



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

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REF: ENQ NO:PC:8010

DT: 12.05.2008

Sub: Procurement of pipe fittings.


**Ref: Enquiry No:PC:8010 dt 24.04.2008
Rate Contract**

Please find the following tender documents for reference.

1. Annexure to Enquiry – List of fittings
2. Tech. delivery condition TDG: 102:03

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.

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


✓ Sr. Manager / Purchase
BHEL / Piping Centre
80,GN Road, T.Nagar
Chennai-600017

ENQ NO: PC8010 dt 24.04.08

ANNEXURE -I - LIST OF ITEMS

ENQ SL NO.	DRAWING NO.	DESCRIPTION	QUANTITY-(NOS)	UNIT RATE
1	4-80-999-93050-/00	FORGED UNEQUAL TEE OD 864.0 X 27.0 / OD 323.9 X 10.31 SA234WPC	60	
2	4-80-999-93051-/00	FORGED UNEQUAL TEE OD 864.0 X 35.0 / OD 508.0 X 25.0 SA234WP11CL1	36	
3	4-80-999-93052-/00	FORGED UNEQUAL TEE OD 864.0 X 35.0 / OD 323.9 X 20.0 SA234WP22CL1	16	
4	4-80-999-93053-/00	FORGED UNEQUAL TEE OD 965.0 X 57.0 / OD 711.2 X 40.0 SA234WP22CL1	13	
5	4-80-999-93054-/00	FORGED UNEQUAL TEE OD 564.0 X 58.0 / OD 323.9 X 35.0 SA234WP91	1	
6	4-80-999-93055-/00	FORGED UNEQUAL TEE OD 564.0 X 58.0 / OD 406.4 X 42.0 SA234WP91	1	
7	4-80-999-93056-/00	FORGED UNEQUAL TEE OD 508.0 X 71.0 / OD 273.0 X 40.0 SA234WPC	2	
8	4-80-999-93057-/00	FORGED UNEQUAL TEE OD 508.0 X 71.0 / OD 168.3 X 27.5 SA234WPC	2	
9	4-80-999-93058-/00	FORGED UNEQUAL TEE OD 355.6 X 50.0 / OD 219.1 X 32.0 SA234WPC	6	
10	4-80-999-93059-/00	FORGED UNEQUAL TEE OD 508.0 X 71.0 / OD 355.6 X 50.0 SA234WPC	6	
11	4-80-999-93060-/00	FORGED UNEQUAL TEE OD 559.0 X 54.0 / OD 406.4 X 38.0 SA234WP91	15	
12	4-80-999-93061-/00	FORGED UNEQUAL TEE OD 559.0 X 54.0 / OD 323.9 X 31.0 SA234WP91	26	
13	4-80-999-93062-/00	FORGED UNEQUAL TEE OD 508.0 X 64.0 / OD 273.0 X 36.0 SA234WPC	30	
14	4-80-999-93063-/00	FORGED UNEQUAL TEE OD 508.0 X 64.0 / OD 368.0 X 48.0 SA234WPC	15	
15	4-80-999-93064-/00	FORGED UNEQUAL TEE OD 368.0 X 48.0 / OD 219.1 X 30.0 SA234WPC	45	
16	4-80-999-93065-/00	FORGED UNEQUAL TEE OD 508.0 X 64.0 / OD 368.0 X 48.0 SA234WPC	38	
17	4-80-999-93066-/00	FORGED UNEQUAL TEE OD 914.0 X 30.0 / OD 711.0 X 25.0 SA234WP91	1	
18	4-80-999-93067-/00	FORGED UNEQUAL TEE OD 711.2 X 25.0 / OD 610.0 X 20.0 SA234WP91	1	
19	4-80-999-93068-/00	FORGED EQUAL TEE OD 660 X 36.0 SA234WP22CL1	1	
20	4-80-999-93069-/00	FORGED UNEQUAL TEE OD 711.2 X 40.0 / OD 660.0 X 36.0 SA234WP22CL1	25	
21	4-80-999-93070-/00	FORGED UNEQUAL TEE OD 508.0 X 64.0 / OD 168.3 X 27.5 SA234WPC	25	
22	4-80-999-93071-/00	FORGED UNEQUAL TEE OD 323.9 X 31.0 / OD 219.1 X 25 SA234WP91	1	
23	4-80-999-93072-/00	FORGED UNEQUAL TEE OD 323.9 X 31 / OD 168.3 X 27.5 SA234WP91	12	
24	4-80-999-93073-/00	FORGED EQUAL TEE OD 323.9 X 31 SA234WP91	4	



1.0 CODES:-

The fittings shall meet Indian Boiler Regulations (IBR) and the following requirements in addition to the standards specified in the Purchase Order (PO).

2.0 RAW MATERIALS:-

- All pipes used for fittings shall meet the respective specification. The test certificate shall be furnished.
- All mother pipes used for fittings shall be subjected to a hydraulic test as per SA 530 or UT as per ASTM E 213 at the mill
- All plates used for fittings shall be UT tested as per S1 of SA578 and acceptance norms shall be as per Level B of SA578
- The raw material forging shall be ultrasonically tested as per SA 388 and the acceptance norm shall be as per 3.3.4 of ASME Sec VIII Div 2.
- Steel for SA182 F11, F12 & F22 if indigenously procured, to be from following manufacturers approved under IBR for creep resistant steels: i) Alloy Steel Plant Durgapur, ii) Tata Iron & Steel company, Jamshedpur & iii) Mahindra Ugin Steel Company, Mumbai..

3.0 PROCESS:-



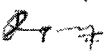

- Process of manufacture shall conform to applicable standards.
- All fittings shall be of seamless unless otherwise specified in the purchase order.
- In case of welded fittings, WPS, PQR & welder qualification shall be approved by BHEL PC, prior to start of welding.
- All fittings shall have smooth surfaces, workman like finish and free from loose scales and defects like laps, seams, folds, cracks, pitting etc.. Repair by welding is NOT permitted.
- Dimensions shall be as per ASME B16.9 or B16.28, Butt Weld edges shall be as given in Purchase Order. The ends of reducers shall have a straight portion of Minimum 13mm.
- Unless otherwise specified in the P.O SA 234 WP 11/12/22 fittings shall be supplied as per class 1, SA 182 F11/12 shall be supplied as class 2, SA 182 F22 shall be of class 3 only.

4.0 HEAT TREATMENT:-

4.1 All fittings shall be heat treated as below.

SA 234 WP B	- As per specification
SA 105, SA234 WP C	- Normalised
SA234 WP11/ WP12/ WP22	- Normalised & Tempered
SA182 F11/ F12/ F22	- Normalised & Tempered
Stainless Steel :-	
SA 182 F304/ 316/ 321/ 347	- Solution annealed
SA 403 WP304/ 316/ 321/ 347	- Solution annealed

- 4.2 Fittings conforming to SA 234 WP91 and SA182 F91 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 \pm 10 deg C

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P. Elangovan, QA			K. Ganeshan, MPL	



5.0 TESTING :-

- (a) Carbon content of SA 234 WPB, WPC, SA 105 fittings shall be restricted to 0.25% max.
- (b) All ferrous fittings shall be tested by MPI as per ASTM E-709 and SS fittings shall be LPI tested as per ASTM E 165.
- (c) One fitting of each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard.
- (d) All fittings of wall thickness above 6mm or NB 200mm and above shall be Ultrasonically Tested as per SA 388; acceptance norms shall be 3.3.4 of ASME section VIII Div.2.
- (e) Hardness test shall be carried out on each fittings of WP91 / F91. For other fittings hardness shall be checked on 10% of the fittings.
- (f) In case of welded fittings; all the welds shall be 100% RT tested and acceptance norms shall be UW 51 of ASME Sec VIII DIV-1
- (g) The following supplementary tests shall be carried out for specifications namely SA105, SA 182 F11 / F12 / F22 / F91, SA 234 WPC / WP11 / WP12 / WP22 / WP91 (No supplementary test applicable for SA 234 WPB)
 - a) Product analysis – one / heat / size.
 - b) Tension test – one / heat / heat treatment lot / size.
- (h) Metallography:- Metallography shall be carried out one per heat, per size, per heat treatment lot of WP91 / F91 fittings.

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 MARKING, COLOUR CODING, PACKING AND PRESERVATION :-

- 7.1** All fittings shall be PUNCHED OR ETCHED with specification, Grade, Heat No, maker's emblem and Inspection Authorities Seal. In addition, specification, grade, heat no and size shall be stenciled on fittings of sizes above 76mm.

7.2 COLOUR CODING:-

SA 234 WPB / WPBW	=	Red
WPC / SA105	=	Blue
WP11 / SA182 F11	=	Green & White
WP12 / SA182 F12	=	Black & Red
WP22 / SA182 F22	=	Blue & Red
WP91 / SA182 F91	=	Brown & Red
SA182 / SA 403 F / WP 304	=	Blue & Yellow
316	=	Black & Green
321	=	Blue & Brown
347	=	Yellow & Black

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7.3 PACKING AND PRESERVATION :-

All fittings except SS to be applied with resin type rust preventive coating with visibility to punched and stenciled details on outside and either with rust preventive coating or rust inhibitor inside. SS fittings to be surface treated as per ASTM A380 both inside and outside. Ends to be closed, with end caps secured for storage and suitably packed in box/crate to avoid transit/other damages.

8.0 INSPECTION & CERTIFICATION :-

All fittings are to be Inspected at the manufacturer's works by the Inspection agencies / authorities as per IBR and as indicated in the P.O. Inspection certificate in IBR Form III C shall be submitted along with the Work Test Certificate countersigned by the above authorities and shall include the following.

1. Test Certificate Number & date.
2. BHEL P.O Number & Amendment Number
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. Starting material details.
9. Steel making process
10. Laddle Analysis of Raw Material and product analysis of fitting.
- *11. Positive Material Identification (PMI) report for Alloy steel fittings.
- *12. Supplementary Test(Product analysis, Tension test..) results.
- *13. Heat Treatment Chart.
- *14. NDE report. (VISUAL,MPI, LPI,UT)
- *15. Tensile Test Report
- *16. Hardness Test Report
- *17. Metallography as applicable.
- *18. Dimensional conformance.
- *19. RT test report / Results (for welded fittings)
- *20. Guarantee of HTP shall be given as follows:- "Fittings are capable of withstanding without failure, leakage 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.

9.0 RECORDS OF REVISION :-

Rev 01 : a) Fully revised for better clarity.

: b) Para 2.0 e added.

Rev 02 : a) Para 2.0 (c): UT acceptance norms revised from level A to B.

Rev 03 : a) Fully revised for better clarity.

: b) Para 4.2,6.0, 8.0 (11) added.

c) Para 2 (d) ,4.1, 5 (d) are revised.

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