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Springs—Symbols

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by Japan Spring Manufacturers Association (JSMA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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Springs—Symbols

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 16249** published in 2013 with some modifications of the technical contents.

The portions given dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies general principles for the creation of symbols indicating physical quantities, coefficients and parameters for metal springs (hereafter, referred to as “symbol for spring”).

It also specifies the presentation of basic characters, subscripts and application symbols for spring with attention to the technical documentation exchanged between the parties concerned with delivery. The scope of metallic springs in this Standard is the helical compression springs, helical extension springs, helical torsion springs, flat springs and leaf springs.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 16249:2013 *Springs—Symbols* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0103 *Springs—Vocabulary*

NOTE : Corresponding International Standard: ISO 26909 *Springs—Vocabulary* (MOD)

JIS Z 8000-1 *Quantities and units—Part 1: General*

NOTE : Corresponding International Standard: ISO 80000-1 *Quantities and units—Part 1: General* (MOD)

JIS Z 8000-4 *Quantities and units—Part 4: Mechanics*

NOTE : Corresponding International Standard: ISO 80000-4 *Quantities and units—Part 4: Mechanics* (IDT)

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS B 0103**, and the following apply.

3.1 basic character

main part of symbol for spring representing physical quantities, coefficients and parameters of spring

3.2 subscript

second part of symbol for spring that follows basic character in order to complement the physical quantities, coefficients and parameters with respect to properties, feature, running number, etc.

It is expressed by an inferior letter.

3.3 application symbol

symbol which is a basic character, or a combination of basic character and subscript

Example : Basic character of “*D*” and subscript of “*e*” as application symbol *D_e*.

4 Composition of symbol for spring

4.1 General

A simple symbol for spring consists of a basic character alone. Subscripts may be added to this basic character to create more complex symbol.

Quantities and units to be used are specified in accordance with **JIS Z 8000-1** and **JIS Z 8000-4**.

For the purpose of international applicability, all basic characters and subscripts should be derived from English words, and designations used in technical documents up to the time of publication of the corresponding International Standard should be adopted as far as possible.

Wide conformity of the symbols for springs has been attempted.

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

As there is a risk of confusion with Arabic number 0, the following Latin letters shall not be used.

O (upper case) and *o* (lower case)

As there is a risk of confusion with Latin letters, the following Greek letters shall not be used.

A, B, E, Z, H, I, K, 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 letters or Greek letters.

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

Parameters shall be written in italic typeface.

Example : D for diameter of coil τ for shear 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 (one letter)

Example 2 A_{L0} (two letters)

Example 3 $d_{\max}$ (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 ” is a letter taken from “moment”)

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

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

Subscripts for parameters shall be written in italic typeface. Subscripts other than parameters are written in roman typeface. Subscripts of digits shall be written in roman typeface. However, running numbers shall be generally written in italic typeface.

Example 6 A_{L0} (“ $L0$ ” is free length of spring written in italic typeface)

Example 7 l_A (“ A ” is leg A written in roman typeface)

Example 8 L_1 (“ 1 ” is 1 in running number written in italic type)

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

Example 9 $r_{w,A}$ (“w,A” is effective working radius of leg A)

Example 10 $D_{e,\max}$ (“e,max” is external and maximum)

5 Creation of new symbol for springs

5.1 General

A new symbol for spring created in the future should follow the rules described below. The composition of symbol for spring should conform to clause 4.

5.2 Latin letters and Greek letters for basic characters

Latin letters shall be used for basic characters when describing the coefficients or physical quantities measured by devices or instruments.

Example 1 Length, diameter, load, etc. (including mean value)

Greek letters shall be used for basic characters when describing the calculated physical quantities.

Example 2 Stress, deflection, amount of loss, etc.

5.3 Upper case letters and lower case letters for basic characters

Upper case letters shall be used for basic characters when describing the shape or functions of a whole spring.

Example 1 L : length of spring D : diameter of coil F : spring load

Lower case letters shall be used for basic characters when describing the materials or partial dimensions of a spring.

Example 2 d : diameter of wire l : straight length at coil end

5.4 Latin letters, Greek letters and Arabic numbers for subscripts

Latin letters, Greek letters or Arabic numbers shall be used for subscripts.

When subscripts are abbreviated terms, Latin letters shall be used.

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.

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.

6 Basic character and subscript components

6.1 Basic character components

Basic characters are as shown in Table 1.

Table 1 Basic characters

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