



# General Note: BHARAT HEAVY ELECTRICALS LIMITED

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

PHONE : 2577042  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail :  
Web :

429-002/A

	<b>Collective No.</b>  1201400033	<b>Enquiry Date</b>  07.11.2014	<b>Due Date For Quotation</b>  19.01.2015
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 Quantity	Schedule Date
10	<p>Material : Alloy 617 Shape: Pipe Specification : Refer TDC 0:437 Rev 01 dated 10.12.2014 or 0:125 Rev 01 dated 10.12.2014 as per manufacturing route Dimensional requirements: The pipe shall conform to the dimensions as given below. The supplier has to send his quote for any of the options as given below. The same supplier may send quotes for more than one option as given below. Please note the sizes and tolerance are based on the manufacturing route.</p> <p>OPTION 1 Pipe manufacturing route: Forged and machined Applicable TDC: 0:437 Rev 01 dated 10.12.2014 Diameter, mm: 457 Tolerance on diameter: 1% (Max 4 mm)of Nominal OD Nominal thickness, mm: 105 Tolerance on thickness: +3 mm / -0 mm Length, mm (min.): 1500</p> <p>OPTION 2 Pipe manufacturing route: seamless (extruded / Hot rolled pipes) Applicable TDC: 0:125 Rev 01 dated 10.12.2014 Diameter, mm: 457 Tolerance on diameter: 1% (Max 4 mm)of Nominal OD Nominal thickness, mm: 120 Tolerance on thickness: + or - 12.5% Length, mm (min.): 1500</p> <p>OPTION 3 Pipe manufacturing route: seamless (extruded / Hot rolled pipes) Applicable TDC: 0:125 Rev 01 dated 10.12.2014 Diameter, mm: 457 Tolerance on diameter: 1% (Max 4 mm)of Nominal OD Nominal thickness, mm: 105 Tolerance on thickness: + 12.5% / -0% Length, mm (min.): 1500</p>	M	1.500	1.50	02.02.15

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

**M. DEEBAN KUMAR**  
Engineer

MANAGER / PURCHASE  
(FOSSIL BOILERS)

MM / RM / Purchase / Pipes  
BHEL, TRICHY - 620 014.



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1201400033 / 07.11.2014

23505

Alloy 617 Pipe for AUSC Header

**General Note:**

1.) SUPPLY SHALL BE AS PER SPECIFICATION MENTIONED AGAINST ITEM & TDC 0.437 REV 01 / 0.125 REV 01 WITH RESPECT TO MANUFACTURING ROUTE MENTIONED IN ANNEXURE B, FOR IBR APPLICATION

2.) ALL ENQUIRY TERMS AND CONDITONS ARE MENTIONED IN ANNEXURE-A AND ANNEXURE- B. SUPPLIERS SHOULD ATTACH THE DULY FILLED AND SIGNED ANNEXURE- A & B ALONG WITH THEIR OFFER.

**enclosures:**

"LD clause has to be confirmed without fail."

**PR Links**

Material.	PR.No	PR.Item.	Quantity	Acc. Assign	Customer Number
	108063643	00010	1.500	/000000	

**list of suppliers**

RFQ-5900000064

Open Tender Dummy Code

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**M. DEEBAN KUMAR**  
Engineer  
MM / RM / Purchase / Pipes  
BHEL, TRICHY - 620 014  
MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,

# BHARAT HEAVY ELECTRICALS LIMITED

MM/RM/PURCHASE/PIPES  
BHEL / TRICHY-620 014.

## ANNEXURE-A

### Enquiry Terms & Conditions For Supply Of Seamless Pipes

**Note:** This Annexure has to be mandatorily filled & signed by the manufacturer (or) mill and submitted along with Technical bid.

SI No	BHEL Requirements	Supplier Comments (Acceptance or otherwise for each point to be given )
01.	<b><u>Material specification:</u></b> Supply shall be made strictly as per Specifications mentioned in the enquiry.	
02.	<b><u>Specification, Size &amp; Quantity:</u></b> a) Specification, size and quantity shall be as given in enquiry. b) All pipes are to be supplied fully meeting the <b>TDC: 0.437 rev01 / 0.125 rev 01</b> with respect to the manufacturing route mentioned in annexure- B. Point by point confirmations to be indicated in the offer without fail. If there is any deviation, the same should be mentioned clearly in the offer itself. c) All pipes are to be stenciled and colour coded, longitudinally and continuously throughout the length of the pipe with specific details as listed out in the above respective TDCs and the SIPPP 21 Rev 04. d) All pipes are to be supplied to the specific length detailed in the description. Any deviation in length has to be indicated in the offer itself. Supplier shall indicate the place of manufacture & mill name in the offer.	
03	<b><u>Offer Submission:</u></b> ➤ Tenders will be finalized on " <b>TWO</b> part basis". ➤ The offer is to be submitted within 2.00 P.M on or before the due date. Late offers will not be considered.	
04.	<b><u>Terms of Delivery :</u></b> <b>A. <u>Indigenous:</u></b> a) Bidders should submit their offer for EXW / Dispatching station or FOR Destination BHEL Stores, Trichy. The quote should be inclusive of all charges, including testing packing, inspection etc. For FOR destination quote, freight breakup is to be given. b) Any other extra charges like ED, CST/VAT etc. are to be indicated clearly. The offer will be evaluated on total landed cost to BHEL Trichy. c) MODVAT CREDIT: If any excise Duty is payable, the chapter head / sub-head reference and the rate of the duty should be quoted. If the tenderer is availing MODVAT credit for this input material, the effect of preformed credit should be passed on to the purchaser. Tenderer under MODVAT shall be preferred. <b>B. <u>Imports:</u></b> a) Suppliers to quote their rates on <b>FOB/Load Port basis only</b> for the below ports clearly mentioning their preferred type of Loading (Containerised Cargo or Break Bulk cargo). The quote should be all inclusive of all charges, including testing packing, inspection etc. Offers with CFR rates will not be considered for evaluation. b) The available load ports for FCL (Full Container Load) Cargo in Freight Contract are Antwerp, Hamburg, Genoa, Rotterdam, Bilbao, Gothenberg, Felixstowe, St.Petersberg, Busan, Dalian, Shanghai, Kobe, Osaka, Yokohama c) The available load ports for LCL (Less than Container Load) Cargo in Freight Contract are Antwerp, Hamburg, Genoa, Rotterdam, Bilbao, Gothenberg, Felixstowe, Thamesport, Tilbury, Le Harve, St.Petersberg, Busan, Masan, Dalian, Shanghai, Tianjin, Kobe, Osaka, Yokohama, Singapore, Durban d) The available load ports for BB (Break Bulk) Cargo in Freight Contract are Antwerp, Hamburg, Genoa e) In case if the suppliers are unable to execute through the above ports with the available types of	

	cargo loading (Reasons for the same to be mentioned), FOB rate along with ocean freight (LILO basis) applicable upto chennai to be quoted	
05.	<p><b><u>Payment terms:</u></b></p> <p><b>A. <u>Indigenous:</u></b></p> <p>i) BHEL Payment term is 100% direct EFT payment after 45 days from the date of receipt and acceptance of materials.</p> <p>ii) The duplicate copy of the invoice meant for the transporters should accompany the material as stipulated under C.E. rules 52a and 173c (or) 57gg. A Photostat copy of the above invoice for each Delivery Chelan should be submitted along with the original bills routed through bank or submitted directly to BHEL finance department.</p> <p>iii) Any deviation in the above payment term will attract loading as mentioned below. “Base rate of SBI (as applicable on the date of bid opening. Techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidders.</p> <p>iv) Payment through bank is not preferred. In case of payment through bank is opted by supplier, BHEL prefers documents submission through bank with copy of LR and door delivery of goods to site/stores with consignee copy attached. In this case loading will be 3% on the offered value.</p> <p>v) Offers of indigenous Suppliers with payment terms as LC / Advance Payment are liable for rejection.</p> <p><b>B. <u>Imports:</u></b></p> <p>i) BHEL Payment term is 100% payment on CAD basis after 45 days from the date of receipt of documents, specified in PO, at BHEL bank. Respective bank charges to respective account.</p> <p>ii) Any deviation in the above payment term will attract loading as mentioned below. “Base rate of SBI (as applicable on the date of bid opening. Techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidders.</p> <p>iii) If the LC payment is insisted, <b>TWO</b> sets of original TCs to be submitted prior to dispatch and a certificate to that effect from BHEL should form a part of the documents to be negotiated. If this condition is not complied by the vendor, the offer is liable for rejection.</p> <ul style="list-style-type: none"> <li>➤ In the case of Usance LCs the loading will be considered @ 1.5% on the offered Value.</li> <li>➤ For LC at sight the loading will be considered @ 3.5% on the offered Value.</li> <li>➤ Normally CAD at sight and Confirmed LCs are liable for rejection.</li> </ul>	
06.	<p><b><u>Delivery:</u></b> The offer shall clearly indicate delivery period in fixed number of weeks/Months from the date of Purchase Order.</p>	
07.	<p><b><u>Liquidated Damage (Indigenous &amp; Imports):</u></b></p> <ol style="list-style-type: none"> <li>1. Liquidated damages shall be 0.5% of the total order value per week or part thereof subject to a maximum of 10% of the total order value.</li> <li>2. For staggered delivery schedule, LD shall be 0.5% of the undelivered portion per week of the delay or part thereof subject to a maximum of 10% of the total order value. <b>(Not applicable, since this enquiry is not called for staggered delivery schedule.)</b></li> <li>3. Any deviation from the above LD clause, loading will be applied to the extent to which it is not agreed by the bidder (at offered value).</li> <li>4. a) IMPORT: For CFR / CIF terms, LD will be calculated from the B/L date. For FOB terms, LD will be calculated from final inspection agency’s signed date in the TC. b) INDIGENOUS: For “FOR Delivery terms”, Lorry way bill date and for “Ex-work delivery terms” final inspection certificate date / intimation of readiness whichever is later will be taken for LD calculation.</li> </ol>	
08.	<p><b><u>Risk Purchase clause :</u></b> BHEL at its 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 thereof. The supplier shall be liable for any loss which BHEL may sustain by reason of such risk purchases in addition to LD at the maximum rate mentioned in the LD clause above. Confirm your acceptance.</p>	
09.	<p><b><u>Performance Bank Guarantee :</u></b> The Bidder, in the event of an order, should furnish a bank Guarantee from BHEL’s consortium banks (List attached) or counter – guaranty by vendor’s bank to BHEL’s consortium banks, at no extra cost to BHEL, in a proforma prescribed by BHEL, provided along with the order, for an amount equivalent to 10% of the contract value. The BG shall be valid for period of 18 months from the date of last shipment or 12 months from the date of receipt / acceptance at BHEL, Trichy whichever is later, with a claim period of two months.</p>	

<p><b>10. <u>Validity:</u></b> Offer/Price validity of <b>90 days is required</b> after the price bid opening in case you are technically and commercially qualified.</p>	
<p><b>11. <u>Agency Commission :</u></b></p> <ul style="list-style-type: none"> <li>➤ In respect of offers from overseas suppliers, agency commission, if any, payable to their agents in India, shall invariable be shown separately in the Performa invoice and this will be paid by us in India, in Indian rupees, on satisfactory completion of the contract.</li> <li>➤ It overseas principal has any till-up with any third party in respect of agency commission it should be declared while submitting offers.</li> <li>➤ Copies of current agency agreement / authorization letter in respect of agency commission shall be furnished along with offer, if not made available earlier.</li> <li>➤ For calculation of rupee equivalent agency commission, exchange rate as prevailing on the date of order will be taken.</li> </ul>	
<p><b>12. <u>General condition:</u></b></p> <ul style="list-style-type: none"> <li>a) In addition to TCs in relevant IBR forms corresponding mill TCs should also be provided along with dispatch of pipes. Two sets of original and one copy of all such TCs are to be provided to BHEL,Trichy.</li> <li>b) Material is to be inspected by third party inspection agency as approved by IBR and test certificate are to be countersigned by respective Inspection agency in case the Mill is not approved by IBR.</li> <li>c) For Alloy &amp; Carbon Steel: Transparent Rust preventive coating and packing should be such that the coating withstands atleast one year of storage at open yard on receipt of material.</li> <li>d) We require the shipment of the pipes to be as per the dates mentioned against the individual items in the enquiry.</li> <li>e) Confirmation for partial ordering to be indicated in the offer itself.</li> <li>f) No revision of prices will be entertained after the tenders are opened.</li> <li>g) For the evaluation purposes, exchange rate (TT selling rate of SBI) as on schedule date of tender opening (Part I, i.e technical bid, in case of two part bid) shall be considered.</li> <li>h) BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed.</li> <li>i) 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.</li> <li>j) 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.</li> <li>k) In the event of our customer order covering this tender being cancelled / placed on hold / otherwise modified, BHEL would be constrained to accordingly cancel / hold / modify the tender / your purchase order at any stage of execution.</li> <li>l) The offers of the bidders who are on the banned list as also the offer of bidders who engage the services of the banned firms, shall be rejected. The list of banned firms is available on the BHEL website -www.bhel.com.</li> <li>m) If the supplier has not supplied any manufactured seamless pipes to BHEL till time, the Pre dispatch inspection has to be carried out if the vendor became L1.</li> <li>n) The Import supplier which is going to supply first time to BHEL (not supplied any materials earlier), the Payment will be made after 45 days of receipt &amp; acceptance of materials at BHEL store.</li> </ul>	
<p><b>14. <u>Enclosures:</u></b></p> <ul style="list-style-type: none"> <li>a) Enquiry</li> <li>b) TDC/TDG</li> <li>c) PBG Format &amp; List of consortium banks</li> <li>d) Integrity Pact</li> </ul>	
<p>(On behalf of BHEL)</p>	<p style="text-align: center;"><b><u>SIGNED BY MANUFACTURER / MILL</u></b></p> <p>Name of Mill: Designation / Department: Seal &amp; Signature</p>

## ENQ TERM AND CONDITION – ANNEXURE- B

### General Note:

Q1) Please submit your offer in TWO part bid (technical cum commercial id in one cover and price bid in another cover) in single cover. The Covers should be duly super scribed with the ENQUIRY NO and DUE DATE in BOLD letter without fail.

2) All Pipes are to be supplied fully meeting the material specification & Technical Delivery condition TDC: 0:437/Rev01 (for forged pipes) or TDC 0:125 Rev01 (for seamless pipes) with respect to manufacturing route as mentioned. Point-by-Point confirmations is required for TDC. If there is any deviation, the same should be mentioned clearly in the offer itself.

3) Material specification, Pipe OD, wall thickness should be strictly as per enquiry.

4) Offered length shall be as per enquiry. Multiple length with 10 mm cutting allowance is acceptable. No payment will be made for cutting allowance portion.

5) 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 1 - 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.

6) The OFFER, sealed and Super scribed as "Parts 1 & 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 (1ST). OFFERS RECEIVED AFTER 14:00 Hrs (1ST) WILL NOT BE CONSIDERED FOR EVALUATION.

7) OFFER is to be addressed to:

Sr. MANAGER / PURCHASE - Pipes / MM / MFG

4th Floor - Building 24

BHARAT HEAVY ELECTRICALS LIMITED

HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620 014

TAMIL NADU, INDIA.

8) Tenders should be free from CORRECTION AND ERASURES, Corrections if any, must be attested.

(A) If, in the price structure quoted for the required goods, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.

B) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.

C) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (A) and (B) above.

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.

9) **Fixed price:** All items should be quoted on "Per unit basis". 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 or 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.

10) **Bid currency:** Indian bidders should submit the prices only in Indian Rupees. Foreign bidders

## ENQ TERM AND CONDITION – ANNEXURE- B

may submit their bid in their preferred currency. For the evaluation purposes the exchange rate (TT - Selling Rate of SBI) on technical bid opening date will be considered.

- 11) The offer is to be signed and sealed in original by the bidder without fail.
- 12) 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:

The letter from their Principal authorizing 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, exchange rate as prevailing on the date of order will be taken.
- g. Copy of current agency agreement is to be enclosed. Offers with non-compliance to any of the above will be liable for rejection.

13) OFFER FROM TRADERS, **RE-ROLLERS (only cd of pipes), FABRICATORS, MACHINE SHOPS (only have lathe and machining facility)** AND STOCKISTS ARE NOT ACCEPTABLE AND WILL NOT BE CONSIDERED FOR EVALUATION.

14) BIDDERS WHO ARE NOT REGISTERED VENDOR OF BHEL TRICHY HAVE TO SUBMIT THE FILLED IN SUPPLIER REGISTRATION FORMS (SRF) AVAILABLE IN THE BHEL WEBSITE - [www.bhel.com](http://www.bhel.com) AND THE OTHER REQUIRED DOCUMENTS CALLED FOR IN THE SRF (INCLUDING D&B REPORTS FOR IMPORT VENDORS, THE FACILITIES AVAILABLE AT THE MILL - STARTING MATERIAL TO FINISHED PRODUCT, MANUFACTURING QUALITY PLAN, INSPECTION & TEST PLAN TO MEET THE TDC REQUIREMENTS) ALONG WITH THE TECHNICAL BID WITHOUT FAIL.

OFFERS SUBMITTED WITHOUT THIS WILL BE REJECTED.

15) IN ADDITION, VENDORS WHO ARE NOT IN THE BHEL VENDOR LIST AS PERMANENT VENDORS FOR THIS MATERIAL CATEGORY SHOULD SUBMIT AN EXPERIENCE CERTIFICATE DETAILING THE QUANTITY SUPPLIED SPEC WISE YEAR WISE ALONG WITH THE UNPRICED PO COPIES AND PROOF OF SUPPLY (SUCH AS INVOICE & BILL OF LADING COPIES) ALONG WITH THE OFFER FOR ALL THE TENDERED SPECIFICATIONS FOR OFFER ACCEPTANCE. THE MANUFACTURER SHALL HAVE MANUFACTURED ATLEAST A MIN QTY OF 25MT OF INCONEL MATERIAL/ TENDERED SPEC.

- 16) If supplier is not a steel maker then source of raw material for the manufacturing of pipes shall be submitted.
- 17) The manufacturer shall submit filled in forging supplier facility report or pipes facility report respectively. OFFERS SUBMITTED WITHOUT THIS WILL BE REJECTED.
- 18) In house test facilities for mechanical, chemical & non - destructive testing are mandatory requirements.
- 19) BHEL/End customer reserve the right to inspect the item ordered at any stage at vendor's works.
- 20) Acceptance of TC before dispatch is must.
- 21) The additional requirements for the above product over those given in the TDCs as mentioned below.
- Dimensional requirements:  
The pipe shall conform to the dimensions as given in the following table. Supplier to mention the route of manufacture for each offered item in their offer.
- a) For pipes manufactured to TDC 0:437 the tolerance shall be – OD:±1%, WT: +3mm, -0mm, length: 1500mm (min)
- b) For pipes manufactured to TDC 0:125 the tolerance shall be – OD:±1%, WT: ±12.5%, length: 1500mm (min)

- 22) Date of price bid opening will be informed later after acceptance of offer on technical ground.
- 23) Bidders are to confirm all the above points in their "Technical and unpriced commercial bid". Incomplete offers will not be considered.

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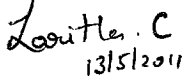
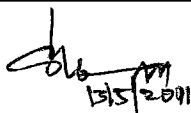
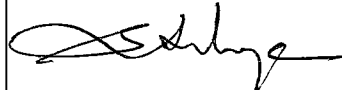
**BHARAT HEAVY ELECTRICALS LIMITED  
TIRUCHIRAPALLI 620 014**

**QUALITY ASSURANCE**

SIP:PP:21/ 04

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**COLOUR CODES FOR TUBES AND PIPES  
(FOR BOILERS, PRESSURE VESSELS & HEAT EXCHANGERS)**

REV	DATE	PREPARED	REVIEWED	APPROVED
01	05/02/99	R. Sasikumar	A.R.Reddy	K. Rengachari
02	22/07/04	K. Ganesan	U. Revisankaran	C.R.Raju
03	20/01/09	V.Kalyanaraman	S.Selvarajan	U.Revisankaran
04	13/05/2011	 C.Haritha 13/5/2011	 V.Kalyanaraman 13/5/2011	 S.Selvarajan 13.05.11

**RECORD OF REVISIONS**

Rev. No.	Clause No.	Details of Revision	Remarks
01	--	New Specifications included based on TDC revision.	
02	--	Amendment A1 dt. 26.04.01 issued for Rev. 01 incorporated. Colour code for SA 213 Gr. T23 added.	
03	--	1)Colour code for SA 213 Gr. T92, P23,P92,SA178 Gr. D added. 2)Colour code for SA 210 Gr. C modified to BLUE only. (From BLUE & GREEN)	
04	--	Colour code for SUPER304 (Code Case : 2328) added	

Following Colour codes are to be applied as **longitudinal bands** (if not specified in other documents) on tubes & pipes to identify them to specification during receipt, storage, issue and processing. For heat exchanger tubes circumferential colour code can be provided at both ends of tubes (300 mm away from end).

Specification	Colour 1	Colour 2	Colour 3
12 X 1 MØ	RED	YELLOW	
13 Cr Mo 44	ALUMINIUM	BLACK	
A 200 Gr. T5	ALUMINIUM	RED	YELLOW
A 200 Gr. T9	ALUMINIUM	GREEN	YELLOW
AISI 602	WHITE	YELLOW	
API 5L Gr. B	ALUMINIUM		
BS 3059 PART2 CDS/HFS 360	ALUMINIUM	BLACK	BROWN
BS 3059 P2 S2 440	ALUMINIUM	BLACK	RED
BS 3059 P2 S2 622 Gr. 490	ALUMINIUM	BLACK	GREEN
BS 3602 PART1 CDS 360	ALUMINIUM	BLACK	BLUE
NFA49-213 42C	ALUMINIUM	BLUE	BROWN
NFA49-213 TU 10CD9.10	ALUMINIUM	BLUE	RED
NFA49-213 TU 15CD2.05	ALUMINIUM	BLUE	GREEN
NFA49-213 TU Z10CD9	ALUMINIUM	BLUE	YELLOW
NFA49-213 TU Z10CDVNB09.01	ALUMINIUM	GREEN	RED
SA 106 Gr. B	RED		
SA 106 Gr. C	BLUE		
SA 178 Gr. D	ORANGE		
SA 179	BLACK	BLUE	GREEN
SA 192	WHITE		
SA 199 T5	BLUE	BROWN	RED
SA 209 Gr. T1	ALUMINIUM	RED	
SA 210 Gr. A1	YELLOW		
SA 210 Gr. C	BLUE		
SA 213 Gr. T11	ALUMINIUM	YELLOW	
SA 213 Gr. T12	BROWN	YELLOW	
SA 213 Gr. T2	BROWN	GREEN	
SA 213 Gr. T22	GREEN	RED	
SA 213 Gr. T23	RED	WHITE	
SA 213 Gr. T5	BLACK	BROWN	GREEN
SA 213 Gr. T9	BROWN	WHITE	
SA 213 Gr. T91	GREEN	YELLOW	
SA 213 Gr. T92	BROWN	BLUE	
SA 213 Gr. TP 304	BLUE	GREEN	YELLOW
SA 213 Gr. TP 304H	BLACK	BLUE	YELLOW
SA 213 Gr. TP 304L	BLUE	WHITE	YELLOW
SA 213 Gr. TP 309H	BLACK	BROWN	YELLOW
SA 213 Gr. TP 316	BROWN		
SA 213 Gr. TP 316 Ti	BLACK	BLUE	
SA 213 Gr. TP 316L	BLUE	BROWN	YELLOW
SA 213 Gr. TP 321	BLUE	WHITE	
SA 213 Gr. TP 321H	BLACK	WHITE	
SA 213 Gr. TP 347H	BLACK	YELLOW	
SUPER 304 (Code Case -2328)	BLACK	RED	GREEN
SA 268 Gr. TP 405	ALUMINIUM	GREEN	

Specification	Colour 1	Colour 2	Colour 3
SA 268 Gr. TP 410	BROWN	RED	YELLOW
SA 268 Gr. TP 443	BLUE	GREEN	WHITE
SA 269 TP 316	GREEN	RED	YELLOW
SA 312 Gr. TP 304	BLUE	YELLOW	
SA 312 Gr. TP 304L	BLUE	RED	YELLOW
SA 312 Gr. TP 316	BLACK	GREEN	
SA 312 Gr. TP 316L	BLACK	BLUE	BROWN
SA 312 Gr. TP 321	BLUE	BROWN	
SA 312 Gr. TP 347	BLUE	RED	WHITE
SA 333 Gr. 1	BLACK	BROWN	RED
SA 333 Gr. 3	BLACK	GREEN	RED
SA 333 Gr. 6	BLUE	GREEN	RED
SA 334 Gr. 1	BROWN	GREEN	RED
SA 334 Gr. 3	BLACK	RED	YELLOW
SA 334 Gr. 6	BLACK	BLUE	RED
SA 335 Gr. P1	BROWN	GREEN	YELLOW
SA 335 Gr. P11	GREEN	WHITE	
SA 335 Gr. P12	BLACK	RED	
SA 335 Gr. P2	BLUE	BROWN	GREEN
SA 335 Gr. P22	BLUE	RED	
SA 335 Gr. P23	RED	WHITE	
SA 335 Gr. P5	BLACK	BROWN	
SA 335 Gr. P9	ALUMINIUM	BROWN	
SA 335 Gr. P91	BROWN	RED	
SA 335 Gr. P92	BROWN	BLUE	
SB 163 Inconel	BLACK	GREEN	YELLOW
ST 35.4	ALUMINIUM	BLUE	
Steel 20	GREEN		
Structural Tubes & Pipes	BLUE	BROWN	WHITE
X20 Cr Mo V 121	BLACK		

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(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 forbearance, 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:

**Record of Revision:**

Rev 00: 06/10/14: Fresh Issue

Rev 01: 10/12/14: Cl 2, 4, 5, 6 and 9 corrected

**1. Material:**

Specification : ASME SB564 (Latest on the date of Purchase Order)  
 Material : UNS N06617  
 Additional Requirement : As listed below (Supplementary to Specification)  
 Size and Qty. : As per Purchase order

**2. Chemical Composition and Process:**

Material shall be produced by using vacuum induction melting (VIM) followed by vacuum arc re-melting (VAR) or electro slag refining (ESR). Any other suitable melting and re-melting process shall be used only after approval from the purchaser.  
 Forged bar shall be ensured for uniform structure & strength with reduction ratio in area: 3:1 min. from ingot to finished forging. Forgings shall be manufactured as close to the final shape as possible.

Product Analysis: As per spec

Heat Analysis in weight %: Test method as per ASTM E1473

Element	Cr	Fe	Mn	Mo	Co	Al	C	Cu	B	Si	S	N	Ti	Ni
Wt %	21-23	1.5 max	0.3 max	8-10	11-13	0.8-1.3	0.05-0.08	0.05 max	0.002-0.005	0.3 max	0.008 max	0.05 max	0.3-0.5	Bal.

Raw materials used in making of forged bars including incoming scrap shall be checked by supplier to ensure freedom from radioactivity.

**3. Dimensions and Tolerances:**

- i) Dimensions and tolerances: As per BHEL purchase order and relevant drawings.
- ii) The forged pipes shall not deviate from straightness by more than 1mm in any one shall not be more than 6mm over the entire length. A sharp bend at the end or kink and twist are not acceptable. These limitations are applicable for any given plane

**4. Heat Treatment on Forging:**

UNS N06617 – solution annealed in the range 1150°C to 1175°C.

**5. Mechanical Tests:**

Extent of test: one sample/for each size/heat/HT batch; on final heat treated condition samples:

UNS N06617: Tensile Strength: Min 655 MPa, Yield Strength (0.2% off set): Min 241 MPa, Elongation (L=5.65√A), min 35%

Macrostructure: Grain size ASTM No 2 to 5.

**6. Non-destructive testing & Hydro testing:**

UT: 100% for all diameters. Notch depth 3% of max thickness. Testing method and acceptance shall be as per supplementary requirement in ASME SB-564.

Reference hole as per table: UT testing reference hole for inspection in radial direction		
Dia of forging, mm	Dia of ref flat bottom hole, mm	Remarks
D ≤ 150	3.2	
150 < D ≤ 400	6.4	
400 < D ≤ 600	6.4	
600 < D ≤ 1200	6.4	1. Sensitivity of 6.4mm hole shall be ensured at 600mm depth and the scan should be carried out from throughout the circumference to cover the complete diameter. 2. Dual element transducer shall be used to inspect the near surface areas within the dead zone of the single element transducer used for inspection as described in point 1.

**LPI:** 100% - test method & acceptance as per supplementary requirements in ASME SB-564.

All the chemicals used for LPI shall meet the requirement that total halogen and sulphur of each material shall not exceed 1% by weight of residue. Recommended for NP grade (nuclear purpose) LPI consumables.

**Hydro:** On all pipes as per B 829 Cl 5.2 with S = 163MPa.

**7. Workmanship and Finish:**

The Inside & outside surfaces shall be free from any imperfections. The material shall be plain, uniform in quality and condition, smooth, straight or flat and free of wrinkles, overlaps, tears, cracks, seams, folds, pitting etc. Localised imperfections, if any, may be removed by skin machining only to a surface finish of <= 6.3 microns ensuring the wall thickness. Local depressions or ground spots are not acceptable. Loose scales shall be removed by blast cleaning in surfaces after heat treatment. No repairs/weld repairs permitted.

**8. Marking & Packing:**

Details of stamping on front face of each item with low stress stamps and border by oil paint: (1) Heat number, (2) Specification & grade, (3) Size, (4) Maker's emblem/code, (5) Identification details as per drawing. Work inspectors stamp next to heat number. The Forgings are to be properly packed and despatched to avoid damage during transit.

**9. Inspection & Certification:**

The inspection and tests to be witnessed by an IBR approved inspecting agency, in case the Forge shop is not recognised as a "Well known Forger" under IBR.

IBR Form IIIG countersigned by applicable inspection agency and Test certificate with following details, shall accompany the product (including proof machined). Well known Forger shall provide IBR Form IIIF and Test certificate with following details, shall accompany the product (including proof machined). Also Manufacturer Test Certificate shall be provided with the following details: -

1. Purchase Order No. (BHEL), TDC No. & Test certificate number.
2. Specification, Grade with applicable year of code, Heat Number, Drawing No., Quantity & Size
3. Supplier TC of the steel used in making the finished product – Well known steel maker IBR Form IV & others Form IVA.
4. Details of steel ingot, Melting & forging process, Chemistry including incidental elements - Heat wise.
5. Heat treatment details of the material and test bars, Mechanical test results with reference & acceptance standard.
6. NDE examination test results with reference & acceptance standard.
7. Results of dimensional data sheet

Survey meter shall be used to measure radioactive contamination at 5cm near the surface. Acceptance limits: Shall be less than 0.1 milli Rontgen (MR) per hr or 1 micro Sievert per hr. The Measured Radioactivity levels shall be reported in the Mill Test Certificate. (Not to be recorded in IBR Form).

All the tests specified here shall be carried out at works and the test results shall be furnished in the test certificates (4 copies). The bars shall be inspected and certified by the inspecting agency authorised by BHEL, wherever specified in the purchase order.

**10. Quality Plan:**

Before start of production the manufacturer shall submit a Manufacturing and Inspection plan (MIP) to **BHEL product QA** for approval. The MIP shall constitute of:

- |                                       |                                       |                                  |
|---------------------------------------|---------------------------------------|----------------------------------|
| i) melting & refining,                | vii) preliminary heat treatment,      | xii) marking preservation and    |
| ii) ingot weight and type,            | viii) internal tests and inspection   | dispatch,                        |
| iii) forging process, press rating,   | before final heat treatment,          | xiii) test instructions for NDE  |
| iv) top bottom end discard            | ix) quality heat treatment along with | examinations along with sketches |
| percentages,                          | parameters,                           | xiv) type of machining and       |
| v) position of the part in ingot,     | x) test and inspections after heat    | examinations.                    |
| vi) sketch of the forging process and | treatment,                            |                                  |
| its forging ratios,                   | xi) test certificate requirements,    |                                  |

**11. Audit Checks at BHEL:**

BHEL reserves the right to carry out audit checks for chemistry, HT condition, mechanical test and NDT on representative test bars or job. Supplies found defective during check or subsequent processing at BHEL are liable for rejection.

**12. End Use**

To be used in forgings for Advanced Ultra-Super Critical (AUSC) boiler applications.

Haritha.C/QA	Ravibharath.R/WRI	Kalyanaraman.V/ QA	Selvarajan.S/QA	Revisankaran.U/QA
Prepared by	Reviewed by			Approved by

**Record of Revision:**

Rev 00: 06/10/14: Fresh Issue

Rev 01: 10/12/14: Cl 2, 4, 5 and 9 corrected

**1. Material:**

Specification	:	ASME SB167 (Latest on the date of Purchase Order)
Material	:	UNS N06617
Additional Requirement	:	As listed below (Supplementary to Specification)
Size and Qty.	:	As per Purchase order

**2. Chemical Composition and Process:**

Material shall be produced by using vacuum induction melting (VIM) followed by vacuum arc re-melting (VAR) or electro slag refining (ESR). Any other suitable melting and re-melting process shall be used only after approval from the purchaser.

Product Analysis: As per spec. Raw materials used in making of pipes including incoming scrap shall be checked by supplier to ensure freedom from radioactivity. Pipes shall be made by seamless process/ extruded process and shall be hot worked annealed or cold work annealed.

Heat Analysis in weight %: Test method as per ASTM E1473

Element	Cr	Fe	Mn	Mo	Co	Al	C	Cu	B	Si	S	N	Ti	Ni
Wt %	21- 23	1.5 max	0.3 max	8-10	11-13	0.8- 1.3	0.05- 0.08	0.05 max	0.002- 0.005	0.3 max	0.008 max	0.05 max	0.3- 0.5	Bal

**3. Dimensional Tolerances & Straightness:**

- OD/ID and Wall thickness tolerances as per BHEL PO and relevant Drawing.
- The Pipes shall not deviate from straightness by more than 1mm in any one shall not be more than 6mm over the entire length. A sharp bend at the end or kink and twist are not acceptable. These limitations are applicable for any given plane.

**4. Heat Treatment:**

UNS N06617 – solution annealed in the range 1150°C to 1175°C.

**5. Mechanical Tests:**

Extent of test: one sample/for each size/heat/HT batch; on final heat treated condition samples:

UNS N06617: Tensile Strength: Min 665 MPa, Yield Strength (0.2% off set): Min 240 MPa, Elongation ( $L=5.65\sqrt{A}$ ), min 35%

Microstructure: Grain size ASTM No 2 to 5.

**6. Non-destructive testing & Hydro testing: (Preferably on-line automated)**

Each tube shall be examined for its integrity of full section over its entire length.

**Eddy current testing:** Eddy current testing shall be conducted as per ASTM E 571. 100 % area shall be inspected to ensure absence of surface and sub-surface defects.

**Ultrasonic Testing:** For thickness equal to and greater than 3.6 mm UT shall be conducted as per ASTM E213. Calibration: 2 axial notch (one ID & one OD) and 2 transverse notch (one ID & one OD) shall be used to standardise the system settings (to draw DAC) for circumferential scan and axial scan respectively. Notch shall be of length 50mm and depth 3% (maximum) of nominal thickness of job (Minimum depth shall be 0.3 mm). For OD less than 30mm one notch in outer surface (OD) is sufficient for calibration. The direction of scanning shall be clockwise & anti clockwise for circumferential scan to find longitudinal discontinuity and two axial direction for axial scanning to find transverse discontinuity. Scanning shall be done with scanning sensitivity of reference level plus 6 dB. Evaluation shall be carried out with reference sensitivity.

Acceptance criteria: Any discontinuity crossing the DAC shall not be acceptable irrespective of length. Any discontinuity with indication less than DAC shall be sized and if the length of discontinuity is greater than 10 mm it shall not be acceptable. All indications shall be sized and reported.

**Hydro testing:** Extent of test: On all pipes as per ASME SB 829 Cl 5.2 with S = 163MPa.

**7. Workmanship and Finish:**

The Inside & outside surfaces of the pipes shall be free from any imperfections. The material shall be plain, uniform in quality and condition, smooth, straight or flat and free of wrinkles, overlaps, tears, cracks & defects like laps, seams, folds, cracks, pitting etc. Localised imperfections, if any, may be removed by skin machining only to a surface finish of  $\leq 6.3$  microns ensuring the wall thickness, inside and outside diameter. Local depressions or ground spots are not acceptable. No repairs/weld repairs permitted. Pipes (inside & outside) to be clean & shot blasted to remove scales after HT.

**8. Marking & Packing:**

Details to be identified: On Each Pipe 1) Heat number 2) Specification & grade 3) Size 4) Maker's emblem/code, 5) No. of pipes 6) Inspector's seal.

- i) Upto OD 31.8 (Excl.) – Sl.No: 1 to 7 to be stamped on metal or plastic tag attached to bundle.
- ii) OD 31.8 to OD 76.1 (Incl.) – Sl.No:1 to 5, 7 to be paint stencilled on each pipe, 1 to 7 to be stamped on metal or plastic tag attached to bundle.
- iii) OD > 76.1- Sl.No: 2,3,4,5 & 7 to be hard stamped with round edged stamp at 100mm from an end of each pipe and 1 to 5 to be paint stencilled on each pipe.

**9. Inspection & Certification:**

- a) Products shall be inspected at works and the applicable IBR Form must be Countersigned by the Inspecting Authority as indicated below:
- b) Imported Items: Inspecting Authority approved by IBR for the Country of origin (To be concurred by BHEL before placing PO). Indigenously Supplied items: Boiler Inspectorate/Directorate of respective State.
- c) Certification in IBR Form-IIID (Annexure – I) for IBR items from “IBR-Well Known Pipe Maker” and for Others IBR Form-IIIA (Annexure – II) as per enclosed format to be submitted.
- d) Manufacturer’s Test certificate (MTC) (ORIGINAL in ENGLISH with following details):
  - i) Purchase Order No. (BHEL), TDC No. & Test certificate No., Size and Quantity-Melt wise.
  - ii) Specification and Grade with year of code, Code case number, Heat Number, Steel & Pipe making process, chemistry including incidental elements-Ladle and product Analysis.
  - iii) Supplier TC of the steel used in making the finished product – Well known steel maker IBR Form IV & others Form IVA.
  - iv) Details of steel ingot, Melting & forming process, Chemistry including incidental elements - Heat wise.
  - v) Heat treatment details of the material and test bars, Mechanical test results with reference & acceptance standard.
  - vi) NDE examination test results with reference & acceptance standard.
  - vii) Results of dimensional data sheet
- e) Survey meter shall be used to measure radioactive contamination at 5cm near the surface. Acceptance limits: Shall be less than 0.1 milli Rontgen (MR) per hr or 1 micro Sievert per hr. The Measured Radioactivity levels shall be reported in the Mill Test Certificate. (Not to be recorded in IBR Form).

All the tests specified here shall be carried out at works and the test results shall be furnished in the test certificates (4 copies). The bars shall be inspected and certified by the inspecting agency authorised by BHEL, wherever specified in the purchase order.

**f) Quality Plan:**

Before start of production the manufacturer shall submit a Manufacturing and Inspection plan (MIP) to **BHEL product QA** for approval. The MIP shall constitute of:

- |   |  |   |
|---|--|---|
| i) melting & refining,                  | vi) internal tests and inspection before final heat treatment, | xi) marking preservation and dispatch,                          |
| ii) ingot weight and type,              | vii) quality heat treatment along with parameters,             | xii) test instructions for NDE examinations along with sketches |
| iii) hot rolling/extrusion process      | ix) test and inspections after heat treatment                  | xiii) type of machining and examinations.                       |
| iv) top bottom end discard percentages, | x), test certificate requirements,                             |   |
| v) position of the part in ingot,       |  |   |
| vi) preliminary heat treatment,         |  |   |

**g) Audit Checks at BHEL:**

BHEL reserves the right to carry out audit checks for chemistry, HT condition, mechanical test and NDT on representative test bars or job. Supplies found defective during check or subsequent processing at BHEL are liable for rejection.

**h) End Use**

To be used in pipes of boilers and headers for Advanced Ultra-Super Critical (AUSC) boiler applications.

		 10/12/14		
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Prepared by	Reviewed by		Approved by	