BUREAU OF INDIAN STANDARDS
(Eastern Region Office, Kolkata)

DRAFT PRODUCT CERTIFICATION MANUAL FOR COMMENTS

Our Ref: DDGE/22/IS 1161 Dated: 20 Feb 2014

Sub: Draft manual for IS 1161

This has reference to CMD circular CMD:1/31 dated 11 Nov 2013 on the above subject. In this connection, please find enclosed the draft product certification manuals as per details below:

STEEL TUBES FOR STRUCTURAL PURPOSES

Kindly examine the draft product certification manual and forward your comments on the draft to ERO at ero@bis.org.in , in the format given below:

Sl no	Clause no/page no	Comments

Last date for comments: 05 March 2014.

(Product Certification Officer)
ERO

DOC : MANUAL / IS 1161/ 1, Nov 2013

PRODUCT MANUAL

FOR CERTIFICATION OF

STEEL TUBES FOR STRUCTURAL PURPOSES

AS PER

IS 1161:1998

BUREAU OF INDIAN STANDARDS

Prepared By	Checked By	Issued By
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AMENDMENT SHEET

Sl No	Page No	Amendment no.	Amendment dt	Remarks / Reasons for amendment

FOREWORD

This manual attempts in highlighting the requirements of Steel tubes for Structural Purposes as per IS 1161 thereof providing handy and significant information related to BIS certification of the same. It elaborates the principle manufacturing processes alongwith desired controls, certification criteria and the requirements of inspection and testing in order to ensure uniformity of practice in certification of the product by various BOs.

This document is intended for internal use of BIS. This Manual should not be treated as a replacement for the Product Standard or the Referred Standards or the relevant Scheme of Testing and Inspection. Contents of this Manual except for what is laid down in ISS and STI and CMD Circulars are recommendatory in nature. Latest Standards and STI as enforced from time to time shall be applicable.

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Section 1 – Product Description

1.1 Steel Tubes for Structural Purposes: A longitudinal formed cylinder (say out of sheet, skelp, flat, strip, plate etc.) joined at the longitudinal seam by processes like :

- Hot Finished Seamless (HFS)
- Cold Finished Seamless (CFS)
- Hot Finished Welded (HFW)
- Electric Resistance Welded (ERW) or High Frequency Induction Welded (HFIW)

1.2 Terminology

Sheet	A hot or cold-rolled flat product, rolled in rectangular section of thickness below 5 mm and supplied in straight lengths. The width is at least 100 times the thickness and the edges can be mill, trimmed, sheared or flame cut. A sheet can also be obtained by cutting of strips.
Strip	A hot/cold rolled flat product and rolled approximately in rectangular cross section of thickness normally 12 mm and below with mill, rolled, trimmed or sheared edges and supplied in coil form.
Skelp	Skelp is strip. Note: Skelp is historically coined from the word 'skelping', an operation in which long narrow strip was beaten into the shape of a tube which was heated to a very high temperature and rolled, resulting in forge welding of the seam.
Plate	A hot or cold-rolled flat product, rolled from an ingot or slab, in rectangular cross section of thickness 5 mm and above and width 600 mm and above, and supplied in straight lengths.
Tubes/pipes	A long, hollow, open ended object of circular or other section. The terms tube and pipe are often used synonymously.
Black Tubes	Tube manufactured without any subsequent surface treatment.
Bevelling	The forming of a bevel on tube ends, generally for end to end welding
Weld	A union between two pieces of metal at faces rendered plastic or liquid by heat or by pressure, or both. Filler metal may be used to effect the union.
Butt Weld	A weld in which the weld metal lies substantially within the extension of the planes of the surfaces of the parts joined or within the extension of the planes of the smaller of the two parts of differing size.
Arc Welding	Fusion welding in which heat for welding is obtained from an electric arc or arcs.

Fusion Welding	Any welding process in which the weld is made between metals in a state of fusion without hammering or pressure
Manual Welding	Fusion Welding in which the welding device is held and manipulated by hand
Hot finished	Tubes made and finished by a hot working process. Generally applied to seamless tubes. Tubes manufactured by weld process and lap weld process are also hot finished.
Submerged Are welding	Arc welding in which bare wire electrode is used; the are is enveloped in a powdered flux, some of which fuses to form a removable covering of slag on the weld.
Cold drawing	Reducing the cross-sectional area of a tube, when cold, by drawing through a die. The tubes are occasionally pushed through the die.
Lap weld process (Hydraulic or water-gas)	A process of making large diameter welded tubes in which a steel plate is bent into cylindrical shape in bending rolls. The overlapping edges are heated for short distances to welding temperature and subsequently welded by pressing them together by hydraulic or water-gas power. The heating and pressing is repeated until the length is welded.
Continuous weld Process (Fretz-Moon Process)	A process for making welded steel tubes, in which a continuous strip is passed (by joining the ends of the coils) through a tunnel furnace, from which it emerges at welding temperature to enter a series of rolls which form it into a tube and weld the abutting edges together.

1.3 Latest Indian Standard with Product Title and Number of Amendments

IS Number - IS 1161: 1998
Product Title – Steel Tubes for Structural Purposes
Number of Amendments – 5

1.4 List of Referred Indian Standards

IS 228	Method of Chemical Analysis of Steel
IS 1239(Pt 1)	Mild Steel Tubes and other Steel fittings- Mild Steel Tubes
IS 1387	General Requirements for the supply of Metallurgical Material
IS 1608	Mechanical Testing of Metals
IS 2328	Method for Flattening test on Metallic Tubes
IS 2329	Method for Bend Test on Metallic Tubes (in full section)
IS 4711	Method for sampling of Steel Pipes, Tubes and Fittings
IS 4736	Hot Dip Zinc coatings on Mild Steel Tubes
IS 4740	Code of practice for packaging of Steel Tubes
IS 10748	Hot- Rolled Steel Strip for Welded Tubes and Pipes

1.5 Application Check-list (Technical points)

- Clear Indication of manufacturing process (ERW/ HFIW/HFS/CDS/HFW), Nominal Bore, Class, Grade, Galvanized or black.
- Conformity of Raw Material to IS 10748 and evidence thereof.
- If Galvanized, then whether it is in-house or outsourced
- If galvanizing is outsourced then conformity to guidelines in Annex- 1 or 4 as applicable
- List of Manufacturing machinery including rolls for all nominal bore of pipes applied for
- List of Test Equipment including bend and flattening test facilities for all sizes
- Test report of pipes covering all parameters , from BIS approved labs submitted within time norms (in simplified procedure) and conformance to IS 1161
- Test report of Zinc (in case of galvanized tubes – applied under simplified procedure) and its conformity to relevant ISS
- Copy of agreement and undertaking as per Annex- 1 if galvanization is outsourced

SECTION 2 – Raw Materials / Components

1. Hot- Rolled Steel Strip for Welded Tubes and Pipes as per IS 10748
2. Zn ingots (in case of galvanized pipes)

Section 3 – Manufacturing Process and In-Process Controls

3.1 Manufacturing Process: Pipes can be manufactured by techniques which may or may not contain any seam. Pipes which do not contain any seam are termed as seamless pipes. The example are Hot Finished Seamless (HFS), Cold Drawn Seamless (CDS) etc. Tubes having seams many be supplied in Hot or Cold Drawn conditions **:-** Example are welded pipes having longitudinal seams like electric resistance welding (ERW), High Frequency Induction Welding (HFIW). Steel tubes shall be manufactured through one of the following processes

a) Hot finished seamless (HFS)

b) Cold finished seamless (CDS)

c) Hot-finished welded (HFW) and

d) Electric resistance welded (ERW) or high frequency induction welded (HFIW)

1. **Electric Resistance Welding (ERW)** - It employs a series of operations, in the first of which the flat rolled steel is cold shaped into tubular form. Welding is effected by the application of pressure and heat generated by induction or by an electric current through the seam. The welding pressure is generated by constricting rolls and the electromagnetic effects of the high welding current. Electric resistance welded tubular products having longitudinal seam are usually made in sizes from 3.2 mm to 0.6 m actual outside diameter, but larger sizes are also manufactured.

2. **Seamless Process** : Steel tubular products produced by seamless processes are made in diameters usually up to 0.66 m by the rotary piercing method and up to 1.22 m by hot extrusion.

   a) Rotary Piercing- In rotary piercing, rounds of the necessary diameter and length are first heated to rolling temperature. Each hot round is fed into a set of rolls having crossed axes and surface contours that pull it through the rolls, thus rupturing it longitudinally. The force of the rolls then causes the metal to flow around a piercing point, enlarging the axial hole, smoothing the inside surface and forming a tube. After being pierced, the rough tube is usually hot rolled to final dimensions.

   b) Press Piercing- A press piercing mill is composed of three basic elements: A roll stand with a round pass between a pair of driven rolls; a billet pusher; and a fixed plug located between the two rolls. The billet, enveloped in a four sided guide, a forced against the plug by the combined action of the pusher and the driven rolls. The material deformation inherent in this process in mainly compressive, with low elongation (1.2% maximum), and thus the billet material (wrought or continuously cast) is not subjected to high tensile stresses. After being pierced, the rough tube is hot rolled to final dimension.

   c) Hot Extrusion is a hot working process for making hollows, suitable for processing into finished tubing of regular and irregular form, by forcing hot, pre-pierced billets through a suitably shaped orifice formed by an external die and internal mandrel.

3. **Cold Finishing:** Pipe both seamless and welded, may be cold finished. The process may be used to increase or decrease the diameter, to produce shapes other than round, to produce a smoother surface or closer dimensional tolerances, or to modify mechanical properties.

   a) Cold Drawing- The process most commonly used is cold drawing, in which the de-scaled hot worked tube is plastically deformed by drawing it through a die and over a mandrel (mandrel drawing) to work both exterior and interior surfaces. Cold drawing though the die only (without a mandrel) is called "sink drawing" or "sinking." Cold drawing may be employed to improve the surface finish and dimensional accuracy, and to increase the strength of tubular products. Some customer specifications prescribe strength levels that can be attained by cold working.

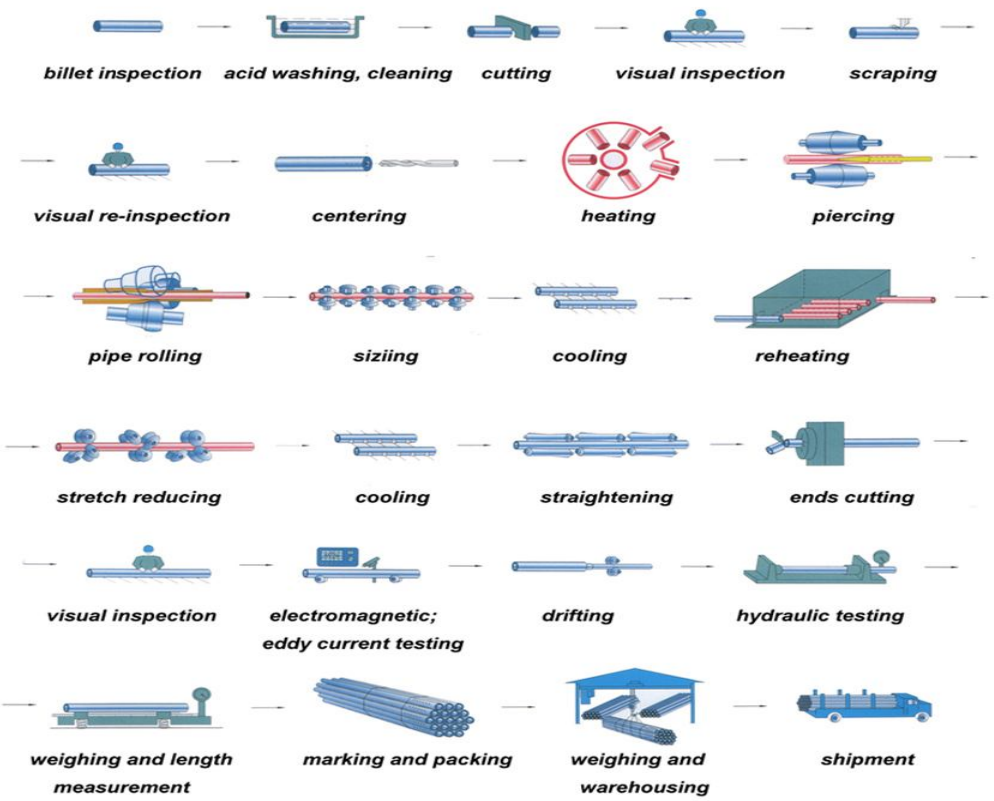
   b) Tube Reducing and Swaging. In tube reducing by rotorolling or pilgering, and in swaging, a reducing die works the tube hollow over a mandrel; swaging may, however, be done without a mandrel. The importance of tube reducing is due to application of heavy reductions (up to 85%) to mill-length tubes, and consumption of less power.

   c) Cold Finishing. Tubular products of circular cross section may be cold finished on the outside by turning, grinding or polishing, or by any combination of these processes. They may be bored on the inside. Because these operations involve only stock removal, with negligible plastic deformation, there is no enhancement of mechanical properties.

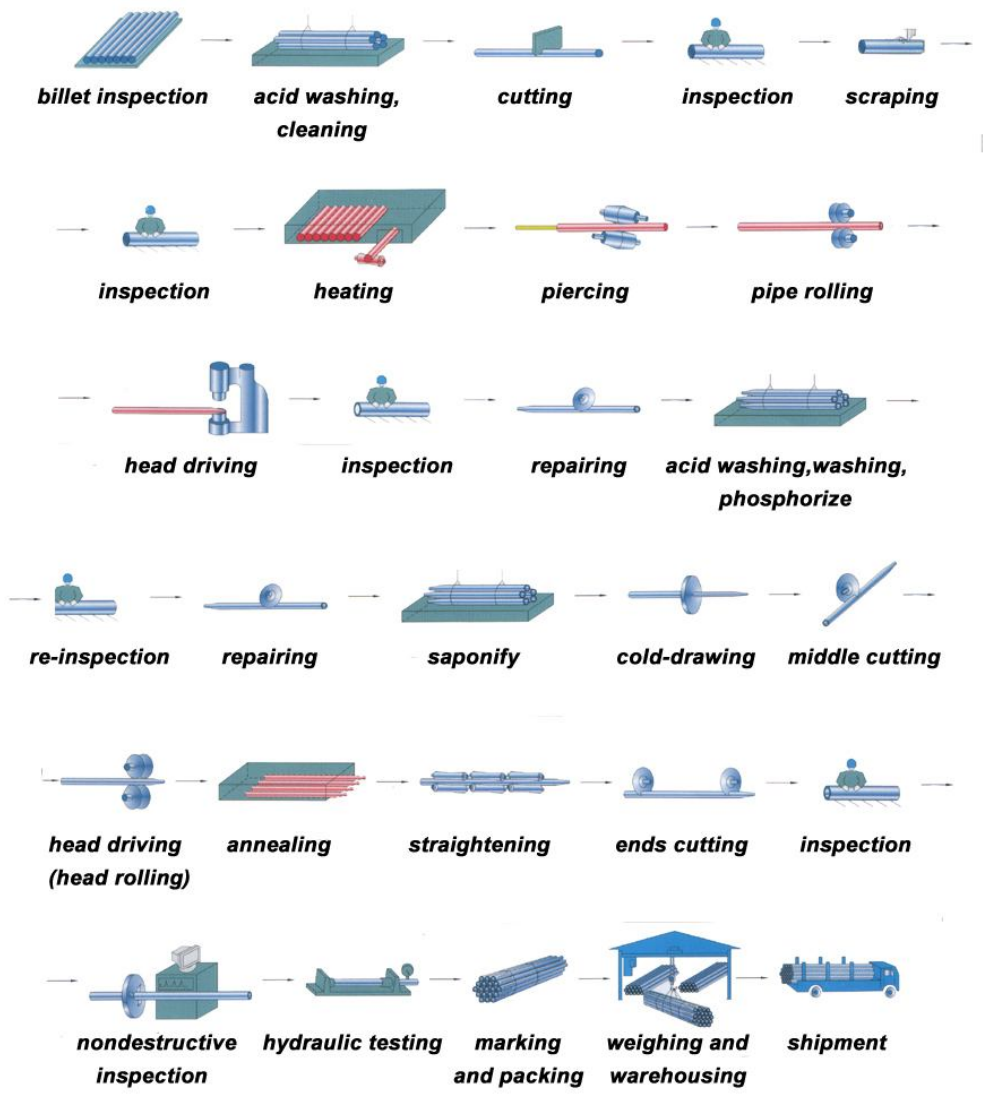
Existing licensees of Mild Steel Tubes can also procure BIS Standard Marked black tubes from other licensees under their own brand name and sell these tubes after galvanizing, threading, socketing and testing. Please refer CMDs guidelines given in Annex- 1.

Licences can also be granted to galvanizing units procuring BIS certified black tubes for galvanizing and other finishing operation. Please refer CMDs guidelines given in Annex- 4.

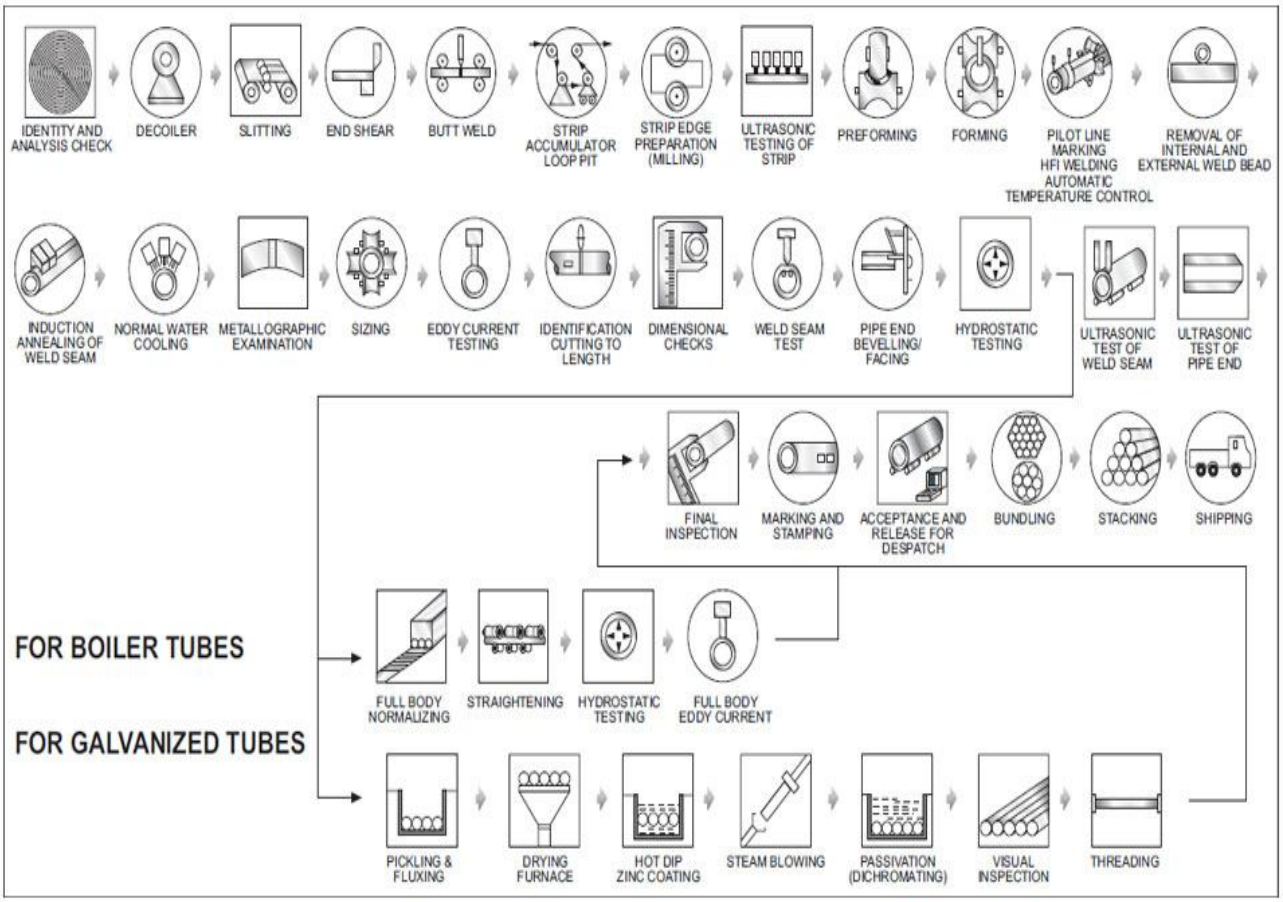
TYPICAL PROCESS FLOW CHART OF HOT ROLLED SEAMLESS STEEL PIPE



TYPICAL PROCESS FLOW CHART OF COLD DRAWN SEAMLESS STEEL PIPE



MANUFACTURING AND TESTING FLOW DIAGRAM OF HIGH FREQUENCY INDUCTION WELDED / ELECTRIC RESISTANCE WELDED BLACK AND GALVANIZED PIPES/ TUBES



3.2 **Infrastructure for Production:** Apart from authenticated premises, necessary infrastructure includes the following

1	Slitting mill and handling arrangement	9	Varnishing /coating arrangement
2	Tube mills and setup for ERW / High frequency induction tube	10	Hacksaw machines/ Flying saws
3	Pipe end facing machines	11	Lathe , Shaping and planning machine
4	Straightening rolls	12	Drill machines and bench grinder
5	Welding transformers	13	Air Compressor
6	Galvanizing plant	14	D.G. Set
7	E.O.T. Crane	15	Weigh Bridge/ Weighing machine
8	Pickling tank.	16	Storage & packing Bays

Section 4 – Certification Criteria

4.1 Critical Requirements of the Standard: All requirements of this standard are Critical

4.2 Scheme of Testing and Inspection: DOC: STI / 1161 / 5 June 2000

4.3 Marking fee Rates:

Unit- 1 Tonne ; Rate: Rs 8,70 per tonne
MMF – 29000/= (Small Scale untits) ; 34000/= (Large Scale units)

4.4 Grouping Guidelines, if any:

As per CMDs circular *CMD-III/16: 1239,3589 dated 1997 11 13(Annex- 2)*

4.5 Guidelines for writing Scope of Licence

Example: Steel Tubes for Structural purposes, Black / Galvanized / Galvanized and Black, Plain / Bevel / Plain and Bevel ended , ERW/ HFIW/HFS / CDS/HFS, Yst 210 / 240 / 310, Class – Light / Medium/ Heavy, Sizes from_____ NB to _____NB as per IS 1161:1998

4.6 Guidelines for Inclusion of new Varieties

As per CMDs circular *CMD-III/16: 1239,3589 dated 1997 11 13(Annex- 2)*

4.7 Sample size, including guidelines for drawal of separate samples when samples are required to be sent to different labs for testing

Physical / Mechanical testing - 1m x 3 nos ; Chemical Testing – 50 g
Also please refer Annex- 3 regarding guidelines on drawal of samples for IT

4.8 Manner of Sealing of Sample(s):

Drillings may be sealed in polyethylene / paper packets with wax seal and BIS sample tag
Tube samples may be bundled together with wax seal and BIS sample tag

4.9 Remnants of sample(s): May be disposed off

4.10 Procedure to be followed for destroying / deshaping / recycling the product that does not meet the quality parameters during regular production

To be scrapped after flattening / deshaping

SECTION 5- INSPECTION AND TESTING

5.1 Packing Material

Drillings (if drawn) – Polyethylene / Paper packets
Pipes – No special packing material required

5.2 List of Test Equipment

Sl No	Cl No & Requirement	Method of test	Test Equipment	Range/ Least count	Calibration
1	OD Cl 6, Table 1	IS 1161	Vernier Calliper	Range : 0-150/ 300/ 600 mm LC : 0.02/0.01 mm	Min Once a year
2	Thickness Cl 6, Table 1	IS 1161	Micrometer -Pointed -Ball ended Dial thickness gauge	Range: 0 - 25 mm LC: 0.01 mm/	Min Once a year
3	Mass (Kg/m) Cl 6, Table 1 Weight of lot	IS 1161	Weighing balance Weighing bridge	0-300 kg., LC: 10 g 40 T	Min Once a year
4	Mass of Zn coating (Cl 8)	IS 4738 IS 6745	Weighing balance	0-3 kg, LC: 0.01g	Min Once a year
			Chemicals : Alchohol , Solvent naptha /trichloroethylene, antimony trioxide/ antimony trichloride, HCl (sp gr 1.16)		
	Free bore test(Cl 8)	IS 4736	Straight Rod of dia 4/6/11/16/21 as per size	230 mm long	----------
	Uniformity of coating(Cl 8)	IS 4736 IS 2633	Thermometer	0- 100 / LC=1 deg	
			Hydrometer	0-0.6, LC=0.01	
			Copper Sulphate, Copper Hydroxide		
	Adhesion test (Upto 50 NB) Adhesion test (>50 NB) (Cl 8)	IS 4736 IS 2629	Grooved former Pivotted hammer, Knife	Radius = 8 x OD	----------
5	Straightness (Cl 9.1)	IS 1161	Straight Edge / Tight String with magnetic clamp / flat platform Filler guage	1 m long 0.1 mm	---------- ----------
6	Length (Cl 10.1)	IS 1161	Measuring Tape	0- 10 m, LC - 1 mm	Min once a year
7	Tensile test (Cl 11.2)	IS 1068	UTM	Range: 20 – 500 kN LC: 0.05 KN	Min once a year
8	Cold Bend test (11.3.1)	IS 2329	Tube bending machine	Groove radius = 6 x OD	----------
9	Flattening test (11.3.2.)	IS 2328	UTM with flattening test attachments		Min once a year

5.3 Test Facilities in BIS labs (as on 26/11/13)

Lab	Testing Facility	Remarks
CL	Complete	
EROL	Partial	Except Straightness
NROL	Complete	
PBOL	Partial	Excluding bend test
SROL	Partial	Bend test for tubes not available
WROL	Partial	Except Bend Test

Test facilities at BIS approved labs - To be verified from intranet from time to time

IS No.	Testing Charges
IS 1161 : 1998	Rs 1085 upto & including 50 NB, Rs.2035 above 50 NB

5.4 Testing of samples for GOL :

- To be on Independent testing basis (Length may be tested during PI on same lot from which IT samples are drawn)
- May be on FT basis if approved by competent authority

5.5 Details of tests

- In applicant cases the following needs to be drawn
  - Product samples - As per grouping guidelines (Annex- 2) out of the samples offered
  - Raw material IS 10748 – Need not be drawn if ISI marked (TC to be obtained from applicant)
  - Raw material sample of Zinc (approx 100 g) needs to be drawn in case of galvanized pipes

- During surveillance visits / market samples only product samples needs to be drawn

ANNEX- 1

(Copy of CMD circular)

Central Marks Department -III

Our Ref : CMD-III/16: 1239 (Pt.1) **1996 08 27**

Subject : Guidelines for existing licensees of Mild Steel Tubes as per IS 1239 (Pt.1):1990 who want to procure BIS Standard Marked black tubes from other licensees under their own brand name and sell these tubes after galvanizing, threading, socketing and testing.

A request has been received from a licensee of Mild Steel tubes as per IS 1239 (Pt.1):1990 to permit them to procure BIS Standard Mark black MS tubes in the brand name and to sell these tubes after galvanizing, threading, socketing and testing. The matter has been examined in CMD and it is proposed that following guidelines be followed for permitting licenses to process BIS standard Marked black MS tubes and sell these tubes after further processing :

i) The licensee shall procure BIS Standard Marked black tubes in their own brand name from valid BIS licensees with prior permission from BIS. The source and the class and size designation of such pipes should be endorsed in his licence suitably.

ii) The licensee shall keep separate record about procurement of BIS Standard Marked black tubes.

iii) If the existing licensee does not have the facility to manufacture the classes and size designations of black pipes which he has been permitted to procure from another licensee, this fact should be endorsed in the endorsement mentioned in (i) above.

iv) In addition to having all test facilities according to IS 1239 (Pt.1):1990 for all the classes and size designations of pipes for which he is licenced, he should have test facilities for all the classes and size designations of black pipes which he proposes to procure from another BIS licensee.

v) The licensee shall carry out required tests at different stage of processing as per frequency given in STI for IS 1239(Pt.1) on these tubes and maintain separate records.

vi) The finished galvanized tubes shall be marked with the licence No. and the lot no. of the galvanizing licensee in addition to other requirements as per scheme of Testing and Inspection (STI). The lot no. and licence number of the galvaniser shall be marked at each end of the tubes by transfix labels which cannot be removed from the pipe and reused. It should be possible to correlate the lot No. of black tubes, procured from outside source with the lot No. of galvanizing tubes.

vii) The responsibility about the quality and conformity of galvanized tubes to IS 1239 (Pt.1) shall lie with the licensee doing galvanizing, further processing and marketing.

viii) The licensee shall also ensure that the manufacturer of black tubes does not supply tubes with same brand name to any other manufacturer or market himself.

ix) The quantities of such pipes would be included in the production of the licensee who is galvanizing and marketing the pipes, for calculation of marking fee.

Submitted for consideration and approval, please.

Sd/-
(C K Veda)
JDCM

ANNEX- 2

(Copy of CMD circular)

BUREAU OF INDIAN STANDARDS
(Central Marks Department -III)

Our Ref : CMD-III/16: 1239,3589 **1997 11 13**

Subject : General grouping for all types of steel tubes for grant of licence / inclusion of additional sizes/classes/grades/types, etc.

Number of Indian Standards are available on Steel Tubes. In order to establish a uniform procedure for coverage of various sizes/classes/grades/types of steel tubes while considering grant of licences and also for inclusion of additional varieties in existing licences, the following procedure shall be followed :

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.

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. It supersedes the grouping for steel tubes for IS 1161, IS 1239(Pt.1) issued vide CMD note ref. CMD/16:1239 dt. 1980 02 27.

Sd/-(VISHNU GUPTA)
Joint Director (CMD-II)

ANNEX- 3

(Copy of CMD circular)

(CENTRAL MARKS DEPARTMENT-III)

Our Ref : CMD-III/16:1239(Pt.1) 10 February 2005

Sub : Drawal of samples for independent testing

This has reference to samples of steel tubes being drawn for testing at BIS labs and other recognized labs. On steel tubes brand name of the manufacturer is embossed in addition to other markings. It is not possible to deface the brand name on the tubes. Therefore, it has been decided that while drawing the samples of steel tubes IO should ensure that sample is cut in such a way that brand name of the licensee, or any other marking indicating the source of manufacture and CM/L No. is not appearing on the sample(cut piece of tube). While sealing the sample, IO to ensure that identity of the manufacturer or licence no is not marked anywhere on the sample or its packing. This is to be ensured for all the samples of steel tubes covered under various Indian standards.

The above procedure be implemented with immediate effect.

Sd/-(C.K.Veda)
DCM-III

ANNEX- 4

(Copy of CMD circular)

CENTRAL MARKS DEPARTMENT –III

Our Ref : CMD-III/16:1161 **2001-01-08**

Subject : Processing of applications of galvanizing units procuring BIS certified black tubes for galvanizing and other finishing operation.

Placed below are the notes received from ERO and GZO requesting to provide guidelines for processing applications from the units who want to procure BIS certified black tubes as per IS 3589 and IS 3601 respectively for galvanizing these tubes and selling them under their brand name with BIS certification. CMD guidelines are already available for operation of BIS licence by galvanizing units for MS tubes as per IS 1239 (Pt 1) (flag A).

In both IS 3589 and IS 3601 galvanizing is optional requirement and tubes may be supplied in galvanized conditions if required by the purchaser. Similar provision is also available in IS 1161. It is proposed to permit processing of applications for galvanizing units for IS 1161, IS 3589, IS 3601 and similar tube standards having provision for galvanizing in line with the existing guidelines for IS 1239(Pt 1). Accordingly, guidelines have been prepared and given at Annexure I.

Submitted for consideration and approval please.

Sd/-
(C.K.Veda)
Director (CMD-III)

Encl: As above

DCM-III – sd/- 2001 01 09
ADGM – sd/- 2001 01 09

(Copy of CMD circular)

Annexure I to note CMD-III/16:1161 dated 2001-01-08

Guidelines for processing of applications from firms who do not want to manufacture but procure BIS standard market black tubes as per IS 1161, IS 3589, IS 3601 and other tube standards having provision of galvanizing under their own brand name and sell these tubes after galvanizing other finishing operation, testing and marking.

1. Applications shall be processed after testing of three samples of different sizes (preferably minimum, intermediate, maximum size intended to cover) and completion of all other formalities. All these samples be tested for galvanizing and other finishing operations and any one sample out of three samples shall be tested for all the requirements as per relevant standard.

2. BIS standard marked black tubes shall be procured with test certificate from BIS licensee as per applicable standard with prior permission from BIS in respect of each source. The class and size designation of such tubes shall be endorsed in the license.

3. The firm shall ensure that black tubes procured are marked with their brand name (the galvanizing units) and license number of manufacturing unit as per the stipulation of the marking clause of relevant STI.

4. The firm shall keep records about procurement of BIS standard marked black tubes. The firm shall have complete galvanizing , finishing, colour banding and testing facilities as per relevant Indian Standard for all the classes and sizes designation of tubes which they proposed to procure from BIS licensee of black tubes.

5. Black tubes shall be received and stocked control unit/batch wise before processing

6. The licensee shall strictly follow relevant STI and maintain records.

7. The lot and license number of the galvanizing unit shall be marked at each end of the tube by transfix label which cannot be removed easily from the pipe and reused. It should be possible to correlate the lot number of black tube procured with the lot number of galvanizing unit. Further complete record shall be maintained about supplier’s name, batch number, brand and supplier’s certificate number.

8. The responsibility about the conformity of galvanized tubes in respect of all the requirements of relevant applicable standard shall always be with the firm doing galvanizing, finishing operation etc.

9. The galvanizing unit shall pay marking fee on the entire production galvanized and meeting the requirement of relevant standard irrespective of fact that the firm is procuring ISI marked tubes from other tube licensees.