SLOVENSKI STANDARD
kSIST FprEN 16983:2016

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Krožnikaste vzmeti - Specifikacije kakovosti - Mere

Disc springs - Quality specifications - Dimensions

Tellerfedern - Qualitätsanforderungen - Maße

Rondelles ressorts - Spécification de qualité - Dimensions

Ta slovenski standard je istoveten z: **FprEN 16983**

ICS:

21.160	Vzmeti	Springs

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English Version

Disc springs - Quality specifications - Dimensions

Rondelles ressorts - Spécification de qualité - Dimensions

Tellerfedern - Qualitätsanforderungen - Maße

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 407.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (FprEN 16983:2016) has been prepared by Technical Committee CEN/TC 407 “Project Committee - Cylindrical helical springs made from round wire and bar - Calculation and design”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Unique Acceptance Procedure.

This European Standard has been prepared by the initiative of the Association of the European Spring Federation ESF and is based on the German Standard DIN 2093 “Disc springs – Quality specifications – Dimensions”, which is known and used in many European countries.

1 Scope

This standard specifies the set of requirements that ensure the correct functioning of disc spring. These include requirements relating to the materials and manufacturing process, tolerances on dimensions and spring forces, and also the permissible relaxation and fatigue life of such springs as a function of stress.

All requirements specified here are minimum requirements.

This standard covers three dimensional series of disc springs.

NOTE In this standard, disc springs are divided into three groups and three dimensional series. Classification into groups is based on the manufacturing process, which is a function of the material thickness. The assignment of disc springs to dimensional series is governed by the h_0 / t ratio.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1654, *Copper and copper alloys - Strip for springs and connectors*

EN 10083 (all parts), *Steels for quenching and tempering*

EN 10089, *Hot-rolled steels for quenched and tempered springs - Technical delivery conditions*

EN 10132-4, *Cold rolled narrow steel strip for heat treatment - Technical delivery conditions - Part 4: Spring steels and other applications*

EN 10151, *Stainless steel strip for springs - Technical delivery conditions*

EN ISO 3269, *Fasteners - Acceptance inspection (ISO 3269)*

EN ISO 6507 (all parts), *Metallic materials - Vickers hardness test (ISO 6507)*

EN ISO 6508 (all parts), *Metallic materials - Rockwell hardness test (ISO 6508)*

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definition given in EN ISO 26909 apply.

NOTE Disc springs are annular coned elements that offer resistance to a compressive load applied axially. They may be designed as single disc springs or as disc springs stacked in parallel or in series, either singly or in multiples. They may be subjected to both static and fatigue loading, and may have flat bearings.

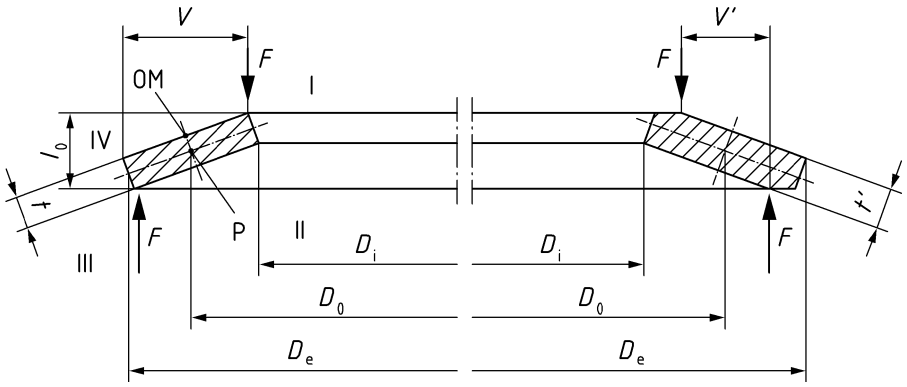
3.2 Symbols, units and abbreviated terms

Table 1 — Symbols, units and abbreviated terms

Symbol	Unit	Description
D_e	mm	Outer diameter of spring
D_i	mm	Inner diameter of spring
D_0	mm	Diameter of centre of rotation
E	MPa	Modulus of elasticity
F	N	Spring load
F_c	N	Design spring load when spring is in the flattened position
F_t	N	Test load for length L_t or l_t
ΔF	N	Relaxation
L_0	mm	Length of springs stacked in series or in parallel, in the initial position
L_c	mm	Design length of springs stacked in series or in parallel, in the flattened position
N		Number of cycles to failure
R	N/mm	Spring rate
W	N mm	Energy capacity of spring
h_0	mm	Initial cone height of springs without flat bearings, $h_0 = l_0 - t$
h_0'	mm	Initial cone height of springs with flat bearings, $h'_0 = l_0 - t'$
i		Number of disc springs or packets stacked in series
l_0	mm	Free overall height of spring in its initial position
l_t	mm	Test length of disc spring, $l_t = l_0 - 0{,}75\ h_0$
s	mm	Deflection of single disc spring
s_1, s_2, s_3 ...	mm	Spring deflections related to spring loads F_1, F_2, F_3...
t	mm	Thickness of single disc spring
t'	mm	Reduced thickness of single disc spring with flat bearings (group 3)
μ		Poisson's ratio
σ	MPa	Design stress
$\sigma_{II}, \sigma_{III}, \sigma_{OM}$	MPa	Design stresses at the points designated II, III, OM (see Figure 1)
σ_h	MPa	Fatigue stress related to the deflection of springs subject to fatigue loading
σ_O	MPa	Maximum fatigue stress
σ_U	MPa	Minimum fatigue stress
$\sigma_H = \sigma_O - \sigma_U$	MPa	Permanent range of fatigue stress
P		Theoretical centre of rotation of disc spring cross section (see Figure 1)
V, V'		Lever arms
R_a		Mean surface roughness

4 Dimensions and designation

4.1 General



a) without flat bearings:
Group 1
Group 2

b) with flat bearings:
Group 3

Figure 1 — Single disc spring of group 1, 2 or 3 (sectional view), including the relevant points of loading

Designation of a disc spring of dimensional series A with an outer diameter, D_e of 40 mm:

Disc spring FprEN 16984 — A 40

4.2 Disc spring groups

Table 2 — Disc spring groups

Group	t	With flat bearings and reduced thickness
1	< 1,25	No
2	1,25 ≤ t ≤ 6	No
3	6 < t ≤ 14	Yes

4.3 Dimensional series

Table 3 — Dimensional series

series	h_0/t
A	≈ 0,40
B	≈ 0,75
C	~1,30