

Raymond[®]

Die Springs Manufactured
to ISO Specification



Associated Spring
Raymond



BARNES[®]
GROUP INC

ISO Specification Die Springs

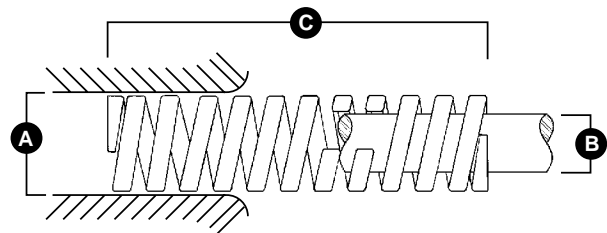
Associated Spring Raymond Die Springs are manufactured using a wire cross section developed to provide optimum balance between load carrying characteristics and cycle life.

Produced under carefully controlled processes with special equipment developed by Barnes Group, Inc's research and development facilities.

All of the manufacturing steps are closely monitored by rigid quality controls, inspection and testing to ensure that the long service life engineered into every die spring is constant.

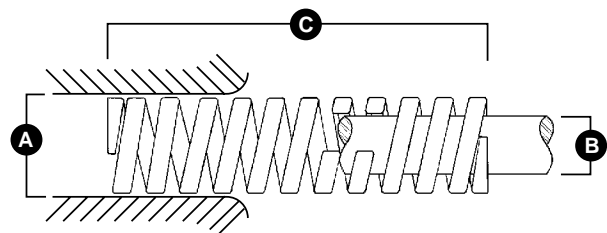
Full technical specifications available on request from Associated Spring Raymond.

Springs manufactured in accordance with ISO 10243.



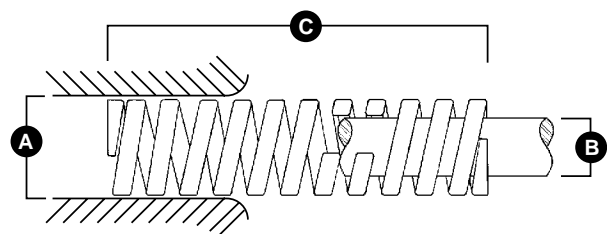
Green • Light Duty

Pages 6-7 and- 14-15



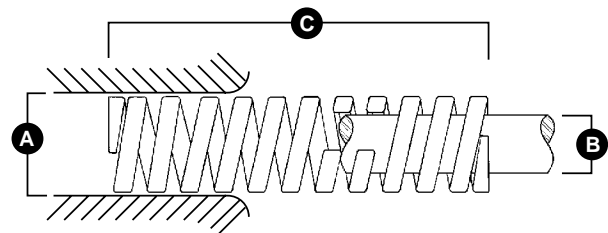
Blue • Medium Duty

Pages 8-9 and 16-17



Red • Heavy Duty

Pages 10-11 and 18-19



Yellow • Extra Heavy Duty Pages 12-13 and 20-21

Selecting Die Springs

A general rule to observe in spring selection is to always use as many springs as the die will accommodate which will produce the required load with the least amount of deflection. This will increase the useful life of the spring, reduce the chances of spring failure and the resulting downtime, loss of production and increased maintenance cost.

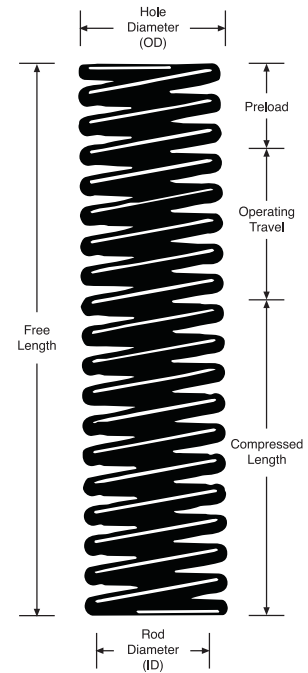
Die spring costs are a very small percentage of the total cost of the die. An effort to save a few cents on die springs is a misguided act that can cost many dollars in lost time and labor.

The more rapidly a spring works, the more attention must be paid to its fatigue limits. In slow moving dies or fixtures, it is possible to get good performance with springs operating near maximum deflection. As the working speed increases, the life expectancy of the spring at that deflection decreases.

Springs for strippers, pressure pads, and other die components can be selected from

the following pages. When selecting a die spring it is necessary to determine the type of performance required of the springs: short, normal, or long run. For short or normal run applications use the deflections tabulated in the long life columns. For long run applications use deflections based on optimum life. The recommended deflections for each spring based on the performance required are shown on pages 6 to 21.

Another approach when selecting a spring is to work back from the amount of operating travel the springs will be subjected to as indicated by the die layout. Select springs in the appropriate duty range which will operate efficiently at the required travel. Calculate the number of springs needed by dividing the load supplied by one spring into the total load required. Round the total number of springs to the next higher even number for balanced performance.



Deflection To Compressed Length Conversion Table

ISO Die Spring Series												
Free Length (mm)	Light Duty Compressed Length (mm)			Medium Duty Compressed Length (mm)			Heavy Duty Compressed Length (mm)			Extra Heavy Duty Compressed Length (mm)		
	Deflection in % free length			Deflection in % free length			Deflection in % free length			Deflection in % free length		
	25%	30%	35%	20%	25%	30%	15%	20%	25%	15%	17%	20%
25	18.8	17.5	16.3	20.0	18.8	17.5	21.3	20.0	18.8	21.3	20.8	20.0
32	24.0	22.4	20.8	25.6	24.0	22.4	27.2	25.6	24.0	27.2	26.6	25.6
38	28.5	26.6	24.7	30.4	28.5	26.6	32.3	30.4	28.5	32.3	31.5	30.4
44	33.0	30.8	28.6	35.2	33.0	30.8	37.4	35.2	33.0	37.4	36.5	35.2
51	38.3	35.7	33.2	40.8	38.3	35.7	43.4	40.8	38.3	43.4	42.3	40.8
64	48.0	44.8	41.6	51.2	48.0	44.8	54.4	51.2	48.0	54.4	53.1	51.2
76	57.0	53.2	49.4	60.8	57.0	53.2	64.6	60.8	57.0	64.6	63.1	60.8
89	66.8	62.3	57.9	71.2	66.8	62.3	75.7	71.2	66.8	75.7	73.9	71.2
102	76.5	71.4	66.3	81.6	76.5	71.4	86.7	81.6	76.5	86.7	84.7	81.6
115	86.3	80.5	74.8	92.0	86.3	80.5	97.8	92.0	86.3	97.8	95.5	92.0
127	95.3	88.9	82.6	101.6	95.3	88.9	108.0	101.6	95.3	108.0	105.4	101.6
139	104.3	97.3	90.4	111.2	104.3	97.3	118.2	111.2	104.3	118.2	115.4	111.2
152	114.0	106.4	98.8	121.6	114.0	106.4	129.2	121.6	114.0	129.2	126.2	121.6
178	133.5	124.6	115.7	142.4	133.5	124.6	151.3	142.4	133.5	151.3	147.7	142.4
203	152.3	142.1	132.0	162.4	152.3	142.1	172.6	162.4	152.3	172.6	168.5	162.4
254	190.5	177.8	165.1	203.2	190.5	177.8	215.9	203.2	190.5	215.9	210.8	203.2
305	228.8	213.5	198.3	244.0	228.8	213.5	259.3	244.0	228.8	259.3	253.2	244.0

Die Spring Features & Benefits

Raymond Die Springs Offer	Features	Benefits
Superior Materials & Wire Profile	<ul style="list-style-type: none"> • All Raymond die springs are made from high tensile strength chromium alloy steels. • Optimal wire cross section. • Spring ends are ground square. • Other raw materials are available for special conditions and environments. 	<ul style="list-style-type: none"> • Inherent toughness to withstand heavy load demands. • Superior performance in high stress applications. • Heat resistance up to 230°C. • Readily available, cost efficient raw material. • Consistent controlled metallurgy. • Offers maximum design possibilities. • Wire cross section provides optimum deflection and protection against failure due to excessive stress build-up. • Square ends create reliable, flat, maximum load-bearing surface. • Specialty materials available to meet customer requirements.
Dimensional Consistency	<ul style="list-style-type: none"> • Dimensional requirements remain consistent and measurably the same from one batch of springs to the next. 	<ul style="list-style-type: none"> • Provides uniform spring performance. • Ensures consistent rate recordings. • Greater load accuracy at a given test height. • Certainty that OD will work freely in prescribed hole and ID will work freely over prescribed rod. • Raymond assurance of the highest production and quality standards. • Reliable performance engineered into every Raymond die spring.
Longer Spring Life	<ul style="list-style-type: none"> • Engineered to better withstand shock loading. • Designed to endure constant high-speed deflections. • Shot-peened to increase fatigue life. • Less downtime. 	<ul style="list-style-type: none"> • Reliable, trouble-free performance. • Increased fatigue life by as much as 30%. • Reduced spring breakage. • Uniform performance over a longer lifetime. • More cost effective. • Extra performance margins.
Excellent Deflection	<ul style="list-style-type: none"> • Springs provide greater available travel to solid. 	<ul style="list-style-type: none"> • More travel in each spring. • Higher load capacities. • Increased fatigue life. • Greater application flexibility. • More reliable performance. • Lower solid height.

Common Die Spring Terminology

HOLE DIAMETER This identifies the outside diameter (OD) of the die spring. Raymond die springs are available in eight different hole sizes matched to standard drill sizes. Each spring is made to fit in the hole, so the OD of the spring is actually less than the hole diameter.

ROD DIAMETER This is a nominal identification of the inside diameter (ID) of the die spring. Raymond die springs are available in eight different hole sizes matched to standard stripper bolts. Each spring is made to fit over the rod, so the ID of the springs is actually greater than the rod diameter.

FREE LENGTH The length of a die spring before it is subject to any operating force or load.

PRELOAD The distance the free length of the die spring is reduced by the pressure of assembled tool.

OPERATING TRAVEL The distance which is subtracted from the spring length after operating force has been applied.

DEFLECTION The amount of change in spring length after operating force has been applied. The compressed length is computed by subtracting the initial compression and the operating travel from the free length.

SOLID HEIGHT The length of a spring when it is compressed by enough load to bring all the coils into contact with each other.

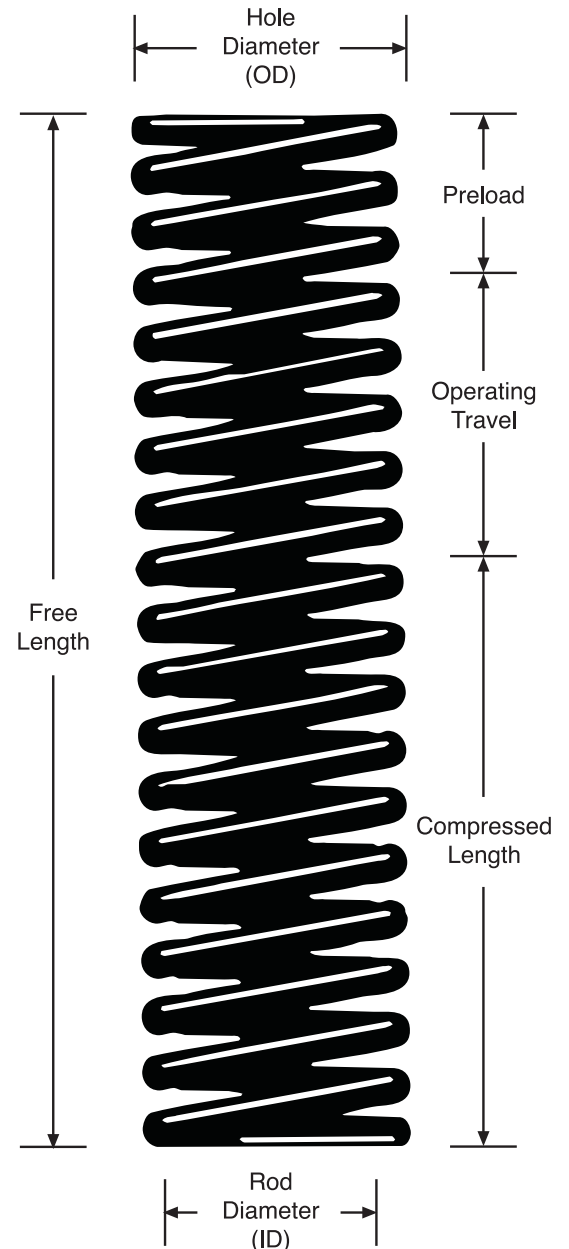
REMOVE SET The manufacturing process of closing a compression spring to solid to eliminate load loss in operation.

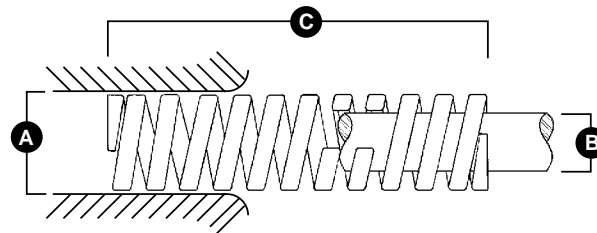
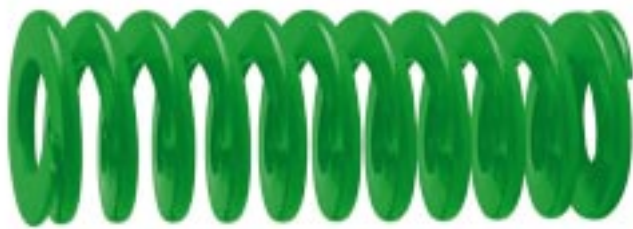
PERMANENT SET This happens when the elastic limits are exceeded and the spring does not return to its original length when the load is released.

ELASTIC LIMIT The maximum compression stress that a die spring can endure without taking permanent set.

LOAD This is the force built up by compressing the spring. Load is expressed in terms of total Newtons, which is the load on the spring per a specific unit of deflection. Load is generated and stress on the coils increases.

STRESS In a spring, this describes the internal force that resists deflection under load. This force is equal to, and in the opposite direction of, the external load. Stress is expressed in Newtons per square millimeter of sectional area.





Raymond® LIGHT DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS GREEN

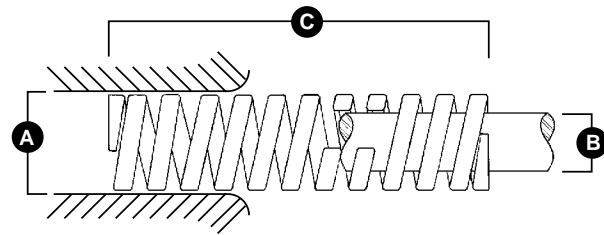
Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE						
					For Optimum Life (25% of free length)		For Long Life (30% of free length)		Maximum Operating Def. (35% of free length)		*Maximum Deflection
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)
10	5	25	203-104	10.0	62.5	6.3	75.0	7.5	87.5	8.8	10.3
		32	203-105	8.5	68.0	8.0	81.6	9.6	95.2	11.2	13.1
		38	203-106	6.8	64.6	9.5	77.5	11.4	90.4	13.3	15.6
		44	203-107	6.0	66.0	11.0	79.2	13.2	92.4	15.4	18.0
		51	203-108	5.0	63.8	12.8	76.5	15.3	89.3	17.9	20.9
		64	203-110	4.3	68.8	16.0	82.6	19.2	96.3	22.4	26.0
		76	203-112	3.2	60.8	19.0	73.0	22.8	85.1	26.6	31.2
		305	203-148	1.1	83.9	76.3	100.7	91.5	117.4	106.8	125.0
12.5	6.3	25	203-204	17.9	111.9	6.3	134.3	7.5	156.6	8.8	10.3
		32	203-205	16.4	131.2	8.0	157.4	9.6	183.7	11.2	13.1
		38	203-206	13.6	129.2	9.5	155.0	11.4	180.9	13.3	15.6
		44	203-207	12.1	133.1	11.0	159.7	13.2	186.3	15.4	18.0
		51	203-208	11.4	145.4	12.8	174.4	15.3	203.5	17.9	20.9
		64	203-210	9.3	148.8	16.0	178.6	19.2	208.3	22.4	26.3
		76	203-212	7.1	134.9	19.0	161.9	22.8	188.9	26.6	31.2
		305	203-248	1.4	106.8	76.3	128.1	91.5	149.5	106.8	125.0
16	8	25	203-304	23.4	146.3	6.3	175.5	7.5	204.8	8.8	10.3
		32	203-305	22.9	183.2	8.0	219.8	9.6	256.5	11.2	13.1
		38	203-306	19.3	183.4	9.5	220.0	11.4	256.7	13.3	15.6
		44	203-307	17.1	188.1	11.0	225.7	13.2	263.3	15.4	18.0
		51	203-308	15.7	200.2	12.8	240.2	15.3	280.2	17.9	20.9
		64	203-310	10.7	171.2	16.0	205.4	19.2	239.7	22.4	26.3
		76	203-312	10.0	190.0	19.0	228.0	22.8	266.0	26.6	31.2
		305	203-348	2.5	190.6	76.3	228.8	91.5	266.9	106.8	125.0
20	10	25	203-404	55.8	348.8	6.3	418.5	7.5	488.3	8.8	10.2
		32	203-405	45.0	360.0	8.0	432.0	9.6	504.0	11.2	12.5
		38	203-406	33.3	316.4	9.5	379.6	11.4	442.9	13.3	15.0
		44	203-407	30.0	330.0	11.0	396.0	13.2	462.0	15.4	18.0
		51	203-408	24.5	312.4	12.8	374.9	15.3	437.3	17.9	20.0
		64	203-410	20.0	320.0	16.0	384.0	19.2	448.0	22.4	25.0
		76	203-412	16.0	304.0	19.0	364.8	22.8	425.6	26.6	30.0
		89	203-414	14.0	311.5	22.3	373.8	26.7	436.1	31.2	35.0
		102	203-416	12.0	306.0	25.5	367.2	30.6	428.4	35.7	41.0
		115	203-418	10.9	313.4	28.8	376.1	34.5	438.7	40.3	46.0
		127	203-420	9.5	301.6	31.8	362.0	38.1	422.3	44.5	51.0
		139	203-422	8.4	291.9	34.8	350.3	41.7	408.7	48.7	56.0
		305	203-448	4.0	305.0	76.3	366.0	91.5	427.0	106.8	122.0
25	12.5	25	203-504	100.0	625.0	6.3	750.0	7.5	875.0	8.8	10.2
		32	203-505	80.3	642.4	8.0	770.9	9.6	899.4	11.2	12.5
		38	203-506	62.0	589.0	9.5	706.8	11.4	824.6	13.3	15.0
		44	203-507	52.9	581.9	11.0	698.3	13.2	814.7	15.4	18.0
		51	203-508	44.0	561.0	12.8	673.2	15.3	785.4	17.9	20.0
		76	203-512	28.0	532.0	19.0	638.4	22.8	744.8	26.6	30.0

*Tabulated deflections shown represent near solid and are for design information only.

Raymond® LIGHT DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS GREEN

Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE						
					For Optimum Life (25% of free length)		For Long Life (30% of free length)		Maximum Operating Def. (35% of free length)		*Maximum Deflection
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)
25	12.5	89	203-514	24.0	534.0	22.3	640.8	26.7	747.6	31.2	35.0
		102	203-516	21.1	538.1	25.5	645.7	30.6	753.3	35.7	41.0
		115	203-518	18.7	537.6	28.8	645.2	34.5	752.7	40.3	46.0
		127	203-520	16.7	530.2	31.8	636.3	38.1	742.3	44.5	51.0
		139	203-522	15.3	531.7	34.8	638.0	41.7	744.3	48.7	56.0
		152	203-524	14.0	532.0	38.0	638.4	45.6	744.8	53.2	61.0
		178	203-528	12.5	556.3	44.5	667.5	53.4	778.8	62.3	71.0
		203	203-532	10.4	527.8	50.8	633.4	60.9	738.9	71.1	81.0
		305	203-548	7.0	533.8	76.3	640.5	91.5	747.3	106.8	122.0
32	16	38	203-606	94.0	893.0	9.5	1071.6	11.4	1250.2	13.3	15.0
		44	203-607	79.5	874.5	11.0	1049.4	13.2	1224.3	15.4	18.0
		51	203-608	67.0	854.3	12.8	1025.1	15.3	1196.0	17.9	20.0
		64	203-610	53.0	848.0	16.0	1017.6	19.2	1187.2	22.4	25.0
		76	203-612	44.0	836.0	19.0	1003.2	22.8	1170.4	26.6	30.0
		89	203-614	37.2	827.7	22.3	993.2	26.7	1158.8	31.2	35.0
		102	203-616	32.0	816.0	25.5	979.2	30.6	1142.4	35.7	41.0
		115	203-618	29.0	833.8	28.8	1000.5	34.5	1167.3	40.3	46.0
		127	203-620	25.0	793.8	31.8	952.5	38.1	1111.3	44.5	51.0
		139	203-622	23.0	799.3	34.8	959.1	41.7	1119.0	48.7	56.0
		152	203-624	21.5	817.0	38.0	980.4	45.6	1143.8	53.2	61.0
		178	203-628	18.2	809.9	44.5	971.9	53.4	1133.9	62.3	71.0
		203	203-632	15.8	801.9	50.8	962.2	60.9	1122.6	71.1	81.0
		254	203-640	12.5	793.8	63.5	952.5	76.2	1111.3	88.9	102.0
305	203-648	10.3	785.4	76.3	942.5	91.5	1099.5	106.8	122.0		
40	20	51	203-708	92.0	1173.0	12.8	1407.6	15.3	1642.2	17.9	20.0
		64	203-710	73.0	1168.0	16.0	1401.6	19.2	1635.2	22.4	25.0
		76	203-712	63.0	1197.0	19.0	1436.4	22.8	1675.8	26.6	30.0
		89	203-714	51.0	1134.8	22.3	1361.7	26.7	1588.7	31.2	35.0
		102	203-716	43.0	1096.5	25.5	1315.8	30.6	1535.1	35.7	41.0
		115	203-718	39.6	1138.5	28.8	1366.2	34.5	1593.9	40.3	46.0
		127	203-720	37.0	1174.8	31.8	1409.7	38.1	1644.7	44.5	51.0
		139	203-722	32.0	1112.0	34.8	1334.4	41.7	1556.8	48.7	56.0
		152	203-724	28.0	1064.0	38.0	1276.8	45.6	1489.6	53.2	61.0
		178	203-728	25.2	1121.4	44.5	1345.7	53.4	1570.0	62.3	71.0
		203	203-732	22.7	1152.0	50.8	1382.4	60.9	1612.8	71.1	81.0
		254	203-740	17.0	1079.5	63.5	1295.4	76.2	1511.3	88.9	102.0
		305	203-748	14.8	1128.5	76.3	1354.2	91.5	1579.9	106.8	122.0
		50	25	64	203-810	156.0	2496.0	16.0	2995.2	19.2	3494.4
76	203-812			125.0	2375.0	19.0	2850.0	22.8	3325.0	26.6	30.0
89	203-814			109.0	2425.3	22.3	2910.3	26.7	3395.4	31.2	35.0
102	203-816			94.0	2397.0	25.5	2876.4	30.6	3355.8	35.7	41.0
115	203-818			81.0	2328.8	28.8	2794.5	34.5	3260.3	40.3	46.0
127	203-820			71.0	2254.3	31.8	2705.1	38.1	3156.0	44.5	51.0
139	203-822			66.5	2310.9	34.8	2773.1	41.7	3235.2	48.7	56.0
152	203-824			60.0	2280.0	38.0	2736.0	45.6	3192.0	53.2	61.0
178	203-828			52.0	2314.0	44.5	2776.8	53.4	3239.6	62.3	71.0
203	203-832			44.0	2233.0	50.8	2679.6	60.9	3126.2	71.1	81.0
254	203-840			35.0	2222.5	63.5	2667.0	76.2	3111.5	88.9	102.0
305	203-848	28.5	2173.1	76.3	2607.8	91.5	3042.4	106.8	122.0		
63	38	76	203-912	189.0	3591.0	19.0	4309.2	22.8	5027.4	26.6	30.0
		89	203-914	158.0	3515.5	22.3	4218.6	26.7	4921.7	31.2	35.0
		102	203-916	131.0	3340.5	25.5	4008.6	30.6	4676.7	35.7	41.0
		115	203-918	116.0	3335.0	28.8	4002.0	34.5	4669.0	40.3	46.0
		127	203-920	103.0	3270.3	31.8	3924.3	38.1	4578.4	44.5	51.0
		152	203-924	84.3	3203.4	38.0	3844.1	45.6	4484.8	53.2	61.0
		178	203-928	71.5	3181.8	44.5	3818.1	53.4	4454.5	62.3	71.0
		203	203-932	61.7	3131.3	50.8	3757.5	60.9	4383.8	71.1	81.0
		254	203-940	47.0	2984.5	63.5	3581.4	76.2	4178.3	88.9	102.0
		305	203-948	38.2	2912.8	76.3	3495.3	91.5	4077.9	106.8	122.0

*Tabulated deflections shown represent near solid and are for design information only.



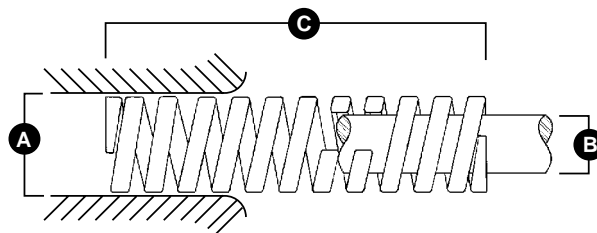
Raymond® MEDIUM DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS BLUE

Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE							
					For Optimum Life (20% of free length)		For Long Life (25% of free length)		Maximum Operating Def. (30% of free length)		*Maximum Deflection	
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)	
A	B	C										
10	5	25	204-104	16.0	80.0	5.0	100.0	6.3	120.0	7.5	9.5	
		32	204-105	13.0	83.2	6.4	104.0	8.0	124.8	9.6	12.2	
		38	204-106	11.9	90.4	7.6	113.1	9.5	135.7	11.4	14.4	
		44	204-107	10.3	90.6	8.8	113.3	11.0	136.0	13.2	16.7	
		51	204-108	8.9	90.8	10.2	113.5	12.8	136.2	15.3	19.4	
		64	204-110	7.5	96.0	12.8	120.0	16.0	144.0	19.2	24.3	
		76	204-112	5.3	80.6	15.2	100.7	19.0	120.8	22.8	28.9	
		305	204-148	1.6	97.6	61.0	122.0	76.3	146.4	91.5	116.0	
12.5	6.3	25	204-204	30.0	150.0	5.0	187.5	6.3	225.0	7.5	9.5	
		32	204-205	24.8	158.7	6.4	198.4	8.0	238.1	9.6	12.2	
		38	204-206	21.4	162.6	7.6	203.3	9.5	244.0	11.4	14.4	
		44	204-207	18.5	162.8	8.8	203.5	11.0	244.2	13.2	16.7	
		51	204-208	15.5	158.1	10.2	197.6	12.8	237.2	15.3	19.4	
		64	204-210	12.1	154.9	12.8	193.6	16.0	232.3	19.2	24.3	
		76	204-212	10.2	155.0	15.2	193.8	19.0	232.6	22.8	28.9	
		89	204-214	8.4	149.5	17.8	186.9	22.3	224.3	26.7	33.8	
305	204-248	2.1	128.1	61.0	160.1	76.3	192.2	91.5	116.0			
16	8	25	204-304	49.4	247.0	5.0	308.8	6.3	370.5	7.5	9.5	
		32	204-305	37.1	237.4	6.4	296.8	8.0	356.2	9.6	12.2	
		38	204-306	33.9	257.6	7.6	322.1	9.5	386.5	11.4	14.4	
		44	204-307	30.0	264.0	8.8	330.0	11.0	396.0	13.2	16.7	
		51	204-308	26.4	269.3	10.2	336.6	12.8	403.9	15.3	19.4	
		64	204-310	20.5	262.4	12.8	328.0	16.0	393.6	19.2	24.3	
		76	204-312	17.8	270.6	15.2	338.2	19.0	405.8	22.8	28.9	
		89	204-314	15.2	270.6	17.8	338.2	22.3	405.8	26.7	33.8	
102	204-316	13.5	275.4	20.4	344.3	25.5	413.1	30.6	38.8			
305	204-348	4.8	292.8	61.0	366.0	76.3	439.2	91.5	116.0			
20	10	25	204-404	98.0	490.0	5.0	612.5	6.3	735.0	7.5	9.4	
		32	204-405	72.6	464.6	6.4	580.8	8.0	697.0	9.6	12.0	
		38	204-406	56.0	425.6	7.6	532.0	9.5	638.4	11.4	14.0	
		44	204-407	47.5	418.0	8.8	522.5	11.0	627.0	13.2	16.5	
		51	204-408	41.7	425.3	10.2	531.7	12.8	638.0	15.3	19.0	
		64	204-410	32.3	413.4	12.8	516.8	16.0	620.2	19.2	24.0	
		76	204-412	25.1	381.5	15.2	476.9	19.0	572.3	22.8	28.0	
		89	204-414	22.0	391.6	17.8	489.5	22.3	587.4	26.7	33.0	
		102	204-416	19.8	403.9	20.4	504.9	25.5	605.9	30.6	38.0	
		115	204-418	18.1	416.3	23.0	520.4	28.8	624.5	34.5	43.0	
		127	204-420	16.6	421.6	25.4	527.1	31.8	632.5	38.1	48.0	
		139	204-422	15.1	419.8	27.8	524.7	34.8	629.7	41.7	52.0	
		152	204-424	13.2	401.3	30.4	501.6	38.0	601.9	45.6	57.0	
		305	204-448	6.1	372.1	61.0	465.1	76.3	558.2	91.5	114.0	
25	12.5	25	204-504	147.0	735.0	5.0	918.8	6.3	1102.5	7.5	9.4	
		32	204-505	118.0	755.2	6.4	944.0	8.0	1132.8	9.6	12.0	
		38	204-506	93.0	706.8	7.6	883.5	9.5	1060.2	11.4	14.0	
		44	204-507	80.8	711.0	8.8	888.8	11.0	1066.6	13.2	16.5	
		51	204-508	68.6	699.7	10.2	874.7	12.8	1049.6	15.3	19.0	
		64	204-510	53.0	678.4	12.8	848.0	16.0	1017.6	19.2	24.0	
76	204-512	43.2	656.6	15.2	820.8	19.0	985.0	22.8	28.0			

*Tabulated deflections shown represent near solid and are for design information only.

Raymond® MEDIUM DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS BLUE											
Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE						
					For Optimum Life (20% of free length)		For Long Life (25% of free length)		Maximum Operating Def. (30% of free length)		*Maximum Deflection
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)
A	B	C									
25	12.5	89	204-514	38.2	680.0	17.8	850.0	22.3	1019.9	26.7	33.0
		102	204-516	33.0	673.2	20.4	841.5	25.5	1009.8	30.6	38.0
		115	204-518	28.0	644.0	23.0	805.0	28.8	966.0	34.5	43.0
		127	204-520	25.9	657.9	25.4	822.3	31.8	986.8	38.1	48.0
		139	204-522	23.2	645.0	27.8	806.2	34.8	967.4	41.7	52.0
		152	204-524	20.8	632.3	30.4	790.4	38.0	948.5	45.6	57.0
		178	204-528	17.8	633.7	35.6	792.1	44.5	950.5	53.4	67.0
		203	204-532	15.8	641.5	40.6	801.9	50.8	962.2	60.9	76.0
305	204-548	10.2	622.2	61.0	777.8	76.3	933.3	91.5	114.0		
32	16	38	204-606	185.0	1406.0	7.6	1757.5	9.5	2109.0	11.4	14.0
		44	204-607	158.0	1390.4	8.8	1738.0	11.0	2085.6	13.2	16.5
		51	204-608	134.0	1366.8	10.2	1708.5	12.8	2050.2	15.3	19.0
		64	204-610	99.0	1267.2	12.8	1584.0	16.0	1900.8	19.2	24.0
		76	204-612	80.5	1223.6	15.2	1529.5	19.0	1835.4	22.8	28.0
		89	204-614	69.1	1230.0	17.8	1537.5	22.3	1845.0	26.7	33.0
		102	204-616	58.8	1199.5	20.4	1499.4	25.5	1799.3	30.6	38.0
		115	204-618	51.5	1184.5	23.0	1480.6	28.8	1776.8	34.5	43.0
		127	204-620	44.8	1137.9	25.4	1422.4	31.8	1706.9	38.1	48.0
		139	204-622	42.3	1175.9	27.8	1469.9	34.8	1763.9	41.7	52.0
		152	204-624	37.8	1149.1	30.4	1436.4	38.0	1723.7	45.6	57.0
		178	204-628	32.5	1157.0	35.6	1446.3	44.5	1735.5	53.4	67.0
		203	204-632	28.9	1173.3	40.6	1466.7	50.8	1760.0	60.9	76.0
254	204-640	21.4	1087.1	50.8	1358.9	63.5	1630.7	76.2	95.0		
305	204-648	18.3	1116.3	61.0	1395.4	76.3	1674.5	91.5	114.0		
40	20	51	204-708	181.6	1852.3	10.2	2315.4	12.8	2778.5	15.3	19.0
		64	204-710	140.0	1792.0	12.8	2240.0	16.0	2688.0	19.2	24.0
		76	204-712	108.0	1641.6	15.2	2052.0	19.0	2462.4	22.8	28.0
		89	204-714	90.7	1614.5	17.8	2018.1	22.3	2421.7	26.7	33.0
		102	204-716	81.0	1652.4	20.4	2065.5	25.5	2478.6	30.6	38.0
		115	204-718	71.8	1651.4	23.0	2064.3	28.8	2477.1	34.5	43.0
		127	204-720	62.7	1592.6	25.4	1990.7	31.8	2388.9	38.1	48.0
		139	204-722	57.5	1598.5	27.8	1998.1	34.8	2397.8	41.7	52.0
		152	204-724	51.6	1568.6	30.4	1960.8	38.0	2353.0	45.6	57.0
		178	204-728	44.1	1570.0	35.6	1962.5	44.5	2354.9	53.4	67.0
		203	204-732	36.7	1490.0	40.6	1862.5	50.8	2235.0	60.9	76.0
		254	204-740	30.1	1529.1	50.8	1911.4	63.5	2293.6	76.2	95.0
		305	204-748	24.6	1500.6	61.0	1875.8	76.3	2250.9	91.5	114.0
50	25	64	204-810	209.0	2675.2	12.8	3344.0	16.0	4012.8	19.2	24.0
		76	204-812	168.0	2553.6	15.2	3192.0	19.0	3830.4	22.8	28.0
		89	204-814	140.0	2492.0	17.8	3115.0	22.3	3738.0	26.7	33.0
		102	204-816	119.0	2427.6	20.4	3034.5	25.5	3641.4	30.6	38.0
		115	204-818	106.0	2438.0	23.0	3047.5	28.8	3657.0	34.5	43.0
		127	204-820	97.0	2463.8	25.4	3079.8	31.8	3695.7	38.1	48.0
		139	204-822	87.0	2418.6	27.8	3023.3	34.8	3627.9	41.7	52.0
		152	204-824	80.0	2432.0	30.4	3040.0	38.0	3648.0	45.6	57.0
		178	204-828	69.5	2474.2	35.6	3092.8	44.5	3711.3	53.4	67.0
		203	204-832	59.8	2427.9	40.6	3034.9	50.8	3641.8	60.9	76.0
		229	204-836	50.9	2331.2	45.8	2914.0	57.3	3496.8	68.7	86.0
		254	204-840	43.9	2230.1	50.8	2787.7	63.5	3345.2	76.2	95.0
		305	204-848	38.6	2354.6	61.0	2943.3	76.3	3531.9	91.5	114.0
63	38	76	204-912	312.0	4742.4	15.2	5928.0	19.0	7113.6	22.8	28.0
		89	204-914	260.0	4628.0	17.8	5785.0	22.3	6942.0	26.7	33.0
		102	204-916	221.0	4508.4	20.4	5635.5	25.5	6762.6	30.6	38.0
		115	204-918	187.0	4301.0	23.0	5376.3	28.8	6451.5	34.5	43.0
		127	204-920	168.0	4267.2	25.4	5334.0	31.8	6400.8	38.1	48.0
		152	204-924	136.0	4134.4	30.4	5168.0	38.0	6201.6	45.6	57.0
		178	204-928	114.0	4058.4	35.6	5073.0	44.5	6087.6	53.4	67.0
		203	204-932	100.0	4060.0	40.6	5075.0	50.8	6090.0	60.9	76.0
		229	204-936	89.2	4085.4	45.8	5106.7	57.3	6128.0	68.7	86.0
		254	204-940	78.4	3982.7	50.8	4978.4	63.5	5974.1	76.2	95.0
		305	204-948	64.7	3946.7	61.0	4933.4	76.3	5920.1	91.5	114.0

*Tabulated deflections shown represent near solid and are for design information only.



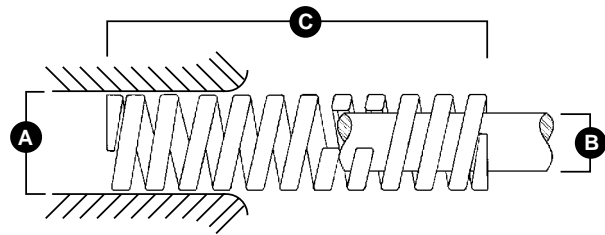
Raymond® HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS RED

Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE							
					For Optimum Life (15% of free length)		For Long Life (20% of free length)		Maximum Operating Def. (25% of free length)		*Maximum Deflection	
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)	
A	B	C										
10	5	25	205-104	22.1	82.9	3.8	110.5	5.0	138.1	6.3	7.5	
		32	205-105	17.5	84.0	4.8	112.0	6.4	140.0	8.0	9.6	
		38	205-106	17.1	97.5	5.7	130.0	7.6	162.5	9.5	11.4	
		44	205-107	15.0	99.0	6.6	132.0	8.8	165.0	11.0	13.2	
		51	205-108	12.8	97.9	7.7	130.6	10.2	163.2	12.8	15.3	
		64	205-110	10.7	102.7	9.6	137.0	12.8	171.2	16.0	19.2	
		76	205-112	7.5	85.5	11.4	114.0	15.2	142.5	19.0	22.8	
		305	205-148	2.1	96.1	45.8	128.1	61.0	160.1	76.3	91.5	
12.5	6.3	25	205-204	42.1	157.9	3.8	210.5	5.0	263.1	6.3	7.5	
		32	205-205	33.2	159.4	4.8	212.5	6.4	265.6	8.0	9.6	
		38	205-206	29.3	167.0	5.7	222.7	7.6	278.4	9.5	11.4	
		44	205-207	24.6	162.4	6.6	216.5	8.8	270.6	11.0	13.2	
		51	205-208	19.6	149.9	7.7	199.9	10.2	249.9	12.8	15.3	
		64	205-210	15.0	144.0	9.6	192.0	12.8	240.0	16.0	19.2	
		76	205-212	13.2	150.5	11.4	200.6	15.2	250.8	19.0	22.8	
		89	205-214	11.4	152.2	13.4	202.9	17.8	253.7	22.3	26.7	
305	205-248	2.8	128.1	45.8	170.8	61.0	213.5	76.3	91.5			
16	8	25	205-304	75.7	283.9	3.8	378.5	5.0	473.1	6.3	7.5	
		32	205-305	52.8	253.4	4.8	337.9	6.4	422.4	8.0	9.6	
		38	205-306	48.5	276.5	5.7	368.6	7.6	460.8	9.5	11.4	
		44	205-307	42.8	282.5	6.6	376.6	8.8	470.8	11.0	13.2	
		51	205-308	37.1	283.8	7.7	378.4	10.2	473.0	12.8	15.3	
		64	205-310	30.3	290.9	9.6	387.8	12.8	484.8	16.0	19.2	
		76	205-312	25.7	293.0	11.4	390.6	15.2	488.3	19.0	22.8	
		89	205-314	21.7	289.7	13.4	386.3	17.8	482.8	22.3	26.7	
		102	205-316	19.3	295.3	15.3	393.7	20.4	492.2	25.5	30.6	
		305	205-348	7.1	324.8	45.8	433.1	61.0	541.4	76.3	91.5	
20	10	25	205-404	216.0	810.0	3.8	1080.0	5.0	1350.0	6.3	7.5	
		32	205-405	168.0	806.4	4.8	1075.2	6.4	1344.0	8.0	9.6	
		38	205-406	129.0	735.3	5.7	980.4	7.6	1225.5	9.5	11.0	
		44	205-407	112.0	739.2	6.6	985.6	8.8	1232.0	11.0	13.0	
		51	205-408	94.0	719.1	7.7	958.8	10.2	1198.5	12.8	15.0	
		64	205-410	72.1	692.2	9.6	922.9	12.8	1153.6	16.0	19.0	
		76	205-412	59.7	680.6	11.4	907.4	15.2	1134.3	19.0	23.0	
		89	205-414	50.5	674.2	13.4	898.9	17.8	1123.6	22.3	27.0	
		102	205-416	44.2	676.3	15.3	901.7	20.4	1127.1	25.5	31.0	
		115	205-418	38.4	662.4	17.3	883.2	23.0	1104.0	28.8	35.0	
		127	205-420	34.1	649.6	19.1	866.1	25.4	1082.7	31.8	38.0	
		139	205-422	31.0	646.4	20.9	861.8	27.8	1077.3	34.8	42.0	
		152	205-424	28.2	643.0	22.8	857.3	30.4	1071.6	38.0	46.0	
		305	205-448	15.0	686.3	45.8	915.0	61.0	1143.8	76.3	91.0	
25	12.5	25	205-504	375.0	1406.3	3.8	1875.0	5.0	2343.8	6.3	7.5	
		32	205-505	297.0	1425.6	4.8	1900.8	6.4	2376.0	8.0	9.6	
		38	205-506	219.0	1248.3	5.7	1664.4	7.6	2080.5	9.5	11.0	
		44	205-507	187.0	1234.2	6.6	1645.6	8.8	2057.0	11.0	13.0	
		51	205-508	156.0	1193.4	7.7	1591.2	10.2	1989.0	12.8	15.0	
64	205-510	123.0	1180.8	9.6	1574.4	12.8	1968.0	16.0	19.0			

Raymond® HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS RED

Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE						
					For Optimum Life (15% of free length)		For Long Life (20% of free length)		Maximum Operating Def. (25% of free length)		*Maximum Deflection
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)
A	B	C									
25	12.5	76	205-512	99.0	1128.6	11.4	1504.8	15.2	1881.0	19.0	23.0
		89	205-514	84.0	1121.4	13.4	1495.2	17.8	1869.0	22.3	27.0
		102	205-516	73.0	1116.9	15.3	1489.2	20.4	1861.5	25.5	31.0
		115	205-518	65.0	1121.3	17.3	1495.0	23.0	1868.8	28.8	35.0
		127	205-520	57.7	1099.2	19.1	1465.6	25.4	1832.0	31.8	38.0
		139	205-522	52.7	1098.8	20.9	1465.1	27.8	1831.3	34.8	42.0
		152	205-524	47.8	1089.8	22.8	1453.1	30.4	1816.4	38.0	46.0
		178	205-528	41.0	1094.7	26.7	1459.6	35.6	1824.5	44.5	53.0
		203	205-532	35.8	1090.1	30.5	1453.5	40.6	1816.9	50.8	61.0
		305	205-548	22.9	1047.7	45.8	1396.9	61.0	1746.1	76.3	91.0
32	16	38	205-606	388.0	2211.6	5.7	2948.8	7.6	3686.0	9.5	11.0
		44	205-607	324.0	2138.4	6.6	2851.2	8.8	3564.0	11.0	13.0
		51	205-608	272.0	2080.8	7.7	2774.4	10.2	3468.0	12.8	15.0
		64	205-610	212.0	2035.2	9.6	2713.6	12.8	3392.0	16.0	19.0
		76	205-612	172.0	1960.8	11.4	2614.4	15.2	3268.0	19.0	23.0
		89	205-614	141.0	1882.4	13.4	2509.8	17.8	3137.3	22.3	27.0
		102	205-616	122.0	1866.6	15.3	2488.8	20.4	3111.0	25.5	31.0
		115	205-618	107.0	1845.8	17.3	2461.0	23.0	3076.3	28.8	35.0
		127	205-620	93.0	1771.7	19.1	2362.2	25.4	2952.8	31.8	38.0
		139	205-622	86.0	1793.1	20.9	2390.8	27.8	2988.5	34.8	42.0
		152	205-624	78.0	1778.4	22.8	2371.2	30.4	2964.0	38.0	46.0
		178	205-628	67.2	1794.2	26.7	2392.3	35.6	2990.4	44.5	53.0
		203	205-632	59.1	1799.6	30.5	2399.5	40.6	2999.3	50.8	61.0
		254	205-640	46.4	1767.8	38.1	2357.1	50.8	2946.4	63.5	76.0
305	205-648	38.0	1738.5	45.8	2318.0	61.0	2897.5	76.3	91.0		
40	20	51	205-708	350.0	2677.5	7.7	3570.0	10.2	4462.5	12.8	15.0
		64	205-710	269.0	2582.4	9.6	3443.2	12.8	4304.0	16.0	19.0
		76	205-712	219.0	2496.6	11.4	3328.8	15.2	4161.0	19.0	23.0
		89	205-714	190.0	2536.5	13.4	3382.0	17.8	4227.5	22.3	27.0
		102	205-716	163.0	2493.9	15.3	3325.2	20.4	4156.5	25.5	31.0
		115	205-718	142.0	2449.5	17.3	3266.0	23.0	4082.5	28.8	35.0
		127	205-720	128.0	2438.4	19.1	3251.2	25.4	4064.0	31.8	38.0
		139	205-722	115.0	2397.8	20.9	3197.0	27.8	3996.3	34.8	42.0
		152	205-724	105.0	2394.0	22.8	3192.0	30.4	3990.0	38.0	46.0
		178	205-728	89.0	2376.3	26.7	3168.4	35.6	3960.5	44.5	53.0
		203	205-732	77.0	2344.7	30.5	3126.2	40.6	3907.8	50.8	61.0
		254	205-740	61.0	2324.1	38.1	3098.8	50.8	3873.5	63.5	76.0
		305	205-748	51.0	2333.3	45.8	3111.0	61.0	3888.8	76.3	91.0
50	25	64	205-810	413.0	3964.8	9.6	5286.4	12.8	6608.0	16.0	19.0
		76	205-812	339.0	3864.6	11.4	5152.8	15.2	6441.0	19.0	23.0
		89	205-814	288.0	3844.8	13.4	5126.4	17.8	6408.0	22.3	27.0
		102	205-816	245.0	3748.5	15.3	4998.0	20.4	6247.5	25.5	31.0
		115	205-818	215.0	3708.8	17.3	4945.0	23.0	6181.3	28.8	35.0
		127	205-820	192.0	3657.6	19.1	4876.8	25.4	6096.0	31.8	38.0
		139	205-822	168.0	3502.8	20.9	4670.4	27.8	5838.0	34.8	42.0
		152	205-824	154.0	3511.2	22.8	4681.6	30.4	5852.0	38.0	46.0
		178	205-828	134.0	3577.8	26.7	4770.4	35.6	5963.0	44.5	53.0
		203	205-832	117.0	3562.7	30.5	4750.2	40.6	5937.8	50.8	61.0
		254	205-840	89.0	3390.9	38.1	4521.2	50.8	5651.5	63.5	76.0
		305	205-848	73.0	3339.8	45.8	4453.0	61.0	5566.3	76.3	91.0

*Tabulated deflections shown represent near solid and are for design information only.



Raymond® EXTRA HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS YELLOW

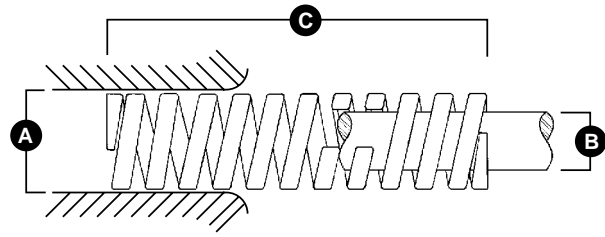
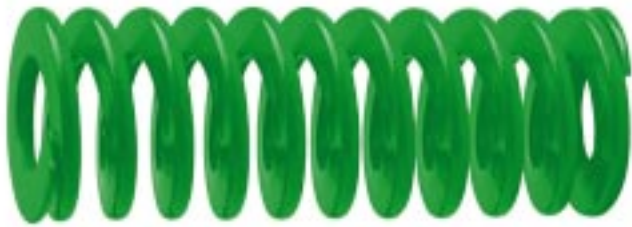
Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE							
					For Optimum Life (15% of free length)		For Long Life (17% of free length)		Maximum Operating Def. (20% of free length)		*Maximum Deflection	
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)	
A	B	C										
10	5	25	206-104	36.8	138.0	3.8	156.4	4.3	184.0	5.0	6.2	
		32	206-105	27.9	133.9	4.8	151.8	5.4	178.6	6.4	8.0	
		38	206-106	23.7	135.1	5.7	153.1	6.5	180.1	7.6	9.5	
		44	206-107	19.2	126.7	6.6	143.6	7.5	169.0	8.8	11.0	
		51	206-108	16.5	126.2	7.7	143.1	8.7	168.3	10.2	13.0	
		64	206-110	13.2	126.7	9.6	143.6	10.9	169.0	12.8	16.0	
		76	206-112	10.9	124.3	11.4	140.8	12.9	165.7	15.2	19.0	
		305	206-148	2.6	119.0	45.8	134.8	51.9	158.6	61.0	76.0	
12.5	6.3	25	206-204	58.5	219.4	3.8	248.6	4.3	292.5	5.0	6.2	
		32	206-205	43.9	210.7	4.8	238.8	5.4	281.0	6.4	8.0	
		38	206-206	36.0	205.2	5.7	232.6	6.5	273.6	7.6	9.5	
		44	206-207	30.3	200.0	6.6	226.6	7.5	266.6	8.8	11.0	
		51	206-208	26.2	200.4	7.7	227.2	8.7	267.2	10.2	13.0	
		64	206-210	21.2	203.5	9.6	230.7	10.9	271.4	12.8	16.0	
		76	206-212	17.1	194.9	11.4	220.9	12.9	259.9	15.2	19.0	
		89	206-214	14.5	193.6	13.4	219.4	15.1	258.1	17.8	22.0	
305	206-248	4.3	196.7	45.8	223.0	51.9	262.3	61.0	76.0			
16	8	25	206-304	118.0	442.5	3.8	501.5	4.3	590.0	5.0	6.2	
		32	206-305	89.0	427.2	4.8	484.2	5.4	569.6	6.4	8.0	
		38	206-306	72.1	411.0	5.7	465.8	6.5	548.0	7.6	9.5	
		44	206-307	60.9	401.9	6.6	455.5	7.5	535.9	8.8	11.0	
		51	206-308	52.3	400.1	7.7	453.4	8.7	533.5	10.2	13.0	
		64	206-310	41.2	395.5	9.6	448.3	10.9	527.4	12.8	16.0	
		76	206-312	34.1	388.7	11.4	440.6	12.9	518.3	15.2	19.0	
		89	206-314	29.5	393.8	13.4	446.3	15.1	525.1	17.8	22.0	
102	206-316	25.6	391.7	15.3	443.9	17.3	522.2	20.4	26.0			
305	206-348	8.4	384.3	45.8	435.5	51.9	512.4	61.0	76.0			
20	10	25	206-404	293.0	1098.8	3.8	1245.3	4.3	1465.0	5.0	6.2	
		32	206-405	224.0	1075.2	4.8	1218.6	5.4	1433.6	6.4	8.0	
		38	206-406	177.0	1008.9	5.7	1143.4	6.5	1345.2	7.6	9.5	
		44	206-407	149.0	983.4	6.6	1114.5	7.5	1311.2	8.8	11.0	
		51	206-408	128.0	979.2	7.7	1109.8	8.7	1305.6	10.2	13.0	
		64	206-410	99.0	950.4	9.6	1077.1	10.9	1267.2	12.8	16.0	
		76	206-412	81.7	931.4	11.4	1055.6	12.9	1241.8	15.2	19.0	
		89	206-414	69.5	927.8	13.4	1051.5	15.1	1237.1	17.8	22.0	
		102	206-416	60.6	927.2	15.3	1050.8	17.3	1236.2	20.4	26.0	
		115	206-418	53.0	914.3	17.3	1036.2	19.6	1219.0	23.0	29.0	
		127	206-420	47.5	904.9	19.1	1025.5	21.6	1206.5	25.4	32.0	
		139	206-422	43.0	896.6	20.9	1016.1	23.6	1195.4	27.8	35.0	
		152	206-424	39.0	889.2	22.8	1007.8	25.8	1185.6	30.4	38.0	
		305	206-448	21.2	969.9	45.8	1099.2	51.9	1293.2	61.0	76.0	
25	12.5	32	206-505	374.4	1797.1	4.8	2036.7	5.4	2396.2	6.4	8.0	
		38	206-506	346.0	1972.2	5.7	2235.2	6.5	2629.6	7.6	9.5	
		44	206-507	244.0	1610.4	6.6	1825.1	7.5	2147.2	8.8	11.0	
		51	206-508	207.5	1587.4	7.7	1799.0	8.7	2116.5	10.2	13.0	
		64	206-510	161.0	1545.6	9.6	1751.7	10.9	2060.8	12.8	16.0	
		76	206-512	130.8	1491.1	11.4	1689.9	12.9	1988.2	15.2	19.0	
89	206-514	110.5	1475.2	13.4	1671.9	15.1	1966.9	17.8	22.0			

*Tabulated deflections shown represent near solid and are for design information only.

Raymond® EXTRA HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES METRIC DIMENSIONS YELLOW

Hole Dia. (mm)	Rod Dia. (mm)	Free Length (mm)	CATALOG NUMBER	Load at 1 mm Def. (N)	LOAD DEFLECTION TABLE							
					For Optimum Life (15% of free length)		For Long Life (17% of free length)		Maximum Operating Def. (20% of free length)		*Maximum Deflection	
					Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Load (N)	Deflection (mm)	Deflection (mm)	
A	B	C										
25	12.5	102	206-516	96.3	1473.4	15.3	1669.8	17.3	1964.5	20.4	26.0	
		115	206-518	85.7	1478.3	17.3	1675.4	19.6	1971.1	23.0	29.0	
		127	206-520	76.3	1453.5	19.1	1647.3	21.6	1938.0	25.4	32.0	
		152	206-524	63.5	1447.8	22.8	1640.8	25.8	1930.4	30.4	38.0	
		178	206-528	53.9	1439.1	26.7	1631.0	30.3	1918.8	35.6	44.0	
		203	206-532	47.0	1431.2	30.5	1622.0	34.5	1908.2	40.6	51.0	
		305	206-548	30.9	1413.7	45.8	1602.2	51.9	1884.9	61.0	76.0	
32	16	38	206-606	528.2	3010.7	5.7	3412.2	6.5	4014.3	7.6	9.5	
		44	206-607	424.4	2801.0	6.6	3174.5	7.5	3734.7	8.8	11.0	
		51	206-608	353.0	2700.5	7.7	3060.5	8.7	3600.6	10.2	13.0	
		64	206-610	269.2	2584.3	9.6	2928.9	10.9	3445.8	12.8	16.0	
		76	206-612	218.5	2490.9	11.4	2823.0	12.9	3321.2	15.2	19.0	
		89	206-614	180.3	2407.0	13.4	2727.9	15.1	3209.3	17.8	22.0	
		102	206-616	155.0	2371.5	15.3	2687.7	17.3	3162.0	20.4	26.0	
		115	206-618	140.0	2415.0	17.3	2737.0	19.6	3220.0	23.0	29.0	
		127	206-620	124.0	2362.2	19.1	2677.2	21.6	3149.6	25.4	32.0	
		152	206-624	102.0	2325.6	22.8	2635.7	25.8	3100.8	30.4	38.0	
		178	206-628	88.2	2354.9	26.7	2668.9	30.3	3139.9	35.6	44.0	
		203	206-632	76.0	2314.2	30.5	2622.8	34.5	3085.6	40.6	51.0	
		254	206-640	60.8	2316.5	38.1	2625.3	43.2	3088.6	50.8	64.0	
305	206-648	49.0	2241.8	45.8	2540.7	51.9	2989.0	61.0	76.0			
40	20	51	206-708	628.0	4804.2	7.7	5444.8	8.7	6405.6	10.2	13.0	
		64	206-710	487.0	4675.2	9.6	5298.6	10.9	6233.6	12.8	16.0	
		76	206-712	379.0	4320.6	11.4	4896.7	12.9	5760.8	15.2	19.0	
		89	206-714	321.0	4285.4	13.4	4856.7	15.1	5713.8	17.8	22.0	
		102	206-716	281.0	4299.3	15.3	4872.5	17.3	5732.4	20.4	26.0	
		115	206-718	245.0	4226.3	17.3	4789.8	19.6	5635.0	23.0	29.0	
		127	206-720	221.0	4210.1	19.1	4771.4	21.6	5613.4	25.4	32.0	
		152	206-724	168.0	3830.4	22.8	4341.1	25.8	5107.2	30.4	38.0	
		203	206-732	132.0	4019.4	30.5	4555.3	34.5	5359.2	40.6	51.0	
		254	206-740	107.0	4076.7	38.1	4620.3	43.2	5435.6	50.8	64.0	
305	206-748	87.8	4016.9	45.8	4552.4	51.9	5355.8	61.0	76.0			
50	25	64	206-810	709.0	6806.4	9.6	7713.9	10.9	9075.2	12.8	16.0	
		76	206-812	572.0	6520.8	11.4	7390.2	12.9	8694.4	15.2	19.0	
		89	206-814	475.0	6341.3	13.4	7186.8	15.1	8455.0	17.8	22.0	
		102	206-816	405.0	6196.5	15.3	7022.7	17.3	8262.0	20.4	26.0	
		115	206-818	352.0	6072.0	17.3	6881.6	19.6	8096.0	23.0	29.0	
		127	206-820	316.0	6019.8	19.1	6822.4	21.6	8026.4	25.4	32.0	
		152	206-824	239.0	5449.2	22.8	6175.8	25.8	7265.6	30.4	38.0	
		203	206-832	187.0	5694.2	30.5	6453.4	34.5	7592.2	40.6	51.0	
		254	206-840	153.0	5829.3	38.1	6606.5	43.2	7772.4	50.8	64.0	
		305	206-848	127.0	5810.3	45.8	6585.0	51.9	7747.0	61.0	76.0	

*Tabulated deflections shown represent near solid and are for design information only.

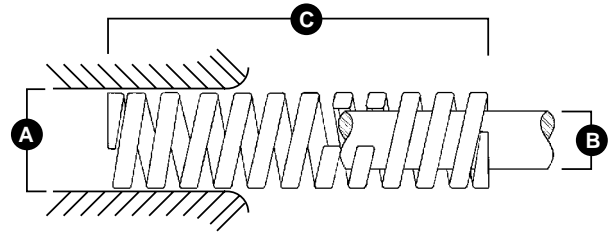


Raymond® LIGHT DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS GREEN												
Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE							
					For Optimum Life (25% of free length)		For Long Life (30% of free length)		Maximum Operating Def. (35% of free length)		*Maximum Deflection	
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)	
0.394	0.197	0.98	203-104	5.71	14.1	0.25	16.9	0.30	19.7	0.35	0.406	
		1.26	203-105	4.85	15.3	0.31	18.3	0.38	21.4	0.44	0.516	
		1.50	203-106	3.88	14.5	0.37	17.4	0.45	20.3	0.52	0.614	
		1.73	203-107	3.43	14.8	0.43	17.8	0.52	20.8	0.61	0.709	
		2.01	203-108	2.86	14.3	0.50	17.2	0.60	20.1	0.70	0.823	
		2.52	203-110	2.46	15.5	0.63	18.6	0.76	21.7	0.88	1.024	
		2.99	203-112	1.83	13.7	0.75	16.4	0.90	19.1	1.05	1.228	
		12.01	203-148	0.63	18.9	3.00	22.6	3.60	26.4	4.20	4.921	
0.492	0.248	0.98	203-204	10.22	25.2	0.25	30.2	0.30	35.2	0.35	0.406	
		1.26	203-205	9.36	29.5	0.31	35.4	0.38	41.3	0.44	0.517	
		1.50	203-206	7.77	29.0	0.37	34.8	0.45	40.7	0.52	0.614	
		1.73	203-207	6.91	29.9	0.43	35.9	0.52	41.9	0.61	0.709	
		2.01	203-208	6.51	32.7	0.50	39.2	0.60	45.8	0.70	0.823	
		2.52	203-210	5.31	33.5	0.63	40.2	0.76	46.8	0.88	1.035	
		2.99	203-212	4.05	30.3	0.75	36.4	0.90	42.5	1.05	1.228	
		3.50	203-214	3.08	27.0	0.88	32.4	1.05	37.8	1.23	1.437	
12.01	203-248	0.80	24.0	3.00	28.8	3.60	33.6	4.20	4.921			
0.630	0.315	0.98	203-304	13.36	32.9	0.25	39.5	0.30	46.0	0.35	0.406	
		1.26	203-305	13.08	41.2	0.31	49.4	0.38	57.7	0.44	0.516	
		1.50	203-306	11.02	41.2	0.37	49.5	0.45	57.7	0.52	0.614	
		1.73	203-307	9.76	42.3	0.43	50.7	0.52	59.2	0.61	0.709	
		2.01	203-308	8.96	45.0	0.50	54.0	0.60	63.0	0.70	0.823	
		2.52	203-310	6.11	38.5	0.63	46.2	0.76	53.9	0.88	1.035	
		2.99	203-312	5.71	42.7	0.75	51.3	0.90	59.8	1.05	1.228	
		3.50	203-314	4.91	43.0	0.88	51.6	1.05	60.2	1.23	1.437	
4.02	203-316	4.45	44.7	1.00	53.7	1.20	62.6	1.41	1.646			
12.01	203-348	1.43	42.9	3.00	51.4	3.60	60.0	4.20	4.921			
0.787	0.394	0.98	203-404	31.86	78.4	0.25	94.1	0.30	109.8	0.35	0.402	
		1.26	203-405	25.70	80.9	0.31	97.1	0.38	113.3	0.44	0.492	
		1.50	203-406	19.01	71.1	0.37	85.3	0.45	99.6	0.52	0.591	
		1.73	203-407	17.13	74.2	0.43	89.0	0.52	103.9	0.61	0.709	
		2.01	203-408	13.99	70.2	0.50	84.3	0.60	98.3	0.70	0.787	
		2.52	203-410	11.42	71.9	0.63	86.3	0.76	100.7	0.88	0.984	
		2.99	203-412	9.14	68.3	0.75	82.0	0.90	95.7	1.05	1.181	
		3.50	203-414	7.99	70.0	0.88	84.0	1.05	98.0	1.23	1.378	
		4.02	203-416	6.85	68.8	1.00	82.6	1.20	96.3	1.41	1.614	
		4.53	203-418	6.22	70.5	1.13	84.6	1.36	98.6	1.59	1.811	
		5.00	203-420	5.42	67.8	1.25	81.4	1.50	94.9	1.75	2.008	
		5.47	203-422	4.80	65.6	1.37	78.8	1.64	91.9	1.92	2.205	
5.98	203-424	4.28	64.1	1.50	76.9	1.80	89.7	2.09	2.402			
12.01	203-448	2.28	68.6	3.00	82.3	3.60	96.0	4.20	4.803			
0.984	0.492	0.98	203-504	57.10	140.5	0.25	168.6	0.30	196.7	0.35	0.402	
		1.26	203-505	45.85	144.4	0.31	173.3	0.38	202.2	0.44	0.492	
		1.50	203-506	35.40	132.4	0.37	158.9	0.45	185.4	0.52	0.591	
		1.73	203-507	30.21	130.8	0.43	157.0	0.52	183.2	0.61	0.709	
		2.01	203-508	25.12	126.1	0.50	151.3	0.60	176.6	0.70	0.787	
		2.52	203-510	20.10	126.6	0.63	151.9	0.76	177.3	0.88	0.984	
		2.99	203-512	15.99	119.6	0.75	143.5	0.90	167.4	1.05	1.181	

Raymond® LIGHT DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS GREEN

Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE							
					For Optimum Life (25% of free length)		For Long Life (30% of free length)		Maximum Operating Def. (35% of free length)		*Maximum Deflection	
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)	
A	B	C										
0.984	0.492	3.50	203-514	13.70	120.1	0.88	144.1	1.05	168.1	1.23	1.378	
		4.02	203-516	12.05	121.0	1.00	145.2	1.20	169.4	1.41	1.614	
		4.53	203-518	10.68	120.9	1.13	145.1	1.36	169.2	1.59	1.811	
		5.00	203-520	9.54	119.2	1.25	143.1	1.50	166.9	1.75	2.008	
		5.47	203-522	8.74	119.5	1.37	143.4	1.64	167.3	1.92	2.205	
		5.98	203-524	7.99	119.6	1.50	143.5	1.80	167.4	2.09	2.402	
		7.01	203-528	7.14	125.1	1.75	150.1	2.10	175.1	2.45	2.795	
		7.99	203-532	5.94	118.7	2.00	142.4	2.40	166.1	2.80	3.189	
		12.01	203-548	4.00	120.0	3.00	144.0	3.60	168.0	4.20	4.803	
1.260	0.630	1.50	203-606	53.67	200.8	0.37	240.9	0.45	281.1	0.52	0.591	
		1.73	203-607	45.39	196.6	0.43	235.9	0.52	275.2	0.61	0.709	
		2.01	203-608	38.26	192.1	0.50	230.5	0.60	268.9	0.70	0.787	
		2.52	203-610	30.26	190.6	0.63	228.8	0.76	266.9	0.88	0.984	
		2.99	203-612	25.12	187.9	0.75	225.5	0.90	263.1	1.05	1.181	
		3.50	203-614	21.24	186.1	0.88	223.3	1.05	260.5	1.23	1.378	
		4.02	203-616	18.27	183.5	1.00	220.1	1.20	256.8	1.41	1.614	
		4.53	203-618	16.56	187.5	1.13	224.9	1.36	262.4	1.59	1.811	
		5.00	203-620	14.28	178.5	1.25	214.1	1.50	249.8	1.75	2.008	
		5.47	203-622	13.13	179.7	1.37	215.6	1.64	251.6	1.92	2.205	
		5.98	203-624	12.28	183.7	1.50	220.4	1.80	257.1	2.09	2.402	
		7.01	203-628	10.39	182.1	1.75	218.5	2.10	254.9	2.45	2.795	
		7.99	203-632	9.02	180.3	2.00	216.3	2.40	252.4	2.80	3.189	
		10.00	203-640	7.14	178.5	2.50	214.1	3.00	249.8	3.50	4.016	
12.01	203-648	5.88	176.6	3.00	211.9	3.60	247.2	4.20	4.803			
1.575	0.787	2.01	203-708	52.53	263.7	0.50	316.5	0.60	369.2	0.70	0.787	
		2.52	203-710	41.68	262.6	0.63	315.1	0.76	367.6	0.88	0.984	
		2.99	203-712	35.97	269.1	0.75	322.9	0.90	376.8	1.05	1.181	
		3.50	203-714	29.12	255.1	0.88	306.1	1.05	357.2	1.23	1.378	
		4.02	203-716	24.55	246.5	1.00	295.8	1.20	345.1	1.41	1.614	
		4.53	203-718	22.61	256.0	1.13	307.1	1.36	358.3	1.59	1.811	
		5.00	203-720	21.13	264.1	1.25	316.9	1.50	369.8	1.75	2.008	
		5.47	203-722	18.27	250.0	1.37	300.0	1.64	350.0	1.92	2.205	
		5.98	203-724	15.99	239.2	1.50	287.1	1.80	334.9	2.09	2.402	
		7.01	203-728	14.39	252.1	1.75	302.5	2.10	353.0	2.45	2.795	
		7.99	203-732	12.96	259.0	2.00	310.8	2.40	362.6	2.80	3.189	
		10.00	203-740	9.71	242.7	2.50	291.2	3.00	339.8	3.50	4.016	
		12.01	203-748	8.45	253.7	3.00	304.5	3.60	355.2	4.20	4.803	
1.969	0.984	2.52	203-810	89.08	561.2	0.63	673.4	0.76	785.6	0.88	0.984	
		2.99	203-812	71.38	533.9	0.75	640.7	0.90	747.5	1.05	1.181	
		3.50	203-814	62.24	545.3	0.88	654.3	1.05	763.4	1.23	1.378	
		4.02	203-816	53.67	538.9	1.00	646.7	1.20	754.5	1.41	1.614	
		4.53	203-818	46.25	523.6	1.13	628.3	1.36	733.0	1.59	1.811	
		5.00	203-820	40.54	506.8	1.25	608.2	1.50	709.5	1.75	2.008	
		5.47	203-822	37.97	519.5	1.37	623.4	1.64	727.3	1.92	2.205	
		5.98	203-824	34.26	512.6	1.50	615.1	1.80	717.6	2.09	2.402	
		7.01	203-828	29.69	520.2	1.75	624.3	2.10	728.3	2.45	2.795	
		7.99	203-832	25.12	502.0	2.00	602.4	2.40	702.8	2.80	3.189	
		10.00	203-840	19.99	499.7	2.50	599.6	3.00	699.5	3.50	4.016	
		12.01	203-848	16.27	488.6	3.00	586.3	3.60	684.0	4.20	4.803	
2.480	1.496	2.99	203-912	107.92	807.3	0.75	968.8	0.90	1130.3	1.05	1.181	
		3.50	203-914	90.22	790.4	0.88	948.4	1.05	1106.5	1.23	1.378	
		4.02	203-916	74.80	751.0	1.00	901.2	1.20	1051.4	1.41	1.614	
		4.53	203-918	66.24	749.8	1.13	899.7	1.36	1049.7	1.59	1.811	
		5.00	203-920	58.81	735.2	1.25	882.3	1.50	1029.3	1.75	2.008	
		5.98	203-924	48.14	720.2	1.50	864.2	1.80	1008.3	2.09	2.402	
		7.01	203-928	40.83	715.3	1.75	858.4	2.10	1001.5	2.45	2.795	
		7.99	203-932	35.23	704.0	2.00	844.8	2.40	985.6	2.80	3.189	
		10.00	203-940	26.84	671.0	2.50	805.2	3.00	939.4	3.50	4.016	
		12.01	203-948	21.81	654.9	3.00	785.8	3.60	916.8	4.20	4.803	

*Tabulated deflections shown represent near solid and are for design information only.



Raymond® MEDIUM DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS BLUE

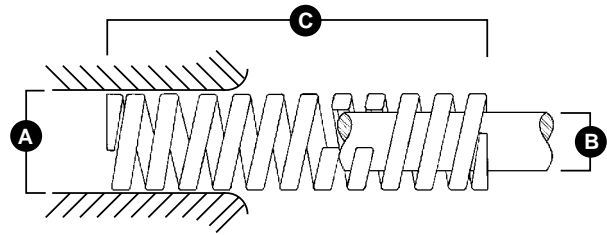
Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE							
					For Optimum Life (20% of free length)		For Long Life (25% of free length)		Maximum Operating Def. (30% of free length)		*Maximum Deflection	
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)	
A	B	C										
0.394	0.197	0.98	204-104	9.14	18.0	0.20	22.5	0.25	27.0	0.30	0.374	
		1.26	204-105	7.42	18.7	0.25	23.4	0.31	28.1	0.38	0.480	
		1.50	204-106	6.79	20.3	0.30	25.4	0.37	30.5	0.45	0.567	
		1.73	204-107	5.88	20.4	0.35	25.5	0.43	30.6	0.52	0.657	
		2.01	204-108	5.08	20.4	0.40	25.5	0.50	30.6	0.60	0.764	
		2.52	204-110	4.28	21.6	0.50	27.0	0.63	32.4	0.76	0.957	
		2.99	204-112	3.03	18.1	0.60	22.6	0.75	27.2	0.90	1.138	
		12.01	204-148	0.91	21.9	2.40	27.4	3.00	32.9	3.60	4.567	
0.492	0.248	0.98	204-204	17.13	33.7	0.20	42.2	0.25	50.6	0.30	0.374	
		1.26	204-205	14.16	35.7	0.25	44.6	0.31	53.5	0.38	0.480	
		1.50	204-206	12.22	36.6	0.30	45.7	0.37	54.9	0.45	0.567	
		1.73	204-207	10.56	36.6	0.35	45.8	0.43	54.9	0.52	0.657	
		2.01	204-208	8.85	35.5	0.40	44.4	0.50	53.3	0.60	0.764	
		2.52	204-210	6.91	34.8	0.50	43.5	0.63	52.2	0.76	0.957	
		2.99	204-212	5.82	34.8	0.60	43.6	0.75	52.3	0.90	1.138	
		3.50	204-214	4.80	33.6	0.70	42.0	0.88	50.4	1.05	1.331	
12.01	204-248	1.20	28.8	2.40	36.0	3.00	43.2	3.60	4.567			
0.630	0.315	0.98	204-304	28.21	55.5	0.20	69.4	0.25	83.3	0.30	0.374	
		1.26	204-305	21.18	53.4	0.25	66.7	0.31	80.1	0.38	0.480	
		1.50	204-306	19.36	57.9	0.30	72.4	0.37	86.9	0.45	0.567	
		1.73	204-307	17.13	59.4	0.35	74.2	0.43	89.0	0.52	0.657	
		2.01	204-308	15.07	60.5	0.40	75.7	0.50	90.8	0.60	0.764	
		2.52	204-310	11.71	59.0	0.50	73.7	0.63	88.5	0.76	0.957	
		2.99	204-312	10.16	60.8	0.60	76.0	0.75	91.2	0.90	1.138	
		3.50	204-314	8.68	60.8	0.70	76.0	0.88	91.2	1.05	1.331	
		4.02	204-316	7.71	61.9	0.80	77.4	1.00	92.9	1.20	1.528	
		12.01	204-348	2.74	65.8	2.40	82.3	3.00	98.7	3.60	4.567	
0.787	0.394	0.98	204-404	55.96	110.2	0.20	137.7	0.25	165.2	0.30	0.370	
		1.26	204-405	41.45	104.5	0.25	130.6	0.31	156.7	0.38	0.472	
		1.50	204-406	31.98	95.7	0.30	119.6	0.37	143.5	0.45	0.551	
		1.73	204-407	27.12	94.0	0.35	117.5	0.43	141.0	0.52	0.650	
		2.01	204-408	23.81	95.6	0.40	119.5	0.50	143.4	0.60	0.748	
		2.52	204-410	18.44	92.9	0.50	116.2	0.63	139.4	0.76	0.945	
		2.99	204-412	14.33	85.8	0.60	107.2	0.75	128.7	0.90	1.102	
		3.50	204-414	12.56	88.0	0.70	110.0	0.88	132.1	1.05	1.299	
		4.02	204-416	11.31	90.8	0.80	113.5	1.00	136.2	1.20	1.496	
		4.53	204-418	10.34	93.6	0.91	117.0	1.13	140.4	1.36	1.693	
		5.00	204-420	9.48	94.8	1.00	118.5	1.25	142.2	1.50	1.890	
		5.47	204-422	8.62	94.4	1.09	118.0	1.37	141.6	1.64	2.047	
		5.98	204-424	7.54	90.2	1.20	112.8	1.50	135.3	1.80	2.244	
		12.01	204-448	3.48	83.7	2.40	104.6	3.00	125.5	3.60	4.488	
0.984	0.492	0.98	204-504	83.94	165.2	0.20	206.6	0.25	247.9	0.30	0.370	
		1.26	204-505	67.38	169.8	0.25	212.2	0.31	254.7	0.38	0.472	
		1.50	204-506	53.10	158.9	0.30	198.6	0.37	238.4	0.45	0.551	
		1.73	204-507	46.14	159.8	0.35	199.8	0.43	239.8	0.52	0.650	
		2.01	204-508	39.17	157.3	0.40	196.7	0.50	236.0	0.60	0.748	
		2.52	204-510	30.26	152.5	0.50	190.6	0.63	228.8	0.76	0.945	
		2.99	204-512	24.67	147.6	0.60	184.5	0.75	221.4	0.90	1.102	

*Tabulated deflections shown represent near solid and are for design information only.

Raymond® MEDIUM DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS BLUE

Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE						
					For Optimum Life (20% of free length)		For Long Life (25% of free length)		Maximum Operating Def. (30% of free length)		*Maximum Deflection
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)
0.984	0.492	3.50	204-514	21.81	152.9	0.70	191.1	0.88	229.3	1.05	1.299
		4.02	204-516	18.84	151.3	0.80	189.2	1.00	227.0	1.20	1.496
		4.53	204-518	15.99	144.8	0.91	181.0	1.13	217.2	1.36	1.693
		5.00	204-520	14.79	147.9	1.00	184.9	1.25	221.9	1.50	1.890
		5.47	204-522	13.25	145.0	1.09	181.3	1.37	217.5	1.64	2.047
		5.98	204-524	11.88	142.2	1.20	177.7	1.50	213.2	1.80	2.244
		7.01	204-528	10.16	142.5	1.40	178.1	1.75	213.7	2.10	2.638
		7.99	204-532	9.02	144.2	1.60	180.3	2.00	216.3	2.40	2.992
		12.01	204-548	5.82	139.9	2.40	174.9	3.00	209.8	3.60	4.488
		1.260	0.630	1.50	204-606	105.64	316.1	0.30	395.1	0.37	474.1
1.73	204-607			90.22	312.6	0.35	390.7	0.43	468.9	0.52	0.650
2.01	204-608			76.51	307.3	0.40	384.1	0.50	460.9	0.60	0.748
2.52	204-610			56.53	284.9	0.50	356.1	0.63	427.3	0.76	0.945
2.99	204-612			45.97	275.1	0.60	343.9	0.75	412.6	0.90	1.102
3.50	204-614			39.46	276.5	0.70	345.7	0.88	414.8	1.05	1.299
4.02	204-616			33.57	269.7	0.80	337.1	1.00	404.5	1.20	1.496
4.53	204-618			29.41	266.3	0.91	332.9	1.13	399.5	1.36	1.693
5.00	204-620			25.58	255.8	1.00	319.8	1.25	383.7	1.50	1.890
5.47	204-622			24.15	264.4	1.09	330.5	1.37	396.6	1.64	2.047
5.98	204-624			21.58	258.3	1.20	322.9	1.50	387.5	1.80	2.244
7.01	204-628			18.56	260.1	1.40	325.2	1.75	390.2	2.10	2.638
7.99	204-632			16.50	263.8	1.60	329.7	2.00	395.7	2.40	2.992
10.00	204-640	12.22	244.4	2.00	305.5	2.50	366.6	3.00	3.740		
12.01	204-648	10.45	251.0	2.40	313.7	3.00	376.5	3.60	4.488		
1.575	0.787	2.01	204-708	103.69	416.4	0.40	520.5	0.50	624.7	0.60	0.748
		2.52	204-710	79.94	402.9	0.50	503.6	0.63	604.3	0.76	0.945
		2.99	204-712	61.67	369.1	0.60	461.3	0.75	553.6	0.90	1.102
		3.50	204-714	51.79	363.0	0.70	453.7	0.88	544.4	1.05	1.299
		4.02	204-716	46.25	371.5	0.80	464.4	1.00	557.2	1.20	1.496
		4.53	204-718	41.00	371.3	0.91	464.1	1.13	556.9	1.36	1.693
		5.00	204-720	35.80	358.0	1.00	447.5	1.25	537.1	1.50	1.890
		5.47	204-722	32.83	359.4	1.09	449.2	1.37	539.1	1.64	2.047
		5.98	204-724	29.46	352.7	1.20	440.8	1.50	529.0	1.80	2.244
		7.01	204-728	25.18	353.0	1.40	441.2	1.75	529.4	2.10	2.638
		7.99	204-732	20.96	335.0	1.60	418.7	2.00	502.5	2.40	2.992
		10.00	204-740	17.19	343.8	2.00	429.7	2.50	515.6	3.00	3.740
		12.01	204-748	14.05	337.4	2.40	421.7	3.00	506.0	3.60	4.488
1.969	0.984	2.52	204-810	119.34	601.4	0.50	751.8	0.63	902.2	0.76	0.945
		2.99	204-812	95.93	574.1	0.60	717.6	0.75	861.2	0.90	1.102
		3.50	204-814	79.94	560.3	0.70	700.3	0.88	840.4	1.05	1.299
		4.02	204-816	67.95	545.8	0.80	682.2	1.00	818.7	1.20	1.496
		4.53	204-818	60.53	548.1	0.91	685.1	1.13	822.2	1.36	1.693
		5.00	204-820	55.39	553.9	1.00	692.4	1.25	830.9	1.50	1.890
		5.47	204-822	49.68	543.8	1.09	679.7	1.37	815.6	1.64	2.047
		5.98	204-824	45.68	546.8	1.20	683.5	1.50	820.1	1.80	2.244
		7.01	204-828	39.68	556.3	1.40	695.3	1.75	834.4	2.10	2.638
		7.99	204-832	34.15	545.8	1.60	682.3	2.00	818.8	2.40	2.992
		9.02	204-836	29.06	524.1	1.80	655.1	2.26	786.2	2.70	3.386
		10.00	204-840	25.07	501.4	2.00	626.7	2.50	752.1	3.00	3.740
		12.01	204-848	22.04	529.4	2.40	661.7	3.00	794.0	3.60	4.488
2.480	1.496	2.99	204-912	178.15	1066.2	0.60	1332.7	0.75	1599.3	0.90	1.102
		3.50	204-914	148.46	1040.5	0.70	1300.6	0.88	1560.7	1.05	1.299
		4.02	204-916	126.19	1013.6	0.80	1267.0	1.00	1520.4	1.20	1.496
		4.53	204-918	106.78	967.0	0.91	1208.7	1.13	1450.4	1.36	1.693
		5.00	204-920	95.93	959.4	1.00	1199.2	1.25	1439.0	1.50	1.890
		5.98	204-924	77.66	929.5	1.20	1161.9	1.50	1394.2	1.80	2.244
		7.01	204-928	65.09	912.4	1.40	1140.5	1.75	1368.6	2.10	2.638
		7.99	204-932	57.10	912.8	1.60	1141.0	2.00	1369.2	2.40	2.992
		9.02	204-936	50.93	918.5	1.80	1148.1	2.26	1377.7	2.70	3.386
		10.00	204-940	44.77	895.4	2.00	1119.2	2.50	1343.1	3.00	3.740
		12.01	204-948	36.94	887.3	2.40	1109.1	3.00	1331.0	3.60	4.488

*Tabulated deflections shown represent near solid and are for design information only.

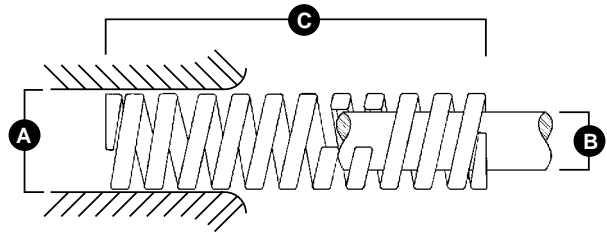


Raymond® HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS RED												
Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE							
					For Optimum Life (15% of free length)		For Long Life (20% of free length)		Maximum Operating Def. (25% of free length)		*Maximum Deflection	
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)	
0.394	0.197	0.98	205-104	12.62	18.6	0.15	24.8	0.20	31.0	0.25	0.295	
		1.26	205-105	9.99	18.9	0.19	25.2	0.25	31.5	0.31	0.378	
		1.50	205-106	9.76	21.9	0.22	29.2	0.30	36.5	0.37	0.449	
		1.73	205-107	8.57	22.3	0.26	29.7	0.35	37.1	0.43	0.520	
		2.01	205-108	7.31	22.0	0.30	29.4	0.40	36.7	0.50	0.602	
		2.52	205-110	6.11	23.1	0.38	30.8	0.50	38.5	0.63	0.756	
		2.99	205-112	4.28	19.2	0.45	25.6	0.60	32.0	0.75	0.898	
		12.01	205-148	1.20	21.6	1.80	28.8	2.40	36.0	3.00	3.602	
0.492	0.248	0.98	205-204	24.04	35.5	0.15	47.3	0.20	59.2	0.25	0.295	
		1.26	205-205	18.96	35.8	0.19	47.8	0.25	59.7	0.31	0.378	
		1.50	205-206	16.73	37.5	0.22	50.1	0.30	62.6	0.37	0.449	
		1.73	205-207	14.05	36.5	0.26	48.7	0.35	60.8	0.43	0.520	
		2.01	205-208	11.19	33.7	0.30	44.9	0.40	56.2	0.50	0.602	
		2.52	205-210	8.57	32.4	0.38	43.2	0.50	54.0	0.63	0.756	
		2.99	205-212	7.54	33.8	0.45	45.1	0.60	56.4	0.75	0.898	
		3.50	205-214	6.51	34.2	0.53	45.6	0.70	57.0	0.88	1.051	
12.01	205-248	1.60	28.8	1.80	38.4	2.40	48.0	3.00	3.602			
0.630	0.315	0.98	205-304	43.22	63.8	0.15	85.1	0.20	106.4	0.25	0.295	
		1.26	205-305	30.15	57.0	0.19	76.0	0.25	95.0	0.31	0.378	
		1.50	205-306	27.69	62.2	0.22	82.9	0.30	103.6	0.37	0.449	
		1.73	205-307	24.44	63.5	0.26	84.7	0.35	105.8	0.43	0.520	
		2.01	205-308	21.18	63.8	0.30	85.1	0.40	106.3	0.50	0.602	
		2.52	205-310	17.30	65.4	0.38	87.2	0.50	109.0	0.63	0.756	
		2.99	205-312	14.67	65.9	0.45	87.8	0.60	109.8	0.75	0.898	
		3.50	205-314	12.39	65.1	0.53	86.8	0.70	108.5	0.88	1.051	
4.02	205-316	11.02	66.4	0.60	88.5	0.80	110.7	1.00	1.205			
12.01	205-348	4.05	73.0	1.80	97.4	2.40	121.7	3.00	3.602			
0.787	0.394	0.98	205-404	123.34	182.1	0.15	242.8	0.20	303.5	0.25	0.295	
		1.26	205-405	95.93	181.3	0.19	241.7	0.25	302.2	0.31	0.378	
		1.50	205-406	73.66	165.3	0.22	220.4	0.30	275.5	0.37	0.433	
		1.73	205-407	63.95	166.2	0.26	221.6	0.35	277.0	0.43	0.512	
		2.01	205-408	53.67	161.7	0.30	215.6	0.40	269.4	0.50	0.591	
		2.52	205-410	41.17	155.6	0.38	207.5	0.50	259.4	0.63	0.748	
		2.99	205-412	34.09	153.0	0.45	204.0	0.60	255.0	0.75	0.906	
		3.50	205-414	28.84	151.6	0.53	202.1	0.70	252.6	0.88	1.063	
		4.02	205-416	25.24	152.0	0.60	202.7	0.80	253.4	1.00	1.220	
		4.53	205-418	21.93	148.9	0.68	198.6	0.91	248.2	1.13	1.378	
		5.00	205-420	19.47	146.0	0.75	194.7	1.00	243.4	1.25	1.496	
		5.47	205-422	17.70	145.3	0.82	193.8	1.09	242.2	1.37	1.654	
5.98	205-424	16.10	144.6	0.90	192.7	1.20	240.9	1.50	1.811			
12.01	205-448	8.57	154.3	1.80	205.7	2.40	257.1	3.00	3.583			
0.984	0.492	0.98	205-504	214.13	316.2	0.15	421.5	0.20	526.9	0.25	0.295	
		1.26	205-505	169.59	320.5	0.19	427.3	0.25	534.2	0.31	0.378	
		1.50	205-506	125.05	280.6	0.22	374.2	0.30	467.7	0.37	0.433	
		1.73	205-507	106.78	277.5	0.26	370.0	0.35	462.5	0.43	0.512	
		2.01	205-508	89.08	268.3	0.30	357.7	0.40	447.2	0.50	0.591	
		2.52	205-510	70.23	265.5	0.38	354.0	0.50	442.4	0.63	0.748	

Raymond® HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS RED

Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE						
					For Optimum Life (15% of free length)		For Long Life (20% of free length)		Maximum Operating Def. (25% of free length)		*Maximum Deflection
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)
A	B	C									
0.984	0.492	2.99	205-512	56.53	253.7	0.45	338.3	0.60	422.9	0.75	0.906
		3.50	205-514	47.96	252.1	0.53	336.2	0.70	420.2	0.88	1.063
		4.02	205-516	41.68	251.1	0.60	334.8	0.80	418.5	1.00	1.220
		4.53	205-518	37.12	252.1	0.68	336.1	0.91	420.1	1.13	1.378
		5.00	205-520	32.95	247.1	0.75	329.5	1.00	411.9	1.25	1.496
		5.47	205-522	30.09	247.0	0.82	329.4	1.09	411.7	1.37	1.654
		5.98	205-524	27.29	245.0	0.90	326.7	1.20	408.4	1.50	1.811
		7.01	205-528	23.41	246.1	1.05	328.1	1.40	410.2	1.75	2.087
		7.99	205-532	20.44	245.1	1.20	326.8	1.60	408.5	2.00	2.402
		12.01	205-548	13.08	235.5	1.80	314.1	2.40	392.6	3.00	3.583
1.260	0.630	1.50	205-606	221.55	497.2	0.22	662.9	0.30	828.7	0.37	0.433
		1.73	205-607	185.00	480.8	0.26	641.0	0.35	801.3	0.43	0.512
		2.01	205-608	155.31	467.8	0.30	623.7	0.40	779.7	0.50	0.591
		2.52	205-610	121.05	457.6	0.38	610.1	0.50	762.6	0.63	0.748
		2.99	205-612	98.21	440.8	0.45	587.8	0.60	734.7	0.75	0.906
		3.50	205-614	80.51	423.2	0.53	564.3	0.70	705.3	0.88	1.063
		4.02	205-616	69.66	419.6	0.60	559.5	0.80	699.4	1.00	1.220
		4.53	205-618	61.10	415.0	0.68	553.3	0.91	691.6	1.13	1.378
		5.00	205-620	53.10	398.3	0.75	531.1	1.00	663.8	1.25	1.496
		5.47	205-622	49.11	403.1	0.82	537.5	1.09	671.9	1.37	1.654
		5.98	205-624	44.54	399.8	0.90	533.1	1.20	666.4	1.50	1.811
		7.01	205-628	38.37	403.4	1.05	537.8	1.40	672.3	1.75	2.087
		7.99	205-632	33.75	404.6	1.20	539.5	1.60	674.3	2.00	2.402
		10.00	205-640	26.49	397.4	1.50	529.9	2.00	662.4	2.50	2.992
12.01	205-648	21.70	390.8	1.80	521.1	2.40	651.4	3.00	3.583		
1.575	0.787	2.01	205-708	199.85	602.0	0.30	802.6	0.40	1003.3	0.50	0.591
		2.52	205-710	153.60	580.6	0.38	774.1	0.50	967.6	0.63	0.748
		2.99	205-712	125.05	561.3	0.45	748.4	0.60	935.5	0.75	0.906
		3.50	205-714	108.49	570.3	0.53	760.3	0.70	950.4	0.88	1.063
		4.02	205-716	93.07	560.7	0.60	747.6	0.80	934.5	1.00	1.220
		4.53	205-718	81.08	550.7	0.68	734.3	0.91	917.8	1.13	1.378
		5.00	205-720	73.09	548.2	0.75	730.9	1.00	913.7	1.25	1.496
		5.47	205-722	65.67	539.1	0.82	718.8	1.09	898.4	1.37	1.654
		5.98	205-724	59.96	538.2	0.90	717.6	1.20	897.0	1.50	1.811
		7.01	205-728	50.82	534.2	1.05	712.3	1.40	890.4	1.75	2.087
		7.99	205-732	43.97	527.1	1.20	702.8	1.60	878.6	2.00	2.402
		10.00	205-740	34.83	522.5	1.50	696.7	2.00	870.8	2.50	2.992
		12.01	205-748	29.12	524.6	1.80	699.4	2.40	874.3	3.00	3.583
		1.969	0.984	2.52	205-810	235.82	891.4	0.38	1188.5	0.50	1485.6
2.99	205-812			193.57	868.8	0.45	1158.5	0.60	1448.1	0.75	0.906
3.50	205-814			164.45	864.4	0.53	1152.5	0.70	1440.6	0.88	1.063
4.02	205-816			139.90	842.7	0.60	1123.7	0.80	1404.6	1.00	1.220
4.53	205-818			122.77	833.8	0.68	1111.7	0.91	1389.7	1.13	1.378
5.00	205-820			109.63	822.3	0.75	1096.4	1.00	1370.5	1.25	1.496
5.47	205-822			95.93	787.5	0.82	1050.0	1.09	1312.5	1.37	1.654
5.98	205-824			87.93	789.4	0.90	1052.5	1.20	1315.6	1.50	1.811
7.01	205-828			76.51	804.4	1.05	1072.5	1.40	1340.6	1.75	2.087
7.99	205-832			66.81	801.0	1.20	1067.9	1.60	1334.9	2.00	2.402
10.00	205-840			50.82	762.3	1.50	1016.5	2.00	1270.6	2.50	2.992
12.01	205-848			41.68	750.9	1.80	1001.1	2.40	1251.4	3.00	3.583

*Tabulated deflections shown represent near solid and are for design information only.



Raymond® EXTRA HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS YELLOW												
Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE							
					For Optimum Life (15% of free length)		For Long Life (17% of free length)		Maximum Operating Def. (20% of free length)		*Maximum Deflection	
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)	
A	B	C										
0.394	0.197	0.98	206-104	21.01	31.0	0.15	35.2	0.17	41.4	0.20	0.244	
		1.26	206-105	15.93	30.1	0.19	34.1	0.21	40.2	0.25	0.315	
		1.50	206-106	13.53	30.4	0.22	34.4	0.26	40.5	0.30	0.374	
		1.73	206-107	10.96	28.5	0.26	32.3	0.30	38.0	0.35	0.433	
		2.01	206-108	9.42	28.4	0.30	32.2	0.34	37.8	0.40	0.512	
		2.52	206-110	7.54	28.5	0.38	32.3	0.43	38.0	0.50	0.630	
		2.99	206-112	6.22	27.9	0.45	31.7	0.51	37.3	0.60	0.748	
		12.01	206-148	1.48	26.8	1.80	30.3	2.04	35.7	2.40	2.992	
0.492	0.248	0.98	206-204	33.40	49.3	0.15	55.9	0.17	65.8	0.20	0.244	
		1.26	206-205	25.07	47.4	0.19	53.7	0.21	63.2	0.25	0.315	
		1.50	206-206	20.56	46.1	0.22	52.3	0.26	61.5	0.30	0.374	
		1.73	206-207	17.30	45.0	0.26	50.9	0.30	59.9	0.35	0.433	
		2.01	206-208	14.96	45.1	0.30	51.1	0.34	60.1	0.40	0.512	
		2.52	206-210	12.11	45.8	0.38	51.9	0.43	61.0	0.50	0.630	
		2.99	206-212	9.76	43.8	0.45	49.7	0.51	58.4	0.60	0.748	
		3.50	206-214	8.28	43.5	0.53	49.3	0.59	58.0	0.70	0.866	
12.01	206-248	2.46	44.2	1.80	50.1	2.04	59.0	2.40	2.992			
0.630	0.315	0.98	206-304	67.38	99.5	0.15	112.7	0.17	132.6	0.20	0.244	
		1.26	206-305	50.82	96.0	0.19	108.9	0.21	128.1	0.25	0.315	
		1.50	206-306	41.17	92.4	0.22	104.7	0.26	123.2	0.30	0.374	
		1.73	206-307	34.77	90.4	0.26	102.4	0.30	120.5	0.35	0.433	
		2.01	206-308	29.86	90.0	0.30	101.9	0.34	119.9	0.40	0.512	
		2.52	206-310	23.53	88.9	0.38	100.8	0.43	118.6	0.50	0.630	
		2.99	206-312	19.47	87.4	0.45	99.1	0.51	116.5	0.60	0.748	
		3.50	206-314	16.84	88.5	0.53	100.3	0.59	118.1	0.70	0.866	
4.02	206-316	14.62	88.1	0.60	99.8	0.68	117.4	0.80	1.024			
12.01	206-348	4.80	86.4	1.80	97.9	2.04	115.2	2.40	2.992			
0.787	0.394	0.98	206-404	167.30	247.0	0.15	280.0	0.17	329.4	0.20	0.244	
		1.26	206-405	127.90	241.7	0.19	274.0	0.21	322.3	0.25	0.315	
		1.50	206-406	101.07	226.8	0.22	257.1	0.26	302.4	0.30	0.374	
		1.73	206-407	85.08	221.1	0.26	250.6	0.30	294.8	0.35	0.433	
		2.01	206-408	73.09	220.1	0.30	249.5	0.34	293.5	0.40	0.512	
		2.52	206-410	56.53	213.7	0.38	242.2	0.43	284.9	0.50	0.630	
		2.99	206-412	46.65	209.4	0.45	237.3	0.51	279.2	0.60	0.748	
		3.50	206-414	39.68	208.6	0.53	236.4	0.59	278.1	0.70	0.866	
		4.02	206-416	34.60	208.5	0.60	236.2	0.68	277.9	0.80	1.024	
		4.53	206-418	30.26	205.6	0.68	233.0	0.77	274.1	0.91	1.142	
		5.00	206-420	27.12	203.4	0.75	230.6	0.85	271.2	1.00	1.260	
		5.47	206-422	24.55	201.6	0.82	228.4	0.93	268.8	1.09	1.378	
5.98	206-424	22.27	199.9	0.90	226.6	1.02	266.5	1.20	1.512			
12.01	206-448	12.11	218.1	1.80	247.1	2.04	290.7	2.40	2.992			
0.984	0.492	1.26	206-505	213.78	404.0	0.19	457.9	0.21	538.7	0.25	0.315	
		1.50	206-506	197.57	443.4	0.22	502.5	0.26	591.2	0.30	0.374	
		1.73	206-507	139.32	362.1	0.26	410.3	0.30	482.7	0.35	0.433	
		2.01	206-508	118.48	356.9	0.30	404.5	0.34	475.8	0.40	0.512	
		2.52	206-510	91.93	347.5	0.38	393.8	0.43	463.3	0.50	0.630	
		2.99	206-512	74.69	335.2	0.45	379.9	0.51	447.0	0.60	0.748	
		3.50	206-514	63.10	331.7	0.53	375.9	0.59	442.2	0.70	0.866	

Raymond® EXTRA HEAVY DUTY DIE SPRINGS ISO SPECIFICATION SERIES INCH DIMENSIONS YELLOW

Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10" Def. (lb)	LOAD DEFLECTION TABLE						
					For Optimum Life (15% of free length)		For Long Life (17% of free length)		Maximum Operating Def. (20% of free length)		*Maximum Deflection
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)
A	B	C									
0.984	0.492	4.02	206-516	54.99	331.3	0.60	375.4	0.68	441.7	0.80	1.024
		4.53	206-518	48.93	332.4	0.68	376.7	0.77	443.1	0.91	1.142
		5.00	206-520	43.57	326.8	0.75	370.3	0.85	435.7	1.00	1.260
		5.98	206-524	36.26	325.5	0.90	368.9	1.02	434.0	1.20	1.496
		7.01	206-528	30.78	323.5	1.05	366.7	1.19	431.4	1.40	1.732
		7.99	206-532	26.84	321.8	1.20	364.7	1.36	429.0	1.60	2.008
		12.01	206-548	17.64	317.8	1.80	360.2	2.04	423.8	2.40	2.992
1.260	0.630	1.50	206-606	301.60	676.9	0.22	767.1	0.26	902.5	0.30	0.374
		1.73	206-607	242.33	629.7	0.26	713.7	0.30	839.6	0.35	0.433
		2.01	206-608	201.56	607.1	0.30	688.1	0.34	809.5	0.40	0.512
		2.52	206-610	153.71	581.0	0.38	658.5	0.43	774.7	0.50	0.630
		2.99	206-612	124.76	560.0	0.45	634.7	0.51	746.7	0.60	0.748
		3.50	206-614	102.95	541.1	0.53	613.3	0.59	721.5	0.70	0.866
		4.02	206-616	88.51	533.2	0.60	604.2	0.68	710.9	0.80	1.024
		4.53	206-618	79.94	542.9	0.68	615.3	0.77	723.9	0.91	1.142
		5.00	206-620	70.80	531.1	0.75	601.9	0.85	708.1	1.00	1.260
		5.98	206-624	58.24	522.8	0.90	592.6	1.02	697.1	1.20	1.496
		7.01	206-628	50.36	529.4	1.05	600.0	1.19	705.9	1.40	1.732
		7.99	206-632	43.40	520.3	1.20	589.7	1.36	693.7	1.60	2.008
10.00	206-640	34.72	520.8	1.50	590.2	1.70	694.4	2.00	2.520		
12.01	206-648	27.98	504.0	1.80	571.2	2.04	672.0	2.40	2.992		
1.575	0.787	2.01	206-708	358.59	1080.1	0.30	1224.1	0.34	1440.1	0.40	0.512
		2.52	206-710	278.08	1051.1	0.38	1191.2	0.43	1401.4	0.50	0.630
		2.99	206-712	216.41	971.4	0.45	1100.9	0.51	1295.1	0.60	0.748
		3.50	206-714	183.29	963.4	0.53	1091.9	0.59	1284.6	0.70	0.866
		4.02	206-716	160.45	966.6	0.60	1095.4	0.68	1288.8	0.80	1.024
		4.53	206-718	139.90	950.2	0.68	1076.8	0.77	1266.9	0.91	1.142
		5.00	206-720	126.19	946.5	0.75	1072.7	0.85	1262.0	1.00	1.260
		5.98	206-724	95.93	861.2	0.90	976.0	1.02	1148.2	1.20	1.496
		7.01	206-732	75.37	903.6	1.20	1024.1	1.36	1204.9	1.60	2.008
		10.00	206-740	61.10	916.5	1.50	1038.7	1.70	1222.0	2.00	2.520
12.01	206-748	50.13	903.1	1.80	1023.5	2.04	1204.1	2.40	2.992		
1.969	0.984	2.52	206-810	404.84	1530.2	0.38	1734.2	0.43	2040.3	0.50	0.630
		2.99	206-812	326.61	1466.0	0.45	1661.5	0.51	1954.7	0.60	0.748
		3.50	206-814	271.23	1425.7	0.53	1615.7	0.59	1900.9	0.70	0.866
		4.02	206-816	231.26	1393.1	0.60	1578.8	0.68	1857.5	0.80	1.024
		4.53	206-818	200.99	1365.1	0.68	1547.1	0.77	1820.1	0.91	1.142
		5.00	206-820	180.44	1353.4	0.75	1533.8	0.85	1804.5	1.00	1.260
		5.98	206-824	136.47	1225.1	0.90	1388.4	1.02	1633.5	1.20	1.496
		7.01	206-832	106.78	1280.2	1.20	1450.9	1.36	1706.9	1.60	2.008
		10.00	206-840	87.36	1310.5	1.50	1485.3	1.70	1747.4	2.00	2.520
		12.01	206-848	72.52	1306.3	1.80	1480.4	2.04	1741.7	2.40	2.992

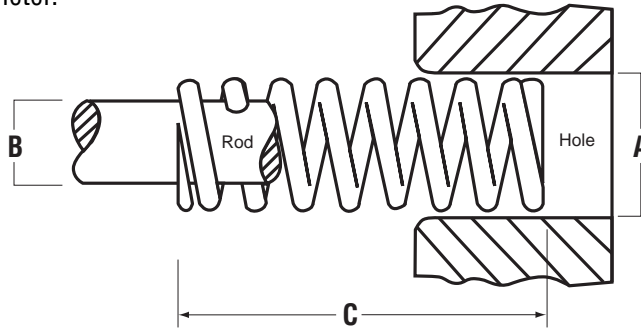
*Tabulated deflections shown represent near solid and are for design information only.

Raymond® Round Wire Die Springs are optimally engineered to ensure maximum fatigue life when using proper die spring application techniques.

For maximum operating life *always pre-load* the springs and *prevent exceeding the maximum recommended deflection*.

Product Characteristics

- Material: Music Wire ASTM-A228 or AMS-5112 or Chrome Silicon ASTM-A401
 Spring Rate: Spring Rate is reference only and can be calculated from the table shown below.
 Load @ Max. Def.: Defined as the load at maximum deflection and is held to +/- 10%.
 Free Length: The overall length of the spring in a free state condition.
 Hole Dia.: Each spring is manufactured to fit into the indicated hole size and is actually less than the hole diameter.
 Rod Dia.: Each spring is manufactured to fit over the indicated rod size and is actually greater than the rod diameter.



Raymond® Round Wire Die Springs												
KEY CHARACTERISTICS			LIGHT LOAD (GREEN)			MEDIUM LOAD (BLUE)			HEAVY LOAD (RED)			PACKAGING
A Hole Dia. (mm)	B Rod Dia. (mm)	C Free Length (mm)	Max. Deflection (mm)	Load @ Max. Deflection (N)	Part No.	Max. Deflection (mm)	Load @ Max. Deflection (N)	Part No.	Max. Deflection (mm)	Load @ Max. Deflection (N)	Part No.	Standard Box Quantity
9.53	4.76	25.40	10.16	44.84	903-104	9.40	115.21	904-104	7.62	157.47	905-104	200
9.53	4.76	31.75	12.70	43.59	903-105	11.75	111.09	904-105	9.53	153.46	905-105	200
9.53	4.76	38.10	15.24	42.44	903-106	14.10	109.37	904-106	11.43	148.13	905-106	100
9.53	4.76	44.45	17.78	42.04	903-107	16.45	107.43	904-107	13.34	144.79	905-107	100
9.53	4.76	50.80	20.32	42.35	903-108	18.80	105.99	904-108	15.24	146.79	905-108	100
9.53	4.76	57.15	22.86	41.37	903-110	23.50	104.92	904-110	19.05	146.12	905-110	100
9.53	4.76	63.50	25.40	40.57	903-112	28.19	103.69	904-112	22.86	143.72	905-112	100
9.53	4.76	69.85	27.94	38.43	903-148	112.78	100.73	904-148	91.44	139.32	905-148	50
12.70	7.14	25.40	10.16	86.83	903-204	9.40	204.08	904-204	7.62	285.58	905-204	100
12.70	7.14	31.75	12.70	82.51	903-205	11.75	197.50	904-205	9.53	275.23	905-205	100
12.70	7.14	38.10	15.24	81.14	903-206	14.10	195.03	904-206	11.43	268.23	905-206	100
12.70	7.14	44.45	17.78	82.20	903-207	16.45	190.09	904-207	13.34	261.56	905-207	100
12.70	7.14	50.80	20.32	77.22	903-208	18.80	187.63	904-208	15.24	264.22	905-208	100
12.70	7.14	57.15	22.86	74.73	903-210	23.50	183.51	904-210	19.05	256.88	905-210	50
12.70	7.14	63.50	25.40	76.33	903-212	28.19	180.71	904-212	22.86	256.22	905-212	50
12.70	7.14	69.85	27.94	75.98	903-214	32.89	184.91	904-214	26.67	252.21	905-214	50
12.70	7.14	76.20	30.48	72.59	903-248	112.78	173.80	904-248	91.44	243.41	905-248	50
15.88	8.73	25.40	10.16	181.49	903-304	9.40	299.54	904-304	7.62	621.86	905-304	100
15.88	8.73	31.75	12.70	171.26	903-305	11.75	281.85	904-305	9.53	583.83	905-305	100
15.88	8.73	38.10	15.24	160.14	903-306	14.10	274.03	904-306	11.43	570.48	905-306	50
15.88	8.73	44.45	17.78	155.69	903-307	16.45	264.98	904-307	13.34	544.13	905-307	50
15.88	8.73	50.80	20.32	154.09	903-308	18.80	260.04	904-308	15.24	541.79	905-308	50
15.88	8.73	57.15	22.86	150.35	903-310	23.50	250.99	904-310	19.05	530.45	905-310	50
15.88	8.73	63.50	25.40	145.72	903-312	28.19	246.88	904-312	22.86	520.44	905-312	50
15.88	8.73	69.85	27.94	143.86	903-314	32.89	245.39	904-314	26.67	523.11	905-314	50
15.88	8.73	76.20	30.48	143.05	903-316	37.59	245.56	904-316	30.48	517.77	905-316	50
15.88	8.73	82.55	32.99	136.65	903-348	112.78	235.03	904-348	91.44	494.82	905-348	50

Problems and Answers

Problems & Answers

Most problems that arise in the use of die springs usually result from improper application... failure to take advantage of and protect the features engineered into the spring.

Spring Failure

Raymond die springs are produced under such careful controls that manufacturing problems have virtually been eliminated. Die spring failure is usually due to either poor spring design and manufacture or incorrect application of the spring. The most common problem source is the use of die springs too close to, or beyond, the springs' physical limitations. The solution, of course, lies with the designer's and user's careful selection of springs for each application.

Other solutions to common spring problems are as follows:

Spring Guidance

Raymond die springs are manufactured with ends squared and ground so that they stand on their own base and compress evenly under load. There is a positive relationship between the spring's outside diameter and total length which determines whether or not a spring will buckle under load.

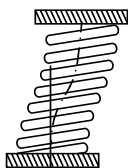
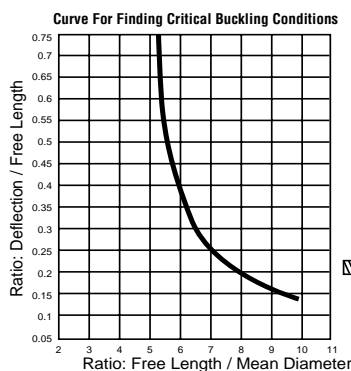


FIG. A

FIG. A

Generally, if the free length is more than four times the mean diameter of the spring, it could have a buckling problem under compression. This is solved by providing guidance by a pocket, a rod, or both to reduce buckling. It is always recommended to provide guidance for any die spring.

Figure A provides information as to whether a specific spring with squared, ground ends is subject to buckling. The curve indicates that buckling may occur to a squared-and-ground spring, both ends of which are compressed against parallel plates, if the values fall above and to the right of the curve.

Holes and Rods

Holes or pockets provided in the die for springs must be the specified size listed on pages 4 to 21. Springs increase in diameter as they are compressed. If the hole is undersized, a wearing or binding action will produce early spring failure.

Holes also must have flat bottoms with square corners. This will allow the spring to work on a flat surface and provide uniform stress on the coils when the spring is compressed.

Working a spring over a rod also provides good protection against buckling. Care should be taken to be sure the rod is smooth. If the rod is shorter than the spring, it should have a tapered nose so that there is no danger of the spring coils coming in contact with a sharp edge.

Alignment

Care should be taken to make certain that whatever device is used to contain or guide the spring is properly aligned on both sides of the die. Holes or rods that do not match can cause problems that create spring failure and damage to the tool.

Temperature

Heat is a frequently ignored factor in spring failure or load loss. The maximum rated service temperature for chromium alloy steel is 475°F (250°C). Figure B shows the percentage of load-loss due to heat and stress combinations. Thought should be given to the heat generated by the working die which can be significant in many applications. Heat absorbed by the tool can be transferred to the springs resulting in a loss of load and premature spring failure.

Deflection

Deflection beyond the manufacturer's recommendation can cause early spring failure. Check the press or die travel to be sure of the actual deflection to which the spring will be subjected. If it is beyond a safe limit, changes should be made without delay.

Spring Alteration

Each Raymond die spring is carefully engineered to perform within specific areas of work. Altering the spring such as reducing its length or number of coils, grinding the inside or outside diameter, or placing restrictions on the movement of the coils can cause early spring failure. Trying to alter a spring by grinding down its ends can change the temper of the material and negatively affect spring performance.

Altering springs from their manufactured state almost invariably leads to problems and failure. Don't gamble an expensive die for the small amount saved on a cheap alteration.

Corrosion

Frequently, spring failure can be traced to corrosive elements. Reduction of material or pitting of the spring will reduce its useful life. Be alert to conditions that may effect the spring's surface such as rust, lubricants, soaps, chemicals, etc. Clean, protected springs give the best job performance.

Load Loss vs. Temperature

INITIAL STRESS P.S.I./bar	CARBON STEEL			CHROMIUM ALLOY		
	Approximate Percent Loss of Load			Approximate Percent Loss of Load		
	Degrees F/C°			Degrees F/C°		
	250/121°	350/177°	400/204°	250/121°	350/177°	450/232°
40,000/2,760	2.0	3.5	4.5	1.0	2.0	5.0
50,000/3,450	2.0	4.0	5.0	1.0	2.0	5.0
60,000/4,400	2.5	4.5	5.5	1.0	2.0	5.5
70,000/4,830	3.0	5.5	6.5	1.0	2.5	6.0
80,000/5,515	3.0	6.0	8.0	1.5	2.5	6.0
90,000/6,205	4.0	8.0	9.0	1.5	3.0	7.0
100,000/6,895	4.5	9.5	10.5	2.0	4.0	8.0
110,000/7,585	7.0	11.5	14.0	2.0	5.0	10.0
120,000/8,275	9.5	13.0	17.5	3.5	8.0	13.0

FIG. B



Proper Die Spring Application

The most common die spring problems are generally the most basic — the result of improper selection and application. But trying to save a few pennies on die springs or a few minutes on selection can result in enormous expenses in terms of premature spring failure, increased maintenance costs and lost productivity. That's why making sure you have the best die spring for every application is truly a wise investment.



DO make spring selection a part of the early design function, and work within the spring's physical limits. It's best to determine which springs and how many are needed for the job before the die is built.



DO preload each spring into the assembled tool to prevent the possibility of shock loading, which causes a stress surge in the vibration frequency and may result in early spring failure.



Do provide safeguards from adverse external elements such as heat, corrosive atmosphere, metal chips and other obstructions



DO provide proper guidance on all springs to reduce the chance of buckling. As a general rule, if the free length is more than four times the mean diameter of the spring, it could have a buckling problem under compression. This is solved by using a guide rod, boring a pocket, or both.



DO deepen spring pockets proportionately when the die is sharpened to maintain the same spring travel and load level. Each spring pocket needs to have a flat bottom and square corners, so the spring will provide uniform stress on each coil as it is compressed.



DO perform preventative maintenance on a regularly scheduled basis. Keep records on the number of cycles each die performs, and replace all the die springs at predetermined intervals.



DON'T replace only one spring, or mix springs of assorted lengths and deflection ranges on a die. Instead of using an unbalanced, mixed assembly of old and new springs, replace all of the springs to distribute the load evenly.



DON'T alter a die spring by cutting off coils or grinding the inside or outside diameter. Altering a die spring causes early failure and creates the potential for damaging the die.



DON'T expect maximum performance life from a spring that is producing at maximum load. Although die springs are designed to produce maximum load, they are highly stressed when maximum loads are met.



DON'T wait — make spring selection a part of the early design function, and work within the spring's physical limits. It's best to determine which springs and how many are needed for the job before the die is built.



DO call — our knowledgeable customer service and engineering professionals are always available to assist you with everything from custom sizes and special materials to technical questions and unusual applications.

Partners for Success

Make Us Your Partner for Success

A world wide leader in the design and manufacture of springs, Associated Spring Raymond supplies thousands of products to industry, including our standard English dimension die springs, service parts and special order services. Our broad product lines and vast, off-the-shelf inventories assures we have the right products to meet all of your essential application requirements. We can also apply our design and manufacturing capabilities to meet your needs for custom springs and critical metal parts, supplying you with unique solutions for your products.

So think of us as your partner and call us toll-free at 800-458-0867. We are ready to help with technical assistance, inquiries, order placement and your success.

Other Products

- Standard English Dimension Raymond Die Springs
- Die Springs Manufactured to JIS Specification
- Service Parts
 - Compression Springs
 - Extension Springs
 - Compression and Extension Spring Assortment Kits
 - Miscellaneous Springs
- Special Order Springs
- Nitrogen Gas Springs

Metric Conversion Factors			
	To Convert	To	Multiply By
Dimensions	in	mm	25.4
	mm	in	0.039
Force	lb	kg	0.454
	lb	N	4.448
	kg	lb	2.205
	N	kg	0.102
	kg	N	9.807
Rate	lb/in	kg/mm	0.018
	lb/in	N/mm	0.175
	kg/mm	lb/in	56.0
	N/mm	lb/in	5.71

Special Springs

Company: _____
 Address: _____
 City: _____
 State: _____ Zip: _____
 Attn: _____
 Phone: _____
 Fax: _____

Compression

Quantity Required
Wire Size
Type of Wire
Outside Diameter
Inside Diameter
Free Length
Hole Size
Rod Size
No. of Coils
Pitch
Rate
Solid Height
Direction of Coils
Type of Ends
Test Loads
Print Available?
Finish
Comments

In Office Use Only

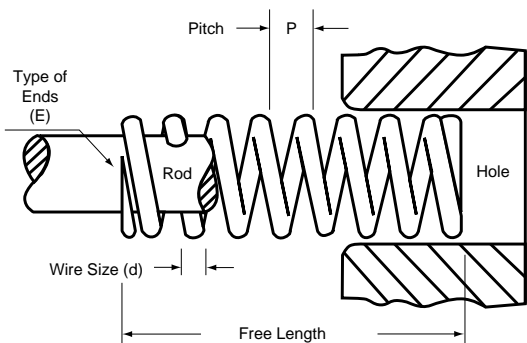
Date Received: _____

Date Quoted: _____

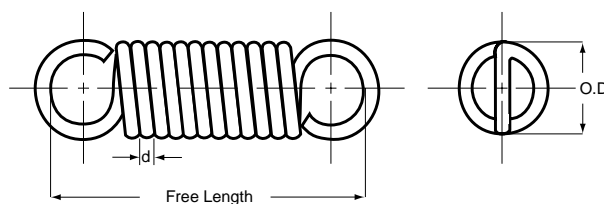
Quoted By: _____

Extension

Quantity Required
Wire Size
Type of Wire
Outside Diameter
Inside Diameter
Free Length
Initial Tension
No. of Coils
Pitch
Rate
Maximum Extension
Direction of Coils
Type of Loops
Test Loads
Print Available?
Finish
Comments



CALL OUR SPECIAL ORDER DEPARTMENT FOR DESIGN ASSISTANCE AND QUOTES: 1-800-228-1156



Raymond® Nitrogen Gas Springs



High Force Long Life High Cycle Rate

Raymond offers more than 20 unique models with strokes ranging from .24" (6mm) to 11.8" (300mm), initial contact forces from 15 lbs. (66 N) to 41,000 lbs. (182,000 N), and diameters as small as 0.5" (12 mm).

If you are designing a new product, or making improvements to an existing one, a Raymond nitrogen gas spring may be the answer. Call Associated Spring Raymond technical assistance to discuss new application ideas. Current applications include valve actuators, shock absorbing bumpers, mountain bike suspensions, etc.

If your application calls for a custom spring such as a special stroke length, shorter overall length, smaller diameter, high cycle rates or other differentiating specifications, call our technical assistance department and let us customize a spring or spring system for you.

Technical Features

- High initial force
- Low force increase through stroke
- Pressure medium: Nitrogen gas
- Range of operating temperature: -25°F to 180°F (-32°C to 82°C)
- Maximum piston rod speed: 115 ft/min (35 meters/minute)
- Component type mounting fixtures
- Manufacturer is ISO 9001 certified
- Strict testing and quality control

CALL US AT 1 (800) 228-1156 OR FAX AT (419) 891-9192 FOR OUR COMPLETE CATALOG OF SPECIFICATIONS. ASK FOR HEAVY DUTY GAS SPRING CATALOG, FORM R100.

Raymond *m-Struts*[™]

Mechanical Struts

Associated Spring
Raymond 

Associated Spring Raymond now offers a proprietary line of mechanical coil spring struts. We designed our struts to meet demanding, maintenance free applications where conventional gas struts fail. Made of corrosion-resistant stainless steel, and unlike gas and pneumatic models, our struts have no internal gases or seals to fail.



Whether it is resistance against environmental contamination, high temperature (400°F/ 205°C+), high humidity, corrosion, or simply life cycle, our struts offer unmatched performance.

Two separate lines are currently offered, with various load and stroke options:

- Standard Mechanical Spring Struts: Stainless steel construction, stainless steel springs, and M6 threaded ends
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- Under development is a full line of Extension, Dampening and Self-Centering models (available now as custom-built samples).

All of our models are available with various end configurations.

Associated Spring Raymond will work with your specifications to custom design and produce the mechanical strut that you need, including the brackets and adjoining hardware.



Typical Applications:

- Food Preparation & Processing
- Heating, Ventilation & Aeration
- Motion Control & Dampening
- Clean Room

Typical Industries:

- Automotive
- Medical, Pharmaceutical & Chemical
- Marine
- Defense
- Nuclear
- Agriculture & Construction

For further information, or should you need application design support, please contact us at struts@asraymond.com, or call us at 1-800-646-6416.

*Patent Pending

For product literature, technical assistance or order information, see your local Raymond distributor . . . or call us toll-free for the name of the Associated Spring Raymond distributor nearest you.

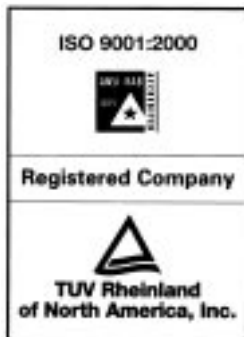
**Associated Spring
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GROUP INC**

1705 Indian Wood Circle, Suite 210
Maumee, OH 43537-4046

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FAX Number: (419) 891-9192

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