Variable Spring Hangers & Support

Overview

Variable springs are designed for supporting pipes, vessels, and pipe structure connections to large tanks.

Variable springs are recommended for install on pipelines subject to:

- Thermal movement
- Vertical movement that does not exceed 3 inches (75 millimeters).

The word "variable" refers to the fact that the load-carrying capacity of the spring varies considerably as the spring is compressed or expanded from a fixed reference point. As the pipe moves up, the spring is expanded and the load that it exerts is decreased. The opposite effect is experienced when the pipe moves down. In either case, the exerted load must not vary more than 25% of the calculated load or it is best to use a constant spring (link to constant page?).

Variable Spring Hangers and Support Terminologies

Spring Part No.	Categorized by spring rate.
Spring Size	Categorized by load range.
Spring Type	Categorized by physical shape.
Hot load / Hot setting / Operating load	The weight the spring has to support while the pipe line system is in operation.
Cold load / Cold setting / Installed load	The weight the spring has to support while the pipe line system is NOT in operation. This is also called *pre-set* load.
Movement / Travel	The measure of a vertical travel distance of the pipe which is supported by the spring when the pipe line is *in operation*.
Movement / Travel direction	The movement direction, either UP or DOWN of the pipe while in operation compared to its resting point (not in operation).
Spring rate	Lbs/In of spring travel.
Hydro-tested load	The test which determines whether the spring will support the operating load.
Travel stops	Limit the spring travel at the top and bottom to a small percentage beyond the specified range. In addition, they prevent the spring from moving while the spring is not in operation (in pre-set mode) or in hydrostatic testing phrase.
Load flange	Top Plate on which the pipe load rests.
Variability	The amount of supporting load variation on horizontal piping. The percentage of variability should not exceed 25%.

Selecting the Correct Variable Spring

In order to manufacture a variable spring, some of the following data will need to be known:

- Part No.
- Size
- Type
- Operating load or lot load
- Installed load or cold load
- Movement and its direction

One of the first 5 conditions in the chart below must be met (condition 6 is used to obtain pricing only)

Condition	Known	Unknown
1	Part No., Size, Hot load, Movement & Direction	Cold load
2	Part No., Size, Cold load, Movement & Direction	Hot load
3	Hot load, Movement & Direction	Part No., Size, Cold load
4	Cold load, Movement & Direction	Part No., Size, Hot load
5	Hot load, Cold Load & Spring rate	Part No., Size & Movement
6	Figure, Size, Type	Hot load, Cold load, Movement & Spring rate

Finish

Finish or coating on the spring housing is dependent upon the environment in which the springs are installed.

Possible Finishes Include:

- Painted black (a different color may be available upon request)
- Plated
- Hot-dip galvanized

Information needed for Ordering

- One of the conditions mentioned in the above chart (Selecting the correct spring)
- Preferred spring housing final coating/finish
- Any parts that are not Rilco standard (Example: lifting lugs)

Spring Types

>Drawing	Rilco Type	Grinnell Equivalent	Description
	A	**A**	**Hanger-Type Support:** Design for use where headroom is *unlimited*. Top of spring housing is a rod which allows the spring to attach to a support.
	B	**B**	**Single-Lug Hanger Type Support:** Designed for use where headroom is *limited*. Top of spring housing has a *single lug* to accommodate a *double-lug* beam attachment from the top support.
	C	**C**	**Hanger-Type Support:** Designed for use where headroom is *limited*. Top of spring housing has *double lugs* to accommodate a *single-lug* attachment from the top support.
	D	**D**	**Hanger-Type Support:** Designed for use where variable spring hanger is positioned above supporting structure with spring adjustment made from the top.
	E	**E**	**Hanger-Type Support:** Designed for use when spring adjustment must be below the structure on which the spring housing is being supported.
	F	**F**	**Base-Type Support:** Designed for supporting piping from below.

	G	**G**	**Hanger-Type Support:** Designed for use where headroom is limited or where an obstruction prohibits the use of a single spring hanger.

Figure Numbers/Sizes and Grinnell Equivalents

Rilco		Grinnell Equivalent	
Part Number	**Size**	**Figure Number**	**Size**
RVS-82	**0 - 22**	**82**	**0 - 22**
RVS-268	**0 - 22**	**268**	**0 - 22**
RVS-98	**0 - 22**	**98**	**0 - 22**
RVS-3X	**0 - 22**	**Triple**	**0 - 22**
RVS-4X	**0 - 22**	**Quadruple**	**0 - 22**

Load Table

SpringSize	Rod Size (in.)	Load (lb.)		Spring Rate (lb./in.)				
		Minimum	Maximum	RVS-82	RVS-268	RVS-98	RVS-3X	RVS-4X
0	1/2"	50	88	30	15	7	5	4
1		74	126	42	21	10	7	5
2		95	162	54	27	13	9	7
3		123	210	70	35	17	12	9
4		165	282	94	47	23	16	12
5		221	378	126	63	31	21	16
6	5/8"	294	504	168	84	42	28	21
7		392	672	224	112	56	37	28
8		525	900	300	150	75	50	38
9	3/4"	700	1200	400	200	100	67	50
10		910	1560	520	260	130	87	65
11		1190	2024	680	340	170	113	85
12	1"	1575	2700	900	450	225	150	113

13		2100	3600	1200	600	300	200	150
14	1 1/4"	2800	4800	1600	800	400	267	200
15		3780	6480	2160	1080	540	360	270
16	1 1/2"	5250	9000	3000	1500	750	500	375
17	1 3/4"	7000	12000	4000	2000	1000	667	500
18	2"	9320	15970	5320	2660	1330	887	665
19	2 1/4"	12380	21230	7080	3540	1770	1180	885
20	2 1/2"	16450	28200	9400	4700	2350	1567	1175
21	2 3/4"	21875	37500	12500	6250	3125	2083	1563
22	3"	29173	50010	16670	8335	4167	2778	2034

Specification

Component	Rilco Standard?	Description/Comment
Coil	Yes	Neoprene or powder coated & designed per MSS-SP58
Travel stops	Yes	Hydrostatic & Upper stops are standard
Metal name plate	Yes	Stainless steel etched with client tag, Rilco part number, size, type hot load, cold load, spring rate & movement. Loads and movements available in imperial or metric unit.
Guided load column (Type F only)	No	Specify guided load column when required.
Lifting lugs	No	Recommended for spring weighing more than 100 lbs. or 45 kg.

Formulas and Calculations

Upward movement	If cold load is greater than hot load
Downward movement	If hot load is greater than cold load
Movement	= (**Cold load - Hot load) / Spring rate.** If result > 0 then movement direction is up. Otherwise, it's down.
Variability (% load change)	**= ((Movement x Spring rate) / Hot load) x 100**