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ISO RECOMMENDATION

R 1119

SERIES OF CONICAL TAPERS AND TAPER ANGLES

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BRIEF HISTORY

The ISO Recommendation R 1119, *Series of conical tapers and taper angles,* was drawn up by Technical Committee ISO/TC 3, *Limits and fits,* the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question led to the adoption of a Draft ISO Recommendation.

In July 1968, this Draft ISO Recommendation (No. 1650) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Israel	South Africa, Rep. of
Belgium	Italy	Spain
Canada	Japan	Sweden
Chile	Korea, Rep. of	Switzerland
Czechoslovakia	Netherlands	Thailand
Denmark	New Zealand	Turkey
France	Norway	U.A.R.
Germany	Poland	United Kingdom
Hungary	Portugal	U.S.S.R.
India	Romania	

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in September 1969, to accept it as an ISO RECOMMENDATION.

ISO Recommendation | R 1119 | September 1969

SERIES OF CONICAL TAPERS AND TAPER ANGLES

1. SCOPE

This ISO Recommendation 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.

Series 1 and 2, as specified in Table 1 of this ISO Recommendation, should 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 should 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.

The method of dimensioning conical surfaces on drawings is covered in ISO Recommendation R . . .*, *Dimensioning and tolerancing of cones.*

2. DEFINITIONS

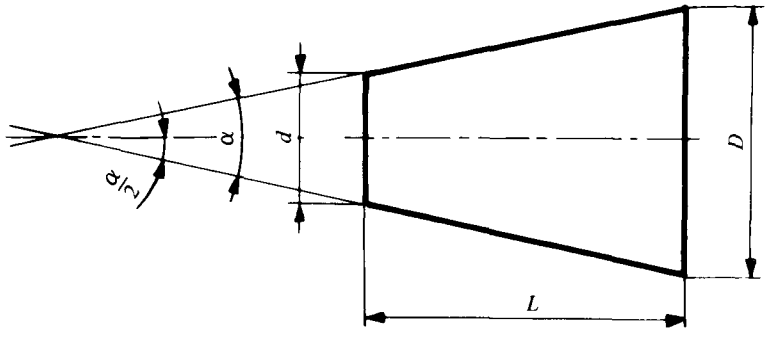
2.1 *Cone angle* α. Included angle between generators as measured in the axial plane section.

2.2 *Rate of taper C.* Ratio of the difference between the diameters of two sections to the distance between these sections, given by the following equation :

$$C = \frac{D-d}{L} = 2\tan\frac{\alpha}{2} = 1 : \tfrac{1}{2}\cot\frac{\alpha}{2}$$ (see drawing below)

The rate of taper is a dimensionless quantity.

NOTE. – 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 $\frac{1}{2}\cot\frac{\alpha}{2} = 20$.



* At present at the stage of draft proposal.

3. VALUES

TABLE 1 – **Cones for general applications**

Basic values		Calculated values		
Series 1	Series 2	Taper angles α		Rate of taper C
120°		–	–	1 : 0.288 675
90°		–	–	1 : 0.500 000
	75°	–	–	1 : 0.651 613
60°		–	–	1 : 0.866 025
45°		–	–	1 : 1.207 107
30°		–	–	1 : 1.866 025
1 : 3		18° 55′ 28.7″	18.924 644°	–
	1 : 4	14° 15′ 0.1″	14.250 033°	–
1 : 5		11° 25′ 16.3″	11.421 186°	–
	1 : 6	9° 31′ 38.2″	9.527 283°	–
	1 : 7	8° 10′ 16.4″	8.171 234°	–
	1 : 8	7° 9′ 9.6″	7.152 669°	–
1 : 10		5° 43′ 29.3″	5.724 810°	–
	1 : 12	4° 46′ 18.8″	4.771 888°	–
	1 : 15	3° 49′ 5.9″	3.818 305°	–
1 : 20		2° 51′ 51.1″	2.864 192°	–
	1 : 30	1° 54′ 34.9″	1.909 682°	–
1 : 50		1° 8′ 45.2″	1.145 877°	–
1 : 100		34′ 22.6″	0.572 953°	–
1 : 200		17′ 11.3″	0.286 478°	–
1 : 500		6′ 52.5″	0.114 591°	–

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*.

The values of Series 1 are recommended values; if they do not offer sufficient choice, however, values of Series 2 should be taken.

* See ISO Recommendation R 3, *Preferred numbers – Series of preferred numbers.*

TABLE 2 – Cones for particular applications

Basic values	Calculated values			ISO Recommendation R	Applications
	Taper angle α		Rate of taper C		
18° 30′	–	–	1 : 3.070 115	110	Winding cones for the textile industry
11° 54′	–	–	1 : 4.797 451	326	
8° 40′	–	–	1 : 6.598 442	111–324–325–575	
7°	–	–	1 : 8.174 928	112–327	
7 : 24	16° 35′ 39.4″	16.594 290°	1 : 3.428 571	297–839	Machine tool spindles Tool fits
1 : 9	6° 21′ 34.8″	6.359 660°	–	*	Battery terminals
1 : 12.262	4° 40′ 11.6″	4.669 884°	–	239	Jacobs taper No. 2
1 : 12.972	4° 24′ 53.1″	4.414 746°	–	239	Jacobs taper No. 1
1 : 15.748	3° 38′ 13.4″	3.637 060°	–	239	Jacobs taper No. 33
1 : 16.666	3° 26′ 12.2″	3.436 716°	–	594–595–596	Medical purpose equipment
1 : 18.779	3° 3′ 1.0″	3.050 280°	–	239	Jacobs taper No. 3
1 : 19.002	3° 0′ 52.4″	3.014 543°	–	296	Morse taper No. 5
1 : 19.180	2° 59′ 11.7″	2.986 582°	–	296	Morse taper No. 6
1 : 19.212	2° 58′ 53.8″	2.981 618°	–	296	Morse taper No. 0
1 : 19.254	2° 58′ 30.6″	2.975 179°	–	296	Morse taper No. 4
1 : 19.264	2° 58′ 24.8″	2.973 556°	–	239	Jacobs taper No. 6
1 : 19.922	2° 52′ 31.5″	2.875 406°	–	296	Morse taper No. 3
1 : 20.020	2° 51′ 41.0″	2.861 377°	–	296	Morse taper No. 2
1 : 20.047	2° 51′ 26.7″	2.857 417°	–	296	Morse taper No. 1
1 : 20.288	2° 49′ 24.7″	2.823 537°	–	239	Jacobs taper No. 0
1 : 23.904	2° 23′ 47.5″	2.396 524°	–	296	Brown & Sharpe taper No. 1 to 3
1 : 40	1° 25′ 15.4″	1.420 936°	–	**	Anaesthetic equipment

NOTE. – The values in this table should be used only for the particular applications mentioned opposite them; besides this mention, the national standard corresponding to this ISO Recommendation may refer to any other standard in the country concerning this particular application.

* Publication 95-3 of the IEC (International Electrotechnical Commission)

** In preparation by Technical Committee ISO/TC 121.