भारतीय मानक

इमारतों के भीतर एवं बाहर संवातन और वर्षा के पानी के साथ मल एवं अपशिष्ट विसर्जन के लिए अनम्यकृत पॉलीविनाइल क्लोराइड (यू॰पी॰वी॰सी॰) अन्तः क्षेपण संचकित फिटिंग्स – विशिष्टि

Indian Standard

UNPLASTICIZED POLYVINYL CHLORIDE (UPVC) INJECTION MOULDED FITTINGS FOR SOIL AND WASTE DISCHARGE SYSTEM FOR INSIDE AND OUTSIDE BUILDINGS INCLUDING VENTILATION AND RAIN WATER SYSTEM — SPECIFICATION

ICS 83.140.30

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

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Price Group 6

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastic Piping System Sectional Committee had been approved by the Civil Engineering Division Council.

This standard has been formulated in keeping with the practice of formulating separate standards for pipes and their corresponding fittings, as in the case of UPVC pipes for potable water supplies.

In the formulation of this standard, assistance has been derived from the following International Standards:

a)	ISO/DIS 3633 : 1995 (prEN 1329-Part 1 & Part 3)	Unplasticized polyvinyl chloride (PVC-u) pipes and fittings for soil and waste discharge (low and high temperature) systems inside buildings — Specification
b)	ISO 8283-1-1991	Plastic pipes and fittings — Dimensions of sockets and spigots for discharge systems inside buildings — Part 1 Unplasticized polyvinyl chloride (PVC-u) and chlorinated polyvinyl chloride (PVC-c)

The composition of the technical committee responsible for the formulation of this standard is given at Annex F.

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

UNPLASTICIZED POLYVINYL CHLORIDE (UPVC) INJECTION MOULDED FITTINGS FOR SOIL AND WASTE DISCHARGE SYSTEM FOR INSIDE AND OUTSIDE BUILDINGS INCLUDING VENTILATION AND RAIN WATER SYSTEM — SPECIFICATION

1 SCOPE

This standard covers the requirements for Unplasticized Polyvinyl Chloride (UPVC) injection moulded fittings for jointing with solvent cement or elastomeric sealing ring to the UPVC pipes for soil and waste discharge system for inside and outside buildings including ventilation and rain water system covered in IS 13592.

2 NORMATIVE REFERENCES

The following Indian Standards contain provisions which through reference in this text constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
1070 : 1992	Reagent grade water — Specification (*third revision*)
4905 : 1968	Methods for random sampling
5382 : 1985	Specification for rubber sealing rings for gas mains, water mains and sewers (*first revision*)
6307 : 1985	Specification for rigid PVC sheets (*first revision*)
7834 (Part 1) : 1987	Specification for injection moulded PVC fittings with solvent cement joints for water supplies : Part 1 General requirements (*first revision*)
12235	Methods of test for unplasticized PVC pipes for potable water supplies:
(Part 6) : 1986	Stress relief test
(Part 7) : 1986	Resistance to sulphuric acid
13592 : 1992	Specification for UPVC pipes for soil and waste discharge system inside buildings including ventilation and rain water system

3 TYPES OF FITTINGS

Fittings shall be of one of the following types:

a) Tee (87.5°), Wye (45°) single, double (cross) or reducing, with or without inspection doors;
b) Bend, with or without inspection doors (87.5, 45 and 22°);
c) Reducer;
d) Coupler;
e) Socket plug;
f) Cleansing pipe;
g) Adaptor (for connecting UPVC pipes to other materials);
h) Vent cowl;
j) Pipe clip; and
k) Waste trap with strainer (Nahani trap with jali).

4 SIZE DESIGNATION

The sizes of the fittings shall be designated by the diameters of their sockets. The nominal inside diameter of the sockets of the fittings shall correspond to the nominal outside diameters of the pipes given in IS 13592.

5 COLOUR OF FITTINGS

Colour of fittings shall be uniform dark shade of grey.

6 MATERIALS

6.1 The materials from which the fittings are produced shall consist essentially of polyvinyl chloride, to which may be added only those additives that are needed to facilitate the manufacture of sound and durable fittings of good surface finish, mechanical strength and opacity under conditions of use, together with such pigments as are necessary to meet the requirements of **5**. None of these additives shall be used separately or together in quantities sufficient to impair the chemical and physical properties of the fittings. The material shall contain sufficient quantity of titanium dioxide to meet the requirements as specified in **14**.

6.2 The addition of the manufacturer's own clean rework material produced during manufacture and work testing, complying with this standard is

permissible up to 10 percent. No other rework material shall be used.

7 DIMENSIONS

7.1 Wall Thickness

Wall thicknesses at the plain ends and at sockets of the fittings shall be as given in Table 1.

Table 1 Wall Thickness

Sl No.	Nominal Diameter *DN*	Wall Thickness At Plain End *e*		At Socket	
				e_2	e_3
		Min	*Max*	*Min*	*Min*
	mm	mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)	(6)
i)	40	3.2	3.8	2.9	2.4
ii)	50	3.2	3.8	2.9	2.4
iii)	63	3.2	3.8	2.9	2.4
iv)	75	3.2	3.8	2.9	2.4
v)	90	3.2	3.8	2.9	2.4
vi)	110	3.2	3.8	2.9	2.4
vii)	125	3.2	3.8	2.9	2.4
viii)	140	3.6	4.2	3.2	2.7
ix)	160	4.0	4.6	3.6	3.0

NOTE — For both solvent cement fittings and ring seal fittings a reduction of 5 percent of the wall thickness resulting from core shifting is permitted. In such a case, the average of two opposite wall thicknesses shall be equal to or exceed the values given in this table.

7.2 Socket Dimensions

Dimensions of sliding socket and grooved sockets of fittings shall be as given in Table 2 and Table 3 respectively.

The groove for rubber ring socket can be an integral part of the moulded fitting or can be formed by assembly of sliding socketed moulded fitting with another moulded component such as ring seal adaptor. The overall dimensions shall conform to those in Table 3, for grooved sockets as above.

7.2.1 Out-of-Roundness Tolerances of Socket Inside Diameters

The maximum out-of-roundness tolerance (maximum diameter — minimum diameter) shall be within 0.7 percent of the nominal diameter *DN*.

7.2.2 Mean inside diameter of socket shall be equal to the mean outside diameter of the pipe of the same size.

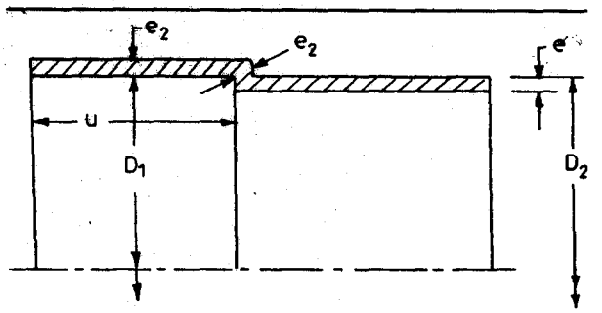
7.3 Dimensions for Waste Trap (Nahani Trap)

Dimensions of waste trap (nahani trap) shall be given below:

Maximum diameter of rim of bowl	=	135.0 mm
Minimum depth of bowl	=	80.0 mm
Minimum water seal	=	10.0 mm
Minimum spigot length	=	70.0 mm
Spigot end outside diameter	=	75.0^{+2}_{-0} mm

Table 2 Socket and Spigot Dimensions for Solvent Cement Fittings

(*Clause* 7.2 and *Table* 3)



Sl No.	Nominal Diameter *DN*	Socket Depth *u*	Mean Inside Diameter of Socket at Mid Point D_1		Mean Outside Diameter of Spigot Portion D_2	
		Min	*Min*	*Max*	*Min*	*Max*
	mm	mm	mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	40	26.0	40.1	40.3	40.0	40.3
ii)	50	30.0	50.1	50.3	50.0	50.3
iii)	63	36.0	63.1	63.3	63.0	63.3
iv)	75	40.0	75.1	75.3	75.0	75.3
v)	90	46.0	90.1	90.3	90.0	90.3
vi)	110	48.0	110.1	110.4	110.0	110.4
vii)	125	51.0	125.1	125.4	125.0	125.4
viii)	140	54.0	140.2	140.5	140.0	140.5
ix)	160	58.0	160.2	160.5	160.0	160.5

NOTES

1 The mean internal diameter of the socket portion of the fitting is defined as being the arithmetical mean of the two diameters measured at 90° to each other at the midpoint of the socket length using the same cross-section. The inside diameter of the socket may be decreased from mouth to root; for sizes up to 75 mm the total included angle of the taper shall not exceed 0 degree 40 minutes, and for sizes 90 mm and above the total included angle of the taper shall not exceed 0 degree 30 minutes.

2 Only the manufacturer of the fittings is equipped to measure the socket inside diameter. Since the socket length is a minimum only (no tolerance is given to this dimension), it is not practical, other than for the manufacturer, to establish the exact position of the mid-point of the socket. He can therefore, tool up to measure his own fitting but such equipment will not necessarily give the correct figures for a fitting of other manufacturer.

3 The length of the plain end of the fitting shall not be less than the depth of the socket for the corresponding size.

7.4 Chamfer

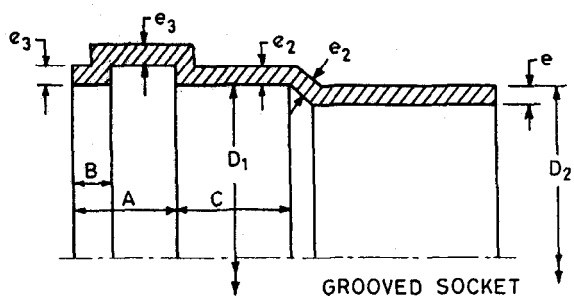
The spigot ends of fittings shall be chamfered to an angle of 15°±1°, to the axis of the pipe.

8 SEALING RINGS

Sealing rings shall be made of elastomers as

Table 3 Socket and Spigot Dimensions for Ring Seal Fittings

(*Clauses* 7.2 *and* 8)



Sl No.	Nominal Diameter *DN*	Mean Inside Diameter of Socket at Midpoint D_1		Length of Beading Neck *A*	Neck of Socket *B*	Length Beyond Beading *C*	Mean Outside Diameter of Spigot Portion D_2	
		Min	*Max*	*Max*	*Min*	*Min*	*Min*	*Max*
	mm	mm	mm	mm	mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	40	40.1	41.1	18	5	18	40.0	40.3
ii)	50	50.1	51.1	18	5	20	50.0	50.3
iii)	63	63.1	64.1	18	5	23	63.0	63.3
iv)	75	75.1	76.2	20	5	25	75.0	75.3
v)	90	90.1	91.2	23	5	28	90.0	90.3
vi)	110	110.1	111.3	26	6	32	110.0	110.4
vii)	125	125.1	126.4	28	7	35	125.0	125.4
viii)	140	140.2	141.4	30	8	38	140.0	140.5
ix)	160	160.2	161.5	32	9	42	160.0	160.5

NOTE — The minimum dimensions D_1 in this table for grooved sockets shall be maintained same as that of sliding sockets (D_1) in Table 2.

specified in IS 5382, having IRHD hardness of 50 ± 5. The sealing ring shall have no detrimental effect on the properties of the fitting and shall not cause the test assembly to fail. The width of the sealing ring shall be compatible with the groove in the socket.

Components, for example, ring seal adaptors used to retain the sealing rings, shall comply with requirements applicable to fittings and assemblies, that is, as in Table 3.

9 MANUFACTURE

Fittings shall be manufactured by the injection moulding process except that fittings with access doors may be subjected to post moulding fabrication at the manufacturer's premises. No fitting shall be fully prefabricated.

10 WORKMANSHIP

Both the inner and outer surfaces of the fitting shall be cleanly finished, smooth and free from grooving, blistering or other deleterious defects, when viewed without magnification. Each end of the fitting shall be free from chips and rough edges, and shall be square to the axis of the approximate line.

11 DESIGN REQUIREMENTS

11.1 Sockets of fittings shall be either of solvent cement type or rubber ring type. Rubber ring socket fittings shall be supplied complete with rubber sealing rings and when applicable, ring seal adaptors.

11.2 Socket and Spigot Configurations

A fitting shall have any of the following configurations of socket and spigot:

a) A solvent cement type of socket at each end of the fitting;

b) A rubber ring type of socket at each end of the fitting;

c) A solvent cement type socket at one or two ends, and a spigot at the other end, or at each of the other ends (as applicable) of the fitting;

d) A rubber ring type of socket at one or two ends, and a spigot at the other end, or at each of the other ends (as applicable) of the fitting; and

e) A solvent cement type socket at one or two ends, and a rubber ring type socket at the other end or at each of the other ends (as applicable) of the fitting.

11.3 Access Openings

When so required, fittings shall be supplied with an access opening, with threaded caps. Dimensions of access openings shall be as per Table 4.

Table 4 Dimensions of Access Openings

(*Clause* 11.3)

Sl No.	Nominal Diameter	Minimum Clear Opening (Diameter)
	mm	mm
(1)	(2)	(3)
i)	40 to 50	Equal to inside diameter of fitting
ii)	63 to 90	54.0
iii)	110 to 140	63.0
iv)	160	75.0

11.4 Vent Cowl

Vent cowls may be of suitable lenght with perforations/ openings. The dimensions of wall thickness and socket depth may be as per Table 5.

11.5 Pipe Clips

Pipe clips may be of GI/Anti-corrosive material. The dimensions of pipe clips may be as per Table 6.

12 PHYSICAL TEST REQUIREMENTS

12.1 Visual Appearance

The internal and external surfaces of fittings shall be smooth and clean, and free from groovings and other defects. The ends shall be clean and shall be square with the axis of the appropriate line. Slight shallow longitudinal grooves or irregularities in the wall thickness shall be permissible provided the wall thickness remains within the permissible limits.

12.2 Stress Relief Test

When tested by the method described in IS 12235 (Part 6) the test specimen shall not show blisters, excessive delamination or cracking or signs of weld line splitting. The weld line or lines may become pronounced during the test, but this shall not be deemed to constitute failure.

12.3 Vicat Softening Temperature

The Vicat softening temperature shall not be less than 78°C when determined in accordance with IS 6307.

The specimen from the fitting shall be supported on a suitable concave surface of radius equal to that of the specimen ensuring support at all ends.

13 RESISTANCE TO SULPHURIC ACID

When tested by the method described IS 12235 (Part 7), the mass of the specimen shall neither increase by more than 0.32 g nor decrease by more than 0.13 g. The effect of the acid on the surface appearance of the specimen (roughening, bleaching or blackening) shall be ignored.

Table 5 Dimensions of Vent Cowl

(*Clause* 11.4)

Sl No.	Nominal Diameter	Socket Depth *Min*	Wall Thickness of Socket, *Min*
	mm	mm	mm
(1)	(2)	(3)	(4)
i)	40 to 63	20.0	1.8
ii)	75 to 90	22.0	2.0
iii)	110 to 160	24.0	2.0

Table 6 Dimensions of Pipe Clips

(*Clause* 11.5)

Sl No.	Nominal Diameter	Minimum Stand-off Distance	Mean Inside Diameter	
			Min	*Max*
	mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)
i)	40	50.0	40.0	40.4
ii)	50	55.0	50.0	50.4
iii)	63	61.0	63.0	63.4
iv)	75	67.0	75.0	75.5
v)	90	75.0	90.0	90.6
vi)	110	85.0	110.0	110.7
vii)	125	92.5	125.0	125.7
viii)	140	100.0	140.0	140.8
ix)	160	110.0	160.0	160.8

NOTE — In pipe clips used to fasten pipes to a wall, the distance, known as the stand-off distance, between the wall and the center line of the installed pipes shall not be less than the appropriate values given in this table.

14 TITANIUM DIOXIDE CONTENT

When tested by the method described in Annex A, the titanium dioxide content shall not be less than 2.5 percent by mass.

15 SULPHATED ASH CONTENT

When tested by the method described in Annex B, the sulphated ash content shall not be more than 10 percent by mass.

16 MECHANICAL PROPERTIES

16.1 Impact Test (Drop Test)

When tested by the method described in Annex C, the specimen shall not fracture or crack through its complete wall thickness.

17 WATER TIGHTNESS OF JOINT

The assembly of fitting with pipe tested for water tightness by the method described in Annex D, shall show no visible leakage.

18 SAMPLING AND CRITERIA FOR CONFORMITY

18.1 Acceptance Test

The scale of sampling and criteria for conformity of a

lot for acceptance tests specified in Table 7 shall be as given in Annex E.

Table 7 Acceptance and Type Tests

(*Clauses* 18.1 *and* 18.2)

Sl No.	Test	Clause	Acceptance Test	Type Test
(1)	(2)	(3)	(4)	(5)
i)	Colour	5	Y	
ii)	Dimensions	7.1, 7.2	Y	
iii)	Workmanship	10	Y	
iv)	Visual appearance	12.1	Y	
v)	Stress relief test	12.2	Y	
vi)	Sulphated ash content	15	Y	
vii)	Impact test (Drop test)	16.1	Y	
viii)	Water tightness test	17	Y	
ix)	Vicat softening temperature	12.3		Y
x)	Resistance to sulphuric acid	13		Y
xi)	Titanium dioxide content	14		Y

18.2 Type Test

Type tests indicated in Table 7 above shall be conducted whenever a change is made in the polymer composition, method of manufacture, or a new size of fitting is to be introduced. However, if no change is envisaged, at least one sample from each size shall be subjected to type tests once in six months.

19 MARKING

19.1 Each fitting shall be clearly and indelibly marked with the following:

a) Manufacturer's name or trade-mark, and

b) Nominal diameter of fitting and angle where applicable

19.1.1 Batch number shall be marked on the carton/ packing.

19.2 BIS Certification Marking

The fittings may also be marked with the Standard Mark.

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

ANNEX A

(*Clause* 14)

DETERMINATION OF TITANIUM DIOXIDE CONTENT

A-1 PRINCIPLE

A sample of the UPVC fitting is ignited in a furnace and the resulting ash is boiled with sodium sulphate and sulphuric acid. This solution is diluted with distilled water and the concentration of titanium dioxide determined by spectrophotometry.

A-2 REAGENTS

A-2.1 Except where otherwise specified, only reagents of recognized analytical grade and only water conforming to IS 1070 shall be used.

A-2.2 Sulphuric acid (density 1 840 kg/m^3)

A-2.3 Anhydrous sodium sulphate

A-2.4 Hydrogen peroxide (30 percent)

A-2.5 Sulphuric Acid — 10 percent solution (1 part concentrated sulphuric acid added to 9 parts of distilled water).

A-2.6 Rutile titanium dioxide of average assay 93 percent titanium dioxide.

A-3 APPARATUS

A-3.1 Ultra violet/visible range spectrophotometer to read at 408.0 ± 0.2 nm.

A-3.2 Muffle furnace capable of being maintained at 850 ±10°C.

A-3.3 Analytical balance with 0.1 mg accuracy.

A-3.4 Hot Plate.

A-3.5 Porcelain or silica crucibles – 50 ml volume.

A-3.6 Thermometers capable of indicating the required temperatures to an accuracy of ±2°C.

A-3.7 Standard laboratory glassware.

A-4 PREPARATION OF TEST SAMPLE

The bulk sample shall be prepared by finely milling section of fitting and then mixing it uniformly. No preconditioning of the test samples is required. Test portions for analysis are randomly selected from this bulk sample.

NOTE — Fragments or pieces obtained from an impact test may also be used.

A-5 PROCEDURE

A-5.1 Standards Preparation

A-5.1.1 Weigh approximately 100 mg of titanium dioxide to the nearest 0.1 mg and record the mass. Transfer the titanium dioxide to a 250-ml beaker and add 1.5 g of anhydrous sodium sulphate and 50 ml of concentrated sulphuric acid. Add boiling chips, cover the beaker with a watch glass, and heat to boiling point on a hot-plate until the solid material has dissolved.

A-5.1.2 When the solution has cooled, add approximately 100 ml of distilled water, stirring continuously. After cooling, transfer the solution to a 500-ml volumetric flask containing approximately 200 ml of distilled water, and make up to the mark with distilled water.

A-5.2 Preparation of the Standard Curve

A-5.2.1 Prepare standard titanium dioxide solutions in the following concentrations: 0.00, 0.02, 0.04, 0.06, 0.08 and 0.10 mg/ml by transferring 0, 5.0, 10.0 15.0, 20.0, and 25.0 ml of the standard solution into separate 50-ml volumetric flasks and dilute almost to volume with 10 percent sulphuric acid solution. Add 2.0 ml of 30 percent hydrogen peroxide solution to each of the volumetric flasks, dilute to volume with 10 percent sulphuric acid solution, shake and leave in a dark cupboard for approximately 30 min, with occasional further shaking.

A-5.2.2 Using the spectrophotometer, determine the absorbance of each solution at a wave length of 408 nm using 1.0 cm cells with a blank of 2.0 ml 30 percent hydrogen peroxide in 50 ml 10 percent sulphuric acid solution.

A-5.2.3 From these results plot a standard curve (absorbance *versus* concentration in mg/ml).

A-5.3 Sample Preparation

A-5.3.1 For samples containing in the region of 5 percent titanium dioxide weigh approximately 1.5 g of the test portion.

A-5.3.2 For samples containing in the region of 0.6 percent titanium dioxide, weigh approximately 3.0 g of the test portion.

A-5.3.3 Weigh the appropriate amount of sample (**A-5.3.1** or **A-5.3.2**) to the nearest 0.1 mg and transfer into a 50-ml porcelain or silica crucible and record the mass [M].

A-5.3.4 Heat the crucible, gently at first, with a Bunsen burner until charring is complete and the evolution of copious white fumes has ceased.

A-5.3.5 Transfer the crucible to a muffle furnace maintained at 850 ±10°C and ignite to a white or pale grey ash. (This takes approximately 4 h.)

A-5.3.6 Allow the crucible to cool, then add 1.5 g of anhydrous ammonium sulphate and 50 ml of concentrated sulphuric acid, followed by boiling chips. Cover the crucible with a watchglass and bring the contents to a boil on the hot plate. A clear solution should result.

NOTE — Sometimes the solution is slightly cloudy, but this has no effect on the final result.

A-5.3.7 Allow the crucible to cool and then carefully transfer the contents of the beaker containing 200 ml of distilled water. Thoroughly wash the crucible with further aliquots of distilled water.

A-5.3.8 After cooling, transfer the solution to a 500-ml volumetric flask and make up the volume [V_1] with distilled water.

A-5.4 Determination of Titanium Dioxide in the Sample Solution

A-5.4.1 Transfer 20 ml [V_3] of the sample solution prepared in **A-5.3.8** to a 50-ml volumetric flask and dilute almost to volume with 10 percent sulphuric acid solution. Add 2.0 ml of 30 percent hydrogen peroxide, make up to volume [V_2] with 10 percent sulphuric acid solution, shake and leave in a dark cupboard for 30 min, with occasional further shaking.

A-5.4.2 Determine the absorbance of the sample as in **A-5.2.2**. Should the absorbance fall outside the calibration range, repeat the determination using a suitable aliquot of sample solution.

A-5.4.3 Determine the concentration (C), in mg/ml, of titanium dioxide in the final solution, from the standard curve.

A-6 CALCULATIONS

Titanium dioxide content shall be calculated as follows:

$$\text{Titanium dioxide content in percent by mass of fitting} = \frac{C \times V_1 \times V_2}{M \times V_3} \times 100$$

where

C = concentration of titanium dioxide in the final solution in mg/ml;

M = mass of test portion sample in mg;

V_1 = total volume of sample solution in ml (500);

V_2 = volume of solution prepared in ml (50); and

V_3 = volume of solution transferred out of total volume of sample solution, in ml (50).

ANNEX B

(*Clause* 15)

DETERMINATION OF SULPHATED ASH CONTENT

B-1 PRINCIPLE

Calcination with sulphuric acid treatment after combustion, that is, by burning the substance and transforming the residue into sulphates using concentrated sulphuric acid and, finally, heating the residue at 850°C until constant mass is reached.

B-2 REAGENTS

B-2.1 Sulphuric Acid (Density 1 840 kg/m^3)

B-3 APPARATUS

B-3.1 Silica or platinum crucible, diameter of upper portion 45 to 75 mm, height equal to the diameter. The size shall be sufficient so that the crucible is not more than half filled by the test portion sample.

B-3.2 Analytical balance with 0.1 mg accuracy.

B-3.3 Bunsen burner with silica triangle and tripod or other suitable heating device.

B-3.4 Muffle furnace capable of being maintained at 850 ± 10°C.

B-3.5 Pipette of appropriate capacity.

B-3.6 Dessicator containing an effective drying agent that does not react chemically with the ash components.

NOTE — In some cases, the affinity of the ash for water may be greater than that of drying agents commonly used.

B-4 PROCEDURE

B-4.1 Prepare the crucible by heating in the muffle furnace at 850 ± 10°C until constant mass is reached. Allow it to cool in the dessicator to room temperature, but for atleast one hour and weigh to the nearest 0.1 mg (M_1).

B-4.2 Introduce into the crucible 2 to 5 g of the sample and reweigh to the nearest 0.1 mg (M_2). Heat the crucible directly on the heating device so that the sample burns slowly and loss of ash is avoided. Continue this operation until no more smoke is evolved.

B-4.3 After allowing the crucible and contents to cool, add sulphuric acid dropwise by means of a pipette of suitable capacity until the residue is soaked completely. Heat carefully on the heating device until the evolution of smoke ceases, taking care to avoid spattering of the contents of the crucible.

B-4.4 If, after allowing the crucible to cool, carbon is still evident, add 1 to 5 drops of sulphuric acid and reheat until evolution of white fumes has ceased.

B-4.5 Place the crucible at the entrance of the muffle furnace maintained at 850 ± 10°C (the temperature in the entrance zone is about 300 to 400°C), then advance the crucible slowly into the furnace. Calcine slowly (to prevent loss of ash particles) for 30 min at 850 ± 10°C.

B-4.6 Remove the crucible from the furnace. Place it in the dessicator, allow to cool to room temperature, but for atleast one hour, and weigh to the nearest 0.1 mg (M_3).

B-4.7 Calcine again, under the same conditions until constant mass is reached, that is, until the results of two consecutive weighings do not differ by more than 0.5 mg. The duration of heating in the furnace shall not, however, exceed 3 h; if constant mass is not attained after this time, the mass after 3 h shall be used for calculating the test result. The residue after calcination shall be white.

B-5 NUMBER OF DETERMINATIONS

Carry out two determinations. Calculate the arithmetic mean of the results. If the individual test results differ from each other by more than 10 percent of their mean, repeat the procedure until two successive results do not differ from each other by more than 10 percent of their mean.

B-6 EXPRESSION OF RESULTS

The sulphated ash content shall be calculated as follows:

$$\text{Sulphated ash content in percent by mass of fitting} = \frac{M_3 - M_1}{M_2 - M_1} \times 100$$

where

M_1 = mass of the crucible,

M_2 = mass of the crucible and test portion sample, and

M_3 = mass of the crucible and residue.

ANNEX C

(*Clause* 16.1)

IMPACT TEST (DROP TEST)

C-1 The fitting specimen shall be conditioned for at least 30 min at a temperature of 0 ± 1°C. The specimen shall be dropped freely, in random positions, from a height of 2 m for *DN* up to 75 and 1 m for *DN* above 75 m, onto a flat concrete floor, within 10 s of being removed from the conditioning chamber.

C-2 The specimen shall be examined for breaks or cracks.

NOTE — In the context of this test, 'damage' means any visible split or any complete breakage in the body of the fitting. Surface scratches, scuffing, or chipping of edges which may occur in the test does not constitute damage.

ANNEX D

(*Clause* 17)

WATER TIGHTNESS OF JOINT

D-1 The jointed assembly of fitting with pipe shall be tested for water tightness in an apparatus which consists of end sealing devices for the open ends of the fittings, one end connected to a hydraulic pressure source which shall be capable of allowing the system to be bled and the other end(s) blocked. The water used being at ambient temperature. The hydrostatic pressure shall be gradually increased to 0.05 MPa, and maintained at 0.05 MPa for a period of 15 min.

D-2 The jointed assembly shall be examined for leakage.

ANNEX E

(*Clause* 18.1)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY FOR ACCEPTANCE TESTS

E-1 LOT

E-1.1 All fittings in a single consignment, of the same size and type, and manufactured under essentially the same conditions shall constitute a lot.

E-1.2 For ascertaining conformity of the lot to the requirements of the specification, samples shall be tested from each lot separately.

E-2 COLOUR, WORKMANSHIP, VISUAL APPEARANCE AND DIMENSIONAL REQUIREMENTS

E-2.1 The number of test samples to be taken from the lot, shall depend on the size of the lot, size and type of the fitting. This shall be in accordance with Table 8.

E-2.2 The fittings shall be selected at random from the lot and in order to maintain the randomness of the selection, a random number table shall be used. For guidance and use of random number tables, IS 4905 may be referred to. In the absence of a random number table, the following procedure may be adopted:

Starting from any fitting in the lot, count them as 1,2,3, etc up to *r* and so on, where *r* is an integral part of *N/n*, *N* being the number of fittings in the lot, and, *n* the number of fittings in the sample. Every *r*th fitting so counted shall be withdrawn so as to constitute the required sample size.

E-3 OTHER ACCEPTANCE TESTS

The lot having satisfied the colour, workmanship, visual appearance and dimensional requirements shall be tested for other acceptance tests as given in **E-3.1** and **E-3.2**.

E-3.1 Stress Relief and Impact (Drop Test)

E-3.1.1 The lot having satisfied the colour,

Table 8 Scale of Sampling and Criteria for Conformity for Colour Workmanship, Visual Appearance and Dimensional Requirements

(*Clause* E-2.1)

Sl No.	Number of Fittings in the Lot	Sample Size	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)
i)	Up to 500	50	0	1
ii)	501 to 1 200	80	1	2
iii)	1 201 to 3 200	125	1	2
iv)	3 201 to 10 000	200	2	3

workmanship, visual appearance and dimensional requirements, shall be tested for stress relief and impact (drop test).

E-3.1.2 For this purpose, the procedure adopted for sampling and criteria for conformity shall be the same as under **E-2.2**, using Table 9.

E-3.2 Sulphated Ash Content and Water Tightness

E-3.2.1 The lot having satisfied the colour, workmanship, visual appearance, dimensional requirements, stress relief and impact (drop test), shall be tested for sulphated ash content and water tightness.

E-3.2.2 For this purpose, the procedure adopted for sampling and criteria for conformity shall be the same as under **E-2.2**, using Table 10.

Table 9 Scale of Sampling and Criteria for Conformity for Stress Relief and Impact (Drop Test)

(*Clause* E-3.1.2)

Sl No.	Number of Fittings in the Lot	Sample Size	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)
i)	Up to 150	8	0	1
ii)	151 to 280	13	0	1
iii)	281 to 500	13	0	1
iv)	501 to 1 200	20	0	1
v)	1 201 to 10 000	32	1	2

Table 10 Scale of Sampling and Criteria for Conformity for Sulphated Ash Content and Water Tightness

(*Clause* E-3.2.2)

Sl No.	Number of Fittings in the Lot	Sample Size	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)
i)	Up to 150	3	0	1
ii)	151 to 280	5	0	1
iii)	281 to 500	5	0	1
iv)	501 to 1 200	5	0	1
v)	1 201 to 10 000	8	0	1

ANNEX F

(Foreword)

COMMITTEE COMPOSITION

Plastic Piping System Sectional Committee, CED 50

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(*Continued on page* 11)

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