



BHARAT HEAVY ELECTRICALS LIMITED
HEEP HARIDWAR INDIA-PIN 249403
FAX NO: 0091 1334 226462/223948
PHONE NO: 0091 1334 284049

Tender No.: F/3990/2013/3890K/1

Due Date: 04.06.2014

Sub: BHEL-HEEP Haridwar/OPEN-TENDER

Dear Sir,

The Heavy Electricals Equipment Plant (HEEP) located in Haridwar, India is one of the major manufacturing plants of Bharat Heavy Electricals Ltd. The core business of HEEP includes design and manufacture of large steam and gas turbines, turbo generators and so on. Government of India has a plan to add more than 76000 MW in the current five year plan (2012-2017).

Sealed tenders with the Tender No. and opening date clearly super-scribed on the cover are invited from the manufacturers (registered as well as unregistered) for the supply of the following items:-

The tender documents can be down loaded from our web site www.bhel.com or www.bhelhwr.co.in or www.tenders.gov.in or <http://eprocure.gov.in> submitted with requisite EMD and tender fee. **Only those vendors who fulfill the Minimum Qualifying Requirements (as per Annexure) will be considered for further technical evaluation.**

This notification shall be published in Indian as well as International News paper. **The last date for taking tender documents shall be 03.06.2014 & opening of tender shall be 04.06.2014.** Tenders will be received up to 1.45 P.M. on 04.06.2014 and opened on the same day at 2.00 P.M. in the Tender Room. **Please note that tender received after due date & time (1.45PM on 04.06.2014) will not be opened.** BHEL will not be responsible for any type of postal / courier delay.

Intending vendors must remit the tender fee of Rs. 2,000/- for indigenous vendors (or equivalent amount in foreign currency for foreign vendors i.e. USD 50/- or EU 40/-) against each tender along with the requisite EMD Rs 1, 00,000/- (Rupees One Lacs Fifty Thousands) in the form of cash/pay order/bank demand draft only (Cheque / Bank Guarantee are not acceptable) while submitting the tender documents as detailed in "Instruction to Bidders", after downloading from this web site. In case of foreign bidders e-payment may also be accepted as EMD. EMD may be waived for following cases:

- Central/State – PSUs/Government departments
- Micro and Small Enterprises (Registered under SSI, NSIC, Khadi Boards, DIC etc) subject to submission of appropriate documents.

Specifications of the above items can be physically collected from BHEL Haridwar or vendors can contact by email ashishk@bhelhwr.co.in; rschn@bhelhwr.co.in; pkbansal@bhelhwr.co.in against proof of draft of the tender fee in favour of BHEL, Haridwar. This draft is to be submitted along with offer. Amendments/Corrigendum, if any, will be hosted on our web site only. Other terms and conditions will be as per tender documents.

Tender no.	Item Description	Specification & Rev. No.	Cross-section	Qty.
F/3990/2013/3890/K/1	Bar material for Turbine Blades (Nimonic 80A) Grade: NiCr20TiAl	HW12784 Rev.01	64x29	200 Kg

The total quantity may undergo change at the time of ordering.

The details of each item with required delivery are given in **Annexure-IV(Details of Items)**

Please submit your Techno-Commercial offer only for the above requirement subject to our terms and conditions.

BIDS SHALL BE OPENED OF THOSE VENDORS ONLY WHO SHALL SUBMIT EMD AND TENDER FEE. [PLEASE SUBMIT SEPARATE DRAFTS FOR EMD AND TENDER FEE DRAWN IN FAVOUR OF BHEL, HARIDWAR IN ANOTHER ENVELOPE SUPERSCRIBED WITH BOLD LETTERS “EMD & TENDER FEE” at 2 PM on the due date in the presence of authorized representative of the bidders who may like to be present. The authorized representative should bring authority letter from their parent company (Manufacturer) for attending the bid opening.

KINDLY READ “INSTRUCTIONS TO BIDDERS.” QUOTATIONS NOT IN ACCORDANCE WITH THE INSTRUCTIONS ARE LIABLE TO BE DISQUALIFIED AND IGNORED.

Thanking You,

Yours Faithfully,

For & on behalf of BHEL, Hardwar

(P K Bansal)

AGM (Purchase-Steel)

INSTRUCTIONS TO BIDDERS FOR OPEN TENDER

DEFINITION

Registered Vendors - Are those who are registered with BHEL, Haridwar for procurement of Bar Material for Turbine Blades Grade NiCr20TiAl.

Un-registered Vendors - Are those who are not registered with BHEL, Haridwar for procurement of Bar Material for Turbine Blades Grade NiCr20TiAl.

Un-registered vendors shall be considered, if and only if, they meet the minimum qualification requirement and quality requirements as given below.

MINIMUM QUALIFICATION REQUIREMENT for Bar Material for Turbine Blades Grade NiCr20TiAl (Nimonic 80A)

Note: Vendors already registered with HEEP, BHEL Haridwar for enquiry items are exempted from the condition below:

Below points (1 to 5) are mandatory qualification requirements. Offers of vendors not meeting these requirements will not be considered:

1. Vendor must have experience of manufacturing and supplying rectangular bars in grade NiCr20TiAl (material number 2.4952).
2. In support of above, details of the experience to be submitted with offer in the format given below:

S. No	Name of customer	Purchase order No	Size	Year of supply	Quantity

3. Vendor must have in-house manufacturing facilities like melting, secondary refining, rolling / forging, heat treatment etc. to manufacture rectangular bars as per BHEL specification HW12784 and enquiry size. Details of the manufacturing facilities like melting, secondary refining, rolling / forging, heat treatment etc. are to be provided with offer.
4. Vendor must have in house testing facilities to carry out all properties testing as per the requirements of clause 7 BHEL specifications HW12784. However, outsourcing of Creep Rupture testing is permitted. Details of testing facilities are to be submitted with offer. In case of outsourcing of Creep Testing, details of source to be furnished with offer.
5. Vendor to confirm that they will meet all the requirements of BHEL specification HW12784. Clause wise confirmation to be given with offer.
6. Vendor to confirm inspection by third party inspection agency (M/s LRS/TUV/BVIS) for foreign bidders and BHEL nominated inspection agency M/s TUV for indigenous bidders as per quality plan "QA/CF/QP/358, rev 00".

Vendors must fill up Annexure – II in confirmation to above Minimum Qualifying Requirements.

ESSENTIAL INSTRUCTIONS

1. **Only those bids will be opened which have been submitted with requisite EMD & tender fee.**
2. **All un-registered vendors shall be approved by BHEL, if found suitable, on the basis of data furnished by them in Supplier Registration Form (SRF) Foreign Vendors or Indigenous Vendors. SRF can be downloaded from website http://www.bhel.com/vender_registration/vender.php**
3. **Vendor (s) shall not be considered for ordering if not approved by BHEL.**
4. **BHEL team may visit the vendor (s) works for verification of capability and capacity claimed in tender documents/offer (s).**
5. The tenders shall be submitted in three parts
 - i. Part I - Techno -Commercial Bid,
 - ii. Part II - Price Bid &
 - iii. Part III - Vendor Registration FormAs described below on or before the due date. Vendor Registration Form shall be submitted by unregistered vendors only.
6. **BHEL will deal directly with the manufacturers/principal vendors and no correspondence with the agents will be entertained. The agents will not be permitted to visit/interact with BHEL on behalf of their principals. Subsequently also, no correspondence of any type will be made with any agents. (All individuals/companies – representing/advisor/retainership basis or claimed to be part of time employees for many OEMs/claiming to be channel or business partner for BHEL work/stockist not registered specifically etc are agents). Communications with only those agents who have submitted agency agreement with their respective principal may be done.**
7. The bidders (original registered suppliers) will have to submit ink-signed offer/bid in original directly to BHEL. In case the bid is submitted by FAX/e-mail, the bidders shall simultaneously ensure submission of ink-signed original bid to BHEL also in manner prescribed in tender.
8. The suppliers or their authorized person may be allowed to attend the tender opening, if duly authorized by their principals, through a specific letter for a particular enquiry for specific price bid opening on that particular day. General authorization letter is not acceptable.
9. **The Quotation should be from the Principal / Original Manufacturer, failing which the quotation is likely to be ignored. In Case the quotation is submitted through agent, the quotation must accompany original authorization letter.**
10. Any corrections / amendments shall be properly & fully authenticated with signature. No Overwriting is acceptable.
11. Part-I containing techno-Commercial bid and part-III containing Vendor Registration Form will be opened on the date and time specified in the tender notice in the presence of those vendors who wish to attend.
12. Part-II (Price Bids) along with supplementary price bids, if necessary, will be opened at a later date of only those bidders whose techno-commercial bids have been found acceptable.
13. Suitability of delivery shall be the important criteria for evaluation of techno commercial bid and the bids falling within the delivery period and meeting the last delivery requirement. Any offers beyond this period shall be rejected.
14. Currency exchange rate (TT selling of SBI) will be applicable on the date of opening of Part-I (Techno-commercial Bid) for evaluation purpose.
15. **Depending upon the delivery suitability, BHEL reserves the right to split order on more than one vendor.**
16. **Evaluation of Bid: - The bid shall be evaluated**
 - a. **Cost to BHEL basis. (Basic Cost + Insurance + Transportation + Duty)**
 - b. **The loading, if any, on account of LD penalty, payment terms or any other cost determined at later stage, which shall be communicated to the vendor.**
17. Tenders when finalized shall be in the name of the bidder only and change of name during tender evaluation (without certificate from registrar of company) and after submission of the tender is liable to make the offer ineligible for participation.
18. All test certificates / Guarantee certificates to be submitted in TRIPLICATE along with dispatch documents.
19. BHEL reserves the right to open the price bid (part-II) along with the opening of techno-commercial offer at its option and in that case vendor will be informed accordingly.
20. **BHEL reserves the right to go for reverse auction. Vendors are requested to give their best price. In case of failure of reverse auction the paper bid shall be processed. Bidder should clearly indicate their acceptance for reverse auctioning in Annexure-I. The bids of those vendors who do not agree for reverse auction may not be considered. The Terms & Condition for Reverse Auctioning are given below.**

21.Total weight -- /Gross / Net in Kg. essentially should be indicated.

22. BHEL will evaluate the technical bids against essential criteria/requirements. BHEL may seek clarifications, if required, from the qualified bidders only. These clarifications will be communicated to the eligible vendors. **The offers of those bidders, who are unable to respond in specified time frame, are likely to be ignored.**

23. SETTLEMENT OF DISPUTES

- Indigenous Vendors: In all cases of dispute the matter shall be referred for arbitration to any arbitrator to be appointed by the Executive Director or any officer who is the administrative head of Bharat Heavy Electricals Ltd., at Haridwar. The venue of arbitration shall invariably be Ranipur Haridwar. The award of the arbitrator shall be final and binding on both the parties. The arbitrator shall have the power to extend, from time to time, the time for making his award with the consent of the parties.
- Foreign Vendors: In the event of any dispute or difference arising between the parties to this contract regarding execution of same or their respective rights and liabilities there under, the same shall except as otherwise expressly provided therein, be referred to the arbitration of the two arbitrators, one to be appointed by each party; or in the case of the said arbitrators not agreeing then an umpire to be appointed by the two arbitrators in writing before entering on that reference and provisions of the Indian Arbitration Act ,1940 or any statutory notification, or re-enactment therefore and rules framed there under from time to time shall apply to such arbitration . If the two arbitrators do not agree on the appointment of umpire, the nomination of the umpire shall be done by the International Chamber of Commerce, Paris(France).The decision of arbitrators, or in case of their not agreeing, that of the said umpire shall be binding both on seller and purchaser. The venue of the arbitration invariably be New Delhi.

24. JURISDICTION

All question, dispute or differences arising under, out of or in connection with the purchase order shall be subject to the exclusive jurisdiction of Haridwar courts.

25. OVER RIDING CLAUSE

All stipulations made in any correspondence other than those exchanged in regards to “instruction” in our tender documents / enquiry for submission of your offer, if at all shall be void to the extent they are repugnant to the conditions contained herein above and in the purchase order.

26. FINALITY OF MANAGEMENT DECISION

At all places in the preceding clauses BHEL Management’s decision shall be final.

IN CASE YOU ARE NOT MAKING AN OFFER AGAINST THIS ENQUIRY, THEN PLEASE ARRANGE TO SEND A LETTER OF REGRET IF YOU HAVE COLLECTED THE TENDER DOCUMENTS FROM BHEL.

DETAILS OF COMPOSITION OF PART-I (TECHNO-COMMERCIAL BID), PART-II (PRICE BID) & PART-III (VENDOR REGISTRATION FORM)

PART-I (TECHNO-COMMERCIAL BID) shall comprise of following documents:

- a. Confirmation to Minimum Qualification Requirement as per Annexure-II (For unregistered vendors only).
- b. Complete technical offer as per specification, technical requirement along with un-priced bid giving FOB and CFR Mumbai separately and delivery schedule.
- c. Validity of offer to be indicated.
- d. **Annexure - I** - Compliance sheet for technical/commercial terms and conditions for two part tender.
- e. **Deviation with reference to specification, if any, should be clearly indicated on a separate sheet.**
- f. Details of activity outsourced.

PART –II (Price Bid)

- a. Price bid with prices to be submitted as part-II of the tender.
- b. Prices should remain firm till the execution of the order.
- c. For Indigenous vendors: please quote your rates on FOR destination - Store-HEEP-BHEL basis. However, the insurance will be arranged by BHEL. You can dispatch the goods through any Indian Bank Association approved transporters having their branch at Haridwar/destination. For your convenience the names and addresses of transporters approved by IBA & BHEL are posted at our hwrnet”. If any bidder still quotes on other than FOR destination basis, then his offer will be loaded by maximum freight, packing & forwarding charges quoted by any other bidder from the same or nearby station, against the enquiry/freight rate available with BHEL. Further, non-availability of BHEL approved transporter will not be accepted for re-scheduling the delivery or waiver of penalties on account of delayed delivery.
- d. For foreign vendors: The prices are to be quoted on FOB and C&F Mumbai basis separately. The bids will be evaluated on C&F Mumbai basis. The bidder who quote on other than C&F Mumbai basis then his offer will be loaded by maximum freight, packing & forwarding charges quoted by any other bidder from the same or nearby port against the enquiry/freight rate available with BHEL. Further non-availability of ship will not be accepted for re-scheduling the delivery or waiver of penalties on account of delayed delivery.
- e. In case of FOB, Loading port must be mentioned. Please note that **Ex-Works** price are **not** acceptable & offer shall not be considered.
- f. Insurance – Marine in case of foreign vendor & inland in case of Indigenous vendor shall be taken care by BHEL.
- g. **Prices are to be written in both Figures & Words. In case of any difference between the two, the figure written in words shall be considered for evaluation. No over writing in this is acceptable.**
- h. LD Penalty shall be applicable at the rate of ½ % (half percent) per week or part thereof subject to a maximum of 10%. In case of any variation in LD penalty, your prices shall be loaded to the extent LD penalty not accepted by you.
- i. Payment term shall be “100% payment against dispatch documents, through irrevocable & unconfirmed LC or Cash against Documents (for foreign vendors) with bank charges as either side and “after receipt and acceptance of material” (for indigenous vendors)”. **BHEL as a rule do not agree to release advance payment.**
- j. **Difference, if any, in cost in payment terms with respect to BHEL Payment terms (“100% payment against dispatch documents, through irrevocable & unconfirmed LC (for foreign vendors) and after receipt and acceptance (for indigenous vendors)” shall be loaded in prices of vendor.**
- k. Irrevocable LC is opened for one quarter (3 months) & is established 60days prior to delivery schedule. The charges of establishing the LC are on either side i.e. charges in India to be borne by BHEL and charges outside of India to be borne by vendor. If any vendor insists for LC for more than one quarter, vendor has to essentially bear all charges (Within & outside India) for the period exceeding one quarter.

Part-III - Vendor Registration Form (SRF)
(SRF-Foreign Suppliers or SRF-Indian Suppliers)

- a. The SRF (as applicable) duly filled up will be assessed for manufacturing capability quality systems being followed, organizational soundness and financial worthiness. The same shall be submitted with Part-I (Techno-Commercial Bid) by un-registered vendor only with BHEL, HEEP, Haridwar.

MARKING OF ENVELOPE:

- Each envelope is to be super scribed as “TENDER FOR (ITEM NAME) AGAINST TENDER NO. ----- DUE ON -----”.
- Drafts for Tender Fee & EMD to be kept in one envelope – Envelope –A. On the Top of the envelope, please write Draft No., Issuing Bank Details & Amount. Those vendors who are quoting for more than one tender must submit a statement in the envelopes of all those tenders giving details of all the tenders being quoted. However, the draft of each tender should be kept in individual tender envelop.
- Techno-Commercial - Part-I to be kept in another envelope – Envelope-B & to be marked as Techno-Commercial Offer.
- Vendor Registration Form - Part –III to be kept in another envelope – Envelope – C & to be marked as Vendor Registration Form.
- Price Bid – Part-II to be kept in another envelope – Envelope-D & to be marked as Price Bid.
- Envelope-A, Envelope-B, Envelope-C & Envelope-D are to be kept in one envelope super scribed as above

Envelopes not marked as above are liable to be ignored and will not be opened.

ANNEXURE-I

COMPLIANCE SHEET FOR TECHNICAL/COMMERCIAL TERMS AND CONDITIONS FOR TWO PART TENDER

PLEASE FILL THIS ANNEXURE & ATTACH WITH YOUR TECHNO-COMMERCIAL BID.

Offer must be sent in two separate sealed envelopes containing techno-commercial offer in one envelope marked "TECHNO-COMMERCIAL BID" and prices in second envelope marked "PRICE-BID". Both the envelopes must be contained in the main envelope. Tender name and due date to be marked on all the envelopes.

You are requested to kindly confirm /clarify the following:-

S. No.	Description	Vendor's Confirmation
1	Vendor to confirm that they meet each & every clause of specification HW12784 Rev 01.	YES / NO
2	Validity: confirm that validity of the offer shall be 90 days from the date of tender opening	YES / NO
3	Confirm that un-priced part of price bid is enclosed with technical commercial offer	YES / NO
4	Confirm delivery period quoted in terms of months/weeks/days.	YES / NO
5	Confirm that prices are quoted on FOB as well as CFR Mumbai basis (for foreign vendors) and FOR Haridwar basis only (for Indian vendors)	YES / NO
6	Confirm that Loading Port has been mentioned.	YES / NO
7	Confirm that prices shall be firm and fixed throughout delivery period.	YES / NO
8	Confirm that payment term shall be "100% through irrevocable and unconfirmed LC Or Cash against documents" for foreign vendors and "100% after receipt and acceptance of material" for indigenous vendors.	YES / NO
9	LD Penalty shall be applicable at the rate of ½ % (half percent) per week or part thereof subject to a maximum of 10%. In case of any variation in LD penalty, your prices shall be loaded to the extent LD penalty not accepted by you.	YES / NO
10	Confirm that all test certificates to be submitted as per BHEL specification. in TRIPLICATE along with dispatch documents	YES / NO
11	Right of acceptance – BHEL reserves the right to reject any or all quotations without assigning any reasons thereof. BHEL also reserves the right to increase or decrease the tendered quantities. Vendors should be prepared to accept order for reduced quantities without any extra charges. Vendor should also be prepared for giving discount in case of increase in quantity.	YES / NO
1	Confirm specifically that material shall be supplied as per tender documents.	YES / NO
1	Ink signed order acceptance shall be furnished within 15 days of order placement.	YES / NO
1	Confirm if there is Indian agency commission.	YES / NO
15	Please confirm to participate in Reverse Auction on CFR Mumbai basis charges for foreign suppliers. For Indian suppliers, please quote your rates on FOR Destination basis.	YES / NO
1	Confirm acceptance of Risk Purchase clause.	YES / NO
17	Confirm to send original ink signed copy of offer, if offer has been sent through e-mail or FAX or photocopy has been submitted.	YES / NO

ANNEXURE-II

MINIMUM QUALIFICATION REQUIREMENT for Bar Material for Turbine Blades Grade NiCr20TiAl (Nimonic 80A)

Note: Vendors already registered with HEEP, BHEL Haridwar for enquiry items are exempted from the condition below:

Below points (1 to 5) are mandatory qualification requirements. Offers of vendors not meeting these requirements will not be considered:

1. Vendor must have experience of manufacturing and supplying rectangular bars in grade NiCr20TiAl (material number 2.4952).
2. In support of above, details of the experience to be submitted with offer in the format given below:

S. No	Name of customer	Purchase order No	Size	Year of supply	Quantity

3. Vendor must have in-house manufacturing facilities like melting, secondary refining, rolling / forging, heat treatment etc. to manufacture rectangular bars as per BHEL specification HW12784 and enquiry size. Details of the manufacturing facilities like melting, secondary refining, rolling / forging, heat treatment etc. are to be provided with offer.
4. Vendor must have in house testing facilities to carry out all properties testing as per the requirements of clause 7 BHEL specifications HW12784. However, outsourcing of Creep Rupture testing is permitted.
Details of testing facilities are to be submitted with offer. In case of outsourcing of Creep Testing, details of source to be furnished with offer.
5. Vendor to confirm that they will meet all the requirements of BHEL specification HW12784. Clause wise confirmation to be given with offer.
6. Vendor to confirm inspection by third party inspection agency (M/s LRS/TUV/BVIS) for foreign bidders and BHEL nominated inspection agency M/s TUV for indigenous bidders as per quality plan "QA/CF/QP/358, rev 00". Quality plan is enclosed in Annexure-V.

Signature with stamp

Name:

Name of Firm:

Designation: Date:

ANNEXURE-III

TERMS AND CONDITIONS OF REVERSE AUCTIONING

Against this enquiry for the subject item /system with detailed scope of supply as per enquiry specifications, BHEL may resort to “REVERSE AUCTION PROCEDURE” i.e., ON LINE BIDDING ON INTERNET.

- For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
- BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
- BHEL will inform the vendor in writing in case of reverse auction, the details of Service Provider to enable them to contact & get trained.
- Business rules like event date, time, start price, bid decrement, extensions etc. also will be communicated through service provider for compliance.
- Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse auction. Without this, the vendor will not be eligible to participate in the event.
- BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the vendor to enable them to fill-in the price and keep it ready for keying in during the Auction.
- Reverse auction will be conducted on scheduled date & time.
- At the end of Reverse Auction event, the lowest bidder value will be known on the network.
- The lowest bidder has to Fax the duly signed Filled-in prescribed format as provided on case-to-case basis to BHEL through Service provider within 24 hours of Auction without fail.
- Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct business with BHEL as per prevailing procedure.
- In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL’s standard practice.

ANNEXURE-IV

(Item Details and Delivery Schedule)

Tender no.	Item Description	Specification & Rev. No.	Cross-sections	Qty.	Delivery
F/3990/2013/3890/K/1	Bar Material for Turbine Blades Grade: NiCr20TiAl (Nimonic 80A)	HW12784 Rev.01	64x29mm	200 Kg	31.10.2014

MANUFACTURER'S NAME AND ADDRESS		STANDARD QUALITY PLAN				TO BE LED BY BHEL		TO BE FILLED BY BHEL						
VENDOR'S NAME		BAR MATERIAL FOR TURBINE BLADES		QP NO. REV.	QA/CF/QP/358									
BHEL		-		00	00									
SL. NO.		CHARACTERISTICS		CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY		REMARKS		
1		3		4	5	6	7	8	9	D _e	M	B	N	11
2		1												
3		2												
4		3												
5		4												
6		5												
7		6												

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	D _e	11
1.	VACUUM INDUCTION MELTING		MAJOR	SPECTRO ANALYSIS	EACH HEAT	HW12784	HW12784	TC	P	V
2.	ELECTRO SLAG REMELTING (ESR) OR VACUUM ARC REMELTING (VAR) ROLLING / FORGING		MAJOR	SPECTRO ANALYSIS	EACH HEAT	HW12784	HW12784	TC	P	V
3.						AS PER VENDOR'S PRACTICE		IR	P	-
4.	HEAT TREATMENT		MAJOR	HT CHART	100%	HW12784	HW12784	TC	P	V
5.	STRAIGHTENING		MAJOR	STARIGHTNESS	100%	HW12784 & AS PER VENDOR'S PRACTICE		TC	P	V
6.	HARDNESS TEST		MAJOR	HARDNESS	10% PER HEAT PER HT BATCH OR MIN 10 BARS WHICH EVER IS MAXIMUM	HW12784	HW12784	TC	P	W
7.	MECHANICAL TESTING	0.2% PROOF STRENGTH TENSILE % ELONGATION % REDUCTION IN AREA IMPACT	MAJOR	MECHANICAL TEST	HARDEST AND SOFTEST BAR PER HT BATCH	HW12784	HW12784	TC	P	W

MANUFACTURER/SUBCONTRACTOR	FOR CUSTOMER USE	APPROVED BY
	<p>LEGEND:</p> <p>! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.</p> <p>M: MANUFACTURER / SUBCONTRACTOR</p> <p>B: BHEL NOM. INSPECTION AGENCY "TUV" (INDIAN VENDORS)</p> <p>THIRD PARTY INSPECTION AGENCY LRS/TUB/BV (FOR FOREIGN VENDORS)</p> <p>N: CUSTOMER</p> <p>INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION</p> <p>ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER</p>	<p>APPROVED BY</p> <p><i>Sugandha Agansal</i></p> <p>06/10/2011</p> <p>CA</p>

MANUFACTURER'S NAME AND ADDRESS		STANDARD QUALITY PLAN				TO BE FILLED BY BHEL		TO BE FILLED BY BHEL	
VENDOR'S NAME		ITEM		BAR MATERIAL FOR TURBINE BLADES		QP NO.		QA/CF/QP/358	
BHEL		DRG. NO.		-		REV.		00	
SL. NO.		SPEC.		HW12784		REV.		01	
COMPONENT & OPERATIONS		CHARACTERISTICS		CLASS		TYPE OF CHECK		QUANTUM OF CHECK	
2		3		4		5		6	
1		3		4		5		6	
REFERENCE DOCUMENT		7		ACCEPTANCE NORMS		8		FORMAT OF RECORDS	
9		9		10		10		11	
REMARKS		11		11		11		11	

SL. NO.	DESCRIPTION	CLASS	TYPE OF CHECK	AS PER SPEC	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY	REMARKS
8.	METALLOGRAPHIC EXAMINATION IN CORNER AND IN CENTER POSITION	MAJOR	METALLOGRAPHIC	AS PER SPEC	HW12784	HW12784	TC	P	V
9.	PROCESS QUALIFICATION FOR EACH FABRICATION FACILITY (FOR FIRST TIME SUPPLY)	MAJOR	CREEP	AS PER SPEC	HW12784	HW12784	TC	P	V
9.1	MECHANICAL TESTING IN EDGE POSITION	MAJOR	MECHANICAL TEST	AS PER SPEC	HW12784	HW12784	TC	P	W
9.2	METALLOGRAPHIC EXAMINATION IN LONGITUDINAL DIRECTION	MAJOR	METALLOGRAPHIC	AS PER SPEC	HW12784	HW12784	TC	P	V
10.	NDT	MAJOR	VISUAL DP, UT	100%	HW12784	HW12784	TC	P	W
11.	MATERIAL IDENTIFICATION / VERIFICATION CHECK	MAJOR	SPECTRO	100%	HW12784	HW12784	TC	P	W
12.	VISUAL & DIMENSIONAL CHECK	MAJOR	VISUAL & MEASURE	100%	PURCHASE ORDER	PURCHASE ORDER	TC	P	W * *10% RANDOM
13.	IDENTIFICATION MARKING	MAJOR	VISUAL	100%	HW12784	HW12784	TC	P	V

MANUFACTURER/SUBCONTRACTOR		FOR CUSTOMER USE	
LEGEND: ! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER / SUBCONTRACTOR B: BHEL NOM. INSPECTION AGENCY "TUV" (INDIAN VENDORS) N: CUSTOMER THIRD PARTY INSPECTION AGENCY LRS/TUB/BV (FOR FOREIGN VENDORS) INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER		APPROVED BY <i>Sugandha Dgarnal</i> 15/10/13 Asst. Dir., BHEL.	

दिनांक एवं हस्ताक्षर
& DATE

संस्थान क्रय विनिर्देश (हीप - हरिद्वार)

HW 12784

पृष्ठ का
Page 1 of 7

PLANT PURCHASE SPECIFICATION

(HEEP - HARIDWAR)

SUPERSEDES
INVENTORY NO.10 07/2008
TLV 9520

BAR MATERIAL FOR TURBINE BLADES NiCr20TiAl

1.0 GENERAL:

The specification governs the quality of bars, rolled or forged for milled turbine blades in grade NiCr20TiAl (Material no. 2.4952).

2.0 APPLICATION:

Bars are required for blades used for turbine and compressor.

3.0 CONDITION OF DELIVERY:

Bars shall be supplied in hot rolled or forged and milled, heat treated condition. The bars should be straight and free from waviness.

4.0 DIMENSION AND TOLERANCES:

The dimension shall be as per order and tolerance shall be as per EN 10269.

5.0 GENERAL REQUIREMENTS:

The manufacturer must demonstrate that he has implemented a quality system that meets the requirements stipulated in EN ISO 9000. The stipulations of the present purchasing specification apply for all the manufacturers' production shops, as well as their sub-suppliers. If the material is delivered for the first time, a process qualification according to clause 12.0 "Process qualification" must be performed. Separate process qualification is required for each facility of the manufacturer.

Before starting the production, the manufacturer shall provide BHEL a manufacturing and inspection sequence plan (MIP) for information after the successful process qualification. The MIP establishes the quality assured sequence of operations. Information on internal and external specifications is also given in the MIP. BHEL may view the manufacturer's internal MIP if he wishes to do so. The manufacturer has to inform BHEL about every change in the manufacturing or subcontractor process or inspection process. BHEL decides if a new qualification process is necessary. Subcontracting of any manufacturing steps is permissible only with BHEL written approval.

Also manufacturer shall submit test instructions for non-destructive and destructive testing which are performed as part of his own quality assurance measures. The test instructions shall include precise information on the tests, illustrated by sketches if necessary. General hints on other specification are not sufficient.

6.0 MANUFACTURING:**6.1 Melting:**

The alloy shall be made by vacuum induction melting / electro-slag re-melting (VIM / ESR) or by vacuum induction melting / vacuum arc re-melting (VIM / VAR) process.

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दिनांक एवं हस्ताक्षर
SIGN & DATEसामग्री सूची संख्या
INVENTORY NO.25/9/11
P-4101
9-4-14

TSX	B. CHOUDHARY	<i>B. Choudhary</i> 23/09/11	नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
IPSC	V. K. CHAUHAN	<i>V. K. Chauhan</i> 23/9/11	अनुवादक TRANSLATED BY	
QAX	N. K. MANWANI	<i>N. K. Manwani</i> 23/9/11	निर्माणकर्ता WORKED BY	PANKAJ AGARWAL
STE	P. K. BANSAL	<i>P. K. Bansal</i> 23/9/11	जांचकर्ता CHECKED BY	ASHISH RANJAN
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	GOPAL KRISHNAN
			स्वीकृति APPROVED :	संस्थान मानक समिति PLANT STANDARDS COMMITTEE
			Gr. No.	2.60
Rev 01			निर्माण PREPARED :	जारी ISSUED :
9-4-14			MTE	मानक विभाग STANDARDS DIVISION
			दिनांक DATE :	20.09.2011



PLANT PURCHASE SPECIFICATION
(HEEP - HARIDWAR)

6.2 Ingot Discard:

Sufficient discard shall be made from each ingot to ensure freedom from piping, injurious segregation and other imperfections.

6.3 Forging:

The ingot conversion shall be conducted in such a manner as to produce substantially uniform structure throughout the forged bar. The manufacturing process of the bars can be rolling or forging.

6.4 Heat Treatment:

The forging shall be heat treated to get desired mechanical properties as per clause 7.2.1.

Solution treatment : 8 h at 1050 - 1080°C, Air cooling

Stabilizing: 24 h at 845°C (± 10°C), Air cooling

Precipitation hardening: 16 h at 700°C (± 10°C), Air cooling

The forming process and the solution treatment shall be chosen in such a way that over the whole cross section a homogeneous microstructure with a grain size of 3 to 6 according to ASTM E 122 will be reached. (See also 7.2.2)

7.0 PROPERTIES AND TESTS:

7.1 Chemical Composition:

Heat analysis in weight % (according to EN 10269 table 1) shall be as follows:

C	0.04 – 0.10	Si	≤ 0.30	Mn	≤ 1.00
P	≤ 0.010	S	≤ 0.010	Cr	18.0 – 21.0
Ti	1.80 – 2.70	Ni	Rest	Co	≤ 1.00
Fe	≤ 1.50	Al	1.0 – 1.8	B	≤ 0.008
Cu	≤ 0.20	Ti + Al	≥ 3.50		

7.2 Position of test pieces:

Specimen extraction is performed as per attachment 1. The specimens are to be taken in longitudinal direction. The positions of the specimens given in the attachment are meant to serve only as an example. Details concerning the locations of specimens, both at bar material and at bar material made of semi finished parts, are to be agreed upon by BHEL and must be given in the MIP, including a sketch of the specimen location.

7.2.1 Mechanical Properties:

It shall be ensured that the required mechanical properties are achieved throughout the entire bar cross section. The uniformity of the strength of the bars of a given delivery (per melt and heat treatment batch = **test unit**) shall be verified by a hardness test per EN ISO 6506-1. HBW 10/3000 or HBW 5/750 shall be used. Any other hardness test method shall be subject to prior agreement with BHEL. The hardness test shall be performed on 10% of each test unit, however on at least 10 bars, or if the test unit comprises less than 10 bars on every bar.

Mechanical properties shall be determined on the hardest and softest bar indentified by this test. Tensile testing shall be conducted according to EN 10002 resp. ASTM E8M (preferred round tension test specimen with $L_0 = 50$ mm and $d_0 = 10$ mm) or ASTM E8 (Standard specimen per fig. 8). Impact testing shall be performed with standard-test pieces with V-notch according to EN 10045. The following properties must be demonstrated at room temperature by the following tests:

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निर्माणकर्ता WORKED BY	Ashish Ranjan	<i>A.Ranjan</i>	20.9.11
जांचकर्ता CHECKED BY	Gopal Krishnan	<i>G.Krishnan</i>	20.9.11

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 SUPERSEDES INVENTORY NO.

0.2% proof Strength N/mm ²	Tensile Strength N/mm ²	Elongation (Lo=5d) (%)	Reduction in area (%)	Impact Energy (J)	Hardness HBW
≥ 600	1000 - 1300	≥ 17	≥ 17	≥ 20 ¹⁾	≥ 260

1) Average of 3 Charpy V-notch specimens.

In addition a short time creep rupture test according to DIN EN 10291 or other agreed standard has to be carried out, using the following parameters:

Test temperature: T = 750°C
 Proof stress σ_o = 310 MPa

The following values have to be reached:

Creep rupture time t_m ≥ 100 h
 Elongation A_u ≥ 4 %
 Reduction of area Z_u ≥ 4 %

If no creep rupture is occurred after 100 h, the proof stress can be increased for further 30 MPa after every 24 h, until the creep rupture occurred.

7.2.2 Grain Size Check:

The metallographic examination has to be carried out at the beginning and at the end of the hardest and softest bar and in each case in the corner and in the center of the cross section. A substantially homogeneous microstructure with a grain size 3 -6 according to ASTM E 112 has to be achieved in the cross section. A grain size DUPLEX ALA 3 according to ASTM E 930 is acceptable provided, that a grain size of 1 is not exceeded. A deviating microstructure has to be documented according to ASTM E 1181 and to be approved by the BHEL. Reduction of amount of testing can be agreed with the BHEL. For this purpose the manufacturer has to provide adequate results.

7.2.3 Outer and Inner Quality / NDE:

7.2.3.1 Scope of Inspection:

Following NDE shall be performed in delivery condition:

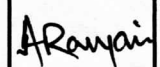
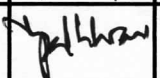
- Visual inspection of all bars
- verification test of all bars
- Complete ultrasonic inspection (UT) of all bars according to EN 10308 type 1a (table 1) or other agreed standard (e.g. AMS STD 2154) has to be carried out. The calibration block and the reference block have to be manufactured out of materials with similar acoustic properties and similar surface conditions. The test has to be performed only by employees with level 2 certified according to EN 473 or SNT-TC-1A.
- 100% PT of all bars without the face areas according to EN 571-1. It is permitted to carry out a UT with a double transducer probe in the near surface area instead of PT.

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हस्ताक्षर एवं दिनांक
SIGN & DATE
 24/9/11

सामग्री सूची संख्या
INVENTORY NO.
 P-4101

REV 01	निर्माणकर्ता WORKED BY	Ashish Ranjan		20.09.11
	जांचकर्ता CHECKED BY	Gopal Krishnan		20.9.11

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7.2.3.2 Criteria for registration and decision:

a) Regarding UT inspection quality class 3 according to EN10308 (table 3) shall be applied. The decision limit for loss of back wall echo is 3 dB for all bar dimensions. The recording level is defined with $> 1\text{mm } d_{eq}$. All indication $d_{eq} \leq 1\text{mm}$ are acceptable.

b) PT: Indications $\geq 5\text{ mm}$ are unacceptable. Indications-free grinding excavations with depths $\leq 1\text{mm}$ are acceptable.

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8.0 MARKING:
Blades are to be marked as per attachment 2 and specification AA0400310.

9.0 DOCUMENTATION:
The supplier shall supply four copies of the test certificate 3.1 as per EN10204 unless and otherwise stated on the order. The test certificate shall bear the following information:

- Order no.
- Specification no. / Material Designation
- Heat Number, heat analysis and melting method
- Complete information of all heat treatments performed
- Results of mechanical testing, including a list with all measured hardness
- Photos of microstructure with results of the grain size determination & creep test report
- Results of non destructive testing
- Confirmation of the material identification check
- Confirmation of the dimensional and visual check

10.0 CLEARANCE FOR DELIVERY:
The total results of the tests / checks carried out are the deciding factor for clearance for delivery, and hence shall be intimated to BHEL in advance. In case of nonconformance, BHEL evaluates the total results taking into consideration intended use of the material and examines accordingly the acceptability of deviation (if any). No material shall be delivered, if deviated, without acceptance by BHEL. The clearance, however, does not relieve the supplier of his responsibility for the hidden / unreported non-permissible defects which are found later.

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11.0 DEVIATIONS:
Deviations from this Purchase Specification, which arise during manufacturing, may be submitted to BHEL in writing, giving full details of the deviation. Acceptance of concession request will be at the sole discretion of BHEL.

12.0 PROCESS QUALIFICATION:
A qualification review, performed jointly by the BHEL and supplier, is required before starting production for the first order. This initial process qualification is required for each fabrication facility of the manufacturer. The fabrication and inspection parameters stipulated during this phase form the basis of the manufacturing and inspection sequence plan (MIP) which the supplier prepares at his own responsibility. Manufacturing is commenced after the check of conformity by the purchaser and depends on the results of the qualification review, If necessary; the manufacturing parameters are to be further optimized. Unless otherwise stipulated by the purchaser, the process qualification shall also be required for the first three orders in addition. If desired, a process qualification can also be called for as verification of the reliability of fabrication.

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 24/9/11

REV 01

सामग्री सूची संख्या INVENTORY NO. P-4101		निर्माणकर्ता WORKED BY Ashish Ranjan	 20.9.11
		जांचकर्ता CHECKED BY Gopal Krishnan	 20.9.11

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PLANT PURCHASE SPECIFICATION

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In addition to the scope of testing and examination given in section 7.0 the following tests shall performed (also on the hardest and softest bar):

- Mechanical tests also in the edge position of the cross section
- Photos of the microstructure with results of the grain size determination in longitudinal direction

All results shall be given in a detailed report to BHEL.

13.0 CROSS REFERRED STANDARDS:

EN ISO 9000, ASTM E122, EN 10269, EN ISO 6506-1, EN 10002, ASTM E8M, EN 10045, DIN EN 10291, ASTM E930, ASTM E1181, EN 10308, EN 473, EN 571-1, EN10204

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INVENTORY NO.

P-4101

REV 01

निर्माणकर्ता

WORKED BY

Ashish
Ranjan

20.09.11

जांचकर्ता

CHECKED BY

Gopal
Krishnan

20.9.11



Attachment 1

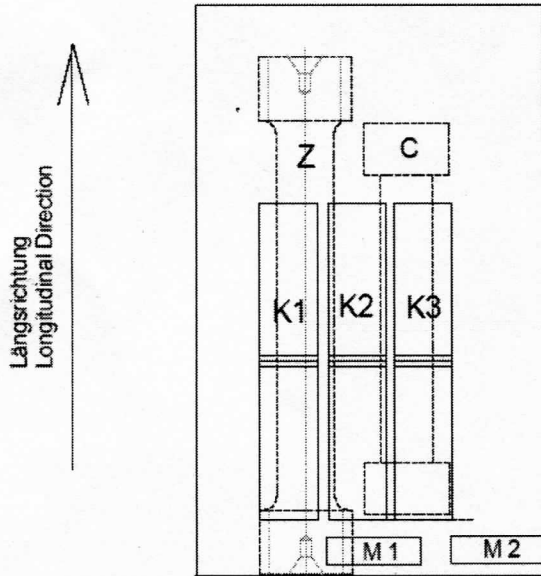
STANDARD TESTING

Make sure that all specimens are located in the middle of material.

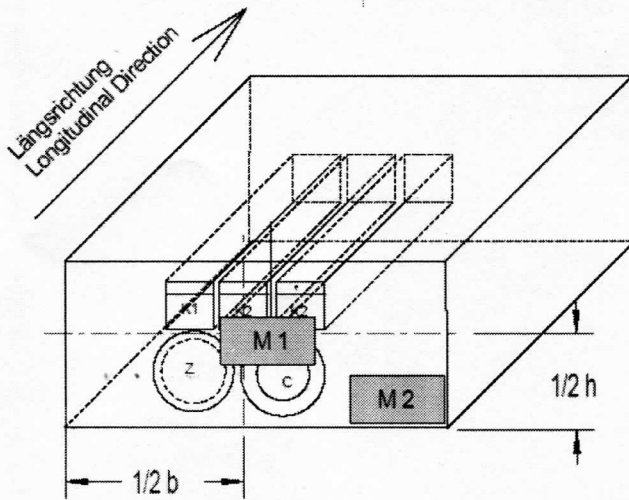
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- Z: Tensile Specimen
- C: Creep test specimen
- K1- K3: Charpy impact specimen
- M1: Micro specimen (Cross Section)
- M2: Micro specimen (Cross Section)



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REV 01

निर्माणकर्ता WORKED BY	Ashish Ranjan	<i>Ashish Ranjan</i>	20.09.11
जांचकर्ता CHECKED BY	Gopal Krishnan	<i>Gopal Krishnan</i>	20.09.11



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PLANT PURCHASE SPECIFICATION
(HEEP - HARIDWAR)

Attachment 2

Marking for Steel for Steam Turbine Blades

Following details are to be marked on the blades:

Heat No.

Manufacturer Name / Reference

Purchase order No.

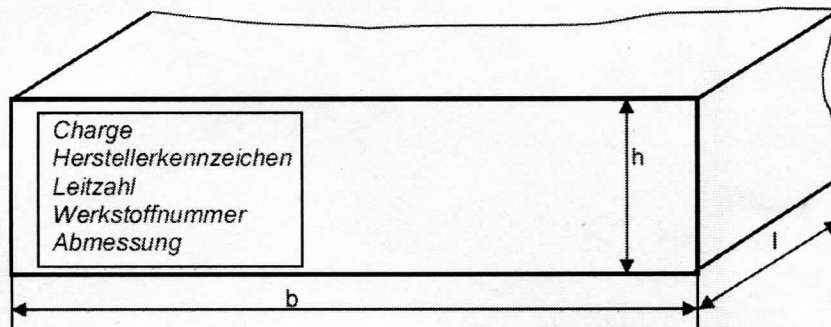
Material No.

Dimensions

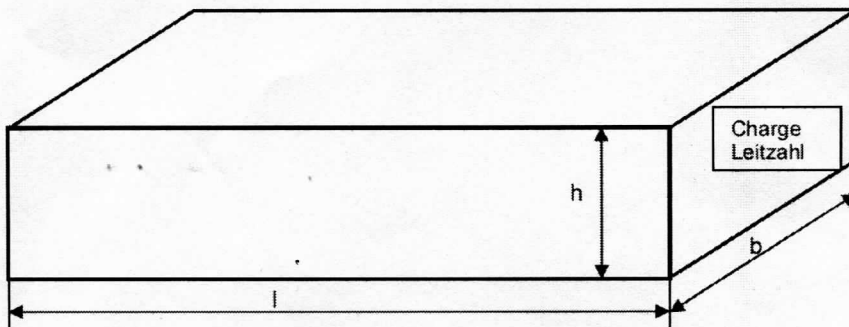
The identification marking shall be applied as follows:

In Case of bars:

Marking of each individual bar at the front with details mentioned above.



In case of cut pieces (cut bars, rhomboids): with stamped figures, ink stamp or stickers/labels



h = Dicke, thickness
l = Länge, length
b = Breite, width

SUPERSEDES INVENTORY NO.

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सामग्री सूची संख्या INVENTORY NO.

P-4101

REV 01

निर्माणकर्ता WORKED BY

Ashish Ranjan

Ashish Ranjan

20.09.11

जांचकर्ता CHECKED BY

Gopal Krishnan

Gopal Krishnan

20.9.11