INTERNATIONAL STANDARD

ISO 1119

Second edition
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Geometrical Product Specifications (GPS) — Series of conical tapers and taper angles

Spécification géométrique de produits (GPS) — Série d'angles de cônes et de conicités

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 1119 was prepared by the Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This second edition cancels and replaces the first edition (ISO 1119:1975), of which the tables have been corrected and updated, but not technically modified.

Annexes A and B of this International Standard are for information only.

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Introduction

This International Standard is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences chain links 1 and 2 of the chain of standards on angle.

For more detailed information of the relation of this International Standard to other standards and the GPS matrix model, see annex A.

Geometrical Product Specifications (GPS) — Series of conical tapers and taper angles

1 Scope

This International Standard gives a series of cones or conical tapers, ranging from 120° to less than 1°, or ratios from 1:0,289 to 1:500, intended for general use in mechanical engineering.

It applies only to plain conical surfaces, and excludes prismatic pieces, taper threads, bevel gears, etc.

The method of dimensioning and tolerancing conical surfaces on drawings is covered in ISO 3040.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 3:1973, *Preferred numbers — Series of preferred numbers.*

ISO 3040:1990, *Technical drawings — Dimensioning and tolerancing — Cones.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1
cone angle
α
included angle between generatrixes as measured in the axial plane section

3.2
rate of taper
C
ratio of the difference between the diameters of two sections to the distance between these sections

$$C = \frac{D-d}{L} = 2 \tan \frac{\alpha}{2} = \frac{1}{\frac{1}{2} \cot \frac{\alpha}{2}}$$

See figure 1.

NOTES

1 The rate of taper is a dimensionless quantity.

2 The expression C = 1:20 means that a diameter difference $D - d$ of 1 mm occurs in an axial distance L of 20 mm between diameters D and d and that

$$\frac{1}{2} \cot \frac{\alpha}{2} = 20$$

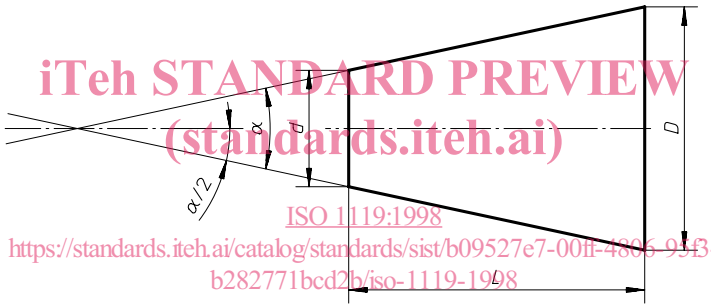

Figure 1

4 Values

Series 1 and 2, as specified in table 1, shall be used in this order of preference, with a view to reducing the range of tools, gauges and measuring instruments required for production of conical parts.

Table 2 shall be used only for the particular applications indicated in the last column.

These tables give calculated values for cone angle or rate of taper, to facilitate design, production, and control of conical pieces.

Table 1 — Cones for general applications

Basic value		Calculated values			Rate of taper, C
		Cone angle, α			
Series 1	Series 2			rad	
120°		—	—	2,094 395 10	1:0,288 675 1
90°		—	—	1,570 796 33	1:0,500 000 0
	75°	—	—	1,308 996 94	1:0,651 612 7
60°		—	—	1,047 197 55	1:0,866 025 4
45°		—	—	0,785 398 16	1:1,207 106 8
30°		—	—	0,523 598 78	1:1,866 025 4
1:3		18° 55' 28,7199"	18,924 644 42°	0,330 297 35	—
	1:4	14° 15' 0,1177"	14,250 032 70°	0,248 709 99	—
1:5		11° 25' 16,2706"	11,421 186 27°	0,199 337 30	—
	1:6	9° 31' 38,2202"	9,527 283 38°	0,166 282 46	—
	1:7	8° 10' 16,4408"	8,171 233 56°	0,142 614 93	—
	1:8	7° 9' 9,6075"	7,152 668 75°	0,124 837 62	—
1:10		5° 43' 29,3176"	5,724 810 45°	0,099 916 79	—
	1:12	4° 46' 18,7970"	4,771 888 06°	0,083 285 16	—
	1:15	3° 49' 5,8975"	3,818 304 87°	0,066 641 99	—
1:20		2° 51' 51,0925"	2,864 192 37°	0,049 989 59	—
	1:30	1° 54' 34,8570"	1,909 682 51°	0,033 330 25	—
1:50		1° 8' 45,1586"	1,145 877 40°	0,019 999 33	—
1:100		34' 22,6309"	0,572 953 02°	0,009 999 92	—
1:200		17' 11,3219"	0,286 478 30°	0,004 999 99	—
1:500		6' 52,5295"	0,114 591 52°	0,002 000 00	—

NOTE — For series 1, values from 120° to 1:3 are approximately in accordance with the R 10/2 series of preferred numbers, and values from 1:5 to 1:500 are in accordance with the R 10/3 series (see ISO 3).

Table 2 — Selection of cones for particular application

Basic value	Calculated values: Cone angle, α		rad	Rate of taper, C	International Standard number	Applications
11°54'	—	—	0,207 694 18	1:4,797 451 1	5237 8489-5	Cones and tubes for textile industry
8°40'	—	—	0,151 261 87	1:6,598 441 5	8489-3, 8489-4, 324, 575	
7°	—	—	0,122 173 05	1:8,174 927 7	8489-2	
1:38	1° 30' 27,7080"	1,507 696 67°	0,026 314 27	—	368	
1:64	0° 53' 42,8220"	0,895 228 34°	0,015 624 68	—	368	
7:24	16° 35' 39,4443"	16,594 290 08°	0,289 625 00	1:3,428 571 4	297	Machine tool spindles, Tool fits
1:12,262	4° 40' 12,1514"	4,670 042 05°	0,081 507 61	—	239	Jacobs taper No. 2
1:12,972	4° 24' 52,9039"	4,414 695 52°	0,077 050 97	—	239	Jacobs taper No. 1
1:15,748	3° 38' 13,4429"	3,637 067 47°	0,063 478 80	—	239	Jacobs taper No. 33
6:100	3° 26' 12,1776"	3,436 716 00°	0,059 982 01	1:16,666 666 7	594-1 595-1 595-2	Medical equipment
1:18,779	3° 3' 1,2070"	3,050 335 27°	0,053 238 39	—	239	Jacobs taper No. 3
1:19,002	3° 0' 52,3956"	3,014 554 34°	0,052 613 90	—	296	Morse taper No. 5
1:19,180	2° 59' 11,7258"	2,986 590 50°	0,052 125 84	—	296	Morse taper No. 6
1:19,212	2° 58' 53,8255"	2,981 618 20°	0,052 039 05	—	296	Morse taper No. 0
1:19,254	2° 58' 30,4217"	2,975 117 13°	0,051 925 59	—	296	Morse taper No. 4
1:19,264	2° 58' 24,8644"	2,973 573 43°	0,051 898 65	—	239	Jacobs taper No. 6
1:19,922	2° 52' 31,4463"	2,875 401 76°	0,050 185 23	—	296	Morse taper No. 3
1:20,020	2° 51' 40,7960"	2,861 332 23°	0,049 939 67	—	296	Morse taper No. 2
1:20,047	2° 51' 26,9283"	2,857 480 08°	0,049 872 44	—	296	Morse taper No. 1
1:20,288	2° 49' 24,7802"	2,823 550 06°	0,049 280 25	—	239	Jacobs taper No. 0
1:23,904	2° 23' 47,6244"	2,396 562 32°	0,041 827 90	—	296	Brown & Sharpe taper No. 1 to 3
1:28	2° 2' 45,8174"	2,046 060 38°	0,035 710 49	—	8382	Resuscitators
1:36	1° 35' 29,2096"	1,591 447 11°	0,027 775 99	—	5356-1	Anaesthetic equipment
1:40	1° 25' 56,3516"	1,432 319 89°	0,024 998 70	—		

NOTE — The values in this table should be used only for the particular applications mentioned in the rightmost column.

Annex A
(informative)

Relation to the GPS matrix model

For full details about the GPS matrix model see ISO/TR 14638.

A.1 Information about the standard and its use

This International Standard on conical tapers covers definitions of parameters and corresponding values for some applications. It should be completed by standards covering chain links 3 to 6 in order to allow an unambiguous understanding.

A.2 Position in the GPS matrix model

This International Standard is a general GPS standard, which influences chain link 1 and 2 of the chain of standards on angle in the general GPS matrix, as illustrated in figure A.1.

Fundamental GPS standards	Global GPS standards						
	General GPS matrix						
	Chain link number	**1**	**2**	**3**	**4**	**5**	**6**
	Size						
	Distance						
	Radius						
	Angle						
	Form of line independent of datum						
	Form of line dependent on datum						
	Form of surface independent of datum						
	Form of surface dependent on datum						
	Orientation						
	Location						
	Circular run-out						
	Total run-out						
	Datums						
	Roughness profile						
	Waviness profile						
	Primary profile						
	Surface imperfections						
	Edges						

Figure A.1

A.3 Related standards

The related standards are those of the chains of standards indicated in figure A.1.