



**Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)**

Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017
Phone : 91 (044) 28161245, Fax 044 28161 341 e-mail: prs@bhelmpc.co.in

REF: ENQ NO:18

DT: 03.02.2010

Sub: Procurement of fabricated Y-pieces and Tees.

Ref: Enquiry No:PC:4101000018 dt 01.02.2010

Please find the following tender documents for reference.

1. List of items and sample drawings
2. Tech. delivery condition TDG: 108:04.

Pre qualification is the criteria for consideration for other than BHEL approved vendors. After qualifying for registration, the new vendors may be considered for future requirements, in line with BHEL system and policy. Such vendors will not be considered for this enquiry.

This is a limited tender and only vendors who are contacted through e-mail/courier may submit their offers.

New vendors may download vendor registration forms from BHEL web site www.bhel.com and relevant data for formal registration.


Dy Manager / Purchase
BHEL / Piping Centre
80,GN Road, T.Nagar
Chennai-600017
Ph: 044-28161243

Enquiry No:4101000018 dt 01.02.2010

Annexure - List of items

Tender Due Date:15.02.2010

Delivery required : 4 months from LOI/PO date

Sl no	MATLCODE	Drawing No	DESCRI	Enq Qty Nos	CUR	Unit rate
1	925057820000	3-80-999-97699/00	FAB UET 559X54/ 323.9X31 SA182F91	15		
2	925057830000	3-80-999-97698/00	FAB UET 559X 54 / 406.4 X 38.0 SA182F91	2		
3	925057840000	3-80-999-97712/00	FAB UET559X 54/219.1X40SA182F91/SA335P22	11		
4	925057890000	3-80-999-97691/00	FAB UET 965X 57 / 711.2 X 40 SA182F22CL3	1		
5	925057900000	3-80-999-97704/01	FAB UET 914 X 30 / 711 X 25 SA182F91	10		
6	925057910000	3-80-999-97705/01	FAB UET 711.2 X 25 / 610 X 20 SA182F91	20		
7	925057930000	3-80-999-97688/00	FAB UET 864.0 X 27 / 323.9 X10.31 SA105	39		
8	925057940000	3-80-999-97689/00	FAB UET 864X 35 / 508X 25 SA182F11CL2	16		
9	925057950000	3-80-999-97690/00	FAB UET 864 X 35 /323.9 X 20 SA182F22CL3	4		
10	925057960000	3-80-999-97702/00	FAB UET 368 X 48/ 219.1 X 30 SA105	23		
11	925057970000	3-80-999-97703/00	FAB UET 508 X 64 / 368 X 48 SA105	37		
12	925057980000	3-80-999-97700/00	FAB UET 508 X 64 / 273X 36 SA105	23		
13	925058000000	3-80-999-97708/00	FAB UET 508X 64/ 168.3 X 27.5 SA105	5		
14	925058050000	2-80-999-99497/00	HDR L=2017 508X64/368X48/168.3X26 SA105	2		
15	925058070000	3-80-999-97709/00	FAB UET 323.9 X 31/ 219.1X 25 SA182 F91	8		
16	925058080000	3-80-999-97711/01	FAB EQT 323.9 X 31SA182 F91	8		
17	925058090000	3-80-999-97710/00	FAB UET323.9 X 31/168.3 X 27.5SA 182 F91	14		
18	925058100000	2-80-999-99495/00	FAB Y PIECE 965X57/711.2X40 SA182F22CL3	4		

Enquiry No:41010000018 dt 01.02.2010

Annexure - List of items

Tender Due Date:15.02.2010

Delivery required : 4 months from LOI/PO date

Sl no	MATLCODE	Drawing No	DESCRI	Enq Qty Nos	CUR	Unit rate
19	925058110000	2-80-999-99494/01	FAB Y PIECE 914X30/711.2X25SA182F91	6		
20	925058120000	2-80-999-99496/00	FAB Y PIECE 864X 27/660 X 20 SA105	11		
21	925058130000	2-80-999-99492/00	FAB Y PIECE 559X54/406.4X38 SA182F91	4		
22	925058150000	2-80-301-09376/01	FAB YPCE 559 X 54 / 457 X 43 SA182F91	1		
23	925058160000	3-80-301-26022/01	FAB UNEQTEE 559 X 54 /457 X 43 SA182F91	1		
24	925058200000	3-80-310-26028/01	FABUNEQTEE965 X37/559 X28.58 SA182F22CL3	2		
25	925058210000	3-80-320-26029/01	FABUNEQTEE 965 X37/323.9X28 SA182F22CL3	1		
26	925058220000	3-80-320-26030/01	FABUNEQTEE965 X25/355.6X11.13SA105	2		
27	925058230000	3-80-320-26031/01	FABUNEQTEE 965X25/323.9X10.31SA105	1		
28	925058240000	2-80-320-09378/01	FAB Y PIECE 965 X 25 / 762X 20 SA105	1		
29	925058250000	3-80-423-26098/01	FAB UNEQ TEE 559X72 /406.4X54 SA105	22		
30	925058260000	3-80-423-26099/01	FAB UNEQ TEE 559X72/273X36 SA105	4		
31	925058470000	3-80-310-26455/01	FAB UNEQTEE 762 X 25/ 711 X 25 SA182F91	2		
32	925058480000	3-80-310-26456	FAB UNEQTEE 965 X 32 /762 X 25 SA182F91	1		
33	925058490000	2-80-310-09573	FAB Y PIECE 965 X32 /762 X25 SA182F91	1		
34	925058500000	3-80423-26717/01	FABUNEQTEED508X48/ OD355.6X36 SA105	42		

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3-80-666-08-E

NO ENLARGED

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

NOTES :- 1. DESIGN PRESSURE : 188.5 Kg/Sq.Cm (g)

2. DESIGN TEMPERATURE : 540° C

3. FOLLOW TDG : 108

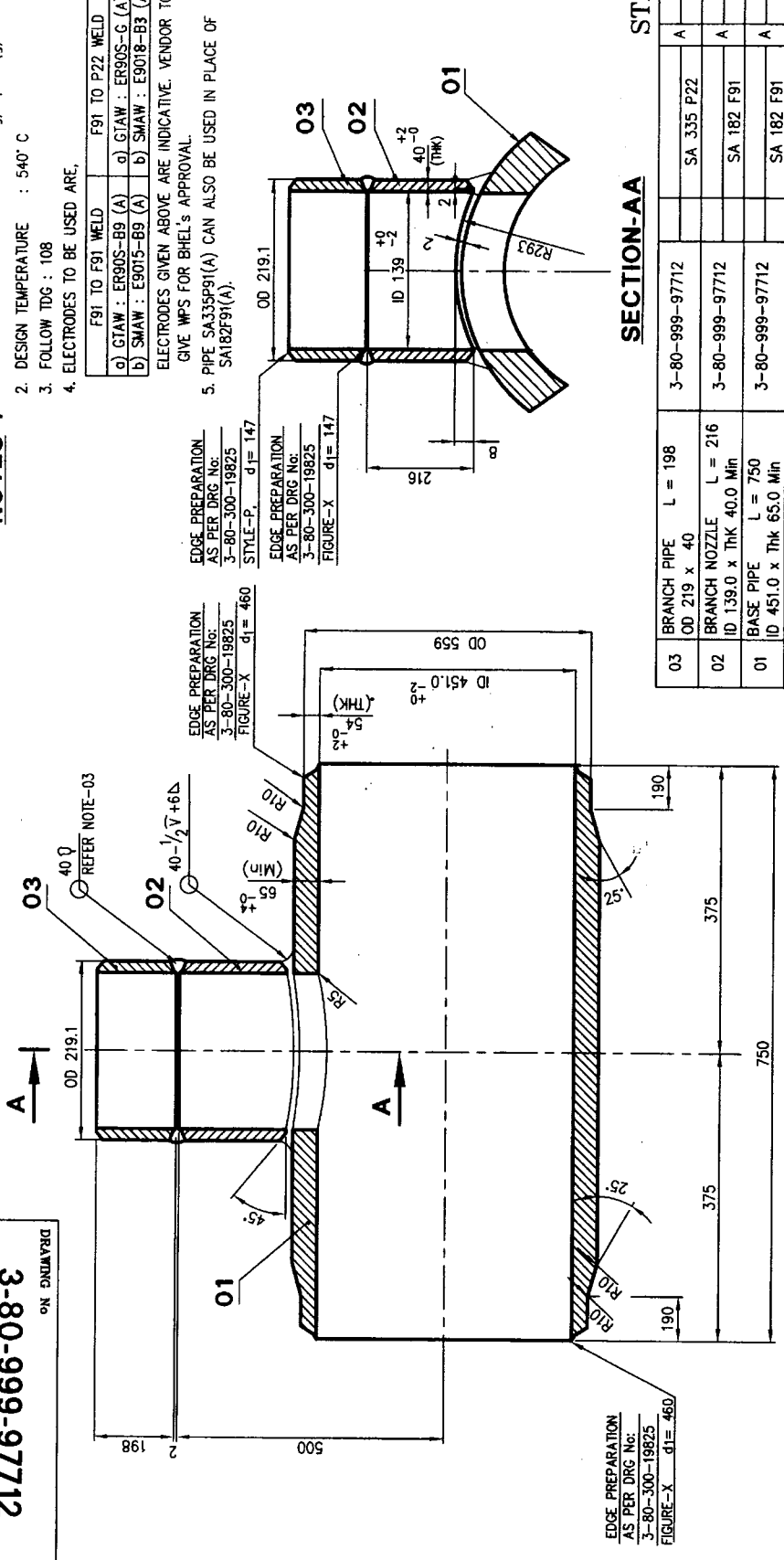
4. ELECTRODES TO BE USED ARE,

F91 TO F91 WELD	F91 TO P22 WELD
a) GTAW : ER90S-B9 (A)	a) GTAW : ER90S-G (A)
b) SMAW : E9015-B9 (A)	b) SMAW : E9018-B3 (A)

GIVE WPS FOR BH&L'S APPROVAL.

5. PIPE SA335P91(A) CAN ALSO BE USED IN PLACE OF SA182F91(A).

12.5



EDGE PREPARATION
AS PER DRG No:
3-80-300-19825
FIGURE-X d1= 460

EDGE PREPARATION
AS PER DRG No:
3-80-300-19825
FIGURE-X d1= 460

EDGE PREPARATION
AS PER DRG No:
3-80-300-19825
FIGURE-X d1= 147

EDGE PREPARATION
AS PER DRG No:
3-80-300-19825
FIGURE-X d1= 147

SECTION-AA

ITEM NO.	DESCRIPTION	DRAWING NO.	UNIT WT.	QTY.
03	BRANCH PIPE L = 198 OD 219 x 40	3-80-999-97712	SA 335 P22	35.000
02	BRANCH NOZZLE L = 216 ID 139.0 x Thk 40.0 Min	3-80-999-97712	SA 182 F91	41.000
01	BASE PIPE L = 750 ID 451.0 x Thk 65.0 Min	3-80-999-97712	SA 182 F91	636.870
			MATERIAL CODE	
			MATERIAL SPEC.	

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT



BHARAT HEAVY ELECTRICALS LTD.,
PIPING CENTRE,
CHENNAI 600 017

DEPT.	GRADE OF UN TOL DIM	SCALE	WEIGHT (Kg)	ITEM No.
	C/M/F	N.T.S.	712.870	

TITLE
FABRICATED UNEQUAL TEE WITH MATCHING PEECE
(OD559.0x54.0/OD219.1x40.0)

REV	DATE	ALTD
01		

ZONE	APPD

NAME	SIGN	DATE	NO OF ITEMS
DEN UBATHULLAH		07.02.08	
CHD R. ANANTH		07.02.08	
APPD S. JAYAKUMAR		07.02.08	

REEL NO. REF. NO.
3-80-301-24986/00

CARD CODE	DRAWING No.	REV
U 01	3-80-999-97712	00

SIZE A3

52861-00C-08-C

ON SHIPWARD

NOTES:-

01. APPLICABLE FOR P91 MATERIAL
02. FOR OD MISMATCHING REF. FIGURE-Xa.
03. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
04. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm

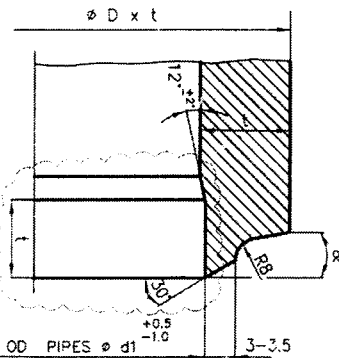


FIGURE - X

FOR OD PIPES ϕ d1

FOR ID CONTROLLED PIPES ϕ d1

MATCHING EDGE PREPARATION FOR MISMATCH OD

DIAMETRICALLY GREATER THAN 8 mm
(i.e. OD1 - OD2 > 8 mm) APPLICABLE FOR BENDS/FITTINGS OF P91 MATERIALS

NOTES:-

01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
02. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
03. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm

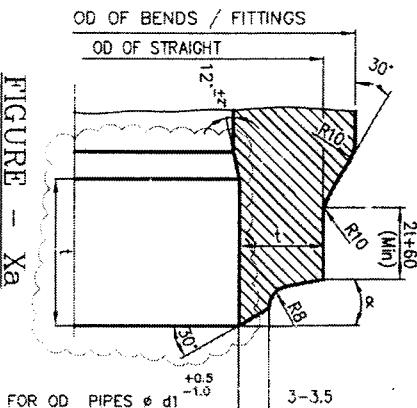
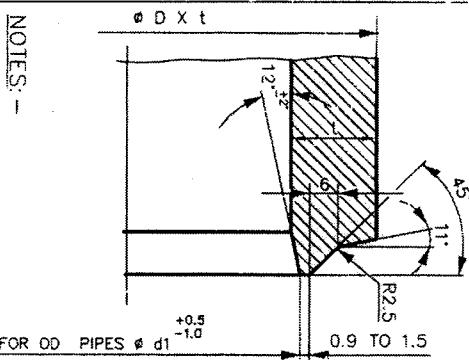


FIGURE - Xa

FOR OD PIPES ϕ d1

FOR ID CONTROLLED PIPES ϕ d1



FOR OD PIPES ϕ d1

FOR ID CONTROLLED PIPES ϕ d1

NOTES:-

01. USE WHEN $t \geq 14.2$ mm.
02. FOR OD MISMATCHING REF. FIGURE-Pa

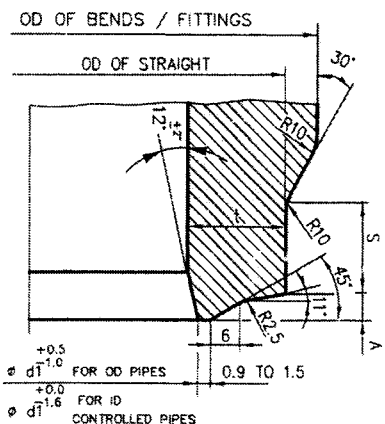
STYLE - P

MATCHING EDGE PREPARATION FOR MISMATCH OD

DIAMETRICALLY GREATER THAN 8 mm
(i.e. OD1 - OD2 > 8 mm) APPLICABLE FOR BENDS/FITTINGS OTHER THAN P91 MATERIALS

NOTES:-

01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
02. WHEN $t \leq 65$, $S+A = 65$ Min. & $t \leq 65$, $S=65$ Min. WHERE t = THK OF CONN. PIPE (STRAIGHT).



FOR OD PIPES

FOR ID CONTROLLED PIPES

STYLE - Pa

MATCHING EDGE PREPARATION FOR MISMATCH OD

DIAMETRICALLY GREATER THAN 8 mm
(i.e. OD1 - OD2 > 8 mm) APPLICABLE FOR ELBOWS OTHER THAN P91 MATERIALS

NOTES:-

01. OD = OUTSIDE DIA OF CONNECTING PIPE (STRAIGHT) TO BE PHYSICALLY MEASURED/VERIFIED.
02. t = THK OF CONN. PIPE (STRAIGHT)

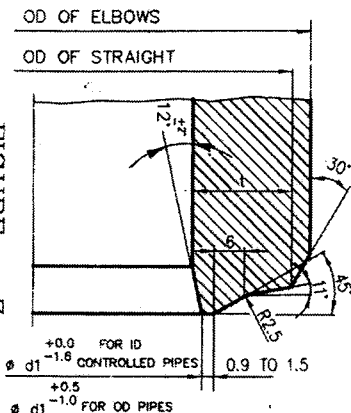
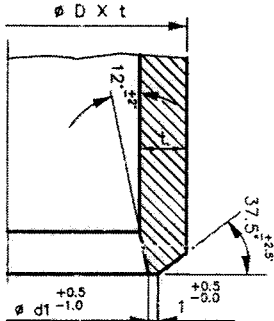


FIGURE - Z



STYLE - D

NOTES:-

01. USE WHEN $t < 14.2$ mm.



BHARAT HEAVY ELECTRICALS LTD.

PIPING CENTRE, CHENNAI

STANDARD

61

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECTBHARAT HEAVY ELECTRICALS LTD.
PIPING CENTRE, CHENNAI

STANDARD

61

DATE	BY	CHKD	APRD	DATE	BY	CHKD	APRD
11.10.07	K. RAGUNATH	K. RAGUNATH	K. RAGUNATH	11.10.07	K. RAGUNATH	K. RAGUNATH	K. RAGUNATH

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1.0 GENERAL

Fabricated Tees and Y-piece shall meet Indian Boiler Regulations (IBR) and the following requirements in addition to the latest version of relevant material specifications namely ASME SA 105, SA 106, SA 182, SA 335.

2.0 FORGINGS.

2.1 Material : SA 105, SA 182 F11, F12, F22, F91.

2.2 Carbon content of SA105 items shall be restricted to 0.25% maximum.

2.3 SA 182 F91 forgings shall be normalised at 1040 to 1070 deg C (for wall thickness larger than 75 mm, accelerated cooling may be done to obtain a fully martensitic structure) and tempered at 760 ± 10 deg C

2.4 Unless otherwise specified in the P.O, items of SA182 F11/12 shall be supplied as per class 2 and SA182 F22 shall be supplied as per class 3 only

2.5 Product analysis shall be carried out on One piece / Heat / HT lot / Size.

2.6 Tension test shall be carried out on one Test piece for each specification, heat, heat treatment lot and size.

2.7 Bend test for CS (SA 105) : One sample of 19 mm thick and 25mm width to be bent 180 deg around mandrel of radius 6.35mm.

2.8 Bend test for AS (SA182): One Sample of 25.4 mm width and thickness = t to be bent 180 deg around mandrel of radius $= 1.5 t$. Test on representative sample is also acceptable.

2.9 Hardness test shall be carried out on all items of F91, and minimum 10% for other material Grades; acceptance norm shall be as per SA 105 / SA 182.

2.10 All fittings shall be tested by MT as per ASTM E-709 and acceptance norm shall be as per ASME B 31.1 Clause 136.4.3

2.11 Forgings of all thickness shall be ultrasonically tested as per SA 388 and acceptance norms shall be as per 3.3.4 of ASME Section VIII Division 2.

2.12 Metallography:- Metallography shall be carried out on one per heat, per size, per heat treatment lot of WP91 / F91 fittings. Acceptance norms - The Material shall be free from any micro fissures. Microstructure shall show tempered martensite and also to be examined for any grain growth. Photomicrograph with 500x (Min) magnification along with Metallography report to be provided. The actual magnification shall be indicated.

3.0 PIPES.

3.1 Material : SA 106 Gr.C, SA 335 P11, P12, P22, P91.

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



3.2 The pipes used shall meet the requirements indicated in Technical delivery condition ref. TDG : 101. The applicable / latest revision number of this document is indicated in the Tender / Purchase order.

4.0 FABRICATION OF Y Piece and Tees

4.1 Fit up, fabrication, dimension and tolerance shall be as per BHEL drawing

4.2 Welding : WPS and PQR shall be approved by well known independent inspecting agencies like Lloyds, BV, SGS, Copy of approved WPS & PQR shall be furnished along with the Technical part of the bid for approval by BHEL

4.2.1 Welding of F91 / P91 material :

GTAW rods (ER 90S – B9) and SMAW electrodes (E9015 – B9) used shall be of following makes.

- a) Bohler Schweisstechnik Austria, Austria
- b) Bohler Thyssen Schweisstechnik, Germany
- c) Kobe Steels Ltd., Japan
- d) Oerlikon Welding Ltd, Switzerland
- e) Metrode Products, U.K

The core wire chemistry shall be equivalent to F91/ P91 . Synthetic electrodes are not permitted.

4.3 PWHT for F91 / P91 material shall be 760 ± 10 deg C. Holding time shall be minimum 2 hours for thickness up to 50mm; minimum 4 hours for thickness 51 to 100 mm. PWHT for other material shall be as per ASME B31.1.

5.0 NON DESTRUCTIVE EXAMINATION

5.1 All NDE shall be done after PWHT only – and witnessed by Inspection authorities.

5.2 NDE procedures (MT-Wet, PT,RT,UT and Hardness)shall be approved by BHEL

5.3 All welds shall be subjected to RT, Wet MT and PT as per ASME Sec V. Evaluation and acceptance norms shall be as per ASME B31.1 Clause 136.4.5 for RT, Clause 136.4.3 for MT, Clause 136.4.4 for PT. Hardness shall be as per SA 234.

5.4 All welds shall also be subjected to UT and its methodology and acceptance shall be as per AD 2000 Merkblatt HP 5/3-2002 Edition, with additional requirements as in 5.4.1 through 5.4.3 below.

5.4.1 The examination shall be conducted by Pulse Echo contact testing.

The following digital equipments or its equivalent models with A-scan presentation that generates and receives frequencies in the range of 1 MHz to 5 MHz. shall be used for examination:

GE Inspection Technology (Krautkramer make), Olympus (EPOCH IV, XT), Sonatest (Master scan series-350M/380M)U.K

The calibration blocks used shall be of same material specification, diameter & thickness.

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPE



The UT equipment shall be calibrated at the beginning of each period of extended use or every 3 months whichever is less.

- 5.4.2 All recordable indications will be stored in memory of either the digital flaw detector or a PC for review at a later period.
- 5.4.3 The equipment calibration data for specific weld as well as the hard copy of 'Static echo-trace pattern'— showing the flaw-echo amplitude with respect to DAC, flaw depth, projection surface distance (probe position) and beam-path shall be attached to UT test report. This hard-copy of echo-trace with equipment calibration data will form part of test documentation.
- 5.5 Qualified Level II personnel shall perform the examination as well as evaluation, and a test report shall be issued.

6.0 POSITIVE MATERIAL IDENTIFICATION (PMI) FOR ALLOY STEEL FITTINGS.

Each alloy steel fitting shall be checked for the correctness of the material during manufacturing and final inspection using X-ray fluorescence principle or spark emission spectrography.

7.0 WORK MAN SHIP, FINISH AND REPAIR

All items shall have smooth, workman like finish, and to be free from scale & defects like laps, seams, folds, cracks, etc. Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum dimension after repair shall meet drawing / Specification. Repairs by fusion welding are prohibited.

8.0 PAINTING , COLOUR CODING, MARKING

- 8.1 **PAINTING :** The external surfaces of all fittings shall be shall be blast cleaned and painted with sea worthy painting.

The internal surfaces shall be protected with rust preventive coating or rust inhibitor. Stainless steel and Galvanised fittings need not be painted.

- 8.2 **COLOUR CODING :** All fittings shall be colour coded circumferentially at ends as given below

SA 105 / SA 106 Gr.C	=	Blue
SA 182 F11 / SA 335 P11	=	Green & White
SA 182 F12 / SA 335 P12	=	Black & Red
SA 182 F22 / SA 335 P22	=	Blue & Red
SA 182 F91 / SA 335 P91	=	Brown & Red

8.3 MARKING:

- 8.3.1 The fittings dispatched to **BHEL Stores** shall be punched / etched with Material code, Heat number, material specification, maker's emblem, Inspectors seal and Statutory authorities seal (as applicable) .

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P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



In addition, the above details along with size shall be paint stenciled on the fittings.

- 8.3.2 The fittings dispatched directly to project site as **DTS** shall be punched and paint stenciled with DU code (14 digit work order du detail) as given by purchase in addition to marking done as per para 8.3.1.

- 9.0 **PACKING AND END PROTECTION:** Machined ends of the fittings shall be well protected using end caps and fittings shall be suitably packed in box / crate to avoid transit & other damages.

- 10.0 **MANUFACTURING QUALITY PLAN.**
Vendor shall submit manufacturing Quality plan along with technical part of the bid for BHEL approval.

11.0 **INSPECTION & CERTIFICATION**

All items are to be inspected at the manufacturer's works by the Inspection agencies / authorities as per IBR. Inspection certificate in IBR Form IIIC shall be submitted along with the Work Test Certificate (EN 10204 Type 3.2) countersigned by authorities as per IBR and shall include the following. (Three ink signed originals required).

1. Test Certificate Number & date.
2. BHEL P.O Number & Amendment Number(if any)
3. BHEL P.O. Serial Number
4. BHEL TDC Number
5. Size-wise Quantity
6. Specification, Grade & Year of code.
7. Heat/Melt Number
8. Steel making process.
9. Starting material details
10. Positive Material identification (PMI) report for Alloy steel finished fitting.
11. Ladle and product Analysis of Raw Material.
12. Product analysis report.
13. Heat Treatment Chart.
14. Separate NDE reports are required for
VT, MT, PT, RT,
UT (UT Reports in soft copy + hard copy)
15. Tensile Test report
16. Bend Test report
17. Hardness Test report
18. Metallography Report along with photomicrograph with minimum 500x magnification.
19. Dimensional conformance.

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



20. Guarantee of HTP shall be given in the test certificate as follows, if hydro test is not carried out :- "Fabricated Y piece / welded Tees are capable of with standing without failure, breakage or impairment of their serviceability a hydrostatic test pressure equal to that prescribed for the specified matching pipe of equivalent material".

12.0 RECORDS OF REVISION.

Rev 01 : a) Para 3.0, 4.2.1 ,6.0 , 10.0 are included

b) Para 1.0,4.2,4.3,8.2,11.0 are revised

Rev 02 : a) Para 2.10,4.2.1,8.1, 8.2, 9.0 are revised

Rev 03 : a) Para 2.12, 8.0 and 11.0 (18) are revised

Rev 04 : a) Para 8.1 modified as sea worthy painting.

b) Para 11 modified. Works TC 'EN 10204 Type 3.2' specified. Individual reports are required.

*** **

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



1.0 GENERAL

Materials: SA106GrB, GrC; SA 335 P11,P12,P22 & P91.

This Technical Delivery Conditions specify the requirements in addition to ASME SA 106, SA 335. If the blooms for SA 335 pipes are sourced from India, then the sources shall be, TISCO, MUSCO and ASP Durgapur - which are IBR approved.

2.0 CHEMICAL COMPOSITION

For SA106 Gr B and Gr C :- Carbon content shall be limited to 0.25% max. for pipe thickness up to and including 20 mm; and 0.30% max. for pipe thickness above 20 mm.

3.0 TOLERANCES

3.1 **OD specified pipes:-** Unless otherwise specified in the PO, tolerances shall be as below.

- Outside diameter : $\pm 1\%$ (Max. 4 mm)
- Wall thickness as per SA 530
- Weight tolerance as per SA 530

3.2 **ID specified pipes:-** Unless otherwise specified in the PO, tolerances shall be:

- ID: + 0.0mm, -3.2mm
- Thickness: +3.2mm, -0.0mm

4.0 MECHANICAL TESTS

Number of Test (as per IBR): 2 numbers up to first 100 pipes and additional 1 number per subsequent 100 pipes or part thereof.

5.0 **SUPPLEMENTARY TESTS:** These are applicable to SA 106 Cr C, SA335 P11, P12, P22, P91. The supplementary test results shall be indicated in the Test Certificate along with the mandatory test results.

5.1 **Product Analysis -S1:-** Product Analysis shall be carried out on 5% of pipes per lot per heat (minimum 2 Nos)

5.2 **Transverse tension test- S2:-** Transverse tension test shall be carried out (for size NB 200 mm and above) on one end of 5% of pipes per lot (minimum 1 No).

6.0 HARDNESS FOR SA 335 P91 PIPES:-

Hardness test shall be carried out on each SA 335 P91 pipes. The values shall be 180-250 BHN and shall be indicated in the Test certificate.

7.0 NON DESTRUCTIVE TEST

Each pipe shall be ultrasonically tested as per ASTM E 213 in both clockwise & anticlockwise directions; calibration to be done on two axial notches of 50 mm length (inside & outside) and a depth of 5% of wall thickness (minimum 0.3 mm; maximum 1.5mm). The results shall be indicated in the Test Certificate.

8.0 REPAIR:-

Repair by welding is prohibited.

The pipe shall meet the dimensional tolerance (clause 3.0 above) after any mechanical repair as permitted in the standard.

S. Jayakumar, Engg
P. Elangovan, QA
K. Ganeshan, MM

Approved by

V. Krishnan, Commercial

B. Prakash Rao, Q & MS

R. Easwaran, Quality, HPBP



9.0 WORKMANSHIP:-

All pipes shall have smooth surfaces, free from loose scales and defects like laps, seams, folds, cracks, pitting etc. The surface imperfection beyond the permissible limit of ASME SA106 / SA335 shall be removed mechanically without affecting the minimum thickness and workmanlike finish.

10.0 MARKING

The following details are to be marked on the consignment for identification

- | | | |
|---------------------|---------------------------|--------------------------|
| 1) PO Number | 2) Supplier's emblem/code | 3) Specification & grade |
| 4) Heat number | 5) Size | 6) No. of pipes |
| 7) Inspector's seal | | |

OD up to 31.8 mm (excluding)	Details 1 to 7 shall be stamped on metal / plastic tag attached to bundle
OD 31.8 mm to OD 76.1mm (including)	- Details 1 to 5 shall be paint stencilled on each pipe. - Details 1 to 7 to be stamped on Metal / Plastic tag attached to bundle.
OD above 76.1 mm	- Details 2,3,4,5 & 7 shall be hard stamped with round edged stamp at 100mm from an end of each pipe. - Details 1 to 5 shall be paint stencilled on each pipe.

11.0 COLOUR CODING

Longitudinal colour bands shall be made throughout the length of the pipe. The colours shall be as per BHEL procedure SIP: PP: 21.

12.0 PRESERVATION

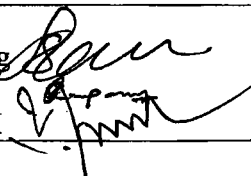
- Outside:- resin type rust preventive coating with visibility to stencilled details.
- Inside:- rust inhibitor or resin type rust preventive coating.
- Ends of the pipes shall be secured with caps.

13.0 INSPECTION AND CERTIFICATION

Products must be inspected and certified by the IBR approved Inspecting Authority in IBR FORM III B (i) for tubes and FORM III A (i) for pipes

Well-known pipe or tube maker (recognised in IBR) to submit IBR FORM III D or III E respectively (Mill Certificate).

*** **

S. Jayakumar, Engg		Approved by	V. Krishnan, Commercial
P. Elangovan, QA		B. Prakash Rao, Q & MS	
K. Ganeshan, MM		R. Easwaran, Quality, HPBP	