भारतीय मानक

Indian Standard

IS 18751 : 2024

पानी संग्रहण हीटर के लिए पॉलिमर लेपित भीतरी टंकियाँ — विशिष्टि

Polymer Coated Inner Tanks for Storage Water Heater — Specification

ICS 87.040

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June 2024 **Price Group 8**

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.

The specifications for stationary storage type electric water heaters are outlined in the IS 2082 : 2018 ‘Stationary storage type electric water heaters — Specification.’ Currently, that standard covers water heaters with inner tanks constructed from materials such as copper, stainless steel, and vitreous enamelled coated tanks. However, due to the growing demand for water heaters with polymer-coated inner tanks in the market, the committee has decided to develop a new Indian Standard to address this product.

The composition of the Committee, responsible for the formulation of this standard is given in Annex K.

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.

Indian Standard

POLYMER COATED INNER TANKS FOR STORAGE WATER HEATER — SPECIFICATION

1 SCOPE

1.1 This standard prescribes requirements, methods of sampling and tests for polymer coated inner tanks for use in stationary storage type electrical water heaters.

1.2 This standard does not deal with requirement of external coating of steel tank.

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 edition of these standards.

3 TERMINOLOGY

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

3.1 Baking — A process of drying/curing and hardening a paint/coating by heating usually at temperature above 200 °C.

3.2 Blast Cleaning — The cleaning and roughening of a surface by the use of natural or artificial grit or fine metal shot (usually steel), which is projected on to a surface by compressed air or mechanical means.

3.3 Burning Off — The removal of paint by a process in which the paint is softened by heat, for example, on a flame, and then scraped off while still soft.

3.4 Curing — The process of condensation or polymerization of a material by heat or chemical means, resulting in full development of desirable properties.

3.5 Electrostatic Spraying — Methods of spraying in which an electrostatic potential is created between the work to be coated and the atomized powder particles. The charged particles of powder are attracted to the articles being painted and are then deposited and discharged. The electrostatic potential is used in some processes to aid the atomization of the powder.

3.6 Holiday — The coating imperfections such as pinholes, porosity etc, that exhibit electrical continuity to the substrate when measured by a scanning electrode attached to high arc voltage

4 TEST SPECIMEN

The test specimens shall be prepared from a polymer-coated tank of either circular or square shape, with a diameter or side length of 105 mm ± 5 mm. These specimens shall be cut from the vertical sides of the tank. Before cutting, the polymer coating must be removed along the cutting line by grinding down to the base metal surface of the tank. The width of the zone where the polymer is removed should match the width of the cutting tool, plus an additional 2 mm on each side.

NOTE — Grinding machines operating with corundum or diamond stones are suitable for removing the enamel.

5 REQUIREMENT

5.1 Polymer Powder

The polymer powder shall be free flowing homogeneous particles. It may consist of synthetic resins, hardeners, pigments, fillers and additives suitable for application by standard methods, for example, electrostatic, spraying, tribostatic spraying, fluidized bed coating, etc. It shall give a continuous, smooth film when applied by one of the above methods and stoved as per schedule prescribed by the supplier.

5.2 Base Metal

The base metal and the component used for the fabrication of polymer coated inner tank shall be made of steel sheet. The steel sheet conforming to IS 513 (Part 1) or IS 513 (Part 2) or IS 1079 shall be used. The sheet shall have a nominal thickness of 1.2 mm with a negative tolerance of 8 percent. Measure the thickness of the exposed metal by means of a micrometer at three points, each point at a distance of at least 1 cm from the preceding one. The average of the three measurements shall be taken as the thickness of the metal.

NOTE — For the purpose of this test, it is presumed that the thickness of the whole ware is the same.

5.3 Fitting Components

The base plate of all pipes and fittings on the polymer tank shall conform to requirements as laid down in IS 2082.

5.4 Welding

The welding of the steel tank shall be done with low hydrogen type electrode to minimize welding defects (*see* IS 6560).

5.5 Polymer Coating

All surfaces of the tank that are exposed to hot water shall have a continuous coating without any pinhole.

5.6 Storage Capacity

The storage capacity of each tank shall be within ± 5 percent of the rated capacity marked on the tank.

5.6.1 The tank shall be fixed in its working position. The drain plugs and all outlets except the top most outlet shall be plugged. The container is filled with water through its inlet until water starts flowing at the top most outlet. The inlet is closed and when the overflow ceases completely, the water is drained out through the drain plug and the volume of water determined either by measuring or weighing. The capacity so measured is called the storage capacity.

5.7 Restriction of Toxic Material

The polymer coating material shall conform to the limits of toxic materials as given in Table 1.

5.8 Solubility Test

The coating when tested by the procedure given in Annex B, shall not lose weight of more than 4 mg/cm^2.

5.9 Cathodic Protection

Cathodic protection shall be provided. Each coated tank shall be furnished with a sacrificial anode of magnesium, aluminum or zinc. Considering the efficacy of magnesium anode may be preferred. The anode shall be electrically grounded to the tank [*see* IS 8062 (Part 2)].

5.10 Edges and Fittings

All edges and fittings, welded or otherwise, shall be coated with polymer except sharp edges, threading's and small areas immediately adjacent to various fittings.

5.11 Hydrostatic Test

Compliance is checked by subjecting the tank to water pressure as given in **22.47** of IS 302-2-21. The polymer coated tank shall withstand the water pressure occurring in normal use.

5.11.1 *Electrical Continuity* (*Holiday Testing*)

There shall be no holiday (pinhole) in the coating after hydrostatic testing (*see* **5.11**). If holiday is detected in the coating, tank shall be regarded as failing to meet the requirements of the test

5.11.2 *Coating Coverage Test*

After completing the hydrostatic test (*see* **5.11**), the tanks shall be cut into four or more segments using a saw. Each segment shall be visually inspected for the presence of exposed metal areas except the cracked areas of the Polymer caused by the cutting operation. If any exposed area of the metal shows a coating chip off the tank shall be regarded as failing to meet the requirement of the test.

5.12 The polymer coated tank shall confirm the requirements given in Table 2.

Table 1 Requirements for Restriction of Toxic Materials in Polymer Coating

(*Clause* 5.7)

SI No.	Characteristic	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Cadmium (as Cd), percentage, *Max*	0.01	IS 16197 (Part 5)
ii)	Lead (as Pb), percentage, *Max*	0.01	IS 16197 (Part 5)
iii)	Chromium (as Cr), percentage, *Max*	0.01	IS 16197 (Part 5)
iv)	Mercury (as Hg), percentage, *Max*	0.01	IS 16197 (Part 4)
v)	Hexavalent chromium, percentage, *Max*	0.01	IS 16197 (Part 7/Sec 1)
vi)	Polybrominated biphenyl, percentage, *Max*	0.01	IS 16197 (Part 6)
vii)	Polybrominated diphenyl ethers, percentage, *Max*	0.01	IS 16197 (Part 6)

Table 2 Requirements for Polymer Coated Inner Tanks

(*Clause* 5.12)

Sl No.	Characteristic	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Coating film thickness, µm	150 to 450	Annex C
ii)	Gloss, at 60°, unit	70 to 90	Annex D
iii)	Cross cut adhesion	No visible damage or detachment of film	IS 101 (Part 5/Sec 2)*
iv)	Pull-off adhesion on 20 mm dolly, at 2.5 MPa	To pass the test	Annex E
v)	Holiday test	No holiday	Annex F
vi)	Hardness by durometer-shore "D" at 27 °C ± 2 °C, *Min*	80	Annex G
vii)	Curing test, after 20 double rubs	No discoloration and no coating removal	Annex H
viii)	Resistance to heat at double bake schedule	No damage or deteriorate in the mechanical properties	IS 101 (Part 7/ Sec 3)*
ix)	Salt spray for 1 000 hrs	No blistering, no staining, no loss of adhesion and creepage from scribe shall be less than 1 mm	IS 101(Part 6/ Sec 1)*
x)	Humidity test for 1 000 hrs	No blistering, no rusting and no loss of adhesion	IS 101 (Part 6 / Sec 1)*
xi)	Hot water immersion test at 98 °C ± 2 °C for 2 500 hrs	No blistering, no rusting and no loss of adhesion	IS 101 (Part 7/ Sec 1)*

6 PACKING AND MARKING

6.1 Packing

Each polymer coated tanks shall be packed as agreed between the manufacturer and the purchaser.

6.2 Marking

6.2.1 Each coated water tank shall be marked and legibly with the following information:

a) Indication of the source of manufacture;
b) Name of the material, that is, coated water tank;
c) Serial number of the tank
d) Batch number or lot number in code or otherwise to enable the lot to be traced from records;
e) Rating pressure; and
f) Storage capacity.

6.2.2 *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 there under, and the products may be marked with the Standard Mark.

7 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.

8 COATING APPLICATION ON TANK

For the application of coating system on tank the Annex J may be followed.

* For the purpose of testing, the test specimens shall be prepared as prescribed in 4.

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 101	Methods of sampling and tests for paints, varnishes and related products:
(Part 5/Sec 2) : 1988	Mechanical tests : Section 2 Flexibility and adhesion (*third revision*)
(Part 6/Sec 1) : 1988	Durability tests; Section 1 Resistance to humidity under condition of condensation (*third revision*)
(Part 7)	Environmental tests on paint films;
(Sec 1) : 1989	Resistance to water (*third revision*)
(Sec 3) : 1989/ ISO 3248 : 2016	Determination of the effect of heat (*fourth revision*)
IS 302 (Part 2/ Sec 21) : 2018	Safety of household and similar electrical appliances: Part 2 Particular requirements, Section 21 Stationary storage type electric water heaters (*second revision*)
IS 513	Cold reduced carbon steel sheet and strip:
(Part 1) : 2016	Cold forming and drawing purpose (*sixth revision*)
(Part 2) : 2016	High tensile and multi-phase steel (*sixth revision*)
IS 1070 : 2023	Reagent grade water — Specifications (*fourth revision*)
IS 1079 : 2017	Hot rolled carbon steel sheet, plate and strip — Specification (*seventh revision*)
IS 1303 : 1983	Glossary of terms relating to paints (*second revision*)
IS 2500 (Part 1) : 2000/ISO 2859 -1 : 1999	Sampling procedures for inspection by attributes: Part 1 Sampling schemes indexed by acceptance quality limit (AQL) for lot–by–lot inspection (*third revision*)
IS 3618 : 1966	Specification for phosphate treatment of iron and steel for protection against corrosion
IS 6560 : 2017/ ISO 21952 : 2012	Welding consumables — Wire electrodes, wires, rods and deposits for gas shielded arc welding of creep-resisting steels — Classifications (*second revision*)
IS 8062 (Part 2) : 2006	Cathodic protection of buried pipeline/structures for transportation of natural gas, oil and liquids — Code of practice (*first revision*)
IS 9954 : 1981	Pictorial surface preparation standards for painting of steel surfaces
IS 16197	Determination of certain substances in electrotechnical products:
(Part 4) : 2014/ IEC 62321-4 : 2013	Mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP-OES and ICP-MS
(Part 5) : 2014/ IEC 62321-5 : 2013	Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS
(Part 6) : 2018/ IEC 62321-6 : 2015	Polybrominated biphenyls and polybrominated diphenyl ethers in polymers by gas chromatography — Mass Spectrometry (GC-MS)
(Part 7/Sec 1) : 2018/IEC 62321-7-1 : 2015	Hexavalent chromium, Section 1 Presence of hexavalent chromium (Cr (VI)) in colourless and coloured corrosion-protected coatings on metals by the colorimetric method

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ANNEX B

(*Clause* 5.8)

SOLUBILITY TEST

B-1 APPARATUS

The apparatus required for determining the solubility of Polymer is illustrated in Fig. 1 to Fig. 5. The cylinder assembly shall be constructed of 1.5 mm (16 Guage) AISI type 304 stainless steel. The ends shall be ground so as to conform with the curvature of the tank to be tested. The gaskets shall be of neoprene rubber. The apparatus shall be heated with a gas burner of electric heater placed outside the cylinder assembly.

B-2 SPECIMENS

The specimen for the solubility test shall comprise of four section pieces each of size 100 mm × 100 mm cut from the polymer coated tank approximately midway between the ends.

B-3 PREPARATION OF SPECIMEN

The specimens (*see* 4) shall be buffed to remove rough edges and coating fragments. The specimen shall be scrubbed on both sides using nylon brush and a mild abrasive detergent powder, rinsed with distilled water, dried for one hour in a drying oven and cooled in a desiccator.

B-4 THE INITIAL MASS

The specimen shall be weighed to an accuracy of 0.1 mg.

B-5 CALIBRATION OF TEST CELL

Each test cell shall be calibrated before it is used following the procedure given below:

Assemble the cell as it is to be opened. Fill with water to just below where the condenser tube is welded to the tank. Adjust the input to the heat source to give a slow rolling boil. If the water rises in the condenser, remove small amounts of water until the cell operates without surging. Switch off the heat and check it to see if the water level is completely covering the panels. Cool to room temperature, then measure the volume of water contained in the cell. Record this volume in the cell and use this amount of test solution in all subsequent tests.

B-6 TEST SOLUTION

The test solution used for each cycle shall consist of 400 mg of sodium bicarbonate dissolved in one liter of distilled water.

B-7 TEST PROCEDURE

Assemble the test cell using weighed panels of the same enamel on each end of the test cell. Pour the correct volume of the test solution into the cell. Adjust the input to the heater to give a consistent slow, rolling boil. After boiling for 18 hours, dismantle the cell and discard the used test solution. Clean the specimen using soft cloth and store in a desiccator between solution treatments. After 8 cycles of 18 hours each, clean specimen as before rinse with distilled water and dry at 107 °C for 1 hour. Place the specimen in a desiccator while hot and after cooling to room temperature weigh to an accuracy of 0.1 mg.

B-8 CALCULATIONS

The loss of mass per unit area of the polymer coated surface (M) after treatment with boiling water is calculated as follows:

$$M = \frac{M_1 - M_2}{A}$$

where

M_1 = mass, in g, of the test specimen before the test;

M_2 = mass, in g, of the test specimen after the test; and

A = area, in m^2, of the exposed surface of the test specimen.

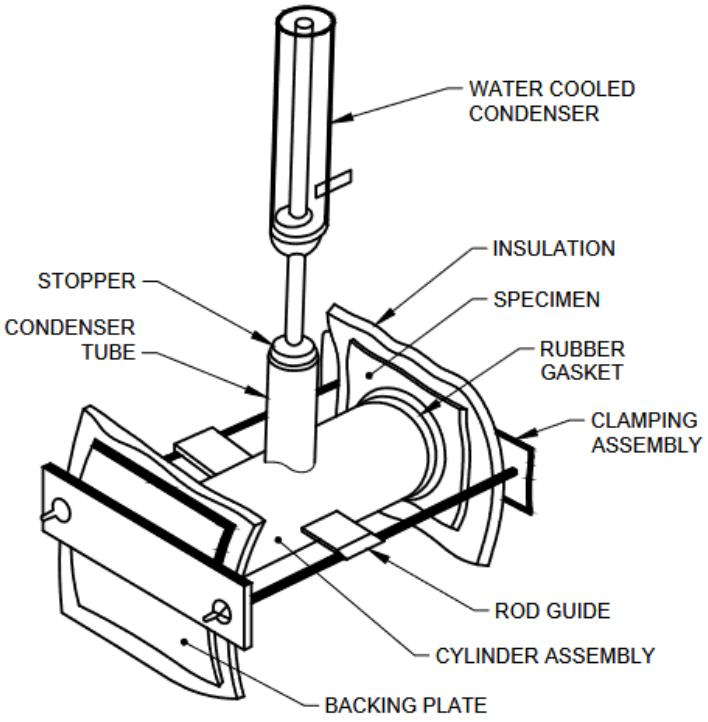
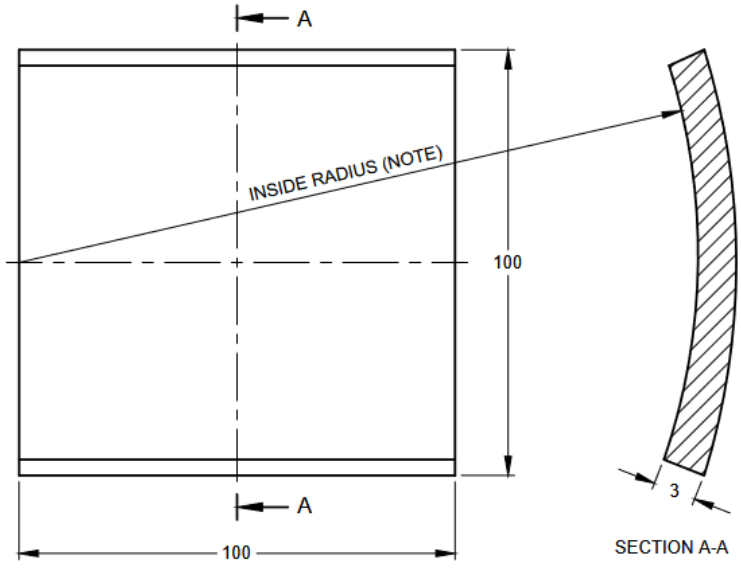
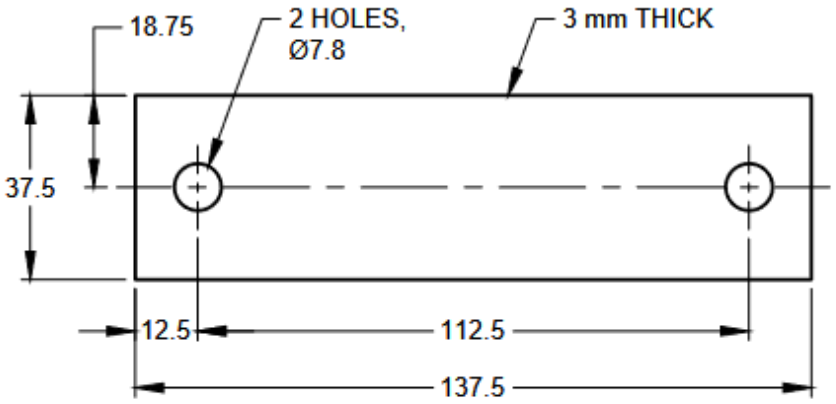


FIG. 1 TEST CELL FOR SOLUBILITY TEST OF COATING



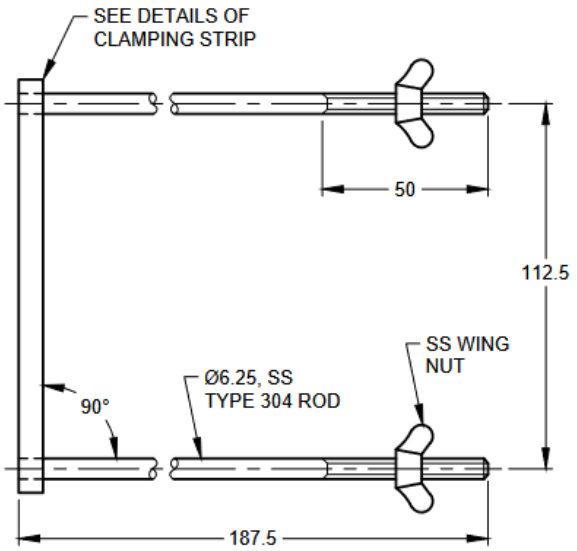
All dimensions in millimetres.

FIG. 2 BACKING PLATE



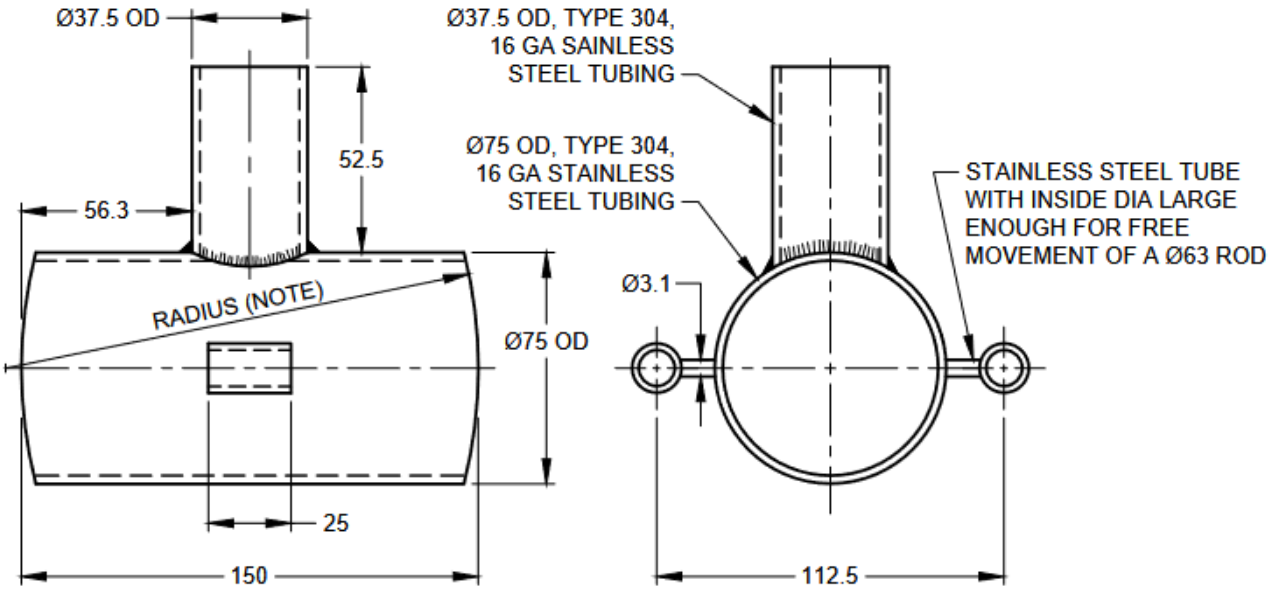
All dimensions in millimetres.

FIG. 3 CLAMPING STRIP



All dimensions in millimetres.

FIG. 4 CLAMPING ASSEMBLY



All dimensions in millimetres.
FIG. 5 CLYLINDER ASSEMBLY

ANNEX C

[*Table 2, Sl No.* (i)]

COATING FILM THICKNESS

C-1 GENERAL

The method for measuring the thickness of a dried film thickness on coated tank test. The measurement is made after the film has dried.

C-2 APPARATUS

A suitable digital coating thickness gauge, capable of measuring accurately.

C-3 PROCEDURE

Ensure calibration of the gauge and ensure that the coating is dried before use of the gauge. Inspect the probe tip and surface to be measured to ensure that they are clean. Measure the coating at three different positions on panel and note down reading. Verify calibration periodically to ensure that the instrument continues to read properly.

C-4 CALCULATION

Report Instrument used, serial number, range and mean of the thickness readings.

ANNEX D

[*Table* 2, *Sl No.* (ii)]

DETERMINATION OF GLOSS

D-1 GENERAL

This test method covers the measurement of the specular gloss of non-metallic specimens for glossmeter geometries of 60°.

D-2 APPARATUS

Gloss meter apparatus which consists of an incandescent light source furnishing an incident beam, means for locating the surface of the specimen, and a receptor located to receive the required pyramid of rays reflected by the specimen at 60° angle.

D-3 PROCEDURE

Calibrate the glossmeter at the start and completion of every period of glossmeter operation, and during the operation at sufficiently frequent intervals. To calibrate, adjust the instrument to read correctly the gloss of a highly polished standard, properly positioned and oriented, and then read the gloss of a working standard in the mid-gloss range. Position each specimen (*see* **4**) in turn beneath (or on) the glossmeter. Take at least three readings on a 3 inch × 6 inch (75 mm × 150 mm) area of the test specimen and calculate the mean specular gloss reading.

D-4 REPORT RESULTS

Report means specular gloss readings and the geometry used. Mention uniformity of surface if of interest.

ANNEX E

[*Table* 2, *Sl No.* (iv)]

PULL OFF ADHESION USING PORTABLE ADHESION TESTER

E-1 GENERAL

The test aims to measure the adhesion of a coating to the steel surface by application of a perpendicular negative force to a dolly bonded to the surface of the coating having uniform thickness. Although the aim is to test the tensile stress necessary to break the weakest interface (adhesive failure to the base), failures may take place within the coating (cohesive failure) or interface between the dolly and surface (glue failure) or a mix of these failures. Readings with adhesive failure to the base may be considered as the true adhesion. The pull off load is computed based on maximum indicated load from a calibrated pull off tester and the area stressed. The result may vary between different devices depending on the instrumental parameters.

E-2 APPARATUS

Apparatus shall comprise of the following:

E-2.1 Adhesion (Tensile) Tester — Preferably automatic with self-aligning aluminum dolly, centering device and hydraulically operated.

E-2.2 Loading Fixtures/Test Dollies — Usually, aluminum made cylindrical test dollies having a flat surface on one end and a means of attachment to the tensile tester on the other end. Dolly diameter shall be 20 mm for this test standard. If the dolly surface is highly polished roughen the same lightly using an emery paper.

E-2.3 Core cutter or a sharp knife

E-2.4 Adhesives — For securing the fixture to the coating. Adhesive should not affect the coating properties. The most suitable adhesives recommended for this test are two component solvent free epoxies, cyanoacrylates and peroxide-catalyzed polyester adhesives.

E-2.5 Fine scouring pad or fine sandpaper, (400 grit or finer), clean cloth

E-3 PROCEDURE

Very lightly abrade the surface of the specimen as prepared in **4** and the surface of the test dolly with scouring pad (preferred) or fine sandpaper and wipe with cloth. Prepare and apply the adhesive in accordance with the manufacturer's instructions. Use the minimum quantity of adhesive required to produce a firm, continuous and even bond between the surface and the test dolly. Remove any excess

adhesive immediately if possible. Allow the adhesive to cure for at least 24 h or as specified by the manufacturer.

Use the core cutter or sharp knife for cutting through cured adhesive and the paint coating to the substrate, round the circumference of the dolly. Adhesion test shall be carried on fully cured coating at 20 °C to 30 °C temperature. Use standard 20 mm dolly to obtain direct reading from the analogue dial gauge of the self-aligning, Type V adhesion tester. For the 20 mm dolly the pressure reacted by the dolly is the same as pressure in the actuator and is transmitted directly to the pressure gauge. When using digital version of the tester, enter the correct dolly size being used that is 20 mm. When using hand plunger pump type manual machine, apply stress at a rate not greater than 1 MPa/s such that failure of the assembly takes place within 90 s of the initial application of the stress. If the surface curvature causes error in readings, the adhesion will be tested on reference flat steel coupons. Average reading from three randomly selected spots shall constitute one test. Test to be pass if pull of adhesion value is minimum 2.5 MPa.

E-4 REPORT

Report the following:

a) Coating thickness;

b) Diameter of dolly;

c) Make and model of pull off gauge; and

d) Individual readings in MPa and nature of failure (cohesive or adhesive failure).

ANNEX F

[*Table 2, Sl No.* (v)]

ELECTRICAL CONTINUITY (HOLIDAY) TEST

F-1 GENERAL

The coated tank sample shall be tested with an approved holiday detector, preferably equipped with an audio-visual signaling device, to indicate any faults, holes, breaks or conducting particles in the protective coating.

F-2 PROCEDURE

F-2.1 The applied output voltage of holiday detector shall have a spark discharge for thickness equal to at least twice the thickness of the coating to assure adequate inspection voltage and compensate for any variation in coating thickness and calculated according to formula prescribed in **F-3**. The electrode shall be passed over the coated surface at approximately half the spark discharge distance from the coated surface only one time at the rate of approximately 10 m/min to 20 m/min. The edge effect shall be ignored. Excessive voltage shall be avoided as it tends to induce holiday in the coated surface, thereby, giving erroneous readings.

F-2.2 While selecting test voltages, consideration should be given to the tolerance on coating thickness and voltage should be selected on the basis of maximum coating thickness likely to be encountered during testing of a particular tank.

F-3 CALCULATION

The testing voltage shall be calculated by using following formula:

Testing voltage $V = 7\,900\ \sqrt{T} \pm 10$ percent, where T is the average coating thickness in mm.

F-4 RESULT

Record any audio-visual sound or spark indicates pinhole, break or presence of conducting particle.

ANNEX G

[*Table* 2, *Sl No.* (vi)]

HARDNESS BY DUROMETER - SHORE "D"

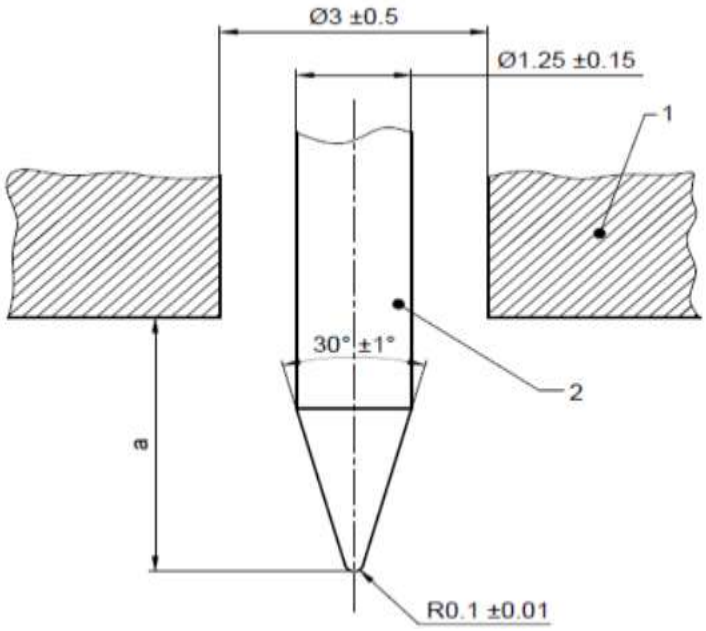
G-1 GENERAL

The prescribed test method is meant for checking indentation hardness of dried paint films applied on a steel substrate with the help of durometer. The durometer recommended for this test is Type D shore durometer. A specified indenter is forced into the coated panel under specified conditions and the depth of penetration is measured. Indentation hardness is inversely related to the depth of penetration of indenter into the coated test panel which, in turn, is dependent on the modulus of elasticity and viscoelastic properties of the coating material. This is an empirical test method intended primarily for control purpose. There is no direct relationship between the indentation hardness determined by this method with the fundamental properties of the material being tested.

G-2 APPARATUS

G-2.1 Type D Durometer — *see* Fig. 6

Consists of presser foot having hole diameter 3 mm ± 0.5 mm centered at least 6 mm from any edge of the foot and an indenter which is hardened steel rod of diameter 1.25 mm ± 0.15 mm. Indicating device of durometer reads extent of protrusion in terms of unit ranging from 0 to 100.



Key

1 Presser foot
2 Indenter
a Full protrusion: 2.5 mm ± 0.04 mm

All dimensions in millimetres.
FIG. 6 TYPE D DUROMETER

G-3 TEST SPECIMEN

As prescribed in 4

G-4 CALIBRATION

The spring of durometer should be calibrated from time to time by the manufacturer.

G-5 PROCEDURE

Place the test specimen on a hard, horizontal, plane surface. Hold the durometer in a vertical position with the point of the indenter at least 9 mm from any edge of the test specimen. Apply the presser foot to the test specimen as rapidly as possible, without shock, keeping the foot parallel to the surface of the test specimen. Apply just sufficient pressure to obtain firm contact between presser foot and test specimen. Observe reading on indicating device within 15 s ± 5 s after presser foot is in firm contact with test specimen. Maximum reading shall be recorded from the gauge. Take 5 measurements of hardness at different position on the test specimen at least 6 mm apart. Determine mean value of reading.

G-6 RESULTS

Average value of indentation hardness should be reported along with coating thickness, temperature, type of durometer used.

ANNEX H

[*Table 2, Sl No.* (vii)]

CURING TEST

H-1 REAGENTS

H-1.1 Methyl Ethyl Ketone (MEK) — 100 percent MEK solvent or a blend of 10 percent MEK 90 percent Xylene.

H-2 APPARATUS

H-2.1 Weighing Balance

H-2.2 Cotton Wool

H-3 PRINCIPLE

A soaked piece of cotton wool is rubbed over a cured paint film. After exposure the paint film is checked for softening of the film and/or other defects

H-4 TEST SPECIMEN

As prescribed in 4

H-5 PROCEDURE

Put the coated panel on the balance. Take the cotton wool and saturate it with the test solvent to a dripping wet condition. Put the cotton wool within 10 seconds on the test panel and move it, with the protected index finger under a 45° angle over the panel. Rub with an average pressure (1 kg to 1 1⁄2 kg) over a distance of 15 cm over the panel. Move forward and back with the same speed (one movement is one rub and takes approximately 1 s). One forward and back motion is one double rub. Continue rubbing the test area for a total of 20 double rubs. Take care to stay within the rectangular test area. If the film has not been removed down to the substrate after 20 double rubs, the film can be said to have attained optimal curing levels.

ANNEX J

(*Clause* 8)

COATING APPLICATION ON TANK

J-1 GENERAL

The polymer coating system may be applied in accordance with manufacturer's recommendations. Application by plural component machine is recommended.

J-2 SURFACE PREPARATION

J-2.1 Initial Preparation

All dirt, contaminants, defect, irregularities shall be removed from the steel surface prior to blasting.

J-2.2 Shot Blast Cleaning

Blasting is used for preparing the insides of any kind and size of water heaters for subsequent coating. The shot blasting concentrates abrasive particles at high speed in a controlled manner at the material thereby removing surface contaminates due to the abrasive impact.

Shot blasting involves the deployment of a high-quality abrasive that is expelled against the material at force. These tiny elements strip or abrade the top layer of the material, removing imperfections, rust and cosmetic damage, or dirt-fully preparing it for use. The degree of cleanliness shall be minimum Sa 2.5 grade.

J-2.3 Pretreatment

Refer IS 3618

J-2.4 Coating Application

J-2.4.1 Material preparation may be in accordance with manufacturer's recommendations.

J-2.4.2 *Application Temperature*

Coating shall be applied when the component metal temperature is between 100 °C to 160 °C or as per Manufacturer recommendation. Preheating of tank may be carried out using online heaters or as per recommendations of the manufacturer.

J-2.4.3 Curing temperature of coating system shall be (220 ± 20) ºC for 10 minutes or as per manufacturer recommendation.

J-3 COATING REPAIR

For repairing of coatings, tanks shall be re-blasted to ensure the complete removal of defective coating followed by **J-2**.

ANNEX K

(*Foreword*)

COMMITTEE COMPOSITION

Paints, Varnishes and Related Products Sectional Committee, CHD 20

Organization	*Representative(s)*
Institute of Chemical Technology, Mumbai	PROF P. A. MAHANWAR **(*Chairperson*)**
Akzo Nobel Coatings India Pvt Ltd, Gurugram	SHRI SANATAN HAJRA
Asian Paints Ltd, Mumbai	SHRI RAJEEV KUMAR GOEL SHRI RAJES BARDIA (*Alternate*)
Berger Paints India Ltd, Howrah	SHRI TAPAN KUMAR DHAR SHRI SWAGATA CHAKROBORTY (*Alternate*)
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Directorate General of Quality Assurance, New Delhi	SHRI A. K. KANAUJIA SHRI B. S. TOMAR (*Alternate*)
Engineers India Limited, New Delhi	SHRI S. GHOSHAL SHRI A. SATYA SRIDHAR (*Alternate*)
Indian Institute of Technology, Mumbai	PROF SMRUTIRANJAN PARIDA
Institute of Chemical Technology, Mumbai	SHRI D. V. PINJARI
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Voluntary Organisation in Interest of Consumer Education (VOICE), New Delhi	SHRI M. A. U. KHAN DR RAJIV JHA (*Alternate*)

Organization	*Representative(s)*
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Member Secretary
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This Indian Standard has been developed from Doc No.: CHD 20 (25149).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi