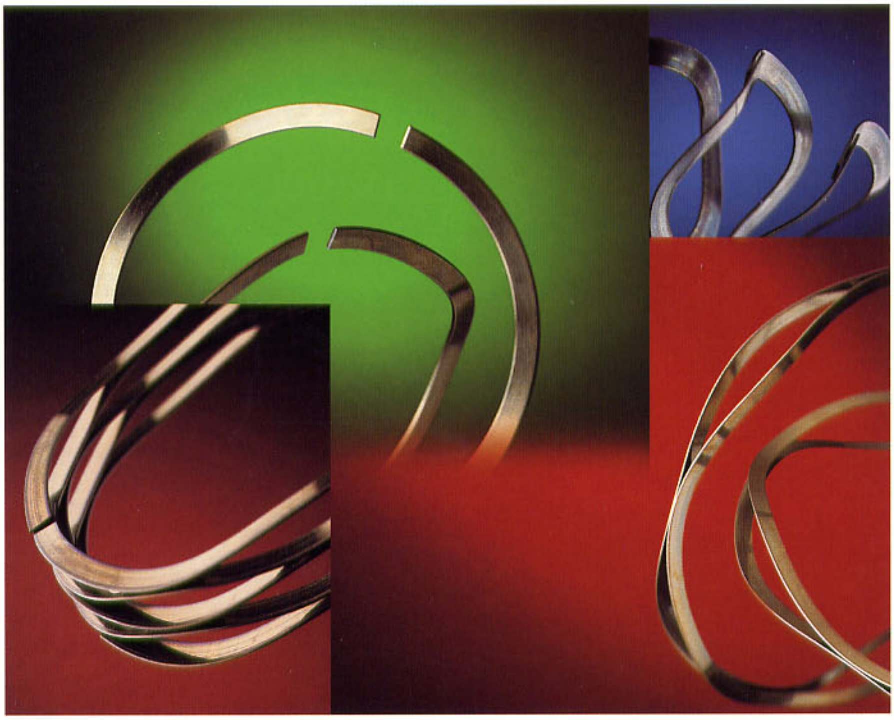
Spirolox®

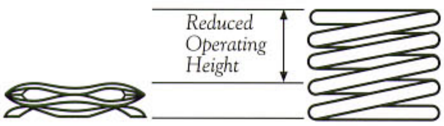
COMPRESSION WAVE SPRINGS



- **Wide choice of standard and custom designs**
- **ISO 9001 Certified**
- **Off-the-shelf delivery**

Why More Design Engineers Are Specifying Spirolox Compression Wave Springs

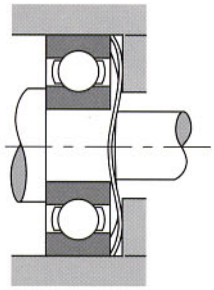
Instead of conventional round wire springs, coil springs, or wavy washers, more and more design engineers are specifying compression wave springs for taking up play and compensating for dimensional variations in tight radial and axial spaces under both static and dynamic conditions. Reason: compared to those alternatives, compact wave springs save space and provide more precise load deflection characteristics. This allows engineers to design smaller assemblies with lower free lengths and/ or lower operating heights—sometimes by as much as 50%—while improving deflection characteristics.



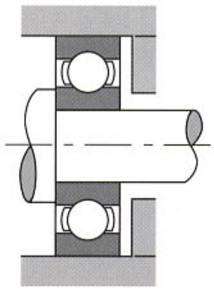
And today, more and more design engineers are specifying Spirolox wave springs for two good reasons.

First, we maintain a large supply of all popular sizes of wave springs that are ready for delivery within 24 hours of ordering. This off-the-shelf delivery means on-time assembly for you, and on-time shipments for your customers. What's more, we maintain a nationwide network of over 900 distributors. That means you can get the wave springs you want, in the quantity you want, where you want, and when you want. In short, Spirolox offers faster delivery and better service.

The other reason design engineers prefer Spirolox is because they know that as an ISO 9001-certified company, our quality-assurance program is second-to-



Wave spring eliminates diametral clearance within bearing. Result: long life.



Without wave spring, excessive clearance increases bearing wear.

none. Achieving ISO certification is no small task, and Spirolox takes great pride in this accomplishment. And in many ways, it's a natural extension of our entire quality program. ISO 9001-certification—one of the most sought-after quality certifications by companies around the world—means that we not only meet our own demanding quality standards, but our quality assurance programs also meet the standards of external auditors.

In practical terms, ISO certification means greater internal operating and manufacturing efficiencies, which is your guarantee that our products consistently meet high-quality standards. Of course, our customers have always been assured of that. But now it's officially certified.

Certification of conformance for materials used and/or finished parts is available upon request. Certification for special design requirements can also be requested when orders are placed.

Wave spring design considerations

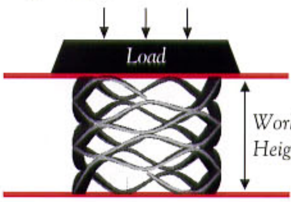
Specific wave spring applications are extremely diverse. However, there are common denominators shared by most designs that can help you determine which wave spring best suits your needs. They are: design envelope, load requirement, and operating conditions.

Design envelope—The design envelope usually consists of a bore in which the spring operates and/or a shaft which the spring clears. The spring may pilot the bore or the shaft, depending on the application. Bearing preload springs are designed to lightly contact the bore. Other wave springs "float" between the bore and shaft.

All wave springs are designed with diametral expansion in mind to prevent interference with a shaft. The distance between the loading surfaces defines the operating height of the spring.

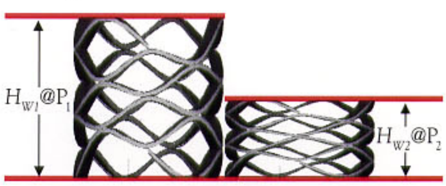
Load requirement—The load requirement may be stated in one of three ways:

1. A load requirement at a specific working height.



2. The minimum load requirement at one working height, and a maximum load requirement at another working height.

3. The specified spring rate between the minimum and maximum working heights.



Where: spring rate $K_R = \frac{\text{Load}}{\text{Deflection}}$

Operating conditions—The two most prevalent operating conditions to consider when specifying wave springs are fatigue and environment.

1. **Fatigue**—all wave springs suffer fatigue over time due to bending stresses and cyclic loading. Spirolox offers preset wave springs for handling increased load capacity and extending service life. Residual stresses are built into wave springs during the manufacturing process.

Formula for calculating stress (σ):

$$\sigma = \frac{(0.75 \bullet \pi \bullet P \bullet D_M)}{(E \bullet F^2 \bullet N^2)}$$

Design stresses for wave springs

Static/Low Cycles	
No preset	100% of tensile strength
Preset springs	150% of tensile strength

Cyclic Service	
10^4 cycle life	80% of tensile strength
10^5 cycle life	53% of tensile strength
10^6 cycle life	50% of tensile strength
10^7 cycle life	48% of tensile strength

X	Estimated Cycle Life
< .40	Under 30,000
.40 – .49	30,000 – 50,000
.50 – .55	50,001 – 75,000
.56 – .60	75,001 – 100,000
.61 – .67	100,001 – 200,000
.68 – .70	200,001 – 1,000,000
> .70	Over 1,000,000

Formula for calculating fatigue stress ratio (X):

$$X = \frac{S - \sigma_1}{S - \sigma_2}$$

Where: S = Material tensile strength

σ_1 = Calculated stress at lower work heights (must be less than S)

σ_2 = Calculated stress at upper work height

Formula for calculating spring rate (K_R):

$$K_R = \frac{P}{U} = \frac{(Z \bullet M \bullet E \bullet F^3 \bullet N^4)}{(3.88 \bullet L \bullet D_M^{\ 3})}$$

Correction Factor (Z):

N	2.5	3	3.5	4	4.5	5
Z	1.46	1.60	1.74	1.88	2.02	2.16
N	5.5	6	6.5	7	7.5 or more	
Z	2.30	2.44	2.58	2.72	2.86	

Formula for calculating diametral expansion (D_S):

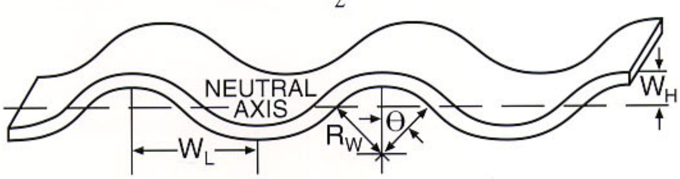
$$D_S = 0.02222 \bullet R_W \bullet N \bullet \Theta + E$$

$$\text{Where: } R_W = \frac{(4\,W_H^{\ 2} + W_L^{\ 2})}{8\,W_H}$$

$$\Theta = \text{ArcSin}\left(\frac{W_L}{2\,R_W}\right)$$

$$W_L = \frac{\pi\,D_M}{2N}$$

$$W_H = \frac{[(H_F/L) - F]}{2}$$



Variable	Units	Description
D_M	in.	Mean Diameter
D_S	in.	Solid Outer Diameter
E	in.	Spring Radial Wall
F	in.	Spring Thickness
H_F	in.	Free Height
H_W	in.	Work Height
ID	in.	Inside Diameter
K_R	lbs./in.	Spring Rate
L		Number of Turns
M	psi	Modulus of Elasticity
N		Number of Waves
OD	in.	Outside Diameter
P	lbs.	Load
R_W	in.	Effective Wave Radius
S	psi	Material Tensile Strength
U	in.	Deflection
W_H	in.	½ Wave Free Height
W_L	in.	½ Wave Length
X		Fatigue Stress Rate
Z		Correction Factor
Θ	deg.	Included Wave Angle
σ	psi	Bending Stress

2. **Environment**—Operating environments such as high temperatures and corrosive media can pose many challenges, but with careful wave spring material selections, these problems can be minimized.

Materials Selection Guide

Spirolox offers wave springs in three basic material groups:

1. Carbon steel, which is the workhorse material, is most often specified.
2. Stainless steel, which provides superior corrosion resistance. Stainless steel wave springs can be passivated.
3. Several exotic alloys.

Table 1—Available Materials

Material	Reference Specifications*	Remarks
Carbon Spring Steel	SAE 1070-1090	Carbon steel springs are normally supplied with an oil coating to protect the material against rust in normal storage. Color may vary from bright steel to dark blue. Where corrosion is a factor or finished appearance must be considered, consult factory for plating information.
17-7PH Condition C/CH900 (SC)	AMS-5529	Primarily used for applications where corrosion resistance and high strength up to 650° are required.
Stainless Steel 302 (S)	AMS 5866	No. 302 Stainless withstands all ordinary rusting and is immune to all foodstuffs. It resists nitric acid well, halogen acids poorly, and the sulphur acids moderately. Used cryogenically. Under cold work, the permeability of 302 Stainless increases and therefore is affected by a magnetic flux.
Stainless Steel 316 (SB)	AISI 316	Used where additional corrosion protection is needed in comparison to 302 Stainless Steel.
Austenetic Alloy (SN) A286	AMS-5525 excluding stress rupture, elongation, and bend testing	A286 Austenetic Alloy is used in high temperature applications (900°F) and where corrosion resistance and/or non-magnetic properties are required.
Beryllium Copper (M)	ASTM-B197, Alloy 25	Beryllium Copper is non-magnetic. It is resistant to ordinary rust, corrosion from sea water or sea air, and to most alkaline solutions. However, it has poor resistance to certain compounds of ammonia, sulphur, and mercury.

Listed primarily for chemical compositions

Note: To specify material, add suffix to the end of part number. Example: TR-87 is carbon spring steel; TR-87-SC is 17-7 stainless steel.

Table 2—Material Specifications

	T_1 Material Thickness (inches)	S Max Work Stress During Installation (Min. Tensile Strength) (psi)	S_S Shear Strength of Spring Material (psi)	δ Allowable Working Stress Under Load (psi)	M Modulus of Elasticity (psi)	Maximum Recommended Service Temp. (°F)
Carbon Spring Steel	.0067 – .0147 .0148 – .0212 .0213 – .0432 .0433 – .0790 .0791 and over	269,000 255,000 221,000 211,000 206,000	153,000 138,000 126,000 120,000 120,000	242,000 218,000 199,000 190,000 190,000	30×10^6	250° 400° 400° 400° 400°
17-7 PH Condition C/CH900 (SC)	All sizes	240,000	137,000	200,000	29.5×10^6	650°
Stainless Steel 302 (S)	.0067 – .0150 .0151 – .0220 .0221 – .0470 .0471 – .0620 .0621 – .0740 .0741 – .0890 .0891 and over	210,000 210,000 200,000 185,000 175,000 165,000 155,000	119,000 119,000 114,000 105,500 100,000 95,000 92,000	178,000 178,000 170,000 157,000 157,000 157,000 157,000	28×10^6	400° 400° 400° 400° 400° 400° 400°
Stainless Steel 316 (SB)	.0080 – .0160 .0162 – .0230 .0232 – .0480 .0482 – .0610 .0612 plus	185,000 185,000 175,000 160,000 150,000	105,000 105,000 100,000 90,000 85,000	157,000 157,000 149,000 136,000 136,000	28×10^6	400° 400° 400° 400° 400°
A286 Austenetic Alloy (SN)	All sizes	185,000	114,000	170,000	31×10^6	900°
Beryllium Copper (M)	All sizes	185,000	128,000	149,000	18.5×10^6	400°

Table 3—Available Finishes

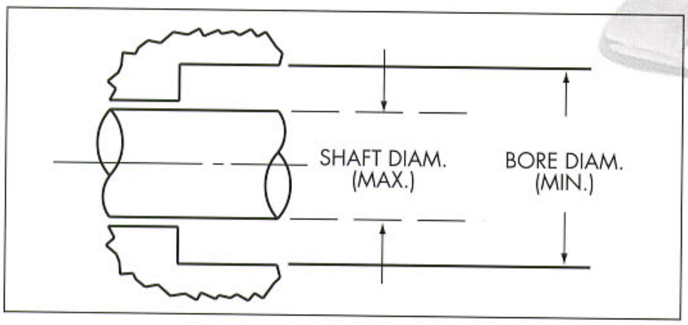
Protective Coating and Treatments	Reference Specifications	Remarks
Black Oxide (BX)	Mil-C 13924 Class 1	Used to produce a uniform, satin black finish on carbon steel. Its corrosion resistance is inferior to phosphate.
Stainless Passivated (SP)	Federal specification QQ-P-35	Used on stainless steel to remove any particles of foreign matter which may cause breaks in the shiny oxide film which theoretically provides the steel's corrosion resistance.
Phosphate Coat [Zinc Base] (L)	DOD-P-16232 Type Z, Class 2	Used for better corrosion resistance than black oxide, but not suited for severe out-of-doors service. Cannot be applied to stainless steel.

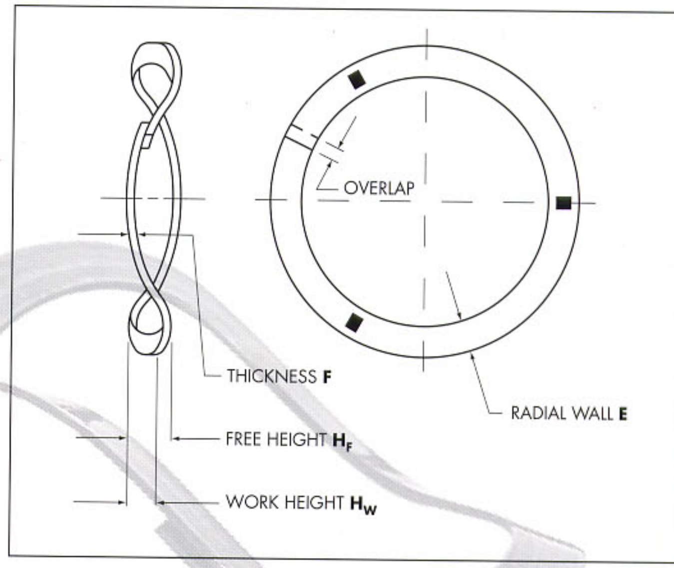
Note: Plating adds approximately .001" in width to each turn of wave spring; therefore a two-turn plated wave spring increases approximately .002" in width.

Standard Single Turn

Overlap Style—3 Waves

This space-saving series can function as a spring member and take up axial play, all while maintaining a precise spring force. Series TR-50 through TR-162 clear bore diameters ranging from .50" through 1.62", and shaft diameters from .40" through 1.31". Available in carbon steel or 17-7PH stainless steel. Other materials available (page 4). Contact factory for design assistance.





3 Wave Overlap End Construction

Inch Series

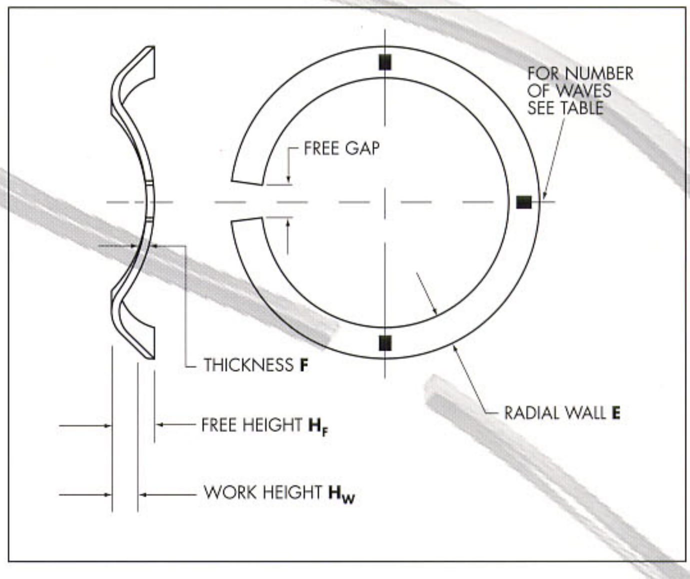
Spirolox P/N	Bore Ø Min.	Shaft Ø Max.	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number Of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate Lbs./In.* K_R
TR 50	0.50	0.40	7	0.050	0.102	3	0.008	0.041	135
TR 62	0.62	0.48	10	0.050	0.076	3	0.010	0.059	386
TR 75	0.75	0.50	14	0.062	0.11	3	0.010	0.079	318
TR 87	0.87	0.62	16	0.062	0.10	3	0.013	0.095	432
TR 100	1.00	0.78	18	0.062	0.15	3	0.013	0.095	205
TR 112	1.12	0.84	20	0.078	0.13	3	0.017	0.134	385
TR 125	1.25	0.96	22	0.078	0.15	3	0.017	0.134	306
TR 137	1.37	1.09	24	0.078	0.18	3	0.017	0.134	235
TR 150	1.50	1.17	26	0.078	0.17	3	0.019	0.144	283
TR 162	1.62	1.31	28	0.078	0.16	3	0.019	0.144	343

* *Spring rate theoretical.*
** *Material size subject to change.*

Standard Single Turn

Gap Style—4 or More Waves

These larger diameter wave springs, Series TR-175 to TR-1600, range from 1.75" through 16" bore diameter, and 1.44" through 15.14" shaft diameter. The spring force may be single use or repetitive. Available in carbon steel and 17-7PH stainless steel. Other materials available (page 4). Contact factory for design assistance.



4 Waves & Greater Gap End Construction — Inch Series

Spirolox P/N	Bore Ø Min.	Shaft Ø Max.	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number Of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate Lbs./In.* K_R
TR 175	1.75	1.44	30	0.078	0.13	4	0.019	0.144	577
TR 187	1.87	1.56	32	0.078	0.12	4	0.019	0.144	770
TR 200	2.00	1.68	34	0.093	0.14	4	0.025	0.149	723
TR 212	2.12	1.80	36	0.093	0.12	4	0.025	0.149	1187
TR 225	2.25	1.93	38	0.093	0.15	4	0.025	0.149	667
TR 237	2.37	1.99	40	0.093	0.13	4	0.025	0.169	968
TR 250	2.50	2.12	42	0.093	0.17	4	0.025	0.169	545
TR 262	2.62	2.24	44	0.093	0.15	4	0.025	0.169	713
TR 275	2.75	2.34	46	0.109	0.14	4	0.031	0.189	1295
TR 287	2.87	2.47	48	0.109	0.15	4	0.031	0.189	1132
TR 300	3.00	2.59	50	0.109	0.19	4	0.031	0.189	617
TR 312	3.12	2.71	52	0.109	0.17	4	0.031	0.189	874
TR 325	3.25	2.75	54	0.109	0.17	4	0.031	0.229	960
TR 337	3.37	2.84	56	0.109	0.17	4	0.031	0.229	857
TR 350	3.50	3.00	58	0.109	0.18	4	0.031	0.229	764
TR 362	3.62	3.12	60	0.109	0.20	4	0.031	0.229	691
TR 375	3.75	3.25	62	0.109	0.21	4	0.031	0.229	622
TR 387	3.87	3.37	64	0.109	0.22	4	0.031	0.229	568
TR 400	4.00	3.50	66	0.109	0.19	5	0.031	0.229	815
TR 412	4.12	3.62	67	0.109	0.16	5	0.031	0.229	1249
TR 425	4.25	3.74	69	0.109	0.17	5	0.031	0.229	1135

* *Spring rate theoretical.*
** *Material size subject to change.*

Standard Single Turn

4 Waves & Greater Gap End Construction (Cont.) **Inch Series**

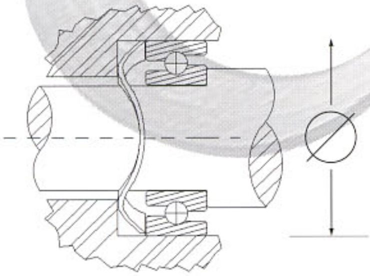
Spirolox P/N	Bore Ø Min.	Shaft Ø Max.	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number Of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate Lbs./In.* K_R
TR 437	4.37	3.86	70	0.109	0.18	5	0.031	0.229	1041
TR 450	4.50	3.99	72	0.109	0.18	5	0.031	0.229	952
TR 462	4.62	4.11	73	0.125	0.21	5	0.031	0.229	884
TR 475	4.75	4.24	75	0.125	0.22	5	0.031	0.229	814
TR 487	4.87	4.37	76	0.125	0.23	5	0.031	0.229	755
TR 500	5.00	4.49	78	0.125	0.24	5	0.031	0.229	699
TR 512	5.12	4.61	80	0.125	0.25	5	0.031	0.229	653
TR 525	5.25	4.74	82	0.125	0.26	5	0.031	0.229	608
TR 537	5.37	4.86	84	0.125	0.27	5	0.031	0.229	570
TR 550	5.50	4.99	86	0.125	0.20	6	0.031	0.229	1198
TR 562	5.62	5.11	88	0.125	0.20	6	0.031	0.229	1124
TR 575	5.75	5.24	90	0.125	0.21	6	0.031	0.229	1050
TR 587	5.87	5.36	92	0.125	0.22	6	0.031	0.229	989
TR 600	6.00	5.49	94	0.125	0.23	6	0.031	0.229	928
TR 612	6.12	5.61	96	0.125	0.23	6	0.031	0.229	877
TR 625	6.25	5.73	98	0.125	0.24	6	0.031	0.229	826
TR 637	6.37	5.86	100	0.125	0.25	6	0.031	0.229	784
TR 650	6.50	5.98	102	0.125	0.26	6	0.031	0.229	741
TR 675	6.75	6.23	104	0.125	0.28	6	0.031	0.229	668
TR 700	7.00	6.19	106	0.156	0.25	6	0.035	0.312	1158
TR 725	7.25	6.44	108	0.156	0.26	6	0.035	0.312	1034
TR 750	7.50	6.69	110	0.156	0.27	6	0.035	0.312	928
TR 775	7.75	6.94	114	0.156	0.29	6	0.035	0.312	835
TR 800	8.00	7.19	118	0.156	0.31	6	0.035	0.312	755
TR 825	8.25	7.44	122	0.156	0.33	6	0.035	0.312	685
TR 850	8.50	7.68	126	0.156	0.26	7	0.035	0.312	1224
TR 875	8.75	7.93	130	0.156	0.27	7	0.035	0.312	1117
TR 900	9.00	8.18	134	0.156	0.23	8	0.035	0.312	1838
TR 950	9.50	8.68	142	0.156	0.21	9	0.035	0.312	2483
TR 1000	10.00	9.17	150	0.156	0.23	9	0.035	0.312	2121
TR 1050	10.50	9.67	158	0.156	0.24	9	0.035	0.312	1820
TR 1100	11.00	10.17	166	0.156	0.26	9	0.035	0.312	1571
TR 1150	11.50	10.66	174	0.156	0.28	9	0.035	0.312	1368
TR 1200	12.00	11.16	182	0.156	0.31	9	0.035	0.312	1200
TR 1250	12.50	11.66	190	0.156	0.27	10	0.035	0.312	1608
TR 1300	13.00	12.16	198	0.156	0.29	10	0.035	0.312	1425
TR 1350	13.50	12.65	206	0.156	0.32	10	0.035	0.312	1271
TR 1400	14.00	13.15	214	0.156	0.25	12	0.035	0.312	2349
TR 1450	14.50	13.65	221	0.156	0.26	12	0.035	0.312	2107
TR 1500	15.00	14.13	230	0.156	0.28	12	0.035	0.312	1905
TR 1550	15.50	14.64	239	0.156	0.26	13	0.035	0.312	2365
TR 1600	16.00	15.14	248	0.156	0.27	13	0.035	0.312	2145

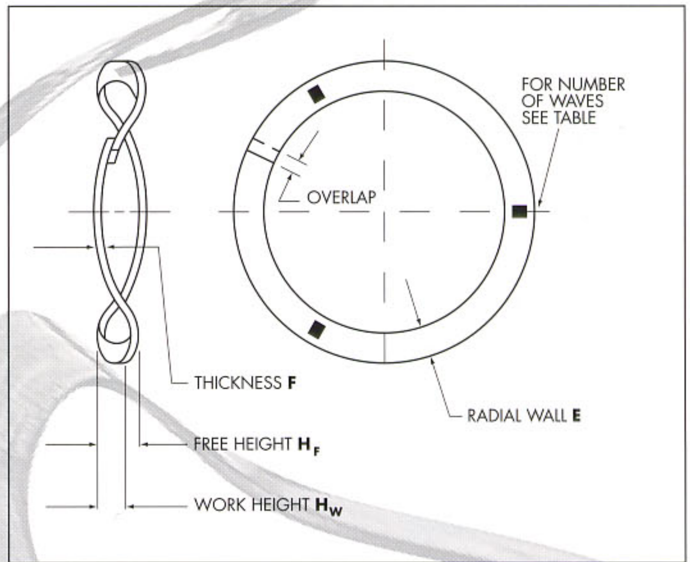
** Spring rate theoretical.*
*** Material size subject to change.*

Bearing Preload

Overlap Style—3 and 4 Waves

Designed to lightly contact the housing, these springs eliminate diametral clearance within a bearing. Series TB-63 through TB-374 correspond with popular metric bearing sizes. Sizes range from 16 mm through 95 mm bore diameter. Available in carbon steel and 17-7PH stainless steel. For bearing preload cross-references, see page 12.





3 and 4 Wave Overlap End Construction

Metric Series

Spirolox P/N	Bearing Outside Ø	Load Newtons P	Work Height H_W	Free Height H_F (Ref.)	Number Of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate N/mm* K_R
TB 63	16	44.5	1.57	2.1	3	0.25	2.00	81
TB 75	19	53.4	1.57	3.3	3	0.25	2.00	31
TB 87	22	62.3	1.57	2.4	3	0.34	2.41	75
TB 95	24	66.7	1.57	3.0	3	0.34	2.41	47
TB 102	26	71.2	1.98	2.4	3	0.43	3.40	164
TB 110	28	75.6	1.98	3.1	3	0.43	3.40	68
TB 118	30	84.5	1.98	3.3	3	0.43	3.40	64
TB 126	32	89.0	1.98	3.1	3	0.43	3.40	80
TB 138	35	97.9	1.98	3.6	3	0.43	3.40	59
TB 146	37	102.3	1.98	4.0	3	0.48	3.65	51
TB 158	40	111.2	1.98	4.7	3	0.48	3.65	41
TB 165	42	115.7	1.98	2.6	4	0.48	3.65	184
TB 185	47	129.0	1.98	3.6	4	0.48	3.65	80
TB 205	52	142.4	2.36	3.5	4	0.64	3.78	125
TB 217	55	151.3	2.36	3.2	4	0.64	3.78	189
TB 244	62	169.1	2.36	4.1	4	0.64	4.29	97
TB 268	68	186.9	2.77	3.5	4	0.79	4.80	241
TB 276	70	191.3	2.77	3.6	4	0.79	4.80	220
TB 284	72	195.8	2.77	4.3	4	0.79	4.80	128
TB 295	75	204.7	2.77	3.9	4	0.79	4.80	176
TB 315	80	218.0	2.77	5.0	4	0.79	4.80	98
TB 335	85	231.4	2.77	4.3	4	0.79	5.81	149
TB 354	90	249.2	2.77	5.6	4	0.79	5.81	88
TB 374	95	262.5	2.77	5.3	4	0.79	5.81	104

* *Spring rate theoretical.*

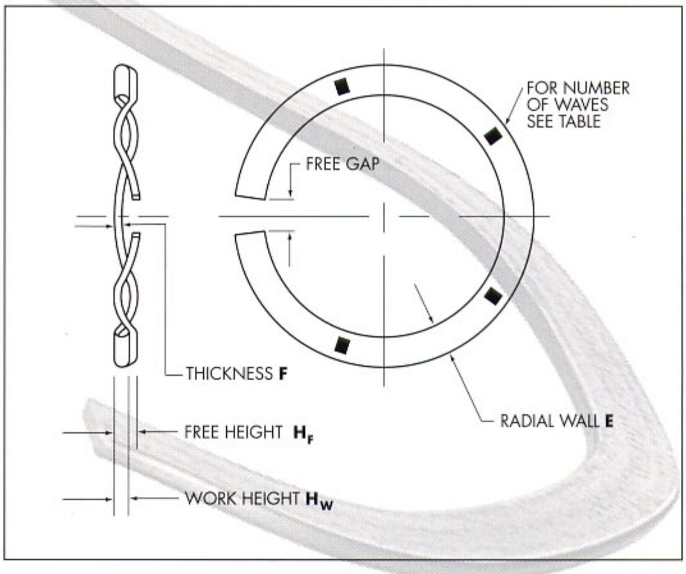
** *Material size subject to change.*

All dimensions metric.

Bearing Preload

Gap Style—5 or More Waves

Designed to lightly contact the housing, these springs eliminate diametral clearance within a bearing. Series TB-394 through TB-2284 correspond with popular metric bearing sizes. Sizes range from 100 mm through 580 mm bore diameter. Available in carbon steel and 17-7PH stainless steel. For bearing preload cross-references, see page 12.



5 Wave and Greater Gap End Construction

Metric Series

Spirolox P/N	Bearing Outside Ø	Load Newtons P	Work Height H_W	Free Height H_F (Ref.)	Number Of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate N/mm* K_R
TB 394	100	275.9	2.77	3.9	5	0.79	5.81	248
TB 413	105	289.2	2.77	4.1	5	0.79	5.81	213
TB 433	110	302.6	2.77	4.4	5	0.79	5.81	184
TB 453	115	315.9	3.18	5.2	5	0.79	5.81	160
TB 472	120	329.3	3.18	5.5	5	0.79	5.81	140
TB 492	125	342.6	3.18	6.0	5	0.79	5.81	123
TB 512	130	356.0	3.18	6.4	5	0.79	5.81	109
TB 532	135	369.3	3.18	7.0	5	0.79	5.81	97
TB 551	140	382.7	3.18	5.1	6	0.79	5.81	203
TB 571	145	396.0	3.18	5.4	6	0.79	5.81	182
TB 591	150	404.9	3.18	5.7	6	0.79	5.81	164
TB 630	160	440.5	3.18	6.5	6	0.79	5.81	134
TB 650	165	453.9	3.18	6.9	6	0.79	5.81	121
TB 669	170	467.2	3.18	7.4	6	0.79	5.81	111
TB 689	175	480.6	3.96	5.9	6	0.89	9.53	252
TB 709	180	493.9	3.96	6.1	6	0.89	9.53	230
TB 728	185	507.3	3.96	6.4	6	0.89	9.53	211
TB 748	190	520.6	3.96	6.6	6	0.89	9.53	194
TB 787	200	547.3	3.96	5.7	7	0.89	9.53	324
TB 807	205	560.7	3.96	5.8	7	0.89	9.53	299
TB 827	210	578.5	3.96	6.0	7	0.89	9.53	278
TB 847	215	591.8	3.96	6.3	7	0.89	9.53	258
TB 866	220	605.2	3.96	6.5	7	0.89	9.53	240
TB 886	225	618.5	3.96	5.6	8	0.89	9.53	381

** Spring rate theoretical.*
*** Material size subject to change.*

All dimensions metric.

Bearing Preload

5 Wave and Greater Gap End Construction (Cont.) **Metric Series**

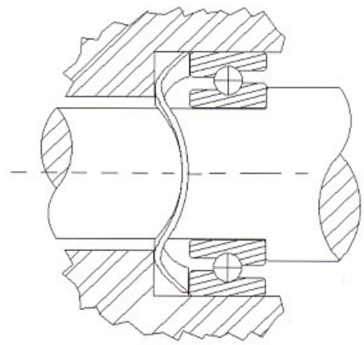
Spirolox P/N	Bearing Outside Ø	Load Newtons P	Work Height H_W	Free Height H_F (Ref.)	Number Of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate N/mm* K_R
TB 906	230	631.9	3.96	5.1	9	0.89	9.53	570
TB 925	235	645.2	3.96	5.2	9	0.89	9.53	532
TB 945	240	658.6	3.96	5.3	9	0.89	9.53	498
TB 984	250	685.3	3.96	5.5	9	0.89	9.53	439
TB 1024	260	712.0	3.96	5.8	9	0.89	9.53	388
TB 1043	265	725.3	3.96	5.9	9	0.89	9.53	366
TB 1063	270	743.1	3.96	6.1	9	0.89	9.53	345
TB 1102	280	769.8	3.96	6.5	9	0.89	9.53	308
TB 1142	290	796.5	3.96	6.8	9	0.89	9.53	276
TB 1181	300	823.2	3.96	7.3	9	0.89	9.53	249
TB 1221	310	849.9	3.96	6.1	9	1.07	9.53	392
TB 1260	320	876.6	3.96	6.4	9	1.07	9.53	355
TB 1339	340	934.5	3.96	7.1	9	1.07	9.53	295
TB 1378	350	961.1	3.96	7.5	9	1.07	9.53	270
TB 1417	360	987.9	3.96	6.6	10	1.07	9.53	377
TB 1457	370	1014.6	3.96	6.9	10	1.07	9.53	346
TB 1496	380	1041.3	3.96	7.2	10	1.07	9.53	319
TB 1535	390	1072.4	3.96	7.6	10	1.07	9.53	294
TB 1575	400	1099.1	3.96	8.0	10	1.07	9.53	272
TB 1614	410	1125.8	3.96	7.7	10	1.07	11.10	297
TB 1654	420	1152.5	3.96	8.1	10	1.07	11.10	276
TB 1693	430	1179.2	3.96	7.1	11	1.07	11.10	376
TB 1732	440	1205.9	3.96	7.4	11	1.07	11.10	350
TB 1811	460	1263.7	3.96	8.1	11	1.07	11.10	305
TB 1890	480	1317.1	3.96	7.4	12	1.07	11.10	380
TB 1969	500	1370.5	3.96	8.1	12	1.07	11.10	335
TB 2126	540	1481.8	3.96	8.0	13	1.07	11.10	364
TB 2284	580	1593.0	3.96	8.0	14	1.07	11.10	394

** Spring rate theoretical.*
*** Material size subject to change.*

All dimensions metric.

Bearing Preload Cross-Reference Guide

To select the appropriate Spirolox wave spring for your bearing size, use the handy cross-reference guide presented on this page. The numbers listed for the various categories represent standard bearing part numbers and/or the suffix of a standard bearing size.

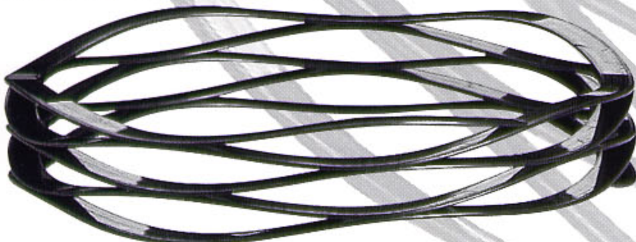


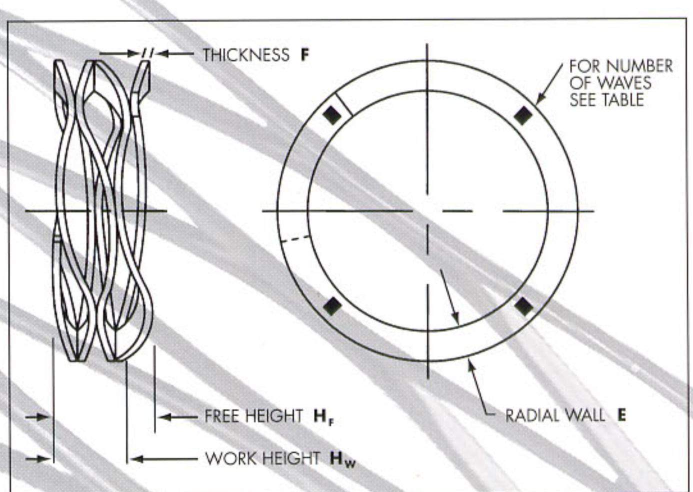
Bearing OD (mm)	Extremely Light 61900	Light 6200	Medium 6300	Heavy 6400	Spirolox Part Number
16					TB-63
19					TB-75
22	61900				TB-87
24	61901				TB-95
26					TB-102
28	61902				TB-110
30	61903	6200			TB-118
32		6201			TB-126
35		6202	6300		TB-138
37	61904		6301		TB-146
40		6203			TB-158
42	61905		6302		TB-165
47	61906	6204	6303		TB-185
52		6205	6304		TB-205
55	61907				TB-217
62	61908	6206	6305	6403	TB-244
68	61909				TB-268
70					TB-276
72	61910	6207	6306	6404	TB-284
75					TB-295
80	61911	6208	6307	6405	TB-315
85	61912	6209			TB-335
90	61913	6210	6308	6406	TB-354
95					TB-374
100	61914	6211	6309	6407	TB-394
105	61915				TB-413
110	61916	6212	6310	6408	TB-433
115					TB-453
120	61917	6213	6311	6409	TB-472
125	61918	6214			TB-492
130	61919	6215	6312	6410	TB-512
135					TB-532
140	61920	6216	6313	6411	TB-551
145	61921				TB-571
150	61922	6217	6314	6412	TB-591
160		6218	6315	6413	TB-630
165	61924				TB-650
170		6219	6316		TB-669

Bearing OD (mm)	Extremely Light 61900	Light 6200	Medium 6300	Heavy 6400	Spirolox Part Number
175					TB-689
180	61926	6220	6317	6414	TB-709
185					TB-728
190	61928	6221	6318	6415	TB-748
200		6222	6319	6416	TB-787
205					TB-807
210	61930			6417	TB-827
215		6224	6320		TB-847
220	61932				TB-866
225			6321	6418	TB-886
230	61934	6226			TB-906
235					TB-925
240			6322		TB-945
250	61936	6228		6419	TB-984
260	61938		6324		TB-1024
265				6420	TB-1043
270		6230			TB-1063
280	61940		6326		TB-1102
290		6232		6421	TB-1142
300			6328		TB-1181
310		6234			TB-1221
320		6236	6330	6422	TB-1260
340		6238	6332		TB-1339
350					TB-1378
360		6240	6334		TB-1417
370					TB-1457
380			6336		TB-1496
390					TB-1535
400		6244	6338		TB-1575
410					TB-1614
420			6340		TB-1654
430					TB-1693
440		6248	6342		TB-1732
460			6344		TB-1811
480		6252			TB-1890
500		6256	6348		TB-1969
540		6260	6352		TB-2126
580		6264	6356		TB-2284

Peak-to-Peak Springs

These springs are lighter and offer a space savings over round wire coiled springs, with the same spring force. Series CM sizes range from .625" through 2" bore diameter, and are manufactured with multiple turns. Available in light, medium, or heavy-duty spring force. Materials: carbon steel and 17-7PH stainless steel. Other materials available (page 4). Contact factory for design assistance.





Peak-to-Peak Springs — **Inch Series**

Spirolox P/N	Bore Ø	Shaft Ø	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number of Turns L	Number of Waves N	Spring Thickness F **	Radial Wall E **	Spring Rate* Lbs./In.
CML 62- 3	0.625	0.450	6	0.055	0.160	3	2.5	0.010	0.058	57
CML 62- 4	0.625	0.450	6	0.068	0.210	4	2.5	0.010	0.058	42
CML 62- 5	0.625	0.450	6	0.085	0.260	5	2.5	0.010	0.058	34
CML 62- 6	0.625	0.450	6	0.106	0.320	6	2.5	0.010	0.058	28
CML 62- 7	0.625	0.450	6	0.128	0.370	7	2.5	0.010	0.058	25
CML 62- 9	0.625	0.450	6	0.165	0.480	9	2.5	0.010	0.058	19
CML 62-11	0.625	0.450	6	0.202	0.590	11	2.5	0.010	0.058	15
CML 62-13	0.625	0.450	6	0.238	0.690	13	2.5	0.010	0.058	13
CMM 62- 3	0.625	0.450	12	0.104	0.150	3	3.5	0.010	0.058	261
CMM 62- 4	0.625	0.450	12	0.130	0.190	4	3.5	0.010	0.058	200
CMM 62- 5	0.625	0.450	12	0.175	0.250	5	3.5	0.010	0.058	160
CMM 62- 6	0.625	0.450	12	0.206	0.300	6	3.5	0.010	0.058	128
CMM 62- 7	0.625	0.450	12	0.246	0.350	7	3.5	0.010	0.058	115
CMM 62- 9	0.625	0.450	12	0.317	0.450	9	3.5	0.010	0.058	90
CMM 62-11	0.625	0.450	12	0.386	0.550	11	3.5	0.010	0.058	73
CMM 62-13	0.625	0.450	12	0.454	0.650	13	3.5	0.010	0.058	61
CML 75- 3	0.750	0.550	7	0.142	0.220	3	3.5	0.008	0.071	90
CML 75- 4	0.750	0.550	7	0.187	0.290	4	3.5	0.008	0.071	68
CML 75- 5	0.750	0.550	7	0.246	0.370	5	3.5	0.008	0.071	56
CML 75- 6	0.750	0.550	7	0.285	0.440	6	3.5	0.008	0.071	45
CML 75- 7	0.750	0.550	7	0.348	0.520	7	3.5	0.008	0.071	41
CML 75- 9	0.750	0.550	7	0.446	0.670	9	3.5	0.008	0.071	31
CML 75-12	0.750	0.550	7	0.580	0.880	12	3.5	0.008	0.071	23
CMM 75- 3	0.750	0.550	13	0.159	0.220	3	3.5	0.010	0.078	213
CMM 75- 4	0.750	0.550	13	0.203	0.290	4	3.5	0.010	0.078	149
CMM 75- 5	0.750	0.550	13	0.270	0.380	5	3.5	0.010	0.078	118
CMM 75- 6	0.750	0.550	13	0.314	0.440	6	3.5	0.010	0.078	103
CMM 75- 7	0.750	0.550	13	0.381	0.520	7	3.5	0.010	0.078	94
CMM 75- 9	0.750	0.550	13	0.489	0.670	9	3.5	0.010	0.078	72
CMM 75-12	0.750	0.550	13	0.649	0.900	12	3.5	0.010	0.078	52
CMH 75- 3	0.750	0.550	22	0.169	0.220	3	3.5	0.013	0.079	431
CMH 75- 4	0.750	0.550	22	0.215	0.280	4	3.5	0.013	0.079	338
CMH 75- 5	0.750	0.550	22	0.291	0.370	5	3.5	0.013	0.079	278
CMH 75- 6	0.750	0.550	22	0.335	0.430	6	3.5	0.013	0.079	232
CMH 75- 7	0.750	0.550	22	0.405	0.510	7	3.5	0.013	0.079	210

* *Spring rate theoretical.*
** *Material size subject to change*

Peak-to-Peak Springs (Cont.)

Inch Series

Spirolox P/N	Bore Ø	Shaft Ø	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number of Turns L	Number of Waves N	Spring Thickness F **	Radial Wall E **	Spring Rate* Lbs./In.
CMH 75- 9	0.750	0.550	22	0.526	0.670	9	3.5	0.013	0.079	153
CMH 75-12	0.750	0.550	22	0.699	0.890	12	3.5	0.013	0.079	115
CML 87- 3	0.875	0.600	12	0.117	0.190	3	3.5	0.010	0.097	164
CML 87- 4	0.875	0.600	12	0.158	0.250	4	3.5	0.010	0.097	130
CML 87- 5	0.875	0.600	12	0.207	0.320	5	3.5	0.010	0.097	106
CML 87- 6	0.875	0.600	12	0.242	0.380	6	3.5	0.010	0.097	87
CML 87- 7	0.875	0.600	12	0.287	0.450	7	3.5	0.010	0.097	74
CML 87- 9	0.875	0.600	12	0.378	0.590	9	3.5	0.010	0.097	57
CML 87-12	0.875	0.600	12	0.498	0.780	12	3.5	0.010	0.097	43
CMM 87- 3	0.875	0.600	18	0.124	0.190	3	3.5	0.012	0.094	273
CMM 87- 4	0.875	0.600	18	0.164	0.250	4	3.5	0.012	0.094	209
CMM 87- 5	0.875	0.600	18	0.214	0.320	5	3.5	0.012	0.094	170
CMM 87- 6	0.875	0.600	18	0.252	0.380	6	3.5	0.012	0.094	141
CMM 87- 7	0.875	0.600	18	0.296	0.450	7	3.5	0.012	0.094	117
CMM 87- 9	0.875	0.600	18	0.385	0.580	9	3.5	0.012	0.094	92
CMM 87-12	0.875	0.600	18	0.509	0.770	12	3.5	0.012	0.094	69
CMH 87- 3	0.875	0.600	25	0.166	0.220	3	3.5	0.014	0.094	463
CMH 87- 4	0.875	0.600	25	0.214	0.290	4	3.5	0.014	0.094	329
CMH 87- 5	0.875	0.600	25	0.278	0.370	5	3.5	0.014	0.094	272
CMH 87- 6	0.875	0.600	25	0.327	0.440	6	3.5	0.014	0.094	221
CMH 87- 7	0.875	0.600	25	0.395	0.530	7	3.5	0.014	0.094	185
CMH 87- 9	0.875	0.600	25	0.510	0.680	9	3.5	0.014	0.094	147
CMH 87-12	0.875	0.600	25	0.670	0.890	12	3.5	0.014	0.094	114
CML 100- 3	1.000	0.730	12	0.084	0.190	3	3.5	0.010	0.097	113
CML 100- 4	1.000	0.730	12	0.108	0.260	4	3.5	0.010	0.097	79
CML 100- 5	1.000	0.730	12	0.145	0.330	5	3.5	0.010	0.097	65
CML 100- 6	1.000	0.730	12	0.165	0.390	6	3.5	0.010	0.097	53
CML 100- 7	1.000	0.730	12	0.201	0.470	7	3.5	0.010	0.097	45
CML 100- 9	1.000	0.730	12	0.258	0.600	9	3.5	0.010	0.097	35
CML 100-12	1.000	0.730	12	0.342	0.800	12	3.5	0.010	0.097	26
CML 100-15	1.000	0.730	12	0.445	1.010	15	3.5	0.010	0.097	21
CML 100-18	1.000	0.730	12	0.519	1.200	18	3.5	0.010	0.097	18
CML 100-21	1.000	0.730	12	0.633	1.430	21	3.5	0.010	0.097	15
CML 100-24	1.000	0.730	12	0.710	1.620	24	3.5	0.010	0.097	13
CMM 100- 3	1.000	0.730	18	0.087	0.190	3	3.5	0.012	0.094	175
CMM 100- 4	1.000	0.730	18	0.113	0.250	4	3.5	0.012	0.094	131
CMM 100- 5	1.000	0.730	18	0.148	0.320	5	3.5	0.012	0.094	105
CMM 100- 6	1.000	0.730	18	0.175	0.380	6	3.5	0.012	0.094	88
CMM 100- 7	1.000	0.730	18	0.212	0.450	7	3.5	0.012	0.094	76
CMM 100- 9	1.000	0.730	18	0.276	0.580	9	3.5	0.012	0.094	59
CMM 100-12	1.000	0.730	18	0.360	0.770	12	3.5	0.012	0.094	44
CMM 100-15	1.000	0.730	18	0.452	0.970	15	3.5	0.012	0.094	35
CMM 100-18	1.000	0.730	18	0.549	1.170	18	3.5	0.012	0.094	29
CMM 100-21	1.000	0.730	18	0.650	1.370	21	3.5	0.012	0.094	25
CMM 100-24	1.000	0.730	18	0.720	1.540	24	3.5	0.012	0.094	22
CMH 100- 3	1.000	0.730	25	0.131	0.220	3	3.5	0.014	0.094	281
CMH 100- 4	1.000	0.730	25	0.174	0.290	4	3.5	0.014	0.094	216
CMH 100- 5	1.000	0.730	25	0.227	0.380	5	3.5	0.014	0.094	163
CMH 100- 6	1.000	0.730	25	0.266	0.450	6	3.5	0.014	0.094	136
CMH 100- 7	1.000	0.730	25	0.319	0.530	7	3.5	0.014	0.094	118
CMH 100- 9	1.000	0.730	25	0.406	0.680	9	3.5	0.014	0.094	91
CMH 100-12	1.000	0.730	25	0.541	0.900	12	3.5	0.014	0.094	70
CMH 100-15	1.000	0.730	25	0.688	1.140	15	3.5	0.014	0.094	55
CMH 100-18	1.000	0.730	25	0.813	1.350	18	3.5	0.014	0.094	47
CMH 100-21	1.000	0.730	25	0.957	1.590	21	3.5	0.014	0.094	39
CMH 100-24	1.000	0.730	25	1.083	1.800	24	3.5	0.014	0.094	35
CML 112- 3	1.125	0.850	12	0.146	0.240	3	3.5	0.012	0.094	128
CML 112- 4	1.125	0.850	12	0.186	0.320	4	3.5	0.012	0.094	90
CML 112- 5	1.125	0.850	12	0.250	0.410	5	3.5	0.012	0.094	75
CML 112- 6	1.125	0.850	12	0.295	0.490	6	3.5	0.012	0.094	62

** Spring rate theoretical.*

*** Material size subject to change.*

Peak-to-Peak Springs (Cont.)

Spirolox P/N	Bore Ø	Shaft Ø	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number of Turns L	Number of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate* Lbs./In.
CML 112- 7	1.125	0.850	12	0.344	0.570	7	3.5	0.012	0.094	53
CML 112- 8	1.125	0.850	12	0.392	0.650	8	3.5	0.012	0.094	47
CML 112-10	1.125	0.850	12	0.488	0.810	10	3.5	0.012	0.094	37
CML 112-13	1.125	0.850	12	0.659	1.080	13	3.5	0.012	0.094	29
CML 112-16	1.125	0.850	12	0.807	1.330	16	3.5	0.012	0.094	23
CML 112-20	1.125	0.850	12	1.017	1.670	20	3.5	0.012	0.094	18
CMM 112- 3	1.125	0.850	20	0.160	0.260	3	3.5	0.014	0.094	200
CMM 112- 4	1.125	0.850	20	0.202	0.340	4	3.5	0.014	0.094	145
CMM 112- 5	1.125	0.850	20	0.270	0.440	5	3.5	0.014	0.094	118
CMM 112- 6	1.125	0.850	20	0.318	0.520	6	3.5	0.014	0.094	99
CMM 112- 7	1.125	0.850	20	0.381	0.620	7	3.5	0.014	0.094	84
CMM 112- 8	1.125	0.850	20	0.427	0.700	8	3.5	0.014	0.094	73
CMM 112-10	1.125	0.850	20	0.536	0.880	10	3.5	0.014	0.094	58
CMM 112-13	1.125	0.850	20	0.708	1.150	13	3.5	0.014	0.094	45
CMM 112-16	1.125	0.850	20	0.861	1.410	16	3.5	0.014	0.094	36
CMM 112-20	1.125	0.850	20	1.088	1.770	20	3.5	0.014	0.094	29
CMH 112- 3	1.125	0.850	30	0.178	0.250	3	3.5	0.018	0.094	417
CMH 112- 4	1.125	0.850	30	0.229	0.330	4	3.5	0.018	0.094	297
CMH 112- 5	1.125	0.850	30	0.303	0.420	5	3.5	0.018	0.094	256
CMH 112- 6	1.125	0.850	30	0.350	0.500	6	3.5	0.018	0.094	200
CMH 112- 7	1.125	0.850	30	0.421	0.590	7	3.5	0.018	0.094	178
CMH 112- 8	1.125	0.850	30	0.470	0.660	8	3.5	0.018	0.094	158
CMH 112-10	1.125	0.850	30	0.593	0.830	10	3.5	0.018	0.094	127
CMH 112-13	1.125	0.850	30	0.787	1.100	13	3.5	0.018	0.094	96
CMH 112-16	1.125	0.850	30	0.956	1.340	16	3.5	0.018	0.094	78
CMH 112-20	1.125	0.850	30	1.202	1.690	20	3.5	0.018	0.094	61
CML 125- 3	1.250	1.000	12	0.084	0.230	3	3.5	0.012	0.094	82
CML 125- 4	1.250	1.000	12	0.113	0.310	4	3.5	0.012	0.094	61
CML 125- 5	1.250	1.000	12	0.149	0.400	5	3.5	0.012	0.094	48
CML 125- 6	1.250	1.000	12	0.172	0.460	6	3.5	0.012	0.094	42
CML 125- 7	1.250	1.000	12	0.207	0.550	7	3.5	0.012	0.094	35
CML 125- 8	1.250	1.000	12	0.227	0.620	8	3.5	0.012	0.094	31
CML 125-10	1.250	1.000	12	0.301	0.790	10	3.5	0.012	0.094	25
CML 125-13	1.250	1.000	12	0.395	1.030	13	3.5	0.012	0.094	19
CML 125-16	1.250	1.000	12	0.467	1.250	16	3.5	0.012	0.094	15
CML 125-20	1.250	1.000	12	0.591	1.570	20	3.5	0.012	0.094	12
CMM 125- 3	1.250	1.000	20	0.124	0.280	3	3.5	0.014	0.094	128
CMM 125- 4	1.250	1.000	20	0.165	0.370	4	3.5	0.014	0.094	98
CMM 125- 5	1.250	1.000	20	0.215	0.470	5	3.5	0.014	0.094	78
CMM 125- 6	1.250	1.000	20	0.253	0.560	6	3.5	0.014	0.094	65
CMM 125- 7	1.250	1.000	20	0.303	0.660	7	3.5	0.014	0.094	56
CMM 125- 8	1.250	1.000	20	0.341	0.750	8	3.5	0.014	0.094	49
CMM 125-10	1.250	1.000	20	0.427	0.940	10	3.5	0.014	0.094	39
CMM 125-13	1.250	1.000	20	0.577	1.240	13	3.5	0.014	0.094	30
CMM 125-16	1.250	1.000	20	0.692	1.510	16	3.5	0.014	0.094	24
CMM 125-20	1.250	1.000	20	0.866	1.890	20	3.5	0.014	0.094	20
CMH 125- 3	1.250	1.000	30	0.158	0.270	3	3.5	0.018	0.094	268
CMH 125- 4	1.250	1.000	30	0.210	0.350	4	3.5	0.018	0.094	214
CMH 125- 5	1.250	1.000	30	0.272	0.453	5	3.5	0.018	0.094	166
CMH 125- 6	1.250	1.000	30	0.320	0.540	6	3.5	0.018	0.094	136
CMH 125- 7	1.250	1.000	30	0.384	0.640	7	3.5	0.018	0.094	117
CMH 125- 8	1.250	1.000	30	0.433	0.720	8	3.5	0.018	0.094	105
CMH 125-10	1.250	1.000	30	0.538	0.900	10	3.5	0.018	0.094	83
CMH 125-13	1.250	1.000	30	0.717	1.190	13	3.5	0.018	0.094	63
CMH 125-16	1.250	1.000	30	0.878	1.460	16	3.5	0.018	0.094	52
CMH 125-20	1.250	1.000	30	1.103	1.830	20	3.5	0.018	0.094	41
CML 137- 3	1.375	1.030	15	0.075	0.250	3	3.5	0.012	0.122	86
CML 137- 4	1.375	1.030	15	0.099	0.330	4	3.5	0.012	0.122	65
CML 137- 5	1.375	1.030	15	0.129	0.420	5	3.5	0.012	0.122	52
CML 137- 6	1.375	1.030	15	0.155	0.510	6	3.5	0.012	0.122	42

** Spring rate theoretical.*

*** Material size subject to change.*

Peak-to-Peak Springs (Cont.) **Inch Series**

Spirolox P/N	Bore Ø	Shaft Ø	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number of Turns L	Number of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate* Lbs./In.
CML 137- 7	1.375	1.030	15	0.179	0.590	7	3.5	0.012	0.122	36
CML 137- 8	1.375	1.030	15	0.206	0.680	8	3.5	0.012	0.122	32
CML 137-10	1.375	1.030	15	0.256	0.840	10	3.5	0.012	0.122	26
CML 137-13	1.375	1.030	15	0.341	1.110	13	3.5	0.012	0.122	20
CML 137-16	1.375	1.030	15	0.424	1.360	16	3.5	0.012	0.122	16
CML 137-20	1.375	1.030	15	0.530	1.710	20	3.5	0.012	0.122	13
CMM 137- 3	1.375	1.030	25	0.142	0.260	3	3.5	0.016	0.133	212
CMM 137- 4	1.375	1.030	25	0.186	0.340	4	3.5	0.016	0.133	162
CMM 137- 5	1.375	1.030	25	0.240	0.430	5	3.5	0.016	0.133	132
CMM 137- 6	1.375	1.030	25	0.281	0.510	6	3.5	0.016	0.133	109
CMM 137- 7	1.375	1.030	25	0.340	0.610	7	3.5	0.016	0.133	93
CMM 137- 8	1.375	1.030	25	0.384	0.690	8	3.5	0.016	0.133	82
CMM 137-10	1.375	1.030	25	0.486	0.870	10	3.5	0.016	0.133	65
CMM 137-13	1.375	1.030	25	0.632	1.130	13	3.5	0.016	0.133	50
CMM 137-16	1.375	1.030	25	0.788	1.400	16	3.5	0.016	0.133	41
CMM 137-20	1.375	1.030	25	0.982	1.740	20	3.5	0.016	0.133	33
CMH 137- 3	1.375	1.030	35	0.149	0.250	3	3.5	0.018	0.143	347
CMH 137- 4	1.375	1.030	35	0.189	0.330	4	3.5	0.018	0.143	248
CMH 137- 5	1.375	1.030	35	0.247	0.420	5	3.5	0.018	0.143	202
CMH 137- 6	1.375	1.030	35	0.287	0.500	6	3.5	0.018	0.143	164
CMH 137- 7	1.375	1.030	35	0.343	0.590	7	3.5	0.018	0.143	142
CMH 137- 8	1.375	1.030	35	0.390	0.670	8	3.5	0.018	0.143	125
CMH 137-10	1.375	1.030	35	0.490	0.840	10	3.5	0.018	0.143	100
CMH 137-13	1.375	1.030	35	0.646	1.100	13	3.5	0.018	0.143	77
CMH 137-16	1.375	1.030	35	0.793	1.350	16	3.5	0.018	0.143	63
CMH 137-20	1.375	1.030	35	1.000	1.700	20	3.5	0.018	0.143	50
CML 150- 3	1.500	1.140	20	0.129	0.250	3	3.5	0.016	0.133	165
CML 150- 4	1.500	1.140	20	0.164	0.320	4	3.5	0.016	0.133	128
CML 150- 5	1.500	1.140	20	0.213	0.410	5	3.5	0.016	0.133	102
CML 150- 6	1.500	1.140	20	0.247	0.490	6	3.5	0.016	0.133	82
CML 150- 7	1.500	1.140	20	0.301	0.580	7	3.5	0.016	0.133	72
CML 150- 8	1.500	1.140	20	0.337	0.660	8	3.5	0.016	0.133	62
CML 150-10	1.500	1.140	20	0.430	0.830	10	3.5	0.016	0.133	50
CML 150-13	1.500	1.140	20	0.565	1.090	13	3.5	0.016	0.133	38
CML 150-16	1.500	1.140	20	0.694	1.340	16	3.5	0.016	0.133	31
CML 150-20	1.500	1.140	20	0.866	1.670	20	3.5	0.016	0.133	25
CMM 150- 3	1.500	1.140	35	0.122	0.260	3	3.5	0.018	0.143	254
CMM 150- 4	1.500	1.140	35	0.158	0.340	4	3.5	0.018	0.143	192
CMM 150- 5	1.500	1.140	35	0.206	0.430	5	3.5	0.018	0.143	156
CMM 150- 6	1.500	1.140	35	0.241	0.520	6	3.5	0.018	0.143	125
CMM 150- 7	1.500	1.140	35	0.291	0.610	7	3.5	0.018	0.143	110
CMM 150- 8	1.500	1.140	35	0.324	0.690	8	3.5	0.018	0.143	96
CMM 150-10	1.500	1.140	35	0.409	0.870	10	3.5	0.018	0.143	76
CMM 150-13	1.500	1.140	35	0.540	1.140	13	3.5	0.018	0.143	58
CMM 150-16	1.500	1.140	35	0.657	1.390	16	3.5	0.018	0.143	48
CMM 150-20	1.500	1.140	35	0.835	1.750	20	3.5	0.018	0.143	38
CMH 150- 3	1.500	1.140	60	0.166	0.240	3	4.5	0.018	0.143	811
CMH 150- 4	1.500	1.140	60	0.216	0.310	4	4.5	0.018	0.143	638
CMH 150- 5	1.500	1.140	60	0.278	0.400	5	4.5	0.018	0.143	492
CMH 150- 6	1.500	1.140	60	0.329	0.480	6	4.5	0.018	0.143	397
CMH 150- 7	1.500	1.140	60	0.390	0.560	7	4.5	0.018	0.143	353
CMH 150- 8	1.500	1.140	60	0.443	0.640	8	4.5	0.018	0.143	305
CMH 150-10	1.500	1.140	60	0.555	0.800	10	4.5	0.018	0.143	245
CMH 150-13	1.500	1.140	60	0.726	1.050	13	4.5	0.018	0.143	185
CMH 150-16	1.500	1.140	60	0.890	1.290	16	4.5	0.018	0.143	150
CMH 150-20	1.500	1.140	60	1.119	1.610	20	4.5	0.018	0.143	122
CML 175- 3	1.750	1.340	25	0.155	0.310	3	3.5	0.018	0.143	161
CML 175- 4	1.750	1.340	25	0.200	0.410	4	3.5	0.018	0.143	119
CML 175- 5	1.750	1.340	25	0.265	0.520	5	3.5	0.018	0.143	98
CML 175- 6	1.750	1.340	25	0.310	0.620	6	3.5	0.018	0.143	81

** Spring rate theoretical.*
*** Material size subject to change.*

Peak-to-Peak Springs (Cont.)

Inch Series

Spirolox P/N	Bore Ø	Shaft Ø	Load Lbs. P	Work Height H_W	Free Height H_F (Ref.)	Number of Turns L	Number of Waves N	Spring Thickness F**	Radial Wall E**	Spring Rate* Lbs./In.
CML 175- 7	1.750	1.340	25	0.367	0.730	7	3.5	0.018	0.143	69
CML 175- 8	1.750	1.340	25	0.415	0.830	8	3.5	0.018	0.143	60
CML 175-10	1.750	1.340	25	0.523	1.040	10	3.5	0.018	0.143	48
CML 175-12	1.750	1.340	25	0.638	1.260	12	3.5	0.018	0.143	40
CML 175-14	1.750	1.340	25	0.737	1.460	14	3.5	0.018	0.143	35
CML 175-16	1.750	1.340	25	0.844	1.680	16	3.5	0.018	0.143	30
CMM 175- 3	1.750	1.340	50	0.188	0.290	3	4.5	0.018	0.143	490
CMM 175- 4	1.750	1.340	50	0.244	0.380	4	4.5	0.018	0.143	368
CMM 175- 5	1.750	1.340	50	0.315	0.480	5	4.5	0.018	0.143	303
CMM 175- 6	1.750	1.340	50	0.374	0.570	6	4.5	0.018	0.143	255
CMM 175- 7	1.750	1.340	50	0.452	0.680	7	4.5	0.018	0.143	219
CMM 175- 8	1.750	1.340	50	0.505	0.770	8	4.5	0.018	0.143	189
CMM 175-10	1.750	1.340	50	0.629	0.960	10	4.5	0.018	0.143	151
CMM 175-12	1.750	1.340	50	0.768	1.160	12	4.5	0.018	0.143	128
CMM 175-14	1.750	1.340	50	0.899	1.360	14	4.5	0.018	0.143	108
CMM 175-16	1.750	1.340	50	1.026	1.550	16	4.5	0.018	0.143	95
CMH 175- 3	1.750	1.340	90	0.232	0.300	3	4.5	0.024	0.148	1324
CMH 175- 4	1.750	1.340	90	0.314	0.410	4	4.5	0.024	0.148	938
CMH 175- 5	1.750	1.340	90	0.409	0.530	5	4.5	0.024	0.148	744
CMH 175- 6	1.750	1.340	90	0.482	0.630	6	4.5	0.024	0.148	608
CMH 175- 7	1.750	1.340	90	0.577	0.740	7	4.5	0.024	0.148	552
CMH 175- 8	1.750	1.340	90	0.651	0.840	8	4.5	0.024	0.148	476
CMH 175-10	1.750	1.340	90	0.813	1.050	10	4.5	0.024	0.148	380
CMH 175-12	1.750	1.340	90	0.980	1.270	12	4.5	0.024	0.148	310
CMH 175-14	1.750	1.340	90	1.147	1.480	14	4.5	0.024	0.148	270
CMH 175-16	1.750	1.340	90	1.317	1.700	16	4.5	0.024	0.148	235
CML 200- 3	2.000	1.600	25	0.094	0.340	3	3.5	0.018	0.143	102
CML 200- 4	2.000	1.600	25	0.120	0.450	4	3.5	0.018	0.143	76
CML 200- 5	2.000	1.600	25	0.158	0.570	5	3.5	0.018	0.143	61
CML 200- 6	2.000	1.600	25	0.179	0.680	6	3.5	0.018	0.143	50
CML 200- 7	2.000	1.600	25	0.217	0.800	7	3.5	0.018	0.143	43
CML 200- 8	2.000	1.600	25	0.243	0.910	8	3.5	0.018	0.143	37
CML 200-10	2.000	1.600	25	0.306	1.140	10	3.5	0.018	0.143	30
CML 200-12	2.000	1.600	25	0.365	1.360	12	3.5	0.018	0.143	25
CML 200-14	2.000	1.600	25	0.433	1.590	14	3.5	0.018	0.143	22
CML 200-16	2.000	1.600	25	0.490	1.820	16	3.5	0.018	0.143	19
CMM 200- 3	2.000	1.600	50	0.140	0.300	3	4.5	0.018	0.143	313
CMM 200- 4	2.000	1.600	50	0.184	0.390	4	4.5	0.018	0.143	243
CMM 200- 5	2.000	1.600	50	0.245	0.510	5	4.5	0.018	0.143	189
CMM 200- 6	2.000	1.600	50	0.278	0.590	6	4.5	0.018	0.143	160
CMM 200- 7	2.000	1.600	50	0.345	0.710	7	4.5	0.018	0.143	137
CMM 200- 8	2.000	1.600	50	0.395	0.810	8	4.5	0.018	0.143	120
CMM 200-10	2.000	1.600	50	0.498	1.020	10	4.5	0.018	0.143	96
CMM 200-12	2.000	1.600	50	0.593	1.220	12	4.5	0.018	0.143	80
CMM 200-14	2.000	1.600	50	0.694	1.430	14	4.5	0.018	0.143	68
CMM 200-16	2.000	1.600	50	0.800	1.640	16	4.5	0.018	0.143	60
CMH 200- 3	2.000	1.600	90	0.197	0.310	3	4.5	0.024	0.148	796
CMH 200- 4	2.000	1.600	90	0.258	0.410	4	4.5	0.024	0.148	592
CMH 200- 5	2.000	1.600	90	0.332	0.520	5	4.5	0.024	0.148	479
CMH 200- 6	2.000	1.600	90	0.389	0.620	6	4.5	0.024	0.148	390
CMH 200- 7	2.000	1.600	90	0.465	0.730	7	4.5	0.024	0.148	340
CMH 200- 8	2.000	1.600	90	0.525	0.830	8	4.5	0.024	0.148	295
CMH 200-10	2.000	1.600	90	0.661	1.040	10	4.5	0.024	0.148	237
CMH 200-12	2.000	1.600	90	0.781	1.240	12	4.5	0.024	0.148	196
CMH 200-14	2.000	1.600	90	0.941	1.480	14	4.5	0.024	0.148	167
CMH 200-16	2.000	1.600	90	1.069	1.680	16	4.5	0.024	0.148	147

* *Spring rate theoretical.*

** *Material size subject to change.*

Spirolox Wave Spring Design
COPY THIS PAGE

FAX: 1-314-343-7058
Phone: 1-314-343-5885 or 1-800-467-2424

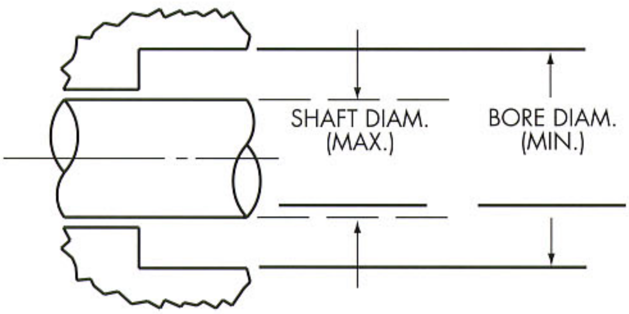
Name ______________________ Company ______________________

Address ____

City ______________________ State ____________ ZIP ____________

Fax (______) ______________________ Phone (______) ______________________

1. Design Envelope:
Spring Pilots
- ☐ Bore
- ☐ Shaft



Spring Dimensions
Spirolox Wave Spring O.D. _______ inch maximum
Spirolox Wave Spring I.D. _______ inch minimum
Number of Waves _______
Maximum Solid Height _______

2. Load Characteristics (Specify one of the following:)
A. Load range from _____ lbs. to ____ lbs. at work height of _____ in.
Approximate free height _____ in.
Spring rate _____ lbs./in.

B. Load (1) _____ lbs. at work height (1) of _____ in.
Load (2) _____ lbs. at work height (2) of _____ in.
Approximate free height _____ in.
Spring rate _____ lb./in.

C. Other specifications ______________________________
____
____
____

Spirolox®

3. Cyclic Service:
- ☐ Fixed load
- ☐ Cyclic load
  - ☐ Up to 10,000 cycles
  - ☐ Up to 100,000 cycles
  - ☐ Up to one million cycles
  - ☐ Above one million cycles

4. Environment
Maximum temperature ______ °F
- ☐ Corrosive
- ☐ Non-corrosive

5. Material
- ☐ Carbon spring steel
- ☐ 17-7PH condition C/CH 900
- ☐ Stainless steel 302

6. Finish
- ☐ Passivation
- ☐ Black Oxide
- ☐ Phosphate
- ☐ ______________

7. Application ______________________________
____
____

8. Quantity ______________________________
____
____

9. Miscellaneous: Please fill in the following space if you have any other comments: ______________________________
____
____
____
____
____
____
____