DISC SPRING

SF-TAF, DIN 2093

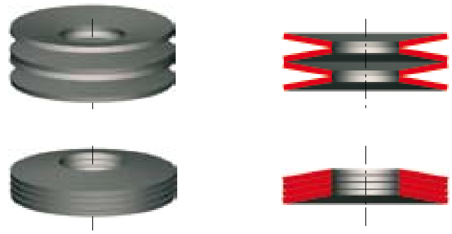
Disc springs for static and dynamic load

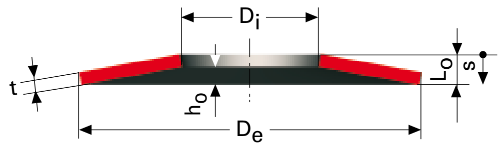
Disc springs are particularly suited for use in applications that require a high force but have limited space. By combining the springs in various ways, it is possible to obtain different forces and characteristics. See figures opposite.

The disc springs we stock are of the highest quality and have a special profile, which keeps the inner diameter unchanged when the spring is compressed. As a result, these springs produce very little friction, exhibit low working loss and have a considerably longer lifespan. The advantages afforded by this design are not requirements of standards SMS 2313 or DIN 2093.

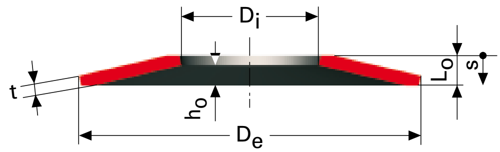
Disc springs are divided into three groups:

- Group 1: Springs with a thickness (t) < 1.25 mm have not been chamfered on inner or outer diameters.
- Group 2: Springs with a thickness (t) from 1.25 up to 6.0 mm are chamfered on inner and outer diameters.
- Group 3: Springs with a thickness (t) > 6.0 mm are chamfered on all sides. In addition, all contact surfaces are ground flat.





Group 1 and Group 2 springs



Group 3 springs

Disc springs for static load

We can manufacture disc springs of a simpler design in varying material qualities. These disc springs are intended for static loads, e.g. as tensioning washers in a threaded joint reinforcement.

Custom dimensions

Upon request, we also manufacture disc springs in custom sizes using both standard materials and special materials, e.g. stainless, acid-proof and heat-resistant materials, in a wide selection of qualities.

Packs

Disc springs are sold only in the pack sizes shown below. This does not apply to SF-TAF low force or SF-TAFR.

≤ 28	x 14.2	x 1.5	= 200 pcs
≥ 31.5	x 16.3	x 1.25	= 100 pcs
≥ 40	x 14.3	x 1.25	= Individually

Stock

Disc springs up to De < 150 are kept in stock.

All dimensions are in mm

D_e = Outer diameter

D_i = Inner diameter

t = Material thickness

t_1 = Material thickness (Group 3)

L_o = Unloaded length

h_o = Cup height, max. deflection

s = Deflection

F = Spring force in Newtons

Material: Group 1: CK 67/51CrV4
Group 2: 51CrV4
Group 3: 51CrV4

Finish: Shot peened, phosphated, blackened and oiled

1 kp = 9.80665 Newtons, 1 Newton = 0.10197 kp

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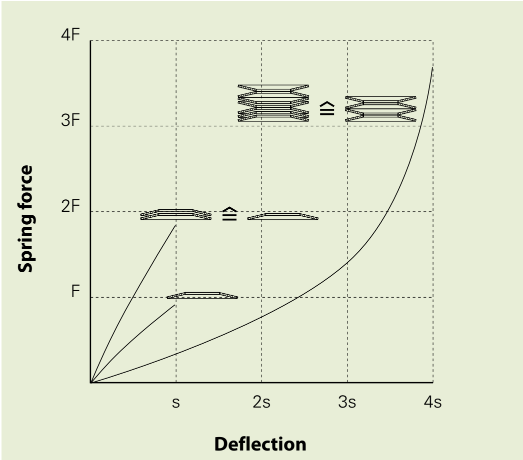
Spring location

D_i and D_e mm	Diametrical play mm
<16	0,2
>16–20	0,3
>20–26	0,4
>26–31,5	0,5
>31,5–50	0,6
>50–80	0,8
>80–140	1,0
>140–150	1,6
>250	2,0

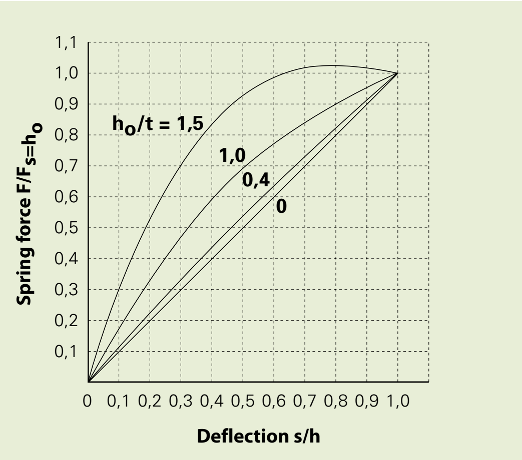
Progressive characteristic

By combining springs of different thickness in varying sequences, it is possible to obtain different progressive spring characteristics.



Characteristic for one spring

At dynamic load, cup height should only be used for 0.75 x h_O. The diagram shows how the spring characteristic is influenced by the ratio between cup height and material thickness (h_O/t). Information about this ratio can be found in the dimension tables. We can provide diagrams for each type and dimension on request.

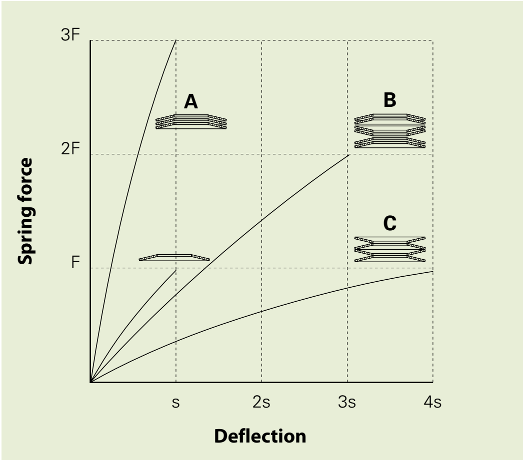


Characteristic for different combinations

A. 3 parallel stacked springs. The force according to the table x no. of parallel springs.

B. 2 parallel stack springs in series. Force according to the table x no. of parallel springs (in this case 2). Deflection h_O x no. of series (in this case 3).

C. Single stacked springs. Force as shown in the table. Deflection according to the table x no. of springs.



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Diameter tolerances

D_e and D_i mm	Tolerance D_e mm	Tolerance D_i mm
>3–6	0 / -0,12	0 / +0,12
>6–10	0 / -0,15	0 / +0,15
>10–18	0 / -0,18	0 / +0,18
>18–30	0 / -0,21	0 / +0,21
>30–50	0 / -0,25	0 / +0,25
>50–80	0 / -0,30	0 / +0,30
>80–120	0 / -0,35	0 / +0,35
>120–180	0 / -0,40	0 / +0,40
>180–250	0 / -0,46	0 / +0,46
>250–315	0 / -0,52	0 / +0,52
>315–400	0 / -0,57	0 / +0,57
>400–500	0 / -0,63	0 / +0,63
>500–600	0 / -0,68	0 / +0,68

Concentricity tolerances

D_e mm	Tolerance mm	
>3–6	0,15	2 x IT 11
>6–10	0,18	2 x IT 11
>10–18	0,22	2 x IT 11
>18–30	0,26	2 x IT 11
>30–50	0,32	2 x IT 11
>50–80	0,60	2 x IT 12
>80–120	0,70	2 x IT 12
>120–180	0,80	2 x IT 12
>180–250	0,92	2 x IT 12
>250–315	1,04	2 x IT 12
>315–400	1,14	2 x IT 12
>400–500	1,26	2 x IT 12
>500–600	1,36	2 x IT 12

Thickness and free height tolerances

Group	Thickness (t / t_1) mm	Tolerance Thickness (t) mm	Tolerance Free height (L_o) mm
1	0,2–0,6	+0,02 / -0,06	+0,10 / -0,05
1	>0,6–<1,25	+0,03 / -0,09	+0,10 / -0,05
2	1,25–2,0	+0,04 / -0,12	+0,15 / -0,08
2	>2,0–3,0	+0,04 / -0,12	+0,20 / -0,10
2	>3,0–3,8	+0,04 / -0,12	+0,30 / -0,15
2	>3,8–6,0	+0,04 / -0,12	+0,30 / -0,15
3	>6,0–15	±0,10	±0,30
3	>15–25	±0,12	±0,50*
3	>25–40	±0,15	±1,00*

* Applies to springs with D_e / t < 20

Spring force tolerances

Group	Thickness (t / t_1) mm	Tolerance at $s = 0.75\ h_o$ %
1	<1,25	+25 / -7,5
2	1,25–3,0	+15 / -7,5
2	>3,0–6,0	+10 / -5
3	>6,0–15	±5