An ISO 9001 Company

Bharat Heavy Electricals Limited

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

TITLE: Supply of Carbon Steel Forged Rods to BHEL Trichy	Phone: +91 431 2577426 / 2575329 Fax : +91 431 2520 719 Email : tantuway@bheltry.co.in geetha@bheltry.co.in

Reference Number: 1401500047	**Date: 05.08.2015**	**Due date for submission of offer : 28.08.2015**

You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order.

Please note that under any circumstance both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the date tender opening.

BHEL / Trichy is looking for Carbon Steel Forged Rods to BHEL Trichy 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 "**1401500047**"

Offer should reach us before 14:00 hours on the due date of 28.08.2015.	Yours Faithfully, For **Bharath Heavy Electricals Limited** Sr. Engineer / MM / Purchase - C&F

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: skraman@bheltry.co.in,
nagarjuna@bheltry.co.in

Enquiry No	Enquiry Date	Due Date for Quotation
1401500047	05.08.2015	28.08.2015

Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order.
Bid should be submitted in two parts. 1.Techno-commercial bid (Part-I) and 2.Price bid(Part-II) in a separate sealed cover and both covers must be placed in a third cover and sealed. Our Enquiry No., Enq. date & Enq. Due date must be written on all three covers.

Item	Description	Unit	Quantity	Delivery Schedule Quantity	Date
10	D14330229007	KG	694.000	694.00	30.11.15
	Rod Dia 150 x 2500L - 2 No. RL is not acceptable				
20	D14330229008	KG	450.000	450.00	30.11.15
	Rod Dia 70 x 1500L - 10 No. RL is not acceptable				

General Note:

1. Supply of Carbon Steel Forged Rods as per specification ASME Sec IIA SA350LF2 class 1 & TDC NO.D145_TDC_05_R00.DTD.21/08/2013.
2. Inspection by BHEL approved third party for imports (IBR) and BHEL/BARC for indigenous supply.
3. TDC clause by clause confirmation is required. Supplier has to clearly mention for each clause whether it is acceptable/not acceptable/deviation (if any).
4. Along with technical bid, the vendor has to give draft copies of QAP, Manufacturing Plan, MSTP, HT Plan, and NDE procedures. To prepare QAP, UT & MT procedures, vendor shall refer attached sample formats A, B & C. For other procedures, sample format/procedures are given in TDC itself.
5. For Material code-D14330229007, Rod Dia 150 x2500 L, test specimens are to be taken from both ends of forged rods.
6. For Material code-D14330229008, Rod Dia 70 x 1500 L, taking test specimens from each bar can be limited to one side only provided the length of forged bar at the time of HT is less than 2000 mm.
7. Raw material inspection report shall be provide along with supply of material.

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**

PRAKASH TANTUWAY
Senior Engineer
Purchase-MM/GSF
BHEL, TIRUCHY-620014

Yours faithfully,

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
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8. The actual production of material is permitted only after review/approval of Manufacturing/Testing/Inspection, Drawing/ Documents and Quality Assurance plans (QAP) by BHEL-Trichy / BARC.

9. Five sets of additional dialects containing Test Certificates, copies of the approved Procedure, DCR, Drawing etc. apart from contractual requirements are required.

10. Dispatch clearance for the material will be given only on final acceptance of the test certificates by BHEL, Trichy/BARC.

11. Acceptable variation in total weight is +10% and -0%.

12. For the above material no end user certificate will be provided.

13. Please confirm against each point in the TERMS AND CONDITIONS attached, sign and attach along with the offer.

14. All the items in this tender will be considered as a single package for evaluation and ordering.

All the tenders may be addressed to the following address:

The Tender Opening Cell / MM
Room No: 26, Building 24, Ground Floor
Bharat Heavy Electricals Limited
TIRUCHIRAPALLI 620014

In case personal delivery of the offer, it shall be dropped into the respective box kept in Room No: 26, after duly entering the data in the system.

Offers will be accepted only up to 14.00 Hrs on the due date. Therefore, vendors shall ensure to submit the offers well before this time. All due date extension requirements should be addressed to the respective Purchase mail IDs. All the due date extension requests from vendors will be considered only up to 48 hours before the due date and time.

Vendors are requested to avoid submission of offers through e mail / fax. In case of any unavoidable situation, offers shall be sent through e mail to the following mail ID only tender_cell@bheltry.co.in.

As tenders are being opened by Common Tender Opening Cell, offer covers should be sealed with tenderer's distinctive seal and super scribed with correct Tender No. item of supply and due date of opening.

The offers will be opened at 14.30 hrs on the due date of the 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

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**
PRAKASH TANTUWAY
Senior Engineer
Purchase / MM / C&I
BHEL, TIRUCHY - 620 014
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
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E-mail: skraman@bheltry.co.in,
nagarjuna@bheltry.co.in

1401500047 / 05.08.2015 23505

are liable to be rejected.

Enclosures:

"LD clause has to be confirmed without fail."

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**

PRAKASH TANTUWAY
Senior Engineer
Purchase / MM / C&T
BHEL, TIRUCHY - 620 014

MANAGER / PURCHASE
(FOSSIL BOILERS)

Yours faithfully,

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

BHARAT HEAVY ELECTRICALS LIMITED
MM / PURCHASE - C&F
BHEL, Trichy – 620014

Annexure II

Enquiry Terms and Conditions

Note: This annexure has to be mandatorily filled in and signed by the manufacturer (or) mill and submitted along with Technical bid

S.No.	BHEL Requirements	Supplier Comments (Acceptance or otherwise for each point to be given)
1	**Material Specification:** Supply of CS Forged Rods shall be strictly as per the material specification mentioned against each item of the enquiry.	
2	**Technical Conditions:** 1. Supply of CS Forged Rods shall be strictly as per specification mentioned against each item of the enquiry. 2. Supply shall be as per TDC: D145_TDC_05_R00. 3. Inspection by authorized inspection agency attached (Annexure 2). 4. TC in FORM IIIC, works TC, Raw Material TC, UT report, MPI report and other test certificates as called in TDC: D145_ TDC_05_R00 shall be sent along with supply.	
3	**Payment Term (Indigenous)** 1. Payment term is 100% direct payment after 45 days from the date of receipt and acceptance of materials. **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.** 2. Offers of indigenous Suppliers with payment terms as LC / Advance Payment / Payment through bank are liable for rejection.	
4	**Payment Term (Imports)** 1. 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. **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.**	

	2. In the case of Usance LCs the loading will be considered @ 1.5% on the offered Value. 3. For LC at sight the loading will be considered @ 3.5% on the offered Value.	

	4. Incase of LC, LC will be opened only on intimation of readiness of material for shipment. LC will not be opened prior to readiness of materials. 5. Normally CAD at sight and Confirmed LCs are liable for rejection. However, if CAD at sight is accepted by BHEL, a loading of 5% will be done on the offered Value.	
5	**Liquidated Damages / Penalty** 1. 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. 2. **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).** 3. If LD is not accepted on total order value a loading of 10% on the offered value will be done. 4. For FOB contract LD will be calculated form the date of TPI signature. 5. For CFR contracts LD will be calculated from the date of B/L.	
6	**Bank Guarantee / Warrantee**: 1. 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% (Ten percent) of the value of the contract. 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. 2. Supplier to accept guarantee/warrantee of "18 months from dispatch or 12 months from commissioning, whichever is earlier". Any deviation to this may lead to rejection of the offer.	
7	**Risk Purchase:** 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.	

8	**BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed.**	
9	**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. Unit rates quoted should include all the charges like third party inspection charges, packing & Forwarding etc. If the charges are shown separately, the same shall be in % of basic unit rate. No Lump sum charges shall be quoted.	
10	**Bid Currency**: 1. Indian bidders should submit the prices only in Indian Rupees. Foreign bidders may submit their bid in their preferred currency. 2. **For evaluation, Exchange rate (TT selling Rate of SBI) as on TechnoCommercial bid opening date shall be considered.**	

	3. **Delivery Conditions:** **For Indigenous bidders** - **Ex-works offers will not be considered.** Bidders should submit their offer on FOR Destination, BHEL Stores, Trichy basis. The quote shall include all charges, including testing, packing, inspection, freight and insurance charges, etc. **A. Imports:** a) 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. If FOB rates are not indicated, offer may be liable for rejection. **FOR CFR INCO TERMS** b) For CFR terms, moved through CONTAINERS (Suppliers should clearly specify this in their offer) it would be presumed by BHEL that the freight charges quoted is on LILO (LINER IN LINER OUT) basis including extra charges, if any, like Container Imbalance Charges, Trade Imbalance charges or any other charges payable to the Liner. No other charges other than the quoted Freight rate will be paid by BHEL excepting applicable Terminal Handling Charges, Container cleaning Charges, DO charges to Shipping Liner at Discharge Port. If any deviation is taken by Tenderer, a loading of 22% on the freight rate per MT shall be considered by BHEL for arriving at the Total landed Cost. c) In case of shipment through Containers on CFR basis, the BL should bear the endorsement that "14 free days for Container Detention is applicable". **FOR FOB INCO TERMS** d) The available load ports for FCL (Full Container Load) Cargo in Freighting Contract are Antwerp, Hamburg, Genoa, Rotterdam, Bilbao, Gothenberg, Felixstowe, St.Petersberg, Busan, Dalian, Shanghai, Kobe, Osaka, Yokohama.	

	e) The available load ports for LCL (Less than Container Load) Cargo in Freighting 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, f) 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 up to Chennai to be quoted. g) For FOB contract delivery period mentioned shall be the date of TPI signature.	
11	**Validity:** 1. **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.** 2. 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. 3. 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.	
12	1. Please submit your offer in TWO part bid (technical cum commercial bid 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.	

13	1.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. 2. The OFFER, sealed and Super scribed 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. The OFFER to be addressed to: **The Tender Opening Cell/MM** **Room No-26 , Building – 24 , Ground Floor** **Bharat Heavy Electrical Limited** **Tiruchirappalli- 620014.** Note: Bidders are requested to submit their offers only through sealed bids. 3. Bidders may submit their bids through email/fax etc. 4. 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. 5. **Offers from Stockiest, traders will not be acceptable.** 6. 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 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. Copy of current agency agreement is to be enclosed without which the offer is liable for rejection.

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 business transaction and hence binding on both the parties.

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 finalization of the tender. Such bidders will not be permitted to participate in the further tender proceedings and will be communicated suitably.

7. 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 AND THE OTHER REQUIRED DOCUMENTS
CALLED FOR IN THE SRF (INCLUDING D&B REPORTS FOR IMPORT VENDORS. ALONG WITH THE TECHNICAL BID WITHOUT FAIL. The same shall be scrutinized as per BHEL evaluation procedures

8. ALL VENDORS (BHEL REGISTERED VENDORS OR NEW VENDORS) 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 / TENDERED SPECIFICATIONS AND TEST
CERTIFICATES FOR THE SAME; FOR OFFER ACCEPTANCE. THE

MANUFACTURER SHALL HAVE MANUFACTURED / TENDERED SPEC AND THE SAME SHALL HAVE BEEN SUPPLIED/IN USE/OPERATION.

9. ALL VENDORS (BHEL REGISTERED VENDORS OR NEW VENDORS) SHALL SUBMIT - THE FACILITIES AVAILABLE AT THE MILL - STARTING MATERIAL TO FINISHED PRODUCT, MANUFACURING QUALITY PLAN, INSPECTION & TEST PLAN TO MEET THE TDC REQUIREMENTS (product form wise) ALONG WITH THE TECHNICAL BID SHOULD BE SUBMITED WITHOUT FAIL.

The same shall be scrutinized as per BHEL evaluation procedures.

OFFERS SUBMITTED WITHOUT THIS WILL BE REJECTED.

10. If supplier is not a steel maker then source & form of raw material for the manufacturing shall be submitted product form wise.

11. The manufacturer shall submit filled in forging / forming / pressing supplier facility report. Suppliers without basic manufacturing facilities in house, shall not be considered for evaluation.

12. In house test facilities for mechanical, chemical & non - destructive testing are mandatory requirements for consideration of this offer.

13. BHEL/End customer reserve the right to inspect the item ordered at any stage at vendor's works and if found not to meet the stipulated conditions, material is liable for rejection.

14. Acceptance of TC by BHEL before dispatch is must.

15. Date of price bid opening will be informed later after acceptance of offer on technical ground.

16. Bidders are to confirm all the above points in their "Technical and unpriced commercial bid". Incomplete offers will not be considered. The technical documents submitted for consideration of offer (shall be in English) is to be signed and sealed in original by mill without fail.

17. Suppliers have to submit their registration forms online in BHEL portal (www.bhel.com). The hard copy of the supplier registration form (17 pages) and checklist (1 page)with signatory on all the pages shall be courier to the below mentioned address:

Mr. EBINESAN,
DGM/SDC/MM,
24 Bldg, IV Floor,
BHEL, Trichy-620014.
Phone- 0431-2577448
e-mail- ebi@bheltry.co.in

Sample Format -A

QAP

Sl. No.	Operation	Characteristics	Type of check/method	Extent of Check	Reference Documents	Acceptance Standard	Format of Records	Inspection by			REMARKS
								vendor	BHEL	CUSTOMER	
1	Raw Material/ Incoming Inspection	Ingot Identification		each heat	as per Material Specn. **ASME SEC-IIA SA-350 Grade LF2 Class-1**	as per Material Specn. **ASME SEC-IIA SA-350 Grade LF2 Class-1**		PR	R	R	
		Ladle Analysis		each heat							
		Check Analysis		each heat							
		Ingot/Bloom Identification		each heat							
2	Forging	Temperature						PR	R	R	
		Reduction Ratio		Minimum 3.0							
		Dimensions									
3	Heat Treatment	Type of HT	Loading temp.; ROH & ROC; Soaking Temp. & Time etc.; No. of Test Specimens to be loaded					PR	R	R	
4	Test Coupon	Identification	Stamping					PR	W	W	
5	Inspection & Testing	Mechanical Testing	Tensile Test (RT)					PR	W	W	
			Tensile Test (ET)								
			Impact Test								
			Hardness								
			Product Analysis								
			Macro Analysis								
			Micro Structure								
			Inclusion Rating								
6	NDE	UT			as per CUSTOMER approved proc.			PR	W	W	
		MT						PR	W	W	
7	Final Inspection	Dimension Check						PR	W	W	
		Visual Inspection									
		Marking & color coding									
		Test Certificates verification									
8	Preservation & Packing										
9	Issue of Third Party Inspection & Shipping Release Note							PR	H	H	

CHANDRA PRAKASH JOSHI
Planning Engineer, Matl Plng.,
Advanced Technology Products
BHEL, TIRUCHY 620 014.

Sample Format -B(1)

PROCEDURE FOR ULTRASONIC TESTING

UT

1.0	Scope	
2.0	Technique	Method of testing to be detailed
3.0	Reference documents	ASME & as per applicable TDC
4.0	NDT Personnel	Qualification of the personnel to be engaged
5.0	UT Equipment & Accessories	
	(i) Details of the Flaw Detector	Make & Model
	(ii) UT probe (Dual/Single Crystal)	Type of Probe
		Size of Probe
		Frequency
		Focal Length
	(iii) Angle Beam details	
	(iv) Couplant:	Type & Brand Name
6.0	Equipment Check before use	
7.0	Surface Preparation	
8.0	Calibration	Calibration Block /Reference Notch requirements and its dimensional details
9.0	Calibration Confirmation	system changes & periodic examination checks
10	Scanning Plan	Directions of scanning to be given as a sketch
11	Scanning Procedure	stage of UT
		Technique Sheet references
		Scanning level
		Scanning Speed
		overlap % to cover total UT area
12	Recording	Defect recording
13	Report to give	(i) recordable indication
		(ii) location of recordable indiacations
		(iii) dimensions of the area not inspected
		(iv) Purchaser Drg. No. & Order No.
		(v) applicable specn., calibration details, Instrument details, surface condition, couplant and Search Unit
14	Quality Levels:	
15	Report Format	

22/07/15

CHANDRA PRAKASH JOSHI
Planning Engineer Matl. Plng.
Advanced Technology Products
BHEL, TIRUCHY 620 014.

Sample Format - B(2)

ULTRASONIC TEST CERTIFICATE

Certificate No. & Date:-
Customer :-
Work Order No.:-
Purchase order No &date:-

Item No.	Component	Drg.No./Size (in mm)	Qty.	Job Sl. No.	Group No.	Material Specification

Ultrasonic Test Method:-
Details of the equipment used:-

Surface Condition		Type of couplant used & Brand Name	
Search Unit (including Sl.No)		Scanning	
Search Unit Size		Range (mm)of CRT	
Frequency		Pulse Energy	
Ultrasonic Test Standard		Amplitude	
Acceptance Standard		Supression	
Applicable Procedure,,Specification with R		Type of cable and length	
Identification of Calibration Block		Oerator Name	
Examination Conducted Surface		NDE Qualification Level	

ATTENTUATOR SETTING

(i) Attentuator Reference Standard

(ii) Attentuator Testing sensitivity

TEST RESULT:

REMARKS:

Supplier signature & stamp

Test Witnessed By:

22/07/15

CHANDRA PRAKASH JOSHI

Sample Format - B(3)

TABLE

(to be followed for UT)

Drg. No. Reference			
Stage of Examination	After HT and proof-machining (semi-finished) condition		
Size of the proof-machined solid forging	Dimension after proof-machining for UT to be given.		
Type of Beam	NORMAL	NORMAL	ANGLE BEAM (45°)
Position of Scanning	with reference to Sketch	with reference to Sketch	with reference to Sketch
UT Reference Block details	hole details	hole details	Notch details
Direction of Scanning	Sketch to be given		

22/07/15

CHANDRA PRAKASH
Planning Engineer Matl. Ping.
Advanced Technology Products
BHEL, TIRUCHY 620 014.

Sample Format - C(1)

SAMPLE PROCEDURE FOR MAGNETIC PARTICLE EXAMINATION

MT

1.0	Scope	Extent of examination as per applicable specn.
2.0	Procedure	Method of testing to be detailed
3.0	Reference documents	ASME & as per applicable TDC
4.0	NDT Personnel	Qualification of the personnel to be engaged
5.0	MT Equipment	
6.0	Examination Medium	Particle Type, Make & designation to be mentioned
7.0	Surface Preparation	
9.0	Calibration	Lifting Power of Yoke etc.
10.0	Sensitivity Check & Magnetic Field Adequacy:	Strength of magnetic field, sensitivity of detection etc.
11	Examination	Preliminary exmination; Direction of Magnetization & Method of Examination
12	Examination Coverage	allowable leg spacing of yoke, magnetic flux condition and field overlap to cover 100% of forging surface
13	Interpretation	Based on applicable specification
14	Demagnetization	Demagnetisation at any time after completing MPI
15	Evaluation	As per the referred code & specification
14	Report to give	(i) Non-rejectable indications (ii) Rejectable indiacations
15	Examination Record	(i) Equipment & type of current (ii) Magnetiac Particles type (iii) Map or record of indications (iv) Material and size
15	Acceptance Criteria	As per applicable Specification and ASME standards
16	Report Format	

CJosh. 22/07/15

CHANDRA PRAKASH JOSHI
Planning Engineer Matl. Plng.
Advanced Technology Products
BHEL, TIRUCHY 620 014.

Sample Format - C(2)

MAGNETIC PARTICLE EXAMINATION REPORT

Certificate No. & Date:-
Work Order No.:-
Purchase Order No. & Date:-
Customer Name:-

Item No.	Component	Drg. No./Size (in mm)	Qty.	Job Sl. No.	Group No.	Material Specification

Methods of Magnetization:
Examination Medium:
Test Equipment:

Surface Condition		Area Covered	
Current used		Lifting Power	
Production spacing		Powder Colour	
Calibration		Magnetization Time	
Test Standard		Date of Examination	
Acceptance Standard		Operator Name	
Applicable Procedure, Specification with Rev. No.		NDE Qualification LEVEL	

TEST RESULT:

REMARKS:

Test Witnessed By:

22/07/15

CHANDRA PRAKASH JOSHI
Planning Engineer, Matl. Plng.,
Advanced Technology Products
BHEL, TIRUCHY 620 014.

FORGE SHOP

1.00.00 Name of Company, Address

2.00.00 Type & No. of Forging Press : Forging hammer

Capacity - (Tonnes)

3.00.00 Max. size of Material that can be handled dimensions, weight and type of materials.

4.00.00 Production with relevant standards (for last three years)

Carbon Steel

Stainless Steel

Alloy steel

Inconel –

5.00.00 Heating Facilities -

5.10.00 Furnace - No. and capacity

5.10.10 Type - Oil Fired, Gas Fired, Electric heating

5.10.20 Dimensions

5.10.30 Mode of Temperature control & extent of automation.

5.10.40 Temperature recording facilities

5.20.00 Distance of heating furnace from Forging Press

5.30.00 Handling Facilities - Crane/Truck/Manual/ any other indicate list of such facility.

6.00.00 Availability of in-house Heat Treatment facility Yes/No

6.10.00 If yes: Type of heat treatment possible

6.20.00 If no, source of Heat Treatment with relevant details.

6.20.10 Annealing -

6.20.20 Normalising -

6.20.30 Stress Relieving -

6.20.40 Quenching: - Water/Oil

Any other Heat treatment? -

6.20.50 Type & No. of Furnace -

6.20.60 Dimensions, Type of Temp. Control,
Temp - Time Recording facilities.

7.00.00 Source of Raw Materials -

Indigenous/imported (Indicate source and quantity of material procured during last three years)

8.00.00 Machining Facilities -

List of machines installed

9.00.00 Cutting facilities - Type & No. of Machine

10.00.00 Availability of testing facilities Yes/No

10.10.00 If no - Indicate source of testing with relevant details

10.20.00 If yes :-

10.20.10 Chemical Analysis: Method

10.20.20 Mech. Testing

10.20.21 Hardness testing

10.20.22 Metallorgraphy

10.20.23 Universal Tensile Testing M/C -
Ambient Low Temp.

10.20.24 Any other tests –

10.30.00 Non-destructive

10.30.10 Radiography

FORGE SHOP

10.30.20 Ultrasonic Test

10.30.30 Dye Penetration

10.30.40 MPI

10.30.50 Any other NDE

11.00.00 Experience with Third Party/Statutory Agency:

Indicate the agency

12.00.00 Source of procurement of Dies & availability for Machining of such dies.

13.00.00 Consistency in supply:

13.10.00 Has the vendor produced items of similar nature in past?

13.20.00 Has the vendor maintained delivery commitments in past?

13.30.00 Has there been frequent labor trouble in past?

13.40.00 Has there been major upset due to faulty material management?

13.50.00 Is the system of planning & scheduling resilient enough to overcome temporary setbacks & make up lost time?

13.60.00 Has the vendor got standby arrangement for power?

13.70.00 Can the vendor quickly offload the work to other reliable sub-vendor?

13.80.00 Total order booked till date.

14.00.00 Remarks:

PLACE: SIGNATURE WITH SEAL

DATE:

TECHNICAL SPECIFICATION FOR LOW ALLOY STEEL FORGED BARS OF SA-350 LF2

Prepared by(BHEL)	Reviewed by(BHEL)	Approved by (BHEL)	Approved by (BARC)
Akhilesh Kumar Singh	K. Krishnamoorthy	M. Ponnusamy	

Record of revision: 00 Fresh

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CONTENTS

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1.0 SCOPE

1.1 **Specifications:** This specification covers the technical requirements for the material, manufacture, examination, inspection, testing, documentations, identification and packing of Normalized Low Alloy Steel (LAS) forged bar/s as per latest ASME Section IIA SA-350 Grade LF2 Class 1 with applicable supplementary requirements. General requirements of relevant ASTM standards are applicable.

1.2 **Size and Quantity:** As per **Annexure II** and purchase order.

1.3 **Supply condition:** Normalized.

2.0 REFERENCE DRAWINGS

2.1 Refer **Figure: Annexure II and Annexure III**

3.0 DOCUMENTS TO BE SUBMITTED

3.1 **Along With Bid:** Refer **Annexure I** for details of the documents (in English only) to be submitted with the offer.

3.2 Only suppliers with previous experience of manufacturing near to or bigger than the product (forged bar) size shall bid. The bid with insufficient information is likely to be rejected.

3.3 **Prior To Start of Manufacture:** Following details for product shall be submitted for the approval of purchaser :-

3.3.1 Chemistry for ladle and top & bottom of each ingot shall be submitted for acceptance before giving clearance for shipping of ingot.

3.3.2 **Quality Assurance Plan (QAP):** Detailed QAP shall be submitted. QAP shall include all quality assurance stages from ladle analysis, in coming inspection of ingot, forging process, heat treatment, inspection & testing, non destructive examination (NDE), cleaning, preservation, packing etc. It shall include process inspection, testing and NDE procedures with acceptance standards. Stage of purchaser and third party inspection and hold points shall be clearly indicated on the same.

3.3.3 **Manufacturing Process Plan (MPP):** Stage wise forging plan showing the following:

1. Size, Melt & No. of ingots / blooms to be used. Allocation of forgings on ingots / blooms.
2. Various forging stages indicating direction of forging and reduction ratio at each stage to be indicated. The overall reduction ratio after final stage shall be more than 3 in all directions. Principal working direction of forgings shall also be indicated.
3. As forged contour.
4. Heat treatment contour.
5. Forging contour at stage of UT.

3.3.4 **Material sampling and test plan (MSTP): Only integral test specimens are to be used for tests specified.** Location, orientation (including notch orientation for impact specimens), size and number of test specimens shall be shown in the corresponding forgings to be supplied. Location of hardness measurements shall also be indicated. Refer Annexure III for MSTP.

3.3.5 **Heat Treatment (HT) plan** including thermocouple location, HT cycle, expected temperature variations, details of furnace, job loading details in the furnace, heating rate, cooling rate, heating medium, instrumentation etc.

3.3.6 **NDE plan and procedures** including details of probes to be used for different scanning for each forging. Location, orientation and size of reference notches & holes shall be indicated. Detailed sketch of UT reference block required for each scanning direction shall be given.

3.3.7 Procedure for micro test, macro test & grain size and inclusion rating.

3.3.8 Procedures / plans for Cleaning, Preservation and Packing.

3.4 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.

4.0 THIRD PARTY INSPECTION

4.1 An independent third party inspection (TPI) shall be engaged for checking all documents and witnessing all the stages and testing as per QAP. All the documents and test certificates as per QAP shall be sent to the purchaser, duly reviewed and signed by TPI, for approval, before forgings are dispatched.

5.0 MANUFACTURING PROCESS

5.1 **Primary Melting:** Shall be done in Electric Arc Furnace with vacuum degassing, fully killed.

5.2 All bars shall be made of forgings only. The forgings shall be made with least two upsets and two drawing operations.

5.3 **Forging reduction ratio:** The overall forging reduction ratio, in all three directions, shall more than 3 after final stage of forging.

5.4 Forging shall be done as close as possible to the final forging (product) contour with allowances for heat treatment and UT.

6.0 CHEMICAL COMPOSITION

6.1 Following analysis shall be done for all elements and impurities as per ASTM E30 and ASTM E350:

6.1.1 Ladle analysis of ingot from samples taken during pouring.

6.1.2 Ingot / bloom analysis - Check test for chemical composition after receipt of ingot / bloom at forging shop on the samples taken from top and bottom end discards of the ingot. Samples shall be taken at least three locations so as to cover complete cross section of the ingot. Supplier shall submit along with the bid, the location both at top and bottom ends discards of the ingot for the approval of the purchaser.

6.1.3 Product analysis at top and bottom of each forging including test forgings after heat treatment and also on simulated heat treated test coupon. Samples taken across thickness at distance of one quarter and one half of tempered wall thickness from heat treated surfaces and just below the surfaces at each sampling location.

6.1.4 For ladle, ingot and product analysis the chemical composition, unless specified otherwise shall be in accordance with SA-350 Grade LF2 with following restrictions:

Table 1:

Element	Percentage (by weight)
Carbon (C)	0.3% max
Manganese (Mn)	0.6% - 1.35%
Phosphorous (P)	0.025% max.
Sulfur (S)	0.025% max.
Silicon (Si)	0.15% - 0.3%
Nickel (Ni)	0.40% max.[B]
Chromium (Cr)	0.20-0.25% max.[B,C]
Molybdenum (Mo)	0.10% max.[B,C]
Copper (Cu)	0.30% max.[B]
Columbium (Cb)	0.02% max.
Vanadium (V)	0.01% max.
Aluminum (Al)	0.04% max.
Cobalt (Co)	0.02% max.
Hydrogen (H)	1.5 ppm max., taken during vacuum pouring of ingot and in the final forgings

Notes for Table 1:

B -The sum of copper, nickel, chromium, vanadium and molybdenum shall not exceed 1% on heat analysis.

C –The sum of chromium and molybdenum shall not exceed 0.32% on heat analysis.

6.1.5 Carbon Equivalent (CE) shall not be more than 0.48 as per latest ASME Sec IIA SA350 LF2.

7.0 HEAT TREATMENT (HT)

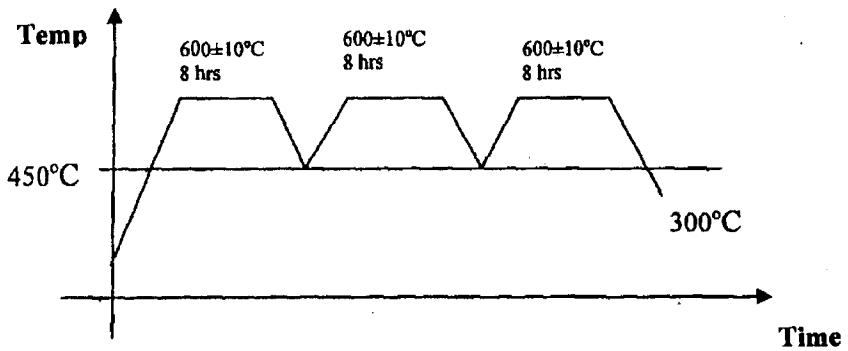
7.1 'Normalization' shall be done after contour machining near to finish dimensions.

7.2 Supplier shall submit heat treatment procedure for approval before carrying out any heat treatment.

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

7.4 The loading and unloading of items in the furnace may be witnessed by third party representative. Heat treatment chart shall be submitted for review. At least two thermocouples shall be mounted on all forgings. Temperature Vs Time recording of each thermocouple shall be submitted for approval. Uniformity of heat treatment temperature shall be proved by thermocouple attached to component.

7.5 **Simulated heat treatment:** After normalization HT of the forgings, the test specimens (called STC) specified in **Table 2** shall be subjected to simulated heat treatment cycle as per the following:



Note: Rate of heating and cooling ≤ 30°C/hr above

8.0 MECHANICAL & METALLURGICAL TESTS

8.1 **Stage of test:** All tests shall be carried out after 'Normalization' HT of forgings. All tests shall be carried on set of test specimens without simulated HT (called RTC) and then repeated on set of test specimens (STC) subjected to simulated heat treatment as per **para 7.5** above. Stage of machining out of test specimens shall be cleared only after it is shown that requirements of carrying out UT & its calibration are met. Besides on final forgings, macro etch test and inclusion rating shall be carried out at some intermediate stage after some working (cogging or intermediate) on ingot / bloom.

8.2 **Extent of test:** Tests shall be done on each and every forging at both ends (referred as End 1 & End 2 in **Table 2** below). Product may be combined in a single forging stock to reduce the extent of testing. Reduction in testing due to such combination, if any, shall be mutually discussed and agreed.

8.3 **Material Sampling and Testing Plan (MSTP):**

8.3.1 Size of each integral test coupon shall be sufficient to carry out required tests as per this specification **after discarding material as per para 8.3.2.**

8.3.2 Test coupon shall be drawn after discarding material equal to the diameter (D) of the bar forgings from each end. The central axis of the test specimen shall be taken at least D/4 from the nearest heat treated surface.

8.3.3 The test specimen shall have its longitudinal axis located parallel to the direction of major working of the forging or test blank.
Required number of test specimen shall be as per **Table 2** below, unless otherwise specified. Refer **Annexure III** for item wise testing.

8.3.4 Table 2 - Required Number of test specimens:

S. No.	Number of Tests[2]	Nomenclature	Test Temp.	No. of specimen for RTC		No. of specimen for STC		Extent of testing	Remark
				End 1	End 2	End 1	End 2		
1.	Tension Longitudinal Tension Transverse	TLR TTR	RT	1 1	1 1	1 1	1 1	On each forged piece	8 samples for each forged piece
2.	Tension Longitudinal Tension Transverse	TLH TTH	350° C	1 1	1 1	1 1	1 1	On each forged piece	8 samples for each forged piece
3.	Impact[1] Long. Impact[1] Transverse	ILT ITT	-45.6°C	1 set 1 set	1 set 1 set	1 set 1 set	1 set 1 set	On each forged piece	8 set of samples for each forged piece
4.	Impact[1] Longitudinal Impact[1] Transverse	ILC ITC	+23°C	1 set 1 set	1 set 1 set	1 set 1 set	1 set 1 set	On each forged piece	8 set of samples for each forged piece
5.	Micro and grain size	M1	RT	1	1	1	1	On each forged piece	4 samples from each forging parallel to maximum working direction
6.	Macro	M2	RT	1	1	1	1	On each ingot & on each forged piece	Minimum 4 Nos. of specimens (two each at top & bottom after discarding sufficient material) from each ingot after some working (cogging or intermediate stage) and 4 samples from each forging parallel to maximum working direction
7.	Inclusion rating	IR	RT	1	1	1	1	On each ingot & each forged piece	Minimum 4 Nos. of specimens (two each at top & bottom after discarding sufficient material) from each ingot after some working (cogging or intermediate stage). 4 samples from each forging parallel to maximum working direction
8.	Hardness	H	RT	--	--	--	--	On each forged piece	On each forging, along two lines 180° apart on both top and bottom surface and along length of forging.

NOTE:
1. Each set of impact specimen shall consist of three (3) impact specimens.
2. Material Sampling Test Plan (MSTP) shall also provide test specimen sizes with their orientation (including notch orientation for impact specimens) with respect to the product. Sample MSTP is shown Annexure III.

8.4 **Detailed requirement of tests:**

8.4.1 **Tensile Test:** ASTM A370: Stress strain diagram for all tests shall be provided. 0.2% yield strength (YS) shall be obtained by extensometer or stress strain diagram with min. 100X magnification. For high temperature test, minimum three thermocouples (2 at ends and 1 at center of gauge length of specimen) shall be used. Soaking period shall be minimum 20 min. For the duration of test the indicated temperature shall be maintained within ±3°C of test temperature i.e. 350°C. The material shall conform to the requirements as to tensile properties prescribed below:

	at RT	at 350°C
Yield strength (0.2% offset) (MPa min)	**250**	**183**
Tensile Strength (MPa min)	**485-655**	**483**
Elongation on 4d (% min)	**22%**	**To be reported**
Reduction in area (% min)	**30%**	**To be reported**

8.4.2 **Impact Test:** Notched bar impact specimens shall be of the simple beam, Charpy-type, in accordance with Test Methods ASTM E 23, Type A with a V notch. Impact specimens tested at **-45.6°C** and **+23°C** shall exhibit following minimum properties:

At -45.6°C Impact strength (average of 3 specimens)	**25 J/cm^2**
At -45.6°C Impact strength (minimum of 3 specimens)	**20 J/cm^2** (only for one specimen)
At -45.6°C Lateral expansion (minimum of 3 specimens)	**To be reported**
At +23°C Impact strength (average of 3 specimens)	**85 J/cm^2**
At +23°C Lateral Expansion (minimum of 3 specimens)	**0.9 mm**

8.4.3 **Hardness Test:** ASTM A370, on each forging: along two lines 180° apart on both top and bottom surface and along length of forging. Hardness shall not exceed **197HB**.

8.4.4 **Inclusion rating:** As per ASTM E45 Method D. Examination of surface direction shall be along the grain flow (normal to principal working direction). Heavy series is not allowed. Thin series – 1.0 for each category A, B, & D shall be aimed for and C series not allowed. Procedure for testing shall be submitted for approval.

8.4.5 **Macro Etch test:** As per ASTM E340 & E381. On all end surfaces of the forgings, surfaces to be free of macro cracks, dendrites and segregation. Surfaces shall be checked at 5X-20X for flow lines & internal imperfection. Etchant type, temperature and duration shall be reported. Original photograph to be provided. Grain flow direction to be confirmed from this test. Acceptance shall be S2, R2, and C1. Procedure for testing shall be submitted for approval.

8.4.6 **Microstructure and grain size:** Microstructure grain size determination shall be done as per ASTM E 112, ASTM E3 and ASTM E407. At 100X magnification, parallel to the main deformation direction. Etchant type, temperature and duration shall be reported. Original photo micro graph at 200X to be provided. Structure to be homogeneous. Grain size shall be 5 or finer. Procedure for testing shall be submitted for approval.

9.0 NON DESTRUCTIVE TEST

9.1 Stage of test: After HT on contours as close as possible to final contour.

9.2 QA representative/third party shall witness 100% UT examination and 100% magnetic particle examination.

9.3 All NDE examinations (UT & MPE) shall be carried out as per approved procedures. The selection of appropriate techniques/methods shall be approved. Work shall be taken up after approval of procedures.

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

9.5 Non destructive examinations shall be carried out by personnel qualified to level-1 of ASNT/ISNT and evaluated by personnel qualified to level-2 of ASNT/ISNT.

9.6 **Ultrasonic Testing (UT):**

9.6.1 100% volumes as per SA 388 (latest revisions) using reference block technique. Minimum 3 point distance amplitude correction (DAC) curve shall be generated to cover full thickness.

9.6.2 Surface finish for UT: 6.3µm or better to ensure required test sensitivity.

9.6.3 Reference Blocks for UT Calibration:

a) Reference defects: For straight beam: dia 3mm flat bottom hole (FBH). For angular beam: 25mm long 60° V notch having a depth of maximum 3% of final design thickness to be specified for each forging or max 6 mm, whichever is less.

b) Reference FBH & notches can be machined on integral extensions or extra margins on the job itself. Proposal for such reference shall be marked on the forging plan sketches. Separate blocks of the same material can be used if they are acoustically similar, i.e., back wall echo is within 2 dB.

c) Reference blocks used shall also be supplied.

9.6.4 Scanning Directions: Normal beam from all surfaces. Angle beam on outside diameter in two circumferential as well as two axial directions.

9.6.5 Recording & Acceptance: All indications equal and above 50% of DAC (Reference defect indication) shall be recorded for review. Cracks, thermal ruptures or other injurious indications irrespective of echo height are unacceptable. Other indications less than that from reference hole/notch shall normally be acceptable.

9.7 **MPI & Visual**

9.7.1 100% as per practice SA 275. Following relevant indications (indications having major dimensions greater than 1.6mm) are unacceptable.

a) Any linear indications of length greater than 3.2mm.

b) Rounded indications greater than 4.8mm.

c) Four or more relevant indication in a line separated by 1.6mm or less edge to edge.

d) Ten or more relevant indications in any 3871mm^2 of area whose major dimension is no more than 152mm with the dimensions taken in the most unfavorable location relative to the indications being evaluated.

10.0 FINISH

10.1 Free from mill scales and injurious defects like scales, laps, seams, folds, cracks, string, tears, blisters, scratches, etc.

11.0 REPAIR

11.1 Repairs involving fusion welding is not permitted. Surface defects can be removed by mechanical means with the approval of PURCHASER and the defective areas shall be smoothly dressed up with the adjacent surface followed by MPI. The minimum thickness after repair shall meet the drawing/specification requirements. Details shall be recorded.

12.0 NON-CONFORMANCE

12.1 All non-conformances shall be recorded & reported for the approval of purchaser.

13.0 MARKING

13.1 Engraving on each item with the following details (apart from specification) with low stress stamps, and identified by a halogen free painted border line.

1. Maker's Name.
2. Size.
3. Melt & Heat treatment no.
4. Specification & grade.
5. Maker's emblem/code
6. Drawing no.
7. Purchaser
8. Inspecting Authority's seal.

14.0 PRESERVATION AND PACKING

14.1 After passivation, all surfaces shall pass white cloth swab test. All forgings shall be coated with anti rust coating. Sea worthy packing shall be ensured. Procedure/plan shall be submitted for these.

15.0 INSPECTION AND CERTIFICATION

15.1 The supplier shall confirm that the product comply with this specification. The inspection & test shall be carried out in presence of the third party inspecting agency authorized by PURCHASER and also the Purchaser's Inspectors. All inspection reports & test certificates shall be submitted to PURCHASER for approval along with manufacturer's comments on the same. Shipping shall take place only after clearance, approval from PURCHASER. Each item shall be backed by 5 copies of test certificate furnishing the following details legibly in English language and certified by the inspecting authority:

1. Purchase Order No. (with purchaser's name), MPS No. & Test certificate No.
2. Specification & Grade with applicable year code.
3. Quantity & size.
4. Drawing No.
5. Heat No.
6. Steel making process
7. Chemistry including incidental elements – Ladle & Product analysis
8. HT details of the material & test coupons
9. Mechanical & Metallurgical test results as per **para 8.0**
10. NDE test results with reference & acceptance standard as per **para 9.0.**
11. Repair details, if any.
12. Cleaning & surface treatment details.
13. Dimensional reports.
14. All recorded documents as in clause 3.0 & any other report/procedure called for.

16.0 AUDIT CHECKS AT PURCHASER'S PREMISES

16.1 PURCHASER reserves the right to carry out audit checks for chemistry, HT condition, mechanical testing, metallurgical testing & NDT on representative test material or on the job, at their discretion. If any item is found defective during check tests or during subsequent processing at PURCHASER place, such items are liable for rejection.

ANNEXURE I

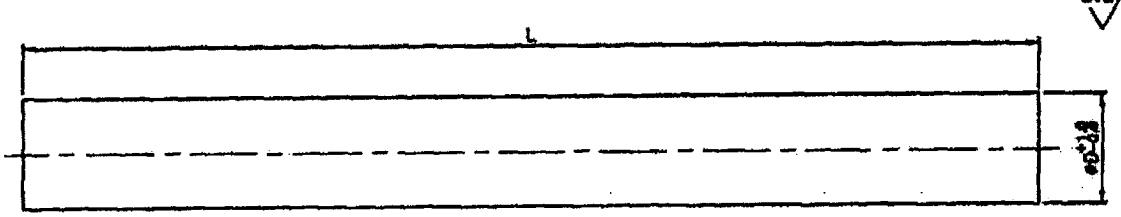
S. No.	Description	Document to be submitted along with the bid	Remark
1.	Details of previous experience	Details of the same material and grade supplied previously with client name and sample test certificates (TC) for each product	Supplied size of shell, dished end and plates / bars shall be comparable to this specification
2.	Manufacturing Facilities	Details of:	
		Forging shop capacity	Maximum forging sizes
		Heat treatment furnace capacity	Size & Type
		Testing facilities	Size
			Chemical, Metallurgical, Mechanical & NDE
3.	Quality Assurance Plan (QAP)	Sample QAP covering all stages from raw material to finished product with witness & hold points clearly indicated	QAP shall be in line with this specification
4.	Manufacturing Process Plan (MPP)	Sample MPP having brief description of all manufacturing operations with guaranteed forging ratio and grain size	Minimum forging ration more than 3 in all directions. Forged size shall also include integral test coupon and discard allowances
5.	Material Sampling & Testing Plan (MSTP)	Confirmation on Table 2 and **Annexure III**	Proposed minimum test block size proposed
7.	Heat Treatment Plan	Sample HT plan	Confirmation of Normalization HT
8.	Ultrasonic Test	Sample UT plan	Covering 100% volumetric
9.	All tests as per this specification	Testing standard followed	
10.	Third party inspection	Proposed third party name	Internationally recognized third party
11.	Point by point reply	Supplier shall confirm para by para of this specification and bring out deviation, if any	Deviation, if any, shall be clearly specified

ANNEXURE II

Item size & quantity

S. No.	Description	Size (mm)	Quantity	Remark
1.	Bar	DxL		

3.2/(✓)



NOTES :-

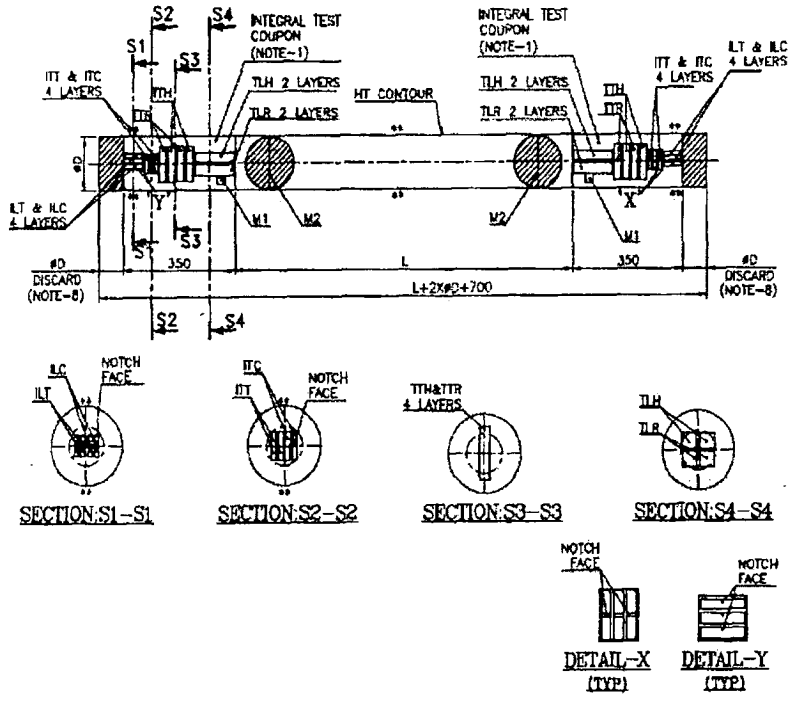
1. MATERIAL SPECIFICATION : ASME SEC IIC SA-350 LF2 CLASS 1 AND AS PER APPROVED TECHNICAL SPECIFICATION.
2. MANUFACTURE, EXAMINATION & TESTING : AS PER APPROVED TECHNICAL SPECIFICATION.
3. EACH AND EVERY FORGING SHALL BE TESTED AS PER FIGURE 1-0M.
4. THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.
5. THE COMPONENT SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
6. DETAILED DRAWING INDICATING VARIOUS STAGES OF MANUFACTURE, AND LOCATION OF TEST SPECIMENS SHALL BE SUBMITTED FOR PURCHASER'S APPROVAL BEFORE START OF PRODUCTION.

BAR

ANNEXURE III

MSTP for item of ANNEXURE II

S. No.	Description	Remark
1.	Bar	



LEGENDS :-

TLR – LONGITUDINAL TENSILE TEST AT ROOM TEMPERATURE
TLH – LONGITUDINAL TENSILE TEST AT 350°C
TTR – TRANSVERSE TENSILE TEST AT RT
TTH – TRANSVERSE TENSILE TEST AT 350 °C
ILT – LONGITUDINAL IMPACT TEST AT –45.6°C.
ITT – TRANSVERSE IMPACT TEST AT –45.6°C
ILC – LONGITUDINAL IMPACT TEST AT +23°C
ITC – TRANSVERSE IMPACT TEST AT +23°C
M1 – MICRO EXAMINATION AND GRAIN SIZE CHECK
M2 – MACRO ETCH TEST

NOTES :-

1. INTEGRAL TEST COUPONS SHALL BE PART OF FORGING TILL HEAT TREATMENT IS COMPLETED.
2. MECHANICAL, CHEMICAL AND METALLURGICAL TESTS SHALL BE CARRIED OUT ON THESE TEST COUPONS AS PER APPROVED TECHNICAL SPECIFICATION.
3. TEST SPECIMENS FOR MECHANICAL, CHEMICAL & METALLURGICAL TESTS SHALL BE AS PER APPROVED TECHNICAL SPECIFICATION.
4. PRODUCT FORGINGS (ITEMS OF 1–0) MAY BE COMBINED INTO SINGLE OR MULTIPLE FORGING STOCK/S IN ORDER TO REDUCE THE EXTENT OF TESTING. FINAL SIZE OF THE FORGING STOCK DEPENDS UPON THE MANUFACTURER REFER PARA 8.2 OF TECHNICAL SPECIFICATION.
5. MACRO AND INCLUSION RATING TESTS SHALL BE CARRIED OUT ON INGOT AFTER SOME WORKING AND ON EACH AND EVERY FORGING.
6. ALL DIMENSIONS ARE IN MM
7. **HARDNESS TEST AT INTERVAL OF 180° AT THE ENDS AND MIDDLE.
8. MATERIAL EQUAL TO THE DIAMETER OF THE BAR SHALL BE DISCARDED BEFORE TAKING OUT TEST COUPONS.

MSTP FOR BAR

(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:

Fax : 011-2306 2626

संख्या /No. 20/29/2009 -Boilers
भारत सरकार
वाणिज्य और उद्योग मंत्रालय
(औद्योगिक नीति एवं संवर्धन विभाग)
उद्योग भवन, नई दिल्ली - 110107
GOVERNMENT OF INDIA
MINISTRY OF COMMERCE AND INDUSTRY
(DEPTT. OF INDUSTRIAL POLICY & PROMOTION)
UDYOG BHAWAN, NEW DELHI-110107,
दिनांक/ **Dated, the 8th October , 2014**

To

1. All the members of the Central Boilers Board
2. All the Inspecting Authorities

Subject: List of recognised Inspecting/Competent Authorities, Well Known Steel Makers, Foundries/Forgings units, Tube/Pipe Makers, Material Testing Laboratories and Remnant Life Assessment Organizations under Indian Boiler Regulations as on 30th September, 2014.

Sir,

I am to forward herewith a copy each of the list of recognised Inspecting/Competent Authorities, Well Known Steel Makers, Foundries/Forgings units, Tube/Pipe Makers, Material Testing Laboratories and Remnant Life Assessment Organizations under Indian Boiler Regulations, 1950, as on 30th September, 2014 for your reference and record.

Thanking you,

Yours faithfully,

(S. K. Jain)
Development Officer &
Assistant Secretary, Central Boilers Board
Tel.No.011-23063166

(As on 30/09/2014)

INSPECTING AUTHORITIES

	NAME OF THE AUTHORITY	AREA OF OPERATION
1.	Director of Boilers, Andhra Pradesh	Andhra Pradesh
2.	Chief Inspector of Boilers, Arunachal Pradesh	Arunachal Pradesh
3.	Chief Inspector of Boilers Assam	Assam
4.	Chief Inspector of Boilers Bihar	Bihar
5.	Chief Inspector of Boilers Chhattisgarh	Chhattisgarh
6.	Chief Inspector of Boilers, Delhi	N.C.T.D.
7.	Chief Inspector of Boilers, Goa.	Goa
8.	Director of Boilers, Gujarat.	Gujarat, Daman & Diu and Dadra & Nagar Haveli
9.	Chief Inspector of Boilers, Haryana.	Haryana & Chandigarh
10.	Chief Inspector of Boilers, Himachal Pradesh.	Himachal Pradesh
11.	Chief Inspector of Boilers,, Jharkhand.	Jharkhand
12.	Director of Boilers, Karnataka.	Karnataka
13.	Director of Boilers, Kerala.	Kerala
14.	Director of Boilers, Madhya Pradesh.	Madhya Pradesh
15.	Director of Boilers, Maharashtra.	Maharashtra
16.	Chief Inspector of Boilers, Meghalaya	Meghalaya
17.	Chief Inspector of Boilers, Manipur	Manipur

18. Chief Inspector of Boilers, Mizoram	Mizoram
19. Chief Inspector of Boilers, Nagaland	Nagaland
20. Director of Boilers, Orissa	Orissa
21. Director of Boilers, Punjab	Punjab
22. Chief Inspector of Boilers, Labour Department, Government of Puducherry, Puducherry	Puducherry
23. Chief Inspector of Boilers, Rajasthan.	Rajasthan
24. Director of Boilers Tamil Nadu	Tamil Nadu
25. Director of Boilers Telangana	Telangana
26. Chief Inspector of Boilers, Tripura	Tripura
27. Director of Boilers, Uttar Pradesh	Uttar Pradesh
28. Chief Inspector of Boilers Uttarakhand	Uttarakhand
29. Chief Inspector of Boilers, West Bengal	West Bengal
30. M/s. Lloyd's Register Asia 63-64, Kalpataru Square, 6th Floor, Kondivita Lane, Off. Andheri-Kurla Road, Mumbai-400 059	Tamil Nadu, Maharashtra Karnataka, Gujarat, Haryana, Himachal Pradesh, Punjab, Andhra Pradesh, Telangana & Odisha
31. M/s Bureau Veritas (India) Private Limited, Marwah Centre, 6th Floor, Opp. Ansa Inds. Estate, K. Marwah Marg, Off. Saki-Vihar Road, Andheri (East), Mumbai-400 072	Chhattisgarh, Gujarat , Haryana , Madhya Pradesh, Maharashtra , Odisha , Tamil Nadu, Bihar, Jharkhand, Sikkim & West Bengal
32. M/s ABS Industrial Verification (India) Pvt. Limited, 10th Floor, Lakhani's Centrium, Sector-15, Plot No. 27, CBD Belapur (E), Navi Mumbai-400 614	Maharshtra, Odisha & West Bengal

33.	M/s TUV India Pvt. Limited (TUV Nord Group) 801, Raheja Plaza-1, L.B.S. Marg, Ghatkopar(W) Mumbai-400 086	Andhra Pradesh, Gujarat, Maharashtra, Himachal Pradesh, TamilNadu, Telangana & Karnataka
34.	M/s. TUV Nord Systems GmbH Co.KG. Langemarckstr 20 451141 Essen GERMANY.	Europe, Brazil, China, Korea and Thailand
35.	M/s RSA (Formerly Royal & Sun Alliance plc) 17 York Street, Manchester, M2 3RS, United Kingdom	Europe
36.	M/s. Japan Inspection Company Limited, No.10-7, 1-Chome, hatchobori, Chou-ku, Tokyo, 104-0032, Japan	All countries in Asia except India
37.	M/s. S.G.S. Korea Company Limited, Industrial Division, 647-2,Sinpyeong-dong, Saha-gu, Busan, KOREA (604-030).	Korea & Japan
38.	M/s Bureau Veritas, 67-71, Boulevard du Chateau, 92200 Neuilly-sur-Seine, FRANCE	All countries except India.
39.	M/s. Lloyds Register Verification Ltd., 71, Fenchurch Street, London EC 3M, U.K.	All countries except India.
~~40.~~	~~M/s. Velosi Certification Bureau Ltd.,~~ Unit 1 Woodside Business Park, Whitley Wood Lane, Reading, Berkshire,RG2 8LW United Kingdom	~~Europe, Middle East~~ Countries, China, Malaysia Singapore & USA
41.	M/s TUV Rheinland AG Am Grauen stein, D-51105 Koln, Germany	All countries except India
42.	M/s OOO "TekhnoLogicheskieEnergosistime" 1. Kalinia St. Belgorod, 308001 Russia	Russia, China, Ukraine, USA & Germany

43	M/s Engineering Bureau Franke International, 55, Amurskaya St., Dnepropetrovsk 49108, Ukraine	Ukraine, Russia, Belarus, China , Uzbekistan, Poland, Belgium, Romania, & Czech Republic
44.	M/s. ARISE Boiler Inspection & Insurance Company Risk Retention Group, Grand Bay 1, 7000 South Edgerton Road, Suite 100, Breeksville, OH 44141 USA	USA & Canada
45.	M/s Tata Projects Limited, Quality Service Division, 2nd Floor, Varun Towers-1, Begumpet, Hyderabad-500 016	All countries except India
46.	M/s TUV SUD Industrie Service GmbH, Wstendstr. 199, 80686 Munich, Germany	All countries except India
47.	M/s Germanischer Lloyd Industrial Services GmbH, Steinhoeft 9, 20459 Hamburg, Germany	All countries except India
48	M/s. TUV Thuringen e.V., Business Division Steam and Pressure Technology, Melchendorfer Str. 64, 99096 Erfurt, Germany	Europe
49.	M/s. SGS-CSTC Standards Technical Services Co. Ltd. 9th Building, No. 69, KangQiao Industrial Park, Block 1159, KangQiao East Road, Pudong District, Shanghai-201 319 China	China
50	M/s Intertek Inspection Services UK Limited (Formerly M/s Moody International Limited) Hayworthe House, Market Place, Haywards Heath, West Sussex, United Kingdom	All countries except India
51.	M/s ABSG Consulting Inc., 16855 Northchase Drive, Houston, TX 77060 United States of America	All countries except India

52. M/s. Hartford Steam Boiler Inspection and Insurance Company of Connecticut, One State Street, 8th Floor Hartford, CT 06141-0299 U.S.A.	All countries except India and China
53. M/s. Certification Engineers International Limited, D 101-106, First Floor, International Technology Centre, CBD Belapur Station Complex, Navi Mumbai-400 614	All countries in Europe, Middle East & China
54. M/s. Det Norske Veritas AS, Veritasveien 1, PO Box 300, N-1322, Hovik, Norway	Europe, South & North America and Asia (except India)