Ranipet	Technical Delivery Condition (TDC) FOR Electric Resistance Welded (ERW) Plain Carbon Steel Tubes for Structural Purposes	Doc Ref:	TDC:RTE:202
		Rev.No.	00
		Date:	16.09.2013
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1.0 SCOPE

1.1 This Technical Delivery Condition (TDC) covers the requirements for the supply of **Electric Resistance Welded (ERW)** plain carbon steel tubes for structural purposes.

2.0 MATERIAL SPECIFICATION

2.1 The applicable specification is IS: 1161 : 1998

2.1 The size, length, quantity and specification are as per the purchase order

2.2 The ERW tubes shall be manufactured from hot rolled steel strip for welded tubes and pipes conforming to IS 10748.

3.0 DESIGNATION

3.1 ERW Tubes covered by this standard shall be designated with following information;

3.1.1 Nominal Bore,

3.1.2 Classification of Wall thickness as Light, Medium and Heavy and

3.1.3 Grade of Material as Y St 210, Y St 240 and Y St 310 defending on the yield stress of the material.

4.0 DIMENSIONS AND WEIGHTS

4.1 The standard sizes and weights of tubes for structural purposes shall be as given in Table-1 of IS:1161.

5.0 SPECIAL REQUIREMENT ON TOLERANCES FOR BHEL' S APPLICATIONS

5.1 **Outside Diameter :**

5.1.1 Up to and including 48.3mm shall be (+) or (-) 0.2 mm

5.1.2 Over 48.3mm shall be (+) or (-) 1.0 (One) percent.

5.2 **Thickness (for all sizes) :**

Welded Tubes shall be (+) not limited (-) minus 2.0 (Two) percent.

5.3 **Weight :**

Weight of 10 Tonne Lots - restricted to two (2) percent ie., the difference between the table-1 (of IS:1161-1998) weight and the corresponding actual weight shall be restricted to 2% (two percentage).

5.4 **Straightness :**

Straightness of tubes shall be 1mm for a length of 1000mm and subject to maximum of 4 mm for a length of 6.0 Mtr.

Prepared by (QA)	Reviewed by	Signature	Approved by
	Engg (AQCS)	21/9/13	
	Material Planning		
	Purchase		
	QC (Proc)		
	QA		Head / QA

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5.5 **Lengths**

5.5.1 **Random Length:** The tubes shall be supplied in 6.0 Mtr lengths unless otherwise specified and the length tolerance for the same shall be plus (+) or minus (-) 10 mm

5.5.3 **Exact Length:** For specific length (exact length) of each tube the tolerance shall be (+) 6mm and (-) minus 0.0 mm.

6.0 WORKMANSHIP

6.1 Plain End - The ends of the tubes shall be finished clean and supplied with square cut.

6.2 For welded tubes, the height of the internal weld fin shall not be greater than 60 percent of the specified wall thickness.

6.3 The tube shall be cleanly finished and reasonably free from scale. Further tube shall be free from cracks, surface flaws, laminations and other defects. The ends shall be cut cleanly and square with the axis of tube.

6.4 Surface imperfections such as handling marks, light die or roll marks, or shallow pits shall be removed without affecting wall thickness.

6.5 Welded tubing shall be free of protruding metal on the outside surface of the weld seam.

7.0 GALVANIZING

7.1 If the tubes are required in galvanizing condition the zinc coating on the tubes shall be conforming to the requirements and tested as per methods specified in IS: 4736.

8.0 MECHANICAL TESTS

8.1 The mechanical test shall be carried out on the selected tube, strip or plate. The tensile strength, Yield stress and the percentage of Elongation shall be as per the table-2 of IS:1161 and the tubes shall be sampled in accordance with IS 4711.

8.2 Ductility Test (Cold Bend Test - Up to and including 50 mm NB) and Flattening Test (Tubes Above 50mm NB) shall be tested as per clause no. 11.3 .2 of IS: 1161.

9.0 SAMPLING OF TUBES

9.1 Sampling of tubes in accordance with IS 4711 for the purpose of drawing samples all mild steel tubes bearing same designation and manufactured under a single process shall be grouped together to constitute a lot.

9.2 Each lot shall be sampled separately and assessed for conformity to this specification.

9.3 Scale of sampling and permissible number of defectives for Mass and DR shall be as per table 1 of IS:4711:2008 - refer page 4 of 5 of this TDC.

9.4 Scale of sampling and permissible number of defectives for physical tests (Tensile, Bend, Flattening and Drift) shall be as per table 2 of IS:4711:2008 - refer page 4 of 5 of this TDC.

9.5 The Process Inspection to be carried out by the manufacturer shall be as per the Annexure-A of IS:4711:2008 - refer page 5 of 5 of this TDC.

10.0 MARKING

10.1 Each tube shall be marked with manufacturer' s name or trade mark and class of tube like L, M and H with IS number.

11.0 OILING

11.1 All the tubes shall be oiled externally to protect the surfaces from rusting for a minimum Coating of 20 microns.

12.0 BUNDLING AND PACKING

12.1 Tubes are to be bundled for transport and shall be packed in accordance with IS:4740

13.0 TEST CERTIFICATE

12.1 Detailed correlated Test Certificates to be submitted along with the supply, for the tests conducted as required in the specification and in this TDC.

14.0 BHEL reserves the right to carry out tests and to reject the items wherever non conformance to the TDC / IS specification is observed in the supply.

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RECORD OF REVISIONS

Rev No.	Effective Date	Clause No.	Revision Details
00	16.09.2013	--	Fresh Release - The earlier TDC RTE 262 Rev 00 Dtd.16.02.2011 has been withdrawn and a separate TDC (TDC RTE 202) released for ERW Tubes for Structural purpose based on IS : 1161 - 1998. Similarly, separate TDC (TDC RTE 203) has been released for ERW Tubes for use of Water, Non-Hazardous Gas, Air and Steam based on IS: 1239 (Part -1) - 2004.

Table 1 Scale of Sampling and Permissible Number of Defectives for Mass and Dimensional Characteristics

(*Clause* 5.3)

Sl No.	Lot	Pipes or Tubes (Outside Dia ≤ 200 mm)		Others	
		Sample	Acceptance	Sample	Acceptance
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 100	3	0	2	0
ii)	101-150	5	0	3	0
iii)	151-300	8	0	5	0
iv)	301-500	13	0	8	0
v)	501-1 000	20	1	13	0
vi)	1 001-3 000	32	2	20	1
vii)	3 001-10 000	50	3	32	2
viii)	10 001and above	80	5	50	3

Table 2 Scale of Sampling and Permissible Number of Defectives for Physical Tests (Tensile, Bend, Flattening and Drift)

(*Clause* 5.5)

Sl No.	Lot Size	Stage of the Sample	Sample Size for Each Physical Test	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 100	First	1	0	*See* Note 1
ii)	101-150	First	2	0	*See* Note 1
iii)	151-300	First	3	0	2
		Second	3	0	1
iv)	301-800	First	5	0	2
		Second	5	1	2
v)	801-3000	First	8	0	2
		Second	8	2	3
vi)	3001and above	First	13	1	3
		Second	13	3	4

NOTES

1 If one sample fails to meet the requirement, the purchaser may select 2 samples randomly from the same lot and both the samples should comply with the requirements except the original failed length.

2 The test pieces for physical tests may be cut from the same item wherever possible.

ANNEX A

(*Foreword*, and *Clause* 4)

RECOMMENDED LEVELS OF INSPECTION/TESTING

Sl No.	*Characteristics for Inspection/Testing*	*Frequencies of Inspection/Testing Pipes and Tubes Manufactured*	
		Seamless Process	Other Process Like Fretz-Moon and ERW
i)	Chemical composition	A ladle analysis from every cast	A ladle analysis from every cast
ii)	Visual inspection for surface defects and steel defects	Each pipe and tube	Each pipe and tube
iii)	Outside diameter	All pipes and tubes	1/h
iv)	Thickness	All pipes and tubes	1/h
v)	Length	All pipes and tubes	1/h
vi)	Tensile test	One coil from each cast	One coil from each cast
vii)	Bend test	One for every 100 cast or part thereof	One test every hour
viii)	Flattening test	One for every 20 cast or part thereof	One test every half hour
ix)	Drift test	One for every 20 cast or part thereof	One test every half hour
x)	Hydraulic test	Each pipe and tube	Each pipe and tube

BHEL Ranipet	Technical Delivery Conditions (TDC) For Electric Resistance Welded (ERW) or High Frequency Induction Welded (HFIW) Steel Tubes (Intended for Water, Non-hazardous Gas, Air and Steam)	Doc Ref:	TDC: RTE : 203
		Rev.No.	00
		Date:	20.09.2013
		Page No	1 of 5

1.0 SCOPE

1.1 This Technical Delivery Condition (TDC) covers the requirements for the supply of **Electric Resistance Welded (ERW)** steel tubes intended for use for Water, Non-Hazardous Gas, Air and Steam. This TDC is applicable to tubes of size 6 mm to 150 mm nominal bore.

2.0 MATERIAL SPECIFICATION

2.1 The applicable specification is IS 1239 (Part-1):2004

2.1 The bore size, length, end condition, class of tube (L, M & H) quantity and specification are as per the purchase order.

2.2 The ERW tubes shall be manufactured from hot rolled steel strip for welded tubes and pipes conforming to IS 10748 or Cold-rolled low carbon steel sheets and strips conforming to IS 513.

2.3 Steel tubes shall be manufactured through the process of Electric Resistance Welded or High Frequency Induction Welded (ERW or HFIW)

3.0 DESIGNATION

3.1 ERW Tubes covered by this standard shall be designated with following information;

3.1.1 Nominal Bore,

3.1.2 Classification as Light, Medium and Heavy depending on the wall thickness

3.1.3 Screwed and socketed or plain end / bevel end to denote end condition and

3.1.4 Black or Galvanized to denote surface condition.

4.0 DIMENSIONS AND WEIGHTS

4.1 The dimensions and nominal mass of tubes shall be in accordance with table 3, 4, and 5 of IS 1239 (Part-1) 2004 subject to the tolerances mentioned in clause no. 5.0 of this TDC.

5.0 SPECIAL REQUIREMENT ON TOLERANCES FOR BHEL' S APPLICATIONS

5.1 **Thickness (for all sizes) :**

Welded Tubes shall be (+) not limited (-) minus 2.0 (Two) percent.

5.2 **Weight :**

Weight of 10 Tonne Lots - restricted to two (2) percent ie., the difference between the weights mentioned in table-3, 4 & 5 of IS 1239 (Part 1): 2004 and the corresponding actual weight shall be restricted to 2% (two percentage).

Prepared by (QA)	Reviewed by	Signature	Approved by
	Engg (AQCS)		
	Material Planning		
	Purchase		
	QC (Proc)		
	QA		Head / QA

Issued By Quality Assurance

5.3 **Straightness :**

Straightness of tubes shall be 1mm for a length of 1000mm and subject to maximum of 4 mm for a length of 6.0 Mtr.

5.4 **Lengths**

5.4.1 **Random Length:** The tubes shall be supplied in 6.0 Mtr lengths unless otherwise specified and the length tolerance for the same shall be plus(+) or minus(-) 10 mm.

5.4.3 **Exact Length:** For specific length (exact length) of each tube the tolerance shall be (+) 6mm and (-) minus 0.0 mm.

6.0 WORKMANSHIP

6.1 Plain End - The ends of the tubes shall be finished clean and supplied with square cut.

6.2 For welded tubes, the height of the internal weld fin shall not be greater than 60 percent of the specified wall thickness.

6.3 The tube shall be cleanly finished and reasonably free from scale. Further tube shall be free from cracks, surface flaws, laminations and other defects. The ends shall be cut cleanly and square with the axis of tube.

6.4 Surface imperfections such as handling marks, light die or roll marks, or shallow pits shall be removed without affecting wall thickness.

6.5 Welded tubing shall be free of protruding metal on the outside surface of the weld seam.

6.6 ERW tubes used for steam services shall be normalized. Only medium and heavy class of tube shall normally be used for steam services.

7.0 GALVANIZING

7.1 If the tubes are required in galvanizing condition the zinc coating on the tubes shall be conforming to the requirements and tested as per methods specified in IS: 4736.

8.0 LEAK PROOF TEST

8.1 Each tube shall be tested for leak tightness as an in-process test at manufacturer' s works either by hydrostatic test or alternatively by eddy current test in accordance with Annex.B of IS 1239 (Part-1) : 2004

9.0 MECHANICAL TEST

9.1 The tensile test shall be carried out on full section or strip cut from the selected tubes, and elongation percentage,

9.2 Bend Test on tubes up to and including 50mm Nominal bore as per IS 2329 and Flattening Test on tubes above 50 mm nominal bore.

10.0 SAMPLING OF TUBES

10.1 The procedure for sampling of tubes for various test and criteria for conformity, IS 4711 shall be followed. Lot for the purpose of drawing samples all tubes bearing same designation and manufactured under a single process shall be grouped together to constitute a lot.

10.2 Each lot shall be sampled separately and assessed for conformity to this specification.

10.3 Scale of sampling and permissible number of defectives for Mass and DR shall be as per table 1 of IS 4711 : 2008 - refer page 4 of 5 of this TDC.

10.4 Scale of sampling and permissible number of defectives for physical tests (Tensile, Bend, Flattening and Drift) shall be as per table 2 of IS:4711-2008 - refer page 5 of 5 of this TDC.

10.5 The Process inspection to be carried out by the manufacturer shall be as per the Annexure - A of IS:4711 - 2008 - Refer page 5 of 5 of this TDC.

11.0 MARKING

11.1 Each tube shall be marked with manufacturer' s name or trade mark and class of tube like L, M, and H with IS number ie., IS 1239 (Part 1)

11.2 The different classes of tubes shall be distinguished by colour bands which shall be applied as follows before the tubes leaves the manufacturer' s works:

a) Light Tubes - Yellow
b) Medium Tubes - Blue
c) Heavy Tubes - Red

12.0 OILING

12.1 All the tubes shall be oiled externally to protect the surfaces from rusting for a minimum coating of 20 microns.

13.0 BUNDLING AND PACKING

13.1 Tubes are to be bundled for transport and shall be packed in accordance with IS:4740

14.0 TEST CERTIFICATE

12.1 Detailed correlated Test Certificates to be submitted along with the supply, for the tests conducted as required in the specification and in this TDC.

15.0 BHEL reserves the right to carry out tests and to reject the items wherever non conformance to the TDC / IS specification is observed in the supply.

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ix)	Drift test	One for every 20 cast or part thereof	One test every half hour
x)	Hydraulic test	Each pipe and tube	Each pipe and tube