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उत्पाद मैनुअल

**(Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections
(For General Engineering Purposes))**

733: 1983 के अनुसार

**PRODUCT MANUAL FOR
Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections (For General
Engineering Purposes)
ACCORDING TO IS 733: 1983**

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो) अनुरूपता मूल्यांकन (विनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification.

1.	मानक संख्या IS No.	:	IS 733: 1983
	शीर्षक Title	:	Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections (For General Engineering Purposes)
	संशोधनों की संख्या No. of amendments	:	2
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	No specific requirement for raw material Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence/Factory Surveillance
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer Annex – A

c)	नमूने का परिमाण Sample Quantity	: For chemical testing – 5 pcs of 5 cm length For mechanical testing – 1 pcs of 1 meter In case of higher sizes (bulky sizes) of Bars, Rods and Regular Solid Sections and Irregular Solid Sections, prepared Pieces for Mechanical testing may be sent. Requirements of Dimensions and Tolerances (cl.7.) may be tested in the factory (F/T) on full sizes of Bars/Rods/Regular Sections/Irregular Sections from which samples are drawn for IT. Note: This section indicates the quantity of the sample of the product and/or the raw material (if applicable), required to be sent to the laboratory for testing, for the purpose of Grant of Licence/Change in Scope of Licence/ Factory Surveillance (in case of market surveillance, effort may be made to procure the required quantity of product sample, as far as possible since raw material sample may not be available in market)
3.	परीक्षण उपकरणों की सूची List of Test Equipment	: Please refer to Annex-B देखें
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	: Please refer to Annex-C देखें
5.	एक दिन में संभावित परीक्षण Possible tests in a day	
		All tests (if spectrometer is available for chemical tests) Note: This section is for the guidance of BIS Certification Officers/Technical Auditors of BIS Authorized Outside Surveillance Agencies (OSAs) during factory inspection to provide readyreference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.
6.	लाइसेंस का दायरा /Scope of the Licence:	733:1983 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेंस निम्नलिखित कार्यक्षेत्र के लिए प्रदान किया जाता है “ Licence is granted to use Standard Mark as per IS 733:1983 with the following scope:
7.	Name of the product	Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections (For General Engineering Purposes)
	Type of section	Rods/Square or hexagonal bars/regular or irregular sections etc.
	Dimensions/Sizes	Diameter, Width, thickness etc.
	Condition(s)	Temper designations such as F, O, T5 etc.
	Designation (s)	19000, 19500, 63400 etc.

ANNEXURE A**GROUPING GUIDELINES****A) Grouping based upon Grade Designations:**

A.1 Manufacturer shall declare the Grade Designations (specified at Table 1) intended to be covered in the scope of licence

Group	Grade Designations	Grouping
1	19000 19500 19600	One sample of Grade Designation having the highest Purity of Aluminium shall be drawn to cover Grade Designations having lower purity in the Scope (Also See A.2)
2	24345 24534	One sample of any Grade Designation shall be drawn and tested (Also See A.2)
3	43000 46000	One sample of any Grade Designation shall be drawn and tested (Also See A.2)
4	52000 53000 54300	One sample of any Grade Designation shall be drawn and tested (Also See A.2)
5	63400 64423 64430 65032	One sample of any Grade Designation shall be drawn and tested (Also See A.2)
6	74530 76528	One sample of any Grade Designation shall be drawn and tested (Also See A.2)

A.2 Evidence of manufacturing capability such as Mill Test Certificates (MTCs) (of earlier consignments) of all Grade Designations, intended to be covered in the scope of the licence,

within each Group, shall be submitted by the manufacturer and their conformity to the requirements of IS 733 shall be ensured before endorsing all Grade Designations in the Scope of Licence. In case of non-availability of MTCs, samples of all those Grade Designations shall also be drawn and tested from each Group.

B) Grouping based upon Temper Condition:

B.1 Grade Designations specified at Table 1 can be supplied in different Temper Conditions and mechanical properties of Grade Designations in different Temper Condition are specified at Table 2. Manufacturer shall declare the Temper Condition for supply of each Grade Designation as a part of scope of the licence.

Temper Conditions	Grouping
F,O,T4,T5,T6	Samples of different Grade Designations, drawn at A above, shall be drawn in such combination that samples of all Temper Conditions, intended to be covered in the scope of the licence, are tested.

C) Grouping based upon Sections and Sizes:

C.1 Manufacturer shall declare the Sections and their Sizes intended to be covered in the Scope of the Licence.

Sections	Grouping
Bars Rods Regular Solid Sections(Angles, Channels, Tees etc.) Irregular Solid Sections	Samples of different Grade Designations and Temper Designations, drawn at A & B above, shall be drawn in such combination that samples of all Sections, intended to be covered in the scope of the licence, are tested. The samples of different Sections drawn may be of any size. However, scope of licence with regards to sizes shall be restricted based upon manufacturing capability.

D. Scope of licence shall be restricted based on the manufacturing and testing facilities available.

E. During operation of licence, samples of each variety covered in the scope of licence, shall be tested in rotation, to the extent possible

ANNEX – B**LIST OF TEST EQUIPMENTS****(INDICATIVE LIST, FOR GUIDANCE ONLY)**

Sr. No.	Test Equipment	Tests used in with Clause Reference
1.	Vernier Caliper	Dimensions and Tolerances (Clause 7)
2.	Micrometer	
3.	Steel Scale	
4.	Right Angle	
5.	Measuring Tape	
6.	Feeler Gauge	
7.	Straight Surface	
8.	Universal Tensile Testing Machine	Tensile Test (Clause 9) And Table 2
9.	Extensometer	
10.	Spectrometer	Chemical Composition (Clause 5)
11.	Analytical Balance(0-200gm, LC- 0.1mg)	
12.	Hot Plate	
13.	Hot Air Oven	
14.	Photometer (Absorption cell)	
15.	Porcelain/Silica Crucible	
16.	Platinum Crucible	
17.	Thermometer	
18.	Filter Paper including ashless filter paper pad	
19.	Stainless steel/nickel beaker, Plastic/polyethene/SS Beaker	
20.	Pyrex beakers and other glassware	
21.	Reagents-Mixed Acid(Conc.HCL, Conc. Sulphuric Acid, Conc. Nitric Acid), Dilute Sulphuric Acid, Hydrofluoric Acid, Hydrogen Sulphide(gas), Hydrogen Sulphide Wash Solution, Dilute Nitric Acid, Concentrated Ammonium Hydroxide, Dilute Ammonium Hydroxide Wash Solution, Citric Acid Solution, Sodium-Diethyl-Dithiocarbonate solution,Carbon Tetrachloride, Sodium Sulphate, Standard Copper Solution, silica basin.	Copper (Below 0.1%)
22.	Reagents – Concentrated Sulphuric Acid, Concentrated Nitric Acid, Concentrated Hydrochloric Acid, Mixed Acids(Conc.HCL, Conc. Sulphuric Acid, Conc. Nitric Acid), Hydrofluoric Acid, Dilute Sulphuric Acid, Ammonium Fluoride, Concentrated Ammonium Hydroxide, Acetic Acid, Urea Solution, Potassium Iodide Solution, Standard Sodium Thiosulphate Solution, Starch solution, ammonium thiocyanate, Sodium Hydroxide Solution, Sodium Sulphate Solution, Sodium Hydroxide-Sodium Sulphate Wash Solution,	Copper (Above 0.1%)

	Dilute Nitric Acid, Sulphurous Acid, Hydrogen Sulphide (gas), Hydrogen Sulphide Wash Solution	
23.	Reagents – Sodium Hydroxide, Hydrogen Peroxide, Sodium Carbonate, Methyl Red Indicator Solution, Conc. Ammonium Hydroxide, Ammonium Chloride Wash Solution, Ammonium Chloride, Conc. Hydrochloric Acid, Ammonium Sulphide Solution, Ammonium Persulphate, Ammonium Sulphide Wash Solution, Bromine Water, 8-Hydroxyquinoline Solution, Dilute Ammonium Hydroxide, Methyl Orange Indicator Solution, Potassium Bromate-Potassium Bromide Solution, Potassium Iodide Solution, Starch Solution, Standard Potassium Iodate Solution, Standard Sodium Thiosulphate Solution	Magnesium (0.01 to 12 %)
24.	Reagents – Sodium Hydroxide Solution, Hydrogen Peroxide, Potassium Cyanide Solution, Dilute Hydrochloric Acid, Ammonium Chloride, Bromine Water, Conc. Ammonium Hydroxide, Sodium Acetate, Tartaric Acid, Chrome Blank T Indicator, Standard Magnesium Sulphate, Standard EDTA Solution.	Magnesium (0.5 to 11%)
25.	Reagents- Sodium Hydroxide Solution, Dilute Nitric Acid, Ammonium Molybdate Solution, Standard Silicon Solution.	Silicon (0.02 to 0.3%)
26.	Reagents – Sodium Hydroxide Solution, Hydrogen Peroxide, Conc. Sulphuric Acid, Sulphuric Acid-Perchloric Acid Mixture, Perchloric Acid Solution, Conc. Nitric Acid, Sulphurous Acid, Dilute Sulphuric Acid, Conc. Hydrochloric Acid, Ammonium Acetate Solution, Dilute Hydrochloric Acid, Hydrofluoric Acid	Silicon (Above 0.3%)
27.	Reagents-Sodium Hydroxide Solution, Finely granulated lead containing under 0.001% iron, Acetate Buffer Solution, Hydroxylamine Hydrochloride Solution, O-phenanthroline solution, Standard Iron Solution. Equipment – Magnet, Nickel Beaker.	Iron (0.03 to 0.10%)

28.	<p>Reagents -Concentrated Sulphuric Acid, Concentrated Nitric Acid, Concentrated Hydrochloric Acid, Mixed Acids(Conc.HCL, Conc. Sulphuric Acid, Conc. Nitric Acid), Dilute Sulphuric Acid, Hydrofluoric Acid, Potassium Bisulphate, Hydrogen Sulphide, Hydrogen Sulphide Wash Solution, Potassium Permanganate Solution, Potassium Thiocyanate Solution, Standard Titanous Chloride Solution.</p> <p>Equipment – Apparatus for Storing Titanous Chloride Solution, Solid Glass Beads.</p>	Iron (0.01 to 2.0%)
29.	<p>Reagents – Sodium Hydroxide Solution, Sodium Nitrite Solution, Acid Mixture(Conc. Nitric Acid and Phosphoric Acid), Hydrofluoric Acid, Potassium Periodate Solution, Standard Manganese Solution</p>	Manganese (Mn content between 0.01 to 0.1%)
30.	<p>Reagents - Sodium Hydroxide Solution, Acid Mixture(Conc. Sulphuric Acid, Phosphoric Acid and Nitric Acid), Silver Nitrate Solution, Ammonium Persulphate Solution, Ammonium Chloride Solution, Standard Arsenite-Nitrite Mixture, Sodium Arsenite, Standard Manganese Solution.</p>	Manganese (Chromium Content up to 0.5%)
31.	<p>Reagents – Conc. Nitric Acid, Sodium Bismuthate, Sulphurous Acid, Dilute Nitric Acid, Phosphoric Acid, Standard Ferrous Ammonium Sulphate Solution, Standard Sodium Oxalate Solution, Standard Potassium Permanganate Solution.</p> <p>Equipment- Asbestos Gooch Crucible.</p>	Manganese (Mn content between 0.1 to 1.5%)
32.	<p>Reagents – Dilute Hydrochloric Acid, Potassium Chlorate, Carbon Tetrachloride, Complex Forming Solution (Conc. Ammonium Hydroxide, Ammonium Oxalate, HCl acid, sodium acetate, sodium thiosulphate solution and sodium sulphide solution), Dithizone Solution, Sodium Sulphide Wash Solution, Standard Zinc Solution.</p>	Zinc (Photometric Method for Zn content below 0.1%)

33.	Reagents – Mixed Acid(Conc. Sulphuric Acid, Conc. HCl and Conc. Nitric Acid), Dilute Sulphuric Acid, Hydrogen Sulphide(gas), Hydrogen Sulphide Wash Solution, Tartaric Acid Solution, Conc. Ammonium Hydroxide, Methyl Red Indicator Solution, Formic Acid Mixture, Formic Acid Wash Solution, Dilute Hydrochloric Acid, Ammonium Nitrate, Methylated Spirit, Mercuric Potassium Thiocyanate Solution, Chloroform, Standard Zinc Solution, Standard Potassium Iodate Solution.	Zinc (By Mercuric Thiocyanate Method)
34.	Reagents – Sodium Hydroxide Solution, Nitric Acid-Sulphuric Acid Mixture, Dilute Sulphuric Acid, Hydrogen Peroxide, Standard Titanium Solution.	Titanium
35.	Reagents – Conc. Sulphuric Acid, Conc. Nitric Acid, Silver Nitrate, Hydrofluoric Acid, Ammonium persulphate, Dilute HCl, Standard Ferrous Ammonium Sulphate Solution, Standard Potassium Permanganate Solution.	Chromium

ANNEX C

SCHEME OF INSPECTION AND TESTING

1. QUALITY ASSURANCE PLAN

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1. For the purpose of this scheme, aluminium bar, rod or sections of same shape, dimension and condition, produced continuously from the same cast one the same line in one go, shall be taken as one control unit.

1.3.1 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**.

1.3.2 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING- It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in house as "R" or other tests which can be subcontracted as "S". Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as "R" in Column 2 of Table 1) is also optional.

2.2.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as "R" in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the

specification. They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 **TEST RECORDS**- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. PACKING AND MARKING - The Standard Mark as given in the Schedule of the license and Licence Number (i.e. CM/L.....) shall be suitably incorporated on each lot of bar, rod or section and on the Test Certificate. The marking shall be done as per the provisions of the Indian Standard, provided always that the product thus marked and packed conforms to all the requirement of the specification.

3.1 Packing and Marking shall be done as per the Indian Standard.

4. TEST CERTIFICATE: For each consignment of BIS Certified material conforming to this standard there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed).

5. REJECTION - All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016. <Any product specific requirements to be inserted her

TABLE 1
(ONLY FOR GUIDANCE PURPOSE)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or)S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
4.1	Freedom from Defects	---	IS 733	R	Manufacturer shall exercise adequate in-process controls to ensure the material remains free from harmful defects.		
4.2	Peripheral Coarse Grain Envelope	---	IS 733	S	For aluminium copper and aluminium-zinc-magnesium-copper which are susceptible to peripheral alloys, grains coarsening, the permissible limit of 'coarse grain' envelope shall be as agreed to between the manufacturer and the purchaser.		
5	Chemical Composition	5.1.1	IS 733 IS 504(all parts) or any other established instrumental/chemical method	R	One	Each Heat/Cast	---
7	Dimensions and Tolerances	7.1	IS 733	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
9	Tensile Test	9.1	IS 733 IS 1608 (Part 1)	R	One	Each Control Unit	

**ANNEXURE I
TEST CERTIFICATE FORMAT
XYZ ALUMINIUM COMPANY**

ISI Mark With IS no. and CM/L no.
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TEST CERTIFICATE FOR Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections (For General Engineering Purposes)

TEST CERTIFICATE NO. _____ DATED _____
TO M/s _____

It is certified that the material described below fully conforms to IS 733:1983. Chemical composition of the product, as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks Licence No. CM/L_____are as indicated below against each order no. etc.

(PLEASE REFER TO IS 733:1983 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order no and date	Type (bar, rod or section) and nominal size	Designation (19000, 19500 etc) and condition	Cast No./Lot No.	Quantity (in tonnes)	Chemical Analysis (in %)										Tensile properties			Remarks				
					Al	Cu	Mg	Si	Fe	Mn	Zn	Ti and/or other grain refining elements	Cr	Ti+V	Total impurities	Cr+Mn	0.2% proof stress (Mpa)		Tensile strength (Mpa)	Elongation (%)		

The material supplied conforms to specified tolerances
REMARKS
SHIPPING ADVICE NO.

WAGON NOS

FOR XYZ IRON AND STEEL COMPANY

“For details of BIS certification please visit www.bis.gov.in”