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TECHNICAL SPECIFICATION
FOR
PIPES PACKAGE

PROJECT : 4 x 200 MW PARBATI HEP STAGE II

CUSTOMER : NATIONAL HYDROELECTRIC POWER CORPORATION LTD.

Revisions :

Prepared by:

Checked by:

Approved By:

Date

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Raviteja

Amit

Kumar Gunjan

30/09/2014

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Raviteja Jetti

Amit

Kumar Gunjan


TECHNICAL SPECIFICATION FOR
Fire protection system Pipe Package
1. SCOPE :

Supply of pipes as per concerned Annexure as mentioned at the Variant Table

2. COMPLIANCE WITH STANDARDS:

Dimensions, Tolerances and other requirements as per individual standards listed in Annexure mentioned at Variant Table (**Copies of BHEL standards referred in concerned Annexure to be enclosed by Purchase Dept.**)

3. MATERIAL:

As indicated in individual item description / as per individual standards listed in Annexure mentioned at Variant Table

4. SIZES:

As indicated in individual item description listed in concerned Annexure mentioned at Variant Table

5. TECHNICAL DELIVERY CONDITIONS:

As per corporate standard No. AA 049 00 01.

6. IBR ATTESTATION:

IBR attestation is not required for the fire water lines.

7. LIST OF ANNEXURES:

Annexure no.	Document No.	Rev No.	Description of Document
Annexure-1	SMQP/FPS/06/092013	00	Manufacturing Quality Plan for Pipes
Annexure-2	PEMC-05086	00	BOQ cum Price Bid Format
Annexure-3	PESD/HYD-776	00	Pre-bid Queries Format

VARIANT TABLE

Var. No.	FOR BOQ REF.	Details/Description	Material Code
00	PEMC-05086	PIPES PACAKGE-Parbati -Phase-II	

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BOQ cum Price Bid format					ANNEXURE-2		Rev-00		
PROJECT: Paravati Phase-II					PEMC-05086				
W.O.NO: W-1085136000					DATE: 30.09.2014				
S.NO	LINE SIZE	OD (max) X Thickness	MATL	DESC	SPECNO	LENGTH IN 'M'	PART NO.	UNIT RATE	TOTAL AMT
1	10"	273.0 X 6.35	IS 3589	C.WELDED	AA10147 Rev. 05 & AA0490001 Rev. 04	230	38601001		
2	8"	219.1 X 6.35	IS 3589	C.WELDED	AA10147 Rev. 05 & AA0490001 Rev. 04	600	38601002		
3	6"	166.5 X 5.4	IS 1239	C.WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	930	38601003		
4	4"	115.0 X 5.4	IS 1239	C.WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	240	38601004		
5	3"	89.5 X 4.8	IS 1239	C.WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	1500	38601005		
6	2"	60.8 X 4.5	IS 1239	C.WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	1000	38601006		
7	1"	34.2 x 4.0	IS 1239	C.WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	490	38601007		
8	1/2"	21.3 X 3.2	IS 1239	C.WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	140	38601008		
9	4"	115.0 x 5.4	IS 1239 GALV	SCRM WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	610	38601009		
10	3"	89.5 x 4.8	IS 1239 GALV	SCRM WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	350	38601010		
11	2 1/2"	76.6 x 4.5	IS 1239 GALV	SCRM WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	110	38601011		
12	2"	60.8 x 4.5	IS 1239 GALV	SCRM WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	580	38601012		
13	1 1/2"	48.8 x 4.0	IS 1239 GALV	SCRM WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	770	38601013		
14	1"	34.2 x 4.0	IS 1239 GALV	SCRM WELDED	AA10152 Rev. 06 & AA0490001 Rev. 04	2390	38601014		
								GRAND TOTAL	

Notes:

- Price bid evaluation will be based on total price quoted as per SI. No. 1 to 14 of the above.
- Bidder to quote strictly as per BHEL's specification requirements. Responsibility of ensuring correctness & completeness of scope of supply as per specification requirement solely lies with bidder.
- Bidder to note that this is a UNIT RATE CONTRACT. The BOQ indicated in this Price Format are for tender evaluation only. However the BOQ shall be finalised during detailed engineering stage and shall be binding on the bidder as per the firm Unit rate.
- Bidder to note that the variation in quantities of any item shall be limited to (-) 0 % to (+) 10 %.
- Bidder to quote the base rates only. Applicable taxes and duties to be indicated separately.
- The final payment shall be based on actual quantities only.
- Bidder to note that they have to quote for all the items mentioned above. Any partial/incomplete offers shall make bidder's offer liable for rejection. Accordingly bidder to indicate 'Quoted' against all the items listed above.



CORPORATE PURCHASING SPECIFICATION

AA 101 47

Rev. No. 05

PREFACE SHEET

**CARBON STEEL PIPES-ELECTRIC RESISTANCE WELDED/SUBMERGED
ARC WELDED**

FOR INTERNAL USE ONLY
REMOVE THIS PREFACE SHEET BEFORE ISSUE TO SUPPLIERS

Comparable Standards:

1. INDIAN : IS : 3589 - 2001
Gr: ERW-Fe 410

Suggested/Probable Suppliers And Grades:

Refer plant vendors list.

User Plant References:

1. BHOPAL : ---
2. HEER, HARDWAR : ---
3. TIRUCHY : BM - 32

Revisions :

Cl. 26.6.13 of MOM of MRC-S&GPS

APPROVED :

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE-MRC (S&GPS)

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BHOPAL

Corp. R&D

AUGUST, 1976

**CORPORATE PURCHASING SPECIFICATION**

AA 101 47

Rev. No. 05

PAGE 1 OF 4

**CARBON STEEL PIPES-ELECTRIC RESISTANCE WELDED/SUBMERGED
ARC WELDED****1.0 GENERAL:**

This specification governs the quality requirements of Electric Resistance Welded/Submerged Arc Welded, Carbon Steel Pipes, of 168.3 mm to 2540 mm.

2.0 APPLICATION:

For conveying gas, water and oil.

3.0 CONDITION OF DELIVERY:

Pipes shall be supplied in straight lengths with plain ends.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall comply with the requirements of the following National standard and also meet the requirements of this specification.

IS : 3589 - 2001 : Steel pipes for water and sewage
Gr: ERW - Fe 410 :

5.0 DIMENSIONS AND TOLERANCES :**5.1 Sizes:**

Pipes shall be supplied to the dimensions specified on BHEL order.
BHEL order shall clearly state the outside diameter and wall thickness of the pipe.

5.2 Tolerances:**5.2.1 Wall Thickness:**

The tolerances on wall thickness of the pipes shall be $\pm 10\%$ for ERW and $+20\%$, $- 12.5\%$ for SAW.

5.2.2 Straightness:

The deviation from a straight line shall not exceed 0.2% of the length.

5.3 Length:

Pipes shall be supplied in random length of 4 to 7 metres unless exact lengths are called for in BHEL order.

Revisions:

Cl. 26.6.13 of MOM of MRC-S&GPS

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**6.0 MANUFACTURE:**

Electric Resistance Welded and Induction Welded, Submerged Arc Welded:

The pipes shall be made from steel plates or strips by butt welding longitudinally or spirally. The weld shall be continuous. Prior to welding, edges or plates or strips may be prepared suitably where required, by process of manufacture.

7.0 FREEDOM FOR DEFECTS :

All pipes shall be cleanly finished and when visually inspected shall be free defects such as cracks, surface flaws, laminations etc. The ends shall be cleanly cut and reasonably square with the axis of the pipes.

8.0 CHEMICAL COMPOSITION :

The laddle analysis of steel and the maximum permissible variation in the composition of the product from the melt analysis shall be follows :

Element	Melt analysis, percent, max.	Permissible variation, for product analysis, max
Carbon	0.20	+ 0.02
Sulphur	0.040	+ 0.005
Phosphorus	0.040	+ 0.005
Manganese	1.30	+ 0.04

9.0 TEST SAMPLES :

Unless otherwise agreed between BHEL and manufacturer, the procedure for sampling of pipe for various tests and criteria for conformance shall be as given in IS:4711. Test samples shall be cut from pipes in final condition of supply.

9.1 Flattening Test:

For pipes produced in single lengths the flattening test shall be made from each end with the welds at 0° and 90°.

For pipes produced in multiple lengths, tests shall also be made on two intermediate rings cut from each multiple lengths of pipe in the weld at 0°.

**10.0 MECHANICAL PROPERTIES :****10.1 Tensile:**

When tested in accordance with IS:1608, the tensile properties of strip cut longitudinally (excluding weld) from selected pipe shall show properties given below :

Tensile strength	: 410 MPa, min
Yield stress	: 235 MPa, min.
Elongation on 5.65 $\sqrt{S_0}$ gauge length	: 18 percent , min.

10.2 Fattening Test (For ERW pipes):

A ring not less than 40mm in length taken from the end of each selected tube shall be flattened between parallel plates as follows, in accordance with IS: 3589.

The test shall be made keeping, the weld at 90° to the direction of the force. No opening shall occur by fracture in the weld until the distance between the plates is less than 75 percent of the original diameter of the pipe or no cracks or breaks on the metal elsewhere than the weld shall occur until the distance between the plates is less than 60 percent of the original outside diameter.

10.3 Guided bend test (For SAW pipes):

Strips not less than 40mm wide cut circumferentially from pipes perpendicular to weld seam with weld near the middle of sample shall without fracture be doubled over a round bar the diameter of which shall be calculated as given below: The weld reinforcement shall be removed from faces.

One face and one root bend specimen as per fig.1 of IS:3589 shall be bent 180° in a jig in accordance with Fig.2 of IS:3589.

$$1.15 (D-2t)$$

$$A = \frac{1.15 (D-2t)}{eD/t - 2e - 1}$$

$$eD/t - 2e - 1$$

1.15 = peaking factor

D = Specified OD in mm

t = Specified wall thickness in mm

e = Strain in mm i.e. 0.1275 for grade Fe 410

Acceptance of bend test shall be as per clause 9.3.2 and 9.3.3 of IS:3589.

11.0 HYDRAULIC TEST:

Each length of the pipe shall be hydraulically tested at the manufacturer's works, before the pipes is coated, wrapped or lined at the manufacturer's works.



The hydraulic test pressure shall be the pressure calculated from the following formula, except that the maximum test pressure shall not exceed 5 MPa:

$$P = 2 St/D$$

where P = Test pressure in MPa

S = Stress in MPa which shall be taken as 60 percent of the minimum yield stress

t = Specified thickness in mm

D = Specified outside diameter in mm

Test pressure shall be applied and maintained for sufficiently long time for proof and inspection.

NOTE: Normally 5 seconds are sufficient for the purpose of test.

12.0 TEST CERTIFICATES :

Three copies of test certificates shall be supplied, unless otherwise stated on the order.

In addition, to the above, the supplier shall ensure to enclose one copy of the test certificate along with their despatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information :

AA 101 47: Rev. No. 05: Carbon Steel Pipes-ERW/SAW

BHEL order No,
Supplier's Reference :

Name
Identification
Melt No.

Results of Tests :

Results of Dimensional inspection.

Results of chemical analysis and mechanical & hydraulic tests.

13.0 PACKING AND MARKING :

As agreed to between BHEL and manufacturer, surface coating if required shall be as per guide line given in annex A to D of IS:3589. When tubes are required to be galvanised. The zinc coating shall be in accordance with IS: 4736.

Each pipe shall be die-stamped with the following information:

AA 10147: Carbon Steel Pipes - ERW/SAW

BHEL Order No.

Consignment/Identification No.

Out side Diameter and Wall Thickness.

Supplier's Name

14.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 1608

2. IS : 3589

3. IS:4711

4. IS:4736



CORPORATE PURCHASING SPECIFICATION

AA 101 52

Rev. No. 06

PREFACE SHEET

STEEL TUBES - ELECTRIC RESISTANCE WELDED/SUBMERGED ARC WELDED

FOR INTERNAL USE ONLY
REMOVE THIS PREFACE SHEET BEFORE ISSUE TO SUPPLIERS

Comparable Standards:

1. INDIAN : IS : 1239 (part 1) - 2004
Gr: ERW

Suggested/Probable Suppliers And Grades:

Refer plant vendors list.

User Plant References:

1. BHOPAL : PS 101 52 - Ungalvanized Tubes.
2. HEERWAR, HARDWAR : PS 101 53 - Galvanized Tubes.
3. HYDERABAD : HY 012 02 99, HY 021 02 99
4. TIRUCHY : BM - 32

Revisions :

Cl. 27.6.11 of MOM of MRC-S&GPS

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**CORPORATE PURCHASING SPECIFICATION**

AA 101 52

Rev. No. 06

PAGE 1 OF 4

**STEEL TUBES - ELECTRIC RESISTANCE WELDED / SUBMERGED
ARC WELDED****1.0 GENERAL:**

This specification governs the quality requirements of light, medium and heavy grades of Electric Resistance Welded/Submerged Arc Welded steel tubes with plain ends in ungalvanized and galvanized condition in the range of 60mm to 150mm NB.

2.0 APPLICATION:

For general purpose, suitable for bending, welding and screwing for flanges and fittings. Not suitable for steam services.

3.0 CONDITION OF DELIVERY:

Tubes shall be supplied with plain ends.

The ends shall be cut cleanly and square with the axis of the tube.

Unless otherwise specified, tubes shall be supplied in ungalvanized condition.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall comply with the requirements of the following National standard and also meet the requirements of this specification.

IS : 1239(part 1) - 2004: Steel Tubes, Tubular and other Wrought Steel Fittings
Gr: ERW

5.0 DIMENSIONS AND TOLERANCES :**5.1 Sizes:**

BHEL order shall clearly state the maximum outside diameter, and wall thickness of the tube.

5.2 Tolerances:**5.2.1 Thickness:**

Light tubes	+	Not limited
	-	8 percent
Medium and Heavy tubes	+	Not limited
	-	10 percent

Revisions:

Cl. 27.6.11 of MOM of MRC-S&GPS

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**5.2.2 Weight:**

Single tube (light series)	+ 10 percent - 8 percent
Single tube (medium and heavy series)	± 10 percent
For quantities per load of 10 tonnes, min (light series)	+ 7.5 percent - 5 percent
For quantities per load of 10 tonnes, min (medium and heavy series)	± 7.5 percent

5.2.3 Internal Weld Fin:

Height of the internal weld fin shall not be greater than 60 percent of the specified thickness.

5.2.4 Length:**5.2.4.1 Random Length:**

Tubes shall be supplied in random lengths of 4 to 7 metres, unless otherwise specified and in the line with IS: 1239, Pt. 1.

5.2.4.2 Exact Length:

When exact lengths are called for, the tolerances shall be + 6mm, - 0 mm of the specified length.

6.0 MANUFACTURE:

Tubes shall be made from tested quality steel manufactured by any approved process and shall be fully killed.

Tubes shall not be manually welded.

7.0 FREEDOM FOR DEFECTS :

Tubes shall be cleanly finished and reasonably free from injurious defects. They shall be reasonably straight. The ends shall be cut cleanly and reasonably square with the axis of the tube.

8.0 CHEMICAL COMPOSITION :

The melt analysis of steel shall be as follows:

Element	Percent, max.	Permissible variation over specified limit, ± max
Carbon	0.20	0.02
Manganese	1.30	0.04
Sulphur	0.040	0.005
Phosphorus	0.040	0.005

**9.0 GALVANIZING:**

When galvanized tubes are ordered, the Zinc coating on the tubes shall be in accordance with IS: 4736.

10.0 TEST SAMPLES:

All tubes bearing the same designation and manufactured under a single process shall be grouped together to constitute a lot. Each lot shall be sampled separately in accordance with IS: 4711.

11.0 MECHANICAL PROPERTIES :**11.1 Tensile:**

The tensile strength of strips cut from selected tubes, when tested in accordance with IS:1608 shall be as follows:

Tensile strength : 320 N/mm², min.

Elongation on 5.65 √ So gauge length:

Upto and Includ. 25 mm NB : 12 percent, min.

Over 25 mm upto includ. 150 mm NB : 20 percent, min.

- Note:** 1. For welded tubes, the strip tensile test specimen shall not contain the weld.
2. For galvanized tubes, zinc coating may be removed by stripping prior to tensile test.

11.2 Bend Test (On tubes upto and including 50mm Nominal bore):

When tested in accordance with IS:2329, the tubes shall be capable of withstanding the bend test without showing any signs of fracture or failure.

Tubes shall be bent with the weld at 90° to the plane of bending. The tubes shall not be filled for this test.

Ungalvanized tubes shall be capable of being bent cold without cracking, through 180° around a former having a radius at the bottom of groove in the plane of bending equal to at least six times the outside diameter of the tube.

Galvanized tubes shall be capable of being bent cold without cracking of the steel, through 90° round a former having a radius at the bottom of the groove equal to at least eight times the outside diameter of the tube.

11.3 Flattening Test (On tubes above 50mm Nominal bore):

Rings not less than 40mm in length, cut from the end of each selected tubes shall be flattened between parallel plates with the weld at 90° (point of maximum bending) in accordance with IS:2328. No opening shall occur by fracture in the weld until the distance between the plates is less than 75 percent of the original outside diameter of the tube and no cracks or breaks on the metal elsewhere than in the weld shall occur until the distance between the plates is less than 60 percent of the original outside diameter.

Test rings may have the inner and outer edges rounded.



11.4 Hydraulic Test/Eddy Current Test:

Each tube shall withstand a test pressure of 5 N/mm² without showing leakage defects of any kind. The pressure shall be applied and maintained for a minimum period of 30 seconds for proof and inspection.

Note: Eddy current test may be done in place of Hydrostatic test as per the procedure in Annexure-B of IS: 1239, Part-1.

12.0 TEST CERTIFICATES :

Three copies of test certificates shall be supplied, unless otherwise stated on the order.

In addition, to the above, the supplier shall ensure to enclose one copy of the test certificate along with their dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

AA 101 52: Rev. No. 06: Steel tubes-ERW/SAW

BHEL order No,
Supplier's Reference :

Name
Identification No.
Melt No.

Results of Tests :

Results of Chemical, Mechanical tests and Hydraulic/Eddy Current test,

13.0 PROTECTIVE COATING

The shall be protected with a rust preventive coating of varnish, externally throughout the length.

14.0 PACKING AND MARKING :

Each tube shall be plugged at both ends by means of tight fitting end caps.

The tubes shall be suitably packed in bundles/packages to prevent corrosion and damage during transit.

Each bundle/package shall bear the following information:

AA 10152: Steel Tubes - ERW/SAW

BHEL Order No.

Consignment/Identification No.

Out side Diameter and Wall Thickness.

Supplier's Name

15.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 1239

2. IS : 1608

3. IS:2328

4. IS:2329

5. IS:4711

6. IS : 4736



CORPORATE STANDARD

AA 049 00 01

Rev. No. 04

PAGE 1 OF 3

PROCEDURE FOR MARKING AND PACKING OF SEAMLESS STEEL TUBES & PIPES

1.0 SCOPE

This standard specifies the requirements for marking and packing of seamless steel tubes and pipes.

2.0 MARKING

Sl. No.	Particulars	Upto & incl. 33.4 OD and thickness < 6 mm	Above 33.4 and up to & incl. 114.3 OD and thickness < 6 mm	Other sizes and thickness not covered in columns. (3) & (4)
(1)	(2)	(3)	(4)	(5)

I. DETAILS TO BE IDENTIFIED

1.	Purchase order No.	1 to 7 to be stamped	2,3,4 & 5 only to	3, 4, & 7 to be hard
2.	Marker's emblem	on aluminium metal	be paint stenciled	stamped on the
3.	Specn.No.& grade	tag and securely	on each tube.	body of pipes 2, 5
4.	Melt Number	attached to each	1 to 7 to be stamped	and 7 to be paint
5.	Size (OD X TK X length)	bundle	on aluminium metal	stenciled on the
6.	No. of tubes/pipes		tag and securely	pipes. (Alternatively
7.	Inspector's seal		attached to each	paint stenciled is
			bundle.	permitted on mutual
				agreement for 3, 4
				& 7 only)

II	COLOUR CODING:	Circumferentially/ Longitudinally	Circumferentially/ Longitudinally	Circumferentially/ Longitudinally
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Note: If specified on order, the colour code on pipes and tubes shall be as per Annexure - I

- 2.1 Stamping shall be done at about 100mm from the ends of the pipe with rounded letters and depth of stamping shall not exceed 0.5 mm.
- 2.2 Stainless steel tubes/pipes shall be paint stenciled only and the paint shall be free from corrosion promoting agents like sulphur and chlorine.
- 2.3 Marking shall be legibly done in ENGLISH language only, preferably with a stencil of 20 mm.

Revisions :
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Rev. No. 04	Amd.No.	Reaffirmed	Prepared HYDERABAD	Issued Corp. R&D	Dt. of 1st Issue JUNE, 1978
Dt: 15.11.2002	Dt:	Year :			



3.0 PRESERVATION

- 3.1 All painted details shall be protected with one coat of transparent rust preventive.
- 3.2 Other than stainless steel, all tubes and pipes shall be applied with rust preventive coating on the outside and either with a rust preventive coating or rust inhibitor on the inside **to provide protection against corrosion for a period of 3 months for out door storage in marine / industrial atmospheres.** For heat exchanger tubes, rust preventive coating shall given dry or wet type as specified in BHEL order.
- 3.3 The ends of the tubes/pipes shall be closed with end caps made of PVC /plastic which should be securely held so that it will not fall off during transit.

Note: The supplier must specify the type of rust preventive at the time of supply and also the method of its easy removal.

4.0 PACKING

- 4.1 a) Tubes and pipes upto and including 33.4 mm OD and smaller shall be supplied in bundles.
 b) Tubes and pipes above 33.4 to 114.3 OD shall also be supplied in bundles, whenever the wall thickness is less than 6.0 mm.
 c) Tubes and pipes of OD above 33.4 mm and wall thickness above 6.0 mm shall be supplied loose.
- 4.2 a) Weight of each bundle shall not exceed 1 metric ton.
 b) No wooden pellets should be used to cover the tubes.
 c) The bundle must be fastened by using galvanized wire / metal straps.
 d) Two straps must be fastened one at each end of the bundle at one metre from the ends. For the balance length, there shall be a wire bundling at reasonable intervals.
- 4.3 All the tubes of wall thickness 3.2 mm and below shall be properly packed in wooden crates to avoid any dent formation and other transit damages to the tubes.
- 4.4 A packing list, sealed in a thick polythene cover, shall be sent along with each consignment with the following details:
1. BHEL order number:
 2. Number of bundles (including serial number also):
 3. Material specification No. and grade:
 4. Size of tube/pipe
 5. Customer's Name



CORPORATE STANDARD

AA 049 00 01

Rev. No. 04


PAGE 3 OF 3

COLOUR CODES FOR TUBES AND PIPES

ANNEXURE - I

Specification	Colour - 1	Colour - 2	Colour - 3
13 x 1 MF	RED	YELLOW	-
13 Cr Mo 44	ALUMINIUM	BLACK	-
A 200 Gr. T5	ALUMINIUM	RED	YELLOW
A 200 Gr. T9	ALUMINIUM	GREEN	YELLOW
AISI 602	WHITE	YELLOW	-
API 5L Gr. B	ALUMINIUM	-	-
BS 3059 PART2 CDS /HFS 360	ALUMINIUM	BLACK	BROWN
BS 3602 PART 1 CDS 360	ALUMINIUM	BLACK	BLUE
NFA 49 - 213 42 C	ALUMINIUM	BLUE	BROWN
NFA49 - 213 TU 10 CD 9.10	ALUMINIUM	BLUE	RED
NFA49 - 213 TU 15 CD 2.05	ALUMINIUM	BLUE	GREEN
NFA49 - 213 TU Z10 CD 9	ALUMINIUM	BLUE	YELLOW
NFA49 - 213 TU Z10C VNSB 09.01	ALUMINIUM	GREEN	RED
SA 106 Gr. B	RED	-	-
SA 106 Gr. C	BLUE	-	-
SA 179	BLACK	BLUE	GREEN
SA 192	WHITE	-	-
SA 199 T5	BLUE	BROWN	RED
SA 209 Gr. T1	ALUMINIUM	RED	-
SA 210 Gr. A1	YELLOW	-	-
SA 210 Gr. C	BLUE	GREEN	-
SA 213 Gr. T11	ALUMINIUM	YELLOW	-
SA 213 Gr. T12	BROWN	YELLOW	-
SA 213 Gr. T2	BROWN	GREEN	-
SA 213 Gr. T22	GREEN	RED	-
SA 213 Gr. T5	BLACK	BROWN	GREEN
SA 213 Gr. T9	BROWN	WHITE	-
SA 213 Gr. T91	GREEN	YELLOW	-
SA 213 Gr. TP 304	BLUE	GREEN	YELLOW
SA 213 Gr. TP 304 H	BLACK	BLUE	YELLOW
SA 213 Gr. TP 304 L	BLUE	WHITE	YELLOW
SA 213 Gr. TP 304 M	BLACK	BROWN	YELLOW
SA 213 Gr. TP 316	BROWN	-	-
SA 213 Gr. TP 316 Ti	BLACK	BLUE	-
SA 213 Gr. TP 316L	BLUE	BROWN	YELLOW
SA 213 Gr. TP 321	BLUE	WHITE	-
SA 213 Gr. TP 321H	BLACK	WHITE	-
SA 213 Gr. TP 347H	BLACK	YELLOW	-
SA 268 Gr. TP 405	ALUMINIUM	GREEN	-
SA 268 Gr. TP 410	BROWN	RED	YELLOW
SA 268 Gr. TP 443	BLUE	GREEN	WHITE
SA 269 TP 315	GREEN	RED	YELLOW
SA 312 Gr. TP 304	BLUE	YELLOW	-
SA 312 Gr. TP 304L	BLUE	RED	YELLOW
SA 312 Gr. TP 316	BLACK	GREEN	-
SA 312 Gr. TP 304L	BLACK	BLUE	BROWN
SA 312 Gr. TP 321	BLUE	BROWN	-
SA 312 Gr. TP 3347	BLUE	RED	WHITE
SA 333 Gr. 1	BLACK	BROWN	RED
SA 333 Gr. 3	BLACK	GREEN	RED
SA 333 Gr. 6	BLUE	GREEN	RED
SA 334 Gr. 1	BROWN	GREEN	RED
SA 334 Gr. 3	BLACK	RED	YELLOW
SA 334 Gr. 6	BLACK	BLUE	RED
SA 335 Gr. P1	BROWN	GREEN	YELLOW
SA 335 Gr. P11	GREEN	WHITE	-
SA 335 Gr. P12	BLACK	RED	-
SA 335 Gr. P2	BLUE	BROWN	GREEN
SA 335 Gr. P22	BLUE	RED	-
SA 335 Gr. P5	BLACK	BROWN	-
SA 335 Gr. P29	ALUMINIUM	BROWN	-
SA 335 Gr. P291	BROWN	RED	-
SB 163 Incono1	BLACK	GREEN	YELLOW
ST 35.4	ALUMINIUM	BLUE	-
STEEL 20	GREEN	-	-
Structural Tubes & Pipes	BLUE	BROWN	WHITE
X20 Cr Mo V 121	BLACK	-	-

ANNEXURE-1

		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/06/092013				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032					PRODUCT:PIPES		REV NO: 00	DATE: 01/09/2013			
		PAGE 1 OF 2											
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	Raw Material (Mother Hollow, Billets etc.)	Mechanical & Chemical Properties	Major	Mech., Chem. Analysis	One per Lot/Batch /Heat	BHEL Spec	BHEL Spec	MTC	√	2		1	
2.0	INPROCESS INSPECTION												
		Heat Treatment	Major	TC Review	One per Lot/Batch /Heat	BHEL Spec	BHEL Spec	TC, HT Chart	√	2	2	1	*If applicable
		WPS, PQR, WPQ*	Major	Doc. Review	100%	BHEL Spec	BHEL Spec	WPS,PQR, WPQ	--	2		1	*for Welded pipes
		NDE*	Critical	RT/UT /LP	As per BHEL Spec	BHEL Spec	BHEL Spec	NDE Reports	√	2		1	*as applicable
3.0	FINAL INSPECTION & TESTING												
	PIPES	Mechanical Analysis (UTS, YS, EL, BEND/Flattening)	Major	Mech. Analysis	One per Lot/Batch /Heat	BHEL Spec	BHEL Spec	MTC	√	2		1	
		Chemical Analysis	Major	Chem. Analysis	One per Lot/Batch /Heat	BHEL Spec	BHEL Spec	MTC	√	2		1	
		Dimensional (OD, ID, Length, Thickness, Edge preparation, Straightness, etc.)	Critical	Measurement	100%	BHEL Spec	BHEL Spec	TC	√	2	1		10% Witness by BHEL/BHEL's TPIA
		Hydrostatic Test/ Eddy Current test/ Ultrasonic test	Critical	Hydro Test ET/UT	100%	BHEL Spec	BHEL Spec	TC	√	2	1		10% Witness by BHEL/BHEL's TPIA
		IBR Certificate*	Critical	TC Review	100%	BHEL Spec	BHEL Spec	TC	√	2		1	*If applicable
		PMI*	Critical	PMI test	Random	BHEL Spec	BHEL Spec	TC	√	2	1		*If applicable

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY	APPROVED BY	APPROVED BY
	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

SL NO		COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
											P	W	V	
			Galvanizing (Coating weight, uniformity, Adherence)	Critical	Strip test, Preece test, Bend/Pivot hammer test	Random	BHEL Spec	BHEL Spec	TC	√	2	1		*for G.I Pipe
4.0	PRESERVATION & PACKING													
			Painting*, (Shade, DFT Check) Marking	Major	Visual, Measurement	Random	BHEL Spec	BHEL Spec	TC	√	2	1		*if applicable
			Packing*	Major	Visual	Random	BHEL Spec	BHEL Spec	Packing List	√	2		1	

NOTE:-

1. This standard MQP should be read along with specification (latest revision), approved drawings & approved data sheet.
2. Drawing/data sheet shall prevail over quality plan for contradiction if any between quality plan and drawing/specification.
3. All test certificates/reports reviewed and certified by TPI/BHEL shall be submitted to BHEL as documentation package.
4. All type test reports submitted shall not be older than 5 yrs from the date of purchase order.
5. Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY	APPROVED BY	APPROVED BY
	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

ANNEXURE - 3

TD-106-2	Rev.No. 5 Form No.		<p align="center">PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, HYDERABAD –32.</p>	PESD/HYD-776								
				Rev No.: 00								
				Page 1 of 1								
<p align="center">COPYRIGHT AND CONFIDENTIAL</p> <p>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>		<p align="center"><u>PRE-BID QUERRIES FROM SPECIFICATION</u></p> <p>If the proposal submitted has got any Queries from the technical stipulations in the bidding document, the Bidder shall tabulate below the full particulars of such Queries and shall sign below. Additional sheets may be enclosed, if necessary. Queries are to be furnished with mention of specific clause numbers. Technical and commercial Queries to scope of supply and services shall be indicated separately.</p> <table border="1" data-bbox="240 763 1517 1485"> <thead> <tr> <th data-bbox="240 763 491 842">SL.No.</th> <th data-bbox="491 763 842 842">Clause No.</th> <th data-bbox="842 763 1246 842">Description as per specification</th> <th data-bbox="1246 763 1517 842">Queries by Bidder</th> </tr> </thead> <tbody> <tr> <td data-bbox="240 842 491 1485"> </td> <td data-bbox="491 842 842 1485"> </td> <td data-bbox="842 842 1246 1485"> </td> <td data-bbox="1246 842 1517 1485"> </td> </tr> </tbody> </table> <p>We confirm that all the Pre-Bid Queries to the Technical Specification, Job Specification and enclosures including reference documents attached are listed in this Annexure only. No other Pre-Bid Queries even if mentioned elsewhere shall be considered for any technical/ commercial evaluation or for ordering.</p> <p>Bidder's Signature.....</p> <p>Date:.....</p>			SL.No.	Clause No.	Description as per specification	Queries by Bidder				
		SL.No.	Clause No.	Description as per specification	Queries by Bidder							
Doc												