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:PC:9010 DT: 14.08.2009

Sub: Procurement of fabricated Tees.

Ref: Enquiry No:PC:9010 dt 14.08.09

Please find the following tender documents for reference.

1. List of items and sample drawing
2. Tech. delivery condition TDG: 108:03.

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

Enq:PC 9010 DT 14.08.2009

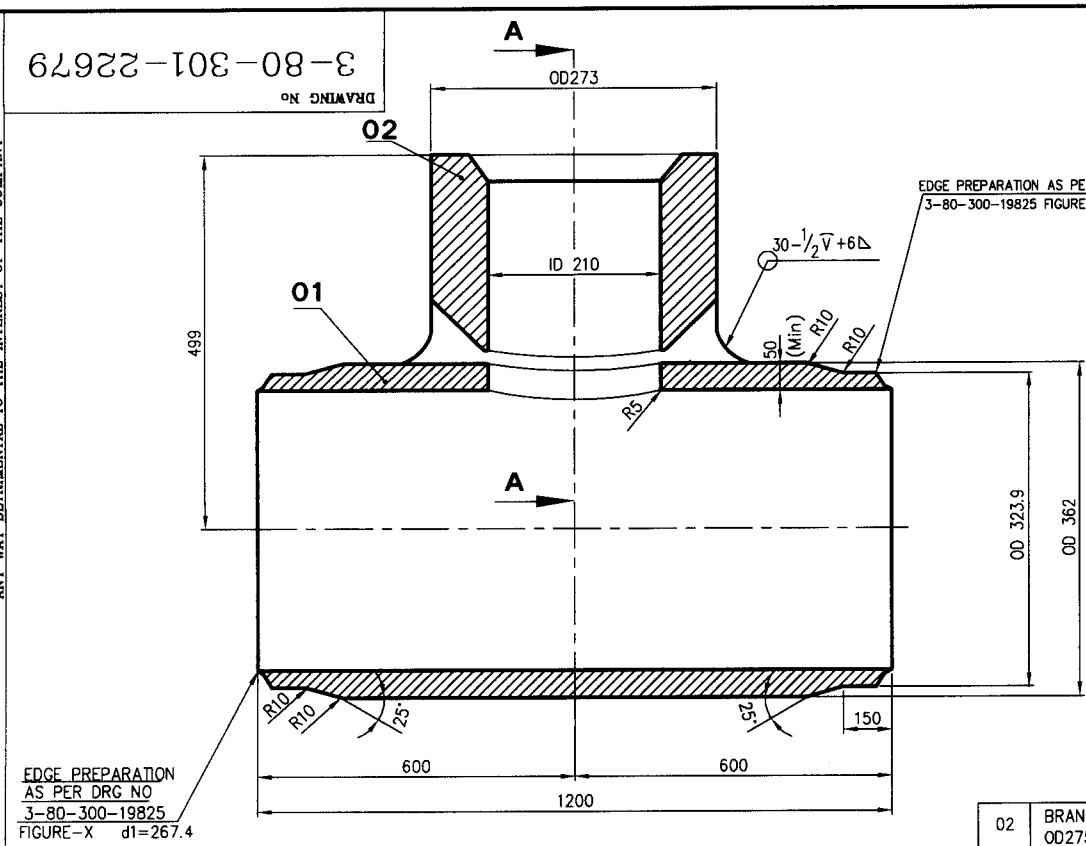
LIST OF ITEMS

SL.NO	Material Code	Drawing no	Description	QTY
1	925058420000	3-80-301-22679	FAB UNEQ TEE323.9 X 31/273 X 25 SA182F91	3
2	925058430000	3-80-359-26123	FAB UEQT OD 406.4X38 /355.6X29-SA182F91	2
3	925058440000	3-80-359-26124	FAB UEQT OD406.4X38 /273X25-SA182F91	2
4	925058450000	3-80-359-26125	FAB UEQT OD 355.6X29 /323.9X31-SA182F91	4
5	925058460000	3-80-359-26126	FAB UEQTOD 660X36 /559X28.58-SA182F22CL1	4
				15

Note: Delivery shall be four months from LOI/ PO date.

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

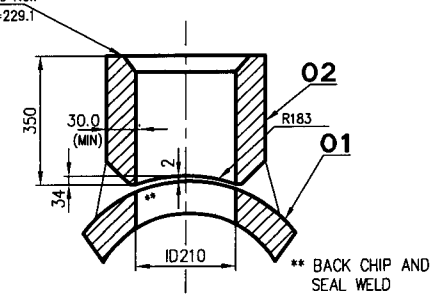
DRAWING No. 3-80-301-22679



12.5

NOTES :-

01. ELECTRODES TO BE USED (FOR WELDING OF "F91" WITH "F91" ONLY)
   a) TIG : RT 2 1/4 Cr 1Mo(A)
   b) ARC : BOHLER FOX C9 MV(A)



SECTION-AA

RAW MATERIAL REQUIRED FROM SUPPLIER		
	LENGTH (mm)	WEIGHT (kg)
BASE PIPE	1220	470
BRANCH NOZZLE	350	69.0

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
02	BRANCH NOZZLE L=350 OD275 ID210xTHK30	3-80-301-22679		92 516 636 0000 / SA 182 F91	A	63.000 / 1
01	BASE PIPE L = 1200 ID 262.0 x Thk 50.0 Min	3-80-301-22679		92 505 717 0000 / SA 182 F91	A	401.000 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	N.MAHARAJAA		11.04.2006	
CHD	G.AARTHI		11.04.2006	
APPD	A.P.M.KUTTY		11.04.2006	

REV	DATE	ALTD
01		APPD
ZONE		

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	464.0		

TITLE: **FABRICATED UNEQUAL TEE (OD323.9x31.0/OD273.0x25.0)**

CARD CODE: U 01

DRAWING No.: **3-80-301-22679**

REV: **00**

SIZE A3

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 to1070 deg C (for wall thickness larger than 75 mm, accelerated cooling may be done to obtain a fully martensitic structure) and tempered at 760 $\pm$ 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 bent180deg 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.

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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, dia & thickness.

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 :** All fittings (except stainless steel and galvanised) shall be **painted** on the external surface as given below

a) surface preparation : Blast cleaning
b) Primer coat : 50 microns of Red oxide zinc phosphate confirming to IS 12744
c) Final coat : 70 microns of Synthetic enamel paint confirming to IS2934 .
d) Shade : (i) smoke grey – shade no 692 of IS5 for all carbon steel fittings
(ii) Sea green -- shade no 217 of IS5 for all Alloy steel fittings

The internal surface 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

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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) .
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 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. NDE reports [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 500x (min) magnification..
*19. Dimensional conformance.

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*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".

*Details furnished in the Tests certificate in lieu of chart/report is acceptable.

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

** ** **

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