PM/ IS 3589/ 1/ May 2020

PRODUCT MANUAL FOR
Steel Pipes for Water and Sewage
(168.3 To 2540 mm Outside Diameter)
According to IS 3589:2001

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 3589:2001**
	Title	**:**	Steel Pipes for Water and Sewage (168.3 To 2540 mm Outside Diameter)
	No. of amendments	**:**	4
2.	**Sampling Guidelines**		
a)	**Raw material**	**:**	No specific requirement
b)	**Grouping Guidelines**	**:**	Please refer Annex - A
c)	**Sample Size**	**:**	Mechanical Test 2 meter Chemical test : 5 pcs of 5cm x 5cm (for OES) or 50 gm drillings for testing by chemical method
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**	**:**	All tests
6.	**Scope of the Licence :**		
	Licence is granted to use Standard Mark as per IS 3589:2001 with the following scope:		
	Name of the product	Steel Pipes for Water and Sewage (168.3 To 2540 mm Outside Diameter)	
	Method of Manufacture	ERW,SAW..	
	Steel Grade	Fe330. …	
	Size	OD, Thickness	
	End of pipe	Plain ended...	
	Optional	Protective coating(galvanizing)	

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ANNEXURE A
TO PRODUCT MANUAL FOR
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GROUPING GUIDELINES

1. Grouping of Steel Pipes for Water and Sewage is carried out on the basis of method of manufacture and strength as under:
   a) Method of manufacture
   b) Tensile Strength
2. Accordingly, for the purpose of the GOL/CSoL the product is grouped as under:

Method of Manufacture/ Type	Steel Grade (in ascending order)	Group	Remarks
S	Fe330 Fe410 Fe450	1	i. Three samples preferably of minimum, intermediate and maximum size (One from each grade, if applicable) from grades intended to be covered under the licence shall be tested for all the requirements of the specification. ii. In case pipe of higher-steel grade is tested and found conforming then lower grades may also be covered in the licence. iii. Subject to (i) & (ii) above, in case Galvanized pipes are tested and found conforming then uncoated pipes may also be covered in the scope of the licence. For coatings other than galvanizing, samples may not be tested or included in licence scope as they are to be supplied as agreed between manufacturer and purchaser.
ERW	Fe330 Fe410 Fe 450	2	-do-
SAW	Fe330 Fe410 Fe 450	3	-do-

3. It shall, however, be ensured that the applicant/licensee has got complete manufacturing capabilities as well as testing facilities for the sizes/grades/types of pipes required to be covered in the licence scope.

4. In case test facilities of NDT are available, substituting hydraulic pressure test, details of method and acceptance details shall be submitted by manufacturer.

5. During the operation of license, BO shall ensure that all Grades & Product types covered in the license are drawn for independent testing on rotation over a period of time.

ANNEXURE B
TO PRODUCT MANUAL FOR
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LIST OF TEST EQUIPMENTS

Major test equipment required to test as per requirements of Indian Standard.

Sl. No.	Test Equipment/Chemicals and Identification Numbers (Where applicable)	Tests Used in with Clause Reference
1	Vernier Caliper, micrometer (screw) gauge,Pi- Tape, Steel Scale, Straightedge, String, Concrete platform, Weighing Balance	Dimensions (11) Tolerances (12)
2	Hydrostatic testing machine Fitted with calibrated pressure gauges, sealing devices for each end of the pipe of various dia, water injecting/pumping system	Hydraulic Pressure Test (10)
3	Universal Testing Machine (UTM)	Tensile Test (9.1)
4	UTM with flattening test attachments	Flattening test (9.2)
5	Hydraulic Press or UTM with guided bend test Jig having roller shoulders	Guided Bend Test (9.3)
6	**Instrumental methods** Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry. Spectrophotometer	C,S,P,Mn,Si,Al, Microalloying elements content (8) Mn,S,P,Si
7	Strohlein or Leco apparatus with all attachments Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccator, porcelain boats or ceramic crucibles, Thermometer, Electronic Balance, Distilled Water,Hot air oven, Oxygen - 99.5 percent minimum purity,ether or acetone, Standard Reference Material (NML) with certificate Reagents for C: tin granules or pure iron fillings, acidulated water/brine water, methyl red,caustic potash Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes -Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate	C& S -chemical method, alternative to instrumental method (8)
8	Weighing balance, Heater/ Heating element along with energy regulator, Ice water bath, Vol Flask Cap – 1 litre, (Whatman) filter paper No. 040,Suction Filtration Facility, Filter paper pulp pad,Standard Reference Material (NML) with certificate	Phosphorus content- chemical method, alternative to instrumental method (8)

	Potassium Permanganate (KMnO4), Sodium Nitrite (Na2NO3), Ammonium Molybdate [(NH4)2 Mo2O7], Ammonium Phosphate [(NH4)3 PO4], Potassium Nitrate (K2NO3), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO4), Sulphurous Acid, ,Hydrobromic Acid (HBr) , other chemicals and reagent as applicable	
9	Hot plate, Conical flask Reagents: silver nitrate, ammonium persulphate sodium arsenite solution, Dilute Nitric Acid, Phosphoric Acid, Dilute Sulphuric Acid,Concentrated .Nitric Acid, NaCl Solution, Permanganic acid	Manganese content- chemical method, alternative to instrumental method(8)
10	Medium textured filter paper, Porcelain casserole, platinum crucible,filter paper pulp, hot plate, hot air oven, muffle furnace Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute SulphuricAcid, PerchloricAcid, Tartaric acid and hydroflouric acid	Silicon content- chemical method, alternative to instrumental method (8)
11	Inert gas fusion followed by determination using thermal conductivity detector	Nitrogen content (8)
12	Copper carbonate (laboratory grade) or Copper hydroxide (laboratory grade), Copper Sulphate Crystals – Technical grade, Ammonium Hydroxide, Alcohol, Distilled water, Volatile organic solvent such as ether, trichloroethylene, carbon tetrachloride, etc. and other chemicals and reagents applicable, Thermostatically Controlled Freezer (Capable of achieving 15 deg to 20 deg Celsius temp., LC = 1 deg. C)	Uniformity of Zinc Coating (16.2)
13	Weighing balance, Clean soft cotton cloth, Vernier Caliper, micrometer, Stripping method: Antimony trioxide / Antimony tri chloride, Conc.HCl, soft cotton cloth, solvent naptha, trichloroethylene, alcohol, Distilled Water, 100 ml glass burette with stopcock, rubber tube	Mass of Zinc Coating (16.2)

Note: The above is an indicative list for the purpose of guidance only

ANNEXURE C
TO PRODUCT MANUAL FOR
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SCHEME OF INSPECTION AND TESTING

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, MARKING, PACKING –
The Standard Mark as given in the Schedule of the license and Licence Number (i.e. CM/L…….) shall be incorporated, and the marking and packing shall be done as per the provisions of the Indian Standard, provided always that the product thus marked and packed conforms to all the requirement of the specification.

4. CONTROL UNIT – For the purpose of this Scheme of Inspection & Testing, tubes of same size, type & grade, manufactured from same material (Cast/Heat of steel) under identical conditions in a day on each tube mill shall constitute one 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.

5.2. The steel to be used in production of steel tubes shall be manufactured as per Cl 6 and 8 of IS 3589:2001. Steel tubes shall be manufactured as per Cl 7 of IS 3589:2001 , as applicable.

6. TEST CERTIFICATE-For each consignment of BIS Certified material conforming to IS 3589:2001 there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed)

7. 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: LEVELS OF CONTROL

(1)				(2)	(3)		(4)
TEST DETAILS					**LEVELS OF CONTROL**		
Clause	**Requirements**	**Test Method**		**Test equipment requirement** R: required (or) S: Sub-contracting permitted	**No. of Samples**	**Frequency**	**REMARKS**
		Clause	**Reference**				
8	Chemical Composition i)Ladle Analysis	8.1, Table-2	IS 3589:2001 IS 228(various Parts) or any established chem/instr.method	R	One	Each Heat	Applicable only for manufacturers with steel making facilities.
	ii)Check Analysis	8.2, Table-2,3		S	One	Each Cast	No testing is required if material is ISI marked and received with test certificate.
9.1	Tensile Test	9.1 ,13 Table-4	IS 3589:2001 IS 1608 Pt.1 IS 3802 Pt.1 IS 4711	R	One	Each consignment of same thickness of skelp/plate, and size of pipes and day of production	In case the sample fails, two more such samples from different pipes shall be drawn and tested. In the event of any further failure the entire day's production shall not be marked.
9.2.1	Flattening test for ERW pipes	9.2.1,13	IS 3589:2001 IS 4711	R[$]	One	a) Every 4 hour production for pipes of each control unit of OD upto & including 350 mm. b) Every 12 hour production for pipes of each control unit of OD over 350 upto & including 900mm. c) 24 hours of production of pipes of each control unit of OD over 900mm	In case of failure of the samples, the whole lot of pipes represented by these samples shall be tested for test on weld and those found failing shall be rejected
9.2.3	Flattening Test for seamless pipes	9.2.3, 13	IS 3589:2001 IS 4711	R[$]	One	-do-	-do-
9.3	Guided Bend Test (for SAW Pipes)	9.3, Fig-1,2 13	IS 3589:2001 IS 2328 IS 4711	R[$]	One	-do-	-do-

(1)				(2)	(3)		(4)
TEST DETAILS					LEVELS OF CONTROL		
Clause	Requirements	Test Method		Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples	Frequency	REMARKS
		Clause	Reference				
10.	Hydraulic pressure test	10	IS 3589:2001	R[$]	Each pipe	Each pipe	Method for NDT and the acceptance level shall be as agreed to between the manufacturer and the purchaser.
12	Tolerances a) Length b) Diameter c)Thickness d) Straightness e) Ovality f) Mass	12.4 12.3.1 12.3.2 12.5 12.3.3 12.1 Table-5,6	IS 3589:2001	R	One	Every one hour	In case the sample fails, that hour's production shall not be marked unless defective pipes are sorted out.
16.1	Protective coating (if required)	16.1 Annex A to D	IS 3589:2001	R[$]	One	As and if agreed between manufacturer and purchaser	
16.2	Galvanizing (if required)	16.2	IS 4736 [illegible] IS 3589:2001	R[$]	One	Four-hour production from each control unit	
17	Joints & ends	17,Fig 3A,3B,4 Table-7	IS 3589:2001	R	One	Every one hour	
14	Visual inspection, Appearance and workmanship	14.1 to 14.5	IS 3589:2001	R	Each pipe	Each pipe	

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled 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.

[$]Note-3: Test equipment(s) to be possessed by the manufacturer only for type(s) and condition(s) in which they intend to supply the material.

BIS STANDARD MARK

ANNEXURE I

(Para 6 of the Scheme of Inspection and Testing)

XYZ IRON AND STEEL COMPANY

(Registered office Address and works address)

TEST CERTIFICATE FOR Steel Pipes for Water and Sewage (168.3 To 2540 mm Outside Diameter)

TEST CERTIFICATE No._____ DATE_____

To M/s_____

We certified that the material described below fully conforms to IS 3589:2001 Chemical composition and Physical properties of the product, as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks LicenceNo.CM/L_____ are as indicated below against each order No.

(PLEASE REFER TO IS 3589:2001 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Control Unit No.	Dimensions and Tolerances			CHEMICAL COMPOSITION							PHYSICAL PROPERTIES					Hydraulic test/NDT#	Coating#
		OD	Thk	Length	C %	S %	P %	Si %	Mn %	Al %	@Micro Alloying Elements %	TS	YS	%EL	Bend Test	Flattening test		

If agreed between

@ Micro-alloying element present should be indicated

REMARKS

WAGON NO.

TRUCK NO.

FOR XYZ IRON AND STEEL COMPANY

(It is suggested that size A4 paper be used for this test certificate)