



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

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: 4101400046 DT: 16.05.2014

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



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Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017
Phone : 91 (044) 28161355, Fax : 91 (044) 28161341
e-mail: gps@bhelmpc.co.in

REF: ENQ NO: 4101400046

DT: 16.05.2014

Sub: Request for quotation Forged fittings– reg.

Ref: Enquiry No: 4101400046 dt 16.05.2014

This is a two part bid.

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 (technical bid) will be opened at **14.30 hrs** on the **due date 30.05.2014** in the presence of tenderers who may like to be present. Late tenders are liable to be rejected.

1. List of items.
2. Tech. delivery condition TDG: 102 REV.07.
3. Part I format of Terms and conditions.
4. EP drawings.

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

As this tender is against **strict delivery period of 4 months** to meet our project requirements. You are requested to submit your bids well before due date. **Kindly note that we may not give extension for submission of bids.**

Sr. Manager / Purchase
BHEL / Piping Centre
80, GN Road, T. Nagar
Chennai-600017
e-mail: varada@bhelmpc.co.in

LIST OF ITEMS

SL. NO.	MATERIAL CODE	DESCRIPTION	SPECIFICATION	CONSTRUCTION	FITTING D1 VALUE	QTY (Nos.)	CURENCY	RATE /PIECE (RS.)
1	921040020000	BW LR 90DEG ELBOW 273X21.44 SA234WP91	SA234WP91	SEAMLESS	STY XF/235.2	16		
2	921040030000	BW LR 90DEG ELBOW OD114.3X11.13SA234WP91	SA234WP91	SEAMLESS	XF-93.7	30		
3	921040040000	BW LR 90DEG ELBOW OD88.9X7.62 SA234WP91	SA234WP91	SEAMLESS	XF-73.7	4		
4	921040060000	BW LR 45DEG ELBOW 406.4X30.96 SA234WP91	SA234WP91	SEAMLESS	XF-349.8	7		
5	921040070000	BW LR 90DEG ELBOW 406.4X30.96 SA234WP91	SA234WP91	SEAMLESS	XF-349.8	66		
6	921040090000	BW LR 90DEG ELBOW 323.9X25.4 SA234WP91	SA234WP91	SEAMLESS	XF-279	28		
7	921049990000	BW LR 90DEG ELBOW 508X38.1 SA234WP91	SA234WP91	SEAMLESS	STY XF/436.0	72		
8	921059160000	BW EQUAL TEE OD508X38.1 SA234WP91	SA234WP91	SEAMLESS	STY XF/436.0	4		
9	921059170000	BW EQUAL TEE OD273X21.44 SA234WP91	SA234WP91	SEAMLESS	STY XF/235.2	2		
10	921059180000	BW EQUAL TEE OD114.3X11.13 SA234WP91	SA234WP91	SEAMLESS	XF-93.7	6		
11	921059190000	BW EQUAL TEE OD406.4X30.96 SA234WP91	SA234WP91	SEAMLESS	XF-349.8	7		
12	921179340000	BW RED OD273X21.4/219.1X18.26 SA234WP91	SA234WP91	SEAMLESS	STY XF-235.2/XF-187	4		
13	921179350000	BWC.RED OD114.3X11.13/60.3X5.54SA234WP91	SA234WP91	SEAMLESS	XF-93.7/XF-50.1	4		

LIST OF ITEMS

SL. NO.	MATERIAL CODE	DESCRIPTION	SPECIFICATION	CONSTRUCTION	FITTING D1 VALUE	QTY (Nos.)	CURENCY	RATE /PIECE (RS.)
14	921179360000	BWC.RED OD114.3X11.13/88.9X7.62SA234WP91	SA234WP91	SEAMLESS	XF-93.7/XF-73.7	4		
15	921179370000	BW C.RED OD88.9X7.62/60.3X5.54 SA234WP91	SA234WP91	SEAMLESS	XF-73.7/XF-50.1	4		
16	921179380000	BW C.RED OD60.3X5.54/48.3X5.08 SA234WP91	SA234WP91	SEAMLESS	XF-50.1 / XF-39.2	12		
17	921179390000	BW RED OD508X38.1/406.4X30.96 SA234WP91	SA234WP91	SEAMLESS	XF-436/ XF-349.8	4		
18	921179400000	BW RED 406.4X30.96/323.9X25.4 SA234WP91	SA234WP91	SEAMLESS	XF-349.8/XF-279	14		
19	921179410000	BW RED OD323.9X25.4/273X21.44 SA234WP91	SA234WP91	SEAMLESS	XF-279/XF-235.2	22		
20	921179680000	C.RED OD219.1X18.26/114.3X11.13SA234WP91	SA234WP91	SEAMLESS	STY XF-187/XF-93.7	9		
21	925050030000	BW EQUAL TEE OD60.3X5.54 SA234WP91	SA234WP91	SEAMLESS	XF-50.1	14		
22	925050110000	BW UNEQT OD508X38.1/406.4X30.96SA234WP91	SA234WP91	SEAMLESS	XF-436/XF-349.8	4		
23	92524XXX0000	BW EQT 48.3X5.08 SA234WP91	SA234WP91	SEAMLESS		4		
24	925050130000	UEQT OD273.1X21.44/114.3X11.13 SA234WP91	SA234WP91	SEAMLESS	XF-235.2/XF-93.7	2		
25	925050140000	UEQT OD406.4X30.96/219.1X18.26 SA234WP91	SA234WP91	SEAMLESS	XF-349.8/XF-187	21		
26	925050150000	UEQT OD508X38.1/219.1X18.26 SA234WP91	SA234WP91	SEAMLESS	XF-436/XF-187	12		

LIST OF ITEMS

SL. NO.	MATERIAL CODE	DESCRIPTION	SPECIFICATION	CONSTRUCTION	FITTING D1 VALUE	QTY (Nos.)	CURENCY	RATE /PIECE (RS.)
27	925247680000	LR 90DEG ELBOW OD 60.3X5.54SA234WP91	SA234WP91	SEAMLESS	XF-49	49		
						425		

“ 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



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 :	4101400046 dt 16.05.2014
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	AGREED
02	We have not taken any 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
03	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
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 3-80-999-97744 REV.00 shall be followed for ELBOWS and 3-80-300-19825 REV. 03 shall be followed for other tendered items.	AGREED
07	We have not taken any Deviations to the list of items provided such as Descriptions, Quantity, Spec., Fittings D1 values, Drawings. To be confirmed by Vendor.	AGREED

We confirm that all techno-commercial terms shall be as per the finalized MOU ref **BHEL: PC: IMP: MOU: BWF: REV 00**. Deviations to MOU in the offer, if any, may be considered null and void by BHEL and this is accepted by us.

DATE:

SIGNATURE OF VENDOR WITH SEAL



BHARATH HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
PIPING CENTRE, MATERIAL MANAGEMENT
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07	We have not taken any Deviations to the list of items provided such as Descriptions, Quantity, Spec., Fittings D1 values, Drawings. To be confirmed by Vendor.	AGREED
08	TAXES ED -----% CST -----% OTHER TAXES IF ANY -----%	

We confirm that all techno-commercial terms shall be as per the finalized MOU ref **BHEL: PC: IND: MOU: BWF: REV 00**. Deviations to MOU in the offer, if any, may be considered null and void by BHEL and this is accepted by us.

DATE:

SIGNATURE OF VENDOR 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

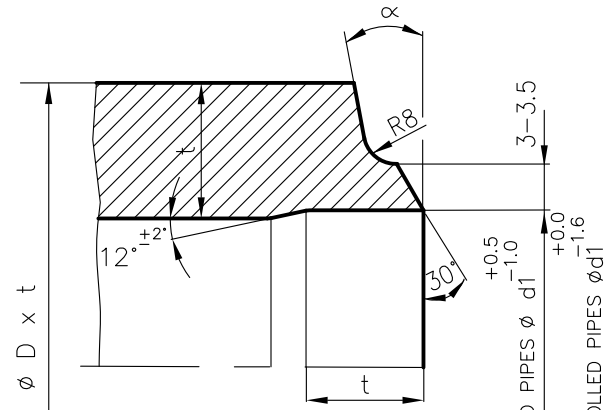


FIGURE - X

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)

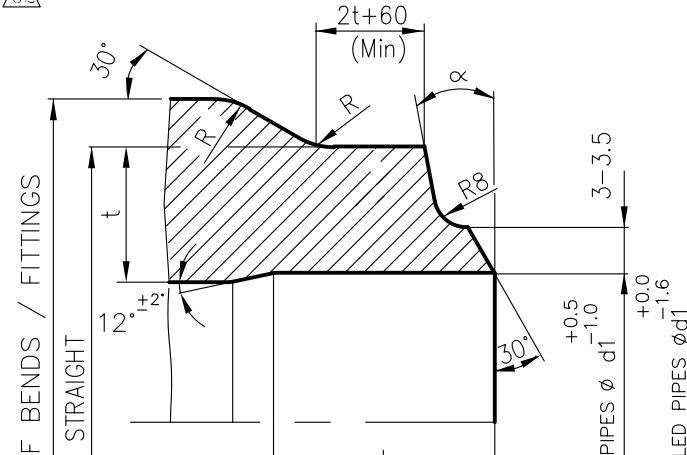
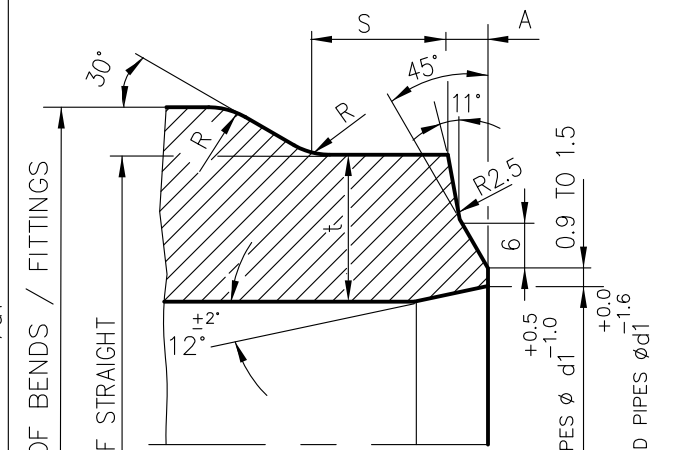


FIGURE - Xa

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

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)

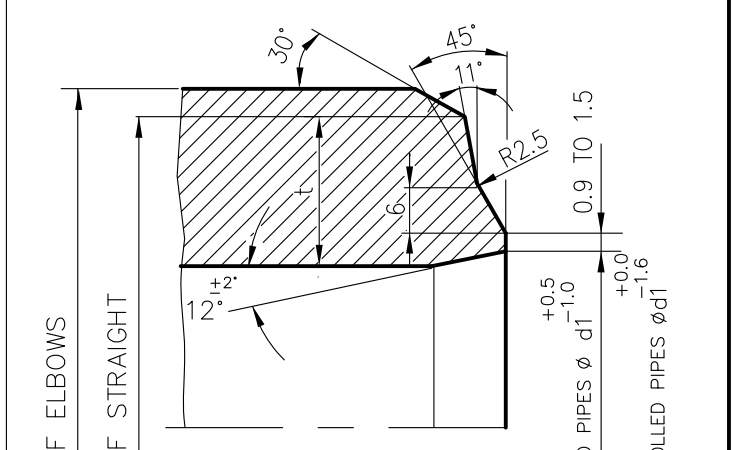


FIGURE - Z

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.

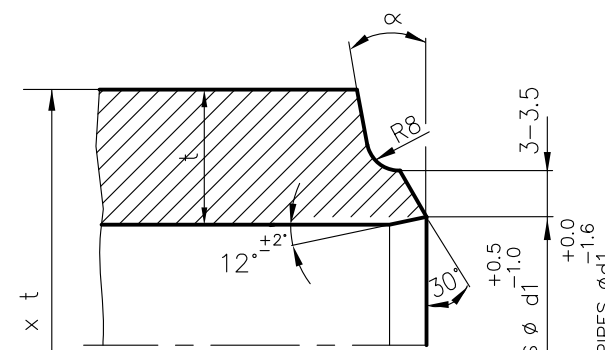


FIGURE - Xb
(BEND END)

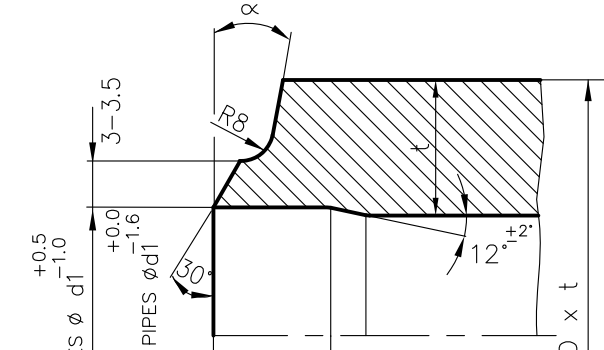
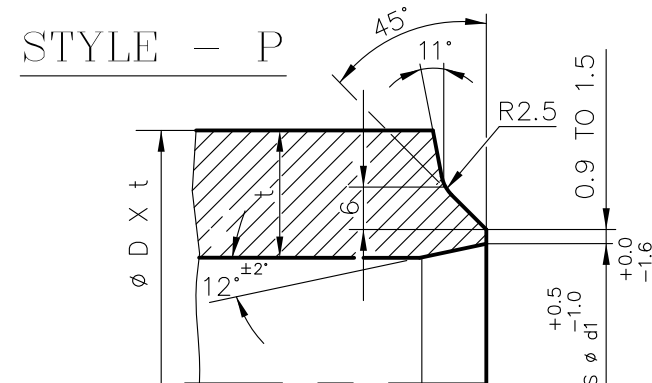


FIGURE - Xc
(STRAIGHT END)

STYLE - P

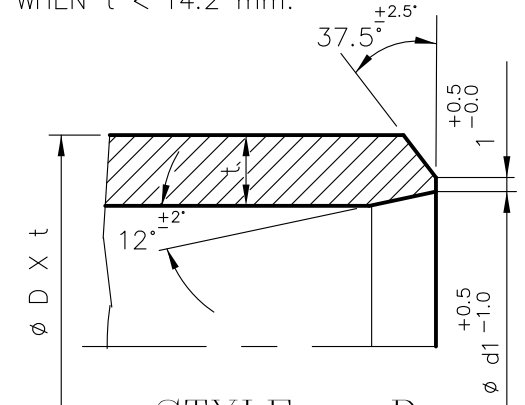


NOTES: -

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

NOTES: -

01. USE WHEN $t < 14.2$ mm.



STYLE - D

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

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

STANDARD

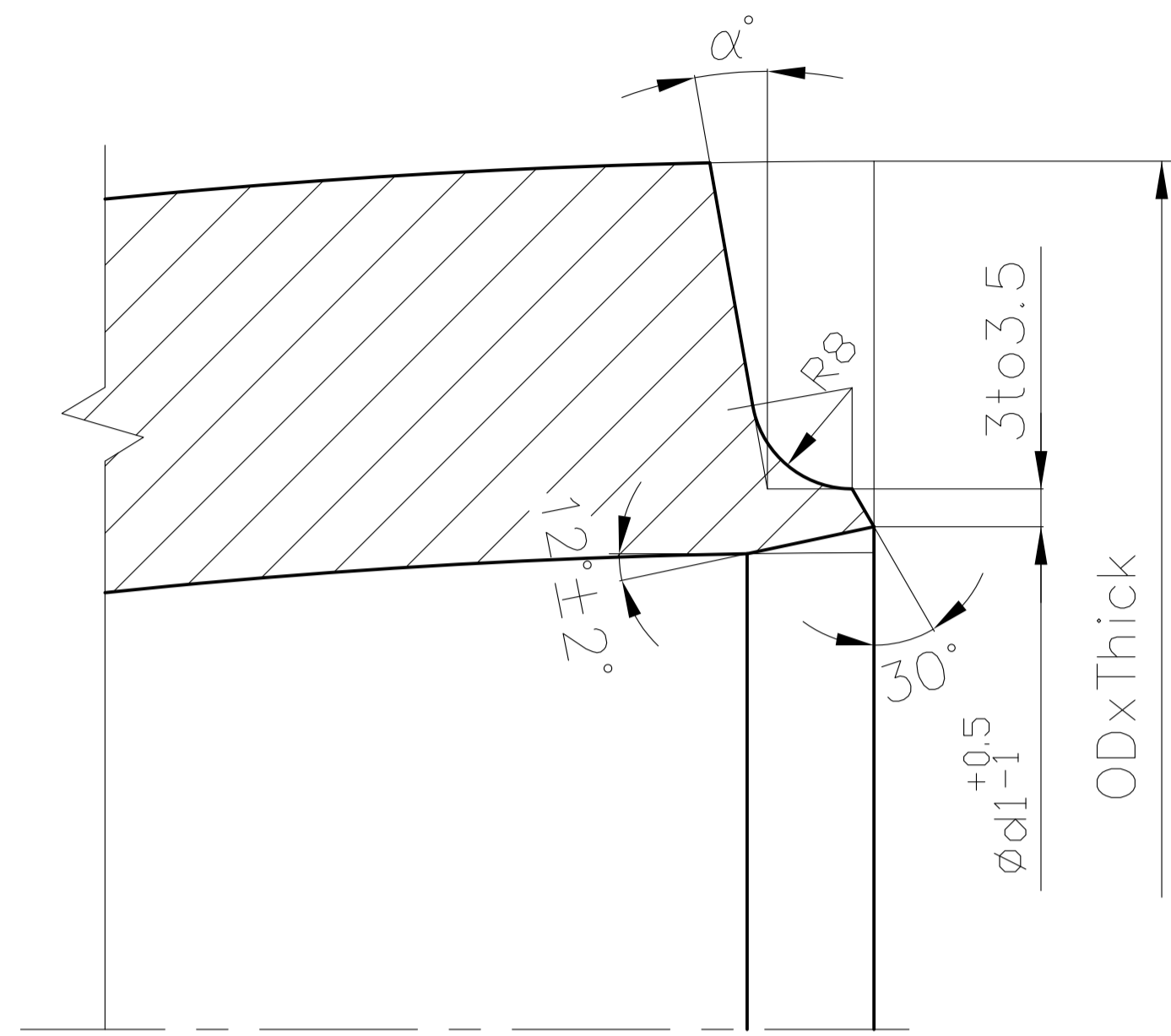
	BHARAT HEAVY ELECTRICALS LTD.		DRN	NAME	SIGN	DATE	NO OF ITEMS
	PIPING CENTRE, MADRAS		CHD	K.B.RAGUNATH		11.10.01	
			APPD	M.C.SEKARAN		11.10.01	
				APPD	A.VELAYUTHAM	11.10.01	

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

CAUTION THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY


3-80-999-97744
DRAWING NO.



$\alpha^{\circ} = 6^{\circ}$ FOR WALL THICKNESS ≤ 30 mm.
 $\alpha^{\circ} = 10^{\circ}$ FOR WALL THICKNESS > 30 mm.

FIGURE-Xf

STANDARD

 BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, CHENNAI, 600 017	NAME	SIGN	DATE
	DRN	R.ANANTH	19.01.2009
	CHD	R.ANANTH	19.01.2009
	APPD	M.N.VASUDEVAN	19.01.2009
DEPT.	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).
CODE	C/M/F	N.T.S.	
TITLE	REF.TO ASSY / OLD DRG.		
BW EP FOR WP91 ASMEB16.9 FITTINGS	CARD CODE	DRAWING No.	REV
U 01	3-80-999-97744	00	

REV	DATE	ALTERED
01		APPROVED



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 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
SA 815 (Duplex Stainless Steel)	- 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. Soaking time: 1Hr. minimum. Still air cooling.

G.Venkataramani, Engg & Qlty

A.P.Madhavan Kutty, Quality

Approved by

K. Vedaprasad, QC

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

K. Vedaprasad, QC

A.P.Madhavan Kutty, Quality

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

A.P.Madhavan Kutty, Quality

Approved by

K. Vedaprasad, QC

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".

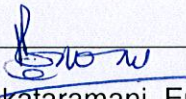
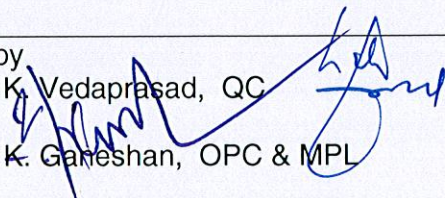

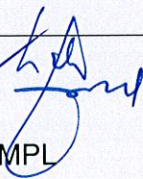
*Details furnished in the Tests certificate in lieu of chart/report is acceptable.

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 

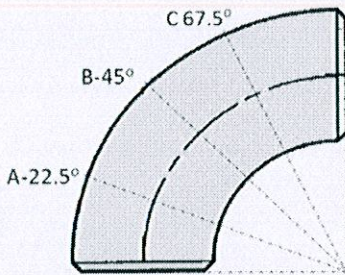


Thickness Measurement Report for Elbow

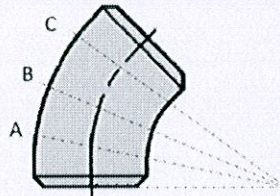
Doc No : TDG102:001 Rev:00

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. S. S.
3/2/14