



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

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

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REF: ENQ NO: 4101100096

DT: 18.08.2011

Sub: Procurement of BW Fittings - WP 91.

Ref: Enquiry No:PC: 4101100096 dt 18.08.2011

Please find the following tender documents for reference.

1. List of items and sample drawings
2. Tech. delivery condition TDG: 102 Rev 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. Offers from other vendors 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.

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

Sl. No	Material	Description	Enq Qty	Drq. No.	TDG	Currency	Unit Rate
1	921174180000	ECC RED OD457X42/323.9X31-SA234WP91	12	4-80-301-63014	TDG 102 Rev 04		
2	921174690000	ECC RED 559X54 /457X43 SA234WP91	1	4-80-301-68291	TDG 102 Rev 04		
3	921174710000	BW CON RED 711 X 25/ 610X 23 SA234WP91	2	As per standard	TDG 102 Rev 04		
4	921174730000	ECC RED 965 X 32 / 762 X 25 SA234WP91	1	4-80-310-68292	TDG 102 Rev 04		
5	921174960000	REDUCEROD 762 X 25/OD 660 X 35 SA234WP91	2	4-80-310-69297	TDG 102 Rev 04		
6	921174980000	REDUCEROD786X38/OD762X 25SA234WP91	2	4-80-311-69299	TDG 102 Rev 04		
7	921174990000	REDUCEROD814X52/OD762X25 SA234WP91	2	4-80-311-69300	TDG 102 Rev 04		
8	921175160000	REDUCEROD711.2X25/OD59X28.58 SA234WP91	2	As per standard	TDG 102 Rev 04		
9	921175170000	BW RED OD355.6 X 29 / OD273X25 SA234WP91	2	As per standard	TDG 102 Rev 04		
10	921175610000	REDUCER OD 273 X25 / 219.1X 25 SA234WP91	3	As per standard	TDG 102 Rev 04		
11	921176170000	RED OD457.2x25/355.6x38SA234WP91	1	As per standard	TDG 102 Rev 04		
12	921176260000	BW ECCREDUCEROD711X45/559X35SA234WP91	2	As per standard	TDG 102 Rev 04		
13	921176280000	BWECREDUCER OD559X35/355.6X29SA234WP91	1	As per standard	TDG 102 Rev 04		
14	925059500000	BWUNEQUALTEEOD 559x35/323.9x31SA234WP91	1	As per standard	TDG 102 Rev 04		
15	925059530000	BWUNEQUALTEEOD406.4X38/355.6X29SA234WP91	1	As per standard	TDG 102 Rev 04		
16	925059760000	EQUAL TEE OD 60.3X12.5SA234WP91	40	As per standard	TDG 102 Rev 04		
17	925179440000	ECC RED OD 559X54/OD406.4X38-SA234WP91	4	4-80-301-62569	TDG 102 Rev 04		
18	925195840000	PIPE CAP 168.3 X 15 SA234WP91	4	3-80-312-28315	TDG 102 Rev 04		
19	925195890000	CAP OD60.3X12.5SA234WP91	8	As per standard	TDG 102 Rev 04		
20	925195900000	CAP OD355.6X9.53SA234WP91	8	As per standard	TDG 102 Rev 04		
21	925195910000	CAP OD73X5.16SA234WP91	8	As per standard	TDG 102 Rev 04		
22	925246270000	BW LR 90DEG ELL 323.9 X 31 SA234WP91	219	4-80-999-93093/00	TDG 102 Rev 04		
23	925246280000	BW LR 45DEG ELL 323.9 X 31 SA234WP91	20	4-80-999-93094/00	TDG 102 Rev 04		
24	925246290000	BW LR 90DEG ELL 219.1 X 25 SA234WP91	32	As per standard	TDG 102 Rev 04		
25	925247660000	LR 90DEG ELBOW OD 219.1X34SA234WP91	18	As per standard	TDG 102 Rev 04		
26	925247670000	LR 90DEG ELBOW OD 60.3X12.5SA234WP91	132	As per standard	TDG 102 Rev 04		
27	925247680000	LR 90DEG ELBOW OD 60.3X5.54SA234WP91	75	As per standard	TDG 102 Rev 04		
28	925247690000	LR 90DEG ELBOW OD 33.4X4.55SA234WP91	130	As per standard	TDG 102 Rev 04		
29	925247820000	SR 90DEG ELBOW OD 711X42SA234WP91	4	As per standard	TDG 102 Rev 04		
30	925247860000	LR 45DEG ELBOW OD355.6X9.53SA234WP91	8	As per standard	TDG 102 Rev 04		
31	925249580000	BW LR 90 DEG ELL 273 X 25 SA234 WP91	13	As per standard	TDG 102 Rev 04		
32	925249770000	BWLR90D ELBOW OD610x36 SA234WP91	8	4-80-312-70630	TDG 102 Rev 04		
Grand Total			766				



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 ± 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.

S. Jayakumar, Engg

Approved by

K. Vedaprasad, QC

P. Elangovan, QA

K. Ganesan, MPI



- (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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K. Ganeshan, MPI



- 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 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.

S. Jayakumar, Engg

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Approved by

K. Vedaprasad, QC

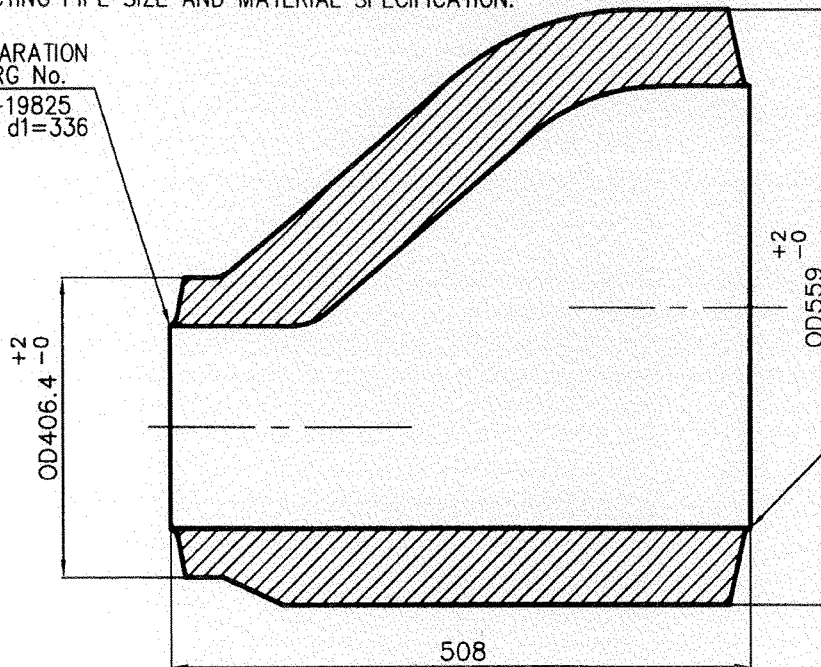
K. Ganesan, MPI

ALL DIMENSIONS ARE IN MILLIMETRES

REV	DATE	ALTERED
		APPROVED

NOTES:-

01. FITTING SHALL CONFORM TO ALL THE REQUIREMENTS OF ASME B16.9 & A 234.
02. THIS DRAWING IS FOR INDICATING THE OVER ALL DIMENSIONS, CONNECTING PIPE SIZE AND MATERIAL SPECIFICATION.

EDGE PREPARATION
AS PER DRG No.3-80-300-19825
FIGURE-X, d1=336EDGE PREPARATION
AS PER DRG No.3-80-300-19825
FIGURE-X, d1=460

	ECCENTRIC REDUCER OD559x54 / OD406.4x38		92 517 944 0000	A		520	000
			SA 234 WP91				
VAR NO.	DESCRIPTION	STD	MATL. CODE	A C	UNIT DI	UNIT.WT.(Kg)	
			MATL. SPECN.			QTY.	

**BHARAT HEAVY ELECTRICALS LIMITED**PIPING CENTRE
CHENNAI 600 017

NAME	SIGN	DATE	NO. OF VAR
DRN K.R.BALA	<i>K.R.BALA</i>	19.07.08	
CHD C.SARAVANAN	<i>C.Saravanan</i>	19.07.08	
APPD T.N.ELANGO VAN	<i>T.N.ELANGO VAN</i>	19.07.08	

DEPT	GRADE OF UNTOL DIM	SCALE	WEIGHT (KG).	BHEL PO REF.NO:	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	520.000			
TITLE			CARD CODE	DRAWING NO.	REV	
ECCENTRIC REDUCER			U 01	4-80-301-62569	00	
OD559X54 / OD406.4X38						

Size A4