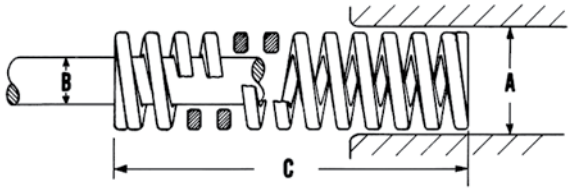
DieMax XL™ Round Wire Die Springs

Inch Sizes
Round Wire Construction



- Available in light, medium and heavy load ratings
- Manufactured with Chromium Alloy steel
- Uniform hole and rod sizes matched to conventional sizes
- SPC quality assurance
- Our quality means extra long life and reliable performance

Light Load Springs: Green

Hole Diam. (in) A	Rod Diam. (in) B	Free Length (in) C	CATALOG NUMBER	RATE Pounds Reqd. to deflect 1/10 in.	LOAD-DEFLECTION TABLE							
					Total Deflection Recommended for Long Life (25% of C)		Total Deflection Recommended for Avg. Life (30% of C)		Maximum Operating Deflection (40% of C)		Total Travel to Solid	
					Load lbs.	Defl. in.	Load lbs.	Defl. in.	Load lbs.	Defl. in.	Load lbs.	Defl. in.
3/8	3/16	3/4	9-0603-119	3.35	6	0.19	8	0.23	10	0.30	13	0.39
		1	9-0604-119	2.52	6	0.25	8	0.30	10	0.40	13	0.52
		1 1/4	9-0605-119	1.96	6	0.31	7	0.38	10	0.50	13	0.65
		1 1/2	9-0606-119	1.59	6	0.38	7	0.45	10	0.60	12	0.78
		1 3/4	9-0607-119	1.35	6	0.44	7	0.53	9	0.70	12	0.91
		2	9-0608-119	1.19	6	0.50	7	0.60	9	0.80	13	1.06
		2 1/2	9-0610-119	0.93	6	0.63	7	0.75	9	1.00	12	1.31
		3	9-0612-119	0.76	6	0.75	7	0.90	9	1.20	12	1.56
		12	9-0648-119	0.18	5	3.00	7	3.60	9	4.80	11	6.19
1/2	9/32	3/4	9-0803-119	6.45	12	0.19	15	0.23	19	0.30	24	0.37
		1	9-0804-119	4.88	12	0.25	15	0.30	20	0.40	26	0.53
		1 1/4	9-0805-119	3.71	12	0.31	14	0.38	19	0.50	25	0.66
		1 1/2	9-0806-119	3.04	11	0.38	14	0.45	18	0.60	24	0.80
		1 3/4	9-0807-119	2.54	11	0.44	13	0.53	18	0.70	24	0.94
		2	9-0808-119	2.17	11	0.5	13	0.60	17	0.80	23	1.06
		2 1/2	9-0810-119	1.68	11	0.63	13	0.75	17	1.00	22	1.31
		3	9-0812-119	1.43	11	0.75	13	0.90	17	1.20	23	1.62
		3 1/2	9-0814-119	1.22	11	0.88	13	1.05	17	1.40	23	1.90
		12	9-0848-119	0.34	10	3.00	12	3.60	16	4.80	21	6.41
5/8	11/32	3/4	9-1003-119	13.50	25	0.19	30	0.23	41	0.30	58	0.43
		1	9-1004-119	10.2	25	0.25	31	0.30	41	0.40	59	0.58
		1 1/4	9-1005-119	7.7	24	0.31	29	0.38	38	0.50	56	0.73
		1 1/2	9-1006-119	6.0	23	0.38	27	0.45	36	0.60	53	0.88
		1 3/4	9-1007-119	5.0	22	0.44	26	0.53	35	0.70	51	1.02
		2	9-1008-119	4.33	22	0.50	26	0.60	35	0.80	51	1.18
		2 1/2	9-1010-119	3.38	21	0.63	25	0.75	34	1.00	50	1.49
		3	9-1012-119	2.73	20	0.75	25	0.90	33	1.20	49	1.78
		3 1/2	9-1014-119	2.31	20	0.88	24	1.05	32	1.40	48	2.08
		4	9-1016-119	2.01	20	1.00	24	1.20	32	1.60	48	2.39
		12	9-1048-119	0.64	19	3.00	23	3.60	31	4.80	46	7.24

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DieMax XL™ Maximum Life Springs

Four load classifications – in standard ISO sizes for dies, jigs, fixtures, and general tool work.

DANLY IEM springs are offered in a range of lengths, diameters, and load classifications that conform to the ISO 10243 International Standard and the NAAMS (North American Automotive Metric Standard), including color coding for easy identification of load range.

ISO 9002 registered Quality

All of our **DANLY IEM** die springs are manufactured to ISO 9001: 2008 quality standards consistent with the **DANLY IEM** reputation for providing the stamping industry with the most carefully engineered diemakers' supplies. Comparison testing of the operating life of **DANLY IEM** die springs and competitive products have shown that **DANLY IEM** springs offer significantly longer life.

The exceptional quality of **DANLY IEM** die springs has made them popular for a wide variety of applications. For example, **DANLY IEM** die springs are commonly used in general tool work, such as jigs and fixtures, as well as in industrial clutches and brakes and as components in farm machinery and aircraft mechanisms. Many manufacturers specify **DANLY IEM** die springs because the quality and service life of these springs improves the reliability and performance of their products.

Whatever your application might be, you can be sure that the springs you select from this catalog will consistently provide rugged, dependable spring performance. They will live up to the **DANLY IEM** reputation for quality and value.

For help with your selection, or to order die springs, contact **DANLY IEM** or your authorized **DANLY IEM** distributor.

LIGHT LOAD
Green Color Coded

MEDIUM LOAD
Blue Color Coded

HEAVY LOAD
Red Color Coded

EXTRA HEAVY LOAD
Yellow Color Coded

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DieMax XL™ Maximum Life Springs

DieMax XL™ Maximum Life Springs - springs you can rely on.

A combination of enhanced raw material, optimal spring design, innovative manufacturing processes, and broad distribution channels allow the DieMax XL™ spring to yield the best, most dependable performance and availability combination, time after time.

Spring Wire

Manufactured from spring quality chromium silicon alloy steel in accordance with ASTM A1000-99 specifications. The high tensile strength and superior heat resistance wire characteristics contribute to the low-stress, long life spring design.

Enhanced Design

Our spring starts with a modified trapezoidal cross section and changes to a "D" cross section after coiling. This wire cross section, exclusive to **DANLY IEM**, has significantly lower stress levels during compression compared to competitor designs. The "D" cross section also allows for more coils per spring while providing a greater amount of spring travel to solid when compared to competitor springs.

Physical Dimensions and Load Ratings

Computer controlled coiling and spring setting equipment allow tight control over the critical spring characteristics. Every manufactured lot of DieMax XL™ springs is carefully inspected for hole/rod fit, free length, spring rate, solid height, squareness and physical appearance. All inspection results are recorded and analyzed to ensure compliance to quality standards. These tight tolerances and highly inspected attributes guarantee the springs will work freely over the rods or freely in the holes specified without binding. They also ensure that the free lengths, solid heights and spring loads are compatible from spring to spring and lot to lot for predictable, long-life performance.

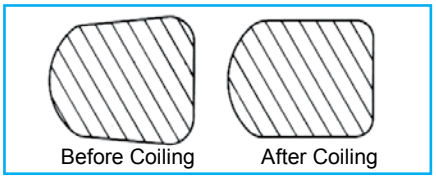
Manufacturing Processes

In addition to the optimal, low-stress spring design, the continual investment in the most advanced coiling and spring processing equipment allows **DANLY IEM** to offer a premium, long-life, mechanical spring solution. From the computer controlled spring coilers with in-line SPC data collection, the springs are routed through a series of steps including shot peening to reduce working stresses, and set removal which ensures the spring length and load will not relax in the tool.

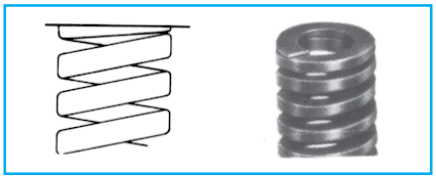
Coilers - *Using the latest in CNC coiling technology, springs are produced with much better predictability and consistency in performance, rates and lengths.*

SPC Quality Assurance - *Using SPC software, operators insure that every production process meets our high quality standards.*

Computer Controlled Spring Testing - *Utilizing custom software, spring testers track and verify consistency in spring dimensions and rates.*



Modified trapezoidal cross section of rectangular wire springs changes to a "D" cross section during coiling to achieve a low stress level that means longer spring life.



Ends of each spring are closed and ground square to assure that the spring will stand on either end and provide a maximum bearing surface.

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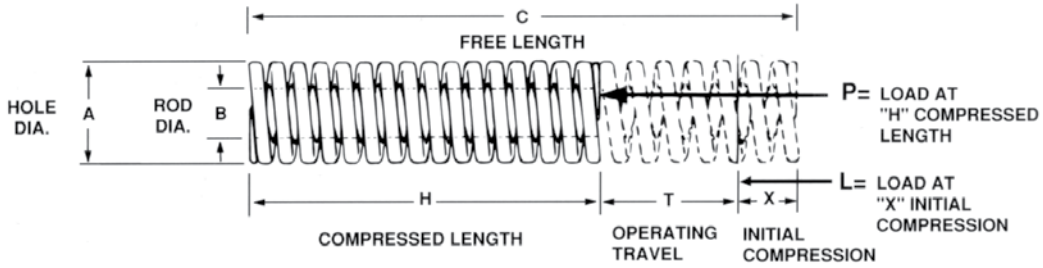
Spring Selection Steps



If the diameter and length are known, turn directly to dimension tables on pages 6 through 23 to select springs with desired total load.

If diameter and length are not known, use the following seven spring selection steps and refer to the rate column of the dimension tables for spring selection.

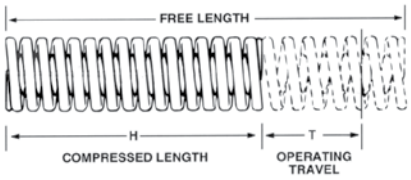
In determining the length of a spring, it should be remembered that maximum delivered spring load is obtained by selecting longer springs. For best economy and saving of space, choose Light and Medium Load springs or the Heavy Load spring having a free length equal to six times the travel, or an Extra Heavy Load spring having a free length equal to eight times the travel. If ratios lower than these are used because of height limitations, the number of springs required will be substantially increased.

Step 1

Estimate the level of production required of the die - short run, constant production, etc.

Step 2

Determine compressed spring length “H” and operating travel “T” from the die layout.



INCH

THIS CHART CONVERTS COMPRESSED LENGTHS TO FREE LENGTHS

C Free Length (in)	LIGHT LOAD H-COMPRESSED LENGTH (in)			MEDIUM LOAD H-COMPRESSED LENGTH (in)			HEAVY LOAD H-COMPRESSED LENGTH (in)			EXTRA HEAVY LOAD H-COMPRESSED LENGTH (in)		
	Long Life 25%	Average Life 30%	Maximum Deflection 40%	Long Life 25%	Average Life 30%	Maximum Deflection 37.5%	Long Life 20%	Average Life 25%	Maximum Deflection 30%	Long Life 17%	Average Life 20%	Maximum Deflection 25%
3/4	0.56	0.53	0.45	0.56	0.53	0.47	0.60	0.56	0.53	0.62	0.60	0.56
1	0.75	0.70	0.60	0.75	0.70	0.62	0.80	0.75	0.70	0.83	0.80	0.75
1 1/4	0.94	0.87	0.75	0.94	0.87	0.78	1.00	0.94	0.87	1.04	1.00	0.94
1 1/2	1.12	1.05	0.90	1.12	1.05	0.93	1.20	1.12	1.05	1.25	1.20	1.12
1 3/4	1.31	1.22	1.05	1.31	1.22	1.09	1.40	1.31	1.22	1.45	1.40	1.31
2	1.50	1.40	1.20	1.50	1.40	1.25	1.60	1.50	1.40	1.66	1.60	1.50
2 1/2	1.87	1.75	1.50	1.87	1.75	1.56	2.00	1.87	1.75	2.07	2.00	1.87
3	2.25	2.10	1.80	2.25	2.10	1.87	2.40	2.25	2.10	2.50	2.40	2.25
3 1/2	2.62	2.45	2.10	2.62	2.45	2.18	2.80	2.62	2.45	2.91	2.80	2.62
4	3.00	2.80	2.40	3.00	2.80	2.50	3.20	3.00	2.80	3.33	3.20	3.00
4 1/2	3.37	3.15	2.70	3.37	3.15	2.81	3.60	3.37	3.15	3.75	3.60	3.37
5	3.75	3.50	3.00	3.75	3.50	3.12	4.00	3.75	3.50	4.15	4.00	3.75
5 1/2	4.13	3.85	3.30	4.13	3.85	3.44	4.40	4.13	3.85	4.57	4.40	4.13
6	4.50	4.20	3.60	4.50	4.20	3.75	4.80	4.50	4.20	5.00	4.80	4.50
7	5.25	4.90	4.20	5.25	4.90	4.37	5.60	5.25	4.90	5.83	5.60	5.25
8	6.00	5.60	4.80	6.00	5.60	5.00	6.40	6.00	5.60	6.66	6.40	6.00
9	–	–	–	6.75	6.30	5.62	–	–	–	–	–	–
10	7.50	7.00	6.00	7.50	7.00	6.25	8.00	7.50	7.00	8.30	8.00	7.50
12	9.00	8.40	7.20	9.00	8.40	7.50	9.60	9.00	8.40	10.00	9.60	9.00

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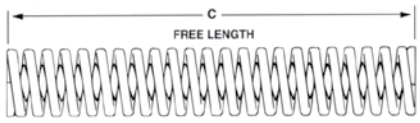
Spring Selection Steps

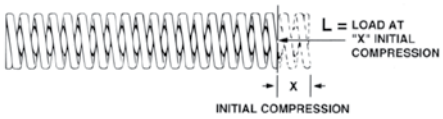
Step 3

Determine free length "C" as follows: Decide which load classification the spring should be selected from: Light, Medium, Heavy, or Extra-Heavy Load. Then choose the figure nearest the compressed length "H" required by the die design from the appropriate charts below on pages 4 and 5. Read corresponding "C" (free length).



Step 4

Estimate total initial spring load "L" required for all springs when springs are compressed "X" inches or millimeters.



Step 5

Determine "X" (initial compression) by using the following formula:

$$X = C\text{-}H\text{-}T$$

Step 6

Inch: Determine "R" (total rate for all springs in pounds per 1/10 inch) by using the following formula:

$$R = \frac{L}{10xX}$$

Metric: Determine "R" (total rate for all springs in newtons per millimeter) by using the following formula:

$$R = \frac{L}{X}$$

Step 7

Select springs as follows:

1. The free length "C" must comply with the length determined in Step 3.
2. Divide "R" in Step 6 by the number of springs to be used (if known) in order to get the rate per spring. Then refer to the following pages for the catalog number of springs having the desired rate. If the number of springs is not known, divide "R" from Step 6 by the rate of the spring you select for the correct number of springs.

METRIC

THIS CHART CONVERTS COMPRESSED LENGTHS TO FREE LENGTHS

C Free Length (mm)	LIGHT LOAD H-COMPRESSED LENGTH (mm)			MEDIUM LOAD H-COMPRESSED LENGTH (mm)			HEAVY LOAD H-COMPRESSED LENGTH (mm)			EXTRA HEAVY LOAD H-COMPRESSED LENGTH (mm)		
	Long Life 25%	Average Life 30%	Maximum Deflection 40%	Long Life 25%	Average Life 30%	Maximum Deflection 37.5%	Long Life 20%	Average Life 25%	Maximum Deflection 30%	Long Life 17%	Average Life 20%	Maximum Deflection 25%
19	14	13	11	14	13	12	15	14	13	16	15	14
25	19	18	15	19	18	16	20	19	18	21	20	19
32	24	22	19	24	22	20	26	24	22	27	26	24
38	29	27	23	29	27	24	30	29	27	32	30	29
44	33	31	26	33	31	28	35	33	31	37	35	33
51	38	36	31	38	36	32	41	38	36	42	41	38
64	48	45	38	48	45	40	51	48	45	53	51	48
76	57	53	46	57	53	47	61	57	53	63	61	57
89	67	62	53	67	62	56	71	67	62	74	71	67
102	76	71	61	76	71	64	82	76	71	85	82	76
115	86	80	68	86	80	71	91	86	80	95	91	86
127	95	89	76	95	89	79	102	95	89	105	102	95
139	105	98	84	105	98	87	112	105	98	116	112	105
152	114	106	91	114	106	95	122	114	106	126	122	114
178	133	125	107	133	125	111	142	133	125	148	142	133
203	152	142	122	152	142	127	162	152	142	168	162	152
229	–	–	–	172	160	143	–	–	–	–	–	–
254	190	178	152	190	178	159	203	190	178	211	203	190
305	229	213	183	229	213	191	244	229	213	253	244	229

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