DRAFT PRODUCT CERTIFICATION MANUAL FOR COMMENTS

Our Ref: DDGE/22/IS 9295 Dated: 20 Feb 2014

Sub: Draft manual for IS 9295

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

STEEL TUBES FOR IDLERS FOR BELT CONVEYORS

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

<table>
<thead>
<tr>
<th>SI no</th>
<th>Clause no/page no</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Last date for comments: 05 March 2014.

(Product Certification Officer)

ERO
MANUAL FOR CERTIFICATION OF STEEL TUBES FOR IDLERS FOR BELT CONVEYORS AS PER IS 9295 (FIRST ISSUE )

BUREAU OF INDIAN STANDARDS
MANAK BHAWAN, 9, BAHADUR SHAH ZAFAR MARG,
NEW DELHI – 110002
FIRST ISSUE

FORWORD

This manual attempts in highlighting requirements of products steel tubes for idlers for belt conveyors as per is IS 9295 thereof for providing handy and significant information related to certification of the product.

It attempts to elaborate manufacturing processes and desired controls, involved inspection and testing as need to 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.

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.
Section I: Product Description

1.0 Latest Indian Standard Number with Product Title and number of amendments

IS 9295: 1993 (Reaffirmed 2009)

Title: SPECIFICATION FOR STEEL TUBES FOR IDLERS FOR BELT CONVEYORS

Amendment Issued: four - (04) – latest amendment no. 4 December 2012

1.1 Product Description:

Steel tubes are extensively used as idlers for belt conveyors and the standard covering requirements for the same was first published in 1979. This Standard covers the requirements for steel tubes for idlers for belt conveyor.

The standards cover the requirements of tubes manufactured by following two process

Seamless
ERW (including HFIW)

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 examples are Hot Finished Seamless (HFS), Cold Drawn Seamless (CDS) etc.

Pipe with seam are welded pipes having longitudinal seams like electric resistance welding (ERW), Cold Drawn Electric Welding (CEW), High Frequency Induction Welding (HFIW).

The designation of pipes in the standard is based on Process of manufacture followed by minimum guaranteed yield stress (e.g HFS 210 (Hot finished seamless with minimum yield strength of 210 MPa ), .CDS 210 (Cold Drawn seamless with minimum yield strength of 210 MPa ) ERW 210 (Electric resistance welding with minimum yield strength of 210 MPa)

All finished products based on their manufacturing process and selection of raw materials further ensures minimum Yield strength properties as identified by grades like e.g ERW 160 to ERW 310 as contained in relevant standard.

1.2 List of referred Indian standards for raw material and test method

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>IS No</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IS : 1387-1967</td>
<td>General requirements for the supply of metallurgical materials</td>
</tr>
<tr>
<td>2</td>
<td>IS 228(part-9)</td>
<td>Sulphur in plain carbon steels by evolution method (for sulphur 0.01 to 0.25 percent)</td>
</tr>
<tr>
<td>3</td>
<td>IS 228(part-3)</td>
<td>Methods of chemical analysis of steels: Part 3 Determination of phosphorus by alkaliometric method</td>
</tr>
</tbody>
</table>
1.3 Check list for submission of an application for GOL

Please refer to general check list available on BIS web site. In addition to this

Section II: Raw Materials / Components

2.1 Selection of Raw material:

The tube shall be made from the steel manufactured by open hearth basic oxygen, electric furnace, or any other process approved by the purchaser, or a combination of these processes.

a) Steel

The standards does not refer to any specific IS for quality of raw material, however, the selection of raw material shall be of tested quality Steel to meet specific chemical requirements including Mechanical Strength stipulated in the product standards.

Steel sheets (Hot or Cold rolled) are normally procured from primary steel producers in different forms. (e.g. coils or straight lengths) and quantity. 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.

The product standards IS 9295 has reference to IS 228 for undertaking chemical analysis to ascertain contents of the specified elements (e.g. Sulphur%, of 0.06 and phosphorous% of 0.06) and their permissible variation limits in check analysis 0.005%. 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 1608 (Tensile testing of metals) etc.

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 or welded tubes and pipes) or IS 513 (Cold-rolled low carbon steel sheets & strips).

Section III: Manufacturing Process and In-process Quality Controls

3.1 Description of Manufacturing Process(es)

Pipes-Idler Tubes production process begins with slitting of wide Steel Hot Rolled Coils to the width required for the production of customer specific section dimensions. The slit coil is then fed through the mill and is shaped into a round tube by a series of forming
coils. The converging strip edges of this round tube are squeezed together and welded using high frequency induction welding. After this the external excess weld bead is removed and the tube then passes through a set of shaping rolls where it is shaped to its final form, exactly sized to the required dimensions followed by cutting to the desired length and bundled as per customer requirement.

The standards cover following types and grades of pipes

<table>
<thead>
<tr>
<th>TYPES</th>
<th>GRADES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Based on the process of manufacture)</td>
<td></td>
</tr>
<tr>
<td>Hot-Finish Seamless (HFS)</td>
<td>YSt 210, YSt 240 apd YSt 310</td>
</tr>
<tr>
<td>Cold-Drawn Seamless (CDS)</td>
<td>YSt 210, vs. 240 and YSt 310</td>
</tr>
<tr>
<td>ERW (including HFIW )</td>
<td>YSt 210, YSt 240 and YSt 310</td>
</tr>
</tbody>
</table>

**Hot-Finish Seamless (HFS)**

Seamless Pipe is made when steel in a solid, round cylindrical shape, called a “billet” or a “tube round” is heated and then either pushed or pulled (while being rapidly rotated) over a mandrel with a piercing point positioned in the center of the billet. This activity produces a hollow tube or “shell”. The tube is then further finished until it becomes the size and wall thickness desired. (Because the pipe is formed in a heated manner the pipe is normalized and should have a consistent steel cellular pattern throughout its circumference). Seamless pipe is made in sizes from 1/8” to 26” and is widely used in construction, oil refining, chemical and petro-chemical industries. It is available in heavy wall thicknesses and exotic chemistries, and is suitable for coiling, flanging and threading. It is, however, expensive, in short supply and unavailable in long lengths.

**Cold-Drawn Seamless (CDS)**

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.

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.

**ERW Process**

The Electric Resistance Welding (E.R.W) is also known as high frequency contract welding. The worlds most sophisticated and efficient method of tube welding. The H.R.Steel Strip cut to specified width with a very close tolerance and with edges that are in the ideal condition for perfect welding will be made to pass through various rolls, will be formed as open seem pipes, then through the connection from plant the edges of open seem pipe will be heated and welded (at this point the welding unit plant delivers
current at a frequency of 4,500,000 cycles per second. The welded edges joint together under forcing pressure by roles. The result is a strong welded pipe/tube like any other metal but without change in its chemical composition. Soon after welding the special cutting tool completely removes the weld flash on the outer surface of all welded tubes.

The weld flash in the bore of the tube is also trimmed when specified. At this stage an arrangement of roles size and straighten to the tube to the close tolerance as required. Once this is done the tube automatically cut into specific predetermined lengths. Finally the emphasis is laid on precision. When specification or application demand greater dimensional accuracy, enhanced physical properties and a super fine finished is performed without any trace of the inner and outer weld flash.

The tubes are then finally checked thoroughly for dimensional accuracy and surface quality as required by various specifications.

HR Coil → uncoiling → Shearing → Spiral accumulator → cage forming → HFIW(ERW) → Seam annealing → mill cutting → flattening test

3.2 Infrastructure for production

Manufacturing Facility

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 250mm).
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).
12. Arrangement for marking of class of pipe, relevant ISS, ISI Std. mark, manufacturers name etc (as per STI requirements).
13. Lathe machine
14. Shaper machine
15. Planner
16. Drill machines
17. Grinder bench
18. Air Compressor
19. D.G. Set
20. Weigh Bridge (say 40 t capacity)
21. Storage & packing Bays

Section IV: Certification Criteria

4.1 Identification of Critical Requirements of the Indian Standard

Critical Requirement:
Mechanical - YS, TS, Elongation, Drift expansion test, Flattening test, Thickness, OD, Mass
Chemical – S, P
Hardness test (as per agreement between purchaser and supplier)

4.2 Scheme of Testing and Inspection

Scheme of Testing and Inspection (STI)

STI for Certification of Steel Tubes for Idlers for Troughed Belt Conveyers according to IS 9295:1983; Doc: STI/9295/2, Feb 1985.

4.3 Marking Fee Rates

Marking fee
Product: STEEL TUBES FOR IDLERS FOR BELT CONVEYORS IS 9295:1983
Unit - One Tonne
LS – Rs. 34,000.00
SS – Rs. 29,000.00
Unit rate - Rs. 8.70 for all Units
Effective date : 06-08-2012

4.4 Grouping Guidelines, if any

Grouping Guidelines IS 9295
GRANT OF LICENCE

General grouping for all types of steel tubes for grant of licence/inclusion of additional sizes/classes/grades/types are available for all types of tube ref- CMD-III/16: 1239, 3589 13.11.97. Based on this guideline the following grouping guideline for Grant of Licence is proposed.

1. The standard covers requirements for Steel Tubes for Idlers and Belt Conveyors with three types of Process:
   - Group I - Hot Formed Seamless
   - Group – II - Cold Drawn Seamless
   - Group – III ERW (including HFIW)

2. Further tubes are classified based on minimum guaranteed yield stress YS 210, YS 240, YS 310. Tubes are supplied with different OD and thickness as per Table 2 of IS 9295.

3. In view of the above, the following Grouping guidelines are proposed:
   - Three samples of preferably lowest OD, intermediate OD and highest OD from each Group of products as given in sl no. 1 shall be drawn to cover the range of OD in the group. Regarding the Grade, if superior grade is drawn lower grade may be included in the scope of license (e.g if grade ERW 310 is drawn scope may include ERW 240 and ERW 210 also)

4. It should be ensured that firm has complete manufacturing and testing facilities for such variety and grade being recommended.

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 grades of tubes, procedure as given above for grant of licence shall be followed.

4.5 Guidelines for writing Scope of Licence

Steel tubes for Idlers for belt conveyors as per IS 9295:1983
For the following Sizes / Grade / Variety

(i) Manufacturing Process : HFS / ERW / HFIW / CDS
(ii) Grade : Yst 210, Yst 240, Yst 310
(iii) Sizes : 63.5 to 219.1 Outside Diameter

4.6 Guidelines for Inclusion of new Varieties

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

Mechanical test – 2 mtrs of sample for each size/grade
Chemical test – 50 gm drillings for each size/grade

4.8 Manner of Sealing of Sample(s)

As per procedure

4.9 Whether remnants of sample(s) are returnable / non-returnable, to be scrapped / used, to be deshaped before disposal in case of safety items), any other precaution required for dealing with remnants

Not applicable

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

As per STI

Section V: Inspection and Testing

5.1 Packing Material requirement (to be available in factory at all times) for Packing / Dispatch of Samples

No specific packing material is required for packing. Samples may be packed to protect it from physical damage which may make it unsuitable for testing.

5.2 List of required Test Equipment / Facilities with requirement and frequency of Calibration

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Tests</th>
<th>Chemicals Used</th>
<th>Equipment Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Chemical Composition (cl 7)</td>
<td>Ammonia, Ammonium Hydroxide, Ammonium Phosphate, Cadmium Chloride, Hydrochloric Acid, Molybdic Acid/Ammonium Molybdate, Nitric Acid, Phenolphthalein, Potassium Hydroxide, Potassium Iodate, Potassium Iodide, Potassium Nitrate</td>
<td>Weight Balance (0-200 gm LC : 0.1 mg.), Beaker, Conical Flask, Titration Assembly (Stand, Burette, etc), Whatman Paper (No. 40), Hot Plate, Measuring Cylinder</td>
</tr>
</tbody>
</table>
### Or
Instrument method for Chemical analysis (OES/AAS/ICP etc.)

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Method (cl)</th>
<th>Equipment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Mechanical Properties (cl 8)</td>
<td>Potassium Permanganate Sodium Hydroxide Sodium Nitrite Sodium Thiosulphate Standard Steel Sample</td>
</tr>
<tr>
<td></td>
<td>Tensile test (cl 8.1)</td>
<td>Universal testing machines (Load cells of Appropriate capacities or having 3-4 ranges in Conventional equipment) Range: 20 kN – 400 kN LC: 0.01 kN</td>
</tr>
<tr>
<td></td>
<td>Drift Expansion test (cl 8.2)</td>
<td>Steel mandrels of appropriate diameter and conically shaped to form included angles like 30°, 45°, 60° as stipulated in relevant product standards to be used.</td>
</tr>
<tr>
<td></td>
<td>Flattening Test (cl 8.3)</td>
<td>Test method as per IS 2328 to be followed</td>
</tr>
<tr>
<td>03</td>
<td>Weight (cl 9)</td>
<td>Weighing Machine/Platform (range of 0-20 kg, LC 10g)</td>
</tr>
</tbody>
</table>
| 04  | Harness test (cl 10) | Hardness Test equipments:  
  i) Rockwell Scale ‘C’  
  ii) Vickers, 30 kg load  
  iii) Brinell (appropriate ball size/load) |
| 05  | Dimensions & Tolerance | Vernier calipers (0-300mm, LC 0.1mm)  
  Measuring tape (0-10mtr, LC-1mm)  
  Micrometer (0-25mm, LC 0.01mm)  
  Steel scale (0-1mtr, LC-1mm) |

The equipments are required to be calibrated from NABL accredited Lab as per the frequency recommended by the supplier but shall not be less than one year in any case.

### 5.3 Status of Test Facilities in BIS Labs and OSLs with Testing Charges, and approximate time required for testing by BIS labs / OSLs

BIS lab has complete testing facility for the product, there are many OSL for testing the product. Latest list of BIS and BIS recognized Lab can be obtained from BIS web site.
The product does not have any long duration test and as such the time required is approximately 17 hrs as per the information available on BIS Intranet. The actual time will depend on number of pending sample at BIS/BIS recognized Lab.

### List of BIS Laboratories

**Date:** 1/12/2013

<table>
<thead>
<tr>
<th>Lab</th>
<th>Quantity</th>
<th>Lab Type</th>
<th>Testing Facility</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Number :- IS 9295 - 0 : 1983</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td>2 mt + 25g</td>
<td>Mech</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>EROL</td>
<td>2 mt + 25g</td>
<td>Mech</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>NROL</td>
<td>2 mt + 50gdrilling (chem)</td>
<td>Mech-P/Chem-C</td>
<td>P</td>
<td>except drift expansion test</td>
</tr>
<tr>
<td>PBOL</td>
<td>1.5m + 50g drillings</td>
<td>Mech/chem</td>
<td>P</td>
<td>Excl. Drift expansion tests</td>
</tr>
<tr>
<td>SROL</td>
<td>2 mt + 25g</td>
<td>Mech</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>WROL</td>
<td>2 mt + 25g</td>
<td>Mech/Chem</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Testing Charges</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 9295 : 1983</td>
<td>Rs 1275/-</td>
<td>17 man-hour duration</td>
</tr>
</tbody>
</table>

5.4 Whether Grant of Licence will be based on:

- Independent testing basis

5.5 Details of Tests to be carried out in the Factory in case of:

**Applicant Samples / Verification Samples**

1. Workmanship
2. Straightness
3. Length

**Surveillance / Market Samples**

Chemical & Mechanical test

**Raw Material Samples to be got tested, if any:**

Standards doest not refer to any raw material for conformity, as such any raw material which is suitable to achieve product conformity may be used. So raw material testing is not required by the ISS.