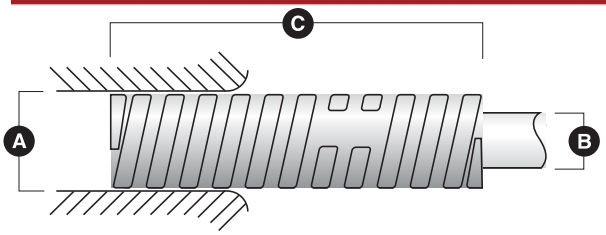
Medium Heavy Duty | INCH DIMENSIONS



INCH (in) 1

US Series

Raymond® — **MEDIUM HEAVY DUTY DIE SPRINGS** — **INCH DIMENSIONS** — **RED**

Hole Dia. (in) A	Rod Dia. (in) B	Free Length (in) C	CATALOG NUMBER	Load at 1/10 in. 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 (37% of free length)
					Load (lb)	Deflection (in)		Deflection (in)	Load (lb)	Deflection (in)	Deflection (in)
3/8	3/16	1	104-104	8.4	16.8	0.20	21.0	0.25	25.2	0.30	0.37
		1 1/4	104-105	7.3	18.3	0.25	22.8	0.31	27.4	0.38	0.46
		1 1/2	104-106	6.7	20.1	0.30	25.1	0.38	30.2	0.45	0.56
		1 3/4	104-107	5.8	20.3	0.35	25.4	0.44	30.5	0.53	0.65
		2	104-108	5.0	20.0	0.40	25.0	0.50	30.0	0.60	0.74
		2 1/2	104-110	3.7	18.5	0.50	23.3	0.63	27.8	0.75	0.93
		3	104-112	3.0	18.0	0.60	22.5	0.75	27.0	0.90	1.11
		12	104-148	0.8	19.2	2.40	24.0	3.00	28.8	3.60	4.44
1/2	9/32	1	104-204	15.5	31.0	0.20	38.8	0.25	46.5	0.30	0.37
		1 1/4	104-205	12.2	30.5	0.25	37.8	0.31	45.8	0.38	0.46
		1 1/2	104-206	9.8	29.4	0.30	37.2	0.38	44.1	0.45	0.56
		1 3/4	104-207	8.5	29.8	0.35	37.2	0.44	44.6	0.53	0.65
		2	104-208	7.5	30.0	0.40	37.5	0.50	45.0	0.60	0.74
		2 1/2	104-210	6.0	30.0	0.50	37.5	0.63	45.0	0.75	0.93
		3	104-212	5.1	30.6	0.60	38.3	0.75	45.9	0.90	1.11
		3 1/2	104-214	4.0	28.0	0.70	35.0	0.88	42.0	1.05	1.30
		12	104-248	1.1	26.4	2.40	33.0	3.00	39.6	3.60	4.44
5/8	11/32	1	104-304	30.0	60.0	0.20	75.0	0.25	90.0	0.30	0.37
		1 1/4	104-305	21.5	53.8	0.25	67.2	0.31	80.6	0.38	0.46
		1 1/2	104-306	19.0	57.0	0.30	71.3	0.38	85.5	0.45	0.56
		1 3/4	104-307	16.8	58.8	0.35	73.5	0.44	88.2	0.53	0.65
		2	104-308	15.5	62.0	0.40	77.5	0.50	93.0	0.60	0.74
		2 1/2	104-310	11.5	57.5	0.50	71.9	0.63	86.3	0.75	0.93
		3	104-312	10.0	60.0	0.60	75.0	0.75	90.0	0.90	1.11
		3 1/2	104-314	8.5	59.5	0.70	74.4	0.88	89.3	1.05	1.30
		4	104-316	7.6	60.8	0.80	76.0	1.00	91.2	1.20	1.48
		12	104-348	2.6	62.4	2.40	78.0	3.00	93.6	3.60	4.44
3/4	3/8	1	104-404	50.0	100.0	0.20	125.0	0.25	150.0	0.30	0.37
		1 1/4	104-405	38.0	95.0	0.25	118.8	0.31	142.5	0.38	0.46
		1 1/2	104-406	31.0	93.0	0.30	117.8	0.38	139.5	0.45	0.56
		1 3/4	104-407	27.0	94.5	0.35	118.8	0.44	141.8	0.53	0.65
		2	104-408	24.0	96.0	0.40	120.0	0.50	144.0	0.60	0.74
		2 1/2	104-410	18.8	94.0	0.50	118.4	0.63	141.0	0.75	0.93
		3	104-412	14.9	89.4	0.60	111.8	0.75	134.1	0.90	1.11
		3 1/2	104-414	12.8	89.6	0.70	112.0	0.88	134.4	1.05	1.30
		4	104-416	11.0	88.0	0.80	110.0	1.00	132.0	1.20	1.48
		4 1/2	104-418	10.0	90.0	0.90	113.0	1.13	135.0	1.35	1.67
		5	104-420	9.0	90.0	1.00	112.5	1.25	135.0	1.50	1.85
		5 1/2	104-422	8.0	88.0	1.10	110.0	1.38	132.0	1.65	2.04
		6	104-424	7.5	90.0	1.20	112.5	1.50	135.0	1.80	2.22
		12	104-448	3.5	84.0	2.40	105.0	3.00	126.0	3.60	4.44

* Deflection values shown represent compressed lengths near solid and are for design information only.

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Medium Heavy Duty | INCH DIMENSIONS

US Series

Raymond® MEDIUM HEAVY DUTY DIE SPRINGS — INCH DIMENSIONS — RED

Hole Dia.	Rod Dia. (in)	Free Length (in)	CATALOG NUMBER	Load at 1/10 in. 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 (37% of free length)	
	B	C			Load (lb)		Load (lb)		Load (lb)		Defl ection (in)	
		1	104-504	82.7	165.4	0.20	206.8	0.25	248.1	0.30	0.37	
		1 1/4	104-505	65.3	163.3	0.25	202.4	0.31	244.9	0.38	0.46	
		1 1/2	104-506	53.8	161.4	0.30	204.4	0.38	242.1	0.45	0.56	
		1 3/4	104-507	46.1	161.4	0.35	202.8	0.44	242.0	0.53	0.65	
		2	104-508	40.0	160.0	0.40	200.0	0.50	240.0	0.60	0.74	
		2 1/2	104-510	32.2	161.0	0.50	202.9	0.63	241.5	0.75	0.93	
		3	104-512	26.7	160.2	0.60	200.3	0.75	240.3	0.90	1.11	
1	1/2	3 1/2	104-514	22.9	160.3	0.70	201.5	0.88	240.5	1.05	1.30	
		4	104-516	20.2	161.6	0.80	202.0	1.00	242.4	1.20	1.48	
		4 1/2	104-518	17.8	160.2	0.90	201.1	1.13	240.3	1.35	1.67	
		5	104-520	15.7	157.0	1.00	196.3	1.25	235.5	1.50	1.85	
		5 1/2	104-522	13.7	150.7	1.10	189.1	1.38	226.1	1.65	2.04	
		6	104-524	12.5	150.0	1.20	187.5	1.50	225.0	1.80	2.22	
		7	104-528	10.9	152.6	1.40	190.8	1.75	228.9	2.10	2.59	
		8	104-532	9.6	153.6	1.60	192.0	2.00	230.4	2.40	2.96	
		12	104-548	6.5	156.0	2.40	195.0	3.00	234.0	3.60	4.44	
		1 1/2	104-606	114.4	343.2	0.30	429.0	0.38	514.8	0.45	0.56	
		1 3/4	104-607	100.8	352.8	0.35	441.0	0.44	529.2	0.53	0.65	
		2	104-608	83.8	335.2	0.40	419.0	0.50	502.8	0.60	0.74	
		2 1/2	104-610	62.4	312.0	0.50	390.0	0.63	468.0	0.75	0.93	
		3	104-612	51.2	307.2	0.60	384.0	0.75	460.8	0.90	1.11	
		3 1/2	104-614	44.0	308.0	0.70	385.0	0.88	462.0	1.05	1.30	
		4	104-616	38.1	304.8	0.80	381.0	1.00	457.2	1.20	1.48	
1 1/4	5/8	4 1/2	104-618	32.9	296.1	0.90	371.8	1.13	444.2	1.35	1.67	
		5	104-620	30.0	300.0	1.00	375.0	1.25	450.0	1.50	1.85	
		5 1/2	104-622	26.4	290.4	1.10	363.0	1.38	435.6	1.65	2.04	
		6	104-624	25.0	300.0	1.20	375.0	1.50	450.0	1.80	2.22	
		7	104-628	21.0	294.0	1.40	367.5	1.75	441.0	2.10	2.59	
		8	104-632	18.4	294.4	1.60	368.0	2.00	441.6	2.40	2.96	
		10	104-640	14.5	290.0	2.00	362.5	2.50	435.0	3.00	3.70	
		12	104-648	12.4	297.6	2.40	372.0	3.00	446.4	3.60	4.44	
		2	104-708	103.0	412.0	0.40	515.0	0.50	618.0	0.60	0.74	
		2 1/2	104-710	81.2	406.0	0.50	511.6	0.63	609.0	0.75	0.93	
		3	104-712	62.4	374.4	0.60	468.0	0.75	561.6	0.90	1.11	
		3 1/2	104-714	54.0	378.0	0.70	475.2	0.88	567.0	1.05	1.30	
		4	104-716	46.5	372.0	0.80	465.0	1.00	558.0	1.20	1.48	
		4 1/2	104-718	41.0	369.0	0.90	463.3	1.13	553.5	1.35	1.67	
1 1/2	3/4	5	104-720	36.8	368.0	1.00	460.0	1.25	552.0	1.50	1.85	
		5 1/2	104-722	33.0	363.0	1.10	455.4	1.38	544.5	1.65	2.04	
		6	104-724	29.5	354.0	1.20	442.5	1.50	531.0	1.80	2.22	
		7	104-728	25.5	357.0	1.40	446.3	1.75	535.5	2.10	2.59	
		8	104-732	22.0	352.0	1.60	440.0	2.00	528.0	2.40	2.96	
		10	104-740	17.6	352.0	2.00	440.0	2.50	528.0	3.00	3.70	
		12	104-748	14.4	345.6	2.40	432.0	3.00	518.4	3.60	4.44	
		2 1/2	104-810	118.4	592.0	0.50	740.0	0.63	888.0	0.75	0.93	
		3	104-812	93.0	558.0	0.60	697.5	0.75	837.0	0.90	1.11	
		3 1/2	104-814	78.2	547.4	0.70	688.2	0.88	821.1	1.05	1.30	
		4	104-816	66.4	531.2	0.80	664.0	1.00	796.8	1.20	1.48	
		4 1/2	104-818	60.0	540.0	0.90	675.0	1.13	810.0	1.35	1.67	
		5	104-820	53.4	534.0	1.00	667.5	1.25	801.0	1.50	1.85	
2	1	5 1/2	104-822	49.0	539.0	1.10	676.2	1.38	808.5	1.65	2.04	
		6	104-824	45.0	540.0	1.20	675.0	1.50	810.0	1.80	2.22	
		7	104-828	37.4	523.6	1.40	654.5	1.75	785.4	2.10	2.59	
		8	104-832	33.0	528.0	1.60	660.0	2.00	792.0	2.40	2.96	
		10	104-840	26.0	520.0	2.00	650.0	2.50	780.0	3.00	3.70	
		12	104-848	21.5	516.0	2.40	645.0	3.00	774.0	3.60	4.44	

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Selecting Die Springs

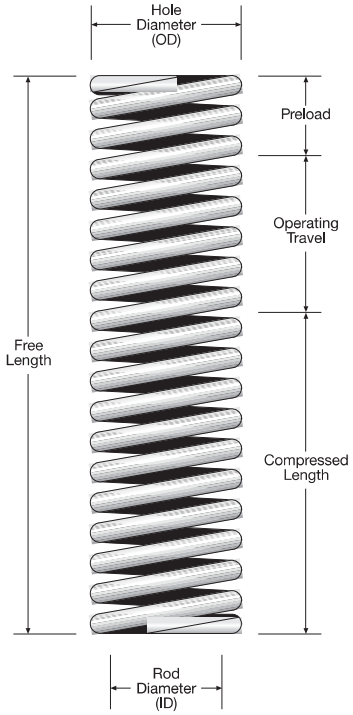
A general rule to observe in spring selection is to always use as many springs as the die will accommodate which will produce the required load with the least amount of deflection. This will increase the useful life of the spring, reduce the chances of spring failure and the resulting downtime, loss 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 fi nish this can be easily done.

Some common fi nishes are:

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- Dacromet®
- Geomet®
- Zinc
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- Teflon®

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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 effi cient raw material. • Consistent controlled metallurgy. • Offers maximum design possibilities. • Wire cross section provides optimum defl ection and protection against failure due to excessive stress build-up. • Square ends create reliable, fl at, 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 fl exibility. • More reliable performance. • Lower solid height.

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