DOC No.CMD-III/1239/1 MANUAL

DATE OF ISSUE 17 MARCH 2008

MANUAL FOR CERTIFICATION OF STEEL PIPES, TUBES AND FITTINGS

IS 1161, 1239 (Pt. 1), 1239 (Pt. 2), 1978, 3589, 3601, 4270, 4923, 5504, 6392 & 9295

FIRST ISSUE

BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 B.S. ZAFAR MARG

NEW DELHI – 110 002

MANUAL FOR CERTIFICATION OF STEEL PIPES, TUBES AND FITTINGS

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FIRST ISSUE

FORWORD

The present manual attempts in highlighting requirements of various products relating to steel tubes and fittings thereof for providing handy and significant information related to relevant products. It elaborate principle manufacturing processes and desired controls, involved inspection and testing as need be practiced by BIS licencees and further monitoring thereof expected to be exercised by BIS Inspecting Officials (IO) during planned visits to those units and monitoring of BIS Certification Marks (CM) activities. Different tests as contained in relevant standards and referred standards thereof need be carried out at the licencees laboratory by the visiting officer with knowledge and background possessed by the individual. Since such IOs. come from different educational and technical background and may not be experienced or even having basic knowledge in the relevant field or product category, such documentation of sectoral manual aims in providing basic inputs and all essential aspects with the expectation of bringing uniformity of vision and enabling adoption of rational practices by concerned BIS officials during their visits for inspections to such sector as well as follow of actions.

THIS DOCUMENT IS INTENDED FOR INTERNAL USE BY BIS INSPECTING OFFICERS WHO SHOULD HOWEVER DO NOT TREAT SUCH DOCUMENT AS REPLACEMENT FOR REFERRED STANDARDS OR THAT OF RELEVANT SCHEME FOR TESTING AND INSPECTION (STI). STANDARDS AND OTHER DOCUMENTS (STI ETC.) REFERRED ARE AS APPLICABLE AT THE TIME OF PREPARATION OF MANUAL HOWEVER, LATEST STANDARDS/OTHER DOCUMENTS AS IMPLEMENTED SHALL BE REFERRED.

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SECTION – I

1.0 PRODUCTS AND SIGNIFICANT PROCESSES:

1.1 Products outlined in this document is already identified by the title i.e. Sectoral Manual for STEEL PIPES, TUBES AND FITTINGS which however relates to specific utilities like for carrying water, gas, air steam etc., for use in structural purposes, for General Engineering purposes etc. Pipes of other materials (such as Cast Iron, PVC, HDPE, Concret etc.) or even some other steel pipes having different utility like oxygen lancing, conduit pipe used for protection of electrical wiring system etc. have been kept out of the purview of this manual.

1.2 For understanding about the principle products dealt herein together with their manufacturing processes the following explanatory note (Ref. 1.3 to 1.5 below) and terminology (Ref. 2.0) as described in different standards under deliberation including those defined at IS 1956 (Pt. VIII) -1976 (Glossary of terms relating to Iron and Steel: Steel Tubes and Pipes) and IS 812 -1957 (Glossary of terms relating to Welding and Cutting of Metals) and/or Metals Hand Books published by American Society for Metals would prove useful.

1.3 WELDING PROCESSES

In this process longitudinal formed cylinder (say out of sheet, skelp, flat, strip, plate etc.) are joined at the longitudinal seam by processes like :-

a) 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.

b) Furnace Butt Welding - In furnace butt welding, skelp with square or slighting beveled edges is furnace heated to the welding temperature. The heated stock is roll formed into cylindrical shape as it emerges form the furnace, additional heat is usually provided by an Oxygen or air jet impinging the seam edges and the tube passes through constricting rolls where the seam edges, are welded by the pressure of rolls. Furnace butt welded products are available in normal dia from 3.2 mm to 100 mm.

c) Fusion Welding - In this process the flat rolled steels with edges suitably prepared, is formed into tubular shape either by hot or cold shaping. The flat rolled steel may be shaped longitudinally (straight seam) or bent into helical longitudinally (spiral welded). The edges are welded with or without simultaneously depositing filler metal in a molten or molten-and-vapour state. Mechanical pressure is not required to effect

welding. Fusion may be accomplished by either electrical arc or gas heating or by a combination of both.

1.4 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, prepierced billets through a suitably shaped orifice formed by an external die and internal mandrel.

1.5 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.

2.0 TERMINOLOGY

1)	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.
2)	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.
3)	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.
4)	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.
5)	Tubes/pipes	A long, hollow, open ended object of circular or other section. The terms tube and pipe are often used synonymously.
6)	Tubulars	A term used to include pieces, long-screws, bends, springs, return beds and barrel nipples.
7)	Fittings	Term used to denote fittings like elbows, tee, cross etc.
8)	Sockets	The screwed coupling utilized in jointing the tubes together. Note :- The term 'socket' is synonymous with the tem 'coupling'.
9)	Black Tubes	Tube manufactured without any subsequent surface treatment.
10)	Bevelling	The forming of a bevel on tube ends, generally for end to end welding
11)	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.
12)	Welder	The operator who performs the welding operation. Note:- This term is often used in the United States of America to describe a welding machine.
13)	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.
14)	Arc Welding	Fusion welding in which heat for welding is obtained from an electric arc or arcs.
15)	Fusion Welding	Any welding process in which the weld is made between metals in a state of fusion without hammering or pressure.
16)	Manual Welding	Fusion Welding in which the welding device is held and manipulated by hand
17)	Weld Zone	The sum of the weld-metal zone and the heat-affected zone
18)	Fusion Zone	The portion of a weld in which parent metal has been fused.
19)	Heat affected Zone	Parent metal metallurgically affected by the heat of welding (or cutting), but neither melted nor made plastic.
20)	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.
21)	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. The tube is then heated all over and passed through rounding rolls.
22)	Sub merged 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.
23)	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. The resulting continuous tube is cut to the desired length.
24)	Cold drawn welded tube	Welded tube subsequently cold drawn
25)	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.

26)	Joints	The term "joints" refers to the means of connecting lengths of pipe or of connecting pipes to other units. Common types are flange (fixed or loose) flexible, screwed , spigot and socked, welded.
27)	Casing Pipe	Casing pipe is a pipe which is used to protect the wells and the boreholes from collapsing.
28)	Housing Pipe	Housing pipe is the upper portion of the case section of the well and serves as a housing for the pumping equipment and is a vertical conduit through which water flows from the aquifer to the pump. It is water-tight and extends downwards from ground surface to a fade depth below the anticipated pumping water level.
29)	Drive Pipe	Drive pipe is also a type of casing made up of seamless or welded mild steel pipes designed to withstand the driving force and to penetrate into the ground so as to protect the collapse of the movement of the loose formation which take place during the drilling operations.

3.0 INTENDED USAGE AND CONSUMER CATEGORIES

3.1 Intended use of products under deliberation are apparent from scope of such products itself. Summary statement showing brief scope against each products or ISS also outlined in **Annexure-'B'**. It may be seen there from that most of the products covered under those standards namely IS 1239 (Pt. 1) IS 1239 (Pt. 2), IS 1978, IS 3589, IS 4270 and IS 5504 are used primarily for carrying water and as such the principle buyers are common public (for their domestic application) besides Govt. Depts. Municipal Corporations, Public Health Engg., NGOs various Jal Nigam and allied agencies.

3.2 Other standards like IS 1161 (Tubes for structural purposes), IS 3601 (Tubes for Mech. & Gen, Engg. Purposes), IS 4923 (Hollow Sections for structural use) & IS 9295. Tubes for idlers for belt conveyors) have specific utility in fields outlined in respective standards itself and also evident from the title of such ISS. Flanges of IS 6392 are extensively used in pipe line industries and associated project handling organizations both falling under Govt. and private buying sectors.

3.3 Reference be also made to Cl. 1.1 of Section II for detailed information.

4.0 COMPLAINTS AND FAILURES

4.1 Common Product Failures-Common types of failures encountered in such products and there applications are unsoundness, failure to sustain expected working pressure, Leakage etc. Such failures could be attributed mainly to materials failure arising out of deployment of inferior qualities of raw materials or material containing

inherent defects like lamination, loose scale, deep pits, pinholes, cracks etc. Use of thinner section of material than stipulated ones are also prevalent.

4.1.1 Further, due to improper fabrication or inadequate process controls in involved manufacturing processes including relevant welding techniques, may give rise of several types of defects in basic materials, (tubes etc.), as well as joints contained in products. Imperfect welds like incomplete fusion, burnt, undercuts, cracks, porosity, slag etc. not only causes failure in service applicability but may also lead to reduction of effective cross-sections of pipes and fittings causing hinderance of material flow or transportation. In adequate scarfing of weld seam are quite common. In order to ensure proper scarfing and freeness from such defects in pipes suitable clauses have been included in standards like IS 1978 & IS 3601. It is known that anchoring of Zinc and solidification of Zinc Lump in galvanized pipes pose problem and hinderance of material flow due to reduction of inner section of pipe.

4.1.2 A reference may also be made to IS 10793 which provides classifications of imperfection in metallic fusion welds. Broadly such imperfections have been classified into six groups namely Cracks, Cavities, Solid inclusions, Lack of fusion and penetration, Imperfect shape, Miscellaneous imperfections not included in previously mentioned groups. All such defects with illustration of some typical defects have been placed as Annexure-D

4.2 Inadequate or Improper adhesion of coating (say Galvanized pipes or fittings) also gives rise to common service failure and may result in accelerated corrosion of base material. Similarly poor quality of oil, varnish or coating materials and their improper application on pipes may cause failure in service as applicable for Black, antirust or even specially coated pipes. As stated above anchoring of Zinc in weld fin affects material flow due to which in standards like IS 1978 vide Cl. 8.4 restricts maximum heights of outside weld bead and that of inside weld. Similarly vide Cl. 19.1.3 of IS 3601, the height of internal fin of ERW tubes have been restricted to 60% of the specified thickness. To ensure freedom from deposition of extra lumps of zinc, on inner surface, free bore test has been stipulated vide Cl. 5.3 of IS 4736.

4.3 Leakage and failure from joints (weld, thread) are very common which may be attributed to manufacturing defects besides problems associated with laying and jointing of such products for desired pipe lines or installation. Ovality, lack of straightness, twist further aggravates occurrence of such failures in installation.

5.0 STATUTORY REQUIREMENTS-

5.1 Government of India under Essential Commodities Act issued “Mild Steel Tubes (Quality Control) order 1978” applicable for products covered under IS 1239 (Pt.1), IS 1161 & IS 4270. This exclude seamless tubes or tubes made is accordance with API specification or for tubes produced as per different specification meant for foreign buyer.

5.1.1 By virtue of this enactment, productions, storing for sale or distribution and selling of above tube products is prohibited unless those are ISI marked and not having wall thickness less than the wall thickness stipulated for light class in the specified standards and meeting the require of thickness of zinc coating on the Galvanised tubes as per IS 4736.

5.1.2 Further, in order to ensure that substandard products even in short lengths do not reach the customer end for the intended use of full length of subject products, government of India vide order of 1st June 1983, modified the para 4 of the original Quality Control (QC) order to read as under.

"The residual quantities of substandard quality left with manufacturers, traders, shall be punched with hole of minimum 5 mm diameter to be clear and through, by any process, with an interval of maximum 1.5 metres between such punched holes before being sold in the markets"

5.2 Designated agencies of Union Territories and States are authorized to ensure enforcement of the QC order and modification thereof. A reference may be made to the full text of Gazette publications issued by Ministries of Industries (Dept. of Heavy Industries) vide order of 18 July 1978 and 1st June 1983 attached as **Annexure 'C'**.

SECTION II

1. SPECIFICATION

1.0 Products of Steel pipes, tubes or fitting covered in this document primarily relates to different types of pipes /tubes manufactured out of steel skelp, strip, sheets and/or plates of appropriate quality, grade and section (including thickness) to meet the intended end use.

1.1 Salient Aspects of product standards-

i) IS 1239 (Pt. 1)-04 : Covers tubes of 6 mm to 150 mm Nominal Bore (NB) for the purpose of carrying water, gas, air, steam and based on intended service condition available in different thickness as appropriately designated by classes like, Light, Medium & Heavy.

ii) IS 1239 (Pt 2)-92 : Cover various types of fittings and are necessary adjustment of IS 1239 Pt. 1 tubes.

iii) IS 1978-82 : Cover line pipe for multiferrous utilities in conveying gas, waters & oil. Service condition demands severity & ruggedness besides, Leak proofness in involved joints and alignments. Based on manufacturing process involved [e.g.- Seamless, Butt Welded pipes, Submerged Arc Welding (SAW) etc.] Grades Yst 170, Yst 210 & Yst 240 are covered to denote minimum Yield strength values in MPa.

iv) IS 3589-01 : Covers pipes having 168.3 mm to 2540 mm O/D for carrying water and sewage. Pipes are designated by methods of manufacture (e.g. Seamless, ERW, SAW etc.) and grades Fe 330, Fe 410 or Fe 450 to denote minimum Tensile strength in MPa.

v) IS 4270-: Covers tubes for casing, driving, housing with joints intended for water wells application having Grade of steel Fe 410 or Fe 450 to indicate minimum Tensile strength in MPa.

vi) IS 5504 : Covers spiral seams welded pipes of 457 mm to 2000 mm diameter having maximum thickness of 12.5 mm with application for carrying water primarily.

1.1.1 All above quoted pipes or fittings have significant application in domestic, public health engineering and largely contributes in the area of transportation of potable (safe drinking) water in urban and rural population. Obviously, all such products are invariable tested for leakage (primarily subjecting to hydrostatic or pneumatic test) to ensure soundness before leaving manufacturing premises. Pipes after laying are also subjected to appropriate pressure to ensure soundness of pipes, fittings and their joints.

1.1.2 Other standards like IS 1161 (Tubes for structural purposes), IS 3601 (Tubes for Mech. & Gen, Engg. Purposes), IS 4923 (Hollow Sections for

structural use) & IS 9295 (Tubes for idlers for belt conveyors) have specific utility in fields outlined in respective standards itself and also evident from the title of such ISS. All such finished products based on their manufacturing process and selection of raw materials further ensures minimum Yield strength properties as identified by grades like Yst 160 to Yst 540 as contained in relevant standards.

To illustrate an extract of table 1 of IS 3601 is appended which makes reference of entire range of grades ie. Yst 160 to Yst 540 based on applicability.

TABLE 1 TYPES AND GRADES OF STEEL TUBES
(Clause 1.3 and 3.1)

Section	Type	Grade
2.	Welded tubes (WT): Hot finished welded (HFW), electric resistance welded (ERW), High frequency induction butt welded (HFIW) and Oxy- acetylene welded tubes (OAW)	160, 210 240 & 310
3	Hot finished seamless (HFS)	160, 210, 240 & 310
4	Cold drawn seamless (CDS)	160, 210, 240, 310, 370, 430 & 540
5	Cold drawn electric resistance welded (CEW)	160, 210, 240,310 370 & 430

1.1.3 IS 6392 (Steel pipe flanges) does not come in the category of "tubes" but has large application as their "fittings". Such "flanges" are extensively used in jointing pipe lengths effectively maintaining their characteristics of compatibility and interchangeability. These fitting could be cast, forged and plates or flat steel pipe Flanges (Integral, welded, screwed etc.) for use in pipe line industries as applicable for oil, water, steam, air, gas & chemical services.

1.2 Referred Specifications

1.2.1 All above product standards appearing at 1.1 have invariably made reference to IS 228 for undertaking chemical analysis to ascertain contents of the specified elements (e.g. Sulphur%, Phosphorous%) and their ranges/limits. Other common standards referred primarily includes IS 1387 (Gen. requirements for the supplies of metallurgical materials), IS 2328 (Methods for flattening test of metallic tubes), IS 2329 (Methods for Bend test on metallic tubes), IS 1608 (Tensile testing of metals) etc.

1.2.2 For noting all referred specifications contained in each product standard being dealt in this manual, a reference be made to the matrix attached as **Annexure –'A'**. However it is encouraged that to gain complete knowledge about actual status, the full text of product standards should be consulted.

2.0 List of Raw Materials

a) Steel

i) Unless specified otherwise in relevant ISS, tested quality Steel to meet specific requirements including Mechanical Strength of different product standards are permitted. {e.g. Seamless Tubes in accordance with IS 1239 (Pt. I)-}

ii) Reference also be made for :-
   a) Hot rolled steel strip for welded tubes & pipes as per IS 10748. [application includes tubes as per IS 1239 (Pt. 1) & IS 1161]
   b) Cold rolled low carbon steel sheets & strips as per IS 513

iii) Based on the verities and applications requirements for raw materials of certain product standards stipulates the raw material requirements as could be seen from referring Table 1 & Cl. 2 of IS 6392 (Steel pipe flanges) placed at the end of this section and Cl. 6.1 of IS 1978 (Specification for Line Pipe)

b) Zinc- Zinc ingot and Zinc for galvanizing as per IS 209 and IS 13229 respectable. (applicable for units engaged in galvanizing operation.)

c) Sockets- Threaded galvanized sockets of various sizes as per IS 1239 (Pt. 2) (for supply with tubes of IS 1239 (Pt. 1)

3.0 Source of supplies

a) Steel

Steel sheets (Hot or Cold rolled) & plates are normally procured from primary steel producers in different forms (e.g. coils or straight lengths) and quantity. Various units of SAIL (e.g. Coils from Bokaro & Rourkela plants, skelp from Durgapur), TISCO (Jamshedpur) Nippon Denro Ispat Jindal Strips, Avery Cycle Industries (Ludhiana) Essar Steel etc. are common suppliers.

Usually sheets & coils are slitted at tube manufacturers' units as per requisite size and section of intended tubes production. Skelps could be obtained from re-roller spread over the country.

All such raw material accompany test certificate of conformance or even may be supplied under BIS CM scheme in accordance with IS 10748 (Hot rolled steel strip for welded tubes and pipes) or IS 513 (Cold-rolled low carbon steel sheets & strips).

b) Zinc- Imported through MMTC, Hindustan Zinc Ltd.

c) Sockets- Only a Limited IS 1239 (Pt.1) tube manufacturers are engaged in production of sockets as per IS 1239 (Pt. 2). Usually sockets ISI marked or otherwise are procured from small scale industries, a cluster of which is situated at Howrah, West Bangal.

TABLE 1 MATERIAL SPECIFICATION FOR IS 6392-71

(Clause 2.1)

Sl	Classification	Specification
	a) Forgings	
i)	Carbon steel	IS : 2004 Classes 2 and 3
ii)	Carbon molybdenum steel	IS 1570 Grade 20 Mo 55 with 0.050, Max, of S & P
iii)	Chrome-molybdenum steel	
	1) 1 percent chromium - 0.5 percent molybdenum steel	IS : 2611
	2) 2.25 percent chromium – 1 percent molybdenum steel	IS 4367 , Grade 10 Cr2 Mol
	b) Castings	
iv)	Carbon steel	IS : 2856 Grade CSw- C20 and CSw- C25
v)	Chrome-molybdenum steel	
	1) Carbon molybdenum steel	IS 3038 Grade 2
	2) 2.25 percent chromium – 0.5 percent molybdenum steel	IS: 3038 Grade 4
	3) 2.25 percent chromium -1 percent molybdenum steel	IS :3038 Grade 5
	c) Rolled Plates	
i)	Carbon steel	IS : 2002 Grade 1 and 2A
ii)	Carbon molybdenum steel	IS : 2041 Grade 20 Mo 55

SECTION III

1.0 MANUFACTURING PROCESS

1.1 Different manufacturing processes practiced is best understood by referring relevant product specifications and manufacturing techniques contained therein. Attempt is made to list principle manufacturing processes which are also reflected in the annexed summary of products showing involved processes thereof against each ISS (Ref. **Annexure- 'B'**) :-

Hot Finished Seamless (HFS)
Cold Drawn or Finished Seamless (CDS)
Electric Resistance Welding (ERW)
High Frequency Induction Welding (HFIW)
Hot Finished Welding (HFW)
Butt Welded Pipes (BWP)
Electric Fusion Welding (EFW)
Sub-merged Arc Welding (SAW)
Cold Drawn Electric Resistance Welding (CEW)
Oxy Acetylene Welding (OAW)
Hand-Welding or Manual Arc Welding (MAW)

1.2 Broadly pipes could 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), Cold Drawn Electric Welding (CEW), High Frequency Induction Welding (HFIW).

Other **specialized weld technique** are :- Submerged Arc Welding (SAW), Electric Fusion Welding (EFW), Butt Welded Pipes (BWP), Oxy-Acetylene Welding (OAW), Spiral Welding as practiced in IS 5504 pipes.

Hand Welding or Manual Arc Welding (MAW) has also limited application.

1.3 Product under deliberation take account of intended service conditions. The purpose could be transportation of concerned liquid, gas etc. (e.g. Potable Water for Urban or Rural distribution, water pipeline for general or industrial purpose, waste line systems, carrying of steam, air, gas, oil, for industrial use.) Naturally the variance relates to many factors including quantity (say bulk), pressure of content, nature of

corrosiveness, temperature (Ambient or High temperature) involved pipeline in transportation purpose, severity and designed life of installations. All above stated condition along with others would not only be the guiding factors for the designer but also for the purchasers in deciding their technical specification of tubes, pipes with relevant joints/fittings encompassing size, section, wall thickness, mechanical strength, ductility, coating etc. besides their pressure rating. Consequently tube manufacturer have to adopt right manufacturing technique and adhere to adequate and effective process control for fulfilling the product requirements. Generally products covered under IS 1239 (Pt. 1 & Pt. 2), IS 4270, IS 3589, IS 1978, fall under this category.

1.3.1 Non pressure pipes intended for structural purposes (IS 1161, IS 4923) or General Engineering purpose (IS 3601) though subjected to less severe conditions, provide customers specifications depending on their intended uses and expected performance which is governed by dimension and characteristics like mechanical strength, ductility (as assessed by bend, guided bend, flattening, drift etc. as applicable) besides expected protections through appropriate coatings.

1.3.2 Tubes and fitting thereof are manufactured at plants by suitable processes keeping in view the specific requirements of customers. Common Customers have interest in tubes and fittings products covered in IS 1239 Pt. 1 & Pt. 2 for their domestic use. On the other hand, organized sectors like Municipal Corporations, Public Health Engg. Departments, Govt. Organizations, Industrial Houses etc. procure products covered under IS 4270, IS 3589, IS 5504, IS 1978 etc. as public utility items or for specific industrial applications. Tubes are also manufactured keeping in view of special application relating to particular industries. The example being IS 9295-83 i.e. Steel Tubes for Idlers for Belt Conveyors. Further, installation of pipe lines involve appropriate laying of pipes and jointing together through couplers, sockets, bend, Screw in boss, Flanges or even by welding (say manually, automatic processes insitu, Butt welding etc.) Besides IS 1239 (Pt. 2), the wide range of varieties contained in IS 6392 could be cited as example.

1.3.3 A typical process (flow) chart is attached as **Annexure- 'E'**, outlying manufacturing and testing as applicable for Electric Resistance Welded (ERW) tubes namely IS 1239 (Pt. 1)

2.0 CONTROLS

2.1 Appropriate controls for maintenance of different parameters as stipulated against various products are of paramount importance. Such aspects may include besides **chemicals**, **dimensions** (e.g. Outside Dia, Thickness, Lengths etc. ascertained by checking with the help of micrometers, vernier, calipers , pie tapes, scale etc.) **mass** (single or for lot supply) may be ascertained by using appropriate balance, calibrated weights and/or weighing Machines. Desired **tensile strength**, **Yield** property and **ductility** could be evaluated through tensile test and elongation % in accordance with

IS 1608-05. **Leak-proofness** or ensuring continuity may be arrived through **hydrostatic, pneumatic** and/or **eddy current test**. Appropriate **formability** or **ductility** (as could be ascertained by subjecting bend, flattening and/or drift test) **threads** (by actual measurements or checking by engaging calibrated gauges etc.)

2.1.1 Steel tube manufacturers may exercise stricter on process controls through installation of online **ultrasonic probing** for material soundness and thickness measurement and/or eddy-current test setup for locating unsoundness in parent material and welded portion.

2.2 Selection of right quality of raw material (skelps sheets, plates etc.) commensurate with available mill technology, capability and capacity vis-a-vis size/section and type, class of tubes or fittings are quite significant. At every stage of production or processes appropriate control measures need be exercised by the manufacturing unit. Against each set parameter and methodology, periodic checking and measurements would provide enough information towards adequacy of process control or otherwise in order to enable the management to take corrective actions such as replacement or resetting of rolls, dies etc for stricter control in achieving dimension; adjustment of current, voltage, electrode arc, or speeds of mill for ensuring maintenance of electric resistance or ensuring soundness in weld seams/joints etc.

2.3 Widely differing **welding techniques** are practiced by industries based on product varieties and end uses which necessitate adoption of proper and distinct welding practices to obtain sound weld joints without adversely affecting parent material or weld metal like development of hard spots or martensite formation as referred in IS 1978 and IS 4270 respectively.

2.3.1 Degree of **freedom from defects** have either been included in product standards or need be concluded from classification of imperfections in metallic fusion welds contained in IS 10793-83. To illustrate line pipe as per Cl. 8.6 of IS 1978 identifies injurious defects like leaks, laminations, arc burns etc.

Common **imperfections** encountered **in fusion weld** along with typical illustration are placed at **Annexure – 'D'.**

2.3.2 Product Standards namely IS 1978, IS 3589 and IS 5504 also permit **repair of welds** by adoption of appropriate **welding procedure** through **qualified welder**. Performance level of involved welder could be assessed through specific test as has been included in the product standards.

2.3.2.1 To illustrate repair-welding procedure and welder performance test have been referred at Clauses 2.4, 8.6, 8.8 & 8.9 of IS 1978 and have been detailed at appendix – 'B' of said standard. In this case the repair welding procedure as per B-2 & B-3 consist of test like transverse tensile test, longitudinal tensile-elongation, transverse guided bend test and nick-break test. Similarly repair weld performance tests have been included at B-4.

2.3.2.2 To ascertain appropriateness of repair of injurious defects like sweats, leaks, subject to their depth not exceeding one-third of the specified wall thickness, the precautionary aspect (like complete removal of defects, cleaning the cavity) prior to welding and the provision of retesting of all repaired pipes hydraulically has been made vide Cl. 7.4 of IS 3589 and Cl.10 of IS 5504.

2.4 A host of the manufacturing units ensure maintenance all such identified contributory parameters and also demonstrate same through plotting those against fixed upper and lower control limits. This could be viewed as good manufacturing practice where besides knowing the actual status of the exercised controls, its trends could also be analysed for planning further.

2.5 An unit deploying semi-dry process for galvanizing tubes could have sequential stages like cleaning (removing oil, paint, dust by solvent), pickling (dipping in tank of 20% HCL) rinsing (in running water), pre-fluxing (dipping in solution of 30% concentration containing 1:1 Zinc Chloride and Ammonium Chloride- dried and heated to about 80^0C), galvanizing (flux blanket, temperature 450-465^0C, 40-65 Seconds dip to obtain mass of coating ranging 450-720 g./m^2), quenching and Dichromating (quenched in running water, dipping in 1 % Sodium Dichromatic solution).

2.5.1 Surface of tubes (cleanliness, freeness from oil, scale, dirts, rust, loose scale etc.) and **bath conditions** (e.g. concentrates, impurities contained, viscosity, temperature etc.) along with adhering of **time schedule** provides adequate confidence for obtaining appropriate zinc coating in terms of **quality** and desired **thickness**. Thus much emphasis is given by the manufacturing/processing unit for frequent and regular checking, measuring, analyzing and recording set parameters and controlling baths to rectify the situation. Suitable inhibitor (say Rhodinc) is added to pickling bath to avoid attack on metallic surface and checking of bath done regularly to ensure that iron content does not exceed desired level.

2.5.2 It is known that the manufacturing processes have to be appropriate for obtaining desired coating and finish condition. Towards this supply of tubes in galvanized condition plays predominant role. As far as practicable tubes need be galvanized in accordance with IS 2629 i.e. recommended practice for hot dip galvanizing of iron and steel. Zinc used need to conform to suitable grade specified in IS 209+ i.e. Zinc ingot or IS 13229 i.e. Zinc for galvanizing. Purity of Zinc should normally be over 99 %.

2.5.3 Based on the article size, section and length, a manufacturing unit deploys galvanizing tanks where in batches or individually such items are hot dipped and removed thereafter at pre determined time on ensuring desired coating thickness besides their adhereness and uniformity. Full length of tubes are usually kept in slanted position on taking out of hot bath and steam is blown from the end kept at higher position to ensure that extra zinc or dross are completely drained out prior to their solidification. Manufacturing technique may give rise to non uniform zinc coating at both ends. However to ensure that mass of zinc coating of both ends meet the minimum mass of zinc coating stipulated in standards, a suitable note have been included under clause 5.1 of IS 4736 i.e. hot dip zinc coatings on Mild steel tubes.

3.0 ENVIRONMENTAL ASPECT

3.1 Since galvanizing process is hazardous, cumbersome and emits lot of poisonous fumes and thereby pollutes environment, it is essential to satisfy the regulatory authority through adoption of appropriate techniques, making special arrangements for equipment, excising controls ensuring safety measures and engaging skilled personnel equipped with protective clothing. Due to polluting of surrounding, often such galvanizing is not permitted in confined industrial units specially for old units situated in congested locality engaged in manufacturing black tubes.

4.0 OUTSOURCING

4.1 BIS has adopted industry friendly policy, without flouting government directives, to permit interested licensed units, including those situated in restricted area to get their black pipes galvanized at another licensed unit with the stated conditions. In all such cases based on merit permission is accorded by BIS on condition of exercising necessary controls.

4.2 A reference may also be made to BIS circular under reference No. CMD – III/16:1161 Dt. 8th January 2001, which deals on the subject of **"Processing of applications of galvanizing units procuring BIS certified black tubes for galvanizing and other finishing operations."** Here guidelines have been provided for processing application of firms who are engaged in procuring BIS Standard Marked black tubes as per IS 1161, IS 3589, IS 3601 (besides IS 1239 Pt. I tubes) and other tube standards having provision of galvanizing under their own brand name and sell these tubes after galvanizing other finishing operations, testing and making. For full text reference may be made to relevant appendix.

5. TYPICAL LIST OF MACHINERIES/EQUIPMENTS

1. Slitting mill and handling arrangement (like EOT crane, welding set etc.
2. Tube mills of appropriate capacities and setup for ERW (if applicable, for say sizes 15 mm to 50 mm and 65 mm to 150 mm or higher capacity say upto 250 mm).
3. High frequency induction tube welding plant (if applicable of appropriate capacity say upto 50 mm NB).
4. Pipe end facing machines
5. Cutting tool to remove excessive height of the weld bead (scarfing) and internal fin,
6. Straightening rolls
7. Welding transformers
8. Air compressor
9. Weighing machine (say 300 kg capacity).
10. E.O.T. Crane (say 5 tonnes capacity).
11. Threading machines.
12. Automatic galvanizing plant with steam blowing arrangement .
13. Pickling tank.
14. Accessories and associated setup for galvanizing (including E.O.T. Crane).
15. Varnishing equipment/coating arrangement as applicable.

16. Power hacksaw/ Hacksaw machines/ Flying saws in pipe manufacturing line.
17. Arrangement for marking of class of pipe, relevant ISS, ISI Std. mark, Manufacturers name etc (as per STI requirements).
18. Lathe machine
19. Shaper machine
20. Planner
21. Drill machines
22. Grinder bench
23. Air Compressor
24. D.G. Set
25. Weigh Bridge (say 40 t capacity)
26. Storage & packing Bays

SECTION IV – I

1.0 INSPECTION & TESTING

1.1 Reference may be made to relevant Scheme for Testing and Inspections (STIs) for taking account of inspection, measurement and tests called for including need for maintenance of record by the licensees with respect to utilization of raw material, desired inprocess control and evaluation of finished products.

1.2 All STIs in principle contain some common provision as guidance or directives for adherence which includes :-

1) Maintaining of suitable equipped and staffered **laboratory** for undertaking different **tests** (as stipulated in specification) in accordance with the methods prescribed.
2) Use of **Statistical Quality Control** (SQC) methods for controlling the qualities of product during production and need for introduction of Qualities Management System (Ref. various parts of IS 397 and IS/ISO 9000 series)
3) Marking of **Standard Mark**, as given in column (1) of the first schedule of the licence and **other markings** together with color bands applicable for

specific product variety, grade and class, as contained in relevant standards and elaborated in particular STIs.

To illustrate: [Ref. STI for IS 1239 (Pt. I) -04]

a) Each tube shall be embossed with the manufacturer's name or trade mark, IS No. (say IS 1239 (Pt. I), and applicable class of tube i.e. Light, Medium and Heavy (denoted by 'L', 'M' and 'H' respectively) at regular interval of one metre.
b) Each tube of size 25 mm NB and above shall be marked with batch number by embossing/stenciling/transfix label/ etching. For sizes upto and including 20 mm NB batch number shall be marked on the tag attached to the bundle of steel tubes.
c) Each tube length to have co lour bands like Yellow, Blue or Red for 'L' 'M' or 'H' class tubes respectively .
d) Marking of Licence No (CM/L. . . .) on each tube by embossing/stenciling/ transfix label/ etching.
e) Each bundle of product to contain metal/plastic tag with following information.

i) The class of tube/process of manufacture
ii) Identity of the source of manufacture
iii) Size
iv) Batch number or Identification mark in code or otherwise enable the date of manufacture and control unit number to be traced back to factory records
v) License No (CM/L…) and
vi) Made in India (if required)

4) Providing Definition of **Control Unit** to enable drawl of representative samples out of homogeneous lot and as contained in relevant product standards and making its applicability with respect to involved test and process controls as contained in **levels of control** and associated table. Such table provide detailed information related to requirements to be evaluated and corresponding test methods for involved no of samples, lot size and frequency including retest provision.

5) **Rejection record** maintenance**.** Also modality of rejection which is critical and mandatory for tubes falling under MS Tubes (QC) Order 1978 as amended on 1st January 1983

6) **Supply of samples** –Responsibilities and liabilities of licensee and BIS outlined.
7) Provision for **replacement**.
8) Provision for **stop marking/ suspension of marking.**
9) **Production data** submission.

1.3 Raw Material -Primarily the raw material utilized by the manufacturer of products under deliberation are produced by primary or secondary steel producer

through standardized melting routes (through open hearth, basic oxygen process, electric farness etc.) and adhering to stringent process controls in melting casting (say ingots or continuous cast sections) and successive rolling to obtain requisite finished section either in hot or cold finished conditions.

1.4 Chemical requirements -In all cases whether such raw materials like steel strips, sheets, plates are supplied covering under BIS certification scheme or not, those are invariably accompanying test certificates containing chemical analysis based on ladle samples. Steels supplied in rimming qualities contain such values based on product sample. In most of the products standards provisions have also been made for check analysis drawn from raw material or finished products permitting variation from certified analysis values. Usually a variation of 0.02 %, 0.04%, 0.005% and 0.005% on upper specified range has been allowed for elements 'C' (carbon), 'Mn' (manganese), 'S' & 'P' (Sulphur & Phosphorous) respectively falling under Mild Steel or Plain Carbon steel category normally having 0.27% 'C' maximum. Raw material for IS 6392 differs widely as many be seen from table I of said standard having altogether different materials and chemical compositions.

1.5 Further, besides ascertaining **dimensional** conformance including thickness requirement, suitability of the raw material supplies may be ascertained from mechanical properties (when applicable) as contained in test certificates (either BIS certified or Works Tested) accompanying such consignment vis-à-vis intended final products through series of manufacturing processes at the manufacturers end.

2.0 PROCESS CONTROLS

2.1 For effective in-process controls often hourly testing or inspection have been prescribed for practicing during actual manufacturing of products.

2.1.1 To illustrate requirements for dimension, mass, joint, tube end, length of IS 1239 (Pt. I) tubes to be measured/checked by drawing one sample every hour. Likewise as per IS 4923, one sample every half an hour has been prescribed for ascertaining dimensions, weight, straightness and twist requirements. Further as per STI of IS 6392, each flange is to be checked for conformity or otherwise for requirement of Dimensions, Machining of flanges, Workmanship & Finish, Joint faces and Finish of Joints surfaces.

2.2 In case of failure of sample in dimension or mass production to be suspended and cause of failure to be investigated for rectification. 100% inspection of material produced during 1 hour prior to failure to be segregated. Only tubes found conforming to be accepted and rest to be disposed off as rejected. For subsequent products, frequency of testing shall be changed to 15 minutes till 5 consecutive samples pass.

2.3 Hydrostatic/Pneumatic/Eddy current test etc.- Provisions of standards are reflected in relevant STIs need be followed.

2.4 Workmanship, Finish, Protective Coating - Provisions of standards as applicable and as indicated in relevant STIs need be adhered by manufacturers and same verified by IOs

3.0 SAMPLING AND CRITERION FOR CONFORMITY

3.1 Unless otherwise agreed to between the manufacturer and the purchaser, the methods of sampling of steel pipes, tubes and fittings outlined in IS 4711 to be followed for sampling and criteria for conformity. Various STIs have therefore referred this standard making same applicable for licensees.

4.0 RETEST

4.1 Provision for retest are generally included in product standards and same reflected in relevant STIs. For specific applicability and criteria of acceptance the text of standards together with corresponding contents of STIs (more truly the table thereof) need be referred for implementation

4.2 As a typical illustration provision made vide Cl 14.4 of IS 1239 (Pt. 1) is appended.

"Should any one of the test pieces first selected fail to pass any of the tests specified above, two further samples shall be selected for testing in respect of each failure. Should the test pieces from both these additional samples pass, the material shall be deemed to comply with the requirements of that particular test. Should the test pieces form either of these additional samples fail, the material represented by the test samples shall be deemed as not complying with the standard"

SECTION IV-2

TEST METHODS

1.0 Relevant product standards or referred standards therein with respect to specific test methods need be consulted at the first instance for ensuring correct and appropriate test methods against each test parameter for practice and record by the manufacturers and also for following same by BIS inspection officers (IOs) during their inspections and assessment at licensees premises. Further general guidelines and precautionary measures are appended together with a few typical examples showing criteria of acceptances;

1.1 Chemical Analysis- Relevant part of IS 228 to be consulted. Usually ladle analysis are stipulated. Product analysis or check analysis may also be involved.

1.2 Dimensions - Referred standards and generally accepted measurement techniques to be followed. Usually it relates to outside diameter (O/D), inside diameter (I/D), wallthickness (t), depth (D), breadth (B), ovality, eccentricity, fin at inside/outside dia length etc. as applicable. Checking involves measuring instrument like micrometers (flat end, ball point, conventional or digital), vernier (conventional or digital) height gauge, calipers (outside, inside, dial) pie tape, steel tape, scale etc. of appropriate range, least count and accuracy.

1.2.1 A number of observations over selected cross section (usually from both ends and also at middle portion for O/D and ovality) provide adequate values for reporting O/D, ovality, thickness. Normally minimum O/D would be revealed at 90^0 of position recording maximum O/D value.

1.2.2 Ball point or pointed micrometers are useful in checking wall thickness of tubes accurately. Utmost care need be taken for recording minimum thickness value around circumference which may arise due to inadequate process controls during welding (say deep undercut) or other operations. A typical example being removal of parent metal during scarfing operation (aiming removal of weld bead) of welded tube having mismatch of formed parent sheets.

1.3 Weight/ Mass- Tubes/ pipes in single or lot are involved. Single full length, parted or bulk pipes weighments may be called for. Suitable balance (self adjusted electronic, pan balance with calibrated standards weights) or weighing machines of suitable capacities together with steel tape, scale etc. are required.

1.4 Tensile, Yield and Elongation %- Reference to be made to relevant standards and IS 1608 primarily. Further reference may be made to IS 12278 i.e. Ring tensile test on Metallic tubes as has been mentioned at 14.1 of IS 1239 (Pt. 1).

Note:

i) Standard prepared sample as outlined in IS 1608; Either strip sample out of tube/pipe or full section/rings (for smaller section of products) to be subjected to such test. Ring tensile test as described in IS 12278-88 (applicable for tubes with O/D exceeding 150 mm and wall thickness not greater than 40 mm.) specifies the method of test to reveal surface and internal defects by subjecting parted ring test sample to strain until fracture occurs. Test also enables assessment of ductility of tubes.

ii) Suitable Tensile or Universal Testing Machine (UTM) of appropriate range, least count and accuracy to be deployed. Calibration of such machine to be done in

accordance with IS 1828 Pt. 1 for appropriate class. Usually ± 1 % accuracy is ensured.

iii) Speed of testing (Loading) should be uniform and in conformance with requirement contained in Cl. 10.1 of IS 1608-05. For ring tensile test rate be 5 mm/sec. maximum.

iv) Area of cross section (A) of sample piece t be calculated. For complete tubes measurements of O/D, t would be required where as for slitted strip sample would be width, t and consideration for curvature in concerned sample pieces. Reference be made to annexure 'D' of IS 1608-05 which provides guidelines for types of test pieces to be used for tubes.

v) Noting load where Yield occurred and maximum value reached from dial of UTM (or digital displayed) corresponding Yield stress and tensile strength respectively could be computed by dividing the values by the nominal area of cross section. i.e. A. Values corresponding to Yield and tensile could also be read from stress strain graphs.

vi) Gauge Length in mm to be marked for 5.65v**A** where A is Area of cross section in mm^2. Alternate gauge lengths when used a reference to be made to IS 3803 (Pt 1)-89 i.e. method for elongation conversation of carbon and low alloy steels. When elongation in measured over a given fixed length, its conversion to proportional gauge length may also be agreed in accordance with provision of ISO 2566-1.

vii) After fracture both pieces brought together (usually placing on magnetic chucks or fabricated angle stand) to measure elongated portion of gauge length and computing elongation in percentage. For obtaining correct elongation % of the sample the position of break should be within middle third of gauge length. In case actual break occurs beyond this limit and result is found not meeting the stipulated value, the test may be repeated. Where fresh test is not feasible old values could be reported with suitable remarks like "broken beyond middle third" or "broken beyond gauge mark" as the case could be. To avoid such situation often additional marks (e.g. marking of half gauge marks) are put. Markings may be made through "pop mark" (using sharp steel punch having suitable radius at tip to avoid notch effect) or using pointed scribers.

Further, when fracture occurs outside the gauge mark (and sample found non-meeting the requirement or retest to be avoided), the method based on sub-division of original gauge length into N equal parts may be used on prior agreement as described in Annexure –'G' of IS 1608.

1.5 Length and Straightness- To be checked as per relevant product standards and tolerances thereof. For requirements of length reference may be made to relevant standards for production and supply. Normally lengths are supplied to random lengths of 4-7 m (also provision for 7-14 m as in IS 5504, IS 3589). Supply to exact lengths or short lengths also permitted in some product standards under stated conditions and tolerances.

Length are checked using steel tapes or scales.

Straightness of tubes to be checked for ascertaining to maximum deviation permitted in products standards. Rolling tube lengths on leveled concrete platform would enable noting maximum deviation. Usually 1 mm deviation in a length of 600 mm has been

allowed as in products of IS 1161, IS 4270, IS 4923 (for finish and straightend condition). Maximum 1 in 200 deviation has been stipulated for Mill Straightend tubes of IS 4923. For tubes of IS 9295 deviation of 1 in 1000 has been specified. On the other hand a maximum deviation of 0.2 % of the total length has been permitted as per Cl. 12.5 of IS 3589 pipe while checking straightness using a taut string or wire from end to end along the side of the pipe.

1.6 Twist: Applicable for hollow section as per Cl. 9.2 of IS 4923. Checking and recording to be done keeping in view above clause.

1.7 Hydrostatic/Leak Proof Test etc.- Usually such tests to be carried out at manufacturers' work in uncoated condition as an in-process test. For Hydrostatic or Pneumatic test pressure, duration and modalities reference may be made to individual product standards. Eddy current test has been included in IS 1239 (Pt.1) as an alternative to hydrostatic test which need to be carried out as per annexure –B of said standard.

1.8 Bend: i) Normally applicable for tubes 50 mm Nominal Bore (NB) or below. Test of full section to be done in accordance with IS 2329 -85 (Ref. IS 1239 Pt. 1, Cl. 11.3.1 of IS 1161, Cl 11.3 of IS 1978, IS 3601 etc.)
ii) Provision for bend test of strip (over 38 mm vide) also appears as per Cl .13.3 of IS 3601.
1.8.1 Guided Bend- This test are applicable for SAW pipes and need be followed as detailed in relevant standards namely Cl. 11.4.1 of IS 1978, Cl. 9.3 of IS 3589 and Cl. 6.3 of IS 5504

1.8.2 Flattening Test- Test method as detailed in IS 2328 -83 to be practiced (Ref. IS 1239 Pt. 1, Cl. 11.3.2 of IS 1161, Cl. 6.2 of IS 4270, seamless pipe of IS 3589, IS 3601, Cl. 11.2.4 of IS 1978, Cl 6.2 of IS 5504 and IS 9295)

1.9 Drift Test- Test method outlined in IS 2335-85 to be followed. (Ref. IS 1239 Pt. 2, IS 3601, IS 9295) Steel mandrels of appropriate diameter and conically shaped to form included angles like 30^0, 45^0, 60^0 at stipulated in relevant product standards to be used.

1.10 Crushing Test-Applicable for IS 3601 tube as detailed in Cl. 13.6

1.11 Expansion Test on Socket (Taper screw plug test)- As per Cl. 11.2.2 of IS 1239 Pt. 2 this test has been stipulated as alternate to drift test of socket. In this test taper screw of dimension as given in table 31 is deployed. Threads form and angle of taper need to conform to IS 554 and made out of hardened steel having 700 – 800 HV/30kg (Ref. IS 1501)

1.12 Threads- Ref. may be made to applicable product standards and IS 554, IS 8999-, IS 3333 (Pt. 1). Conformance usually ascertained through gauging deploying calibrated applicable plug or ring gauges.

1.13 Galvanizing- Reference may be made to individual product standards for applicability and also IS 4736, IS 2633, IS 6745 & IS 2629.

a) **Mass of Zinc Coating-** (Reference Cl. 5.1 of IS 4736) For Tubes with thickness upto 6 mm, the minimum mass of Zinc Coating on a sample of 100 mm long test pieces checked in accordance with IS 6745 shall be 360 g/m^2**.** Two specimens to be taken from opposite ends of IS 1239 (Pt. 1) tube under test.

b) **Freedom form defects-** (Ref. Cl. 5.2 of IS 4736 Cl. 6.1 of IS 2629 etc.) Coating shall be reasonable smooth and free from imperfections such as flux, ash, dross, black spots, pinholes, lumpiness, runs, rust stains, bulky white deposits and blisters. Guidance for rejections/acceptance of above stated defects have been prescribed in Appendix of IS 2629.

c) **Free bore test**- (Ref. Cl.5.3 of IS 4736) A 230 mm long rod of appropriate diameter having maximum clearance (inside margin) of 4 mm need be passed through the bore.

d) **Uniformity of galvanized coating** (Ref. Cl. 5.4 of IS 4736) Unless specified otherwise, coating on 100 mm long test piece drawn from either ends of tubes (discarding 50 mm from each end) shall with stand 5 dips of 1 minute duration when tested in accordance with IS 2633.

e) **Adhering test** (Ref. Cl 5.5 of IS 4736) Tubes of maximum 50 mm on cold bending through 90^0 round grooved former not to develop any crack in coating. Tubes of higher bore to be subjected to "pivoted hammer test" as given in Cl. 6.4.1 of IS 2629

Note:

i) Uniformity of galvanized coating as described at d) above by ascertaining requisite dips (hence commonly known as "Dip test" or "Preece test" in not applicable for "aged" or "weathered" galvanized material. However, if necessary, corrosion film present on such weathered article need be removed before testing by method outlined at appendix "A" of IS 2633.

ii) Cleaning of sample and/or removal of lacquer or varnish coatings prior to test (Ref. Cl. 2.3 of IS 2633).

iii) Preparation of Copper sulphate solution and maintaining specific gravity of 1.186 at 18 ± 2^0C during test (Ref. Cl. 3.1 of IS 2633) in follow procedure and interpretation as outlined at Cl. 4 of IS 2633.

1.14 Check for martensite- Vide Cl .5.3 of IS 4270, it has been prescribed to ensure that no martensite is formed. Alternatively, no untempered martensite, should remain even though same structure might have appeared during welding. Such examination is feasible only by preparation of sample, polishing, etching and micro examining under suitable magnification.

1.15 Checking for hard spots-Irregular surface of welded pipes in sizes 508 O/D when attributes to hard spot, its hardness to be checked to ensure that same is within 35 RC or 327 Brinell as per Cl. 8.4 h) of IS 1978.

1.16 Hardness

i) IS 1501 Vickers hardness test for metallic materials for ascertaining suitability of taper screw for expansion test of socket within 700-800 HV/30 ranges as per Cl. 11.2.2 of IS 1239 (Pt. 2).

ii) IS 9295 Provides Cl. 10.1 for agreed values (and method) between purchaser and manufacturer.

iii) IS 4270, Cl. 5.3 stipulates for hardness values lower than 230 HV.

1.17 NDT

Ref. Cl 12 of IS 1978 which provides optional test requirements like Radiological evaluation, Ultrasonic, Electromagnetic, Magnetic particles etc. as per applicability and standards test methodology with evaluation criteria thereof.

1.18 Pipe/Tube ends-

i) Liner and angular measurements called for as in Cl. 9 and figure 3 of IS 4270

ii) Liner and angular measurements and checking by metal gauges of appropriate dimension as mentioned in Cl. 17 of IS 3589

1.19 Alignment Test-

Axes of any two screwed pipes not to be out of line by more than 100 mm in each 6 m as stipulated in Cl. 11 of IS 4270.

1.20 Workmanship, finish and free from surface defects

All tubes and fittings intended to be covered under BIS CM Scheme are subjected to visual inspection in order to ensure desired workmanship, finish (eg. Black or Coated conditions) and freeness from surface defects as outlined in relevant product standards.

SECTION–IV-3

1.0 TEST EQUIPMENTS

1.1 Test equipments essential (or recommandary in nature) for any tube manufacturer would widely vary with regards to the varieties of products, (encompassing sizes, grades, types etc.) manufacturing processes involved including types of coating and also the policy of the management for equipping the laboratory with respect to the types of equipments and their sophistication. Inspite of so, attempt is made herein to enlist primarily the essential equipments for handling major steel tube products both in black and galvanized condition and for supply of plain ended or screwed and socketed tubes.

TYPICAL TEST EQUIPMENTS AND INSTRUMENTS FOR STEEL TUBES

Sl. No	Test equipment/ Instruments /Arrangement /Chemicals required.	Capacity /Range and Least count	Whether calibration required & frequency Yes/No	Principle Test for which required	Remarks And common make/ supplier
1. i)	Micrometer -Flat end -Pointed -Ball ended (Conventional / Digital)	Range: 0 - 25 mm LC: 0.01 mm/0.001 mm	Yes (A)*	i) Thickness of slitted coil/sheet/tubes ii) O/D, I/D, Ovality etc. iii) Height of weld bead/ internal fin	Mitutoyo (Japan) Indian tools (Mumbai)
ii)	Micrometer (Conventional / Digital)	Ranging from 125 – 300 mm LC : 0.02 mm	Yes (A)*		
iii)	Dial thickness gauge	0 -100 mm/ LC 0.01 mm	Yes (A)*		
2.	Vernier caliper (Conventional / Digital)	Range : 0-150 mm 0-300 mm 0-600 mm LC : 0.02/0.01 mm	Yes (A)**	O/D, I/D, Ovality etc.	-do-
3.	Measuring Steel tape/scale	Range : 0 - 1 metre 0- 10 metre LC : 1 mm	Yes (initial)	Length of tube Section weight	Local Supplier

4. i) ii) iii) iv)	Straightedge, String Concrete platform Angle protector 180^0 and vernier	-	No except for vernier	Straightness/ twist	Local supplier
5.	Universal Testing Machine (Load cells of appropriate capacities or having 3-4 ranges in conventional equipment)	Range: 20 kN – 500 kN LC: 0.05 kN	Yes (A)	Tensile strength, Yield Stress, Elongation %, Flattening, Drift expansion, Guide bend, Crushing strength etc.	FIE (Ichalkaranji), KMI, Blue Star supplied. Imported makes: Llyods, Dennison, Instron etc.
6	Bend test Machine	15 mm NB -50 mm NB Complete with Clamps	No	Bend test	Local supplier
7.	Hydraulic leak Tightness Testing Machine (Hydrostatic test)	Fitted with calibrated pressure gauges , 0-10 MPa	Yes	Leak proof test	(Alternatively by Eddy current test) Local supplier ELMEC, Prolific etc.
8.	Eddy current test equipment		-	-do-	Technofore, Kirloskar etc.
9.	Pneumatic pressure test setup for sockets	Range: 0 – 1 MPa	Yes	Pressure test	Local supplier
10.	Ring/ Plug gauges [ref IS 554/ IS 3333 (Pt. 1), IS 8999]		Yes	Checking of threads/joints	Hortsman, Accurate, Prcision

11. i)	Weighing balance	0-300 kg. LC: 10 g	Yes (A)*	Mass of tube (Kg/metre)	Avery, Tulaman
ii)	Weighing bridge	40 t	Yes (A)	Weighment of supplied lot	-do-
iii)	Physical Balance with weight box	0-3 kg. LC: 0.01 gm.	Yes (A)*	Mass of specimen for zinc coating test	Adir Dutt and local supplier
iv)	Chemical Balance/Electronic balance	0-100 gm./0-2 kg. LC : 1 mg.	Yes (A)* (self calibration for Elec. balance)	-do- and fine weight of chemical samples	Adir Dutt, Metler, Atco etc.
12	Muffle Furnace	LC : 1 degree Celsius Range : 0-1200 degree Celsius	Yes (for temp.)	Chemical analysis	Local supplier
13.	Hot Plate	-	-	-	Local supplier
14.	Strohlein or LECO apparatus for Carbon & Sulphur complete with all attachment	-	Yes (A)*	Chemical Composition	LECO and local supplier
15.	Barometer with chart	-	Yes* (initial)	Correction factor for carbon content	Local supplier

16. i)	Complete range of chemicals/ reagents and glass wares, measuring cylinder required for chemical analysis and formation of stripping solution for Zinc coating test and uniformity of coating.	Purity of chemical/Reagents as required	Class A Glass wares and calibration for measuring glasses	Chemical Composition and Zinc coating	Local supplier, Borosil, Marck etc.
ii)	Instrument method for chemical analysis (OES/AAS/ ICP etc.)		Yes **	Chemical analysis of elements and gasses.	Imported equipments
17.	Hydrometer	-	No*	Specific gravity of copper sulphate solution for checking uniformity of Zinc coating	Local supplier
18.	Pivotal Hammer	-	No.	Adhesion test	Local supplier
19.	Arrangement for Drift expansion test or Taper Screw plug test for sockets	Dimensions of mandrel as specified	No	Expansion test on sockets	Mandrel or taper screw fabrication

20.	Hardness Test equipments : i) Rockwell Scale 'C' ii) Vickers, 30 kg load iii) Brinell (appropriate ball size/load)	Covering ranges (say): 20-100 RC 100-850 VPN 100-300 BHN	Yes (A)*	Checking of hardspot and other requirement of standards	FIE Milhard
21. i) ii) iii)	**NDT :** Ultrasonic Radiographic Magnetic particles etc.	-	*	Material soundness and thickness	Sperry, ECE Krautaramme, Philips Local supplier
22.	Magnifying glass	10 X	No		Local supplier
23.	Metallurgical Microscope with all attachments and sample preparation/ etching arrangement	100 X 400 X	Yes *		CarlzeissJena, Neophot, Olympus

Note:

A- Recommended Calibration Frequency annual.

* -Periodic checks necessary with Standard Reference Material (SRM)/ Standard Calibration Blocks/Calibrated graticules as applicable.

**- Instrument to be calibrated with certified reference material before utilization.

SECTION V

1.0 CERTIFICATION CRITERIA

1.1 BIS Certification Marks (CM) Scheme is a system in which the manufacturer produces a material in conformance to relevant Indian Standard on grant of a license by BIS on agreed terms. Before granting of a licence, capability of the unit/plant is assessed in respect of its manufacturing capacity for intended products (considering types, classes, sizes, varieties etc.), in-process quality control, quality assurance facilities (including well equipped laboratory), suitability of personnel engaged in respect to their qualification, experience, skill in establishing the quality system and maintenance thereof. Such activities would enable the licensed manufacturer to produce in systematic and continuous manner self certification of licenced products ensuring conformance of marked products (say tubes and/or fittings) to the quality parameters as specified in relevant product standards. On ensuring that the producer in capable of fulfilling various requirements as expected, verification of manufacturing machineries & test equipments and after successful testing of sample (s) in independent laboratory, the licence is granted by BIS, subject to the manufacturer's acceptance of rate of marking fee and minimum marking fee as well as acceptance for implementation of relevant STI.

1.2 Important steps in certification are-

i) Grant of licence and issuance of licence document by BIS (Ref. **Appendix-7** showing typical licence copy with essential contents including product variety considered.)

ii) Continuous monitoring of operation of licence through periodic, supervisory visits, regular assessment, consideration for inclusion of additional varieties, obtaining feedback from customers and through market sample evaluation, reviewing complaints and status of operation including suspension of licence, stop marking etc.

iii) Renewal of license before expiry of validity or expiry of same. Adverse decision, temporary and time bound in nature (like deferment of renewal) may also be taken.

2.0 Reference may be made to BIS Act 1986, BIS Rules 1987, and specially BIS (Certification) Regulations 1988 to acquaint with provisions contained therein including that for certification activity and associated aspects like power, function, responsibility, authority and limitations thereof together with legal standings, enforcement activities etc. Detailed guidelines contained in Operational Manual (OM) and orders issued by CMD, BIS from time to time need be followed.

3.0 Regarding drawl of representative sample for considering grant of licence and inclusion of varieties vis-à-vis grouping applicable for steel tubes, a reference may

be made to CMD's circular under reference CMD-III/16: 1239. 3589 dated 13th November 1997.
Following portion quoted from above circular provides salient information.

"GRANT OF LICENCE – Most of the tube makers are manufacturing pipes of the sizes between 15 to 150 mm NB. As regards different classes (if applicable) of pipes, there is difference of thickness requirements only. There 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."

4.0 In addition to independent evaluation by laboratories with respect to various test requirements as contained in different products, while visit to manufacturer's premises by IOs of BIS, additional observations are to be made with respect of subjective requirements and aspects like marking clauses, packing and bundling clauses, besides surface finish, freedom from defects and workmanship pertaining to BIS marked products stacks available in the unit.

Further, appropriateness of hydrostatic test (as applicable), conformance to straightness which are performed for full length are also to be evaluated at the plant by IOs.

SECTION VI

SPECIAL GUIDELINES FOR GROUPING

Available guidelines of CMD on above and relevant aspect of grant of licence, operation of Certifications Marks licence and marking of products are appended.

Subject	Reference No. & Date
Processing of applications of galvanizing units procuring BIS certified black tubes for galvanizing and other finishing operation	CMD-III/16:1161 08.01.2001
Drawl of MS tube Galvanized samples from both ends	CMD-III/16: 1239 (Pt. 1) 07.08.2000
General grouping for all types of steel tubes for grant of licence/inclusion of additional sizes/classes/grades/types	CMD-III/16: 1239, 3589 13.11.97
Marking of licence No. and batch No. on each MS tubes covered under IS1239 (Pt.1)-90	CMD-III/16: 1239 (Pt 1) 15.04.97
Operation of Certification Marks Licence for IS 1239 (Pt. 1)	CMD-III/16: 1239 (Pt 1) 10.09. 97
Guidelines for existing licensees of Mild Steel Tubes as per IS 1239 (Pt. 1)-90 who want to procure BIS Standard Marked black tubes form other licensees under their own brand name and sell these tubes after galvanizing, threading, socketing and testing.	CMD-III/16: 1239 (Pt 1) 27.08.96

BUREAU OF INDIAN STANDARDS

(Central Marks Department -III)

Our Ref : CMD-III/16: 1239(Part.1) **1997 04 15**

Subject : Marking of licence No. and batch No. on each M S tubes covered under IS 1239(Pt.1):1990.

This is in continuation to CMD circular of even No. dated 15 Jan 1997 on the above subject.

In view of the difficulties expressed by some of the licensees and Federation of Engineering Industries of India (FEII) it has been decided by the Competent Authority to allow the following method of marking s for marking of licence number and batch number on each MS tube covered under IS 1239(Part 1) for identification of the licensee and traceability of factory test records in addition to the existing markings with immediate effect :

i) Embossing

ii) Stencilling

iii) Transfix labels (not stickers)

iv) Etching

The licensee may use same or any combination of the above methods for marking of licence number and batch number. The licence number and batch number may be marked atleast at one place on each tube.

All ROs/BOs are requested to inform the licensee under their jurisdiction immediately and ensure implementation of above decision.

Sd/-
(C.K.VEDA)
Adl Director

DCM-II -Sd/-ALL ROs/BOs

BUREAU OF INDIAN STANDARDS

(Central Marks Department -III)

Our Ref : CMD-III/16: 1239 (Pt.1) **1997 09 10**

Subject : Operation of certification Marks Licence for IS 1239(Pt.1):1990.

CMD has finalized the following guidelines on the above subject :

1) 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 and sell these tubes after galvanizing, threading, socketing and testing (copy enclosed).

2) Guidelines for the units who do not want to manufacture but procure BIS Standard Marked black tubes as per IS 1239(Pt.1) from BIS licensee under their own brand name and sell these tubes after galvanizing, threading, socketing and testing (copy enclosed).

This is for your information please

Sd/-(VISHNU GUPTA)
JDCM

Encl : as above

DCM-II -Sd/-Circulated to All ROs/BOs

BUREAU OF INDIAN STANDARDS

(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 pr 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

<u>DCM-II -</u>DDGR's shall be the Competent Authority to give permission under 'A' Please.
ADGM **-Sd/-**

B**UREAU 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)

DCM-II -Sd/-Circulated to All ROs/BOs

BUREAU OF INDIAN STANDARDS

(CENTRAL MARKS DEPARTMENT-III)

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

DDGM –Sd/-All ROS/BO,BIS Labs

ANNEX A

PRODUCTS → REFERRED STANDARDS ↓	**TITLE**	IS 1239 (Pt. 1) Steel tubes, tubulars & other wrought steel fitting- **Steel Tubes**	IS 1239 (Pt. 2) Mild steel sockets tubular & other Wrought steel fittings	IS 1161 (steel Tubes for structural purposes)	4270 (Steel tubes used for water wells)	IS 1978 (Line Pipes)	IS 3589 (Steel pipes for water and sewage)	IS 3601 (Steel tubes for Mech. & Gen. Engg. Purpose)	IS 4923 (Hollow steel Secs For structural Use)
IS 228 Various Parts	Chemical analysis of steels	v	v	v	v	v	v	v	v
IS 513:94	Cold-rolled low Carbon steel sheets and strips	v	-	-	-	-	-	-	-
IS 554:99	Dims. for pipe threads (pressure tight joints)	v	v	-	-	-	-	-	-
IS 1387:93	Gen. requirements for the supply of metallurgical materials	v	v	v	v	v	-	v	v
IS 1608:05	Mech. Testing of metals-Tensile testing	v	v	v	v	v	v	v	v
IS 2328:83	Flattening test on metallic tubes	v	-	v	v	-	v	v	-
IS 2329:85	Bend test on metallic tubes	v	-	v	-	-	-	v	-
IS 4711:74	Sampling of steel pipes, tubes and fittings	v	v	v	v	-	v	-	-
IS 4736:86	Hot dip zinc coatings on mild steel tubes	v	v	v	v	-	v	-	-
IS 4740:79	Code of practice for packing of steel tubes	v	-	v	-	-	-	-	-
IS 8999:79	Gauging practice for pipe threads where pressure tight joints are required on the threads	v	v	-	-	-	-	-	-
IS 10748:95	Hot rolled steel strip for welded tubes and pipes	v	-	v	-	-	-	-	-
IS 12278:88	Ring tensile test on metallic tubes	v	-	-	-	-	-	-	-
IS 1239 (Pt. I)	Steel tubes, tubulars & other wrought steel fitting-Steel Tubes	-	v	v	-	-	-	-	-

PRODUCTS → REFERRED STANDARDS ↓	**TITLE**	IS 1239 (Pt. 1) Steel tubes, tubulars & other wrought steel fitting- **Steel Tubes**	IS 1239 (Pt. 2) Mild steel sockets tubular & other Wrought steel fittings	IS 1161 (steel Tubes for structural purposes)	4270 (Steel tubes used for water wells)	IS 1978 (Line Pipes)	IS 3589 (Steel pipes for water and sewage)	IS 3601 (Steel tubes for Mech. & Gen. Engg. Purpose)	IS 4923 (Hollow steel Secs For structural Use)
IS 2335: 85	Drift expanding test on metallic tubes	-	v	-	-	-	-	v	-
IS 1501: 02	Vickers hardness test for metallic materials	-	v	-	-	-	-	-	-
IS 1879: 87	Malleable CI pipe fittings	-	v	-	-	-	-	-	-
IS 3468:75	Pipe Nuts	-	v	-	-	-	-	-	-
IS 1956 (Pt. 8) :76	Glossary of term :- steel tubes & pipes	-	-	-	v	-	-	-	-
IS 4905: 68	Methods of random sampling	-	-	-	v	-	-	-	-
IS 3333 (Pt. I):67	Dimns. For petroleum industry pipe threads	-	-	-	-	v	-	-	-
IS 3803 (Pt. I) :89	Method for Elongation conversation of C & low alloy steels	-	-	-	-	-	v	-	-
IS 2633 :72	Uniformity test of coating of zinc coated articles	-	-	-	-	-	-	v	-
IS 1364:67	Precision and semi-precision hexagon bolts, screws, nuts and lock nuts	-	-	-	-	-	-	-	-
IS1367 :67	Tech. supply conditions for threaded fasteners	-	-	-	-	-	-	-	-
IS 2004:70	C steel forgings for gen. engg. purposes	-	-	-	-	-	-	-	-
IS 1570:61	Schedules for wrought steels for gen. engg. Purposes	-	-	-	-	-	-	-	-
IS 2611:64	C Cr Mo steel forgings for high temperature service	-	-	-	-	-	-	-	-
IS 4367: 67	Alloy and tool steel forgings for gen. industrial use	-	-	-	-	-	-	-	-

PRODUCTS → REFERRED STANDARDS ↓	**TITLE**	IS 1239 (Pt. 1) Steel tubes, tubulars & other wrought steel fitting- **Steel Tubes**	IS 1239 (Pt. 2) Mild steel sockets tubular & other Wrought steel fittings	IS 1161 (steel Tubes for structural purposes)	4270 (Steel tubes used for water wells)	IS 1978 (Line Pipes)	IS 3589 (Steel pipes for water and sewage)	IS 3601 (Steel tubes for Mech. & Gen. Engg. Purpose)	IS 4923 (Hollow steel Secs For structural Use)
IS 2856:64	C steel casting suitable for high temperature service	-	-	-	-	-	-	-	-
IS 3038: 65	Alloy steel casting for pressure containing parts suitable for high temperature service.	-	-	-	-	-	-	-	-
IS 2002: 62	Steel plates for boilers.	-	-	-	-	-	-	-	-
IS 2041:62	steel plates for pressure vessels	-	-	-	-	-	-	-	-

In addition to above referred standards following ISS/ISO have relevance to this sectoral Manual

IS 2-60	Rules for rounding off numerical values
IS 209-92	Zinc Ingot
IS 261-82	Copper Sulphate
IS 812-57	Glossary of terms relating to welding and cutting of metals
IS 1828 (Pt. 1)-91	Verification of static Uniaxial Testing Machines : Tensile Testing Machine
IS 2629 -85	Recommended practice of hot dip galvanizing of Iron & steel
IS 6745-72	Methods for determination of mass of Zinc coating an Zinc Coated iron and steel articles
IS 10793-83	Classification of Imperfections in Metallic fusion welds.
IS 13229-91	Zinc for Galvanizing.
ISO 2566-1	Coversion of elongation values - Part 1: Carbon and low alloy steels.

ANNEX -B

IS No.	Short Title	Scope/Class /Grade etc.	Manufacturing Process				
1239 Pt. 1:04	Steel Tubes, Tubulars & other wrought steel fittings- Steel Tubes	6-150 mm NB for carrying water, gas & steams. Light (upto 100 mm), Medium & Heavy class (upto 150 mm)	HFS, ERW, HFIW, HFW & CDS	Chemical (Cl. 7)	Dimensions & Mass (O/D, t, SW/Mass) (table 3 to 5)	Hydrostatic (on black) or Eddy Current (Cl. 13 & A-'B')	Tensile, El% (Cl. 14.1)
1239 Pt. 2:92	Steel Tubes, Tubulars & other wrought fittings- MS Sockets, Tubular & other wrought steel pipe fittings	6-150 mm NB (Generally)	HFS, ERW,HFIW, HFW for Sockets. Tubulars from IS 1239 Pt. 1 pipes. Hand Welding permitted	Chemical (Cl. 7)	Dimensions (Cl. 8, 9 & table 1 to 28)	Hydraulic or pneumatic pressure test (Cl. 11.1a or b & table 30)	Tensile & El% (Cl 6.4)
1161:98	Steel tubes for structural purposes	Light, Medium & Heavy class; grads Yst 210, 310 & 410	HFS, ERW, HFIW, HFW	Chemical (Cl. 5.1 & table 3)	Dimensions & Mass (O/D, t, Weight) (Cl. 6 & table 1)		Tensile, yield & El% (Cl 11 & table 2)
4270 :01	Steel tubes used for water wells	Covers tubes for casing, driving, housing with joints screwed & socketed butt joint, screwed flushbutt joints & plain bevelled end pipes for butt welded joints. Grades Fe 410 & Fe 450	HFS, ERW,HFIW, EFW, CDS	Chemical (Cl. 5.2)	Dimensions & Mass (O/D, t, Weight /Mass) (Cl. 7.1 & tables 2-5)	Hydrostatic (Cl. 8)	Tensile, yield & El% (Cl 6.1 & table 1)
3589 :01	Steel pipes for water & sewage (168.3 to 2540 mm O/D)	Different types of seamless & welded 'C' steel pipes for water and sewage	HFS, ERW, SAW, CDS	Chemical (Cl. 8 & table 2)	Dimensions & Mass (O/D, t & Mass) (Cl. 11 & table 5, Cl 12 for tolerance	Hydraulic test or NDT (Cl. 10)	Tensile, yield & El% (Cl 9.1 & table 4)
3601:84	Steel tubes for Mech. & Gen. Engg. purposes	Welded & seamless tubes for nonpresure & non-structural use (4 types)	WT, (HFW, ERW, HFIW, OAW) HFS, CDS CEW	Chemical (Cl. 3)	Dimensions & Mass (O/D, t & Mass) (Cl. 9.1 Appendix A)		Tensile, yield & El% (Cl 12.1 - 12.1.3)

IS No.	Short Title	Scope/Class /Grade etc.	Manufacturing Process				
4923:97	Hollow Steel Sections for structural use	Hot and Cold formed square & rectangular hollow steel sections (HF & CF)	HFS, ERW, HFIW HFW & CDS	Chemical (Cl. 6.1)	Dimensions, weight (D, B, t weight) (Cl. 8 & tables 1&2 Also ref. Cl. 13 & 17)		Tensile, yield & El% for CF (Cl 14& table 3; for CF Cl 18 & table 4)
5504:97	Spiral welded pipes	Spiral seam welded pipes 457 - 2000 mm dia & up to 12.5 mm t	ERW, EFW, SAW (double Seams) (Cl. 4)	Chemical (Cl. 5)	Dimensions, (O/D, t) (Cl. 8.2)	Hydros tatic test (Cl. 7)	Tensile, yield & El% (Cl 6.1)
9295:83	Steel tubes for Idlers for belt conveyors	63.5 to 219.1 O/D tubes of Yst 210, 240 & 310 Grades	HFS, ERW, HFIW, CDS	Chemical (Cl. 7)	Dimensions & Mass/Weight (O/D, t & mass) (Cl. 9 & table 2 & Cl. 13)		Tensile, yield & El% (Cl 8.1 & table 1)
1978:82	Line Pipe	Different types of seamless & welded line pipes for use in conveying gas, water & oil. Grades Yst 170, Yst 210 & Yst 240	HFS, ERW HFIW, HFW, CDS & SAW (single & double seam)- As rolled, N & T, SCSR or SCAH	Chemical (Cl. 6.1 6.2, 6.3 & 6.4)	Dimensions, Weight, & Threads (O/D, t, I/D weight) (Cl. 7.1, table 1, 2 Cl. 7.4, 7.5.1, 7.5.2 & 7.5.3)	Hydros tatic test (Cl.11. 5)	Tensile, yield & El% (Cl 11.1 & table 4)
6392:71	Steel Pipe Flanges	Steel pipe flanges (Integral welded , screwed etc.) for oil, water, steam, air, gas and chemical services (0.1 to 16) classes i.e. N/mm2 pressure ratings	Cast, forged and plats or fiat (ep rolled) may in volve threading welding etc.	Chemical Material (Cl. 2.1, 2.2 & table 1)	Dimensions (Cl. 5 tables 2-42 & Cl. 6.1)	Hydra uti test (Cl 8.1)	

Note- Abbreviation Used

SAW- Sub-merged Arc welded

HFS- Hot Finished Seamless

ERW - Electric Resistance Welded
HFIW- High Frequency Induction Welded

HFW- Hot Fusion Welded

EFW- Electric Fusion welded

CDS- Cold finish seamless

WT- Welded Tubes

t- thickness

O/D Outside Dia

I/D- Inside Dia

El%- Elongation %

D- Depth; B- Breadth

OPT - Optional

Sec. - Section

ANNEXURE-C
Page 1 of 2

THE GAZETTE OF INDIA
EXTRA ORDINARY
PART II – Section 3 Sub-Section (i)
PUBLISHED BY AUTHORITY
No. 211] NEW DELHI, TUESDAY, JULY 18, 1978/ASADHA 27, 1900

MINISTRY OF INDUSTRY
(Department Of Heavy Industry)
ORDER
New Delhi, The 18th July, 1978

G.S.R. 374(E) – In exercise of the power conferred by Section 3 of the Essential Commodities Act, 1955 (10 of 1955), the Central Government hereby makes the following Order, namely:-

1. Short title and commencement:

(i) This Order may be called the Mild Steel Tubes (excluding Seamless tubes and tubes according to API specifications) (Quality Control) Order 1978.

(ii) It shall come into force on 1st August, 1978.

2. Definition: In this order, unless the context otherwise requires-

(a) 'Mild Steel Tubes' mean seam welded including electric resistance welded, screw and socketed and plain and mild steel tubes;

(b) "Specified Standards' mean the following Indian Standard Specifications as amended/revised form time to time.

S. No.	IS No.	Title
1.	1239 (Part I) 1973	Mild Steel Tubes and Tubulars
2.	1161-1978	Steel tubes for structural purposes (Second revision)
3.	4270-1967	Steel tubes used for water wells (upto 200 mm dia.).

3. No person shall by himself or by any person on his behalf manufacture or store for sale, sell or distribute any mild steel tubes having wall thickness less than the wall thickness stipulated for light class in the specified standards covered by this Order and that it would be with ISI Certification mark and provided that the thickness of Zinc coating on the galvanized tubes shall be in accordance with IS 4736-1968 provided further that nothing in this Order shall apply in relation to export of mild steel tubes which do not conform to the specified standard but conform to any specification required by the foreign buyer.

4. The residual quantities of sub-standard quality left with manufacturers/traders can be disposed of by cutting pipes and tubes into length not in excess of 1.5 metre before being sold in the market.

5. This Order cancels the Order on this subject dated 21.6.77 and all Corrigenda thereof.

HARI BHUSHAN,

Adviser (Tech) & Ex. Officio Jt. Secy.

THE GAZETTE OF INDIA
EXTRAORDINARY
PART II- SECTION 3 SUB-SECTION (i)
PUBLISHED BY AUTHORITY
NO. 209] NEW DELHI, THURSDAY, JUNE 1, 1983/JYAISTHA 11, 1905

MINISTRY OF INDUSTRY
(Department Of Heavy Industry)
ORDER
New Delhi The 1st June, 1983

G.S.R. 462 (E)- In exercise of the powers conferred by section 3 of the Essential Commodities Act, 1955 (10 of 1955), the Central Government hereby makes the following amendments in the Mild Steel Tubes (Excluding Seamless tubes and tubes according to API specifications (Quality Control) Order, 1976 (hereinafter referred to as the said Order). In the said order for paragraph 4, the following paragraph shall be substituted, namely:-

"4. The residual quantities of sub-standards qualities left with manufacturers, traders shall be punched with holes of minimum 5 mm diameter to be clear and through, by any process, with an interval of maximum 1.5 metres between such punched holes, before being sold in the markets."

"Note- Principal Rules/Order published vide Notification NO. G.S.R. 374 (E) dated 18the July 1978, Gazette of India Extraordinary Part II- Section-3, Sub-section (i) page 633-634."

By Order
S.C. DHINGRA, Adviser (Tech.)
And Ex. Officio Jt. Secy.

ANNEXURE-D

CLASSIFICATION OF IMPERFECTIONS IN FUSION WELDS

(Ref. IS 10793-83/ISO 6520-1982)

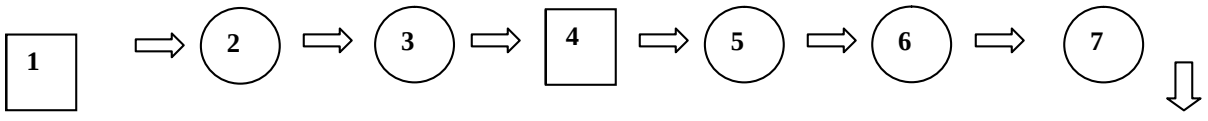
Designation	Explanations
Group No. 1 CRACKS	
Cracks	A discontinuity produced by a local rupture which may arise from the effect of cooling or stresses.
Micro-fissure (micro-crack)	When a crack has microscopic dimensions it is known as a micro-fissure or micro-crack.
Longitudinal Crack	A crack substantially parallel to the axis of the weld. Such cracks may also be situated at the weld junction.
Transverse crack	A crack substantially transverse to the axis of the weld.
Radiating cracks	Cracks radiating from a common point. Small radiating cracks are known as “star cracks”.
Crater crack	A crack in the end crater of a weld, which may be longitudinal, transverse or star cracking.
Group of disconnected cracks	A group of disconnected cracks.
Branching cracks	A group of connected cracks originating from a common crack and distinguishable from disconnected cracks and from radiating cracks.
Note: All above stated cracks may be situated, in the weld metal, in the heat-affected zone or in the parent metal.	
Group No. 2 CAVITIES	
Gas cavity	A cavity formed by entrapped gas.
Gas pore	A gas cavity of essentially spherical form:
Uniformly distributed porosity	A number of gas pores distributed in a substantially uniform manner through out the weld metal; not to be confused with linear porosity.
Localized (clustered) porosity	Group of gas cavities.
Linear porosity	A line of gas pores situated parallel to the axis of the weld. **Page 2 of 4**
Elongated cavity	A large non-spherical cavity with its major dimension approximately parallel to the axis of the weld.
Worm-hole	A tubular cavity in weld metal caused by release of gas. The shape and

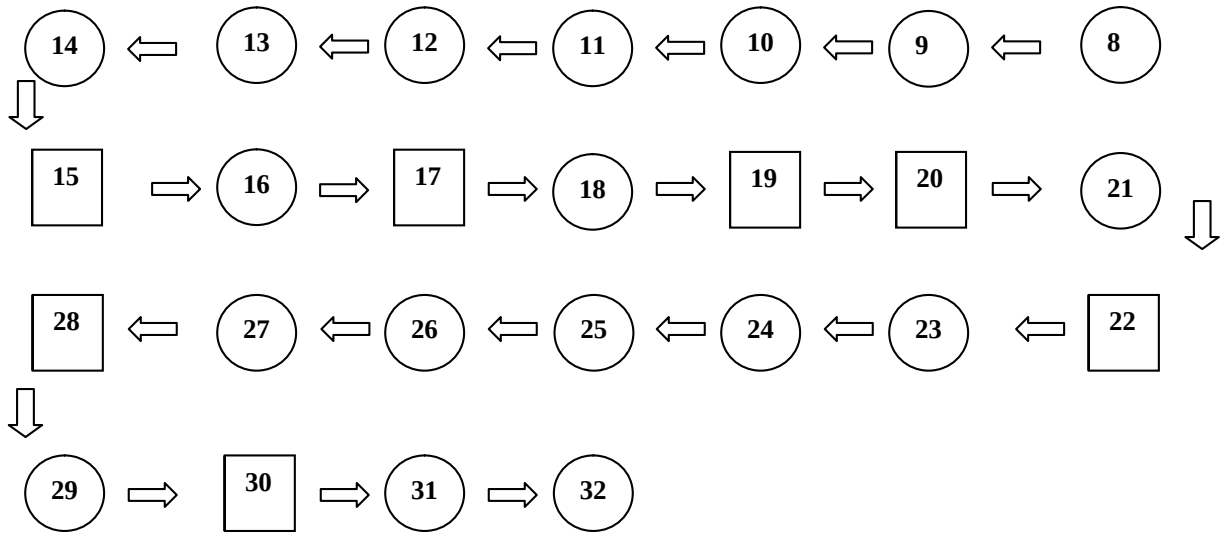
	position of worm-holes is determined by the mode of solidification and the sources of the gas. Generally they are grouped in clusters and distributed in a herringbone formation.
Surface pore	A small gas pore which breaks the surface of a weld.
Shrinkage cavity	A cavity due to shrinkage during solidification.
Interdendritic shrinkage	An elongated shrinkage cavity formed between dendrites during cooling which may contain entrapped gas. Such a defect is generally to be found perpendicular to the weld face.
Micro-shrinkage	Shrinkage only visible under the microscope.
Interdendritic micro-shrinkage	Interdendritic shrinkage only visible under the microscope.
Crater pipe	The depression at the end of a weld run and not eliminated before or during subsequent weld passes.
Group No.3 SOLID INCLUSIONS	
Solid inclusion	Solid foreign substances entrapped in the weld metal.
Slag inclusion	Slag entrapped in the weld metal.
Flux inclusion	Flux entrapped in the weld metal.
Oxide inclusion	Metallic oxide trapped in the weld metal during solidification.
Puckering	In certain cases, especially in aluminum alloys, gross oxide film enfoldment can occur due to a combination of unsatisfactory protection from atmospheric contamination and turbulence in the weld pool.
Metallic inclusion	A particle of foreign metal trapped in the weld metal. It may be of tungsten, copper or other metals.
Note: Slag/Flux inclusion may be Linear, isolated or others.	
Group no. 4 LACK OF FUSION AND PENETRATION	
Lack of fusion (incomplete fusion)	Lack of union, between weld metal and parent metal or weld metal and weld metal.
Lack of penetration (Incomplete penetration)	Lack of fusion between parent metal and parent metal due to failure of weld metal to extend into the root of the joint.
Page 3 of 4 Group No. 5 IMPERFECT SHAPE	
Imperfect shape	Imperfect shape of the external surfaces of the weld or defective joint geometry.
Undercut	A groove at the toe (s) (or at the root) of a weld run due to welding.

	Undercut may be continuous or intermittent.
Shrinkage groove	A shallow groove in the root caused by contraction in the weld metal along each side of the penetration bead.
Excess weld metal	An excess of weld metal at the face(s) of the butt weld.
Excessive convexity	An excess of weld metal at the face of a fillet weld.
Excessive penetration	Excess weld metal protruding through the root of a weld made from one side or through weld metal previously deposited from either side of a multi-run joint. It may be localized also.
Incorrect weld profile	Too small an angle between the plane of the parent metal surface and a plane tangential to the weld bead surface at the toe.
Overlap	Excess of weld metal at the toe of a weld covering the parent metal surface but not fused to it.
Misalignment	Misalignment between two welded pieces. This could be “linear” or “angular”.
Sagging	Weld metal collapse due to gravity.
Burn through	A collapse of the weld pool resulting in a hole in the weld or at the side of the weld.
Incompletely filled groove	A longitudinal continuous or intermittent channel in the surface of a weld due to insufficient deposition of weld metal.
Irregular width/ surface	Excessive variation in width or surface.
Note: Other common imperfections are, “excessive asymmetry of fillet weld”, “Root concavity”, “Root porosity” or say local surface irregularity at a weld restart due to “Poor restart”.	
Group No. 6 **MISCELLANEOUS IMPERFECTION**	
Such defects includes stray flash or arc strike, Spatter, Tungsten spatter, Torn surface, Grinding mark, Chipping mark, Under flushing.	

ANNEXURE-E

MANUFACTURING AND TESTING FLOW DIAGRAM OF ERW TUBES





Note- i) For supply of plain black tubes operations at 23 to 27 and 29 to be skipped.

ii) Following **symbol** used in flow sheet

○ - Depicts manufacturing process □ - Depicts checks/tests

iii) **Operations** involved are as under –

1. Raw material identification and checks (Chem. & thickness)
2. Decoiler
3. Slitting
4. Ultrasonic testing
5. End shear
6. Butt weld
7. Strip accumulator
8. Strip edge preparation
9. Preforming
10. Forming
11. Automatic welding
12. Removal of internal/external weld bead/fin
13. Induction annealing of weld seam
14. Water cooling
15. Metallographic examination
16. Sizing
17. Eddy current testing
18. Identification cutting to length
19. Dimensional checks
20. Weld seam test
21. Pipe end beveling/facing
22. Hydrostatic testing
23. Pickling and fluxing
24. Drying
25. Hot dip Zinc coating
26. Steam blowing
27. Passivation
28. Visual inspection
29. Threading
30. Final inspection
31. Marking and stamping
32. Final acceptance, bundling, stacking prior to dispatch

APPENDIX-1 (Refer Latest STIs)

SCHEMES OF TESTING AND INSPECTION (STI) in vogue with respect of relevant products contained in this sectoral Manual

i) STI for Certification of Steel Tubes for Structural purpose according to IS 1161-98; Doc: STI/1161/5, June 2000.

ii) STI for Certification of Steel Tubes according to IS 1239 (Pt. I) -2004; Doc: STI/1239 (Pt. 1)/8, Oct. 2004.

iii) STI for Certification of Mild Steel Sockets, Tubular and other wrought Steel Pipe Fittings according to IS 1239 (Pt. 2) -1992; Doc: STI/1239 (Pt. 2)/4, April 1993.

iv) STI for Certification of Line Pipes according to IS 1978- 1982; Doc: STI/1978/3 Nov. 1986.

v) STI for Certification of Seamless or Electrically Welded Steel Pipes for water and sewage (168.3 to 2540 mm outside diameter) according to IS 3589-2001, Doc: STI/3589/5, Aug. 2001.

vi) STI for Certification of Steel Tubes for Mechanical and General Engineering purposes according to IS 3601-84; Doc: STI/3601/2, Aug 1985.

vii) STI for Certification of Steel Tubes used for water wells according to IS 4270-2001, Doc: STI/4270/5, Oct 2001.

viii) STI for Certification of Hollow Steel Sections for structural use as per IS4293-97; Doc: STI/4923/6, Nov. 1999.

ix) STI for Certification of Spiral Welded Pipes according to IS 5504-97; Doc: STI/5504/1, April 2001.

x) STI for Certification of steel pipe flanges according to IS 6392-71 Doc: STI/6392/2 Aug 2002

xi) STI for Certification of Steel Tubes for Idlers for Troughed Belt Conveyers according to IS 9295-83; Doc: STI/9295/2, Feb 1985.

APPENDIX - 2

MARKING FEE SCHEDULES (Refer BIS website www.bis.org.in)

IS No.	Part	Section	Year	Product	Unit	Large Scale Marking Fee	Small Scale Marking Fee	Unit Rate
1161	0	0	1969	STEEL TUBES FOR STRUCTURAL PURPOSES.	1 TONNE	24000	17000	7.2
1239	1	0	2004	MILD STEEL TUBES	1 TONNE	24000	17000	7.2
1239	2	0	1992	MILD STEEL TUBULARS AND FITTINGS.	1 TONNE	24000	17000	36
1978	0	0	1982	LINE PIPE	1 TONNE	24000	17000	7.2
3589	0	0	2001	SEAMLESS OR ELECTRICALLY WELDED STEEL PIPES FOR WATER GAS AND SEWAGE(168.3 TO 2540 mm OUTSIDE DIAMETER)	1 TONNE	24000	17000	7.2
3601	0	0	1984	TUBES FOR GENERAL ENGINEERING PURPOSES.	1 TONNE	24000	17000	7.2
4270	0	0	2001	STEEL TUBES USED FOR WATER WELLS	1 TONNE	24000	17000	7.2
4923	0	0	1997	HOLLOW STEEL SECTION FOR STRUCTURAL USE	1 TONNE	24000	17000	7.2
5504	0	0	1997	SPIRAL WELDED PIPES	1 TONNE	31000	25000	6
6392	0	0	1971	STEEL PIPE FLANGES	1 PIECE	24000	17000	1.45
9295	0	0	1983	STEEL TUBES FOR IDLERS FOR TROUGHED BELT CONVEYORS	ONE TONNE	24000	17000	7.2

APPENDIX 3

LIST OF LABORATORIES WHERE SAMPLES CAN BE TESTED. (Not exhaustive)

1. BIS Laboratories (Central Laboratories & Regional Labs.)

2. **Regional Testing Centre (NR), Okhla, New Delhi**
3. **Shriram Institute for Industrial Research, Delhi**
4. **National Test House (Kolkata & Ghaziabad)**
5. **Metallurgical Services, Ghatkapore, Mumbai**
6. **Welding Research Institute, Trichunapalli**

APPENDIX-4

LOT INSPECTION SAMPLING PLAN

It is not in the purview of this manual to deal on the above subject as normally BIS is not involved in consignment or lot inspection of finished products. In this regard reference may be made to IS 4711-74 i.e. sampling of steel pipes, tubes and fittings which provides guidelines for sampling and acceptance criteria. However, sampling related to process control and product evaluation are already taken care by the provision of relevant STIs referred in this manual.

APPENDIX 5

BIS TESTING CHARGES IN VOGUE

Sl.	Product	Year	Charges	
i)	IS 1161	89	a) Upto 50 mm NB (except HFS)	Rs. 1050.00
			b) Above 50 mm NB & HFC	Rs. 1125.00

ii)	IS 1239 (Pt.1)	90	a) Upto 50 mm NB	Rs. 1050.00
			b) Above 50 mm NB	Rs. 1125.00
iii)	IS 1239 (Pt.2)	82	a) Complete excluding Coating Test	Rs. 1725.00
			b) Coating Test	Rs. 225.00
iv)	IS 1978	82		Rs. 1275.00
v)	IS 3589	91		Rs. 1200.00
vi)	IS 3601	84	a) Ungalvanized welded steel tubes (W.T.)	Rs. 1050.00
			a) HFS	Rs. 900.00
			b) CDS	Rs. 1050.00
			c) CEW	Rs. 900.00
			d) Addl. For Galvanizing	Rs. 150.00
vii)	IS 4270	01		Rs. 1875.00
viii)	IS 4923	85		Rs. 975.00
ix)	IS 5504	97		Not available
x)	IS 6392	71		Not available
xi)	IS 9295	83		Rs. 1275.00

Note-

i) Testing charges as provided by CL BIS.

ii) For updating position and find out breakup of circulated charge reference be made to test charge schedule of CL, BIS.

APPENDIX – 6

TYPICAL GAZETTED STANDARDS MARKS

IS	Part	Section	Year
IS 1239	1	0	1990

MILD STEEL TUBES

IS 1239	2	0	1992

MILD STEEL SOCKET TUBULARS & FITTINGS

IS 1161	0	0	1969

STEEL TUBES FOR STRUCTURAL PURPOSES

IS 3601	0	0	1984

TUBES FOR GENERAL ENGINEERING PURPOSES

IS 3589	0	0	2001

SEAMLESS OR ELECTRICALLY WELDED STEEL PIPES

APPENDIX-7

TYPICAL LICENCE DOCUMENT WITH ENDORSEMENT DETAILS (On Grant and Inclusion)

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

मानक चिन्ह लगाने की अनुज्ञप्ति (लाइसेंस)

Licence for the use of STANDARD MARK

अनुज्ञप्ति (लाइसेंस) सं. सीएम/एल - XXXXXXX

LICENCE NO. CM/L - XXXXXXX

यह ब्यूरो, भारतीय मानक ब्यूरो अधिनियम, 1986 (1986 का 63) द्वारा प्रदत्त शक्तियों के आधार पर

को (जिसे इसमें आगे अनुज्ञप्तिधारी कहा गया है), इसकी प्रथम अनुसूची के पहले कालम में दिखाए गए मानक चिन्ह का उपयोग करने को अनुज्ञप्ति (लाइसेंस) प्रदान करती है। इस मानक चिन्ह का उपयोग ऐसी वस्तु पर/प्रसंस्करण के संबंध में किया जाएगा जिसका उल्लेख इसकी उक्त अनुसूची के दूसरे कालम में किया गया है। यह वस्तु/प्रसंस्करण उक्त अनुसूची के तीसरे कालम में उल्लिखित संबंधित भारतीय मानक के अनुसार विनिर्मित होगी/के अनुरूप होगा।

1. By virtue of the power conferred on it by the BUREAU OF INDIAN STANDARDS ACT, 1986(63 of 1986) the BUREAU hereby grants to

M/s ABC

(hereinafter called the licensee) this licence to use the Standard Mark set out in the first column of the First Schedule hereto, upon or in respect of the article/process set out in the second column of the said Schedule which is manufactured in accordance with/conforms to the related Indian Standard(s) referred to in the third column of the said Schedule as from time to time amended or revised.

२. इस अनुज्ञप्ति (लाइसेंस) के सात ये अधिकार और बाध्यताएं है जिनका अनुबंध उक्त अधिनियम के आधीन बनाए गए विनियमों में है। अनुज्ञप्तिधारी अपनी बाध्यताओं का अनुसरण करते हुए, इसकी दूसरी अनुसूची में उल्लिखित चिन्ह लगाने की नियत फीस सम्यक् रीति से और नियत समय पर देगा तथा परीक्षण और निरीक्षण की उस स्कीम को, जिसकी प्रति संलग्न है, ब्यूरो की संतुष्टि के अनुरूप चलाएगा।

2. This licence carries the rights and obligations stipulated in the Regulations made under the above mentioned Act. In pursuance of this obligation,the licensee shall pay in due manner and time the scheduled Marking Fee set out in the, Second Schedule hereto and maintain to the satisfaction of the BUREAU the Scheme of Testing and Inspection a copy of which is attached hereto.

३. यह अनुज्ञप्ति (लाइसेंस) ddmmyy से dd mm yy तक विधिमान्य रहेगी और विनियमों में विहित रूप में इसका नवीकरण हो सकेगा।

3.This licence shall be valid from FIRST AUGUST , ONE THOUSAND NINE HUNDRED EIGHTY to THIRTY-FIRST JULY , TWO THOUSAND SEVEN and may be renewed as prescribed in the Regulations.

आज *दो हजार* के mm मास के दिन
हस्ताक्षरित तथा मद्रांकित ।

Signed, Sealed and Dated this dd day of mm yy

भारतीय मानक ब्यूरो की ओर से
for BUREAU OF INDIAN STANDARDS

प्रमुख (शाखा)/उप/अपर महानिदेशक
Head (Branch office)/Dy./Addl Director General

प्रथम अनुसूची

THE FIRST SCHEDULE

मानक चिन्ह STANDARD MARK (1)	वस्तु/प्रसंस्करण ARTICLE/PROCESS (2)	भारतीय मानक INDIAN STANDARD(S) (3)
IS 1239  Part 1 CM/L-XXXXXXX	Steel tubes, Black, Plain end, Class- Light, Size upto and including 50 mm NB	IS 1239: Part 1: 2004 Steel Tubes, Tubulars and Other Wrought Steel Fittings - Specification - Part 1 : Steel Tubes

द्वितीय अनुसूची
THE SECOND SCHEDULE

अनुज्ञप्ति (लाइसेंस) संख्या सी एम/एल -XXXXX के लिए चिन्ह लगाने की फीस की अनुसूची
SCHEDULE OF MARKING FEE FOR LICENCE NO.CML- XXXXXXX

वस्तु प्रसंस्करण ARTICLE/PROCESS (1)	इकाई UNIT (2)	प्रति इकाई चिन्ह लगाने की फीस MARKING FEE PER UNIT (3)	भुगतान की रीति MANNER OF PAYMENT (4)
Steel tubes, Black, Plain end, Class- Light. Size upto and including 50 mm NB	1 TONNE	Rs.7.2 per unit for all the units with a minimum marking fee of Rs. 24000/= during an operative period of one year.	क) लाइसेंस के एक वर्ष तक चालू रहने के लिए न्यूनतम फीस अग्रिम देय होगी और यह फीस अगले नवीकरण (नवीकरणों) के लिए जमा रहेगी। (a) Minimum marking fee for one operative year payable in advance which will be carried over to next renewal(s). ख) लाइसेंस के पहले नवीकरण के समय चालू अवधि के पहले नौ महीनों के लिए लगे उत्पादन पर इकाई दर से बनने वाली चिन्ह लगाने की वास्तविक फीस या न्यूनतम फीस, जो भी अधिक हो, गणितीयतः देय होगी। बाद के नवीकरणों के लिए 12 महीने की अवधि के लिए चिन्ह लगाने की वास्तविक फीस, जिसमें पिछली चालू अवधि के अन्तिम तीन महीने और चालू अवधि के पहले नौ महीने शामिल होंगे या न्यूनतम फीस, जो भी अधिक हो, देय होगी। (b) Actual marking fee for the first nine months of the operative period calculated on the unit rate on the production marked on the minimum fee,whichever is higher,shall be payable at Ghaziabad at the time of the first renewal of the licence. For subsequent renewals,the actual marking fee for 12 months/period consisting of last three months of previous operative period and first nine months of the current operative period or the minimum fee,whichever is higher, shall be payable.

भारतीय मानक ब्यूरो की ओर से
for BUREAU OF INDIAN STANDARDS

प्रमुख (गाज़ियाबाद)/उप/अपर महानिदेशक
Head (Branch office)/Dy./Addl Director General

Inclusion of Varities

Licence No. CM/L……

Name of Licensee- ABC
IS No. -1239 (Pt. 1)-04
Product - Steel Tubes

Endorsement No. 'N'/Dated DD/MM/YY

The following additional sizes and types have been included in Column (2) of the First Schedule and Column (1) of the Second Schedule of the licence along with the Standard Mark in Column (1) of the First Schedule with effect from DD/MM/YY.

Medium and Heavy class of tubes upto 150 mm NB, Black and Galvanized, Plain end and Socketed.

Other terms and conditions of the licence remain the same.

Signature of Group Leader/Director

APPENDIX-8

TYPICAL TEST REPORT PROFORMA AS PROVIDED BY MECHANICAL LABORATORY, CL BIS

1) Note : Page 1 & 2 are common for all test reports.

2) Format of IS 1239 (Pt. 1) & IS 3601 beginning from page 3 enclosed.

BUREAU OF INDIAN STANDARDS
(CENTRAL LABORATORY)
(MECHANICAL)

DOC:No. : CL/QF/2401
Telegram :MANAKSANSTHA, NEW DELHI
Telephone :0120-2770032,2770235,2770345
Fax :0120-2776663

Plot No.20/9,Site IV
Sahibabad Indl. Area
Sahibabad-201010
Distt.Ghaziabad [U.P.]

TEST REPORT AS PER IS: Amendment No.

REPORT No. M- Date ----------
(Job card No.)

PART A. PARTICULARS OF SAMPLE SUBMITTED

a)	Nature of Sample	:	
b)	Grade / Variety / Type/ Class / Size / etc	:	
c)	Declared values, if any	:	
d)	Code No.	:	
e)	Batch No. and Date of Manufacture	:	
f)	Quantity	:	
g)	Date of Receipt (Testing section)	:	
h)	BIS Seal	:	INTACT/NOT INTACT/NOT SEALED
i)	IO's signature	:	Signed/Unsigned
j)	Any other Information / Expiry date, if any	:	
k)	Date of commencement of testing	:	
l)	Date of completion of testing	:	

(Signature) OIC(Sample cell) | Signature (Testing Personnel) | Signature (Director/Group Leader)

N.B 1.This report, in full or in part, shall not be published, advertised, used for any legal action, unless prior permission has been secured from the Director General, Bureau of Indian Standards. This report is intended for "BIS CERTIFICATION MARKS PURPOSE ONLY"

2. This test report is ONLY FOR THE SAMPLE TESTED.

PART B: SUPPLIMENTARY INFORMATION

IS-
REPORT NO.M-

a).	Reference to sampling procedure, wherever applicable
b)	Supporting documents for the measurements taken and results derived like graphs, table sketchs and or photographs as appropriate to test report, if any.
c)	Deviation from the test methods as prescribed in relevant ISS/ Work instructions, If any.

TEST REPORT No. : M -

PART C: IS : 1239 (Part 1) : 2004

REST RESULTS (Amd. ----)

Sl No.	TESTS	SPECIFIED REQUIREMENTS	RESULTS
1	Designation (Cl 4)	NB /Class / End / Surface Condition	
2.	Dimensions (Cl 8)		
		i) Outside diameter :	mm. Max mm. Max
		ii) Thickness	mm. Max mm. Max + Not limited mm. Max - 10 % mm. Max
		iii) Mass, kg/m	± 10% kg / m
3.	Joints (CL 10.1)	Screwed tubes shall be supplied with pipe threads conforming to IS 554-85.	
4	Physical Test (Cl 14)		
	a) Tensile Test	i) Tensile Strength :	Mpa Min. Mpa
		ii) Elongation	% Min %
	b) Bend Test		
	c) Flattening Test		
5	Galvanizing/ Protective Coating (Cl 12 & 18.1)	a) Mass of zinc coating : (From two specimens taken from the opposite ends of the tube.)	g / m2 Min g / m2
		b) Adhesion Test	
		c) Uniformity of Coating	
6	Tests on Socket (Cl 13.1)	IS 1239 (Pt 2) –92	
	a)	Galvanizing (Cl 13)	
		i) Mass of Zinc Coating	: --- g / m2 Min
		ii) Adhesion Test	:
		iii) Uniformity of Coating	:
	b)	Dimensions Outside dia. (Cl 9.1 Table 6)	: --- mm Min.
		Length	: --- mm Min
	c)	Joint (Cl 10)	
	d)	Drift Expansion Test (Cl 11.2.1)/ Taper screw plug test (Cl 11.2.2)	

PART D: REMARKS

1. Only one test piece was tested for the mass of Zn coating as only cut t piece was supplied.
2. Drift expansion test at 6 d) could not be carried out as length of test sample is not twice the diameter as required (Cl 4 of IS 2335-85)
3. Taper screw plug test at 6 e) could not be carried out as testing facilities are not available at CL (Mech.)

Authorised Signatory

TEST REPORT No. : M -

Sl No.	TESTS	SPECIFIED REQUIREMENTS			RESULTS
1	Designation (Cl 2)				
2.	Dimensions (Cl 9)	Size : 163.0 X 2.80 mm (All Dimensions are in mm)			
		i) Outside diameter :	± Not declared	Max Min	
		ii) Thickness	± 10%	Max Min	
		iii) Height of int. fin		Max	
3.	Straightness (Cl 7)	The tube shall not deviate from straightness by more than 1 mm in any 600 mm length.			
4	Mechanical Properties				
a)	Tensile Test	Designation :			
	i) Tensile Strength		Mpa Min.	Mpa	
	ii) Yield Stress		Mpa Min.	Mpa	
	iii) Elongation (9500/TS)		% Min	%	
b)	Flattening Test				
c)	Bend Test (For HFW Tubes only upto 60.3 mm NB)	N.A.			
d)	Drift Expanding Test	At 12.5 % increase on ID			
5.	Surface Protection	Unless otherwise specified , tubes shall be supplied uncoated or with manufacturer's standard mill protective coating.			

PART D:
REMARKS :
1. The sample is being sent to sample cell for checking chemical requirements.

Authorised Signatory