



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

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REF: ENQ NO:PC:8008

DT: 21.04.2008

Sub: Procurement of pipe fittings.

**Ref: Enquiry No:PC:8008 dt 21.04.2008
Rate Contract**

Please find the following tender documents for reference.

1. Annexure to Enquiry – List of SS BW fittings , Terms and conditions
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 - LIST OF ITEMS - BW FITTINGS - STAINLESS STEEL.

SL NO	Material	DESCRIPTION	SPECIFICATION	Tentative QTY	UNIT RATE	## TYPE OF CONSTRUCTION
1	925057360000	BW U.EQT 168.3X3.4/88.9X3.05SA403WP304H	SA403WP304H	10		SEAMLESS
2	925057580000	BWUEQT219.1X8.18/168.3X7.11 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
3	925178000000	BWCONRED 88.9X3.05/60.3X2.77 SA403WP304H	SA403WP304H	10		SEAMLESS
4	925178720000	BWCONRED168.3X5/88.9X3.05 SA403WP304H	SA403WP304H	10		SEAMLESS
5	925178730000	BWCONRED219.1X6.35/141X4.42 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
6	925178740000	BWCONRED168.3X3.4/73X3.05 SA403WP304H	SA403WP304H	10		SEAMLESS
7	925178750000	ECC.RED168.3X3.4/114.3X3.05SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
8	925178760000	BWECRED219.1X6.35/114.3X4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
9	925179000000	BW RED219.1X6.35/141.3X3.96 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
10	925179170000	BW C.RED219.1X5.4/168.3X5.4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
11	925179470000	RED 219.1X8.18/114.3X6.02 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
12	925195420000	BW END CAP 219.1X8.18 SA403WP304H	SA403WP304H	10		SEAMLESS
13	925244210000	BW LR 45DEG ELL 88.9 X 3.05SA403WP304	SA403WP304H	25		SEAMLESS
14	925244420000	BW LR 90DEG ELL 88.9 X 4 SA403WP304H	SA403WP304H	30		SEAMLESS
15	925244640000	BW LR 90DEG ELL 48.3 X 5.08 SA403WP304H	SA403WP304H	20		SEAMLESS
16	925246110000	BW LR 90DEG ELL 73 X 5.16 SA403WP304H	SA403WP304H	150		SEAMLESS
17	925246120100	BW LR 90DEG ELL 60.3 X 2.77 SA403WP304H	SA403WP304H	25		SEAMLESS
18	925246130100	BW LR 90DEG ELL 48.3 X 2.77 SA403WP304H	SA403WP304H	100		SEAMLESS
19	925246140100	BW LR 90DEG ELL 33.4 X 2.77 SA403WP304H	SA403WP304H	250		SEAMLESS
20	925246150000	BW LR 90DEG ELL 21.3 X 2.77 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
21	925246170000	BW LR 90DEG ELL 273 X 6.35 SA403WP304H	SA403WP304H	75		WELDED OR SEAMLESS
22	925246240000	LR 90DEG ELL 168.3X3.4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
23	925247370000	BW SR 90DEG ELL 323.9X4.57 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
24	925247380000	BW LR 90DEG ELL 355.6X6.35 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
25	925247390000	BW SR 90DEG ELL 355.6X6.35 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
26	925247460500	BW LR 45DEG ELL 355.6X6.35 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
27	925247470000	BW LR 45DEG ELL 114.3X4.5SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
28	925247470500	BW LR 45DEG ELL 114.3 X 4.5 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
29	925247480500	BW LR 45DEG ELL 219.1X6.35 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
30	925247490000	BW LR 45DEG ELL 168.3X5SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
31	925247490500	BW LR 45DEG ELL 168.3 X 5 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
32	925247500500	BW LR 45DEG ELL 219.1X3.76 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
33	925247510000	BW LR 45DEG ELL 168.3X3.4SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS

ANNEXURE - LIST OF ITEMS - BW FITTINGS - STAINLESS STEEL.

SL NO	Material	DESCRIPTION	SPECIFICATION	Tentative QTY	UNIT RATE	## TYPE OF CONSTRUCTION
34	925247510500	BW LR 45DEG ELL 168.3 X 3.4 SA403WP304H	SA403WP304H	15		WELDED OR SEAMLESS
35	925247520500	BW LR 90DEG ELL 323.9X4.57 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
36	925248670000	BW LR 90DEG ELL 21.3 X 3.73 SA403WP304H	SA403WP304H	15		SEAMLESS
37	925248850000	BW LR 45DEG ELL 168.3X7.11 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
38	925248980000	BW LR 90 DEG ELL 219.1X8.18 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
39	925249010000	BW LR 90 DEG ELL 88.9X3.05 SA403WP304H	SA403WP304H	30		SEAMLESS
40	925254510000	BWUEQT114.3X6.02/33.4X4.55 SA403WP304H	SA403WP304H	10		SEAMLESS
41	925254510100	BWUEQT114.3X3.05/33.4X2.77 SA403WP304H	SA403WP304H	15		SEAMLESS
42	925254520000	BW UEQT 114.3X4.5 48.3X4.5 SA403WP304H	SA403WP304H	10		SEAMLESS
43	925254530000	BWUEQT114.3X6.02/88.9X5.49 SA403WP304H	SA403WP304H	10		SEAMLESS
44	925254640000	BW EQT 88.9 X 4 SA403WP304H	SA403WP304H	10		SEAMLESS
45	925254650000	BW EQT 114.3 X 4.5 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
46	925254790000	BW EQT 60.3 X 5.54 SA403WP304H	SA403WP304H	10		SEAMLESS
47	925254810000	BW UEQT 60.3X5.54/33.4X4.55 SA403WP304H	SA403WP304H	25		SEAMLESS
48	925254820000	BW UEQT 60.3X5.54/21.3X3.73 SA403WP304H	SA403WP304H	50		SEAMLESS
49	925254830000	BW EQT 21.3 X 3.73 SA403WP304H	SA403WP304H	10		SEAMLESS
50	925254950000	BWUEQT168.3X7.11/114.3X6.02 SA403WP304H	SA403WP304H	25		WELDED OR SEAMLESS
51	925256170000	BW UEQT 88.9X5.49/48.3X5.08 SA403WP304H	SA403WP304H	10		SEAMLESS
52	925256170100	BW UEQT 88.9X3.05/48.3X2.77 SA403WP304H	SA403WP304H	10		SEAMLESS
53	925256830000	BW UEQT 168.3X3.4/88.9X5.49 SA403WP304H	SA403WP304H	10		SEAMLESS
54	925257160000	BW EQT 73 X 5.16 SA403WP304H	SA403WP304H	10		SEAMLESS
55	925257170100	BW EQT 60.3 X 2.77 SA403WP304H	SA403WP304H	10		SEAMLESS
56	925257180000	BW EQT 33.4 X 3.38 SA403WP304H	SA403WP304H	50		SEAMLESS
57	925257180100	BW EQT 33.4 X 2.77 SA403WP304H	SA403WP304H	25		SEAMLESS
58	925257190000	BW EQT 21.3 X 2.77 SA403WP304H	SA403WP304H	15		SEAMLESS
59	925257220100	BW UEQT 168.3X3.4/88.9X3.05 SA403WP304H	SA403WP304H	10		SEAMLESS
60	925257280000	BW UEQT 73X5.16 / 33.4X3.38 SA403WP304H	SA403WP304H	50		SEAMLESS
61	925257410000	BW EQT 273 X 4.19 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
62	925257480000	BW UEQT 114.3X3.05 / 73X3.05 SA403WP304H	SA403WP304H	10		SEAMLESS
63	925257490000	BWUEQT114.3X3.05/60.3X2.77 SA403WP304H	SA403WP304H	15		SEAMLESS
64	925257630000	BW EQT 48.3 X 5.08 SA403WP304H	SA403WP304H	10		SEAMLESS
65	925259250000	BW EQT 114.3 X 4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
66	925259260000	BWUEQT114.3X3.05/60.3X3.91 SA403WP304H	SA403WP304H	10		SEAMLESS

ANNEXURE - LIST OF ITEMS - BW FITTINGS - STAINLESS STEEL.

SL NO	Material	DESCRIPTION	SPECIFICATION	Tentative QTY	UNIT RATE	## TYPE OF CONSTRUCTION
67	925259280000	BW EQT 355.6 X 6.35 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
68	925259290000	BW UEQT 355.6X6.35/273X4.19 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
69	925259290500	BW UN EQT 355.6X6.35/273X4.18SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
70	925259310000	BWUEQT355.6X6.35/323.9X4.57 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
71	925259320000	BW EQT 219.1 X 6.35 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
72	925259330000	BW UEQT 219.1X6.35 / 114.3X4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
73	925259360500	BW UEQT 323.9X4.57/273X4.18 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
74	925259400500	BWUEQT355.6X6.35/168.3X3.4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
75	925259410500	BW UEQT 273X4.18 / 168.3X3.4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
76	925259560000	BW EQT 219.1X3.76 SA403WP304H	SA403WP304H	25		WELDED OR SEAMLESS
77	925259580000	BW UEQT 168.3X5 / 114.3X4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
78	925259600000	BW UEQT 168.3X5 / 114.3X4.5 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
79	925259690000	BW UEQT 48.3X5.08/33.4X4.55 SA403WP304H	SA403WP304H	10		SEAMLESS
80	925259940000	BWUEQT168.3X7.11/114.3X6.02SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
81	925274490000	BWCONRED88.9X5.49/60.3X5.54 SA403WP304H	SA403WP304H	10		SEAMLESS
82	925274490100	BWCONRED88.9X3.05/60.3X2.77 SA403WP304H	SA403WP304H	10		SEAMLESS
83	925274780000	BW CON RED 114.3X4.5/88.9X4 SA403WP304H	SA403WP304H	10		SEAMLESS
84	925274870000	BWCONRED114.3X6.02/73X5.16 SA403WP304H	SA403WP304H	10		SEAMLESS
85	925276800000	C.RED 168.3X3.4/141.3X3.4SA403WP304	SA403WP304H	10		WELDED OR SEAMLESS
86	925276870100	BWCONRED273.1X4.19/114.3X3.05SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
87	925276910100	BWCONRED88.9X3.05/21.3X2.77 SA403WP304H	SA403WP304H	10		SEAMLESS
88	925276920000	BWCONRED273X6.35/168.3X7.11 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
89	925276950000	BWCONRED273.1X4.19/168.3X3.4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
90	925277470000	BW RED219.1X3.76/141.3X3.76 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
91	925278860000	BWCONRED48.3X5.08/33.4X4.55 SA403WP304H	SA403WP304H	10		SEAMLESS
92	925279220000	BWCONRED73X5.16/60.3X5.54 SA403WP304H	SA403WP304H	10		SEAMLESS
93	925279610000	BW RED 323.9X4.57 / 273X4.19 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
94	925279620000	BW RED 219.1X6.35 / 114.3X4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
95	925279710500	BWECRED273.1X4.19/168.3X3.4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
96	925279720000	ECC RED 168.3X3.4/114.3X4.5SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
97	925279730500	BW RED 219.1X3.76/168.3X3.4SA403WP304H	SA403WP304H	15		WELDED OR SEAMLESS
98	925279740000	C. RED 168.3X3.4/88.9X3.05SA403WP304H	SA403WP304H	10		SEAMLESS
99	925279750500	BW RED 323.9X4.57 / 273X4.18 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS

ANNEXURE - LIST OF ITEMS - BW FITTINGS - STAINLESS STEEL.

SL NO	Material	DESCRIPTION	SPECIFICATION	Tentative QTY	UNIT RATE	## TYPE OF CONSTRUCTION
100	925279770500	BWCONRED273X4.18/219.1X6.35 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
101	925279950000	BW RED355.6X6.35/323.9X4.57 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
102	925279960000	BWCONRED323.9X4.57/168.3X3.4 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
103	925279970000	BWCONRED355.6X6.35/273X4.19 SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
104	955247500000	BW LR 45DEG ELBOW 219.1X3.76SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
105	955247520000	BW LR 90DEG ELBOW 323.9X4.57SA403WP304H	SA403WP304H	10		WELDED OR SEAMLESS
106	925246920000	BW LR 90DEG ELL 88.9 X 5.49 SA403WP316	SA403WP316	10		SEAMLESS
107	925247700000	BWCONRED114.3X4.5/60.3X3.91 SA403WP316	SA403WP316	10		SEAMLESS
108	925057460000	BW UEQT 88.9X3.05/73X3.05 SA403WP321	SA403WP321	10		SEAMLESS
109	925248270000	BW LR 90DEG ELL 73 X 3.05 SA403WP321	SA403WP321	15		SEAMLESS
110	925258460000	BW EQT 48.3 X 3.68 SA403WP321	SA403WP321	10		SEAMLESS
111	925258510000	BW EQT 88.9 X 5.49 SA403WP321	SA403WP321	10		SEAMLESS
112	925258580000	BW UEQT 33.4X2.77 / 21.3X2.11 SA403WP321	SA403WP321	40		SEAMLESS
113	925258670000	BW UEQT 60.3X3.91 / 48.3X3.68 SA403WP321	SA403WP321	10		SEAMLESS
114	925258680000	BW UEQT 73X5.16 / 60.3X3.91 SA403WP321	SA403WP321	10		SEAMLESS
115	925258710000	BW UEQT 88.9X5.49 / 60.3X3.91 SA403WP321	SA403WP321	10		SEAMLESS
116	925258750000	BW UEQT 114.3X8.56/60.3X3.91 SA403WP321	SA403WP321	10		SEAMLESS
117	925258760000	BW UEQT 114.3X8.56/88.9X5.49 SA403WP321	SA403WP321	10		SEAMLESS
118	925278560000	BWCONRED33.4X2.77/26.7X2.11 SA403WP321	SA403WP321	30		SEAMLESS
119	925278610000	BWCONRED48.3X2.77/33.4X2.77 SA403WP321	SA403WP321	10		SEAMLESS
120	925278620000	BWCONRED60.3X2.77/26.7X2.11 SA403WP321	SA403WP321	10		SEAMLESS
121	925278630000	BWCONRED60.3X2.77/33.4X2.77 SA403WP321	SA403WP321	10		SEAMLESS
122	925278640000	BWCONRED60.3X2.77/48.3X2.77 SA403WP321	SA403WP321	10		SEAMLESS
123	925278670000	BW CON RED 73X5.16/60.3X3.91 SA403WP321	SA403WP321	10		SEAMLESS
124	925278670100	C.RED 73X5.16/60.3X3.91SA403WP321	SA403WP321	10		SEAMLESS



REFER TERMS & CONDITIONS FOR PROCUREMENT OF FITTINGS

S. VARADARAJAN
Dy. Manager - Purchase
BHEL / Piping Centre
80, G.N. Road, T. Nagar
Chennai - 600 017.

ANNEXURE - II

SPECIAL TERMS AND CONDITIONS FOR RATE CONTRACT ENQUIRY COMMON TO INDIGENOUS / FOREIGN VENDORS

1) This is a **Rate Contract Enquiry**. The quantity mentioned are tentative. The rate agreed upon in Rate Contract shall be firm for a period of minimum **one year** from the date of agreement. No revision of rates are allowed after finalization of the Rate Contract.

2) The Fittings shall be manufactured as per our TDC:TDG:102:3-for **Butt-welded fittings** / TDC:TDG:103:01-for **Socket Welded fittings**/ TDC:TDG:104:02-for **Forgings, stub etc.**/TDC:TDG:12:0-for **IS1239 Black & Galvanised fittings**. . Compliance to all the clauses of TDC shall be specifically indicated and deviation if any shall be indicated.

3) Payment terms(Indigenous) - 100% payment within 45 days with 10% PBG against presentation of documents to BHEL/PC-finance with a copy of invoice alone to purchase department.**DOCUMENTS TO BE DIRECTLY SUBMITTED TO BHEL/PC.**

INVOICE IN TRIPPLICATE

DELIVERY CHALLAN IN DUPLICATE.

C GUARANTEE CERTIFICATE IN DUPLICATE.

D LORRY WAY BILL COPY- ONE COPY (ORIGINAL COPY OF LWB SHOULD BE SENT THROUGH THE CARRIER)

E INSPECTION REPORT COPY – ONE COPY

F IBR FORM III-C- ONE COPY

G ED GATE PASS ORIGINAL OR COPY WITH A CONFIRMATION THAT THE ORIGINAL IS SENT WITH THE GOODS.

Payment terms(Foreign) - 100% payment through Letter of credit at site.
with 10% PBG and all **Original** shipping documents, invoice and Test certificates to be routed through bank.

4) BHEL reserves the right to negotiate or re-float the tender opened if L1 price / or other details are not acceptable to them.

5) BHEL reserves the right to negotiate the L1 rate.

6) BHEL reserves the right to order on more than one vendor at the lowest acceptable price to BHEL.

7) Delivery should be 12 to 16 weeks from the placement of order-for Indigenous.
and 16 to 24 weeks(FOB) - for foreign vendors.

8) LD - Supplier failing to deliver raw material / equipment / component within the period specified in the Contract, the Purchaser shall deduct Liquidated damages the same equivalent to **0.5% of the price for each week of delay up to a maximum of 15% of the price of delayed / undelivered goods** to be reckoned from the contract delivery date of Cargo readiness date (ie) final inspection agencies signed date in the Certificate, with reference to **foreign vendors (for FOB contracts only)** and with reference to **indigenous vendors (for Ex-works contracts only)**. For **'CFR Chennai sea port (foreign vendors) and FOR Trichy stores (for indigenous vendors)** LD will be reckoned from the B/L date and Lorry weigh bill date respectively.

9) Performance and Progress of the Vendor will be monitored and reviewed periodically and Purchase Order will be placed based on the Performance of the Vendor.

10) This being rate contract the negotiated L1 rates may be counter offered to other suppliers.



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. Ladle 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.

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

S. Jayakumar, Engg

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Approved by

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	Bharat Heavy Electricals Limited, Piping Centre, Chennai Technical Delivery Conditions Conditions for Butt welded – Fittings as per Indian Boiler Regulations.	TDG : 102 Rev. 03 Date : 16.02.2008 Page : 1 of 3
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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:-

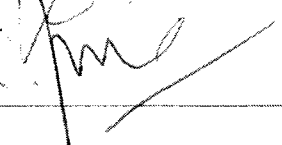
- Process of manufacture shall conform to applicable standards.
- All fittings shall be of seamless unless otherwise specified in the purchase order.
- In case of welded fittings, WPS, PQR & welder qualification shall be approved by BHEL PC, prior to start of welding.
- All fittings shall have smooth 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 ± 10 deg C

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