0.900	1.450	412	0.138	754	0.275	1050	0.413	1320	0.550	
	Inch	0.787	0.402	0.035	0.057	93	0.005	170	0.011	237	0.016	299	0.022	
DSM0201010	mm	20.000	10.200	1.000	1.550	544	0.138	1010	0.275	1430	0.413	1820	0.550	
	Inch	0.787	0.402	0.039	0.061	123	0.005	228	0.011	322	0.016	410	0.022	
DMS0201011	mm	20.000	10.200	1.100	1.550	548	0.113	1050	0.225	1520	0.338	1980	0.450	
	Inch	0.787	0.402	0.043	0.061	124	0.004	237	0.009	343	0.013	446	0.018	
DSM0201012	mm	20.000	10.200	1.250	1.750	890	0.125	1710	0.250	2480	0.375	3220	0.500	
	Inch	0.787	0.402	0.049	0.069	201	0.005	385	0.010	559	0.015	727	0.020	
DSM0201015	mm	20.000	10.200	1.500	1.800	857	0.075	1700	0.150	2520	0.225	3340	0.300	
	Inch	0.787	0.402	0.059	0.071	193	0.003	383	0.006	569	0.009	754	0.012	
DSM0221106	mm	22.500	11.200	0.600	1.400	240	0.200	370	0.400	425	0.600	444	0.800	
	Inch	0.886	0.441	0.024	0.055	54	0.008	84	0.016	96	0.024	100	0.310	
DSM0221108	mm	22.500	11.200	0.800	1.450	306	0.163	533	0.325	707	0.488	855	0.650	
	Inch	0.886	0.441	0.031	0.057	69	0.006	120	0.013	160	0.019	193	0.026	
DSM0221112	mm	22.500	11.200	1.250	1.750	693	0.125	1330	0.250	1930	0.375	2510	0.500	
	Inch	0.886	0.441	0.049	0.069	156	0.005	300	0.010	435	0.015	566	0.020	

Disc Springs



EN (NEWTON) = 0.102 KG INCHES X 25.4 = M
= 0.225 LB LBS. X .454 = KG

PART NUMBER		O.D.	I.D.	MATL.	O/A HGT	[f = 0.25 h]		[f = 0.50 h]		[f = 0.75 h]		[Flat f = h]		# Bag
		D	d			t	O.H.	Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	
DSM0238207	mm	23.000	8.200	0.700	1.500	2.79	0.200	448	0.400	544	0.600	602	0.800	150
	Inch	0.906	0.323	0.028	0.059	63	0.008	101	0.016	123	0.024	136	0.031	
DSM0238208	mm	23.000	8.200	0.800	1.550	332	0.188	560	0.375	719	0.563	842	0.750	
	Inch	0.906	0.323	0.031	0.061	75	0.007	126	0.015	162	0.022	190	0.030	
DSM0238209	mm	23.000	8.200	0.900	1.600	391	0.175	687	0.350	919	0.525	1120	0.700	
	Inch	0.906	0.323	0.035	0.063	88	0.007	155	0.014	207	0.021	253	0.028	
DSM0238210	mm	23.000	8.200	1.000	1.700	507	0.175	909	0.350	1240	0.525	1540	0.700	
	Inch	0.906	0.323	0.039	0.067	115	0.007	205	0.014	280	0.021	347	0.028	
DSM0231009	mm	23.000	10.200	0.900	1.650	463	0.188	802	0.375	1060	0.563	1270	0.750	
	Inch	0.906	0.402	0.035	0.065	105	0.007	181	0.015	239	0.022	287	0.030	
DSM0231010	mm	23.000	10.200	1.000	1.700	538	0.175	964	0.350	1320	0.525	1630	0.700	
	Inch	0.906	0.402	0.039	0.067	122	0.007	218	0.014	297	0.021	368	0.028	
DSM0231012	mm	23.000	10.200	1.250	1.900	870	0.163	1630	0.325	2310	0.488	2960	0.650	
	Inch	0.906	0.402	0.049	0.075	196	0.006	367	0.013	521	0.019	667	0.026	
DSM0231210	mm	23.000	12.200	1.000	1.600	475	0.150	872	0.300	1220	0.450	1540	0.600	
	Inch	0.906	0.480	0.039	0.063	107	0.006	197	0.012	275	0.018	347	0.024	
DSM0231212	mm	23.000	12.200	1.250	1.850	863	0.150	1630	0.300	2330	0.450	3000	0.600	
	Inch	0.906	0.480	0.049	0.073	195	0.006	368	0.012	526	0.018	677	0.024	
DSM0231215	mm	23.000	12.200	1.500	2.000	1160	0.125	2250	0.250	3300	0.375	4320	0.500	
	Inch	0.906	0.480	0.059	0.079	262	0.005	508	0.010	744	0.015	975	0.020	
DSM0251010	mm	25.000	10.200	1.000	1.750	492	1.188	870	0.375	1170	0.563	1440	0.750	
	Inch	0.984	0.402	0.039	0.069	111	0.007	196	0.015	265	0.022	324	0.030	
DSM0251207	mm	25.000	12.200	0.700	1.600	331	0.225	515	0.450	600	0.675	635	0.900	
	Inch	0.984	0.480	0.028	0.063	75	0.009	116	0.018	135	0.027	143	0.035	
DSM0251209	mm	25.000	12.200	0.900	1.600	367	0.175	644	0.350	862	0.525	1050	0.700	
	Inch	0.984	0.480	0.035	0.063	83	0.007	145	0.014	195	0.021	237	0.028	
DSM0251210	mm	25.000	12.200	1.000	1.800	585	0.200	1020	0.400	1360	0.600	1650	0.800	
	Inch	0.984	0.480	0.039	0.071	132	0.008	230	0.016	307	0.024	372	0.031	
DSM0251212	mm	25.000	12.200	1.250	1.950	848	0.175	1570	0.350	2210	0.525	2810	0.700	
	Inch	0.984	0.480	0.049	0.077	192	0.007	355	0.014	550	0.021	635	0.029	
DSM0251215	mm	25.000	12.200	1.500	2.050	1040	0.138	2010	0.275	2930	0.413	3830	0.550	
	Inch	0.984	0.480	0.059	0.081	235	0.005	453	0.011	660	0.016	863	0.022	
DSM0281008	mm	28.000	10.200	0.800	1.750	348	0.238	552	0.475	662	0.713	723	0.950	
	Inch	1.102	0.402	0.031	0.069	79	0.009	125	0.019	149	0.028	163	0.037	
DSM0281010	mm	28.000	10.200	1.000	1.900	512	0.225	872	0.450	1130	0.675	1340	0.900	
	Inch	1.102	0.402	0.039	0.075	116	0.009	197	0.018	255	0.027	302	0.035	
DSM0281012	mm	28.000	10.200	1.250	2.050	736	0.200	1340	0.400	1850	0.600	2320	0.800	
	Inch	1.102	0.402	0.049	0.081	166	0.008	302	0.016	418	0.024	524	0.031	
DSM0281015	mm	28.000	10.200	1.500	2.200	1000	0.175	1900	0.350	2720	0.525	3510	0.700	
	Inch	1.102	0.402	0.059	0.087	226	0.007	429	0.014	615	0.021	792	0.028	
DSM0281210	mm	28.000	12.200	1.000	1.950	590	0.238	992	0.475	1270	0.713	1480	0.950	
	Inch	1.102	0.480	0.039	0.077	133	0.009	224	0.019	286	0.028	335	0.037	
DSM0281212	mm	28.000	12.200	1.250	2.100	844	0.213	1520	0.425	2080	0.638	2590	0.850	
	Inch	1.102	0.480	0.049	0.083	190	0.008	343	0.017	470	0.025	585	0.033	
DSM0281215	mm	28.000	12.200	1.500	2.250	1150	0.188	2160	0.375	3080	0.563	3950	0.750	
	Inch	1.102	0.480	0.059	0.089	259	0.007	487	0.015	695	0.022	891	0.030	
DSM0281408	mm	28.000	14.200	0.800	1.800	435	0.250	681	0.500	801	0.750	859	1.000	
	Inch	1.102	0.559	0.031	0.071	98	0.010	154	0.020	181	0.030	194	0.039	
DSM0281410	mm	28.000	14.200	1.000	1.800	476	0.200	832	0.400	1110	0.600	1340	0.800	
	Inch	1.102	0.559	0.039	0.071	108	0.008	188	0.016	250	0.024	303	0.031	
DSM0281412	mm	28.000	14.200	1.250	2.100	907	0.213	1630	0.425	2240	0.638	2790	0.850	
	Inch	1.102	0.559	0.049	0.083	205	0.008	369	0.017	506	0.025	629	0.033	
DSM0281415	mm	28.000	14.200	1.500	2.150	1030	0.163	1970	0.325	2840	0.488	3680	0.650	
	Inch	1.102	0.559	0.059	0.085	233	0.006	445	0.013	641	0.019	831	0.026	
DSM0311210	mm	31.500	12.200	1.000	2.100	587	0.275	951	0.550	1170	0.825	1310	1.100	
	Inch	1.240	0.480	0.039	0.083	132	0.011	215	0.022	263	0.032	295	0.043	
DSM0311212	mm	31.500	12.200	1.250	2.200	761	0.238	1340	0.475	1810	0.713	2210	0.950	
	Inch	1.240	0.480	0.049	0.087	172	0.009	303	0.019	407	0.028	498	0.037	
DSM0311215	mm	31.500	12.200	1.500	2.350	1030	0.213	1910	0.425	2690	0.638	3410	0.850	
	Inch	1.240	0.480	0.059	0.093	233	0.008	432	0.017	607	0.025	770	0.033	
DSM0311608	mm	31.500	16.300	0.800	1.850	384	0.263	594	0.525	687	0.788	722	1.050	
	Inch	1.240	0.642	0.031	0.073	87	0.010	134	0.021	155	0.031	163	0.041	
DSM0311612	mm	31.500	16.300	1.250	2.150	791	0.225	1410	0.450	1910	0.675	2360	0.900	
	Inch	1.240	0.642	0.049	0.085	178	0.009	318	0.018	432	0.027	533	0.035	

Disc Springs



EN (NEWTON) = 0.102 KG INCHES X 25.4 = M
= 0.225 LB LBS. X .454 = KG

PART NUMBER		O.D.	I.D.	MATL.	O/A	[f = 0.25 h]		[f = 0.50 h]		[f = 0.75 h]		[Flat f = h]		# Bag
		D	d		t	HGT	Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	Load P	
DSM0311615	mm	31.500	16.300	1.500	2.400	1260	0.225	2310	0.450	3230	0.675	4080	0.900	70
	Inch	1.240	0.642	0.059	0.094	284	0.009	522	0.018	729	0.027	920	0.035	
DSM0311317	mm	31.500	16.300	1.750	2.450	1390	0.175	2670	0.350	3870	0.525	5040	0.700	60
	Inch	1.240	0.642	0.069	0.096	314	0.007	602	0.014	874	0.021	1140	0.028	
DSM0311620	mm	31.500	16.300	2.000	2.750	2200	0.188	4240	0.375	6170	0.563	8050	0.750	60
	Inch	1.240	0.642	0.079	0.108	496	0.007	957	0.015	1390	0.022	1820	0.030	
DSM0341210	mm	34.000	12.300	1.000	2.250	637	0.313	998	0.625	1170	0.938	1260	1.250	90
	Inch	1.339	0.484	0.039	0.089	144	0.012	225	0.025	265	0.037	284	0.049	
DSM0341212	mm	34.000	12.300	1.250	2.350	815	0.275	1400	0.550	1820	0.825	2160	1.100	70
	Inch	1.339	0.484	0.049	0.093	184	0.011	315	0.022	410	0.032	488	0.043	
DSM0341215	mm	34.000	12.300	1.500	2.500	1100	0.250	1980	0.500	2730	0.750	3400	1.000	70
	Inch	1.339	0.484	0.059	0.098	248	0.010	447	0.020	615	0.030	767	0.039	
DSM0341412	mm	34.000	14.300	1.250	2.400	913	0.288	1550	0.575	1990	0.863	2350	1.150	60
	Inch	1.339	0.563	0.049	0.094	206	0.011	349	0.023	450	0.034	530	0.045	
DSM0341415	mm	34.000	14.300	1.500	2.550	1220	0.263	2190	0.525	2990	0.788	3700	1.050	60
	Inch	1.339	0.563	0.059	0.100	276	0.010	495	0.021	675	0.031	836	0.041	
DSM0341615	mm	34.000	16.300	1.500	2.550	1290	0.263	2310	0.525	3160	0.788	3910	1.050	50
	Inch	1.339	0.642	0.059	0.100	291	0.010	522	0.021	712	0.031	882	0.041	
DSM0341620	mm	34.000	16.300	2.000	2.850	2100	0.213	4000	0.425	5780	0.638	7500	0.850	50
	Inch	1.339	0.642	0.079	0.112	473	0.008	904	0.017	1310	0.025	1690	0.033	
DSM0351809	mm	35.500	18.300	0.900	2.050	458	0.288	712	0.575	832	0.863	884	1.150	100
	Inch	1.398	0.720	0.035	0.081	103	0.011	161	0.023	188	0.034	200	0.045	
DSM0351812	mm	35.500	18.300	1.250	2.250	731	0.250	1280	0.500	1700	0.750	2060	1.000	60
	Inch	1.398	0.720	0.049	0.089	165	0.010	288	0.020	383	0.030	465	0.039	
DSM0351820	mm	35.500	18.300	2.000	2.800	1860	0.200	3580	0.400	5190	0.600	6750	0.800	60
	Inch	1.398	0.720	0.079	0.110	421	0.008	807	0.016	1170	0.024	1520	0.031	
DSM0401412	mm	40.000	14.300	1.250	2.650	904	0.350	1460	0.700	1780	1.050	1980	1.400	50
	Inch	1.575	0.563	0.049	0.104	204	0.014	329	0.028	402	0.041	448	0.055	
DSM0401415	mm	40.000	14.300	1.500	2.750	1110	0.313	1930	0.625	2550	0.938	3060	1.250	50
	Inch	1.575	0.563	0.059	0.108	251	0.012	436	0.025	575	0.037	691	0.049	
DSM0401420	mm	40.000	14.300	2.000	3.050	1800	0.263	3360	0.525	4770	0.788	6100	1.050	40
	Inch	1.575	0.563	0.079	0.120	406	0.010	759	0.021	1080	0.031	1380	0.041	
DSM0401615	mm	40.000	16.300	1.500	2.800	1220	0.325	2100	0.650	2750	0.975	3280	1.300	45
	Inch	1.575	0.642	0.059	0.110	276	0.013	475	0.026	621	0.038	741	0.051	
DSM0401620	mm	40.000	16.300	2.000	3.100	1970	0.275	3660	0.550	5170	0.825	6580	1.100	40
	Inch	1.575	0.642	0.079	0.122	445	0.011	827	0.022	1170	0.032	1490	0.043	
DSM0401820	mm	40.000	18.300	2.000	3.150	2180	0.288	4030	0.575	5660	0.863	7170	1.150	40
	Inch	1.575	0.720	0.079	0.124	492	0.011	910	0.023	1280	0.034	1620	0.045	
DSM0402010	mm	40.000	20.400	1.000	2.300	565	0.325	876	0.650	1020	0.975	1070	1.300	50
	Inch	1.575	0.803	0.039	0.091	128	0.013	198	0.026	229	0.038	242	0.051	
DSM0402015	mm	40.000	20.400	1.500	2.650	1110	0.288	1950	0.575	2620	0.863	3200	1.150	45
	Inch	1.575	0.803	0.059	0.104	250	0.011	441	0.023	592	0.034	723	0.045	
DSM0402020	mm	40.000	20.400	2.000	3.100	2180	0.275	4040	0.550	5700	0.825	7260	1.100	40
	Inch	1.575	0.803	0.079	0.122	491	0.011	912	0.022	1290	0.032	1640	0.043	
DSM0402022	mm	40.000	20.400	2.250	3.150	2340	0.225	4480	0.450	6500	0.675	8460	0.900	35
	Inch	1.575	0.803	0.089	0.124	527	0.009	1010	0.018	1470	0.027	1910	0.035	
DSM0402025	mm	40.000	20.400	2.500	3.450	3350	0.238	6450	0.475	9390	0.713	12200	0.950	35
	Inch	1.575	0.803	0.098	0.136	756	0.009	1460	0.019	2120	0.028	2760	0.037	
DSM0452212	mm	45.000	22.400	1.250	2.850	1040	0.400	1620	0.800	1890	1.200	2010	1.600	30
	Inch	1.772	0.882	0.049	0.112	235	0.016	366	0.031	427	0.047	453	0.063	
DSM0452217	mm	45.000	22.400	1.750	3.050	1520	0.325	2700	0.650	3650	0.975	4480	1.300	30
	Inch	1.772	0.882	0.069	0.120	344	0.013	610	0.026	823	0.038	1010	0.051	
DSM0452225	mm	45.000	22.400	2.500	3.500	2770	0.250	5320	0.500	7720	0.750	10000	1.000	30
	Inch	1.772	0.882	0.098	0.138	626	0.010	1200	0.020	1740	0.030	2270	0.039	
DSM0501812	mm	50.000	18.400	1.250	2.850	757	0.400	1180	0.800	1370	1.200	1460	1.600	30
	Inch	1.969	0.724	0.049	0.112	171	0.016	266	0.031	310	0.047	329	0.063	
DSM0501815	mm	50.000	18.400	1.500	3.300	1380	0.450	2180	0.900	2610	1.350	2840	1.800	30
	Inch	1.969	0.724	0.059	0.130	311	0.018	493	0.035	588	0.053	640	0.071	
DSM0501820	mm	50.00	18.400	2.000	3.500	1920	0.375	3390	0.750	4570	1.125	5600	1.500	25
	Inch	1.969	0.724	0.079	0.138	423	0.015	766	0.030	1030	0.044	1260	0.059	
DSM0501825	mm	50.000	18.400	2.500	4.100	3700	0.400	6730	0.800	9320	1.200	11700	1.600	25
	Inch	1.969	0.724	0.098	0.161	836	0.016	1520	0.031	2100	0.047	2630	0.063	
DSM0501830	mm	50.000	18.400	3.000	4.400	5040	0.350	9550	0.700	13700	1.050	17600	1.400	20
	Inch	1.969	0.724	0.118	0.173	1140	0.014	2150	0.028	3090	0.041	3980	0.055	
DSM0502020	mm	50.000	20.400	2.000	3.500	1970	0.375	3480	0.750	4690	1.125	5750	1.500	25
	Inch	1.969	0.803	0.079	0.138	444	0.015	785	0.030	1060	0.044	1300	0.059	
DSM0502025	mm	50.000	20.400	2.500	3.850	3010	0.338	5600	0.675	7920	1.013	10100	1.350	25
	Inch	1.969	0.803	0.098	0.152	679	0.013	1260	0.027	1790	0.040	2280	0.053	

Disc Springs



EN (NEWTON) = 0.102 KG INCHES X 25.4 = M
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PART NUMBER	O.D. D	I.D. d	MATL. t	O/A HGT O.H.	[f = 0.25 h]		[f = 0.50 h]		[f = 0.75 h]		[Flat f = h]		# Bag	
					Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	Load P	Defl. f		
DSM0502220	mm	50.000	22.400	2.000	3.600	2250	0.400	3920	0.800	5220	1.200	6330	1.600	25
	Inch	1.969	0.882	0.079	0.142	507	0.016	886	0.031	1180	0.047	1430	0.063	
DSM0502225	mm	50.000	22.400	2.500	3.900	3260	0.350	6040	0.700	8510	1.050	10800	1.400	30
	Inch	1.969	0.882	0.098	0.154	736	0.014	1360	0.028	1920	0.041	2440	0.055	
DSM0502512	mm	50.000	25.400	1.250	2.850	854	0.400	1330	0.800	1550	1.200	1650	1.600	25
	Inch	1.969	1.000	0.049	0.112	193	0.016	300	0.031	350	0.047	371	0.063	
DSM0502515	mm	50.000	25.400	1.500	3.100	1240	0.400	2030	0.800	2510	1.200	2840	1.600	30
	Inch	1.969	1.000	0.059	0.122	280	0.016	458	0.031	567	0.047	642	0.063	
DSM0502520	mm	50.000	25.400	2.000	3.400	1950	0.350	3490	0.700	4760	1.050	5900	1.400	25
	Inch	1.969	1.000	0.079	0.134	440	0.014	788	0.028	1070	0.041	1330	0.055	
DSM0502525	mm	50.000	25.400	2.500	3.900	3470	0.350	6440	0.700	9060	1.050	11500	1.400	20
	Inch	1.969	1.000	0.098	0.154	784	0.014	1450	0.028	2050	0.041	2600	0.055	
DSM0502530	mm	50.000	25.400	3.000	4.100	4250	0.275	8210	0.550	12000	0.825	15600	1.100	25
	Inch	1.969	1.000	0.118	0.161	960	0.011	1850	0.022	2700	0.032	3530	0.043	
DSM0562815	mm	56.000	28.500	1.500	3.450	1460	0.488	2260	0.975	2620	1.463	2770	1.950	20
	Inch	2.205	1.122	0.059	0.136	329	0.019	510	0.038	592	0.058	624	0.077	
DSM0562820	mm	56.000	28.500	2.000	3.600	1910	0.400	3340	0.800	4440	1.200	5380	1.600	15
	Inch	2.205	1.122	0.079	0.142	431	0.016	753	0.031	1000	0.047	1210	0.063	
DSM0562830	mm	56.000	28.500	3.000	4.300	4140	0.325	7900	0.650	11400	0.975	14800	1.300	20
	Inch	2.205	1.122	0.118	0.169	935	0.013	1780	0.026	2570	0.038	3330	0.051	
DSM0602020	mm	60.000	20.500	2.000	4.100	2320	0.525	3800	1.050	4730	1.575	5380	2.100	15
	Inch	2.362	0.807	0.079	0.161	523	0.021	858	0.041	1070	0.062	1210	0.083	
DSM0602025	mm	60.000	20.500	2.500	4.300	3020	0.450	5380	0.900	7300	1.350	9010	1.800	20
	Inch	2.362	0.807	0.098	0.169	681	0.018	1210	0.035	1650	0.053	2030	0.071	
DSM0602030	mm	60.000	20.500	3.000	4.700	4450	0.425	8230	0.850	11600	1.275	14700	1.700	15
	Inch	2.362	0.807	0.118	0.185	1000	0.017	1860	0.033	2610	0.050	3320	0.067	
DSM0602525	mm	60.000	25.500	2.500	4.400	3450	0.475	6080	0.950	8180	1.425	10000	1.900	20
	Inch	2.362	1.004	0.098	0.173	778	0.019	1370	0.037	1850	0.056	2260	0.075	
DSM0602530	mm	60.000	25.500	3.000	4.650	4500	0.413	8350	0.825	11800	1.238	15000	1.650	15
	Inch	2.362	1.004	0.118	0.183	1010	0.016	1980	0.032	2660	0.049	3390	0.065	
DSM0603025	mm	60.000	30.500	2.500	4.300	3450	0.450	6150	0.900	8348	1.350	10300	1.800	10
	Inch	2.362	1.201	0.098	0.169	778	0.018	1390	0.035	1880	0.053	2320	0.071	
DSM0603030	mm	60.000	30.500	3.000	4.700	5080	0.425	9410	0.850	13200	1.275	16800	1.700	15
	Inch	2.362	1.201	0.118	0.185	1150	0.017	2120	0.033	2990	0.050	3790	0.067	
DSM0603035	mm	60.000	30.500	3.500	5.000	6590	0.375	12600	0.750	18200	1.125	23500	1.500	20
	Inch	2.362	1.201	0.138	0.197	1490	0.015	2840	0.030	4100	0.044	5310	0.059	
DSM0633118	mm	63.000	31.000	1.800	4.150	2360	0.588	3660	1.175	4240	1.763	4460	2.350	15
	Inch	2.480	1.220	0.071	0.163	534	0.023	826	0.046	957	0.069	1010	0.093	
DSM0633125	mm	63.000	31.000	2.500	4.250	2940	0.438	5270	0.875	7190	1.313	8900	1.750	10
	Inch	2.480	1.220	0.098	0.167	664	0.017	1190	0.034	1620	0.052	2010	0.069	
DSM0633130	mm	63.000	31.000	3.000	4.800	4890	0.450	8980	0.900	12500	1.350	15800	1.800	15
	Inch	2.480	1.220	0.118	0.189	1100	0.018	2030	0.035	2830	0.053	3570	0.071	
DSM0633135	mm	63.000	31.000	3.500	4.900	5400	0.350	10400	0.700	15000	1.050	19500	1.400	10
	Inch	2.490	1.220	0.138	0.193	1220	0.014	2340	0.028	3390	0.041	4410	0.055	
DSM0702520	mm	70.000	25.500	2.000	4.500	2410	0.625	3770	1.250	4440	1.875	4760	2.500	15
	Inch	2.756	1.004	0.079	0.177	544	0.025	851	0.049	1000	0.074	1070	0.098	
DSM0703025	mm	70.000	30.500	2.500	4.900	3760	0.600	6300	1.200	8030	1.800	9360	2.400	10
	Inch	2.756	1.201	0.098	0.193	848	0.024	1420	0.047	1810	0.071	2110	0.094	
DSM0703030	mm	70.000	30.500	3.000	5.100	4680	0.525	8380	1.050	11400	1.575	14200	2.100	15
	Inch	2.756	1.201	0.118	0.201	1060	0.021	1890	0.041	2580	0.062	3190	0.083	
DSM0703530	mm	70.000	35.500	3.000	5.100	5030	0.525	9010	1.050	12300	1.575	15200	2.100	10
	Inch	2.756	1.398	0.118	0.201	1130	0.021	2030	0.041	2770	0.062	3440	0.083	
DSM0703540	mm	70.000	35.500	4.000	5.800	8760	0.450	16600	0.900	23900	1.350	30900	1.800	6
	Inch	2.756	1.398	0.257	0.228	1980	0.018	3750	0.035	5400	0.053	6980	0.071	
DSM0704040	mm	70.000	40.500	4.000	5.600	8390	0.400	16100	0.800	23400	1.200	30400	1.600	5
	Inch	2.756	1.594	0.157	0.220	1890	0.016	3360	0.031	5270	0.047	6860	0.063	
DSM0704050	mm	70.000	40.500	5.000	6.000	11500	0.300	22700	0.600	33700	0.900	44500	1.200	10
	Inch	2.756	1.594	0.197	0.244	2610	0.012	5130	0.024	7600	0.035	10000	0.047	
DSM0713620	mm	71.000	36.000	2.000	4.600	2860	0.650	4430	1.300	5140	1.950	5430	2.600	10
	Inch	2.795	1.417	0.079	0.181	646	0.026	1000	0.051	1160	0.077	1220	0.102	
DSM0713625	mm	71.000	36.000	2.500	4.500	2890	0.500	5050	1.000	6730	1.500	8150	2.000	15
	Inch	2.795	1.417	0.098	0.177	653	0.020	1140	0.039	1520	0.059	1840	0.079	
DSM0713640	mm	71.000	36.000	4.000	5.600	7380	0.400	14200	0.800	20500	1.200	26700	1.600	6
	Inch	2.795	1.417	0.157	0.220	1670	0.016	3200	0.031	4640	0.047	6030	0.063	
DSM0803125	mm	80.000	31.000	2.500	5.300	3680	0.700	5930	1.400	7240	2.100	8070	2.800	8
	Inch	3.150	1.220	0.098	0.209	830	0.028	1340	0.055	1630	0.083	1820	0.110	
DSM0803130	mm	80.000	31.000	3.000	5.500	4530	0.625	7850	1.250	10400	1.875	12500	2.500	10
	Inch	3.150	1.220	0.118	0.217	1020	0.025	1770	0.049	2340	0.074	2810	0.098	

Disc Springs



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PART NUMBER		O.D.	I.D.	MATL. t	O/A HGT	[f = 0.25 h]		[f = 0.50 h]		[f = 0.75 h]		[Flat f = h]		# Bag
		D	d		O.H.	Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	Load P	Defl. f	
DSM0803140	mm	80.000	31.000	4.000	6.100	7320	0.525	13700	1.050	19400	1.575	24800	2.100	5
	Inch	3.150	1.220	0.157	0.240	1650	0.021	3090	0.041	4380	0.062	5600	0.083	
DSM0803630	mm	80.000	36.000	3.000	5.700	5400	0.675	9200	1.350	11900	2.025	14100	2.700	8
	Inch	3.150	1.417	0.118	0.224	1220	0.027	2080	0.053	2690	0.080	3180	0.106	
DSM0803640	mm	80.000	36.000	4.000	6.200	8160	0.550	15200	1.100	21400	1.650	27200	2.200	5
	Inch	3.150	1.417	0.157	0.224	1840	0.022	3420	0.043	4830	0.065	6150	0.087	
DSM0804122	mm	80.000	41.000	2.250	5.200	3700	0.738	5720	1.475	6610	2.213	6950	2.950	8
	Inch	3.150	1.614	0.089	0.205	835	0.029	1290	0.058	1490	0.087	1570	0.116	
DSM0804130	mm	80.000	41.000	3.000	5.300	4450	0.575	7840	1.150	10500	1.725	12800	2.300	8
	Inch	3.150	1.614	0.118	0.209	1000	0.023	1770	0.045	2370	0.068	2900	0.091	
DSM0804140	mm	80.000	41.000	4.000	6.200	8730	0.550	16200	1.100	22900	1.650	29100	2.200	5
	Inch	3.150	1.614	0.157	0.244	1970	0.022	3660	0.043	5160	0.065	6570	0.087	
DSM0804150	mm	80.000	41.000	5.000	6.700	11800	0.425	22900	0.850	33600	1.275	44000	1.700	4
	Inch	3.150	1.614	0.197	0.264	2670	0.017	5180	0.033	7580	0.050	9920	0.067	
DSM0904625	mm	90.000	46.000	2.500	5.700	4230	0.800	6580	1.600	7680	2.400	8160	3.200	6
	Inch	3.543	1.811	0.098	0.224	955	0.031	1490	0.063	1730	0.094	1840	0.126	
DSM0904635	mm	90.000	46.000	3.500	6.000	5840	0.625	10400	1.250	14200	1.874	17500	2.500	6
	Inch	3.543	1.811	0.138	0.236	1320	0.025	2350	0.049	3200	0.074	3950	0.098	
DSM0904650	mm	90.000	46.000	5.000	7.000	11300	0.500	21600	1.000	31400	1.500	40800	2.000	4
	Inch	3.543	1.811	0.197	0.276	2540	0.020	4880	0.039	7080	0.059	9210	0.079	
DSM1004140	mm	100.000	41.000	4.000	7.200	8710	0.800	15200	1.600	20300	2.400	24500	3.200	4
	Inch	3.937	1.614	0.157	0.283	1970	0.031	3440	0.063	4570	0.094	5540	0.126	
DSM1004150	mm	100.000	41.000	5.000	7.750	12300	0.688	22900	1.375	32400	2.063	41200	2.750	3
	Inch	3.937	1.614	0.197	0.305	2790	0.027	5180	0.054	7300	0.081	9300	0.108	
DSM1005127	mm	100.000	51.000	2.700	6.200	4780	0.875	7410	1.750	8610	2.625	9090	3.500	5
	Inch	3.937	2.008	0.106	0.244	1080	0.034	1670	0.069	1940	0.103	2050	0.138	
DSM1005135	mm	100.000	51.000	3.500	6.300	5620	0.700	9820	1.400	13100	2.100	15800	2.800	5
	Inch	3.937	2.008	0.138	0.248	1270	0.028	2220	0.055	2950	0.083	3580	0.110	
DSM1005140	mm	100.000	51.000	4.000	7.000	8760	0.750	15300	1.500	20700	2.250	25300	3.000	4
	Inch	3.937	2.008	0.157	0.276	1960	0.030	3460	0.059	4670	0.089	5720	0.118	
DSM1005150	mm	100.000	51.000	5.000	7.800	13900	0.700	25800	1.400	36300	2.100	46200	2.800	3
	Inch	3.937	2.008	0.197	0.307	3140	0.028	5830	0.055	8200	0.083	10400	0.110	
DSM1005160	mm	100.000	51.000	6.000	8.200	17100	0.550	32900	1.100	48000	1.650	62700	2.200	2
	Inch	3.937	2.008	0.236	0.323	3850	0.022	7430	0.043	10800	0.065	14200	0.087	
DSM1125730	mm	112.000	57.000	3.000	6.900	5830	0.975	9040	1.950	10500	2.925	11100	3.900	3
	Inch	4.409	2.244	0.118	0.272	1320	0.038	2040	0.077	2370	0.115	2500	0.154	
DSM1125740	mm	112.000	57.000	4.000	7.200	7640	0.800	13300	1.600	17800	2.400	21500	3.200	3
	Inch	4.409	2.244	0.157	0.283	1720	0.031	3010	0.063	4010	0.094	4860	0.126	
DSM1125760	mm	112.000	57.000	6.000	8.500	15800	0.625	30200	1.250	43700	1.875	56700	2.500	3
	Inch	4.409	2.244	0.236	0.335	3570	0.025	6820	0.049	9870	0.074	12800	0.098	
DSM1254140	mm	125.000	41.000	4.000	8.200	8500	1.050	13900	2.100	17300	3.150	19700	4.200	3
	Inch	4.921	1.614	0.157	0.323	1920	0.041	3150	0.083	3920	0.124	4450	0.165	
DSM1255140	mm	125.000	51.000	4.000	8.500	10100	1.125	16300	2.250	19800	3.375	22100	4.500	3
	Inch	4.921	2.008	0.157	0.335	2280	0.044	3670	0.089	4470	0.133	4980	0.177	
DSM1255150	mm	125.000	51.000	5.000	8.900	13100	0.975	22900	1.950	30700	2.925	37300	3.900	2
	Inch	4.921	2.008	0.197	0.350	2950	0.038	5180	0.077	6920	0.115	8430	0.154	
DSM1255160	mm	125.000	51.000	6.000	9.400	17000	0.850	31500	1.700	44300	2.550	56300	3.400	2
	Inch	4.921	2.008	0.236	0.370	3840	0.033	7110	0.067	10000	0.100	12700	0.134	
DSM1256150	mm	125.000	61.000	5.000	9.000	14600	1.000	25500	2.000	34000	3.000	41200	4.000	3
	Inch	4.921	2.402	0.197	0.354	3300	0.039	5760	0.079	7670	0.118	9290	0.157	
DSM1256160	mm	125.000	61.000	6.000	9.600	19800	0.900	36300	1.800	50700	2.700	64000	3.600	3
	Inch	4.921	2.402	0.236	0.378	4470	0.035	8200	0.071	11400	0.106	14500	0.142	
DSM1256180	mm	125.000	61.000	8.000	10.900	33200	0.725	64100	1.450	93600	2.175	122000	2.900	3
	Inch	4.921	2.402	0.315	0.429	7490	0.029	14500	0.057	21100	0.086	27600	0.114	
DSM1256435	mm	125.000	64.000	3.500	8.000	8510	1.125	13200	2.250	15400	3.375	16300	4.500	3
	Inch	4.921	2.520	0.138	0.315	1920	0.044	2990	0.089	3480	0.133	3690	0.177	
DSM1256450	mm	125.000	64.000	5.000	8.500	12200	0.875	21900	1.750	29900	2.625	37000	3.500	3
	Inch	4.921	2.520	0.197	0.335	2760	0.034	4950	0.069	6750	0.103	8360	0.138	
DSM1256480	mm	125.000	64.000	8.000	10.600	30100	0.650	58600	1.300	85900	1.950	113000	2.600	3
	Inch	4.921	2.520	0.315	0.417	6800	0.026	13200	0.051	19400	0.077	25400	0.102	
DSM1257160	mm	125.000	71.000	6.000	9.300	19500	0.825	36300	1.650	51200	2.475	65200	3.300	3
	Inch	4.921	2.795	0.236	0.366	4410	0.032	8190	0.065	11600	0.097	14700	0.130	
DSM1257180	mm	125.000	71.000	8.000	10.400	29800	0.600	58100	1.200	85500	1.800	112000	2.400	3
	Inch	4.921	2.795	0.315	0.409	6720	0.024	13100	0.047	19300	0.071	25400	0.094	
DSM1257199	mm	125.000	71.000	10.000	11.800	42000	0.450	83300	0.900	124000	1.350	165000	1.800	2
	Inch	4.921	2.795	0.394	0.465	9490	0.018	18800	0.035	28000	0.053	37200	0.071	

ADDITIONAL SPRING PRODUCTS

Dayton Lamina supplies the most extensive selection of springs and pressure control devices used in die sets, molds, fixtures and machines. Among the products stocked are the following:



JIS Springs

- True metric springs
- Manufactured and color coded to the Japanese Industrial Standard
- Five load ratings



Formathane® Urethane

- Specially formulated for metalforming
- Greater abrasion resistance
- Higher pressures with added durability



Marsh Mellow® Die Springs

- An effective alternative to costly nitrogen gas springs
- Widely used in the automotive and metal stamping industries
- Available from 1-1/8" to 6" O.D.



Custom Springs

- Unique physical attributes
- Critical tolerances
- Specific inspection or certification requirements

AMERICA'S LEADING DIE SPRING MANUFACTURER



- PROUDLY MADE IN THE USA
- EXTENSIVE NETWORK OF INVENTORY LOCATIONS AND STOCKING DISTRIBUTORS
- HOLDS MORE CLOSELY TO ADVERTISED LOADS AND DEFLECTIONS THAN OTHERS
- ISO 9001:2008 CERTIFIED

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SPECIFY DANLY AND LAMINA SPRINGS!***



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