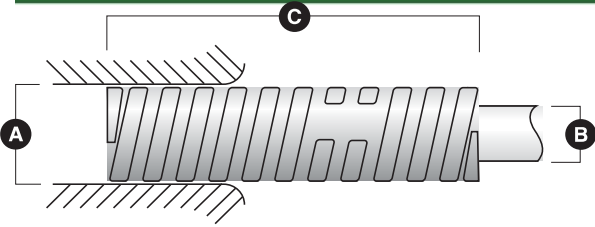


# Extra Heavy Duty

# INCH DIMENSIONS



## US Series

### Raymond® EXTRA HEAVY DUTY DIE SPRINGS INCH DIMENSIONS GREEN

Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10 in. 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 (25% of free length)
					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)
3/8	3/16	1	106-104	21.0	31.5	0.15	35.7	0.17	42.0	0.20	0.25
		1 1/4	106-105	14.6	27.7	0.19	30.7	0.21	36.5	0.25	0.31
		1 1/2	106-106	12.5	28.8	0.23	32.5	0.26	37.5	0.30	0.38
		1 3/4	106-107	10.5	27.3	0.26	31.5	0.30	36.8	0.35	0.44
		2	106-108	9.0	27.0	0.30	30.6	0.34	36.0	0.40	0.50
		2 1/2	106-110	7.5	28.5	0.38	32.3	0.43	37.5	0.50	0.63
		3	106-112	6.3	28.4	0.45	32.1	0.51	37.8	0.60	0.75
		12	106-148	1.5	27.0	1.80	30.6	2.04	36.0	2.40	3.00
		1/2	9/32	1	106-204	31.0	46.5	0.15	52.7	0.17	62.0
1 1/4	106-205			24.0	45.6	0.19	50.4	0.21	60.0	0.25	0.31
1 1/2	106-206			19.2	44.2	0.23	49.9	0.26	57.6	0.30	0.38
1 3/4	106-207			17.0	44.2	0.26	51.0	0.30	59.5	0.35	0.44
2	106-208			14.0	42.0	0.30	47.6	0.34	56.0	0.40	0.50
2 1/2	106-210			11.5	43.7	0.38	49.5	0.43	57.5	0.50	0.63
3	106-212			9.4	42.3	0.45	47.9	0.51	56.4	0.60	0.75
3 1/2	106-214			8.0	42.4	0.53	48.0	0.60	56.0	0.70	0.88
12	106-248			2.4	43.2	1.80	49.0	2.04	57.6	2.40	3.00
5/8	11/32	1	106-304	63.0	94.5	0.15	107.1	0.17	126.0	0.20	0.25
		1 1/4	106-305	43.8	83.2	0.19	92.0	0.21	109.5	0.25	0.31
		1 1/2	106-306	37.0	85.1	0.23	96.2	0.26	111.0	0.30	0.38
		1 3/4	106-307	31.0	80.6	0.26	93.0	0.30	108.5	0.35	0.44
		2	106-308	28.0	84.0	0.30	95.2	0.34	112.0	0.40	0.50
		2 1/2	106-310	22.0	83.6	0.38	94.6	0.43	110.0	0.50	0.63
		3	106-312	19.0	85.5	0.45	96.9	0.51	114.0	0.60	0.75
		3 1/2	106-314	15.4	81.6	0.53	92.4	0.60	107.8	0.70	0.88
		4	106-316	13.5	81.0	0.60	91.8	0.68	108.0	0.80	1.00
12	106-348	4.5	81.0	1.80	91.8	2.04	108.0	2.40	3.00		
3/4	3/8	1	106-404	140.0	210.0	0.15	238.0	0.17	280.0	0.20	0.25
		1 1/4	106-405	110.0	209.0	0.19	231.0	0.21	275.0	0.25	0.31
		1 1/2	106-406	89.0	204.7	0.23	231.4	0.26	267.0	0.30	0.38
		1 3/4	106-407	75.0	195.0	0.26	225.0	0.30	262.5	0.35	0.44
		2	106-408	66.0	198.0	0.30	224.4	0.34	264.0	0.40	0.50
		2 1/2	106-410	50.0	190.0	0.38	215.0	0.43	250.0	0.50	0.63
		3	106-412	40.5	182.3	0.45	206.6	0.51	243.0	0.60	0.75
		3 1/2	106-414	34.5	182.9	0.53	207.0	0.60	241.5	0.70	0.88
		4	106-416	30.0	180.0	0.60	204.0	0.68	240.0	0.80	1.00
		4 1/2	106-418	26.5	180.2	0.68	204.1	0.77	238.5	0.90	1.13
		5	106-420	23.5	176.3	0.75	199.8	0.85	235.0	1.00	1.25
		5 1/2	106-422	21.5	178.5	0.83	202.1	0.94	236.5	1.10	1.38
		6	106-424	19.5	175.5	0.90	198.9	1.02	234.0	1.20	1.50
12	106-448	9.5	171.0	1.80	193.8	2.04	228.0	2.40	3.00		

\* Deflection values shown represent compressed lengths near solid and are for design information only. The color blue is a registered trademark of Barnes Group Inc.



# Extra Heavy Duty

# INCH DIMENSIONS



US Series

Raymond® EXTRA HEAVY DUTY DIE SPRINGS					INCH DIMENSIONS						GREEN		
Hole Dia. (in)	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10 in. Def. (lb)	LOAD DEFLECTION TABLE								
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					Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	Load (lb)	Deflection (in)	
A	B	C											
1	1/2	1 1/2	106-506	160.0	368.0	0.23	416.0	0.26	480.0	0.30	0.38		
		2	106-508	116.0	348.0	0.30	394.4	0.34	464.0	0.40	0.50		
		2 1/2	106-510	89.6	340.5	0.38	385.3	0.43	448.0	0.50	0.63		
		3	106-512	73.6	331.2	0.45	375.4	0.51	441.6	0.60	0.75		
		3 1/2	106-514	62.4	330.7	0.53	374.4	0.60	436.8	0.70	0.88		
		4	106-516	55.2	331.2	0.60	375.4	0.68	441.6	0.80	1.00		
		4 1/2	106-518	48.8	331.8	0.68	375.8	0.77	439.2	0.90	1.13		
		5	106-520	43.2	324.0	0.75	367.2	0.85	432.0	1.00	1.25		
		6	106-524	36.0	324.0	0.90	367.2	1.02	432.0	1.20	1.50		
		12	106-548	17.6	316.8	1.80	359.0	2.04	422.4	2.40	3.00		
		1 1/4	5/8	2	106-608	205.0	615.0	0.30	697.0	0.34	820.0	0.40	0.50
				2 1/2	106-610	152.5	579.5	0.38	655.8	0.43	762.5	0.50	0.63
3	106-612			122.0	549.0	0.45	622.2	0.51	732.0	0.60	0.75		
3 1/2	106-614			108.5	575.1	0.53	651.0	0.60	759.5	0.70	0.88		
4	106-616			89.0	534.0	0.60	605.2	0.68	712.0	0.80	1.00		
4 1/2	106-618			83.5	567.8	0.68	643.0	0.77	751.5	0.90	1.13		
5	106-620			70.0	525.0	0.75	595.0	0.85	700.0	1.00	1.25		
6	106-624			57.5	517.5	0.90	586.5	1.02	690.0	1.20	1.50		
8	106-632			46.0	552.0	1.20	625.6	1.36	736.0	1.60	2.00		
10	106-640			34.5	517.5	1.50	586.5	1.70	690.0	2.00	2.50		
12	106-648			27.0	486.0	1.80	550.8	2.04	648.0	2.40	3.00		
1 1/2	3/4			2	106-708	408.5	1225.5	0.30	1388.9	0.34	1634.0	0.40	0.45
		2 1/2	106-710	328.5	1248.3	0.38	1412.6	0.43	1642.5	0.50	0.63		
		3	106-712	255.0	1147.5	0.45	1300.5	0.51	1530.0	0.60	0.75		
		3 1/2	106-714	213.5	1131.6	0.53	1281.0	0.60	1494.5	0.70	0.88		
		4	106-716	184.5	1107.0	0.60	1254.6	0.68	1476.0	0.80	1.00		
		4 1/2	106-718	162.5	1105.0	0.68	1251.3	0.77	1462.5	0.90	1.13		
		5	106-720	145.0	1087.5	0.75	1232.5	0.85	1450.0	1.00	1.25		
		6	106-724	120.5	1084.5	0.90	1229.1	1.02	1446.0	1.20	1.50		
		8	106-732	90.5	1086.0	1.20	1230.8	1.36	1448.0	1.60	2.00		
		10	106-740	71.0	1065.0	1.50	1207.0	1.70	1420.0	2.00	2.50		
		12	106-748	55.0	990.0	1.80	1122.0	2.04	1320.0	2.40	3.00		
		2	1	2 1/2	106-810	411.0	1561.8	0.38	1767.3	0.43	2055.0	0.50	0.60
3	106-812			319.0	1435.5	0.45	1626.9	0.51	1914.0	0.60	0.70		
3 1/2	106-814			276.4	1464.9	0.53	1658.4	0.60	1934.8	0.70	0.88		
4	106-816			231.1	1386.6	0.60	1571.5	0.68	1848.8	0.80	0.97		
4 1/2	106-818			188.8	1283.8	0.68	1453.8	0.77	1699.2	0.90	1.13		
5	106-820			180.4	1353.0	0.75	1533.4	0.85	1804.0	1.00	1.25		
6	106-824			147.3	1325.7	0.90	1502.5	1.02	1767.6	1.20	1.50		
8	106-832			111.6	1339.2	1.20	1517.8	1.36	1785.6	1.60	2.00		
10	106-840			88.4	1326.0	1.50	1502.8	1.70	1768.0	2.00	2.50		
12	106-848			71.2	1281.6	1.80	1452.5	2.04	1708.8	2.40	3.00		

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Clark & Osborne, LLP 317-255-5668 Phone 317-253-4486 FAX www.clarkandosborne.com sales@clarkandosborne.com

# Selecting Die Springs



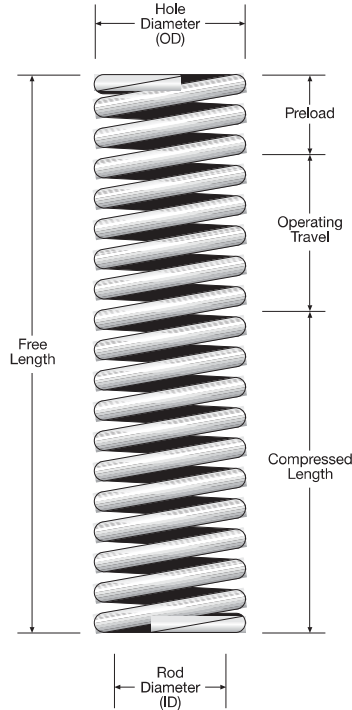
A general rule to observe in spring selection is to always use as many springs as the die will accommodate which will produce the required load with the least amount of deflection. This will increase the useful life of the spring, reduce the chances of spring failure and the resulting downtime, loss 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 a d on optimum life. The recommended deflections for each spring based on the performance required are shown on pages 6 to 28.

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.



**Associated Spring Raymond** has capabilities well beyond the catalog components shown. We supply custom components and functional assemblies. If you simply need a Raymond® die spring or other spring type with a different finish this can be easily done.

**Some common finishes are:**

- Plain
- Dacromet®
- Geomet®
- Zinc
- Black Oxide
- Temperature Indicating
- Teflon®

Additional catalogs are available for other catalog stocked parts for:



**CloverDome**

**m-Struts®**



Our engineers can also customize the dimensions and/or rates for your OEM or aftermarket application based on the design constraints. Even further we can design and supply functional sub-assemblies for new designs or cost reduction efforts. Contact Associated Spring Raymond to learn more about the possibilities for your application:

Please Order From:  
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**RAYMOND**  
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# Die Spring Features & Benefits



## Raymond Die Springs Offer

### Features

### Benefits

#### Superior Materials & Wire Profile

- 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.

- 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

- Dimensional requirements remain consistent and measurably the same from one batch of springs to the next.

- 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

- Engineered to better withstand shock loading.
- Designed to endure constant high-speed deflections.
- Shot-peened to increase fatigue life.
- Less downtime.

- 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

- Springs provide greater available travel to solid.

- More travel in each spring.
- Higher load capacities.
- Increased fatigue life.
- Greater application flexibility.
- More reliable performance.
- Lower solid height.



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