

**PRODUCT MANUAL FOR
Steel Tubes for Structural Purposes
According to IS 1161:2014**

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 1161:2014
	Title	:	Steel Tubes for Structural Purposes
	No. of amendments	:	NIL
2.	Sampling Guidelines		
a)	Raw material	:	Steel tubes shall be manufactured from Hot rolled steel strip as per IS 10748
b)	Grouping Guidelines	:	Please refer Annex – A
c)	Sample Size	:	For tubes-Mechanical: 3m, Chemical: 5 pcs of 5cm x 5cm For HR strip- Mechanical: 0.5 sq m, Chemical: 5 pcs of 5cm x 5cm
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 1161:2014 with the following scope:		
	Name of the product	Steel Tubes for Structural Purposes	
	Grade	Grade: YSt 210, Yst 240	
	Size	Nominal Bore: 15mm up to and including 150 mm	
	Any other aspect required as per the Standard	Manufacturing Process: ERW/HFIW/Seamless etc. End Condition: Plain/Bevel Ended Surface Condition: Black/ Galvanized	



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ANNEXURE A
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GROUPING GUIDELINES

GRANT OF LICENCE -Most of the tube makers are manufacturing pipes of the sizes between 15 to 150 mm Nominal Bore. As regards different classes (if applicable) of pipes, there is difference of thickness requirements only. Three samples preferably of minimum intermediate and maximum size (One from each class, if applicable) from each type and grade intended to be covered under the licence shall be tested for all the requirements of the specification.

INCLUSION – For the purpose of inclusion of additional sizes of tubes in the existing licences, one sample (preferably maximum for higher sizes or minimum for lower sizes intended to be covered) shall be tested for all the requirements of the specification.. Similarly for inclusion of additional classes/grades of tubes, one sample from each class/grade shall be tested. However, for inclusion of additional types, procedure as given above for grant of licence shall be followed.

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

On the question of grades, samples be drawn from highest grade material and the recommendations may include lower grades also. If galvanized tubes are tested, recommendation may include black tubes as well.

After the grant of licence it may be ensured that samples of all sizes, types and grades covered in the licence without testing are drawn one by one and tested in independent labs at the earliest.

ANNEXURE B
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LIST OF TEST EQUIPMENT

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

Sl. No.	Test Equipment	Tests used in with Clause Reference
1.	Device for instrumental chemical analysis such as Optical Spectrometer with all requisite channels, certified reference materials etc. OR Equipment, Apparatus and reagents as per list annexed in case of analysis as per IS 228	Material, Cl. 5 (Chemical composition)
2.	Vernier Calliper	Outside Diameter, Cl 6, Table 1
3.	Pointed & Ball ended Micrometer and Dial thickness gauge	Thickness, Cl 6, Table 1
4.	Weighing balance of LC 10 gm & Weighing bridge	Mass (Kg/m), Cl 6, Table 1 & Weight of lot
5.	Weighing balance of LC 0.01gm & Chemicals : Alcohol , Solvent naptha /trichloroethylene, antimony trioxide/ antimony trichloride, HCl (Sp Gr 1.16)	Mass of Zn coating (Cl 8)
6.	230 mm long Straight Rod of diameters as per sizes	Free bore test (Cl 8)
7.	Thermometer, Hydrometer & Chemicals: Copper Sulphate, copper carbonate or Copper Hydroxide, distilled water	Uniformity of coating (Cl 8)
8.	Grooved former, Pivoted hammer and Knife	Adhesion test (Cl 8)
9.	1 m long Straight Edge / Tight String with magnetic clamp / flat platform & Filler gauge	Straightness (Cl 9.1)
10.	Measuring Tape	Length (Cl 10.1)
11.	Universal Testing Machine	Tensile test (Cl 11.2)
12.	Tube bending machine, grooved former (with radius at bottom of the groove equal to $6 \times O. D.$ of the tube)	Cold Bend test (11.3.1)
13.	UTM with flattening test attachments	Flattening test (11.3.2.)

The list above is meant for guidance and may not be taken as conclusive

ANNEXURE TO LIST OF TEST EQUIPMENT

INDICATIVE LIST OF TEST APPARATUS, CHEMICALS AND REAGENTS FOR CHEMICAL ANALYSIS THROUGH CHEMICAL METHODS AS PER IS 228

1.	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)
2.	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, Potassium Permanganate (KMnO ₄), Sodium Nitrite (Na ₂ NO ₃), Ammonium Molybdate [(NH ₄) ₂ Mo ₂ O ₇], Ammonium Phosphate [(NH ₄) ₃ PO ₄], Potassium Nitrate (K ₂ NO ₃), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO ₄), Sulphurous Acid, Hydrobromic Acid (HBr) , other chemicals and reagent as applicable	Phosphorus content (chemical method, alternative to instrumental method)
3.	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)
4.	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 Sulphuric Acid, Perchloric Acid, Tartaric acid and hydrofluoric acid	Silicon content (chemical method, alternative to instrumental method)
5.	Plate, Muffle Furnace, porcelain or silica crucible, Reagents: Hot Wash Solution (dilute sulphuric acid solution 1 : 99 v/v with hydrogen sulphide), dilute sulphuric acid, hydrogen sulphide, Dilute Nitric Acid, Sodium Fluoride, solid, Dilute Ammonium	Cu content (chemical method, alternative to instrumental method)

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	Hydroxide, Acetic Acid, Potassium Iodide, Starch Solution, Sodium Thiosulphate Solution, Ammonium Bifluoride Solution	
6.	ashless paper pulp, paper pulp pad, hot plate, dessicator, Reagents: ammonium nitrate, methyl red, dilute ammonium hydroxide, Concentrated hydrochloric acid Concentrated nitric acid, Perchloric acid, Hydrofluoric Acid	Ni content (chemical method, alternative to instrumental method)
7.	Hot plate, stop watch Reagents: dilute sulphuric acid and phosphoric acid mixture, concentrated nitric acid, ammonium persulphate, silver nitrate, dilute hydrochloric acid, ferrous ammonium sulphate, standard potassium permanganate solution.	Cr content (chemical method, alternative to instrumental method)

ANNEXURE C
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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.

1.1The 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– The Standard Mark as given in the First Schedule of the license shall be embossed at a suitable place on the outside of each tube, provided always that the tube thus marked conforms to all the requirements of the specification. Each tube shall carry legibly the manufacturer’s name or trade mark. In addition, the following information shall be included in the label attached to each bundle or stencilled on the tube;

- a) The grade of tubes;
- b) Name of the manufacturer or trade mark, if any;
- c) Size,
- d) Identification mark in code or otherwise to enable the date and lot of manufacturer to be traced back to factory records;
- e) ‘Made in India’, if required.
- f) License No.(CM/L-.....)
- g) The following information should be given on each label - “For details of BIS certification Scheme, visit www.bis.gov.in”

3.1 Test Certificate – If so desired by the purchaser, for each consignment of BIS certified material conforming to IS 1161:2014, test certificate may be issued which shall contain the Standard Mark, cast/control unit number, type, class, size of tubes and corresponding test results as given in Annex 1

4. CONTROL UNIT – All the steel tubes of one size & grade manufactured from same manufacturing process in one shift (8 hrs or less) shall constitute a single 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.

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. Any rejected material which is potentially resalable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/coil number/control unit number, as applicable, relating to all such



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rejections/defective/substandard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced

TABLE 1 LEVELS OF CONTROL

(Para 5 of Scheme of Testing and Inspection)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S:Sub-contracting permitted	Levels of Control		
Cl	Requirement	Test Methods Clause Reference			No. of Sample	Frequency	Remarks
5.	Material	5.1, Table 3	IS 1161	R	One	Each Consignment	No testing is required if material is ISI marked
6.	Dimensions and Weight	6.1, 6.2 & Table 1	-do-	R	One (of each size)	Every hour	In case any sample fails, that hour's production shall not be marked.
7.	Workmanship	7	-do-	R	Each tube	-	The tube failing in this requirement shall not be Marked.
8.	Galvanizing	8	IS 4736	R	Two (Once every four hours)	Each control unit	One sample in the beginning and thereafter once in four hours. In case of failure in visual defects, segregate defective tubes & re-galvanize. In case of other defects re-galvanize all tubes.
9.	Straightness	9	IS 1161: 2014	R	Each tube	-	The tube failing in this requirement shall not be marked.
10.	Length	10	-do-	R	One hour's Production of each size, grade	Every hour	Records shall be maintained

					and class		
11	Mechanical tests Tensile Strength and elongation	11.2	-do-	R	Two	Each Shift (One shift production of tubes of one size, class & grade)	Should any of test piece fail two further samples shall be selected for testing. If both the samples pass, the material represented by the test samples shall be deemed to comply with the requirements.
	Cold bend test (where applicable)	11.3.1	-do-	R	One	Every Hour (One hour's Production of each size, grade & class)	-do-
	Flattening Test (Where applicable)	11.3.2	-do-	R	-do-	-do-	-do-
13.	Oiling & Painting	13	-do-	R	-do-	Each Shift	-do-

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 empanelled by the Bureau.

Note-2: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.



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ANNEXURE -I (Para 3.1 of the Scheme of Testing and Inspection)
XYZ - IRON AND STEEL COMPANY
(Registered Office Address and works address)
TEST CERTIFICATE FOR STEEL TUBES

TEST CERTIFICATE NO. _____

DATE _____

To

M/s

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We certify that the material described below fully conforms to IS 1161:2014 Chemical composition and mechanical properties of the product, as tested in accordance with the Scheme of Testing and Inspection contained in the BIS Certification Marks Licence No.CM/L _____ are as indicated below against each order no.

{PLEASE REFER TO IS 1161:2014 FOR DETAILS OF SPECIFICATION REQUIREMENTS}

TEST RESULTS

Order no	Size	Grade	Cast/lot no.	Qty (tonnes)	Chemical Analysis (% by wt)					Mechanical Properties			Galvanizing		Remarks
					C	S	Mn	P	CE etc.	TS (Mpa)	% El	Flattening/ Cold Bend test	Weight (g/m ²)	Uniformity	

Remarks

REMARKS

SHIPPING ADVICE NO/WAGON NO.

FOR XYZ IRON AND STEEL COMPANY