

Technical product documentation — Springs

Part 2. Presentation of data cylindrical helical compression springs

The European Standard EN ISO 2162-2 : 1996 has the status of a
British Standard

ICS 01.100.20; 21.160



Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee TDE/4, Engineering drawing practice, upon which the following bodies were represented:

Atomic Weapons Establishment
British Gas plc
British Standards Society
Drawing Office Material Manufacturers' and Dealers' Association
Electricity Association
Gauge and Tools Makers' Association
HEVAC Association
Institution of Chemical Engineers
Institution of Engineering Designers
Power Generation Contractors' Association
Society of British Aerospace Companies Ltd.
University of Warwick

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Contents

| | Page |
|--|--------------------|
| Committees responsible | Inside front cover |
| National foreword | ii |
| Foreword | 2 |
| 1 Scope | 3 |
| 2 Normative references | 3 |
| 3 Definitions | 3 |
| 4 Letter symbols | 3 |
| 5 Presentation of data | 3 |
| Annexes | |
| A (informative) Example of the presentation of a preprinted data set for a spring | 7 |
| B (informative) Bibliography | 10 |
| ZA (normative) Normative references to international publications with their relevant European publications | 11 |
| Tables | |
| 1 Spring design parameters and letter symbols | 4 |
| 2 Types of spring ends | 6 |

National foreword

This British Standard has been prepared by Technical Committee TDE/4 and is the English language version of EN ISO 2162-2 : 1996 *Technical product documentation — Springs Part 2: Presentation of data for cylindrical helical compression springs*, published by the European Committee for Standardization (CEN). It is identical with ISO 2162-2 : 1993 published by the International Organization for Standardization (ISO).

It is envisaged that when the full range of European Standards on technical drawing is implemented BS 308 will be withdrawn.

Cross-references

| Publication referred to | Corresponding British Standard |
|---|---|
| EN ISO 2162-1 : 1996 (ISO 2162-1 : 1993) | BS EN ISO 2162 <i>Technical product documentation — Springs</i> BS EN ISO 2162-1 : 1996 <i>Simplified representation</i> |
| EN ISO 2162-3 : 1996 (ISO 2162-3 : 1993) | BS EN ISO 2162-3 : 1996 <i>Vocabulary</i> |

Compliance with a British Standard does not of itself confer immunity from legal obligations.

ICS 01.100.20; 21.160

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

English version

Technical product documentation — Springs —
Part 2: Presentation of data for cylindrical helical compression
springs

(ISO 2162-2 : 1993)

Documentation technique de produits —
Ressorts —
Partie 2: Présentation des données techniques
des ressorts cylindriques de compression
(ISO 2162-2 : 1993)

Technische Produktdokumentation —
Federn —
Teil 2: Angaben für zylindrische
Schraubendruckfedern
(ISO 2162-2 : 1993)

This European Standard was approved by CEN on 1996-03-02. 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 Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels



Foreword

The text of the International Standard from Technical Committee ISO/TC 10, Technical drawings, product definition and related documentation, of the International Organization for Standardization (ISO) has been taken over as a European Standard by the Technical Board of CEN.

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 January 1997, and conflicting national standards shall be withdrawn at the latest by January 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

NOTE. Normative references to International Standards are listed in annex ZA (normative).

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.



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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.

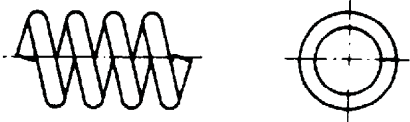

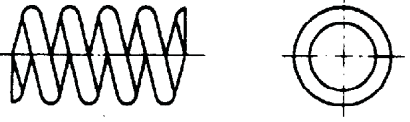
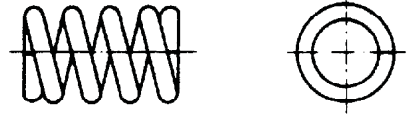
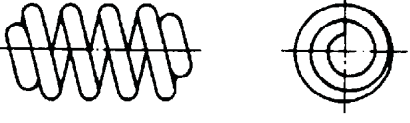
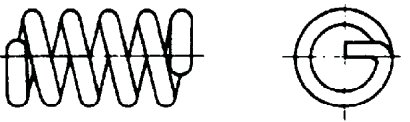
Table 1 — Spring design parameters and letter symbols

| 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 $L_1, L_2, L_3, \dots, L_n$ (at ambient temperature of 20 °C) | N | $F_1, F_2, F_3, \dots, F_n$ |
| 10 | spring load for the minimum test length L_n | N | F_n |
| 11 | theoretical spring load at solid length L_c | N | F_{eth} |
| 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 $F_1, F_2, F_3, \dots, F_n$ | mm | $L_1, L_2, L_3, \dots, L_n$ |

| 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 $F_1, F_2, F_3, \dots, F_n$ | N/mm ² | $\tau_1, \tau_2, \dots, \tau_n$ |
| 26 | torsion stress for L_c | N/mm ² | τ_c |
| 27 | torsion stress range (corrected) for $F_1, F_2, F_3, \dots, F_n$ | N/mm ² | $\tau_{k1}, \tau_{k2}, \dots, \tau_{kn}$ |
| 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 | $\sqrt[3]{R_s}$ |
| 31 | static transverse flexibility | (N/mm) ⁻¹ | $\sqrt[3]{R_{tr}}$ |
| 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.

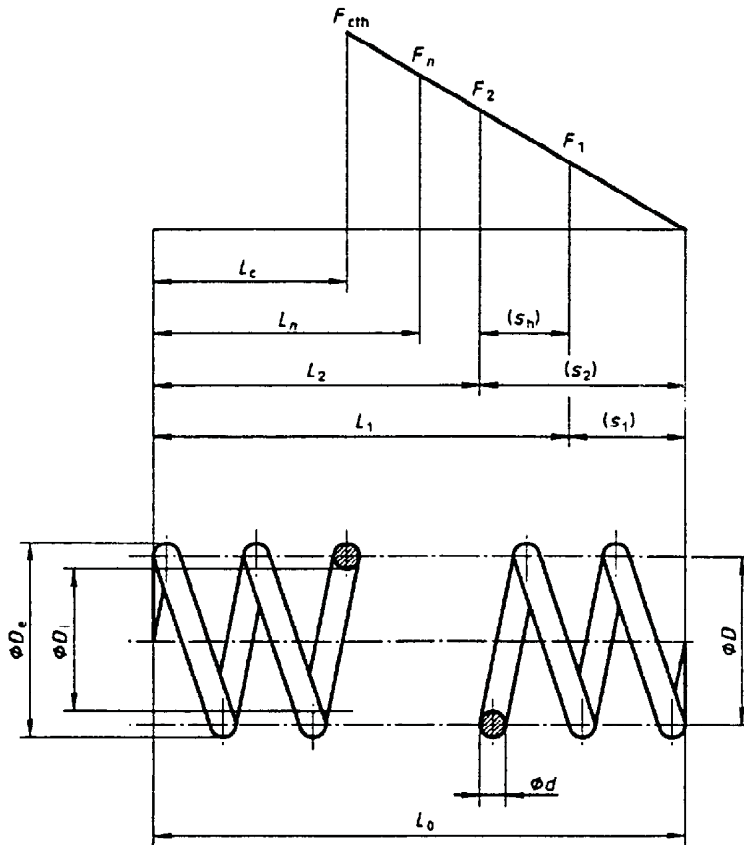
Annex A
(informative)

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

A.2 Overleaf, or page 2

| | | | | | |
|-----------|-------------------------|-------------|-------------------------|-------------------|--------------------------|
| d | mm | F_1 | ±..... N | s_h | mm |
| D | mm | L_1 | mm | τ_{kh} | N/mm ² |
| D_e | ±..... mm | τ_1 | N/mm ² | k | — |
| D_i | ±..... mm | τ_{k1} | N/mm ² | N | ≥..... — |
| L_0 | ±..... mm | F_2 | ±..... N | δF | ≤..... N/mm ² |
| n | — | L_2 | mm | f_e | Hz |
| n_t | — | τ_2 | N/mm ² | R_s | N/mm |
| L_c | mm | τ_{k2} | N/mm ² | t | h |
| F_{cth} | N | F_n | N | T ¹⁾ | /..... °C |
| τ_c | N/mm ² | L_n | mm | | |
| | | τ_n | N/mm ² | | |
| | | τ_{kn} | N/mm ² | | |

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

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.

* S *

Annex B
(informative)

Bibliography

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

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

Annex ZA (normative)

Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

| Publication | Year | Title | EN | Year |
|-------------|------|--|---------------|------|
| ISO 2162-1 | 1993 | <i>Technical product documentation — Springs — Part 1: Simplified representation</i> | EN ISO 2162-1 | 1996 |
| ISO 2162-3 | 1993 | <i>Technical product documentation — Springs — Part 3: Vocabulary</i> | EN ISO 2162-3 | 1996 |



List of references

See national foreword.



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