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मानक

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Jawaharlal Nehru

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IS 1154 (2000): Temporary Corrosion Preventive Fluid, Soft Film, Solvent Deposited, Water Displacing [PCD 3: Petroleum, Lubricants and their Related Products]



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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

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जल विस्थापन — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard

TEMPORARY CORROSION PREVENTIVE FLUID,
SOFT FILM, SOLVENT DEPOSITED, WATER
DISPLACING — SPECIFICATION

(*First Revision*)

ICS 75.100

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

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Lubricants and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This Indian Standard has been prepared with a view to facilitating the supply to large and small scale consumers of a material of quality most suited for use under Indian climatic conditions.

This standard forms one of a series of Indian Standards on temporary corrosion preventives, namely, IS 958 : 1975 'Specification for temporary corrosion preventive, grease type, soft film', IS 1153 : 1975 'Specification for temporary corrosion preventive fluid, hard film, solvent deposited' and IS 1674 : 1960 'Specification for temporary corrosion preventive, soft film, hot dipping type' covering different types of temporary corrosion preventives. Considerable assistance has been drawn from these existing standards as well as the British Standard BS 7541 : 1992 'Specification for temporary preventives for the protection of metal surfaces against corrosion during transport and storage' and the Japanese Standard JIS K2246-1994 'Rust preventive oils' in the preparation of this standard.

This standard was originally published in 1957. The present revision has been prepared as a result of a review of the standard in light of the present day requirement of the product. The characteristics for appearance, kinematic viscosity, film thickness, loss through drainage, humidity cabinet test and removability have been included. One more grade of the preventives has been included. This standard covers the requirements of IS 1674.

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

TEMPORARY CORROSION PREVENTIVE FLUID, SOFT FILM, SOLVENT DEPOSITED, WATER DISPLACING — SPECIFICATION (*First Revision*)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and tests for temporary corrosion preventive fluid, soft film, solvent deposited, water displacing suitable for the protection of metal surfaces during transport and storage.

2 NORMATIVE REFERENCES

The following Indian Standards 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 the standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
170 : 1986	Acetone (<i>third revision</i>)
296 : 1986	Sodium carbonate anhydrous (<i>third revision</i>)
410 : 1977	Cold rolled brass sheet, strip and foil (<i>third revision</i>)
513 : 1994	Cold rolled low carbon steel sheet and strips (<i>fourth revision</i>)
713 : 1981	Zinc base ingots for die casting (<i>second revision</i>)
737 : 1986	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (<i>third revision</i>)
1070 : 1992	Reagent grade water (<i>third revision</i>)
1447 : 1966	Methods of sampling of petroleum and its products
1448	Methods of test for petroleum and its products:
[P : 15] : 1976	Detection of copper corrosion from petroleum products by the copper strip tarnish test (<i>second revision</i>)
[P : 20] : 1982	Flash point by Abel apparatus (<i>first revision</i>)
[P : 21] : 1992	Flash point (closed) by Pensky Martens apparatus (<i>second revision</i>)
[P : 25] : 1976	Determination of kinematic and dynamic viscosity (<i>first revision</i>)
1839 : 1961	Toluene, reagent grade
4408 : 1979	Sodium chloride, analytical reagent (<i>first revision</i>)

3 GRADES

The temporary corrosion preventive fluid, soft film, solvent deposited, water displacing shall be of two grades:

- a) Grade 1, and
- b) Grade 2.

4 DEFINITION

For the purpose of this standard, the temporary corrosion preventives are materials used for the protection of metallic surfaces during transportation and storage. These are applied to the metallic surfaces and function by forming protective barriers or other appropriate mode of action at the metal surface. The corrosion preventives are readily removable by hot or cold solvents, wiping, detergent solutions or stripping.

NOTE — The term temporary signifies ready removability of the corrosion preventive and not the duration of its efficacy. The corrosion preventives should completely wet the metal surfaces and form smooth continuous film when applied by suitable methods.

5 REQUIREMENTS

5.1 General Requirements

The temporary corrosion preventives, soft film, solvent deposited shall be easily removable by applicable means such as wiping, action of solvents or detergents or manual stripping. This property shall be retained by the film after aging also.

The temporary corrosion preventives, soft film, solvent deposited shall be smooth homogeneous materials consisting of film forming agents and other ingredients dissolved or dispersed in media as applicable for the different grades. They shall be free from dirt and other visible impurities and shall not contain any separated water.

5.2 Keeping Quality

When stored in the original sealed containers under normal ambient conditions, the temporary corrosion preventives shall retain their properties and shall meet the requirements covered in this standard for the corresponding grades for a period of at least 12 months from the date of delivery.

5.3 Specific Requirements

The temporary corrosion preventives shall comply with

the appropriate requirements for the grades covered in Table 1.

6 PACKING AND MARKING

6.1 Packing

Material shall be packed in suitable containers of appropriate size as agreed to between the purchaser and the supplier.

6.2 Marking

6.2.1 The containers shall be securely closed and marked with the following:

- Indication of source of manufacture;
- Name and grade of material;
- Net mass of material;
- Recognized trade-mark, if any; and
- Identification in code or otherwise to enable the lot of consignment or manufacture to be traced back from records.

6.3 BIS Certification Marking

Each container may also be marked with the Standard Mark.

6.3.1 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 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.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Representative samples of material shall be drawn as prescribed in IS 1447.

7.2 Tests for determining all the characteristics given in Table 1 of the standard shall be conducted on the composite sample.

7.3 The lot shall be declared as conforming to the requirements of this standard, if all the test results on the composite sample satisfy the requirements of this standard.

Table 1 Requirements for Temporary Corrosion Preventive Fluid, Soft Film, Solvent Deposited, Water Displacing

(Clause 5.3)

Sl No.	Characteristic	Requirement		Method of Test, Ref to	
		Grade 1 (3)	Grade 2 (4)	[P :] of IS 1448 (5)	Annex (6)
i)	Appearance at 25/30°C	Homogeneous	Liquid	Visual examination	—
ii)	Type of film formed	Soft, dry transparent	Soft, oily non-sticky	do	—
iii)	Kinematic viscosity, cSt at 40°C, <i>Min</i>	—	15	[P : 25]	—
iv)	Flash point, °C, <i>Min</i> :				
	a) Abel	32	—	[P : 20]	—
	b) PMCC	—	60	[P : 21]	—
v)	Film thickness, micron	← Report →		—	A
vi)	Copper corrosion, 50°C, 3 h, <i>Max</i>	1	1	[P : 15]	—
vii)	Humidity cabinet test, h, passing, <i>Min</i>	360	360	[P : ¹⁾]	—
viii)	Salt spray corrosion test, h, passing, <i>Min</i>	100	100	[P : ²⁾]	—
ix)	Loss through drainage, percent by mass, <i>Max</i>	10	—	—	B
x)	Stability	No separation	—	—	C
xi)	Removability	Easily removable by wiping with cloth soaked in kerosene/white spirit		—	D
xii)	Water displacement property	Pass	Pass	—	E
xiii)	Corrosive effect on lead, loss in mass in mg/cm ² of the surface, <i>Max</i> ³⁾	1.0	1.0	—	F
xiv)	Freedom from corrosive effect on metal couples ³⁾	← No corrosion →		—	G

¹⁾ Under preparation. Till such time it is published, ASTM D 1748 shall be followed.

²⁾ Under preparation. Till such time it is published, ASTM B 117 shall be followed.

³⁾ As agreed between purchaser and supplier.

ANNEX A

[Table 1, Sl No. (v)]

DETERMINATION OF FILM THICKNESS

A-1 GENERAL

Testing by the gravimetric method is specified herein, but other suitable methods may also be employed.

A-1.1 Sampling Method

Sampling shall be performed in accordance with IS 1447.

A-1.2 General Common Items

A-1.2.1 Test Pieces

- Material* — Steel sheet or strip conforming to IS 513.
- Dimensions* — The thickness dimensions shall be (1.0 to 2.0) mm × 60 mm × 80 mm.
- Hooking Holes* — As required test pieces shall respectively be provided with a hole of 2 mm diameter at two locations for their suspension (see Fig. 1).
- Number of Test Pieces* — Three test pieces shall be used for each test.

A-1.2.2 Preparation of Test Pieces

A-1.2.2.1 Grinding method

Test pieces shall be ground on both sides in dry condition with abrasive cloth or abrasive paper and the edges shall be rounded at the same time. The direction of final grinding shall be parallel to the short sides exclusively for those test pieces used in the test (see Note) and parallel to the long sides for other test pieces.

A-1.2.2.2 Cleaning method

Test pieces shall be immersed in warm petroleum naphtha and then in warm anhydrous methanol to be cleaned until no stains attach to the gauze used for wiping.

A-1.2.2.3 Method of preservation

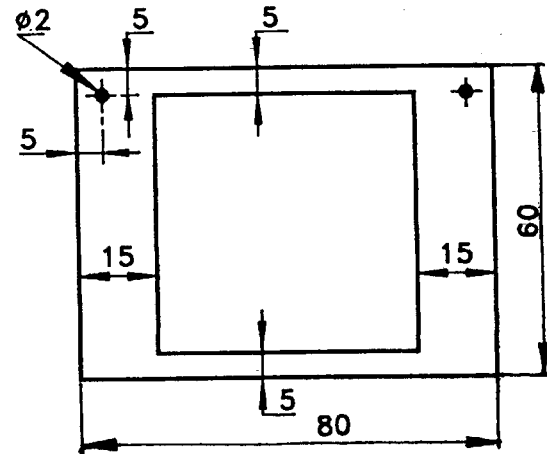
When test pieces are not intended for immediate use for the test, they shall be kept in a desiccator. However, those test pieces elapsed for 24 h or longer after preparation shall be reprepared for the test.

A-2 METHOD OF REPAIRING COATED TEST PIECES

A-2.1 Method of Coating

The operation of coating with the rust preventive oil shall be performed at a relative humidity of 50 percent or lower and a temperature of $25 \pm 1^\circ\text{C}$. The rust preventive oil shall be put in the container used for

coating in such a quantity as to completely immerse the test pieces and thoroughly mixed with stirring. The foam accumulated on the surface shall be removed. Steel test pieces shall be according to Fig. 1. It shall be immersed in the container holding the oil for 1 minute and then withdrawn at a rate of 100 mm per minute.



All dimensions in millimetres.

FIG. 1 TEST PIECE

A-2.2 Method of Drying

The coated test pieces shall be naturally dried for 24 h in suspended condition in a clean place until they are subjected to the film thickness and other tests.

A-3 METHOD OF OBTAINING FILM DENSITY

Twenty five g of sample shall be placed in a flat-bottomed evaporating dish of 90 mm in inner diameter and maintained at $107 \pm 2^\circ\text{C}$ for 16 h in an explosion proof air bath. By using the evaporation residue as the test sample (see Note) the film density shall be obtained by the Hubbard pycnometer method.

NOTE — Where the evaporation residue obtained in one operation is less than 25 ml, the evaporation residues obtained in two or more operations shall be used as the test sample.

A-4 CALCULATION

The film thickness of the coated test pieces shall be calculated from the following formula:

$$\text{Film thickness (micron)} = \frac{10\,000 \times M}{D \times A}$$

where

M = mass of film (g),

D = density of film (g/cm^3), and

A = total surface area of test piece (cm^2).

ANNEX B

[Table 1, Sl No. (ix)]

METHOD OF TEST FOR DRAINAGE**B-1 APPARATUS****B-1.1 Oven**

The oven shall be thermostatically controlled and capable of maintaining a temperature of $70 \pm 1^\circ\text{C}$.

B-2 MATERIALS**B-2.1 Mild Steel Panels**

The mild steel test panels required for this test shall be of panel sheet (drawing type) specified in IS 513. The panels shall be approximately $80\text{ mm} \times 40\text{ mm} \times 1.3\text{ mm}$ in size with a 6 mm diameter hole drilled centrally near one of the shorter edges. The panels shall be free from mill scale or oxides, pits, scratches and other surface imperfections.

B-2.2 Carborundum Powder (No. 150)**B-2.3 Toluene or Acetone**

Confirming to IS 1839 or IS 170.

B-3 PREPARATION OF TEST PANELS

Polish the panels on both sides by means of a pad of filter paper and carborundum powder and then degrease with toluene or acetone. Dry, cool and weigh to the nearest milligram.

B-4 PROCEDURE**B-4.1 Carry Out the Test in Triplicate**

B-4.2 Apply sufficient quantity of the corrosion preventive so as to give a residual film mass of 1.7 to 2.4 mg/cm^2 . Spread the material uniformly over both sides of the test panels by brushing, taking care that no deep brush marks are left on the panels. Finally, draw a doctor blade over the panels to ensure that the film is uniform all over. Suspend the panels for 24 hours in a vertical position at room temperature in a well ventilated position and out of direct sunlight. Cut off flush with the lower edge any material hanging as a bead from the panel. Weigh the coated panels to the nearest milligram. Suspend the coated panels vertically for 4 hours in an oven maintained at $70 \pm 1^\circ\text{C}$. After the specified period has elapsed, carefully remove the panels without jarring, suspend in a vertical position, and allow to cool to room temperature in a dust-free place. After removal of any material hanging as a bead from the lower edge, weigh the coated panel again to the nearest milligram.

B-4.2.1 Calculate the loss in mass of the coated panel as percentage of the original mass of the coating. Report the average of the three results.

ANNEX C

[Table 1, Sl No. (x)]

METHOD OF TEST FOR STABILITY**C-1 APPARATUS****C-1.1 Oven**

The oven shall be thermostatically controlled and capable of maintaining a temperature of $50 \pm 1^\circ\text{C}$.

C-1.2 Test Tube

The test tube shall be $150 \pm 10\text{ mm}$ in height and $25 \pm 5\text{ mm}$ in diameter. It shall be made from heat-resistant glass and shall be fitted with a vented cork.

C-1.3 Thermometer

The thermometer shall be such as to read accurately the required temperature within $\pm 1^\circ\text{C}$.

C-2 CLEANING OF THE TEST TUBE

Clean the test tube with concentrated solution of chromic acid, and then rinse with distilled water (*see* IS 1070) till free from acid and finally air dry.

C-3 PROCEDURE

C-3.1 Fill the test tube to within 25 mm of the top with the corrosion preventive. Close the tube with the vented cork and then subject it to the temperature cycle stated below:

- 2 hours at $0 \pm 1^\circ\text{C}$
- 2 hours at $50 \pm 1^\circ\text{C}$
- 20 hours at room temperature.

C-3.2 Repeat the above cycle on three consecutive days and then allow the tube to stand undisturbed for a further period of 3 days at room temperature. Examine the contents of the tube for separation into layers or sedimentation.

C-3.3 The corrosion preventive shall be taken to have satisfied the requirement of the test if there is no separation of layers or sedimentation.

ANNEX D

[Table 1, Sl No. (xi)]

DETERMINATION OF REMOVABILITY**D-1 SOLVENT CUTBACK TYPE RUST PREVENTIVE OIL****D-1.1 Apparatus**

The construction of the main parts of the removability tester used for this test shall be as shown in Fig. 2.

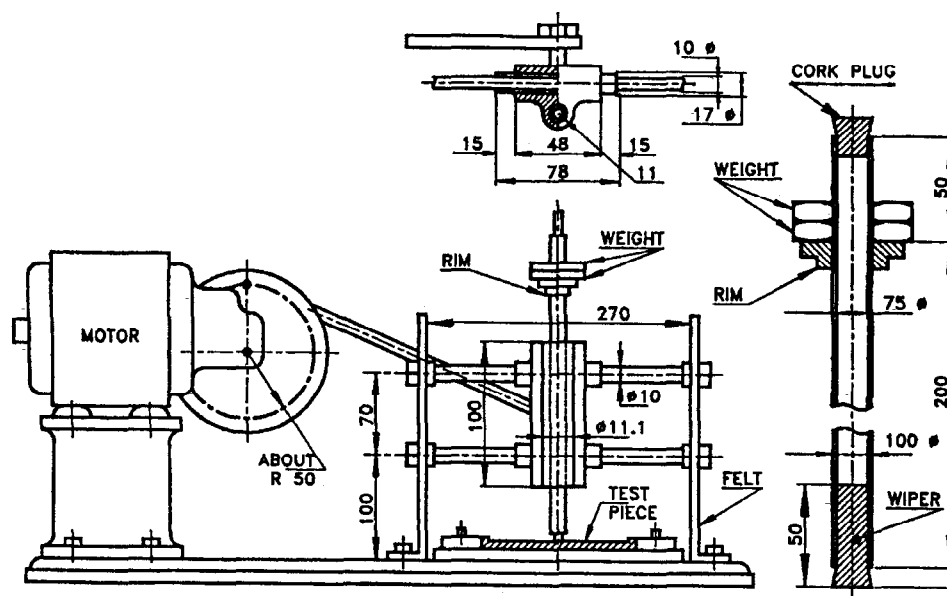
D-1.1.1 One end of a tube of 7.5 mm in inner diameter and 250 mm in length shall be filled with a padding of pure-wool felt (about 19 mm in thickness and 400 to 700 g/l m²) of 50 mm in length in such a manner that the end of the padding protrudes out of the tube by 6 to 12 mm.

D-1.1.2 A solvent (*see Note*) shall be introduced into

the tube mentioned in **D-1.1.1** from the above and a cork plug shall be put on in such a manner that the felt is sufficiently wetted and the solvent does not flow down naturally from the end of the felt, and a weight shall be placed on the tube by suitable means to make the total mass 200 g; this shall be used as the wiper.

NOTE — Cleaning solvent having the following properties:

- Reaction — neutral.
- Flash point, °C, *Min* — 38
- Initial boiling point, °C, *Min* — 150
- 50 percent running point, °C, *Min* — 180
- End point, °C, *Min* — 210
- Copper corrosion, 50°C, *Max* — 1



All dimensions in millimetres.
FIG. 2 REMOVABILITY TESTER

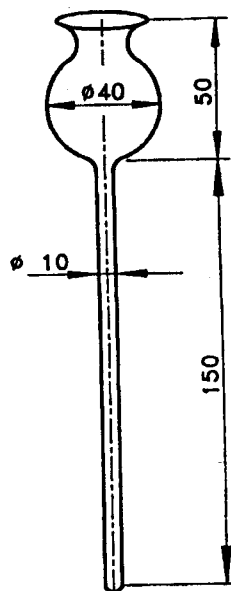
D-1.1.3 This wiper shall be inserted in a guiding metal tube of 10.0 mm in inner diameter and 100 mm in length and the guide tube shall be placed vertically at the centre of the test piece. The wiper shall be attached to a device which reciprocates the wiper with a wiping distance of 50 mm and a wiping rate of 40 ± 5 cycles/minute. One cycle shall mean an operation until the wiper returns to the initial position.

D-1.2 Coated Test Piece

The coated test pieces used in this test shall be the one which has been subjected to 360 h humidity test for the grades covered in this standard.

D-1.3 Test Procedure

The coated test piece shall be placed at the specified position of the removability tester at room temperature and the wiper shall be reciprocated for the specified number of cycles. After wiping by the specified cycles, examination shall be made for the presence or absence of remaining film parts which are 6 mm or larger in width by the naked eye and present on the surface covering all the wiped distance.



All dimensions in millimetres.
FIG. 3 GLASS TUBE FOR WIPER

D-2 RUST PREVENTIVE PETROLEUM

D-2.1 Apparatus

D-2.1.1 Wiper

A padding of pure wool felt (about 19 mm in thickness and 400 to 700 g/1 m²) of about 25 mm in length shall be inserted into one end of a glass tube (Fig. 3) of 7.5 mm in inner diameter, 10 mm in outer diameter, and about 150 mm in length having a bulb of about 50 mm in length and 40 mm in outer diameter in such a manner that the end of the padding projects out of the tube by about 3 mm.

D-2.1.2 The width of the felt of the wiper shall be adjusted so that the solvent **D-1.1.2** introduced to a specified height flows down at a rate of 15.0 ± 0.5 g/minute. The total mass of the wiper consisting of the glass tube, felt, and solvent shall be 45.0 ± 0.5 g.

D-2.1.3 During the test, the quantity of the solvent shall desirably be maintained constant.

D-2.1.4 This wiper shall be attached to the removability tester of Fig. 2 and placed vertically at the centre of the test piece. The wiping distance shall be about 50 mm and the wiping rate shall be 30 ± 5 cycles/minute. One cycle shall mean the operation until the wiper returns to the initial position.

D-2.2 Coated Test Piece

The coated test piece used in this test shall be the one which has been subjected to the test of rust preventive petroleum and the one which has been subjected to the test of rust preventive petroleum.

D-2.3 Test Procedure

The coated test piece shall be placed at the specified position of the removability tester and after wiping for 15 cycles examination shall be made for the presence or absence of remaining film parts of 8 mm or larger in width and present on the surface covering the whole wiped distance.

ANNEX E

[Table 1, Sl No. (xii)]

TEST FOR WATER DISPLACEMENT PROPERTY

E-1 APPARATUS**E-1.1 Glass Desiccator**

The glass desiccator shall be provided with tight-fitting lid. Its dimensions shall be such that when the test panels are suspended there is at least 38 mm gap between the panels and any side of the desiccator as well as between the surface of the liquid and the bottom of the panels.

E-2 MATERIALS**E-2.1 Mild Steel Panels**

The mild steel required for this test shall be of Panel Sheet (Type P) specified in IS 513. The panels shall be approximately 76 mm × 38 mm × 1.25 mm (or 18 BG) in size and shall have one 6-mm diameter hole, drilled centrally near one of the shorter edges. The panels shall be free from mill scale or oxides, pits, scratches and surface imperfections.

E-2.2 Carborundum Powder (No. 150)**E-2.3 Sodium Chloride Solution**

The sodium chloride shall be of analytical reagent grade (*see* IS 4408). The strength of the solution shall be 3 percent (*m/v*).

E-2.4 Toluene

Sulphur-free, conforming to IS 1839.

E-2.5 Acetone

Sulphur-free and conforming to IS 170.

E-2.6 Sodium Carbonate Solution

Saturated, containing an excess of solid sodium carbonate conforming to IS 296.

E-3 PREPARATION OF THE MILD STEEL PANELS

Polish the panels on both sides by means of a pad of filter paper and carborundum powder and then degrease with toluene. Rinse the panels with acetone and then dry for a few minutes in warm dry air. During and after degreasing, care shall be taken not to handle the test surface with bare hands.

E-4 PROCEDURE

E-4.1 Carry out the test in quadruplicate.

E-4.2 Immerse, one by one, the clean and degreased panels completely in the sodium chloride solution for 30 seconds. Withdraw momentarily to ensure that the film is complete. Then immerse for a further period of 90 seconds. (If a complete film is not formed, the panels have been insufficiently cleaned and the cleaning process shall be repeated.) Withdraw the panels and allow to drain at room temperature for 10 seconds. Immediately immerse the panels in the temporary corrosion preventive for a period of two minutes, withdraw and examine the panels visually to find out whether complete displacement of water has taken place. Allow to hang in a vertical position for one hour at room temperature.

E-4.3 Suspend the panels vertically in a closed desiccator containing sodium carbonate solution to maintain the appropriate humidity. Space the panels so that they are 38 mm apart between themselves as also from the sides of the desiccator and liquid surface. Leave the panels in the desiccator for 72 hours at room temperature after which examine the panels for corrosion.

E-4.4 The temporary corrosion preventive shall be taken to have satisfied the requirement of the test, if complete displacement of water takes place and three out of four panels do not show any sign of corrosion. Any corrosion extending up to 6 mm from the edges shall be ignored.

ANNEX F

[Table 1, Sl No. (xiii)]

TEST FOR CORROSIVE EFFECT ON LEAD

F-1 APPARATUS

F-1.1 Oven

The oven shall be thermostatically controlled and capable of maintaining a temperature of $50 \pm 1^\circ\text{C}$

F-1.2 Glass Container

A wide-mouthed glass container fitted with liquid-tight ground-glass stopper shall be used. Its capacity shall be approximately 500 ml and it shall be made from heat-resistant glass.

F-2 MATERIAL

F-2.1 Lead Test Panels

The test panels shall have the following composition:

- | | |
|---|--------|
| a) Metallic lead, percent by mass, <i>Min</i> | 99.99 |
| b) Copper, percent by mass, <i>Max</i> | 0.003 |
| c) Antimony, percent by mass, <i>Max</i> | 0.002 |
| d) Bismuth, percent by mass, <i>Max</i> | 0.005 |
| e) Iron, percent by mass, <i>Max</i> | 0.003 |
| f) Nickel and cobalt together, percent by mass, <i>Max</i> | 0.001 |
| g) Silver, percent by mass, <i>Max</i> | 0.002 |
| h) Zinc, percent by mass, <i>Max</i> | 0.002 |
| j) Tin, cadmium, arsenic and sulphur | Traces |
| k) Total of all impurities present, percent by mass, <i>Max</i> | 0.01 |

F-2.1.1 The panel shall be approximately 75 mm × 50 mm × 1.5 mm in size and shall be free from deep scratches and surface imperfections.

F-2.2 Toluene or Acetone

Same as described in A-2.3.

F-2.3 Methanol

Same as described in B-2.4.

F-2.4 Dilute Acetic Acid

Approximately 1 percent by volume.

F-3 CLEANING OF LEAD PANELS

F-3.1 Clean the panels on both sides and on all edges to a smooth bright finish by scraping with a sharp tool. Clean and degrease by swabbing with a cloth saturated with toluene or acetone and then rinse with methanol. Finally, dry the panels in a current of warm, dry air. During and after degreasing, do not handle the panel by bare hands, but with a pair of clean forceps.

F-4 PROCEDURE

F-4.1 Carry out the test in triplicate.

F-4.2 Weigh each panel accurately. Place the weighed lead panels in the glass containers and add sufficient quantity of the corrosion preventive such that the panels are immersed to a depth of 12 mm below the surface of the corrosion preventive. Close the container with the stopper and place it for 8 hours in the oven maintained at $50 \pm 1^\circ\text{C}$. Remove the container from the oven, withdraw the panels and cool. Remove the film of corrosion preventive by swabbing lightly with cotton wool soaked in toluene or acetone. Dip the panels in boiling dilute acetic acid for 1 to 2 minutes rinse with water, dry and weigh.

F-4.3 Express the average loss in mass of the panels in milligrams per square centimetre of surface.

ANNEX G

[Table 1, Sl No. (xiv)]

METHOD OF TEST FOR FREEDOM FROM CORROSIVE EFFECT ON METAL COUPLES

G-1 APPARATUS**G-1.1 Oven**

The oven shall be thermostatically controlled and capable of maintaining a temperature of $50 \pm 1^\circ\text{C}$.

G-1.2 Glass Containers

Four suitable wide-mouthed heat-resistant glass containers, fitted with vented corks, shall be used.

G-2 MATERIAL**G-2.1 Test Panels**

The test panels of 50 mm \times 25 mm shall be of the following metals and composition.

G-2.1.1 Mild Steel

The mild steel test panels required for this test shall be of panel sheet (drawing type) specified in IS 513.

G-2.1.2 Brass

The brass test panels shall have the composition as prescribed for Grade CuZn 37 of IS 410.

G-2.1.3 Aluminium Alloy

The aluminium alloy test panels shall have the composition as prescribed for Grade HS 14 or Grade HS 15 specified in IS 737.

G-2.1.4 Magnesium Alloy

The magnesium alloy test panels shall have the following composition:

- | | |
|---|------------|
| a) Aluminium, percent by mass, <i>Max</i> | 0.05 |
| b) Zinc percent by mass, <i>Max</i> | 0.03 |
| c) Manganese, percent by mass | 1.0 to 2.0 |
| d) Copper, percent by mass, <i>Max</i> | 0.02 |
| e) Silicon, percent by mass, <i>Max</i> | 0.02 |
| f) Iron, percent by mass, <i>Max</i> | 0.03 |
| g) Nickel, percent by mass, <i>Max</i> | 0.005 |
| h) Calcium, percent by mass, <i>Max</i> | 0.02 |
| j) Magnesium, percent by mass | Remainder |

G-2.1.5 Zinc Base Alloy

This zinc base alloy test panels shall have the composition as prescribed in IS 713.

G-2.1.6 The pair of metals concerned shall be drilled centrally to accommodate a nut and bolt which shall be of brass, except in the case of mild steel aluminium alloy couple where a steel nut and bolt shall be used. The pair of metals shall be clamped firmly together in the form of a cross with an angle of 20° between their major axes before the test.

G-2.2 Emery Cloth (No. 0)**G-2.3 Toluene or Acetone****G-2.4 Methanol**

The methanol shall be water-white and not less than 98 percent (by column) in strength. It shall not contain more than traces of aldehydes and acids (*see* IS 517).

G-3 CLEANING OF METAL PANELS

G-3.1 Burnish the metal panels with emery cloth (in the case of magnesium and aluminium alloys, moist pumice powder shall be used) to a smooth bright finish. Clean and degrease by swabbing with cloth soaked in toluene or acetone and then rinse with methanol (*see* Note). Finally, dry the metal panels in a current of warm, dry air and immediately utilize for the test. During and after degreasing, do not touch the metal panels by bare hands, but handle with a pair of clean forceps. Clean and degrease the nuts and bolts before use.

NOTE— In the case of magnesium alloy, dry methanol shall not be used.

G-4 PROCEDURE

Take sufficient quantity of temporary corrosion preventive in each of the four glass containers and introduce one metal couple in each of the containers such that half the length of the metal couples is immersed in the corrosion preventive. Close the glass containers with the ventred corks and place them in the oven maintained at $50 \pm 1^\circ\text{C}$ for 6 hours. Remove the glass containers from the oven and take out the metal couples from the containers. Separate the metal panels of couples. Remove the film of temporary corrosion preventive by swabbing the metal panels with cloth soaked in toluene or acetone and visually examine for corrosion.

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This Indian Standard has been developed from Doc : No. PCD 4 (1636).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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