IS 13183 (1991): Aluminium paint, heat resistant [CHD 20: Paints, Varnishes and Related Products]

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IS 13183 : 1991

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Indian Standard

ALUMINIUM PAINT, HEAT RESISTANT — SPECIFICATION

UDC 667.633.42 : 669.71

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 1991 **Price Group 2**

Paints and Allied Products Sectional Committee, CHD 020

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Paints and Allied Products Sectional Committee had been approved by the Chemical Division Council.

Considering the need of an aluminium paint for the painting of steel structures and equipments to prevent corrosion at high temperature, it was decided to formulate a standard on heat resistant paint.

Paint complying with this standard is intended for interior and exterior use on metal surfaces that may be subjected to temperature up to 600°C.

The paint is intended for use on gasoline, diesel and steam engines, steam turbines, pumps etc and interior structural members of boilers and boiler houses.

For the purpose of deriding 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 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 2 MAY 2002
TO
IS 13183:1991 ALUMINIUM PAINT, HEAT RESISTANT — SPECIFICATION

(*Page* 2, *Table* 1, *Sl No* 2, *col* 2) — Substitute 'Non volatile matter and pigment content' *for* 'Non-volatile matter'.

(*Page* 2, *Table* 1, *Sl No.* 2, *col* 4) — Substitute '101 (Part 8/Sec 2) 1990' *for* '27 of IS 101 1964'.

(CHD 20)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 JANUARY 1993
TO
IS 13183 : 1991 ALUMINIUM PAINT, HEAT RESISTANT — SPECIFICATION

(*Page* 3, *clause* **B-1**, *informal table*, *line* 4) — Delete

(*Page* 3, *clause* **B-1**, *para* 2, *line* 6) — Substitute 'grade 1' *for* 'grade 3'

(*Page* 3, *clause* **C-2**) — Substitute 'STEEL' *for* 'STFEL'

(*Page* 4, *Annex* E) — Delete

(CHD 020)

Reprography Unit, BIS, New Delhi, India

Indian Standard

ALUMINIUM PAINT, HEAT RESISTANT — SPECIFICATON

1 SCOPE

This standard prescribes the requirements, methods of sampling and test for the heat resistant Aluminium Paint. This material shall withstand solvents, normal weather exposure and temperature up to 600°C.

1.1 The material will be used as a finishing heat resistant paint for chimneys, stacks, boiler, pipes and furnace structures where protection to moderate corrosive marine and industrial environment and heat resistance are required.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 COMPOSITION AND GRADES

The material shall be based on suitable binders such as silicone resin, organic titanates, hydrocarbon resin or synthetic rubber resins alongwith aluminium paste (*see* IS 289 : 1963) and extender pigments in suitable proportions

Grade 1 — up to 600°C

Grade 2 — up to 400°C

Grade 3 — up to 200°C

NOTES

1 Composition mentioned in the specification should be treated as guidelines and not mandatory upon the manufacturer.

2 Maximum operating temperature resistance for a paint is limited by melting point of the pigment. Since melting point for aluminium is 600°C, paints above 600°C temperature resistance are not recommended.

4 REQUIREMENTS

4.1 The paint shall be suitable for brushing or spraying without reduction.

4.2 Keeping Properties

The paint shall not skin, gel, thicken excessively or cake in the original unopened container for a period of not less than one year from the date of manufacture.

4.3 Heat Resistance

Films of paint prepared and tested as in Annex B shall show no cracking, blistering, flaking or peeling. When cut as in Annex B the paint shall adhere tightly to the metal.

4.4 Salt Spray Resistance

Films of paint prepared and tested as in Annex C and examined immediately after removal from the test shall show not more than a trace of rusting and not more than 5 blisters, non of which is larger than 1 mm in diameter. Dulling or staining unaccompained by red rusting shall be permitted. On removal of the paint from the panels tested as in C-2, the surface of the steel shall show no more than a trace of rusting, pitting or corrosion.

4.5 Water Resistance

A film of paint when tested as in Annex D shall show no wrinkling or blistering immediately upon removal of the panel from the water. The paint shall be no more than slightly affected when examined 2 hours after removal, and after 24 hours air drying, the portion of the paint which was immersed shall show no more than a slight whitening or dulling in comparison to the portion that was not immersed.

4.6 Mass in kg/10 Litres

The minimum mass in kg/10 litres of the material, when tested as per IS 101 (Part 1/Sec 7) : 1987 shall be within ± 3 percent of the approved sample.

4.7 The material shall also conform to the requirements given in Table 1.

5 PACKING AND MARKING

5.1 Packing

The paint shall be packed as agreed to between the purchaser and the supplier.

5.2 Marking

The container shall be marked with the following information:

a) Name and grade of the material;

b) Indication of the source of manufacture;

c) Volume of the material;

d) Batch No. or Lot No. in code or otherwise;

e) Month and year of manufacture; and

f) Caution notes as follows;

i) The material is to be kept away from flames, and

ii) Use only with adequate ventilation. Avoid prolonged breathing of vapour or contact with skin.

Table 1 Requirements for Aluminium Paint, Heat Resistant

(*Clause* 4.7)

Sl No.	Characteristic	Requirement	Method of Test Ref. to IS No.
(1)	(2)	(3)	(4)
1)	Drying time		
	a) Surface dry h, *Max*	1	101 (Part 3/Sec 1) : 1986
	b) Tack free h, *Max*	3	
	c) Hard dry h, *Max*	18	
2)	Non-volatile matter, percent by mass, *Min*	30	27 of IS 101 : 1964
3)	Flash point, °C	Above 27°C	101 (Part 1/Sec 6) : 1967
4)	Colour	That of metallic aluminium	11 of IS 101 : 1964
5)	Finish	Bright, smooth & lustrous	101 (Part 3/Sec4) : 1987
6 *	Scratch hardness, (750 g load)	To pass the test	101 (Part 5/Sec 1) : 1988
7)*	Flexibility and adhesion, after 48 hours drying	- d o -	101 (Part 5/Sec 2) : 1988
8)*	Protection against corrosion under conditions of condensation (7 days)	- d o -	101 (Part 6/Sec 1) : 1988
	Consistency, Sec, *Min*	20	101 (Part 1/Sec 5)

*Applicable only to grade 2 and 3 and to be carried out after full cure

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS 101 (Part 1/Sec 1) 1986

6.2 Criteria of Conformity

A lot shall be described as conforming to the requirements of this standard, if the test results of the composite sample satisfy all the requirements prescribed under **4.**

7 TESTS

7.1 Tests shall be conducted as referred in col 4 of Table 1.

7.2 Quality of Reagents

Unless otherwise specified, pure chemicals and distilled water (*see* IS 1070 : 1977) shall be employed.

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

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
101 1964	Methods of test for ready mixed paints and enamels (*second revision*)
101 (Part 1/Sec 1) 1086	Methods of sampling and test for paints, varnishes and related products . Part 1 Test on liquid paints (general and physical) Sec 1 Sampling (*third revision*)
Sec 5) : 1987	Sec 5 Consistency (*under print*)
Sec 6) : 1987	Sec 6 Flash point (*third revision*)
Sec 7) 1987	Sec 7 Mass per 10 litres (*third revision*)
(Part 3/Sec 1) : 1986	Part 3 Tests on paint film formation Sec 1 Drying time (*third revision*)

IS No.	*Title*	*IS No.*	*Title*
Sec 4) : 1987	Sec 4 Finish (*third revision*)	(Part 6/Sec 1) . 1887	Part 6 Durability tests on paint films Sec 1 Durability under conditions of condensation (*third revision*)
(Part 5/Sec 1) : 1987	Part 5 Mechanical tests on paint films Sec 1 Hardness test (*third revision)*	289 : 1963	Aluminium paste for paints (*revised*)
Sec 2) : 1987	Sec 2 Flexibility and adhesion (*third revision*)	1070 : 1977	Water for general laboratory use (*second revision*)

ANNEX B

(*Clause* 4.3)

TESTING OF HEAT RESISTANCE

B-1 HOT ROLLED STEEL

Select eight 10 cm × 15 cm panels which are completely free of loose mill scale from 14 gauge as rolled commercial quality low carbon steeh Clean it with the solvent, aliphatic naphtha-ethylene glycol monethyl ether solvent mixture. Spray the paint, one or two coats, on all the eight panels so as to obtain a total dry film thickness between 20 to 30 microns. Dry it in air for 24 hours. Place the panels in furnace in such a way that no part of these is in direct contact with the bottom or sides of the furnace and subject to the following heating schedules.

Grade	*Time*	*°C*
3	8 h	200
2	4 h	300
	1 h	400
	1 h	600
1	8 h	400
	8 h	500
	8 h	600

Remove the panels from the furnace for as short a period of time as possible and inspect (except for knife test) for compliance with **4.3** at the end of each heating period. Remove two panels at the end of the 400°C, for grade 2, and 500°C, lor grade 3, healing periods lor use in the salt spray test (*see* Annex C) At the conclusion of the heating schedule remove the remaining two panels, allow to cool in air for 24 hours, cut with a knife blade and observe for conformity with **4.3.**

B-2 COLD ROLLED STEEL

Prepare and clean the panels as in **B-1** Apply the paint to the side of the pane! that has been flat polished Air dry for 30 minutes and bake at 250°C for 1 hour. Cool to room temperature Place the panels in a furnace and heat for 24 houts, in a furnace that has been previously raised to a temperature of 600° ± 2°C. Remove from the oven, cool and inspect for conformity with **4.3** performing the knife test as in **B-1.**

ANNEX C

(*Clause* 4.4)

TESTING OF SALT SPRAY RESISTANCE

C-1 HOT ROLLED STEEL

Expose the unscared panels removed from the 400°C or 500°C heating periods of **B-1** to the salt spray for 24 hours as per **3** of IS 101 (Part 6/ Sec 1). Upon removal wash the panels gently in warm running water until free from any visible salt deposits and examine immediately for conformity with **4.4.**

C-2 COLD ROLLED STFEL

Prepare three 10 cm × 30 cm steel panels as in **B-2**, except that these are not to be heated up to 600°C. Expose the unscored panels to the salt spray as in **C-1** for 96 hours, Upon removal, wash the panels gently in warm running water until free from any visible salt deposits and examine immediately for conformity with **4.4.**

ANNEX D

(*Clause* 4 5)

TESTING OF WATER RESISTANCE

D-1 Prepare a film of paint as in **B-2**, except do not heat to 600°C. Coat all exposed uncoated metallic surfaces with wax or suitable coating and immerse the panel for 24 hours at 27 ± 2°C. Upon removal, observe the panel for conformity with **4.5**.

ANNEX E

(*Table* 1, *Sl No.* 5)

DETERMINATION OF SILICON CONTENT

E-1 Place the extracted vehicle in a flask and distill off most of the solvent. Transfer the concentrated resin solution to a tared platinum crucible, using benzene to wash the flask thoroughly, and evaporate the remaining solvent on a steam bath. Add 4 to 5 drops of chlorobenzene which reduces frothing on some samples, and agitate or warm the contents to dissolve the samples, Add 2 ml of 15 percent fuming H_2SO_4 to the solution at room temperature, followed by 0 5 ml of fuming HNO_8. Hold over a low flame or heat several hours to accomplish digestion. When the mass has solidified and danger of frothing is past, heat the crucible to complete expulsion of SO_8 fumes. Place residue, usually black, in a muffle furnace for 1 hour at 800°C and weigh the remaining residue as silicon dioxide (SiO_3).

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The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

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Doc : No. CHD 20 (0014)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at New India Printing Press, Khurja, India