BRITISH STANDARD

BS EN 15800:200

Incorporating corrigendum July 2009

Cylindrical helical springs made of round wire — Quality specifications for cold coiled compression springs

ICS 21.160

British Standards

National foreword

This British Standard is the UK implementation of EN 15800:2008. It partially supersedes BS 1726-1:2002, which is being revised to remove conflicting material. In the meantime, where conflict exists between the two standards the provisions of BS EN 15800:2008 take precedence.

The UK participation in its preparation was entrusted by Technical Committee FME/9, Fasteners, to subcommittee FME/9/3, Product standards for fasteners.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2009

ISBN 978 0 580 67550 8

Amendments/corrigenda issued since publication

Date	Comments
31 July 2009	Addition of supersession details, and correction to committee details, in National foreword

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15800

December 2008

ICS 21.160

English Version

Cylindrical helical springs made of round wire - Quality specifications for cold coiled compression springs

Ressorts cylindriques hélicoïdaux en fils ronds - Prescriptions de qualité des ressorts de compression façonnés à froid

Zylindrische Schraubenfedern aus runden Drähten - Gütevorschriften für kaltgeformte Druckfedern

This European Standard was approved by CEN on 18 October 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 15800:2008: E

Contents

Foreword

This document (EN 15800:2008) has been prepared by Technical Committee CEN/TC 378 "Project Committee – Springs", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2009, and conflicting national standards shall be withdrawn at the latest by June 2009.

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 2095 "Helical springs made of round wire — Specification for cold coiled compression springs", which is known and used in many European countries.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard applies to cylindrical helical compression springs made of round spring wire. Cold coiled compression springs can be made with wire up to about 16 mm diameter. (See also EN 13906-1).

Cylindrical helical springs made of round wire from European Standard materials are subject to the limiting values in Table 1:

Table 1

Characteristic	**Cold coiled compression springs**
Wire diameter	0,07 mm ≤ d ≤ 16 mm
Mean coil diameter	0,63 mm ≤ D ≤ 200 mm
Length of unloaded spring	L_o ≤ 630 mm
Number of active coils	$n \geq 2$
Spring index	4 ≤ w ≤ 20

A specification for the parameters of cold formed helical compression springs is given in Annex B.

2 Normative references

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

EN 10270-1, *Steel wire for mechanical springs — Part 1: Patented cold drawn unalloyed spring steel wire*

EN 10270-2, *Steel wire for mechanical springs — Part 2: Oil hardened and tempered spring steel wire*

EN 10270-3, *Steel wire for mechanical springs — Part 3: Stainless spring steel wire*

EN 12166, *Copper and copper alloys — Wire for general purposes*

3 Representation

Dimensions in millimetres

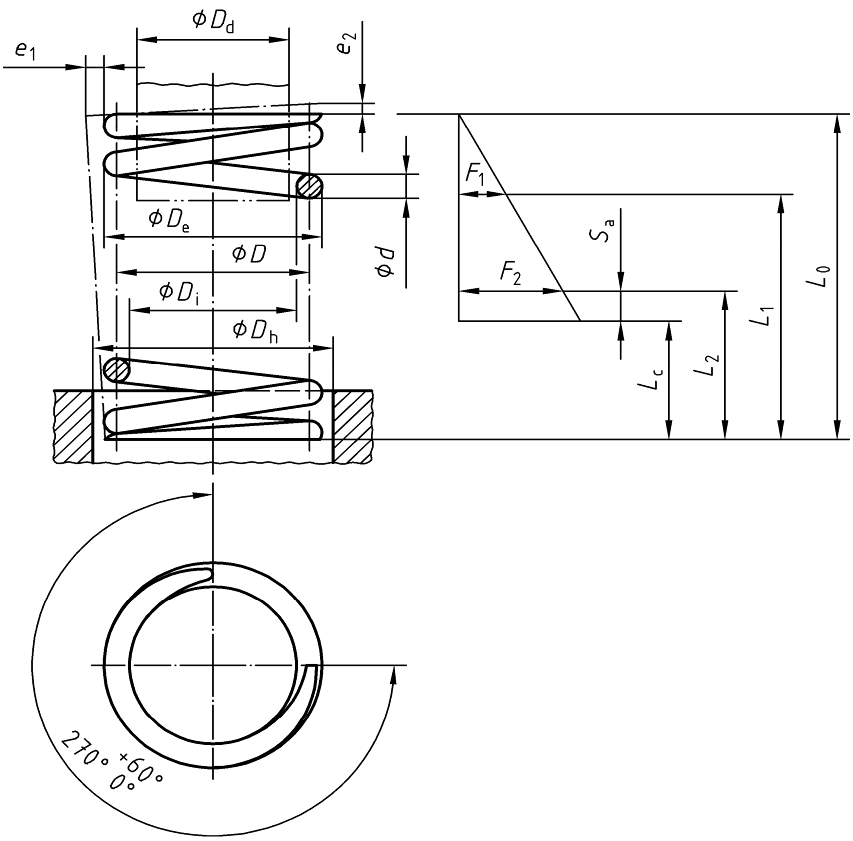


Figure 1 — Type 1 Spring ends closed and ground (with theoretical characteristic)

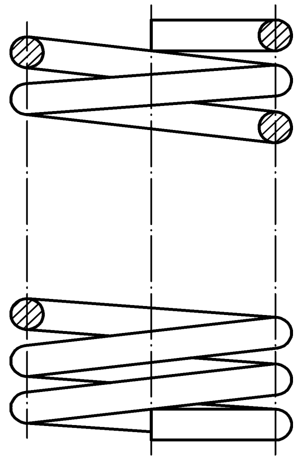


Figure 2 — Type 2 Spring ends closed

4 Definitions, symbols, units and terms

Table 2

Symbols	Units	Terms
a_F	N	Value for determining variations of spring force and spring length (effect of geometry and dimensions)
A_D	mm	Permissible variation of coil diameter (D_e, D_i, D) of unloaded spring
A_F	N	Permissible variation of spring force F at given spring length L
A_{L0}	mm	Permissible variation of length L_0 of unloaded spring
d	mm	Nominal diameter of wire (or bar)
d_{max}	mm	Upper deviation of d
D_e	mm	Outside diameter of spring
D_d	mm	Mandrel diameter (inner guide)
D_h	mm	Sleeve diameter (outer guide)
D_i	mm	Inside diameter of spring
$D = \frac{D_e + D_i}{2}$	mm	Mean diameter of spring
e_1	mm	Permissible variation of squareness of the unloaded ground spring
e_2	mm	Permissible variation in parallelism of the ground spring bearing surfaces, measured for D_e
F	N	Spring force
$F_1, F_2 ......$	N	Spring forces for the spring lengths L_1, L_2 (at ambient temperature of 20 °C)
$F_{c\ th}$	N	Theoretical spring force at solid length L_c NOTE The actual spring force at the solid length is as a rule greater than the theoretical force.
k_f	—	Factor for determining variations of spring force and spring length (effect of active coils)
L	mm	Spring length
L_0	mm	Nominal free length of spring
L_1	mm	Length at smallest test load F_1
$L_1, L_2 ......$	mm	Spring lengths for the spring forces F_1, $F_2 .....$
L_c	mm	Solid length
L_n	mm	Minimum permissible spring length (depending upon S_a)
n	—	Number of active coils
n_t	—	Total number of coils
Q	—	Coefficient of quality grade
$R = \frac{\Delta F}{\Delta s}$	N/mm	Spring rate
s_1 , $s_2 ....$	mm	Spring deflections, for the spring forces F_1, $F_2 ....$
s_c	mm	Spring deflection for the solid length L_c
s_h	mm	Deflection of spring (stroke) between two positions
S_a	mm	Sum of minimum gaps between adjacent active coils at spring length L_n
$w = \frac{D}{d}$	—	Spring index
$\lambda = \frac{L_0}{d}$	—	Slenderness ratio

5 Requirements

5.1 Coiling direction

Compression springs are generally made with right-hand coiling, or with alternating right-hand and left-hand coiling for nested spring assemblies; in this case the outer spring is usually right-hand coiled. If left-hand coiling for springs is required, this shall be obvious from the note "left-hand coiled" which shall appear in drawings or enquiries and order documents. See Annex B.

5.2 Spring ends

The spring ends whereby the spring force is transmitted to the connecting components shall be designed so that the deflection of the spring is as nearly axial as possible in every position of the spring. This is generally achieved by reducing the pitch of one finishing coil at each end. To obtain adequate bearing surfaces perpendicular to the spring axis, the wire ends are ground in accordance with Figure 1.

If grinding of the spring ends is found to be inexpedient, the spring should be made according to Figure 2, that means without ground wire ends. In all cases the type of finish for the spring ends shall be stated in one of the contractual documents: descriptive, drawings or enquiries and order documents. See Annex B.

If unground spring ends are acceptable for the particular use concerned, e.g. when the compression springs are made of wire having a diameter less than approximately 1 mm or with a spring index over 15, grinding of the wire ends should be omitted for economic reasons. See Annex B.

When the compression springs are made of wire having a diameter under 0,3 mm the wire ends should not be ground.

With regard to the simultaneous grinding of the spring ends of compression springs having a wire diameter from 0,3 mm up to about 5 mm it should be noted that only springs which allow adequate contact pressure can be ground flat.

Tests so far carried out indicate that this contact pressure shall amount to approximately

$$\frac{R}{D} \geq 0{,}03 \text{ N/mm}^2 \quad (1)$$

The spring ends should only be deburred if this is required for proper functioning, and shall be agreed between the spring manufacturer and the customer. This information shall be included in enquiries, drawings, and orders. See Annex B.

5.3 Solid length L_c

(all coils are closed)

For springs with ground ends according to Figure 1, the solid length is:

$$L_c \leq n_t \cdot d_{max} \quad (2)$$

For springs without ground ends according to Figure 2, the following applies:

$$L_c \leq (n_t + 1{,}5) \cdot d_{max} \quad (3)$$

where

n_t = $n + 2$

2 = Number of non-active coils

Springs have $n \geq 2$ coils

5.4 Material

The material selection shall be done in line with loading and function of the spring.

The materials covered by this standard are:

a) Patented cold drawn unalloyed spring steel wire to EN 10270-1.

b) Oil hardened and tempered spring steel wire to EN 10270-2.

c) Stainless spring steel wire to EN 10270-3.

d) Wire from copper and copper alloys to EN 12166.

5.5 Surface Treatment

5.5.1 Shot-peening

Springs may be shot peened, if agreed between manufacturer and customer.

5.5.2 Surface protection

Either organic or inorganic coatings may be applied, if agreed between manufacturer and customer.

6 Quality grades

6.1 Permissible variations of Quality Grades

For springs the quality grades 1, 2 and 3 are specified (for coefficients Q see Table 4).

All the permissible variations listed below apply only to material given in EN 10270. For materials in EN 12166, permissible variations shall be agreed between manufacturer and customer.

The choice between quality grades 1, 2 and 3 is governed by operational requirements. The quality grade required and the permissible variations shall be expressly agreed or stated in the drawing.

In the absence of information, quality grade 2 shall apply.

In the interests of rationalized production quality grade 1 should be specified only when the particular use calls for it. For this purpose not all the quantities in Subclauses 6.2 to 6.6 necessarily belong to a **single** quality grade. If variations smaller then "1" are required, agreements shall be made between manufacturer and customer.

6.2 Permissible variations of wire diameters *d*

The permissible variations for wire diameter *d* are specified in the corresponding material standards see 5.4.

6.3 Permissible variations A_D for coil diameter *D* of unloaded spring

For mean coil diameters *D* up to 200 mm, see Table 3.

In drawings and in enquiries and order documents the inner diameter D_i, or the external diameter D_e and the mean coil diameter D shall be stated.

The permissible variations specified for the mean coil diameter *D* apply to both the corresponding inner diameter D_i and the external diameter D_e.

In the case of springs working in a sleeve or on a mandrel, it is recommended that the smallest sleeve diameter or largest mandrel diameter also shall be stated.

Table 3

D mm		Permissible variations A_D mm								
		Quality grade 1 with spring index *w*			Quality grade 2 with spring index *w*			Quality grade 3 with spring index *w*		
above	to	4 to 8	above 8 to 14	above 14 to 20	4 to 8	above 8 to 14	above 14 to 20	4 to 8	Above 8 to 14	above 14 to 20
0,63	**1**	± 0,05	± 0,07	± 0,1	± 0,07	± 0,1	± 0,15	± 0,1	± 0,15	± 0,2
1	**1,6**	± 0,05	± 0,07	± 0,1	± 0,08	± 0,1	± 0,15	± 0,15	± 0,2	± 0,3
1,6	**2,5**	± 0,07	± 0,1	± 0,15	± 0,1	± 0,15	± 0,2	± 0,2	± 0,3	± 0,4
2,5	**4**	± 0,1	± 0,1	± 0,15	± 0,15	± 0,2	± 0,25	± 0,3	± 0,4	± 0,5
4	**6,3**	± 0,1	± 0,15	± 0,2	± 0,2	± 0,25	± 0,3	± 0,4	± 0,5	± 0,6
6,3	**10**	± 0,15	± 0,15	± 0,2	± 0,25	± 0,3	± 0,35	± 0,5	± 0,6	± 0,7
10	**16**	± 0,15	± 0,2	± 0,25	± 0,3	± 0,35	± 0,4	± 0,6	± 0,7	± 0,8
16	**25**	± 0,2	± 0,25	± 0,3	± 0,35	± 0,45	± 0,5	± 0,7	± 0,9	± 1,0
25	**31,5**	± 0,25	± 0,3	± 0,35	± 0,4	± 0,5	± 0,6	± 0,8	± 1,0	± 1,2
31,5	**40**	± 0,25	± 0,3	± 0,35	± 0,5	± 0,6	± 0,7	± 1,0	± 1,2	± 1,5
40	**50**	± 0,3	± 0,4	± 0,5	± 0,6	± 0,8	± 0,9	± 1,2	± 1,5	± 1,8
50	**63**	± 0,4	± 0,5	± 0,6	± 0,8	± 1,0	± 1,1	± 1,5	± 2,0	± 2,3
63	**80**	± 0,5	± 0,7	± 0,8	± 1,0	± 1,2	± 1,4	± 1,8	± 2,4	± 2,8
80	**100**	± 0,6	± 0,8	± 0,9	± 1,2	± 1,5	± 1,7	± 2,3	± 3,0	± 3,5
100	**125**	± 0,7	± 1,0	± 1,1	± 1,4	± 1,9	± 2,2	± 2,8	± 3,7	± 4,4
125	**160**	± 0,9	± 1,2	± 1,4	± 1,8	± 2,3	± 2,7	± 3,5	± 4,6	± 5,4
160	**200**	± 1,2	± 1,5	± 1,7	± 2,1	± 2,9	± 3,3	± 4,2	± 5,7	± 6,6

6.4 Permissible variations A_F for spring force F at given spring length L

The permissible variation for spring force is

$$A_F = \pm \left(a_F \cdot k_f + \frac{1{,}5\ F}{100} \right) \cdot Q \qquad (4)$$

The value a_F can be found from Figures 3 and 4 or can be calculated by the respective equation in Annex A.

The factor k_f is obtainable from Figure 5 and the coefficient Q from Table 4 or can be calculated by the respective equation in Annex A.

The a_F quantities specified in Figures 3 and 4 for springs according to Figure 1 apply only to springs which are resistant to buckling (see also EN 13906-1).

6.5 Permissible variations A_{L0} for length L_0 of unloaded spring

The length of the unloaded spring shall be up to 630 mm.

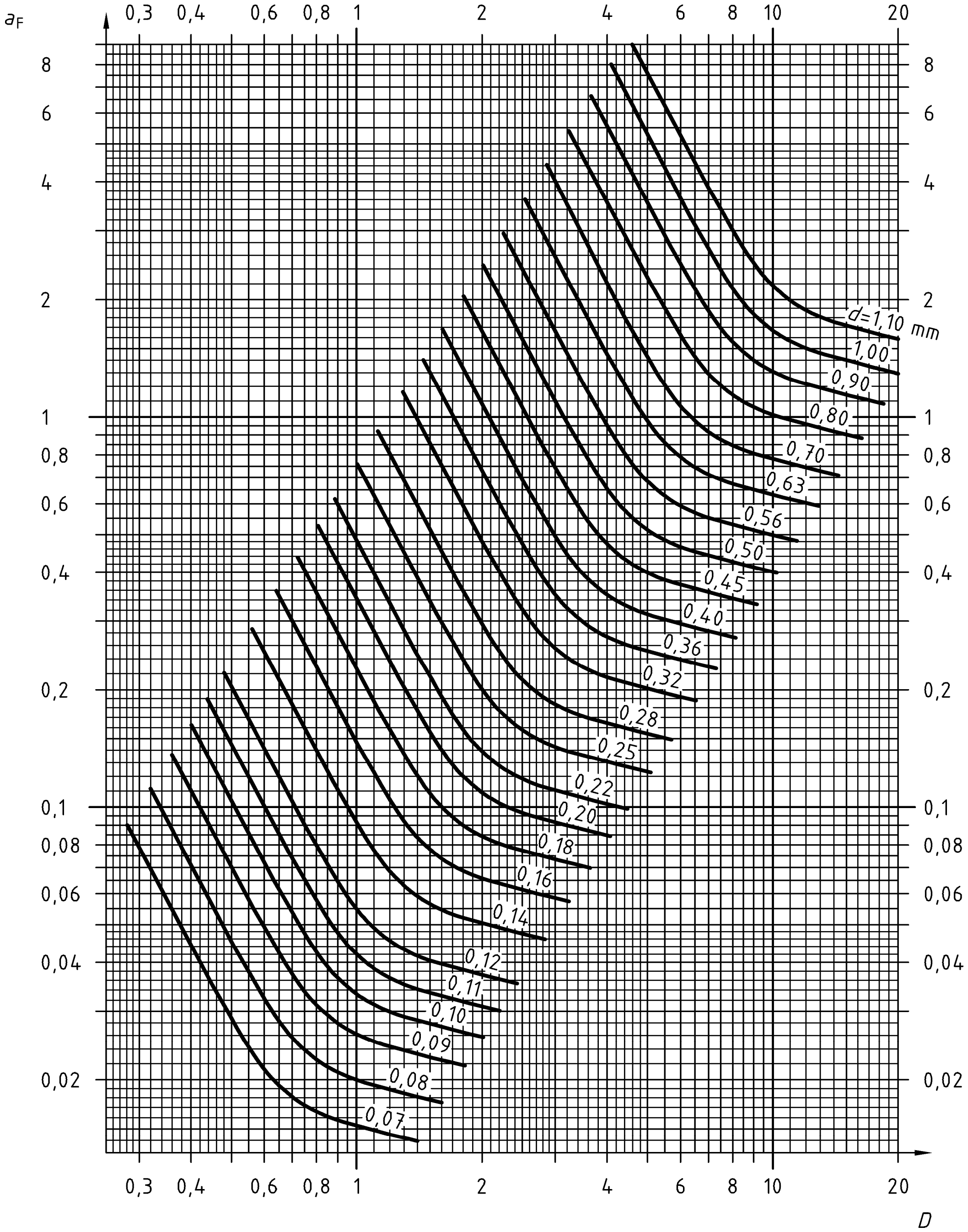
L_o is only toleranced in accordance with the requirements of 6.7.

The permissible variation is

$$A_{L0} = \pm \frac{a_F \cdot k_f \cdot Q}{R} \qquad (5)$$

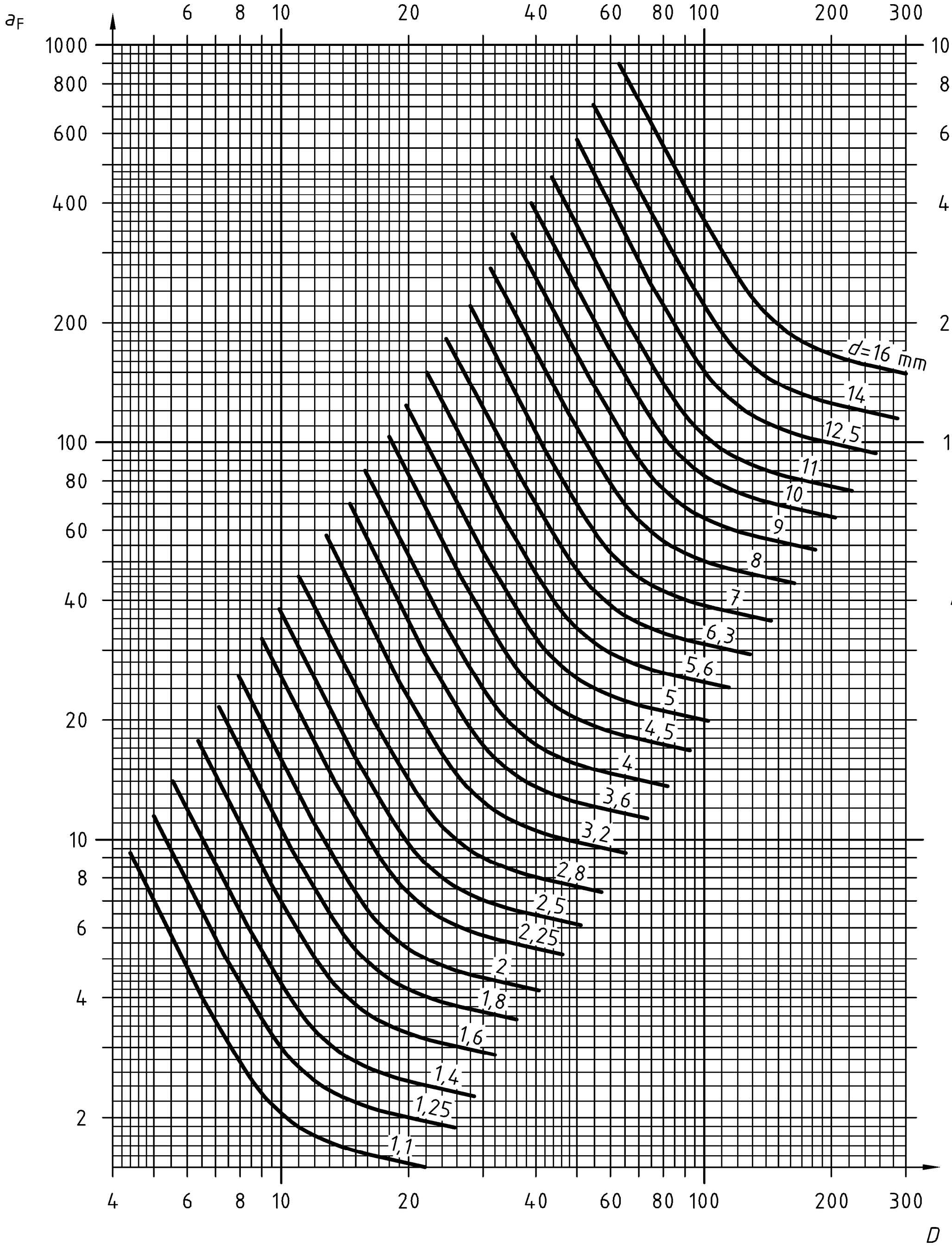
Table 4

Quality grade	Q
1	0,63
2	1,00
3	1,60



a_F in N
D in mm

Figure 3 — Value a_F; influence of geometry and dimensions on variations of spring force and spring length for wire diameters from 0,07 mm to 1,1 mm



a_F in N
D in mm

Figure 4 — Value a_F; influence of geometry and dimensions on variations of spring force and spring length for wire diameters from 1,1 mm to 16 mm

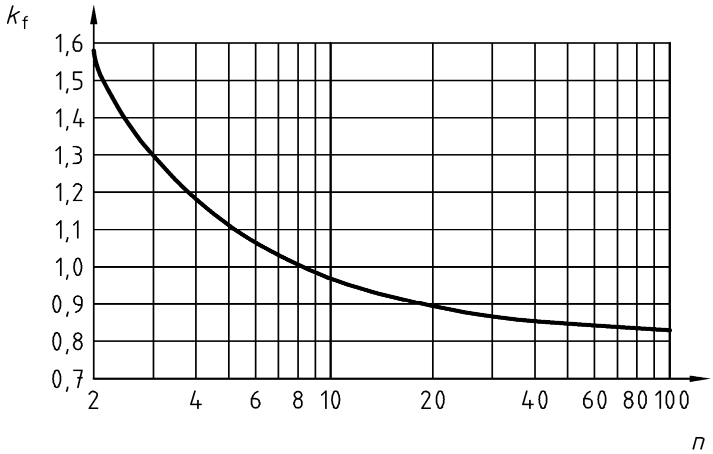


Figure 5 — Factor k_f; influence of active coils on variations of spring force and spring length

6.6 Permissible variations e_1 and e_2 of unloaded springs with ends closed and ground

Table 5

Quality grade	1	2	3
Variation e_1 of squareness from the vertical	0,03 L_0	0,05 L_0	0,08 L_0
Variation e_2 from parallelism	0,015 D_e	0,03 D_e	0,06 D_e

Values should only be specified for e_1 and e_2 (see Figure 1), if vital for the functioning of the spring.

Quality grade 1 can only be achieved with springs having a spring index $w \leq 12$ and a slenderness ratio $\lambda \leq 5$.

6.7 Production margin

The spring manufacturer needs a production margin in order to meet the permitted tolerances specified, see Table 6.

Table 6

Quantities specified	Production margin provided by:
One spring force and the corresponding length of the loaded spring	L_0
One spring force and the corresponding length of the loaded spring and the length of the unloaded spring L_0	n and d or n and D_e, D_i
Two spring forces and the corresponding lengths of the loaded spring	L_0, n and d or L_0, n and D_e, D_i

The numerical values of the items thus available as a production margin shall be stated in the drawings, enquiries and order documents and count only as reference values.

In the event of a production margin being utilized, care must be taken to ensure that the permissible shear stress is not exceeded (see EN 13906-1).

7 Testing

7.1 Static load testing

The testing is carried out on the spring in the upright position in the direction of loading. For this propose the given spring length L shall be attained in the increasing force direction only, and the corresponding force F read off. The maximum design force shall not be exceeded during the load testing. Permissible variation in the spring load indication shall be ± 1 %.

In the case of preset springs it is essential in all cases that prior to static testing they shall be compressed to the solid length or to an agreed spring length; in the case of nonpreset springs compression to the minimum length occurring in service or during installation is performed. This length shall be stated.

Springs which are not resistant to buckling (see EN 13906-1) shall be tested on a mandrel or in a sleeve, the diameters of the mandrel or sleeve and the test method being agreed.

7.2 Characteristic

The characteristic (force-deflection curve) calculated according to EN 13906-1 is a straight line for the helical compression spring. In practice, the characteristic is not linear at the start and finish. If it is desired to test the spring rate R by determining the spring characteristic, the testing shall be carried out in the range from 0,3 F_n to 0,7 F_n to make sure to cover the linear portion, in doing so F_n has to be associated with the smallest permissible test length L_n.

The spring rate R is therefore:

$$R = \frac{\Delta F}{\Delta L} = \frac{\Delta F}{\Delta s} = \frac{F_2 - F_1}{L_1 - L_2} = \frac{F_2 - F_1}{s_2 - s_1} \tag{6}$$

where ΔF is the increase in force corresponding to a reduction in length ΔL or the increase in deflection Δs (see Figure 6).

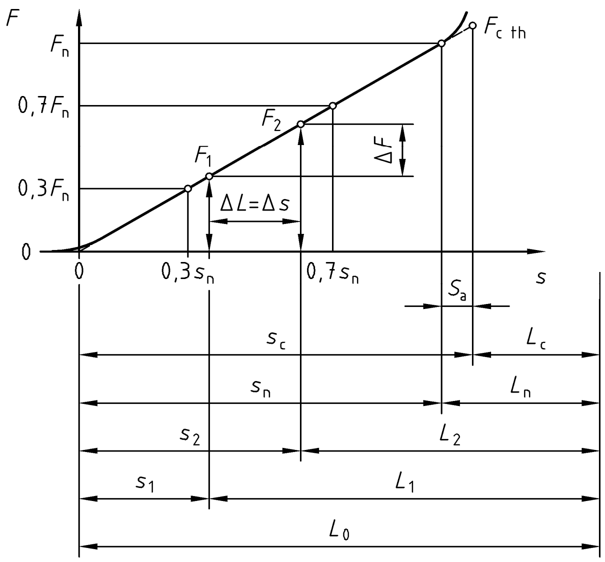


Figure 6 — Test diagram

7.3 Test load for pressing to solid length (settling testing)

Testing to solid length L_c shall be performed with not more than 1,5 times the theoretical spring force $F_{c\ th}$ corresponding to the solid length L_c.

Any testing of solid length is to be agreed between manufacturer and customer.

Annex A
(informative)

Declaration and formulas

This European Standard contains the agreements reached, in the present state of the art, between the branches of industry concerned regarding design, requirements and testing of cold coiled compression springs within the limits given in table 1. The permissible variations have been specified in a way that the manufacture and acceptance of relatively small quantities can also be performed with economically acceptable effort. For compression springs the quality grades 1, 2 and 3 are specified, the permissible variations being, for quality grade 1, 0,63 times, and for quality grade 3, 1,6 times those of the medium quality grade 2. Compression springs with force and length variations corresponding to quality grade 1 can be made with an average 1 % reject rate by utilizing ordinary production facilities and applying the measuring methods prevailing at the present day. Springs of this kind shall be 100 % tested and this entails increased expenditure in production. Quality grade 2 should therefore be specified as preferred because this quality grade can be guaranteed by adopting properly organized in-manufacture spot testing instead of 100 % testing. Quality grade 2 will usually yield the most favourable cost-quality ratio.

The average failure rate of 1 % for tolerances of force and lengths for quality grade 1 corresponds statistically to a spread of ± 2,58 s (s = standard deviation of the normal distribution, see ISO 16269-6).

The equations for figures 3, 4 and 5 are as follows:

$$k_\mathrm{f} = -\frac{1}{3 \cdot n^2} + \frac{8}{5 \cdot n} + 0{,}803 \qquad \text{(A.1)}$$

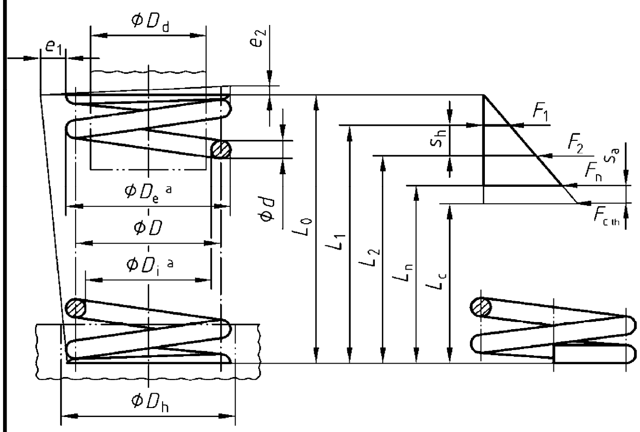
$$a_\mathrm{F} = 65{,}92 \cdot \frac{d^{3{,}3}}{D^{1{,}6}} \cdot \left[-0{,}84 \left(\frac{w}{10}\right)^3 + 3{,}781 \left(\frac{w}{10}\right)^2 - 4{,}244 \frac{w}{10} + 2{,}274 \right] \qquad \text{(A.2)}$$

$$w = \frac{D}{d} \qquad \text{(A.3)}$$

Applying these equations the spring index shall be $4 \le w \le 20$ (see Table 1).

Annex B
(informative)

Example - Specification for a Cylindrical Helical Compression Spring



d = ... mm
D_e = ... ± .... mm
D_i = ... ± .... mm
D = ... mm
D_d = ... mm
D_h = ... mm
L_0 = ... mm
L_1 = ... mm
L_2 = ... mm
L_n = ... mm
L_c = ... mm
s_h = ... mm
e_1 ≤ .... mm
e_2 ≤ .... mm
F_1 = ... ± .... N τ_c = ... N/mm²
F_2 = ... ± .... N τ_{k1} = ... N/mm²
F_n = ... ± .... N τ_{k2} = ... N/mm²
$F_{c\,th} \approx$ .... N τ_{kn} = ... N/mm²

variation of stress between two loads τ_{kh} .... N/mm²
spring rate R .... N/mm
spring index w ....
Stress correction factor k ....

[a] Specify tolerances of D_e or D_i !

Type 1 **Closed end coil and ground** O   Type 2 **Closed end coil** O

1	Number of active coils Total number of coils	n = ... n_t = ...
2	Direction of coils	right O left O
3	Burring of spring ends	no O inside O outside O
4	Working deflection	s_h = ... mm
5	Stress cycle frequency	f = ... Hz
6	Range of working temperature from .... to .... °C	
7	Wire or rod surface	drawn O rolled O tipless grinded O spring shot peened O
8	Surface protection:	
9	Material standard: .... Material name: .... Permissible shearing stress τ_{zul} = ... N/mm² Calc. basis of shear modulus G = ... N/mm²	

10 Permissible deviations

	Quality class 1	Quality class 2	Quality class 3
D_e, D_i	O	O	O
L_0	O	O	O
F_1	O	O	O
F_2	O	O	O
e_1	O	O	O
e_2	O	O	O

11	Production compensation	by:
	a) if the spring force and the spring length are specified	L_0 O
	b) if the spring force, the spring length and L_0 are specified	n and d O n and D_e, D_i O
	c) if two spring forces and the spring lengths are specified	L_0, n and d O L_0, n and D_e, D_i O
12	Setting length L_S = ... mm Set test springs! Supply remaining springs set O / not set O	springs to be supplied not set may be longer than L_0

The user of this form is allowed to copy this present form.

The terms k, τ_c, τ_{k1}, τ_{k2}, τ_{kn}, τ_{kh} and τ_{zul} detailed in Table B.1 are taken from EN 13906-1.

Table B.1

Symbol	Unit	Name
k	—	Stress correction factor (depending on D/d)
τ_c	N/mm^2	Uncorrected torsional stress, for the solid length L_c
τ_{k1}, τ_{k2} …	N/mm^2	Corrected torsional stress, for the spring forces F_1, F_2 …
τ_{kh}	N/mm^2	Corrected torsional stress range, for the stroke s_h
τ_{kn}	N/mm^2	Corrected torsional stress, for the spring force F_n
τ_{zul}	N/mm^2	Permissible torsional stress

Bibliography

[1] ISO 16269-6, *Statistical interpretation of data – Part 6: Determination of statistical tolerance intervals*

[2] EN 13906-1, *Cylindrical helical springs made from round wire and bar — Calculation and design — Part 1: Compression springs*

BSI - British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001 Email: orders@bsigroup.com You may also buy directly using a debit/credit card from the BSI Shop on the Website http://www.bsigroup.com/shop

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact Information Centre. Tel: +44 (0)20 8996 7111 Fax: +44 (0)20 8996 7048 Email: info@bsigroup.com

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001 Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsigroup.com/BSOL

Further information about BSI is available on the BSI website at http://www.bsigroup.com.

Copyright

Details and advice can be obtained from the Copyright and Licensing Manager. Tel: +44 (0)20 8996 7070 Email: copyright@bsigroup.com

BSI Group Headquarters 389 Chiswick High Road, London, W4 4AL, UK
Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/standards