भारतीय मानक **IS 1284 : 2023**

Indian Standard

गढ़ा एल्यूमीनियम मिश्रधातु बोल्ट और स्क्रू स्टॉक (सामान्य इंजीनियरिंग प्रयोजनों के लिए) — विशिष्टि

(तीसरा पुनरीक्षण)

Wrought Aluminium Alloy Bolt and Screw Stock (for General Engineering Purposes) — Specification

(Third Revision)

ICS 77.120.10

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

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Ores and Feedstock for Aluminium Industry, its Metals/Alloys and Products Sectional Committee, MTD 07

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ores and Feedstock for Aluminium Industry, its Metals/Alloys and Products Sectional Committee, had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1956 and subsequently revised in 1966 and 1975. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards.

In addition, following significant changes have been made:

a) Reference clause has been included.

Some characteristics and typical uses of the alloys have been listed in Annex A.

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

For the purpose of deciding whether a particular requirement of this standard is complied with, the final 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 of value should be the same as that of the specified in this standard.

Indian Standard

WROUGHT ALUMINIUM ALLOY BOLT AND SCREW STOCK (FOR GENERAL ENGINEERING PURPOSES) — SPECIFICATION

(Third Revision)

1 SCOPE

This standard covers the requirements of wrought aluminium alloy, bolt and screw stock in various tempers.

2 REFERENCES

The standards given below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indications 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 these standards:

IS No.	*Title*
IS 504 (Part 1 to 12) : 2002	Chemical analysis of aluminium and its alloys: Parts 1 to 12 (*second revision*)
IS 504 (Part 13 to 16) : 2003	Chemical analysis of aluminium and its alloys: Parts 13 to 16 (*second revision*)
IS 1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)
IS 1608 (Part 1) : 2022/ISO 6892-1 : 2022	Metallic materials — Tensile testing: Part 1 Method of test at room temperature (*fifth revision*)
IS 3577 : 1992	Wrought aluminium and its alloys — Rivet, bolt and screw stock — Dimensions and tolerances (*first revision*)
IS 5052 : 1993	Aluminium and its alloys — Temper designations (*first revision*)
IS 6051 : 1970	Code for designation of aluminium and its alloys

3 TERMINOLOGY

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

3.1 Bolt Stocks — Round bar or wire suitable for the manufacture of bolts.

3.2 Screw Stock — Round bar or wire suitable for the manufacture of screws by machining.

3.3 Heat Treatment Batch — A quantity of material of one alloy, of the nearly same dimensions and produced in the same way, solution-treated in one furnace load, or such material so solution-treated and subsequently precipitation-treated in one furnace load. More than one heat treatment batch may comprise a furnace load.

4 SUPPLY OF MATERIAL

General requirements for the supply of aluminium and aluminium alloy products shall conform to IS 1387.

5 FREEDOM OF DEFECTS

Bolt and screw stock shall be sound and free from harmful defects.

6 CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES

6.1 The chemical composition and mechanical properties of bolt and screw stock shall comply with the requirements of Table 1 and Table 2 respectively.

6.1.1 The chemical analysis as mentioned in **6.1**, shall be carried out either in accordance with the methods specified in IS 504 (Part 1 to 12) and IS 504 (Part 13 to 16) or by any other established instrumental/chemical method. In case of any dispute, the method specified in IS 504 (Part 1 to 12) and IS 504 (Part 13 to 16) shall be used as referee method. However, when the method is not given in IS 504 (Part 1 to 12) and IS 504 (Part 13 to 16), the referee method shall be as agreed between the purchaser and the supplier.

6.1.2 Mechanical tests shall be carried out as specified in **9**.

Table 1 Chemical Composition of Wrought Aluminium Alloy Bolt and Screw Stock for General Engineering Purposes

(*Clause* 6.1)

(Value are in Percent *Max*, Unless Shown Otherwise)

Sl No.	Alloy Designations	Copper	Magnesium	Silicon	Iron	Manganese	Zinc	Titaniumand/ or Other Grain Refining Elements	Chromium	Aluminium	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	24345	3.8 to 5.8	0.2 to 0.8	0.5 to 1.2	0.7	0.3 to 1.2	0.2	0.3*	0.3*	Remainder	—
ii)	24534	3.5 to 4.7	0.4 to 1.2	0.2 to 0.7	0.7	0.4 to 1.0	0.2	0.3	—	Remainder	—
iii)	53000	0.1	2.8 to 4.0	0.6	0.5	0.5	0.2	0.2	0.25	Remainder	Cr + Mn = 0.5
iv)	55000	0.1	4.5 to 5.5	0.6	0.5	0.5	0.2	0.2	0.25	Remainder	Cr + Mn = 0.5
v)	64423	0.5 to 1.0	0.5 to 1.3	0.7 to 1.3	0.8	1.0	—	—	—	Remainder	—
vi)	64430	0.1	0.4 to 1.2	0.6 to 1.3	0.6	0.4 to 1.0	0.1	0.2	0.25	Remainder	—
vii)	65032	0.15 to 0.4	0.7 to 1.2	0.4 to 0.8	0.7	0.2 to 0.8	0.2	0.2	0.15 to 0.35	Remainder	Either Mn or Cr shall be present

NOTES

1 Designations shall be as given in IS 6051.

2 It is the responsibility of the supplier to ensure that any element not specifically limited is not present in an amount such as is generally accepted as having an adverse effect on the product. If a purchaser's requirements necessitate limits for any element not specified, these should be agreed to between the supplier and the purchaser.

*Titanium and/or other grain refining elements and/or chromium may be present at the option of the supplier provided the total content does not exceed 0.3 percent.

Table 2 Mechanical Properties of Wrought Aluminium Alloy, Bolt and Screw Stock (for General Engineering Purposes)

(*Clause* 6.1)

Sl No.	Alloy Designation	Condition of Test*	Diameter (mm)	0.2 Percent Proof Stress (N/mm 2)	Tensile Strength (N/mm 2)
				Min	*Min*
(1)	(2)	(3)	(4)	(5)	(6)
i)	24345	T6	0 to 12.5	345	430
ii)	24534	T4	0 to 12.5	220	375
iii)	53000	H X 4	0 to 12.5	220	270 to 320
iv)	55000	H X 4	0 to 12.5	240	310 to 355
v)	64423	T6	0 to 12.5	265	330
vi)	64430	T6	0 to 6.3	255	295
			6.3 to 12.5	270	310
vii)	65032	T6	0 to 6.3	225	265
			6.3 to 12.5	235	280

7 DIMENSIONS AND TOLERANCES

The diameters of bolt and screw stock and the tolerances permissible on them shall be as laid down in IS 3577.

8 SELECTION OF TEST SAMPLES

8.1 The test samples shall be selected as specified in **8.2**. Before the test samples are cut off, they shall be marked to identify them with the lot they represent.

8.2 Bolt and Screw Stock of Non Heat-Treatable Aluminium Alloys

Bolt and screw stock of the same diameter, of the same grade and manufactured under similar conditions shall be grouped into lots weighing up to 250 kg and one test sample shall be cut from a coil or length selected.

8.3 Bolt and Screw Stock of Heat-Treatable Aluminium Alloys

Bolt and screw stock of the same diameter, of the same grade and manufactured under similar conditions shall be grouped into lots weighing up to 250 kg and one test sample shall be cut from a coil or length selected from each lot. The test sample shall be tested in the T4 or T6 condition as specified by the purchaser, except that for alloy 24534 and 24315 the head-forming test shall be made on the test sample not more than two hours after solution treatment. The test samples shall not be mechanically worked or further heat-treated before they are tested.

9 MECHANICAL TESTS

The following tests shall be made on the test pieces prepared from test samples selected as specified in **8**.

9.1 Tensile Test

The tensile test shall be carried out and the proof stress determined thereby in accordance with IS 1608 (Part 1).

9.2 Head-Forming Test (Applicable Only to Bolt and Screw Stock 1.60 mm Diameter and Above)

For bolt and screw stock 1.60 mm to 650 mm diameter, a length of bolt and screw stock equal to the diameter shall be flattened cold in an axial direction until the diameter of the flattened part shall be equal to 1.8 times the original diameter.

10 RETESTS

10.1 Should any one of the test pieces first selected fail to conform to the mechanical tests, two further samples from the same lot shall be selected for testing, one of which shall be from the bolt and screw stock from which the original test sample was taken, unless that has been withdrawn by the supplier.

'*' For temper designation, refer to IS 5052 'aluminium and its alloys — Temper designations.

For heat-treatable alloys, the supplier shall have the right, if he so desires, to reheat-treat the material before two further samples are selected.

10.2 Should the test pieces from both these additional samples conform to the values prescribed, the lot represented by the test samples shall be deemed to comply with the requirements of mechanical properties. Should the test piece from either of these additional samples fail, the lot represented by the test samples shall be liable to rejection.

11 MARKING

11.1 If required, bolt and screw stock may by suitably marked for identification, with the name of the manufacturer, grade and condition of the material. The supplier shall furnish a certificate that the material supplied complies with the requirements of this specification.

11.2 BIS Certification Marking

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

ANNEX A

(*Foreword*)

CHARACTERISTICS AND TYPICAL USES OF ALUMINIUM ALLOYS

Sl No.	*Alloy Designation*	*Characteristics*	*Available Forms*	*Typical Uses*
(1)	(2)	(3)	(4)	(5)
i)	24345	Combines high strength with fair ductility in the solution-treated condition, when forming can be done and parts subsequently aged.	Sheet, plate, extrusion, tube, wire, and forgings	Heavy duty forgings, structures where high mechanical properties are of utmost importance, aircraft application of clad sheets, extrusions and armaments.
ii)	24534	A strong alloy that is aged naturally at room temperature after solution treatment and has fair ductility in this condition.	Extrusion, tube, wire, rolled rod, and forgings	Stressed parts in aircraft and other structures where high strength is of primary consideration.
iii)	53000	Ductile in soft condition, but work hardens rapidly becoming extremely tough. Has high resistance to corrosive attack, especially in marine atmosphere.	Sheet, extrusion, tube, wire, and rolled rod	Shipbuilding; rivets, pressure vessels and other processing tanks; cryogenics and welded structures.
iv)	55000	- do -	Sheet, plate, wire and forgings	Shipbuilding and other applications demanding moderately high strength with good corrosion resistance; rivets, zippers, welding wire etc
v)	64423	Stronger than 64430 and has superior machinability	Extrusions	Applications requiring good strength and machinability such as textile machinery components.
vi)	64430	Medium-strength alloy with good mechanical pro-perties, corrosion resistance and weldability	Sheet, plate, extrusion, tube, wire, and forgings	Structural applications of all kinds, such as road and rail transport vehicles, bridges, cranes, roof trusses, rivets etc Cargo containers, milk containers, deep drawn containers and flooring.
vii)	65032	Medium-strength to 64430	Sheet, plate, extrusion, tube, forgings, and wire	Similar to 64430

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Ores and Feedstock for Aluminium Industry, its Metals/Alloys and Products Sectional Committee, MTD 07

Organization	*Representative(s)*
CSIR - Institute of Minerals and Materials Technology, Bhubaneswar	DR KALI SANJAY **(*Chairperson*)**
Aeronautical Development Establishment, Bengaluru	SHRI G. S. RAVINDRA SHRI T. MOHAN REDDY (*Alternate*)
Aluminium Association of India, Bengaluru	SHRI ANIL MATHEW SHRI T. VIMAL RAJ (*Alternate*)
Aluminium Secondary Manufacturers Association, New Delhi	SHRI NAVEEN PANT SHRI PRAVEEN DIXIT (*Alternate*)
Bharat Aluminium Company Limited, New Delhi	MS ANJALI PAWAR SHRI JITENDRA KUMAR VERMA (*Alternate*)
Century Extrusions Limited, Kolkata	SHRI V. JHUNJHUNWALA SHRI SANJAY SINGH SEHRAWAT (*Alternate*)
Century Metal Recycling Limited, Faridabad	SHRI MOHAN AGARWAL
CSIR - Advanced Materials and Processes Research Institute, Bhopal	DR D. P. MONDAL
CSIR - National Metallurgical Laboratory, Jamshedpur	DR KANAI SAHOO DR V. C. SRIVASTAVA (*Alternate*)
Defence Metallurgical Research Laboratory, Ministry of Defence, Hyderabad	DR G. JAGAN REDDY DR S. N. SAHU (*Alternate*)
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Defence Research and Development Laboratory, Ministry of Defence, Hyderabad	DR G. RAJA SINGH DR N. A. ARUN (*Alternate*)
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Hindustan Aeronautics Limited, Bengaluru	SHRI R. R. BHAT
Indian Space Research Organization, Bengaluru	DR S. K. GHOSH

Organization	*Representative(s)*
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Jindal Aluminium Limited, Bengaluru	SHRI O. K. SHARMA SHRI P. DEVARAJ (*Alternate*)
Material Recycling Association of India (MRAI), Mumbai	SHRI DHAWAL SHAH SHRI JAYANT JAIN (*Alternate*)
National Aluminium Company Limited, Bhubaneswar	SHRI S. NANDA
National Test House, Kolkata	DR NISHI SRIVASTAVA SHRI BUDDH PRAKASH (*Alternate*)
Shri Ram Institute for Industrial Research, Delhi	SHRI P. K. KAICHER SHRI B. GOVINDAN NAIR (*Alternate*)
Vedanta Limited, Mumbai	SHRI VIVEK SAXENA SHRI RAM SANDIPAM (*Alternate*)
BIS Directorate General	SHRI SANJIV MAINI, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (METALLURGICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI ASHISH PRABHAKAR WAKLE
SCIENTIST 'C'/DEPUTY DIRECTOR
(METALLURGICAL ENGINEERING), BIS

Panel on Primary Product Panel, MTD 07/P1

Organization	*Representative(s)*
Aluminium Association of India, Bengaluru	SHRI BUTCHI BABU **(*Convenor*)**
Aluminium Secondary Manufacturers Association, New Delhi	SHRI ANIL AGARWAL
Century Extrusions Limited, Kolkata	SHRI V. JHUNJHUNWALA
Hindalco Industries limited, Mumbai	SHRI S. SASIKUMAR
Jawaharlal Nehru Aluminium Research Development and Design Centre, Nagpur	DR ANUPAM AGNIHOTRI
Jindal Aluminium Limited, Bengaluru	SHRI P. DEVARAJ
Material Recycling Association of India (MRAI), Mumbai	SHRI JAYANT JAIN SHRI JAY PODDAR (*Alternate*)
National Test House, Kolkata	SHRIMATI ANSHU MALA SHUKLA
Vedanta Limited, Mumbai	SHRI VIVEK SAXENA SHRI RAM SANDIPAM (*Alternate*)

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

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