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Springs — Symbols

Ressorts — Symboles

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Foreword

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The committee responsible for this document is ISO/TC 227, *Springs*.

Introduction

Several spring symbols related to cylindrical helical compression springs specified in ISO 2162-2 have been quoted according to this International Standard.

In this International Standard, existing spring symbols that have been used globally and customarily among several nations or regions are adopted without major alteration.

Existing spring symbols that have been used locally or in a limited nation/region have been redesigned in a logical way according to a particular rule for creating new spring symbols.

Springs — Symbols

1 Scope

This International Standard specifies general principles for the creation of symbols of physical quantities, coefficients, and parameters for metal springs. It specifies the presentation of basic characters, subscripts, and application symbols for use in the field of helical compression springs, helical extension springs, helical torsion springs, flat springs, and leaf springs with attention to technical product documentation, especially for describing and ordering.

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.

ISO 26909, *Springs — Vocabulary*

ISO 80000-1, *Quantities and units — Part 1: General*

ISO 80000-4, *Quantities and units — Part 4: Mechanics*

3 Terms and definitions

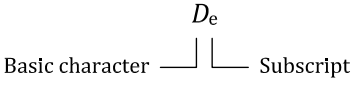
For the purposes of this document, the terms and definitions given in ISO 26909 and the following apply.

3.1
basic character
main part of spring symbols representing physical quantities, coefficients, and parameters of springs

3.2
subscript
second part of spring symbols that follows basic characters in order to modify the physical quantities, coefficients, and parameters with respect to properties, feature, numbering, etc.

3.3
application symbol
combination of basic character and subscript

EXAMPLE Application symbol



4 Composition of spring symbols

4.1 General

Simple spring symbols consist of basic characters alone. Subscripts may be added to these basic characters to create more complex symbols.

Quantities and units used are specified in accordance with ISO 80000-1 and ISO 80000-4.

For the purpose of international applicability, all basic characters and subscripts should be derived from English words, and designations used in technical literature up to the time of publication of this International Standard are adopted as far as possible. Wide conformity of the symbols for springs has been attempted.

The characters that are permitted to be used for spring symbols are Latin letters (upper case or lower case), Greek letters (upper case or lower case), and Arabic numbers.

NOTE 1 As there is a risk of confusion with the Arabic number 0, the following Latin letters have not been specified: *O* (upper case letter), *o* (lower case letter).

NOTE 2 As there is a risk of confusion with Latin letters, the following Greek letters have not been specified: *A*, *B*, *E*, *Z*, *H*, *I*, *K*, *κ*, *M*, *N*, *O*, *o*, *P*, *T*, *Y* and *X*.

4.2 Basic characters

Basic characters consist of one upper case letter or lower case letter written in Latin or Greek alphabet.

The letter should be derived from the corresponding spring term or designation in English.

Variables shall be in italic typeface.

EXAMPLES D for coil diameter, τ for torsional stress

4.3 Subscripts

Subscripts consist of one, two or three letters, digits, or letter/digit combinations of Latin letters, Greek letters or Arabic numbers.

EXAMPLE 1 D_{e} (e: one letter)

EXAMPLE 2 A_{L0} (*L0*: two letters)

EXAMPLE 3 $d_{\max}$ (max: three letters)

Subscripts should be as short as possible. A single letter/digit is preferable; however, when the symbol of a single letter/digit overlaps with an existing symbol or if it is difficult to describe the meaning with a single letter/digit, two or three letters/digits are acceptable.

EXAMPLE 4 A_M (*M*: one letter taken from “moment”)

EXAMPLE 5 $d_{\max}$ (max: three letters taken from “maximum”)

The letters should be derived from the corresponding spring terms or designation in English.

Subscripts that represent physical quantities shall be printed in italic typeface. Others shall be printed in roman typeface. Subscripts of Arabic numbers should be printed in roman typeface. However, running numbers are generally printed in italic typeface.

EXAMPLE 6 A_{L0} (*L0*: free length: italic type)

EXAMPLE 7 l_{A} (A: length at leg A: roman type)

EXAMPLE 8 L_1 (*1*: running number: italic type)

Up to two sets of subscripts are permitted in one spring symbol. In this case, they shall be separated by means of a comma (,) but without a space between them.

EXAMPLE 9 $r_{\mathrm{w,A}}$ (w,A: effective working radius of leg A)

5 Creation of new spring symbols

5.1 General

New spring symbols created in the future should follow the rules described below. The composition of the symbols should conform to Clause 4.

5.2 Latin letters and Greek letters for basic characters

Latin letters for basic characters are used when describing coefficients or quantities measured by devices or instruments, e.g. length, diameter, and load (including mean value).

Greek letters for basic characters are used when describing the quantities calculated, e.g. stress, deflection, and amount of loss.

5.3 Upper case letters and lower case letters for basic characters

Upper case letters for basic characters are used when describing quantities of the whole spring shape or function.

EXAMPLES 1 L for spring length, D for diameter of coil, F for spring load

Lower case letters for basic characters are used when describing quantities of spring materials or partial dimensions.

EXAMPLES 2 d for diameter of wire, l for straight length at coil end

5.4 Latin letters and Greek letters for subscripts

Basic Latin letters and Greek letters shall be used for subscripts.

When subscripts are abbreviated terms, they shall be in Latin typeface only.

5.5 Upper case letters and lower case letters for subscripts

In the case of subscripts consisting of a single character, upper case letters should be used basically.

When a subscript consists of a single character and the upper case letter of this character is already used for an existing symbol, the lower case letter may be used.

When an upper case letter is used as a basic character, the corresponding subscript should be the upper case letter.

When a lower case letter is used as a basic character, the corresponding subscript should be the lower case letter.

In the case of subscripts consisting of two or three characters, lower case letters should be used basically.

6 Basic character and subscript components of spring symbols

6.1 Basic character components

Basic characters are shown in Table 1.

Table 1 — List of basic characters

No.	Symbol	Parameter	Compression	Extension	Torsion	Flat	Leaf
1.1	*A*	permissible variation	X	X	X	X	X
1.2	*b*	width or breadth	—	—	—	X	X
1.3	*C*	camber	—	—	—	—	X
1.4	*D*	spring diameter	X	X	X	—	—
1.5	*d*	wire diameter	X	X	X	—	—
1.6	*E*	modulus of elasticity	—	—	X	X	X
1.7	*e*	perpendicularity	X	—	—	—	—
		parallelism	X	—	—	—	—
1.8	*F*	spring load or force	X	X	X	X	X
1.9	*f*	frequency	X	X	X	X	X
1.10	*G*	modulus of rigidity	X	X	—	—	—
1.11	*H*	spring height	—	—	—	—	X
1.12	*L*	spring length	X	X	X	—	—
1.13	*l*	leg length	—	—	X	—	—
		beam length	—	—	—	X	—
		span length	—	—	—	—	X
1.14	*M*	moment or spring torque	—	—	X	X	—
1.15	*m*	hook opening	—	X	—	—	—
1.16	*N*	number of cycles	X	X	X	X	X
1.17	*n*	number of coils	X	X	X	—	—
		number of leaves	—	—	—	—	X
1.18	*p*	pitch	X	—	—	—	—
1.19	*R* See Annex A	spring rate	X	X	X	X	X
1.20	*r*	radius	—	X	X	X	—
1.21	*s*	spring deflection	X	X	—	X	X
1.22	*T*	temperature	X	X	X	X	X
1.23	*t*	thickness of beam or leaf	—	—	—	X	X
1.24	*α*	position angle when unloaded only	—	—	X	—	—
		torsional angle or working angle	—	—	X	—	—
1.25	*Δ*	amount of change	X	X	X	X	X
1.26	*σ*	bending stress	—	—	X	X	X
1.27	*τ*	torsional stress	X	X	—	—	—

6.2 Subscript components

Subscripts are shown in Table 2.

Table 2 — List of subscripts

No.	Symbol	Parameter	Compression	Extension	Torsion	Flat	Leaf
2.1	A	eye A	—	—	—	—	X
		leg A	—	—	X	—	—
2.2	B	coiling body	—	X	X	—	—
		eye B	—	—	—	—	X
		leg B	—	—	X	—	—
2.3	c	solid	X	—	—	—	—
2.4	*D*	diameter of coil or diameter of spring	X	X	X	—	—
2.5	d	mandrel or inner guide	X	—	X	—	—
2.6	E	eye	—	—	—	—	X
2.7	e	external or outside	X	X	X	—	—
		natural	X	X	X	X	X
2.8	*F*	spring load or force	X	X	X	X	X
2.9	H	hook	—	X	—	—	—
2.10	*h*	deflection between two positions	X	X	X	—	—
2.11	i	inside or inner	X	X	X	—	—
		initial	—	X	—	—	—
2.12	*L0*	free length	X	X	—	—	—
2.13	*M*	moment or spring torque	—	—	X	—	—
2.14	max	maximum	X	X	X	X	X
2.15	min	minimum	X	X	X	X	X
2.16	n	maximum test point	X	X	X	—	—
2.17	R	required	X	X	X	X	X
2.18	ST	straight	—	—	—	—	X
2.19	t	total	X	—	—	—	—
2.20	w	effective working	—	—	X	—	—
2.21	0	free condition or unloaded	X	X	X	X	X
2.22	1	measuring position of perpendicularity	X	—	—	—	—
	1	running number (specified position)	X	X	X	X	X
2.23	2	measuring position of parallelism	X	—	—	—	—
	2	running number (specified position)	X	X	X	X	X

7 Application symbols for helical compression springs

Application symbols for helical compression springs are shown in Table 3, and some sample symbols are shown in Figures 1 and 2.