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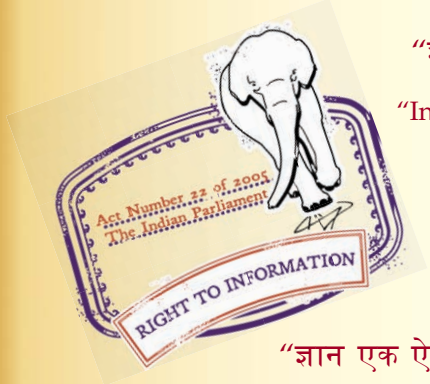

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Indian Standard

DIMENSIONS FOR WROUGHT ALUMINIUM AND ALUMINIUM ALLOYS, BAR, ROD AND SECTION

(First Revision)

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Indian Standard

DIMENSIONS FOR WROUGHT ALUMINIUM AND ALUMINIUM ALLOYS, BAR, ROD AND SECTION

(First Revision)

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Indian Standard

DIMENSIONS FOR WROUGHT ALUMINIUM AND ALUMINIUM ALLOYS, BAR, ROD AND SECTION

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 31 July 1981, after the draft finalized by the Light Metals and Their Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1969. In this revision the tolerances have been modified in the light of the experience gained since its first publication and the current manufacturing practices. A new table for tolerances on width across flats of regular sections at open ends has been incorporated.

0.3 This standard should be used in conjunction with IS : 733-1975*.

0.4 While preparing this standard, the views of producers and consumers relating to the manufacturing and trade practices followed in the country in this field were taken into account. Assistance has also been derived from B. S. 1474 : 1972 'Wrought aluminium and aluminium alloys, bars extruded round tube and sections', issued by the British Standards Institution.

0.5 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†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down the dimensions and tolerances for wrought aluminium and aluminium alloys in the form of bar, rod and section.

*Specification for wrought aluminium and aluminium alloys, drawn tube (for general engineering purposes) (*revised*).

†Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Bar — Any solid section other than round that is long in relation to cross-section and whose width or greatest distance between parallel faces is greater than 6 mm.

2.2 Rod — A round solid section which is long in relation to cross-section having a diameter greater than 6 mm.

2.3 Regular Solid Section — A solid rolled, drawn or extruded section other than round, polygonal or rectangular which may be conveniently divided into approximate rectangles with measurable dimensions.

2.4 Irregular Solid Section — A solid rolled, drawn or extruded section, the profile of which cannot be divided readily into approximate rectangles of measurable dimensions.

3. DIMENSIONS

3.1 Rods — Standard diameters of rods shall be as follows:

7, 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 25, 28, 32, 40, 45, 50, 56, 63, 71, 80, 90, 100, 110, 125, 140 or 160 mm.

3.2 Hexagonal Bars — Standard width across flats of regular sections shall be as follows:

6·4, 7, 8, 9, 10, 11, 12, 14, 17, 19, 22, 24, 27, 30, 32, 36, 41, 46, 50, 55 or 60 mm.

3.3 Square Bars — Standard widths of square bars shall be as follows:

6·4, 7, 8, 9, 10, 11, 12, 14, 16, 19, 20, 24, 26, 32, 38, 50, 55, 60, 76 or 90 mm.

3.4 Regular Sections — Standard thicknesses of regular sections and width of section shall be as given in **3.4.1** and **3.4.2**, respectively.

3.4.1 *Thickness of Regular Sections* — Thickness shall be as follows:

1·2, 1·6, 2, 2·5, 3·2, 4, 5, 6, 8, 10, 12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160 or 200 mm.

3.4.2 *Width of Section* — Width shall be as follows:

12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250 or 320 mm.

4. TOLERANCES

4.1 Regular Sections — The dimensional tolerance of regular sections and solid bars are covered in Tables 1, 2, 3 and 4. However, an extra tolerance of 50 percent shall be allowed for non-heat-treatable alloys 52 000, 53 000, 55 000, and 54 300.

4.1.1 Tolerances for bars and sections of dimensions larger than those covered by Tables 2, 3 and 4 and shall be subject to agreement between the supplier and the purchaser.

4.1.2 For determining the tolerances for regular sections, such as squares and rectangular bars, angles, T-sections, I-beams, H-sections, Z-sections and any other normal types of sections which can conveniently be divided into approximate rectangles with measurable dimensions, the section shall be divided into a series of equivalent rectangles; an angle, for example, being divided into a series of two rectangles. For the purpose of determining tolerances on thickness and width, the widths of each such rectangle shall be the same as the major linear dimension of the angle, and the tolerance on thickness of each leg of the angle shall be taken as if that leg were a rectangle of the same overall dimension.

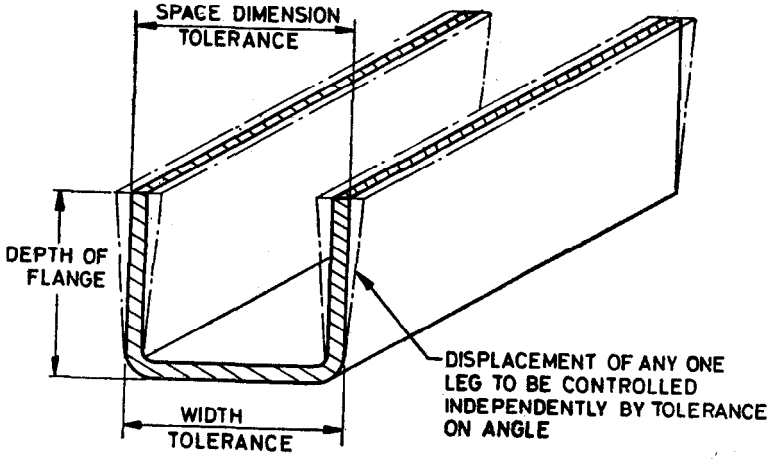

FIG. 1 TOLERANCE ON SPACE DIMENSIONS OF REGULAR SECTIONS

4.2 Sections of Complicated Shape — Sections not covered by Tables 1 to 4 shall be regarded as sections of complicated shape. Tolerances for these sections shall be subject to mutual agreement between the supplier and the

purchaser. The tolerances shall be based, as far as possible, on the tolerances prescribed for regular sections.

4.3 Section for which Specially Close Tolerances are Required — Additional manufacturing operations are necessary where specially close tolerances are required, and such tolerances shall be agreed upon between the supplier and the purchaser.

4.4 Tolerances for Concavity and Convexity — The tolerances for concavity and convexity shall be as follows:

Width of Section		*Tolerances*
Over	Up to and including	
mm	mm	mm
—	25·0	± 0·18
25·0	38·0	± 0·25
38·0	50·0	± 0·30
50·0	—	± 0·30 plus 0·13 mm for every 25 mm of width (*see* example below)

Example : The tolerances for concavity and convexity for a solid section of 150 mm width shall be as follows:

$$\pm(0{\cdot}30+0{\cdot}13\times\frac{150}{25}) = \pm\,(0{\cdot}30 + 0{\cdot}13 \times 6) = \pm\,1{\cdot}08 \text{ mm}$$

4.5 Tolerances for Straightness and Twist — All bars and sections shall be supplied in a straightened condition and reasonably free from twist. The tolerances for straightness, and twist, shall be as follows:

Diameter of Circumscribing Circle mm	*Allowable deviation from straightness* (mm/m of length)
Up to and including 25·0	2·1
Over 25·0	1·7

NOTE 1 — The same tolerance values apply for both straightness and twist.

NOTE 2 — Twist is normally measured by placing the extruded section on a flat surface and measuring the maximum distance at any point along its length between the bottom surface of the section and the flat surface. From this measurement, the deviation from true straightness of the section is subtracted. The remainder is the twist.

4.6 Angular Tolerance — The tolerances on angles of regular sections measured at the extremities of the section shall be as follows:

Thickness of Thinnest Leg		*Allowable Deviation from Angle Specified*
Over mm	Up to and including mm	
—	5·0	± 2°
5·0	19·0	± 1·5°
19·0	—	± 1°

4.6.1 Tolerances on angles of other sections shall be as agreed to between the supplier and the purchaser.

TABLE 1 TOLERANCE ON DIAMETERS OF RODS

(*Clause* 4.1)

All dimensions in millimetres.

DIAMETER	TOLERANCE		
	Class A		Class B
	Plus	Minus	
Up to 12·0	0·03	0·07	± 0·20
Over 12 up to 25	0·05	0·10	± 0·25
Over 25 up to 40	0·07	0·13	± 0·30
Over 40 up to 50	0·13	0·13	± 0·38
Over 50 up to 56	0·15	0·15	± 0·46
Over 56 up to 71	0·20	0·20	± 0·53
Over 71 up to 80	0·25	0·25	± 0·61
Over 80	½ percent of diameter	½ percent of diameter	± 1 percent of diameter

NOTE — Class A tolerances are applicable for drawn rods and not to the asextruded rods.

TABLE 2 TOLERANCES ON OVERALL WIDTHS AND WIDTHS ACROSS FLATS OF BARS, AND REGULAR SECTIONS (AT METAL DIMENSIONS)

(*Clause* 4.1)

All dimensions in millimetres.

WIDTH AND WIDTH ACROSS FLATS	TOLERANCE
(1)	(2)
6·4	± 0·20
10	± 0·23
12	± 0·25
16	± 0·28
25	± 0·30
32	± 0·38
50	± 0·46
60	± 0·53
80	± 0·69
100	± 0·75
120	± 0·85
160	± 1·02
200	± 1·14
250	± 1·40
300	± 1·65
320	± 1·70

NOTE — For intermediate sizes, tolerance for the next higher size shall be taken.

TABLE 3 TOLERANCES ON OVERALL WIDTH AND WIDTH ACROSS FLATS OF REGULAR SECTIONS (AT SPACE DIMENSIONS)

(*Clause* 4.1)

All dimensions in millimetres

Overall External Width	Minimum Thickness of Web or Flange	External or Internal Width Tolerances at Top of Gap for an Internal Depth									
		Less than 6·5	6·5 and Over but Less Than 12·5	12·5 and Over but Less Than 19·0	19 and Over but Less Than 25	25 and Over but Less Than 50	50 and Over but Less Than 75	75 and Over but Less Than 100	100 and Over but Less Than 125	125 and Over but Less Than 150	150 and Over but Less Than 180
		±	±	±	±	±	±	±	±	±	±
Less than 6·5	Less than 1·5	0·38	0·43	0·48	0·53	—	—	—	—	—	—
	1·50 and over but less than 2·00	0·33	0·38	0·43	0·48	—	—	—	—	—	—
	2·0 and over but less than 2·5	0·28	0·33	0·38	0·43	—	—	—	—	—	—
	2·5 and over	0·23	0·28	0·33	0·38	—	—	—	—	—	—
6·5 and over but less than 12·5	Less than 1·5	0·44	0·49	0·54	0·59	—	—	—	—	—	—
	1·5 and over but less than 2·0	0·39	0·44	0·49	0·54	—	—	—	—	—	—
	2·0 and over but less than 2·5	0·34	0·39	0·44	0·49	—	—	—	—	—	—
	2·5 and over but less than 5·0	0·29	0·34	0·39	0·44	—	—	—	—	—	—
	5·0 and over	0·24	0·29	0·34	0·39	—	—	—	—	—	—
12·5 and over but less than 19·00	Less than 1·5	0·50	0·55	0·60	0·65	—	—	—	—	—	—
	1·5 and over but less than 2·0	0·45	0·50	0·55	0·60	—	—	—	—	—	—
	2·0 and over but less than 2·5	0·40	0·45	0·50	0·55	—	—	—	—	—	—
	2·5 and over but less than 5·0	0·35	0·40	0·45	0·50	—	—	—	—	—	—
	5·0 and over but less than 7·5	0·30	0·35	0·40	0·45	—	—	—	—	—	—
	7·5 and over	0·25	0·30	0·35	0·40	—	—	—	—	—	—
19·00 and over but less than 25·00	Less than 1·5	0·56	0·61	0·66	0·71	—	—	—	—	—	—
	1·5 and over but less than 2·0	0·51	0·56	0·61	0·66	—	—	—	—	—	—
	2·0 and over but less than 2·5	0·46	0·51	0·56	0·61	—	—	—	—	—	—
	2·5 and over but less than 5·0	0·41	0·46	0·51	0·56	—	—	—	—	—	—
	5·0 and over but less than 7·5	—	0·41	0·46	0·51	—	—	—	—	—	—
	7·5 and over	—	0·36	0·41	0·46	—	—	—	—	—	—
25 and over but less than 38	Less than 2·5	—	—	—	0·74	0·94	1·14	—	—	—	—
	2·5 and over but less than 5·0	—	—	—	0·66	0·86	1·07	—	—	—	—
	5·0 and over but less than 7·5	—	—	—	0.58	0·79	0·99	—	—	—	—
	7·5 and over	—	—	—	0.53	0·74	0·94	—	—	—	—
38 and over but less than 50	Less than 2·5	—	—	—	0·86	1·07	1·27	1·47	—	—	—
	2·5 and over but less than 5·0	—	—	—	0·76	0·96	1·17	1·37	—	—	—
	5·0 and over but less than 7·5	—	—	—	0·69	0·89	1·09	1·30	—	—	—
	7·5 and over	—	—	—	0·61	0·81	0·02	1·22	—	—	—
50 and over but less than 65	Less than 2·5	—	—	—	0·99	1·19	1·40	1·60	1·80	2·01	—
	2·5 and over but less than 5·0	—	—	—	0·84	1·04	1·24	1·45	1·65	1·85	—
	5·0 and over but less than 7·5	—	—	—	0·76	0·96	1·17	1·37	1·57	1·78	—
	7·5 and over	—	—	—	0·69	0·89	1·09	1·30	1·50	1·70	—

(*Continued*)

TABLE 3 TOLERANCES ON OVERALL WIDTH AND WIDTH ACROSS FLATS OF REGULAR SECTIONS (AT SPACE DIMENSIONS) — *Contd*

(*Clause* 4.1)

All dimensions in millimetres.

Overall External Width	Minimum Thickness of Web or Flange	External or Internal Width Tolerances at Top of Gap for an Internal Depth									
		Less than 6·5	6·5 and Over but Less Than 12·5	12·5 and Over but Less Than 19·0	19 and Over but Less Than 25	25 and Over but Less Than 50	50 and Over but Less Than 75	75 and Over but Less Than 100	100 and Over but Less Than 125	125 and Over but Less Than 150	150 and Over but Less Than 180
		±	±	±	±	±	±	±	±	±	±
65 and over but less than 75	Less than 2·5	—	—	—	1·12	1·32	1·52	1·73	1·93	2·13	2·34
	2·5 and over but less than 5·0	—	—	—	0·94	1·14	1·35	1·55	1·75	1·96	2·16
	5·0 and over but less than 7·5	—	—	—	0·84	1·04	1·24	1·45	1·65	1·85	2·06
	7·5 and over	—	—	—	0·76	0·96	1·17	1·37	1·57	1·78	1·98
75 and over but less than 100	Less than 5·0	—	—	—	1·14	1·35	1·55	1·75	1·96	2·16	2·36
	5·0 and over but less than 7·5	—	—	—	1·02	1·22	1·42	1·63	1·83	2·03	2·24
	7·5 and over	—	—	—	0·91	1·12	1·32	1·52	1·73	1·93	2·13
100 and over but less than 125	Less than 5·0	—	—	—	1·35	1·55	1·75	1·96	2·16	2·36	2·56
	5·0 and over but less than 7·5	—	—	—	1·19	1·40	1·60	1·80	2·01	2·21	2·41
	7·5 and over	—	—	—	1·07	1·27	1·47	1·68	1·88	2·09	2·29
125 and over but less than 150	Less than 5·0	—	—	—	1·52	1·73	1·93	2·13	2·34	2·54	2·74
	5·0 and over but less than 7·5	—	—	—	1·35	1·55	1·75	1·96	2·16	2·36	2·56
	7.5 and over	—	—	—	1·22	1·42	1·63	1·83	2·03	2·24	2·44
150 and over but less than 175	Less than 7·5	—	—	—	1·52	1·73	1·93	2·13	2·34	2·54	2·74
	7·5 and over	—	—	—	1·37	1·57	1·78	1·98	2·19	2·39	2·59
175 and over but less than 200	Less than 7·5	—	—	—	1·68	1·88	2·09	2·29	2·49	2·69	2·90
	7·5 and over	—	—	—	1·52	1·73	1·93	2·13	2·34	2·54	2·74
200 and over but less than 225	Less than 7·5	—	—	—	1·85	2·11	2·36	2·62	2·87	3·12	3·38
	7·5 and over	—	—	—	1·65	1·90	2·16	2·41	2·67	2·92	3·17
225 and over but less than 250	7·5 and over	—	—	—	1·80	2·06	2·31	2·56	2·82	3·07	3·33
250 and over and up to 275	7·5 and over	—	—	—	1·96	2·21	2·46	2·72	2·97	3·23	3·48
Over 275	Subject to mutual agreement										

NOTE — The tolerances may be either on internal gap or external gap (between flanges or legs) as agreed between the purchaser and the supplier and as shown in Fig. 1.

TABLE 4 TOLERANCES ON THICKNESS OF REGULAR SECTIONS AND BARS

(*Clause* 4.1)

All dimensions in millimetres

Thickness of Section	Width of Section														
	12	16	20	25	32	40	50	63	80	100	125	160	200	250	320
1·2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1·6	0·18	0·20	0·20	0·20	0·20	*	*	*	*	*	*	*	*	*	*
2	0·18	0·20	0·20	0·20	0·20	0·23	0·25	0·28	0·30	0·33	0·36	0·38	0·41	0·46	*
2·5	0·18	0·20	0·20	0·20	0·20	0·23	0·25	0·28	0·30	0·33	0·36	0·38	0·41	0·46	*
3·2	0·18	0·20	0·20	0·20	0·23	0·25	0·28	0·30	0·33	0·36	0·38	0·41	0·43	0·48	*
4	0·20	0·23	0·23	0·23	0·25	0·28	0·30	0·33	0·36	0·38	0·41	0·43	0·46	0·51	*
5	0·20	0·23	0·23	0·23	0·25	0·28	0·30	0·33	0·36	0·38	0·41	0·43	0·46	0·51	*
6	0·20	0·23	0·23	0·23	0·25	0·28	0·30	0·33	0·36	0·41	0·46	0·51	0·56	0·66	*
8	0·23	0·25	0·25	0·25	0·28	0·30	0·33	0·36	0·38	0·43	0·48	0·53	0·58	0·71	*
10	0·23	0·25	0·25	0·25	0·28	0·30	0·33	0·36	0·38	0·43	0·48	0·53	0·58	0·71	*
12	0·25	0·28	0·28	0·28	0·30	0·33	0·36	0·38	0·41	0·46	0·48	0·53	0·58	0·74	0·97
16	0·28	0·30	0·30	0·30	0·33	0·36	0·38	0·41	0·43	0·48	0·51	0·56	0·61	0·76	1·02
20		0·30	0·30	0·30	0·36	0·38	0·41	0·43	0·46	0·51	0·53	0·61	0·69	0·79	1·04
25		0·30	0·30	0·30	0·36	0·38	0·41	0·43	0·46	0·51	0·53	0·61	0·69	0·79	0·04
32					0·38	0·41	0·43	0·46	0·48	0·53	0·56	0·66	0·74		
40						0·46	0·48	0·51	0·53	0·56	0·61	0·71	0·79		
50							0·53	0·56	0·58	0·61	0·66	0·76	0·84		
63								0·61	0·64	0·66	0·71	0·81	0·89		
80									0·69	0·71	0·74	0·86	0·94		
100										0·76	0·79	0·91	0·99		
125											0·89	0·97	1·04		
160												1·02	1·09		
200													1·14		

* To be regarded as special sections.

NOTE 1—For intermediate sizes, take tolerances for the next higher size.

NOTE 2—All the tolerances are plus and minus tolerances.

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones: 331 01 31, 331 13 75 Telegrams: Manaksanstha (Common to all Offices)

Regional Offices:	*Telephone*
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	331 01 31 331 13 75
*Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054	36 24 99
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	2 18 43 3 16 41
Southern : C. I. T. Campus, MADRAS 600113	41 24 42 41 25 19 41 29 16
†Western : Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95
Branch Offices:	
'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	2 63 48 2 63 49
‡Peenya Industrial Area 1st Stage, Bangalore Tumkur Road BANGALORE 560058	38 49 55 38 49 56
Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, BHOPAL 462003	6 67 16
Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002	5 36 27
53/5, Ward No. 29, R.G. Barua Road, 5th Byelane, GUWAHATI 781003	3 31 77
5-8-56C L. N. Gupta Marg (Nampally Station Road), HYDERABAD 500001	23 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	6 34 71 6 98 32
117/418 B Sarvodaya Nagar, KANPUR 208005	21 68 76 21 82 92
Patliputra Industrial Estate, PATNA 800013	6 23 05
T.C. No. 14/1421, University P.O., Palayam TRIVANDRUM 695035	6 21 04 6 21 17
Inspection Offices (With Sale Point):	
Pushpanjali, First Floor, 205-A West High Court Road, Shankar Nagar Square, NAGPUR 440010	2 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

*Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, Calcutta 700072 — 27 68 00

†Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 — 89 65 28

‡Sales Office in Bangalore is at Unity Building, Narasimharaja Square, Bangalore 560002 — 22 36 71

Reprography Unit, BIS, New Delhi, India