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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		<p align="center">HOT FINISHED OR COLD-FORMED SEAMLESS CARBON STEEL STRUCTURAL PIPE TO AISI 4130</p> <p>1.0 GENERAL:</p> <p>This specification governs the requirements of hot finished or cold formed seamless carbon steel structural pipe to AISI 4130.</p> <p>2.0 APPLICATION:</p> <p>The structural tubing of rectangular, circular and square cross sections, used in the fabrication of Mast and Sub-structures of Oil Rigs.</p> <p>3.0 COMPLIANCE WITH STANDARDS:</p> <p>The tubing shall conform to the latest version of AISI 4130, and with the following additional requirements.</p> <p>4.0 DIMENSIONS AND TOLERANCES:</p> <p>4.1 Sizes: The sizes (Outside dimensions and nominal and nominal wall thickness) of the pipe shall be as specified in the purchase order.</p> <p>Unless otherwise stated, the tubes shall be supplied in lengths of 20' (6.096 m) or 40' (12.192 m) as indicated in the purchase order.</p> <p>4.2 Tolerances: Shall be as per AISI 4130 (Latest).</p> <p>5.0 MANUFACTURE:</p> <p>The tubes shall be manufactured by seamless process.</p> <p>6.0 END CONDITION:</p> <p>The ends of the structural tubes shall be square cut and burrs shall be removed on both outside and inside.</p> <p>7.0 CHEMICAL ANALYSIS:</p> <p>The chemical composition of the material shall be as follows:</p>			
		Ref. Doc	Revisions : Refer to record of revisions :	Prepared : ROHIT	Approved : RAJEEV

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Element (%)		C	Si	Mn	P	S	Cr	Mo
Ladle	Min.	0.28	0.15	0.4	-		0.80	0.15
Analysis	Max.	0.33	0.35	0.6	0.035	0.40	1.10	0.25

8.0 MECHANICAL PROPERTIES:

The mechanical properties of the square, circular and rectangular pipes shall be as follows:

Tensile Strength min. N/mm ²	Yield Strength min. N/mm ²	Elongation % min. L=50mm
790	655	15

NOTE:

- 1) The elongation value applies to tubes with wall thickness 4.57 mm (0.18") and over. For wall thicknesses under 0.180" (4.57 mm), the minimum elongation shall be calculated by the formula. Elongation % min. $L=2" (50.8 \text{ mm}) = 61t+12$. Where t = nominal wall thickness of tubing in inches.
- 2) Tensile testing shall be done as per ASTM A370 or any other reputed national/international standard.

9.0 TEST SAMPLES:

9.1 For Chemical Analysis: One sample per melt shall be taken for chemical analysis.

9.2 For Mechanical tests:

9.2.1 One tension test as specified in clause 8.0 shall be made from a length of tubing representing each lot.

9.2.1 The term lot shall apply to all tubes of the same nominal size and wall thickness that are produced from the same heat of steel.

9.3 Hydrostatic test / NDT:

Each length of pipe shall be subjected to Hydrostatic test as per ASME SA 530. (Over and above 12 mm thick)

As an alternative to the Hydrostatic test, (Up to 12 mm thick) each length of pipe shall be subjected to NDT as given below:

- a) For thickness up to and including 3.6mm, Eddy current test as per ASME SE 309 and for thickness up to and including 12mm, Flux leakage test as per ASME SE 570.
or
- b) Ultrasonic test as per ASME SE 213.


Norms of acceptance shall be as specified in the respective standards mentioned above.

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10.0 INSPECTION AT SUPPLIER'S WORKS:

The representative of BHEL shall have free access to the supplier's works at all times during the execution of the order, to satisfy himself that the material is produced as per the quality requirements of this specification. All reasonable facilities shall be extended to him, free of charge. He may also witness the sampling, testing and marking called for in this specification.

11.0 RETEST:

If the results of the mechanical tests representing any lot fail to confirm the requirements of clause 8.0, then the lot can be retested using additional tubing of double the original number from the same lot.

The lot shall be acceptable if each of the samples confirm to the specified requirements during retest. The tubing shall be rejected if it fails to meet the retest requirement.

12.0 TEST CERTIFICATE:

12.1 Five copies of the test certificate with the following details shall be furnished.

- a) BHEL Order No.
- b) BHEL Specification No. OE57117 / Rev.00
- c) AISI 4130
- d) Melt No.
- e) Consignment/Identification No.
- f) Results of Product analysis.
- g) Results of Mechanical tests.

12.2 The test certificate shall be signed by the chief of Quality/Chief metallurgist of the supplier and BHEL representative.

13.0 MARKING:

The following details shall be punched at one end of the tubes and encircled by paint:


- a) Melt No.
- b) Supplier's mark

In addition to the above, the following details shall also be marked on each tube.

- c) BHEL Order No.
- d) OE57117 Rev.00
- e) AISI 4130
- f) Size & Length
- g) Weight
- h) Consignment/Identification No.

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14.0 REJECTION & REPLACEMENT:

In the event of the material proving defective in the course of further processing at BHEL, the same shall be rejected notwithstanding any previous acceptance.

The supplier shall replace the material at his own cost and the rejected material shall be returned after all the commercial conditions are satisfied.

VAR	DESCRIPTION	MATERIAL CODE	PRESSURE/ NDT TEST PER CL. 9.3
01	PIPE(SMLS) 101.6X4.76 AS AISI 4130	OE9757117013	NO
02	PIPE(SMLS) 101.6X6.35 AS AISI 4130	OE9757117021	NO
03	PIPE(SMLS) 127X9.52 AS AISI 4130	OE9757117030	NO
04	PIPE(SMLS) 127X8.0 MM AS AISI 4130	OE9757117048	NO
05	PIPE(SMLS) 127X7.1 MM AS AISI 4130	OE9757117056	NO
06	PIPE(SMLS) 114.3X8.0 MM AS AISI 4130	OE9757117064	NO
07	PIPE(SMLS) 88.9X6.3 MM AS AISI 4130	OE9757117072	NO
08	PIPE(SMLS) 76.1X6.3 MM AS AISI 4130	OE9757117080	NO
09	PIPE(SMLS) 63.5X3.2 MM AS AISI 4130	OE9757117099	NO
10	PIPE(SMLS) 141.3X19.05 MM AS AISI 4130	OE9757117102	YES
11	PIPE(SMLS) 60.3X8.74 MM AS AISI 4130	OE9757117110	YES

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