Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)
Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017
Phone : 91 (044) 2815 8821, Fax : 91 (044) 2815 8869
e-mail: prs@bhelmpc.co.in

REF: ENQ NO:PC:9003 DT: 11.06.2009

Sub: Procurement of socket welded fittings.

Ref: Enquiry No:PC:9003 dt 11.06.09

Please find the following tender documents for reference.

1. List of items
2. Tech. delivery condition TDG: 103:02

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 though e-mail/courier may submit their offers.

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

Dy Manager / Purchase
BHEL / Piping Centre
80,GN Road, T.Nagar
Chennai-600017

SL NO	Material code	DESCRIPTION	SPECIFICATION	Annual tentative QTY
1	921054170000	SW UEQT NB 50 / 25 CL 3000SA182F22CL3	SA182F22CL3	**30**
2	921054450200	SW UEQT NB 25/15 CL6000(WITH MPI) SA105	SA105	**20**
3	921054460200	SW UEQT NB 50/25 CL6000(WITH MPI) SA105	SA105	**50**
4	921054470200	SWUEQTNB50/25CL6000(WITHMPI) SA182F22CL3	SA182F22CL3	**30**
5	921054500200	SW EQT NB 15 CL 3000 (WITH MPI) SA105	SA105	**1850**
6	921054510200	SW EQT NB 25 CL 3000 (WITH MPI) SA105	SA105	**4450**
7	921054520200	SW EQT NB 40 CL 3000 (WITH MPI) SA105	SA105	**700**
8	921054530200	SW EQT NB 50 CL 3000 (WITH MPI) SA105	SA105	**640**
9	921054540200	SW EQT NB 15 CL 6000 (WITH MPI) SA105	SA105	**165**
10	921054550200	SW EQT NB 25 CL 6000 (WITH MPI) SA105	SA105	**115**
11	921054560200	SW EQT NB 40 CL 6000 (WITH MPI) SA105	SA105	**30**
12	921054570200	SW EQT NB 50 CL 6000 (WITH MPI) SA105	SA105	**50**
13	921054590200	SW EQT NB 25 CL 6000 SA182F22CL3	SA182F22CL3	**90**
14	921054600200	SW EQT NB 50 CL 6000 SA182F22CL3	SA182F22CL3	**30**
15	921054620200	SW UEQT NB 25/15 CL3000(WITH MPI) SA105	SA105	**2250**
16	921054640200	SW UEQT NB 40/25 CL3000(WITH MPI) SA105	SA105	**780**
17	921054650200	SW UEQT NB 50/25 CL3000(WITH MPI) SA105	SA105	**535**
18	921054660200	SW UEQT NB 50/40 CL3000(WITH MPI) SA105	SA105	**225**
19	921054880000	SW EQT Nb 25 Cl 3000SA182F22CL3	SA182F22CL3	**130**
20	921171340200	SW RED NB 50 / 40 CL 3000 SA105	SA105	**385**
21	921171410200	SW RED NB 25 / 15 CL 3000 SA105	SA105	**2850**
22	921171420200	SW RED NB 25 / 15 CL 6000 SA105	SA105	**1200**
23	921171430200	SW RED NB 40 / 15 CL 3000 SA105	SA105	**30**
24	921171440200	SW RED NB 40 / 25 CL 3000 SA105	SA105	**355**
25	921171450200	SW RED NB 50 / 25 CL 3000 SA105	SA105	**640**
26	921171460200	SW RED NB 50 / 25 CL 6000 SA105	SA105	**50**
27	921171470200	SW RED NB 50 / 40 CL 6000 SA105	SA105	**30**
28	925043720000	SW 90DEG ELL NB 40 CL 9000 SA182F22CL3	SA182F22CL3	**100**
29	925043730000	SW 90DEG ELL NB 40 CL 3000 SA182F22CL3	SA182F22CL3	**35**
30	925043740000	SW 90DEG ELL NB 25 CL 3000 SA182F22CL3	SA182F22CL3	**700**
31	925043750000	SW 90DEG ELL NB 50 CL 9000 SA105	SA105	**240**
32	925043760000	SW 90DEG ELL NB 40 CL 9000 SA105	SA105	**130**
33	925043770000	SW 90DEG ELL NB 40 CL 3000 SA105	SA105	**680**
34	925043780000	SW 90DEG ELL NB 25 CL 3000 SA105	SA105	**8000**
35	925043790000	SW 90DEG ELL NB 50 CL 3000 SA105	SA105	**2200**
36	925043800000	SW 45DEG ELL NB 50 CL 3000 SA105	SA105	**40**
37	925043840000	SW 90DEG ELL NB 25 CL 3000 SA182F304H	SA182F304H	**2150**
38	925044480000	SW 90DEG ELL NB 15 CL 3000 SA105	SA105	**2100**
39	925044630000	SW 90DEG ELL NB 40 CL 3000 SA182F304H	SA182F304H	**85**
40	925044710000	SW 90DEG ELL NB 50 CL 3000 SA182F22CL3	SA182F22CL3	**660**
41	925048230000	SW 90DEG ELL NB 25 CL 9000 SA182F22CL3	SA182F22CL3	**575**

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SL NO	Material code	DESCRIPTION	SPECIFICATION	Annual tentative QTY
42	925048330000	SW 90DEG ELL NB 25 CL 9000SA105	SA105	**10**
43	925049780000	SW 90DEG ELL NB20 CL3000SA105	SA105	**50**
44	925052440000	SW UEQT NB 25 / 15 CL 3000 SA182F22CL3	SA182F22CL3	**10**
45	925052460000	SW UEQT NB 40 / 15 CL 3000 SA105	SA105	**145**
46	925052710000	SW UEQT NB 50 / 15 CL 3000 SA105	SA105	**135**
47	925052960000	SW EQT NB 25 CL 3000 SA182F304H	SA182F304H	**650**
48	925052970000	SW EQT NB 25 CL 6000 SA182F304H	SA182F304H	**70**
49	925052980000	SW UEQT NB 25 / 15 CL 3000 SA182F304H	SA182F304H	**735**
50	925052990000	SW UEQT NB 25 / 15 CL 6000 SA182F304H	SA182F304H	**40**
51	925053060000	SW EQT NB 40 CL 3000 SA182F22CL3	SA182F22CL3	**10**
52	925055060000	SW EQT NB 50 CL 9000 SA105	SA105	**60**
53	925055130000	SW UEQT NB 50 / 40 CL 9000 SA105	SA105	**90**
54	925055390000	SW UEQT NB40 / 25 CL 3000 SA403WP304H	SA403WP304H	**10**
55	925055570000	SW EQT NB 50 CL 3000 SA182F22CL3	SA182F22CL3	**80**
56	925055930000	SW UEQT NB 40 / 15 CL 3000 SA182F304H	SA182F304H	**10**
57	925161340000	SW FULLCOUPLING NB25 CL 3000 SA182F304H	SA182F304H	**715**
58	925161360000	SW FULLCOUPLING NB25 CL 6000 SA182F304H	SA182F304H	**175**
59	925161490000	SW FULLCOUPLING NB50 CL 3000 SA182F304H	SA182F304H	**20**
60	925162060000	SW FULL COUPLING NB 50 CL 3000 SA105	SA105	**775**
61	925162070000	SW FULL COUPLING NB 40 CL 3000 SA105	SA105	**80**
62	925162080000	SW FULL COUPLING NB 25 CL 3000 SA105	SA105	**1350**
63	925162110000	SW FULLCOUPLING NB40 CL 3000 SA182F304H	SA182F304H	**20**
64	925162180000	SW FULL COUPLING NB 25 CL 6000 SA105	SA105	**105**
65	925162230000	SWFULLCOUPLING NB50CL3000 SA182F22CL3	SA182F22CL3	**100**
66	925162250000	SWFULLCOUPLING NB50CL9000 SA182F22CL3	SA182F22CL3	**50**
67	925162260000	SW FULLCOUPLING NB15 CL 3000 SA182F304H	SA182F304H	**85**
68	925164430000	SWFULLCOUPLING NB25CL9000 SA182F22CL3	SA182F22CL3	**60**
69	925173370000	SW RED NB 25 / 15 CL 3000 SA182F22CL3	SA182F22CL3	**1450**
70	925173470400	SW RED NB 25 / 15 CL 6000 SA182F22CL3	SA182F22CL3	**1470**
71	925175170000	SW RED NB 50 / 40 CL 3000 SA182F22CL3	SA182F22CL3	**10**
72	925175430000	SW RED NB 50 / 15 CL 3000 SA105	SA105	**20**
73	925175600000	SW RED NB 50 / 25 CL 6000 SA182F22CL3	SA182F22CL3	**85**
74	925179840000	SW RED NB 25 / 15 CL 9000 SA105	SA105	**10**
75	925195300000	SW END CAP NB 50 CL 3000 SA105	SA105	**20**
76	925195310000	SW END CAP NB 50 CL 3000 SA182F22CL3	SA182F22CL3	**10**
77	925240280000	SW 90DEG ELL NB 25 CL 6000 SA105	SA105	**755**
78	925240750000	SW 90DEG ELL NB 50 CL 6000 SA182F22CL3	SA182F22CL3	**10**
79	925240910000	SW 90DEG ELL NB 50 CL 9000 SA182F22CL3	SA182F22CL3	**50**
80	925240930300	SW 90DEG ELL NB 15 CL 9000 SA182F22CL3	SA182F22CL3	**30**
81	925240940300	SW 90DEG ELL NB 15 CL 6000 SA105	SA105	**30**
82	925242310000	SW 45DEG ELL NB 25 CL 3000 SA105	SA105	**10**

SL NO	Material code	DESCRIPTION	SPECIFICATION	Annual tentative QTY
83	925242340000	SW 45DEG ELL NB 40 CL 3000 SA105	SA105	10
84	925242360000	SW 90DEG ELL NB 50 CL 6000 SA105	SA105	10
85	925243610000	SW LR 90DEG ELL 33.4 X 9.09 CL9000 SA105	SA105	40
86	925244070000	SW 90DEG ELL NB 50 CL 3000 SA182F304H	SA182F304H	200
87	925244160000	SW 90DEG ELL NB 15 CL 3000 SA182F304H	SA182F304H	1200
88	925244230000	SW 45DEG ELL NB 25 CL 3000 SA182F22CL3	SA182F22CL3	20
89	925244260000	SW 45DEG ELL NB 50 CL 3000 SA182F22CL3	SA182F22CL3	10
90	925244390000	SW 90DEG ELL NB 15 CL 3000 SA182F316	SA182F316	10
91	925244400000	SW 90DEG ELL NB 25 CL 3000 SA182F316	SA182F316	145
92	925244480000	SW 90DEG ELL NB 25 CL 6000 SA182F304H	SA182F304H	305
93	925246800200	SW 90DEG ELL NB 25 CL 6000 SA182F22CL3	SA182F22CL3	50
94	925246930000	SW 90DEG ELL NB 40 CL 3000 SA182F316	SA182F316	10
95	925248660000	SW LR 90 ELL 33.4X4.55 SA182F304H-CL3000	SA182F304H	75
96	925250010000	SW UEQT NB 50 / 25 CL 6000 SA182F22CL3	SA182F22CL3	10
97	925250030000	SW EQT NB 50 CL 3000 SA182F22CL3	SA182F22CL3	50
98	925250270000	SW UEQT NB 50 / 25 CL 9000 SA182F22CL3	SA182F22CL3	10
99	925250280000	SW UEQT NB 50 / 25 CL 9000 SA105	SA105	195
100	925250320000	SW EQT NB 25 CL 9000 SA182F22CL3	SA182F22CL3	40
101	925251000000	SW EQT NB 40 CL 9000 SA105	SA105	50
102	925252440000	SW UEQT NB 40 / 25 CL 6000 SA105	SA105	10
103	925252550000	SW UEQT NB 40 / 25 CL 9000 SA105	SA105	10
104	925252560000	SW UEQT NB 50 / 40 CL 6000 SA105	SA105	10
105	925254060000	SW EQT NB 15 CL 3000 SA182F304H	SA182F304H	10
106	925254140000	SW UEQT NB 50 / 15 CL 3000 SA182F304H	SA182F304H	20
107	925254180000	SW UEQT NB 40 / 25 CL 3000 SA182F304H	SA182F304H	30
108	925254350000	SW EQT NB 50 CL 3000 SA182F304H	SA182F304H	20
109	925254420000	SW EQT NB 40 CL 3000SA182F304H	SA182F304H	40
110	925254700000	SW UEQT NB 50 / 25 CL 3000 SA182F304H	SA182F304H	65
111	925257300000	SW UEQT NB 50 / 40 CL 3000 SA182F304H	SA182F304H	10
112	925257990000	SW EQT NB 50 CL 9000 SA182F22CL3	SA182F22CL3	45
113	925259590000	SW UEQT 60.3X2.77/33.4X3.05 SA403WP304H	SA403WP304H	10
114	925270490000	SW RED NB 40 / 25 CL 6000 SA182F22CL3	SA182F22CL3	10
115	925272820000	SW RED NB 20 / 15 CL 3000 SA105	SA105	10
116	925272890000	SW RED NB 50 / 40 CL 9000 SA105	SA105	20
117	925272900000	SW RED NB 40 / 25 CL 6000 SA105	SA105	10
118	925274080000	SW RED NB 25 / 15 CL 3000 SA182F304H	SA182F304H	310
119	925274150000	SW RED NB 40 / 25 CL 3000 SA182F304H	SA182F304H	20
120	925274400000	SW RED NB 50 / 25 CL 3000 SA182F304H	SA182F304H	10
121	925274720000	SW RED NB 50 / 40 CL 3000 SA182F304H	SA182F304H	20
122	925276300000	SW RED NB 50 / 25 CL 3000 SA182F22CL3	SA182F22CL3	30
123	925276310000	SW RED NB 40 / 25 CL 3000 SA182F22CL3	SA182F22CL3	10

SL NO	Material code	DESCRIPTION	SPECIFICATION	Annual tentative QTY
124	925276410000	SW RED NB 25 / 20 CL 3000 SA182F22CL3	SA182F22CL3	**10**
125	925276680000	SW RED NB 25 / 15 CL 9000 SA182F22CL3	SA182F22CL3	**340**
126	925276700000	SW RED NB 50 / 25 CL 9000 SA182F22CL3	SA182F22CL3	**50**
127	925276750000	SW RED NB 25 / 15 CL 6000 SA182F304H	SA182F304H	**35**
128	925276930000	SW RED NB 50 / 40 CL 3000 SA182F22CL3	SA182F22CL3	**10**
129	925276940000	SW RED NB 50 / 25 CL 9000 SA105	SA105	**10**
130	925277630000	SW RED NB 25 / 15 CL 3000 SA182F304H	SA182F304H	**10**

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1.0 CODES

The fittings shall meet Indian Boiler Regulations, (IBR) in addition to the standards specified in the Purchase Order (PO).

2.0 RAW MATERIALS

(a) The raw material used shall meet the respective specification and the test certificate shall be furnished.

(b) Steel for SA 182 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, Bombay.

(c) The raw materials shall be ultrasonically tested (UT) as per SA 388 and the acceptance norms shall be as per 3.3.4 of ASME Sec . VIII Div.2.

(d) Carbon content of Carbon steel fittings (SA 105) shall be restricted to 0.25% max.

3.0 PROCESS

(a) Process of manufacture shall conform to applicable standards.

(b) Dimensions shall be as per ASME B 16.11

(c) Unless otherwise specified in the P.O, SA182 F11/12 fittings shall be supplied as per class 2 and SA182 F22 shall be of Class 3 only.

4.0 HEAT TREATMENT

4.1 All fittings shall be heat treated as below:

SA 105	- Normalised
SA182 F11/ F12/ F22	- Normalised & Tempered

4.2 Fittings confirming to SA182 F91shall be normalised at1040 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

5.0 TESTING

(a) All CS & AS fittings shall be tested by MPI as per ASTM E-709 and SS fittings shall be LPI tested as per ASTM E 165.

(b) One fitting of each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard. Test on representative sample acceptable.

(c) Hardness test shall be carried out on each fittings of F91; for other fittings on

10% of the fittings.

(d) SUPPLEMENTARY TEST : The following supplementary tests shall be carried out for specifications namely SA105, SA 182 F11 / F12 / F22 / F91
a) Product analysis – one / heat / size.
b) Tension test – one / heat / heat treatment lot / size.

(e) 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 WORK MAN SHIP, FINISH AND REPAIR

All fittings shall have smooth, workman like finish, and to be free from scale & defects like laps, seams folds, cracks, etc. Repairs by fusion welding are prohibited. Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum dimension after repair to meet drawing / Specification.

8.0 PAINTING , COLOUR CODING, MARKING, PACKING & END PROTECTION

8.1 **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.

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

SA105	=	Blue
SA182 F11	=	Green & White
SA182 F12	=	Black & Red

SA182 F22	=	Blue & Red
SA182 F91	=	Brown & Red
SA 182 F 304	=	Blue &Yellow
316	=	Black &Green
321	=	Blue & Brown
347	=	Yellow&Black

8.3 **MARKING :**

8.3.1 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.

8.3.2 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 8.3.1.

8.4 **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.

9.0 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 IIIC (for fittings under IBR purview) shall be submitted along with the Work Test Certificate countersigned by any of 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. Steel making / forming process
9. Laddle Analysis of Raw Material and product analysis of fittings wherever applicable.

*10. Supplementary Test S2/S3/S4 as applicable.
*11. Heat Treatment Chart.
*12. NDE report. (VISUAL,MPI, LPI,UT)

*13. Tensile Test Report
*14. Hardness Test Report
15. Metallography Report along with photomicrograph with 500x (min) magnification
*16. Dimensional conformance.
*17. Starting material details.

*18. Guarantee of HTP shall be given as follows:- "Fittings are capable of with standing without failure, breakage 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.

10.0 RECORDS OF REVISION : -

01	Fully revised for better clarity. Cl 2.0 a) added
02	a) Para 4.0, 6.0 included. b) Para 2(c) ,5.0(b), 5.0(e), 5.0(f), 8.0 and 9.0 (15) are revised.

S. Jayakumar, Engg	Approved by	K. Vedaprasad, QC	
P. Elangovan, QA		K. Ganeshan, MPL	