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JAPANESE INDUSTRIAL STANDARD

Gear Notation-Symbols for Geometrical Data

JIS B 0121—1988

Translated and Published

by

Japanese Standards Association

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

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Gear Notation-Symbols for Geometrical Data

B 0121-1988

1. Scope

This Japanese Industrial Standard specifies the letter symbols to be used in numerical formulae, figures and others related to gears, hereinafter referred to as the "gear symbols".

2. Classification of Gear Symbols

The gear symbols shall be classified as given in the following.

- (1) Dimensions indicated on straight lines and on circumferences
- (2) Angular dimensions
- (3) Numerals and ratios
- (4) Precisions

3. Forms of Gear Symbol

The gear symbol shall be one letter of the Roman or Greek alphabet or one letter accompanied by a subscript of a Roman letter or of a numeral on the lower right side.

4. Subscripts to Be Used for Gear Symbols

4.1 The subscripts to serve and the order of arrangement of two or more subscripts shall be in accordance with Table 1.

4.2 When discriminating a pinion from a gear and a worm from a worm wheel, numerals 1 and 2 shall be respectively suffixed to the numerical subscripts.

4.3 If no confusion is anticipated, the subscripts may be omitted.

Applicable Standard:

JIS B 0102-Glossary of Gear Terms

International Corresponding Standard:

ISO 701-1976-International gear notation - Symbols for geometrical data

Table 1. Subscripts and order of their Arrangement

Main subjects	Subscript	Order
Data and reference	No subscript	1
Base circle and base cylinder	b	1 or 2
Recessing side; tooth crest or addendum flank	a	1
Approaching side, dedendum or dedendum flank, bottom or bottom land	f	1
Pitches or pitch errors	p	1
Working	'(apostrophe) or w	1
Plane perpendicular to axis and transverse plane, or tangential direction	t	2
Normal plane	n	2
Axial direction and axial plane	x	2
Radial direction	r	2
External (end)	e	2
Inner (end)	i	2
Middle or mean	m	2
Pitch variation	* u	2
Right hand	R	2
Left hand	L	2
On circular cone or cylinder	y	2
On back cone or equivalent spur gear	v	2
Helix	z	2
Transverse working	α	2
Overlap working	β	2
Total working	γ	2
Cutters	0	3
Pinion or worm	1	4
Gear or worm wheel	2	4
Coefficients (excluding addendum modification coefficient and centre distance modification coefficient)	*(asterisk)	-
Chords	-(upper line)	-

Note * This is not specified in ISO 701.

5. Gear Symbols

The gear symbols shall be in accordance with Tables 2 to 5.

Table 2. Dimensions on Straight Line and Dimension on Cylinder

No.	Term	Symbol	Informative reference
1.1	Centre distance	a	11106, 22102
1.2	In the case of generically defining circular pitches	p	21209
1.3	Reference pitch	p	21208, 43204
1.4	Transverse pitch	p_t	21402
1.5	Normal pitch	p_n	21502
1.6	Axial pitch	p_x	21211, 42202
1.7	Base pitch	p_b	21210
1.8	Transverse base pitch	p_{bt}	21403
1.9	Normal base pitch	p_{bn}	21503
1.10	Tooth depth	h	21301, 42206
1.11	Addendum	h_a	21302, 31303, 42207
1.12	Dedendum	h_f	21303, 31305, 42208
1.13	Chordal height	$\bar{h}$	21507, 31314
1.14	Working depth	k or h_w	22104, 32001, 44002
1.15	In the case of generically defining tooth thickness	s	13208, 31310 13209, 31311 21508
1.16	Arc tooth thickness	s	
1.17	Tooth thickness on base circle	s_b	
1.18	Chordal tooth thickness	$\bar{s}$	
1.19	Base tangent length	W	
1.20	Space width	e	13210, 31312
1.21	Bottom clearance	c	22105, 32002, 44003
1.22	Circumferential backlash	j_t	22106, 32003, 44004
1.23	Normal backlash	j_n	22106, 32004, 44005
1.24	Face width	b	21214, 31208, 43205
1.25	Effective face width	b' or b_w	21215, 43206
1.26	Lead	p_z	13204, 42201
1.27	Length of path of contact	g_z	22303
1.28	Length of approach path	g_t	22306
1.29	Length of recess path	g_a	22307
1.30	Overlap length	g_p	22308

Table 2. (Continued)

No.	Term	Symbol	Informative reference
1.31	In the case of generically defining diameters	d	
1.32	Reference circle diameter	d	21106, 42103, 43203
1.33	Working pitch circle diameter	d' or d_w'	21105
1.34	Tip diameter	d_t	21103, 43201
1.35	Base circle diameter	d_b	21602
1.36	Root circle diameter	d_f	21104
1.37	In the case of generically defining radii	r	
1.38	Reference circle radius	r	
1.39	Working pitch circle radius	r' or r_w	
1.40	Tip circle radius	r_t	
1.41	Base circle radius	r_b	
1.42	Root circle radius	r_f	
1.43	Radius of curvature	ρ	
1.44	In the case of generically defining cone distances	R	
1.45	Cone distance	R_c	31209
1.46	Middle cone distance	R_m	31108
1.47	Inner cone distance	R_i	31107
1.48	Back cone distance	R_b	31106
1.49	Locating distance	* A	31211
1.50	Offset	* E	31213

Note * These are not specified in ISO 701.

Remark: Numerals given in Informative Reference column indicate the serial numbers of equivalent terms in JIS B 0102.

Table 3. Angular Dimensions

No.	Term	Symbol	Informative reference
2.1	In the case of generically defining pressure angles	α	13207, 31307
2.2	Standard pressure angle	α	21205
2.3	Working pressure angle	α' or α_w	21207
2.4	Cutter pressure angle	α_c	21612
2.5	Transverse pressure angle	α_t	21401
2.6	Normal pressure angle	α_n	21501
2.7	Axial pressure angle	α_x	21206
2.8	In the case of generically defining helix angles	β	13202, 21203
2.9	Helix angle of reference pitch cylinder	β	21203
2.10	Helix angle of tip cylinder	β_s	21203
2.11	Helix angle of base cylinder	β_b	21203
2.12	In the case of generically defining lead angles	γ	13203, 21204, 42205
2.13	Lead angle of reference pitch cylinder	γ	21204
2.14	Lead angle of tip cylinder	γ_s	21204
2.15	Lead angle of base cylinder	γ_b	21204
2.16	Shaft angle	Σ	11107
2.17	In the case of generically defining cone angles	δ	
2.18	Reference cone angle	δ	31201
2.19	Tip angle	δ_s	31204
2.20	Root angle	δ_f	31205
2.21	Addendum angle	θ_s	31304
2.22	Dedendum angle	θ_f	31306
2.23	Transverse angle of transmission	φ_s	22206
2.24	Overlap angle	φ_f	22210
2.25	Total angle of transmission	φ_r	22209
2.26	Angular pitch of crown gear	τ	
2.27	Involute α	$\text{inv } \alpha$	$=\tan \alpha - \alpha$

Remark: Numerals given in Informative Reference column indicate the serial numbers of equivalent terms in JIS B 0102.

Table 4. Number and Ratio

No.	Term	Symbol	Informative reference
3.1	Number of teeth	z	11301
3.2	Equivalent number of teeth	z_v	21217
3.3	Number of starts or number of teeth of pinion	z_1	42106
3.4	Gear ratio	u	11302, 44001
3.5	Transmission ratio	i	11303
3.6	Module	m	13206, 31310
3.7	Transverse module	m_t	21404
3.8	Normal module	m_n	21504
3.9	Axial module	m_x	21213, 42203
3.10	Contact ratio	ϵ	
3.11	Transverse contact ratio	ϵ_α	22211
3.12	Overlap ratio	ϵ_β	22212
3.13	Total contact ratio	ϵ_γ	22213
3.14	Specific sliding	* σ	14004
3.15	Angular velocity	ω	
3.16	Linear velocity	v	
3.17	Number of revolutions	n	
3.18	Addendum modification coefficient	x	21609, 43304
3.19	Centre distance modification coefficient	y	22103

Note * This is not specified in ISO 701.

Remark: Numerals given in Informative Reference column indicate the serial numbers of equivalent terms in JIS B 0102.

Table 5. Precision

No.	Term	Symbol	Informative reference
4.1	Circular pitch individual error	f_{pi}	23101
4.2	Pitch variation	* f_u or f_{pu}	23102
4.3	Cumulative pitch error [over a sector of k (integer) pitches]	F_{pk}	23104
4.4	Total cumulative pitch error	F_p	23105
4.5	Base pitch error	f_{pb}	23106
4.6	Total profile error	f_t	23201
4.7	Radial runout	F_r	23203
4.8	Total alignment error	F_a	23202

Note * This is not specified in ISO 701.

Remark: Numerals given in Informative reference column indicate the serial numbers of equivalent terms in JIS B 0102.

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