



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

Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017
Phone : 91 (044) 28161245, Fax : 91 (044) 28161243
e-mail: varada@bhelmpc.co.in

REF: ENQ NO: 4101400062

DT: 24.07.2014

Sub: Request for quotation – Butt Welded Fittings - reg.

Please find the following tender documents enclosed for you to submit offer. The offers should reach us before the time of opening tenders. The offer will be opened at **14.30 hrs** on the **due date 11.08.2014** in the presence of tenderers who may like to be present. Late tenders will be rejected.

In view of the urgent project requirements, the following two conditions are mandatory for this tender and the bid deviating from these conditions may be liable for rejection –

- 1) Delivery period: 04 months from the date of PO.
- 2) LD clause: LD shall be 0.5% per week to a maximum of 10% of the undelivered portion.

Your offer shall contain only the following:

- 1) PART 1 - Techno commercial Bid: Duly filled "Part 1 format & Unpriced bid (indicating the quoted / not quoted items)" provided by BHEL.
- 2) PART 2 - Duly filled in Price Bid: "List of items" provided by BHEL.

NOTE:

- A) **Any other terms or conditions mentioned in your offer other than the above mentioned formats will not be evaluated and will be considered null & void. Hence your offer shall contain ONLY the above mentioned formats.**

Considering the urgent requirement of projects it is to inform you that **due date may not be extended**. The technical bids will be opened on **11.08.2014**. Pl submit your bids **well before the due date**.

Please indicate enquiry no. and date and due date in all correspondences. This is only a request for quotation and not an order.

(Ravi Singh)
Engineer / Purchase
For Senior Manager / Purchase
BHEL / Piping Centre



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Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017
Phone : 91 (044) 28161355, Fax 044 28161 341 e-mail: gps@bhelmpc.co.in

REF: ENQ NO: 4101400062 DT: 24.07.2014

This is a limited tender and only vendors who are already registered with BHEL and contacted through e-mail/courier may submit their offers. Unsolicited offers will not be considered for this enquiry.

New vendors may download vendor registration forms from BHEL web site www.bhel.com and relevant data for formal registration may please be sent to Manager, Supplier development cell, BHEL Piping centre, 80, G N Road, T. Nagar, Chennai – 600017.

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.

(S.Varadarajan)
Sr.Manager / Purchase
BHEL / Piping Centre
80, GN Road, T. Nagar
Chennai-600017
Ph: 044-28161243

4101400062
Dt. 24.07.2014

LIST OF ITEMS

BW FITTINGS FIT AS CS

SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUC TION	FITTING D1 VALUE	CURRENCY	UNIT RATE / FOB Genoa Port
1	921042870000	BW LR 90DEG ELL 406.4 X 6.35 SA234WPB	42	SA234WPB	SEAMLESS	D 393.6		
2	921042900000	BW LR 45DEG ELL 406.4 X 6.35 SA234WPB	28	SA234WPB	SEAMLESS	D 393.7		
3	921043610000	BW LR 90DEG ELL 219.1 X 8.18 SA234WPB	84	SA234WPB	SEAMLESS	D202.7		
4	921044290200	BWLR90DEGELL88.9X5.49(WITHMPI) SA234WPB	107	SA234WPB	SEAMLESS	D79		
5	921044310200	BWLR90DEGELL168.3X7.11(WITHMPI) SA234WPB	98	SA234WPB	SEAMLESS	D155.6		
6	921044610000	BW LR 90DEG ELL 273 X 9.27 SA234WPB	70	SA234WPB	SEAMLESS	D254.5		
7	921044760000	BW LR 45DEG ELL 219.1 X 8.18 SA234WPB	21	SA234WPB	SEAMLESS	D202.7		
8	921044770000	BW LR 45DEG ELL 273 X 9.27 SA234WPB	14	SA234WPB	SEAMLESS	D254.5		
9	921044790000	BW LR 90DEG ELL 114.3 X 13.49SA234WPB	217	SA234WPB	SEAMLESS	D1=D89.5		
10	921044920000	BW LR 90DEG ELL 355.6 X 7.92 SA234WPB	168	SA234WPB	SEAMLESS	D339.8		
11	921051370000	BW EQT 219.1 X 6.35 SA234WPB	14	SA234WPB	SEAMLESS	D206.4		
12	921054780000	BW EQT 88.9 X 5.49 SA234WPB	12	SA234WPB	SEAMLESS	D79		
13	921054810000	BW EQT 219.1 X 8.18SA234WPB	7	SA234WPB	SEAMLESS	D 202.7		
14	921171170200	BW CON RED 273X9.27/219.1X8.18 SA234WPB	7	SA234WPB	SEAMLESS	D254.5/D202.7		
15	921171200200	BW CON RED 323.9X9.53/273X9.27 SA234WPB	7	SA234WPB	SEAMLESS	D304.8/D254.5		
16	921179460000	BW CON.RED OD355.6X38/273X28 SA234WPC	21	SA234WPC	SEAMLESS	P-D=284.2/P-D1=202.8		
17	921179480000	BW C.RED OD406.4X6.35/355.6X6.35SA234WPB	28	SA234WPB	SEAMLESS	D 393.7/D 342.9		
18	921179500000	BW ECC RED OD457.2X50/355.6X38 SA234WPC	7	SA234WPC	SEAMLESS	P-D1=360.1/P-D1=284.2		
19	921179510000	BW CON.RED OD508X52/457.2X50 SA234WPC	4	SA234WPC	SEAMLESS	P-D1=406.6/P-D1=360.1		
20	921179590000	BW C.RED 406.4X12.7/219.1X8.18 SA234WP11	4	SA234WP11	SEAMLESS	D-D1=382.7/D-D1=204.1		
21	921179600000	BW C.RED OD273X9.27/219.1X8.18 SA234WP11	4	SA234WP11	SEAMLESS	D-D1=255.8/D-D1=204.1		
22	921179610000	BW C.RED 219.1X8.18/114.3X6.02 SA234WP11	4	SA234WP11	SEAMLESS	D-D1=204.1/D-D1=103.5		
23	921179620000	BW C.RED OD114.3X6.02/60.3X3.91SA234WP11	11	SA234WP11	SEAMLESS	D102.3/D 53.2		
24	921179630000	BW C.RED OD88.9X5.49/48.3X5.08 SA234WP11	8	SA234WP11	SEAMLESS	D 77.9/D 39.2		
25	921179640000	BW C.RED OD1118X12.7/965X12.7 SA234WPB(W)	7	SA234WPB	WELDED	D-D1=1098.5/D-D1=946.1		

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LIST OF ITEMS

BW FITTINGS FIT AS CS

SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUC TION	FITTING D1 VALUE	CURRENCY	UNIT RATE / FOB Genoa Port
26	921179690000	BW CON RED 406.4X42/355.6X38 SA234WPC	28	SA234WPC	SEAMLESS	P 326.4/P 284.2		
27	921179700000	BWCONRED609.6X17.48/406.4X12.7SA234WP11	4	SA234WP11	SEAMLESS	P 576.8/D 381.3		
28	921179710000	BWCONRED812.8X22.23/609.6X17.48SA234WP11	4	SA234WP11	SEAMLESS	P 770.9/P 576.8		
29	921179720000	CON RED 812.8X9.53/762X9.53 SA234WPB(W)	7	SA234WPB	WELDED	D 793.7/D 742.9		
30	921179730000	BW ECC RED 114.3X6.02/88.9X5.49SA234WP11	8	SA234WP11	SEAMLESS	D 103.5/D 79.0		
31	921179740000	ECC RED 711.2X9.53/609.6X9.53SA234WPB(W)	2	SA234WPB	WELDED	D 692.1/D 590.8		
32	921179750000	ECC RED 812.8X9.53/711.2X9.53SA234WPB(W)	4	SA234WPB	WELDED	D 793.7/D 692.1		
33	921179760000	C.RED OD609.6X9.53/457.2X9.53SA234WPB(W)	14	SA234WPB	WELDED	D 590.8/D 438.5		
34	921179770000	ECC RED 609.6X9.53/457.2X9.53SA234WPB(W)	4	SA234WPB	WELDED	D 590.8/D 438.5		
35	925033080000	BW CAP 219.1 X 6.35 SA234WPB	4	SA234WPB	SEAMLESS	D206.4		
36	925033200000	BW CAP 273 X 6.35 SA234WPB	4	SA234WPB	SEAMLESS	D260.3		
37	925040120000	BW LR 90DEG ELBOW OD355.6X38 SA234WPC	226	SA234WPC	SEAMLESS	P-D1=284.2		
38	925040130000	BW LR 90DEG ELBOW OD457.2X50 SA234WPC	32	SA234WPC	SEAMLESS	P-D1=360.1		
39	925040140000	BW LR 45DEG ELB OD762X9.53 SA234WPB(W)	49	SA234WPB	WELDED	D 742.9		
40	925040170000	BW LR 90DEG ELBOW OD88.9X5.49SA234WP11	12	SA234WP11	SEAMLESS	D 77.9		
41	925040270000	BW LR 45DEG ELL OD457.2X50 SA234WPC	4	SA234WPC	SEAMLESS	P 360.1		
42	925042220000	BW LR 90DEG ELL 762 X 9.53 SA234WPB(W)	35	SA234WPB	WELDED	D 743		
43	925042320000	BW LR 45DEG ELL 114.3 X 13.49 SA234WPB	7	SA234WPB	SEAMLESS	D89.6		
44	925042340000	BW LR 45DEG ELL 508 X 6.35 SA234WPB	56	SA234WPB	SEAMLESS	D 495.5		
45	925042860200	BW LR 90DEG ELL 219.1 X 6.35 SA234WPB	62	SA234WPB	SEAMLESS	D206.4		
46	925042870200	BW LR 90DEG ELL 273 X 6.35 SA234WPB	43	SA234WPB	SEAMLESS	D260.3		
47	925042880200	BW LR 90DEG ELL 323.9 X 6.35 SA234WPB	105	SA234WPB	SEAMLESS	D311.2		
48	925042900100	BW LR 45DEG ELL 273.0X6.35SA234WPB	14	SA234WPB	SEAMLESS	D 260.9		
49	925044080000	BWLR90DEGELL711.2X9.53SA234WPB(WELDED)	2	SA234WPB	WELDED	D691.9		
50	925045370000	BWLR90DEGEL609.6X9.53SA234WPB(WELDED)	68	SA234WPB	WELDED	D 590.5		

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SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUC TION	FITTING D1 VALUE	CURRENCY	UNIT RATE / FOB Genoa Port
51	925046020000	BWLR90DEG ELL168.3X7.11SA234WP11CL1	21	SA234WP11	SEAMLESS	D155.6		
52	925049150000	BW LR 45DEG ELBOW OD355.6X38 SA234WPC	21	SA234WPC	SEAMLESS	P/ D1/ 285		
53	925049350000	BW 90DEG LR ELB OD1118X12.7 SA234WPB(W)	35	SA234WPB	WELDED	D-D1=1098.5		
54	925050060000	BW EQUAL TEE OD355.6X38 SA234WPC	42	SA234WPC	SEAMLESS	P-D1=284.2		
55	925050070000	BW EQUAL TEE OD457.2X50 SA234WPC	8	SA234WPC	SEAMLESS	P-D1=360.1		
56	925050080000	BW EQ TEE 711.2X9.53 SA234WPB (W)	4	SA234WPB	WELDED	D 692.1		
57	925052090000	BW EQT 168.3 X 7.11 SA234WPB	8	SA234WPB	SEAMLESS	D155.6		
58	925052590000	BW EQT 273 X 6.35 SA234WPB	12	SA234WPB	SEAMLESS	D260.3		
59	925053650000	BW EQT 406.4 X 6.35 SA234WPB	7	SA234WPB	SEAMLESS	D 393.7		
60	925053690000	BW UEQT 273.1X9.27 168.3X7.11 SA234WPB	4	SA234WPB	SEAMLESS	D254.5/D155.6		
61	925056340000	B16.9 BW EQUAL TEE 88.9X5.49 SA234WP11	4	SA234WP11	SEAMLESS	D 77.9		
62	925170530000	BWCONRED168.3X7.11/88.9X5.49 SA234WPB	7	SA234WPB	SEAMLESS	D155.6 / D79		
63	925170640000	BWCONRED219.1X6.35/114.3X6.02 SA234WPB	14	SA234WPB	SEAMLESS	D 207.2/D 103.5		
64	925170940000	BW CON RED 355.6X7.92/273X6.35 SA234WPB	14	SA234WPB	SEAMLESS	D 339.8 / D 260.3		
65	925174120000	BW CON RED 273X6.35/168.3X7.11 SA234WPB	2	SA234WPB	SEAMLESS	D260.3/D155.6		
66	925174300000	BWCON RED 273.1X6.35/219.1X6.35 SA234WPB	13	SA234WPB	SEAMLESS	D260.3/D206.4		
67	925174400000	BWCONRED323.9X6.35/219.1X6.35 SA234WPB	28	SA234WPB	SEAMLESS	D 311.2 / D 206.4		
68	925174410000	BWCONRED 323.9X6.35/273X6.35 SA234WPB	21	SA234WPB	SEAMLESS	D 311.5/D 260.9		
69	925175120000	BWCONRED114.3X13.49/88.9X11.13 SA234WPB	42	SA234WPB	SEAMLESS	D 89.5/D 69.2		
70	925175460000	BW CON RED 88.9X5.49/60.3X5.54 SA234WPB	21	SA234WPB	SEAMLESS	D79/D49		
71	925175630000	BWCONRED168.3X7.11/114.3X6.02 SA234WP11	7	SA234WP11	SEAMLESS	D 155.6/D 103.5		
72	925179030000	BWCON.RED 219.1X6.35/168.3X7.11SA234WPB	16	SA234WPB	SEAMLESS	D 206.4 / D 155.6		
73	925196950000	ASMEB16.9 BW CAP OD762X9.53 SA234WPB	7	SA234WPB	SEAMLESS	D 742.9		
74	925196960000	CAP ASMEB16.9 BW OD406.4X6.35 SA234WPB	7	SA234WPB	SEAMLESS	D 393.5		
75	925196970000	BW CAP OD457.2X9.53 SA234WPB	7	SA234WPB	SEAMLESS	D 438.5		

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SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUC TION	FITTING D1 VALUE	CURRENCY	UNIT RATE / FOB Genoa Port
76	925242020000	BW LR 45DEG ELL 457.2 X 9.53 SA234WPB	3	SA234WPB	SEAMLESS	D-438.1		
77	925248600000	BW LR 90DEG ELL 457 X 9.53 SA234WPB	56	SA234WPB	SEAMLESS	D 437.2		
78	925253690000	BW UEQT 273X32 114.3X17.12 SA234WPC	21	SA234WPC	SEAMLESS	P214.5/P83.2		
79	925275620000	C. R. 60.3X11.07/48.3X10.15SA234WP22CL1	7	SA234WP22	SEAMLESS	D 38.2/D 30.3		
80	925277030000	CONRED711.2X9.53/610X9.53SA234WPB(Welded)	2	SA234WPB	WELDED	D 691.9/D 590.9		
81	925277070000	BW ECC RED 273X6.35/219.1X6.35 SA234WPB	2	SA234WPB	SEAMLESS	D 260.9/D 207.2		
82	925277210000	BW C.RED 762X9.53/609.6X9.53SA234WPB(W)	14	SA234WPB	WELDED	D 743/D 590.8		
83	925277310000	BW CON RED 508X6.35/457.2X6.35 SA234WPB	14	SA234WPB	SEAMLESS	D 495.5/D 444.7		
84	925278810000	BW CON RED 88.9X5.49/48.3X5.08 SA234WPB	14	SA234WPB	SEAMLESS	D79 / D39.2		
85	925279860000	BWCONRED 355.6X7.92/323.9X6.35SA234WPB	21	SA234WPB	SEAMLESS	D339.8/D311.2		
86	955176330000	BW CON RED 114.3X6.02/88.9X5.49 SA234WPB	14	SA234WPB	SEAMLESS	D103.5/D79		

“ No raw material / component /other services for these items shall be sourced from China and Eastern European countries either directly or indirectly for manufacturing or supply”.

VENDOR'S SIGNATURE WITH SEAL

LIST OF ITEMS

SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUCT ION	FITTING D1 VALUE	CURRENCY	UNIT RATE
1	921042870000	BW LR 90DEG ELL 406.4 X 6.35 SA234WPB	42	SA234WPB	SEAMLESS	D 393.6		
2	921042900000	BW LR 45DEG ELL 406.4 X 6.35 SA234WPB	28	SA234WPB	SEAMLESS	D 393.7		
3	921043610000	BW LR 90DEG ELL 219.1 X 8.18 SA234WPB	84	SA234WPB	SEAMLESS	D202.7		
4	921044290200	BWLR90DEGELL88.9X5.49(WITHMPI) SA234WPB	107	SA234WPB	SEAMLESS	D79		
5	921044310200	BWLR90DEGELL168.3X7.11(WITHMPI) SA234WPB	98	SA234WPB	SEAMLESS	D155.6		
6	921044610000	BW LR 90DEG ELL 273 X 9.27 SA234WPB	70	SA234WPB	SEAMLESS	D254.5		
7	921044760000	BW LR 45DEG ELL 219.1 X 8.18 SA234WPB	21	SA234WPB	SEAMLESS	D202.7		
8	921044770000	BW LR 45DEG ELL 273 X 9.27 SA234WPB	14	SA234WPB	SEAMLESS	D254.5		
9	921044790000	BW LR 90DEG ELL 114.3 X 13.49SA234WPB	217	SA234WPB	SEAMLESS	D1=D89.5		
10	921044920000	BW LR 90DEG ELL 355.6 X 7.92 SA234WPB	168	SA234WPB	SEAMLESS	D339.8		
11	921051370000	BW EQT 219.1 X 6.35 SA234WPB	14	SA234WPB	SEAMLESS	D206.4		
12	921054780000	BW EQT 88.9 X 5.49 SA234WPB	12	SA234WPB	SEAMLESS	D79		
13	921054810000	BW EQT 219.1 X 8.18SA234WPB	7	SA234WPB	SEAMLESS	D 202.7		
14	921171170200	BW CON RED 273X9.27/219.1X8.18 SA234WPB	7	SA234WPB	SEAMLESS	D254.5/D202.7		
15	921171200200	BW CON RED 323.9X9.53/273X9.27 SA234WPB	7	SA234WPB	SEAMLESS	D304.8/D254.5		
16	921179460000	BW CON.RED OD355.6X38/273X28 SA234WPC	21	SA234WPC	SEAMLESS	P-D=284.2/P-D1=202.8		
17	921179480000	BW C.RED OD406.4X6.35/355.6X6.35SA234WPB	28	SA234WPB	SEAMLESS	D 393.7/D 342.9		
18	921179500000	BW ECC RED OD457.2X50/355.6X38 SA234WPC	7	SA234WPC	SEAMLESS	P-D1=360.1/P-D1=284.2		
19	921179510000	BW CON.RED OD508X52/457.2X50 SA234WPC	4	SA234WPC	SEAMLESS	P-D1=406.6/P-D1=360.1		
20	921179590000	BW C.RED 406.4X12.7/219.1X8.18 SA234WP11	4	SA234WP11	SEAMLESS	D-D1=382.7/D-D1=204.1		
21	921179600000	BW C.RED OD273X9.27/219.1X8.18 SA234WP11	4	SA234WP11	SEAMLESS	D-D1=255.8/D-D1=204.1		
22	921179610000	BW C.RED 219.1X8.18/114.3X6.02 SA234WP11	4	SA234WP11	SEAMLESS	D-D1=204.1/D-D1=103.5		
23	921179620000	BW C.RED OD114.3X6.02/60.3X3.91SA234WP11	11	SA234WP11	SEAMLESS	D102.3/D 53.2		

LIST OF ITEMS

SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUCT ION	FITTING D1 VALUE	CURRENCY	UNIT RATE
24	921179630000	BW C.RED OD88.9X5.49/48.3X5.08 SA234WP11	8	SA234WP11	SEAMLESS	D 77.9/D 39.2		
25	921179640000	BW C.RED OD1118X12.7/965X12.7 SA234WPB(W)	7	SA234WPB	WELDED	D-D1=1098.5/D-D1=946.1		
26	921179690000	BW CON RED 406.4X42/355.6X38 SA234WPC	28	SA234WPC	SEAMLESS	P 326.4/P 284.2		
27	921179700000	BWCONRED609.6X17.48/406.4X12.7SA234WP11	4	SA234WP11	SEAMLESS	P 576.8/D 381.3		
28	921179710000	BWCONRED812.8X22.23/609.6X17.48SA234WP11	4	SA234WP11	SEAMLESS	P 770.9/P 576.8		
29	921179720000	CON RED 812.8X9.53/762X9.53 SA234WPB(W)	7	SA234WPB	WELDED	D 793.7/D 742.9		
30	921179730000	BW ECC RED 114.3X6.02/88.9X5.49SA234WP11	8	SA234WP11	SEAMLESS	D 103.5/D 79.0		
31	921179740000	ECC RED 711.2X9.53/609.6X9.53SA234WPB(W)	2	SA234WPB	WELDED	D 692.1/D 590.8		
32	921179750000	ECC RED 812.8X9.53/711.2X9.53SA234WPB(W)	4	SA234WPB	WELDED	D 793.7/D 692.1		
33	921179760000	C.RED OD609.6X9.53/457.2X9.53SA234WPB(W)	14	SA234WPB	WELDED	D 590.8/D 438.5		
34	921179770000	ECC RED 609.6X9.53/457.2X9.53SA234WPB(W)	4	SA234WPB	WELDED	D 590.8/D 438.5		
35	925033080000	BW CAP 219.1 X 6.35 SA234WPB	4	SA234WPB	SEAMLESS	D206.4		
36	925033200000	BW CAP 273 X 6.35 SA234WPB	4	SA234WPB	SEAMLESS	D260.3		
37	925040120000	BW LR 90DEG ELBOW OD355.6X38 SA234WPC	226	SA234WPC	SEAMLESS	P-D1=284.2		
38	925040130000	BW LR 90DEG ELBOW OD457.2X50 SA234WPC	32	SA234WPC	SEAMLESS	P-D1=360.1		
39	925040140000	BW LR 45DEG ELB OD762X9.53 SA234WPB(W)	49	SA234WPB	WELDED	D 742.9		
40	925040170000	BW LR 90DEG ELBOW OD88.9X5.49SA234WP11	12	SA234WP11	SEAMLESS	D 77.9		
41	925040270000	BW LR 45DEG ELL OD457.2X50 SA234WPC	4	SA234WPC	SEAMLESS	P 360.1		
42	925042220000	BW LR 90DEG ELL 762 X 9.53 SA234WPB(W)	35	SA234WPB	WELDED	D 743		
43	925042320000	BW LR 45DEG ELL 114.3 X 13.49 SA234WPB	7	SA234WPB	SEAMLESS	D89.6		
44	925042340000	BW LR 45DEG ELL 508 X 6.35 SA234WPB	56	SA234WPB	SEAMLESS	D 495.5		
45	925042860200	BW LR 90DEG ELL 219.1 X 6.35 SA234WPB	62	SA234WPB	SEAMLESS	D206.4		
46	925042870200	BW LR 90DEG ELL 273 X 6.35 SA234WPB	43	SA234WPB	SEAMLESS	D260.3		

LIST OF ITEMS

SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUCT ION	FITTING D1 VALUE	CURRENCY	UNIT RATE
47	925042880200	BW LR 90DEG ELL 323.9 X 6.35 SA234WPB	105	SA234WPB	SEAMLESS	D311.2		
48	925042900100	BW LR 45DEG ELL 273.0X6.35SA234WPB	14	SA234WPB	SEAMLESS	D 260.9		
49	925044080000	BWLR90DEGELL711.2X9.53SA234WPB(WELDED)	2	SA234WPB	WELDED	D691.9		
50	925045370000	BWLR90DEGEL609.6X9.53SA234WPB(WELDED)	68	SA234WPB	WELDED	D 590.5		
51	925046020000	BWLR90DEG ELL168.3X7.11SA234WP11CL1	21	SA234WP11	SEAMLESS	D155.6		
52	925049150000	BW LR 45DEG ELBOW OD355.6X38 SA234WPC	21	SA234WPC	SEAMLESS	P/ D1/ 285		
53	925049350000	BW 90DEG LR ELB OD1118X12.7 SA234WPB(W)	35	SA234WPB	WELDED	D-D1=1098.5		
54	925050060000	BW EQUAL TEE OD355.6X38 SA234WPC	42	SA234WPC	SEAMLESS	P-D1=284.2		
55	925050070000	BW EQUAL TEE OD457.2X50 SA234WPC	8	SA234WPC	SEAMLESS	P-D1=360.1		
56	925050080000	BW EQ TEE 711.2X9.53 SA234WPB (W)	4	SA234WPB	WELDED	D 692.1		
57	925052090000	BW EQT 168.3 X 7.11 SA234WPB	8	SA234WPB	SEAMLESS	D155.6		
58	925052590000	BW EQT 273 X 6.35 SA234WPB	12	SA234WPB	SEAMLESS	D260.3		
59	925053650000	BW EQT 406.4 X 6.35 SA234WPB	7	SA234WPB	SEAMLESS	D 393.7		
60	925053690000	BW UEQT 273.1X9.27 168.3X7.11 SA234WPB	4	SA234WPB	SEAMLESS	D254.5/D155.6		
61	925056340000	B16.9 BW EQUAL TEE 88.9X5.49 SA234WP11	4	SA234WP11	SEAMLESS	D 77.9		
62	925170530000	BWCONRED168.3X7.11/88.9X5.49 SA234WPB	7	SA234WPB	SEAMLESS	D155.6 / D79		
63	925170640000	BWCONRED219.1X6.35/114.3X6.02 SA234WPB	14	SA234WPB	SEAMLESS	D 207.2/D 103.5		
64	925170940000	BW CON RED 355.6X7.92/273X6.35 SA234WPB	14	SA234WPB	SEAMLESS	D 339.8 / D 260.3		
65	925174120000	BW CON RED 273X6.35/168.3X7.11 SA234WPB	2	SA234WPB	SEAMLESS	D260.3/D155.6		
66	925174300000	BWCON RED 273.1X6.35/219.1X6.35 SA234WPB	13	SA234WPB	SEAMLESS	D260.3/D206.4		
67	925174400000	BWCONRED323.9X6.35/219.1X6.35 SA234WPB	28	SA234WPB	SEAMLESS	D 311.2 / D 206.4		
68	925174410000	BWCONRED 323.9X6.35/273X6.35 SA234WPB	21	SA234WPB	SEAMLESS	D 311.5/D 260.9		
69	925175120000	BWCONRED114.3X13.49/88.9X11.13 SA234WPB	42	SA234WPB	SEAMLESS	D 89.5/D 69.2		

LIST OF ITEMS

SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATIO N	CONSTRUCT ION	FITTING D1 VALUE	CURRENCY	UNIT RATE
70	925175460000	BW CON RED 88.9X5.49/60.3X5.54 SA234WPB	21	SA234WPB	SEAMLESS	D79/D49		
71	925175630000	BWCONRED168.3X7.11/114.3X6.02 SA234WP11	7	SA234WP11	SEAMLESS	D 155.6/D 103.5		
72	925179030000	BWCON.RED 219.1X6.35/168.3X7.11SA234WPB	16	SA234WPB	SEAMLESS	D 206.4 / D 155.6		
73	925196950000	ASMEB16.9 BW CAP OD762X9.53 SA234WPB	7	SA234WPB	SEAMLESS	D 742.9		
74	925196960000	CAP ASMEB16.9 BW OD406.4X6.35 SA234WPB	7	SA234WPB	SEAMLESS	D 393.5		
75	925196970000	BW CAP OD457.2X9.53 SA234WPB	7	SA234WPB	SEAMLESS	D 438.5		
76	925242020000	BW LR 45DEG ELL 457.2 X 9.53 SA234WPB	3	SA234WPB	SEAMLESS	D-438.1		
77	925248600000	BW LR 90DEG ELL 457 X 9.53 SA234WPB	56	SA234WPB	SEAMLESS	D 437.2		
78	925253690000	BW UEQT 273X32 114.3X17.12 SA234WPC	21	SA234WPC	SEAMLESS	P214.5/P83.2		
79	925275620000	C. R. 60.3X11.07/48.3X10.15SA234WP22CL1	7	SA234WP22	SEAMLESS	D 38.2/D 30.3		
80	925277030000	CONRED711.2X9.53/610X9.53SA234WPB(Welded)	2	SA234WPB	WELDED	D 691.9/D 590.9		
81	925277070000	BW ECC RED 273X6.35/219.1X6.35 SA234WPB	2	SA234WPB	SEAMLESS	D 260.9/D 207.2		
82	925277210000	BW C.RED 762X9.53/609.6X9.53SA234WPB(W)	14	SA234WPB	WELDED	D 743/D 590.8		
83	925277310000	BW CON RED 508X6.35/457.2X6.35 SA234WPB	14	SA234WPB	SEAMLESS	D 495.5/D 444.7		
84	925278810000	BW CON RED 88.9X5.49/48.3X5.08 SA234WPB	14	SA234WPB	SEAMLESS	D79 / D39.2		
85	925279860000	BWCONRED 355.6X7.92/323.9X6.35SA234WPB	21	SA234WPB	SEAMLESS	D339.8/D311.2		
86	955176330000	BW CON RED 114.3X6.02/88.9X5.49 SA234WPB	14	SA234WPB	SEAMLESS	D103.5/D79		

“ No raw material / component /other services for these items shall be sourced from China and Eastern European countries either directly or indirectly for manufacturing or supply”.

4101400062
Dt. 24.07.2014

LIST OF ITEMS

BW FITTINGS FIT AS CS

SL. NO.	MATERIAL CODE	DESCRIPTION	QTY. (Nos.)	SPECIFICATION	CONSTRUCTION	FITTING D1 VALUE	CURRENCY	UNIT RATE
---------	---------------	-------------	-------------	---------------	--------------	------------------	----------	-----------

VENDOR'S SIGNATURE WITH SEAL

3-80-300-19825

DRAWING No.

NOTES: -

- 01. APPLICABLE FOR P91/P92**
i) STRAIGHT WITH STRAIGHT/FITTING
ii) BEND WITH BEND/FITTING
 02. FOR OD MISMATCHING REF. FIGURE-Xa.
 03. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
 04. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm

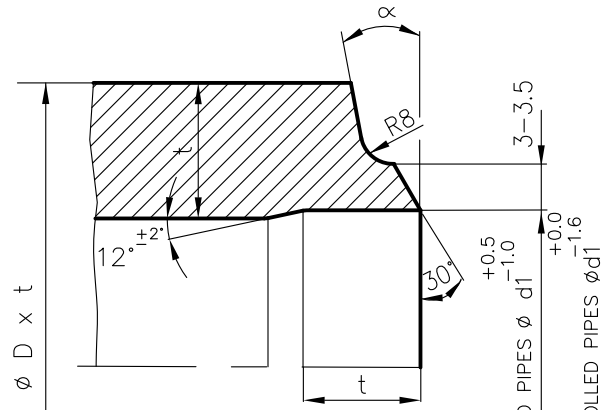


FIGURE - X

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

MATCHING EDGE PREPARATION FOR MISMATCH OD APPLICABLE FOR BENDS/FITTINGS OF P91/P92 MATERIALS

NOTES: -

01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
 02. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
 03. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm
 04. t = THK OF CONNECTING PIPE (STRAIGHT)

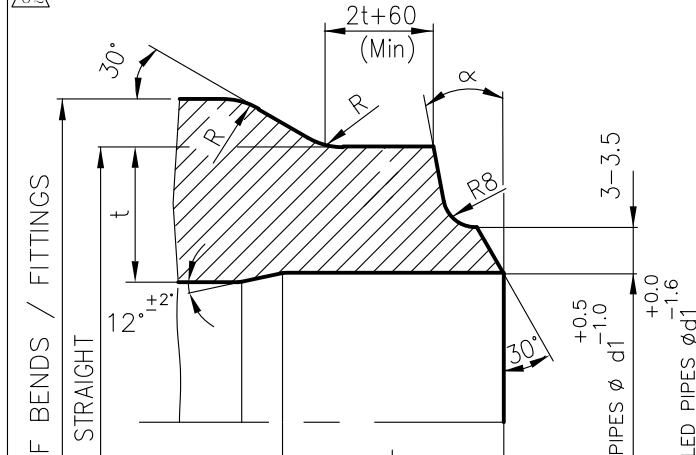


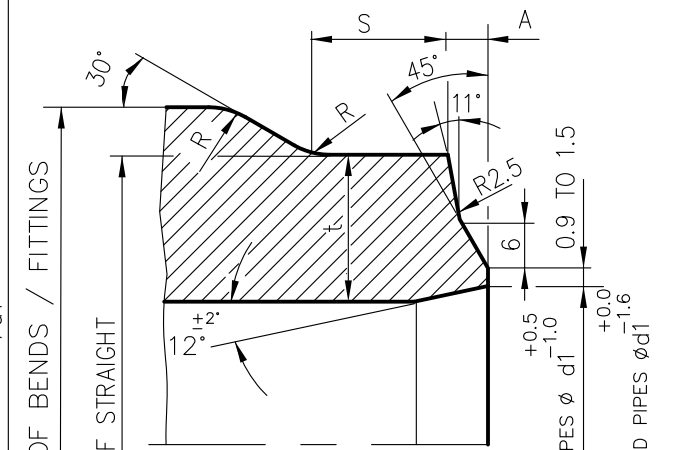
FIGURE - Xa

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

MATCHING EDGE PREPARATION FOR MISMATCH OD DIAMETRICALLY GREATER THAN 8 mm (ie OD1 - OD2 > 8mm) APPLICABLE FOR BENDS/FITTINGS OTHER THAN P91/P92 MATERIALS

NOTES: -

01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
 02. WHEN $t < 65$, $S+A = 65$ Min. & $t > 65$, $S=65$ Min. WHERE t=THK OF CONN.PIPE(STRAIGHT).



STYLE - Pa

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

MATCHING EDGE PREPARATION FOR MISMATCH OD DIAMETRICALLY GREATER THAN 8 mm (ie OD1 - OD2 > 8mm) APPLICABLE FOR ELBOWS OTHER THAN P91/P92 MATERIALS

NOTES: -

01. OD = OUTSIDE DIA OF CONN. PIPE (STRAIGHT) TO BE PHYSICALLY MEASURED/VERIFIED.
 02. t = THK OF CONN.PIPE (STRAIGHT)

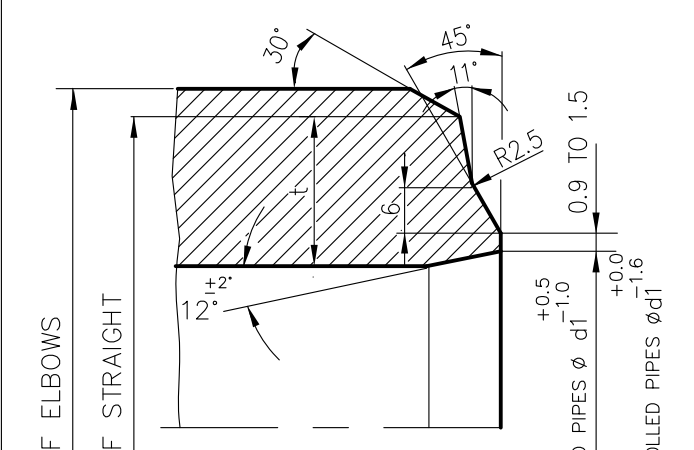


FIGURE - Z

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

NOTES: -

01. APPLICABLE FOR P91 PIPE BEND WELDED WITH P91 STRAIGHT PIPE FOR THICKNESS ≤ 30 mm AND OD ≥ 558 mm.

02. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
 03. FOR OD MISMATCH, REFER THE OD MACHINING ONLY SHOWN IN FIGURE-Xa
 04. FIGURE-Xb AND FIGURE-Xc ARE NOT APPLICABLE FOR P92 MATERIALS.

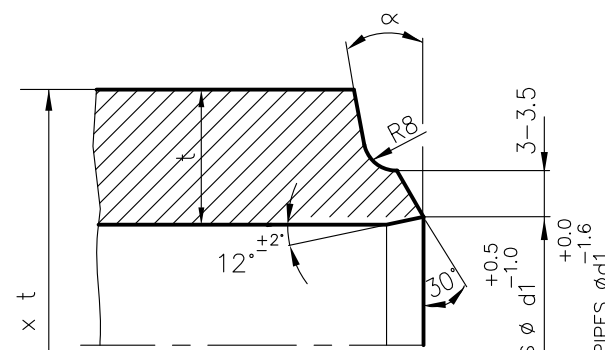


FIGURE - Xb
(BEND END)

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

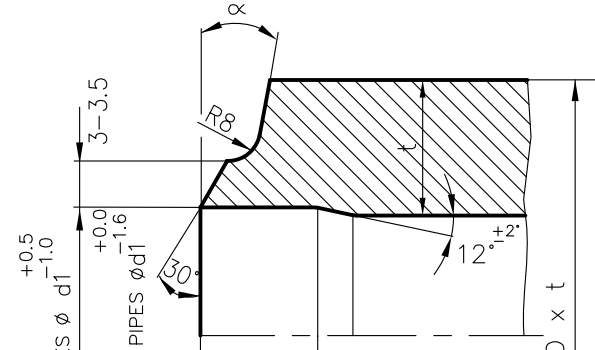
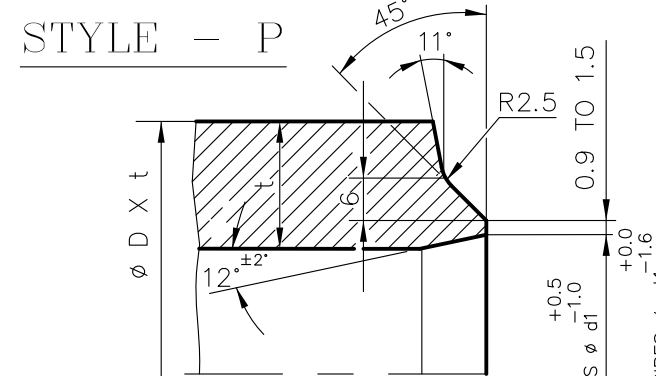


FIGURE - Xc
(STRAIGHT END)

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

STYLE - P



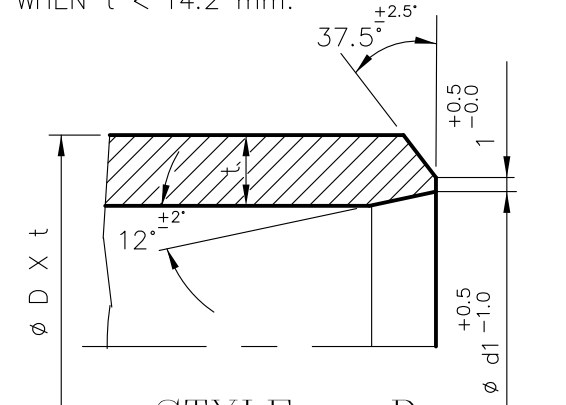
NOTES: -

01. USE WHEN $t \geq 14.2$ mm.
 02. FOR OD MISMATCHING REF. FIGURE-Pa

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

NOTES: -

01. USE WHEN $t < 14.2$ mm.



STYLE - D

FOR OD PIPES ϕ d1
 FOR ID CONTROLLED PIPES ϕ d1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

STANDARD

	BHARAT HEAVY ELECTRICALS LTD.		DRN	NAME	SIGN	DATE	NO OF ITEMS
	PIPING CENTRE, MADRAS		CHD	K.B.RAGUNATH		11.10.01	
			APPD	M.C.SEKARAN		11.10.01	
				APPD	A.VELAYUTHAM	11.10.01	

DEPT.	GRADE OF UN TOL DIM	SCALE	WEIGHT (Kg).	NAME OF ORIGINAL ORGANISATION	ITEM No.
CODE	C/M/F				

TITLE	CARD CODE	DRAWING No.	REV
EDGE PREPARATION DETAILS	U 01	3-80-300-19825	03

GENERAL NOTES :

01. THE MINIMUM THICKNESS AT WELD END SHALL NOT BE LESS THAN
 a) 0.875 TIMES t NOM. FOR OD PIPES.
 b) t MIN. FOR ID CONTROLLED PIPES.
 02. t NOM & t MIN SHALL BE AS PER SPECIFIED PIPE SIZE.
 03. SHARP CORNERS SHALL BE ROUNDED OFF WHEREEVER 'R' IS INDICATED.

NOTES FOR WELDING:

01. WELD REINFORCEMENT TO BE FLUSH GROUND AND MERGED WITH PARENT METAL WITHOUT ANY UNEVENNESS.

REV 03	DATE 10.04.13	ALTERED: M.R.K	APPROVED: C.K.N
ZONE	FIG.Xb AND FIG.Xc ADDED. IN FIG.X. NOTE 01 MODIFIED. IN FIG.Xa,STY-Pa,FIG.Z. P92 MATERIAL ADDED		
REV 02	DATE 10.01.13	ALTERED: M.R.K	APPROVED: C.K.N
ZONE	IN FIG.Xa, NOTE 04 ADDED. GENERAL NOTES 03 ADDED. IN FIG.Xa, 8MM OD MISMATCH IS REMOVED		
REV 01	DATE 11.05.04	ALTERED: R.SENDHIL	APPROVED: A.VELAYUTHAM
ZONE	PROJECT NAME REMOVED AND STANDARD INCORPORATED IN TITLE BLOCK		



BHARATH HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
PIPING CENTRE, MATERIAL MANAGEMENT
80, Gopathy Narayanaswamy Road, T.Nagar, Chennai – 600 017.

PART I FORMAT - TECHNOCOMMERCIAL BID (EXCEPT PRICE)

VENDOR NAME:		ENQ NO :	4101400062 dt 24.07.2014
VENDOR QUOTATION REF:		ITEM:	BUTT WELDED FITTINGS

SL NO	BHEL TERMS	VENDORS CONFIRMATION
01	All the techno-commercial terms and conditions (other than the conditions mentioned below) shall be as per finalized MOU ref BHEL: PC: IMP: MOU: BWF: REV 00 . We have not taken any other deviation to the finalized MOU in our offer. If any such deviations are found, they need not be considered / evaluated by BHEL .Terms finalized in MOU shall be final.	AGREED
02	Unless otherwise specified all fittings shall be of seamless construction. Seamless is acceptable in place of welded, but not vice- versa. In case of welded fittings, approval shall be obtained for WPS, PQR & welder qualifications from BHEL PC prior to start of welding.	AGREED
03	The rates shall be quoted on FOB Genoa port basis.	AGREED
04	If the following two mandatory conditions are not met, the offer will be liable for rejection. 1) Delivery period: 04 months from the date of PO. 2) LD clause: LD shall be 0.5% per week to a maximum of 10% of the undelivered portion.	AGREED
05	TDG: 102:REV.07 (Revised) enclosed, To be confirmed by Vendor.	AGREED
06	No raw material / component /other services shall be sourced from China and Eastern European countries either directly or indirectly for these items.	AGREED
07	EP Drawing 3-80-300-19825 REV. 03 shall be followed.	AGREED

Bids shall be submitted only in the format given in this tender (Part-1 & Part- 2), other documents need not be submitted and will be considered null and void by BHEL and same shall be acceptable to you.

DATE:

SIGNATURE OF VENDOR WITH SEAL



BHARATH HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
PIPING CENTRE, MATERIAL MANAGEMENT
80, Gopathy Narayanaswamy Road, T.Nagar, Chennai – 600 017.

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04	TDG: 102:REV.07 (Revised) enclosed, To be confirmed by Vendor.	AGREED
05	No raw material / component /other services shall be sourced from China and Eastern European countries either directly or indirectly for these items.	AGREED
06	EP Drawing 3- 80-300-19825 REV. 03 shall be followed.	AGREED
07	TAXES ED -----% CST -----% OTHER TAXES IF ANY -----%	Kindly mention the values

Bids shall be submitted only in the format given in this tender (Part-1 & Part- 2), other documents need not be submitted and will be considered null and void by BHEL and same shall be acceptable to you.

DATE:

SIGNATURE OF VENDOR WITH SEAL



1.0 GENERAL:-

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 class1, 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
SA 815 (Duplex Stainless Steel)	- Solution annealed

4.2 Fittings conforming to SA 234 WP91 and SA182 F91 shall be normalised at 1040 to1070deg 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. Soaking time:1Hr. minimum. Still air cooling.

G.Venkataramani, Engg & Qlty

Approved by

K. Vedaprasad, QC

A.P.Madhavan Kutty, Quality

K. Ganeshan, OPC & MPL



5.0 TESTING: -

- (a) **MPI / LPI:-** 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.
- (b) **Tensile Test:-** One fitting of each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard.
- (c) **Ultrasonic Test:-** 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:-**
(i) For SA234 WP91/SA 182 F91:-100% of items;Value:191-250 BHN max.
(ii) For SA 815 (Duplex SS):- 100% of items; Value: 290 BHW max.
(iii) For other specn :- 10% of items; Value - As per specn.
The hardness test values shall be indicated in the Test certificate.
- (e) **Radiography Test (for 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,SA182 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) **Photomicrograph test for WP91 & F91 :-** Photomicrograph test shall be carried out on one per heat, per size. 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 Photomicrograph 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: One coat of 60 microns of In-Organic Ethyl Zinc Silicate primer.
c) Finish coat : Two coats of 20 microns each of Heat Resistance Aluminium paint to IS13183 Gr-1.
d) Total DFT : 100 microns minimum.
d) Shade : Aluminium -- for all fittings.

The internal surface shall be protected with rust preventive coating or rust inhibitor. Stainless steel and Galvanised fittings need not be painted.

G.Venkataramani, Engg & Qlty

Approved by

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K. Ganeshan, OPC & MPL



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

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
SA 815 (Duplex Stainless Steel)	=	Red, White & Green

7.3 **MARKING** (In English only):

7.3.1 The fittings dispatched to **BHEL Stores** shall be hard 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 stencilled 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 stencilled 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 hard punched and paint stencilled 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** (In English only): -

8.1 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 (Three ink signed originals required)

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.

G.Venkataramani, Engg & Qlty

Approved by

K. Vedaprasad, QC

A.P.Madhavan Kutty, Quality

K. Ganeshan, OPC & MPL



9. Steel making process
10. Ladle Analysis of Raw Material and product analysis of fitting.
- *11. Supplementary Test (Product analysis, Tension test.) results.
- *12. Tensile Test Report

- *13. 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".

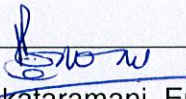
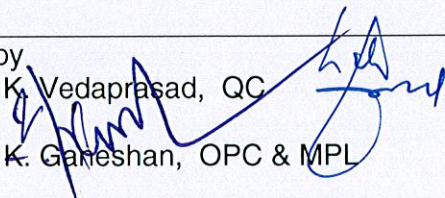

*Details furnished in the Tests certificate in lieu of chart/report is acceptable.

8.2 The following reports shall be **furnished separately** along with the Form III C & MTC indicated in para 8.1 above.

- i. NDE reports for VT, MT, RT, UT (UT Reports in soft copy + hard copy).
- ii. Positive Material identification (PMI) report for Alloy steel.
- iii. Heat Treatment Chart.
- iv. Hardness Test report.
- v. Photomicrograph test report along with photomicrograph with minimum 500 x magnifications.
- vi. Dimensional report (as built drawing with dimensions)
- vii. Thickness Measurement Report for Elbows as per Doc No : TDG102:001

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.
- Rev 04 :** a) Para 5.0 (g), 7.0 and 8.0 (17) are revised.
- Rev 05 :** a) New material specification SA 815 Duplex Stainless Steel included.
b) Para 4.1, 4.2, 5.0 (d), 7.1 & 7.2 are revised.
c) 5.0 (a), (b), (c), (e), (f), (g), 7.3.1 & 7.3.2 are modified for better clarity.
- Rev 06 :** a) Para 8.2 added.
b) Para 5.0(d), 5.0(g), 7.1, & 8.1 are revised.
c) Para 1.0 & 7.2 are modified.
- Rev 07 :** Para 8.2 - vii added.

 G. Venkafaramani, Engg & Qlty	Approved by	 K. Vedaprasad, QC
A.P. Madhavan Kutty, Quality 		K. Ganeshan, OPC & MPL

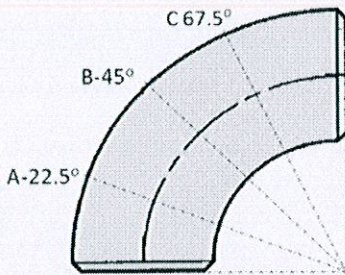


Thickness Measurement Report for Elbow

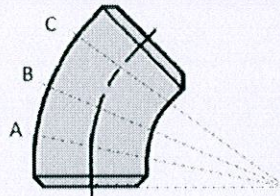
Doc No : TDG102:001 Rev:00

Date : 03-02-2014

A	Vendor Name & Code	
B	PO reference & Date	



90° Elbow



Less than 90°

Measurement (Extrados) points

Angle	A	B	C
90	22.50°	45.00°	67.50°
60	15.00°	30.00°	45.00°
45	11.25°	22.50°	33.75°
30	NA	15.00°	NA

Description of item :
 Material Spec :
 Material Code :

No	Wall thickness at ends		Wall Thickness at angle			Remarks
	End 1	End 2	A	B	C	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						

Manufacturer

BHEL

M. M. S.
3/2/14