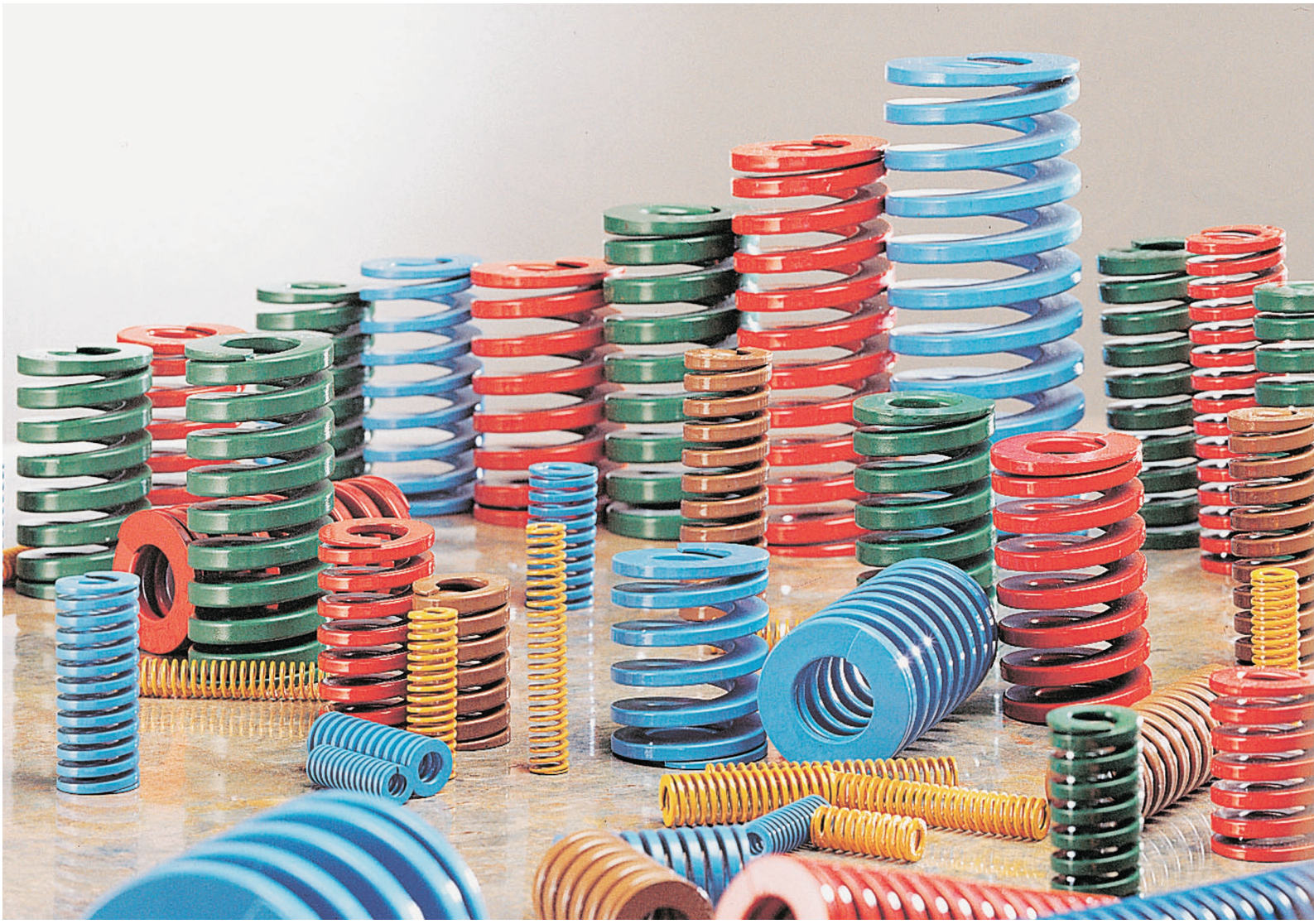
Raymond®

Die Springs Manufactured to JIS Specification



Associated Spring Raymond

BARNES GROUP INC

JIS 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.

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 JIS B 5012.

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Associated Spring Raymond BARNES GROUP INC

Selecting Die Springs

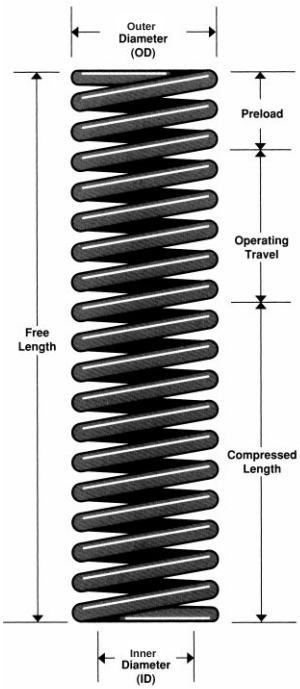
A general rule to observe in spring selection is to always use as many springs as the die will accomodate which will produce the required load with the least amount of deflection. This will increase the useful life of the spring, reduce the chances of spring failure and the resulting downtime, loss of 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 4 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 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.



JIS DIE SPRING SERIES

Free Length (mm)	Extra Light Duty Compressed 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 % of Free Length			Deflection in % of Free Length			Deflection in % of Free Length			Deflection in % of Free Length			Deflection in % of Free Length		
	40%	45%	50%	32%	36%	40%	26%	29%	32%	24%	22%	19%	20%	18%	16%
10	4.0	4.5	5.0	3.2	3.6	4.0	2.6	2.9	3.2	2.4	2.2	1.9	2.0	1.8	1.6
15	6.0	6.8	7.5	4.8	5.4	6.0	3.8	4.3	4.8	3.6	3.3	2.9	3.0	2.7	2.4
20	8.0	9.0	10.0	6.4	7.2	8.0	5.1	5.8	6.4	4.8	4.4	3.8	4.0	3.6	3.2
25	10.0	11.3	12.5	8.0	9.0	10.0	6.4	7.2	8.0	6.0	5.5	4.8	5.0	4.5	4.0
30	12.0	13.5	15.0	9.6	10.8	12.0	7.7	8.6	9.6	7.2	6.6	5.7	6.0	5.4	4.8
35	14.0	15.8	17.5	11.2	12.6	14.0	9.0	10.1	11.2	8.4	7.7	6.7	7.0	6.3	5.6
40	16.0	18.0	20.0	12.8	14.4	16.0	10.2	11.5	12.8	9.6	8.8	7.6	8.0	7.2	6.4
45	18.0	20.3	22.5	14.4	16.2	18.0	11.5	13.0	14.4	10.8	9.9	8.6	9.0	8.1	7.2
50	20.0	22.5	25.0	16.0	18.0	20.0	12.8	14.4	16.0	12.0	11.0	9.5	10.0	9.0	8.0
55	22.0	24.8	27.5	17.6	19.8	22.0	14.1	15.8	17.6	13.2	12.1	10.5	11.0	9.9	8.8
60	24.0	27.0	30.0	19.2	21.6	24.0	15.4	17.3	19.2	14.4	13.2	11.4	12.0	10.8	9.6
65	26.0	29.3	32.5	20.8	23.4	26.0	16.6	18.7	20.8	15.6	14.3	12.4	13.0	11.7	10.4
70	28.0	31.5	35.0	22.4	25.2	28.0	17.9	20.2	22.4	16.8	15.4	13.3	14.0	12.6	11.2
75	30.0	33.8	37.5	24.0	27.0	30.0	19.2	21.6	24.0	18.0	16.5	14.3	15.0	13.5	12.0
80	32.0	36.0	40.0	25.6	28.8	32.0	20.5	23.0	25.6	19.2	17.6	15.2	16.0	14.4	12.8
90	36.0	40.5	45.0	28.8	32.4	36.0	23.0	25.9	28.8	21.6	19.8	17.1	18.0	16.2	14.4
100	40.0	45.0	50.0	32.0	36.0	40.0	25.6	28.8	32.0	24.0	22.0	19.0	20.0	18.0	16.0
125	50.0	56.3	62.5	40.0	45.0	50.0	32.0	36.0	40.0	30.0	27.5	23.8	25.0	22.5	20.0
150	60.0	67.5	75.0	48.0	54.0	60.0	38.4	43.2	48.0	36.0	33.0	28.5	30.0	27.0	24.0
175	70.0	78.8	87.5	56.0	63.0	70.0	44.8	50.4	56.0	42.0	38.5	33.3	35.0	31.5	28.0
200	80.0	90.0	100.0	64.0	72.0	80.0	51.2	57.6	64.0	48.0	44.0	38.0	40.0	36.0	32.0
250	100.0	112.5	125.0	80.0	90.0	100.0	64.0	72.0	80.0	60.0	55.0	47.5	50.0	45.0	40.0
300	120.0	135.0	150.0	96.0	108.0	120.0	76.8	86.4	96.0	72.0	66.0	57.0	60.0	54.0	48.0
350	140.0	157.5	175.0	112.0	126.0	140.0	89.6	100.8	112.0	84.0	77.0	66.5	70.0	63.0	56.0
400	160.0	180.0	200.0	128.0	144.0	160.0	102.4	115.2	128.0	96.0	88.0	76.0	80.0	72.0	64.0
450	180.0	202.5	225.0	144.0	162.0	180.0	115.2	129.6	144.0	108.0	99.0	85.5	90.0	81.0	72.0
500	200.0	225.0	250.0	160.0	180.0	200.0	128.0	144.0	160.0	120.0	110.0	95.0	100.0	90.0	80.0

Common Die Spring Terminology

OUTER DIAMETER This identifies the outside diameter (OD) of the die spring.

INNER DIAMETER This is a nominal identification of the inside diameter (ID) of the die spring.

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 form 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.

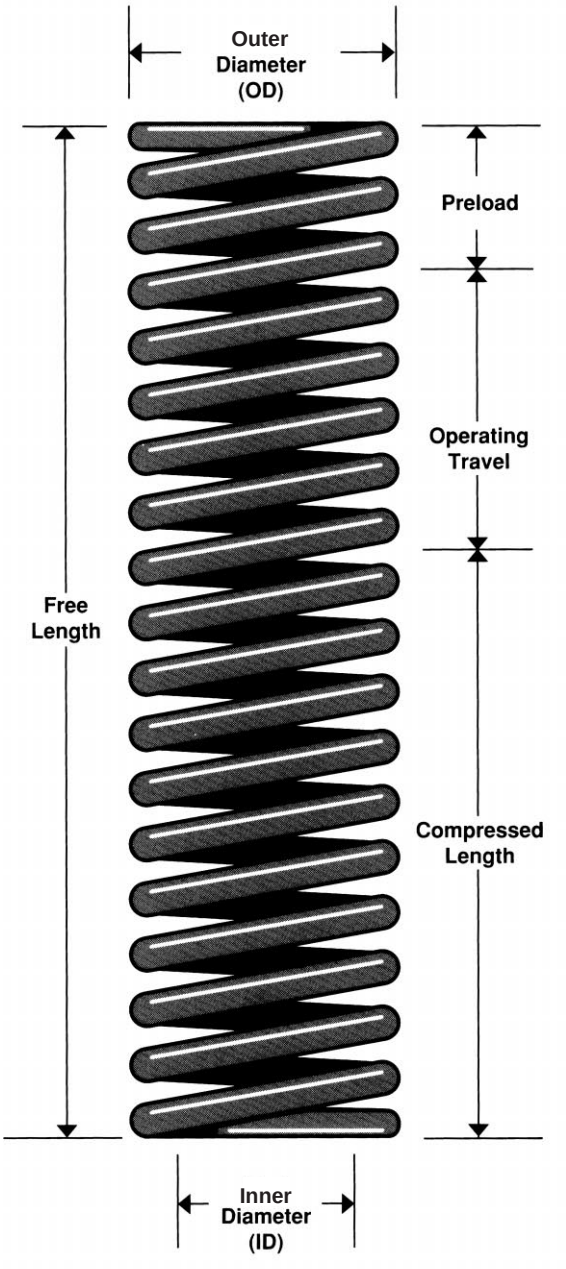
REMOVE SET The manufacturing process of closing a compression spring to solid to eliminate load loss in operation.

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.

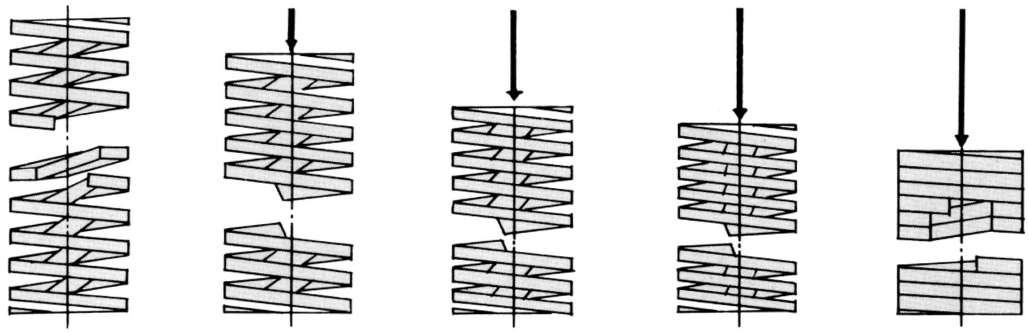
LOAD This is the force built up by compressing the spring. Load is expressed in terms of total Newtons, which is the load on the spring per a specific unit of deflection. Load is generated and stress on the coils increases.

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.

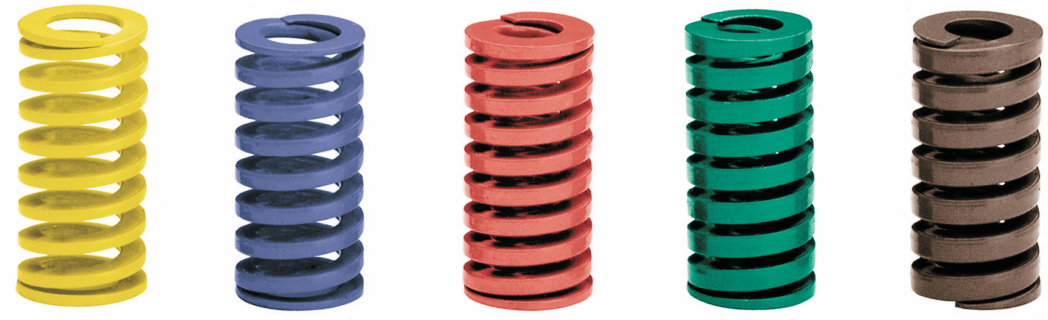


JIS Die Springs

RELATIONSHIP BETWEEN EXPECTED CYCLE LIFE, DUTY CLASS AND DEFLECTION					
Working Time / Deflection	Optimum Life (% of free length)	Long Life (% of free length)	Maximum Operating Deflection (% of free length)	Maximum Deflection (% of free length)	Color
Extra Light Load	40.0%	45.0%	50.0%	Approx. 58.0%	Yellow
Light Load	32.0%	36.0%	40.0%	Approx. 48.0%	Blue
Medium Load	25.6%	28.8%	32.0%	Approx. 38.0%	Red
Heavy Load	19.2%	21.6%	24.0%	Approx. 28.0%	Green
Extra Heavy Load	16.0%	18.0%	20.0%	Approx. 24.0%	Brown



TOLERANCE OF JIS DIE SPRINGS					
Outer Diameter	Inner Diameter	Free Length		Load kgf	Coil Direction
		below 50mm	over 55mm		
+0mm -0.7mm	+0.7mm +0.1mm	±0.5mm	±1%	±10%	right hand



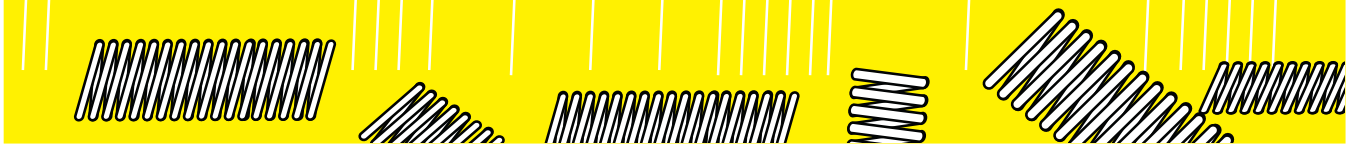
ASF
Extra Light Load

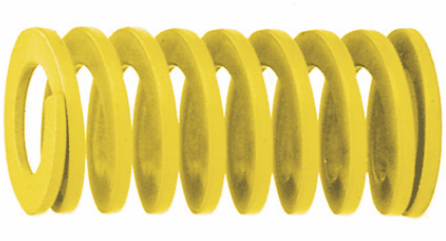
ASL
Light Load

ASM
Medium Load

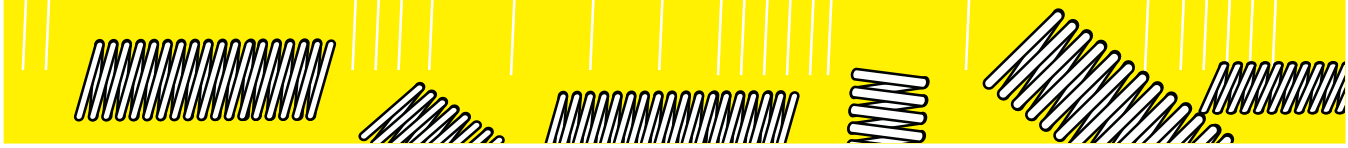
ASH
Heavy Load

ASB
Extra Heavy Load



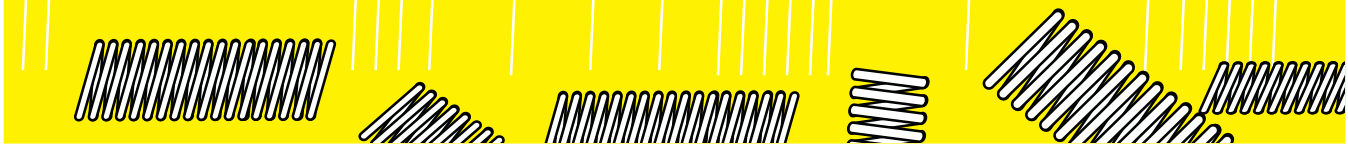


Raymond®	EXTRA LIGHT DUTY DIE SPRINGS			JIS B 5012 Series						Yellow
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (50%of free length)		For Long Life (45% of free length)		For Optimal Life (40% of free length)	
A	B	C			Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
8	4	10	ASF 8 X 10	1.56	5.0	8 (78.5)	4.5	7 (68.6)	4.0	6 (58.8)
		15	ASF 8 X 15	1.04	7.5		6.8		6.0	
		20	ASF 8 X 20	0.78	10.0		9.0		8.0	
		25	ASF 8 X 25	0.62	12.5		11.2		10.0	
		30	ASF 8 X 30	0.52	15.0		13.5		12.0	
		35	ASF 8 X 35	0.44	17.5		15.7		14.0	
		40	ASF 8 X 40	0.39	20.0		18.0		16.0	
		45	ASF 8 X 45	0.35	22.5		20.2		18.0	
		50	ASF 8 X 50	0.31	25.0		22.5		20.0	
		55	ASF 8 X 55	0.28	27.5		24.7		22.0	
		60	ASF 8 X 60	0.26	30.0		27.0		24.0	
10	5	20	ASF 10 X 20	1.00	10.0	10 (98.1)	9.0	9 (88.3)	8.0	8 (78.5)
		25	ASF 10 X 25	0.80	12.5		11.2		10.0	
		30	ASF 10 X 30	0.67	15.0		13.5		12.0	
		35	ASF 10 X 35	0.57	17.5		15.7		14.0	
		40	ASF 10 X 40	0.50	20.0		18.0		16.0	
		45	ASF 10 X 45	0.44	22.5		20.2		18.0	
		50	ASF 10 X 50	0.40	25.0		22.5		20.0	
		55	ASF 10 X 55	0.36	27.5		24.7		22.0	
		60	ASF 10 X 60	0.33	30.0		27.0		24.0	
		65	ASF 10 X 65	0.31	32.5		29.2		26.0	
		70	ASF 10 X 70	0.29	35.0		31.5		28.0	
		75	ASF 10 X 75	0.27	37.5		33.7		30.0	
		80	ASF 10 X 80	0.25	40.0		36.0		32.0	
12	6	20	ASF 12 X 20	1.40	10.0	14 (137.3)	9.0	12.5 (122.6)	8.0	11 (107.9)
		25	ASF 12 X 25	1.12	12.5		11.2		10.0	
		30	ASF 12 X 30	0.93	15.0		13.5		12.0	
		35	ASF 12 X 35	0.80	17.5		15.7		14.0	
		40	ASF 12 X 40	0.70	20.0		18.0		16.0	
		45	ASF 12 X 45	0.62	22.5		20.2		18.0	
		50	ASF 12 X 50	0.56	25.0		22.5		20.0	
		55	ASF 12 X 55	0.51	27.5		24.7		22.0	
		60	ASF 12 X 60	0.47	30.0		27.0		24.0	
		65	ASF 12 X 65	0.43	32.5		29.2		26.0	
		70	ASF 12 X 70	0.40	35.0		31.5		28.0	
		75	ASF 12 X 75	0.37	37.5		33.7		30.0	
		80	ASF 12 X 80	0.35	40.0		36.0		32.0	
14	7	25	ASF 14 X 25	1.44	12.5	18 (176.5)	11.2	16 (156.9)	10.0	14.5 142.2
		30	ASF 14 X 30	1.20	15.0		13.5		12.0	
		35	ASF 14 X 35	1.03	17.5		15.7		14.0	
		40	ASF 14 X 40	0.90	20.0		18.0		16.0	
		45	ASF 14 X 45	0.80	22.5		20.2		18.0	
		50	ASF 14 X 50	0.72	25.0		22.5		20.0	
		55	ASF 14 X 55	0.65	27.5		24.7		22.0	
		60	ASF 14 X 60	0.60	30.0		27.0		24.0	
		65	ASF 14 X 65	0.55	32.5		29.2		26.0	
		70	ASF 14 X 70	0.51	35.0		31.5		28.0	
		75	ASF 14 X 75	0.48	37.5		33.7		30.0	
		80	ASF 14 X 80	0.45	40.0		36.0		32.0	
		90	ASF 14 X 90	0.40	45.0		40.5		36.0	

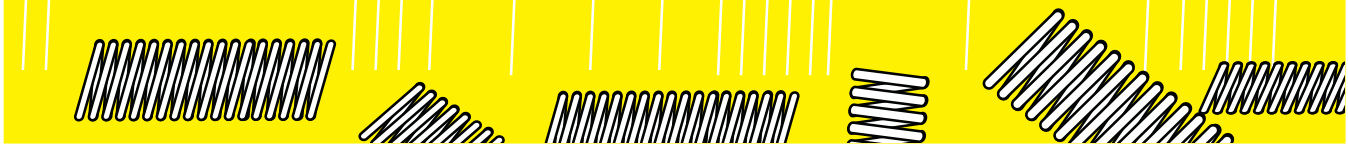


Raymond® **EXTRA LIGHT DUTY DIE SPRINGS** **JIS B 5012 Series** **Yellow**

Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (50%of free length)		For Long Life (45% of free length)		For Optimal Life (40% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
16	8	25	ASF 16 X 25	1.68	12.5	21 (206)	11.2	19 (186.3)	10.0	17 (166.7)
		30	ASF 16 X 30	1.40	15.0		13.5		12.0	
		35	ASF 16 X 35	1.20	17.5		15.7		14.0	
		40	ASF 16 X 40	1.05	20.0		18.0		16.0	
		45	ASF 16 X 45	0.94	22.5		20.2		18.0	
		50	ASF 16 X 50	0.84	25.0		22.5		20.0	
		55	ASF 16 X 55	0.77	27.5		24.7		22.0	
		60	ASF 16 X 60	0.70	30.0		27.0		24.0	
		65	ASF 16 X 65	0.65	32.5		29.2		26.0	
		70	ASF 16 X 70	0.60	35.0		31.5		28.0	
		75	ASF 16 X 75	0.56	37.5		33.7		30.0	
		80	ASF 16 X 80	0.53	40.0		36.0		32.0	
		90	ASF 16 X 90	0.47	45.0		40.5		36.0	
		100	ASF 16 X 100	0.42	50.0		45.0		40.0	
18	9	25	ASF 18 X 25	2.08	12.5	26 (255)	11.2	23 (256)	10.0	21 (206)
		30	ASF 18 X 30	1.74	15.0		13.5		12.0	
		35	ASF 18 X 35	1.49	17.5		15.7		14.0	
		40	ASF 18 X 40	1.30	20.0		18.0		16.0	
		45	ASF 18 X 45	1.16	22.5		20.2		18.0	
		50	ASF 18 X 50	1.04	25.0		22.5		20.0	
		55	ASF 18 X 55	0.95	27.5		24.7		22.0	
		60	ASF 18 X 60	0.87	30.0		27.0		24.0	
		65	ASF 18 X 65	0.80	32.5		29.2		26.0	
		70	ASF 18 X 70	0.74	35.0		31.5		28.0	
		75	ASF 18 X 75	0.70	37.5		33.7		30.0	
		80	ASF 18 X 80	0.65	40.0		36.0		32.0	
		90	ASF 18 X 90	0.58	45.0		40.5		36.0	
		100	ASF 18 X 100	0.52	50.0		45.0		40.0	
20	11	25	ASF 20 X 25	2.56	12.5	32 (314)	11.2	29 (284)	10.0	26 (255)
		30	ASF 20 X 30	2.13	15.0		13.5		12.0	
		35	ASF 20 X 35	1.83	17.5		15.7		14.0	
		40	ASF 20 X 40	1.60	20.0		18.0		16.0	
		45	ASF 20 X 45	1.42	22.5		20.2		18.0	
		50	ASF 20 X 50	1.28	25.0		22.5		20.0	
		55	ASF 20 X 55	1.16	27.5		24.7		22.0	
		60	ASF 20 X 60	1.07	30.0		27.0		24.0	
		65	ASF 20 X 65	0.98	32.5		29.2		26.0	
		70	ASF 20 X 70	0.91	35.0		31.5		28.0	
		75	ASF 20 X 75	0.85	7.5		33.7		30.0	
		80	ASF 20 X 80	0.80	40.0		36.0		32.0	
		90	ASF 20 X 90	0.71	45.0		40.5		36.0	
		100	ASF 20 X 100	0.64	50.0		45.0		40.0	
		125	ASF 20 X 125	0.51	62.5		56.2		50.0	
		150	ASF 20 X 150	0.43	75.0		67.5		60.0	
22	11	25	ASF 22 X 25	3.20	12.5	40 (392)	11.2	36 (353)	10.0	32 (314)
		30	ASF 22 X 30	2.67	15.0		13.5		12.0	
		35	ASF 22 X 35	2.29	17.5		15.7		14.0	
		40	ASF 22 X 40	2.00	20.0		18.0		16.0	
		45	ASF 22 X 45	1.78	22.5		20.2		18.0	
		50	ASF 22 X 50	1.60	25.0		22.5		20.0	
		55	ASF 22 X 55	1.46	27.5		24.7		22.0	
		60	ASF 22 X 60	1.33	30.0		27.0		24.0	
		65	ASF 22 X 65	1.23	32.5		29.2		26.0	
		70	ASF 22 X 70	1.14	35.0		31.5		28.0	
		75	ASF 22 X 75	1.07	37.5		33.7		30.0	
		80	ASF 22 X 80	1.00	40.0		36.0		32.0	
		90	ASF 22 X 90	0.89	45.0		40.5		36.0	
		100	ASF 22 X 100	0.80	50.0		45.0		40.0	
		125	ASF 22 X 125	0.64	62.5		56.2		50.0	
		150	ASF 22 X 150	0.53	75.0		67.5		60.0	



Raymond®	EXTRA LIGHT DUTY DIE SPRINGS			JIS B 5012 Series						Yellow
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (50%of free length)		For Long Life (45% of free length)		For Optimal Life (40% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
25	13.5	25	ASF 25 X 25	4.00	12.5	50 (450)	11.2	45 (441)	10.0	40 (392)
		30	ASF 25 X 30	3.33	15.0		13.5		12.0	
		35	ASF 25 X 35	2.85	17.5		15.7		14.0	
		40	ASF 25 X 40	2.50	20.0		18.0		16.0	
		45	ASF 25 X 45	2.22	22.5		20.2		18.0	
		50	ASF 25 X 50	2.00	25.0		22.5		20.0	
		55	ASF 25 X 55	1.82	27.5		24.7		22.0	
		60	ASF 25 X 60	1.67	30.0		27.0		24.0	
		65	ASF 25 X 65	1.54	32.5		29.2		26.0	
		70	ASF 25 X 70	1.43	35.0		31.5		28.0	
		75	ASF 25 X 75	1.33	37.5		33.7		30.0	
		80	ASF 25 X 80	1.25	40.0		36.0		32.0	
		90	ASF 25 X 90	1.11	45.0		40.5		36.0	
		100	ASF 25 X 100	1.00	50.0		45.0		40.0	
		125	ASF 25 X 125	0.80	62.5		56.2		50.0	
		150	ASF 25 X 150	0.67	75.0		67.5		60.0	
		175	ASF 25 X 175	0.57	87.5		78.7		70.0	
27	13.5	25	ASF 27 X 25	4.80	12.5	60 (588)	11.2	54 (530)	10.0	48 (471)
		30	ASF 27 X 30	4.00	15.0		13.5		12.0	
		35	ASF 27 X 35	3.43	17.5		15.7		14.0	
		40	ASF 27 X 40	3.00	20.0		18.0		16.0	
		45	ASF 27 X 45	2.67	22.5		20.2		18.0	
		50	ASF 27 X 50	2.40	25.0		22.5		20.0	
		55	ASF 27 X 55	2.18	27.5		24.7		22.0	
		60	ASF 27 X 60	2.00	30.0		27.0		24.0	
		65	ASF 27 X 65	1.85	32.5		29.2		26.0	
		70	ASF 27 X 70	1.71	35.0		31.5		28.0	
		75	ASF 27 X 75	1.60	37.5		33.7		30.0	
		80	ASF 27 X 80	1.50	40.0		36.0		32.0	
		90	ASF 27 X 90	1.33	45.0		40.5		36.0	
		100	ASF 27 X 100	1.20	50.0		45.0		40.0	
		125	ASF 27 X 125	0.96	62.5		56.2		50.0	
		150	ASF 27 X 150	0.80	75.0		67.5		60.0	
		175	ASF 27 X 175	0.69	87.5		78.7		70.0	
30	16	25	ASF 30 X 25	5.80	12.5	72 (706)	11.2	65 (637)	10.0	58 (569)
		30	ASF 30 X 30	4.80	15.0		13.5		12.0	
		35	ASF 30 X 35	4.13	17.5		15.7		14.0	
		40	ASF 30 X 40	3.60	20.0		18.0		16.0	
		45	ASF 30 X 45	3.21	22.5		20.2		18.0	
		50	ASF 30 X 50	2.88	25.0		22.5		20.0	
		55	ASF 30 X 55	2.63	27.5		24.7		22.0	
		60	ASF 30 X 60	2.40	30.0		27.0		24.0	
		65	ASF 30 X 65	2.22	32.5		29.2		26.0	
		70	ASF 30 X 70	2.05	35.0		31.5		28.0	
		75	ASF 30 X 75	1.93	37.5		33.7		30.0	
		80	ASF 30 X 80	1.80	40.0		36.0		32.0	
		90	ASF 30 X 90	1.60	45.0		40.5		36.0	
		100	ASF 30 X 100	1.44	50.0		45.0		40.0	
		125	ASF 30 X 125	1.15	62.5		56.2		50.0	
		150	ASF 30 X 150	0.96	75.0		67.5		60.0	
		175	ASF 30 X 175	0.82	87.5		78.7		70.0	
		200	ASF 30 X 200	0.72	100.0		90.0		80.0	



Raymond® **EXTRA LIGHT DUTY DIE SPRINGS** **JIS B 5012 Series** **Yellow**

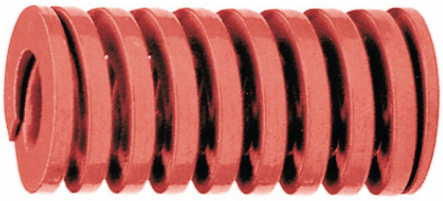
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (50%of free length)		For Long Life (45% of free length)		For Optimal Life (40% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
35	19	40	ASF 35 X 40	4.90	20.0	98 (961)	18.0	88 (963)	16.0	78 (765)
		45	ASF 35 X 45	4.36	22.5		20.2		18.0	
		50	ASF 35 X 50	3.92	25.0		22.5		20.0	
		55	ASF 35 X 55	3.56	27.5		24.7		22.0	
		60	ASF 35 X 60	3.26	30.0		27.0		24.0	
		65	ASF 35 X 65	3.02	32.5		29.2		26.0	
		70	ASF 35 X 70	2.80	35.0		31.5		28.0	
		75	ASF 35 X 75	2.61	37.5		33.7		30.0	
		80	ASF 35 X 80	2.45	40.0		36.0		32.0	
		90	ASF 35 X 90	2.17	45.0		40.5		36.0	
		100	ASF 35 X 100	1.96	50.0		45.0		40.0	
		125	ASF 35 X 125	1.57	62.5		56.2		50.0	
		150	ASF 35 X 150	1.30	75.0		67.5		60.0	
		175	ASF 35 X 175	1.12	87.5		78.7		70.0	
		200	ASF 35 X 200	0.98	100.0		90.0		80.0	
40	22	40	ASF 40 X 40	6.38	20.0	128 (1,255)	18.0	115 (1,128)	16.0	102 (1,000)
		50	ASF 40 X 50	5.12	25.0		22.5		20.0	
		60	ASF 40 X 60	4.26	30.0		27.0		24.0	
		70	ASF 40 X 70	3.65	35.0		31.5		28.0	
		80	ASF 40 X 80	3.20	40.0		36.0		32.0	
		90	ASF 40 X 90	2.84	45.0		40.5		36.0	
		100	ASF 40 X 100	2.56	50.0		45.0		40.0	
		125	ASF 40 X 125	2.04	62.5		56.2		50.0	
		150	ASF 40 X 150	1.70	75.0		67.5		60.0	
		175	ASF 40 X 175	1.46	87.5		78.7		70.0	
		200	ASF 40 X 200	1.28	100.0		90.0		80.0	
		250	ASF 40 X 250	1.02	125.0		112.5		100.0	
50	25	50	ASF 50 X 50	8.00	25.0	200 (1,961)	22.5	180 (1,765)	20.0	160 (1,569)
		60	ASF 50 X 60	6.66	30.0		27.0		24.0	
		70	ASF 50 X 70	5.71	35.0		31.5		28.0	
		80	ASF 50 X 80	5.00	40.0		36.0		32.0	
		90	ASF 50 X 90	4.44	45.0		40.5		36.0	
		100	ASF 50 X 100	4.00	50.0		45.0		40.0	
		125	ASF 50 X 125	3.20	63.5		56.2		50.0	
		150	ASF 50 X 150	2.66	75.0		67.5		60.0	
		175	ASF 50 X 175	2.28	87.5		78.7		70.0	
		200	ASF 50 X 200	2.00	100.0		90.0		80.0	
		250	ASF 50 X 250	1.60	125.0		112.5		100.0	
		300	ASF 50 X 300	1.33	150.0		135.0		120.0	
		350	ASF 50 X 350	1.14	175.0		157.5		140.0	
		400	ASF 50 X 400	1.00	200.0		180.0		160.0	
		450	ASF 50 X 450	0.89	225.0		202.5		180.0	
		500	ASF 50 X 500	0.80	250.0		225.0		200.0	
60	33	60	ASF 60 X 60	9.59	30.0	288 (2,820)	27.0	259 (2,540)	24.0	230 (2,260)
		70	ASF 60 X 70	8.22	35.0		31.5		28.0	
		80	ASF 60 X 80	7.19	40.0		36.0		32.0	
		90	ASF 60 X 90	6.40	45.0		40.5		36.0	
		100	ASF 60 X 100	5.76	50.0		45.0		40.0	
		125	ASF 60 X 125	4.60	62.5		56.2		50.0	
		150	ASF 60 X 150	3.84	75.0		67.5		60.0	
		175	ASF 60 X 175	3.29	87.5		78.7		70.0	
		200	ASF 60 X 200	2.88	100.0		90.0		80.0	
		250	ASF 60 X 250	2.30	125.0		112.5		100.0	
		300	ASF 60 X 300	1.92	150.0		135.0		120.0	
		350	ASF 60 X 350	1.65	175.0		157.5		140.0	
		400	ASF 60 X 400	1.44	200.0		180.0		160.0	
		450	ASF 60 X 450	1.28	225.0		202.5		180.0	
		500	ASF 60 X 500	1.15	250.0		225.0		200.0	

Raymond®	LIGHT DUTY DIE SPRINGS			JIS B 5012 Series						Blue
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (40%of free length)		For Long Life (36% of free length)		For Optimal Life (32% of free length)	
A	B	C			Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
8	4	10	ASL 8 X 10	2.50	4.0	10 (98.1)	3.6	9 (88.3)	3.2	8 (78.5)
		15	ASL 8 X 15	1.67	6.0		5.4		4.8	
		20	ASL 8 X 20	1.25	8.0		7.2		6.4	
		25	ASL 8 X 25	1.00	10.0		9.0		8.0	
		30	ASL 8 X 30	0.83	12.0		10.8		9.6	
		35	ASL 8 X 35	0.71	14.0		12.6		11.2	
		40	ASL 8 X 40	0.63	16.0		14.4		12.8	
		45	ASL 8 X 45	0.56	18.0		16.2		14.4	
		50	ASL 8 X 50	0.50	20.0		18.0		16.0	
		55	ASL 8 X 55	0.46	22.0		19.8		17.6	
		60	ASL 8 X 60	0.42	24.0		21.6		19.2	
10	5	20	ASL 10 X 20	1.81	8.0	14.5 (142.2)	7.2	13 (127.5)	6.4	11.5 (112.8)
		25	ASL 10 X 25	1.45	10.0		9.0		8.0	
		30	ASL 10 X 30	1.21	12.0		10.8		9.6	
		35	ASL 10 X 35	1.03	14.0		12.6		11.2	
		40	ASL 10 X 40	0.90	16.0		14.4		12.8	
		45	ASL 10 X 45	0.80	18.0		16.2		14.4	
		50	ASL 10 X 50	0.73	20.0		18.0		16.0	
		55	ASL 10 X 55	0.66	22.0		19.8		17.6	
		60	ASL 10 X 60	0.60	24.0		21.6		19.2	
		65	ASL 10 X 65	0.55	26.0		23.4		20.8	
		70	ASL 10 X 70	0.51	28.0		25.2		22.4	
		75	ASL 10 X 75	0.48	30.0		27.0		24.0	
		80	ASL 10 X 80	0.45	32.0		28.8		25.6	
12	6	20	ASL 12 X 20	2.63	8.0	21 (206)	7.2	19 (186.3)	6.4	17 (166.7)
		25	ASL 12 X 25	2.10	10.0		9.0		8.0	
		30	ASL 12 X 30	1.75	12.0		10.8		9.6	
		35	ASL 12 X 35	1.50	14.0		12.6		11.2	
		40	ASL 12 X 40	1.32	16.0		14.4		12.8	
		45	ASL 12 X 45	1.17	18.0		16.2		14.4	
		50	ASL 12 X 50	1.05	20.0		18.0		16.0	
		55	ASL 12 X 55	0.96	22.0		19.8		17.6	
		60	ASL 12 X 60	0.88	24.0		21.6		19.2	
		65	ASL 12 X 65	0.81	26.0		23.4		20.8	
		70	ASL 12 X 70	0.75	28.0		25.2		22.4	
		75	ASL 12 X 75	0.70	30.0		27.0		24.0	
		80	ASL 12 X 80	0.66	32.0		28.8		25.6	
14	7	25	ASL 14 X 25	2.80	10.0	28 (275)	9.0	25 (245)	8.0	22 (216)
		30	ASL 14 X 30	2.34	12.0		10.8		9.6	
		35	ASL 14 X 35	2.00	14.0		12.6		11.2	
		40	ASL 14 X 40	1.75	16.0		14.4		12.8	
		45	ASL 14 X 45	1.56	18.0		16.2		14.4	
		50	ASL 14 X 50	1.40	20.0		8.0		16.0	
		55	ASL 14 X 55	1.27	22.0		19.8		17.6	
		60	ASL 14 X 60	1.17	24.0		21.6		19.2	
		65	ASL 14 X 65	1.08	26.0		23.4		20.8	
		70	ASL 14 X 70	1.00	28.0		25.2		22.4	
		75	ASL 14 X 75	0.93	30.0		27.0		24.0	
		80	ASL 14 X 80	0.87	32.0		28.8		25.6	
		90	ASL 14 X 90	0.77	36.0		32.4		28.8	

Raymond®	LIGHT DUTY DIE SPRINGS			JIS B 5012 Series						Blue
				LOAD DEFLECTION TABLE						
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	For Maximum Operating Def. (40%of free length)		For Long Life (36% of free length)		For Optimal Life (32% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
		25	ASL 16 X 25	3.50	10.0		9.0		8.0	
		30	ASL 16 X 30	2.92	12.0		10.8		9.6	
		35	ASL 16 X 35	2.50	14.0		12.6		11.2	
		40	ASL 16 X 40	2.19	16.0		14.4		12.8	
		45	ASL 16 X 45	1.95	18.0		16.2		14.4	
		50	ASL 16 X 50	1.75	20.0		18.0		16.0	
16	8	55	ASL 16 X 55	1.60	22.0	35	19.8	32	17.6	28
		60	ASL 16 X 60	1.46	24.0	(343)	21.6	(314)	19.2	(275)
		65	ASL 16 X 65	1.35	26.0		23.4		20.8	
		70	ASL 16 X 70	1.25	28.0		25.0		22.4	
		75	ASL 16 X 75	1.17	30.0		27.0		24.0	
		80	ASL 16 X 80	1.10	32.0		28.8		25.6	
		90	ASL 16 X 90	0.98	36.0		32.4		28.8	
		100	ASL 16 X 100	0.88	40.0		36.0		32.0	
		25	ASL 18 X 25	4.30	10.0		9.0		8.0	
		30	ASL 18 X 30	3.58	12.0		10.8		9.6	
		35	ASL 18 X 35	3.07	14.0		12.6		11.2	
		40	ASL 18 X 40	2.69	16.0		14.4		12.8	
		45	ASL 18 X 45	2.39	18.0		16.2		14.4	
		50	ASL 18 X 50	2.15	20.0		18.0		16.0	
18	9	55	ASL 18 X 55	1.96	22.0	43	19.8	39	17.6	34
		60	ASL 18 X 60	1.79	24.0	(422)	21.6	(382)	19.2	(333)
		65	ASL 18 X 65	1.66	26.0		23.4		20.8	
		70	ASL 18 X 70	1.54	28.0		25.2		22.4	
		75	ASL 18 X 75	1.44	30.0		27.0		24.0	
		80	ASL 18 X 80	1.35	32.0		28.8		25.6	
		90	ASL 18 X 90	1.20	36.0		32.4		28.8	
		100	ASL 18 X 100	1.07	40.0		36.0		32.0	
		25	ASL 20 X 25	5.40	10.0		9.0		8.0	
		30	ASL 20 X 30	4.50	12.0		10.8		9.6	
		35	ASL 20 X 35	3.86	14.0		12.6		11.2	
		40	ASL 20 X 40	3.38	16.0		14.4		12.8	
		45	ASL 20 X 45	3.00	18.0		16.2		14.4	
		50	ASL 20 X 50	2.70	20.0		18.0		16.0	
20	10	55	ASL 20 X 55	2.45	22.0	54	19.8	49	17.6	43
		60	ASL 20 X 60	2.25	24.0	(530)	21.6	(481)	19.2	(422)
		65	ASL 20 X 65	2.08	26.0		23.4		20.8	
		70	ASL 20 X 70	1.93	28.0		25.2		22.4	
		75	ASL 20 X 75	1.80	30.0		27.0		24.0	
		80	ASL 20 X 80	1.69	32.0		28.8		25.6	
		90	ASL 20 X 90	1.50	36.0		32.4		28.8	
		100	ASL 20 X 100	1.35	40.0		36.0		32.0	
		125	ASL 20 X 125	1.08	50.0		45.0		40.0	
		150	ASL 20 X 150	0.90	60.0		54.0		48.0	
		25	ASL 22 X 25	6.70	10.0		9.0		8.0	
		30	ASL 22 X 30	5.60	12.0		10.8		9.6	
		35	ASL 22 X 35	4.80	14.0		12.6		11.2	
		40	ASL 22 X 40	4.20	16.0		14.4		12.8	
		45	ASL 22 X 45	3.72	18.0		16.2		14.4	
		50	ASL 22 X 50	3.35	20.0		18.0		16.0	
		55	ASL 22 X 55	3.05	22.0		19.8		17.6	
22	11	60	ASL 22 X 60	2.80	24.0	67	21.6	60	19.2	54
		65	ASL 22 X 65	2.58	26.0	(657)	23.4	(588)	20.8	(530)
		70	ASL 22 X 70	2.40	28.0		25.2		22.4	
		75	ASL 22 X 75	2.23	30.0		27.0		24.0	
		80	ASL 22 X 80	2.10	32.0		28.8		25.6	
		90	ASL 22 X 90	1.86	36.0		32.4		28.8	
		100	ASL 22 X 100	1.68	40.0		36.0		32.0	
		125	ASL 22 X 125	1.34	50.0		45.0		40.0	
		150	ASL 22 X 150	1.12	60.0		54.0		48.0	

Raymond®	LIGHT DUTY DIE SPRINGS			JIS B 5012 Series						Blue
				LOAD DEFLECTION TABLE						
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	For Maximum Operating Def. (40%of free length)		For Long Life (36% of free length)		For Optimal Life (32% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
25	12.5	25	ASL 25 X 25	8.40	10.0	84 (824)	9.0	76 (745)	8.0	67 (657)
		30	ASL 25 X 30	7.00	12.0		10.8		9.6	
		35	ASL 25 X 35	6.00	14.0		12.6		11.2	
		40	ASL 25 X 40	5.25	16.0		14.4		12.8	
		45	ASL 25 X 45	4.67	18.0		16.2		14.4	
		50	ASL 25 X 50	4.20	20.0		18.0		16.0	
		55	ASL 25 X 55	3.82	22.0		19.8		17.6	
		60	ASL 25 X 60	3.50	24.0		21.6		19.2	
		65	ASL 25 X 65	3.23	26.0		23.4		20.8	
		70	ASL 25 X 70	3.00	28.0		25.2		22.4	
		75	ASL 25 X 75	2.80	30.0		27.0		24.0	
		80	ASL 25 X 80	2.63	32.0		28.8		25.6	
		90	ASL 25 X 90	2.33	36.0		32.4		28.8	
		100	ASL 25 X 100	2.10	40.0		36.0		32.0	
		125	ASL 25 X 125	1.68	50.0		45.0		40.0	
		150	ASL 25 X 150	1.40	60.0		54.0		48.0	
		175	ASL 25 X 175	1.20	70.0		63.0		56.0	
27	13.5	25	ASL 27 X 25	10.00	10.0	100 (981)	9.0	90 (883)	8.0	80 (795)
		30	ASL 27 X 30	8.33	12.0		10.8		9.6	
		35	ASL 27 X 35	7.14	14.0		12.6		11.2	
		40	ASL 27 X 40	6.25	16.0		14.4		12.8	
		45	ASL 27 X 45	5.56	18.0		16.2		14.4	
		50	ASL 27 X 50	5.00	20.0		18.0		16.0	
		55	ASL 27 X 55	4.55	22.0		19.8		17.6	
		60	ASL 27 X 60	4.17	24.0		21.6		19.2	
		65	ASL 27 X 65	3.85	26.0		23.4		20.8	
		70	ASL 27 X 70	3.57	28.0		25.2		22.4	
		75	ASL 27 X 75	3.33	30.0		27.0		24.0	
		80	ASL 27 X 80	3.13	32.0		28.8		25.6	
		90	ASL 27 X 90	2.78	36.0		32.4		28.8	
		100	ASL 27 X 100	2.50	40.0		36.0		32.0	
		125	ASL 27 X 125	2.00	50.0		45.0		40.0	
		150	ASL 27 X 150	1.67	60.0		54.0		48.0	
		175	ASL 27 X 175	1.43	70.0		63.0		56.0	
30	15	25	ASL 30 X 25	12.11	10.0	121 (1,187)	9.0	109 (1,069)	8.0	97 (951)
		30	ASL 30 X 30	10.08	12.0		10.8		9.6	
		35	ASL 30 X 35	8.65	14.0		12.6		11.2	
		40	ASL 30 X 40	7.56	16.0		14.4		12.8	
		45	ASL 30 X 45	6.73	18.0		16.2		14.4	
		50	ASL 30 X 50	6.05	20.0		18.0		16.0	
		55	ASL 30 X 55	5.50	22.0		19.8		17.6	
		60	ASL 30 X 60	5.04	24.0		21.6		19.2	
		65	ASL 30 X 65	4.65	26.0		23.4		20.8	
		70	ASL 30 X 70	4.32	28.0		25.2		22.4	
		75	ASL 30 X 75	4.03	30.0		27.0		24.0	
		80	ASL 30 X 80	3.78	32.0		28.8		25.6	
		90	ASL 30 X 90	3.36	36.0		32.4		28.8	
		100	ASL 30 X 100	3.02	40.0		36.0		32.0	
		125	ASL 30 X 125	2.42	50.0		45.0		40.0	
		150	ASL 30 X 150	2.01	60.0		54.0		48.0	
		175	ASL 30 X 175	1.72	70.0		63.0		56.0	
		200	ASL 30 X 200	1.51	80.0		72.0		64.0	

Raymond®	LIGHT DUTY DIE SPRINGS			JIS B 5012 Series						Blue
				LOAD DEFLECTION TABLE						
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	For Maximum Operating Def. (40%of free length)		For Long Life (36% of free length)		For Optimal Life (32% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
35	17.5	40	ASL 35 X 40	10.31	16.0	165 (1,618)	14.4	149 (1,461)	12.8	132 (1,295)
		45	ASL 35 X 45	9.17	18.0		16.2		14.4	
		50	ASL 35 X 50	8.25	20.0		18.0		16.0	
		55	ASL 35 X 55	7.50	22.0		19.8		17.6	
		60	ASL 35 X 60	6.87	24.0		21.6		19.2	
		65	ASL 35 X 65	6.35	26.0		23.4		20.8	
		70	ASL 35 X 70	5.89	28.0		25.2		22.4	
		75	ASL 35 X 75	5.50	30.0		27.0		24.0	
		80	ASL 35 X 80	5.15	32.0		28.8		25.6	
		90	ASL 35 X 90	4.58	36.0		32.4		28.8	
		100	ASL 35 X 100	4.12	40.0		36.0		32.0	
		125	ASL 35 X 125	3.30	50.0		45.0		40.0	
		150	ASL 35 X 150	2.75	60.0		54.0		48.0	
		175	ASL 35 X 175	2.35	70.0		63.0		56.0	
		200	ASL 35 X 200	2.06	80.0		72.0		64.0	
40	20	40	ASL 40 X 40	13.50	16.0	216 (2,120)	14.4	194 (1,903)	12.8	173 (1,697)
		50	ASL 40 X 50	10.80	20.0		18.0		16.0	
		60	ASL 40 X 60	9.00	24.0		21.6		19.2	
		70	ASL 40 X 70	7.71	28.0		25.2		22.4	
		80	ASL 40 X 80	6.75	32.0		28.8		25.6	
		90	ASL 40 X 90	6.00	36.0		32.4		28.8	
		100	ASL 40 X 100	5.40	40.0		36.0		32.0	
		125	ASL 40 X 125	4.32	50.0		45.0		40.0	
		150	ASL 40 X 150	3.60	60.0		54.0		48.0	
		175	ASL 40 X 175	3.08	70.0		63.0		56.0	
		200	ASL 40 X 200	2.70	80.0		72.0		64.0	
		250	ASL 40 X 250	2.16	100.0		90.0		80.0	
50	25	50	ASL 50 X 50	16.89	20.0	338 (3,310)	18.0	304 (2,980)	16.0	270 (2,650)
		60	ASL 50 X 60	14.08	24.0		21.6		19.2	
		70	ASL 50 X 70	12.07	28.0		25.2		22.4	
		80	ASL 50 X 80	10.56	32.0		28.8		25.6	
		90	ASL 50 X 90	9.38	36.0		32.4		28.8	
		100	ASL 50 X 100	8.45	40.0		36.0		32.0	
		125	ASL 50 X 125	6.76	50.0		45.0		40.0	
		150	ASL 50 X 150	5.63	60.0		54.0		48.0	
		175	ASL 50 X 175	4.82	70.0		63.0		56.0	
		200	ASL 50 X 200	4.22	80.0		72.0		64.0	
		250	ASL 50 X 250	3.38	100.0		90.0		80.0	
		300	ASL 50 X 300	2.81	120.0		108.0		96.0	
		350	ASL 50 X 350	2.41	140.0		126.0		112.0	
		400	ASL 50 X 400	2.11	160.0		144.0		128.0	
		450	ASL 50 X 450	1.88	180.0		162.0		144.0	
		500	ASL 50 X 500	1.69	200.0		180.0		160.0	
60	30	60	ASL 60 X 60	20.25	24.0	486 (4,770)	21.6	437 (4,290)	19.2	389 (3,810)
		70	ASL 60 X 70	17.35	28.0		25.2		22.4	
		80	ASL 60 X 80	15.18	32.0		28.8		25.6	
		90	ASL 60 X 90	13.50	36.0		32.4		28.8	
		100	ASL 60 X 100	12.15	40.0		36.0		32.0	
		125	ASL 60 X 125	9.72	50.0		45.0		40.0	
		150	ASL 60 X 150	8.10	60.0		54.0		48.0	
		175	ASL 60 X 175	6.94	70.0		63.0		56.0	
		200	ASL 60 X 200	6.07	80.0		72.0		64.0	
		250	ASL 60 X 250	4.86	100.0		90.0		80.0	
		300	ASL 60 X 300	4.05	120.0		108.0		96.0	
		350	ASL 60 X 350	3.47	140.0		126.0		112.0	
		400	ASL 60 X 400	3.04	160.0		144.0		128.0	
		450	ASL 60 X 450	2.70	180.0		162.0		144.0	
		500	ASL 60 X 500	2.43	200.0		180.0		160.0	

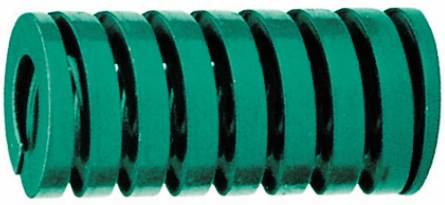


Raymond®	MEDIUM DUTY DIE SPRINGS			JIS B 5012 Series						Red
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (32%of free length)		For Long Life (29% of free length)		For Optimal Life (26% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
8	4	10	ASM 8 X 10	4.34	3.2	14 (137.3)	2.9	12.5 (122.5)	2.6	11 (107.9)
		15	ASM 8 X 15	2.89	4.8		4.3		3.8	
		20	ASM 8 X 20	2.17	6.4		5.8		5.1	
		25	ASM 8 X 25	1.74	8.0		7.2		6.4	
		30	ASM 8 X 30	1.45	9.6		8.6		7.7	
		35	ASM 8 X 35	1.24	11.2		10.1		9.0	
		40	ASM 8 X 40	1.09	12.8		11.5		10.2	
		45	ASM 8 X 45	0.97	14.4		13.0		11.5	
		50	ASM 8 X 50	0.87	16.0		14.4		12.8	
		55	ASM 8 X 55	0.79	17.6		15.8		14.1	
		60	ASM 8 X 60	0.72	19.2		17.3		15.4	
10	5	20	ASM 10 X 20	3.13	6.4	20 (196.1)	5.8	18 (176.5)	5.1	16 (156.9)
		25	ASM 10 X 25	2.50	8.0		7.2		6.4	
		30	ASM 10 X 30	2.08	9.6		8.6		7.7	
		35	ASM 10 X 35	1.78	11.2		10.1		9.0	
		40	ASM 10 X 40	1.56	12.8		11.5		10.2	
		45	ASM 10 X 45	1.38	14.4		13.0		11.5	
		50	ASM 10 X 50	1.25	16.0		14.4		12.8	
		55	ASM 10 X 55	1.13	17.6		15.8		14.1	
		60	ASM 10 X 60	1.04	19.2		17.3		15.4	
		65	ASM 10 X 65	0.96	20.8		18.7		16.6	
		70	ASM 10 X 70	0.89	22.4		20.2		17.9	
		75	ASM 10 X 75	0.83	24.0		21.6		19.2	
		80	ASM 10 X 80	0.78	25.6		23.0		20.5	
12	6	20	ASM 12 X 20	4.53	6.4	29 (284)	5.8	26 (255)	5.1	
		25	ASM 12 X 25	3.62	8.0		7.2		6.4	
		30	ASM 12 X 30	3.02	9.6		8.6		7.7	
		35	ASM 12 X 35	2.58	11.2		10.1		9.0	
		40	ASM 12 X 40	2.27	12.8		11.5		10.2	
		45	ASM 12 X 45	2.01	14.4		13.0		11.5	
		50	ASM 12 X 50	1.81	16.0		14.4		12.8	
		55	ASM 12 X 55	1.64	17.6		15.8		14.1	
		60	ASM 12 X 60	1.51	19.2		17.3		15.4	
		65	ASM 12 X 65	1.39	20.8		18.7		16.6	
		70	ASM 12 X 70	1.29	22.4		20.2		17.9	
		75	ASM 12 X 75	1.20	24.0		21.6		19.2	
		80	ASM 12 X 80	1.13	25.6		23.0		20.5	
14	7	25	ASM 14 X 25	4.87	8.0	39 (383)	7.2	35 (343)	6.4	31 (304)
		30	ASM 14 X 30	4.06	9.6		8.6		7.7	
		35	ASM 14 X 35	3.48	11.2		10.1		9.0	
		40	ASM 14 X 40	3.04	12.8		11.5		10.2	
		45	ASM 14 X 45	2.70	14.4		13.0		11.5	
		50	ASM 14 X 50	2.43	16.0		14.4		12.8	
		55	ASM 14 X 55	2.21	17.6		15.8		14.1	
		60	ASM 14 X 60	2.03	19.2		17.3		15.4	
		65	ASM 14 X 65	1.87	20.8		18.7		16.6	
		70	ASM 14 X 70	1.74	22.4		20.2		17.9	
		75	ASM 14 X 75	1.62	24.0		21.6		19.2	
		80	ASM 14 X 80	1.52	25.6		23.0		20.5	
		90	ASM 14 X 90	1.35	28.8		25.9		23.0	

Raymond®	MEDIUM DUTY DIE SPRINGS			JIS B 5012 Series						Red
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
				For Maximum Operating Def. (32%of free length)		For Long Life (29% of free length)		For Optimal Life (26% of free length)	
				Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C							
16	8	25	ASM 16 X 25	6.39	8.0	51 (500)	7.2	46 (451)	6.4	41 (402)
		30	ASM 16 X 30	5.32	9.6		8.6		7.7	
		35	ASM 16 X 35	4.65	11.2		10.1		9.0	
		40	ASM 16 X 40	3.98	12.8		11.5		10.2	
		45	ASM 16 X 45	3.54	14.4		13.0		11.5	
		50	ASM 16 X 50	3.18	16.0		14.4		12.8	
		55	ASM 16 X 55	2.89	17.6		15.8		14.1	
		60	ASM 16 X 60	2.65	19.2		17.3		15.4	
		65	ASM 16 X 65	2.45	20.8		18.7		16.6	
		70	ASM 16 X 70	2.27	22.4		20.2		17.9	
		75	ASM 16 X 75	2.11	24.0		21.6		19.2	
		80	ASM 16 X 80	1.99	25.6		23.0		20.5	
		90	ASM 16 X 90	1.77	28.8		25.9		23.0	
		100	ASM 16 X 100	1.59	32.0		28.8		25.6	
18	9	25	ASM 18 X 25	8.12	8.0	65 (637)	7.2	58 (569)	6.4	52 (510)
		30	ASM 18 X 30	6.77	9.6		8.6		7.7	
		35	ASM 18 X 35	5.80	11.2		10.1		9.0	
		40	ASM 18 X 40	5.07	12.8		11.5		10.2	
		45	ASM 18 X 45	4.51	14.4		13.0		11.5	
		50	ASM 18 X 50	4.06	16.0		14.4		12.8	
		55	ASM 18 X 55	3.69	17.6		15.8		14.1	
		60	ASM 18 X 60	3.38	19.2		17.3		15.4	
		65	ASM 18 X 65	3.12	20.8		18.7		16.6	
		70	ASM 18 X 70	2.90	22.4		20.2		17.9	
		75	ASM 18 X 75	2.70	24.0		21.6		19.2	
		80	ASM 18 X 80	2.53	25.6		23.0		20.5	
		90	ASM 18 X 90	2.25	28.8		25.9		23.0	
		100	ASM 18 X 100	2.02	32.0		28.8		25.6	
20	10	25	ASM 20 X 25	10.00	8.0	80 (785)	7.2	72 (706)	6.4	64 (628)
		30	ASM 20 X 30	8.33	9.6		8.6		7.7	
		35	ASM 20 X 35	7.14	11.2		10.1		9.0	
		40	ASM 20 X 40	6.25	12.8		11.5		10.2	
		45	ASM 20 X 45	5.55	14.4		13.0		11.5	
		50	ASM 20 X 50	5.00	16.0		14.4		12.8	
		55	ASM 20 X 55	4.54	17.6		15.8		14.1	
		60	ASM 20 X 60	4.16	19.2		17.3		15.4	
		65	ASM 20 X 65	3.84	20.8		18.7		16.6	
		70	ASM 20 X 70	3.57	22.4		20.2		17.9	
		75	ASM 20 X 75	3.33	24.0		21.6		19.2	
		80	ASM 20 X 80	3.12	25.6		23.0		20.5	
		90	ASM 20 X 90	2.77	28.8		25.9		23.0	
		100	ASM 20 X 100	2.50	32.0		28.8		25.6	
		125	ASM 20 X 125	2.00	40.0		36.0		32.0	
		150	ASM 20 X 150	1.67	48.0		43.2		38.4	
22	11	25	ASM 22 X 25	12.13	8.0	97 (951)	7.2	87 (853)	6.4	78 (765)
		30	ASM 22 X 30	10.10	9.6		8.6		7.7	
		35	ASM 22 X 35	8.65	11.2		10.1		9.0	
		40	ASM 22 X 40	7.57	12.8		11.5		10.2	
		45	ASM 22 X 45	6.74	14.4		13.0		11.5	
		50	ASM 22 X 50	6.06	16.0		14.4		12.8	
		55	ASM 22 X 55	5.50	17.6		15.8		14.1	
		60	ASM 22 X 60	5.05	19.2		17.3		15.4	
		65	ASM 22 X 65	4.66	20.8		18.7		16.6	
		70	ASM 22 X 70	4.33	22.4		20.2		17.0	
		75	ASM 22 X 75	4.04	24.0		21.6		19.2	
		80	ASM 22 X 80	3.78	25.6		23.0		20.5	
		90	ASM 22 X 90	3.36	28.8		25.9		23.0	
		100	ASM 22 X 100	3.03	32.0		28.8		25.6	
		125	ASM 22 X 125	2.42	40.0		36.0		32.0	
		150	ASM 22 X 150	2.01	48.0		43.2		38.4	

Raymond®	MEDIUM DUTY DIE SPRINGS			JIS B 5012 Series						Red
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (32%of free length)		For Long Life (29% of free length)		For Optimal Life (26% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
25	12.5	25	ASM 25 X 25	15.63	8.0	125 (1,226)	7.2	112 (1,098)	6.4	100 (981)
		30	ASM 25 X 30	13.02	9.6		8.6		7.7	
		35	ASM 25 X 35	11.20	11.2		10.0		9.0	
		40	ASM 25 X 40	9.76	12.8		11.5		10.2	
		45	ASM 25 X 45	8.68	14.4		13.0		11.5	
		50	ASM 25 X 50	7.81	16.0		14.4		12.8	
		55	ASM 25 X 55	7.10	17.6		15.8		14.1	
		60	ASM 25 X 60	6.51	19.2		17.3		15.4	
		65	ASM 25 X 65	6.00	20.8		18.7		16.6	
		70	ASM 25 X 70	5.58	22.4		20.2		17.9	
		75	ASM 25 X 75	5.21	24.0		21.6		19.2	
		80	ASM 25 X 80	4.88	25.6		23.0		20.5	
		90	ASM 25 X 90	4.34	28.8		25.9		23.0	
		100	ASM 25 X 100	3.90	32.0		28.8		25.6	
		125	ASM 25 X 125	3.12	40.0		36.0		32.0	
		150	ASM 25 X 150	2.60	48.0		43.2		38.4	
		175	ASM 25 X 175	2.23	56.0		50.4		44.8	
27	13.5	25	ASM 27 X 25	18.25	8.0	146 (1,432)	7.2	131 (1,285)	6.4	117 (1,147)
		30	ASM 27 X 30	15.20	9.6		8.6		7.7	
		35	ASM 27 X 35	13.04	11.2		10.0		9.0	
		40	ASM 27 X 40	11.40	12.8		11.5		10.2	
		45	ASM 27 X 45	10.14	14.4		13.0		11.5	
		50	ASM 27 X 50	9.12	16.0		14.4		12.8	
		55	ASM 27 X 55	8.30	17.6		15.8		14.1	
		60	ASM 27 X 60	7.60	19.2		17.3		15.4	
		65	ASM 27 X 65	7.00	20.8		18.7		16.6	
		70	ASM 27 X 70	6.51	22.4		20.2		17.9	
		75	ASM 27 X 75	6.08	24.0		21.6		19.2	
		80	ASM 27 X 80	5.70	25.6		23.0		20.5	
		90	ASM 27 X 90	5.06	28.8		25.9		23.0	
		100	ASM 27 X 100	4.56	32.0		28.8		25.7	
		125	ASM 27 X 125	3.65	40.0		36.0		32.0	
		150	ASM 27 X 150	3.04	48.0		43.2		38.4	
		175	ASM 27 X 175	2.61	56.0		50.4		44.8	
30	15	25	ASM 30 X 25	22.50	8.0	180 (1,765)	7.2	161 (1,579)	6.4	144 (1,412)
		30	ASM 30 X 30	18.75	9.6		8.6		7.7	
		35	ASM 30 X 35	16.10	11.2		10.0		9.0	
		40	ASM 30 X 40	14.06	12.8		11.5		10.2	
		45	ASM 30 X 45	12.50	14.4		13.0		11.5	
		50	ASM 30 X 50	11.25	16.0		14.4		12.8	
		55	ASM 30 X 55	10.23	17.6		15.8		14.1	
		60	ASM 30 X 60	9.37	19.2		17.3		15.4	
		65	ASM 30 X 65	8.65	20.8		18.7		16.6	
		70	ASM 30 X 70	8.03	22.4		20.2		17.9	
		75	ASM 30 X 75	7.50	24.0		21.6		19.2	
		80	ASM 30 X 80	7.03	25.6		23.0		20.5	
		90	ASM 30 X 90	6.25	28.8		25.9		23.0	
		100	ASM 30 X 100	5.63	32.0		28.8		25.6	
		125	ASM 30 X 125	4.50	40.0		36.0		32.0	
		150	ASM 30 X 150	3.75	48.0		43.2		38.4	
		175	ASM 30 X 175	3.21	56.0		50.4		44.8	
		200	ASM 30 X 200	2.81	64.0		57.6		51.2	

Raymond®	MEDIUM DUTY DIE SPRINGS			JIS B 5012 Series						Red
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
				For Maximum Operating Def. (32%of free length)		For Long Life (29% of free length)		For Optimal Life (26% of free length)		
				Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	
A	B	C								
35	17.5	40	ASM 35 X 40	19.14	12.8	245 (2,400)	11.5	220 (2,160)	10.2	195 (1,912)
		45	ASM 35 X 45	17.01	14.4		13.0		11.5	
		50	ASM 35 X 50	15.31	16.0		14.4		12.8	
		55	ASM 35 X 55	13.92	17.6		15.8		14.0	
		60	ASM 35 X 60	12.76	19.2		17.3		15.4	
		65	ASM 35 X 65	11.77	20.8		18.7		16.6	
		70	ASM 35 X 70	10.93	22.4		20.2		17.9	
		75	ASM 35 X 75	10.20	24.0		21.6		19.2	
		80	ASM 35 X 80	9.57	25.6		23.0		20.5	
		90	ASM 35 X 90	8.50	28.8		25.9		23.0	
		100	ASM 35 X 100	7.65	32.0		28.8		25.6	
		125	ASM 35 X 125	6.12	40.0		36.0		32.0	
		150	ASM 35 X 150	5.10	48.0		43.2		38.4	
		175	ASM 35 X 175	4.37	56.0		50.4		44.8	
		200	ASM 35 X 200	3.82	64.0		57.6		51.2	
40	20	40	ASM 40 X 40	25.02	12.8	320 (3,140)	11.5	288 (2,820)	10.2	256 (2,510)
		50	ASM 40 X 50	20.00	16.0		14.4		12.8	
		60	ASM 40 X 60	16.60	19.2		17.3		15.4	
		70	ASM 40 X 70	14.28	22.4		20.2		17.9	
		80	ASM 40 X 80	12.50	25.6		23.0		20.5	
		90	ASM 40 X 90	11.11	28.8		25.9		23.0	
		100	ASM 40 X 100	10.00	32.0		28.8		25.6	
		125	ASM 40 X 125	8.00	40.0		36.0		32.0	
		150	ASM 40 X 150	6.66	48.0		43.2		38.4	
		175	ASM 40 X 175	5.71	56.0		50.4		44.8	
		200	ASM 40 X 200	5.00	64.0		57.6		51.2	
		250	ASM 40 X 250	4.00	80.0		72.0		64.0	
50	25	50	ASM 50 X 50	31.25	16.0	500 (4,900)	14.4	450 (4,410)	12.8	400 (3,920)
		60	ASM 50 X 60	26.04	19.2		17.3		15.4	
		70	ASM 50 X 70	22.32	22.4		20.2		17.9	
		80	ASM 50 X 80	19.53	25.6		23.0		20.5	
		90	ASM 50 X 90	17.36	28.8		25.9		23.0	
		100	ASM 50 X 100	15.62	32.0		28.8		25.6	
		125	ASM 50 X 125	12.50	40.0		36.0		32.0	
		150	ASM 50 X 150	10.41	48.0		43.2		38.4	
		175	ASM 50 X 175	8.92	56.0		50.4		44.8	
		200	ASM 50 X 200	7.81	64.0		57.6		51.2	
		250	ASM 50 X 250	6.25	80.0		72.0		64.0	
		300	ASM 50 X 300	5.20	96.0		86.4		76.8	
60	30	60	ASM 60 X 60	37.40	19.2	720 (7,060)	17.3	648 (6,350)	15.4	575 (5,640)
		70	ASM 60 X 70	32.10	22.4		20.2		17.9	
		80	ASM 60 X 80	28.12	25.6		23.0		20.5	
		90	ASM 60 X 90	25.00	28.8		25.9		23.0	
		100	ASM 60 X 100	22.50	32.0		28.8		25.6	
		125	ASM 60 X 125	18.00	40.0		36.0		32.0	
		150	ASM 60 X 150	15.00	48.0		43.2		38.4	
		175	ASM 60 X 175	12.85	56.0		50.4		44.8	
		200	ASM 60 X 200	11.25	64.0		57.6		51.2	
		250	ASM 60 X 250	9.00	80.0		72.0		64.0	
		300	ASM 60 X 300	7.50	96.0		86.4		76.8	

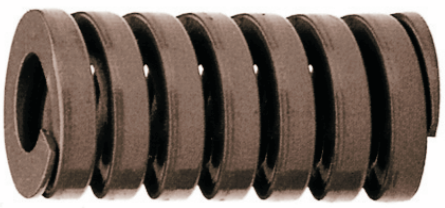


Raymond® HEAVY DUTY DIE SPRINGS				JIS B 5012 Series						Green
					LOAD DEFLECTION TABLE					
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	For Maximum Operating Def. (24%of free length)		For Long Life (22% of free length)		For Optimal Life (19% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
8	4	10	ASH 8 X 10	8.80	2.4	21 (206)	2.2	19 (186.3)	1.9	17 (166.7)
		15	ASH 8 X 15	5.86	3.6		3.2		2.9	
		20	ASH 8 X 20	4.40	4.8		4.3		3.8	
		25	ASH 8 X 25	3.52	6.0		5.4		4.8	
		30	ASH 8 X 30	2.93	7.2		6.5		5.8	
		35	ASH 8 X 35	2.51	8.4		7.5		6.7	
		40	ASH 8 X 40	2.20	9.6		8.6		7.7	
		45	ASH 8 X 45	1.95	10.8		9.7		8.6	
		50	ASH 8 X 50	1.76	12.0		10.8		9.6	
		55	ASH 8 X 55	1.60	13.2		11.8		10.6	
		60	ASH 8 X 60	1.47	14.4		13.0		11.5	
10	5	20	ASH 10 X 20	6.25	4.8	30 (294)	4.3	27 (265)	3.8	24 (235)
		25	ASH 10 X 25	5.00	6.0		5.4		4.8	
		30	ASH 10 X 30	4.16	7.2		6.5		5.8	
		35	ASH 10 X 35	3.57	8.4		7.5		6.7	
		40	ASH 10 X 40	3.15	9.6		8.6		7.7	
		45	ASH 10 X 45	2.77	10.8		9.7		8.6	
		50	ASH 10 X 50	2.50	12.0		10.8		9.6	
		55	ASH 10 X 55	2.27	13.2		11.8		10.6	
		60	ASH 10 X 60	2.08	14.4		13.0		11.5	
		65	ASH 10 X 65	1.92	15.6		14.0		12.5	
		70	ASH 10 X 70	1.79	16.8		15.1		13.4	
		75	ASH 10 X 75	1.67	18.0		16.2		14.4	
		80	ASH 10 X 80	1.56	19.2		17.3		15.4	
12	6	20	ASH 12 X 20	8.90	4.8	43 (422)	4.3	38 (373)	3.8	34 (333)
		25	ASH 12 X 25	7.10	6.0		5.4		4.8	
		30	ASH 12 X 30	5.97	7.2		6.5		5.8	
		35	ASH 12 X 35	5.11	8.4		7.5		6.7	
		40	ASH 12 X 40	4.47	9.6		8.6		7.7	
		45	ASH 12 X 45	3.98	10.8		9.7		8.6	
		50	ASH 12 X 50	3.58	12.0		10.8		9.6	
		55	ASH 12 X 55	3.25	13.2		11.8		10.6	
		60	ASH 12 X 60	2.98	14.4		13.0		11.5	
		65	ASH 12 X 65	2.74	15.6		14.0		12.5	
		70	ASH 12 X 70	2.54	16.8		15.1		13.4	
		75	ASH 12 X 75	2.37	18.0		16.2		14.4	
		80	ASH 12 X 80	2.21	19.2		17.3		15.4	
14	7	25	ASH 14 X 25	9.83	6.0	59 (579)	5.4	53 (520)	4.8	47 (461)
		30	ASH 14 X 30	8.19	7.2		6.5		5.8	
		35	ASH 14 X 35	7.02	8.4		7.5		6.7	
		40	ASH 14 X 40	6.14	9.6		8.6		7.7	
		45	ASH 14 X 45	5.46	10.8		9.7		8.6	
		50	ASH 14 X 50	4.91	12.0		10.8		9.6	
		55	ASH 14 X 55	4.46	13.2		11.8		10.6	
		60	ASH 14 X 60	4.09	14.4		13.0		11.5	
		65	ASH 14 X 65	3.78	15.6		14.0		12.5	
		70	ASH 14 X 70	3.51	16.8		15.1		13.4	
		75	ASH 14 X 75	3.27	18.0		16.2		14.4	
		80	ASH 14 X 80	3.07	19.2		17.3		15.4	
		90	ASH 14 X 90	2.72	21.6		19.4		17.3	

Raymond®	HEAVY DUTY DIE SPRINGS			JIS B 5012 Series						Green
					LOAD DEFLECTION TABLE					
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	For Maximum Operating Def. (24%of free length)		For Long Life (22% of free length)		For Optimal Life (19% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
16	8	25	ASH 16 X 25	12.83	6.0	77 (755)	5.4	69 (677)	4.8	62 (608)
		30	ASH 16 X 30	10.69	7.2		6.5		5.8	
		35	ASH 16 X 35	9.16	8.4		7.5		6.7	
		40	ASH 16 X 40	8.02	9.6		8.6		7.7	
		45	ASH 16 X 45	7.12	10.8		9.7		8.6	
		50	ASH 16 X 50	6.41	12.0		10.8		9.6	
		55	ASH 16 X 55	5.83	13.2		11.8		10.6	
		60	ASH 16 X 60	5.34	14.4		13.0		11.5	
		65	ASH 16 X 65	4.93	15.6		14.0		12.5	
		70	ASH 16 X 70	4.58	16.8		15.1		13.4	
		75	ASH 16 X 75	4.28	18.0		16.2		14.4	
		80	ASH 16 X 80	4.01	19.2		17.3		15.4	
		90	ASH 16 X 90	3.57	21.6		19.4		17.3	
		100	ASH 16 X 100	3.21	24.0		21.6		19.2	
18	9	25	ASH 18 X 25	16.16	6.0	97 (951)	5.4	87 (853)	4.8	78 (765)
		30	ASH 18 X 30	13.57	7.2		6.5		5.8	
		35	ASH 18 X 35	11.54	8.4		7.5		6.7	
		40	ASH 18 X 40	10.10	9.6		8.6		7.7	
		45	ASH 18 X 45	8.98	10.8		9.7		8.6	
		50	ASH 18 X 50	8.08	12.0		10.8		9.6	
		55	ASH 18 X 55	7.34	13.2		11.8		10.6	
		60	ASH 18 X 60	6.73	14.4		13.0		11.5	
		65	ASH 18 X 65	6.21	15.6		14.0		12.5	
		70	ASH 18 X 70	5.77	16.8		15.1		13.4	
		75	ASH 18 X 75	5.39	18.0		16.2		14.4	
		80	ASH 18 X 80	5.05	19.2		17.3		15.4	
		90	ASH 18 X 90	4.50	21.6		19.4		17.3	
		100	ASH 18 X 100	4.04	24.0		21.6		19.2	
20	10	25	ASH 20 X 25	20.00	6.0	120 (1,177)	5.4	108 (1,059)	4.8	96 (941)
		30	ASH 20 X 30	16.66	7.2		6.5		5.8	
		35	ASH 20 X 35	14.28	8.4		7.5		6.7	
		40	ASH 20 X 40	12.50	9.6		8.6		7.7	
		45	ASH 20 X 45	11.11	10.8		9.7		8.6	
		50	ASH 20 X 50	10.00	12.0		10.8		9.6	
		55	ASH 20 X 55	9.09	13.2		11.8		10.6	
		60	ASH 20 X 60	8.33	14.4		13.0		11.5	
		65	ASH 20 X 65	7.69	15.6		14.0		12.5	
		70	ASH 20 X 70	7.14	16.8		15.1		13.4	
		75	ASH 20 X 75	6.67	18.0		16.2		14.4	
		80	ASH 20 X 80	6.25	19.2		17.3		15.4	
		90	ASH 20 X 90	5.55	21.6		19.4		17.3	
		100	ASH 20 X 100	5.00	24.0		21.6		19.2	
		125	ASH 20 X 125	4.00	30.0		27.0		24.0	
		150	ASH 20 X 150	3.33	36.0		32.4		28.8	
22	11	25	ASH 22 X 25	24.16	6.0	145 (1,422)	5.40	130 (1,275)	4.8	116 (1,138)
		30	ASH 22 X 30	20.13	7.2		6.50		5.8	
		35	ASH 22 X 35	17.30	8.4		7.50		6.7	
		40	ASH 22 X 40	15.10	9.6		8.60		7.7	
		45	ASH 22 X 45	13.40	10.8		9.70		8.6	
		50	ASH 22 X 50	12.08	12.0		10.80		9.6	
		55	ASH 22 X 55	10.94	13.2		11.90		10.6	
		60	ASH 22 X 60	10.06	14.4		13.00		11.5	
		65	ASH 22 X 65	9.28	15.6		14.00		12.5	
		70	ASH 22 X 70	8.63	16.8		15.10		13.4	
		75	ASH 22 X 75	8.04	18.0		16.20		14.4	
		80	ASH 22 X 80	7.55	19.2		17.30		15.4	
		90	ASH 22 X 90	6.71	21.6		19.40		17.3	
		100	ASH 22 X 100	6.04	24.0		21.60		19.2	
		125	ASH 22 X 125	4.83	30.0		27.00		24.0	
		150	ASH 22 X 150	4.02	36.0		32.40		28.8	

Raymond®	HEAVY DUTY DIE SPRINGS			JIS B 5012 Series						Green
					LOAD DEFLECTION TABLE					
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	For Maximum Operating Def. (24%of free length)		For Long Life (22% of free length)		For Optimal Life (19% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
25	12.5	25	ASH 25 X 25	31.20	6.0	187 (1,834)	5.40	169 (1,657)	4.8	150 (1,471)
		30	ASH 25 X 30	25.97	7.2		6.50		5.8	
		35	ASH 25 X 35	22.38	8.4		7.50		6.7	
		40	ASH 25 X 40	19.47	9.6		8.60		7.7	
		45	ASH 25 X 45	17.40	10.8		9.70		8.6	
		50	ASH 25 X 50	15.58	12.0		10.80		9.6	
		55	ASH 25 X 55	14.20	13.2		11.90		10.6	
		60	ASH 25 X 60	12.98	14.4		13.00		11.5	
		65	ASH 25 X 65	12.00	15.6		14.00		12.5	
		70	ASH 25 X 70	11.13	16.8		15.10		13.4	
		75	ASH 25 X 75	10.40	18.0		16.20		14.4	
		80	ASH 25 X 80	9.73	19.2		17.30		15.4	
		90	ASH 25 X 90	8.65	21.6		19.40		17.3	
		100	ASH 25 X 100	7.79	24.0		21.60		19.2	
		125	ASH 25 X 125	6.23	30.0		27.00		24.0	
		150	ASH 25 X 150	5.20	36.0		32.40		28.8	
		175	ASH 25 X 175	4.46	42.0		37.80		33.6	
27	13.5	25	ASH 27 X 25	36.40	6.0	219 (2,150)	5.40	197 (1,932)	4.8	175 (1,716)
		30	ASH 27 X 30	30.41	7.2		6.50		5.8	
		35	ASH 27 X 35	26.20	8.4		7.50		6.7	
		40	ASH 27 X 40	22.81	9.6		8.60		7.7	
		45	ASH 27 X 45	20.30	10.8		9.70		8.6	
		50	ASH 27 X 50	18.25	12.0		10.80		9.6	
		55	ASH 27 X 55	16.50	13.2		11.90		10.6	
		60	ASH 27 X 60	15.20	14.4		13.00		11.5	
		65	ASH 27 X 65	14.00	15.6		14.00		12.5	
		70	ASH 27 X 70	13.03	16.8		15.10		13.4	
		75	ASH 27 X 75	12.10	18.0		16.20		14.4	
		80	ASH 27 X 80	11.40	19.2		17.30		15.4	
		90	ASH 27 X 90	10.13	21.6		19.40		17.3	
		100	ASH 27 X 100	9.12	24.0		21.60		19.2	
		125	ASH 27 X 125	7.30	30.0		27.00		24.0	
		150	ASH 27 X 150	6.08	36.0		32.40		28.8	
		175	ASH 27 X 175	5.21	42.0		37.80		33.6	
30	15	25	ASH 30 X 25	45.00	6.0	270 (2,550)	5.4	243 (2,380)	4.8	216 (2,120)
		30	ASH 30 X 30	37.50	7.2		6.5		5.8	
		35	ASH 30 X 35	32.26	8.4		7.5		6.7	
		40	ASH 30 X 40	28.12	9.6		8.6		7.7	
		45	ASH 30 X 45	25.00	10.6		9.7		8.6	
		50	ASH 30 X 50	22.50	12.0		10.8		9.6	
		55	ASH 30 X 55	20.40	13.2		11.9		10.6	
		60	ASH 30 X 60	18.75	14.4		13.0		11.5	
		65	ASH 30 X 65	17.30	15.6		14.0		12.5	
		70	ASH 30 X 70	16.07	16.8		15.1		13.4	
		75	ASH 30 X 75	15.00	18.0		16.2		14.4	
		80	ASH 30 X 80	14.06	19.2		17.3		15.4	
		90	ASH 30 X 90	12.50	21.6		19.4		17.3	
		100	ASH 30 X 100	11.25	24.0		21.6		19.2	
		125	ASH 30 X 125	9.00	30.0		27.0		24.0	
		150	ASH 30 X 150	7.50	36.0		32.4		28.8	
		175	ASH 30 X 175	6.42	42.0		37.8		33.6	
		200	ASH 30 X 200	5.62	48.0		43.2		38.4	

Raymond®	HEAVY DUTY DIE SPRINGS			JIS B 5012 Series						Green
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
				For Maximum Operating Def. (24%of free length)		For Long Life (22% of free length)		For Optimal Life (19% of free length)		
				Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	
A	B	C								
35	17.5	40	ASH 35 X 40	38.22	9.6	367 (3,600)	8.6	330 (3,240)	7.7	293 (2,870)
		50	ASH 35 X 50	30.58	12.0		10.8		9.6	
		55	ASH 35 X 55	27.80	13.2		11.9		10.6	
		60	ASH 35 X 60	25.48	14.4		13.0		11.5	
		65	ASH 35 X 65	23.53	15.6		14.0		12.5	
		70	ASH 35 X 70	21.84	16.8		15.1		13.4	
		75	ASH 35 X 75	20.39	18.0		16.2		14.4	
		80	ASH 35 X 80	19.11	19.2		17.3		15.4	
		90	ASH 35 X 90	16.99	21.6		19.4		17.3	
		100	ASH 35 X 100	15.29	24.0		21.6		19.2	
		125	ASH 35 X 125	12.23	30.0		27.0		24.0	
		150	ASH 35 X 150	10.19	36.0		32.4		28.8	
		175	ASH 35 X 175	8.73	42.0		37.8		33.6	
		200	ASH 35 X 200	7.64	48.0		43.2		38.4	
40	20	40	ASH 40 X 40	50.00	9.6	480 (4,170)	9.6	432 (4,240)	7.7	384 (3,770)
		50	ASH 40 X 50	40.00	12.0		12.0		9.6	
		60	ASH 40 X 60	33.33	14.4		14.4		11.5	
		70	ASH 40 X 70	28.57	16.8		16.8		13.4	
		80	ASH 40 X 80	25.00	18.0		19.2		15.4	
		90	ASH 40 X 90	22.22	19.2		21.6		17.3	
		100	ASH 40 X 100	20.00	21.6		24.0		19.2	
		125	ASH 40 X 125	16.00	24.0		30.0		24.0	
		150	ASH 40 X 150	13.33	30.0		36.0		28.8	
		175	ASH 40 X 175	11.42	36.0		42.0		33.6	
		200	ASH 40 X 200	10.00	42.0		48.0		38.4	
		250	ASH 40 X 250	8.00	48.0		60.0		48.0	
50	25	50	ASH 50 X 50	62.50	12.0	750 (7,360)	10.8	675 (6,620)	9.6	600 (5,880)
		60	ASH 50 X 60	52.08	14.4		13.0		11.5	
		70	ASH 50 X 70	44.64	16.8		15.1		13.4	
		80	ASH 50 X 80	39.06	19.2		17.3		15.4	
		90	ASH 50 X 90	34.72	21.6		19.4		17.3	
		100	ASH 50 X 100	31.25	24.0		21.6		19.2	
		125	ASH 50 X 125	25.00	30.0		27.0		24.0	
		150	ASH 50 X 150	20.83	36.0		32.4		28.8	
		175	ASH 50 X 175	17.85	42.0		37.8		33.6	
		200	ASH 50 X 200	15.62	48.0		43.2		38.4	
		250	ASH 50 X 250	12.50	60.0		54.0		48.0	
		300	ASH 50 X 300	10.41	72.0		64.8		57.6	
60	30	60	ASH 60 X 60	75.00	14.4	1,080 (10,590)	13.0	973 (9,540)	11.5	864 (8,470)
		70	ASH 60 X 70	64.28	16.8		15.1		13.4	
		80	ASH 60 X 80	56.25	19.2		17.3		15.4	
		90	ASH 60 X 90	50.00	21.6		19.4		17.3	
		100	ASH 60 X 100	45.00	24.0		21.6		19.2	
		125	ASH 60 X 125	36.00	30.0		27.0		24.0	
		150	ASH 60 X 150	30.00	36.0		32.4		28.8	
		175	ASH 60 X 175	25.71	42.0		37.8		33.6	
		200	ASH 60 X 200	22.50	48.0		43.2		38.4	
		250	ASH 60 X 250	18.00	60.0		54.0		48.0	
		300	ASH 60 X 300	15.00	72.0		64.8		57.6	



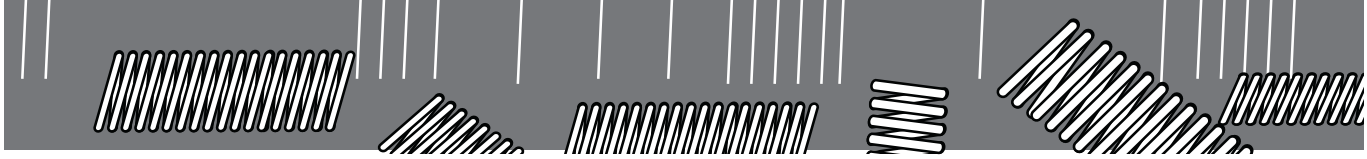
Raymond®	EXTRA HEAVY DUTY DIE SPRINGS			JIS B 5012 Series						Brown
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (20%of free length)		For Long Life (18% of free length)		For Optimal Life (16% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
8	4	10	ASB 8 X 10	16.94	2.0	35 (343)	1.8	30.5 (299)	1.6	26 (255)
		15	ASB 8 X 15	11.30	3.0		2.7		2.4	
		20	ASB 8 X 20	8.47	4.0		3.6		3.2	
		25	ASB 8 X 25	6.78	5.0		4.5		4.0	
		30	ASB 8 X 30	5.65	6.0		5.4		4.8	
		35	ASB 8 X 35	4.84	7.0		6.3		5.6	
		40	ASB 8 X 40	4.20	8.0		7.2		6.4	
		45	ASB 8 X 45	3.77	9.0		8.1		7.2	
		50	ASB 8 X 50	3.39	10.0		9.0		8.0	
		55	ASB 8 X 55	3.08	11.0		9.9		8.8	
		60	ASB 8 X 60	2.82	12.0		10.8		9.6	
10	5	20	ASB 10 X 20	11.25	4.0	45 (441)	3.6	41 (402)	3.2	36 (353)
		25	ASB 10 X 25	9.00	5.0		4.5		4.0	
		30	ASB 10 X 30	7.50	6.0		5.4		4.8	
		35	ASB 10 X 35	6.43	7.0		6.3		5.6	
		40	ASB 10 X 40	5.63	8.0		7.2		6.4	
		45	ASB 10 X 45	5.00	9.0		8.1		7.2	
		50	ASB 10 X 50	4.50	10.0		9.0		8.0	
		55	ASB 10 X 55	4.09	11.0		9.9		8.8	
		60	ASB 10 X 60	3.75	12.0		10.8		9.6	
		65	ASB 10 X 65	3.47	13.0		11.7		10.4	
		70	ASB 10 X 70	3.21	14.0		12.6		11.2	
		75	ASB 10 X 75	3.00	15.0		13.5		12.0	
		80	ASB 10 X 80	2.82	16.0		14.4		12.8	
12	6	20	ASB 12 X 20	14.50	4.0	58 (569)	3.6	52 (510)	3.2	46 (451)
		25	ASB 12 X 25	11.60	5.0		4.5		4.0	
		30	ASB 12 X 30	9.67	6.0		5.4		4.8	
		35	ASB 12 X 35	8.29	7.0		6.3		5.6	
		40	ASB 12 X 40	7.25	8.0		7.2		6.4	
		45	ASB 12 X 45	6.44	9.0		8.1		7.2	
		50	ASB 12 X 50	5.80	10.0		9.0		8.0	
		55	ASB 12 X 55	5.27	11.0		9.9		8.8	
		60	ASB 12 X 60	4.83	12.0		10.8		9.6	
		65	ASB 12 X 65	4.44	13.0		11.7		10.4	
		70	ASB 12 X 70	4.13	14.0		12.6		11.2	
		75	ASB 12 X 75	3.85	15.0		13.5		12.0	
		80	ASB 12 X 80	3.61	16.0		14.4		12.8	
14	7	25	ASB 14 X 25	15.00	5.0	75 (736)	4.5	68 (667)	4.0	60 (588)
		30	ASB 14 X 30	12.50	6.0		5.4		4.8	
		35	ASB 14 X 35	10.72	7.0		6.3		5.6	
		40	ASB 14 X 40	9.38	8.0		7.2		6.4	
		45	ASB 14 X 45	8.34	9.0		8.1		7.2	
		50	ASB 14 X 50	7.50	10.0		9.0		8.0	
		55	ASB 14 X 55	6.82	11.0		9.9		8.8	
		60	ASB 14 X 60	6.25	12.0		10.8		9.6	
		65	ASB 14 X 65	5.77	13.0		11.7		10.4	
		70	ASB 14 X 70	5.36	14.0		12.6		11.2	
		75	ASB 14 X 75	5.00	15.0		13.5		12.0	
		80	ASB 14 X 80	4.69	16.0		14.4		12.8	
		90	ASB 14 X 90	4.17	18.0		16.2		14.4	

Raymond®	EXTRA HEAVY DUTY DIE SPRINGS	JIS B 5012 Series	Brown

Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (20%of free length)		For Long Life (18% of free length)		For Optimal Life (16% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
16	8	25	ASB 16 X 25	20.00	5.0	100 (981)	4.5	90 (883)	4.0	80 (785)
		30	ASB 16 X 30	16.67	6.0		5.4		4.8	
		35	ASB 16 X 35	14.29	7.0		6.3		5.6	
		40	ASB 16 X 40	12.50	8.0		7.2		6.4	
		45	ASB 16 X 45	11.11	9.0		8.1		7.2	
		50	ASB 16 X 50	10.00	10.0		9.0		8.0	
		55	ASB 16 X 55	9.09	11.0		9.9		8.8	
		60	ASB 16 X 60	8.34	12.0		10.8		9.6	
		65	ASB 16 X 65	7.69	13.0		11.7		10.4	
		70	ASB 16 X 70	7.14	14.0		12.6		11.2	
		75	ASB 16 X 75	6.67	15.0		13.5		12.0	
		80	ASB 16 X 80	6.25	16.0		14.4		12.8	
		90	ASB 16 X 90	5.56	18.0		16.2		14.4	
		100	ASB 16 X 100	5.00	20.0		18.0		16.0	
18	9	25	ASB 18 X 25	25.00	5.0	125 (1,226)	4.5	113 (1,108)	4.0	100 (981)
		30	ASB 18 X 30	20.84	6.0		5.4		4.8	
		35	ASB 18 X 35	17.86	7.0		6.3		5.6	
		40	ASB 18 X 40	15.63	8.0		7.2		6.4	
		45	ASB 18 X 45	13.89	9.0		8.1		7.2	
		50	ASB 18 X 50	12.50	10.0		9.0		8.0	
		55	ASB 18 X 55	11.37	11.0		9.9		8.8	
		60	ASB 18 X 60	10.42	12.0		10.8		9.6	
		65	ASB 18 X 65	9.62	13.0		11.7		10.4	
		70	ASB 18 X 70	8.93	14.0		12.6		11.2	
		75	ASB 18 X 75	8.34	15.0		13.5		12.0	
		80	ASB 18 X 80	7.82	16.0		14.4		12.8	
		90	ASB 18 X 90	6.95	18.0		16.2		14.4	
		100	ASB 18 X 100	6.26	20.0		18.0		16.0	
20	10	25	ASB 20 X 25	32.00	5.0	160 (1,569)	4.5	144 (1,412)	4.0	128 (1,255)
		30	ASB 20 X 30	26.67	6.0		5.4		4.8	
		35	ASB 20 X 35	22.86	7.0		6.3		5.6	
		40	ASB 20 X 40	20.00	8.0		7.2		6.4	
		45	ASB 20 X 45	17.78	9.0		8.1		7.2	
		50	ASB 20 X 50	16.00	10.0		9.0		8.0	
		55	ASB 20 X 55	14.55	11.0		9.9		8.8	
		60	ASB 20 X 60	13.33	12.0		10.8		9.6	
		65	ASB 20 X 65	12.31	13.0		11.7		10.4	
		70	ASB 20 X 70	11.43	14.0		12.6		11.2	
		75	ASB 20 X 75	10.67	15.0		13.5		12.0	
		80	ASB 20 X 80	10.00	16.0		14.4		12.8	
		90	ASB 20 X 90	8.89	18.0		16.2		14.4	
		100	ASB 20 X 100	8.00	20.0		18.0		16.0	
		125	ASB 20 X 125	6.40	25.0		22.5		20.0	
		150	ASB 20 X 150	5.33	30.0		27.0		24.0	
22	11	25	ASB 22 X 25	39.00	5.0	195 (1,912)	4.5	176 (1,726)	4.0	156 (1,530)
		30	ASB 22 X 30	32.50	6.0		5.4		4.8	
		35	ASB 22 X 35	27.86	7.0		6.3		5.6	
		40	ASB 22 X 40	24.38	8.0		7.2		6.4	
		45	ASB 22 X 45	21.67	9.0		8.1		7.2	
		50	ASB 22 X 50	19.50	10.0		9.0		8.0	
		55	ASB 22 X 55	17.73	11.0		9.9		8.8	
		60	ASB 22 X 60	16.25	12.0		10.8		9.6	
		65	ASB 22 X 65	15.00	13.0		11.7		10.4	
		70	ASB 22 X 70	13.93	14.0		12.6		11.2	
		75	ASB 22 X 75	13.00	15.0		13.5		12.0	
		80	ASB 22 X 80	12.19	16.0		14.4		12.8	
		90	ASB 22 X 90	10.83	18.0		16.2		14.4	
		100	ASB 22 X 100	9.75	20.0		18.0		16.0	
		125	ASB 22 X 125	7.80	25.0		22.5		20.0	
		150	ASB 22 X 150	6.50	30.0		27.0		24.0	

Raymond®	EXTRA HEAVY DUTY DIE SPRINGS			JIS B 5012 Series						Brown
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (20%of free length)		For Long Life (18% of free length)		For Optimal Life (16% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
25	12.5	25	ASB 25 X 25	49.00	5.0	245 (2,400)	4.5	221 (2,170)	4.0	196 (1,922)
		30	ASB 25 X 30	40.80	6.0		5.4		4.8	
		35	ASB 25 X 35	35.00	7.0		6.3		5.6	
		40	ASB 25 X 40	30.60	8.0		7.2		6.4	
		45	ASB 25 X 45	27.20	9.0		8.1		7.2	
		50	ASB 25 X 50	24.50	10.0		9.0		8.0	
		55	ASB 25 X 55	22.30	11.0		9.9		8.8	
		60	ASB 25 X 60	20.40	12.0		10.8		9.6	
		65	ASB 25 X 65	18.80	13.0		11.7		10.4	
		70	ASB 25 X 70	17.50	14.0		12.6		11.2	
		75	ASB 25 X 75	16.30	15.0		13.5		12.0	
		80	ASB 25 X 80	15.30	16.0		14.4		12.8	
		90	ASB 25 X 90	13.60	18.0		16.2		14.4	
		100	ASB 25 X 100	12.30	20.0		18.0		16.0	
		125	ASB 25 X 125	9.80	25.0		22.5		20.0	
		150	ASB 25 X 150	8.17	30.0		27.0		24.0	
		175	ASB 25 X 175	7.00	35.0		31.5		28.0	
27	13.5	25	ASB 27 X 25	58.00	5.0	290 (2,840)	4.5	261 (2,560)	4.0	232 (2,280)
		30	ASB 27 X 30	48.33	6.0		5.4		4.8	
		35	ASB 27 X 35	41.43	7.0		6.3		5.6	
		40	ASB 27 X 40	36.25	8.0		7.2		6.4	
		45	ASB 27 X 45	32.22	9.0		8.1		7.2	
		50	ASB 27 X 50	29.00	10.0		9.0		8.0	
		55	ASB 27 X 55	26.36	11.0		9.9		8.8	
		60	ASB 27 X 60	24.17	12.0		10.8		9.6	
		65	ASB 27 X 65	22.31	13.0		11.7		10.4	
		70	ASB 27 X 70	20.71	14.0		12.6		11.2	
		75	ASB 27 X 75	19.33	15.0		13.5		12.0	
		80	ASB 27 X 80	18.13	16.0		14.4		12.8	
		90	ASB 27 X 90	16.11	18.0		16.2		14.4	
		100	ASB 27 X 100	14.50	20.0		18.0		16.0	
		125	ASB 27 X 125	11.60	25.0		22.5		20.0	
		150	ASB 27 X 150	9.67	30.0		27.0		24.0	
		175	ASB 27 X 175	8.28	35.0		31.5		28.0	
30	15	25	ASB 30 X 25	72.00	5.0	360 (3,530)	4.5	324 (3,180)	4.0	288 (2,820)
		30	ASB 30 X 30	60.00	6.0		5.4		4.8	
		35	ASB 30 X 35	51.43	7.0		6.3		5.6	
		40	ASB 30 X 40	45.00	8.0		7.2		6.4	
		45	ASB 30 X 45	40.00	9.0		8.1		7.2	
		50	ASB 30 X 50	36.00	10.0		9.0		8.0	
		55	ASB 30 X 55	32.72	11.0		9.9		8.8	
		60	ASB 30 X 60	30.00	12.0		10.8		9.6	
		65	ASB 30 X 65	27.69	13.0		11.7		10.4	
		70	ASB 30 X 70	25.71	14.0		12.6		11.2	
		75	ASB 30 X 75	24.00	15.0		13.5		12.0	
		80	ASB 30 X 80	22.50	16.0		14.4		12.8	
		90	ASB 30 X 90	20.00	18.0		16.2		14.4	
		100	ASB 30 X 100	18.00	20.0		18.0		16.0	
		125	ASB 30 X 125	14.40	25.0		22.5		20.0	
		150	ASB 30 X 150	12.00	30.0		27.0		24.0	
		175	ASB 30 X 175	10.28	35.0		31.5		28.0	
		200	ASB 30 X 200	9.00	40.0		36.0		32.0	

Raymond®	EXTRA HEAVY DUTY DIE SPRINGS			JIS B 5012 Series						Brown
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (20%of free length)		For Long Life (18% of free length)		For Optimal Life (16% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
35	17.5	40	ASB 35 X 40	61.20	8.0	490 (4,810)	7.2	441 (4,320)	6.4	392 (3,840)
		45	ASB 35 X 45	54.44	9.0		8.1		7.2	
		50	ASB 35 X 50	49.00	10.0		9.0		8.0	
		55	ASB 35 X 55	44.54	11.0		9.9		8.8	
		60	ASB 35 X 60	40.83	12.0		10.8		9.6	
		65	ASB 35 X 65	37.69	13.0		11.7		10.4	
		70	ASB 35 X 70	35.00	14.0		12.6		11.2	
		75	ASB 35 X 75	32.67	15.0		13.5		12.0	
		80	ASB 35 X 80	30.62	16.0		14.4		12.8	
		90	ASB 35 X 90	27.22	18.0		16.2		14.4	
		100	ASB 35 X 100	24.50	20.0		18.0		16.0	
		125	ASB 35 X 125	19.60	25.0		22.5		20.0	
		150	ASB 35 X 150	16.33	30.0		27.0		24.0	
		175	ASB 35 X 175	14.00	35.0		31.5		28.0	
		200	ASB 35 X 200	12.25	40.0		36.0		32.0	
40	20	40	ASB 40 X 40	80.00	8.0	640 (6,280)	7.2	576 (5,650)	6.4	512 (5,020)
		50	ASB 40 X 50	64.00	10.0		9.0		8.0	
		60	ASB 40 X 60	53.33	12.0		10.8		9.6	
		70	ASB 40 X 70	45.71	14.0		12.6		11.2	
		80	ASB 40 X 80	40.00	16.0		14.4		12.8	
		90	ASB 40 X 90	35.55	18.0		16.2		14.4	
		100	ASB 40 X 100	32.00	20.0		18.0		16.0	
		125	ASB 40 X 125	25.60	25.0		22.5		20.0	
		150	ASB 40 X 150	21.33	30.0		27.0		24.0	
		175	ASB 40 X 175	18.28	35.0		31.5		28.0	
		200	ASB 40 X 200	15.00	40.0		36.0		32.0	
		250	ASB 40 X 250	12.80	50.0		45.0		40.0	
50	25	50	ASB 50 X 50	100.00	10.0	1,000 (9,810)	9.0	900 (8,830)	8.0	800 (7,850)
		60	ASB 50 X 60	83.33	12.0		10.8		9.6	
		70	ASB 50 X 70	71.42	14.0		12.6		11.2	
		80	ASB 50 X 80	62.50	16.0		14.4		12.8	
		90	ASB 50 X 90	55.55	18.0		16.2		14.4	
		100	ASB 50 X 100	50.00	20.0		18.0		16.0	
		125	ASB 50 X 125	40.00	25.0		22.5		20.0	
		150	ASB 50 X 150	33.33	30.0		27.0		24.0	
		175	ASB 50 X 175	27.57	35.0		31.5		28.0	
		200	ASB 50 X 200	25.00	40.0		36.0		32.0	
		250	ASB 50 X 250	20.00	50.0		45.0		40.0	
		300	ASB 50 X 300	16.66	60.0		54.0		48.0	
60	30	60	ASB 60 X 60	120.00	12.0	1,440 (14,122)	10.8	1,296 (12,710)	9.6	1,152 (11,300)
		70	ASB 60 X 70	102.00	14.0		12.6		11.2	
		80	ASB 60 X 80	90.00	16.0		14.4		12.8	
		90	ASB 60 X 90	80.00	18.0		16.2		14.4	
		100	ASB 60 X 100	72.00	20.0		18.0		16.0	
		125	ASB 60 X 125	57.60	25.0		22.5		20.0	
		150	ASB 60 X 150	48.00	30.0		27.0		24.0	
		175	ASB 60 X 175	41.14	35.0		31.5		28.0	
		200	ASB 60 X 200	36.00	40.0		36.0		32.0	
		250	ASB 60 X 250	28.80	50.0		45.0		40.0	
		300	ASB 60 X 300	24.00	60.0		54.0		48.0	



Mold Return Springs

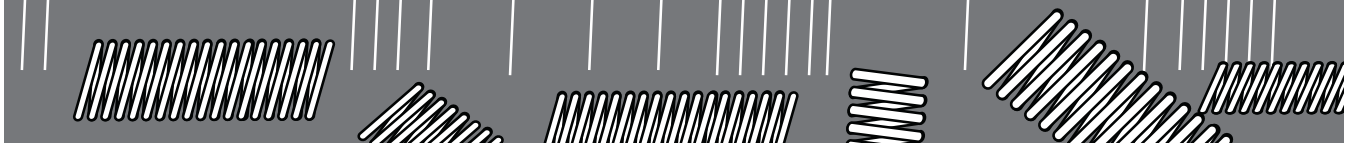
- Maximum Operating Deflections up to 60% of Free Length.
- 2% reduction in Free Length at elevated temperatures up to 200˚ C.

SPRING TOLERANCES							
Rod Diameter	Outer Diameter (mm)	Inner Diameter (mm)	Free Length (mm)	Coil Direction	Squareness	Load (kgf/mm)	Solid Length (mm)
ø8	$14.5\ ^{+0.4}_{-0}$	$9.0\ ^{+0}_{-0.4}$	(±0.5mm) up to 50mm (±1%) over 50mm	Right	1.2˚	±10%	+0
ø10	$17.0\ ^{+0.6}_{-0}$	$11.0\ ^{+0}_{-0.6}$		Right			
ø12	$21.0\ ^{+0.8}_{-0}$	$13.0\ ^{+0}_{-0.8}$		Right			
ø15	$26.0\ ^{+1}_{-0}$	$16.5\ ^{+0}_{-1}$		Right			
ø20	$32.0\ ^{+1}_{-0}$	$21.0\ ^{+0}_{-1}$		Right			
ø25	$39.0\ ^{+1}_{-0}$	$26.0\ ^{+0}_{-1}$		Right			
ø30	$46.0\ ^{+1.2}_{-0}$	$32.0\ ^{+0}_{-1.2}$		Right			

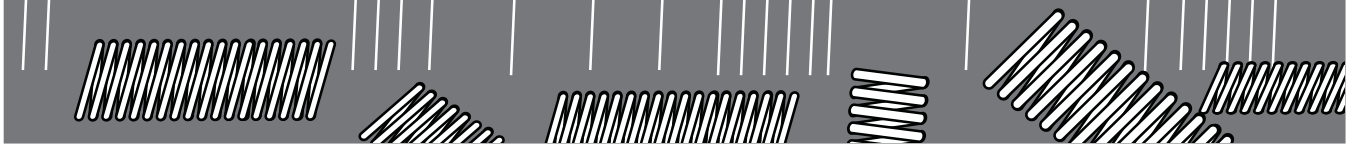
OUTER DIAMETER EXPANSION IN CONTACT						
ASR 14.5	ASR 17	ASR 21	ASR 26	ASR 32	ASR 39	ASR 46
+0.15mm	+0.1mm	+0.1mm	+0.15mm	+0.2mm	+0.26mm	+0.4mm

Raymond® **Mold Return Springs**

Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE		
					For Maximum Operating Def. (50%of free length)		Solid Height
					Deflection (mm)	Load kgf (N)	(mm)
A	B	C					
14.5	9	20	ASR 14.5 X 20	1.10	10.0	11 (107.9)	8
		25	ASR 14.5 X 25	0.88	12.5		10
		30	ASR 14.5 X 30	0.73	15.0		12
		35	ASR 14.5 X 35	0.63	17.5		14
		40	ASR 14.5 X 40	0.55	20.0		16
		45	ASR 14.5 X 45	0.49	22.5		18
		50	ASR 14.5 X 50	0.44	25.0		20
		55	ASR 14.5 X 55	0.40	27.5		22
		60	ASR 14.5 X 60	0.37	30.0		24
		65	ASR 14.5 X 65	0.34	32.5		26
		70	ASR 14.5 X 70	0.31	35.0		28
		75	ASR 14.5 X 75	0.29	37.5		30
		80	ASR 14.5 X 80	0.28	40.0		32
		90	ASR 14.5 X 90	0.24	45.0		36
		100	ASR 14.5 X 100	0.22	50.0		40
		125	ASR 14.5 X 125	0.18	62.5		50



Raymond®					MOLD RETURN SPRINGS		
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE		
					For Maximum Operating Def. (50%of free length)		Solid Height
					Deflection (mm)	Load kgf (N)	
A	B	C					(mm)
17	11	25	ASR 17 X 25	1.52	12.5	19 (186.3)	10
		30	ASR 17 X 30	1.27	15.0		12
		35	ASR 17 X 35	1.09	17.5		14
		40	ASR 17 X 40	0.95	20.0		16
		45	ASR 17 X 45	0.84	22.5		18
		50	ASR 17 X 50	0.76	25.0		20
		55	ASR 17 X 55	0.69	27.5		22
		60	ASR 17 X 60	0.63	30.0		24
		65	ASR 17 X 65	0.58	32.5		26
		70	ASR 17 X 70	0.54	35.0		28
		75	ASR 17 X 75	0.51	37.5		30
		80	ASR 17 X 80	0.48	40.0		32
		90	ASR 17 X 90	0.42	45.0		36
		100	ASR 17 X 100	0.38	50.0		40
		125	ASR 17 X 125	0.30	62.5		50
		150	ASR 17 X 150	0.25	75.0		60
21	13	30	ASR 21 X 30	1.40	15.0	21 (206.0)	12
		35	ASR 21 X 35	1.20	17.5		14
		40	ASR 21 X 40	1.05	20.0		16
		45	ASR 21 X 45	0.93	22.5		18
		50	ASR 21 X 50	0.84	25.0		20
		55	ASR 21 X 55	0.76	27.5		22
		60	ASR 21 X 60	0.70	30.0		24
		65	ASR 21 X 65	0.65	32.5		26
		70	ASR 21 X 70	0.60	35.0		28
		75	ASR 21 X 75	0.56	37.5		30
		80	ASR 21 X 80	0.53	40.0		32
		90	ASR 21 X 90	0.47	45.0		36
		100	ASR 21 X 100	0.42	50.0		40
		125	ASR 21 X 125	0.34	62.5		50
		150	ASR 21 X 150	0.28	75.0		60
26	16.5	30	ASR 26 X 30	2.73	18.0	41 (402)	12
		35	ASR 26 X 35	2.34	21.0		14
		40	ASR 26 X 40	2.05	24.0		16
		45	ASR 26 X 45	1.82	27.0		18
		50	ASR 26 X 50	1.64	30.0		20
		55	ASR 26 X 55	1.49	33.0		22
		60	ASR 26 X 60	1.37	36.0		24
		65	ASR 26 X 65	1.26	39.0		26
		70	ASR 26 X 70	1.17	42.0		28
		75	ASR 26 X 75	1.09	45.0		30
		80	ASR 26 X 80	1.03	48.0		32
		90	ASR 26 X 90	0.91	54.0		36
		100	ASR 26 X 100	0.82	60.0		38
		110	ASR 26 X 110	0.75	66.0		44
		125	ASR 26 X 125	0.66	75.0		50
		150	ASR 26 X 150	0.55	90.0		60
		175	ASR 26 X 175	0.47	105.0		70
		200	ASR 26 X 200	0.41	120.0		80



Raymond® MOLD RETURN SPRINGS

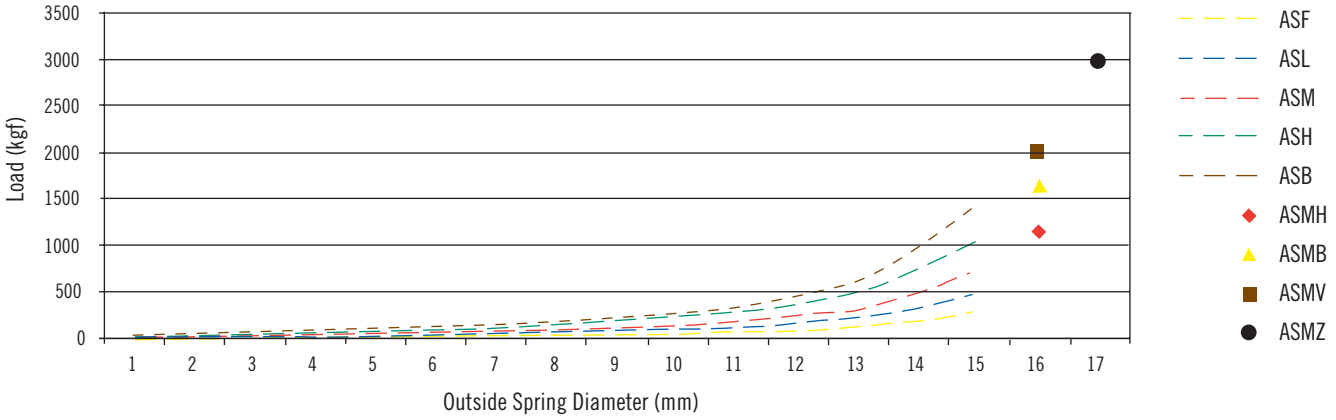
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE		
					For Maximum Operating Def. (50%of free length)		Solid Height
					Deflection (mm)	Load kgf (N)	
A	B	C					(mm)
32	21	40	ASR 32 X 40	2.55	24.0	51 (500)	16
		45	ASR 32 X 45	2.27	27.0		18
		50	ASR 32 X 50	2.04	30.0		20
		60	ASR 32 X 60	1.70	36.0		24
		70	ASR 32 X 70	1.46	42.0		28
		80	ASR 32 X 80	1.28	48.0		32
		90	ASR 32 X 90	1.13	54.0		36
		100	ASR 32 X 100	1.02	60.0		40
		110	ASR 32 X 110	0.93	66.0		44
		125	ASR 32 X 125	0.82	75.0		50
		150	ASR 32 X 150	0.68	90.0		60
		175	ASR 32 X 175	0.58	105.0		70
		200	ASR 32 X 200	0.51	120.0		80
		250	ASR 32 X 250	0.41	150.0		100
		300	ASR 32 X 300	0.34	180.0		120
39	26	40	ASR 39 X 40	2.75	24.0	55 (539)	16
		45	ASR 39 X 45	2.44	27.0		18
		50	ASR 39 X 50	2.20	30.0		20
		60	ASR 39 X 60	1.83	36.0		24
		70	ASR 39 X 70	1.57	42.0		28
		80	ASR 39 X 80	1.38	48.0		32
		90	ASR 39 X 90	1.22	54.0		36
		100	ASR 39 X 100	1.10	60.0		40
		110	ASR 39 X 110	1.00	66.0		44
		125	ASR 39 X 125	0.88	75.0		50
		150	ASR 39 X 150	0.73	90.0		60
		175	ASR 39 X 175	0.63	105.0		70
		200	ASR 39 X 200	0.55	120.0		80
		250	ASR 39 X 250	0.44	150.0		100
		300	ASR 39 X 300	0.37	180.0		120
46	32	50	ASR 46 X 50	2.48	25.0	62 (608)	20
		60	ASR 46 X 60	2.07	30.0		24
		70	ASR 46 X 70	1.77	35.0		28
		80	ASR 46 X 80	1.55	40.0		32
		90	ASR 46 X 90	1.38	45.0		36
		100	ASR 46 X 100	1.24	50.0		40
		110	ASR 46 X 110	1.13	55.0		44
		125	ASR 46 X 125	0.99	62.5		50
		150	ASR 46 X 150	0.83	75.0		60
		175	ASR 46 X 175	0.72	87.5		70
		200	ASR 46 X 200	0.62	100.0		80
		250	ASR 46 X 250	0.5	125.0		100
		300	ASR 46 X 300	0.41	150.0		120

Mega Coil Springs

- "Mega Coil" Springs are specially designed, high load springs.
- These springs are manufactured to the highest quality standards.
- Loads and Spring Rates go beyond Associated Spring Raymond's JIS standard product lines.
- Available in Free Lengths from 100mm to 300mm.

Model	Description	Size (OD)	Free Lengths	Maximum Operating Deflection	Long Life Performance	Optimal Life Performance
				% of Free Length	% of Free Length	% of Free Length
ASMH	1.0 Ton Type Spring	72 mm	100 - 300 mm	32.0	28.8	35.6
ASMB	1.5 Ton Type Spring	72 mm	100 - 300 mm	24.0	21.6	19.2
ASMV	2.0 Ton Type Spring	72 mm	100 - 300 mm	20.0	18.0	16.0
ASMZ	3.0 Ton Type Spring	97 mm	150 - 300 mm	30.0	25.0	20.0

Loads at Maximum Operating Deflections
JIS B 5012 Springs vs. Mega Coil Die Springs



Tolerances

Outside Diameter	Inside Diameter	Free Length	Load	Winding Direction
+0mm -2.0mm	+2.0mm -0mm	±1%	±10%	RH

Raymond® 1.0 TON MEGA COIL SPRINGS — Red

Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (32% of free length)		For Long Life (28.8% of free length)		For Optimal Life (35.6% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
72	44.0	100	ASMH 40 X 100	35.6	32.0	1,139 (11,170)	28.8	1,025 (10,050)	25.6	911 (8,935)
		125	ASMH 40 X 125	28.5	40.0		36.0		32.0	
		150	ASMH 40 X 150	23.7	48.0		43.2		38.4	
		175	ASMH 40 X 175	20.3	56.0		50.4		44.8	
		200	ASMH 40 X 200	17.8	64.0		57.6		51.2	
		250	ASMH 40 X 250	14.2	80.0		72.0		64.0	
		300	ASMH 40 X 300	11.9	96.0		86.4		76.8	

Raymond® 1.5 TON MEGA COIL SPRINGS — Yellow

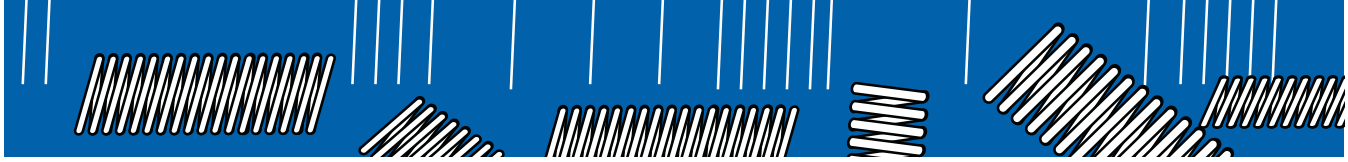
Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (24% of free length)		For Long Life (21.6% of free length)		For Optimal Life (19.2% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
72	40.5	100	ASMB 40 X 100	69.2	24.0	1,661 (16,290)	21.6	1,495 (14,660)	19.2	1,329 (13,035)
		125	ASMB 40 X 125	55.4	30.0		27.0		24.0	
		150	ASMB 40 X 150	46.2	36.0		32.4		28.8	
		175	ASMB 40 X 175	39.6	42.0		37.8		33.6	
		200	ASMB 40 X 200	34.6	48.0		43.2		38.4	
		250	ASMB 40 X 250	27.7	60.0		54.0		48.0	
		300	ASMB 40 X 300	23.1	72.0		64.8		57.6	

Raymond® 2.0 TON MEGA COIL SPRINGS — Brown

Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (20% of free length)		For Long Life (18% of free length)		For Optimal Life (16% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
72	38.5	100	ASMV 40 X 100	100.0	20.0	2,000 (19,615)	18.0	1,800 (17,650)	16.0	1,600 (15,690)
		125	ASMV 40 X 125	80.0	25.0		22.5		20.0	
		150	ASMV 40 X 150	66.7	30.0		27.0		24.0	
		175	ASMV 40 X 175	57.1	35.0		31.5		28.0	
		200	ASMV 40 X 200	50.0	40.0		36.0		32.0	
		250	ASMV 40 X 250	40.0	50.0		45.0		40.0	
		300	ASMV 40 X 300	33.0	60.0		54.0		48.0	

Raymond® 3.0 TON MEGA COIL SPRINGS — Black

Outer Dia (mm)	Inner Dia (mm)	Free Length (mm)	Catalog Number	Load at 1mm Def. (kgf)	LOAD DEFLECTION TABLE					
					For Maximum Operating Def. (30% of free length)		For Long Life (25% of free length)		For Optimal Life (20% of free length)	
					Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)	Deflection (mm)	Load kgf (N)
A	B	C								
97	56.5	150	ASMZ 40 X 150	66.7	45.0	3,000 (29,421)	37.5	2,500 (24,500)	30.0	2,000 (19,615)
		175	ASMZ 40 X 175	57.1	52.5		43.8		35.0	
		200	ASMZ 40 X 200	50.0	60.0		50.0		40.0	
		250	ASMZ 40 X 250	40.0	75.0		62.5		50.0	
		300	ASMZ 40 X 300	33.3	90.0		75.0		60.0	



Die Spring Features & Benefits

Raymond Die Springs Offer	Features	Benefits
Superior Materials & Wire Profile	• All Raymond die springs are made from vapor degassed 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 245°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.

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.

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.

Curve For Finding Critical Buckling Conditions

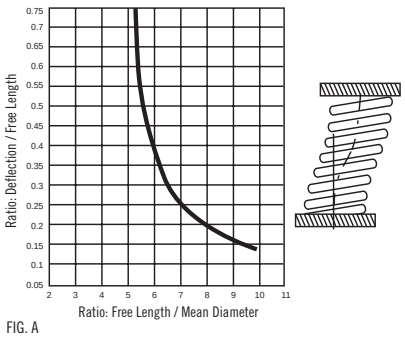


FIG. A

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 allow clearance for the spring. 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 245°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.

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

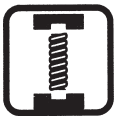
The most common die spring problems are generally the most basic — the result of improper selection and application. But trying to save a few pennies on die springs or a few minutes on selection can result in enormous expenses in terms of premature spring failure, increased maintenance costs and lost 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.

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  - Compression Springs
  - Extension Springs
  - Round Wire Die Springs
  - Compression and Extension Spring Assortment Kits
  - Miscellaneous Springs
- Special Order 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

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