

Cylindrical helical springs made from round wire and bar — Guide to methods of specifying, tolerances and testing —

Part 2: Extension springs

ICS 21.160

Confirmed May 2009

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee GME/15, Mechanical springs, upon which the following bodies were represented:

British Impact Treatment Association
Institute of Spring Technology

This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 25 September 2002

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The following BSI references relate to the work on this British Standard:
Committee reference GME/15
Draft for comment 02/702407 DC

ISBN 0 580 39720 3

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

BS 1726-2 was first published in 1951 and revised in 1964 to incorporate much of the essential information from ADE Design Data Sheets, which were no longer available from HM Stationery Office and for which copyright permission to republish was obtained. The standard was revised in 1988 take account of current manufacturing processes.

BS EN 13906-2 was published in 2001 and under the rules of CEN the UK is obliged to withdraw conflicting standards.

This edition of BS 1726-2 includes those provisions of the previous edition not included in the EN standard.

Together with BS EN 13906-2:2001, this edition of BS 1726-2 supersedes BS 1726-2:1988, which is withdrawn.

BS 1726 is published in three parts:

- *Part 1: Compression springs;*
- *Part 2: Extension springs;*
- *Part 3: Torsion springs.*

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document consists of a front cover, an inside front cover, pages i and ii, pages 1 to 13 and a back cover.

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1 Scope

This Part of BS 1726 provides guidance on the specification, tolerancing and testing of parallel sided helical compression springs manufactured from round wire and bar.

Two grades of tolerance, 1 and 2, are given for springs.

Fifteen types of end coils are provided for, these being divided into three groups.

This standard applies to springs which have not been subjected to heat treatment other than stress relieving after coiling.

This standard gives two methods of specifying springs and a methods of testing springs.

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 applies.

BS 887, *Specification for precision vernier callipers*.

BS 969, *Specification for limits and tolerances on plain limit gauges*.

BS EN ISO 7500-1, *Tension/compression testing machines — Verification and calibration of the force measuring system*.

BS 1726-1, *Cylindrical helical springs made from round wire and bar — Guide to methods of specifying, tolerances and testing — Part 1: Compression springs*.

BS EN ISO 3650, *Geometrical product specifications (GPS) — Length standards — Gauge blocks*.

BS 5411, *Methods of test for metallic and related coatings*.

BS EN 13906-2, *Cylindrical helical springs made from round wire and bar — Calculation and design — Part 2: Extension springs*.

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this Part of BS 1726 the definitions given in BS 1726-1 apply as relevant.

3.2 Symbols

Symbol	Term	Unit
C	spring index	—
D	mean coil diameter	mm
D_i	inside diameter of spring	mm
D_o	outside diameter of spring	mm
D	material diameter	mm
E	material diameter tolerance	mm
f	natural frequency of unloaded spring	Hz
F	spring force	N
F_o	nominal initial tension	N
$F_1, F_2, \text{etc.}$	force at length $L_1, L_2, \text{etc.}$	N
ΔF	change in spring force	N
G	modulus of rigidity	N/mm ²
K	stress correction factor	—
L	spring length	mm
L_B	spring body length	mm
L_H	hook opening gap	mm

Symbol	Term	Unit
L_L	loop length	mm
$L_{\max.}$	maximum length to which the spring will be extended in assembly or use	mm
L_o	free length of spring	mm
$L_{o, \max.}$	maximum free length of spring	mm
$L_{o, \text{tol.}}$	free length tolerance	mm
ΔL	change in spring length	mm
n	number of active coils in spring	—
N	total number of coils in spring	—
R_m	minimum tensile strength	N/mm ²
S	spring rate	N/mm
$S_{\text{tol.}}$	spring rate tolerance	N/mm
δ	extension from nominal free length to loaded length	Mm
ρ	density of material	kg/mm ³
τ	shear stress in spring	N/mm ²
τ_0	shear stress in spring with initial tension	N/mm ²
$\tau_1, \tau_2, \text{etc.}$	shear stress in spring at $F_1, F_2, \text{etc.}$	N/mm ²

4 Specifying springs for general purposes

4.1 Introduction

There are two methods by which a customer may specify a spring. In the first method the customer presents the supplier with a complete design and indicates what manufacturing processes, such as stress relieving, prestressing and shot peening, should be carried out. In this case the information should be supplied on Data Sheet 1 (Figure 1).

When the customer does not have the information to complete Data Sheet 1, the customer should complete Data Sheet 2 (Figure 3). This is an application for spring design in which the customer should specify the requirements from an operational point of view, giving such information as dimensional constraints, force-length parameters, fatigue life, resistance to corrosion, in order that the supplier can produce a spring design to meet these requirements.

When the spring supplier has prepared a design from the information on Data Sheet 2 the spring supplier will complete Data Sheet 1 and submit it to the customer for approval.

4.2 Method one (customer design) using Data Sheet 1

4.2.1 General

It is not necessary to prepare a detailed scale drawing for a helical compression spring and details should be specified on Data Sheet 1 (Figure 1). Only essential dimensions and properties, for which the spring is to be inspected, need be toleranced, other features being given in the design for information only.

The following points should be noted before completing the form.

- Specify only those particulars which are of functional importance by marking the appropriate squares in boxes 5, 6 and 8 of data sheet 1.
- Avoid redundant dimensioning.
- Refer to BS EN 13906-2 for the methods of calculation used to determine values for rate, force and stress.
- If space is insufficient in any box, further details should be attached on a separate sheet and attention drawn to this fact in the relevant box on the form.