INTERNATIONAL STANDARD

ISO 2162-2

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Technical product documentation — Springs —

Part 2: Presentation of data for cylindrical helical compression springs

Documentation technique de produits — Ressorts —

Partie 2: Présentation des données techniques des ressorts cylindriques de compression

Reference number
ISO 2162-2:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 2162-2 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation,* Sub-Committee SC 6, *Mechanical engineering documentation.*

ISO 2162 consists of the following parts under the general title *Technical product documentation — Springs*:

— *Part 1: Simplified representation*

— *Part 2: Presentation of data for cylindrical helical compression springs*

— *Part 3: Vocabulary*

Annexes A and B of this part of ISO 2162 are for information only.

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Technical product documentation — Springs —

Part 2:
Presentation of data for cylindrical helical compression springs

1 Scope

This part of ISO 2162 establishes a uniform system for the presentation of technical data and for the representation of cylindrical helical compression springs to be used in technical product documentation intended for e.g. tender and/or order drawings.

2 Normative references

The following standards contain provisions which through reference in this text, constitute provisions of this part of ISO 2162. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this part of ISO 2162 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2162-1:1993, *Technical product documentation — Springs — Part 1: Simplified representation.*

ISO 2162-3:1993, *Technical product documentation — Springs — Part 3: Vocabulary.*

3 Definitions

For the purposes of this part of ISO 2162, the definitions given in ISO 2162-3 apply.

4 Letter symbols

See table 1.

5 Presentation of data

5.1 General

The data presented shall comprise

a) graphical representation, information on action and on the type of finish to ends; and

b) design and manufacturing data.

5.2 Representation, data on the spring action and indication of the type of spring ends

Graphical representation of the spring shall be in accordance with ISO 2162-1.

Data on the spring action shall be indicated preferably by means of a load deflection chart (or graph) showing the predominant requirements necessary for the functioning of the spring together with any additional requirements.

The type of spring ends shall be indicated in accordance with table 2.

5.3 Technical data list

The technical data list presented shall include all information necessary for the manufacture of the springs. Possibilities for the adaptation of a certain spring to given requirements during manufacture shall be specified.

In particular, for springs working on a rod the minimum inside diameter of the coil shall be stated, and for springs working in a cylinder the maximum outside diameter of the coil shall be stated.

To aid economy in manufacture, tolerances on sizes should not be unnecessarily restrictive.

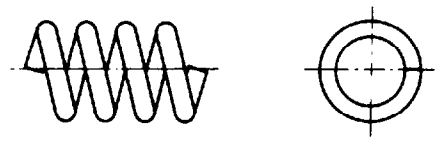
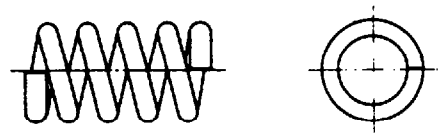
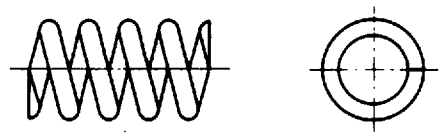
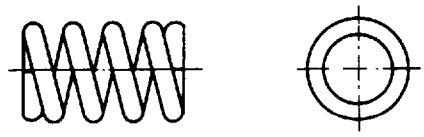
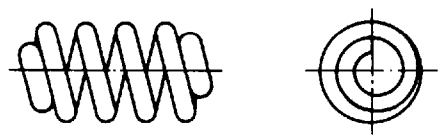
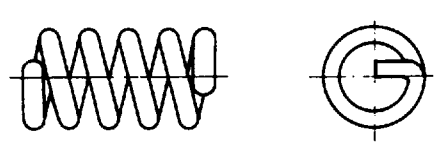
An example of a preprinted data list is given in annex A. This form provides a uniform scheme for the presentation and indication of data on helical compression springs, regardless of the method of data entry. It should be used for enquiries, offers and orders for this type of spring.

Table 1 — Spring design parameters and letter symbols

No.	Parameter	Unit	Letter symbol (Formula)
1	outside (external) diameter of spring	mm	D_e
2	enlargement of outside diameter of spring when loaded	mm	ΔD_e
3	inside diameter of spring	mm	D_i
4	mean diameter of coil	mm	$D\left(=\frac{D_e + D_i}{2}\right)$
5	diameter of wire (or bar)	mm	d
6	maximum outside diameter of wire (or bar)	mm	d_{max}
7	modulus of elasticity (or Young modulus)	N/mm^2 or MPa	E
8.1	load cycle frequency	Hz or s^{-1}	f
8.2	natural frequency (both ends fixed)	Hz or s^{-1}	f_e
9	spring load for the spring lengths $L_1, L_2, L_3, ..., L_n$ (at ambient temperature of 20 °C)	N	$F_1, F_2, F_3, ..., F_n$
10	spring load for the minimum test length L_n	N	F_n
11	theoretical spring load at solid length L_c	N	F_{cth}
12	spring load at temperatures other than 20 °C, e.g. spring load F_2 at 0 °C	N	$F_{2/0}$
13	modulus of rigidity	N/mm^2 or MPa	G
14	stress correction factor depending on D/d	—	k
15	free length	mm	L_0
16	spring length for the loads $F_1, F_2, F_3, ..., F_n$	mm	$L_1, L_2, L_3, ..., L_n$

No.	Parameter	Unit	Letter symbol (Formula)
17	minimum acceptable test length for F_n	mm	L_n
18	solid length	mm	L_c
19	active coils	—	n
20	total number of coils	—	n_t
21	static axial spring rate	N/mm	R_s
22	static transverse spring rate	N/mm	R_{tr}
23	lateral deflection force at defined axial force	N	φC
24	deflection of spring (stroke) between two loads	mm	s_h
25	torsion stress for $F_1, F_2, F_3, ..., F_n$	N/mm^2	$\tau_1, \tau_2, ..., \tau_n$
26	torsion stress for L_c	N/mm^2	τ_c
27	torsion stress range (corrected) for $F_1, F_2, F_3, ..., F_n$	N/mm^2	$\tau_{k1}, \tau_{k2}, ..., \tau_{kn}$
28	torsion stress (corrected) for a given stroke s_h	N/mm^2	τ_{kh}
29	working temperature (minimum/maximum)	°C	T
30	static axial flexibility	(N/mm)$^{-1}$	$1/R_s$
31	static transverse flexibility	(N/mm)$^{-1}$	$1/R_t$
32	working or test duration (during relaxation tests)	h	t
33	(required) total number of cycles up to rupture	—	N
34	permissible relaxation at defined initial stress (normally τ_2), temperature and duration	N/mm^2	δF

Table 2 — Types of spring ends

Form	Execution	View
A	open, not ground	
B	closed, not ground	
C	open, ground	
D	closed, ground	
E	closed, pigtail ends	
F	closed and bent to the centre	

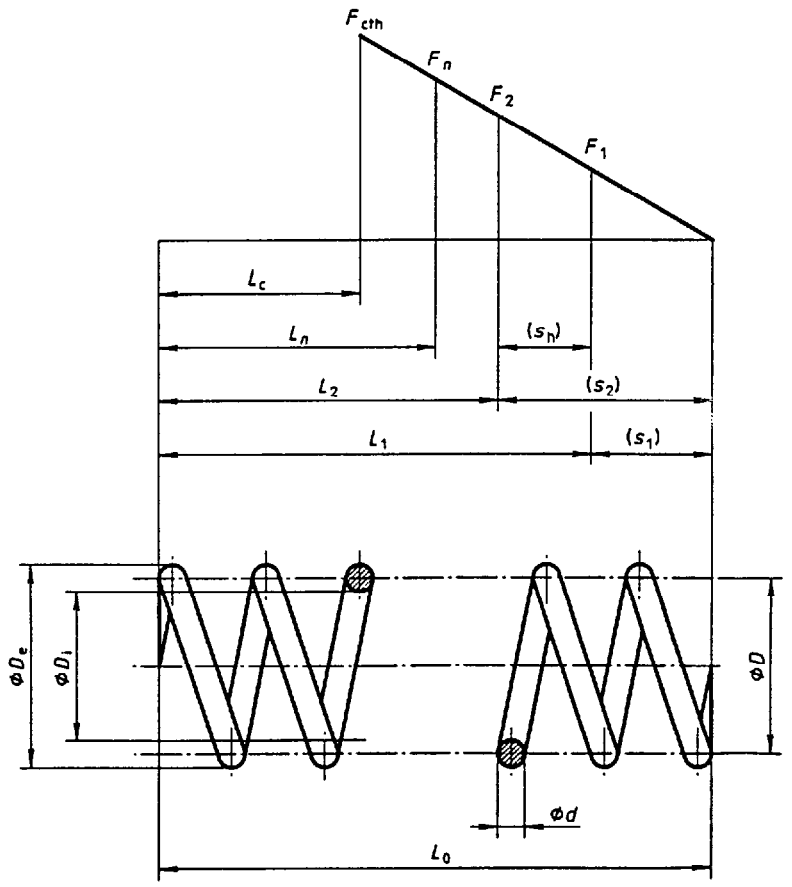
NOTE — The views show a right-hand (RH) spring. However, the same types of ends apply equally for left-hand (LH) springs.

Annex A
(informative)

Example of the presentation of a preprinted data set for a spring

NOTE 1 The actual size of data sheets is A4, in accordance with ISO 5457.

A.1 Front side, or page 1



Spring ends: Form C

Title block
(see ISO 7200)

A.2 Overleaf, or page 2

d	.....	mm	F_1	..... ±	N	s_h	.....	mm
D	.....	mm	L_1	.....	mm	τ_{kh}	.....	N/mm²
D_e	..... ±	mm	τ_1	.....	N/mm²	k	.....	—
D_i	..... ±	mm	τ_{k1}	.....	N/mm²	N	≥	—
L_0	..... ±	mm	F_2	..... ±	N	δF	≤	N/mm²
n	.....	—	L_2	.....	mm	f_e	.....	Hz
n_t	.....	—	τ_2	.....	N/mm²	R_s	.....	N/mm
L_c	.....	mm	τ_{k2}	.....	N/mm²	t	.....	h
F_{cth}	.....	N	F_n	.....	N	T [1]	..... /	°C
τ_c	.....	N/mm²	L_n	.....	mm			
			τ_n	.....	N/mm²			
			τ_{kn}	.....	N/mm²			

			Adaptation of the spring	
			Given requirements	Permissible deviations[3]
Direction of helix	LH ◯[2] RH ◯	◯	One load F_1, corresponding length L_1 and spring rate R_s	L_0, d, n_t
Load cycle frequency, f	static ◯ dynamic (time limited) ◯ dynamic (time unlimited) ◯	◯	Two loads F_1/F_2 and corresponding lengths L_1/L_2	L_0, d, n_t
Material	G: ..... N/mm² E: ..... N/mm²	◯	Length of the unpreset spring and spring rate R_s	d, n_t
Surface condition	drawn ◯ rolled ◯ machined ◯ shot-peening ◯ free of burr — inside ◯ — outside ◯	◯	One load F_1 and the load of the preset spring	L_0
Protective surface coating		◯	One load F_1, the length of the preset spring and the length of the unpreset spring L_0	n_t, d or n_t, D_e, D_i
Degree of presetting, or presetting load				

Further details, e.g. on surface conditions or tolerances

1) Minimum/maximum.
2) ◯ Mark where applicable.
3) The listed parameters may be altered in order to meet the given requirements.

Annex B
(informative)

Bibliography

[1] ISO 5457:1980, *Technical drawings — Sizes and layout of drawing sheets.*

[2] ISO 7200:1984, *Technical drawings — Title blocks.*

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Descriptors: drawings, technical drawings, springs, helical springs, technical data sheets.

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