भारतीय मानक **IS 6307 : 2023**

Indian Standard

अनम्य पीवीसी शीट — विशिष्टि

(दूसरा पुनरीक्षण)

Rigid PVC Sheets — Specification

(Second Revision)

ICS 83.080.20

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

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Plastics Sectional Committee, PCD 12

FOREWORD

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

Rigid PVC sheet is versatile material put to wide range of uses. General purpose rigid PVC sheets are used in display and advertising. Chemically resistant type is finding application in chemical plants for tanks, tank lining, ducting, etc. High impact sheets are used in helmets, aircraft map cues, parachute boxes, penciling, etc. Vacuum forming type is used for domestic and industrial trays, trays for developing photographs, refrigerator door panels, etc.

This standard was first published in 1971 and further revised in 1985. In this revision, the following major changes have been incorporated:

a) Range of thickness of sheet has been modified to 24.00 mm;
b) Cross-referred standards have been updated; and
c) Editorial changes.

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

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

RIGID PVC SHEETS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for rigid PVC sheets of 0.10 mm to 24.00 mm in thickness, manufactured by calendaring, extrusion or calendaring followed by lamination.

2 REFERENCES

The standards given below contain provisions which, through reference in this standard, 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:

IS No.	*Title*
IS 2828 : 2019/ ISO 472 : 2013	Plastics — Vocabulary (*second revision*)
IS 4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 2828 and the following shall apply.

3.2 Rigid PVC Sheet — The sheet produced by extrusion or calendering (subsequently laminated wherever necessary to get required thickness) and consisting of polyvinyl chloride, and/or a copolymer of which the major constituent is vinyl chloride, suitably compounded with other ingredients.

4 TYPES

Rigid PVC sheet may be transparent to opaque, colourless or coloured. The material shall be classified into three types as given below:

a) *Type* l — General purpose;
b) *Type* 2 — With specified impact strength; and
c) *Type* 3 — Suitable for deep draw vacuum forming.

5 REQUIREMENTS

5.1 Appearance

The sheet shall be uniform in colour and finish, transparent or opaque unless specified otherwise by the purchaser, and shall be reasonably free from detrimental scratches, creases, streaks, pinholes, dents, pimples and inclusions.

5.2 Thickness

5.2.1 The thickness of the sheet at any point shall be within the tolerance given in Table 1.

5.2.2 The thickness of plain sheet shall be measured with a micrometer. In case of dispute, it shall however, be measured gravimetrically up to nominal thickness of 0.24 mm as prescribed in Annex A.

5.3 Length and Width

The length and width of rectangular sheets shall be within the tolerance $\frac{-0}{+5}$ mm of the nominal size. For other shapes, the tolerances on linear dimensions shall be as agreed to between the purchaser and the supplier.

5.4 Squareness

Cut sheets shall not deviate more than 10 mm from a true rectangle of the same dimensions.

5.5 The sheet shall also comply with the requirement given in Table 2.

5.6 Delamination (for Calendered and Laminated Sheet)

The material shall show no signs of delamination when tested in accordance with Annex F.

5.7 Horizontal Burning Characteristics

If agreed to between the purchaser and the supplier, rigid PVC sheets shall also be tested for horizontal burning characteristics according to the test method prescribed in Annex G.

NOTE — The test method described in Annex G is used primarily for the purpose of monitoring the consistency of production of the PVC sheet. Its use gives an indication of a suitable formulation which influences the performance of a test specimen as measured by this method. In no circumstances shall the test results thus obtained be considered an overall indication of the potential fire hazards presented by PVC sheet under the actual conditions of use.

6 PACKING AND MARKING

6.1 Packing

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

6.1.2 The rigid PVC sheet shall be stacked horizontally on clean, firm and level ground and in accordance with the manufacturer's instructions. On uneven grounds timber planks should be used. It is advisable to stack sheets not exceeding 25 cm in height. Care should be exercised while handling the sheets, particularly in cold conditions when rigid PVC sheet has a reduced impact strength.

6.2 Marking

6.2.1 The material shall be marked with the following information:

a) Name of the manufacturer and trademark, if any;
b) Type of the material;
c) Methods of manufacture (extruded, calendered or calendered and laminated);
d) Lot number and date of manufacture; and
e) Any other statutory requirements.

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 thereunder, and the products may be marked with the Standard Mark.

7 SAMPLING

Representative samples of the material shall be drawn as prescribed in Annex H.

Table 1 Tolerance on Nominal Thickness

(*Clause* 5.2)

Sl No.	Nominal Thickness, (in mm)	Tolerance on Nominal Thickness, (in percent)		
		Extruded	Calendered	Calender and laminated
(1)	(2)	(3)	(4)	(5)
i)	0.10 to 0.24	± 20	± 12	—
ii)	0.25 to 0.49	± 15	± 10	—
iii)	0.50 to 0.74	± 12	± 10	—
iv)	0.75 to 1.24	± 10	—	± 20
v)	1.25 to 1.49	± 10	—	± 18
vi)	1.50 to 1.99	± 10	—	± 18
vii)	2.00 to 4.99	± 10	—	± 15
viii)	5.00 to 9.99	± 10	—	± 10
ix)	10.00 to 24.00	± 10	—	± 10

Table 2 Requirements for Rigid PVC Sheet

(*Clause* 5.5)

Sl No.	Characteristic	Requirement			Method of Test, Ref to
		Type 1	Type 2	Type 3	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Vicat softening temperature, °C, *Min*	75	65	50	B
ii)	Impact strength, number of failures		No failure		C
iii)	Tensile stress at yield, kg/cm^2, *Min*	450	380	380	D
iv)	Dimensional change at 120 °C, percent, *Max*				
	a) Extruded or calendered	20	20	*	E
	b) Calendered and laminated	5	5	15	

* Limits shall be as agreed between the purchaser and the supplier.

ANNEX A

(*Clause* 5.2.2)

DETERMINATION OF GRAVIMETRIC THICKNESS

A-1 PROCEDURE

A-1.1 Cut out three samples, each about 20 cm^2 to 25 cm^2 in area and weigh them in air. Take a non-absorbent thread/wire and suspend the sample by the thread/wire and weigh under water maintained at 27 °C ± 2 °C. Weigh the thread or wire alone under water maintained at 27 °C ± 2 ºC (the depth of immersion in water in the two weighing being exactly the same).

NOTE — All weighing shall be accurate to 1 percent of the mass.

Calculate the relative density (*S*) as below:

$$\text{Relative density } (S) = \frac{A}{A-(C-B)}$$

where

A = mass, in g, of the test piece in air;
C = mass, in g, of the test piece and thread or wire in water; and
B = mass, in g, of the thread or wire in water.

The average of the three results expressed to the nearest 0.01 shall be taken as the relative density.

A-1.2 Three square test pieces, each having an area of at least 25 $cm^2 \pm 1$ cm^2 and all of exactly the same length and width shall be cut from positions approximately equally spaced across the width of the sample at two places, about 1 m apart in longitudinal direction. Weigh the test pieces and calculate the average mass (*M*).

A-1.3 Calculation

A-1.3.1 Calculate the average gravimetric thickness to the nearest 0·002 5 mm as below:

$$\text{Average gravimetric thickness, in mm} = \frac{10\,M}{S \times L \times B}$$

where

M = average mass in g of the test piece;
S = relative density as determined in **A-1.1.1**;
L = length, in cm, of the test piece; and
B = width, in cm, of the test piece.

A-1.3.2 From the value of average gravimetric thickness obtained in **A-1.3.1**, calculate the percent difference from the nominal thickness of the material.

ANNEX B

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

DETERMINATION OF VICAT SOFTENING TEMPERATURE

B-1 GENERAL

B-1.1 Determination of the temperature at which a standard indenter penetrates 1 mm into the surface of a plastics test specimen under a test load of 5 kg. During test, the temperature is raised at a uniform rate.

B-1.2 The temperature at 1 mm penetration is quoted as the vicat softening temperature (VST) in degrees celsius.

B-2 APPARATUS

B-2.1 Rod — provided with a load-carrying plate, held in a rigid metal frame so that it can move freely in the vertical direction, the base of the frame serving to support the test specimen under the indenting tip at the end of the rod (*see* Fig. 1).

B-2.2 Indenting Tip — preferably of hardened steel, 3 mm long, of circular cross section, and area 1.000 $mm^2 \pm 0.015$ mm^2, fixed at the bottom of the rod. The lower surface of the indenting tip shall be plane and perpendicular to the axis of the rod and free from burrs.

B-2.3 Micrometer Dial Gauge — graduated in divisions of 0.01 mm, to ensure the penetration of the indenting tip into the test specimen. The thrust of the dial gauge, which contributes to the thrust on the test specimen, shall be known and shall comply with the requirements of **B-2.4**.

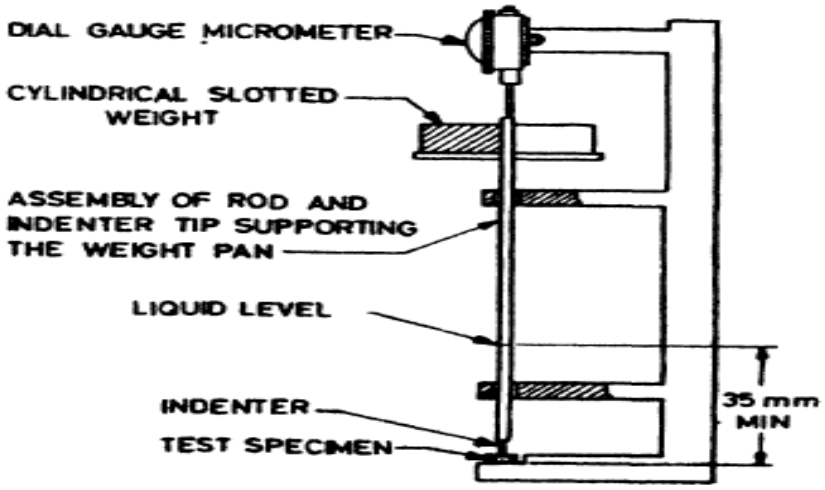


FIG. 1 SCHEMATIC DIAGRAM OF APPARATUS FOR DETERMINATION OF THE VICAT SOFTENING TEMPERATURE

B-2.4 Load-Carrying Plate — fitted to the rod, and suitable weights adjusted centrally so that the total thrust applied to the test specimen can be made up to between 49.05 N (5 000 gf) and 49.54 N (5 050 gf). The combined masses of the rod, indenting tip and load carrying plate shall not exceed 100 g.

NOTE — The construction of the apparatus shall be such that the micrometer dial gauge reading caused by differential thermal expansion over the intended temperature range does not exceed 0·02 mm when the test specimen is replaced by a piece of borosilicate glass or low thermal expansion alloy steel. It is recommended that the apparatus be constructed of low thermal expansion alloy.

B-2.5 Heating Bath — containing a suitable liquid (*see* Notes l and 2) in which the apparatus is placed so that the specimen is at least 35 mm below the surface of the liquid. An efficient stirrer shall be provided. The heating bath shall be equipped with a means of control so that the temperature can be raised at a uniform rate of 50 °C/h ± 5 °C/h *see* Note 3. This heating rate shall be considered to be met if, over every 5 min interval during the test, the temperature change is within the specified limits.

NOTES

1 Liquid paraffin, transformer oil, glycerol and silicone oil may be suitable liquid heat transfer media, but other liquids may be used. ln all cases, it shall be established that the liquid chosen is stable at the temperature used and does not affect the material under test.

2 If no suitable liquid can be found for use as a heat transfer medium (as defined in Note 1), some different heating arrangement for which air may be found to be a suitable heat transfer medium, shall be used. If air is used as the heat transfer medium, it should be noted that errors in the quoted softening point may arise unless care is taken to correct for possible differences in temperature between the air and the specimen.

3 A uniform rate of temperature rise can he obtained by controlling the heat input either manually or automatically, although the latter is strongly recommended. One method of operation found to be satisfactory is to provide an immersion heater adjusted to give the correct rate of temperature rise at the starting temperature of the test, and then to increase the power input (either in the same heater or in a subsidiary heater) by adjustment of a rheostat or variable transformer.

4 It is desirable to have a cooling coil in the liquid bath in order to reduce the time required to lower the temperature between determination. This must be removed or drained before starting a test as boiling of coolant can affect the rate of temperature rise.

B-2.6 Thermometer (or Other Accurate Temperature Measuring Device) — of appropriate range, and with graduations at least at each 0.5 ºC. The scale error at any reading shall not exceed 0·5 °C.

B-3 TEST SPECIMENS

B-3.1 Two test specimens shall be used for each sample. The test specimen shall be at least 10 mm × 10 mm and of thickness equal to the thickness of sheet. The surfaces shall be flat at and parallel.

NOTES

1 If the thickness of sheet exceeds 6 mm, the test specimen shall be reduced in thickness to approximately 3 mm by machining one surface, the other being left intact.

2 If the thickness of sheet is less than 3 mm, not more than 3 pieces shall be stacked together to give a total thickness of 3 mm to 6 mm.

The test specimens shall be conditioned at 27 ºC ± 2 ºC and at relative humidity at (65 ± 5) percent for 24 h prior to testing.

B-4 PROCEDURE

B-4.1 The schematic arrangement of the apparatus is given in Fig. 1.

B-4.2 Mount the test specimen horizontally under the indenting tip of the unloaded rod. The indenting tip shall at no point be nearer to the edge of the test specimen than 3 mm. The surface of the test specimen in contact with the base of the apparatus shall be flat. Immerse the assembly in the heating bath, the temperature of which shall be constant and at least 50° below the expected softening temperature of the material (*see* Note 4 under **B-2.5**). The bulb of the thermometer shall be at the same level and as close as possible to the test specimen. After 5 min with the indenting tip still in position, note the reading of the micrometer dial gauge or set the micrometer to zero. Then add the weight to the load-carrying plate so that the totalthrust on the test specimen is between 49.05 N (5 000 gf) and 49.54 N (5 050 gf). Raise the temperature of the bath at a uniform rate of 50 ºC/h ± 5 ºC/h. Stir the liquid well during the test. Note the temperature of the bath at which the indenting tip has penetrated into the test specimen by 1.00 mm beyond its starting position defined above and record it as the VST of the test specimen.

B-4.2.1 Express the VST of the material under test as the arithmetic mean of the VST's of two test specimens. If the individual results differ by more than 2 °C, the test is invalid and a repeat test shall be carried out.

ANNEX C

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

DETERMINATION OF IMPACT STRENGTH

C-1 GENERAL

The impact strength is determined using a falling weight machine. This method is intended for sheet not less than 1 mm thick.

C-2 TEST SPECIMEN

C-2.1 A specimen either in the form of a disc 60 mm ± 3 mm diameter or a square of 60 mm ± 3 mm side shall be used. The thickness of the specimen shall be the thickness of the sheet under test.

C-2.2 Twenty specimens shall be used.

C-3 APPARATUS

C-3.1 A falling weight machine shall be used and shall consist essentially of the following (*see* Fig. 2):

a) A heavy rigid base fitted with levelling screws.

b) A specimen support in the shape of a hollow steel cylinder of internal diameter 50.0 mm ± 0.05 mm, external diameter of not less than 56 mm and height not less than 25 mm. The support shall be so fixed to the base that its axis coincides with the line of fall of the striker. A soft shock-absorbing disc approximately 6 mm thick shall be placed inside the cylinder and resting on the base.

c) A rigid superstructure to carry the release mechanism and the guide for the striker.

d) A striker consisting of a hardened steel ball, 12.5 mm ± 0.05 mm diameter, rigidly attached to a weight carrier which falls freely in the guides and providing a hemispherical striking surface, which shall be free from flats or any other imperfection.

e) A plumb line or any other device for ensuring that the striker is directly above the center of the specimen support.

f) The weights for attachment to the striker shall be such that the combined weight in kilograms of weights and striker can be adjusted to a value equal to 0.3 times the thickness of the sheet in millimeters. These weights shall be such that increment of 100 g can be made.

g) The height of the apparatus shall be such that the striker can fall 1 825 mm ± 25 mm to the surface of the specimen with the help of a release mechanism.

NOTE — The striker may fall between guides or without guides, but in either case the point of impact of the striker with the specimen shall be not more than 2.5 mm from the axis of specimen support. If guides are used, the fall shall be substantially without friction. If guides are not used and the striker is supported electromagnetically, the magnetic flux shall be reduced to the minimum necessary to support the loaded striker. The machine shall be fitted on a rigid foundation.

C-4 PROCEDURE

C-4.1 The conditioning shall be done at 27 °C ± 2 °C for at least 3 h but the actual testing may he carried out at ambient temperature within one minute of removing the specimen from the conditioning chamber.

C-4.2 The combined weight of the striker and the weights to the nearest 100 g shall be calculated from the following equation:

Total mass, in kg = 0.3 × (nominal thickness of sheet in mm)

C-4.3 The specimen shall be placed centrally on the specimen support, and the release mechanism operated so that the striker falls on the specimen from a height of 1 825 mm ± 25 mm. If any specimen is broken or show a crack or tear extending from one surface to the other, it shall be recorded as a failure.

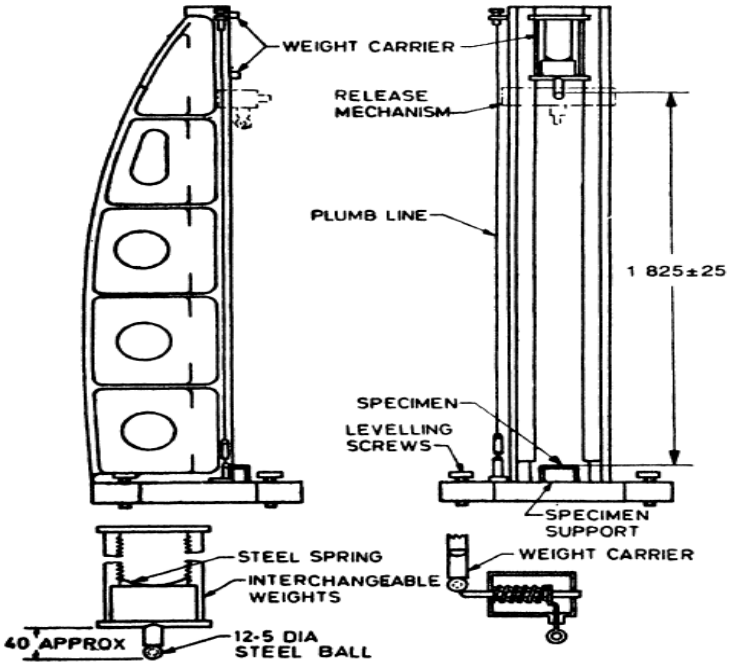


FIG. 2 FALLING WEIGHT MACHINE

ANNEX D

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

DETERMINATION OF TENSILE STRESS AT YIELD

D-1 GENERAL

The tensile stress at yield is determined using dumb-bell specimens cut from the rigid PVC sheets in a tensile tester.

D-2 TEST SPECIMENS

The specimens shall be cut by any appropriate means from the sheet under test in the form and dimensions shown in Fig. 3. The thickness of the specimen shall be the thickness of the sheet under test. Cut edges shall be smooth. Five specimens shall be tested.

D-3 PROCEDURE

The specimen shall be kept at 27 ºC ± 2 ºC for not less than three hours before testing and the test shall be carried out at 27 ºC ± 2 ºC. The specimen shall be gripped at its widened ends and shall be mounted in the tensile testing machine in axial alignment with the direction of pull. It shall be loaded by separating the grips at a substantially constant rate of 20 mm ± 2 mm per minute, until it breaks. The range of testing machine being such that the maximum load falls between 15 percent and 85 percent of the maximum scale reading. The load at yield, that is, the first load that remains constant or decreases with

increase in elongation or the specimen shall be recorded.

D-4 CALCULATION

The tensile stress at yield shall be calculated from the load at yield and the original area of cross-section and shall be expressed at in kg/cm^2.

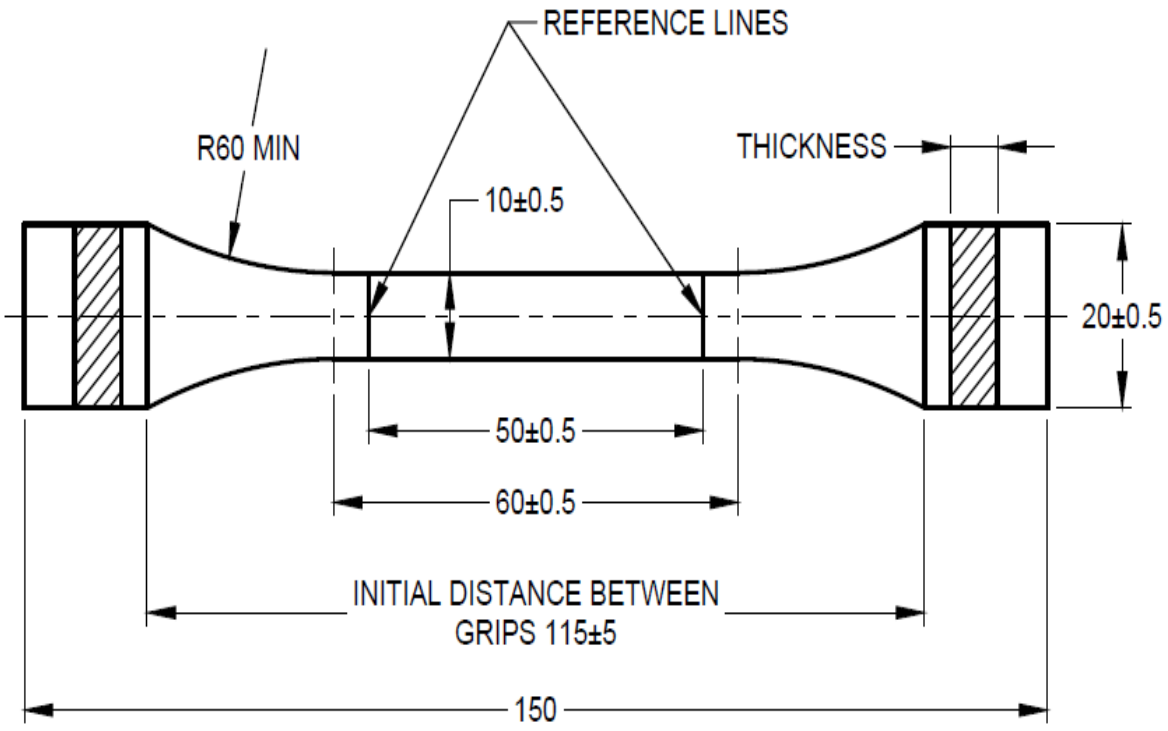


FIG. 3 TEST PIECE

ANNEX E

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

DETERMINATION OF DIMENSIONAL CHANGE AT 120 °C

E-1 GENERAL

E-1.1 Outline of the Method

A circle of diameter 250 mm is scribed on a square test piece selecting an approximate center. Then the sheet is kept in an oven in a suitable assembly at 120 °C ± 2 °C for the specified time. At the end of this period the sample is removed from oven, cooled to room temperature. Another circle of diameter 250 mm using the same center is scribed and maximum decrease from original diameter is measured.

E-2 TEST SPECIMEN

The specimen shall be a square with about 30 cm sides cut from the sheet.

E-3 PROCEDURE

E-3.1 The approximate centre of one face of the specimen shall be determined and this point shall be used as a center for scribing a 250.00 mm ± 0.25 mm diameter circle, the material being at room temperature. A glass plate at least 350 mm square, covered with a fabric or suitable material offering minimum resistance to any movement of the sheet that may occur, is used to prepare the assembly. The assembly shall be heated in an air-oven maintained at 120 °C ± 2 °C for a minimum time of 30 min. The specimen shall then be placed on the assembly in the oven and shall remain there for a time depending on the thickness of the sheet as follows:

E-3.2 The assembly shall be removed from the oven and allowed to cool to room temperature. Further, 250.00 mm ± 0.25 mm circle with the same center as before shall be scribed on the specimen and the maximum decrease from the original diameter of the circle shall be measured to the nearest 0.25 mm.

E-4. CALCULATION

Change in dimension , percent = $\frac{D_1 - D_2}{D_1} \times 100$

where

D_1 = original diameter; and
D_2 = diameter after oven treatment.

Sl No.	*Nominal Thickness* (mm)	*Heating Time* (in min)
(1)	(2)	(3)
i)	Up to 0.24	5 ± 1
ii)	0.25 to 1.49	10 ± 1
iii)	1.50 to 2.99	20 ± 1
iv)	3.00 to 6.49	30 ± 1
v)	6.50 to 24.0	45 ± 1

ANNEX F

(*Clause* 5.6)

DETERMINATION OF RESISTANCE TO DELAMINATION

F-1 GENERAL

F-1.1 Outline of the Method

Two methods are described. Method A is to be followed for rigid PVC sheets of nominal thickness up to and including 3 mm and Method B for higher thickens. In Method A, the specimens are immersed in acetone for 2 h at room temperature and inspected for delamination. In Method B, the specimen fixed vertically in a vice is hammered sharp and examined for delamination.

F-2 METHOD A

F-2.1 Procedure

Place three 100 mm × 25 mm specimens in separate 400 ml beakers so that they are supported at an angle in the beaker, and the 25 mm edges rest on the bottom and side of the beaker. Totally immerse the specimen in acetone (pure grade) at room temperature and cover with watch glass. Maintain for 2 h and visually inspect for delamination or disintegration.

F-2.2 Report

The material shall be deemed to have passed the test if there is no disintegration of the components as evidenced by curling of delaminated sections or separation into granular component. Swelling or softening or both shall not be deemed to be a cause for failure.

F-3 METHOD B

F-3.1 Test Specimen

The specimen shall be 150 mm long, 25 mm wide and the thickness of the sheet under test but more than 3 mm. It shall be cut from the edge of the sheet with its length parallel to the edge of the sheet.

F-3.2 Apparatus — A vice mounted on a rigid base for holding the specimen, a light hammer or mallet and a wedge having the dimensions shown in Fig. 4.

F-3.3 Procedure

The specimen shall be clamped vertically in the vice so that 150 mm edge is horizontal. This edge shall be at least 15 mm above the jaws of the vice. The wedge with its edge parallel with the panel of the lamination shall be placed on the edge of the specimen and shall be struck with a sharp blow with the hammer or mallet. This shall be repeated at five points across the thickness of the specimen, these points being staggered along the edge.

F-3.4 Report

The specimen shall be deemed to have failed if in any one impact, delamination occurs.

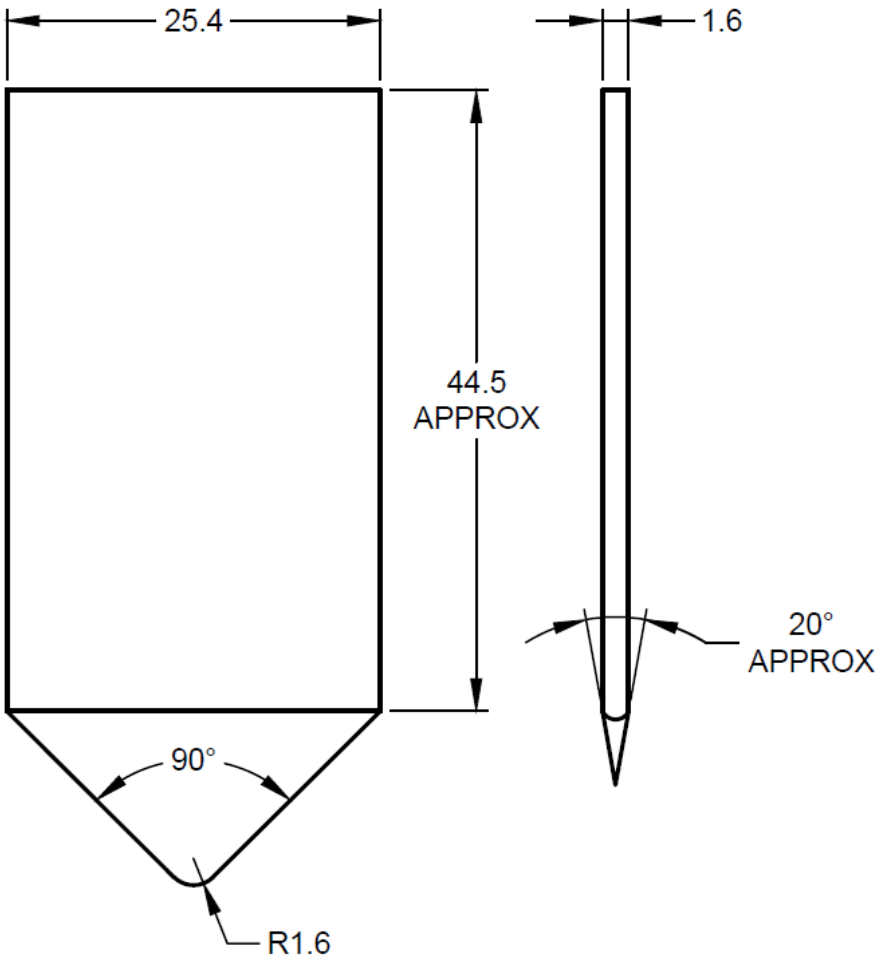


FIG. 4 TEST WEDGE

ANNEX G

(*Clause* 5.7)

TEST FOR HORIZONTAL BURNING CHARACTERISTICS

G-1 OUTLINE OF THE METHOD

The sheet is held horizontally with its transverse axis at an angle of 45° to horizontal. The flame is applied for a short time to the free end of the sheet and after its removal, the time taken for the flame of the burning specimen to travel a distance of 100 mm is measured.

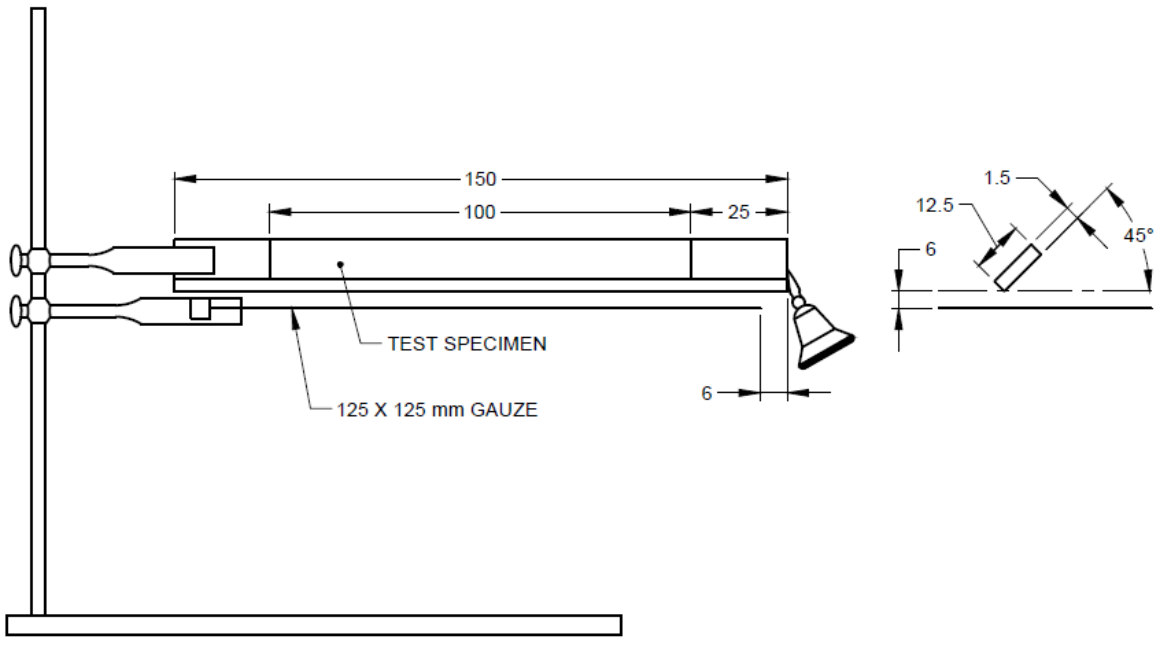
G-2 TEST SPECIMEN

The specimen shall be 150 mm long, 13 mm wide and 1.5 mm ± 0.1 mm thick. Two lines shall be drawn across the specimen, one at 25 mm and the other at 125 mm from one end. Three specimens shall be used.

G-3 PROCEDURE

G-3.1 The specimen shall be tested in a draught free atmosphere. It shall be clamped in a rigid support at one end so that its longitudinal axis and its transverse axis is at 45° to the horizontal and so that both lines on the specimen are clearly visible.

G-3.2 A piece of clean wire gauge, 7 meshes per linear centimeter, 130 mm square shall be clamped in a horizontal position 6 mm below the specimen with 6 mm of the unsupported end of the specimen projecting beyond the edge of the gauge as shown in Fig. 5. An alcohol lamp or bunsen burner with a non-luminous flame 13 mm to 19 mm in height shall be placed under the free end of the specimen so that the top of the flame just touches it. The flame shall be removed after 10 s and the specimen allowed to burn. Record by stopwatch separately, the time during which flaming and afterglow continues.



All dimensions in millimetres.

FIG. 5 SPECIMEN UNDER TEST FOR RATE OF BURNING

ANNEX H

(*Clause* 7.1)

SAMPLING OF RIGID PVC SHEETS

H-l SCALE OF SAMPLING

H-1.1 Lot

In any consignment, all sheets of the same type and thickness manufactured under relatively similar conditions of production shall be grouped together to constitute a lot.

Each lot shall be sampled separately for ascertaining its conformity to the requirements of this specification.

H-1.2 Scale of Sampling

The number of sheets to be selected from a lot shall depend upon the lot size and shall be in accordance with col (2) and (3) of Table 3.

Sheets shall be selected at random from the lot. In order to ensure the randomness of selection, a random number table shall be used. For guidance and use of random number table, IS 4905 may be referred. In the absence of a random number table, the following procedure may be adopted:

Starting from any sheet in the lot, count them in one order at l, 2, 3, ..., up to *r* and so on where *r* is an integral part of *N/n, N* and *n* being the lot size and sample size respectively. Every r^{th} sheet so counted shall be withdrawn so as to constitute a required sample size.

H-2 NUMBER OF TESTS

H-2.1 All the sheets selected as prescribed in col (3) of Table 3 shall be inspected for appearance, thickness, length and width and squareness. Any sheet which is unsatisfactory in one or more of these requirements shall be considered defective.

H-2.2 For impact strength and tensile stress, the number of sheets to be tested is given in col (5) of Table 3. These sheets shall be selected from among those chosen under col (3) of Table 3.

H-2.3 For each of the remaining characteristics one test shall be conducted.

H-3 Criteria for Conformity

H-3.1 A lot shall be considered satisfactory with respect to appearance and dimensional characteristics if the number of defective sheets in the sample does not exceed the permissible number given in col (4) of Table 3.

H-3.2 The lot found satisfactory under **H-3.1** shall be examined for other characteristics. If all the test results obtained on testing the selected sheets as under **H-2.2** and **H-2.3**, satisfy the corresponding requirements given in **5**, the lot shall be deemed as conforming to the requirements of these characteristics.

H-3.3 If the sample fails in one or more tests, each such tests shall be repeated twice. For this purpose, two more samples shall be taken from the same rolls other than those from which the earlier sample had been drawn and the specimens cut from them so that duplicate tests may be conducted in respect of each failure. If all the specimens pass the duplicate test, the lot shall be declared conforming to the specification, otherwise not.

Table 3 Scale of Sampling and Premissible Number of Defectives

(*Clauses* H-1.2, H-2 *and* H-3)

Sl No.	**Lot Size** N	**Tolerance on Nominal Thickness, Percent**		
		Sample Size	Permissible No. of Defectives	Sample Size for Impact Strength and Tensile Stress
(1)	(2)	(3)	(4)	(5)
i)	1	1	0	1
ii)	2 to 25	2	0	1
iii)	26 to 50	3	0	2
iv)	51 to 100	5	0	2
v)	101 to 150	8	1	2
vi)	151 and above	10	1	3

ANNEX J

(*Foreword*)

COMMITTEE COMPOSITION

Plastics Sectional Committee, PCD 12

Organization	*Representative(s)*
Central Institute of Plastics Engineering & Technology (CIPET), Chennai	PROF (DR) SHISHIR SINHA **(*Chairperson*)**
All India Plastics Manufacturers Association (AIPMA), New Delhi	SHRI DEEPAK BALLANI
Central Pollution Control Board, New Delhi	MS DIVYA SINHA SHRI C. K. DIXIT (*Alternate*)
Chemical and Petrochemical Manufactures Association (CPMA), New Delhi	SHRI UDAY CHAND
Coca-Cola India Pvt Ltd, Gurugram	SHRI VIRENDRA LANDGE SHRI RAJENDRA DOBRIYAL (*Alternate*)
Consumer Association of India (CONCERT), Chennai	SHRI G. SANTHANARAJAN SHRI M. R. KRISHNAN (*Alternate*)
CSIR - Central Food Technological Research Institute (CFTRI), Mysore	SHRI R. S. MATCHE SHRI KESHAVA MURTHY. P. (*Alternate*)
CSIR - Indian Institute of Toxicological Research (IITR), Lucknow	DR V.P. SHARMA DR A.B. PANT (*Alternate*)
CSIR - National Chemical Laboratory (NCL), Pune	DR P. R. SURESHA DR R. V. GUNDLOORI (*Alternate* I) SHRIMATI SANGEETA HAMBIR (*Alternate* II)
Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, New Delhi	SHRI O. P. SHARMA SHRI VARUN SINGH POONIA (*Alternate*)
Food Corporation of India (FCI), Delhi	SHRI RAJAGOPAL. A SHRI A. K. U. B. SINGH (*Alternate*)
Food Safety and Standards Authority of India (FSSAI), New Delhi	SHRI CHIRAG GADI
GAIL (India) Ltd, Noida	SHRI MANISH KHANDELWAL
Haldia Petrochemicals Ltd, Kolkata	SHRI RAJ K. DATTA SHRI SUVOMOY GANGULY (*Alternate*)
HPCL Mittal Energy Limited, HMEL, Noida	SHRI VINEET KUMAR GUPTA SHRI ALAKESH GHOSH (*Alternate*)

Organization	*Representative(s)*
Huhtamaki Paper Product Ltd (HPPL), Hyderabad	SHRI MUTHUSAMY CHOCKALINGAM SHRI AISHWARYA VANGE (*Alternate*)
Indian Flexible Packaging & Folding Carton Manufacturers Association (IFCA), Mumbai	SHRI ATIN CHAUDHURI
Indian Centre for Plastics in the Environment (ICPE), Mumbai	SHRI T. K. BANDOPADHYAY
Indian Institute of Packaging (IIP), Mumbai	SHRI MADHAB CHAKRABORTY DR TANWEER ALAM (*Alternate*)
Indian Institute of Technology (IIT), New Delhi	SHRI ANUP K. GHOSH
Indian Oil Corporation, R&D Centre, Faridabad	SHRI DHANANJAY SAHOO DR G. S. KAPOOR (*Alternate*)
Indian Pharmacopoeia Commission, Ghaziabad	DR JAI PRAKASH DR MANOJ KUMAR PANDEY (*Alternate*)
Indian Plastic Institute (IPI), Mumbai	SHRI MIHIR BANERJI SHRI V. B. LALL (*Alternate*)
Ministry of Environment & Forests (MoEF), New Delhi	SHRI SATYENDRA KUMAR SHRI AMIT LOVE (*Alternate*)
National Committee on Plasticulture Applications in Horticulture (NCPAH), Ministry of Agriculture & Farmers Welfare, Govt of India, New Delhi	SHRI ANAND ZAMBRE SHRI KRISHNA KUMAR KAUSHAL (*Alternate*)
ONGC Petro Additions Ltd (OPAL), Gujarat	SHRI VIVEK MEHTA
Organization of Plastics Processors of India, Mumbai	DR SATYAPRASAD BHATTACHARYA SHRI DEEPAK LAWALE (*Alternate*)
Plastindia Foundation, Mumbai	DR E. SUNDARESAN SHRI HITEN BHEDA (*Alternate*)
Reliance Industries Ltd (RIL), Mumbai	SHRI S.V. RAJU SHRI AMIT SHAH (*Alternate* I) SHRI SUNIL MAHAJAN (*Alternate* II)
SABIC Innovative Plastics, Bengaluru	DR SUMANDA BANDYOPADHYAY SHRI SUNIL RAUTO (*Alternate*) SHRI NAGARAJ DHADESUGUR
Shivalik Agro-Poly Products Ltd, Mohali	SHRI PANKAJ KUMAR MAHAJAN DR G. D. TYAGI (*Alternate*)
Technical Training and Research Centre (TTRC), Lohia Group, Kanpur	SHRI R. K. DWIVEDI

Organization	*Representative(s)*
Voluntary Organization in Interest of Consumer Education (VOICE), New Delhi	SHRI M. A. U. KHAN
BIS Directorate General	SHRIMATI MEENAL PASSI, SCIENTIST 'E'/DIRECTOR AND HEAD (PETROLEUM, COAL AND RELATED PRODUCTS) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI SHIVAM DWIVEDI
SCIENTIST 'B'/ASSISITANT DIRECTOR
(PETROLEUM, COAL AND RELATED PRODUCTS), BIS

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Headquarters:

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Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
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