

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

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence 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 licence/certificate.

1.	Product	:	IS 733:1983
	Title	:	Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections (For General Engineering Purposes)
	No. of amendments	:	2
2.	Sampling Guidelines		
a)	Raw material	:	No specific requirement for raw material
b)	Grouping Guidelines	:	Please refer Annex - A
c)	Sample Size	:	For mechanical testing – 2 x 1 meter For chemical testing – 50 gm
3.	List of Test Equipment	:	Please refer Annex - B
4.	Scheme of Inspection and Testing	:	Please refer Annex - C
5.	Possible tests in a day	:	All tests (if spectrometer is available for chemical tests)
6.	Scope of the Licence :		
	Licence is granted to use Standard Mark as per IS 733:1983 with the following scope:		
	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	Width, thickness etc.	
	Condition(s)	Temper designations such as F, O, T5 etc.	
	Designation (s)	19000, 19500, 63400 etc.	

ANNEXURE A
TO PRODUCT MANUAL FOR
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GROUPING GUIDELINES

Designations have been divided into different groups and are arranged in order of least to most stringent based on tensile properties as given below: -

Less Stringent	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
	19000	24345	43000	52000	63400	64423	74530
↓	19500	24534	46000	53000	64430		76528
More stringent	19600			54300	65032		

1. In each group if sample of more stringent designation is drawn the lower designations may be covered for same temper designation.
2. Separate samples under each group are to be drawn for each Temper Condition to be included in Scope of Licence.
3. Sample of any one size for each of the following sections may be drawn to cover all the sections and sizes for which manufacturing and testing facility is available with firm: -
 - i. Bars.
 - ii. Rods.
 - iii. Regular Solid Sections (Angles, Channels, Tees etc.)
 - iv. Irregular Solid Sections.
4. However, it shall be ensured that the firm is having all the necessary manufacturing and testing facilities for the manufacture and testing of the varieties to be included in the licence.

ANNEXURE B
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LIST OF TESTING EQUIPMENT

Major test equipment required to test as per requirements of Indian Standard.

Sr. No.	Test Equipment	Tests used in with Clause Reference	
5.	Vernier Caliper	Dimensions and Tolerances (Clause 7)	
6.	Micrometer		
7.	Steel Scale		
8.	Right Angle		
9.	Measuring Tape		
10.	Feeler Gauge		
11.	Straight Surface		
12.	Universal Tensile Testing Machine		Tensile Test (Clause 9) And Table 2
13.	Extensometer		
14.	Spectrometer		Chemical Composition (Clause 5)
15.	Analytical Balance(0-200gm, LC- 0.1mg)		
16.	Hot Plate		
17.	Hot Air Oven		
18.	Photometer (Absorption cell)		
19.	Porcelain/Silica Crucible		
20.	Platinum Crucible		
21.	Thermometer		
22.	Filter Paper including ashless filter paper pad		
23.	Stainless steel/nickel beaker, Plastic/polyethene/SS Beaker		
24.	Pyrex beakers and other glassware		
25.	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%)	
26.	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, Dilute Nitric Acid, Sulphurous Acid, Hydrogen	Copper (Above 0.1%)	

	Sulphide(gas), Hydrogen Sulphide Wash Solution	
27.	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 %)
28.	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%)
29.	Reagents- Sodium Hydroxide Solution, Dilute Nitric Acid, Ammonium Molybdate Solution, Standard Silicon Solution.	Silicon (0.02 to 0.3%)
30.	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%)
31.	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%)
32.	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. Equipment – Apparatus for Storing Titanous Chloride Solution, Solid Glass Beads.	Iron (0.01 to 2.0%)
33.	Reagents – Sodium Hydroxide Solution, Sodium Nitrite Solution, Acid Mixture(Conc. Nitric Acid and Phosphoric Acid), Hydrofluoric Acid, Potassium Periodate Solution, Standard	Manganese (Mn content between 0.01 to 0.1%)

	Manganese Solution	
34.	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.	Manganese (Chromium Content up to 0.5%)
35.	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. Equipment- Asbestos Gooch Crucible.	Manganese (Mn content between 0.1 to 1.5%)
36.	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.	Zinc (Photometric Method for Zn content below 0.1%)
37.	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)
38.	Reagents – Sodium Hydroxide Solution, Nitric Acid-Sulphuric Acid Mixture, Dilute Sulphuric Acid, Hydrogen Peroxide, Standard Titanium Solution.	Titanium
39.	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

This is an indicative list for the purpose of guidance only and may not be taken as exhaustive

ANNEXURE C
TO PRODUCT MANUAL FOR
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SCHEME OF INSPECTION AND TESTING

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

2. TEST RECORDS –The manufacturer shall maintain test records for the tests carried out to establish conformity.

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

3.1 **TEST CERTIFICATE**–For each consignment of BIS Certified material conforming to the specification there shall be a test certificate which shall contain the Standard Mark, the lot/cast number and the corresponding test results (as given in Annexure I enclosed).

4. CONTROL UNIT –For the purpose of this scheme, aluminium bar, rod or sections of same shape dimension and condition produced continuously from the same cast shall be taken as one control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

6. REJECTIONS–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 rejected material which is potentially re-salable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/coil number/control unit number, as applicable, relating to all such rejections/defective/sub-standard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced.

**SCHEME OF INSPECTION AND TESTING
FOR (Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections
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ACCORDING TO IS 733: 1983**

**TABLE 1
LEVELS OF CONTROL (Clause 5 of SIT)**

(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	Referen ce				
4.1	Freedom from Defects			R	100% visual inspection has to be done for identification of any harmful defects.		
4.2	Peripheral Coarse Grain Envelope			R	To be done only if applicable and required as per agreement between the manufacturer and purchaser.		
5	Chemical Composition	5.1.1	IS 733:19 83	R	2	Each Control Unit	At equally distributed time intervals
7	Dimensions and Tolerances	7.1	-do-	R	4	Each Control Unit	
9	Tensile Test	9.1	-do-	R	2	Each Control Unit	

Note-2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by B.O. Head.

**ANNEXURE I
TEST CERTIFICATE FORMAT
XYZ IRON AND STEEL 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”

