An ISO 9001 Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

TITLE **Supply of Fittings as per Spec. SA420 GRWPL6 (Modified) to BHEL Trichy**	Phone: +91 431 2577630 / 2577480 Fax : +91 431 2520 719 Email : nnithya@bheltry.co.in

Reference Number: 1401100246	**Date: 28.12.2011**	**Due date for submission of offer : 01.02.2012**

BHEL / Trichy is looking for Vendors to supply Fittings as per Spec. SA420 GRWPL6 (Modified) as per the attached documents.

BHEL technical terms & conditions and all annexures can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units) Bharath Heavy Electricals Limited) under reference "**1401100246**"

Offer should reach us before 14:00 hours on the due date of 01.02.2012.	Yours faithfully, ENGINEER / PURCHASE/ C&F / MM For **Bharath Heavy Electricals Limited**

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577480
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: tkr@bheltry.co.in
Web:

ENQUIRY
(INDIGENOUS)

Enquiry No	Enquiry Date	Due Date for Quotation
1401100246	28.12.2011	01.02.2012

Please quote Enquiry No, Date and due date in all correspondences.
This is only a request for quotation and not an order

Item	Description	Unit	Quantity	Delivery Schedule Quantity	Delivery Schedule Date
10	D13930849001 20 NB 90 DEG LR ELBOW AS PER DRG No. 3-93-420-05248/00.	NO	500.000	500.00	12.02.12
20	D13930849002 20 NB EQUAL TEE AS PER DRG No. 3-93-420-05249/00.	NO	260.000	260.00	12.02.12
30	D13930849003 20 NB END CAP AS PER DRG No. 3-93-420-05250/00.	NO	100.000	100.00	12.02.12

General Note:

1. All Fittings shall be supplied as per
   a. Specification SA420 GRWPL6 (Mod)
   b. TDC No. D139-TDC-002-R01
   c. Drawing Nos mentioned against each item.

2. Inspection :
   a) For Foreign suppliers : by any of the following three approved third parties viz.
   i. TUV(Nord), ii. BV, iii. SGS
   b) For Indian suppliers : by BHEL and customer (NPCIL).

3. Offers from traders are not acceptable.

4. No "End Use Certificate" will be given.

5. All the items are to be procured from a single source and order to be finalized on a 'total package' basis. Hence, part offers will be rejected. The rates quoted should include all charges like inspection / testing, freight, insurance etc. (i.e. no seperate rate be indicated as extra).

6. Supplier shall submit Manufacturing / Testing / Inspection Drawing / Documents and Quality Assurance Plan (QAP) for our approval.

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577480
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: tkr@bheltry.co.in
Web:

1401100246 / 28.12.2011

7. The actual production of materials is permitted only after review / approval of Manufacturing / Testing / Inspection Drawing / Documents and Quality Assurance Plan (QAP) by BHEL,Trichy & NPCIL.

8. Five sets of dialets containing Test Certificate, copies of the approved procedures DCR, Drgs., etc. Apart from contractual requirements are required.

9. Bidders shall submit the OFFER in English language (a single envelope containing two inner envelopes) as indicated below:
Envelope 1: This sealed envelope should contain
(a) technical bid
(b) un-priced commercial bid (copy of the Priced Bid without the price details)
This envelope should be clearly marked "Part I - Technical and Un-priced commercial bid, indicating Enquiry No., Due Date, Address & Reference of the Bidder.

Envelope II: This sealed envelope should contain price details. This envelope should be clearly marked "Part II - Price bid", indicating Enquiry No., Due Date, Address & Reference of the Bidder.

10. The OFFER, sealed and Superscribed as "Parts I & II inside" indicating Enquiry No., Due Date, Address & Reference of the Bidder should reach this office on or before the due date by 14:00 Hrs (IST). OFFERS RECEIVED AFTER 14:00 Hrs (IST) WILL NOT BE CONSIDERED FOR EVALUATION.

11. The OFFER to be addressed to:
MANAGER / PURCHASE - C&F / MM / MFG
4th Floor - Building 24
BHARAT HEAVY ELECTRICALS LIMITED
HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620 014
TAMIL NADU, INDIA.

Note: Bidders are requested to submit their offers only through sealed bids. As the part II (priced bid) will not be opened before the technical evaluation is completed, bidders are requested not to submit their bids through email/fax etc.

12. Tenders should be free from CORRECTION AND ERASURES, Corrections if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577480
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: tkr@bheltry.co.in
Web:

1401100246 / 28.12.2011

is difference between amount quoted in words and figures, the lesser amount shall prevail.

13. Fixed price: Prices quoted by the bidder shall be fixed and not subject to any escalation whatsoever during the period of bid validity and execution of the Purchase Order. A bid submitted with an adjustable price will be liable for rejection. Prices shall be written in words and figures. In the event of any discrepancy with regard to total price and unit price whichever is less shall be considered correct. All rates should include the third party inspection charges. RATES QUOTED SHALL BE INCLUSIVE OF ALL CHARGES INCLUDING PACKING, INSPECTION ETC. NO EXTRA PAYMENT WILL BE MADE IN ANY CASE.

14. Bid currency: Indian bidders should submit the prices only in Indian Rupees. Foreign bidders may submit their bid in their preferred currency. For the evaluation purposes the exchange rate on technical bid opening date will be considered.

15. Terms of Delivery: Foreign Bidders should submit their offer for net FOB, Nearest port and CFR, Chennai with freight break up details. BHEL reserves the right to order on FOB or CFR basis. Hence if FOB rates are not quoted in the offer, it is liable to be rejected. Indian Bidders should submit their offer for FOR, Trichy (inclusive of risk in transit) & Ex-Works with the applicable freight breakup details.

16. Taxes and Duties: (for Indian Bidders only) All Taxes and Duties payable as extra to the quoted price should be specifically stated in offers along with CST & TNGST No / Tariff No. etc., failing which the purchaser will not be liable for payment of such Taxes and Duties. Our T.N.G.S.T No. 3560005 Dt. 01-04-1995, C.S.T. No. 239383 dt. 11-06-1991.
The duplicate copy of the invoice meant for transporters should accompany the material as stipulated under Central Excise rules 52A and 173C or 57gG. A Photostat copy of the invoice for each delivery challan should be submitted along with the original bills routed through bank or if submitted directly to BHEL finance department.

17. Modvat credit : (for Indian Bidders only) If any Excise Duty is payable, the chapter head / sub-head reference and the rate of the duty should be quoted. If the tender is availing MODVAT credit for his input material, the effect of proforma credit should be passed on to the purchaser. The

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577480
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: tkr@bheltry.co.in
Web:

1401100246 / 28.12.2011

Bidder under 'MODVAT' shall be preferred.

18. Validity: The offers shall be kept open for acceptance for 90 days from the date of Tender opening. Once the tenders are submitted, rates cannot be changed on any grounds.

19. Terms of Payment :
Indian Bidders - The payment term is 100% payment after 45 days of satisfactory acceptance of materials at BHEL, Tiruchy. As per policy, LC will not be opened. Offers with LC requests/advance payments are liable for rejection.
Foreign Bidders - Cash against documents - Payment will be made 45 days from the date of submission of complete set of documents as specified in the PO at our bank. Requests for LC will be loaded at 1.5% of the basic charge.

20. BHEL prefers the manufacturers to quote directly. In case this is not possible and the offer is being submitted by an Indian agent, the following details are to be furnished along with the offer:

a. The letter from their Principal authorising the Indian agent to submit the offer on their Principal's behalf. In case the Indian agent submits offer on their own letter head then a covering letter (in original) from the Principal should be enclosed, clearly mentioning that they are bound by the offer submitted by the Indian agent on their behalf.

b. Precise relationship between foreign suppliers and their Indian agents and their mutual interest in business, should be clearly spelt out.

c. Any payment, which the agent receives in India or abroad, from the foreign supplier, whether as a commission or as a general retainer fee is to be mentioned in the offer.

d. All services to be rendered by the agent, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier and the Indian agent.

e. The amount of agency commission agreed to between the foreign principal and the Indian agent should be specifically disclosed and the agency commission will be paid in Indian Rupees only on satisfactory completion of the contract.

f. For calculation of rupee equivalent of agency commission,

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577480
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: tkr@bheltry.co.in
Web:

1401100246 / 28.12.2011

exchange rate as prevailing on the date of order will be taken.

g. Copy of current agency agreement is to be enclosed without which the offer is liable for rejection.

21. Bank Guarantee (BG) for import bidders: The Bidder, in the event of an order, should furnish a bank Guarantee from any one of the attached list of consortium banks or counter-guaranteed by any one of this list of banks, at no extra cost in a Performa which will be provided by BHEL along with the order, for an amount equivalent to 10% (Ten percent) of the value of the contract. The Bank Guarantee should remain in full force and effect during the period that would be taken for successful completion of the contract and shall continue to be enforceable till 12 months from the date of receipt of consignment at purchaser's site or 18 months from the date of last shipment at the port of delivery whichever is earlier, with a claim period of two months.

22. Liquidated damages : If supplier fails to deliver the materials within the period specified in the contract the purchaser shall deduct as Liquidated Damages(LD), a sum equivalent to 0.5% of the price for each week or part there of delay upto a maximum of 15% of the price of the delayed or delivered goods.

    LD, if applicable, will be levied from the order delivery date to the date of Bill of lading/LR in case of CFR/FOR contracts and to the date of the inspection in case of FOB/Ex-Works contracts. Grace periods are not acceptable.

23. Risk purchase : Alternatively the purchaser at his option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute therefore. The supplier shall be liable for any loss which the Purchaser may sustain by reason of such risk purchases in addition to penalty at the rate mentioned under liquidated damages.

24. The correspondence between the bidder and BHEL through email is considered to be valid document legally though not signed. It is treated as valid confirmations made on behalf of the respective company and comes under the legal ambit of

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / *PURCHASE*
(FOSSIL BOILERS)
Yours faithfully,

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577480
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: tkr@bheltry.co.in
Web:

1401100246 / 28.12.2011

the business transaction and hence binding on both the parties.

25. Bidders participating in the tender should declare in their technical bid whether they have been black-listed / kept on hold / given Business holiday for a specified period by any Public Sector Undertaking or Government Departments. The reasons for such action with details and the current status of such hold shall be clearly furnished to BHEL. If no such details are mentioned in the offer, it will be construed that the bidder is not under any such hold. However, at a later date if it comes to the notice of BHEL about any such hold under enforcement, BHEL reserves the right to reject the offer at any point of time and also under any stage of the finalisation of the tender. Such bidders will not be permitted to participate in the further tender proceedings and will be communicated suitably.

26. Packing and marking : The Supplier shall arrange for securely protecting and packing the materials to avoid loss or damages during transit.

27. Lowest price received against BHEL tenders need not be the technically acceptable one and in that case, BHEL reserves the right not to consider the same.

28. BHEL reserves the right to negotiate L1 rate or re float the tender opened if L1 price is not the lowest acceptable price to them inter-alia other reasons.

29. Any other conditions which might have been quoted by the seller and are in contravention to the terms prescribed in the order and which have not been specifically accepted in by purchaser will not be applicable to the contract.

30. Bidders to confirm / comply with all the above points in their "Technical and unpriced commercial bid".

Enclosures:

"LD clause has to be confirmed without fail."

"Payment to vendors will be made only thro E-Payment mode"

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

Revision Record:

Rev 00: Fresh

Rev 01: Cl.1.0 & 4.1.3 c – Text modified.
Cl. 4.1.3 e & 4.2.2 -'Y' type consumable inserts identified in place of Flat type inserts

---

Table of Contents

न्यूक्लियर पावर कार्पोरेशन ऑफ इंडिया लिमिटेड
NUCLEAR POWER CORPORATION OF INDIA LTD.

अनुमोदित / APPROVED

19/04/11

समीक्षा/Reviewed 19/4/11

जाँच किया गया/Checked 19.04.11

यह अनुमोदन किए जानेवाले कार्य के परिनिर्धारण का विक्रेता को विवरण की सटीकता के दायित्वों से मुक्त नहीं करता है ।
This Approval of interpretation of the work to be done does not relieve the seller of responsibility of accuracy of details.

Prepared by Engr/QA (BHEL)	Reviewed & approved by (BHEL)	Approved by NPCIL
(K.Krishnamoorthi)	(M.Ponnusamy)	

1.0 Scope

This specification establishes the technical requirements for the material, manufacture, examination, inspection, testing documentation, identification and packaging of seamless carbon steel pipes SA–333 Grade 6 (modified) and butt welding seamless carbon steel fittings SA–420 Gr.WPL-6 (modified).

2.0 Specifications, Codes/standards and drawings

All Specifications, Codes/standards and drawings listed below of the issue in effect on the date of the pertinent tendering documents, apply as specified herein. In the event of any conflict between the provisions of this specification and the documents listed below, this specification with the concurrence of purchaser shall govern.

2.1 Specifications, Codes/standards

ASME	: Boiler pressure vessel code
	: Section II – Part A – Ferrous material specifications
	: Section III – division – 1 sub section NB – Class – 1 components
	: Section – V – Non destructive – Examination
ANSI	: Standards of american national standards institutes
ANSI – B 16.9	: Factory made wrought steel butt welding fittings
ANSI – B 16.25	: Butt Welding of ends
ANSI – B 16.28	: Wrought steel butt welding short radius elbows and Returns
ANSI – B 46.1	: Surface Texture
MSS – SP – 25	: Standard Marking system for Valves, fittings, Flanges and unions
ASTM	: Appropriate standards of american society for testing and materials
SA – 333	: Specification for seamless and welded steel pipe for Low temperature service
SA – 370	: Test method and definitions for mechanical testing of Steel products
SA – 420	: Specification for pipe fittings of wrought carbon steel and Alloy steel for low temperature service
SA – 530	: Specification for general requirements for specialized Carbon and alloy steel pipe
SE – 709	: standard guide for magnetic particle Examination
SE – 165	: Standard Method for liquid Penetrant Examination
SE – 213	: Standard method for ultrasonic inspection of metal pipe and tubing
ASTM – E – 94	: Recommended practice for Radiographic Testing
ASTM – E – 112	: Method for Estimating the Average Grain Size of metals.
ASTM – E – 381	: Method of macro Etch Testing Products, Inspection and Rating Comprising Steel Bars, Billets, Blooms and Forgings.

2.2 Refer applicable Drawings for 20NB TEES, 20NB ELBOWS, and 20NB End caps

3.0 Material and manufacturing Requirements

3.1 Material Requirements

3.1.1 General

All pipes and butt welding fittings shall be new and of high quality carbon steel material and manufacture. All the general requirements, specified herein, regarding material, manufacture, examination, inspection and testing shall be applicable to all pipes and butt welding fittings and shall also be applicable to the starting stock used for the manufacture of butt welding fittings. All pipes and butt welding fittings shall be of 'SEAMLESS' manufacture. They shall have the best workmanship like finish and be made by the best manufacturing practice.

a) The steel shall be clean, homogeneous and instrinsically tough and shall be produced by recognized "fine Grain melting practice" and shall be fully "killed". The manufacturer shall indicate in the bid the austenitic grain size guaranteed in the micro structure for their offered products and shall report the grain size actually achieved in the material certificates in the event of an order. Grain size should be 5 or finer.

b) The steel subjected to vacuum treatment and/or refinement is preferred. The manufacturer shall indicate in the bid the particular type of vacuum treatment and/or refinement method used for Purchasers consideration/evaluation.

c) The chemical composition shall be in accordance with the particular SA – Material specifications specified herein with the following restrictions on chromium, sulphur, phosphorus and other elements:

Chromium	:	0.20% min. and 0.25% max.
Sulphur	:	0.025% max.
Phosphorus	:	0.025% max.
Aluminium	:	0.04% max.
Vanadium	:	0.01% max.
Copper	:	0.30% max.
Cobalt	:	0.02% max.
Nickel	:	0.40% max.
Molybdenum	:	0.10% max.

d) All material product forms shall be supplied in the "Normalized" condition, unless otherwise specified herein and shall be delivered in "pickled" condition. All heat treatment and pickling procedures shall be subjected to purchaser's approval.

e) In addition to the particular SA – Material specification requirements, the following special or supplementary requirements shall be applicable to pipes and butt welding fittings, where appropriate for the material product forms and as specified herein. However, if any of the following requirements are already called for in the SA – Material specification, then such requirements need not be repeated, provided the scope of testing of the stricter of the two is followed :-

SL. No	Special Supplementary Requirement	Material Product Form	Remarks
1.	Metal Macro Structure/ Etching test	Pipes and pipes fittings	Vide 3.1.2(d) and 3.1.3(d)
2.	Grain size evaluation	Pipes and pipes fittings	Vide 3.1.2(d) and 3.1.3(d)
3.	Product analysis (Modified)	Pipes and pipes fittings	Vide 3.1.2(d) and 3.1.3(d)
4.	Hardness Test	Pipes fittings	Vide 3.1.3(d)
5.	Cold Bending (close coiling) test	Pipes	Vide 3.1.2(d) and 4.2 (c)
6.	Flattering test	Pipes	Vide 3.1.2 (d)
7.	Controlled bore and wall thickness	Pipes and pipe fittings	Vide 3.1.2(f) and 3.1.3(e)
8.	Hydrostatic test	Pipes and pipe fittings	Vide 3.1.2(d) and 3.1.3(d)

9.	Magnetic particle Examination	Pipes fittings	Vide 3.1.3(d)
10.	Liquid penetrant Examination	Pipes fittings	Only when magnetic particle examination is not feasible. Permitted only with prior approval of purchaser.
11.	Ultrasonic Examination	Pipes and pipe fittings	Vide 3.3.2 and 4.3
12.	No Repair by Welding	All Pipes and pipe fittings	
13.	No bar stock machined products	All pipe fittings	

3.1.2 Pipes

a) All pipes shall be in accordance with SA – 333 Grade 6 (modified). They shall also meet the requirements of ASME Section III – NB for Class I components and this specification

b) Pipes shall be cold drawn, followed by appropriate heat treatment for controlling and achieving the required micro-structure and mechanical properties. The pipes shall be finally bright annealed. All pipes supplied to this specification shall be suitable for cold bending (close coiling) to a minimum mean radius of the lesser of 250 mm or four times the pipe O.D. the manufacturing route and condition of each lot of pipe shall be recorded. Refer appendix – A for standard QAP.

c) Pipes shall be offered in lengths, unless otherwise specified in tendering documents. Pipes shall be supplied with sqaure cut ends. Average length of supplied pipes shall be 11 meter with minimum length of 7 meter.

d) For all pipes, the special / supplementary tests as defined below shall be conducted with satisfactory results.

1) Metal structure/etching test
2) Grain size evaluation (5 or finer Shall be obtained)
3) Product analysis (modified)

} These tests shall be conducted on one sample,. for each test, taken from each pipe size per lot.

4) Flattening test (as per SA – 530) — This test shall be conducted on each pipe at both ends.
5) Cold bending (close coiling) test, (vide 4.2 (c)).
This test shall be conducted on two samples taken from pipes of each size per lot.
6) Hydrostatic test
7) Ultrasonic examination

} the test/examination shall be conducted on each pipe

e) No repair by welding shall be permitted on the pipes.

f) The pipe / header stubs supplied to this specification shall be of special dimensions with controlled bore diameter and wall thickness.

Nominal size	Special ID for feeder pipe/ header stub (mm)	Special thickness forfeeder stubs (mm) on reactor headers
100 NB	87.00 ± 0.50	$13.50^{+1.0/-0.0}$
65 NB	59.00 ± 0.40	$10.0^{+1.0/-0.0}$
50 NB	49.25 ± 0.30	$9.0^{+1.0/-0.0}$
20NB	18.8 ± 0.20	5.0 (min)

3.1.3 Butt welding pipe fittings

a) All butt welding fittings shall be in accordance with SA – 420 Gr.WPL -6 (modified). They shall also meet the requirements of ASME section – III – NB for class – 1 components and this specification. Pipes of same size and wall thickness. This shall be established and certified as described in NB – 3649 and NB – 3612.

b) Butt welding fittings shall be forged or formed to the finished shape and size by hot working. The hot working shall be done in such a way as to cause metal flow in directions most favorable for resisting the stresses encountered in service and as to achieve completely wrought structure. Forging for pipe fittings shall be done in number of stages. Fittings manufactured by hot working and / or cold forming processes shall be appropriately heat treated for controlling and achieving the required micro structure and mechanical properties. Fittings shall be finally annealed or normalized. The manufacturing route and condition of each lot of fittings shall be recorded. Refer Appendix – B for standard QAP.

c) No fittings shall not be manufactured by machining from bar stock.

d) For all fittings. The special/supplementary tests as defined below shall be conducted with satisfactory results.

1)	Metal structure/etching test	These tests shall be conducted on one sample, for each test, taken from each size of fittings per lot.
2)	Grain size evaluation (5 or finer shall be obtained)	
3)	Product analysis	
4)	Hardness test. . Fittings shall have maximum hardness of 197HB	
5)	Hydrostatic test	The test shall be conducted on 2 samples for each size of fittings per lot. Hydro pressure shall be 174 kg/cm$^{2\,(g)}$
6)	Ultrasonic examination	To be carried out on all fittings refer note 4.3.1 (b)
7)	Magnetic particle examination	
8)	Dimension check	See note given below
9)	Thickness gauging by ultrsonic	

Note:

Ultrasonic thickness gauging:

In addition to thickness measurement by conventional methods, ultrasonic thickness gauging shall be carried out (in grid pattern) on pipe fittings from each lot on random basis. For elbows the extent of examination shall be minimum 10% and for other fittings it shall be minimum 2%. If results are found to be unacceptable, thickness gauging shall be extended on 100% of fittings.

e) The fittings shall have circular, uniform and smooth bores. This shall be demonstrated by Means of longitudinal and transverse sectioning on a representative fitting of each size and wall thickness, produced by the same production process / method for the bulk order fittings. The butt weld edge preparations shall be as per applicable drawings. Suitable for 'Y' type consumable inserts.

f) Ovality, concentricity, other tolerances (except ID and wall thickness) shall be as given in ANSI B 16.28 and B16.9 for pipe fittings.

g) No repair by welding shall be permitted on the fittings

h) Ball passage test shall be carried out on all the elbows. The size of the ball shall be worked out by the manufacturer considering the dimensional requirement and after establishing the procedure obtain BHEL approval.

3.2 Surface finish and End Preparation

3.2.1 The surfaces of pipes and pipe fittings shall be smooth and even, and shall be prepared as required for the examination, inspection and tests called for in para – 4.0 – examination, Inspection and testing.

3.2.2 Butt welding ends of pipe fittings shall be prepared in accordance with drawings for Butt Welding Edge Preparation for feeder fittings for 'Y' type consumable inserts.

3.3 Repair of Pipes and Fittings

3.3.1 All the surface of pipes and fittings shall be smooth and all surface, defects revealed by visual or non-destructive examinations shall be removed as required by ASME section – III NB – 2538 excepting that repair by welding shall not be permitted.

3.3.2 Pipes and pipe fittings containing sub surface defects which are greater than 5% of the wall thickness, as revealed by the volumetric examination such as ultrasonic / radiographic examination, are not acceptable and shall be rejected.

3.3.3 Repairs by thermal process shall not be performed and all local repairs shall be by mechanical means only, viz. grinding and machining and shall be smoothly blended into the surrounding surface. Removal of any defects, surface or sub surface, shall not reduce the remaining local defect free wall thickness under the repair areas to less than the specified minimum wall thickness in Para 3.1.2 (f) & 3.1.3 (e). All repaired areas shall be re-examined by magnetic particle and the volumetric examination by which the defect was detected, to ensure complete removal of the defect. Acceptance of repaired geometrics shall be at the discretion of the Purchaser.

3.3.4 However, repair by local grinding / machining shall not be permitted in such portions of any fitting, if it impairs the integrity or reinforcement of such fittings (e.g. high stress/ stress concentration areas).

4.0 Examination,Inspection and Testing

4.1 General

The manufacturer shall be responsible to provide and perform all the in process and final examination, inspection and testing specified herein. The examination, inspection and testing shall be programmed and conducted in a manner satisfactory to the Purchaser and hence the examination, inspection and testing programme and procedures shall be. subjected to the prior approval of the Purchaser.

The Purchaser or his authorized, agency shall have access to the Manufacture's or their sub-contractors premises at all reasonable times and to the extent necessary to assess compliance with the provisions of the said programme and this specification. Examination, inspection and test reports shall be submitted by the Manufacturer to the Purchaser.

4.2 Material inspection and tests

a) All the materials shall be inspected / tested with satisfactory results and accepted in full compliance with the applicable SA – Material specification and in addition with this specification. The material shall be tested in its final finished and heat treated condition at delivery

b) The pipes and pipe fittings shall be impact tested and shall comply with the impact test requirements of the applicable SA – Material Specification

c) Cold Bend Tests for Pipes

Two pipe sample lengths selected from each size per lot shall be cold bend through 135° around a cylindrical or contoured mandrel to produce pipe bends of mean radius equal to lesser of 250 mm or 4 (four) times the pipe O.D. Suitable flexible bore mandrels or approved filler material shall be used to maintain the section circularity of the pipe bends. After bending, the external surfaces of each test bend shall be inspected and shall be found free from cracks, laminations and other defects. Further external surfaces of each test bend shall be examined by liquid penetrant method and shall be free from any indications. Similarly internal surfaces of the bend shall be inspected after sectioning and liquid penetrant examination carried out. After the successful completion of these inspection and examination, the bend specimens shall be forwarded to the Purchaser for his review and reference purposes.

If the test bends reveal any cracks, laminations or other defects on inspection or any unacceptable indications on liquid penetrant examination, the lot of pipes from which these test bends were made shall be rejected.

d) Documents in the form of Certified Material Inspection / Test reports and Mill Certificates that the required tests have been carried out at the sources shall be furnished by the Manufacturer to the Purchaser.

4.3 Non – destructive Examination of Pipes and Fittings

4.3.1 Examination of Pipes and Pipe – Stock

a) Pipes of all sizes shall be examined for both 'Longitudinal and Transverse' discontinuities by Ultrasonic examination by scanning with beam directed successively in two opposite circumferential directions and two opposite longitudinal directions. The examination shall be carried out in accordance with ASME section III NB – 2550.

b) In case of such pipe fittings which cannot be satisfactorily examined by ultrasonic method, their starting pipe stock material shall be ultrasonically examined as in (a) above. This aspect shall be checked, established prior to taking up manufacturing of pipe fittings and needs approval of purchasers. In addition to ultrasonic inspection, 5% (Min.5 Nos.) fittings of lot of each size shall be radiographed to detect any flaws.

4.3.2 Examination of pipe Fittings

a) Each pipe fitting shall be ultrasonically examined completely to cover its entire volume

b) If it is not possible to cover the entire volume in the finished form the starting stock or semi-finished material, shaped nearest to the final form shall be ultrasonically examined completely and subsequently the finished product shall be ultrasonically examined to the maximum extent possible. Further, if the purchaser deems it necessary the Manufacturer shall examine by radiographic method, to Purchaser's satisfaction, such portion of the finished product which cannot be either ultrasonically examined meaningfully or examined to the required ultrasonic acceptance standards.

The bidder shall describe in detail the stages and extent of volumetric examination in his quotation for Purchaser's evaluation

c) Each pipe fitting shall be examined by magnetic particle method. This examination shall cover completely all the external surfaces and accessible internal surfaces. The examination shall be repeated with magnetization applied successively in two mutually perpendicular directions over the surfaces. When magnetic particle examination cannot be meaningfully carried out over an part of a fitting liquid penetrant examination may be carried out in such cases with prior approval of the Purchaser.

d) The Ultrasonic, Radiographic Magnetic Particle and Liquid Penetrant Examinations shall be in accordance with ASME section III – NB – 2550. The ultrasonic examination acceptance standards for the starting stock or semi – finished material shall be same as called for the corresponding finished product thickness.

e) Ultrasonic thickness gauging for elbows to be done as per approved procedure.

4.4 Additional Examination, Inspection and Testing Requirements

4.4.1 All examination, inspection and testing procedures shall be submitted to Purchaser for approval and only after the approval of such procedures work shall commence.

4.4.2 All chemicals and fluids such as cleaning agents, penetrants, developers and water used for hydrostatic testing and paints used for marking shall preferably be free from halogen and sulphur. However, in no case more than 25 ppm of halogen and sulphur shall be permitted. For hydro testing, the potable quality water is acceptable. Examination materials, chemicals, fluids, or any other material used for examination, inspection and tests shall be removed from the product to achieve a clean – dry surface.

4.4.3 Fittings shall be demagnetized immediately after magnetic particle examination.

4.4.4 In addition to the above examination, inspection and tests, the finish of all surfaces of all pipes and fittings shall be inspected visually as required by the basic SA – Material Specification. This shall include the use of boroscope, dental mirrors or any other devices where necessary.

5.0 Documentation and Identification

5.1 Documentation

All manufacturing procedures, Examination/Inspection/Testing programme and procedures, after approval by Purchaser as called for in this Specification, shall form part of documentation. Various Examination, Inspection and Testing data/results obtained their evaluation and disposition etc, shall be properly documented and certified by the Manufacturer. The final documentation, before issue, shall be countersigned by the purchaser or his Authorized Agency. At least 6 (six) sets of such final documentation shall be supplied to the purchaser.

5.2 Identification

a) Pipes shall be marked in accordance with SA – 530 and the applicable SA – Material Specification. Marking shall be done on both the ends of pipes.

b) All fittings shall be marked in accordance with the applicable SA – Material Specification.

c) In addition, all pipes and fittings shall be identified with this specification no. and the lot reference number.

d) Marking shall be by vibro-tool or electro-etching only.

e) To indicate that the materials have undergone non-destructive examinations an additional material identification shall be painted on each piece as described below
   i) Pipes : A continuous longitudinal white strip
   ii) Fittings : A continuous white strip on the major dimensions but not extending over the machined end preparation.

6.0 Preservation and Packing for Shipping

6.1 The Manufacturer shall not ship the materials without obtaining the clearance for shipment by the Purchaser or his Authorized Agency.

6.2 The supplier shall be responsible for preparing, preserving and packing the materials supplied to this specification, to protect them against corrosion and damage of any kind during shipment to the destination and also during storage at site. Protective measures shall be adequate to prevent corrosion in transit and in storage at the destination for a period of about 48 months in a tropical climate.

6.3 All material shall be cleaned and coated with removable preservative to prevent corrosion. Pipes fittings shall be packaged to protect their weld edge preparation. Pipe ends shall be sealed by water proof plastic end caps. All material shall be packed in weather proof wooden boxes in such a way that material will not undergo any damage or rusting during shipment, handling and site storage. The packaging shall be subjected to the inspection and approval of purchaser or his Authorized Representatives.

6.4 All pipes shall be in bundles with each pipe ends closed, machine strapped at 3 places and box packed.

7.0 Technical Information Required to be Submitted with Bids

1) Catalogue, technical literature indicating product range, manufacturing and testing facilities available at bidder works.
2) Confirmation to the effect that the specifications have been clearly understood by the bidder.
3) Confirmation to the extent that the material shall be supplied completely in accordance with technical specification. In case of any deviations from technical specifications, the fact should be clearly brought out giving cross reference to the Para no., section no. of this specification.
4) Complete manufacturing sequence with details of the process at each stage. Indicate clearly the method for manufacturing ID controlled pipe fittings.
5) Raw material proposed to be used for manufacturing of each type item. i.e. material specification, size, thickness of raw material to be used for manufacturing pipes and pipe fittings.
6) Indicate specifically :
   i) Type of vacuum treatment method used.
   ii) Meeting additional chemistry control requirements.
   iii) Forging ratio for making pipe fittings.
   iv) Availability of pickling facility.
7) Vendor shall indicate the activities to be carried out in house and furnish the details of sub vendors for manufacturing / inspection activities.

8.0 Appendix – A: Standard Quality Assurance Plan for Pipes

Sl no	OPERATION	INSPECTION A	B	C	SAMPLE	INSPECTION
1	Heat analysis	√			One sample per heat	Checking of test certificates- Heat no. grade, fine grain melting practice and fully killed. See restrictions of para 3.1.1 (c)
2	Heat treatment	√	√		All pipes must be heat treated	H.T. by normalizing, checking of time temperature chart.
3	Product analysis	√			As per material spec (min. one sample from each size per each lot)	Checking of test certificates see restrictions of para 3.1.1 (c)
4	Tensile test	√		√	On 5% of the pipes from lot (min.two per lot)	Witness the test operation
5	Impact test	√		√	As per material spec.	Witness the test operation
6	Grain size	√		√	One sample from each size per lot	Checking
7	Flattening test	√		√	Test shall be made from both ends of each pipe	Witness the test operation
8	Cold bending test & liquid Penetrant test	√		√	Two samples taken from pipes of each size per lot	Witness the test operation
9	Metal macro structure / etching test	√			One sample from each size per lot	Also check that no seam and no repair by welding
10	Ultrasonic examination	√	√	√	Refer para 4.3.1	Witness the test operation
11	LP examination	√	√	√	On re- worked areas only	Witness the test operation
12	Hydrostatic test	√	√	√	Each pipe shall be tested at 174 kg / cm^2 (g)	Witness for pressure integrity and leak tightness
13	Dimension check	√		√	Each pipe	Check for double random length, controlled bore, ends, wall thickness, straightness
14	Visual inspection		√		10% random checking- surface quality, cleaning	Inside/outside of pipes to ensure absence of mill scale, degreased condition and dryness.
15	Marking, color coding	√			Each pipe shall be marked	Checking as per para 5.2
16	Document / test certificate verification	√			All certificates must be checked	Checking
17	Preservation and packing	√			All pipes must be suitably packed	Checking as per para 6.0
18	Issue of third party inspection certificate and shipping release Note	√		√		

Appendix – B: Standard Quality Assurance Plan for Pipe Fittings

Sl No	OPERATION	NPC'S INSPECTION			SAMPLE	INSPECTION
		A	B	C		
1	Inspection of pipes	√		√	All pipes	Co-relation with mill T.C., heat no. and grade, surface quality, dimensional check
2	Heat analysis	√		√	One sample per heat	Checking of test certificates. See restrictions of para 3.1.1 (c)
3	Ultrasonic test on starting stock / pipe	√	√	√	Only when UTE on final product is not feasible (as per para 4.3.1 (b))	Prior approval required. Witness the test operation
4	Forming	√		√	One sample from each lot of fittings per size and wall thickness	Longitudinal and transverse sectioning
5	Heat treatment	√	√		All pipe fittings must be heat treated	Checking of time temperature chart and temp. monitoring
6	Product analysis	√			As per material spec. (min. one sample from each size per each lot)	Checking of test certificates see restrictions of para 3.1.1(c)
7	Tensile test	√		√	One sample from each size of fitting per each lot (min. as per material spec.)	Witness the test operation
8	Grain size	√		√	One sample per size per lot	Checking of test certificates
9	Impact test	√		√	As per material spec.	Witness the test operation
10	Hardness test	√		√	One sample from each size of fittings per each lot	Witness the test operation
11	Etching test	√			One sample from each size per lot	Checking of seamless.
12	Micro structure test	√			One sample from each size per lot	Checking
13	Radiographic examination	√	√	√	Required on 5% qty (min. 5 nos. fittings of each size), when UTE is carried out on starting pipe stock material	See para 4.3.1 (b). Checking radiographs
14	Ultrasonic test	√	√	√	As per para 4.3.2	Witness the test operation
15	Magnetic particle examination (LPE if permitted)	√	√	√	Each fitting shall be tested	Witness the test operation
16	Dimension test	√		√	Each fitting	
17	Ultrasonic thickness gauging.	√	√	√	Fitting thickness gauging in grid pattern. Para 3.1.3 (d)	Witness the test operation

18	Hydrostatic test at 174 kg/cm^2(g)	√	√	√	On two samples from each size of fittings per each lot	Witness for pressure integrity and leak tightness
19	Ball passing test for elbows	√		√	100% elbows	Witness the test operation for circularity, ovality
20	Visual inspection test		√		10% random checking – surface quality, cleaning	Inside/outside of fittings to ensure absence of mill scale, degreased condition and dryness.
21	Marking and color coding	√			Each fitting shall be marked	Checking
22	Document / test certificate verification	√			All certificates must be checked.	Checking
23	Preservation and packing	√			All fittings must be suitably packed	Checking
24	Issue of third party inspection certificate and Shipping Release Note.	√				

Legends:

A= checking of test report
B= checking of material or equipment
C= witnessing of operation (customer hold point)

Notes:

1) The lot number, heat number, coil number, mill test certificate number and its quantity shall be identified at raw material stage for ladle analysis, check test analysis and for product analysis. Random samples for various testing as required by QAP and code / material specification shall be drawn by QA representative and stamped.

2) Original test certificate of raw materials shall be required for review at the time of first stage inspection.

3) Manufacturer should use starting stock of pipe of sufficiently higher thickness for making pipe fittings to meet thickness reduction during process of bending, forming, scale removal, grinding (for removal of surface defects if found during Visual / MPE / UTE) marking, etc. manufacturer shall satisfy this aspect to the purchaser's representative before taking up the work.

4) The material test laboratory shall be approved by BHEL.

5) The heat treatment furnaces shall be in good condition and shall have temperature recorder and checked for calibration by BHEL QA / third party and the related certificate shall be submitted. The agency for heat treatment shall be approved by BHEL.

6) The loading and unloading of items in the furnace may be witnessed by BHEL QA / third party representative. Heat treatment chart shall be submitted for review

7) All items shall be identified to avoid mixing and proper identification during inspection and examination.

8) Vendor shall carry out 100% dimensional check on all pipe fittings.

9) All items shall be visually examined for any imperfections and defects.

10) All NDE examinations (UTE, MPE, LPE, eddy current testing, radiography, etc.) shall be carried out as per BHEL approved procedures. The selection of appropriate technique(s) / method(s) shall be approved by BHEL. Work shall be taken up after approval of procedures.

11) BHEL QA representative / third party shall witness 100% UT examination, 100% magnetic particle examination and 100% liquid penetrant examination.

12) On removal of surface defects after MPE / LPE (particularly on class – I components) thickness checking shall be carried out by ultrasonic gauging. The UT instrument shall have reference master thickness gauge of required contour and capable of measuring the least count accuracy as required.

13) Suitable GO – NO GO gauges and fixtures may be used for dimensional inspection. Threads shall be examined by plug and ring gauges. These gauges shall have proper certification for accuracy.

14) Material traceability report (indicating material, size, item description, lot no., heat no., NDE report nos., check test certificate, vendor's final certificate no.,etc.) shall be submitted.

15) Color coding, bin card and proper tagging along with entry in proper registers shall be maintained to identify the location of material at any point during manufacturing and to avoid mixing of materials.

16) All items shall be stamped by vendor's name / monogram apart from item description, size, serial no., class, material code, rating, grade, etc. and meeting BHEL specification. The fittings confirming to NPCIL specification shall be color coded as mentioned in specification.

17) The history docket containing all test certificates, inspection reports, approved procedures, QAPs along with shipping release shall be submitted in properly bound document, duly signed by BHEL QA / third party inspection agency, along with soft copy on CD.

18) In case, manufacturer intends to use "on line" UTE or eddy current examination or hydro test facility, the required system details shall be submitted for approval for on line witnessing and extent of witnessing.

19) Calibrated instruments shall be used for inspection, examination and testing.

20) Non destructive examinations shall be carried out by personnel qualified to level – 1 of ASNT / ISNT and evaluated by ASNT / ISNT level – II.

21) The portion at the end of pipe which is not examined by ultrasonic examination is to be discarded.

22) The visual examination and dimensional check shall cover outer diameter, wall thickness, workmanship, root face, end beveling, end squareness, outer and inner surface finish, out of roundness, straightness, dents on inside / outside surfaces, length, weight, marking, color coding, stamping, stenciling, processing / rolling marks on internal surface.

23) After repair by grinding on parent material up to minimum wall thickness, the repaired area should be blended smoothly to the surrounding surface.

24) Check and ensure consistency and repeatability of detection in ultrasonic examination.

25) The drawing for all non-standard pipe fittings (like branched outlet fittings, lateral tees, etc for which the dimensions are not given in ANSI standards) shall be submitted for BHEL approval.

26) QA representative shall stamp the inspected items.

27) Vendor shall submit guarantee certificate.

List of Consortium Bank			
	Nationalised Bank		**Nationalised Bank**
1	Allahabad bank	19	Vijaya Bank
2	Andhra bank		**Public Sector Banks**
3	Bank of Baroda	20	IDBI
4	Canara Bank		**Foreign bank**
5	Corporation bank	21	CITI Bank N.A
6	Central bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hongkong and Shanghai Banking Corporation Limited
8	Indian Oversea Bank	24	Standard Chartered Bank
9	Oriental bank of Commerce	25	The Royal Bank of Scotland N.V.
10	Punjab National Bank	26	J P Morgan
11	Punjab & Sindh Bank		**Private bank**
12	State Bank of India	27	Axis Bank
13	State Bank of Hyderabad	28	The Federal Bank Limited
14	Syndicate Bank	29	HDFC
15	State Bank of Travancore	30	Kotak Mahindra Bank
16	UCO Bank	31	ICICI
17	Union Bank of India	32	Indusind Bank
18	United Bank of India	33	Yes Bank

(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT AND THE EXPIRY DATE OF BG MUST BE AFTER 60 DAYS FROM THE DATE OF COMPLETION OF WARRANTY PERIOD)

PERFORMANCE BANK GUARANTEE

In accordance of M/s. Bharat Heavy Electricals Limited (A Government of India undertaking, a company incorporated under the Companies Act 1956 having its Registered Office at "BHEL House", SIRI Fort, New Delhi 110 049) through its High Pressure Boiler Plant Division located at Tiruverumbur, Tiruchirapalli- 620 014 (hereinafter called 'the Company') having entered into a contract with …….hereinafter called ' the said contractor ' which term includes 'suppliers' for the purpose of this Bond and under the terms and conditions of the contract No……. Dt ……. Between BHEL, Trichy and as per the contract, the contractor / supplier is to furnish a performance Bank guarantee for Rs. ……. for the due performance of the equipment to be supplied under the above referred contract and for the fulfillment of all the terms and conditions of the contract, We …….(indicate the name of the bank) (herein after referred to as the bank) at the request of …….. (Contractor(s)) do here by undertake to pay the company an amount not exceeding Rs…….against any loss or damage caused to or suffered or would be caused to or suffered by the company by reason of any breach by the said contractor (s) of any of the terms and conditions contained in the said agreement.

2. We …….(indicate the name of the bank with full address), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s) of any of the terms and conditions contained in the said Agreement or by the reason of the contractor(s) 'failure to perform' the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs._____.

3. We undertake to pay unconditionally to the Company any money so demanded notwithstanding any dispute(s) raised by the Contractor in any suit, or proceedings pending before any Court or Tribunal or Arbitration or before any other authority relating thereto our liability under this present being absolute and unequivocal. The payment under this guarantee would not wait till the disputes have been decided by any Court or Tribunal or in the arbitration proceedings or by any other authority. The payment so made by us under this Bond shall be a valid discharge of liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We…….(indicate the name of Bank), further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till_____Office / Department/ Division of the Company certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. (I) Unless a demand or claim under this guarantee is made on us in writing on or before the _____we shall be discharged from all the liability under this guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank before the expiry of the said date, the claim shall be enforceable notwithstanding the fact that the said enforcement is effected after the said date.

(ii) For the purpose of this clause, any letter making demand on the Bank by M/s. BHEL dispatched by Registered Post with Ack.Due or by Telegram or by any Electronic media addressed to the above mentioned address of the Bank shall be deemed to be the claim / demand in writing referred to above irrespective of the fact as to whether and when the said letter reaches the Bank, as also any letter containing the said demand or claim is lodged with the bank personally.

6. We ……..(indicate the name of Bank), further agree with the company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said Contractor(s) or for any forbearence, act or omission on the part of the company or any indulgence by the company to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating would, but for this provision, have effect of not so relieving us.

7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

8. It shall not be necessary for the company to proceed against the contractor before proceeding against the guarantor-bank and the guarantee herein contained shall be enforceable against them notwithstanding any security, which the company may have obtained or obtain from the Contractor shall, at the time when proceedings are taken against the guarantor hereunder be outstanding or unrealised.

9. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Tiruchirapalli.

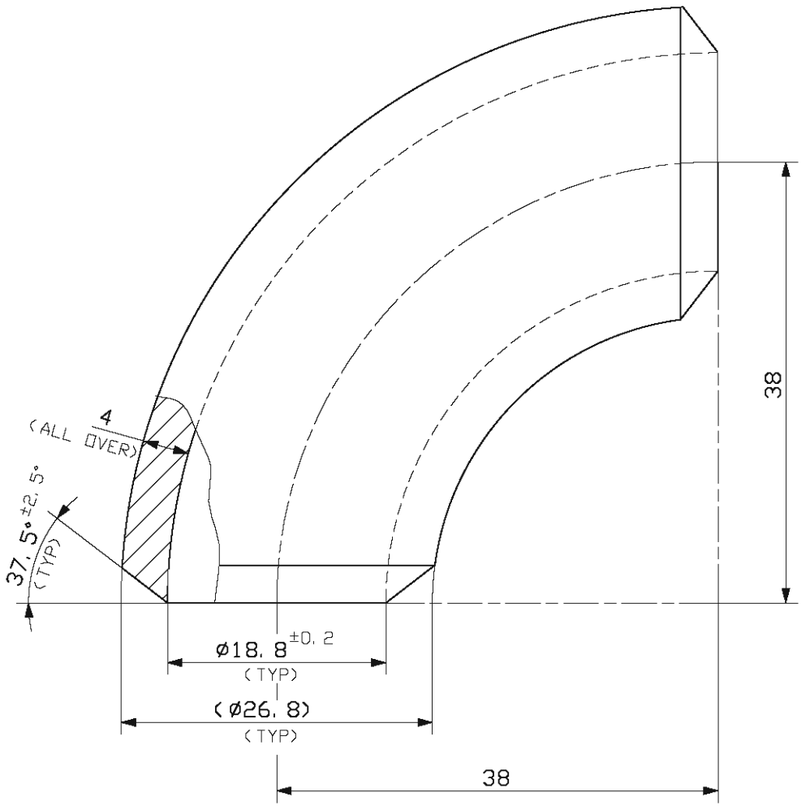
10. The guarantor hereby declare that it has power to execute this guarantee and the executant has full powers to do so on its behalf under the proper authorities granted to him/them by the guarantor.

11. We ……(indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.

In witness whereof we…….., (indicate the name of Bank) have hereunto setout Bank Seal the_____day _____month 200
BANK E-MAIL ID:
BANK PHONE NO.
BANK FAX NO:

DRAWING NO: 3-93-420-05248

ALL DIMENSIONS ARE IN MILLIMETERS



NOTES:-

1. MATERIAL SPECIFICATION FOR THE FORGING IS SA420GrWPL-6(mod.)
2. MATERIAL, CHEMICAL COMPOSITION, MANUFACTURING, EXAMINATION, TESTING AND PACKING SHALL BE AS PER APPROVED SPECIFICATION.
3. COMPONENT SHALL BE SUPPLIED IN FINISHED CONDITION.
4. OVALITY, CONCENTRICITY AND TOLERANCES OTHER THAN MENTIONED IN THE DRAWING SHALL BE AS PER ASME B16.9.
5. SURFACE FINISH SHALL BE 6.3 MICRONS ALL OVER.
6. BUTT WELDING EDGE PREPARATION SHALL BE AS SHOWN IN THE DRAWING.
7. COMPONENT SHALL BE PROPERLY PROTECTED DURING TRANSPORTATION.
8. APPROXIMATE FINISHED WEIGHT : 0.200 KG

TOLERANCE IF NOT SPECIFIED SHALL BE AS BELOW (REFER IS 2102-m)

LINEAR				ANGULAR	
0.5 TO 3	±0.1	400 TO 1000	±0.8	0 TO 10	± 1°
3 TO 6	±0.1	1000 TO 2000	±1.2	10 TO 50	±30′
6 TO 30	±0.2	2000 TO 4000	±2.0	50 TO 120	±20′
30 TO 120	±0.3	—	-	120 TO 400	±10′
120 TO 400	±0.5	—	-	OVER 400	± 5′

REV	DATE	ALTERED : / CHD&APPD :	REV	DATE	ALTERED : / CHD&APPD :

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 700MWe

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
05-229/D

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	N.K		280111	
CHD	SOUGAT		280111	
APPD	V.R		280111	

DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG/CUSTOMER DWG.	ITEM NO	No OF ITEMS
NC	C/M/F	2:1		KAPP-3&4/33117/2006/DD		
CODE 150						

TITLE: 20NB 90° LR ELBOW

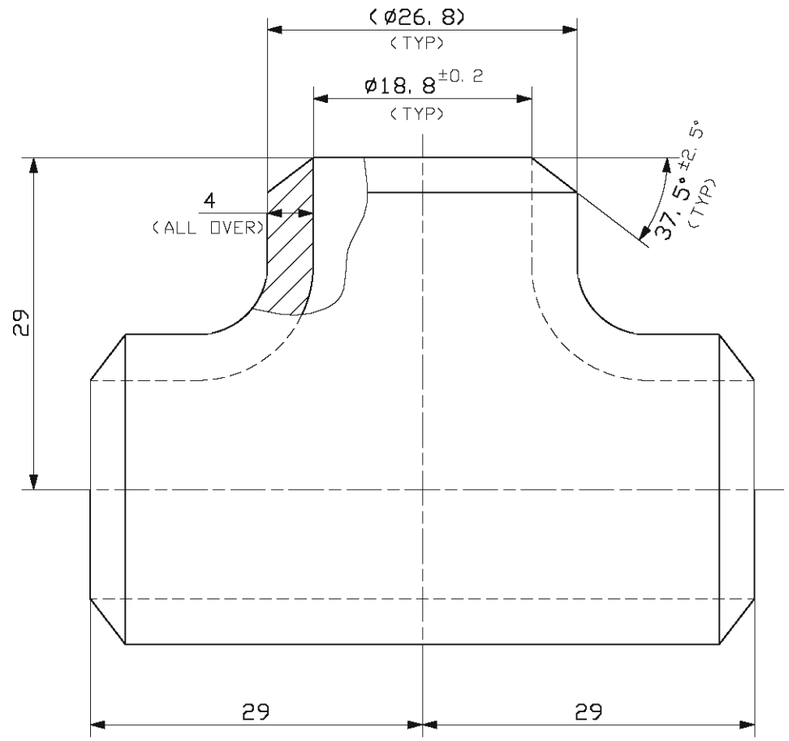
CARD CODE: U 01

DRAWING NO : 3-93-420-05248 REV 00

Size A3

DRAWING NO: 3-93-420-05249

ALL DIMENSIONS ARE IN MILLIMETERS



NOTES:-

1. MATERIAL SPECIFICATION FOR THE FORGING IS SA420GrWPL-6(mod.)
2. MATERIAL, CHEMICAL COMPOSITION, MANUFACTURING, EXAMINATION, TESTING AND PACKING SHALL BE AS PER APPROVED SPECIFICATION.
3. COMPONENT SHALL BE SUPPLIED IN FINISHED CONDITION.
4. OVALITY, CONCENTRICITY AND TOLERANCES OTHER THAN MENTIONED IN THE DRAWING SHALL BE AS PER ASME B16.9.
5. SURFACE FINISH SHALL BE 6.3 MICRONS ALL OVER.
6. BUTT WELDING EDGE PREPARATION SHALL BE AS SHOWN IN THE DRAWING.
7. COMPONENT SHALL BE PROPERLY PROTECTED DURING TRANSPORTATION.
8. APPROXIMATE FINISHED WEIGHT : 0.350 KG

TOLERANCE IF NOT SPECIFIED SHALL BE AS BELOW (REFER IS 2102-m)

LINEAR				ANGULAR	
0.5 TO 3	±0.1	400 TO 1000	±0.8	0 TO 10	± 1°
3 TO 6	±0.1	1000 TO 2000	±1.2	10 TO 50	±30′
6 TO 30	±0.2	2000 TO 4000	±2.0	50 TO 120	±20′
30 TO 120	±0.3	—	-	120 TO 400	±10′
120 TO 400	±0.5	—	-	OVER 400	± 5′

REV	DATE	ALTERED : / CHD&APPD :	REV	DATE	ALTERED : / CHD&APPD :

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 700MWe

05-229/D

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	N.K		280111	
CHD	SOUGAT		280111	
APPD	V.R		280111	

DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG/CUSTOMER DWG.	ITEM NO	No OF ITEMS
NC	C/M/F	2:1		KAPP-3&4/33117/2006/DD		
CODE 150						

TITLE: 20NB EQUAL TEE

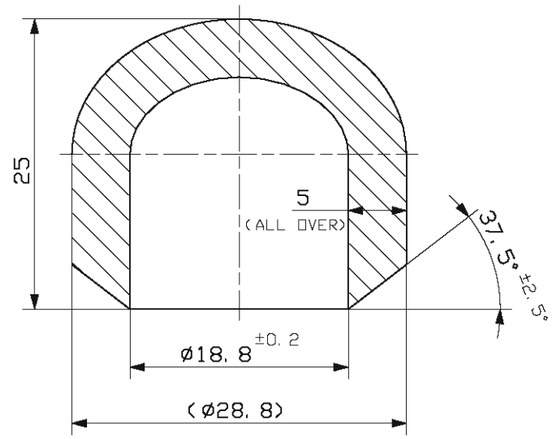
CARD CODE: U 01

DRAWING NO : 3-93-420-0524900 REV

Size A3

DRAWING NO: 3-93-420-05250

ALL DIMENSIONS ARE IN MILLIMETERS



NOTES:-

1. MATERIAL SPECIFICATION FOR THE FORGING IS SA420GrWPL-6(mod.)
2. MATERIAL, CHEMICAL COMPOSITION, MANUFACTURING, EXAMINATION, TESTING AND PACKING SHALL BE AS PER APPROVED SPECIFICATION.
3. COMPONENT SHALL BE SUPPLIED IN FINISHED CONDITION.
4. OVALITY, CONCENTRICITY AND TOLERANCES OTHER THAN MENTIONED IN THE DRAWING SHALL BE AS PER ASME B16.9.
5. SURFACE FINISH SHALL BE 6.3 MICRONS ALL OVER.
6. BUTT WELDING EDGE PREPARATION SHALL BE AS SHOWN IN THE DRAWING.
7. COMPONENT SHALL BE PROPERLY PROTECTED DURING TRANSPORTATION.
8. APPROXIMATE FINISHED WEIGHT : 0.120 KG

TOLERANCE IF NOT SPECIFIED SHALL BE AS BELOW (REFER IS 2102-m)

LINEAR				ANGULAR	
0.5 TO 3	±0.1	400 TO 1000	±0.8	0 TO 10	± 1°
3 TO 6	±0.1	1000 TO 2000	±1.2	10 TO 50	±30′
6 TO 30	±0.2	2000 TO 4000	±2.0	50 TO 120	±20′
30 TO 120	±0.3	—	-	120 TO 400	±10′
120 TO 400	±0.5	—	-	OVER 400	± 5′

REV	DATE	ALTERED : / CHD&APPD :	REV	DATE	ALTERED : / CHD&APPD :

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 700MWe

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
05-229/D

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	N.K		280111	
CHD	SOUGAT		280111	
APPD	V.R		280111	

DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG/CUSTOMER DWG.	ITEM NO	No OF ITEMS
NC	C/M/F	2:1		KAPP-3&4/33117/2006/DD		
CODE 150						

TITLE: 20NB END CAP

CARD CODE: U 01

DRAWING NO : 3-93-420-05250

REV: 00

Size A3