LOAD SELECTION PROCEDURE - METRIC UNITS

Variability is the key principle in selecting the figure and size of a variable spring support. Variability is determined by calculating the change in percentage of the supporting force of a variable spring between the hot (operating) and cold (installed) loads using the following formula:

$$\text{Variability} = \frac{\text{Movement} \times \text{Spring Rate}}{\text{Hot (operating) load}}$$

If the variability is in question, a lower variability is more desirable. The lower variability does not transfer as much stress to the adjacent equipment at the cold (installed) position than a spring with higher variability. To comply with requirements of MSS SP-58 specifications, variability should not exceed 25%. If the design conditions cause the variability to exceed the recommended maximum, RILCO strongly suggests the use of one of our Constant Supports instead of a variable.

SPRING HANGER FIGURE AND SIZE SELECTION

Once hot (operating) or cold (installed) load and travel have been determined in order to select the correct Spring Hanger Figure and size selection:

1. Select a spring figure (RVS-82, 268, etc.) with a working range which will accommodate the travel.
2. Find a spring size where the load is approximately in the middle of the working range loads.
3. Calculate the missing load (either Hot or Cold) by using the following formulas:

Hot (operating) load = Cold (installed) load - (Travel x Spring rate)

or

Cold (installed) load = Hot (operating) load + (Travel x Spring rate)

4. Verify that both loads are within the working range, preferably equidistance from the center of the load chart.

Variable Spring Load Chart (kN)

	Working Range (mm)					Size											
	RVS-					RVS-268		RVS- 82, 268, 98, Triple & Quadruple Spring									
	Quadruple	Triple	98	268	82	000	00	0	1	2	3	4	5	6	7	8	9
						0.03	0.08	0.19	0.28	0.36	0.47	0.63	0.83	1.12	1.50	2.00	2.67
Overtravel						0.03	0.09	0.20	0.29	0.37	0.49	0.65	0.88	1.17	1.56	2.09	2.78
	51	38	25	12	6	0.04	0.10	0.20	0.30	0.39	0.51	0.68	0.92	1.21	1.62	2.17	2.89
						0.04	0.11	0.21	0.32	0.40	0.53	0.71	0.95	1.26	1.68	2.25	3.00
	0	0	0	0	0	0.04	0.12	0.22	0.33	0.42	0.55	0.73	0.98	1.31	1.74	2.34	3.12
						0.05	0.12	0.23	0.34	0.44	0.57	0.76	1.01	1.36	1.81	2.42	3.23
						0.05	0.13	0.24	0.35	0.45	0.58	0.78	1.05	1.40	1.87	2.51	3.34
						0.05	0.14	0.25	0.36	0.47	0.61	0.81	1.09	1.45	1.93	2.59	3.45
	51	38	25	12	6	0.06	0.15	0.26	0.37	0.48	0.62	0.84	1.12	1.50	1.99	2.67	3.56
						0.06	0.16	0.26	0.39	0.49	0.64	0.86	1.16	1.54	2.06	2.75	3.67
						0.07	0.17	0.27	0.40	0.51	0.66	0.89	1.19	1.59	2.12	2.84	3.78
						0.07	0.18	0.28	0.41	0.53	0.68	0.92	1.23	1.64	2.18	2.92	3.89
	102	76	51	25	12	0.08	0.18	0.29	0.42	0.54	0.70	0.94	1.26	1.68	2.24	3.00	4.01
						0.08	0.19	0.30	0.43	0.56	0.72	0.97	1.29	1.73	2.31	3.09	4.12
						0.08	0.20	0.31	0.45	0.57	0.74	0.99	1.33	1.78	2.37	3.17	4.23
						0.09	0.21	0.32	0.45	0.59	0.76	1.02	1.37	1.82	2.43	3.25	4.34
	152	114	76	38	19	0.09	0.22	0.32	0.47	0.60	0.78	1.05	1.40	1.87	2.49	3.34	4.45
						0.09	0.22	0.33	0.48	0.61	0.80	1.07	1.44	1.92	2.55	3.42	4.56
						0.10	0.24	0.34	0.49	0.63	0.82	1.10	1.47	1.96	2.62	3.51	4.67
						0.10	0.24	0.35	0.50	0.65	0.84	1.13	1.51	2.01	2.68	3.59	4.78
	203	152	102	51	25	0.11	0.25	0.36	0.52	0.66	0.86	1.15	1.54	2.06	2.74	3.67	4.90
						0.11	0.26	0.36	0.53	0.68	0.88	1.17	1.58	2.10	2.80	3.76	5.01
						0.12	0.27	0.37	0.54	0.69	0.89	1.20	1.61	2.15	2.87	3.84	5.12
						0.12	0.28	0.38	0.55	0.71	0.92	1.23	1.65	2.20	2.93	3.92	5.23
	254	190	127	64	32	0.12	0.28	0.39	0.56	0.72	0.93	1.25	1.68	2.24	2.99	4.01	5.34
						0.12	0.29	0.40	0.57	0.73	0.95	1.28	1.72	2.29	3.05	4.09	5.45
Overtravel						0.13	0.30	0.40	0.58	0.75	0.97	1.31	1.75	2.34	3.12	4.17	5.56
	51	38	25	12	6	0.13	0.31	0.41	0.60	0.77	0.99	1.34	1.79	2.39	3.18	4.25	5.67
						0.14	0.32	0.42	0.61	0.78	1.01	1.36	1.82	2.43	3.24	4.34	5.79
						Spring Rate (kN/mm)											
					82	-	-	0.13	0.19	0.24	0.31	0.42	0.56	0.75	1.00	1.34	1.78
				268		0.03	0.07	0.07	0.09	0.12	0.16	0.21	0.28	0.37	0.50	0.67	0.89
			98			-	-	0.03	0.04	0.06	0.08	0.10	0.14	0.19	0.25	0.33	0.45
		Triple				-	-	0.02	0.03	0.04	0.05	0.07	0.09	0.12	0.16	0.22	0.30
	QUADRIPLE					-	-	0.02	0.02	0.03	0.04	0.05	0.07	0.09	0.12	0.17	0.22

5. If the loads are at either extreme, select a new spring size and re-calculate the missing load until both the loads are satisfactory.

6. Calculate the variability, which should not exceed 25%.

When Hot (operating) and Cold (installed) loads are known:

1. Select a spring size where both loads are ideally equidistance from the center of the load chart.

2. Calculate the movement with the following formula:

$$\text{Movement} = \frac{\text{Cold (installed) load - Hot (operating) load}}{\text{Spring Rate}}$$

3. Select a Spring figure (RVS-82, 268 etc.) which will give a variability lower than 25%.

NOTE: The lower the variability the better the result.

Your RILCO "Support Team" is always available to assist you with these calculations or to recommend product choices.

Variable Spring Load Chart (kN)

Size: RVS-82, 268, 98, Triple & Quadruple Spring													Working Range (mm) RVS-				
10	11	12	13	14	15	16	17	18	19	20	21	22	82	268	98	Triple	Quad
► 3.47	4.54	6.01	8.01	10.68	14.42	20.03	26.70	35.56	47.21	62.75	83.44	111.27					◄
► 3.62	4.73	6.26	8.34	11.13	15.02	20.86	27.81	37.03	49.19	64.92	86.91	115.91	6	12	25	38	51 ◄ Overtravel
► 3.76	4.92	6.51	8.68	11.57	15.62	21.69	28.93	38.51	51.15	67.97	90.39	120.55					◄
► 3.91	5.11	6.76	9.01	12.02	16.22	22.53	30.04	39.99	53.12	70.59	93.87	125.99					◄
4.05	5.30	7.01	9.35	12.46	16.82	23.36	31.15	41.47	55.09	73.20	97.34	129.82	**0**	**0**	**0**	**0**	**0**
4.20	5.49	7.26	9.68	12.91	17.42	24.20	32.26	42.95	57.06	75.82	100.82	134.46					
4.34	5.67	7.51	10.01	13.35	18.02	25.03	33.38	44.43	59.03	78.43	104.30	139.09					
4.49	5.87	7.76	10.35	13.80	18.62	25.87	34.49	45.91	61.00	81.05	107.77	143.73					
4.63	6.05	8.01	10.68	14.24	19.22	26.70	35.60	47.39	62.97	83.66	111.25	148.36	**6**	**12**	**25**	**38**	**51**
4.77	6.24	8.30	11.01	14.69	19.82	27.54	36.71	48.87	64.93	86.28	114.73	153.00					
4.92	6.43	8.51	11.35	15.13	20.43	28.37	37.83	50.35	66.91	88.89	118.21	157.64					
5.06	6.62	8.76	11.68	15.58	21.03	29.21	38.94	51.83	68.87	91.51	121.68	162.27					
5.21	6.81	9.01	12.02	16.02	21.63	30.04	40.05	53.31	70.84	94.12	125.16	166.91	**1/2**	**1**	**2**	**3**	**4**
5.35	7.00	9.26	12.35	16.47	22.23	30.87	41.16	54.79	72.81	968.93	128.63	171.54					
5.50	7.19	9.51	12.68	16.91	22.83	31.71	42.28	56.27	74.78	99.35	132.11	176.18					
5.64	7.38	9.76	13.02	17.36	23.43	32.54	43.39	57.75	76.75	101.96	135.59	180.82					
5.79	7.57	10.01	13.35	17.80	24.03	33.38	44.50	59.23	78.72	104.58	139.06	185.45	**19**	**38**	**76**	**114**	**152**
5.93	7.76	10.26	13.68	18.25	24.63	34.21	45.61	60.71	80.69	107.19	142.54	190.09					
6.07	7.94	10.52	14.02	18.69	25.23	35.04	46.73	62.19	82.66	109.80	146.02	194.73					
6.22	8.13	10.76	14.35	19.14	25.83	35.88	47.84	63.67	84.63	112.42	149.49	199.36					
6.36	8.32	11.01	14.69	19.58	26.43	36.71	48.95	65.15	86.60	115.03	152.97	204.00	**25**	**51**	**102**	**152**	**203**
6.51	8.51	11.26	15.02	20.03	27.03	37.55	50.06	66.63	88.56	117.65	156.44	208.64					
6.65	8.70	11.52	15.35	20.47	27.63	38.38	51.18	68.11	90.54	120.26	159.92	213.27					
6.80	8.89	11.77	15.69	20.92	28.24	39.22	52.29	69.58	92.50	122.88	163.40	217.91					
6.94	9.08	12.02	16.02	21.36	28.84	40.05	53.40	71.07	94.47	125.49	166.88	222.54	**32**	**64**	**127**	**190**	**254**
► 7.09	9.27	12.26	16.35	21.81	29.44	40.89	54.51	72.54	96.44	128.11	170.35	227.18					◄
► 7.23	9.46	12.52	16.69	22.25	30.04	41.72	55.63	74.03	98.41	130.72	173.83	231.82	**6**	**12**	**25**	**38**	**51** ◄ Overtravel
► 7.38	9.65	12.77	17.02	22.70	30.64	42.56	56.74	75.50	100.38	133.34	177.31	236.46					◄
► 7.52	9.83	13.02	17.36	23.14	31.24	43.39	57.85	76.99	102.35	135.95	180.78	241.09					◄
Spring Rate (kN/mm)													**82**				
2.31	3.03	4.01	5.34	7.12	9.61	13.35	17.80	23.14	31.51	41.83	55.63	74.18					
1.16	1.51	2.00	2.67	3.56	4.81	6.68	8.90	11.84	15.75	20.92	27.81	37.09	**268**				
0.58	0.76	1.00	1.34	1.78	2.40	3.34	4.45	5.92	7.88	10.46	13.91	18.54	**98**				
0.39	0.50	0.67	0.89	1.19	1.60	2.23	2.97	3.95	5.25	6.97	9.27	12.36	**TRIPLE**				
0.29	0.38	0.50	0.67	0.89	1.20	1.67	2.23	2.96	3.94	5.23	6.96	9.27	**QUADRUPLE**				