

**BUREAU OF INDIAN STANDARDS**

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*Draft Indian Standard*

**VARNISH MEDIUM FOR ALUMINIUM PAINT**

— SPECIFICATION

*(Second revision of IS 642)*

(ICS 87.060.10)

Raw materials for Paints, Varnishes and  
Related Product Sectional Committee, CHD 21

**Last Date for Comments: 18<sup>th</sup> January 2024**

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**FOREWORD**

*(Formal Clause shall be added later)*

This standard was originally issued in 1955. It was based largely on the specification of the Directorate General of Supplies & Disposals on Varnish Medium for Aluminium Paint (G/P-307/276). Of late comments had been received on the requirements stipulated for the viscosity and acid value of the material and also urging a change in the requirement of volatile matter of the prepared aluminium paint to “IS 165 : 1950 Specification for Aluminium Paint, Brushing, for General Purposes”, in Dual Container. On a scrutiny of these comments by the Committee responsible for the formulation of this standard, it was agreed to lower the volatile matter limit of the varnish medium covered by this standard in order to make it consistent with the maximum limit of volatile matter, stipulated in IS 165 : 1950. Raising the percentage of volatile matter limit in IS 165: 1950 was not considered desirable because this might adversely affect the durability of the paint.

The first revision in 1963 incorporates changes in the limits of volatile matter, viscosity and acid value. Besides, all other changes found necessary to align this standard with others in the group concerning aluminium paint and components have been incorporated.

This standard is one of a series of Indian Standard specifications on aluminium paint and components. Other specifications published so far in the series are:

IS 289 : 2021 Aluminium Paste for Paints — Specification *(Second Revision)*

IS 2339 : 2013 Aluminium paints for general purposes — Specification *(First Revision)*

Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

This revision has been taken to bring out the standard in the latest style and format of the Indian Standard. In addition, the following changes have been made:

- a) Lead and toxic heavy metals restriction have been prescribed;
- b) The corresponding parts of IS 101 has been referred for the test methods procedure as earlier referred test method IS 197 has been withdrawn.
- c) Various editorial corrections have been made; and
- d) References have been updated.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded-off value should be the same as that of the specified value in this standard.

*Draft Indian Standard*  
**VARNISH MEDIUM FOR ALUMINIUM PAINT**  
— **SPECIFICATION**  
(*Second revision*)

## 1 SCOPE

This standard prescribes the requirements and the methods of test for the material commercially known as varnish medium for aluminium paint.

## 2 REFERENCES

The standards listed in Annex A 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 in Annex A.

## 3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 1303 shall apply.

## 4 REQUIREMENTS

**4.1 Description** — The material shall be clear and transparent, and free from foreign matter, sediment and undissolved water.

**4.2 Composition** — The material shall be prepared from resins, drying oils, driers and thinners in suitable proportions to satisfy the requirements of this standard.

### 4.3 Lead Restriction

The material shall be tested for restriction from lead in accordance with IS 101 (Part 8/Sec 5). When thus tested the material shall not contain lead or compounds of lead or mixtures of both, calculated as metallic lead exceeding 90 ppm (*see* Note).

NOTE — When no lead is used during production, the product is considered lead free.

### 4.4 Toxic Heavy Metal Restriction

Product shall not be manufactured using mercury and mercury compounds, cadmium, chromium VI, arsenic, antimony, and their oxides. The material shall not contain more than 0.1 percent by weight in total of above toxic heavy metals in the form of natural impurities or impurities entailed by the production process which are contained in the raw material when tested by the relevant Atomic Absorption Spectroscopic methods.

NOTE —The test method procedure of AAS method is under preparation, till that this requirement may keep under abeyance.

**4.5** The material shall also comply with the requirements given in Table 1.

**TABLE 1 REQUIREMENTS FOR VARNISH MEDIUM FOR  
ALUMINIUM PAINT**  
(*Clause 4.5*)

SL	CHARACTERISTIC	REQUIREMENT	METHOD OF
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NO.			TEST, REF TO.
(1)	(2)	(3)	(4)
i)	Flash point, <i>Min</i>	30°C	IS 101 (Part 1/Sec 6)
ii)	Volatile matter content, percent by weight, <i>Max</i>	54	IS 33
iii)	Viscosity at 30°C	0.3 to 0.8 stoke	IS 101 (Part 1/Sec 5)
iv)	Acid value, <i>Max</i>	6.0	IS 101 (Part 9/Sec 1)
v)	Keeping properties	Not less than one year from the date of manufacture	Annex B

## 5 PACKING AND MARKING

### 5.1 Packing

The material shall be packed in dual containers or if agreed to between the purchaser and the supplier in metal containers conforming to IS 1407.

### 5.2 Marking

**5.2.1** The packing shall be securely closed and marked with the following particulars:

- a) Name of the material;
- b) Manufacturer's name and trade-mark, if any;
- c) Mass of the material;
- d) Lead content (Maximum);
- e) Toxic heavy metals content;
- f) Batch number or Lot number in code or otherwise;
- g) Month and year of manufacture; and
- h) A cautionary note as below:
  - 1) Keep out of reach of children; or
  - 2) This product may be harmful if swallowed or inhaled

**5.2.2** The packages may also be marked with the Standard Mark.

#### 5.2.3 *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.

## 6 SAMPLING

**6.1** The supplier shall submit a tender sample packed in three different containers, each containing not less than 300 ml of the material.

**6.2** Representative samples of the material shall be drawn as prescribed under IS 33.

## 7 TEST METHODS

**7.1** Tests shall be conducted as prescribed in the col. 4 of Table 1 & Table 2 and Annex B.

### 7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

**7.3 Performance** — An aluminium paint containing the equivalent of not less than 15 percent by weight of aluminium powder prepared from the material by mixing with aluminium paste [conforming to IS 289], and keeping in airtight containers for 48 hours before application, shall comply with the relevant requirements of various characteristics given in Table 2.

**Table 2 Requirements of Prepared Aluminium Paint**  
( Clause 7.3 )

SL NO.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REF TO
(1)	(2)	(3)	(4)
i)	Drying time: Hard Dry*	Not more than 8 hours	IS 101 (Part 3/Sec 1)
ii)	Finish	Bright, lustrous and smooth	IS 101 (Part 3/Sec 4)
iii)	Flexibility and adhesion after 48 hours air-drying	No visible damage, detachment or cracking of the film	IS 101 (Part 5/Sec 2)
iv)	Protection against corrosion under conditions of condensation	No signs of corrosion	Annex C

\*The nature of the paint film shall be adjudged by the usual finger nail test. Until such time that an objective method of test has been standardized, the finger nail test shall be followed.

**ANNEX A**

(Clause 2)

**LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>
IS 33 : 1992	Inorganic pigments and extenders for paints - Methods of sampling and test ( <i>third revision</i> )
IS 101	Methods of sampling and test for paints, varnishes and related products
Part 1	Tests on liquid paints (general and physical)
Sec 3 : 1986	Preparation of panels ( <i>third revision</i> )
Sec 5 : 1989	Consistency ( <i>third revision</i> )
Sec 6 : 1987	Flash point ( <i>third revision</i> )
Part 3	Tests on paint film formation
Sec 1 : 1986	Drying time ( <i>third revision</i> )
Sec 4 : 1987	Finish ( <i>third revision</i> )
Part 5	Mechanical tests
Sec 2 : 1988	Flexibility and adhesion ( <i>third revision</i> )
Part 6	Durability test on paint films
Sec 2 : 1989	Keeping properties ( <i>third revision</i> )
Part 8/Sec 5).	Tests for pigments and other solids
Sec 5 : 2022	Lead Restriction Test
Part 9	Tests for lacquers and varnish
Sec 1 : 1993	Acid value ( <i>third revision</i> )
IS 1303 : 1983	Glossary of terms relating. to paints ( <i>second revision</i> )

**ANNEX B**

**KEEPING PROPERTIES**

(Table 1, Sl. No. (v))

When stored under cover in a dry place in the original sealed containers under normal temperature conditions, the material shall meet the requirement as specified in **4** for the specified period after the date of manufacture. Slight changes in viscosity may be allowed provided the material satisfies the other requirements prescribed in the material specification.

## ANNEX C

[Table 2, Sl. No. iv)]

### PROTECTION AGAINST CORROSION UNDER CONTITIONS OF CONDENSATION

#### C-1 OUTLINE OF THE METHOD

This test is carried by suspending the painted panel after specified period of drying in a corrosion cabinet maintained at 100 percent relative humidity and a temperature cycle of 42°C to 48°C for seven days and examining it for any signs of deterioration and corrosion of metal surface.

#### C-2 APPARATUS

**C-2.1 Metal Panels** — of mild steel as prescribed in IS 101 (Part 1/Sec 3).

**C-2.1.1** The panels shall be prepared as prescribed in IS 101 (Part 1/Sec 3).

NOTE — Results of tests carried out on different substrates do not necessarily correlate with each other.

#### C-2.2 Corrosion Cabinet

The apparatus consists of a closed cabinet in which the relative humidity is maintained at approximately 100 percent and the temperature cycles continuously over a range of 42°C to 48°C, thereby ensuring that copious condensation occurs on test panels positioned vertically within the cabinet.

#### NOTES

1. Should the cabinet be copper lined, the copper shall be tinned or coated with a suitable organic coating to prevent the dissolution of small amounts of copper in the water.
2. The design and dimensions are left to the user's discretion, provided that the following conditions are observed:
  - a) *Humidification* — The humidity shall be maintained by evaporation of water from a reservoir covering (or situated in) the bottom of the cabinet.
  - b) *Water* — Fill the water tank at the bottom of the oven to a depth of 45 mm with distilled water. The water level in the tank shall be adjusted to the same level daily; and water shall be maintained free from grease or oil.
  - c) *Heating* — The cabinet shall be heated through the medium of water by a heater placed immediately below the water reservoir, or preferably by a heater completely immersed in water.
  - d) *Temperature Cycle* — The heater shall be controlled by two thermostats (placed in the air space above the water) in such a way that the temperature of the air space cycles continuously from 42°C to 48°C in not less than 45 minutes and not more than 75 minutes. The time required for heating and cooling shall be approximately equal.
  - e) *Air Circulation* — The air in the cabinet shall be circulated by means of a fan in such a way that the temperature in any part of the air space does not differ by more than 1°C at any given moment. Necessary particulars of the fan are given below:

Blades	Two
Fan diameter	150 mm
Fan width	25 mm at edge

Diameter of the shaft	6.75 mm
Height of the fan from bottom	180 mm
Fan diameter at pulley	15 mm
Speed	1 440 rev/min approximately

- f) *Spacing Test Panels* — If the panels hang in the cabinet, the hooks and rods from which they are suspended shall be made of glass or plastics. If the panels are placed on metal racks, they shall be suitably insulated at their points of contact with rack. It shall be ensured that all the panels are strictly vertical. The panels shall not be placed less than 37 mm apart or less than 37 mm from any side of the cabinet.
- g) *Ambient Conditions* — The cabinet conditions shall be controlled [to give cycles as required in (d) above] at room temperature.
- h) *Rotating of Panel Rack* — In view of the fact that the circulating fan is located on one side only, it is necessary to turn the panel rack everyday to ensure uniformity in actual working.

NOTE — The cabinet shall be opened only once every 24 hours for the rotation of panels and maintenance of water level.

**C-3 PROCEDURE**

**C-3.1** The metal panel is cleaned and prepared as prescribed in **C-2.1.1**. Apply one coat of the paint on both sides of the mild steel panel to give a dry film weight of the material as specified in **C-3.1.1**.

**C-3.1.1** *Dry Film Weight for Test Purposes*

The weight of the dry film of a single coat of the material applied to test panels either by brushing or spraying shall vary with the weight per 10 liters of the material as given below:

<i>Weight of the Wet Material</i>	<i>Limits of Dry Film Weight</i>
<i>Kg/10 litres</i>	<i>g/m<sup>2</sup></i>
Up to 12	27 to 34
Over 12 and up to 14	34 to 44
Over 14 and up to 16	44 to 54
Over 16 and up to 18	54 to 68
Over 18	68 to 80

**C-3.2** Keep the painted panel in a vertical position at room temperature for 24 hours to air-dry, and then at a temperature of 60°C to 65°C for one hour or stove for the specified period. Cool the panel to room temperature and protect the edges to a depth of 5 mm with a suitable protective composition (*see* Note) which shall have melting point above 50 °C; and then suspend it vertically in the corrosion cabinet.

NOTE — Preferably consisting of 3 parts by weight of paraffin wax (melting point 60 °C ) and 1 part by weight carnauba wax (melting point 82°C).

**C-3.3** After exposure under these conditions for seven days, remove the panel and examine for signs of deterioration of the paint film. Remove 25 mm strip of the film from the centre of the panel carefully with a non-corrosive paint remover neglecting 25 mm portion of the



exposed surface from each end and examine the exposed metal for signs of corrosion. The metal surface shall show no sign of corrosion; changes in appearance and condition of the paint film shall not be taken into consideration in deciding about acceptability.

NOTE — Immediately after assessment is made the exposed area shall be protected with a suitable non-corrosive transparent lacquer for reference purposes.