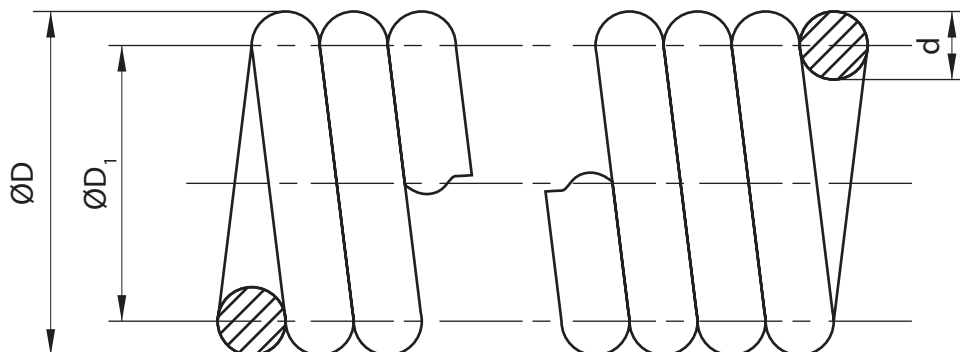



## spring specification

### s-mart tension spring



### standard dimensions

 dimension	D [mm]	d [mm]	D <sub>1</sub> [mm]	n [mm <sup>-1</sup> ]	F <sub>0</sub> [N]	F <sub>20%</sub> [N]	L [mm]
1,6 x 0,25	1,6	0,25	1,35	400	0,30	1,01	500
2,0 x 0,32	2,0	0,32	1,68	312,5	1,00	2,26	500
2,2 x 0,36	2,2	0,36	1,84	278	1,75	3,48	500
2,5 x 0,40	2,5	0,40	2,10	250	3,00	4,98	1000
2,8 x 0,45	2,8	0,45	2,35	222,2	4,50	7,04	1000
3,5 x 0,63	3,5	0,63	2,87	158,7	6,00	13,5	1000
4,0 x 0,80	4,0	0,80	3,20	125	12,00	29,87	1000
6,0 x 1,10	6,0	1,10	4,90	90,9	28,00	52,47	1000
8,0 x 1,60	8,0	1,60	6,40	62,5	40,00	111,5	1000

D : spring outside diameter

d : wire diameter

D<sub>1</sub> : average coil diameter

F<sub>0</sub> : internal preload

n : number of turns per 100 mm

c : spring rate

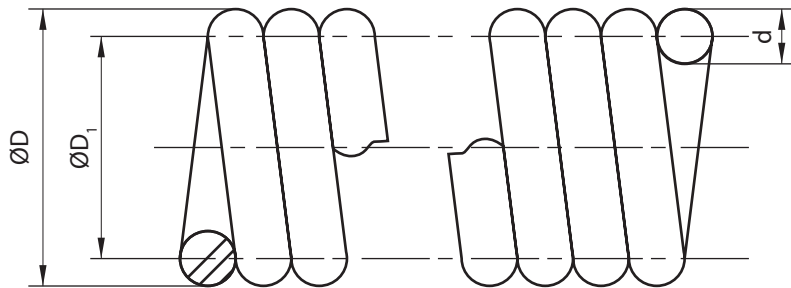
L : length

### material

nomenclature	DIN Nr.	usability*
X12 CrNi 177	1.4310	standard usage up to 250 °C

\* further details referring to the material according to materials of spring overview

## calculation



- D : spring outside diameter  
d : wire diameter  
D<sub>1</sub> : average coil diameter  
n : number of turns per 100 mm  
s : spring deflection

tension springs according to DIN 2089, part 2

## required spring deflection

the required spring deflection is a result of the construction type and of the load during operation.  
due to inadmissible deformations, the spring force is limited to  $F_{20\%}$ .

## required spring force

R01-P; R01-R; R01-AF: rotating:.....  $F = 0,0125 d_{\text{seal}}$   
R01-P; R01-R; R01-AF: swivel movement: .....  $F = 0,025 d_{\text{seal}}$   
R01-AS rotating: .....  $F = 0,025 d_{\text{seal}}$   
R01-AS swivel movement:.....  $F = 0,05 d_{\text{seal}}$

$d_{\text{seal}}$  ..... nominal inside diameter of seal

## calculation of the spring length:

the calculation of the necessary spring length is done by the formula below, spring specific data are included in the factor  $f_1$ . This factor has to be calculated separately for non standard springs.

$$FL = \frac{ID \cdot 100}{100 + f_1 \cdot (F - F_0)} \cdot \pi$$

$$f_1 = \frac{8 \cdot n \cdot D^3}{G \cdot d^4}$$

- FL : required spring length  
ID : spring slot diameter  
G : torsional strength (according to materials of spring overview)  
 $F_0$  : internal preload

D [mm]	1,6	2	2,2	2,5	2,8	3,5	4	6	8
d [mm]	0,25	0,32	0,36	0,40	0,45	0,63	0,80	1,10	1,60
n [mm <sup>-1</sup> ]	400	312,5	278	250	222,2	158,7	125	90,9	62,5
$f_1$ [N <sup>-1</sup> ]	28,189	15,811	11,536	10,119	7,868	2,665	1,119	0,817	0,280
$F_0$ [N]	0,3	1	1,75	3	4,5	6	12	28	40
$F_{20\%}$ [N]	1,01	2,26	3,48	4,98	7,04	13,5	29,87	52,47	111,5