भारतीय मानक

पिटवाँ ऐल्युमीनियम एवं ऐल्युमीनियम मिश्र धातुओं से बनी एक्सट्रूडेड गोल नलियों के आयाम — विशिष्टि

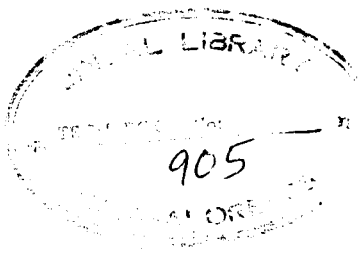
(दूसरा पुनरीक्षण)

Indian Standard

DIMENSIONS FOR WROUGHT ALUMINIUM AND ALUMINIUM ALLOYS EXTRUDED ROUND TUBE — SPECIFICATION

(Second Revision)

ICS 77.150.10



BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2002

Price Group 3

Light Metals and Their Alloys Sectional Committee, MTD 7

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Light Metals and Their Alloys Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1964 and subsequently revised in 1979. While reviewing this standard in the light of experience gained during these years, the Sectional Committee decided to revise the standard.

In this revision, dimensions and tolerances for extruded seamless tubes have been included. Similarly, for ease of references, clause on terminology has been added.

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 : 1960 'Rules for rounding off numerical values (*revised*)'. 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

DIMENSIONS FOR WROUGHT ALUMINIUM AND ALUMINIUM ALLOYS EXTRUDED ROUND TUBE — SPECIFICATION

(Second Revision)

1 SCOPE

This standard specifies the dimensions and tolerances for extruded round tubes made from wrought aluminium and aluminium alloys.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
1285 : 2002	Wroght aluminium and aluminium alloys — Extruded round tube and hollow sections for general engineering purposes — Specification (*third revision*)
5047	Glossary of terms relating to aluminium and aluminium alloys:
(Part 1) : 1986	Unwrought and wrought metals (*second revision*)
(Part 2) : 1979	Plant and operations, thermal treatment, control and testing, finishing
(Part 3) : 1979	Geometrical properties and tolerance, structural and surface defects

3 TERMINOLOGY

For the purpose of this standard the definitions are given in IS 1285 and IS 5047 (Parts 1, 2 and 3) shall apply.

4 STANDARD SIZES

4.1 The standard outside diameters and thickness of structural tubes shall be as given in Table 1.

4.2 The standard outside diameters and thickness of seamless tubes shall be as given in Table 2.

5 TOLERANCE ON STANDARD SIZES

5.1 Tolerance on wall thickness of structural tubes shall be as given in Table 3.

5.2 Tolerance on wall thickness of seamless tubes shall be as given in Table 4.

5.3 Tolerance on outside or inside diameter of structural tubes shall be as given in Table 5.

5.4 Tolerance on outside or inside diameter of seamless tubes shall be as given in Table 6.

5.5 Straightness Tolerance

All tubes shall be supplied in straight condition. The straightness tolerance (*see* Fig. 1) for tubes shall be as follows:

Type	*Allowable Deviation from Straightness (mm/m of length)*
Structural Tubes	1.7
Seamless Tubes	2.1

5.6 Length Tolerance

Unless otherwise agreed, the length tolerances shall be as given in Table 7.

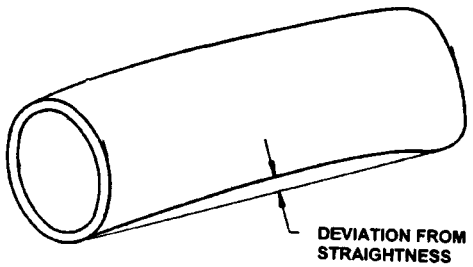


FIG. 1 STRAIGHTNESS TOLERANCE FOR EXTRUDED ROUND TUBES

905

Table 1 Standard Sizes of Extruded Structural Tubes

(*Clause* 4.1)

All dimensions in millimetres.

Wall Thickness	Outside Diameter
1.20 1.60 1.80 2.00	9.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 25.0, 28.0, 32.0, 36.0, 40.0, 45.0, 50.0
2.24 2.50	12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 25.0, 28.0, 32.0, 36.0, 40.0, 45.0, 50.0, 56.0, 63.0, 71.0, 80.0
2.80 3.15	12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 25.0, 28.0, 32.0, 36.0, 40.0, 45.0, 50.0, 56.0, 63.0, 71.0, 80.0, 90.0, 100.0
3.55 4.00	12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 25.0, 28.0, 32.0, 36.0, 40.0, 45.0, 50.0, 56.0, 63.0, 71.0, 80.0, 90.0, 100.0, 110.0, 125.0, 140.0
4.50 5.00	28.0, 32.0, 36.0, 40.0, 45.0, 50.0, 56.0, 63.0, 71.0, 80.0, 90.0, 100.0, 110.0, 125.0, 140.0, 160.0, 180.0, 200.0
5.60 6.30	36.0, 40.0, 45.0, 50.0, 56.0, 63.0, 71.0, 80.0, 90.0, 100.0, 110.0, 125.0, 140.0, 160.0, 180.0, 200.0, 220.0, 250.0
7.10 8.00	45.0, 50.0, 56.0, 63.0, 71.0, 80.0, 90.0, 100.0, 110.0, 125.0, 140.0, 160.0, 180.0, 200.0, 220.0, 250.0
9.00 10.00 11.20 12.50	56.0, 63.0, 71.0, 80.0, 90.0, 100.0, 110.0, 125.0, 140.0, 160.0, 180.0, 200.0, 220.0, 250.0
14.0 16.00	71.0, 80.0, 90.0, 100.0, 110.0, 125.0, 140.0, 160.0, 180.0, 200.0, 220.0, 250.0
18.00 20.00 22.40 25.00	90.0, 100.0, 110.0, 125.0, 140.0, 160.0, 180.0, 200.0, 220.0, 250.0
NOTE — Sizes other than standard and tolerances on them may be as agreed to between the supplier and the purchaser.	

Table 2 Standard Sizes of Extruded Seamless Tubes

(*Clause* 4.2)

All dimensions in millimetres.

Wall Thickness	Outside Diameter
3.5 4.0 5.0	42, 45, 48, 50, 56, 60, 63, 66, 72, 80, 88, 102
6.0 7.0 8.0	48, 50, 56, 60, 63, 66, 72, 80, 88, 102, 115
9.0 10.0 11.0	60, 63, 66, 72, 80, 88, 102, 115, 125
12.0 13.0 14.0	75, 80, 88, 102, 115, 125
15.0 16.0 18.0	88, 102, 115, 125, 140
20.0 25.0 30.0	102, 115, 125, 140
NOTE — Sizes other than standard and tolerances on them may be as agreed to between the suplier and the purchaser.	

Table 3 Tolerances on Wall Thickness of Extruded Structural Tube

(*Clause* 5.1)

All dimensions in millimetres.

Specified Wall Thickness	Outside Diameter	
	Class 1	Class 2
	±	±
Up to 1.2	0.30	–
1.60	0.30	–
1.80	0.30	–
2.00	0.30	–
2.24	0.30	–
2.50	0.33	–
2.80	0.36	–
3.15	0.40	0.90
3.55	0.43	0.94
4.00	0.48	0.97
4.50	0.51	1.02
5.00	0.56	1.07
5.50	0.61	1.12
6.30	0.67	1.18
7.10	0.76	1.27
8.00	0.97	1.47
9.00	1.10	1.60
10.00	1.22	1.73
11.20	1.28	1.79
12.50	1.35	1.85

NOTES

1 Tubes with wall thickness intermediate between standard sizes will have the tolerance of the next higher wall thickness.

2 Tolerances on standard wall thickness above 12.50 mm may be as agreed to between the purchaser and the supplier.

3 For Al-Zn-Mg, Al-Mg and Al-Cu alloys, Class 2 tolerances shall apply.

4 For Al, Al-Mn and Al-Mg-Si alloys, Class 1 tolerances shall apply.

Table 4 Tolerances on Wall Thickness of Extruded Seamless Tube

(*Clause* 5.2)

All dimensions in millimetres.

Specified Wall Thickness	Tolerance
	±
3.50	0.63
4.00	0.70
4.50	0.76
5.00	0.82
5.50	0.88
6.00	0.93
6.50	0.97
7.00	1.01
8.00	1.14
9.00	1.21
10.00	1.30
11.50	1.44
13.00	1.56
14.50	1.67
16.00	1.76

NOTES

1 Tubes with wall thickness intermediate between standard sizes will have the tolerance of the next higher wall thickness.

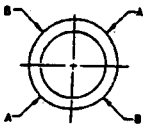
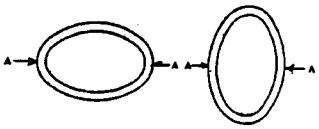
2 Tolerances on wall thickness above 16.00 mm shall be as agreed to between the purchaser and the supplier.

3 For Al-Zn-Mg, Al-Mg and Al-Cu alloys, tolerance shall be one and half times of that specified in the table.

Table 5 Tolerance on Diameter (Inside and Outside) of Extruded Structural Tubes

(*Clause* 5.3)

All dimensions in millimetres.

Specified Diameter (Outside or Inside)		Allowable Deviation of Mean Diameter from Specified Diameter (Size Tolerance)	Allowable Deviation of Diameter at Any Point from Specified Diameter (Ovality Tolerance)
			
		Difference Between ½ (*AA* + *BB*) and Specified Diameter	Difference Between *AA* and Specified Diameter
		±	±
From 9 up to and including	18	0.25	0.50
Above 18 up to and including	30	0.30	0.60
Above 30 up to and including	40	0.36	0.80
Above 40 up to and including	50	0.45	0.90
Above 50 up to and including	60	0.54	1.00
Above 60 up to and including	80	0.60	1.30
Above 80 up to and including	–	1 % of dia	2.5% of dia

NOTES

1 When outside diameter, inside diameter and wall thickness are all specified, standard tolerances are applicable to any two of these dimensions, but not to all three.

2 Mean diameter is the average of two diameter measurements taken at right angles to each other at any point along the length. In other words, mean diameter is 1/2 (*AA* + *BB*).

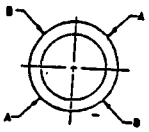
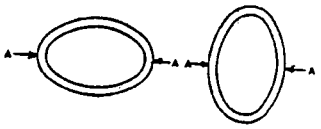
3 Ovalness tolerance is not applicable for annealed temper or if the wall thickness is less than 2.5 percent of the outside diameter.

4 For alloys having magnesium as main alloying element, the tolerance shall be one and half times that specified in the table.

Table 6 Tolerance on Diameter (Inside and Outside) of Extruded Seamless Tubes

(*Clause* 5.4)

All dimensions in millimetres.

Specified Diameter (Outside or Inside)		Allowable Deviation of Mean Diameter from Specified Diameter (Size Tolerance) ± 	Allowable Deviation of Diameter at Any Point from Specified Diameter (Ovality Tolerance) ± 
From 20 up to and including	30	0.42	0.70
Above 30 up to and including	40	0.48	0.80
Above 40 up to and including	50	0.60	1.00
Above 50 up to and including	60	0.72	1.20
Above 60 up to and including	80	0.96	1.60
Above 80 up to and including	100	1.20	2.00
Above 100 up to and including	–	1.50 % of dia	2.5% of dia

NOTES

1 When outside diameter, inside diameter and wall thickness are all specified, standard tolerances are applicable to any two of these dimensions, but not to all three.

2 Mean diameter is the average of two diameter measurement taken at right angles to each other at any point along the length.

3 Ovalness tolerance is not applicable for annealed temper or if the wall thickness is less than 2.5 percent of the outside diameter.

4 For alloys having copper, magnesium or zinc as main alloying element, the tolerance shall be one and half times that specified in the table.

Table 7 Tolerances on Lengths

(*Clause* 5.6)

All dimensions in millimetres.

Nominal Diameter		Length		
Over	Up to and Including	Up to and Including 1 500	Over 1 500 Up to and Including 6 000	Over 6 000
–	50	±4	±5	±6
50	100	±5	±6	±7
100	150	±6	±7	±8
150	–	±7	±8	±9

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Light Metals and Their Alloys Sectional Committee, MTD 7

Organization	*Representative(s)*
In personal capacity, (*Flat No. 102 Rohtas Court, 15 Gokhale Marg, Lucknow-226001*)	SHRI V. K. AGRAWAL (***Chairman***)
Aeronautical Development Establishment, Bangalore	SHRI N. C. SUD SHRIMATI CHHAYA RAJPUT (*Alternate*)
Aluminium Association of India, Bangalore	PROF K. S. S MURTHY SHRI K. S. NAGESH (*Alternate*)
Bharat Aluminium Co Ltd, Korba/New Delhi	SHRI D. K. BISWAS SHRI S. M. CHOBEY (*Alternate* I) SHRI V. K. VASUDEVA (*Alternate* II)
Bharat Forge Ltd, Pune	SHRI N. R. HABBU SHRI A. R. CHAUTHAI (*Alternate*)
Bharat Heavy Electricals Ltd, Bhopal/Hyderabad	SHRI R. K. SETH SHRI C. KANNAN (*Alternate*)
CEMILAC , Ministry of Defence, Bangalore	DR P. RAGHOTHAMA RAO
Central Electricity Authority, New Delhi	SHRI KARNAIL SINGH SHRI NARENDER SINGH (*Alternate*)
Central Electrochemical Research Institute, Karaikudi	SHRI A. SELVAKESAVAN DR V. ANANTH (*Alternate*)
Central Power Research Institute, Bangalore	DR SEETHARAMU SHRI B. H. NARAYANA (*Alternate*)
Civil Aviation Departmment, Bangalore/New Delhi	SHRI R. C. GUPTA SHRI M. M. WALECHA (*Alternate*)
Directorate General Suppliers and Disposal (Inspection Wing), New Delhi/Bhilai	SHRI B. B. RAI SHRI S. K. PANDEY (*Alternate*)
Defence Research & Development Laboratory, Hyderabad	DR S. SUNDARAJAN SHRI G. RAJA SINGH (*Alternate*)
Development Commissioner (SSI), New Delhi	DIRECTOR (MET)
Electrical Manufacturing Co Ltd, Kolkata	SHRI G. K. GHOSH
Galada Continuous Castings Ltd, Hyderabad	SHRI D. C. GALADA
Heat Treaters and Engineers, Mumbai	SHRI SANDEEP PARIKH
Hindalco Industsries Ltd, Renukoot	SHRI J. P. SINGH SHRI ABHAY AGARWAL (*Alternate*)
Hindustan Aeronautics Ltd, Bangalore	DR P. K. SENGUPTA SHRI D. DUTTA (*Alternate*)
ISRO (VSSC), Thiruvananthapuram	DR P. K. BALASUBRAMANIAM
India Foils Ltd, Kolkata	REPRESENTATIVE
India Pistons Ltd, Chennai	SHRI N. GOWRISHANKAR SHRI S. SUNDARAJAN (*Alternate*)
Indian Aluminium Co Ltd, Taloja/Kolkata	SHRI S. V. DESAI SHRI S. GUPTA (*Alternate*)
Indira Gandhi Centre for Atomic Research, Kalpakkam	SHRI K. V. KASIVISWANATHAN
Institute of Indian Foundrymen, New Delhi	SHRI UDAYAN SEN
J.L.N. Aluminium R&D and Design Centre, Nagpur	DR V. V. KUTUMBARAO

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Organization	*Representative(s)*
Jindal Aluminium Ltd, Bangalore	SHRI K. R. RAGHUNATH SHRI S. C. AGRAWAL (*Alternate*)
Ministry of Defence (DGAQA), Hyderabad	SHRI K. N. SINHA SHRI V. K. SACHDEVA (*Alternate*)
Ministry of Defence (DGQA), Ichapur	SHRI A. BHATTACHARYA SHRI P. K. L. R. NIMONKAR (*Alternate*)
Ministry of Defence (DMRL), Hyderabad	DR AMOL A. GOKHALE SHRI VIJAY SINGH (*Alternate*)
Ministry of Defence (OFB), Ambernath	DR S. K. PANDEY SHRI P. R. JADAV (*Alternate*)
National Aerospace Laboratory, Bangalore	DR R. V. KRISHNAN
National Aluminium Co Ltd, Bhubaneswar	SHRI M. M. SETH SHRI S. P. MOHAPATARA (*Alternate*)
National Metallurgical Laboratory, Jamshedpur	SHRI KISHORI LAL
National Thermal Power Corporation, Noida	REPRESENTATIVE
Research Designs and Standards, Lucknow	DIRECTOR (M&C-I) DIRECTOR (CARRIAGE)/I&L (*Alternate* I) ARO (MET-V) (*Alternate* II)
Rural Electrification Corporation, New Delhi	REPRESENTATIVE
BIS Directorate General	SHRI JAGMOHAN SINGH, Director & Head (MTD) [Representing Director General (*Ex-officio*)]

Member Secretary
SHRI DEEPAK JAIN
Joint Director (MTD), BIS