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उत्पाद मैन्युअल
पूर्वप्रबलित कंक्रीट पाइप (विशेष सहायकांग सहित)
आई एस 784:2019 के अनुसार

PRODUCT MANUAL FOR
PRESTRESSED CONCRETE PIPES (INCLUDING SPECIALS)
ACCORDING TO IS 784: 2019

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो) अनुरूपता मूल्यांकन (विनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity 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.

1.	मानक संख्या **IS No.**	:	IS 784 : 2019
	शीर्षक **Title**	:	Prestressed Concrete Pipes (Including Specials)
	संशोधनों की संख्या **No. of amendments**	:	1
2.	नमूना दिशानिर्देश **Sampling Guidelines**		
a)	कच्चा माल **Raw material**	:	Please refer to Annex-A Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence/ Factory Surveillance
b)	समूहीकरण दिशानिर्देश **Grouping Guidelines**	:	Please refer to Annex-B
c)	नमूने का परिमाण **Sample Quantity**	:	3 Pipes (One for pressure permeability test, One for boiling absorption test and one for remaining tests) Note: This section indicates the quantity of the sample of the product and/or the raw material (if applicable), required to be sent to the laboratory for testing, for the purpose of Grant of Licence/Change in Scope of Licence/ Factory Surveillance (incase of market surveillance, effort may be made to procure therequired quantity of product sample, as far as possible since raw material sample may not be available in market)

3.	**परीक्षण उपकरणों की सूची** **List of Test Equipment**	:	Please refer to Annex-C
4.	**निरीक्षण और परीक्षण की स्कीम** **Scheme of Inspection and Testing**	:	Please refer to Annex-D
5.	**एक दिन में संभावित परीक्षण** **Possible tests in a day**		
	As the licence is operated on Factory Testing basis, complete testing of a sample shall be done in factory. Note: This section is for the guidance of BIS Certification Officers/Technical Auditors of BIS Authorized Outside Surveillance Agencies (OSAs) during factory inspection to provide readyreference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.		
6.	**लाइसेंस का दायरा /Scope of the Licence:**		
	"Licence is granted to use Standard Mark as per IS 784: 2019 with the following scope:		
	Name of the product	Prestressed Concrete Pipes	
	Type of pipes	Prestressed concrete cylinder pipe/ Prestressed concrete non-cylinder pipe	
		Pressure/Non-pressure pipes	
	Nominal Internal Diameter		
	Type of Joint (As applicable)		

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ANNEX A
Raw Material

Raw Material	Indian Standard
Cement (Cl 4.1)	Cement used for the manufacture of concrete pipes shall be ISI marked conforming to the relevant Indian Standard as mentioned in Clause 4.1 of IS 784.
Aggregates (Cl 4.2)	The aggregates shall conform to IS 383 & Clause 4.2 of IS 784. If source and/or size and types of coarse and fine aggregate has changed, it shall be treated as additional raw material.
Water (Cl 4.3)	Water used for mixing of concrete and curing of pipes shall conform to 5.4 of IS 456.
Admixtures (Cl 4.4)	Admixtures, if used shall confirm to IS 9103 and Clause 4.4 of IS 784
Steel for Reinforcement (Cl 4.5)	Steel for reinforcement shall confirm to Clause 4.5 of IS 784. If different type and/or sizes of steel for reinforcement are used, it shall be treated as additional raw material.
Steel for cylinder, joint rings and specials (Cl 4.6)	Steel for cylinder, joint rings and specials shall confirm to Clause 4.6 of IS 784
Rubber sealing rings (Cl 4.7)	Rubber sealing rings shall confirm to Clause 4.7 of IS 784
Bitumen or other Protective coating	Bitumen or other Protective coating shall confirm to Clause 4.8 of IS 784

ANNEX-B

Grouping Guidelines

1. Prestressed Concrete Pipes (including Specials) as per IS 784: 2019, are classified as given below:
   a) Manufacturing method:
      i) Prestressed concrete cylinder pipe
      ii) Prestressed concrete non-cylinder pipe
   b) Nominal internal diameter of pipes: 200 mm to 2500 mm
   c) Pressure and Non-pressure pipes
   d) Joints:
      i) For pressure pipes: Spigot and socket type with rubber ring or with steel joint ring embedded
      ii) For non-pressure pipes: Spigot and socket roll on gasket joint or confined gasket joint or flush joint

2. Nominal internal diameter of pipes is further classified into following groups:

Group Designation	**Group 1**	**Group 2**	**Group 3**	**Group 4**	**Group 5**
Nominal Internal diameter of pipe (mm)	200 – 500	600 – 900	1000 – 1200	1300 -1800	1900 - 2500

3. Considering the above, the guidelines given below shall be followed for GOL/CSoL:
   a) Prestressed concrete pipes including specials (as applicable) of any two sizes from each group designation and highest pressure rating shall be tested for all requirements to cover the complete range of sizes in that group designation for pressure ratings upto and including the pressure rating tested.
   b) For covering variety based on manufacturing method, separate samples of prestressed concrete cylinder pipe and prestressed concrete non-cylinder pipe shall be tested.
   c) Pipes of each joint type shall be tested to cover that particular joint in the licence.

4. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.

5. During operation of licence, BOs shall ensure that all the varieties covered in the license are tested in rotation, to the extent possible.

ANNEX-C

List of Test Equipment

(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sl. No.	Tests used in with Clause Reference	Test Equipment
1	Size of aggregates (Clause 4.2)	- Sieve Set IS Sieve Designations: 80mm, 40mm, 20mm, 10mm,4.75mm, 2.36mm, 1.18mm. 600 micron,300 micron and 150 microns
2	Dimensions and Tolerances (Clause 5)	- Vernier caliper, - Depth Gauge, - Screw Gauge, - Steel tape 15 Mts, - Go gauge for checking ends diameter, - No go Gauge for checking ends diameter, - Go gauge for Centre diameter, - No go gauges for Centre diameter, - Feeler gauge.
3	Joint dimensions (Clause 6)	- Vernier caliper, - Depth Gauge, - Screw Gauge, - Steel tape 15 Mts,
4	Concrete mix (Clause 8.1.2, 8.4.7 and clause 9.2.1 of IS 456)	- 150 x 150 mm Cube Moulds, - Concrete cube vibrating machine, - Measuring jars, - Weighing Balance, - Curing tank, - Compression Testing Machine, - Suitable equipment, chemicals and glass wares required to carry out soluble chloride ion content.
5	Pre-tensioning and Release of Longitudinal wires (Clause 8.3)	- Vernier Calliper - Ball ended micrometer
6	Circumferential Pre-stressing (Clause 8.4)	- Vernier Calliper - Ball ended micrometer
7	Cover coating (Clause 8.5)	- Hammer having head mass of not more than 0.5 kg - Vernier calliper - 70.6 x 70.6 cube Moulds, - Mortar cube vibrating machine,

		- Test sieves for aggregates, - Measuring jars, - Weighing Balance - Curing tank, - Compression Testing Machine.
8	Steel socket and spigot joint rings (Clause 9.1.1)	- Outside Micrometer/Calliper
9	Fabrication of steel cylinders (Clause 9.1.2)	- Outside Micrometer/Calliper
10	Hydrostatic testing (Clause 9.1.2.1)	- Hydrostatic pressure test set up with suitable fitting to hold the pipe under pressure sealed from both ends and pressure gauge
11	Fabrication (Clause 10.1)	- Suitable penetrator and Developer as per IS 3658 - Outside Micrometer
12	Deviation from the straightness (clause 12.1)	- Straight edge and feeler gauge set
13	Finish (Clause 12.2)	- Vernier Calliper
14	Design Proving and Manufacturing process approval test in factory (Clause 13.1)	- Test set up as per Annexure-L of IS 784
15	Hydrostatic Factory test (Clause 13.2)	- Hydrostatic test set up with suitable end fitting for various sizes and pressure gauge, - Stopwatch, - Feeler gauge (set up as per IS 3597:1998)
16	Permeability test on coating (Clause 13.3)	- Permeability Test Arrangement with graduated glass tubes, metal cups, wash bottles, crocks etc as per IS 3597
17	Three Edge Bearing Test (for Pips for Drainage, Sewerage and Culverts) (Clause 13.4)	- 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)
18	Dimensional characteristics (Clause 13,5)	- Vernier caliper, - Depth Gauge, - Screw Gauge, - Steel tape 15 Mts, - Go gauge for ends diameter, - No-Go Gauge for ends diameter, - Go gauge for Centre diameter, - No-Go gauge for Centre diameter, - Feeler gauge.

19	Boiling Absorption test on coating mortar (Clause 13.7)	- Coating machine, - Soap solution, - Steel tape, - Vernier calliper, - Adequate sand bed, - Stop watch, - Groove making facility, - Adequate plastic sheet, - Sample concrete cutting machine, - Oven with temperature controller, - Weighing balance, - Facility for boiling water - Dry absorbent/blotting paper.
20	Pressure Permeability test (Clause 13.8)	- Test set up as per clause 12 of IS 3597
21	Weighment of reinforced cage (Clause 4.5.2)	- Weighing Balance of suitable least count and range

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 toestablish conformity.

3. LABELLING AND MARKING – As per the requirements of IS 784: 2019.

4. CONTROL UNIT – Every 50 pipes/specials or part thereof, of same class and size, manufactured continuously on consecutive days (from same consignment of cement, same mix design for concrete/mortar 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 ofcontrol submitted by the manufacturer in column 3 of Table 1, shall be carried out on the wholeproduction 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

(ONLY FOR GUIDANCE PURPOSE)

(1)				(2)	(3)		
Test Details				**Test equipment requirement R: required (or) S: Sub-contracting permitted**	**Recommended Levels of Control**		
Clause	**Requirement**	**Test Methods**			**No. of Sample**	**Frequency**	**Remarks**
		Clause	**Reference**				
4	**Material**						
4.1	Cement	4.1	IS 784	S	-	-	Cement received shall be ISI marked and accompanied with test certificate.
4.2	Aggregates	4.2	IS 784 IS 383	S	One	Once in year for each size.	No further testing is required if accompanied with test certificate or ISI marked. Additional sample shall be tested wherever there is change in source of raw material.
4.3	Water	4.3	IS 784 IS 456	S	One	Once in a year or whenever there is a change in source of water, whichever is earlier	
4.4	Admixtures (if used)	4.4	IS 784 IS 9103	S	One	Each consignment	No further testing is required if accompanied with test certificate or ISI marked.
4.5	**Steel for reinforcement**						
4.5.1	Prestressing steel	4.5.1	IS 784 IS 1785 (Part 1) IS 1785 (Part 2) IS 6006, IS 6003	S	-	-	Reinforcement material received shall be ISI marked and accompanied with test certificate.
4.5.2	Un-tensioned reinforcement	4.5.2	IS 784 IS 432 (Part 1) IS 432 (Part 2) IS 1786, IS 1566 IS 1785 (Part 1) IS 1785 (Part 2)	S	-	-	Reinforcement material received shall be ISI marked and accompanied with test certificate.

4.6	Steel for cylinder, joint rings and specials	4.6	IS 784 IS 2062	S	-	-	Reinforcement material received shall be ISI marked and accompanied with test certificate.
4.7	Rubber sealing rings	4.7	IS 784 IS 5382	S	One	Each size and source	No further testing is required, if received with test certificate or ISI marked.
4.8	Bitumen or other protective coating	4.8	IS 784	S	-	-	As per agreement with supplier.
5 13.5	Dimensions and Tolerances	5.1, 5.2, 5.3, 13.5 15.1.1& 15.1.2	IS 784	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
6, 9.1 11, 13.5	Joints Dimensions	6, 9.1.1 11, 13.5 15.1.3	IS 784	R			
7	Design	7.1 to 7.8	IS 784	-			
5.5 8.1.2 8.5.4 10.1.1	Compressive strength of concrete cubes and mortar cubes	5.5.1, 5.5.3 8.1.2 8.5.4 10.1.1	IS 784	R	One sample 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.	
8.3 & 8.3.3	Longitudinal prestressing wire	8.3, 8.3.3	IS 784	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
8.4.5 & 8.4.6	Circumferential prestressing wire	8.4.5 & 8.4.6	IS 784	R			
8.5	Cover coating	8.5	IS 784	R			
9	Steel cylinders (additional requirement for cylinder pipes)	9.1	IS 784	R	Each cylinder	Before the cylinder is subjected to any further manufacturing process, each steel cylinder with steel socket and spigot rings welded on it, shall be subjected to testing as per Clause 9.1.2.1 of IS 784.	
10	Specials	10.1, 10.2 10.3, 10.4	IS 784	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity.		
12	**Workmanship and finish**						

12.1	Deviation from straightness	12.1, 15.1.4	IS 784	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity.		
12.2	Finish	12.2	IS 784	R			
13.1	Design proving and manufacturing process approval test in factory	13.1	IS 784	R	Two or Three pipes	This test is applicable for pipes with rubber ring joint only. One set of samples of same diameter and highest-pressure rating,shall be tested as design proving and manufacturing process approval test. The additional test shall be carried out whenever there is change in design parameter or once in three years, whichever is earlier.	
13.2	Hydrostatic factory test	13.2.1 13.2.2	IS 784 IS 3597	R	Each Pipe	-	-
13.3	Permeability test on coating	13.3	IS 784 IS 3597	R	Two	Every 10^{th} control unit	Sample shall be selected in such a manner that all sizes shall be covered over a period.
13.4	Three edge bearing test (for pipes for drainage, sewerage and culverts)	13.4	IS 784 IS 3597	R	Two	Each control unit	Maximum safe load shall be applied and result (Pass/fail) shall be recorded.
13.7	Boling absorption test on coating mortar	13.7	IS 784 IS 3597	R	Three	Every 10^{th} control unit	Sample shall be selected in such a manner that all sizes shall be covered over a period.
13.8	Pressure permeability test on coating	13.8	IS 784 IS 3597	R	One	Every 10^{th} control unit	If sample fails after 480 h, two additional samples from same control unit shall be tested and control unit shall be accepted only if both samples pass.