



PRODUCT MANUAL FOR PRECAST CONCRETE PIPES (WITH AND WITHOUT REINFORCEMENT) ACCORDING TO IS 458: 2003

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 458 : 2003
	Title	:	Precast Concrete Pipes (with and without reinforcement)
	No. of Amendments	:	1
2.	Sampling Guidelines:		
a)	Raw material	:	Please refer ANNEX – A
b)	Grouping guidelines	:	Please refer ANNEX – B
c)	Sample Size	:	2 Pipes (One for Permeability test and other for remaining tests) shall be tested in the factory for all the requirements.
3.	List of Test Equipment	:	Please refer Annex-C
4.	Scheme of Inspection and Testing	:	Please refer Annex-D
5.	Possible tests in a day	:	As the licence is operated on Factory Testing basis, complete testing of a sample shall be done in factory.
6.	Scope of the Licence :		
	Precast Concrete Pipes, Reinforced/Unreinforced, Spun/Vibrated cast, Suitable for flush joint/collar joint/spigot and socket joint, for Sizes _____		
	Any other aspect required as per the Standard		NIL

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ANNEX A

RAW MATERIAL

- 1) All types and sizes of steel used for longitudinal and spiral reinforcement shall be ISI marked conforming to the relevant Indian Standard as mentioned in IS 458.
- 2) Fly ash, if used - IS 3812 (Part 1).
- 3) All types and sizes of coarse and fine aggregate – clause 5.3 of IS 458 and clause 3 of IS 383
- 4) Cement used for the manufacture of concrete pipes shall be ISI marked conforming to the relevant Indian Standard as mentioned in IS 458.
- 5) Water used for mixing of concrete and curing of pipes – clause 5.7 of IS 458 and clause 5.4 of IS 456.
- 6) Concrete used in manufacturing of pipes/collar shall conform to clause 5.5 of IS 458. Strength of concrete shall be ensured by testing concrete cubes/cylinder.
- 7) Rubber ring chords used in pipe joint (If supplied) – IS 5382.
- 8) Chemical admixtures (If used) – IS 9103.

Note: If different type and/or sizes of steel for reinforcement are used, it shall be treated as additional raw material. Similarly, if source and/or size and types of coarse and fine aggregate has changed, it shall be treated as additional raw material.

ANNEX-B**GROUPING GUIDELINES**

1. IS 458 : 2003 covers Precast Concrete Pipes which are categorized as under:

- a) Reinforced/Unreinforced
- b) Manufacturing process - Spun/Vibrated cast
- c) Pressure rating class - NP1, NP2, NP3, NP4, P1, P2 and P3
- d) Sizes - 80 mm to 2600 mm (based on class of pipes)
- e) Joints - Flush jointed/Spigot and Socket ended/collar jointed

2. Precast Concrete Pipes are classified as under based on sizes and pressure rating:

Group/ Size/ Class	Group 0 mm	Group 1 mm	Group 2 mm	Group 3 mm	Group 4 mm	Group 5 mm	Remarks
NP 1	80-225	250-450	---	---	---	---	For collars also
NP 2	80-225	250-450	500-800	900-1200	1400-2200	---	For collars also
NP 3	80-225	250-450	500-900	1000-1200	1400-1800	2000-2600	---
	---	300-450	500-900	1000-1200	1400-1800	---	Vibrated cast unreinforced
	---	300-450	500-900	1000-1200	1400-1800	2000-2400	Vibrated cast reinforced
	90-225	250-450	500-900	1000-1200	1400-1800	2000	For collars
NP 4	80-225	250-450	500-900	1000-1200	1400-1800	2000-2600	---
	---	300-450	500-900	1000-1200	1400-1800	---	Vibrated cast unreinforced
	---	300-450	500-900	1000-1200	1400-1800	2000	Vibrated cast reinforced
	90-225	250-450	500-900	1000-1200	1400-1800	2000	For collars
P1	80-225	250-450	500-800	900-1200	---	---	---
P2	80-225	250-450	500-700	800-1000	---	---	---
P3	80-225	250-500	600-800	---	---	---	---

3. Considering the above, the following grouping guidelines for GoL/CSoL have been developed:

- (a) Precast concrete pipes and collars (as applicable) of any two sizes from each group and each class shall be tested in the factory for all the requirements to cover the complete range of sizes in that class.
 - (b) Samples from each type of joint (collar joint/flush jointed/spigot and socket ended) and each manufacturing process (spun cast/vibrated cast) shall be tested as per the above grouping for covering the pipes with the particular type of joint and manufacturing process tested.
- 4. 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 capability and Testing facilities of the Manufacturer.
 - 5. 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.
 - 6. Cement Concrete cubes/Mortar cubes shall be cast in the factory during surveillance visits and the quality of concrete/mortar used in manufacturing of pipes shall be assessed through independent testing. Details of mix design may also be obtained from the firm.

ANNEX C**LIST OF TEST EQUIPMENT***Major test equipment required to test as per the Indian Standard*

Sl. No.	Tests used in with Clause Reference	Test Equipment
1	Dimension and Tolerance/ Workmanship and Finish Clause 8 & 9	Steel Tape, Steel Scale , Steel Scale, Vernier Calipers, Digital Micrometer, Straight Edge as per IS 3597, Go & No-Go Calipers
2	Three-edge bearing test Cl. 10.2(b)	Three Edge Load Bearing Test arrangement with Hydraulic Jack and Load gauge complete assembly as per IS 3597, Gauge Leaf as per IS 3597 (0.25 mm thickness)
3	Hydrostatic Test Cl. 10.2 (a)	Hydrostatic Test Arrangement fitted with “water gauge or “pressure gauge of suitable range and least count ” and water filling arrangement as per IS 3597
4	Permeability Test Cl. 10.2(c)	Permeability Test Arrangement with graduated glass tubes, metal cups, wash bottles, crocks etc as per IS 3597
5	Compressive strength of concrete cube Cl. 10.1.1	Compressive Strength Test Machine fitted with Load Gauge suitable to test cement concrete/mortar test Cube Moulds of size 150 x 150 x 150 mm if cement concrete used and size 7.09 x 7.09 x 7.09 mm if mortar is used for manufacturing of pipes
6	Split tensile strength of Concrete cylinder Clause 10.1.1	Cylindrical Mould and testing machine of adequate range and least count as per IS 5816
7	Weighment of reinforced cage Cl.8.1	Weighing Balance of suitable least count and range
8	Size of aggregates Cl. 5.3	Sieve Set IS Sieve Designations : 80mm, 40mm, 20mm, 10mm,4.75mm, 2.36mm, 1.18mm. 600 micron,300 micron and 150 micron

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

ANNEX D

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 requirements of IS 458:2003.

4. CONTROL UNIT – Every 50 pipes/collars or part thereof, of same class and size, manufactured/cast in a month under similar conditions (from same consignment of cement, same mix ratio for concrete and similar curing condition) shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control submitted by the manufacturer 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 2.0 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) 2 S: Sub-contracting permitted	Recommended Levels of Control		
Clause	Requirement	Test Methods Clause Reference			No. of Sample	Frequency	Remarks
4.1 10.2 (a)	Hydrostatic test (pressure pipe)	7	IS 3597	R	Each pipe		
4.2 10.2 (a)	Hydrostatic test (non-pressure pipe)	7	IS 3597	R	1	Each control unit	
10.2 (b)	Three-edge bearing test	5	IS 3597	R	2	Each control unit	Minimum safe load shall be applied. Results recorded as Pass/Fail
					1	*	Load shall be applied till a crack of 0.25 mm is produced and further increased till ultimate load is reached.
10.2 (c) 10.2.1	Permeability test	8	IS 3597	R	1	*	
5	Material						
5.2	Cement	5.2	IS 458	S	-	-	Cement received shall be ISI marked and accompanied with test certificate.
5.3	Aggregates	5.3	IS 458 IS 383	S	One	Once in year for each size.	Additional sample shall be tested wherever there is change in source of raw material.
5.4	Reinforcement	5.4	IS 458	S	-	-	Reinforcement material received shall be ISI marked and accompanied with test certificate.
5.5 10.1.1	Compression Test on Concrete/mortar Cubes	5.5.1 5.5.3 10.1.1	IS 458	R	One consisting of 3 cubes from each consignment of cement	Supply of cement executed against order spread over up to three months shall be taken as one consignment for this test only. One sample may be tested in a month in case same mix is used for different size/class of pipes.	

5.5 10.1.1	Splitting tensile strength test	5.5.2 10.1.1	IS 458 IS 5816	R	One consisting of 3 cylinders from each consignment of cement	One sample may be tested in a month in case same mix is used for different size/class of pipes (For pressure pipes only)	
5.6	Rubber ring	5.6	IS 458 IS 5832	S	1	Each size and source	No further testing is required, if received with test certificate or ISI marked.
5.7	Water	5.4	IS 456	S	1	Once in a year or whenever there is a change in source of water, whichever is earlier	
5.8	Chemical admixtures (if used)		IS 9103	S	1	Each consignment	No further testing is required if accompanied with test certificate or ISI marked.
6.1	Design/General	6.1	IS 458	R	Each pipe	-	-
6.2 7.3	Reinforcement	6.2 7.3 7.3.1 7.3.2	IS 458	R	Each pipe	-	Each cage shall be checked for the requirement and range of observed values to be recorded.
6.2 6.4	Clear cover and pitch of spirals	6.2 6.4	IS 458	R	1	Each 10 th control unit	Clear cover shall be maintained by effective means and position of each cage in the mould shall be ensured before concreting.
6.3	Ends of pipes	6.3	IS 458	R	Each pipe	-	-
6.3.1	Flexible rubber ring joint testing	6.3.1	IS 458	R	-	-	As per agreement with supplier.
8.1 8.2	Dimension & Tolerances	8.1 8.2	IS 458	R	Each pipe	-	May be checked with gauges

9	Workmanship, finish and deviation from straight	9.1 9.2	IS 458	R	Each pipe	-	-
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* Three edge bearing (ultimate load) test and permeability test shall be carried out on every 10th control unit for sizes upto and including 600 mm and on 20th control unit for sizes above 600 mm.

Note 1 - Hydrostatic test, three edge bearing test, Permeability test and Deviation from straightness test is not applicable to collars.

Note 2 - Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note 3 - The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.