

Domain :	bhel.abcprocure.com		
Parent department:	BHEL Trichy		
Unit name	: BHEL Trichy		
Purchase group	: FB Consumable-PRDN	RFQ/NIT/Enquiry Officer	: RAJAPRAKASH K
Event ID	: 22505	RFQ/NIT/Enquiry no.	: 1901900086
Enquiry Date	: 27/03/2019 05:30:00		
Tender Description	: Supply of Fasteners for 700 MEe SG		
Terms & Conditions	: General Terms and Conditions 1. The Enquiry is a two part E Procurement Enquiry. Offers from any other mode (e-mail offer etc.) will not be accepted. 2. All the Items in this Enquiry will be evaluated as a package basis and will be awarded to a single L1 Bidder. 3. Bidders should scan and upload signed copy of Annexure A and Annexure PQC.		
Product / service / work keywords	: Fastener,		
No. of Bid Parts	: Multiple	Envelope	: Techno-commercial bid , Price bid
Type of contract	: Goods	Project duration / delivery or completion period	: 90 days
Download document	: Before login	RFQ floated under the policy	: PP-PURCHASE POLICY
Estimated Category	: M	Delivery/Location At	: BHEL TRICHY
Delivery Date	: 21/07/2019 05:30:00	Inspection by Agency	: BHEL TRICHY
Inspection Location	: BHEL TRICHY	Min. bid required	: 1
Bid submission configuration			
Bid evaluation	: Grand Total Package	Bidding access	: Open Tender
Base currency	: INR	Bidding type	: ICB/Global
Bidding currencies	: YEN,EURO,USD,POUND,UPIA,AED,MVR,MUR,OMR,SGD,IDR,SAR(Saudi Riyal),Sri Lankan Rupee (LKR),Swiss Franc,MXN (Mexican Peso),PHP (Philippine Peso),Taka (bangladesh),INR		
Key configuration			
Pre-bid meeting	: Don't allow		
Dates configuration			
Document downloading start date	: 31/03/2019 11:00:00	Document downloading end date	: 11/04/2019 14:00:00

Bid submission start date : 31/03/2019 11:00:00 Bid submission end date : 11/04/2019 14:00:00

Bid opening date : 11/04/2019 14:30:00

Document / EMD / Security fee detail

Document fees : Not required EMD : Not required

Bidding forms

Part II : Price bid

Part II - Price bid format

Note :

- 1.Please submit filled Annexure-A along with the offer.
- 2.Please fill Currency and Unit rate for the quoted items.
- 3.Please note, Partial filling is not allowed

MATERIAL CODE	MATERIAL DESCRIPTION	UNIT OF MEASUREMENT	TOTAL QUANTITY
AD15719317106001	STUD M48	NO	300.00
AD15719317106002	MEASURING PIN M14	NO	300.00
AD15719317106003	STUD M27	NO	250.00
AD15719317106004	MEASURING PIN M10	NO	250.00
AD15719317106005	GEAR NUT - 1	NO	300.00
AD15719317106006	GEAR NUT - 2	NO	350.00
AD15719317106007	SLEEVE - 1	NO	300.00
AD15719317106008	SLEEVE - 2	NO	350.00
AD15719317106009	SLEEVE - 3	NO	12.00

I have thoroughly gone through all the tender condition & all the documents and understood the above techno commercial requirements and quoted accordingly

Information for Online Participation

Bidder who wish to participate in this tender needs to procure Digital Certificate as per Information Technology Act-2000 using that they can digitally sign their electronic bids. Bidders can procure the same from any or the CCA approved certifying agencies, or they may contact e-Procurement Technologies Ltd. at below mentioned address and they will assist them in procuring the same. Bidders who already have a valid digital Certificate need not to procure the same. In case bidders need any clarification regarding online participation, they can contact,

e-Procurement Technologies Ltd.

Corporate Office:

Address : A-201/208, Wall Street - 2, Opp. Orient Club,
Nr. Gujarat College, Ellis Bridge,
Ahmedabad - 380006, Gujarat(INDIA)

Digital Certificate Contacts

Contact Person : Mr. Himalay Vaishnav

Cell : +91-9099090830

Phone Nos. : +91-9099090830

Fax No :

e-Mail : info@abcProcure.com

Support Team Contacts

Contact Person : BHEL Support Team Ahmedabad

Cell : +91-8160087732

Phone Nos. : +91-79-68136809/849/871/823/872

Fax No :

e-Mail : Bhel.Support@abcProcure.com

Bidder who wish to participate in e-Tender need to fill data in predefined forms of Price bid available in respective tender only. After filling data in predefined forms bidders need to click on final submission link to submit their encrypted bid. Bidder need to submit Document Fees, EMD & Reference Documents in hard copy if such instruction are given by tendering authority. As Per the new Inter-operability guidelines released by Controller of Certifying Authorities(CCA), the Secured Socket Layer(SSL) certificate for a e-procurement application is generated on a new algorithm, SHA2.

Also, the Digital Certificates that will be applicable for these platforms have to be SHA2 algorithm complaint. For the same, the users have to ensure that they have Windows XP(SP3)/Windows Vista/Windows7 installed in their respective PC/Laptop. In case of Windows XP Service pack - 3, if you get any issue you can install the SSL patch, which is available at our download section of our e-Tender/e-Auction Portal and also at our corporate website www.abcprocure.com just below the label of "Knowledge section".

Fraud Prevention

Bidder along with its associate/collaborators/sub-contractors/sub-vendors/consultants/service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

Preference to Make in India

For this procurement, Public Procurement (Preference to Make in India), order 2017 dated 15.06.2017 & 28.05.2018 and subsequent orders issued by the respective Nodal ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/PO/WO against this NIT. In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable. Default margin of purchase preference shall be 20% to local suppliers with default minimum local content of 50%.

BHARAT HEAVY ELECTRICALS LIMITED

MM/RM/PURCHASE/PIPES

BHEL / TRICHY-620 014.

ANNEXURE-A

ENQ NO- 1901900086

Enquiry Terms & Conditions for Supply of Fasteners

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

Any deviation to the below mentioned terms shall be stated specifically in the comments column for each term and also in case of acceptance to our terms, it will be construed that the whole term is understood and agreed in totality without any deviation. (If otherwise mentioned).

Sl No	BHEL Requirements	Supplier Comments
01.	Material specification: Supply shall be made strictly as per the specifications mentioned in the enquiry. If there is any deviation, the same should be mentioned clearly against that item in the e- procurement offer itself.	
02.	Offer submission: The bidder shall submit his offer in the e-Procurement portal only at https://bhel.abcpurchase.com . The tender will be operated in the two part bid systems. The bidder would be required to register on the e-procurement market place https://bhel.abcpurchase.com and submit their bids online. Scan copy of the filled Annexure-A, Tender documents etc., shall be uploaded in the EPS portal. The offer is to be submitted within 14.00 hours IST on or before the due date. At its option, BHEL may consider extending the due date/s for the tender openings. Sufficient notice would be given by BHEL for such extensions and it will be published as corrigendum in BHEL website and also in the following websites, https://bhel.abcpurchase.com http://eprocure.gov.in Sealed cover bids / e-Mails / FAX / Manual offer will NOT be accepted.	
03.	Authorization for participation in EPS portal through DSC: E-Tender Participation requirements Either Principal or authorized agent shall register their Digital Signature Certificate (DSC) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION). Suppliers are advised to go through the FAQ available in the web portal (https://bhel.abcpurchase.com) DSC shall be registered for the authorized person and all transaction done using that DSC against our tenders shall be taken as valid communication and shall be binding on principal/agent and is valid legally. For foreign Principal In case of Principal (being foreigner), they may apply for DSC through Indian embassy at their country and can register with us for participating in E-tenders. Details of the applicable procedure is available in the webpage http://www.cca.gov.in/cca/ . For Indian agent - In case of agents participating/registering their DSC (of authorized person), it will be at the sole authorization of principal to their agents to participate on their behalf and all transactions done using that DSC against our tenders shall be known as valid communication and shall binding on principal and is legally valid. - Please intimate the authorized person name, Mail ID for registering DSC with BHEL to participate in E-Tenders - The supplier has to indicate the name of the mill person & agent, Contact no, email IDs, who is responsible for bid submission & further clarification query.	
04.	Tender opening: On the due date of tender opening, only the technical bids will be opened. Technical bids will be evaluated by us and clarifications required, if any, will be called for from the bidders on technical and commercial points. Offers not meeting the required specification will be rejected. The price bids of technically suitable bidders will be opened on a later date with prior intimation to techno-commercially suitable bidders.	
05.	Validity of offer: Offers should have a validity of minimum 120 days from the date of tender opening.	

06.	Delivery Incoterms: Indigenous bidders: Should be quoted on F.O.R-Free on road BHEL Stores, Trichy basis only (inclusive of packing, forwarding, freight and transit insurance charges to seller account). Ex-works offer will be rejected. • Supplier shall indicate applicable GST in percentage along with HSN code against each item. • ITC: If the tenderer is availing ITC for this input material, the effect of preformed credit should be passed on to the purchaser. Tenderer under ITC shall be preferred. • Full Input Tax Credit shall be availed for all the items tendered. • The soft copies of the Invoice, LR copy & Test certificates shall be forwarded to BHEL immediately after dispatch. Overseas bidders: Should be quoted on CFR (Cost & Freight), Chennai port (LILO – Liner in Liner Out) basis only. • Import vendors should submit their offer on CFR (Cost & Freight), Chennai port (LILO – Liner in Liner Out) basis with freight break up details. • Port of loading should be indicated without fail. • Port of discharge should be Chennai Sea Port, India. • The preferred shipment mode “Containerized Cargo or Break Bulk” shall be specified clearly in the offer. FOR CFR INCO TERMS: CONTAINERIZED CARGO • 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. 14 FREE DAYS FOR Container detention shall be provided. 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. • In case of shipment through Containers on CFR basis, the BL should bear the endorsement that “14 free days for Container Detention is applicable”. • Place of delivery – Chennai Sea Port should be clearly specified in the Bill of Lading. BREAKBULK CARGO • For CFR terms, moved through BREAK BULK BASIS (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. • The place of delivery “Chennai Sea Port” should be clearly specified in the Bill of Lading. Transport Conditions for Import: • The Original Documents (Bill of Lading, Invoice, Packing List, Certificate of Origin & Test Certificate) shall reach BHEL well in advance before the vessel arrival. The soft copies of the above shall be forwarded to BHEL immediately after shipment. • In the event of delayed submission of documents by the supplier, an amount up to 5% of the invoice value will be retained towards demurrage & other charges and the difference if any between actual charges and recovery will be settled separately through supplementary invoice. • In such cases, the Supplier shall authorize the Steamer / Shipping agent / transporter to freely release the consignment to BHEL by providing a “Surrender Bill of Lading”. • Otherwise, No-objection Certificate shall be issued to the Liner, authorizing BHEL to get the Delivery Order without producing the Original Bill of Lading. • Confirmation to the above is required to ensure avoidance of demurrage & detention charges at Chennai Sea-port that may arise in case of delayed presentation of documents by the Seller. I) Indian Customs has imposed a penalty on late filing of Bill of Entries (Air/Sea Shipments) by the importer. The maximum free time allowed is 24 hrs from the time of arrival of cargo at final port of discharge. Rs.5000/- per day (for Initial 03 days) & Rs.10000/- per day (thereafter). 1) The vendor should furnish the Non-Negotiable Documents (Air Way Bill/Bill of Lading, Commercial Invoice, Packing List, Certificate of Origin) either by email or post/courier to BHEL well before the landing of cargo at final port of discharge. 2) Vendor will be held responsible for the penalty arises against the late filing of Bill of entry due to: a. Non availability of Non-Negotiable Documents (NNDs) before the cargo arrival b. Discrepancy in documents c. Short landing of Consignments (For shipments on CFR/CPT/CIF/CIP – Chennai Port)	
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	II) All the shipments for the contracts (POs) finalized on CFR/CPT -Chennai Port, CIF/CIP-Chennai Port, DDU/DDP Chennai Port basis. 1) Delivery Orders involving multiple agencies like liners/freight forwarders are not allowed. There must be a single agency office at the final discharge Port (Chennai) for issuing the Delivery Order to BHEL. 2) The detention/demurrage charges arise due to the delay in collection of Delivery Orders from multiple agencies of liner/freight forwarder also whose offices are not at available Chennai, the same amount will be deducted from Vendor's bills only. 3) Apart from the normal charges like Terminal Handling Charges, Container cleaning Charges, Delivery Order Charges at final port of discharge will not be borne by BHEL. 4) The liner/freight forwarders should be properly communicated by the Vendor for not to claim such charges for issuing Delivery Order. If the liner/freight forwarder claims such charges in their invoices, the same amount will be deducted from the Vendor bills without any prior intimation in order to avoid the delay in Customs clearance. The likely additional/hidden costs or charges are: a. CIC - Container Imbalance Charges/Surcharges b. EIC - Equipment Imbalance Charge/Surcharges c. CAF - Container/Currency Adjustment Factor d. BAF - Bunker Adjustment Factor e. RDS - Rupee Depreciation Surcharge f. CDS - Currency Depreciation Surcharge	
07.	Delivery period: The offer shall clearly indicate delivery period in fixed number of weeks/Months from the date of Purchase Order.	
08.	Ranking of offers: Ranking L-1, L-2 etc. shall be done as package basis for the techno-commercially acceptable offers on landed cost to BHEL, Trichy basis. Supplier should quote all charges (if any) per items wise only to evaluate offers. Details calculation in point no. 16. All the items in this Enquiry will be evaluated as package basis and will be ordered on single L1 Bidder. Splitting or sharing of quantity is not applicable in this Enquiry.	
09.	BHEL reserves the right to negotiate with L1 vendor or re-float the tender for items where, L1 price is not the lowest acceptable price; increase or decrease the tender quantity.	
10.	TERMS OF PAYMENT: Payment Term for Indigenous suppliers: Payment term is 100% direct EFT payment after 60 days from the date of receipt and acceptance of materials at BHEL Trichy for non-MSE bidders. Any deviation in the above payment terms, any other conditions in payment terms or any other Payment terms will not be accepted. Payment Term for Imports suppliers: BHEL Payment term is 100% payment on CAD basis after 60 days from the date of receipt of documents, specified in PO, at BHEL bank. Respective bank charges to respective account. If supplier insists for LC, only Usance LC with 60 days credit will be opened one month prior to material readiness, further loading will be considered @ 1.5% on the offered value. Hence supplier shall intimate the material readiness accordingly for opening of LC. LC validity period will be 90 days and for any extension, applicable charges will be to supplier's account. Any deviation in the above payment terms, any other conditions in payment terms or any other Payment terms will not be accepted.	
11.	Non-Disclosure Agreement(NDA): The bidders shall enter into the Non-disclosure agreement totally voluntarily, with full knowledge of its meaning and without duress. (Format attached).	
12.	Patent Right The supplier shall, at all times, indemnify and keep indemnified the purchaser, free of cost, against all claims which may arise in respect of goods & services to be provided by the supplier under the contract for infringement of any intellectual property rights or any other right protected by patent, registration of designs or trademarks. In the event of any such claim in respect of alleged breach of patent, registered designs, trademarks etc. being made against the purchaser, the purchaser shall notify the supplier of the same and the supplier shall, at his own expenses take care of the same for settlement without any liability to the purchaser.	
13.	Role of Agents - BHEL strongly discourages the engagement of Agents in India by foreign principals, to deal with BHEL, in BHEL's tenders. - BHEL, due to business reasons would ban, would have banned Indian agents from dealing with BHEL. Any foreign principal who engages such a banned agent, or an employee of the banned agency, or any other person connected with the banned agency, at any time during the tender proceedings, would be disqualified from the tender proceedings. The decision of BHEL in this regard shall be final and be binding on the OEM. Hence in their own interests, prospective tenderers may check with BHEL. The list of banned firms is available on BHEL website www.bhel.com. In view of the requirement of BHEL, it is strongly suggested that in their own interest, foreign principals may desist from engaging	

	any Indian agent and deal with BHEL directly and it is stressed that any Main producer proposing to deal with BHEL by engaging and through an Indian Agent does so at their own risk. BHEL shall in no way be responsible for any consequences that may arise to the foreign principal on account of the antecedents / actions of their Indian agent.	
14.	Agency Commission: - In respect of offers from overseas suppliers, agency commission, if any, payable to their agents in India, shall invariably be shown separately in the Performa invoice and this will be paid by us in India, in Indian rupees, on satisfactory completion of the contract. - It overseas principal has any tie-up with any third party in respect of agency commission it should be declared while submitting offers. - Copies of current agency agreement / authorization letter in respect of agency commission shall be furnished along with offer, if not made available earlier. - For calculation of rupee equivalent agency commission, exchange rate as prevailing on the date of order will be taken.	
15.	LD clause & Risk purchase clause are applicable in this tender. Liquidated Damages (LD): Liquidated damages shall be 0.5% of the total order value per week or part thereof subject to a maximum of 10% of the total order value. 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. 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). IMPORT: For CFR terms, BL date will be considered for LD calculation. INDIGENOUS: For "F.O.R. Delivery terms", Lorry way bill date/BL/Invoice date whichever is later will be taken for LD calculation. Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contractors. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Debit note will be issued by BHEL indicating the respective supply invoice number. Risk Purchase: Alternatively, the purchaser at his option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or dispatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitutes therefor. The supplier shall be liable for any loss, which the purchaser may sustain by reason of such risk purchases in addition to penalty at the rate mentioned in LD clause above.	
16.	Offer Evaluation Criteria: The offers of both import bidders and indigenous bidders will be evaluated on total landed cost to BHEL, Trichy for all the items. The evaluation details with respect to the import & indigenous bidders is detailed below: Indigenous Vendors Total Landed cost/rate for each item = FOR Rate in INR (A) + Applicable Taxes (B) + Loading for payment term & LD (C) (If BHEL's payment term and LD clause not accepted) – Applicable input tax credit (D) A-Indigenous vendors submit offers on Free on Road (FOR), Stores, HPBP BHEL Trichy in INR. B-Applicable GST and any other charges quoted by indigenous vendors will be added to the base price. C-Loading for payment terms & non-acceptance of Liquidated Damages (LD) will be added to the F.O.R. value for arriving the landed rate. D-However input tax credit shall be availed for GST, hence the same is excluded for arriving at the landed cost. Import Vendors Total Landed cost = CFR Rate in INR (A) + Applicable Duties (B) + Incidental Charges (C) + Loading for Container Shipment (D) + Loading for payment term & LD (E) (If BHEL's payment term and LD clause not accepted) A- Import vendors to submit offers on CFR (Cost & Freight), Chennai port (LILO – Liner In Liner Out) basis per item wise in foreign currency, which will be converted to INR by multiplying with the Exchange rate (SBI TT Selling rate) as on the technical bid opening date. B- Customs duty, Safe guard duty (as per the notification No 02/2014-Customs (SG) dated 13th August 2014) and antidumping duty (as per the notification No 18/2016-Customs (ADD) dated 17.05.2016) as if applicable will be added to the INR price. C-Incidental charges of 1.5% will be added to the CFR Value. The incidental charge is inclusive of Insurance, port handling charges, & freight charges for movement from Chennai port to BHEL, Trichy. D-In case of shipment through containers, if 14 free days for Container detention is not provided in the offer, a loading of 22% on the freight rate per MT shall be considered by BHEL for arriving at the Total Landed Cost. E-Loading for non-acceptance payment terms & Non-acceptance of Liquidated Damages (LD) will be added to the CFR value for arriving at the landed cost.	

17.	Comprehensive Economic Partnership Agreement (CEPA): Foreign suppliers shall ensure that the benefits as applicable under comprehensive economic partnership agreement (CEPA) with government of India are disclosed in the bid and relevant documents such as certificate of country of origin, issued by the appropriate authority in the country of exports, is provided by the vendor along with dispatch documents. Bids shall be evaluated with such applicable benefits. In the event of seller failing to provide appropriate documents for purchasers to avail disclosed concessional duty benefits in India, financial loss, so incurred, will be to the seller's account	
18.	PACKING AND MARKING: The supplier shall arrange for securely protecting and packing the stores to avoid loss or damages during transit.	
19.	Special Provisions for Micro and Small Enterprises (MSE) bidders applicable on indigenous bidders only: • Declaration of Udyog Aadhar Memorandum (UAM) number by MSE bidder is mandatory to avail intended benefit available to MSEs as contained in Public Procurement Policy for MSEs Order, 2012 issued by MSME. • Payment for MSE Indigenous vendors will be as per MSMED Act, 2006 • Bidders fail to submit will be considered as non-MSE bidder. • At least 25% of the tendered quantity is earmarked for MSE suppliers in this tender. If L1 offer is from a Micro / Small enterprise, this provision is not applicable. • Out of the 25% tendered quantity reserved for MSE suppliers, 6.25% shall be earmarked for procurement from MSE owned by SC / ST entrepreneurs. In the event of failure of such Micro and Small enterprises to participate in the tender process or meet the tender requirements and the L1 price, the 6.25% sub-target for procurement ear-marked MSE owned by SC / ST entrepreneurs shall be met with other MSE enterprise/s. • Minimum of 3% reservation for women owned MSEs within the above mentioned 25% reservation. In the event of failure of such Micro and Small enterprises to participate in the tender process or meet the tender requirements and the L1 price, the 3% sub-target for procurement ear-marked MSE owned by women entrepreneurs shall be met with other MSE enterprise/s. (The definition for MSEs owned by Women Entrepreneurs is clarified as: • In case of proprietary MSE, proprietor shall be woman. • In case of partnership MSE, the women partners shall be holding at least 51% share in the unit. • In case of private limited companies, at least 51% share shall be held by the women promoters. • All the items in this Enquiry will be evaluated as package basis and will be ordered on single L1 Bidder. Splitting or sharing of quantity is not applicable in this Enquiry. • In case MSE vendor participating in the tender quotes within the price band of L1 + 15%, they will be allowed to supply the requirement subject to acceptance of L1 price by MSE vendor. • If L1 is from a Micro/Small enterprise, the 25% earmarking provision is not applicable and 100% quantity will be ordered on respective L1 MSE source. • MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II certificate having deemed validity (five years from the date of issue in acknowledgement in EM II) or valid NSIC certificate or EM II certificate along with attested copy of a CA certificate (Format enclosed as per Annexure I where deemed validity of EM II certificate of five years have expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for the enquiry if any deficiency in the above required documents is not submitted before the price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer. This provision for MSE will apply subject to the condition that the participating MSE meets the tender requirements. • In case of any change in the MSE status of the bidder, it shall be the responsibility of the bidder to notify the change as a part of the bid document. If at a later date it comes to the knowledge of BHEL, that the change in the status has not been intimated by the bidder and the order is obtained under the premise of an MSE then BHEL would cancel the pending order against this tender and take necessary steps for suspension of the business dealing with the bidder as per the procurement policy of BHEL. • All supplier (new/old) will be eligible for registration/renewal with BHEL as MSE supplier and provided at least any one of the following documents are submitted along with tender documents a) Valid NSIC Certificate (or) b) Entrepreneurs Memorandum part II (EM II) certificate (valid based on deemed validity of 5 years) (or) c) EM II certificate along with attest copy of CA certificate (as per prescribed format at Annexure-I) applicable for the relevant financial year (latest audited), where the deemed validity of EM II is over. However credential of all MSE suppliers will be verified before considering the intended benefits for MSE suppliers as per clause (i) at the time of tender evaluation. d) Udyog Aadhar memorandum with Attested copy of latest audited CA certificate (relevant financial year as per prescribed format at Annexure-I).	

20.	Conditional offers are likely to be rejected.	
21.	The correspondences between the bidder and BHEL through email are considered as 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.	
22.	SHARING OF QUANTITY: All the items in this Enquiry will be evaluated as package basis and will be ordered on single L1 Bidder. Splitting or sharing of quantity is not applicable in this Enquiry.	
	General notes: - No revision of prices will be entertained after the tenders are opened. - For the evaluation purposes, exchange rate (TT selling rate of SBI) as on schedule date of tender opening (Part I, i.e technical bid, in case of two part bid) shall be considered. - BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed. - Lowest price received against BHEL tenders need not be the technically acceptable one and in that case, BHEL reserves the right not to consider the same. - 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. - Offer will be evaluated on PACKAGE basis. - L1 will be arrived based on Net Landed cost to BHEL- Trichy. - No payment will be made for the excess quantity supplied. - The offers of the bidders who are on the banned list as also the offer of bidders who engage the services of the banned firms, shall be rejected. The list of banned firms is available on the BHEL website -www.bhel.com. - No charges shall be indicated as "Lumpsum". All charges shall be in "percentage" of the quoted rates or per item wise of the quoted item. - Indigenous supplier shall indicate applicable GST rate along with HSN code against each item. - Indigenous supplier shall indicate GSTIN number & PAN number of the Business. - Manufacturer's name trademark or patent no. if any should be specified. Illustrative leaflets giving technical particulars are required along with quotation wherever necessary. - Products with I.S.I. certification marks will be preferred. - The bidder has to keep track of any changes by viewing the addendum / Corrigendum's issued by the Purchaser on time-to- time basis in the E-Procurement platform. The Company calling for tenders shall not be responsible for any claims/problems arising out of this. - The user should complete all the processes and steps required for bid submission. The successful bid submission can be ascertained once acknowledgement is given by the system through bid submission number after completing all the processes and steps. BHEL and mjunction Services Ltd. will not be responsible for incomplete bid submission by users. - Users may also note that the incomplete bids will not be saved by the system and are not available for the Purchaser for processing. - Before uploading scanned documents if any, the bidders shall sign on all the statements, documents, certificates uploaded by him, owning responsibility for their correctness / authenticity. - 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. Vendors / Firm / Subcontractor shall not be banned firm of EXIM Bank of India. 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. - BHEL reserves the right to negotiate or re-float the enquiry opened if L1 price is not the lowest acceptable price to them inter-alia other reasons. - In case of any quality rejection of materials, the supplier has to collect the materials at his own cost within the 10 days of rejection of advice. Otherwise the materials will be scrapped. - If Guarantee / Warranty period is applicable as per tender specification, No deviation permitted and deviated offers are liable for rejection. - No revision of prices will be entertained at any circumstances after tenders are opened.	
	GST regarding for Indigenous suppliers: - Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration no which should clearly mention in the offer. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer. - Supplier shall mention their GSTN registration number in all their invoices and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No which is linked/uploaded in GSTN network shall be clearly indicated), item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, etc. - All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code). - A declaration to the effect that all invoice particulars are/were uploaded in the GSTN network/ portal & all tax liability as per GST rules and regulations have been and will be discharged, shall be mentioned in the invoice. If not mentioned in the invoice, a separate declaration shall be submitted as per the requirement of BHEL. - All documents like Mill Test Certificate, LR copy, Guarantee/Warranty certificate, work completion certificate, any other document mentioned in PO, shall be sent along with the vehicle/consignment. For all consignments received within the calendar month, input credit will be availed within that month in line with monthly returns filing cycle. In case of any discrepancy in the document or non-submission of documents mentioned in the PO, then BHEL will not be able to accept or account the material, in such case availing of tax credit will be deferred to next month or so. - In case of discrepancy in the data uploaded by supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note (details to be uploaded in GSTN portal) for the shortages or rejections in the suppliers, within the calendar month notified by BHEL. - For any such delay in availing of tax credit for reasons attributable to supplier (as mentioned above), interest (calculated @ SBI MCLR Rate + 6%) along with penalty if any will be deducted for the delayed period i.e. from the month of receipt till the month tax credit is availed, from the running bills.	
23.	<u>Fraud Prevention Policy</u> “The bidder along with its associate/collaborators/sub-contractors /consultants/service providers shall strictly adhere to BHEL Fraud prevention policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about fraud or suspected fraud as soon as it comes to their notice.”	
24.	<u>Cartel Formation:</u> All the firms should desist from forming cartel as the practice is prohibited under Section 3(3) (a) & (d) of the competition Act 2002. If any such instance is observed during this tender will attract disciplinary action as per BHEL policies.	
25.	<u>Resolution of Disputes:</u> a. Except as provided elsewhere in this Contract, in case amicable settlement is not reached between the Parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to the interpretation of any provision of the Contract; or, in any manner touching upon the Contract, then, either party may, by a notice in writing to the other Party refer such dispute or difference to the sole arbitration of an arbitrator appointed by Head of the BHEL Unit/Region/Division issuing the Contract. b. The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the Parties. c. Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Trichy (the place from which the Contract is issued)	

	d. The cost of arbitration shall be borne as per the award of the Arbitrator. e. Subject to the arbitration in terms of clause as above, the courts at Trichy shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract. f. Notwithstanding the existence or any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner except where the Contract has been terminated by either Party in terms of this Contract. g. In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable: h. In the event of any dispute or difference relating to the interpretation and application of the provisions of the Contract, such dispute or difference shall be referred by either Party for arbitration to the sole arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the arbitrator shall be binding upon the Parties to the dispute, provided, however, any Party aggrieved by such award may make further reference for setting aside or revision of the award to Law Secretary, Department of Legal Affairs, Ministry of Law and Justice, Government of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary or Additional Secretary when so authorized by the Law Secretary, whose decision shall bind the Parties hereto finally and conclusively. The Parties to the dispute will share equally the cost of arbitration as intimated by the Arbitrator
26.	<u>In the event of Force Majeure:</u> a. Notwithstanding the provisions contained in other clauses, the supplier shall not be liable for imposition of any such sanction so long the delay and/or failure of the supplier in fulfilling its obligations under the contract is the result of an event of Force Majeure. For purposes of this clause, Force Majeure means an event beyond the control of the supplier and not involving the supplier's fault or negligence and which is not foreseeable and not brought about at the instance of the party claiming to be affected by such event and which has caused the non – performance or delay in performance. Such events may include, but are not restricted to, wars or revolutions, hostility, acts of public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restrictions, strikes excluding by its employees, lockouts excluding by its management, freight embargoes and Acts of GOD. b. If a Force Majeure situation arises, the supplier shall promptly notify the Purchaser/Consignee in writing of such conditions and the cause thereof within twenty-one days of occurrence of such event. Unless otherwise directed by the Purchaser/Consignee in writing, the supplier shall continue to perform its obligations under the contract as far as reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event. c. If the performance in whole or in part or any obligation under this contract is prevented or delayed by any reason of Force Majeure for a period exceeding sixty days, either party may at its option terminate the contract without any financial repercussion on either side. d. In case due to a Force Majeure event the Purchaser/Consignee is unable to fulfil its contractual commitment and responsibility, the Purchaser/Consignee will notify the supplier accordingly and subsequent actions taken on similar lines described in above sub-paragraphs
	Disclaimer Clause: Neither the Organization (Bharat Heavy Electricals Ltd.) nor the service provider (mjunction Services Ltd.) is responsible for any failure of submission of bids due to failure of internet or other connectivity problems or reasons thereof.
28.	<u>Enclosures:</u> a) Enquiry / BOQ Items b) Annexure A c) Annexure PQC d) Drawing
<u>SIGNED BY MANUFACTURER / MILL</u> Name of Mill: Designation / Department: Seal & Signature	

ANNEXURE - PQC (Pre-Qualification Criteria)

ENQUIRY NO. 19019000XX

Material: Fasteners for 700MWe SG

Sl.No	PRE QUALIFICATION CRITERIA	VENDOR'S RESPONSE
1	Open tender process is followed. Supplier with supply reference of the indented items for nuclear application will only be considered for bid evaluation.	AGREED / NOT AGREED
2	Supplier should have the capability and experience to manufacture the indented items of same or similar material grades as per the referred standards mentioned in technical specification (PC-M-965) and generalized QAP for offer acceptance. Acceptance of Supplier Bid/offer will be subject to submission of the following documents along with Technical offer/bid: (2.a & 2.b)	
2.a	Documentary Proof [Supply Invoice Copy(ies)/ shipping clearance copy(ies) of supply for nuclear application] clearly indicating supply of the intended item(s) of same or similar material grades as proof of supplier's experience in manufacture and supply.	ENCLOSED / NOT ENCLOSED
2.b	Copy(ies) of Approved Material / Performance Test Certificates of supply for nuclear application with details of Customer and Third Party Inspection Agency if any.	ENCLOSED / NOT ENCLOSED
3	Offers received will be evaluated by BHEL. <u>Final acceptance of the Technical Bid will however, is based on NPCIL recommendation.</u>	AGREED / NOT AGREED
4	Quantities given in the indent, may be revised (increased or decreased), based on BHEL/NPCIL requirement. Quantity being procured will be confirmed before price bid opening.	AGREED / NOT AGREED
5	BHEL/NPCIL will not provide End Use and End User Certificates for supplies of the indented items.	AGREED / NOT AGREED
6	Supplier should conform to the requirements of the following points 6.a, 6.b, 6.c & 6.d	
6.a	Stud as per Specification PC-M-965, Drawings (2-93-170-05242 & 2-93-170-05243), Generic QAP for Stud Assembly (QAP: GHAVP: STUD ASSEMBLY:01), and Special Conditions Annexure-01.	AGREED / NOT AGREED
6.b	Stud measuring pin as per Specification PC-M-965, Drawings (2-93-170-05242 & 2-93-170-05243), Generic QAP for Stud Measuring Pin (QAP: GHAVP: STUD MEASURING PIN:01), and Special Conditions Annexure-01.	AGREED / NOT AGREED
6.c	Gear Nut as per specification PC-M-965, drawing (3-93-171-05416), Generic QAP for Gear Nut and Special Conditions Annexure-01.	AGREED / NOT AGREED
6.d	Sleeve as per specification PC-M-965, drawings (3-93-171-05417 & 3-93-170-05447), Generic QAP for Sleeve and Special Conditions Annexure-01.	AGREED / NOT AGREED
7	Supplier to give clause by clause confirmation for all relevant clauses mentioned in technical specification PC-M-965.	AGREED / NOT AGREED
8	All items indicated in the ENQUIRY is proposed to be procured on package basis from a single source/supplier.	AGREED / NOT AGREED
9	Supplier has to submit their Quality Assurance Plan (QAP), related test procedures and other documents based on the generalized QAP provided for each item for approval from BHEL & NPCIL.	AGREED / NOT AGREED
10	The actual production of material is permitted only after approval of Quality Assurance Plan (QAP) and test procedures by BHEL and NPCIL.	AGREED / NOT AGREED
11	Inspection agencies for indigenous supply of materials are BHEL and NPCIL. Inspection agency for imported supplies are BHEL and NPCIL/ third party inspection (TPI) agency appointed/ authorized by NPCIL.	AGREED / NOT AGREED
12	Chemical composition and mechanical tests to be carried out in NABL accredited (or) ISO/IEC 17025 compliant laboratories by supplier.	AGREED / NOT AGREED
13	Supplier shall submit Test Certificates of finished materials for our review. Dispatch clearance will be given after acceptance of Test Certificates by BHEL & NPCIL.	AGREED / NOT AGREED
14	Three sets of documents containing (i) Test Certificates, (ii) Approved quality documents and test procedures, (iii) Design Change Requisitions (if any) and (iv) Drawings etc. to be provided along with the supply of items.	AGREED / NOT AGREED
15	Supplier to guarantee for the products supplied for a period of 18 months from the date of supply or 12 months from the date of commissioning whichever is earlier.	AGREED / NOT AGREED
16	Supplier to submit his Technical and Commercial Bid conforming to the above points as given in this annexure.	AGREED / NOT AGREED

NOTE:- Only Offers meeting the above prequalification criteria points will be evaluated further. Otherwise it will summarily be rejected.

Declaration:-

All the information given above are true to the best of our knowledge and belief.

SIGN AND SEAL OF AUTHORIZED PERSON

 BHEL - TRICHY	THIRD PARTY NON-DISCLOSURE AGREEMENT		Doc.No. : ISMS-04/TP/011
			Ver. No: 3.0 Rev. No: 00
	Date : 27 - 10 - 14		

THIRD PARTY NON-DISCLOSURE AGREEMENT

I, _____, on behalf of the _____ (Name of Company), acknowledge that the information received or generated, directly or indirectly, while working with BHEL, Trichy on contract is confidential and that the nature of the business of the BHEL, Trichy is such that the following conditions are reasonable, and therefore:

I warrant and agree as follows:

I, or any other personnel employed or engaged by our company, agree not to disclose, directly or indirectly, any information related to the BHEL, Trichy Without restricting the generality of the foregoing, it is agreed that we will not disclose such information consisting but not necessarily limited to:

- Technical information: Methods, drawings, processes, formulae, compositions, systems, techniques, inventions, computer programs/data/configuration and research projects.
- Business information: Customer lists, project schedules, pricing data, estimates, financial or marketing data,

On conclusion of contract, I, or any other personnel employed or engaged by our company shall return to BHEL, Trichy all documents and property of BHEL, Trichy, including: drawings, blueprints, reports, manuals, computer programs/data/configuration, and all other materials and all copies thereof relating in any way to BHEL, Trichy 's business, or in any way obtained by me during the course of contract. I further agree that I, or any others employed or engaged by our company shall not retain copies, notes or abstracts of the foregoing.

This obligation of confidence shall continue after the conclusion of the contract also.

I acknowledge that the aforesaid restrictions are necessary and fundamental to the business of the BHEL, Trichy and are reasonable given the nature of the business carried on by the BHEL, Trichy I agree that this agreement shall be governed by and construed in accordance with the laws of country.

I enter into this agreement totally voluntarily, with full knowledge of its meaning, and without duress.

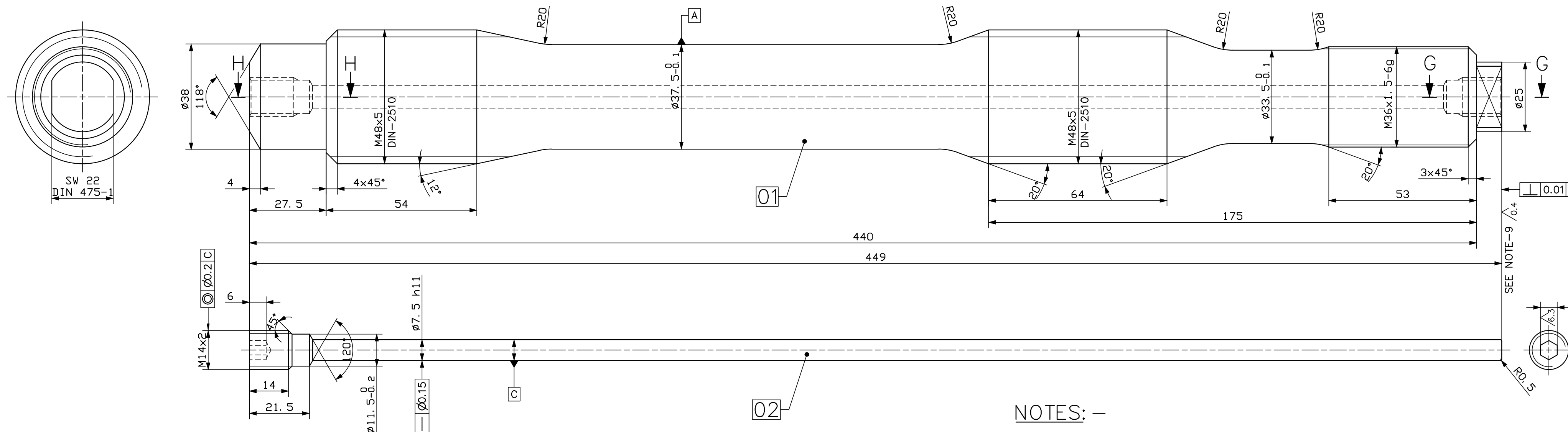
Dated at _____, this ____ day of _____, 20__.

Name

Company

Signature

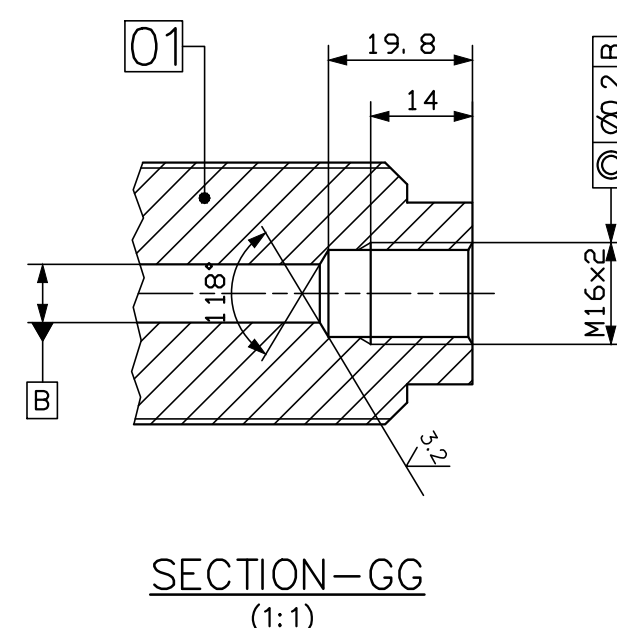
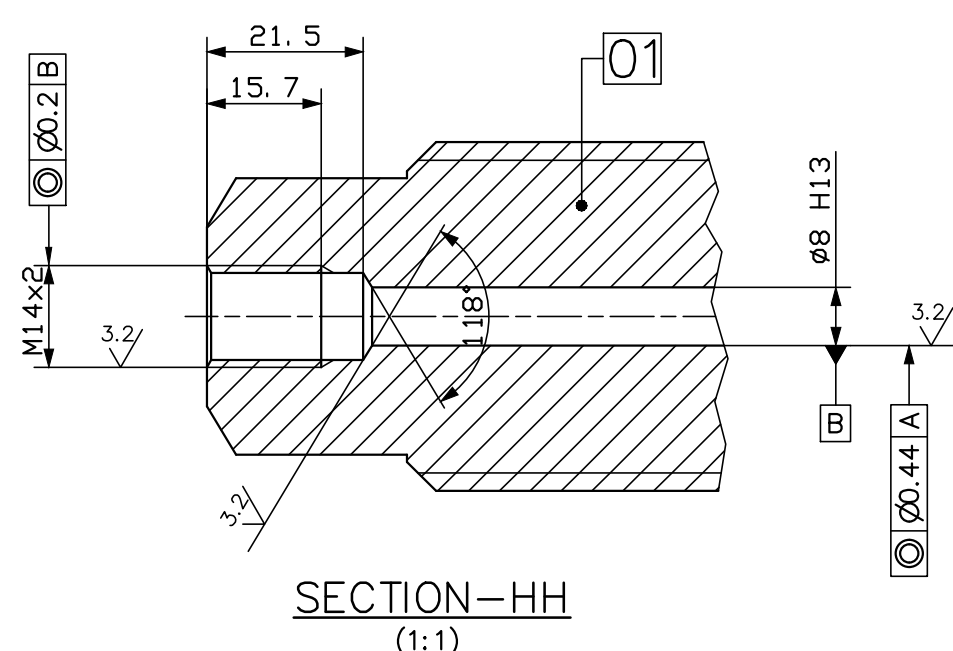
ALL DIMENSIONS ARE IN MILLIMETERS



ITEM NO.	DESCRIPTION	SPECN.
01	STUD	20NiCrMo14.5 II
02	MEASURING PIN	24CrMo5

NOTES: -

1. APPLICABLE SPECIFICATIONS:
PC-M-965
PC-P-979
2. UNLESS OTHERWISE SPECIFIED SURFACE FINISH SHALL BE $\sqrt{3.2}$ OR FINER.
3. THE STUD SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
4. ~~THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.~~
5. THE BAR SHALL BE SUBJECTED TO M.T. AS PER PC-P-979
6. THE BAR SHALL BE SUBJECTED TO U.T. AS PER PC-M-965
7. THE THREADS SHALL BE SUITABLY COATED WITH EASILY REMOVABLE RUST PREVENTIVE COATING TO ENSURE SEA-WORTHINESS. THE FASTENERS SHALL BE TROPICAL PACKING TO PREVENT THE THREADED SURFACES FROM COMING IN CONTACT WITH ANY FOREIGN OBJECTS DURING TRANSPORTATION AND HANDLING.
8. THE THREADS SHALL BE SUBJECTED TO P.T. AS PER PC-P-979
9. ITEM NO.01 (STUD) AND ITEM NO.02 (MEASURING PIN) TO BE SURFACE GROUND AFTER ASSEMBLING.
10. THE THREADINGS OTHERWISE SPECIFIED SHALL BE AS PER DIN-13
11. THE THREAD END SHALL BE AS PER DIN 78-K
12. THE RUNOUT SHALL BE AS PER DIN 76 PART-1



TOLERANCE DIMENSIONS	ALLOWANCE	
	OVER	UNDER
ø8 H13	0.22	0
ø7.5 h11	0	0.09

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

LINEAR					ANGULAR			
0.5	TD	3	± 0.1	400 TD 1000	± 0.8	0	TD 10	$\pm$
3	TD	6	± 0.1	1000 TD 2000	± 1.2	10	TD 50	± 3
6	TD	30	± 0.2	2000 TD 4000	± 2.0	50	TD 120	± 2
30	TD	120	± 0.3	—	—	120	TD 400	± 1
120	TD	400	± 0.5	—	—	OVER	400	$\pm$

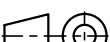
REV 01	DATE 081018	ALTERED : <i>[Signature]</i> CHD&APPD : <i>[Signature]</i>
NOTE-4 DELETED		

NOTE-4 DELETED

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	
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700MWe/GHAVP-1&2

 05-228/D		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014			DRN	NAME N.K.	SIGNATURE <i>[Signature]</i>	DATE 120814	No. OF VAR
					CHD	MAK/RRV	<i>[Signature]</i>	140814	
					APPD	A.S.	<i>[Signature]</i>	160814	
DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE 1:1	WEIGHT (Kg) 4.400	REF TO ASSY / OLD DWG GHAVP-1&2/33111/4031/DD/ROO			ITEM NO	No OF ITEMS
CODE 150									
TITLE STUD ASSY. FOR MANHOLE COVER					CARD CODE U 01	DRAWING NO : 2-93-170-05242			REV 01

DRAWING NO: 2-93-170-05243

ALL DIMENSIONS ARE IN MILLIMETERS

NOTES: -

1. APPLICABLE SPECIFICATIONS:
PC-M-965
PC-P-979
2. UNLESS OTHERWISE SPECIFIED SURFACE FINISH SHALL BE $\sqrt{3.2}$ OR FINER.
3. THE STUD SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
4. THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.
5. THE BAR SHALL BE SUBJECTED TO M.T. AS PER PC-P-979
6. THE BAR SHALL BE SUBJECTED TO U.T. AS PER PC-M-965
7. THE THREADS SHALL BE SUITABLY COATED WITH EASILY REMOVABLE RUST PREVENTIVE COATING TO ENSURE SEA-WORTHINESS. THE FASTENERS SHALL BE TROPICAL PACKING TO PREVENT THE THREADED SURFACES FROM COMING IN CONTACT WITH ANY FOREIGN OBJECTS DURING TRANSPORTATION AND HANDLING.
8. THE THREADS SHALL BE SUBJECTED TO P.T. AS PER PC-P-979
9. ITEM NO.01 (STUD) AND ITEM NO.02 (MEASURING PIN) TO BE SURFACE GROUND AFTER ASSEMBLING.
10. THE THREADINGS OTHERWISE SPECIFIED SHALL BE AS PER DIN-13
11. THE THREAD END SHALL BE AS PER DIN 78-K
12. THE RUNOUT SHALL BE AS PER DIN 76 PART-1

ITEM NO.	DESCRIPTION	SPECN.
01	STUD	20NiCrMo14.5 II
02	MEASURING PIN	24CrMo5

TOLERANCE DIMENSIONS	ALLOWANCE	
	OVER	UNDER
$\phi 4$ h11	0	0.075
$\phi 4.5$ H13	0.18	0

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

LINEAR				ANGULAR			
0.5 TO 3	± 0.1	400 TO 1000	± 0.8	0 TO 10	$\pm 1^\circ$		
3 TO 6	± 0.1	1000 TO 2000	± 1.2	10 TO 50	$\pm 30'$		
6 TO 30	± 0.2	2000 TO 4000	± 2.0	50 TO 120	$\pm 20'$		
30 TO 120	± 0.3	-	-	120 TO 400	$\pm 10'$		
120 TO 400	± 0.5	-	-	OVER 400	$\pm 5'$		

REV	DATE	ALTERED
01	081018	CHD&APPD :

NOTE-4 DELETED

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

700MWe/GHAVP-1&2



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

DRN	NAME	SIGNATURE	DATE	NO. OF VAR
CHD	N.K.		140814	
APPD	MAK/RRV		160814	
	A.S		180814	

DEPT	GRADE OF UNTO L DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	NO OF ITEMS
NC	C/M/F	1:1 2:1	0.893	GHAVP-1&2/33111/4032/DD/ROO		

TITLE	CARD CODE	DRAWING NO :	REV
STUD ASSY. FOR HANDHOLE COVER	U 01	2-93-170-05243	01

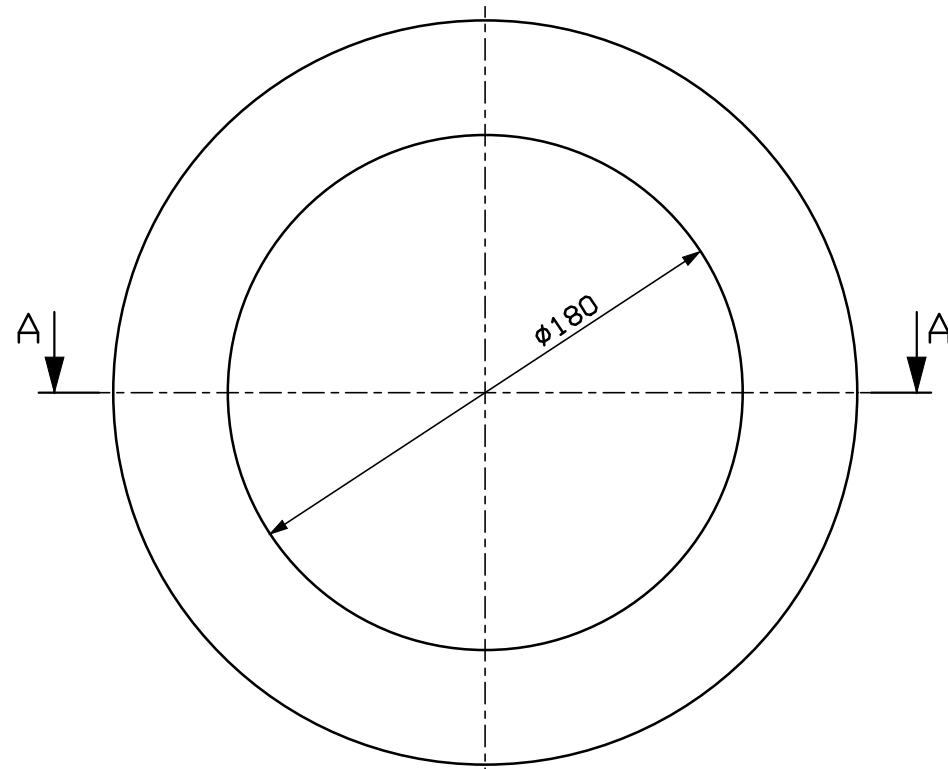
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3-93-170-05447
DRAWING NO:

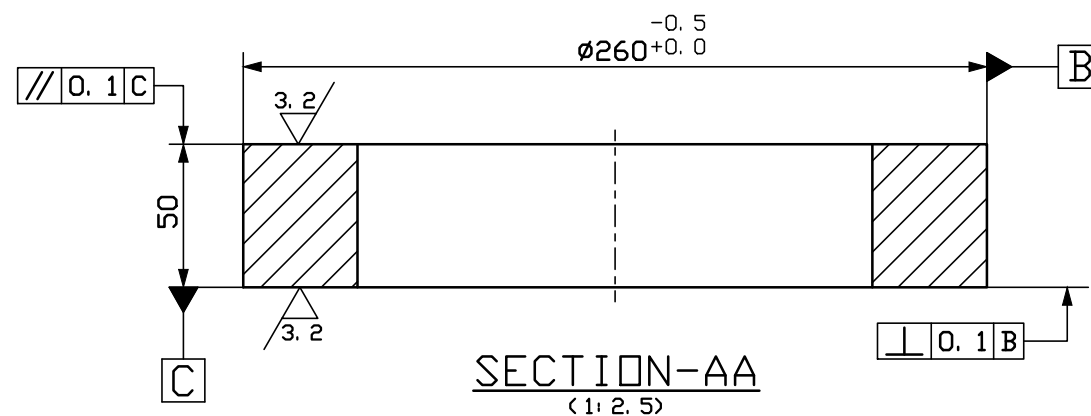
ALL DIMENSIONS ARE IN MILLIMETERS

NOTES:-

1. APPLICABLE SPECIFICATIONS : PC-M-965 & PC-M-979.
2. MATERIAL SPECIFICATION : 34CrNiMo6 (MATERIAL NO.: 1.6582)
3. THE SLEEVE SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
4. ROUND OFF ALL SHARP CORNERS.
5. MACHINED SURFACES UNLESS OTHERWISE SPECIFIED SHALL HAVE A SURFACE
ROUGHNESS VALUE $\sqrt{3.2}$ OR FINER.
6. THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.
7. THE BAR/ROD SHALL BE SUBJECTED TO M.T AS PER PC-M-979 & U.T AS PER PC-M-965.
8. EASILY REMOVABLE RUST PREVENTIVE COATING SHALL BE APPLIED DURING SHIPPING TO
ENSURE SEA-WORTHINESS AND FOR STORAGE IN TROPICAL CONDITIONS.
9. APPROXIMATE WEIGHT : 11.1 kg
10. QUANTITY REQUIRED PER SG : 2 Nos.



SLEEVE
(1: 2.5)

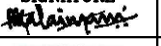
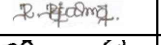
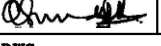


SECTION-AA
(1: 2.5)

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

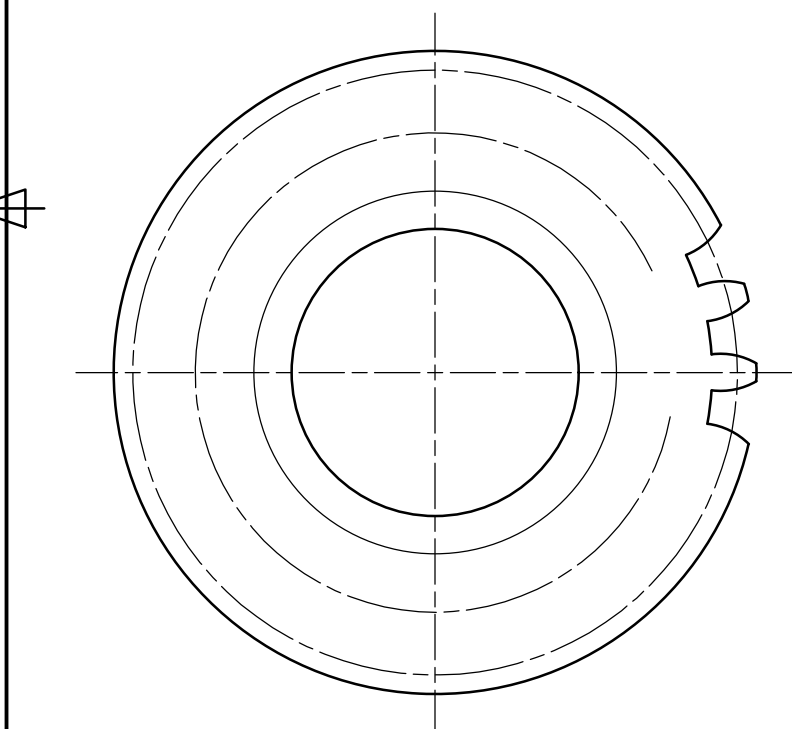
LINEAR				ANGULAR	
0.5 TO 3	± 0.1	400 TO 1000	± 0.8	0 TO 10	± 1°
3 TO 6	± 0.1	1000 TO 2000	± 1.2	10 TO 50	± 30'
6 TO 30	± 0.2	2000 TO 4000	± 2.0	50 TO 120	± 20'
30 TO 120	± 0.3	—	—	120 TO 400	± 10'
120 TO 400	± 0.5	—	—	OVER 400	± 5'

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe/GHAVP-1&2 Ref. Drg. No.: GHAVP-1&2/33111/4225/DD/R00						
 05-229/D	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME N.K	SIGNATURE 	DATE 050918	NO. OF VAR	
			CHD	RRV		050918		
			APPD	A.S		050918		
DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE 1: 2.5	WEIGHT (Kg) 11.1	REF TO ASSY / OLD DWG		ITEM NO	No OF ITEMS
CODE 150	TITLE SLEEVE FOR SG VERTICAL SUPPORT			CARD CODE U 01	DRAWING NO : 3-93-170-05447		REV 00	

Size A3

DRAWING NO:



	VAR-01	VAR-02
A	ø85	ø47.25
B	ø80	ø43.75
C	48	27
D	$\varnothing 73.5^{+0}_{-0.046}$	$\varnothing 39^{+0}_{-0.039}$
E	M48x5-6H	M27x3-6H
F	20°	30°
G	4	3
H	32	25
J	2.5	1.75

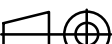
11. EASILY REMOVABLE RUST PREVENTIVE COATING SHALL BE APPLIED DURING SHIPPING TO ENSURE SEA-WORTHINESS AND FOR STORAGE IN TROPICAL CONDITIONS.

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

02		GEAR NUT					A		0. 200	
						34CrNiMo6				
01		GEAR NUT					A		1. 200	
						34CrNiMo6				
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C	UNIT	UNIT WEIGHT	GS
					VAR NO	MATERIAL SPECN		D1	QUANTITY	

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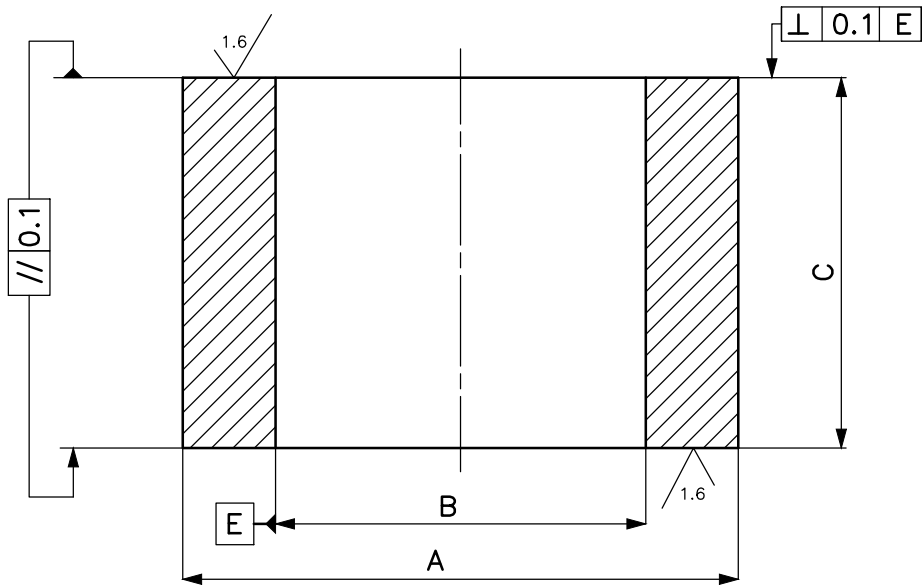
700MWe Steam Generator
W.O.No.D157 TO D160-001-1-93-171-GHAVP-1&2
(Customer Drg.: GHAVP-1&2/33111/4028 TO 4030/DD/REV:00)

		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME K.R.	SIGNATURE 	DATE 060718	NO. OF VAR
				CHD	RRV/NKK		060718	
				APPD	A.S.		060718	
05-229/D								
DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE 1:1	WEIGHT (Kg) — —	REF TO ASSY / OLD DWG		ITEM NO	No OF ITEMS
CODE 150								
TITLE GEAR NUT				CARD CODE U 01	DRAWING NO : 3-93-171-05416			REV 00

Size A3

NOTES:

01. APPLICABLE SPECIFICATIONS:
PC-M-965 & PC-P-979
02. THE SLEEVE SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
03. ROUND OFF ALL SHARP CORNERS.
04. MACHINED SURFACES UNLESS OTHERWISE SPECIFIED SHALL HAVE A SURFACE
ROUGHNESS VALUE $\sqrt{3.2}$ OR FINER.
05. THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.
06. THE BAR/ROD SHALL BE SUBJECTED TO M.T. AS PER PC-M-979 AND U.T. AS PER SA-388
07. EASILY REMOVABLE RUST PREVENTIVE COATING SHALL BE APPLIED DURING SHIPPING TO
ENSURE SEA-WORTHINESS AND FOR STORAGE IN TROPICAL CONDITIONS.



	VAR-01	VAR-02
A	$\phi 73.5^{+0}_{-0.046}$	$\phi 39^{+0}_{-0.039}$
B	$\phi 49$	$\phi 28$
C	49	40

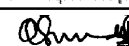
02		SLEEVE							0.190	
						34CrNiMo6	A			
01		SLEEVE							0.910	
						34CrNiMo6	A			
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C	UNIT	UNIT WEIGHT	US
					VAR NO	MATERIAL SPECN		D1	QUANTITY	

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

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

REV	DATE	ALTERED :
01		CHD&APPD :

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe Steam Generator W.O.No. D157 TO D160-001-1-93-171-GHAVP-1&2 (Customer Drg.: GHAVP-1&2/33111/4028 TO 4030/DD/REV:00)							
 05-229/D		Bharat Heavy Electricals Ltd		DRN	NAME K.R.	SIGNATURE 	DATE 060718	NO. OF VAR	
		UNIT: HIGH PRESSURE BOILER PLANT		CHD	RRV/NKK		060718		
		TIRUCHIRAPALLI - 620014		APPD	A.S		060718		
DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE	WEIGHT (Kg) —	REF TO ASSY / OLD DWG			ITEM NO	No OF ITEMS
CODE 150									
TITLE SLEEVE				CARD CODE U 01	DRAWING NO : 3-93-171-05417			REV 00	



NUCLEAR POWER CORPORATION OF INDIA LTD.,
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SPECIFICATION NO. : PC – M – 965

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Dec, 2013							
12							

TECHNICAL SPECIFICATION
FOR
FASTENERS OF FERRITIC STEELS

REF. USI NO. : 33111

	NAME	Designation	SIGNATURE	DATE
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APPROVED BY	U.C.Muktibodh	ED (Engg.)	<i>U.C.Muktibodh</i>	20.12.13

(For Revisions see Revision Control Sheet)

File Name :

CD No.:

(i)

REVISION CONTROL SHEET

DOCUMENT TYPE : TECHNICAL SPECIFICATION

NO. : PC - M - 965

TITLE : FASTENERS OF FERRITIC STEELS

REV. NO. & DATE	DESCRIPTION OF REVISION	PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
0 Dec., 2013	Original (Pages : 12)	Ajit K Shit R.K.Gupta Braham Prakash	P.B.Rshikesan D.Ganesh M.R.S.Saxena	S.N.Kamath M.K.Sharma	U.C. Muktibodh

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	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 1 of 8
	<u>TECHNICAL SPECIFICATION FOR</u> <u>FASTENERS OF FERRITIC STEELS</u>	Rev. No. : 0

1.0 SCOPE

This specification covers the technical requirements for fasteners which include studs, bolts, nuts and washers made of ferritic steels according to TRD 106, AD Markblatt W7, DIN EN 10269 Vd-TuV-Werkstoffblatt 137 and SE – Werkstoffblatt 550-57 ; unless otherwise specified. In case of doubt, more stringent of the requirements shall apply.

The specification is also applicable to the raw materials like rounds and sections used for the manufacture of the above products.

However, acceptance tests shall be conducted on the heat treated (Quenched and Tempered) samples.

This specification is applicable for Steam Generators of projects beyond RAPP-7&8.

2.0 CONTENTS

The requirements of this specification are presented under the following section headings:

Description	Section
Scope	1.0
Contents	2.0
Chemical Analysis	3.0
Heat Treatment	4.0
Minimum Mechanical Requirements	5.0
Test Specimen Location and Orientation	6.0
Tests	7.0
Non Destructive Examination	8.0
Dimensional Check	9.0
Repairs	10.0

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
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	TECHNICAL SPECIFICATION FOR FASTENERS OF FERRITIC STEELS	Page No. : 2 of 8 Rev. No. : 0

Procedures and Plans	11.0
Quality Surveillance	12.0
Marking and Identification	13.0
Reports	14.0
Packing and Shipment	15.0

3.0 CHEMICAL ANALYSIS

Both product and ladle analysis for each heat shall be done.

The chemical composition of various materials shall comply with the respective provisions of DIN EN 10269 , VdTUV- Werkstoffblatt 137 (8.62) and 337 (latest edition).

4.0 HEAT TREATMENT

The fasteners shall be supplied in tempered condition.

5.0 MINIMUM MECHANICAL REQUIREMENTS

All the mechanical requirements stipulated herein are minimum requirements and apply to condition after final heat treatment.

Materials shall comply to DIN EN 10269.

Material 20 Ni Cr Mo 14.5 II (Material No.1.6772) shall comply with the requirements laid down in VdTUV-Werkstoffblatt 337 (Latest Edition).

For material 34 Cr Ni Mo 6 (Material No.1.6582) the following minimum mechanical requirements shall be met.

	Room Temp.	350°C
Ultimate tensile strength N/ mm ²	930-1127	735
Yield point (Yp 0.2) N/ mm ²	833	559
% elongation	16	See note.
% reduction in area	45	45

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
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Note: Although UTS & % elongation at 350°C are not specified, the supplier shall report the actual values obtained during testing in the certificate.

Material 24 Cr Mo5 shall meet all the requirements of DIN EN 10269 latest edition.

Notch Toughness

Axial ISO-V test specimens tested at 20°C shall meet the following:

Lowest individual value = 63 J

Lateral expansion = 0.65 mm minimum

All mechanical tests shall be carried out in accordance with relevant German Standards or equivalent ASTM Standards, unless otherwise specified.

6.0 **TEST SPECIMEN LOCATION AND ORIENTATION**

6.1 Test specimens shall have their axes in the direction of longitudinal axis of the bar.

For impact specimen, the axis of the notch will be normal to the cylindrical surface.

6.2 For bars of lengths 4 meters and above (in the tempered condition), testing shall be carried out at both ends.

6.3 Sampling depth shall be at least D/2 in axial direction, D/6 in radial from the external tempered surface for studs and bolts and 0.5 S in the case of washers and nuts.

Where, S = Wall thickness and)
D = diameter of bar) at the time of final heat treatment
as per DIN EN 10269)

Test specimen removal and all tests shall be carried out after final tempering treatment.

 एनपीसीआईएल NP CIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
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	<u>TECHNICAL SPECIFICATION FOR</u> <u>FASTENERS OF FERRITIC STEELS</u>	Rev. No. : 0

7.0 **TESTS**

7.1 Test shall be conducted in accordance with DIN EN 10269.
Test coupons shall be taken from the hardest and softest bars from each melt / heat treatment batch.

7.2 **Product Analysis**

Specimens for product analysis shall be taken from both the ends of each bar.

7.3 **Hardness Test**

Hardness test shall be carried out on both the ends of each bar.

7.4 **Microstructure Examination**

7.4.1 Grain size shall be determined at x 100 magnification on impact tested specimen at each sampling position.

7.4.2 Microstructure shall be examined at x 200 magnification on impact tested specimens at each sampling position.

7.5 **Tensile Test**

At each sampling position two tensile test specimens shall be taken for tests at room temperature and at + 350°C.

7.6 **Impact Test**

At each sampling position one set of three impact specimens shall be taken for test at + 20°C. The % shear fracture shall be reported for each impact test specimen. Lateral expansion shall be measured on each impact test specimen in accordance with ASME SA-370 and shall be reported.

7.7 **Cone Stripping Test**

Nuts shall be subjected to cone stripping test as per SA 194 of ASME Section II Part. A.

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	<u>TECHNICAL SPECIFICATION FOR</u> <u>FASTENERS OF FERRITIC STEELS</u>	Rev. No. : 0

8.0 NON DESTRUCTIVE EXAMINATION

8.1 Ultrasonic Examination

Non destructive examination shall be carried out on bars after final heat treatment and machining but before thread rolling in accordance with SA-388, recommended practice for ultrasonic examination of heavy steel forgings.

Examination of forged bars must be performed from both frontal faces and from the cylindrical surface with normal beam probes.

If evaluation by normal beam probes on the frontal faces are not feasible, the bars shall be examined from the cylindrical surface in to and fro directions by angle beam.

For bars larger than 120 mm in diameter, additional scanning in the circumferential directions (clockwise and counterclockwise) with 35 degree angle beam probes shall be carried out.

The acceptance standards for ultrasonic examination for bars shall be as follows:

Local Indications

- D < 60 mm, CRR – 2 mm.
- D > 60 mm, CRR – 3 mm.
- D > 120 mm, CRR – 4 mm.

Where, CRR = circular reference reflector.

Indications with linear character are not acceptable. Also accumulation of defect indications in close vicinity is not acceptable.

8.2 Magnetic Particle Examination

Each bar after heat treatment and final machining but before thread cutting shall be examined by magnetic particle method (MT) in accordance with PC-P-979. The extent of examination shall be 100%. Demagnetization to a residual magnetism < 2 oersted is required after test. Any linear non axial indications shall be considered unacceptable.

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	ATOMIC POWER PROJECT	Page No. : 6 of 8
	<u>TECHNICAL SPECIFICATION FOR</u> <u>FASTENERS OF FERRITIC STEELS</u>	Rev. No. : 0

9.0 **DIMENSIONAL CHECK**

The finished fasteners shall be checked for all dimensions and thread profile, pitch, etc., with the help of thread guage. All measurements shall be recorded.

10.0 **REPAIRS**

No repairs are permitted. All non conformities shall be reported to the purchaser or authorized inspection agency before carrying out remedial measures, if any.

11.0 **PROCEDURES AND PLANS**

The following procedures and plans shall be submitted to the purchaser for review and approval in six copies each before start of manufacture.

- a) Manufacturing plan indicating the sequence of operations and testing, witness and hold points.

Witness point signifies that the manufacturer will intimate date of actual performance of that activity to the Purchaser sufficiently in advance so that purchaser can witness the performance of the activity. However, in case purchaser is not present, the manufacturer can proceed with the job.

Hold point is similar to witness point except that in case of hold point the manufacturer cannot proceed with the activity unless purchaser is present or has given written waiver to proceed without his presence.

- b) Heat treatment plan.
- c) Material testing and sampling plan with sketches showing various specimens.
- d) Mechanical test properties.
- e) Non destructive examination procedure.
- f) Quality Assurance Plan.

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	TECHNICAL SPECIFICATION FOR FASTENERS OF FERRITIC STEELS	Rev. No. : 0

12.0 QUALITY SURVEILLANCE

The fasteners shall be subjected to quality surveillance by the purchaser or his authorized inspection agency during manufacture.

A schedule for sampling and testing shall be submitted to the purchaser for review and approval. The test specimens shall be taken only after they are identified and stamped by purchaser or his authorized inspection agency.

The purchaser or his authorized inspection agency shall witness the tests at various stages. These stages shall be clearly identified in the manufacturing plan to be submitted by the supplier.

The manufacturer shall afford the purchaser or his authorized inspection agency all reasonable facilities to satisfy him that the material is being manufactured in accordance with the specification.

13.0 MARKING AND IDENTIFICATION

All the fasteners shall be marked with the following identifications.

- Melt No.
- Manufacturer's identification.
- Steel grade.
- Inspection agency's stamp.

14.0 REPORTS

Four (4) copies of the following reports shall be submitted to the purchaser immediately after completion of tests / inspection, prior to shipment of the material. The reports shall be submitted in bound volume. One set of test reports/ certificates shall be dispatched along with material for each unit.

- Chemical analysis – Ladle and product.
- Mechanical test report.

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	ATOMIC POWER PROJECT	Page No. : 8 of 8
	<u>TECHNICAL SPECIFICATION FOR</u> <u>FASTENERS OF FERRITIC STEELS</u>	Rev. No. : 0

- c) CV impact curve.
- d) Non destructive examination report.
- e) Heat treatment charts.
- f) Visual and dimensional inspection report.
- g) Grain size report with micrographs for microstructure.
- h) Hardness survey report.
- i) Sulfur prints.

Final documentation containing all the above shall also be submitted in soft form (pdf format) with proper indexing.

15.0 **PACKING AND SHIPMENT**

Before shipment, suitable easily removable rust preventive coating shall be applied to ensure sea – worthiness. The fasteners shall be suitably crated to prevent the threaded surfaces from coming in contact with any foreign objects.

Material for each unit shall be packed separately.



NUCLEAR POWER CORPORATION OF INDIA LTD.,
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SPECIFICATION NO. : PC – P – 979

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TOTAL NO. OF PAGES (Including Cover Sheet)	:	10						

TECHNICAL SPECIFICATION

FOR

MAGNETIC PARTICLE AND LIQUID PENETRANT EXAMINATION

REF. USI NO. : 33111

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	Braham Prakash	ACE	<i>Braham Prakash</i>	22.11.2013
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(For Revisions see Revision Control Sheet)

File Name :

CD No.:

(i)

NO.: PC - P - 979

TITLE : TECHNICAL SPECIFICATION FOR MAGNETIC
PARTICLE AND LIQUID PENETRANT EXAMINATION

REV. NO. & DATE	DESCRIPTION OF REVISION	PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
0 Nov., 2013	Original (Pages : 10)	A.K. Shit	P.B.Rshikesan	Sundar Singh	U.C. Muktibodh
		R.K.Gupta	D.Ganesh	S.N.Kamath	
		Braham Prakash	M.R.S.Saxena	M.K.Sharma	

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 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 1 of 8
	TECHNICAL SPECIFICATION FOR MAGNETIC PARTICLE AND LIQUID PENETRANT EXAMINATION	Rev. No. : 0

1.0 SCOPE

This specification covers the procedure for magnetic particle and liquid penetrant examination of Steam Generator /Pressure Vessel components and welds. This procedure covers the minimum requirements, ASME Section V and other reference codes & standards to be referred for other details.

This specification is applicable for projects beyond RAPP-7&8.

2.0 CONTENTS

The requirements of this Specification are presented under the following headings:

	<u>Section</u>
Scope	1.0
Contents	2.0
Surface Condition	3.0
Magnetic Particle Examination	4.0
Liquid Penetrant Examination	5.0
Lighting Conditions	6.0
Acceptance Standards	7.0
Procedure Qualification	8.0
Personnel Qualification	9.0
Post Cleaning	10.0
Report	11.0

3.0 SURFACE CONDITION

Surface preparation by grinding or machining or by other method may be employed where surface irregularities may mask indications of unacceptable discontinuities.

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	TECHNICAL SPECIFICATION FOR MAGNETIC PARTICLE AND LIQUID PENETRANT EXAMINATION	Rev. No. : 0

The surface to be examined and all adjacent areas (at least 25 mm from either side) shall be dry and free from any dirt, lint, scale, rust, welding flux, weld spatter, grease, oil etc. These extraneous matters could obscure surface openings or otherwise interfere with examination.

The surface to be examined shall be cleaned with detergents, organic solvents, de-scaling solutions or paint removers. Degreasing and ultrasonic cleaning may be employed to increase cleaning efficiency.

The surface finish for proof machined items shall be better than 6.3 microns. For rolled sheets, surface finish of less than or equal to 10 μ m is required.

4.0 MAGNETIC PARTICLE EXAMINATION

4.1 This method involves the magnetization of an area to be examined and the application of ferromagnetic particles to the surface. The particles gather at areas of magnetic flux leakage and form indications characteristic of the type of discontinuity detected.

4.2 Magnetization shall be done by direct or half wave rectified current. Use of A.C./Yoke method requires specific approval of the purchaser. Magnetization must be done in two directions as far as possible, at an angle of 90° to each other. If the source of magnetizing current with an open circuit voltage is more than 25 volts, Vanadium steel or aluminum, rather than copper tipped prods are recommended, to avoid copper penetration.

4.2 Field Intensity

The field intensity should range between 25 and 40 oersteds during the testing, and shall be checked during each variation of test equipment, wall thickness and geometry of the components. The field intensity shall be measured using suitable device. Estimation of field intensity based on current and prod spacing is not acceptable.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
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4.3 Duration of Magnetization

The following values shall be used for magnetization and deposition periods.

Magnetization and particle deposition : 10 Seconds

Re-magnetization : 10 Seconds minimum

Depending upon power concentration examination position and shape of the work piece, durations from the above values may be necessary. The time actually needed shall therefore be determined for each area to be examined.

4.4 Demagnetization

Demagnetization of components, if necessary, shall be carried out by using decreasing alternating current field. The value of magnetic field after demagnetization shall be less than 3 Gauss.

4.5 Examination Medium

4.5.1 Wet Particles

The liquid medium in which magnetic particles are suspended shall be suitably treated, depending upon further process of work piece (e.g. oil can cause porosity during subsequent welding). While using water, rust preventive, antifreeze additives etc., shall be added. Periodical checking up of bath strength should be done as per ASTM-E-138.

4.5.2 Dry Particles

Dry particles method is permitted. Care shall be taken to ensure that powder is adequately dry. An applicator shall be used for rapid and uniform application of the dry powder. Care shall be taken to dust on the powder very lightly and sparingly. A low velocity low pressure air-stream from a hand bulb or a small air-hose may be used to remove excess powder.

4.5.3 Contrast

The powder shall be of a color that will provide adequate contrast with the background of the surface being inspected. The contrast can be improved by

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
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applying a thin coat of fast drying white varnish. (Such varnish coat, results in more precise flaw detection due to the smooth surface). Such varnish shall not have halogen and sulfur content more than 25 ppm each. Varnish coat shall be removed after the test. If fluorescent particles are used, the examination is to be conducted in a darkened area, using filtered "Black light", with an intensity reading at least 1000 LUX at the work.

4.6 Prod Contact Points

The prod contact points shall be marked, dressed and checked by Dye penetrant. Care shall be taken to keep the prod contact points as few as possible. The current shall be switched on only after proper contact has been established.

4.7 Field Monitoring

Field intensity direction and powder suspension shall be controlled periodically during the test by using Bertholds test plate or field indicator as per ASME Section V.

4.8 Recording of Indications

Recording of indications as permanent records if required (as per referencing document) shall be done on transparent adhesive tapes. These indications shall be transferred on to a paper and preserved with proper identification.

5.0 LIQUID PENETRANT EXAMINATION

5.1 General

In principle, liquid penetrant is applied to the surface to be examined and allowed to enter in-to the discontinuities. Excess penetrant removed, the part dried and a developer applied. The developer functions both as a blotter to absorb penetrant that has been trapped in discontinuities and as a contrasting back-ground to enhance the visibility of penetrant indications.

Either a colour contrast or fluorescent penetrant method may be used. Any one of the following penetrants shall be used.

	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 5 of 8
	<u>TECHNICAL SPECIFICATION FOR</u> <u>MAGNETIC PARTICLE AND</u> <u>LIQUID PENETRANT EXAMINATION</u>	Rev. No. : 0

- Solvent removable
- Post Emulsifying
- Water washable

For nickel base alloys and/or for stainless steel materials the penetrant materials, cleaner, penetrant, developer, etc., used shall not contain Sulphur or Halogen above 25 PPM.

Only NPC approved penetrant materials to be used for testing. Latest list of approved brand of NDT material to be obtained from QA Directorate, NPCIL.

Selection of liquid penetrant material shall be from the same family (brand). Inter-mixing of family of liquid penetrant materials is not permitted.

5.2 Test Procedure

5.2.1 Application of Penetrant

Penetrant shall be applied by means of brushing or spraying. In case, compressed air type apparatus is used for spraying the penetrant, filters shall be placed on the upstream side near the air inlet to preclude contamination of the penetrant by oil, water or dirt sediments that may have collected in the lines.

The entire test surface (including at least 25 mm from either side of area to be examined) shall be covered by the penetrant.

5.2.2 Penetration Time & Temperature

Duration of penetration and test temperature shall be in accordance with ASTM-E-165. Sufficient penetrant shall be applied during the period of test to prevent drying of penetrant upon the surface.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
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5.2.3 Removal of Excess Penetrant

After the penetration time specified in the procedure has elapsed, any penetrant remaining on the surface shall be removed, taking care to minimize removal of penetrant from discontinuities.

When chemical solvent is being used as the cleaner, care should be taken to ensure that the penetrant is not removed from the flaws.

When the cleaner is water, the pressure of the jet should be kept low (not exceeding 3.5 Kg/cm² and temperature below 43°C).

5.2.4 Application of Developer

The developer shall be applied with spray nozzle of a Spray Gun. The developer shall be sprayed on the entire test surface in such a way that a uniform thin layer is deposited.

5.2.5 Examination and Interpretation of test results

When using the liquid penetrant inspection, the interpretation shall be restricted to, citing the presence or absence of flaws, their general nature magnitude and location. Evaluation of raw material and weld seams shall be performed after the following durations.

- First time after drying of developer.
- After half hour
- After 1 hour

All results shall be recorded and evaluated.

6.0 LIGHTING CONDITIONS

- When conducting an examination under white lighting conditions, the inspector shall ensure that the level of lighting is adequate at the surface of the part (recommended minimum 100 foot candles or 1000 lux).

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
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6.2 Examinations under ultra violet lighting should have a background white light level of less than 20 lux and an ultra violet intensity at the test surface of not less than 1000 μ W/cm².

6.3 The inspector shall allow at least 5 minutes for dark adaptation before beginning the inspection.

6.4 If the examiner wears glasses or lenses, they shall not be photosensitive.

7.0 ACCEPTANCE STANDARDS

7.1 All indications shall be evaluated in terms of the acceptance standards of the referencing "EXAMINATION AND TESTING SPECIFICATION".

7.2 Broad areas of pigmentation which could mask indications of discontinuities are unacceptable and the areas should be cleaned and re-examined.

8.0 PROCEDURE QUALIFICATION

Detailed procedure shall be prepared by supplier for these surface examinations separately and shall be submitted to purchaser approval. Before application of the procedure, the supplier shall demonstrate that the procedure strictly conforms to the stipulations laid down in the preceding paragraphs and meets all requirements of referencing codes and standards of the product.

9.0 PERSONNEL QUALIFICATION

Personnel performing non-destructive examination and evaluation shall be trained, qualified and certified to Level II or Level – III as per recommended practice IS-13805/ISO-9712-3/SNT-TC-1A or any other recognized practice.

10.0 POST CLEANING

Surfaces examined shall be cleaned after evaluation of the test with dry cotton cloth with or without using solvent/cleaner.

	NUCLEAR POWER CORPORATION OF INDIA LTD	
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11.0 REPORT

Record for each examination shall be prepared in a format, containing all details including the details of the technique adopted and analysis of the results and shall be submitted to purchaser.

**Advanced Technology Products
High Pressure Boiler Plant**

Generic QAP for Gear Nut

CUSTOMER	Nuclear Power Corporation of India Limited (NPCIL)
PROJECT	Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP-1&2)
W.O.	D157 to D160-001-1-93-171

BHEL / Quality Assurance & Engineering			NPCIL
Prepared by: O R NITHIN <i>NK</i> 21/9/18 NITHIN K KRISHNAN	Reviewed by: S LAKSHMI <i>S. Lakshmi</i> 21/9/18	Approved by: A SUNDARARAJAN <i>A Sundararajan</i>	<i>Rmingle</i> 21/9/18 C R N (upto) NPCIL

REVISIONS			
REVISION No.	DATE	DESCRIPTION	ORIGINATOR
00	21-09-2018	Initial Issue	Nithin K Krishnan

Supplier's LOGO	Supplier's Name and Address		Generic Quality Plan for Gear Nut					Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171				
			Item: Gear Nut Material: 34Cr Ni Mo6 Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 1 of 4							
Sl. No	Component & Operations	Characteristics	Type of Check	Quantum of check	Reference Document	Acceptance Norms	Format of Record		Agency			Remarks
									M	B	N	
1.	2.	3.	4.	5.	6.	7.	8.	D *	9. **			10.
1.0 Raw Material :												
1.1	Steel Melting: Method to be mentioned	Temperature	Record Verification	100%	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R		---
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Heat	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R		---
1.3	Ingot formation	free from defects	Visual	100%	MPP: To be submitted	RD	--	P	R	R		---
2.0 In process Controls:												
2.1	Forging to Rods/bars	Forging Process	Record Verification	100%	PC-M-965 Rev 00 MPP : To be submitted	TC	√	P	R	R		---
2.2	Heat Treatment: Annealing	R.O.H , Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-965 Rev 00 HT Plan To be submitted	TC	√	P	W	R		HT chart to be submitted along with TC
2.3	Skin machining for NDE	Skin machining	Visual/Dimension	100%	----	RD	--	P	-	-		---
2.4	Visual Inspection of bars/rods	Free from Visual Defects	Visual Test	100%	Free from Visual Defects	RD	√	P	-	R		---
2.5	Magnetic Particle Examination (MT) of bars/rods	Surface and shallow subsurface defects	Magnetic particle test	100%	PC-M-965 Rev 00 PC-P-979 Rev 00 MT Procedure: To be submitted	TC	√	P	H	W		To be demagnetized to a residual magnetism < 2 oersted after test.
						LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH						
Prepared		Reviewed & Approved		Reviewed & Approved		Reviewed & Approved						
SUPPLIER'S NAME: To be filled				BHEL		NPCIL						

Signature
(Nithin-Krishnan)

Signature
21/09/18
(NITHIN-KR)

Signature
21/9/18
(R K Gupta) NPCIL

Supplier's LOGO		Supplier's Name and Address		Grematic Quality Plan for Gear Nut							Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171		
				Item: Gear Nut Material: 34Cr Ni Mo6 Sub-system: Steam Generator			QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:2 of 4						
2.6	Ultrasonic Inspection (UT) of rods/bars	Internal soundness	Ultrasonic Test	100%	PC-M-965 Rev 00 ASME Sec-V: SA388 UT Procedure: To be submitted	TC	√	P	H	W	---		
2.7	Identification & cutting of Test Coupons and Machining of Specimens from Test coupons	Dimensions	Measurement	100%	PC-M-965 Rev 00 MSTP : To be submitted.	RD	√	P	H	W	Refer Note-4		
2.8	Machining, threading & Gear Formation to final dimension of Gear Nut	Dimensions	Measurement	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	--	--	P	-	-	---		
2.9	Heat Treatment: Quenching & Tempering (For Gear Nut and Test coupons)	R.O.H , Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-965 Rev 00 HT Plan To be submitted	TC	√	P	W	R	HT chart to be submitted along with TC		
2.10	Cleaning of Gear Nut	Cleanliness	Visual	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	RD	--	P	R	R	---		
2.11	Final Dimensional Check and visual examination of Gear Nut	Dimensions, Visual	Measurement, Gauge Check, Profile check	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	TC	√	P	W	W	Approved gauges shall be used for checking		
3.0	Mechanical and Metallurgical Tests on Test Coupons:												
3.1	Hardness measurement	Hardness	Brinell Hardness	1/Melt/HTB	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	W	R	Hardness survey report shall be submitted		
3.2	Product Analysis	Chemistry	Chemical analysis	1/Melt/HTB	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R	--		

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

21/09/18

21/09/18

21/9/18

Supplier's LOGO		Supplier's Name and Address		Generic Quality Plan for Gear Nut							Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171		
				Item: Gear Nut Material: 34Cr Ni Mo6 Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:3 of 4							
3.3	Tensile test at RT (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	1/Melt/HTB	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	H	W	--		
3.4	Tensile test at 350°C (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	1/Melt/HTB	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	H	W	--		
3.5	Impact Test at +20°C (Longitudinal)	absorbed energy, lateral expansion, % shear fracture	Destructive Test	1/Melt/HTB	PC-M-965 Rev 00 ASME SA-370 MSTP: To be submitted	TC	√	P	H	W	--		
3.6	Cone stripping Test	Proof Load Test	Destructive Test	Refer Note-5	PC-M-965 Rev 00 ASME SA-194 Cone Stripping Test Procedure: To be submitted MSTP: To be submitted	TC	√	P	W	W	--		
3.7	Micrograph for Grain size & Structure of hardest and softest bar end	Micro structure, Grain Size	Micro test, Grain size check	1/Melt/HTB	PC-M-965 Rev 00	TC	√	P	W	R	Grain size at 100X magnification and microstructure at 200X magnification on impact tested specimens at each sampling position		
4.0	Final Inspection												
4.1	Visual Inspection of Gear Nut	Free from visual defects	Verification and Visual	100%	PC-M-965 Rev 00 and as per Drg. No.: To be filled	TC	√	P	R	R	---		

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

21/09/18

21/09/18

21/09/18
(R H Imps) NPCIL

Supplier's LOGO	Supplier's Name and Address		Crenew Quality Plan for Gear Nut						Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171			
			Item: Gear Nut Material: 34Cr Ni Mo6 Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 4 of 4							
4.2	Marking and Identification of Gear Nut	Melt No., Manufacturer's identification, Steel grade, Inspection Agency stamp	Verification and visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	All gear nuts shall be marked with identifications.	
4.3	Preservation	Appearance	Verification and Visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	---	
4.4	Certification and Documentation Control	Order compliance	Certificate compilation	100%	PC-M-965 Rev 00	TC	√	P	R	R	---	
4.5	Documents (Test Certificates) shall be sent to BHEL/Trichy prior to dispatch. Dispatch clearance will be given after Acceptance of Test Certificates by BHEL&NPCIL					RD	--	P	H	H	---	
4.6	Packing & Shipment	Packing	Visual	100%	PC-M-965 Rev 00	---	--	P	-	R	Ensure Sea worthiness and right quantity of supply. Material for each unit shall be packed separately.	

- Note: 1. MSTP (Material Sampling Plan), MPP (Manufacturing Process plan), Heat Treatment Plan, Ultrasonic, Magnetic Particle etc. shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.
2. Before shipment suitable rust preventive coating shall be applied to ensure sea-worthiness and tropical storage for two years.
3. MPP (Manufacturing Process plan) shall indicate detailed sequence of operations at various stages.
4. Test coupons (for representing the job) shall be identified from the forged bar/rod of adequate size to draw the specimens, if sufficient material is not available in the final forged and machined product. Size of the Test coupons and specimens shall be mentioned in MSTP (Material Sampling and Testing Plan).
5. One cone stripping test shall be performed if any visible surface discontinuities become a matter of issue.

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

21/09/18

21/09/18

21/9/18
NPCIL

**Advanced Technology Products
High Pressure Boiler Plant**

Generic QAP for Sleeve

CUSTOMER	Nuclear Power Corporation of India Limited (NPCIL)
PROJECT	Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP-1&2)
W.O.	D157 to D160-001-1-93-171

BHEL / Quality Assurance & Engineering			NPCIL
Prepared by:	Reviewed by:	Approved by:	
O R NITHIN <i>N.K. 21/9/18</i>	S LAKSHMI <i>S. Lakshmi 21/9/18</i>	A SUNDARARAJAN <i>A. Sundararajan</i>	<i>R. K. Gupta 21/9/18</i> R K Gupta NPCIL
NITHIN K KRISHNAN <i>N.K. 21/9/18</i>			

REVISIONS			
REVISION No.	DATE	DESCRIPTION	ORIGINATOR
00	21-09-2018	Initial Issue	Nithin K Krishnan

Supplier's LOGO	Supplier's Name and Address	Generic Quality Plan for Sleeve						Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171				
		Item: Sleeve Material: 34CrNiMo6 Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 1 of 4								
Sl. No	Component & Operations	Characteristics	Type of Check	Quantum of check	Reference Document	Acceptance Norms	Format of Record		Agency			Remarks
									M	B	N	
1.	2.	3.	4.	5.	6.	7.	8.	D *	9. **			10.
1.0 Raw Material :												
1.1	Steel Melting: Method to be mentioned	Temperature	Record Verification	100%	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R		---
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Heat	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R		---
1.3	Ingot formation	free from defects	Visual	100%	MPP: To be submitted	RD	--	P	R	R		---
2.0 In process Controls:												
2.1	Forging to Rods/bars	Forging Process	Record Verification	100%	PC-M-965 Rev 00 MPP : To be submitted	TC	√	P	R	R		---
2.2	Heat Treatment: Annealing	R.O.H , Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-965 Rev 00 HT Plan To be submitted	TC	√	P	W	R		HT chart to be submitted along with TC
2.3	Skin machining for NDE	Skin machining	Visual/Dimension	100%	----	RD	--	P	-	-		---
2.4	Visual Inspection of bars/rods	Free from Visual Defects	Visual Test	100%	Free from Visual Defects	RD	√	P	-	R		---
2.5	Magnetic Particle Examination (MT) of bars/rods	Surface and shallow subsurface defects	Magnetic particle test	100%	PC-M-965 Rev 00 PC-P-979 Rev 00 MT Procedure: To be submitted	TC	√	P	H	W		To be demagnetized to a residual magnetism < 2 oersted after test.
						LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH						
Prepared		Reviewed & Approved		Reviewed & Approved		Reviewed & Approved						
SUPPLIER'S NAME: To be filled				BHEL		NPCIL						

21/9/18
(Nithin K. Krishnan)

21/9/18
(NITHIN O.R)

21/9/18
(R.K Gupta) NPCIL

Supplier's LOGO		Supplier's Name and Address		Generic Quality Plan for Sleeve							Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171			
				Item: Sleeve Material: 34CrNiMo6 Sub-system: Steam Generator			QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:2 of 4							
2.6	Ultrasonic Inspection (UT) of rods/bars	Internal soundness	Ultrasonic Test	100%	PC-M-965 Rev 00 ASME Sec-V: SA388 UT Procedure: To be submitted	TC	√	P	H	W	---			
2.7	Identification & cutting of Test Coupons and Machining of Specimens from Test coupons	Dimensions	Measurement	100%	PC-M-965 Rev 00 MSTP : To be submitted.	RD	√	P	H	W	Refer Note-4			
2.8	Machining of rods/bars to final dimension of sleeves	Dimensions	Measurement	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	--	--	P	-	-	---			
2.9	Heat Treatment: Quenching & Tempering (For Sleeves and Test coupons)	R.O.H , Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-965 Rev 00 HT Plan To be submitted	TC	√	P	W	R	HT chart to be submitted along with TC			
2.10	Cleaning of sleeves	Cleanliness	Visual	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	RD	--	P	R	R	---			
2.11	Final Dimensional Check of Sleeves	Dimensions	Measurement	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	TC	√	P	W	W	---			
3.0	Mechanical and Metallurgical Tests on Test Coupons:													
3.1	Hardness measurement	Hardness	Brinell Hardness	1/Melt/HTB	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	W	R	Hardness survey report shall be submitted			
3.2	Product Analysis	Chemistry	Chemical analysis	1/Melt/HTB	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R	--			

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

ASAP
21/04/18

16/04/18
21/04/18

Rmyle

Supplier's LOGO		Supplier's Name and Address		Crematic Quality Plan for Sleeve							Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171		
				Item: Sleeve Material: 34CrNiMo6 Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:3 of 4							
3.3	Tensile test at RT (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	1/Melt/HTB	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	H	W	--		
3.4	Tensile test at 350°C (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	1/Melt/HTB	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	H	W	--		
3.5	Impact Test at +20°C (Longitudinal)	absorbed energy, lateral expansion, % shear fracture	Destructive Test	1/Melt/HTB	PC-M-965 Rev 00 ASME SA-370 MSTP: To be submitted	TC	√	P	H	W	--		
3.6	Micrograph for Grain size & Structure of hardest and softest bar end	Micro structure, Grain Size	Micro test, Grain size check	1/Melt/HTB	PC-M-965 Rev 00	TC	√	P	W	R	Grain size at 100X magnification and microstructure at 200X magnification on impact tested specimens at each sampling position		
4.0	Final Inspection												
4.1	Visual Inspection Sleeves	Free from visual defects	Verification and Visual	100%	PC-M-965 Rev 00 and as per Drg. No.: To be filled	TC	√	P	R	R	---		
4.2	Marking and Identification of Sleeves	Melt No., Manufacturer's identification, Steel grade, Inspection Agency stamp	Verification and visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	All sleeves shall be marked with identifications.		

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Signature
21/09/18

Signature
21/09/18

Signature
21/09/18
NPCIL

Supplier's LOGO		Supplier's Name and Address		Cremegric Quality Plan for Sleeve							Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171				
				Item: Sleeve Material: 34CrNiMo6 Sub-system: Steam Generator			QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:4 of 4								
4.3	Preservation	Appearance	Verification and Visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	--				
4.4	Certification and Documentation Control	Order compliance	Certificate compilation	100%	PC-M-965 Rev 00	TC	√	P	R	R	---				
4.5	Documents (Test Certificates) shall be sent to BHEL/Trichy prior to dispatch. Dispatch clearance will be given after Acceptance of Test Certificates by BHEL&NPCIL					RD	--	P	H	H	---				
4.6	Packing & Shipment	Packing	Visual	100%	PC-M-965 Rev 00	---	--	P	-	R	Ensure Sea worthiness and right quantity of supply. Material for each unit shall be packed separately.				

Note: 1. MSTP (Material Sampling Plan), MPP (Manufacturing Process plan), Heat Treatment Plan, Ultrasonic, Magnetic Particle etc. shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.

2. Before shipment suitable rust preventive coating shall be applied to ensure sea-worthiness and tropical storage for two years.

3. MPP (Manufacturing Process plan) shall indicate detailed sequence of operations at various stages.

4. Test coupons (for representing the job) shall be identified from the forged bar/rod of adequate size to draw the specimens, if sufficient material is not available in the final forged and machined product. Size of the Test coupons and specimens shall be mentioned in MSTP (Material Sampling and Testing Plan).

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD HTB: HEAT TREATMENT BATCH
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Signature
21/09/18

Signature
21/09/18

Signature
21/09/18

Advanced Technology Products
High Pressure Boiler Plant

Generic QAP for Stud Assembly

CUSTOMER PROJECT W.O. Nuclear Power Corporation of India Limited (NPCIL)
Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP-1&2)
D157 to D160-001-1-93-171

BHEL / Quality Assurance & Engineering			NPCIL
Prepared by: O R NITHIN NITHIN K KRISHNAN	Reviewed by: S LAKSHMI M LAKSHMINARASIMHAN	Approved by: A SUNDARARAJAN	 CRK Gupta

REVISIONS			
REVISION No.	DATE	DESCRIPTION	ORIGINATOR
00	21-09-2018	Initial Issue	Nithin K Krishnan
01	27-10-2018	R01	Nithin K Krishnan

QAP: GHAVP: STUD ASSEMBLY: 01

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

- ☒ अनुमोदित / APPROVED
☐ टिप्पणी के अनुसार अनुमोदित / APPROVED AS NOTED
☐ संशोधन को आगे बढ़ाएं / चोके ।
☐ PROCEED WITH / HOLD FABRICATION
☐ अंतिम ट्रांसपेरेंसी एवं प्रतियाँ भेजें
☐ SEND FINAL TRANSPARENCIES & PRINTS
☐ संशोधन करें एवं अनुमोदन के लिए पुनः प्रस्तुत करें।
☐ REVISE AND RESUBMIT FOR APPROVAL

जाँचकर्ता
CHECKED BY
31/10/18

समीक्षक
REVIEWED BY
27/10/18

अनुमोदन कर्ता
APPROVED BY
27/11/18

यदि जानकारी के अनुसार अनुमोदन के बिना ही काम शुरू किया गया है तो अनुमोदन के बिना ही काम शुरू नहीं करना।
The Approval of the work to be done does not relieve the supplier of responsibility of supply according to specifications.

Supplier's LOGO	Supplier's Name and Address	Generic Quality Plan for Stud Assembly (QAP: GHAVP: STUD ASSEMBLY: 01)						Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 Rev: 01				
		Item: Stud Size: M27/M48 Material: 20NiCrMo14.5 II (1.6772) Sub-system: Steam Generator			QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 1 of 5							
Sl. No	Component & Operations	Characteristics	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Agency			Remarks
									M	B	N	
1.	2.	3.	4.	5.	6.	7.	8.	D *	9. **			10.
1.0 Raw Material :												
1.1	Steel Melting :Method to be mentioned & to be approved	Steel melting	Record Verification	100%	PC-M-965 Rev-00 VD TUV WB 337 MPP: To be submitted	TC	√	P	R	R	De-oxidising condition: Killed	
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Heat	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R	---	
1.3	Semi product casting/ ingot formation	free from defects	Visual	100%	MPP: To be submitted	RD	--	P	R	R	---	
2.0 In process Controls:												
2.1	Forming Process	Forming Process	Record Verification	100%	PC-M-965 Rev 00 MPP : To be submitted	TC	√	P	R	R	Type of forming: Forging or Hot rolling. To be specified by supplier.	
2.2	Heat Treatment: [Hardening , Tempering, Stress Relieving(if any) as per VD TUV WB 337]	R.O.H , Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-965 Rev 00 VD TUV WB 337 HT Plan To be submitted	TC	√	P	W	R	HT chart to be signed and submitted along with TC	
2.3	Visual Inspection of bars/round	Free from Visual Defects	Visual Test	100%	Free from Visual Defects	RD	√	P	-	R	---	

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Nithin
 27/10/18
 [Sr. Engr/ATP/Engg]
 Nithin

Nithin
 27/10/18
 [Sr. Engr/ATP/Engg]
 Nithin

Supplier's LOGO	Supplier's Name and Address		Generic Quality Plan for Stud Assembly (QAP: GHAVP: STUD ASSEMBLY: 01)				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 Rev: 01				
			Item: Stud Size: M27/M48 Material: 20NiCrMo14.5 II (1.6772) Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 2 of 5						
2.4	Identification & cutting of Test Coupons and Machining of Specimens	Dimensions	Dimensions	100%	PC-M-965 Rev 00 MSTP : To be submitted.	RD	√	P	H	W	---
2.5	Machining to closest possible dimensions (Prior to Threading for conducting UT & MT Test)	Dimensions	Dimensions	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	RD	--	P	R	R	---
2.6	Magnetic Particle Examination (MT) of bars	Surface and shallow subsurface defects	Magnetic particle test	100%	PC-M-965 Rev 00 PC-P-979 Rev 00 MT Procedure: To be submitted	TC	√	P	H	W	To be demagnetized to a residual magnetism < 2 oersted after test
2.7	Ultrasonic Inspection (UT) of bars	Internal soundness	Ultrasonic Test	100%	PC-M-965 Rev 00 ASME Sec-V: SA388 UT Procedure: To be submitted	TC	√	P	H	W	---
3.0 Mechanical and Metallurgical Tests:											
3.1	Hardness measurement	Hardness	Brinell Hardness	On both the ends of each bar	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	W	W	Hardness survey report shall be submitted; 100% witness by BHEL & 10% Sample witness by NPCIL
3.2	Product Analysis of each bar at both ends	Chemistry	Chemical analysis	Refer Note-4	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	W	W	20% sample witness by BHEL & 10% Sample witness by NPCIL

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

27/10/18

27.10.18

Supplier's LOGO		Supplier's Name and Address		Generic Quality Plan for Stud Assembly (QAP: GHAVP: STUD ASSEMBLY: 01)							Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 Rev : 01			
				Item: Stud Size: M27/M48 Material: 20NiCrMo14.5 II (1.6772) Sub-system: Steam Generator			QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:3 of 5							
3.3	Tensile test at RT (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	Refer Note-5	PC-M-965 Rev 00 DIN EN 10269 VD TUV WB 337 MSTP/MPP: To be submitted	TC	√	P	H	W	---			
3.4	Tensile test at 350°C (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	Refer Note-5	PC-M-965 Rev 00 DIN EN 10269 VD TUV WB 337 MSTP/MPP: To be submitted	TC	√	P	H	W	---			
3.5	Impact Test at +20°C (Longitudinal)	absorbed energy, lateral expansion, % shear fracture	Destructive Test	Refer Note-6	PC-M-965 Rev 00 ASME SA-370 VD TUV WB 337 MSTP: To be submitted	TC	√	P	H	W	---			
3.6	Micrograph for Grain size & Structure	Micro structure, Grain Size	Micro test, Grain size check	Refer Note-7	PC-M-965 Rev 00	TC	√	P	W	W	Grain size at 100X magnification and microstructure at 200X magnification on impact tested specimens at each sampling position			
3.7	Final Machining and Threading	Dimensions, Thread profile & pitch	Measurement and thread gauge check	100%	PC-M-965 Rev 00 Thread: DIN 13 Thread End: DIN 78-K & Drawing No.: To be filled	TC	√	P	W	W	To be carried out on finished fasteners. All measurements shall be recorded. Approved Go & No-Go Gauge shall be used.			

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled	BHEL	NPCIL		

Nishu
27/10/18

Nishu
27/10/18

Supplier's LOGO	Supplier's Name and Address		Generic Quality Plan for Stud Assembly (QAP: GHAVP: STUD ASSEMBLY: 01)					Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 Rev : 01				
			Item: Stud	QP No.: To be filled by Supplier								
			Size: M27/M48	Rev. No.: To be filled by Supplier								
			Material: 20NiCrMo14.5 II (1.6772)	Date: To be filled by Supplier								
			Sub-system: Steam Generator	Page No.: 4 of 5								

3.8	PT on threaded portion	NDE Examination of thread	Non destructive Test	100%	PC-P-979 Rev 00	TC	√	P	W	W	20% sample witness by BHEL & 10% Sample witness by NPCIL
3.9	Mix up test	Mix up	PMI	100%	PC-M-965 Rev 00	TC	√	P	W	W	20% sample witness by BHEL & 10% Sample witness by NPCIL
4.0	Assembly of Stud and Stud measuring pin										
4.1	Receive finished stud measuring pin	TC verification of stud measuring pins	Document verification	100%	PC-M-965 Rev 00, Documents and TC of stud measuring pin	RD	--	P	R	R	---
4.2	Assembly of Stud and Stud Measuring Pin	Visual and dimensions	Visual and dimensional measurement	100%	Drawing No.: To be filled	TC	√	P	W	W	1) Stud and measuring pin to be surface ground after successful assembling and pinning of measuring pin with stud to be ensured. 2) 20% sample witness by BHEL & 10% sample witness by NPCIL.
5.0	Final Inspection										
5.1	Visual Inspection of assembly	Free from visual defects	Verification and Visual	100%	PC-M-965 Rev 00 and as per Drg. No.: To be filled	TC	√	P	R	R	---

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Nishu
27/10/18

Nishu
27/10/18

Supplier's LOGO	Supplier's Name and Address		Generic Quality Plan for Stud Assembly (QAP: GHAVP: STUD ASSEMBLY: 01)					Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171				
			Item: Stud Size: M27/M48 Material: 20NiCrMo14.5 II (1.6772) Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 5 of 5								
5.2	Marking and Identification of assembly	Melt No., Manufacturer's identification, Steel grade, Inspection Agency stamp, Sl. No. (unique identification number) of assembly	Verification and visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	All fasteners shall be marked with identifications.	
5.3	Preservation	Appearance	Verification and Visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	Refer Note-2	
5.4	Certification and Documentation Control	Order compliance	Certificate compilation	100%	PC-M-965 Rev 00	TC	√	P	R	R	---	
5.5	Documents (Test Certificates) shall be sent to BHEL/Trichy prior to dispatch. Dispatch clearance will be given after Acceptance of Test Certificates by BHEL&NPCIL					RD	--	P	H	H	---	
5.6	Packing & Shipment	Packing	Visual	100%	PC-M-965 Rev 00	---	--	P	-	R	Ensure Sea worthiness and right quantity of supply. Material for each unit shall be packed separately.	

- Note: 1. MSTP (Material Sampling and Testing Plan), MPP (Manufacturing Process plan), Heat Treatment Plan, Ultrasonic & Magnetic Particle Test Procedure etc. shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.
2. Before shipment, suitable rust preventive coating shall be applied (including threads) to ensure sea-worthiness and tropical storage for two years at appropriate stages.
3. MPP (Manufacturing Process plan) shall indicate detailed sequence of operations at various stages.
4. Test coupons for product analysis shall be taken from both the ends of each bars.
5. At each sampling position, two tensile test specimens shall be taken for tests at RT and at +350° from softest and hardest bars from each melt/heat treatment batch. If the length of bar is 4 meter and above, testing shall be carried out at both the ends.
6. Three impact specimens shall be taken from softest and hardest bars from each melt/heat treatment batch. If the length of bar is 4 meter and above, testing shall be carried out at both the ends.
7. Specimen per softest and hardest bars from each melt/heat treatment batch. If the length of bar is 4 meter and above, testing shall be carried out at both the ends.

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

27/10/18

27/10/18

Advanced Technology Products
High Pressure Boiler Plant

Generic QAP for Stud Measuring Pin

CUSTOMER Nuclear Power Corporation of India Limited (NPCIL)
PROJECT Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP-1&2)
W.O. D157 to D160-001-1-93-171

BHEL / Quality Assurance & Engineering			NPCIL
Prepared by: O R NITHIN NITHIN K KRISHNAN	Reviewed by: S. LAKSHMI M LAKSHMINARASIMHAN	Approved by: A SUNDARARAJAN	Approved by: CR K Kupta

REVISIONS			
REVISION No.	DATE	DESCRIPTION	ORIGINATOR
00	21-09-2018	Initial Issue	Nithin K Krishnan
01	27-10-2018	R01	Nithin K Krishnan

QAP: GHAVP: STUD MEASURING PIN: 01

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

APPROVED

APPROVED AS NOTED

PROCEED WITH / HOLD FABRICATION

SEND FINAL TRANSPARENT COPIES & PRINTS

REVISE AND RESUBMIT FOR APPROVAL

CHECKED BY: 31/10/18 (AKS)

REVIEWED BY: (N. SUNDARARAJAN)

APPROVED BY: 22/11/18 (CR K Kupta)

responsibility of supply according to specifications.

Supplier's LOGO	Supplier's Name and Address	Generic Quality Plan for Stud Measuring Pin (QAP: GHAVP: STUD MEASURING PIN: 01)				Project: GHAVP 1& 2 W.O.: D157 to D160-001-1-93-171 Rev: 01			
		Item: Stud Measuring Pin Size: M10/M14 Material: 24CrMo5 Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 1 of 4					

		Sub-system: Steam Generator			Page No. 1 of 4					Remarks		
Sl. No	Component & Operations	Characteristics	Type of Check	Quantu m Of check	Reference Document	Acceptance Norms	Format of Record		Agency			
							M	B	N			
1.	2.	3.	4.	5.	6.	7.	8.	D *	9. **			10.

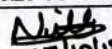
1.0 Raw Material :

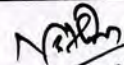
1.1	Steel Melting : Method to be mentioned and approved	Steel melting	Record Verification	100%	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R	---
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Heat	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	R	R	---
1.3	Semi product casting/ ingot formation	free from defects	Visual	100%	MPP: To be submitted	RD	--	P	R	R	---

2.0 In process Controls:

2.1	Forming Process	Forming Process	Record Verification	100%	PC-M-965 Rev 00 MPP : To be submitted	TC	√	P	R	R	Type of forming to be specified by supplier-i.e. drawing/ rolling/Forging.
2.2	Heat Treatment: Quenching and tempering	R.O.H , Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-965 Rev 00 DIN 17240 HT Plan: To be submitted	TC	√	P	W	R	HT chart to be signed and submitted along with TC
2.3	Visual Inspection of bars/round	Free from Visual Defects	Visual Test	100%	Free from Visual Defects	RD	√	P	-	R	---

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	


 27/10/18
 [Nithin/Sr. Engr / ATP/engg]


 27/10/18
 [Nithin - O.R., Sr. Engr / QA]

Supplier's LOGO		Supplier's Name and Address		Generic Quality Plan for Stud Measuring Pin (QAP: GHAVP: STUD MEASURING PIN: 01)							Project: GHAVP 1& 2 W.O.: D157 to D160-001-1-93-171 Rev: 01			
				Item: Stud Measuring Pin Size: M10/M14 Material: 24CrMo5 Sub-system: Steam Generator			QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:2 of 4							
2.4	Identification & cutting of Test Coupons and Machining of Specimens	Dimensions	Dimensions	100%	PC-M-965 Rev 00 MSTP : To be submitted.	RD	√	P	H	W	Refer Note-7			
2.5	Machining to closest possible dimensions (Prior to Threading for conducting MT Test)	Dimensions	Dimensions	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	RD		P	R	R	---			
2.6	Magnetic Particle Examination (MT) of bars	Surface and shallow subsurface defects	Magnetic particle test	100%	PC-M-965 Rev 00 PC-P-979 Rev 00 MT Procedure: To be submitted	TC	√	P	H	W	To be demagnetized to a residual magnetism< 2 oersted after test.			
3.0 Mechanical and Metallurgical Tests:														
3.1	Hardness measurement	Hardness	Brinell Hardness	On both the ends of each bar	PC-M-965 Rev 00 MSTP/MPP: To be submitted	TC	√	P	W	W	Hardness survey report shall be submitted; 100% witness by BHEL & 10% Sample witness by NPCIL			
3.2	Product Analysis of each bar at both ends	Chemistry	Chemical analysis	Refer Note-3	PC-M-965 Rev-00 MPP: To be submitted	TC	√	P	W	W	20% sample witness by BHEL & 10% Sample witness by NPCIL			
3.3	Tensile test at RT (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	Refer Note-4	PC-M-965 Rev 00 DIN 17240 MSTP/MPP: To be submitted	TC	√	P	H	W	---			

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

27/10/18

27/10/18

Supplier's LOGO		Supplier's Name and Address		Generic Quality Plan for Stud Measuring Pin (QAP: GHAVP: STUD MEASURING PIN: 01)						Project: GHAVP 1& 2 W.O.: D157 to D160-001-1-93-171 Rev: 01			
				Item: Stud Measuring Pin Size: M10/M14 Material: 24CrMo5 Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No:3 of 4							
3.4	Tensile test at 350°C (Longitudinal)	Tensile Strength, Yield Strength (0.2% offset), % Elongation,% Reduction in area	Destructive Test	Refer Note-4	PC-M-965 Rev 00 DIN 17240 MSTP/MPP: To be submitted	TC	√	P	H	W	---		
3.5	Impact Test at +20°C (Longitudinal)	absorbed energy, lateral expansion, % shear fracture	Destructive Test	Refer Note-5	PC-M-965 Rev 00 ASME SA-370 DIN 17240 MSTP: To be submitted	TC	√	P	H	W	---		
3.6	Micrograph for Grain size & Structure	Micro structure, Grain Size	Micro test, Grain size check	Refer Note-6	PC-M-965 Rev 00	TC	√	P	W	W	Grain size at 100X magnification and microstructure at 200X magnification on impact tested specimens at each sampling position		
3.7	Final Machining and Threading	Dimensions, Thread profile & pitch	Measurement and thread gauge check	100%	PC-M-965 Rev 00 & Drawing No.: To be filled	TC	√	P	W	W	To be carried out on finished fasteners. All measurements shall be recorded. Approved Go & No-Go Gauge shall be used.		
3.8	Mix up test	Mix up	PMI	100%	PC-M-965 Rev 00	TC	√	P	W	W	20% sample witness by BHEL & 10% Sample witness by NPCIL		
4.0	Final Inspection												
4.1	Visual Inspection of Stud Measuring Pin	Free from visual defects	Verification and Visual	100%	PC-M-965 Rev 00 and as per Drg. No.: To be filled	TC	√	P	R	R	---		

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

27/10/18

28/10/18

Supplier's LOGO	Supplier's Name and Address		Generic Quality Plan for Stud Measuring Pin (QAP: GHAVP: STUD MEASURING PIN: 01)					Project: GHAVP 1& 2 W.O.: D157 to D160-001-1-93-171 Rev: 01				
			Item: Stud Measuring Pin Size: M10/M14 Material: 24CrMo5 Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev. No.: To be filled by Supplier Date: To be filled by Supplier Page No: 4 of 4								
4.2	Identification of Stud Measuring Pin	Melt No., Manufacturer's identification, Steel grade, Inspection Agency stamp	Verification and visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	---	
4.3	Preservation	Appearance	Verification and Visual	100%	PC-M-965 Rev 00	TC	√	P	R	R	Refer Note-9	
4.4	Certification and Documentation Control	Order compliance	Certificate compilation	100%	PC-M-965 Rev 00	TC	√	P	R	R	---	
4.5	Preserve for further assembly					---	--	-	-	-	---	

Note: 1. MSTP (Material Sampling Plan), MPP (Manufacturing Process plan), Heat Treatment Plan, Ultrasonic, Magnetic Particle Test Procedures etc. shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.

2. MPP (Manufacturing Process plan) shall indicate detailed sequence of operations at various stages.

3. Test coupons for product analysis shall be taken from both the ends of each bars.

4. At each sampling position, two tensile test specimens shall be taken for tests at RT and at +350° from softest and hardest bars from each melt/heat treatment batch. If the length of bar is 4 meter and above, testing shall be carried out at both the ends.

5. Three impact specimens shall be taken from softest and hardest bars from each melt/heat treatment batch. If the length of bar is 4 meter and above, testing shall be carried out at both the ends.

6. Specimen per softest and hardest bars from each melt/heat treatment batch. If the length of bar is 4 meter and above, testing shall be carried out at both the ends.

7. Test coupons (for representing the job) shall be identified from the forged bar of adequate size to draw the specimens, if sufficient material is not available in the final forged product. Size of the Test coupons and specimens shall be mentioned in MSTP (Material Sampling and Testing Plan).

8. Stud Measuring Pin material 24CrMo5 shall be as per DIN 17240, since DIN EN 10269 doesn't cover this material.

9. Before shipment, suitable rust preventive coating shall be applied (including threads) to ensure sea-worthiness and tropical storage for two years.

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Nishu
27/10/18

Nishu
27/10/18

VdTÜV-Material data sheet

WB 337

VD

Heat resistant steel

TÜV

20 NiCrMo 145 I and 20 NiCrMo 145 II

337

For nuts and bolts

06.2008

Material No. 1.6772

The VdTÜV material data sheets are prepared in collaboration with the material manufacturers and are a summary of the first certification of the experts of a TÜO¹⁾ in terms of the technical rules for annexures, which require monitoring (e.g. TRD, TRB, AD 2000 data sheets, TRG, TRbF, TRFL, KTA). For deviations from the stipulations of the subsequent sections there should be an agreement between the manufacturers, buyers/secondary producers and the authorized TÜO¹⁾ and individual certification or supplementary certifications are required.

This sheet is applicable to steel rods for nuts and bolts.

Other relevant documents: DIN EN 10269: Steels and nickel alloys for securing elements for use at increased and/or low temperatures

1 Manufacturer/factory See data sheet

2 Brand name and stamp see data sheet

3 Product form (testing Object)

Dimension and delivery state

Product form	Standard max. Heat treatment diameter ¹⁾ mm	Delivery state
Steel rods for nuts and bolts	200	Hardened and tempered

¹⁾ for certified dimensions see data sheet

4 Melting see data sheet

5 De-oxidizing killed/steadied

6 Further manufacturing details hot rolled, forged

¹⁾ technical monitoring organization, which is a member of VdTÜV.

**Substitute for
09.2007 edition**

**Compiled as per the details of TÜV Saarland and
TÜV South Germany**

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7 Areas of application

- 7.1 for components in the primary circuit of nuclear power plants with light water reactors (LWR) as per KTA 3201.1.
- 7.2 for components of the external system as per RSK guidelines for compressed water reactors (DWR) section 4.2.
- 7.3 for reactor safety container as per RSK guidelines for compressed water reactors (DWR) section 5 and KTA 3401 annexure A4.
- 7.4 for other components for atomic plants.
- 7.5 for pressure containers as per AD 2000-data sheet W7 and W10 from -40°C to 400°C. the material cannot be allocated to any group of the table 1 of AD 2000 data sheet HP 0.
- 7.6 pressure devices as guideline 97/23/EG with due consideration of section 4 annexure 1 of the guideline.
- 7.7 For steam boiler as per TRD 105 to 400°C.

8. Chemical analysis

Cast/ladle analysis (Schm)

Product analysis (stck)

Type of analysis		Per cent by weight								
		C	Si	Mn	P	S	Cr	Ni ¹⁾	Mo	Al
Schm	Min.	0.18	0.15	0.30	-	-	1.20	3,40	0.25	0.005
	Max.	0.25	0.40	0.50	0,010	0,010	1.50	4.00	0.50	0.050
Stck	Min.	0.16	0.12	0.26	-	-	1.15	3.33	0.21	0.005
	Max.	0.27	0.43	0.54	0.025	0.015	1.55	4.07	0.54	0.055

¹⁾ for diameter > 70 mm the range of the product analysis is extended to 3.30 to 4.0%

9 Material properties

9.1 Mechanical-technological properties

The analysis is carried as per sections 10 (test details) and 14 (type of test certificate).

The details for 0.2% proof stress $R_{p0.2}$, the elongation at fracture, the contraction at fracture Z and the impact energy KV are minimum values.

The mechanical properties are applicable for the testing stand as per section 11.

9.1.1 Values of the at room temperature as per DIN EN 10002-1

Material grade	Sample direction	$R_{p0.2}$ MPa	R_m MPa	A %	Z %
I	Longitudinal	940	1040 to 1240	14	55
II ✓		980	1080 to 1280	14	55

9.1.2 Values of the tensile test at higher temperature as per DIN EN 10002-5

Material grade	Sample direction	R _{p0.2} at Temperature °C					
		100	145	200	300	350	400
I	Longitudinal	885	865	830	785	735	685
II		930	910	885	830	785✓	705

9.1.3 Values of the impact test (perpendicular to the surface) as per DIN EN 10045-1

MW = average value of 3 samples

EW = smallest individual value

Material grade	Sample direction	Type of sample	Diameter	Temperature	Value	KV J	Lateral widening ¹⁾ mm
I and II	Longitudinal	V-sample	≤130	20	MW	75	-
					EW	64	0.65
			>130 to ≤200		MW	63	-
					EW	52	0.65
			≤200	-10	MW	47	-
					EW	39	-
				-40	MW	31	-
					EW	24	-

¹⁾ required only for the application area "atomic plants" according to section 7.1 to 7.4

¹⁾ required only for the application area "atomic plants" according to section 7.1 to 7.4

9.2 Long-term elevated temperature properties

The long-term values are examined on the basis of tests for upto 10 000 hours and graphic extrapolation upto 100 000 hours. They are applicable as rating characteristic values.

Temperature °C	1% creep limit for		Creep strength for	
	10 ⁴ h MPa	10 ⁵ h MPa	10 ⁴ h MPa	10 ⁵ h MPa
350	685	585	775	665
400	440	340	550	440

9.3 Other properties

No details

10 Test stipulations

10.1 Atomic plants

Type and scope of the tests are as per the KTA rules and standards and as per the specifications checked by experts.

10.2 Conventional plants requiring monitoring

10.2.1 Melting analysis is to be carried out. The product analysis is to be carried out only when the order is placed. Sampling and sample preparation is carried out as per EN ISO 14284.

10.2.2 The dimensions and the surface quality are to be tested.

10.2.3 All rods are to be tested with a suitable test for material mix-up

10.2.4 10% of the rods of a test unit are to be subjected to an ultrasonic test for internal defects.

10.2.5 Brinell hardness test

In case of rods with a diameter of ≤ 120 mm the test is to be carried out on 10% of the rods of the testing unit as per section 10.2.6, however on at least 10 rods or if the testing unit is less than 10 rods then the test is to be carried out on each rod.

If the values of the hardness thus derived are on the upper or lower limit of those prescribed for the tensile strength then the scope of test is increased to 20%. If the values in case 10 or 20% hardness test lie on the upper or lower limit of the tensile strength then 100% of the rods are to be tested.

In case of rods with a diameter of < 120 mm each rod of the test unit is to be subjected to a hardness test.

The hardness is to be measured at one end of the rods to be tested, in half of the rods at one end and in the other half at the other end.

10.2.6 Mechanical-technological test

10.2.6.1 Test units and sampling

Diameter mm	Test unit for tensile test and impact test	Sampling location	Sample direction	Sample length
≤ 40	Melting, heat treatment batch and dimension range ¹⁾	Start or end of the manufacturing length	Longitudinal	½ D
<40				1/6 D
¹⁾ In a test unit the diameter of the thickest piece should be maximum 1.5 times that of the corresponding dimension of the thinnest piece.				

10.2.6.2 Scope of test

The following test is to be carried out for each testing unit and at the sampling location:

1 tensile test at room temperature on the hardest and softest rod

1 impact test on 3 V-samples on the hardest and softest rod at room temperature for the temperature range above -10°C and at -40°C for the temperature range below -10°C .

10.2.7 10% of the nuts and bolts of a test unit are to be subjected to a surface crack test.

11 Heat treatment

Material grade	Tempering		Annealing	Stress relief annealing
	Hardening	Annealing		
I	830 to 900 ⁰ C	Water or oil or polymer ²⁾	520 to 600 ⁰ C	430 to 470 ⁰ C
II			500 to 580 ⁰	
1) Stress relief annealing as per the directions of the manufacturer				
2) For Böhler Edelstahl GmbH				

12 Processing

12.1 Welding and thermal separation
Not permissible.

12.2 Forming
Hot forming can be carried out after discussing with the manufacturer. A new grading as per section 11 is required after hot forming.

Cold forming is not provided for (thread rolling is permissible).

13 Identification marking

13.1 Atomic plants
The products are to be marked according to the KTA rules as per the specifications checked by experts.

13.2 Conventional plants, which require monitoring
Rods with a diameter or a width across flats of more than 25 mm is to be marked on one end with a steel stamp containing

- stamp of the material
- symbol of the manufacturer
- melting (as per AD 2000 data sheet W7)
- sign of the expert

In case of rods with up to 25 mm the marking of each bundle with a tag with the same details is sufficient.

14 Type of test certificate

14.1 Atomic plants
Corresponds to the details given in KTA rules and the specifications checked by experts.

14.2 Conventional plants, which require monitoring
Acceptance test certificate 3.2 (to be issued by the expert of a TÜV) as per DIN EN 10204 according to the technical rules mentioned in section 7.
The following is to be certified by the manufacturer:

- melting process
- result of the melting analysis
- execution of the hardness test and test for material mix-up
- heat treatment condition with details regarding temperature, holding duration and cooling
- execution and result of the non-destructive test
- conformation of the delivery/consignment with the requirements of the VdTÜV material data sheet.

This certificate is a part of the acceptance test certificate 3.2.

15 Calculation

15.1 Atomic plants

The conditions decided in the specifications tested by experts are applicable.

15.2 Conventional plants, which require monitoring

The values mentioned in the corresponding tables in section 9 are to be used for calculation.

VdTÜV-Material data sheet

WB 337-Supplementary sheet

**VD
TÜV**

Heat resistant steel

337

20 NiCrMo 145 I and 20 NiCrMo 145 II

Sup. Sheet

For nuts and bolts

09.2008

Material No. 1.6772

This sheet reproduces the contents of sections 1,2,3 (only certified dimensions) and 4 of the VdTÜV-material data sheet 337, edition 06.2008 and is applicable only in combination with this material data sheet.

1 Manufacturer/Factory

Germany

SV/ Saarstahl Völklingen GmbH
66333 Völklingen

Austria

Böhler / Böhler Edelstahl GmbH
8605 Kapfenberg

2 Brand name and stamp

Manufacturer	Material grade	Brand	Stamp
SV	I	20 CrMo 14 5-I	20 CrMo 14 5-I or K 3 I
	II	20 CrMo 14 5-II	20 CrMo 14 5-II or K 3 II
Böhler	I	Böhler V 12D-I	20 CrMo 14 5-I or V120-I
	II	Böhler V 12D-II	20 CrMo 14 5-II V120-II

3 Product form and dimension

Product form	Manufacturer	max. Diameter mm
Steel bar	SV	200
	Böhler	130

4 Melting

Manufacturer	Process
SV	Electro-arc process(E)
Böhler	Electro-arc process(E) with vacuum finishing treatment(VAD)

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