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सामान्य इंजीनियरी उद्देश्य के लिए शंक्वाकार
टेपर्स एवं टेपर कोण
(दूसरा पुनरीक्षण)

Indian Standard

CONICAL TAPERS AND TAPER ANGLES FOR
GENERAL ENGINEERING PURPOSES

(Second Revision)

[ISO TITLE : GEOMETRICAL PRODUCT SPECIFICATIONS (GPS) —
SERIES OF CONICAL TAPERS AND TAPER ANGLES]

ICS 14.040.01

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NATIONAL FOREWORD

This Indian Standard (Second Revision) which is identical with ISO 1119 : 1998 'Geometrical Product Specifications (GPS) — Series of conical tapers and taper angles' issued by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendation of the Engineering Standards Sectional Committee and approval of the Basic and Production Engineering Division Council.

This standard was originally published in 1966 and subsequently revised in 1981. The first revision was undertaken to take into account the ISO recommendations and latest trends on the subject. While undertaking second revision the Engineering Standards Sectional Committee decided to harmonize it with the latest version of ISO 1119, by adoption under dual numbering system.

The text of ISO Standard has been approved as suitable for publication as Indian Standard without deviations. In the adopted standard, certain conventions are not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear, referring to this Standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker, while in Indian Standards, the current practice is to use a full point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated :

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 3 : 1973	IS 1076 (Part 1) : 1985 Preferred numbers: Part 1 Series of preferred numbers (<i>second revision</i>)	Identical
ISO 3040 : 1990	IS 10718 : 1993 Technical drawings — Dimensions and tolerancing of cones (<i>first revision</i>)	do

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off values should be the same as that of the specified value in this standard.

Indian Standard
**CONICAL TAPERS AND TAPER ANGLES FOR
GENERAL ENGINEERING PURPOSES**
(Second Revision)

[ISO TITLE : 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 generatrices 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

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

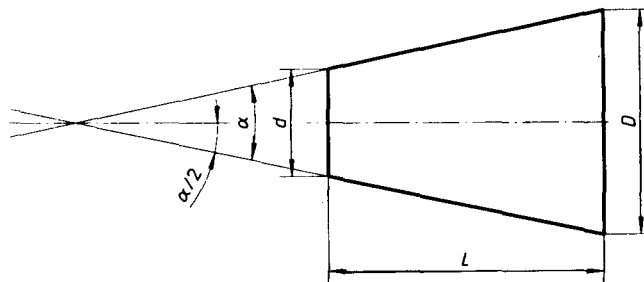


Figure 1

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, <i>C</i>
Series 1	Series 2	Cone angle, α		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			Rate of taper, C	International Standard number	Applications
	Cone angle, α		rad			
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.

	Global GPS standards						
Fundamental 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.

Annex B (informative)

Bibliography

- [1] ISO 239:1974, *Drill chuck tapers.*
- [2] ISO 296:1991, *Machine tools — Self-holding tapers for tool shanks.*
- [3] ISO 297:1988, *7/24 tapers for tool shanks for manual changing.*
- [4] ISO 324:1978, *Textile machinery and accessories — Cones for cross winding for dyeing purposes — Half angle of the cone 4° 20'.*
- [5] ISO 368:1991, *Spinning preparatory, spinning and doubling (twisting) machinery — Tubes for ring-spinning, doubling and twisting spindles, taper 1:38 and 1:64.*
- [6] ISO 575:1978, *Textile machinery and accessories — Transfer cones — Half angle of the cone 4° 20'.*
- [7] ISO 594-1:1986, *Conical fittings with a 6 % (Luer) taper for syringes, needles and certain other medical equipment — Part 1: General requirements.*
- [8] ISO 595-1:1986, *Reusable all-glass or metal-and-glass syringes for medical use — Part 1: Dimensions.*
- [9] ISO 595-2:1987, *Reusable all-glass or metal-and-glass syringes for medical use — Part 2: Design, performance requirements and tests.*
- [10] ISO 5237:1978, *Textile machinery and accessories — Cones for yarn winding (cross wound) — Half angle of the cone 5° 57'.*
- [11] ISO 5356-1:1996, *Anaesthetic and respiratory equipment — Conical connectors — Part 1: Cones and sockets.*
- [12] ISO 8382:1988, *Resuscitators intended for use with humans.*
- [13] ISO 8489-2:1995, *Textile machinery and accessories — Cones for cross winding — Part 2: Dimensions, tolerances and designation of cones with half angle 3° 30'.*
- [14] ISO 8489-3:1995, *Textile machinery and accessories — Cones for cross winding — Part 3: Dimensions, tolerances and designation of cones with half angle 4° 20'.*
- [15] ISO 8489-4:1995, *Textile machinery and accessories — Cones for cross winding — Part 4: Dimensions, tolerances and designation of cones with half angle 4° 20' for winding or dyeing purposes.*
- [16] ISO 8489-5:1995, *Textile machinery and accessories — Cones for cross winding — Part 5: Dimensions, tolerances and designation of cones with half angle 5° 57'.*
- [17] ISO/TR 14638:1995, *Geometrical product specifications (GPS) — Masterplan.*

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