AMENDMENT NO. 1 SEPTEMBER 2024

TO

IS 17682 : 2021 ALUMINIUM COMPOSITE PANEL — SPECIFICATION

(*Second cover page*, *para* 5) — Substitute 'Annex G' *for* 'Annex D'.

[*Page* 3, *Table* 2, *Sl No*. (i), *col* (7)] — Delete 'or IS 13360 (Part 3/Sec 11)'.

[*Page* 3, *Table* 2, *Sl No*. (v), *col* (7)] — Substitute 'Annex D' *for* 'IS 8402'.

(*Page* 3, *Table* 3) — Substitute the following for the existing:

'Table 3 Requirements for Coatings of ACP

(*Clause* 7.1)

Sl No.	**Characteristic**	**Requirements on Basis of Coating Type**				**Method of Test, Ref to**
		PVDF/FEVE (2 Coat)	PVDF/FEVE (3 Coat)	SDP (2/3 Coat)	Polyester (1 Coat)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Coating thickness	24 microns to 30 microns	30 microns to 40 microns	24 microns to 30 microns for 2 coat/ 30 microns to 40 microns for 3 coat	15 microns to 20 microns	IS 6012
ii)	Adhesion (cross hatch)					
	a) Dry	No peeling				**6.2.2** of IS 101 (Part 5/Sec 2)
	b) Wet	No peeling				
	c) Boiling	No peeling				
iii)	Pencil hardness, *Min*	2H	2H	2H	H	IS 101 (Part 5/Sec 1)
iv)	Gloss	As declared by manufacturer ± 5				By glossmeter
v)	Weatherometer test					
	a) Resistance to humidity and neutral salt spray test (for 4 000 h)					
	1) Corrosion	No corrosion				IS 101 (Part 6/Sec 1)
	2) Blister	No blister formation				
	b) Accelerated weathering test	for 4 000 h	for 4 000 h	for 3 000 h	for 1 000 h	IS 101 (Part 6/Sec 1) (By UV condensation method only)
	1) Gloss retention, percent, *Min*	50	50	30	NA	Gloss shall be measured by glossmeter

Price Group 5

Table 3 (*Concluded*)

Sl No.	**Characteristic**	**Requirements on Basis of Coating Type**				**Method of Test, Ref to**
		PVDF/FEVE (2 Coat)	PVDF/FEVE (3 Coat)	SDP (2/3 Coat)	Polyester (1 Coat)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2) Colour retention ΔE, *Max*	5	5	5	NA	Colour shall be measured by spectrophotometer
	3) Chalk resistance, units, *Max*	8	8	8	NA	Chalk resistance shall be measured as per Annex E.
vi)	Chemical resistance					
	a) HCl	5 percent HCl for 24 h, no blistering or visual change	5 percent HCl for 24 h, no blistering or visual change	2 percent HCl for 24 h, no blistering or visual change	NA	Annex F
	b) NaOH	20 percent NAOH for 18 h, ΔE ≤ 5	20 percent NAOH for 18 h, no blistering or visual change	2 percent NAOH for 24 h, no blistering or visual change	NA	
	c) Mortar pat test, 24 h	No blistering or visual change	No blistering or visual change	No blistering or visual change	NA	
	d) Detergent 3 percent solution (at 38 ºC for 72 h)	No blistering or visual change	No blistering or visual change	No blistering or visual change	NA	
	e) 70 percent nitric acid, 30 minute	ΔE ≤ 5	ΔE ≤ 5	NA	NA	

(*Page* 3, *Table* 3, *Note* 1 *and* 2) — Substitute the following for the existing:

'NOTES

1 Specimens shall be immersed in water at ambient temperature for 24 h.

2 Specimens shall be immersed in boiling water for 20 minutes.'

[*Page* 4, *Table* 4, *Sl No*. (iii), *col* (5)] — Substitute 'IS/ISO 11925-2 : 2020' *for* 'Annex B of IS 15061'.

[*Page* 4, *Table 4*, *Sl No*. (vi), *col* (5)] — Substitute 'IS/ISO 1716 : 2018' *for* 'IS 1350 (Part-2)'.

(*Page* 6, Annex A, 1350 (Part 2) and 8402) — Delete.

(*Page* 6, Annex A) — Insert the following in ascending order:

'*IS No.* *Title*

IS 712 : 1984 Specification for building limes (*third revision*)

IS No.	*Title*
IS/ISO 1716 : 2018	Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value)
IS/ISO 11925-2 : 2020	Reaction to fire tests — Ignitability of products subjected to direct impingement of flame: Part 2 Single-flame source test'.

(*Page* 7, Annex C) — Insert the following at the end:

'ANNEX D

(*Table* 2)

PEEL STRENGTH TEST FOR ACP

D-1 APPARATUS

D-1.1 Testing Machine

Power-driven UTM machine, with a constant rate-of-jaw separation or of the inclination balance or Pendulum type, which fulfils the following requirements:

a) The applied tension as measured and recorded is accurate within ±1 percent.

b) Hold specimens in the testing machine by grips which clamp firmly and prevent slipping at all times.

c) The rate of travel of the power-actuated grip is 305 mm/min. This rate which provides a separation of 120 mm is to be uniform throughout the tests.

d) Operate the machine without any device for maintaining maximum load indication. In pendulum-type machines, the weight lever swings as a free pendulum without engagement of pawls.

e) The machine is autographic giving a chart having the mm or inches of separation as one axis and applied tension as the other axis of coordinates.

f) The capacity of the machine is such that the maximum applied tension during test does not exceed 85 percent nor be less than 15 percent of the rated capacity.

g) Test can be performed at ambient conditions or at relative humidity of 60 percent ± 5 percent and at temperature 27 °C ± 2 °C.

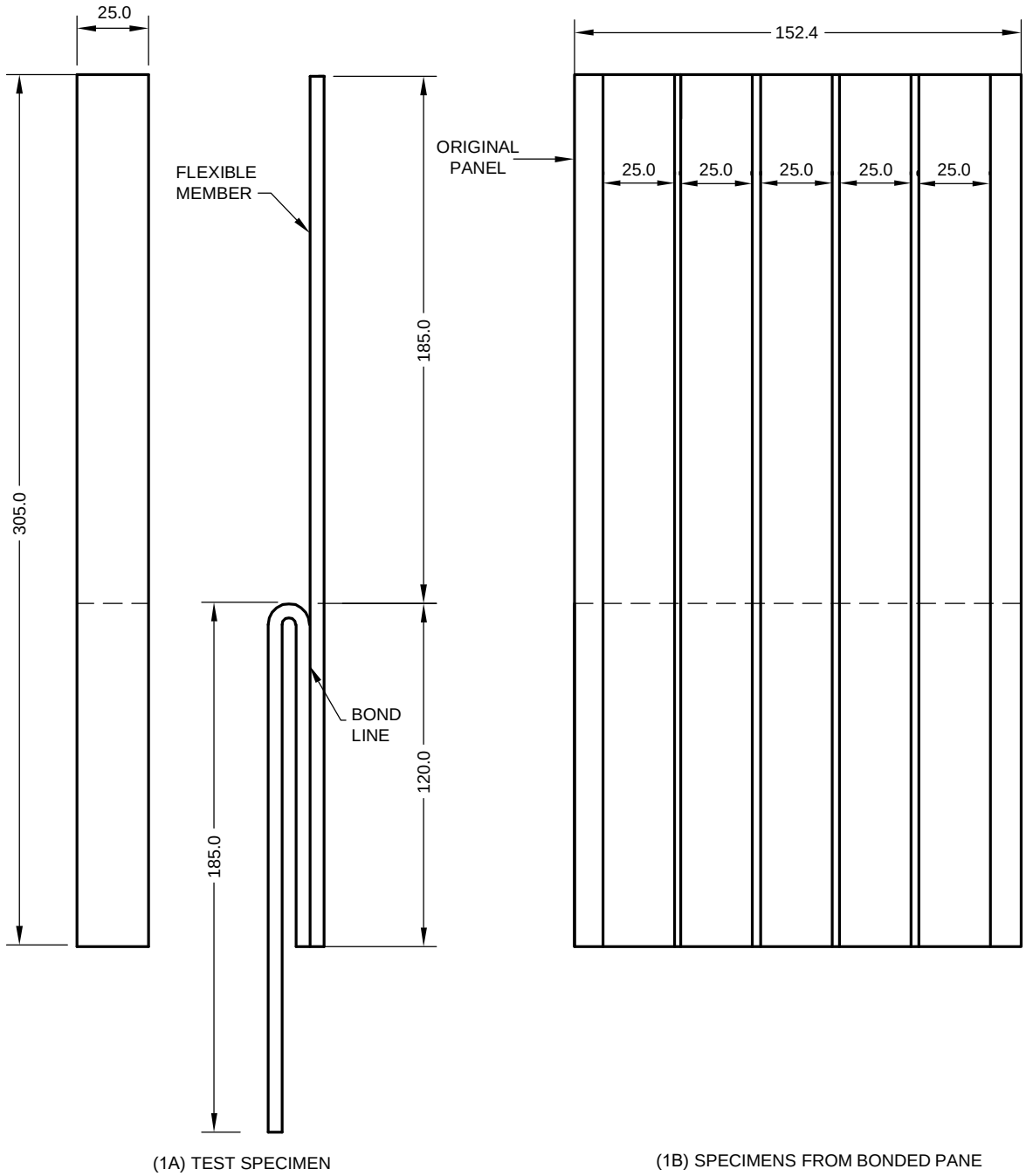
NOTE — If ACP is intended to be used for coastal areas the sample shall be tested at 80 percent ± 5 percent relative humidity and temperature 27 °C ± 2 ºC.

D-2 TEST SPECIMEN

a) The test specimen, shown in Fig. 1(A), consists of one piece of flexible material, 25 mm × 305 mm, bonded for 120 mm at one end to one piece of flexible or rigid material, 25 mm × 185 mm, with the unbonded portions of each member being face to face;

b) Test at least 3 test specimens to evaluate the average peel strength from each side that is, top and bottom side of ACP stripes; and

c) Discard any specimen whose test result is out of line due to some obvious flaw and retest.



All Dimension in millimeters.

FIG. 1 TEST SPECIMEN

D-3 PREPARATION OF TEST SPECIMEN

It is recommended that specimens be cut from bonded panels approximately 152.4 mm in width as shown in Fig. 1(B), so that five standard 25 mm wide specimens are obtained from each panel.

D-4 CONDITIONING

Special conditioning procedures may be used by agreement between the purchaser and the manufacturer, if required.

D-5 PROCEDURE

Separate the free end of the 25 mm wide flexible member by hand from the other member for a distance of about 185 mm. Place the specimen in the testing machine by clamping the free end in one grip, turning back the free end of the flexible member and clamping it in the other grip as shown in Fig. 2.

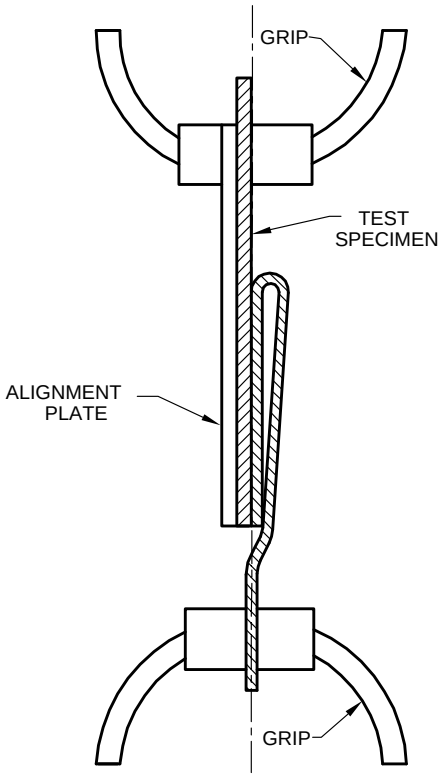


FIG. 2 SPECIMEN UNDER TEST

Maintain the specimen during the test approximately in the plane of the clamps. This may be done by holding the specimen against an alignment plate (Fig. 2) attached to the stationary clamp. In this case, take into account the added weight in determining the load causing separation. Grip the 25 mm wide flexible member symmetrically and firmly without twisting in the power-actuated clamp. Adjust the autographic mechanism and chart to zero and start the machine. Strip the separating member from the specimen approximately at an angle of 180° and continue the separation for a sufficient distance to indicate the peel or stripping value. Peel at least one half of the bonded area, even though a peel or stripping value may be indicated before this point.

D-6 CALCULATION

Determine the actual peel or stripping strength by drawing on the autographic chart the best average load line that will accommodate the recorded curve. Report the load so indicated, corrected for any tare weight which may have been used with the specimen as described in sec 5 expressed in kilograms per millimetre of width for separation at 305 mm/min, as the peel or stripping strength for the particular specimen under test. For each series of tests, calculate the arithmetic mean of all the values, obtained and report as the average value.

D-7 REPORT

Report the following:

a) Complete identification of the adhesive film and specimen tested, including types, source, manufacturer's code numbers, form, etc;

b) Method of preparing test specimens;

c) Conditioning procedure used, if any;

d) Testing room conditions;

e) Number of specimens tested;

f) Speed of testing;

g) Average value of peel or stripping strength;

h) Maximum and minimum strength values of the series;

j) Individual test values, individual autographic charts and other statistical data requested by the purchaser; and

k) Type of failure, if any.

ANNEX E

[*Table* 3, *Sl No.* (v), *col* (7)]

CHALK RESISTANCE

E-1 DEFINITION

Chalking is the formation of a friable powder on a pigmented paint coating evolved from the paint film itself at or just beneath the paint coating surface.

E-2 PROCEDURE

The test methods described below mention the procedures recommended for transferring the chalk to a fabric or fingertip, which is then compared to photographic reference standards to determine the degree of chalking.

E-2.1 Test Method A — Cloth Tape Method

E-2.1.1 *Material*

Fabric, as agreed upon between the producer, user, or other interested parties, to rub against the surface being tested. Black (or white for dark coatings) wool felt, velvet, and velveteen have proven particularly effective.

E-2.1.2 *Procedure*

Wrap the fabric around the index fingertip, then make a 50 mm to 75 mm stroke with medium pressure* on the coating under observation. Remove the fabric and compare the spot of chalk on it with photographic reference for cloth tape as shown in Fig. 3.

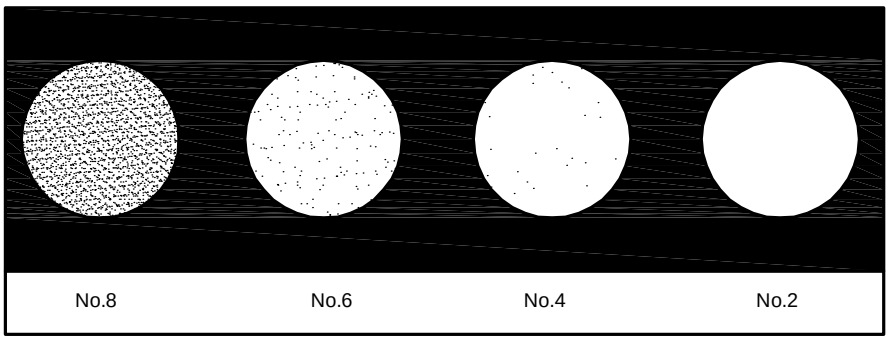


FIG. 3 PHOTOGRAPHIC REFERENCE FOR CLOTH TAPE

E-2.2 Test Method B — Wet Finger Method

E-2.2.1 *Procedure*

Moisten a fingertip and with medium pressure make one continuous rub 50 mm to 65 mm in length on the surface under test. The chalk from this test method should be rated as none, visible, or severe; however, some may prefer to use an even numbered scale of ten to zero.

The numerical rating for the determination of chalking, consisting of a photograph of five strips of tape mounted on a black background, numbered 0, 2, 4, 6, and 8, and varying in this order from black to almost white on the photographic reference as shown in Fig. 4.

*Medium pressure can be quantified by placing the finger on a balance or scale, and pressing downward until 1.5 kg to 2 kg pressure is obtained.

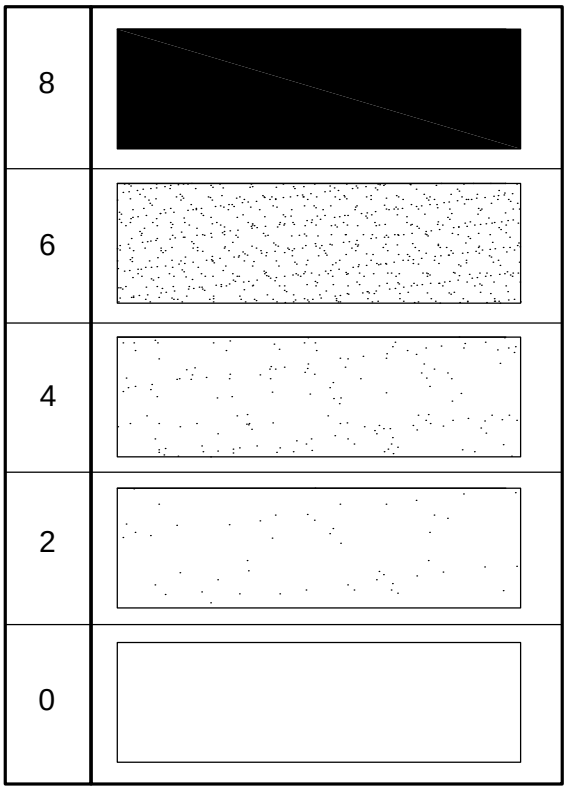


FIG. 4 NUMERICAL RATING PHOTOGRAPHIC REFERENCE

E-3 REPORT

A record of the test method used, the rating, and other pertinent information must be clearly shown on the inspection report for each evaluation.

The pertinent information should include:

a) date of inspection;
b) date of exposure start;
c) duration;
d) name of the person conducting the inspection; and
e) other information agreed upon between the manufacturing and the seller.

ANNEX F

[*Table* 3, *Sl No.* (vi), *col* (7)]

CHEMICAL RESISTANCE

F-1 This test method covers determination of the effect of chemicals on clear and pigmented organic finishes (that is, paint coatings), resulting in any objectionable alteration in the surface, such as discoloration, change in gloss, blistering, softening, swelling, loss of adhesion, or special phenomena.

F-2 TESTING SAMPLES/TEST PANELS

Take paint coated aluminium panels of A5 size (that is; 148 mm × 210 mm) from the actual paint coated aluminium coil which has to be tested for chemical resistance property.

F-3 TEST METHOD/PROCEDURE

F-3.1 PVDF and FEVE Paints — 2 Coats or 3 Coats

F-3.1.1 5 *Percent HCl* (24 *h*)

Apply 3 to 4 drops of 5 percent solution of HCl on the paint coated surface of the test panel being tested. Cover it with a watch glass, convex side up. The acid solution and test shall be conducted at 18 °C to 27 °C (65 °F to 80 °F). After a 24 h exposure, rinse the sample with tap water, wipe it dry with the help of a tissue paper or clean cloth or cotton. Now, take observations of the panel and the observations shall satisfy performance criteria as given in Table 3.

NOTE — For preparation of 5 percent solution of HCl; mix 5 ml of 37 percent commercial or LR grade hydrochloric acid with 95 ml of distilled water in a glass beaker of 250 ml capacity. Mix it properly to make 100 ml solution.

F-3.1.2 20 *Percent NaOH* (18 *h*)

Apply 3 to 4 drops of 20 percent solution of NaOH on the paint coated surface of the test panel being tested. Cover it with a watch glass, convex side up. The alkali solution and test shall be conducted at 18 °C to 27 °C (65 °F to 80 °F). After a 18 h exposure, rinse the sample with tap water, wipe it dry with the help of a tissue paper or clean cloth or cotton. Now, take observations of the panel and the observations shall satisfy performance criteria as given in Table 3.

NOTE — For preparation of 20 percent solution of NaOH; mix 20 gm commercial or LR grade sodium hydroxide pellets or flakes with 80 gm of distilled water in a glass beaker of 250 ml capacity. Mix it properly to make 100 gm solution.

F-3.1.3 70 *Percent* HNO_3 (*Nitric Acid*) (30 *Min*)

Fill an eight-ounce wide-mouth bottle one-half full of nitric acid, 70 percent ACS reagent grade[(1)]. Place the test panel completely over the mouth of the bottle painted side down, for 30 min. Rinse the sample with tap water, wipe it dry, and measure any color change after a one-hour recovery period. It shall satisfy performance criteria as given in Table 3.

F-3.1.4 *Mortar, Pat Test* (24 *h*)

Prepare mortar by mixing 75 g of building lime (conforming to IS 712) and 225 g of dry sand, both passing through a 10-mesh wire screen with sufficient water, approximately 100 g, to make a soft paste. Immediately apply wet pats of mortar about 2 500 mm^2 in area and 12 mm in thickness to coated aluminum specimens which have been aged at least 24 h after coating. Immediately expose test sections for 24 h to 100 percent relative humidity at 38 °C. It shall satisfy performance criteria as given in Table 3.

F-3.1.5 *Detergent* 3 *Percent Solution* (*at* 38 ºC *for* 72 *h*)

Prepare a 3 percent (by weight) solution of detergent as prescribed below and distilled water. Immerse at least two test specimens in the detergent solution at 38 °C for 72 h. Remove and wipe the samples dry. Immediately apply tape (permacel 99 or equivalent) 20 mm wide by pressing down firmly against the coating to eliminate voids and air pockets. Place the tape longitudinally along the entire length of the test specimens. If blisters are visible, then the blistered area must be taped and rated. Sharply pull off at a right angle to the plane of the surface being tested. A typical detergent composition is as follows:

Sl No.	*Detergent Composition*	*Parts by Weight*
(1)	(2)	(3)
i)	Tetrasodium pyrophosphate ($Na_4P_2O_7$), anhydrous	53.0
ii)	Sodium sulfate (Na_2SO_4), anhydrous	19.0

[(1)]The assay of the nitric acid (HNO_3) should be minimum 69.0 percent, maximum 71.0 percent.

Table (*Concluded*)

Sl No.	*Detergent Composition*	*Parts by Weight*
(1)	(2)	(3)
iii)	Sodium metasilicate (Na_2SiO_3), anhydrous	7.0
iv)	Sodium carbonate (Na_2CO_3), anhydrous	1.0
v)	Sodium salt of a linear alkylarylsulfonate (90 percent flake grade)	20.0
	Total	100.0

It shall satisfy performance criteria as given in Table 3.

F-3.2 SDP Paints — 2 Coats or 3 Coats

F-3.2.1 2 *Percent HCl* (24 *h*)

Apply 3 to 4 drops of 2 percent solution of HCl on the paint coated surface of the test panel being tested. Cover it with a watch glass, convex side up. The acid solution and test shall be conducted at 18 °C to 27 °C. After a 24 h exposure, rinse the sample with tap water, wipe it dry with the help of a tissue paper or clean cloth or cotton. Now, take observations of the panel and the observations shall satisfy performance criteria as given in Table 3.

NOTE — For preparation of 2 percent solution of HCl; mix 2 ml of 37 percent commercial or LR grade hydrochloric acid with 98 ml of distilled water in a glass beaker of 250 ml capacity. Mix it properly to make 100 ml solution.

F-3.2.2 2 *Percent NaOH* (24 *h*)

Apply 3 to 4 drops of 2 percent solution of NaOH on the paint coated surface of the test panel being tested. Cover it with a watch glass, convex side up. The alkali solution and test shall be conducted at 18 °C to 27 °C. After a 24 h exposure, rinse the sample with tap water, wipe it dry with the help of a tissue paper or clean cloth or cotton. Now, take observations of the panel and the observations shall satisfy performance criteria as given in Table 3.

NOTE — For preparation of 2 percent solution of NaOH; mix 2 gm commercial or LR grade sodium hydroxide pellets or flakes with 98 g of distilled water in a glass beaker of 250 ml capacity. Mix it properly to make 100 g solution.

F-3.2.3 *Mortar, Pat Test* (24 *h*)

Prepare mortar by mixing 75 g of building lime (conforming to IS 712) and 225 g of dry sand, both passing through a 10 mesh wire screen with sufficient water, approximately 100 g to make a soft paste. Immediately apply wet pats of mortar about 2500 mm^2 in area and 12 mm in thickness to coated aluminum specimens which have been aged at least 24 h after coating. Immediately expose test sections for 24 h to 100 percent relative humidity at 38 °C. It shall satisfy performance criteria as given in Table 3.

F-3.2.4 *Detergent* 3 *Percent Solution* (*at* 38 °C *for* 72 h)

Prepare a 3 percent (by weight) solution of detergent as prescribed below and distilled water. Immerse at least two test specimens in the detergent solution at 38 °C (100 °F) for 72 h. Remove and wipe the samples dry. Immediately apply tape (permacel 99 or equivalent) 20 mm (3/4 in) wide by pressing down firmly against the coating to eliminate voids and air pockets. Place the tape longitudinally along the entire length of the test specimens. If blisters are visible, then the blistered area must be taped and rated. Sharply pull off at a right angle to the plane of the surface being tested. A typical detergent composition is as follows:

Sl No.	*Detergent Composition*	*Parts by Weight*
(1)	(2)	(3)
i)	Tetrasodium pyrophosphate ($Na_4P_2O_7$), anhydrous	53.0
ii)	Sodium sulfate (Na_2SO_4), anhydrous	19.0

Table (*Concluded*)

Sl No.	*Detergent Composition*	*Parts by Weight*
(1)	(2)	(3)
iii)	Sodium metasilicate (Na_2SiO_3), anhydrous	7.0
iv)	Sodium carbonate (Na_2CO_3), anhydrous	1.0
v)	Sodium salt of a linear alkylarylsulfonate (90 percent flake grade)	20.0
	Total	100.0

It shall satisfy performance criteria as given in Table 3.

(*Page* 7, *Annex* D, *title*) — Substitute 'ANNEX G' *for* 'ANNEX D'.

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