



**PRODUCT MANUAL FOR
STRUCTURED-WALL PLASTICS PIPING SYSTEMS FOR
NON-PRESSURE DRAINAGE AND SEWERAGE - PIPES AND FITTINGS
WITH NON-SMOOTH EXTERNAL SURFACE, TYPE B
ACCORDING TO IS 16098 (PART 2) : 2013**

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 16098 (Part 2) : 2013
	Title	:	Structured Wall Plastics Piping Systems for Non-pressure Drainage and Sewerage – Pipes and Fittings with Non-Smooth External Surface, Type B
	No. of Amendments	:	2
2.	Sampling Guidelines:		
a)	Raw material	:	Polyethylene (PE) - Clause 5.1, Table 1 and 2 of IS 16098 (Part 2): 2013 Polypropylene (PP) - Clause 5.1, Table 3 and 4 of IS 16098 (Part 2): 2013 Elastomeric Sealing Rings - Clause 8.3 of IS 16098 (Part 2) : 2013 and IS 5282
b)	Grouping guidelines	:	Please refer ANNEX – A
c)	Sample Size	:	Pipes - 1 m x 9 Nos and Material (PE/PP) Granules – 1 kg
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. IS 16098 (Part 2) :2013 covers Structured-Wall Plastics Piping Systems for Non-pressure Drainage and Sewerage – Pipes and Fittings with Non- Smooth External Surface, Type B which are categorized as given below:

Material	Polyethylene (PE)/ Polypropylene (PP)
Sizes of pipes and fittings (DN/ID)	75, 100, 125, 135, 150, 170, 200, 225, 250, 300, 400, 500, 600, 800, 1000, 1200 (Other nominal sizes falling within the range are also permitted)
Stiffness class for pipes/ fittings	SN 2, SN 4, SN 8, SN 16
Types of fittings	<ul style="list-style-type: none"> • Injection moulded fittings (Clause 6.3.5.2) • Fabricated fittings (Clause 6.3.5.3) • Rotational moulded fittings (Clause 6.3.5.4)
	<ul style="list-style-type: none"> • Bends, swept and unswept angle • Couplers • Reducers • Branches and reducing branches, swept and unswept entry • Plugs • Other designs of fittings, including all sockets and all spigots

2. The sizes/stiffness class of pipes and fittings are grouped as given below:

Group	SN (Nominal stiffness class)	Size
Group 1	SN 4 / SN8 / SN 16	DN ≤ 500
Group 2	SN2 / SN4 / SN8 / SN16	DN > 500

3. Considering the above, following grouping guidelines is developed for GoL/CSoL:
- a) One sample of pipe/fitting of any size from each type with highest SN class from each material category, from each group shall be tested for all requirements to cover pipes/fittings of that type for all the sizes covered in that group and all stiffness class upto and including the stiffness class tested.
 - b) Fitting manufactured by different method of manufacturing shall be treated as separate variety.
4. The Firm shall declare the varieties they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
5. During the operation of the Licence, BO shall ensure that all the types and sizes 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:*

Sl No	Test used with clause reference	Test equipment
1	Base density (Clause 5.1, Table 1 and 3)	<ul style="list-style-type: none"> - Digital Balance with holding attachment - Distilled water - Butyl Acetate - Hydrometer - Glass beaker of 250ml capacity - Thermometer - Air conditioner - Heated press (Steam or Electrical)
2	Melt Flow rate (Clause 5.1, Table 1 and 3)	<ul style="list-style-type: none"> - Melt flow rate apparatus with digital temperature controller and timer and load of 5 kgf
3	Thermal stability (Oxidization Index Test OIT) (Clause 5.1, Table 1 and 3)	<ul style="list-style-type: none"> - DSC Instrument - Crucibles - Thermal stability Apparatus with - Flow meter - Oxygen Gas (99.55 %), - Nitrogen Gas (99.99%) - Gas selector switch and regulators for switching between oxygen and nitrogen during test - Micro meter
4	Resistance to Internal pressure, 165 h (Clause 5.1, Table 2 and 4)	<ul style="list-style-type: none"> - Hydrostatic pressure testing apparatus with pressuring unit, timer and multiple outlets
5	Resistance to Internal Pressure, 1000 h (Clause 5.1, Table 2 and 4)	<ul style="list-style-type: none"> - Thermostatically controlled water bath - Thermometer - End plugs of required sizes
6	Dimensions of Pipes and Fittings (Clause 6.3 and 6.4)	<ul style="list-style-type: none"> - Vernier calliper - Pi tape, - Inside vernier calliper - Ball end micrometer - Measuring tape - Angle protractor
7	Resistance to heating, Oven test, (Clause 7.2, Table 6)	<ul style="list-style-type: none"> - Hot air oven - Micrometer
8	Resistance to heating, Oven test, (Clause 7.2, Table 7)	
9	Effect of Heating (Clause 7.3, Table 8 and 9)	<ul style="list-style-type: none"> - Hot air oven /Oil bath - Stop watch

10	Ring Stiffness, Impact Strength and Ring flexibility (Clause 8.1, Table 10)	<ul style="list-style-type: none"> - Compression testing machine with ring stiffness testing arrangement - Inside vernier calliper - Angle protector - Air conditioner
11	Creep Ratio (Clause 8.1, Table 10)	<ul style="list-style-type: none"> - Compressing loading machine - Inside vernier calliper - Stop watch - Micrometer
12	Stiffness and Impact Test (Clause 8.2, Table 10)	<ul style="list-style-type: none"> - Compression testing machine with ring stiffness testing arrangement - Inside vernier calliper - Angle protector - Air conditioner - Deep freezer
13	Mechanical strength or Flexibility (Clause 8.2, Table 10)	<ul style="list-style-type: none"> - Anchorages to hold samples - Load application arrangement with load indicator and load gauge - Displacement measurement arrangement - Air conditioner - Thermometer
14	Tightness of Elastomeric Sealing Ring joint, (Clause 9, Table 12)	<ul style="list-style-type: none"> - Hydrostatic pressure testing apparatus with vacuum pressuring unit, timer and multiple outlets - Thermostatically controlled water bath - Thermometer - End plugs of required sizes - Stop Watch
15	Water Tightness, (Clause 9, Table 12)	<ul style="list-style-type: none"> - Hydrostatic pressure testing apparatus with pressuring unit, timer and multiple outlets - Thermostatically controlled water bath - Thermometer - End plugs of required sizes
16	Resistance to combined temperature cycling and loading (Clause 9, Table 12)	<ul style="list-style-type: none"> - Gravel filled box [Refer Annex G of IS 16098 (Part 2): 2013] - Compressive testing machine - Cold and Hot water supply unit

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

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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 equipments.
2. **TEST RECORDS** - The manufacturer shall maintain test records for the tests carried out to establish conformity.
3. **LABELLING AND MARKING** - As per the requirement of IS 16098 (Part 2).
4. **CONTROL UNIT**

For Pipe: All pipes of same size and stiffness class manufactured from same compound mix continuously under similar condition of manufacturing for maximum period upto 48 hours shall constitute a control unit.

For Fittings: All fittings of same size, type and stiffness manufactured from same compound mix under similar condition of manufacturing for maximum period upto 48 hours 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 Standards 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	Requirements	Test Methods		No. of Samples	Frequency	Remarks	
		Clause	Reference				
5	Composition of the Material						
5.1	Material (PE) in granules form					Further testing is not required if accompanied with manufacturers test certificate.	
	(i) Base Density (ii) Melt flow rate	5.1, Table 1 [sl no i & ii]	IS 16098 (Part 2) IS 7320 IS 2530	S	One		Each consignment
	(iii) Thermal stability (Oxidation induction test, OIT)	5.1, Table 1 [sl no iii], Annex-C	IS 16098 (Part 2)	S	One		Once in three months for each grade of raw material received
5.1	Material (PP) in granules form					Further testing is not required if accompanied with manufacturers test certificate.	
	(i) Melt flow rate	5.2, Table 3 [sl no i]	IS 16098 (Part 2) IS 2530	S	One		Once a year for each variety received
	(ii) Thermal stability (Oxidation induction test, OIT)	5.2, Table 3 [sl no ii] Annex-C	IS 16098 (Part 2)	S	One		

5.1	Material (PE) in pipe form						
	(i) Resistance to internal pressure, 165 h	5.1, Table 2 [sl no i]	IS 16098 (Part 2) IS 12235 (Part 8/ Sec1)	S	One	Each consignment	Further testing is not required if accompanied with manufacturers test certificate.
	(ii) Resistance to internal pressure, 1000 h	5.1, Table 2 [sl no ii]	IS 16098 (Part 2) IS 12235 (Part 8/ Sec1)	S	One	Once in three months for each grade of raw material received	
5.1	Material (PP) in pipe form						
	(i) Resistance to internal pressure, 165 h	5.1, Table 4 [sl no i]	IS 16098 (Part 2) IS 12235 (Part 8/ Sec1)	S	One	Once in a year for each variety	Further testing is not required if accompanied with manufacturers test certificate.
	(ii) Resistance to internal pressure, 1000 h	5.1, Table 4 [sl no ii]	IS 16098 (Part 2) IS 12235 (Part 8/ Sec1)	S	One		
6.3	Dimensions of Pipes	6.3, Table 5	IS 16098 (Part 2)	R	1	Once in four hours	-
7	Physical characteristics for pipes and fittings						
7.1	Appearance	7.1	IS 16098 (Part 2)	R	Each pipe	-	-
7.1.1	Colour of finished pipes	7.1.1	IS 16098 (Part 2)	-	Each pipe	-	-
7.2	Resistance to Heating (PE pipes)	7.2, Table 6	IS 16098 (Part 2) IS 12235 (Part 6)	R	One	Each Control Unit	-
7.2	Resistance to Heating (PP pipes)	7.2, Table 7	IS 16098 (Part 2) IS 12235 (Part 6)	R	One	Each Control Unit	-

7.3	Effect of heating (PE injection moulded components)	7.3, Table 8 Annex D	IS 16098 (Part 2)	R	One	Each Control Unit	-
7.3	Effect of heating (PP injection moulded components)	7.3, Table 9 Annex D	IS 16098 (Part 2)	R	One	Each Control Unit	-
8	Mechanical characteristics						
8.1	Mechanical characteristics of pipes						
8.1.1	Ring Stiffness	8.1.1, Table 10 [sl no i] Annex C	IS 16098 (Part 2) IS 16098 (Part 1) IS 12235 (Part 9)	R	One	Each control unit	-
8.1.1	Impact Strength	8.1.1, Table 10 [sl no ii] Annex C	IS 16098 (Part 2) IS 16098 (Part 1) IS 12235 (Part 9)	R	One	Each Control Unit	-
8.1.1	Ring Flexibility	8.1.1, Table 10 [sl no iii] Annex D	IS 16098 (Part 2) IS 16098 (Part 1)	R	One	Each Control Unit	-
8.1.2	Creep Ratio	8.1.1, Table 10 [sl no iv] Annex E	IS 16098 (Part 2) IS 16098 (Part 1)	S	One	Once a year for each variety	The test is also to be carried out if there is any change in composition. One size for each class of pipe shall be tested at least once in three year.
8.2	Mechanical characteristics of fittings						
8.2.1	Stiffness	8.2.1, Table 11 [sl no i] Annex C	IS 16098 (Part 2) IS 16098 (Part 1)	R	One	Each Control Unit	-

8.2.1,	Impact Strength	8.2.1, 8.2.2 Table 10 [sl no ii]	IS 16098 (Part 2)	R	1	Each control unit	-
8.2.1	Mechanical strength or flexibility	8.2.1,Table 10 [sl no i] Annex E	IS 16098 (Part 2) IS 16098 (Part 1)	R	1	Each Control Unit	-
8.3	Joints	8.3	IS 16098 (Part 2)	-	All	-	-
	Elastomeric sealing rings	8.3	IS 16098 (Part 2) IS 5382	S	One	Each consignment	Further testing is not required if received with manufacturers test certificate or ISI mark.
9	Performance requirements						
9	Tightness of Elastomeric Sealing Rings	9, Table 12 [sl no i]	IS 16098 (Part 2) IS 12235 (Part 8/ Sec 2 and Sec 3)	S	One	Once a year for each variety	Same for PP or PE
9	Water Tightness	9, Table 12 [sl no ii] Annex-F	IS 16098 (Part 2)	S	One	Once a year for each variety	Same for PP or PE
9	Resistance to combined temperature cycling and External Loading	9, Table 12 [sl no iii] Annex-G	IS 16098 (Part 2)	S	One	Once a year for each variety	Same for PP or PE

Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: 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

- i) Dimension of Pipes and Fittings (Clause 6. 3)
- ii) Visual appearance, Finish and Colour of Finished Pipes (Clause 7.1)
- iii) Resistance to Heating (Clause 7.2)
- iv) Effect of Heating (Clause 7.3)
- v) Ring Stiffness (Clause 8.1.1)
- vi) Impact Strength (Clause 8.1.1)
- vii) Ring Flexibility (Clause 8.1)
- viii) Mechanical Strength or flexibility (Clause 8.2.1)

ANNEX E**SCOPE OF LICENCE**

“Licence is granted to use Standard Mark as per IS 16098 (Part 2): 2013 with the following scope:	
Name of the product	Structured Wall Plastics Piping Systems for Non-pressure Drainage and Sewerage- Pipes and fittings with Non-Smooth External Surface Type B.
Pipe/Fittings:	
Material class	
Stiffness Class (SN)	Nominal Stiffness Class (SN)
Sizes (DN/ID)	Nominal Inside Diameter (DN)
Type of fittings	