

भारतीय मानक
Indian Standard

IS 16361 : 2015
(Reaffirmed 2020)

**थर्मोप्लास्टिक पॉलिमर आधारित लेप
(क) अंतलेपन (ख) परिसज्जा
— विशिष्टि**

**Thermoplastic Polymer based
Coatings: (a) Undercoating (b)
Finishing — Specification**

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Paints, Varnishes and Related Products Sectional Committee, CHD 20

FOREWORD

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

Indian Standard is available for all known generic paints. The thermoplastic polymer based coating has got a unique place in the protective and semi-decorative application. The thermoplastic polymer based coating has got certain uniqueness in comparison to the conventional protective coatings. The most important criteria of this coating is that it is based on bio-degradable, non-plastic, non-toxic polymer based coating and gives better protective coating in comparison to the conventional paints.

Some of the salient features of the thermoplastic polymer based coating are:

- a) The coating is not thermosetting in nature and, therefore, it can be reactivated at a later date during repainting and old paint layer form a monolithic layer with the fresh coating.
- b) Self priming, single pack system, no limitation of pot life.
- c) After application and drying forms elastic skin having high tensile strength and elongation at break, which takes care of expansion and contraction of substrate.
- d) Coated film skin is fire retardant in addition to other properties and impermeable to air and moisture.
- e) Skin is not brittle, so no cracking even after prolonged exposure to open atmosphere or sultry soil as observed from resistance to salt spray test.
- f) Coating is thermoplastic and no layer to layer separation even in multiple layer application.
- g) Coated film is antibacterial, antifungal and non-toxic. Non-toxic property of the coating is very important when the coating is applied inside the drinking water tank for anticorrosion and waterproofing purpose. Similarly coating applied to inside the tank of water treatment plant should also be non-toxic in nature. This test shall be got tested from a reputed Government Institute (for example, IITR, Lucknow), initially at the time of approval and subsequently when change in composition declared subsequently by the manufacturer of the paint.
- h) When TMT/ribbed bar are coated with this coating, the pull out strength increases contrary to the conventional fact that the strength decreases when coated with epoxy coating. This phenomena would support rationalization of structural steel during design of structure.
- j) Easy to carry out patch repair at site at any time and can be used in a wide range working temperature of -15°C to $+150^{\circ}\text{C}$.

This standard covers the material which was being manufactured for almost 15 years and used by different Government, Semi-Government, Corporate and other Organizations and would be required by chemical, petrochemical, fertilizer, nuclear power, thermal power, ports, docks, railways, oil rigs, steel, automobile, water and waste water treatment plants etc.

For satisfactory results, it is desirable that inner coat, top coat and thinner are obtained from the same manufacturer.

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 : 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.

Indian Standard

THERMOPLASTIC POLYMER BASED COATINGS: (A) UNDERCOATING (B) FINISHING — SPECIFICATION

1 SCOPE

This standard prescribes requirements, method of sampling and tests for the material commercially known as thermoplastic polymer based coatings intended to be used as an anticorrosive coating for the protection from corrosion in steel structures, pipe lines, steel towers (transmission/telecom), bridges, flyovers, vehicle chassis, vehicle underbody, reinforcement bars (better substitute of fusion epoxy), concrete tanks and pipeline inside coating, building exterior and terrace, etc. This material is also having waterproofing properties specially when applied in civil constructions and wood products.

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 and the following shall apply.

3.1 Thermoplastic — Here thermoplastic means the polymer coating can be reactivated with the help of suitable thinner for the polymer. After reactivating the polymer, fresh coat of the same polymer coating can be applied and the old reactivated layer will form a monolithic layer with the fresh layer. This is an important property of this coating and could be advantageous as maintenance paint. All conventional anticorrosive paints are thermosetting in nature and cannot be reactivated at a latter date.

3.2 Tensile Strength of the Skin — It is applicable to all material which are solid and has got some elongation property. Tensile strength means the amount of force required per unit area at the breaking point of the material under pull stress. Since the conventional paint skin is not having any elastic property and the skin can not be placed for such testing, it is not mentioned under paint and varnishes. But the polymer coating has got very good tensile

strength and the coating skin can be placed for such testing, this is incorporated as one of the physical property of the coating skin.

3.3 Elasticity of the Skin — It is related to those materials which has got some measurable tensile strength. When the material is under stress for tensile strength measurement, the material get elongated before breaking. Elongation measured at the time of breaking of sample is expressed as percentage of the original length of the test sample. This particular polymer coating skin has got elongation property and the elasticity of the polymer skin may vary from 250 to 450 percent of the original length of the test sample. Conventional paint skin is not having such elasticity and because of that this terminology and definition is not used in paint and varnishes.

3.4 Permeability — Specific permeability of a film is the milligrams of water that permeate through 1 cm² area of 1 mm thick film in 24 h after a constant rate has been attained under conditions of 27°C and a difference in relative humidity across the film of approximately 100 percent.

4 CLASSIFICATION

Based on applications the material has been classified in to three different classes as given below:

- a) *Class I* — [For Industrial and automobile anti-corrosive applications (excluding civil application)] — The products under this class are mainly used for the protection from corrosion on the steel structures, pipe lines, tanks, steel towers (transmission/telecom), bridges, flyovers, vehicle chassis, vehicle underbody, railways, defence etc.
- b) *Class II* — (For anti-corrosive reinforcement bar coating) — The products under this class are mainly used for the protection from corrosion of steel reinforcement bars as a better substitute of fusion epoxy coating.
- c) *Class III* — [For anti-corrosive cum waterproofing for civil (Infrastructure like water treatment plant, sewerage treatment plant, effluent treatment plant etc.)] — House hold building exterior and terrace, drinking water tank, etc. The products under this class

IS 16361 : 2015

are mainly used for the protection from corrosion and water leakage and also for decorative application (all in one) in the buildings from terrace, building exterior, Industrial floor coating, cement pipe line inside coating, water and sewerage treatment plant's tank inside coating, effluent treatment tank's inside coating change, etc. This material would be supplied in two categories:

- 1) As inner coat, and
- 2) As top coat.

In the case of inner coat this is classified as Class I, Class II and Class III depending on their application. Wherein top coat shall be classified as Class I and Class III and would be applied on inner coat. The methods of applications class wise is given in Annex W.

5 MANUFACTURE

The manufacturing process of these products are quite different in comparison to the conventional paint manufacturing process. Here the key is the manufacturing of the polymer which is responsible for all the special properties of the finished products. Part of the polymer is dissolved with different ingredients in a specific blend of organic solvents and other part is used to make colour master batch. Both parts blended together to make an almost homogenous mixture having some ingredients in the emulsified state. With little stirring of the material it will again become homogenous and suitable for direct application as a single pack ready mix coating.

6 REQUIREMENTS

6.1 Composition

The composition shall be such that it satisfies the requirements specified in this standard. Depending on the end use of the coatings, there may be some variation in formulation but the requirement in Table 1 to be met in all cases.

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

7 TESTS

7.1 Unless specified otherwise, tests shall be conducted as prescribed in different parts of IS 101. Reference to the relevant sections are given in col 4 of Table 1.

7.2 Preparation of Test Panels

7.2.1 Type of Panels

7.2.1.1 Steel Panels

Unless otherwise specified panel of $150 \times 100 \times 1.25$ mm of mild steel plate be prepared as per the method

described in 2 of IS 101 (Part 1/Sec 3).

7.2.1.2 Wood Panels

Panel as described in 6 of IS 101 (Part 1/Sec 3).

7.2.1.3 Cement/Asbestos Panels

Panel as described in 7 of IS 101 (Part 1/Sec 3).

7.2.2 The paint shall be mixed properly and thinned with the thinner, supplied along with the paints, if required and applied on metal/wood/cement panel with the help of dip system. The panels shall be coated with 3 or 4 coats of the product and shall be air dried for 2 to 3 h at 27°C after each successive coatings. The final coated test panels shall be air dried for 24 h in a horizontal position at 27°C . Unless otherwise specified in the respective test method, an even and uniform coat having a dry film thickness of 65 to 80 micron shall be obtained. The film thickness shall be determined by the method prescribed in 6 of IS 101 (Part 3/Sec 2). Unless otherwise specified, the air dried coated panels shall be then subjected to conditioning at a temperature of $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity for minimum 48 h. The tests shall then be carried out as soon as possible.

7.3 The pull out test and toxicity test on the applicable variety of the paint are to be considered as type tests and shall be carried out initially on a composite sample of the product taken from a batch/lot for approval. However if there is a change in the composition of the material, these two tests shall be repeated on the product with changed formulation. The other tests are considered as routine tests.

7.4 Quality of Reagents

Unless specified otherwise, pure chemicals and reagent grade water (*see* IS 1070) shall be employed.

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

8. PACKING AND MARKING

8.1 Packing

Unless otherwise agreed to between the purchaser and the supplier, the paint shall be packed in metal containers conforming to IS 1407 or IS 2552.

8.1.1 The material when intended for defence purposes, shall be marked in accordance with IS 5661.

8.2 Marking

Each container shall be legibly marked as under:

- a) Nomenclature of the material;
- b) Nature of coat and class (for example inner coat, class I);

IS 16361 : 2015

Table 1 Requirements for Thermoplastic Polymer Based Coating
(Clauses 6.1 and 6.2)

SI No.	Characteristic	Requirement	Method of Tests, Ref to	
			IS 101	Annex
(1)	(2)	(3)	(4)	(5)
i)	Colour	Standard colour as per IS 5 or as agreed to between the purchaser and the supplier	(Part 4/ Sec 2)	—
ii)	Consistency	Smooth, uniform and suitable for spray/ dip / brush application	—	B
iii)	Viscosity (Brook field)	Air spray – 300 cps, Airless spray – 500 - 600 cps, Dip – 500 - 700 cps, Brush – 400 - 600 cps.	—	C
iv)	Drying Time, Hard Dry, <i>Max</i>	4 h at room temperature	(Part 3/Sec 1)	—
v)	Dry film thickness	20 to 25 micron per coat	Clause 6 of (Part 3/Sec 2)	—
vi)	Finish	Smooth and matt / gloss	(Part 3/Sec 4)	—
vii)	Mass per 10 litre	8.5 to 10 kg	(Part 1/sec 7)	—
viii)	Volume Solid (<i>Min</i>), (non volatile vehicle)	25 (w/w)	(Part 8/Sec 6)	—
ix)	Flash point	Above 28°C	(Part 1/ Sec 6)	—
x)	Resistance to heat	To pass the test	—	D
xi)	Resistance to humidity	To pass the test	—	E
xii)	Resistance to neutral salt spray	To pass the test	—	F
xiii)	Resistance to water	To pass the test	—	G
xiv)	Resistance to acid	To pass the test	—	H
xv)	Resistance to alkali	To pass the test	—	J
xvi)	Resistance to low temperature	To pass the test	—	K
xvii)	Moisture vapour permeability test	Nil	—	L
xviii)	Flexibility and adhesion test – Bend test	To pass the test	—	M
xix)	Flexibility and adhesion test – Scratch hardness [Top coat (finishing)]	To pass the test	—	N
xx)	Hardness test [Top coat (finishing)]	To pass the test	—	P
xxi)	Fire retardant test	Char height, mm, <i>Min</i> 30 Flame spread Length, mm, <i>Max</i> 150 Time after glow, (s), 3 Time after flaming, (s), 12	—	R
xxii)	a) Tensile test: Tensile strength, <i>Min</i> b) Elongation at Break, <i>Min</i>	a) 18 to 21 kg/cm ² b) 250 to 450 percent	—	S
xxiii)	Impact resistance for Class II only	No disbonding of the coating from substrate around impact area.	—	T
xxiv)	Pull out test for Class II material only	Increase in bond strength in comparison to uncoated Ribbed-bar	IS 2770 (Part 1) ¹⁾	
xxv)	Durability test (QUV) [Top coat (finishing)]	To pass the test	—	U
xxvi)	Toxicity test from Institute of Toxicology on 5 male rats and 5 female rats for Class III material only limited to where use is for application of paint for coating in drinking water tank	No mortality	It is to be got done from a reputed Government Institute (for example, IITR, Lucknow)	

¹⁾ other than IS 101.

NOTE — All the above tests shall be done on inner coat except the tests at SI No. xix), xx) and xxv), where the tests shall be performed along with top coat (finishing).

IS 16361 : 2015

- c) Manufacturer's name, address and his recognized trade-mark, if any;
- d) Batch number or lot number in code or otherwise;
- e) Month and year of manufacture;
- f) Net volume of material; and
- g) Advisory note:
 - 1) Do not expose to naked flame.
 - 2) Stir well before use.
 - 3) Apply on dry and clean surface only.

8.3 BIS Certification Marking

The container may also be marked with the Standard Mark.

8.3.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9. SAMPLING

The representative sample shall be drawn as prescribed in IS 101(Part-1/Sec1). Sample taken from each batch of product from any container after thorough mixing may be treated as one sample.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
5 : 2007	Colours for ready mixed paints and enamels (<i>sixth revision</i>)	(Part 8/ Sec 6) : 1993	Tests for pigments and other solids, Volume solids
101	Methods of sampling and test for paints, varnishes and related products	265 : 1993	Hydrochloric acid (<i>fourth revision</i>)
(Part 1)/	Test on liquid paints (general and physical),	266 : 1993	Sulphuric acid (<i>third revision</i>)
Sec 1 : 1986	Sampling (<i>third revision</i>)	296 : 1986	Sodium carbonate, anhydrous (<i>third revision</i>)
Sec 3 : 1986	Preparation of panels (<i>third revision</i>)	376 : 1986	Sodium hydroxide, analytical reagent (<i>third revision</i>).
Sec 6 : 1987	Flash point (<i>third revision</i>)	1070 : 1992	Reagent grade water (<i>third revision</i>)
Sec 7 : 1987	Mass per 10 litres (<i>third revision</i>)	1303 : 1983	Glossary of terms relating to paints (<i>second revision</i>).
(Part 3)/	Tests on paint film formation,	1314 : 1984	Calcium chloride (<i>second revision</i>)
Sec 1 : 1986	Drying time (<i>third revision</i>)	1407 : 1980	Round paint tins (<i>second revision</i>)
Sec 2 : 1989	Film thickness (<i>third revision</i>)	2096 : 1992	Asbestos cement flat sheets (<i>first revision</i>)
Sec 4 : 1987	Finish (<i>third revision</i>)	2552 : 1989	Steel drums (galvanized and ungalvanized) (<i>third revision</i>)
Sec 5 : 1987	Fineness of grind (<i>third revision</i>)	2770 (Part 1) : 1967	Methods of testing bond in reinforced concrete: Part 1 Pull-out test
(Part 4)/	Optical tests,	3400 (Part 1) : 2012	Methods of test for vulcanized rubber: Part 1 Tensile stress-strain properties (<i>third revision</i>)
Sec 2) : 1989	Colour (<i>third revision</i>)	4985 : 2000	Unplasticized PVC Pipes for potable water supplies (<i>third revision</i>)
(Part 5)/	Mechanical test on paint films,	5661 : 1970	Code of practice for packing and marking of packages of paints, enamels, varnishes and allied products
Sec 1 : 1988	Hardness tests (<i>third revision</i>)	8662 : 2004	Enamel, synthetic, exterior: (a) undercoating (b) finishing for railway Coaches (<i>second revision</i>)
Sec 2 : 1988	Flexibility and adhesion (<i>third revision</i>)		
(Part 6)/	Durability tests on paint films,		
Sec 1 : 1988	Resistance to humidity under conditions of condensation (<i>third revision</i>)		
Sec 2 : 1989	Keeping properties (<i>third revision</i>)		
Sec 3 : 1990	Moisture vapour permeability (<i>third revision</i>)		
(Part 7)/	Environmental test on paint films,		
Sec 1) : 1989	Resistance to water (<i>third revision</i>)		

ANNEX B

[Table 1, Sl No. (ii)]

CONSISTENCY

B-1 APPARATUS

B-1.1 Palette Knife or Metal Rod

B-1.2 Steel Panels — Steel panels shall be prepared as given in 7.2.

B-2 PROCEDURE

Insert a clean metal rod or palette knife into the original container and examine the nature of settling. The material shall not cake hard inside the container and shall be in such a condition that stirring easily produces a smooth uniform material suitable for dipping on steel panels.

ANNEX C

[Table 1, Sl No. (iii)]

VISCOSITY

C-0 GENERAL

C-0.1 Determination of the apparent viscosity of the material/coating with the help of rotational type viscometer (Brookfield viscometer).

C-0.2 Outline of the Method

This method consists of determining the apparent viscosity of coating by measuring the torque on a spindle rotating at constant speed in the material.

C-1 APPARATUS

C-1.1 Rotational Type Brookfield Viscometer with Variable Speed

C-1.2 Thermometer, 0 – 100°C, least count – 1°C.

C-1.3 Glass beaker, 500 ml.

C-2 PROCEDURE

C-2.1 Ensure that all the viscosity readings are noted at 25°C. Place the instrument on flat and vibration free surface. Level the instrument with attached spirit level. Select the spindle and attach it to the instrument. Lower the viscometer until the groove (immersion mark) on the spindle just touches the material. Move the container slowly in horizontal plane, until the spindle is located in approximately the center of the container so that the test will be run in an undisturbed region.

C-2.2 Turn on the viscometer. Adjust the viscometer RPM for the material under test. Allow the viscometer to run till constant reading is achieved. Once constant reading is achieved note the reading and switch off the instrument.

C-3 CALCULATIONS

Calculate the apparent viscosity as follows:

$$V = f \times s$$

where

- V = viscosity on sample in centipoises,
- F = scale factor (furnished with instrument), and
- s = scale reading of viscometer.

In case of digital viscometers, viscosity reading is directly displayed on the viewing screen /window.

NOTE — Precautions:

- a) Do not keep viscometer unguarded when not in use.
- b) Do not keep any spindle loose. After use clean the spindle properly and keep in the spindle stand provided with instrument.
- c) Do not keep instrument upside down with a fluid coated with spindle still attached. It will spoil the pivot bearing of the instrument (pivot bearing is where spindle is attached).
- d) Keep conversion table provided to calculate the viscosity in safe place preferable with instrument in case itself.
- e) While checking viscosity maximum care should be taken to avoid air bubbles.

IS 16361 : 2015

ANNEX D

[Table 1, Sl No. (x)]

DETERMINATION OF RESISTANCE TO HEAT

D-0 OUTLINE OF THE METHOD

It prescribes the test method for the evaluation of the heat resistant properties of coatings designed to protect any surfaces exposed to elevated temperatures. Air-dried panel is heated to a specified temperature under stipulated conditions. After this, it is cooled and dipped in water. The extent of deterioration of the film is compared with that of an unheated coated panel tested at the same time.

D-1 APPARATUS

D-1.1 Oven with Air Circulation Arrangement

The oven shall be capable of being maintained at $125 \pm 2^\circ\text{C}$.

D-2 TEST PANELS

D-2.1 Steel Panels

Panel shall be prepared as prescribed in 7.2.

D-3 PROCEDURE

D-3.1 Place the panels in the oven at 125°C and shall be spaced by minimum 100 mm from the sides of the

oven and at least 20 mm apart from each other and subjected to heating at the maintained temperature for the specified time. The preferred method of ensuring even heating of the coated panels is to suspend them by means of fine wires. Alternatively, the panels may be supported in a rack made from suitable heat insulating material or placed them by keeping the painted side upward, on the piece of asbestos board/sheet resting on supports.

D-3.2 At the end of 1h heating remove the panels immediately from the oven and cool to room temperature, which is then immersed in water at room temperature for 24 h. Take out the panels from water and examine it after air drying for 1 h.

D-4 OBSERVATIONS

Examine the panels for change of colour or signs of other deterioration of the coating, by comparing with identically prepared but unheated panels. The material shall be deemed to have passed the test, if the paint film remain firmly adhere with substrate and shall not shows any sign of cracking, blistering, flaking or any other signs of deterioration.

ANNEX E

[Table 1, Sl No. (xi)]

DETERMINATION OF RESISTANCE TO HUMIDITY

E-0 OUTLINE OF THE METHOD

This test is carried by suspending the dried painted panels in a corrosion cabinet maintained with 100 percent relative humidity and a temperature cycle of 42°C to 48°C for 500 h and examining it for any signs of deterioration and corrosion of metal surface.

E-1 APPARATUS

E-1.1 Corrosion Cabinet — As prescribed in 2.1.2 of IS 101 (Part 6/Sec 1).

E-2 TEST PANELS

E-2.1 Steel Panels

Panel shall be prepared as prescribed in 7.2.

E-3 PROCEDURE

E-3.1 Keep the painted panel in a vertical position at a temperature of 60°C to 65°C for 1 h. Cool the panel to room temperature and protect the edges to a depth of 5 mm with a suitable protective composite material which shall have melting point above 50°C [Preferably consisting of 3 parts by weight of paraffin wax (melting point 60°C) and 1 part by weight of carnauba wax (melting point 182°C)]. Then suspend it vertically in the corrosion cabinet.

E-3.2 After exposure for 500 h in the set environmental conditions of corrosion cabinet, remove the panel and examine it for signs of deterioration of paint film. Remove 25 mm strip of the film from the centre of the panel carefully with help of non-corrosive paint

IS 16361 : 2015

remover and examine the exposed metal for signs of corrosion after neglecting 25 mm portion of the exposed surface from each end.

E-4 OBSERVATIONS

The metal surface shall not show any sign of corrosion;

changes in appearance and condition of the paint film shall not be taken into consideration in deciding about acceptability.

NOTE — Immediate after assessment of the panel, the exposed area shall be protected with a suitable non-corrosive transparent lacquer for reference purposes.

ANNEX F

[Table 1, Sl No. (xii)]

DETERMINATION OF RESISTANCE TO NEUTRAL SALT SPRAY TEST

F-0 GENERAL

This standard prescribes a method for determining the resistance of coatings to the neutral salt spray test performed for 2 000 h.

F-1 APPARATUS

F-1.1 Spray cabinet — As prescribed in 3.2 of IS 101 (Part 6/Sec 1).

F-1.2 Test Solution — As prescribed in 3.3 of IS 101 (Part 6/Sec 1).

F-2 TEST PANELS

F-2.1 Steel Panels

Panel shall be prepared as prescribed in 7.2.

F-3 PROCEDURE

F-3.1 Preparation of Scratch

Make a scratch or scribed mark through the coating to the panel. Use the single cutting tool and locate the scratch at least 20 mm away from edges of the test panel.

F-3.2 Follow the procedure as prescribed in 3.5 of IS 101 (Part 6/Sec 1).

F-3.3 Examination of Test Panels

Periodic visual examination of the panels should be made with precaution to avoid any damage to the surface of the test panel. Each periodic examination shall not exceed 60 min in any 24 h period and whenever possible, should be repeated at the same period of next successive days. The panels shall not be allowed to become dry during examination.

NOTE — By agreement between the interested parties, it is sometimes necessary that painted components of different shapes are subjected to the test. When such tests are conducted, it is of particular importance to expose the shaped components in their regular form of use. Within this restriction, the component should be placed so as to minimize the disruption of flow. However, test panels and components should not be tested simultaneously, if the shape of the painted component interferes with the general direction of flow.

F-3.3.1 At the end of the 2000 h, remove the test panels (or painted components, as the case may be) from the apparatus and rinse with clean water to remove residues of salt solution from the surface. Immediately examine the test surfaces for signs of deterioration, for example, blistering, staining, loss of adhesion, and creep of corrosion from scratch. Keep the panels in the standard atmosphere for 1 h and examine the test surfaces for deterioration. Then carefully remove 150 mm × 50 mm strip from the test surface using of a non-corrosive paint remover and examine the exposed surface for signs of corrosion.

IS 16361 : 2015

ANNEX G

[Table 1, Sl No. (xiii)]

DETERMINATION OF RESISTANCE TO WATER

G-0 GENERAL

This prescribed method demonstrate the probable effect on painted surface which are exposed under conditions where prolonged condensation of water may takes place but not have an extremely corrosive atmosphere.

G-1 APPARATUS

As prescribed in 3 of IS 101 (Part 7/sec 1).

G-2 PREPARATION OF TEST PANELS

G-2.1 Steel Panels

Panel shall be prepared as prescribed in 7.2.

G-2.2 Wood Panels

Panel shall be prepared as prescribed in 7.2.

G-2.3 Cement/Asbestos Panels

Panel shall be prepared as prescribed in 7.2. The edges of the test panel, after coating with the product under test, shall be sealed by suitable means.

G-3 PROCEDURE

G-3.1 As prescribed in 5.2 and 5.2.1 of IS 101 (Part 7/ sec 1). All the three type of panels can be

simultaneously put under test provided space permits.

G-3.2 At the end of 500 h, remove the panels from the tank, blot them with absorbent paper and immediately examine the whole test surface of each panel for blistering or other signs of deterioration. Allow the panels to stand at room temperature for 24 h.

NOTE — For periodical examination, panels shall be taken out from the tank and blotted with absorbent paper, examined for blistering or other signs of deterioration and then immediately returned to the tank.

G-4 OBSERVATIONS

Examine the test surface again for loss of adhesion, rust staining, change of colour, embrittlement or signs of any other deterioration. The material shall be deemed to have passed the test if the paint film remains firmly adhere with substrate and shall not shows any sign of cracking, rust staining, embrittlement or any other signs of deterioration.

NOTES

1 The exposed panels at the end of the testing can also be compared against the approved sample.

2 If the exposed surface area of the panels kept for reference purposes, then after completion of examination, carefully remove 150 mm × 50 mm strip from the test surface using of a non-corrosive paint remover and examine the exposed surface of panel for signs of corrosion. This exposed area shall be then protected by a suitable transparent lacquer.

ANNEX H

[Table 1, Sl No. (xiv)]

DETERMINATION OF RESISTANCE TO ACID

H-0 OUTLINE OF THE METHOD

An air-dried panel of the material is immersed in different acids for 7 days. Any deterioration of the film is then examined.

H-1 REAGENT

H-1.1 Sulphuric Acid — 1 : 20 (v/v) (see IS 266).

H-1.2 Hydrochloric Acid — 1 : 10 (v/v) (see IS 265).

H-2 PREPARATION OF TEST PANELS

H-2.1 Steel Panels

Panel shall be prepared as prescribed in 7.2. The edges of the test panel, after coating with the product under test, shall be sealed by suitable means.

H-3 PROCEDURE

H-3.1 The test shall be carried out at a temperature of $27 \pm 2^{\circ}\text{C}$.

IS 16361 : 2015

H-3.2 It is preferable to immerse the test pieces individually in the acid but for convenience, several test pieces can also be immersed in a single tank. In such cases, the nature of the test pieces shall be identical and every precaution shall be taken to ensure that the test liquids are unaffected by the test pieces.

H-3.3 The test pieces shall be spaced at least 30 mm from the sides of the tank and shall be at least 30 mm apart from each other. The test pieces shall be electrically insulated from their supports.

H-3.4 Place sufficient amount of acid solutions in the vessels of suitable sizes to facilitate partial immersion of the test panels in solution. Immerse the test piece in an approximately vertical position using suitable supports, if necessary. Cover the container for the entire duration of the test to minimize the loss of acid solutions by evaporation or splashing. During the entire period of testing, aerate the acid solutions by means of a slow stream of air (free from oil and grease).

Compensate any loss of acid solution by addition of fresh acid solutions or distilled water at suitable intervals in order to maintain the original volume/concentration.

H-3.5 At the end of the 7 days immersion period, test pieces shall be removed and washed thoroughly in running water. Any residual liquid on the surface of test pieces shall be removed by dabbing with suitable absorbent paper or cloth.

H-4 OBSERVATIONS

The test piece after a recovery period of 1 h shall be compared with an identically prepared but un-immersed test panel under good illuminating condition, to examine for any sign of deterioration of coating. The material shall be deemed to have passed the test, if the paint film on the panel does not shows any appreciable changes in characteristic of softening, blistering, cracking and colour.

ANNEX J

[Table 1, Sl No. (xv)]

DETERMINATION OF RESISTANCE TO ALKALI

J-0 OUTLINE OF THE METHOD

An air-dried film of the material is immersed in a solution of different alkalis and examined for any deterioration.

J-1 REAGENTS

J-1.1 Sodium Carbonate Solution — 5 percent anhydrous sodium carbonate in water (*w/w*) (*see* IS 296).

J-1.2 Sodium Hydroxide Solution — 5 percent sodium hydroxide in water (*w/w*) (*see* IS 376).

J-1.3 3M aqueous solution of CaCl₂. (*see* IS 1314).

J-2 PREPARATION OF TEST PANELS

J-2.1 Steel Panels

Panel shall be prepared as prescribed in 7.2. The edges of the test panel, after coating with the product under test, shall be sealed by suitable means.

J-3 PROCEDURE

J-3.1 The test shall be carried out at a temperature of $27 \pm 2^\circ\text{C}$.

J-3.2 It is preferable to immerse the test pieces individually in the test liquids but for convenience, several test pieces can also be immersed in a single tank. In such cases, the nature of the test pieces shall be identical and every precaution shall be taken to ensure that the test liquids are unaffected by the test pieces.

J-3.3 The test pieces shall be spaced at least 30 mm from the sides of the tank and shall be at least 30 mm apart from each other. The test pieces shall be electrically insulated from their supports.

J-3.4 Place sufficient amount of alkali solutions in the vessels of suitable sizes to facilitate partial immersion of the test panels in solution. Immerse the test piece in an approximately vertical position using suitable supports, if necessary. Cover the container for the entire duration of the test to minimize the loss of alkali solution by evaporation or splashing. During the entire period of testing, aerate the alkali solution by means of a slow stream of air (free from oil and grease). Compensate any loss of alkali solution by addition of fresh alkali solution or distilled water at suitable intervals in order to maintain the original volume/concentration.

IS 16361 : 2015

J-3.4.1 At the end of the 1 000 h immersion period, test pieces shall be removed and washed thoroughly in running water. Any residual liquid on the surface of test pieces shall be removed by dabbing with suitable absorbent paper or cloth.

J-4 OBSERVATIONS

The test piece after a recovery period of 1 h shall be

compared with an identically prepared but un-immersed test panel under good illuminating condition, to examine for any sign of deterioration of coating. The material shall be deemed to have passed the test, if the paint film on the panel does not shows any appreciable changes in characteristic of softening, blistering, cracking and colour.

ANNEX K

[Table 1, *Sl No.* (xvi)]

DETERMINATION OF RESISTANCE TO LOW TEMPERATURE

K-0 OUTLINE OF THE METHOD

The prescribed test method is for determining the resistance of a paint to low temperature. An air-dried film of the material is kept in cooling medium at -20°C for 30 min and examined for any deterioration.

K-1 APPARATUS

An arrangement to hold cooling media in closed vessel(can be sealed /air tight) and to measure and maintain the test temperature within $\pm 2^{\circ}\text{C}$ through out the test period.

K-2 TEST PANELS

Steel panels shall be prepared as prescribed in 7.2.

K-3 PROCEDURE

The prepare and conditioned test panel shall be

submerged in the cooling medium (for example dry ice, liquid nitrogen, etc). The test panel shall be kept initially for sufficient time to ensure that the required temperature of -20°C is reached throughout the test panel. After attaining the temperature of -20°C , test shall be continued for 30 min. At the end of testing period, test panels shall be removed and bring to room temperature. After conditioning to room temperature for sufficient time, the test panel shall be examined under good illuminating condition.

K-4 EXAMINATION OF THE TEST PANEL

The test piece shall be examined for any sign of deterioration of coating and if required, shall be compared with an identically prepared but untested test panel. The material shall be deemed to have passed the test, if the paint film on the panel does not shows any appreciable changes in characteristic of blistering, cracking and colour.

IS 16361 : 2015

ANNEX L

[Table 1, Sl No. (xvii)]

DETERMINATION OF MOISTURE VAPOUR PERMEABILITY

L-0 OUTLINE OF THE METHOD

This method determines the rate at which moisture passes through films of paint coating.

L-1 APPARATUS

L-1.1 Permeability Cup — As prescribed in 3.1 of IS 101 (Part 6/Sec 3). The cup having capacity of 12 ml and which permits exposure of 10 cm² of paint film may also be used.

L-1.2 Low Humidity Chamber — As prescribed in 3.2 of IS 101 (Part 6/Sec 3).

L-1.3 Balance — Analytical balance, range – 200 mg, least count – 1 mg.

L-1.4 Temperature Control — As prescribed in 3.4 of IS 101 (Part 6/Sec 3).

L-1.5 Desiccant — As prescribed in 3.6 of IS 101 (Part 6/Sec 3).

L-2 TEST SPECIMENS

L-2.1 The test specimen shall be smooth, through continuous film of uniform thickness throughout the test area and entirely free from dust or other foreign matter. The thickness of the coating applied shall be between 900 and 1 000 micron DFT and shall not vary by more than 5 percent of the total thickness in any test series.

L-2.2 PREPARATION OF FREE FILMS

Take clean, smooth and levelled surfaced M.S. plate of size 12cm × 10cm × 0.2cm(thickness) for testing. Cover the plate from both side with release paper having the releasing side on outer face. Apply the coating on the plate by dipping in the material and dry in the air for 3 h at room temperature. A coating of 900 to 1 000 micron DFT shall be developed by multi dip coating method and repeated drying. Finally allow the coated plate to air dry for 72 h. After air drying, place the panel bearing the film in a mercury bath for amalgamation. Remove carefully the detached film from the bath. Since the film is air dried and to be tested as free film, the unexposed surface of detached film shall be allowed to get exposed to air for at least 7 days prior to test.

NOTE — A device equipped with a perforated metal plate for holding the substrate under vacuum, and a mechanical drive for drawing down the coating with an applicator, serves the purpose better than other modes of application.

L-2.3 Cut a circular disc from the film by the method as prescribed in 4.4 of IS 101 (Part 6/Sec 3).

L-3 PROCEDURE

Follow the steps as prescribed in 4.5 and 5.1 of IS 101 (Part 6/Sec 3).

L-4 CALCULATION

As prescribed in 6 of IS 101 (Part 6/Sec 3).

ANNEX M

[Table 1, Sl No. (xviii)]

BEND TEST

M-0 OUTLINE OF THE METHOD

This is an empirical test for assessing the resistance of a coating of paint, varnish, etc, to cracking and/or detachment from a metal substrate when subjected to bending around a cylindrical mandrel.

M-1 APPARATUS

M-1.1 Mandrel — A rigid mandrel, made up of

corrosion resistant suitable material, such as stainless steel, having diameter of 13 mm shall be used.

M-1.2 Type 2 Apparatus — A suitable apparatus as shown in Fig. 3 and Fig. 4 of IS 101(Part 5/sec 2).

M-1.3 Test Panels — Steel panel of size 100 mm × 50 mm × 1.0 mm. Panel shall be prepared as prescribed in 7.2. Panels shall be flat and free from distortion and the surface shall be free from any visible ridges or cracks.

IS 16361 : 2015

M-2 PROCEDURE

M-2.1 Ambient Conditions

The test shall be carried out at $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity. Warming the test panel by undue handling shall be avoided.

M-2.2 Testing shall be done as prescribed in **2.4.6** of IS 101(Part 5/sec 2).

M-2.3 Examination of the Test Panel

Examine the coating of test panel immediate after

bending. Use normal corrected vision or, by agreement, a lens of 10X magnification, and examine the coating for cracking and/or detachment from the substrate, ignoring the surface of the coating less than 10 mm from the edge of the panel. The material shall be deemed to have passed the test if the coated film on the panel shall not show any visible crack and/or detachment from the steel plate.

NOTE — If a lens is used, it is essential to mention this fact in the test report to avoid misleading comparisons with results obtained using normal vision only.

ANNEX N

[Table 1, Sl No. (xix)]

SCRATCH HARDNESS TEST

N-0 OUTLINE OF THE METHOD

This is a test method for determining the resistance of a paint film to penetration by scratching with a needle. This test may be used for qualitative evaluation test, expressed as 'pass/fail', when tested by applying a single specified load to the needle.

N-1 APPARATUS

N-1.1 A suitable apparatus as prescribed in **3.2** of IS 101 (Part 5/Sec 2).

N-1.2 Preparation of Test Panels

The paint shall be mixed properly and thinned with the thinner, supplied along with the paints, if required and applied on the steel panel as prepared in **7.2.1.1** with the help of dip system. The panel shall be first coated with the inner coat for 2 or 3 coats and shall be air dried for 2–3 h at 27°C after each successive coatings. The final coat shall be with the top coat (finishing coating) only to obtain an even and uniform total coat having a dry film thickness of 65 to 80 micron. The finally coated test pieces shall be air dried for 24 h in a horizontal position at 27°C . The film thickness shall be determined by the method prescribed

in **6** of IS 101 (Part 3/Sec. 2). Unless otherwise specified, the dried coated panels shall be conditioned at a temperature of $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity for a minimum of 48 h. The tests shall then be carried out as soon as possible. Ensure that the panels shall be flat and free from distortion and surface shall be free from any visible ridges or cracks.

N-2 PROCEDURE

N-2.1 Ambient Conditions

The test shall be carried out at $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity. Warming the test panel by undue handling shall be avoided.

N-2.2 Testing shall be done as prescribed in **3.4.2** of IS 101(Part 5/sec 2). The specific load applied to the needle is 1 000 g.

N-2.3 Examination of the Test Panel

Remove the panel and examine the scratch to see if the coating has been penetrated to the substrate. Use normal corrected vision or by agreement, a suitable magnification may be used, in which case the degree of magnification shall be mentioned in the test report.

ANNEX P

[Table 1, Sl No. (xx)]

HARDNESS TESTS

P-0 OUTLINE OF THE METHOD

The method of test prescribed here is for determination of hardness of formed film of the product by Pendulum test method. The resistance of a single coat film or multicoat system of products is determined to a single blow impact by a pendulum.

P-1 APPARATUS

P-1.1 A suitable apparatus as prescribed in 2.2.1 of IS 101 (Part 5/sec 1).

P-2 PREPARATION AND COATING OF TEST PIECES

P-2.1 Test Pieces

It shall be burnished steel tube (as drawn and tempered or in normalized condition) with dimensions as 28 mm internal diameter, 38.0 ± 0.5 mm external diameter and 125 mm length.

P-2.2 Preparation

The test pieces shall be prepared as described in 2 of IS : 101 (Part-1/Sec 3).

P-2.3 Coating of Test Pieces

The coating shall be properly mixed and thinned with

the thinner, supplied along with the paints, if required and applied on the tube with the help of dip system. The tube shall be initially coated with the inner coat for 2 or 3 coats and shall be air dried for 2-3 h at 27°C after each coating. The final coat shall be with the top coat (finishing coating) only to obtain an even and uniform total coat having a dry film thickness of 65 to 80 micron. The final coated test pieces shall be air dried for 24 h in a horizontal position at 27°C. The film thickness shall be determined by the method prescribed in 6 of IS 101 (Part 3/Sec. 2). Unless otherwise specified, the coated test panels shall be conditioned at a temperature of $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity for a minimum of 48 h. The tests shall then be carried out as soon as possible.

P-3 PROCEDURE

P-3.1 Attach the test pieces to the arms of the apparatus and fix the arms at the specified inclination from the vertical. Release the arms for impact by pendulum. Remove the test pieces.

P-3.2 Examination of the Test Piece

Examine the test piece coating immediately after the test. Examine the point of impact for the loss of adhesion or removal of the coating.

ANNEX R

[Table 1, Sl No. (xxi)]

FIRE RETARDANT TEST

R-1 OUTLINE OF THE METHOD

The apparatus consisting of a two foot tunnel inclined at 38° to the horizontal axis to which coated test panel placed facing downwards to form the roof of the tunnel as shown in Fig. 2. Paint under test should be applied at the recommended dry film thickness of 65 to 80 micron.

R-2 EVALUATION OF THE COMPOSITIONS FOR FIRE TEST

R-2.1 2 Foot-Tunnel Test

R-2.1.1 Apparatus — The frame of the tunnel is

fabricated using $75 \times 75 \times 3$ mm angle iron mounted on a 650×125 mm base plate. The sample holding rack utilises a 750×100 mm specimen size. An asbestos backing plate of 750×100 mm is used to prevent the test specimen from warping during the fire test. A small opening at the lower end of the tunnel is provided with a mirror to observe the propagation of the flame. Temperature at the back of the panel is measured by inserting thermocouple through a small hole at the top cover which is located right above the burner. A Bunsen burner is used at the lower end of the inclined tunnel and the distance between the burner top and test specimen is about 40 mm.

IS 16361 : 2015

ANNEX S

[Table 1, Sl No. (xxii)]

TENSILE STRESS – STRAIN PROPERTIES

S-0 PRINCIPLE OF THE METHOD

In this test, test pieces in dumb-bell shape are stretched in a tensile testing machine at a constant rate. Reading of load and elongation are taken as required during the uninterrupted stretching of the test piece and when it breaks.

S-1 APPARATUS

S-1.1 Marker and Tensile Test Machine — The marker and tensile test machine shall be as prescribed in 7 and 11 of IS 3400 (Part 1).

S-2 TEST PIECE

S-2.1 Preparation of Free Films

The paint film shall be prepared as prescribed in L-2.1 and L-2.2.

S-2.2 Preparation of Test Piece

The test piece shall be in the shape of a dumb-bell, Type 1 as described in 6.2 of IS 3400 (Part-1) and of sizes as given in Table 1 and Table 2 of IS 3400 (Part 1).

S-3 PROCEDURE

Testing shall be carried out at $27 \pm 2^\circ\text{C}$, unless otherwise specified. Follow the procedure as described in 9, 9.1, 10, 10.3, 10.4, 12, 12.1, 13 and 13.1 of IS 3400 (Part 1).

NOTE — For dumb-bell thickness, minimum three measurements to be done and minimum value shall be regarded in calculation of tensile strength or breaking strength. If the variation between the values are more than 0.08 mm, such sample should be discarded for test.

S-4 CALCULATIONS

S-4.1 Tensile strength and elongation at break shall be calculated as prescribed in 15 and 15.1 of IS 3400 (Part 1).

S-4.1.1 For tensile strength, elongation at break, the result reported shall be the middle value, if an odd number of test pieces are used, or the average of the middle two values if an even number of test pieces are used, the various results being arranged in order of increasing value. The report shall include the observed values, number of test pieces used and direction of grain (if any).

ANNEX T

[Table 1, Sl No. (xxiii)]

DETERMINATION OF IMPACT RESISTANCE

T-0 GENERAL

Test pieces are subjected to blows from a falling striker of specified mass and shape which is dropped from a known height on the test piece. The severity of this test method can be adjusted by changing the mass of the striker and/or by changing the drop height. The impact resistance of the Class II material meant for coating on reinforcing bar by mechanical damage shall be determined by this method.

T-1 APPARATUS

T-1.1 Falling Weight Testing Machine

T-1.1.1 Main Frame — With guide rails or tube, which can be fixed in the true vertical position, to accommodate the striker (*see* Fig. 7 of IS 4985) and

release mechanism to release the striker to fall vertically and freely.

T-1.1.2 Striker — It is a heavy metallic cylindrical body with hemispherical end comprising nose having diameter of 15.875 mm. The nose may be comprising all or part of the hemisphere, combined with a stem at least 10 mm long (*see* Fig. 8 of IS 4985 for guidance). The mass of the striker, including any associated weights, shall be 1 800 g. Below the stem, the nose shall be of solid steel, polished and free from flats, indentations or other imperfections which may influence the result.

T-1.1.2 Release Mechanism — It is a *drop tube* approximately 1.50 m long used to contain the striker and guide the striker during free fall from a variable height which can be adjusted to any height up to at

IS 16361 : 2015

least 2 m measured from the top surface of the test piece, with an accuracy of ± 10 mm. A scale shall be attached for measuring the height of the drop to the nearest 2.0 mm.

T-1.1.3 Specimen Holder — The base plate of the apparatus shall include a device for positioning and holding the test specimen on line with the axis of the vertical drop line.

T-2 TEST PANELS

Steel panels shall be prepared as prescribed in 7.2.

T-3 PROCEDURE

The test shall be performed at room temperature. With an impact of 9 Nm, no shuttering, cracking or bond loss of the coating shall occur except at the impact area, that is, area permanently deformed by the striker.

ANNEX U

[Table 1, Sl No. (xxv)]

DETERMINATION OF DURABILITY

U-0 GENERAL

U-0.1 Outline of the Method

The prescribed test method is for determination of durability of the product by ascertaining its actual behavior when suitably prepared test panel of the product is subjected to accelerated weathering test. Under accelerated weathering test, the test panel prepared by using paint/coating is exposed to heat, light and water in artificial weathering apparatus in a controlled manner.

U-1 APPARATUS

U-1.1 Accelerated Weathering Apparatus — An artificial weathering apparatus of UV condensation type with following test condition parameters:

- a) Lamp type : Ultra violet fluorescent light UV-B 313
- b) Test cycle : 1) UV — 4 h. at $60 \pm 1^\circ\text{C}$
2) Condensation — 4 h. at $50 \pm 1^\circ\text{C}$
- c) Irradiance : 0.67

U-2 TEST PANELS

U-2.1 Asbestos Cement Panels — It is of sizes $150 \text{ mm} \times 75 \text{ mm}$ (see IS 2096). Panel shall be prepared as prescribed in 7.2 except that initial 2 to 3 coats shall be with inner coat and the final coating shall be with top coat (finishing) so that the total dry thickness of coating shall be between 65 to 80 μ .

U-3 PROCEDURE

The test panel shall be exposed for a period of 500 hr in the apparatus under the conditions stipulated in U-1.1. Expose the panels alternately in UV and condensation at the condition prescribed in U-1.1.

U-4 Evaluation of Exposed Films

U-4.1 Before evaluation, the test panel should be thoroughly cleaned with running water followed by wiping the surface with wet soft cloth or chamois leather with light pressure (to avoid burnishing) till the surface is visibly cleaned of debris.

U-4.2 The requirements of this test shall be considered to be satisfactory, if the performance in respect of the characteristics as prescribed under C-3.2 of IS 8662 are within the limits as specified in C-4.3 of IS 8662.

IS 16361 : 2015

ANNEX W

(Clause 4)

METHODS OF APPLICATIONS

W-0 GENERAL

The manufacturer's guide line (if any) and also the following is to be followed for particular method of application.

W-1 CLASS I

The surface shall be either shot blasted to minimum Sa 2.5 to Swedish Specification SIS 055900: 1967 or cleaned using wire brush/Sand paper to remove the loose rust, dust, etc, and finally cleaned with thinner soaked cloth to remove the last traces of dust, oil and grease. Depending upon the level of corrosion, the DFT of the inner coats are to be decided before going for the top coat with say 20 to 25 micron DFT. This class of coating can be applied by brush, spray or dip process. The dilution level depends upon the process of application. The manufacturer of the paint is to be consulted with the data of chemical composition of the corrosive fumes to find out the required DFT of inner coats.

W-2 CLASS II

The surface shall be shot blasted to minimum Sa 2.5 to Swedish Specification SIS 055900: 1967 to remove the loose scale and finally cleaning with thinner soaked cloth to remove the last traces of dust, oil and grease. Normally two coats are to be applied – one inner coat and the other top coat by dip coating method. For the first coat, the bars are to be dipped in to the coating for 30 to 40 s. Remove the bars, shake it to remove the droplets from the bottom of the bars and allow to dry.

Normally it will be dried at room temperature by air circulation. One can accelerate the drying process by blowing hot air or passing the bars through hot air chamber at a temperature of 110 to 125° C for 10 to 12 s.

Once the bars cooled to room temperature, it can be dipped in the top coat for 30 to 40 s and dried in the same way as above. Though this class is primarily suitable for application by dip method, it may however be applied by spraying and touchup by brush. After the final coat bars can be used after 72 h. It can be cut to size or bend to size with out any de-lamination or cracking. Once it is used for concretizing, one can find enhancement of bond strength by 8 to 12 percent in comparison to the necked bar to concrete bond strength.

W-3 CLASS III

The concrete surface (most of the cases) should be dry and clean before application of this product. Initially the surface can be cleaned with the help of wire brush to remove the loose cement aggregates. Finally remove the dust with the help of cloth and brush. The building exterior can be coated by two inner coats and one top coat for UV resistance. For terrace waterproofing, coating inside the tanks in effluent treatment plant, water treatment plant, sewerage treatment plant, inside coating in cement pipe line, etc, the total thickness depends upon the life expectancy of the coating. The manufacturer's guideline (if any) can be consulted for the total DFT of the coating based on the life expectancy and the combination of products.

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AMENDMENT NO. 1 JULY 2021

TO

IS 16361 : 2015 THERMOPLASTIC POLYMER BASED COATING (A) UNDERCOATING (B) FINISHING — SPECIFICATION

(Page 3, Table 1, Sl No. vii), col 1) — Substitute ‘Volume Solid (Min), (nonvolatile vehicle)’ *for* ‘Solid content percent by weight (Min)’.

(Page 3, Table 1, Sl No. vii), col 2) — Substitute ‘25(w/w)’ *for* ‘25’.

(Page 2, clause 6) — Insert new clause in requirement clause as:

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