



Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)

Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017

Phone : 91 (044) 28161245, e-mail: prs@bhelmpc.co.in

REF: ENQ NO:PC:9015

DT: 01.10.2009

Sub: Procurement of butt welded fittings.

Ref: Enquiry No:PC:9015 dt 01.10.09

Please find the following tender documents for reference.

1. List of items
2. Tech. delivery condition TDG: 102:04

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.

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

DyManager / Purchase
BHEL / Piping Centre
80,GN Road, T.Nagar
Chennai-600017
Ph:28161243/245

SL NO	Material	Material Description	Tentative Qty Nos	Unit rate Rs.
1	921174200000	CON RED OD 711.2X20 / 508X25 SA234WPC	5	
2	921174220000	CREDID260X51MIN/323.9X 51MINSA234WP22CL1	5	
3	921174230000	BW RED OD 406.4 X 61/ 368 X 40 SA234WPC	5	
4	921174300000	BWRED OD 406.4X 50 /368 X 48 SA234WPC	5	
5	921174310000	BWRED OD 368 X 48/ 273 X 32 SA234WPC	5	
6	921174460000	REDUCER 660X22/558.8X23 SA234WPC	15	
7	921174470000	REDUCER OD406..4X40/368X19 SA234WP22	5	
8	921174770000	RED 559 X 72 / 406.4 X 54 SA234WPC	30	
9	921174780000	RED 559 X 72 / 273 X 36 SA234WPC	5	
10	921174810000	C.RED 355.6 X 62/273 X 63.5 SA234WP22CL2	5	
11	921174880000	BWCONRED508X14.2/355.6X11.13 SA234WPC	5	
12	921174890000	BWCONRED711.2X25/559X28.58SA234WP22CL1	5	
13	921174900000	BWCONRED 660X20 / 508X15.09 SA234WPB	5	
14	921174920000	BWCONRED 660X20 / 610X14.27 SA234WPC	5	
15	921174930000	BW CONRED OD384X19.8/323.9X9.53-SA234WPB	5	
16	921174940000	BW CON RED OD 711X20/610X14.27-SA234WPC	5	
17	921174970000	REDUCER OD762X20/OD 558.8X23 SA234WPC Drg No:48032069306	15	
18	925032080000	BW CAP 610 X 9.53 SA234WPB	5	
19	925041310000	BW LR 90DEG ELL 558.8 X 32 SA234WP22CL1	10	
20	925049750000	ASMEB16.9 BW 90DEG ELL 508X33 SA234WP22	5	
21	925049880000	BW LR 45 ELL 711.2X25SA234WP22CL1	10	
22	925057090000	BW UET 559X28.58/406.4X17.5SA234WP22CL1	5	
23	925057330000	BW EQT 508 X 28 SA234WP22	5	
24	925057640000	BW UEQT 610X22.2/457.2X22.2 SA234WP11CL1	5	
25	925058380000	BW UNEQTEE 406.4 X 47 /273 X 25 SA234WPC	5	
26	925178900000	CONRED406.4X55/273X45SA234WP22CL1	5	
27	925179080000	C.RED ID260X51/OD273X45SA234WP22CL1 drg:48030357773	5	
28	925179330000	BWCONRED558.8x28.58/406.4x25SA234WP22CL1	5	
29	925179350000	BWCONRED457.2X85.7/355.6X52 SA234WP22CL1	5	
30	925179400000	BW CON RED 558.8X32/508X30SA234WP22CL1	5	
31	925179860000	RED.558.8X28.58/457.2X32SA234WP22CL1	5	
32	925179920000	BW CO.RE.406.4X55/219.1X32SA234WP22CL1	5	
33	925179940000	BW CO.RE.457.2X32/273X25.4SA234WP22CL1	5	
34	925179990000	BW CON.RED.406.4X61/368X48SA234WPC	20	
35	925240160000	LR 90DEG ELL 368X59SA234WP22CL1	5	
36	925244120000	BW LR 90DEG ELL 609.6 X 20 SA234WP22	5	
37	925244580000	BW LR90DEG ELL559X28.58SA234WP22CL1	75	
38	925245960000	BW LR 90DEG ELL 711.2 X 21.5 SA234WPC	5	
39	925246340000	BW LR 45DEG ELL 609.6 X 20 SA234WP22	5	
40	925246900000	BW LR90DEG ELL711.2 X 25SA234WP22CL1	40	
41	925248880000	BW LR 90DEG ELL 406.4X 55SA234WP22CL1	5	
42	925248970000	BW LR 45 DEG ELL 559X28.58 SA234WP22	20	
43	925249110000	BW LR 45DEG ELL558.8x32SA234WP22CL1	5	

SL NO	Material	Material Description	Tentative Qty Nos	Unit rate Rs.
44	925249120000	BW LR 30DEG ELL558.8x32SA234WP22CL1	5	
45	925249140000	BW LR 90DEG ELL 508 X 30SA234WP22CL1	5	
46	925249160000	BW LR90DEG ELL711.2 X 28 SA234WP22CL1	5	
47	925249170000	BW LR 90DEG ELL711.2X20SA234WPC	25	
48	925249200000	BWLR 90 DEG ELBOW OD 508 X 64 SA234 WPC	200	
49	925249270000	BW LR 60 DEG ELBOW OD 508 X 25 SA234WP22	5	
50	925249280000	BW LR30DEG ELL559X28.58SA234WP22CL1	20	
51	925249290000	BW LR 45 DEG ELBOW OD 508 X 64 SA234WPC	20	
52	925249460000	BW LR 90 DEG ELL 406.4 X 54 SA234WPC	300	
53	925249470000	BW LR 30 DEG ELL 406.4 X 54 SA234WPC	50	
54	925249510000	BW LR 90 DEG ELL 406.4 X 49 SA234WPC	5	
55	925249520000	BW LR 90 DEG ELL 610 X 20 SA234 WP22 CL1	5	
56	925249530000	BW LR 90 DEG ELL 610 X 20 SA234 WPC	5	
57	925249540000	BW LR 90 DEG ELL 660 X 22 SA234 WPC	5	
58	925249550000	BW LR 30 DEG ELL 660 X 22 SA234 WPC	5	
59	925249660000	BWLR 60DEG ELBOW 558X28.58-SA234WP22CL1	5	
60	925251550000	BW EQT 355.6 X 36 SA234WP22	5	
61	925255740000	BW UNEQTEE OD 368X40/219.1X25 SA234WPC	5	
62	925255750000	BWUEQT558.8X28.58/508X25SA234WP22CL1	5	
63	925255970000	BW UEQT OD 610X14.27/406.4X17.5-SA234WPC	5	
64	925256550000	BW UEQT 508 X 52 / 323.9 X 34 SA234WP22	5	
65	925257550000	BW UEQT 610X20 323.9X9.53 SA234WPB	5	
66	925257810000	UEQT 355.6 X 36 / 273 X 28SA234WP22CL1	5	
67	925257880000	BW UEQT 559X28 406.4X22.2 SA234WP22	5	
68	925257920000	BW UEQT406.4X 35/323.9X28SA234WP22CL1	5	
69	925259670000	UNEQT355.6X36/168.3X27.5SA234WP22CL1	5	
70	925270610000	BW CON RED 406.4X35/ 323.9X28 SA234WP22	5	
71	925272910000	BW CON RED 609.6X32 508X12.7 SA234WPB	5	
72	925273470000	BW REDOD406.4X60/ID275MXX43.5MN SA234WPC	5	
73	925273820000	BW CON RED 813X22 711.2X22 SA234WPC	5	
74	925273910000	BW CON RED 711X20 457.2X12.7 SA234WPC	10	
75	925273930000	BW CON RED 813X22 508X14.02 SA234WPC	5	
76	925274930000	C.RED ID260X51/168.3X28SA234WP22CL1	5	
77	925275510000	C. RED 436 X 37 / 323.9 X 28SA234WP22CL1	5	
78	925275540000	C. RED 558.8X28.58/457.2X25SA234WP22CL1	20	
79	925276710000	C.RED 355.6X55.6/219.1X36SA234WP22CL1	5	
80	925277100000	C.RED 711.2 X 45 / 508 X 28SA234WP22CL1	5	
81	925277230000	C.RED 457.2X45/355.6X35.71SA234WP22CL1	5	
82	925279070000	C.RED 559X28/406.4X22.2SA234WP22CL1	25	
83	925279120000	BW CON RED 323.9X56/273X45 SA234WP22	5	
84	955178890000	C.RED.457.2X85/406.4X55SA234WP22CL1	5	



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:-

- a) All pipes used for fittings shall meet the respective specification. The test certificate shall be furnished.
- b) 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
- c) 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
- d) 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.
- e) 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.
- f) Carbon content of SA 234 WPB, WPC, SA 105 fittings shall be restricted to 0.25% max

3.0 PROCESS:-

- a) Process of manufacture shall conform to applicable standards.
- b) All fittings shall be of seamless unless otherwise specified in the purchase order.
- c) In case of welded fittings, WPS, PQR & welder qualification shall be approved by BHEL - PC, prior to start of welding.
- d) 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.
- e) 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.
- f) 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

5.0 TESTING :-

- (a) 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.

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P. Elangovan, QA		K. Ganeshan, MPL



- (b) One fitting of each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard.
- (c) 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.
- (d) Hardness test shall be carried out on each fittings of WP91 / F91. For other fittings hardness shall be checked on 10% of the fittings.
- (e) 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
- (f) 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.
- (g) 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.

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 PAINTING , COLOUR CODING, MARKING, PACKING & END PROTECTION

7.1 **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.

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

SA 234 WPB / WPBW	=	Red
WPC / SA105	=	Blue

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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

7.3 MARKING :

7.3.1 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.

If the thickness of the fitting is less than 6 mm, punching is not permitted and the above details shall be paint stenciled only. Fittings of size up to 2" (50mm) shall be tied together and the above details shall be punched / etched in a separate tag and tied to it.

7.3.2 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 7.3.1.

7.4 **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.

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

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17. Metallography Report along with photomicrograph with 500x (min) magnification.
- *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 acceptyance 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.

Rev 04 : a) Para 5.0 (g), 7.0 and 8.0 (17) are revised.

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