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**उत्पाद मैनुअल**
**सामान्य इंजीनियरिंग प्रयोजनों के लिए गढ़ा एल्यूमीनियम**
**और एल्यूमीनियम मिश्र धातु प्लेट के लिए विशिष्टता**
**IS 736:1986 के अनुसार**

# PRODUCT MANUAL
# FOR SPECIFICATION FOR WROUGHT ALUMINIUM AND ALUMINIUM ALLOY PLATE FOR GENERAL ENGINEERING PURPOSES AS PER IS 736:1986

भारतीय मानक ब्यूरो -स्कीम की विनियम (मूल्यांकन अनुरूपता)I के तहत यह उत्पाद मानुयल प्रमाणीकरण के प्रचलन मे रीति और पारदर्शिता के सुसंगता सुनिश्चित करने के लिए सभी क्षेत्रीय शाखा द्वारा धारियों लाइसेन्स एवं कार्यालयोंसंदर्भ सामग्री के रूप मे उपयोग किया जाएगा। बीआईएस लाइसेन्स किया उपयोग का दस्तावेज़ इस भी द्वारा आवेदकों भावी इच्छुक के करने प्राप्त पत्र प्रमाण है। सकता जा

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. | **उत्पाद**<br>**Product** | **:** | **IS 736:1986** |
| | **शीर्षक**<br>**Title** | **:** | Specification for wrought Aluminium and Aluminium alloy plate for general engineering purposes |
| | **संशोधन संख्या**<br>**No. of amendments** | **:** | Nil |
| 2. | **नमुनाकरण दिशा निर्देश**<br>**Sampling Guidelines** | | |
| a) | **कच्चा माल**<br>**Raw material** | **:** | No specific requirement. |

| | | | |
|---|---|---|---|
| b) | **समूहिकरण दिशा निर्देश**<br>**Grouping Guidelines** | : | Please refer Annex - A |
| c) | **नमूने का परिमाण**<br>**Sample Size** | : | For Chemical test: 5 pcs of 50 mm X 50 mm<br>For Mechanical Test: 1 pc of 500 mm length<br>Test for Dimensions and Tolerances as per cl.8. shall be carried out in factory |
| 3. | **परीक्षण उपकरणो की सूची**<br>**List of Test Equipment** | : | Please refer Annex - B |
| 4. | **निरीक्षण व परीक्षण स्कीम**<br>**Scheme of Inspection andTesting** | : | Please refer Annex - C |
| 5. | **एक दिन में संभावित परीक्षण**<br>**Possible tests in a day** | : | All tests |
| 6. | **लाइसेन्स का कार्यक्षेत्र**<br>**Scope of the Licence :** | | |
| | IS 736 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्रके लिए प्रदान किया जाता है<br>Licence is granted to use Standard Mark as per IS 736 with the following scope: | | |
| | **Name of the product** | Specification for wrought Aluminium and Aluminium alloy plate for general engineering purposes | |
| | **Designation** | 19800,19700,19600,19500,19000,24345…… | |
| | **Condition( Temper Designation)** | M, O,H2,W,WP | |
| | **Size** | Thickness From -----mm to upto and including thickness -----mm<br>Width from ---mm to upto and including-----mm | |

**ANNEXURE A**
**To Product Manual For**
**(Specification for wrought Aluminium and Aluminium alloy plate for general engineering purposes )**
**According to IS 736:1986**

## GROUPING GUIDELINES

1) Wrought Aluminum and Aluminum Alloy Plates as per IS 736:1986 are classified into various designations based upon the major alloying element as per Table 1 . Further, these designations could be supplied in the conditions (temper designations M,O,H2,W,WP) as per the desired mechanical properties as per Table 2.

2) Designations, as specified at Table 1, have been grouped into the following groups based upon the major alloying elements and are arranged in order of least to most stringent based upon the purity/percentage of major alloying element:-

| Lowest Purity/Lowest Percentage of Major Alloying Element ↓ Highest Purity/Highest Percentage of Major Alloying Element | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Group 6 | Group 7 |
|---|---|---|---|---|---|---|---|
| | 19000 | 24345 | 31000 | 40800 | 51000A | 64430 | 74530 |
| | 19500 | 24345Alclad | | | 51000B | 65032 | |
| | 19600 | | | | 52000 | | |
| | 19700 | | | | 53000 | | |
| | 19800 | | | | 54300 | | |
| | | | | | 55000 | | |

3) In view of above, the following grouping guidelines may be considered for GoL/CSoL:-

a) From each group if sample of the higher purity/higher percentage of major alloying element is drawn the lower designations may be covered for same temper designation.

b) Separate samples under each group are to be drawn for each Temper Condition intended to be included in Scope of Licence.

c) The sample drawn above shall be of any size and separate samples for all sizes intended to be covered in the licence are not required to be drawn.

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**
**TO PRODUCT MANUAL FOR**
**(**Specification for wrought Aluminium and Aluminium alloy plate for general engineering purposes
**According to IS 736:1986**

## 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 |
|---|---|---|
| 1 | Vernier Caliper | Dimensions and Tolerances (Clause 8) |
| 2. | Micrometer | |
| 3. | Steel Scale, Steel Tape | |
| 4. | Right Angle | |
| 5. | Measuring Tape | |
| 6. | Feeler Gauge | |
| 7. | Straight Surface | |
| 8. | Universal Tensile Testing Machine | Tensile Test (Clause 6) And Table 2 |
| 9. | Extensometer | |
| 10. | Device for instrumental chemical analysis such as Optical Emission Spectrometer with all requisite channels and Certified/Standard Reference Materials OR Chemicals and Reagents for Chemical method as per IS 504 for each element given below** | 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, Dilute Nitric Acid, Sulphurous Acid, Hydrogen Sulphide(gas), Hydrogen Sulphide Wash Solution | Copper (Above 0.1%) |
| 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, DiluteNitric 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-phenanthrolinesolution,Standard Iron Solution.<br><br>Equipment – Magnet, Nickel Beaker. | Iron (0.03 to 0.10%) |

| | | |
|---|---|---|
| 28. | 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.<br><br>Equipment – Apparatus for Storing Titanous Chloride Solution, Solid Glass Beads. | Iron (0.01 to 2.0%) |
| 29. | Reagents - Sodium Hydroxide Solution, Acid Mixture(Conc. Sulphuric Acid, Phosphoric Acidand Nitric Acid), Silver Nitrate Solution, Ammonium Persulphate Solution, Ammonium Chloride Solution, Standard Arsenite-Nitrite Mixture, Sodium Arsenite, Standard Manganese Solution. | Manganese (Chromium Content upto 0.5%) |
| 30. | 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.<br><br>Equipment- Asbestos Gooch Crucible. | Manganese (Mn content between0.1 to 1.5%) |
| 31. | Reagents – Dilute Hydrochloric Acid, PotassiumChlorate, Carbon Tetrachloride, Complex Forming Solution (Conc. Ammonium Hydroxide, Ammonium Oxalate, HCl acid, sodium acetate, sodium thiosulphate solution andsodium sulphide solution), Dithizone Solution, Sodium Sulphide Wash Solution, Standard Zinc Solution. | Zinc (Photometric Method for Zncontent below 0.1%) |
| 32. | Reagents – Mixed Acid(Conc. Sulphuric Acid, Conc. HCl and Conc. Nitric Acid), Dilute Sulphuric Acid, Hydrogen Sulphide(gas), Hydrogen Sulphide Wash Solution, Tartaric AcidSolution, Conc. Ammonium Hydroxide, Methyl Red Indicator Solution, Formic Acid Mixture, Formic Acid Wash Solution, Dilute HydrochloricAcid, Ammonium Nitrate, Methylated Spirit, Mercuric Potassium Thiocyanate Solution, Chloroform, Standard Zinc Solution, Standard Potassium Iodate Solution. | Zinc (By Mercuric Thiocyanate Method) |
| 33. | Reagents – Sodium Hydroxide Solution, Nitric Acid-Sulphuric Acid Mixture, Dilute Sulphuric Acid, Hydrogen Peroxide, Standard Titanium Solution. | Titanium |
| 34. | Reagents – Conc. Sulphuric Acid, Conc. Nitric Acid, Silver Nitrate, Hydrofluoric Acid, Ammonium persulphate, Dilute HCl, Standard Ferrous Ammonium Sulphate Solution, StandardPotassium 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**
Specification for wrought Aluminium and
Aluminium alloy plate for general
engineering purposes **as per IS 736:1986**
**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 and implement a calibration plan for the test equipment.

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

**3. STANDARD MARK -** 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, provided always that the product thus marked conforms to all the requirement of the specification.

**4. CONTROL UNIT**- All quantity of material of same thickness, designation, temper designation and manufactured under uniform conditions of production from the same raw material shall constitute a 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 Standard and covered by the licence should be marked with Standard Mark.

**5. 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 resalable 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/substandard 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.

**6. TEST CERTIFICATE** : For each consignment of BIS Certified material conforming to IS 736:1986 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)

ANNEXURE C
TO PRODUCT MANUAL FOR
**IS 736:1986**
**Wrought Aluminium and Aluminium Alloy Sheet and Strip for General engineering purposes**
**TABLE 1 LEVETLS OF CONTROL**
**(Para 5.0 of the Scheme of Testing and Inspection)**

| **TEST DETAILS** | | | | Test Equipment Requiremen | | **LEVELS OF CONTROL** | |
|---|---|---|---|---|---|---|---|
| **Cl** | **Requirement** | **Test Methods** | | | **No. of samples** | **Frequency** | **Remarks** |
| | | **Clause** | **Reference** | | | | |
| 4 | Freedom from defects | 4 | IS 736 | R | Adequate inspection to ensure that the material is sound and free from harmful | | |
| 5 | Chemical composition | 5 | Table 1 of IS 736 & IS 504 or any other established instrumental/ chemical method | R | One | Each Control Unit | --- |
| 6 | Mechanical properties | 6 | Table 2 IS 736 | | | | |
| 6.1 | Tensile test | 6.1 & 6.1.1 | IS 736 IS 1608(Part 1) | R | One | Each Control Unit | |
| 8 | Dimensions & Tolerances | 8 | IS 736 IS 2677 | R | Adequate inspection to ensure that the material conforms to the requirements of the specification | | |

Note-1: Whether test equipment is required (R) or sub-contracting (S) is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

BIS STANDARD MARK

**ANNEXURE I**

(Para 7 of the Scheme of Inspection and Testing)

XYZ Company

(Registered office Address and works address)

**TEST CERTIFICATE FOR WROUGHT ALUMINIUM AND ALUMINIUM ALLOY SHEET AND STRIP FOR GENERAL ENGINEERING PURPOSES**

TEST CERTIFICATE No._____ DATE_

To M/s_____

We certified that the material described below fully conforms to 736:1986 as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks LicenceNo.CM/L_____ are as indicated below against each order No.

(PLEASE REFER TO IS 736:1986 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

**TEST RESULTS**

| Order No. & Date | Nominal Size | Control Unit No. | Type | Quantity in tonnes | CHEMICAL COMPOSITION | | | | | | | | | | PHYSICAL PROPERTIES | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | % Al | % Cu | % Mg | % Si | % Fe | % Mn | % Zn | % Ti | % Cr | % Other Element | Tolerances | Tensile Test | Freedom From Defect | ---- |
| | | | | | | | | | | | | | | | | | | |

REMARKS

WAGON NO.

TRUCK NO.

FOR XYZ COMPANY

(It is suggested that size A4 paper be used for this test certificate)