



**PRODUCT MANUAL FOR
CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPES FOR
POTABLE HOT AND COLD WATER DISTRIBUTION SUPPLIES
ACCORDING TO IS 15778: 2007**

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	Product	:	IS 15778 : 2007
	Title	:	CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPES FOR POTABLE HOT AND COLD WATER DISTRIBUTION SUPPLIES
	No. of Amendments	:	2
2.	Sampling Guidelines:		
a)	Raw material	:	Resin and/or resin compound – Clause 6.1 to 6.3
b)	Grouping guidelines	:	Please refer ANNEX – A
c)	Sample Size	:	CPVC pipe - 1 m x 12 nos CPVC resin (if used) – 1 kg CPVC compound – 5 kg CPVC pipe – 30 cm x 12 nos CPVC elbows of angle 90° - 5 nos CPVC double sockets (couplers) of same outside dia as the pipe section – 8 nos with 100 gm solvent for jointing.
			} for clause 6.3.2
3.	List of Test Equipment	:	Please refer ANNEX – B
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – C
5.	Possible tests in a day : Please refer ANNEX – D		
6.	Scope of the Licence : Please refer ANNEX – E		

ANNEX - A**Grouping Guidelines**

1. CPVC pipes for potable hot and cold water distribution supplies as per IS 15778 : 2007 are classified as follows:

Pressure Class	SDR	Size (DN)
1	11	15 -50
2	13.5	15- 50
3	17	65 -150

2. Considering the above, grouping guidelines as given below shall be followed for GoL/CSoL:
- CPVC Pipe of highest size from each Pressure Class/SDR Designation shall be tested for all requirements (except Thermal Stability by Hydrostatic Pressure Testing - clause 10.2) to cover all sizes of pipes of the particular Pressure Class/SDR tested.
 - CPVC Pipe of any Pressure Class/SDR Designation, preferably the highest size, shall also be tested for Thermal Stability by Hydrostatic Pressure Testing while processing the case for GoL/CSoL.
3. The Firm shall declare the varieties of Pipes they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
4. During the operation of the Licence, BO shall ensure that all the varieties covered in the Licence are tested in rotation, to the extent possible.

ANNEX - B**List of Test Equipment***Major test equipment required to test as per the Indian Standard*

S. No.	Tests used in with Clause Reference	Test Equipment
1	Chlorine content of CPVC resin (Clause 6.2.1)	- Drying Oven - Digital Balance - Equipment for Volhard Titration or Potentiometric Titration
2	Chlorine content of CPVC compound (Clause 6.3.1)	- Combustion Bomb } for combustion in - Nickel crucible } bomb technique - Safety oven - Round or Flat bottom Flask with platinum wire and stopper - Filter Paper free from halogen and ash - Beaker 250 ml - Silver nitrate - Nitric acid - Sodium peroxide - Starch - Sucrose or ethylene glycol
3	Verification of the Malfunction Temperature , T_{mal} (Clause 6.3.2)	- Pressure pump - Pressure gauge - Heating device - Thermometer - Stop watch
4	Density (Clause 6.3.3)	- Hot press - Balance - Pan straddle - Pycnometer - Liquid bath with immersion liquid - Density balance
5	Dimensions of pipes (Clause 7)	- Dial Gauge Method or - Micrometer - Ultrasonic gauge - Vernier Calipers or outside caliper - Pi Tape or flexible tape - Tape

6	Pipe ends (Clause 8)	<ul style="list-style-type: none"> - Angle protractor -
7	Opacity (Clause 9.2)	<ul style="list-style-type: none"> - Opacity Test Apparatus - Standard sample of opacity 0.2 %
		<p>or Apparatus for Test Method-2</p> <ul style="list-style-type: none"> - Source of light (halogen lamp 1000 W), - Photo-electric cell (with filter correction to match eye response), - Adjustable power arc or Incandescent lamp - Diaphragm and optical lens - Digital current meter. - Standard sample of opacity 0.2 %
8	Effect on water (Clause 9.3)	<ul style="list-style-type: none"> - Distilled water - Air conditioner - pH meter - Testing reagent and equipment for determination of cadmium, mercury, lead, tin and other toxic substances.
9	Reversion test (Clause 9.4)	<ul style="list-style-type: none"> - Thermostatically Control oil bath/ Hot air oven - Mono-polyethylene glycol, glycerol or mineral oil free from aromatic hydrocarbons - Vernier Calipers - Stop watch
10	Vicat Softening temperature (Clause 9.5)	<ul style="list-style-type: none"> - Oil heating Bath equipped with means to raise the temperature at uniform rate of $50 \pm 5^\circ \text{C/hr.}$ with suitable stirrer. - Rod with loading plate, load and indenting tips - Micrometer dial gauge - Thermometer or temperature measuring equipment
11	Density (Clause 9.6)	<ul style="list-style-type: none"> - Balance - Thermometer - Demineralized water - Beaker - Corrosion resistant wire
12	Hydrostatic characteristics (Clause 10.1)	<ul style="list-style-type: none"> - Hydrostatic pressure testing apparatus with pressuring unit and multiple outlets - Water bath (Hot and cold temperature arrangement) with temperature control - Thermometer - End plugs/caps
13	Thermal stability by hydrostatic pressure testing (Clause 10.2)	

14	Resistance to external blows at 0°C (Clause 10.3)	<ul style="list-style-type: none">- Falling Weight testing machine from height 2000 mm- Striker of weight 0.25, 0.50 & 1.00 kg- Digital watch- Liquid bath or freezer for conditioning of samples
15	Flattening test (Clause 10.4)	<ul style="list-style-type: none">- Compression testing machine- Loading plates- Deformation/Deflection indicator- Vernier calliper- Internal diameter gauge/bore gauge
16	Tensile Strength (Clause 10.5)	<ul style="list-style-type: none">- Tensile Testing machine- Dumb bell die along with Hydraulic jack- Micrometer Ball ended- Air Conditioner

The above list is indicative only and may not be treated as exhaustive.

ANNEX - C

Scheme of Inspection and Testing

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipment.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING – As per the requirements of IS 15778: 2007

4. CONTROL UNIT – All CPVC pipes of one size and Pressure class/SDR designation manufactured as a continuous extrusion run from one extrusion compound up to a maximum of forty eight hours duration shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of [Table 1](#) and the levels of control in column 3 of [Table 1](#), shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standard and covered by the licence should be marked with Standard Mark.

6. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
6	COMPOSITION						
6.2.1	Chloride Content	6.2.1	Annex B IS 15778	S	One	Each consignment	No further testing is required if consignment received is with the test certificate. (See Note -1)
6.3	Compound Properties	6.3	IS 15778 IS 15225	S	One		Once in three months for same source and composition of compound received <i>or</i> whenever there is change in the composition of the compound or change of source of resin used in compound when compounding is done inhouse.
6.3.1	Chloride content	6.3.1	Annex B IS 15778	S	One		Each consignment of CPVC compound received <i>or</i> if CPVC compound is manufactured inhouse, then for each lot of compound manufactured or whenever there is change in source of CPVC compound/CPVC resin
6.3.2	Verification of the Malfunction Temperature, T_{mal}	6.3.2	Annex C IS 15778	S	One		Once in three months or whenever there is change in composition of compound or source of CPVC resin or compound.
6.3.3	Density	6.3.3	IS 13360 (Part3/ Sec1)	S	One		Each consignment of CPVC compound received <i>or</i> if CPVC compound is manufactured inhouse, then for each lot of compound manufactured or whenever there is change in source of CPVC compound/ CPVC resin.

7	Dimensions a) Diameter b) Diameter at any point c) Wall thickness d) Effective length (L _e)	7.1 7.1.1 7.1.2 7.1.3.1	IS 15778 IS 12235 (Part 1) IS 15778	R	10	Each Control unit	See Note -2
8	Pipe Ends	8	IS 15778	R	10	Each Control unit	See Note -2
9	PHYSICAL AND CHEMICAL CHARACTERISTICS						
9.1	Visual Appearance	9.1	IS 15778	-	Each Pipe	-	-
9.2	Opacity	9.2	IS 15778 IS 12235 (Part 3)	S	Two (Thinnest Wall sections)	Once in a three months	Test shall be carried out whenever composition of compounding material or source of compound or resin or method of manufacturing is changed. In an operative year, production from all the machines may be covered to the extent possible.
9.3	Effect on water	9.3 10.3	IS 15778 IS 4985	S	Three	Once in six months	
9.4	Reversion test	9.4	IS 15778 IS 12235 (Part 5/ Sec 1 & Sec 2)	R	Three	Each Control Unit	See Note -2
9.5	Vicat Softening temperature	9.5	IS 15778 IS 12235 (Part 2)	S	Two	Once in three months	-
9.6	Density	9.6	IS 15778 IS 12235 (Part 14)	R	Two	Each Control unit	-

10	MECHANICAL PROPERTIES						
10.1	Hydrostatic Characteristics						
a)	Acceptance Test (20 ⁰ C for 1 h)	10.1 Table 3 [SI No. (i)]	IS 15778 IS 12235 (Part 8/Sec 1)	R	One	Each Control unit	–
b)	Type Test (95 ⁰ C for 165 h and 95 ⁰ C for 1000 h)	10.1 Table 3 [SI No (ii) & (iii)]	IS 15778 IS 12235 (Part 8/Sec 1)	S	One	Once in three months	One size for each class of pipe shall be tested at least once in an operative year.
10.2	Thermal stability by hydrostatic pressure testing (95 ⁰ C for 8760 h)	10.1 Table 3 [SI No. (iv)]	IS 15778 IS 12235 (Part 8/Sec 1)	S	One	Once in three years	This test shall be carried out whenever there is change in composition in raw material/source of raw material or introduction of any additional size of pipe.
10.3	Resistance to external blow at 0 ⁰ C	10.3	IS 15778 IS 4985	R	One	Each Control unit	–
10.4	Flattening Test	10.4	IS 15778 IS 12235 (Part 19)	R	One	Each Control unit	–
10.5	Tensile Strength	10.5	IS 15778 IS 12235 (Part 13)	R	One	Each Control unit	–

Note - 1: Pipe manufacturer shall obtain a test certificate for each batch of raw material along with consignment indicating conformity to requirements as per clause 6.1, clause 6.2 and clause 6.3 of IS 15778: 2007. In case a test certificate is not received, a sample shall be tested for its conformity as specified in Table 1.

Note -2: In case of failure, twice the number of samples shall be tested for that requirement from the same control unit. In case of any further failure, the entire control unit shall be rejected.

Note-3: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-4: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.

ANNEX – D

Possible tests in a day:

- a) Dimensions of pipes (Clause 7)
- b) Pipe ends (Clause 8)
- c) Visual appearance (Clause 9.1)
- d) Opacity (Clause 9.2)
- e) Reversion test (Clause 9.4)
- f) Vicat softening temperature (Clause 9.5)
- g) Density (Clause 9.6)
- h) Hydrostatic characteristics (Acceptance test) {Clause 10.1, Table 3[S1 No.(i)]}
- i) Resistance to external blows at 0 °C (Clause 10.3)
- j) Flattening test (Clause 10.4)
- k) Tensile strength (Clause 10.5)

ANNEX- E**Scope of the Licence :**

“Licence is granted to use Standard Mark as per IS 15778 : 2007 with the following scope:	
Name of the product	CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPES FOR POTABLE HOT AND COLD WATER DISTRIBUTION SUPPLIES
Pressure class	Class1 / Class 2/ Class 3
SDR Classification	SDR 11 /SDR 13.5 / SDR 17
Nominal Size	