



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

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REF: ENQ NO:PC:8011

DT: 12.05.2008

Sub: Procurement of pipe fittings.

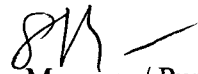
Ref: Enquiry No:PC:8011 dt 06.05.2008
Rate Contract

Please find the following tender documents for reference.

1. Annexure to Enquiry – List of BW 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

ANNEXURE I - LIST OF FITTINGS

Eq sl no	Material	DESCRIPTION	SPECIFICATION	Tentative qty	Unit rate
1	925240160000	LR 90DEG ELL 368X59SA234WP22CL1	SA234WP22CL1	10	
2	925248880000	BW LR 90DEG ELL 406.4X 55SA234WP22CL1	SA234WP22CL1	10	
3	925249140000	BW LR 90DEG ELL 508 X 30SA234WP22CL1	SA234WP22CL1	10	
4	925041310000	BW LR 90DEG ELL 558.8 X 32 SA234WP22	SA234WP22CL1	10	
5	925249110000	BW LR 45DEG ELL558.8x32SA234WP22CL1	SA234WP22CL1	10	
6	925249120000	BW LR 30DEG ELL558.8x32SA234WP22CL1	SA234WP22CL1	10	
7	925244580000	BW LR90DEG ELL559X28.58SA234WP22CL1	SA234WP22CL1	50	
8	925248970000	BW LR 45 DEG ELL 559X28.58 SA234WP22	SA234WP22CL1	10	
9	925249280000	BW LR30DEG ELL559X28.58SA234WP22CL1	SA234WP22CL1	10	
10	925244120000	BW LR 90DEG ELL 609.6 X 20 SA234WP22	SA234WP22CL1	30	
11	925246340000	BW LR 45DEG ELL 609.6 X 20 SA234WP22	SA234WP22CL1	10	
12	925046810000	BWLR90DEGELL 660 X 9.53SA234WP22CL1	SA234WP22CL1	10	
13	925249090000	BW LR 90DEG ELL660X40SA234WP22CL1	SA234WP22CL1	10	
14	925049880000	BW LR 45 ELL 711.2X25SA234WP22CL1	SA234WP22CL1	10	
15	925246900000	BW LR90DEG ELL711.2 X 25SA234WP22CL1	SA234WP22CL1	25	
16	925249160000	BW LR90DEG ELL711.2 X 28 SA234WP22CL1	SA234WP22CL1	10	
17	921174220000	CREDID260X51MIN/323.9X 51MINS A234WP22CL1	SA234WP22CL1	10	
18	925179080000	C.RED ID260X51/OD273X45SA234WP22CL1	SA234WP22CL1	10	
19	925274930000	C.RED ID260X51/168.3X28SA234WP22CL1	SA234WP22CL1	10	
20	925279120000	BW CON RED 323.9X56/273X45 SA234WP22	SA234WP22CL1	10	
21	925276710000	C.RED 355.6X55.6/219.1X36SA234WP22CL1	SA234WP22CL1	10	
22	925279040000	BW CON RED 375 X 55/323.9 X50/SA234WP22C	SA234WP22CL1	10	
23	925270610000	BW CON RED 406.4X35/ 323.9X28 SA234WP22	SA234WP22CL1	10	
24	921174470000	REDUCER OD406..4X40/368X19 SA234WP22	SA234WP22CL1	10	
25	925178900000	CONRED406.4X55/273X45SA234WP22CL1	SA234WP22CL1	10	
26	925179920000	BW CO.RE.406.4X55/219.1X32SA234WP22CL1	SA234WP22CL1	10	
27	925275510000	C. RED 436 X 37 / 323.9 X 28SA234WP22CL1	SA234WP22CL1	10	
28	925179940000	BW CO.RE.457.2X32/273X25.4SA234WP22CL1	SA234WP22CL1	10	
29	925277230000	C.RED 457.2X45/355.6X35.71SA234WP22CL1	SA234WP22CL1	10	
30	955178890000	C.RED.457.2X85/406.4X55SA234WP22CL1	SA234WP22CL1	10	
31	925179350000	BWCONRED457.2X85.7/355.6X52 SA234WP22CL1	SA234WP22CL1	10	
32	925179330000	BWCONRED558.8x28.58/406.4x25SA234WP22cl1	SA234WP22CL1	10	
33	925179860000	RED.558.8X28.58/457.2X32SA234WP22CL1	SA234WP22CL1	10	
34	925179400000	BW CON RED 558.8X32/508X30SA234WP22CL1	SA234WP22CL1	10	
35	925279070000	C.RED 559X28/406.4X22.2SA234WP22CL1	SA234WP22CL1	10	

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Enq sl no	Material	DESCRIPTION	SPECIFICATION	Tentative qty	Unit rate
36	925179960000	C.RED.629X35/559X30SA234WP22CL1	SA234WP22CL1	20	
37	921174350000	BWRED OD 639X35/OD 558.8X32 SA234WP22CL1	SA234WP22CL1	10	
38	921174620000	BWECCRED 660X36/558.8X28.58SA234WP22CL1	SA234WP22CL1	10	
39	921174610000	BWCONCRED 660X36/558.8X28.58SA234WP22CL1	SA234WP22CL1	10	
40	925179390000	BW ECC RED660X40/ 558.8X32SA234WP22CL1	SA234WP22CL1	10	
41	925179510000	C.RED. 660 X 45/323.9 X 45SA234WP22CL1	SA234WP22CL1	10	
42	925277100000	C.RED 711.2 X 45 / 508 X 28SA234WP22CL1	SA234WP22CL1	10	
43	921174190000	ECCREDOD762X40/558.8X28.58SA234WP22CL1	SA234WP22CL1	10	
44	925178850000	C.RED.813X26/508X17.48SA234WP22CL1	SA234WP22CL1	10	
45	921174210000	CONRED OD 813X 56/ 762 X 40 SA234WP22CL1	SA234WP22CL1	10	
46	925251550000	BW EQT 355.6 X 36 SA234WP22	SA234WP22CL1	10	
47	925257810000	UEQT 355.6 X 36 / 273 X 28SA234WP22CL1	SA234WP22CL1	10	
48	925259670000	UNEQT355.6X36/168.3X27.5SA234WP22CL1	SA234WP22CL1	10	
49	925257920000	BW UEQT406.4X 35/323.9X28SA234WP22CL1	SA234WP22CL1	10	
50	925057100000	BW UET 406.4X55/159X30SA234WP22CL1	SA234WP22CL1	10	
51	925057110000	BW UET 406.4X55/168.3X27.5SA234WP22CL1	SA234WP22CL1	10	
52	925057120000	BW UET 406.4X55/273X45SA234WP22CL1	SA234WP22CL1	10	
53	925057330000	BW EQT 508 X 28 SA234WP22	SA234WP22CL1	10	
54	925256550000	BW UEQT 508 X 52 / 323.9 X 34 SA234WP22	SA234WP22CL1	10	
55	925257940000	BW EQT 558.8 X 28.58SA234WP22CL1	SA234WP22CL1	10	
56	925057740000	BW UET 558.8x28.58/406.4x25 SA234WP22CL1	SA234WP22CL1	10	
57	925057760000	BWUNEQT OD558.8 x 32/508X 30SA234WP22CL1	SA234WP22CL1	10	
58	925057090000	BW UET 559X28.58/406.4X17.5SA234WP22CL1	SA234WP22CL1	10	
59	925057130000	BW UET 559X28.58/273X15.09SA234WP22CL1	SA234WP22CL1	10	
60	925057640000	BW UEQT 610X22.2/457.2X22.2 SA234WP11CL1	SA234WP11CL1	20	
61	925255900000	BW EQTEE 660 X 36 SA234 WP22CL 1	SA234WP22CL1	10	
62	925255910000	BWUNEQTEE660X36/558.8X28.58SA234WP22CL1	SA234WP22CL1	10	
63	925057750000	BW UNEQTOD660x40/558.8X32SA234WP22CL1	SA234WP22CL1	10	
64	925257950000	UEQT711.2X25/457.2X22.2SA234WP22CL1	SA234WP22CL1	10	
65	925257960000	UEQT 711.2X25/457.2X22.2SA234WP11CL1	SA234WP11CL1	10	
66	925255760000	UEQT711.2X25/457.2X25 SA234WP22CL1	SA234WP22CL1	10	
67	925057770000	BW UNEQTE 711.2X28/457.2X25 SA234WP22CL1	SA234WP22CL1	10	
68	925057780000	BW UN EQTEE 711.2X28/457.2X25 SA234WP11	SA234WP11CL1	10	
69	925057810000	UNEQTEOD762X40/OD558.8X28.58SA234WP22CL1	SA234WP22CL1	10	
70	925195690000	BW CAP 508 X 64 SA234WPC	SA234WPC	10	

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Enq sl no	Material	DESCRIPTION	SPECIFICATION	Tentative qty	Unit rate
71	925033280000	BW CAP 508 X 71 SA234WPC	SA234WPC	10	
72	925032080000	BW CAP 610 X 9.53 SA234WPB	SA234WPB	10	
73	925249200000	BWLR 90 DEG ELBOW OD 508 X 64 SA234 WPC	SA234WPC	125	
74	925249290000	BW LR 45 DEG ELBOW OD 508 X 64 SA234WPC	SA234WPC	15	
75	925241500000	BW LR 90DEG ELBOW 508 X 71---SA234WPC	SA234WPC	25	
76	925249060000	BW SR 90 DEG ELL 508 X 71 SA234WPC	SA234WPC	10	
77	925249170000	BW LR 90DEG ELL711.2X20SA234WPC	SA234WPC	10	
78	925245960000	BW LR 90DEG ELL 711.2 X 21.5 SA234WPC	SA234WPC	10	
79	921174310000	BWRED OD 368 X 48/ 273 X 32 SA234WPC	SA234WPC	10	
80	921174300000	BWRED OD 406.4X 50 /368 X 48 SA234WPC	SA234WPC	10	
81	925273470000	BW REDOD406.4X60/ID275MXX43.5MN SA234WPC	SA234WPC	10	
82	921174230000	BW RED OD 406.4 X 61/ 368 X 40 SA234WPC	SA234WPC	20	
83	925179990000	BW CON.RED.406.4X61/368X48SA234WPC	SA234WPC	10	
84	925272910000	BW CON RED 609.6X32 508X12.7 SA234WPB	SA234WPB	10	
85	921174460000	REDUCER 660X22/558.8X23 SA234WPC	SA234WPC	15	
86	925273910000	BW CON RED 711X20 457.2X12.7 SA234WPC	SA234WPC	15	
87	921174200000	CON RED OD 711.2X20 / 508X25 SA234WPC	SA234WPC	10	
88	925273820000	BW CON RED 813X22 711.2X22 SA234WPC	SA234WPC	10	
89	925273930000	BW CON RED 813X22 508X14.02 SA234WPC	SA234WPC	10	
90	925057790000	EQ TEE OD 508 X 64 SA234 WPC	SA234WPC	25	
91	925251430000	EQUAL TEE 508 X 71-SA234WPC	SA234WPC	10	
92	925257550000	BW UEQT 610X20 323.9X9.53 SA234WPB	SA234WPB	10	
93	925253990000	BW EQT 711 X 20 SA234WPC	SA234WPC	10	
94	925057800000	UNEQTEE OD711.2X20/OD406.4 X12.7SA234WPC	SA234WPC	10	
95	921174320000	BW RED OD 273 X 30 / 219.1X 25 SA234WP91	SA234WP91	10	
96	925276720000	BWCONRED323.9X33.32/273X28.58 SA234WP91	SA234WP91	10	
97	925179340000	BWCONRED355.6X29/219.1X25 SA234WP91	SA234WP91	10	
98	925179380000	BW CONRED 355.6 X 32/ 273 X 30 SA234WP91	SA234WP91	10	
99	925179320000	BWCONRED406.4x42/273x25 SA234WP91	SA234WP91	10	
100	921174180000	ECC RED OD457X42/323.9X31-SA234WP91	SA234WP91	10	
101	921174600000	BWCONC RED 457 X42/ 323.9 X 31 SA234WP91	SA234WP91	10	
102	925279580000	BW CON RED 558.8 X14/406.4 X11/SA234WP91	SA234WP91	10	
103	925179440000	ECC RED OD 559X54/OD406.4X38-SA234WP91	SA234WP91	10	
104	925179370000	BW CONRED 559 X 54/323.9 X 31 SA234WP91	SA234WP91	10	
105	925179160000	ECC RED 564X58/406.4X42 SA234WP91	SA234WP91	10	

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Enq sl no	Material	DESCRIPTION	SPECIFICATION	Tentative qty	Unit rate
106	925279100000	BW CON RED 609.6 X14/406.4 X11/SA234WP91	SA234WP91	10	
107	921174420000	ECCENTRICRED OD914X30/OD711X25 SA234WP91	SA234WP91	10	
108	925255890000	BW EQTEE 457 X 42 SA234 WP91	SA234WP91	10	



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 Ugine 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

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

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 stencilled 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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K. Ganeshan, MPI



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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