भारतीय मानक

Indian Standard

IS 3654 : 2024

सीधे पक्षीय सेरेशंस — आयाम

(पहला पुनरीक्षण)

Straight Sided Serrations — Dimensions

(First Revision)

ICS 21.120.10

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April 2024 **Price Group 6**

Transmission Devices Sectional Committee, PGD 33

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Transmission Devices Sectional Committee had been approved by the Production and General Engineering Division Council.

This standard was first published in 1966. This revision has been taken up to keep pace with the latest technological developments and international practices.

This standard covers serrated shafts and holes are generally used in automotive, small tools, machine tools and other industries, mostly with close fit and a large number of teeth to allow for many index positions.

This standard deals with straight sided serrations for general engineering use. The preparation of standards on gauging practice and on relevant manufacturing tools will be taken up later. The straight sided serrations bear on flanks and have positive clearance at root and crest.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

STRAIGHT SIDED SERRATIONS — DIMENSIONS

(First Revision)

1 SCOPE

This standard covers the dimensions and tolerances of straight sided serrations of 60° and 55° serration angles.

2 DEFINITIONS

For the purpose of this standard, the following definitions shall apply (*see* Fig. 1).

2.1 Alignment Error — The deviation of a serration along its length from parallelism with the axis of the shaft or hole.

2.2 Crest — The tip of a tooth on a shaft or in a hole.

2.3 Depth of Engagement — The radial difference between the major diameter of a serrated shaft and the minor diameter of a serrated hole mating with the serrated shaft.

2.4 Flank — The side of a serration connecting root and crest.

2.5 Major Apex Diameter — The diameter of the circle which passes through the outer apices of the triangles forming the basis of the teeth.

2.6 Major Diameter

2.6.1 *Shaft* **—** The diameter of the circle which passes through the crests of the teeth.

2.6.2 *Hole* **—** The diameter of the circle, tangential to the root radii of the serrations.

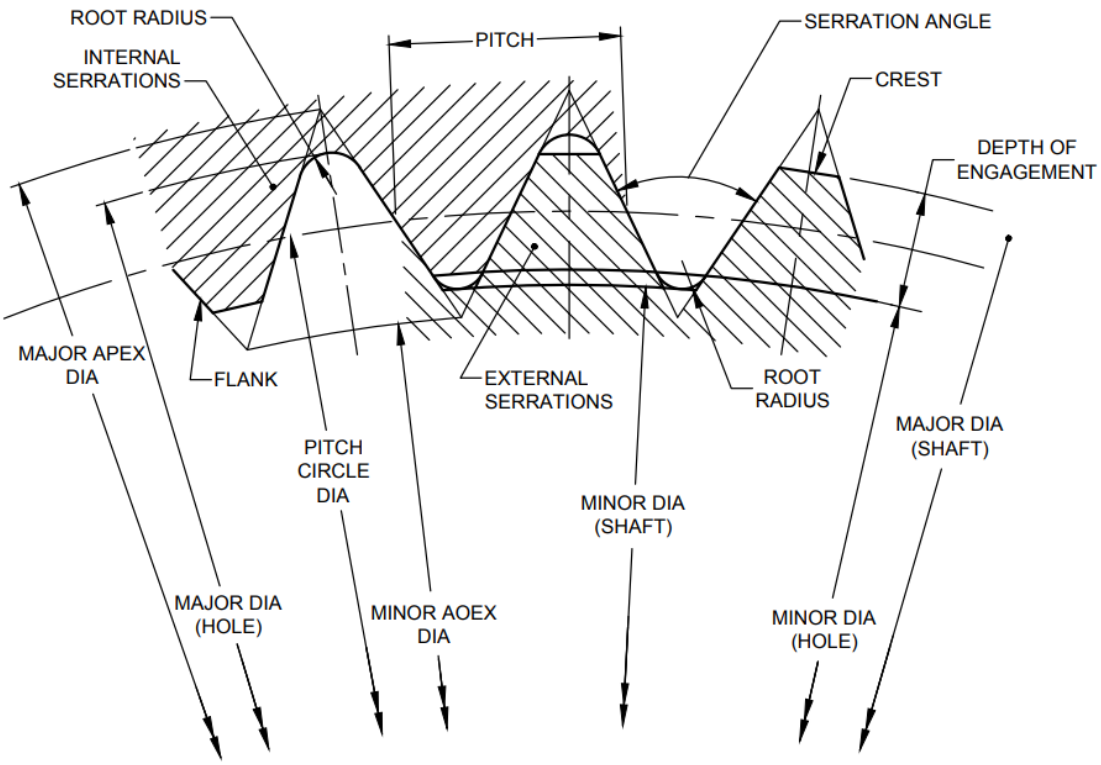


FIG. 1 DEFINITIONS FOR SERRATIONS

2.7 Minor Apex Diameter — The diameter of the circle which passes through the inner apices of the triangles forming the basis of the teeth.

2.8 Minor Diameter

2.8.1 *Shaft* **—** The diameter of the circle tangential to the root radii the serrations.

2.8.2 *Hole* **—** The diameter of the circle which passes through the crests of the teeth.

2.9 Pitch — Length of the arc of the pitch circle between the two points where the pitch circle intersects two adjacent serrations at identical flanks.

2.10 Pitch Circle Diameter — The diameter of an imaginary co-axial cylinder, the surface of which passes through the serrations at such points as to make the width of serration equal to width of serration tooth.

2.11 Root Radius — The radius at the bottom of the serration on a shaft or in a hole.

2.12 Serration — The space between adjacent teeth.

2.13 Serration Angle — The angle included by the flanks of a serration as applicable to external serrations only.

2.14 Serrated Shaft : Serrated Hole — A cylindrical shaft or a hole around the periphery of which (outside or inside respectively) a series of teeth of general triangular form have been produced.

2.15 Spacing Error — An angular displacement of serration in relation to its design position.

3 DIMENSIONS AND TOLERANCES

3.1 The dimensions and tolerances of straight sided serrations shall be as given in Table 1 and Table 2.

3.2 The sides of the serration teeth may also be curved when generated with a straight sided hob.

3.3 The spacing error, tooth thickness error and internal form error shall be checked by pin method. For the purpose of this method, it is assumed that the pins touch the sides of the teeth on contact diameter which is equal to or closely approximates to the pitch diameter d5. The permissible deviations for this contact diameter, which manifests itself in the distance as measured over pins, shall be as given in Table 1 and Table 2.

Table 1 Dimensions and Tolerances of Serrations with 60° Serration Angle

(*Clauses* 3.1, 3.3, 3.4 *and* 4)

All dimensions in millimetres.

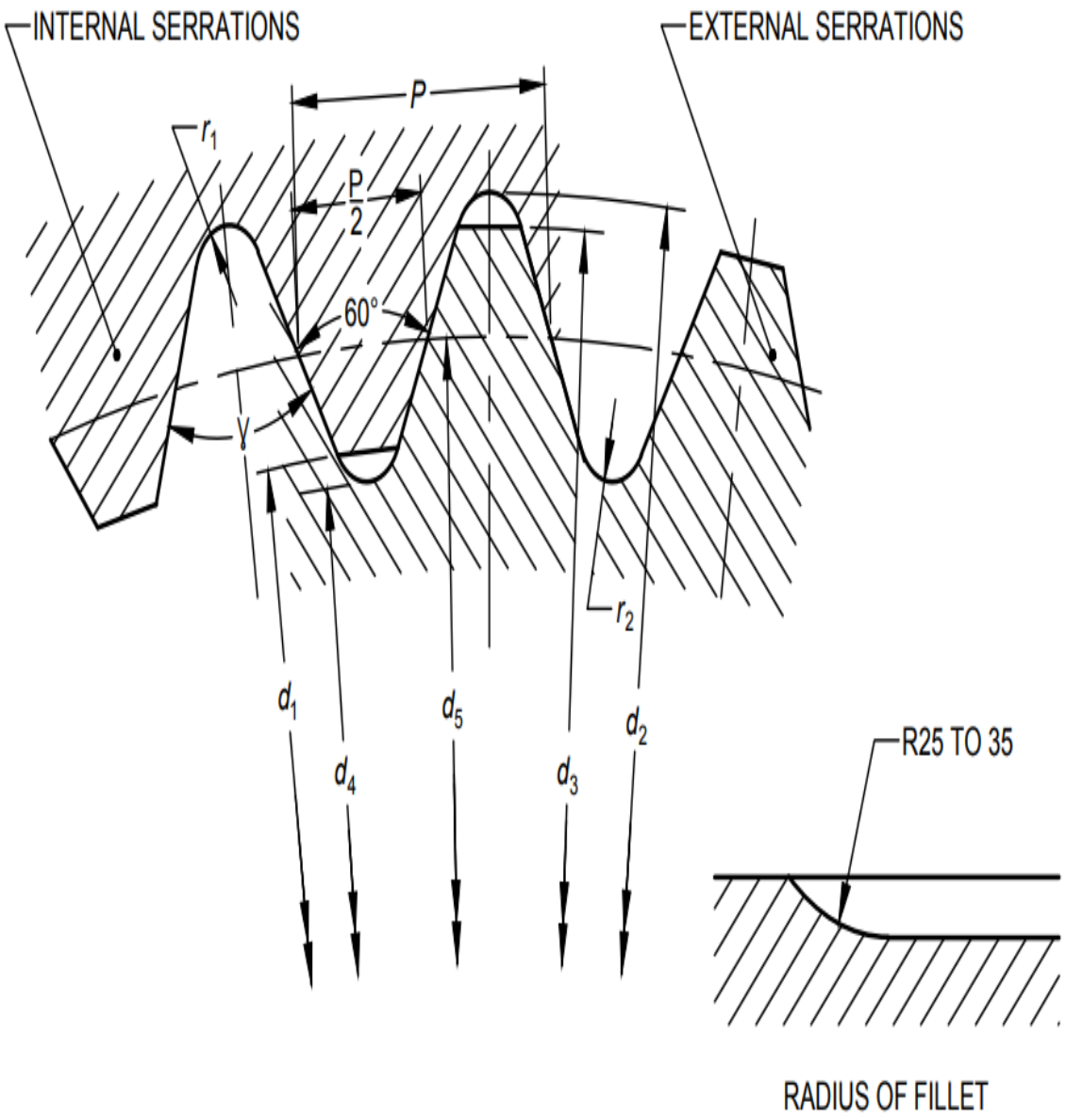


Table (*Concluded*)

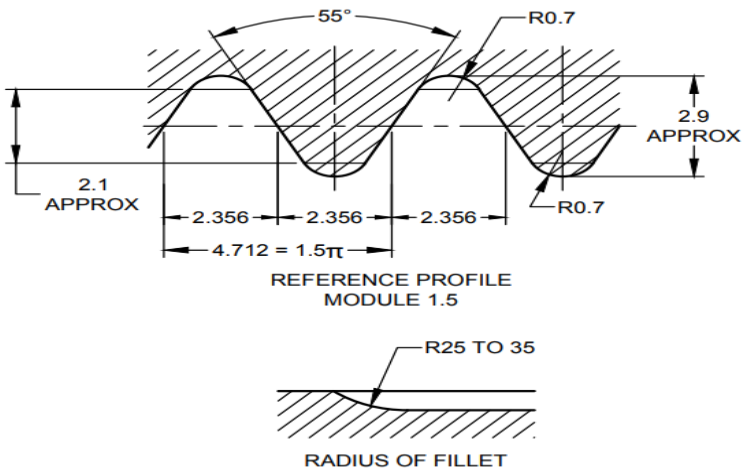
Sl No.	Nominal Size	d_1			d_2[1)]	d_3			d_4[1)]	Pitch Dia d_5	Allowances for Contact Diameter in µm			r_1 Approx	r_2 Approx	Pitch[1)] P	Y	Number of Teeth
		Nom	*Max*	*Min*		Nom	*Max*	*Min*			Internal Serrations	External Serrations						
												Close	Loose					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
i)	7 × 8	6.9	7.27	7.18	8.21	8.1	7.82	7.73	6.91	7.5	+ 63	– 63	– 126	0.08	0.08	0.842	47°– 8'– 35"	28
ii)	8 × 10	8.1	8.47	8.38	9.90	10.1	9.81	9.70	8.26	9.0	+ 65	– 65	– 130	0.08	0.08	1.010	47°– 8'– 35"	28
iii)	10 × 12	10.1	10.50	10.39	12.00	12.0	11.71	11.60	10.20	11.0	+ 68	– 68	– 136	0.10	0.10	1.152	48°	30
iv)	12 × 14	12.0	12.40	12.29	14.18	14.2	13.91	13.80	12.06	13.0	+ 70	– 70	– 140	0.10	0.10	1.317	48°– 23'– 14"	31
v)	15 × 17	14.9	15.30	15.19	17.28	17.2	16.91	16.80	14.91	16.0	+ 75	– 75	– 150	0.15	0.15	1.571	48°– 45'	32
vi)	17 × 20	17.3	17.70	17.59	20.00	20.0	19.70	19.57	17.37	18.5	+ 80	– 80	– 160	0.15	0.20	1.761	49°– 5'– 27"	33
vii)	21 × 24	20.8	21.23	21.10	23.76	23.9	23.60	23.47	20.76	22.0	+ 85	– 85	– 170	0.15	0.25	2.033	49°– 24'– 42"	34
viii)	26 × 30	26.5	26.93	26.80	30.06	30.0	29.70	29.57	26.40	28.0	+ 95	– 95	– 190	0.25	0.30	2.513	48°– 42'– 52"	35
ix)	30 × 34	30.5	30.97	30.81	34.17	34.0	33.69	33.53	30.38	32.0	+ 100	– 100	– 200	0.30	0.40	2.792	50°	36
x)	36 × 40	36.0	36.47	36.31	40.16	39.9	39.59	39.43	35.95	38.0	+ 110	– 110	– 220	0.50	0.40	3.226	50°– 16'– 13"	37
xi)	40 × 44	40.0	40.47	40.31	44.42	44.0	43.68	43.52	39.72	42.0	+ 115	– 115	– 230	0.50	0.40	3.472	50°– 31'– 35"	38
xii)	45 × 50	45.0	45.48	45.32	50.20	50.0	49.68	49.52	44.97	47.5	+ 125	–125	– 250	0.50	0.40	3.826	50°– 46'– 9"	39
xiii)	50 × 55	50.0	50.48	50.32	55.25	54.9	54.56	54.37	49.72	52.5	+ 135	– 135	– 270	0.60	0.40	4.123	51°	40
xiv)	55 × 60	55.0	55.53	55.34	60.39	60.0	59.66	59.47	54.76	57.5	+ 140	– 140	– 280	0.60	0.50	4.301	51°– 25'– 43"	42

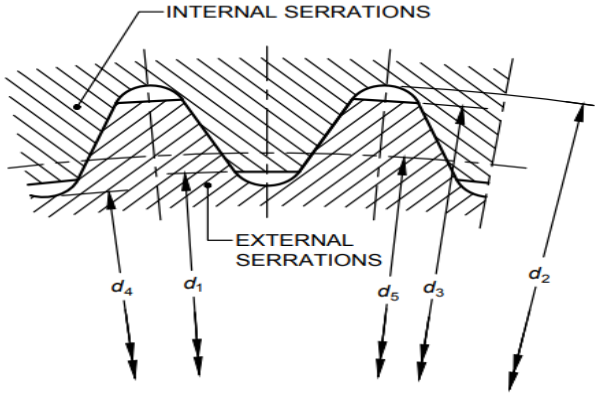
[1)] The values given are obtained by calculations.

Table 2 Dimensions and Tolerances of Serrations with 55° Serration Angle

(*Clauses* 3.1, 3.3, 3.4 *and* 4)

All dimensions in millimetres.





Sl No.	Nominal Size	d_1			d_2[1)]	d_3			d_4[1)]	Pitch Dia d_5	Allowances for Contact Diameter in µm			Number of Teeth
		Nom	*Max*	*Min*		Nom	*Max*	*Min*			Internal Serrations	External Serrations		
												Close	Loose	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
i)	60 × 65	60	60.53	60.34	65.4	65	64.66	64.47	59.6	61.5[2)]	+ 150	– 150	– 300	41

Table (*Concluded*)

Sl No.	Nominal Size	d_1			d_2[1)]	d_3			d_4[1)]	Pitch Dia d_5	Allowances for Contact Diameter in µm			Number of Teeth
		Nom	*Max*	*Min*		Nom	*Max*	*Min*			Internal Serrations	External Serrations		
												Close	Loose	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
ii)	65 × 70	65	65.53	65.34	70.4	70	69.64	69.45	64.6	67.5	+ 160	– 160	– 320	45
iii)	70 × 75	70	70.55	70.36	75.4	75	74.64	74.45	69.6	72.0†	+ 165	– 165	– 330	48
iv)	75 × 80	75	75.55	75.36	80.4	80	79.64	79.45	74.6	76.5†	+ 175	– 175	– 350	51
v)	80 × 85	80	80.55	80.36	85.4	85	84.62	84.40	79.6	82.5	+ 185	– 185	– 370	55
vi)	85 × 90	85	85.60	85.38	90.4	90	89.62	89.40	84.6	87.0†	+ 190	– 190	– 380	58
vii)	90 × 95	90	90.60	90.38	95.4	95	94.62	94.40	89.6	91.5†	+ 200	– 200	– 400	61
viii)	95 × 100	95	95.60	95.38	100.4	100	99.62	99.40	94.6	97.5	+ 205	– 205	– 410	65
ix)	100 ×105	100	100.60	100.38	105.4	105	104.59	104.37	99.6	102.0†	+ 215	– 215	– 430	68
x)	105 × 110	105	105.63	105.41	110.4	110	109.59	109.37	104.6	106.5†	+ 220	– 220	– 440	71
xi)	110 × 115	110	110.63	110.41	115.4	115	114.59	114.37	109.6	112.5	+ 230	– 230	– 460	75
xii)	115 × 120	115	115.63	115.41	120.4	120	119.59	119.37	114.6	117.0†	+ 240	– 240	– 480	78
xiii)	120 × 125	120	120.63	120.41	125.4	125	124.54	124.37	119.6	121.5†	+ 250	– 250	– 500	81

[1)] The values given are obtained by calculations.

[2)] These serrations have profile displacement.

3.4 The loose allowances specified in Table 1 and Table 2 for contact diameter of external serrations shall apply when the force involved acts in one direction only (for example, torsion bar springs).

4 DESIGNATION

Serrations shall be designated by their nominal size, given in Table 1 and Table 2, followed by the number of this standard.

Example:

Serrations of nominal size 12 × 14 shall be designed as:

Serrations 12 × 14 IS 3654

When these serrations are used to transmit force in one direction only, it shall be designated as:

Serrations 12 × 14 L IS 3654

5 BIS Certification Marking

The products(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provision of the *Bureau of Indian Standard Act*, 2016 and the Rules and Regulations framed thereunder, and the product may be marked with the Standard Mark.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

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