Variable Spring Hanger Load Variation and Selection

Cold (installed) load of a variable spring hanger from the hot load, thermal movement and spring rate, and the load variability against a limit.

Method: Variable spring support selection

Input parameters

Unit system: SI

Parameter	Value	Unit
Hot (operating) load	12.000	kN
Thermal movement (+ up, − down)	25.000	mm
Spring rate	120.00	N/mm
Variability limit	25.000	%

Calculated results

Parameter	Value	Unit
Cold (installed) load	15.000	kN
Load change	3.0000	kN
Variability	25.000	%
Largest spring rate for the limit	120.00	N/mm

Notes for this case

• The spring is set so that it carries the hot load in operation; moving up by Δy unloads it, so the cold load is F_h + kΔy. Variability kΔy/F_h is commonly limited to about 25 %; above that, use a softer spring or a constant-effort hanger.

Formula and method

$$F_c = F_h + k\Delta y, \quad V = \frac{k|\Delta y|}{F_h}$$

Variables

F_h	Hot (operating) load	N
Δy	Thermal movement (+ up, − down)	m
k	Spring rate	N/m
V_{max}	Variability limit	-
F_c	Cold (installed) load	N
ΔF	Load change	N
V	Variability	-
k_{max}	Largest spring rate for the limit	N/m

Method and standards

Spring selection.

Assumptions and limits

- Linear spring; vertical movement only.

References

Variable spring support selection

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/piping/spring-hanger-variability

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.