

**BHARAT HEAVY ELECTRICALS LIMITED****MM/RM/PURCHASE/TUBES****BHEL / TRICHY-620 014.**ANNEXURE-B  
1502000038Enquiry Terms & Conditions for Supply of Seamless Steel Tubes & Pipes

**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 Confirmation /Comments
01.	<p><b><u>As per Para 3(a) of the DPIIT's PPP-MII Order Notification No. 45021/2/2017-PP (BE-II) dated 16th September 2020 and GOI, Ministry of Heavy Industries and Public Enterprise, Department of Heavy Industries Order dated 29 September 2020 &amp; Public Procurement (Preference to Make in India), Order 2017 No. P-45021/2/2017-PP (BE-II) Dated 04<sup>th</sup> June, 2020</u></b></p> <p><b>Only Class-I Local Supplier as defined under the above order are eligible to participate in this tender.</b></p> <p>The following clauses are applicable for this tender</p> <p>For this procurement, the local content to categorize a supplier as a class I local supplier/class II local supplier /Non-local supplier and purchase preference to class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT.</p> <p>In case of subsequent Orders issued by the respective Nodal Ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of part II bids against this NIT.</p>	
02	<p><b><u>Special Provisions for Micro and Small Enterprises (MSE) bidders registered as per MSME act:</u></b></p> <p><b>(Subject to participating MSE vendors should meet the tender requirements of BHEL)</b></p> <ul style="list-style-type: none"> <li>➤ As per Gazette Notification no. S.O. 2119(E) dated 26.06.2020 issued by Ministry of MSME applicable/existing Micro and small suppliers are requested to get registered with Udyam Registration portal and share us the Udyam registration no along with Udyam registration certificate.</li> <li>➤ 25% of the tendered quantity is earmarked for MSE suppliers in this tender, subject to participating MSE Vendors should meet the tender requirements of BHEL. In case MSE vendor participating in the tender quotes within the price band of L1 + 15%, they will be allowed to supply the portion of the requirement subject to acceptance of L1 price by MSE vendor. In case of more than one such MSE vendor within the "L1+15% price band", the supply shall be shared proportionately.</li> <li>➤ In the event of Non MSE supplier becoming L1 and MSE supplier quotes within the price band of L1+15% and it is not possible to split the tendered quantity on account of reasons like customer contract requirement/technical requirements, then 100% of the quantity will be offered to MSE suppliers subject to acceptance of L1 price by MSE supplier.</li> <li>➤ Counter offering of L1 rate will not be made with any MSE vendor whose quoted rate is more than the price band of L1+15%.</li> <li>➤ Payment to MSE vendor will be as per the applicable provisions of the MSMED Act 2006.</li> <li>➤ If L1 offer is from a Micro / Small enterprise, the 25% earmarking provision is not applicable.</li> <li>➤ Out of the 25% tendered quantity reserved for MSE suppliers, 6.25% shall be earmarked for procurement from MSE owned by SC/ST entrepreneurs. Apart from this 3% shall be earmarked for procurement from MSE owned by Women entrepreneurs.</li> <li>➤ 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</li> </ul>	

suspension of the business dealing with the bidder as per the procurement policy of BHEL.

- MSE suppliers can avail the intended benefits only if they submit along with the offer, Valid EM-II certificate or valid NSIC certificate or UAM certificate along with attested copy of a CA certificate (Format enclosed as below) 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 bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. Documents should be notarized or attested by a Gazetted officer. However, credentials of all MSE suppliers will be verified before considering the intended benefits for MSE suppliers at the time of tender evaluation. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents.

**03 Specification, Size & Quantity:**

- a) Specification, size and quantity shall be as given in enquiry.
- b) Item No 10 to 150 are to be supplied meeting TDC 102 Rev 18 (**Without Shot peening**) & Item No.160 is to be supplied as per TDG 26 Rev 03.
- c) If there is any deviation, the same should be mentioned clearly with the specific clause no. of the TDC and the deviation against it in the e- **procurement** offer itself.
- d) Creep Test to be carried out as per SIP:RM:01Rev 01 Creep Testing Requirement.
- e) All tubes are to be stenciled and colour coded, longitudinally and continuously throughout the length of the tubes with specific details as listed out in the above respective TDCs and the **SIPPP 21 Rev 07**.
- f) All tubes are to be supplied to the specific length detailed in the description. Any deviation in length has to be indicated in the offer itself. Supplier shall indicate the place of manufacture & mill name in the offer.

**04 Pre-Qualification Requirement (PQR)**

In addition to the TDC requirements, suppliers shall meet the Pre-Qualification Requirements as applicable (Ref:MM:Pur:Tubes Rev02 & Ref:MM:Pur:PC:Pipes Rev 00). The offers of the suppliers who fail to do so will be liable for rejection.

**05 Online Supplier Registration:**

All vendors who are not registered vendor of BHEL, Trichy for the tendered specification may also submit duly filled-in Supplier Registration form through online portal <http://www.supplier.bhel.in> and submit all relevant documents as required.

**06 Offer Submission:**

Offer is to be submitted in **TWO part bids system** (Technical bid + Price bid) in the E-Procurement portal <https://bhel.abcpurchase.com/EPROC/>

- Scanned copy of the filled Annexure-B, Tender documents etc., shall be uploaded in the EPS portal.
- The offer is to be submitted within **2.00 P.M** 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 following websites, <https://bhel.abcpurchase.com/EPROC/>  
<http://www.bhel.com/tender/>  
<http://eprocure.gov.in>
- After the evaluation of technical bids BHEL reserves the right to go for Reverse Auction instead of opening the price bids.
- **Acceptance of offer for item SL no. 40, 110, 150 & 160 will be subject to customer approval as applicable, before price bid opening.**

**07 Authorization for participation in EPS portal through DSC:**

**E-Tender Participation requirements**

Suppliers shall register their Digital Signature Certificate (DSC) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION). Suppliers are advised to go through the Bidder Manual available in the web portal (<https://bhel.abcpurchase.com/EPROC/>)

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.

08	<b>Validity:</b> Offer/Price validity of 60 days is required from the Price bid opening date.	
09	<b>Delivery:</b> The offer shall clearly indicate delivery period in fixed number of weeks/Months from the date of Purchase Order.	
10	<p><b>Terms of Delivery :</b></p> <p><b>A. INDIGENOUS:</b></p> <ol style="list-style-type: none"> <li>a) Bidders should submit their offer for FOR Destination -BHEL Stores, Trichy. The quote should be inclusive of all charges, including testing, packing &amp; forwarding, inspection etc.</li> <li>b) Any other extra charges like GST, SGST, CGST, IGST etc. are to be indicated clearly. The offer will be evaluated on total landed cost to BHEL Trichy.</li> <li>c) Any other Tax are to be indicated in offer and is payable extra only on submission of documentary proof.</li> <li>d) 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.</li> <li>e) The soft copies of the Invoice, LR copy &amp; Test certificates shall be forwarded to BHEL immediately after dispatch.</li> </ol> <p><b>Information for Indigenous suppliers:</b></p> <ol style="list-style-type: none"> <li>1. Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration No (GSTIN) which should be clearly mentioned in the offer. If the dealer is exempted from GST registration, a declaration with due supporting documents need to be furnished for considering the offer. Dealers under composition scheme should declare that he is a composition dealer supported by the screen shot taken from GST portal. The dealer has to submit necessary documents if there is any change in status under GST.</li> <li>2. Supplier shall mention their GSTIN in all their invoices (incl. credit Notes, Debit Notes) 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), Billed to party (with GSTIN) &amp; Shipped to party details, item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST &amp; UTGST) separately, HSN/ SAC Code, Place of Supply etc.</li> <li>3. All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code).</li> <li>4. Invoices will be processed only upon completion of statutory requirement and further subject to following: <ol style="list-style-type: none"> <li>a. Vendor declaring such invoice in Form GST ANX-1</li> <li>b. Receipt of Goods or Services and Tax invoice by BHEL</li> </ol> </li> <li>5. As the continuous uploading of tax invoices in GSTN portal (in GST ANX-1) is available for all (i.e. both Small &amp; Large) tax payers under proposed new GST Return System, all invoices raised on BHEL may be uploaded immediately in GST portal on despatch of material /rendering of services. The supplier shall ensure availability of Invoice in GST portal before submission of invoice to BHEL. Invoices will be admitted by BHEL only if the invoices are available in GSTN portal (in BHEL's GST ANX-2).</li> <li>6. In case of discrepancy in the data uploaded by the 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 or debit note (details also to be uploaded in GSTN portal) for the shortages or rejections in the supplies or additional claims, within the calendar month informed by BHEL.</li> <li>7. In cases where invoice details have been uploaded by the vendor but failed to remit the GST amount to GST Department (Form PMT-08 or Form GST RET-01 to be submitted) within stipulated time, then GST paid on the invoices pertaining to the month for which GST return not filed by the vendor will be recovered from the vendor along with the applicable interest (currently 24% p.a) and all subsequent bills of the vendor will not be processed till filing of the GST return by the vendor</li> </ol>	

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	<p>8. In case GST credit is denied to BHEL due to non-receipt or delayed receipt of goods and/ or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount claimed in the invoice shall be disallowed to the vendor.</p> <p>9. Where any GST liability arising on BHEL under Reverse Charge (RCM), the vendor has to submit the invoices to BHEL well within the timeline prescribed in GST Law, to enable BHEL to discharge the GST liability. If there is a delay in submission of invoice by the vendor resulting in delayed payment of GST by BHEL along with interest, then such interest payable or paid shall be recovered from the vendor.</p> <p>10. Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contracts. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Tax Invoice will be issued by BHEL indicating the respective supply invoice number.</p> <p>11. GST TDS will be deducted as per Section 51 of CGST Act 2017 and in line with Notification 50/2018 – Central Tax dated 13.09.2018. GST TDS certificate which will be generated in GST portal subsequent to vendor accepting the TDS deduction in the GST portal, will be issued to the vendor.</p>	
11	<p><b>Payment terms:</b></p> <ul style="list-style-type: none"> <li>• BHEL Payment term for indigenous suppliers is 100% direct EFT payment after 60 days from the date of receipt and acceptance of materials.</li> <li>• Offers with any other payment terms are liable for rejection.</li> <li>• However, in exceptional cases, Usance LC with 60 days' credit will be opened with 1.5% loading on the offered value. The LC will be opened one month prior to material readiness. Suppliers 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.</li> </ul>	
12	<p><b>Liquidated Damage (Indigenous &amp; Imports):</b></p> <p>LD shall be 0.5% of the undelivered portion per week or part thereof subject to a maximum of 10% of the total order value".</p> <p>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).</p> <p>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.</p> <p>For "FOR Delivery terms", Lorry way bill date will be taken for LD calculation.</p>	
13	<p><b>Risk Purchase clause :</b></p> <p>BHEL at its option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute thereof. The supplier shall be liable for any loss which BHEL may sustain by reason of such risk purchases in addition to LD at the maximum rate mentioned in the LD clause above. Confirm your acceptance.</p>	
14	<p><b>Non-Disclosure Agreement(NDA):</b></p> <p>The bidders shall enter into the Non-disclosure agreement totally voluntarily, with full knowledge of its meaning and without duress. (Format attached).</p>	
15	<p><b>Patent Right</b></p> <p>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 &amp; 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.</p>	
16	<p><b>Evaluation Criteria:</b></p> <p>The Evaluation Currency for this tender shall be "INR". The offers of vendors will be evaluated on total landed cost to BHEL, Trichy.</p> <p>The evaluation process is detailed below:</p>	



**Total Landed cost = FOR Rate in INR (A) + Applicable Taxes (B) + Loading for payment term & LD (C) – Applicable input tax credit (D)**

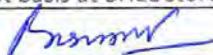
- A. Indigenous vendors submit offers on Free on Road (FOR), Trichy in INR.
- B. GST and any other charges quoted by indigenous vendors will be added to the base price.
- C. Loading for payment terms & non-acceptance of Liquidated Damages (LD) will be added to the FOR value for arriving the landed rate.
- D. However, input credit is availed for GST (SGST, CGST/IGST), hence the same is excluded for arriving at the landed cost.

Note: "In the course of evaluation, if more than one bidder happens to occupy L1 status, effective L1 will be decided by soliciting discounts from the respective L1 bidders. In case more than one bidder happens to occupy the L1 status even after soliciting discounts, the L1 bidder shall be decided by a toss/draw of lots, in the presence of the respective L1 bidders or their representatives. Ranking will be done accordingly. BHEL decision in such situations shall be final and binding".

**17 General condition:**

- a) Bids including all enclosures and supporting documents like catalogues, pamphlets, etc., shall be submitted / uploaded in ENGLISH language only. If the documents submitted have other than English language, translation of the same shall be provided for evaluation.
- b) In addition to TCs in relevant IBR forms corresponding mill TCs should also be provided along with dispatch of tubes. Two sets of original and one copy of all such TCs are to be provided to BHEL, Trichy.
- c) Material is to be inspected by third party inspection agency as approved by IBR and test certificate are to be countersigned by respective Inspection agency in case the Mill is not approved by IBR.
- d) Acceptance of Test Certificates by BHEL before dispatch is must.
- e) While dispatching the tubes, in addition to bundling with metal straps, we require slinging arrangement with nylon belt (not rope) for easy handling at loading and unloading points.
- f) We require the shipment of the Tubes to be as per the dates mentioned against the individual items in the enquiry.
- g) Multiple PO may also be placed considering the applicable duty structure of the respective requirement/Qty.
- h) Confirmation for partial ordering to be indicated in the offer itself.
- i) No revision of prices will be entertained after the tenders are opened.
- j) BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed.
- k) 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.
- l) 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.
- m) In the event of our customer order covering this tender being cancelled / placed on hold / otherwise modified, BHEL would be constrained to accordingly cancel / hold / modify the tender / your purchase order at any stage of execution.
- n) Offer will be evaluated based on Landed cost to BHEL- Trichy on individual line item basis only.
- o) Offers for part quantities on item level basis are not acceptable to BHEL. While tenderers can quote for some or all the tendered items, no supplier shall quote for partial quantity of any given enquiry item. Such partial offer would not be considered in the enquiry for that item.
- p) No payment will be made for the excess quantity / length.
- q) Offer should be submitted only as per the Unit of Measurement (UOM) specified in the enquiry.
- r) 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](http://www.bhel.com).

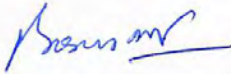
	<p>s) All documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder.</p> <p>t) The bidder shall submit his response through bid submission to the tender on e-procurement platform at <a href="https://bhel.abcprocure.com/EPROC/">https://bhel.abcprocure.com/EPROC/</a>. The bidder would be required to register on the e-procurement market place <a href="https://bhel.abcprocure.com/EPROC/">https://bhel.abcprocure.com/EPROC/</a> and submit their bids online. SEALED COVER BIDS / E-MAILS / FAX / MANUAL OFFERS WILL NOT BE ACCEPTED.</p>
18	<p><b>Fraud Prevention Policy &amp; Suspension of Business Dealings</b></p> <p>"The bidder along with its associate/collaborators/sub-contractors /consultants/service providers shall strictly adhere to BHEL Fraud prevention policy displayed on BHEL website <a href="http://www.bhel.com">http://www.bhel.com</a> and shall immediately bring to the notice of BHEL Management about fraud or suspected fraud as soon as it comes to their notice."</p> <p>Guidelines for suspension of business dealings is available in the webpage: <a href="http://www.bhel.com/vender_registration/vender.php">http://www.bhel.com/vender_registration/vender.php</a> which includes actions that would be taken against suppliers who do not execute the order placed on them.</p>
19	<p><b>Cartel Formation:</b></p> <p>All the firms should desist from forming cartel as the practice is prohibited under Section 3(3) (a) &amp; (d) of the competition Act 2002. If any such instance is observed during this tender will attract disciplinary action as per BHEL policies.</p>
20	<p><b>Resolution of Disputes:</b></p> <p>a. If dispute or difference of any kind shall arise between the Purchaser/Consignee and the supplier in connection with or relating to the contract, the parties shall make every effort to resolve the same amicably by mutual consultations.</p> <p>b. If the parties fail to resolve their dispute or difference by such mutual consultation within 30 days of its occurrence, then, unless otherwise provided in the contract, either the Purchaser/Consignee or the supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided the applicable arbitration procedure will be as per the Arbitration and Conciliation Act, 1996 of India. In the case of a dispute or difference arising between the Purchaser/Consignee and a domestic Supplier relating to any matter arising out of or connected with the contract, such dispute or difference shall be referred to the sole arbitration of an officer in BHEL Trichy, appointed to be the arbitrator by the General Manager/MM BHEL Trichy. The award of the arbitrator shall be final and binding on the parties to the contract subject to the provision that the Arbitrator shall give reasoned award in case the value of claim in reference exceeds Rupees One lakhs (Rs. 1,00,000/-)</p> <p>c. Venue of Arbitration: The venue of arbitration shall be the place from where the contract has been issued, i.e., BHEL Trichy.</p> <p>d. Jurisdiction of the court will be from the place where the tender enquiry document has been issued, i.e., Trichy, India.</p>
21	<p><b>In the event of Force Majeure:</b></p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
22	<p><b>Execution of the order:</b></p> <p>a. BHEL will have the option to pre-inspect the materials at Supplier's works by BHEL's own inspector or by third party agency appointed by BHEL or BHEL's end customer/s. The mere act of the pre-dispatch inspection (PDI) does not absolve the Supplier from giving the specifications as agreed upon in the Purchase Order.</p> <p>b. In the event of any short supply, it shall be the responsibility of the supplier to deliver such short supplied/ missing items on Free-of-Cost basis at BHEL stores.</p>



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**Enclosures:**

- a) TDC 102 Rev 18.
- b) TDG 26 Rev 03
- c) SIP:RM:01 Rev 01 Creep Testing Requirement
- d) SIPPP21-07 Colour Codes
- e) Supplier facility report format
- f) Non-Disclosure agreement.
- g) PQR:MM:Pur:Tubes Rev 02



(On behalf of BHEL)

**BHASKARNATH BISWAS**  
Asst. Engineer - ~~GRF~~  
MM / Purchase / Tubes  
BHEL, TRICHY - 620 014,

**SIGNED BY MANUFACTURER / MILL**

Name of Mill:

Designation / Department:

Seal & Signature

Domain :	bhel.abcprocure.com		
Parent department:	BHEL Trichy		
Unit name	: BHEL Trichy		
Purchase group	: FB Tubes	RFQ/NIT/Enquiry Officer	: BHASKARNATHBISWAS
Event ID	: 49536	RFQ/NIT/Enquiry no.	: 1502000038
Enquiry Date	: 26/11/2020 05:30:00		
Tender Description	: Procurement of Seamless Stainless Steel Tubes to specification.		
Terms & Conditions	: <ol style="list-style-type: none"> <li>1. All the enquiry terms &amp; conditions are given in Annexure-B, attached along with tender. Please note that the Enquiry No. is written on the annexure and is signed by BHEL authorised person. Supplier to submit the same, duly filled with their comments as accepted/Not accepted and signed, along with the offer. Refrain from submitting any additional attachment in this regards. However, any specific deviation from Annexure-B can be attached separately for BHEL review.</li> <li>2. Only Class-I Local Supplier as detailed in Tender Terms and condition -Annexure B can participate in this tender.</li> <li>3. PQRs as per applicable TDC &amp; TDG is attached as tender documents. Please meet the PQR conditions as per the applicable TDC/ TDG.</li> <li>4. For Item SI no 160 Hydro test presure requirement- 280 bar</li> <li>5. Reverse Auction a detailed in Tender terms and Conditions-Annexure B, is applicable.</li> <li>6. TDC as detailed in Tender terms and conditions (Annexure B) is applicable.</li> <li>7.Offers with payment terms as Advance payment &amp; LC at sight will not be considered.</li> <li>8. Supplier to submit the duly filled and signed "Non - Disclosure Agreement" along with the offer.</li> <li>9. All Suppliers and bidders to ensure that Document submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder.</li> </ol>		
Product / service / work keywords	: Tube,		
No. of Bid Parts	: Multiple	Envelope	: Techno-commercial bid , Price bid
Type of contract	: Goods	Project duration / delivery or completion period	: 5 months
Download document	: Before login	RFQ floated under the policy	: PP-PURCHASE POLICY
Estimated Category	: N	No. of items already attached	: 16
Delivery/Location At	:	Delivery Date	: 30/04/2021 05:30:00
Inspection by Agency	: As per TDC	Inspection Location	: At BHEL and Vendor's Works
Min. bid required	: 1		

## Bid submission configuration

Bid evaluation : Item wise Bidding access : Open Tender

Base currency : INR Bidding type : NCB/Indigenous

## Key configuration

Pre-bid meeting : Don't allow

## Dates configuration

Document downloading start date : 26/11/2020 17:30:00 Document downloading end date : 11/12/2020 14:00:00

Bid submission start date : 26/11/2020 17:30:00 Bid submission end date : 11/12/2020 14:00:00

Bid opening date : 11/12/2020 14:30:00

## Document / EMD / Security fee detail

Document fees : Not required EMD : Not required

## Bidding forms

Price Bid

PRICE BID 1

MATERIAL CODE	MATERIAL DESCRIPTION	QTY	UNIT
000000151520630001	TUBE OD 44.5 X 5.6 x 10000 - SA213TP347H	500.00	M
000000151520740001	TUBE OD 47.63 X 5.6 X 10000- SA213TP347H	180.00	M
000000151520890000	TUBE OD 54.00X9.50X10000 - SA213TP347H	330.00	M
000000154510056500	TUBE OD 14 X 1.65 X 6500 - SA213TP304H	4420.00	M
000000154520650001	TUBE OD 44.5 X 4 X 10000-SA213TP347H	200.00	M
000000154520680001	TUBE OD 47.63x 6.3x10000-SA213TP347H	400.00	M
000000154520750001	TUBE OD 51 X 6.3 X 10000-SA213TP347H	350.00	M
000000154520880001	TUBE OD 54 X 6 X 10000 -SA213TP347H	270.00	M
000000154520970001	TUBE OD 51 x 7.1 x 10000-SA213TP347H	400.00	M
000000154521200001	TUBE OD 54 X 4 X 10000 - SA213TP347H	820.00	M
000000154521240001	TUBE OD 12 X 2 X 10000 - SA213TP347H	600.00	M
000000154521300001	TUBE OD 47.63 X 4 X 10000 - SA213TP347H	920.00	M

000000154521791501	TUBE OD 47.63 x 7.1 x 11500 SA213TP347H	115.00	M
000000154521800001	TUBE 47.63 X 6.00 X 10000 - SA213TP347H	200.00	M
000000154522126000	TUBE-31.8X7.2X6000-SA213TP347H	540.00	M
000000159510050000	PIPE DIA 33.4 X 3.38 x 6000 SA312TP304H	1326.00	M

## 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 digitaly 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 : +91-9265562819  
Phone Nos. : +91-79-68136849/48/57  
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](http://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

Offers from Foreign vendors will not be considered. Offers of local vendors with less than the minimum local content as prescribed in this Tender will also not be considered. In the absence of any such information in the tender, the required minimum local content shall be 20%

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%.

 BHEL - TRICHY	<b>THIRD PARTY NON-DISCLOSURE AGREEMENT</b>	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

**BHARAT HEAVY ELECTRICALS LIMITED**  
**MM/RM/PURCHASE/TUBES**

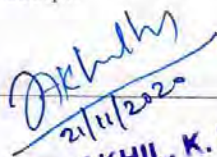
**Ref: MM: Pur:Tubes:Rev 02**

**Dt:21.11.2020**

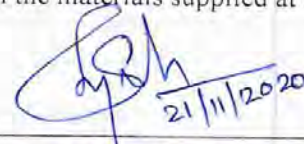
**Pre-Qualification requirements (POR) for the procurement of Seamless Carbon Steel/Alloy Steel/Stainless Steel Tubes through Open Tender (As per TDC: 102 Rev 18)**

**A) Organizational Capability:**

1. Manufacturers having tube mill are only eligible to participate. Offer from traders, fabricators and stockists are not acceptable and will not be considered for evaluation.
2. If the supplier is having only cold mill facility for conversion of mother hollows to finished tubes, the raw material mother hollows shall be sourced from BHEL approved tube suppliers only. (List attached). The source of mother hollow shall be declared along with the offer for BHEL approval. For the declared mother hollow sources, the supplier shall submit unpriced PO copy for and original test certificate/s of mother hollow procured against the BHEL order along with tube test certificate/s at the time of supply of tubes. Note: Suppliers shall procure the Mother hollows to comply with the TDC requirements for tubes.
3. Source of raw material (Billets or blooms) for the manufacturing of mother hollows or tubes shall be from **IBR** approved well known steel maker or certified by **IBR** approved inspecting authority (Form-IV to be attached in all cases). If the Raw material is sourced from different sources, all the sources should be indicated in the offer, and the supplies should be restricted to the indicated list of raw material sources.
4. As per the Steel and Steel Products (Quality Control) Order-2020 dt 27.05.2020 issued by Ministry of Steel, Government of India, all stainless steel tubes shall be made from the stainless steel products (billets/blooms) conforming to equivalent IS standards. IS marked raw material MTC (billets/blooms) shall be submitted along with product test certificate/s
5. Vendor to indicate the nature of the firm. Product catalogue shall be submitted.
6. Suppliers shall submit filled in supplier facility report for Tube mill (Format enclosed). Suppliers without basic manufacturing facilities in-house, shall not be considered for evaluation. In house facilities for Heat treatment & Non-Destructive Testing (On-line UT & Online Thickness Measurement facility for Tubes) are mandatory requirements for consideration of the offer.
7. Chemical, Mechanical testing shall be done in house or at Labs certified as per ISO 17025 or Government approved labs.
8. Suppliers shall submit a valid ISO 9001 certificate or Quality Assurance Manual or Written down procedure.
9. BHEL/End customer reserve the right to inspect the item ordered at any stage at vendor's works and if found not meeting the stipulated conditions, material is liable for rejection.
10. BHEL/End customer reserves the right to inspect the first lot of materials at vendor's works for giving clearance before bulk production.
11. BHEL reserves the right to visit supplier's works to audit and inspect to ensure the capability for technical evaluation.
12. BHEL reserves the right to carry out audit checks at BHEL on the materials supplied at the time of receipt.

  
21/11/2020

**AKHIL. K. DAS**  
Sr. Engineer  
Materials Management / Planning  
BHEL, TRICHY - 620 014.

  
21/11/2020

**SHYAMALADEVI .S**  
Deputy Manager  
Quality Assurance  
BHEL, TRICHY - 620 014

Ref: MM: Pur:Tubes:Rev 02

Dt:21.11.2020

Pre-Qualification requirements (POR) for the procurement of Seamless Carbon Steel/Alloy Steel/Stainless Steel Tubes through Open Tender (As per TDC: 102 Rev 18)

**B) Technical Competence:**

1. Point by point confirmation to the TDC requirements is mandatory for consideration of offer and signed TDC shall be submitted.
2. Suppliers shall submit manufacturing process flow chart from Raw material (Billets or Blooms) to finished product to meet the TDC requirements along with technical bid.
3. Suppliers shall submit the experienced manpower details specific to Manufacturing, Quality and NDE requirements.

**C) Past Experience/ Performance:**

1. Suppliers shall indicate their annual installed capacity for the tendered specifications & it shall be more than the tendered quantity for each specification.
2. i) Suppliers shall have supplied tubes in each of the tendered specification. Unpriced PO copies & Proof of supply (such as invoice / bill of lading copies and sample test certificates) shall be submitted for the tendered specification.  
ii) Details of supplies made in recent past indicating the Quantity, Specification, Size & Customer details shall be submitted year wise.  
iii) Unpriced PO copies & Proof of supply (such as invoice / bill of lading copies and sample test certificates) covering minimum and maximum sizes meeting the tendered size requirements shall be submitted as below.
  - **For Carbon Steel Tubes:** Either in SA192/ SA210GRA1/ SA210GRC or any alloy steel Grades.
  - **For Alloy Steel Tubes except SA213T23:** Either in SA213T11/ SA213T12/ SA213T22 or any higher alloy steel grades.
  - **For Alloy Steel Tubes for SA213T23:** Either in SA213T23 or any higher alloy steel grades.
  - **For Alloy Steel Tubes (SA213T91/ SA213T92):** Either in SA213T91/ SA213T92 Grades
  - **For Stainless Steel Tubes (except SA213TP347H, SUPER304):** Either in SA213TP304H, SA213TP316, SA213TP321, SA213TP321H or any higher Stainless steel grades
  - **For Stainless Steel Tubes (SA213TP347H, SUPER304):** Respective grades of the tendered specification.

If credential is not available for any specific tendered size, then specific declaration shall be submitted by mill stating the capability to produce that quoted size/s.

**D) Financial Soundness:**

1. Indigenous suppliers shall submit Audited copies of annual reports (Balance Sheets), Profit & Loss statement for the last four years (or from date of incorporation whichever is less).
2. Import suppliers shall submit latest report from a reputed third party business rating agency like Dun & Bradstreet, Credit reform etc...

Necessary supporting documents shall be submitted for meeting each of the above Pre-Qualification Criteria for evaluation of the offers.

BHEL shall consider/Not-consider the offers based on the evaluation of documents submitted for the above Pre-Qualification Criteria. If required, BHEL shall make on-site assessment of the facilities at supplier's works during the bid evaluation.

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*Shyamaladevi*  
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**BHARAT HEAVY ELECTRICALS LIMITED**  
**MM/RM/PURCHASE/PIPES**

**Ref:MM: Pur:PC:Pipes:Rev 00**

**Dt:24.11.2020**

**Pre-Qualification requirements (PQR) for the procurement of Stainless Steel pipes through Open Tender (As per TDG: 26/Rev 03)**

**A) Organizational Capability:**

1. Manufacturers having pipe mill are only eligible to participate. Offer from traders, fabricators and stockists are not acceptable and will not be considered for evaluation.
2. If the supplier is having only cold mill facility for conversion of mother hollows to finished pipes, the raw material mother hollows shall be sourced from BHEL approved pipe suppliers only. (List attached). The source of mother hollow shall be declared along with the offer for BHEL approval. For the declared mother hollow sources, the supplier shall submit unpriced PO copy for and original test certificate/s of mother hollow procured against the BHEL order along with pipe test certificate/s at the time of supply of pipes. Note: Suppliers shall procure the Mother hollows to comply with the TDC requirements for pipes.
3. As per the Steel and Steel Products (Quality Control) Order-2020 dt 27.05.2020 issued by Ministry of Steel, Government of India, all stainless steel pipes shall be made from the stainless steel products (billets/blooms) conforming to equivalent IS standards. IS marked raw material MTC (billets/blooms) shall be submitted along with product test certificate/s
4. Vendor to indicate the nature of the firm. Product catalogue shall be submitted.
5. Suppliers shall submit filled in supplier facility report for Pipe mill (Format enclosed). Suppliers without basic manufacturing facilities in-house, shall not be considered for evaluation. In house facilities for Heat treatment & Non-Destructive Testing (On-line UT & Online Thickness Measurement facility for Pipes) are mandatory requirements for consideration of the offer.
6. Chemical, Mechanical testing shall be done in house or at Labs certified as per ISO 17025 or Government approved labs.
7. Suppliers shall submit a valid ISO 9001 certificate or Quality Assurance Manual or Written down procedure.
8. BHEL/End customer reserve the right to inspect the item ordered at any stage at vendor's works and if found not meeting the stipulated conditions, material is liable for rejection.
9. BHEL/End customer reserves the right to inspect the first lot of materials at vendor's works for giving clearance before bulk production.
10. BHEL reserves the right to visit supplier's works to audit and inspect to ensure the capability for technical evaluation.
11. BHEL reserves the right to carry out audit checks at BHEL on the materials supplied at the time of receipt

*Akhil K. Das*  
24/11/2020

**AKHIL. K. DAS**  
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BHEL, TRICHY - 620 014.

*J. N. J. E.*  
24/11/2020

**नंदिनी. जे / NANTHINI .J**  
उप प्रबंधक, गुणवत्ता / Deputy Manager, Quality  
बीएचईएल, पाइपिंग सेन्टर / BHEL, Piping Centre  
टी. नगर, चेन्ने - 17 / T. Nagar, Chennai - 17

**Ref:MM: Pur:PC:Pipes:Rev 00**

**Dt:24.11.2020**

**Pre-Qualification requirements (PQR) for the procurement of Seamless Stainless Steel pipes through Open Tender (As per TDG: 26/Rev 03)**

**B) Technical Competence:**

1. Point by point confirmation to the TDC requirements is mandatory for consideration of offer and signed TDC shall be submitted.
2. Suppliers shall submit manufacturing process flow chart from Raw material (Billets or Blooms) to finished product to meet the TDC requirements along with technical bid.
3. Suppliers shall submit the experienced manpower details specific to Manufacturing, Quality and NDE requirements.

**C) Past Experience/ Performance:**

1. Suppliers shall indicate their annual installed capacity for the tendered specifications & it shall be more than the tendered quantity for each specification.
2. i) Suppliers shall have supplied pipes in each of the tendered specification. Unpriced PO copies & Proof of supply (such as invoice / bill of lading copies and sample test certificates) shall be submitted for the tendered specification.  
  
ii) Details of supplies made in recent past indicating the Quantity, Specification, Size & Customer details shall be submitted year wise.  
  
iii) Unpriced PO copies & Proof of supply (such as invoice / bill of lading copies and sample test certificates) covering minimum and maximum sizes meeting the tendered size requirements shall be submitted as below.
  - **For Stainless Steel Pipes (except SA312TP347H, SUPER304):** Either in SA312TP304H, SA312TP316, SA312TP321, SA312TP321H or any equivalent pipe grade or any higher Stainless steel grades
  - **For Stainless Steel Pipes (SA312TP347H, SUPER304):** Respective grades (or any equivalent pipe grade) of the tendered specification.If credential is not available for any specific tendered size, then specific declaration shall be submitted by mill stating the capability to produce that quoted size/s.

**D) Financial Soundness:**

1. Indigenous suppliers shall submit Audited copies of annual reports (Balance Sheets), Profit & Loss statement for the last four years (or from date of incorporation whichever is less).
2. Import suppliers shall submit latest report from a reputed third party business rating agency like Dun & Bradstreet, Credit reform etc...

**Necessary supporting documents shall be submitted for meeting each of the above Pre-Qualification Criteria for evaluation of the offers.**

**BHEL shall consider/Not-consider the offers based on the evaluation of documents submitted for the above Pre-Qualification Criteria. If required, BHEL shall make on-site assessment of the facilities at supplier's works during the bid evaluation.**

*J. N. J.*

24/11/2020

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उप प्रबंधक, गुणवत्ता / Deputy Manager, Quality  
वीएचईएल, पाइपिंग सेन्टर / BHEL, Piping Centre  
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24/11/2020

**AKHIL. K. DAS**  
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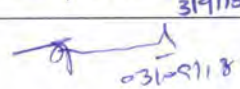
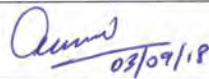


BHARAT HEAVY ELECTRICALS LIMITED  
TIRUCHIRAPPALLI - 620 014, INDIA

### QUALITY ASSURANCE

## CREEP TESTING (STRESS RUPTURE) REQUIREMENTS AS PER IBR

Prepared by	 03/09/2018
Quality Assurance	Abdur Rahman Sultan

Reviewed by	Signature
Product Engineering – Fossil Boilers (S. ANAND KUMAR)	 31/18
Quality Assurance (G.PANNEERSELVAM)	 03/09/18
Approved by	Signature
AGM/QA& BE (AMIT ROY)	 03/09/18

### RECORD OF REVISIONS

Rev. No.	DATE	Clause No.	Details of Revision
00	20/11/2017	---	Fresh issue
01	03/09/2018	1.0	Scope modified to bring more clarity
		2.0	Cl. 2 modified to bring creep requirements for all suppliers, additional labs are listed and Table 2 modified inline with the changes proposed in the new IBR draft.

## 1.0 SCOPE

- a) Creep testing is required as per IBR for all alloy & stainless steels materials *which are to be used in furnace or in super heater zone of boilers being erected in India.*  
*Hence, for our current boiler design, creep testing is required for tubes & forged finned elbows only.*
- b) *If the creep properties are established either by the mill on the starting raw material or by supplier on the finished product, then creep test reports shall meet the requirements of Clause 2.*
- c) *If the starting material is sourced from any mill which has not established creep properties, then creep testing shall be done as per Clause 2 on the product. If the Test results are meeting the requirements, then it can be treated as an approval of the creep values for the Mill which has supplied the starting material.*

## 2.0 CREEP TESTING REQUIREMENTS

Creep testing shall be done in line with the following:

For the starting raw material (Ingot, billet, bloom, etc.), supplier/s shall produce the Creep (stress rupture) test report for each material grade being supplied by them as per the Table 1 given below:

**Table 1. Creep Stress rupture testing Requirements**

Sl. No	Steel Type and Grade	Testing hours – min. (hrs.)	Testing Temperature (°C)	Stress Value (MPa)	No. of tests & Specimen Size
1	Alloy Steels (AS) – Grade 11, 12 and Grade 22	1000	550	100	Two no. of tests with preferably M10 round sample
2	Alloy Steels (AS) – Grade 91, 92 and 23	1000	600	120	Two no. of tests with preferably M10 round sample
3	All Stainless Steels (SS) grades	1000	600	110	Two no. of tests with preferably M10 round sample

- a) *For steels produced indigenously, creep testing shall be carried out at National Metallurgical Laboratory, Jamshedpur, Corporate Research & Development Laboratory of Bharat Heavy Electricals Limited, Hyderabad, Well Known Steel Makers or any other Material Testing Laboratory recognized by the Central Boilers Board.*
- b) *For steels produced outside India, creep testing shall be carried out at Well Known Steel Makers, Nationally recognized / accredited testing laboratory in the country of manufacture. Alternatively, the testing can also be done in any other laboratory if the tests are witnessed by a Competent Person working with IBR Authorized Inspection Agencies.*
- c) Creep testing shall be done as per ASTM E139 (latest) or BS EN ISO 204 (latest).
- d) *Two Test specimens shall be prepared from the test bar.*
- e) **Acceptance Criteria:** The samples tested shall not rupture and shall meet the *creep requirements at 1,000 hours of testing at indicated temperatures & stress values as per Table 1.*
- f) Reporting: As per Table 2.

Table 2. Suggested/Recommended Format for Reporting the Creep Testing Data:

SI No	Description	Details/Results
1	Report No. <span style="float: right;">Date:</span>	
2	Name and Address of the <i>Tube/ Forged Finned Elbow</i> Manufacturer	
3	Name and Address of the Raw Material Supplier	
4	Material Specification & Grade (Code Case, if applicable)	
5	Heat/Melt No, SI No (if applicable)	
6	Heat treatment details (Type & Temperature)	
7	Name and Address of Testing Laboratory	
8	Testing method/ Standard (ASTM E139 or BS EN ISO 204) & Revision/Edition	
9	Test Sample Size	
10	No. of test samples	
11	Temperature at which test is conducted (°C)	
12	Stress value observed (MPa)	
13	Test Start Date & Time	
14	Test End/Reporting Date & Time	
15	Test duration (hours of creep testing)	
16	Test witnessed by (Name of Inspector & Agency)	
17	Test Result (Accepted/Not Accepted)	

**BHARAT HEAVY ELECTRICALS LIMITED  
TIRUCHIRAPALLI 620 014**

**QUALITY ASSURANCE**

SIP: PP: 21 Rev. 07

Page 1 of 4

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

REVISION	DATE	PREPARED	REVIEWED	APPROVED
01	05-02-1999	R. Sasikumar	A. R. Reddy	K. Rengachari
02	22-07-2004	K. Ganesan	U. Revisankaran	C. R. Raju
03	20-01-2009	V. Kalyanaraman	S. Selvarajan	U. Revisankaran
04	13-05-2011	C. Haritha	V. Kalyanaraman	S. Selvarajan
05	27-05-2015	Vaibhav Saxena	S. Selvarajan	U. Revisankaran
06	28-10-2015	Vaibhav Saxena	Manu Shankar. H	S. Selvarajan
07	21-12-2016	<i>Saxena</i> 21-12-2016 Vaibhav Saxena	<i>S. Selvarajan</i> 21/12/16 S. Selvarajan	<i>Revisankaran</i> 21/12/16 U. Revisankaran

**RECORD OF REVISIONS**

Rev. No	Clause No.	Details of Revision	Remarks
01		New Specifications included based on TDC revision.	--
02		Amendment A1 dt. 26.04.01 issued for Rev. 01 incorporated. Colour code for SA 213 Gr. T23 added.	--
03		1) Colour code for SA 213 Gr. T92, P23, P92, SA178 Gr. D added. 2) Colour code for SA 210 Gr. C modified to BLUE only.(From BLUE & GREEN)	--
04		Colour code for super 304H added	--
05		1) First para modified for clarity for colour codes containing more than one colours. 2) UNS number for Super 304H added.	--
06		Colour code for super 304H corrected in line with Revision 04.	--
07		1) First paragraph modified to include Instructions for sequence for colour code bands. 2) Sl. No. column added in table. 3) Colour code for SA 312 Gr. TP 304H added.	--

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Following Colour codes are to be applied as longitudinal bands (if not specified in other documents) on tubes & pipes to identify them to specification during receipt, storage, issue and processing. For heat exchanger tubes circumferential colour code can be provided at both ends of tubes (300 mm away from end). If the Colour code contains more than one Colour then bands of Colours shall be applied adjacent to each other without any overlap. ***In case of multiple colour bands, the sequence shall be maintained as indicated in the table.***

Sl. No.	Specification	Colour 1	Colour 2	Colour 3
1.	12 X 1 MØ	RED	YELLOW	
2.	13 Cr Mo 44	ALUMINIUM	BLACK	
3.	A 200 Gr. T5	ALUMINIUM	RED	YELLOW
4.	A 200 Gr. T9	ALUMINIUM	GREEN	YELLOW
5.	AISI 602	WHITE	YELLOW	
6.	API 5L Gr. B	ALUMINIUM		
7.	BS 3059 PART2 CDS/HFS 360	ALUMINIUM	BLACK	BROWN
8.	BS 3059 P2 S2 440	ALUMINIUM	BLACK	RED
9.	BS 3059 P2 S2 622 Gr. 490	ALUMINIUM	BLACK	GREEN
10.	BS 3602 PART1 CDS 360	ALUMINIUM	BLACK	BLUE
11.	NFA49-213 42C	ALUMINIUM	BLUE	BROWN
12.	NFA49-213 TU 10CD9.10	ALUMINIUM	BLUE	RED
13.	NFA49-213 TU 15CD2.05	ALUMINIUM	BLUE	GREEN
14.	NFA49-213 TU Z10CD9	ALUMINIUM	BLUE	YELLOW
15.	NFA49-213 TU Z10CDVNB09.01	ALUMINIUM	GREEN	RED
16.	SA 106 Gr. B	RED		
17.	SA 106 Gr. C	BLUE		
18.	SA 178 Gr. D	ORANGE		
19.	SA 179	BLACK	BLUE	GREEN
20.	SA 192	WHITE		
21.	SA 199 T5	BLUE	BROWN	RED
22.	SA 209 Gr. T1	ALUMINIUM	RED	
23.	SA 210 Gr. A1	YELLOW		
24.	SA 210 Gr. C	BLUE		
25.	SA 213 Gr. T11	ALUMINIUM	YELLOW	
26.	SA 213 Gr. T12	BROWN	YELLOW	
27.	SA 213 Gr. T2	BROWN	GREEN	
28.	SA 213 Gr. T22	GREEN	RED	
29.	SA 213 Gr. T23	RED	WHITE	
30.	SA 213 Gr. T5	BLACK	BROWN	GREEN
31.	SA 213 Gr. T9	BROWN	WHITE	
32.	SA 213 Gr. T91	GREEN	YELLOW	
33.	SA 213 Gr. T92	BROWN	BLUE	
34.	SA 213 Gr. TP 304	BLUE	GREEN	YELLOW
35.	SA 213 Gr. TP 304H	BLACK	BLUE	YELLOW
36.	SA 213 Gr. TP 304L	BLUE	WHITE	YELLOW
37.	SA 213 Gr. TP 309H	BLACK	BROWN	YELLOW
38.	SA 213 Gr. TP 316	BROWN		
39.	SA 213 Gr. TP 316 Ti	BLACK	BLUE	
40.	SA 213 Gr. TP 316L	BLUE	BROWN	YELLOW
41.	SA 213 Gr. TP 321	BLUE	WHITE	
42.	SA 213 Gr. TP 321H	BLACK	WHITE	
43.	SA 213 Gr. TP 347H	BLACK	YELLOW	

Sl. No.	Specification	Colour 1	Colour 2	Colour 3
44.	SA 268 Gr. TP 405	ALUMINIUM	GREEN	
45.	SA 268 Gr. TP 410	BROWN	RED	YELLOW
46.	SA 268 Gr. TP 443	BLUE	GREEN	WHITE
47.	SA 269 TP 316	GREEN	RED	YELLOW
48.	SA 312 Gr. TP 304	BLUE	YELLOW	
49.	SA 312 Gr. TP 304L	BLUE	RED	YELLOW
50.	<b>SA 312 Gr. TP 304H</b>	<b>BLACK</b>	<b>BLUE</b>	<b>YELLOW</b>
51.	SA 312 Gr. TP 316	BLACK	GREEN	
52.	SA 312 Gr. TP 316L	BLACK	BLUE	BROWN
53.	SA 312 Gr. TP 321	BLUE	BROWN	
54.	SA 312 Gr. TP 347	BLUE	RED	WHITE
55.	SA 333 Gr. 1	BLACK	BROWN	RED
56.	SA 333 Gr. 3	BLACK	GREEN	RED
57.	SA 333 Gr. 6	BLUE	GREEN	RED
58.	SA 334 Gr. 1	BROWN	GREEN	RED
59.	SA 334 Gr. 3	BLACK	RED	YELLOW
60.	SA 334 Gr. 6	BLACK	BLUE	RED
61.	SA 335 Gr. P1	BROWN	GREEN	YELLOW
62.	SA 335 Gr. P11	GREEN	WHITE	
63.	SA 335 Gr. P12	BLACK	RED	
64.	SA 335 Gr. P2	BLUE	BROWN	GREEN
65.	SA 335 Gr. P22	BLUE	RED	
66.	SA 335 Gr. P23	RED	WHITE	
67.	SA 335 Gr. P5	BLACK	BROWN	
68.	SA 335 Gr. P9	ALUMINIUM	BROWN	
69.	SA 335 Gr. P91	BROWN	RED	
70.	SA 335 Gr. P92	BROWN	BLUE	
71.	SB 163 Inconel	BLACK	GREEN	YELLOW
72.	ST 35.4	ALUMINIUM	BLUE	
73.	Steel 20	GREEN		
74.	Structural Tubes & Pipes	BLUE	BROWN	WHITE
75.	X20 Cr Mo V 121	BLACK		
76.	SA 213 UNS S30432( Super 304)	BLACK	RED	GREEN

@@@@@@@@@@

## Technical: Seamless Tubes & Pipes Suppliers ( Carbon / Alloy / Stainless Steel ) Supplier Facility Report

1. Name of the Company

2. Address of the Registered Office  
( Telephone, E-Mail, Fax )

3. Factory Location and Address  
( Telephone, E-Mail, Fax )

4. Installed Capacity ( Tonnes / Year )

4.1) Carbon Steel

a) SA 192

b) SA 210 Gr. A1, C

c) SA 106 Gr. B, C

d) Riffled Tube / SA 210 Gr. C

4.2) Alloy Steel

a) SA 335 P11, P12, P22

b) SA 213 T11, T22

c) SA 335 P91, SA 213 T91

d) SA 335 P23, P92

e) SA 213 T23, T92

f) Riffled Tube /  
SA 213 T12, T22, T23

4.3) Stainless Steel

a) SA 213 TP 304H

b) SA 213 TP 347H

c) SA <sup>213</sup> TP 347HFG

d) Super 304H

5. Are you making your own steel  
( Bloom ) for making Tubes / Pipes ?

YES

NO

6. If yes, for Sl. No. 5

a) Type of Furnace

b) Capacity of furnaces  
( Metric Tonnes / Melt )

c) Facility for manufacture  
of Blooms

7. If No, for Sl. No. 5

a) Source of Raw Material ( Blooms )

**8. Tube / Pipe Manufacturing Facility details**

8.1 Capacity of the rolling mill with respect to  
Diameter ( Minimum and Maximum ),  
Thickness ( Minimum and Maximum ) and  
Length ( Maximum )

a) Through Hot Finishing

b) Through Cold Finishing

8.2 Type & Make of Hot Mill along with the details  
of the Individual Equipments

8.3 Type & Make of Cold Mill along with the details  
of the Individual Equipments

**9. Heat Treatment Facility Details**

a) Capacity of the Furnaces

b) Type of Heat Treatment Carried out  
( Batch or Continuous )

**10. In House Testing Equipments Details**

a) Online UT Facilities

b) Online Eddy Current ( EC ) Facility

c) Hydro Test Facilities  
( Indicate the Maximum Pressure )

d) Chemical and Mechanical Testing Facilities

11. Details of Accreditation for Quality Systems  
( Like ISO, ASME, API etc., )

12. Are you Approved by any  
Third Party / Statutory Agency ?   
If so, specify the Agency ( **Attach details in ENGLISH** )

13. Have you manufactured the following   
Size / Specification / Length to  
BHEL or any other well-known Boiler Manufacturer for Boiler Application  
**Please provide the details of to whom, when and how much supplied.**

→ a) **TUBES:**

TUBES REQUIREMENT- LENGTH : 6500 mm to 13800 mm			
SL. NO.	OUTER DIAMETER	WALL THICKNESS	SPECIFICATION
1	21.3 to 73.01 mm	2.11 to 14.02 mm	SA 106 Gr B / Gr C ( Carbon Steel ) SA 335 P12, P22, P23, P91, P92 ( Alloy Steel )
2	28.6 to 76.1 mm	3.2 to 12.5 mm	SA 192 / SA 210 Gr A1 / Gr C ( Carbon Steel ) SA 210 Gr. C ( Rifle Tubes ) SA 213 T12, T22, T23 ( Alloy Rifle Tubes )
3	14 to 76.1 mm	3.2 to 12.5 mm	SA 213 T11, T22, T23, T91, T92 ( Alloy Steel ) SA 213 TP 304 H, TP 347 H, TP 347 HFG, Super 304 H ( SS )

b) **PIPES:**

PIPES REQUIREMENT – LENGTH 3000 mm to 9000 mm			
SL. NO.	OUTER DIAMETER	WALL THICKNESS	SPECIFICATION
1	88.9 to 864.00 mm	3.96 to 148.0 mm	SA106 Gr B / Gr C ( Carbon Steel )
2	88.9 to 965.00 mm	3.96 to 130.0 mm	SA335 P11, P12, P22, P23 ( Alloy Steel )
3	127.0 to 812.8 mm	11.50 to 100.00 mm	SA335 P91, P92 ( Alloy Steel )
4	88.9 to 323.9 mm	3.05 to 12.5 mm	SA312 TP304H, 321 H, 316 ( SS )

14. Please go thro the attached **Technical Delivery Condition (TDC)** and give point-by-point confirmation.

a) **For Tubes:** TDC: 0:102, 0:105, 0:119

b) **For Pipes:** TDC: 0:101, TDG: 32, TDG: 100, TDG: 101, TDG: 26, TDG: 6876


PLACE :

DATE :

SIGNATURE WITH SEAL

**NOTE:** Enclose Additional Sheets / Annexures wherever required referring the Sl. No. of this format.

\*\*\*\*\*

	<b>BHEL – Tiruchirappalli - 620014, India.</b> <b>Quality Assurance Department</b> <b>TECHNICAL DELIVERY CONDITIONS</b>	DOC No: <b>TDC:0:102</b> Rev: <b>18</b> Effective Date: <b>05/08/2019</b> Page: <b>1 of 6</b>
<b>Product: SEAMLESS STEEL TUBES (for BOILERS)</b>		

**Revision record:**

- Rev 08:** 21.09.04: UT as per BS EN 10246-7, in lieu of ASTM E 213
- Rev 09:** 31/12/05: Cl 5.0 - mention of shape and size of tensile test specimen on TC introduces
- Rev 10:** 29/12/07: Cl 1.0, 3.0, 6.0, 7.0, 11.0 and 12.0 modified.
- Rev 11:** 19/05/09: Cl 8.0 – Modified. Cl 9.0 – Marking details included in line with material specification.
- Rev 12:** 08/06/11: Cl 1.0- SA 213 T12, T92 and T23 removed from this TDC. Cl 2.0 Process of Manufacture – Clarified. Cl 9.0- Stenciling and colour coding modified. Cl 12.0- Modified.
- Rev 13:** 04/07/11: Cl 6.0: Modified, Cl 9.0 – Marking: Correction made in the “Details to be identified”
- Rev 14:** 26/10/12: Cl 2.0, 6.0 and 12.0 modified
- Rev 15:** 19/02/2016: TDC: 0:124 requirements merged in this TDC. And Cl 1 modified; Cl 2 modified to include polygonization requirements; Cl 4– heat treatment temperature added for Gr 91; Cl 5– lot size for mechanical tests defined & additional requirements of Gr 23, 91 & 92 added; Cl 6, 7, 9 – modified; Cl 10 –Preservation requirements modified; Cl 11 – modified; Cl 12-changed as per latest IBR including MAWP requirements.
- Rev 16:** 13/10/2017: Clause 1 & 12 modified to include raw material requirements and certification in IBR Form IV. Clause 5 (f) added to include creep requirements.
- Rev 17:** Dt: 20/04/2018 - Cl 2 added to include Billet/Bloom Requirements, Cl. 3 modified, Cl. 6(f) modified, Cl. 13.3 (k) added to include mill TC certification
- Rev 18:** Dt: 05/08/2019 – Cl 2 modified based on feedback from user departments, suppliers and internal discussions, Cl 5 modified, Cl 6 added to include shot peening requirements, subsequent clauses renumbered, Cl 7 (f) & Cl 9 modified, Cl 14.3 (l) & Cl 15 added.

**1. MATERIALS**

Specification: ASME (Latest as on the date of Enquiry/PO, whichever is earlier):

- Carbon Steel (CS) : SA 192; SA 210 Gr. A1 & Gr. C
- Alloy Steel (AS) : SA 209 Gr.T1, SA 213 Gr. T11, T12, T22, T23 (Code case: 2199), T91 and T92 (Code Case: 2179).
- Stainless Steel (SS) : SA 213 TP 304H, 316, 321, 321H, 347H; UNS No: S30432 (Code Case: 2328, Super 304).
- Additional Requirement : As listed below (Supplementary to above material specifications)
- Size and Quantity : As per Purchase order

**2. BILLET/BLOOM REQUIREMENTS:**

The billets/blooms shall be fully killed.

*For carbon steel and alloy steel, billets/blooms shall be made by vacuum degassing. For Stainless steel, billets/blooms shall be made by vacuum degassing or argon oxygen decarburization (AOD).*

Ladle analysis is required for all steels. Chemistry shall be controlled as given below for below specified grades. For all other grades, it shall be as per applicable material specifications:

- i. Carbon Steel: Max. Carbon: SA 210 Gr.A1: 0.25%, SA 210 Gr.C: 0.30%
- ii. For SA 213 T12: Aluminum: 0.025% max; Silicon: 0.20%min. on product analysis and the values shall be reported in the test certificate.
- iii. Stainless Steel (SS): Boron: 0.01% max., Vanadium: 0.10% max.

The billet/bloom shall conform to the chemical and process requirements of respective tube specifications. The billet/bloom shall be sourced from IBR well known steel makers or with inspection and certification by IBR authorized Inspecting Authority in case the mill is not approved by IBR. Mill test certificate shall be submitted to BHEL.

**3. CHEMICAL COMPOSITION AND PROCESS OF MANUFACTURE OF TUBES**

a) **Carbon Steel & Alloy Steel:** Tubes shall be seamless and made by processes specified below:

- 1. All tubes shall be cold formed in case of “t/D” ratios > 0.15, where “t” is the specified nominal wall thickness and “D” is the specified nominal OD of the tube.



Product: SEAMLESS STEEL TUBES (for BOILERS)

2. Tubes may be cold formed or hot formed in case of "t/D" ratios upto and including 0.15.
3. The degree of polygonization (P), measured as indicated in Fig.1 & calculated using the below formula, shall not exceed 15% in both the above cases:

$$P = \{[\sum S_B - \sum S_A] / [0.135*(3D - \sum S_A)]\} * 100$$

where, P is the degree of polygonization in %

D is the specified nominal OD of the tube

$\sum S_B$  is the sum of maximum tube wall thicknesses measured at 6 locations 60 degrees apart and

$\sum S_A$  is the sum of minimum tube wall thicknesses measured at 6 locations 60 degrees apart.

Wall thickness shall be measured using profile projector/shadowgraph/digital scanner/any other suitable instrument meant for this purpose.

Definition of the measure points

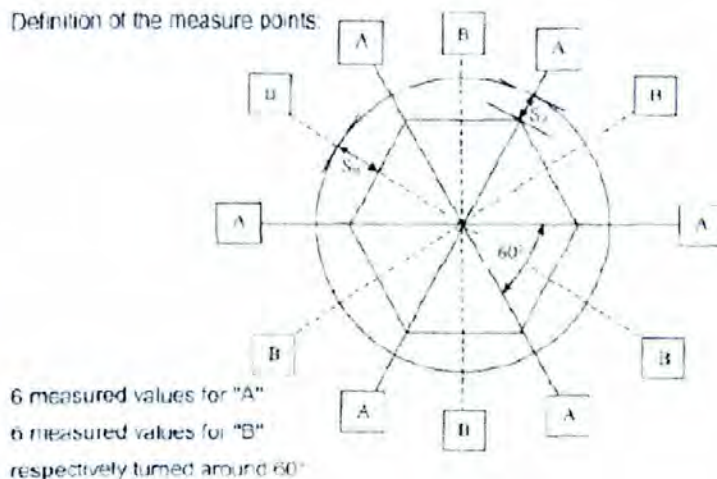


Fig. 1

**Stainless Steel:** Tubes shall be seamless and cold finished. All raw materials used in steel making including incoming scrap shall be checked by supplier to ensure freedom from radioactivity (Applicable for SS materials only).

b) **Product analysis** on tubes is required for all steels. Chemistry shall be controlled as per applicable material specifications and the elements including carbon for carbon steel, Aluminium (for T12), Boron & Vanadium (for Stainless steel) as indicated in Clause 2 shall also be reported in the product analysis.

#### 4. DIMENSIONAL TOLERANCES

- a) For Cold finished tubes: CS: as per SA 450; for AS & SS shall be as per SA 1016.  
Tolerance on thickness shall be: For OD  $\leq$  38.1 mm: -0% to +20% and For OD  $>$  38.1 mm: -0% to +22%
- b) For hot finished tubes the tolerance shall be as follows:  
For Outside Diameter:  $\pm$  0.4mm.  
For Thickness: -0% to +22% t  $>$  4.5 mm  
-0% to +24% t between 3.6 and 4.5 mm (both inclusive)  
-0% to +28% t  $<$  3.6mm

#### 5. HEAT TREATMENT

**CS Hot finished:** No Heat Treatment required.

**CS Cold finished:** Subcritical annealed (temperature  $\geq$  650°C), fully annealed or normalized.

**AS:** Normalized and Tempered. For SA213 T91 & T92: Normalizing: 1050-1080°C & Tempering: 750-780°C.

For SA213 T23: Normalizing: 1050-1080°C & Tempering: 750-775°C.



(The total thickness of the decarburized material (Both on ID & OD of the tube together) shall be measured once per Heat treatment lot. The measurement shall be determined from a representative sample that has been sectioned, polished, etched and examined at 100X. The total decarburization thickness shall not exceed 7% of the specified minimum wall thickness and shall be reported in the test certificate.)

SS: Solution Annealed condition as per material specification.

6. *INSIDE SHOT PEENING FOR ALL STAINLESS STEEL TUBES OF SA213 TP347H and SA213 UNS No: S30432 (Code Case: 2328, Super 304):*

6.1 *Shot peening shall be carried out inside the stainless steel tubes after solution annealing, unless specified otherwise in Enquiry/Purchase order*

6.2 *Qualification:*

- a) *The qualification for tube inside shot peening shall be performed according to the below described test steps. The range of qualification covers tube internal diameters (Di) in the range of  $Di \pm 2mm$  as well as the specific material grade and qualifies the shot peening process based on the used machine settings (peening parameters). Stainless Steel shots shall be used.*
- b) *Qualification evaluations (hardness test and microstructure) shall be performed on at least one (1) sample tube, with evaluations at sections cut from the beginning, middle and end of the tube.*
  - i) *Metallographic examination for proof of thickness of cold worked microstructure across the entire tube circumference and a minimum depth of 70  $\mu m$  from the inner surface shall be carried out and documentation of representative shot peened conditions at 500X magnification shall be submitted.*
  - ii) *Hardness test shall be carried out at a distance of 40  $\mu m$  from the inner surface at quarter points ( $4 \times 90^\circ$ ) spread around the tube circumference. Acceptance criteria: hardness values of the shot peened zone shall be a minimum of 100 HV0.1 above the average hardness of the unaffected base material (2mm from outer surface).*
  - iii) *Almen strips representing acceptable shot peening conditions shall be produced during the qualification.*

*General requirements- Almen testing shall be in conformance with SAE J442 – Almen testing reading tolerances shall be in conformance with SAE AMS 2430 § 3.7.*


*For SS tube shot peening, where SS shots shall be used, C type Almen strip in conformance with SAE AMS 2431/4C shall be used.*

6.3 *In-process tests – Quantum of test shall be one test per heat no. and tube internal diameter*

- i) *Hardness test shall be executed in accordance with the prior performed qualification at the beginning or end of tube {see point 6.1 (b) (ii)}.*
- ii) *The Almen test (alternative test instead of the hardness test) shall be executed in accordance with the previously performed qualification {see point 6.1 (b) (iii)}. Almen test readings shall not be lower than the established "Minimum" shot peening intensity.*

6.4 *Marking & Certification:*

- a) *After shot peening treatment, all tubes shall be marked with the letters "SP" for "shot peened".*
- b) *Certification for Shot peening shall be done in Material Test Certificate (MTC).*
- c) *Results of qualification shall be submitted as one time exercise for each internal diameter and material grade which shall include Almen test, Metallographic examination and Hardness test.*
- d) *Results of In-process tests shall also be submitted for each heat and tube internal diameter.*

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## 7. MECHANICAL TESTS

- a) As per specification. Quantum of test: As per specification – For each nominal size per heat per heat treatment batch (Minimum 2 tubes for first 100 tubes and 1 per 100 or part thereof for tubes over 100 numbers, as per IBR).
- b) Tension test required for SA 192. **Acceptance:** explanatory note in Specification. Hardness for SA 192: 120 HBW (max).
- c) For tension tests the shape and size of the specimen shall be mentioned on the Test Certificate (viz., Full tube tensile or strip tensile or round tensile).
- d) Additionally, the material supplied shall meet the requirements as below:  
**T91**-Tensile strength: Min: 630MPa, Max: 850MPa; Yield Strength: Min: 450MPa; Hardness (HBW): Min: 195/Max: 250  
**T92**-Tensile strength: Min: 620 MPa, Max: 850 MPa; Hardness (HBW): Min: 190 / Max:250  
**T23**-Tensile strength: Min: 510 MPa, Max: 730 MPa; Hardness (HBW): Min: 150 / Max:220
- e) **Charpy Impact V-Notch Test at the mill as per SA 370 for SA 213 T23:**
  - **Impact testing frequency** - minimum of two tubes per each heat treatment lot produced.
  - **V-Notch Impact test procedure & specimen size as per ASME SA 370.**
  - **Test temperature:** 20°C.
  - **Acceptance:** All specimens shall absorb energies at or above 40 ft-lb (55Joules) for a full size specimen (10mm thickness). The energy requirement is proportionally reduced for sub-size specimens as specified in ASME SA 370, Table 9.
  - The fracture surfaces on all specimens must exhibit 100% ductile appearance regardless of the absorbed energy values obtained.
  - Any specimen exhibiting an absorbed energy less than 40 ft-lb (55Joules) or less than 100% ductile behavior shall constitute permanent rejection of the entire lot of tubing.
- f) Creep testing shall be carried *for all alloy steel and stainless steel tubes* out as per SIP:RM:01 (latest revision).

## 8. NON DESTRUCTIVE TEST (In-house Automated Online Testing Only)

- a) Each tube shall be examined full section over its entire length.  
**Ultrasonic Testing:** For thickness  $\geq 3.6$  mm to be conducted as per ASTM E213. Calibration: 2 axial 50mm long notches, one in outer surface and the other in inside surface. For OD <30 mm, one notch in outer surface only. Notch depth: 5% of wall thickness (Min. 0.3 mm, Max: 1.5 mm). Scanning: clockwise & anti-clockwise.  
  
**Eddy current Test:** For thickness < 3.6mm, as per ASTM E309 /E426 as applicable, Calibration: Longitudinal notch depth: 5% of wall thickness (Min. of 0.3 mm) or drilled hole as per SA 106.
- b) SS: Finished tubes shall be checked for radioactive contamination and reported. Survey meter shall be used to measure at 5cm near the surface. **Acceptance limits:** Shall be less than 0.1 milli Rontgen (mR) per hour or 1 micro Sievert per hour.
- c) The residual magnetism in all finished tubes, measured with field indicator, shall be limited to 5 gauss maximum.

## 9. HYDROSTATIC TEST

Extent of test: On all tubes of thickness < 3.6 mm. **Hydrostatic pressure for all grades shall be calculated** as per SA 450 Cl 23.3 with S=80% of specified min. yield strength at room temperature. For others if specified in Purchase Order. **Acceptance:** No leak shall be permitted.



## 10. FINISH AND REPAIR

Inside and outside surfaces are shall be free from scales and defects like laps, seams, folds, cracks, pitting etc. Repairs by welding are prohibited. Surface defects can be removed mechanically, ensuring smooth curved surface and maintaining specified minimum thickness without affecting the workmanlike finish.

## 11. MARKING: (in English only)

- a) **Details to be identified:** Tubes shall be marked repeatedly & continuously along its entire length with the following details as indicated below:  
(1) PO Number, (2) Maker's emblem/code, (3) Specification & grade, (4) Code case (if applicable) (5) Heat number, (6) Size (OD x Thickness x Length, in mm), (7) No. of tubes, (8) Inspector's seal, (9) Condition: Hot finished or Cold Finished, (10) Tube Minimum Wall Thickness Designation (For SA 213 Spec only).
- Below OD 31.8mm. (Excl.) – Sl Nos:1 to 10 to be stamped on metal/plastic tag attached to bundle.
  - OD 31.8-76.1mm. (Incl.) - Sl Nos: 1 to 6, 9 and 10 to be paint stenciled, repeatedly through the entire length of each tube. Also Sl.No:1 to 10 to be stamped on Metal/Plastic tag attached to bundle.
  - OD>76.1 mm- Sl Nos: 2 to 6 & 8 to be hard stamped with round edge stamp at 100mm from both ends and Sl No:1 to 6, 9 and 10 to be paint stenciled on each tube.
- b) **Colour Coding:** Continuous longitudinal colour coding shall be done on the entire length of all tubes, without masking stenciling. If more than one color is to be applied on the tubes then, colour bands shall be adjacent. Colour coding scheme as per Procedure SIP: PP: 21 (latest).

## 12. PRESERVATION:

All tubes, except SS, shall have Rust Preventive Fluid (RPF) coating on the external surface as follows: The Tubes shall be coated with suitable RPF with minimum DFT of 50 microns. RPF coated steel surfaces shall be capable of withstanding salt spray corrosion test for minimum 1000 hours. The RPF coating should be sea worthy, ensuring freedom from corrosion when transported through sea voyage. The RPF coating shall get dried and shall be a transparent coating, so that it is possible to see the tube surface clearly as well as read any stenciled matter on tube surface. The inside surface of the tube shall be protected with volatile corrosive rust inhibitor. Rust preventive coating shall withstand at least one year storage at open yard from receipt of materials. The supplier shall stand guarantee for this. SS tubes to be surface treated as per ASTM A380 both inside and outside. Tube ends shall be closed with push type plastic end caps/plugs secured tightly to avoid entry of water during transportation and storage.

## 13. PACKING:

Tubes of thickness  $\leq 2.5$ mm, shall be packed in boxes and others in bundles. Tubes of thickness  $\geq 6.5$  mm and OD  $\geq 88.9$  can be shipped loose. Bundles to be  $\leq 4$  tons of equal no. of tubes, fastened with galvanized strap (1x25mm.min.) or annealed wire for CS & AS and by Nylon strap for SS at both ends & at 1m interval in between. Wooden pallets/cardboard to cover tubes are not permitted.

## 14. INSPECTION AND CERTIFICATION:

- 14.1 Products shall be inspected at works and the applicable IBR Form must be Countersigned by the Inspecting Authority as indicated below:

**Imported Items:** Inspecting Authority approved by IBR for the Country of origin (To be concurred by BHEL before placing PO.)

**Indigenously Supply:** Director of Boilers/Chief Inspector of Boilers/Inspecting Authority approved by IBR, for the respective state.



Product: SEAMLESS STEEL TUBES (for BOILERS)

14.2 Certification in IBR Form III-B for finished tubes from “IBR-Well Known Tube Maker” or “Inspecting Authority”, as applicable, shall be submitted to BHEL.

Also, certification in IBR Form IV for the raw material signed by “IBR-Well Known Steel Maker” or “Inspecting Authority”, as applicable, shall be submitted to BHEL.

Refer to BHEL Engineering Drawing: 4-03-000-00061 (Latest Rev) for MAWP values for various material grades & sizes at various temperatures.




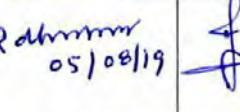
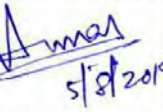
14.3 **Additionally, Manufacturer’s Test certificate(MTC)** (ORIGINAL in ENGLISH) with following details shall be submitted to BHEL:

- Purchase Order No. (BHEL), TDC No and its Rev No, Test certificate No., Size and Quantity-Melt wise.
- Specification and Grade with year of code, Code case number (if applicable), Heat Number, Steel & Tube making process, chemistry including incidental elements-Ladle and product Analysis.
- Heat Treatment details with actual temperature and soaking time
- Mechanical test results
- Detailed NDE report with reference norms, acceptance standards and test results.
- Grain size, as applicable.
- Decarburization layer thickness
- Certification for compliance to residual magnetism
- Certification for minimum DFT of rust preventive coating
- Creep test report for minimum of 1,000 hours as per Cl. 5(f) (only for IBR applications).
- Mill test certificate of the raw material (billets/blooms) as per Cl. 2.
- Certification for Shot peening, as applicable. Also, results of Almen test, metallographic examination and hardness shall be reported along with acceptance norms on shot peened SS tubes as per Cl 6.4.*

In the MTC a clause for Certificate of Compliance (as per SA 1016) shall be added stating that: All materials/components supplied to Purchase Order meet all requirements contained in the PO, this Technical delivery conditions and applicable ASME specifications.

14.4 For SS: Measured Radioactivity levels shall be reported in the Mill Test Certificate and shall be submitted to BHEL.

15. *End use: These tubes are meant for use in subcritical and supercritical Boilers. These tubes shall be capable of undergoing forming, bending and welding operations necessary for the application without developing defects.*

 05/08/2019	 05/08/2019	 5/8/19	 05/08/19	 5/8/2019
Abdur Rahmar Sr. Engr/QA	M. Nadeakumar AGM/MM	S. Anand Kumar SDGM/PE/FB	R. Dharmar AGM/QC	JVV Aruna Kumar SDGM/QA
<b>Prepared By</b>	<b>Reviewed by</b>			<b>Approved By</b>



## 1.0 GENERAL

Materials: ASME SA 312 (Austenitic Stainless Steel Pipes), SA 790 (Duplex Stainless Steel Pipes).

1.1 This Technical Delivery Conditions specify the additional requirements for the supply of Austenitic and Duplex Stainless Steel Pipes (Seamless and Welded) to material specification indicated above.

1.2 The pipes shall conform to the size, grade and quantity as specified in the purchase order.

1.3 Seamless pipes shall be supplied unless welded pipe requirement is specified in the purchase order.

## 2.0 PROCESS AND CHEMICAL ANALYSIS

2.1 The chemical composition of the steel shall conform to the requirements of the respective material specification.

2.2 If the welded pipes are specified in the P.O, then they shall be made by an automatic welding process with no addition of filler metal in the welding operation.

2.3 Product analysis as per material specification shall be furnished in the Test certificate.

## 3.0 DIMENSIONAL TOLERANCES

The pipes shall conform to the dimensional tolerances specified in ASTM A999.

## 4.0 HEAT TREATMENT

All pipes shall be supplied in the heat treated condition as specified in the respective material specification.

## 5.0 MECHANICAL TEST

5.1 The pipes shall be subjected to mechanical tests as specified in material specification and report shall be furnished.

5.2 The number of test samples shall be selected as per respective material specification.

## 6.0 HARDNESS TEST FOR DUPLEX SS PIPES

Hardness test shall be carried out on each pipe in case of SA 790 duplex Stainless Steel. The hardness values shall be indicated in test certificate.

## 7.0 HYDROSTATIC PRESSURE TEST

Each length of pipe shall be subjected to hydrostatic pressure test, at a pressure as specified in the purchase order.

## 8.0 FINISH & REPAIR

The Inside & outside surfaces of the pipes shall be free from any imperfections & defects like laps, seams, folds, cracks, pitting etc;. Repair by welding is prohibited. Localised imperfections, if any, may be removed mechanically ensuring the wall thickness. Local depressions or ground spots are not acceptable.

Prepared by :

Vivekananda Yeflu

Approved by:

Vedaprasad K  
Quality

K. Ganeshan  
OP&C and MPL

Verkataramani.G  
Engineering & Quality



The pipe shall meet the dimensional tolerance (clause 3.0 above) after any mechanical repair as permitted in the standard.

All pipes shall have a finish as specified in respective material specification.

## 9.0 MARKING AND PACKING

The following details are to be marked on the consignment for identification

- |                |                           |                          |
|----------------|---------------------------|--------------------------|
| 1) PO Number   | 2) Supplier's emblem/code | 3) Specification & grade |
| 4) Heat number | 5) Size                   | 6) Inspector's seal      |

OD up to 31.8 mm (excluding)	Details 1 to 6 shall be stamped on metal / plastic tag attached to bundle
OD 31.8 mm to OD 76.1mm (including)	<ul style="list-style-type: none"><li>Details 1 to 5 shall be paint stencilled on each pipe.</li><li>Details 1 to 6 to be stamped on Metal / Plastic tag attached to bundle.</li></ul>
OD above 76.1 mm	<ul style="list-style-type: none"><li>Details 2 to 6 shall be hard stamped / engraved at 100mm from an end of each pipe.</li><li>Details 1 to 5 shall be paint stencilled on each pipe.</li></ul>

9.1 The Pipes dispatched directly to project site as **DTS** shall be punched and paint stencilled with DU code (14 digit work order du detail-) as given by purchase in addition to marking done as per para 9.0.

10.0 **COLOUR CODING** : All pipes shall be colour coded longitudinally to full length of the pipe as given below.

SA312 TP304 : Blue & Yellow.

SA312 TP304H : Black, Blue & Yellow.

SA312 TP316 : Black & Green.

SA312 TP316L : Black, Blue & Brown.

SA312 TP321 : Blue & Brown.

SA312 TP347 : Blue, Red & White.

SA790 UNS S32205 : Red , White & Green

## 11.0 PRESERVATION & END PROTECTION

All Pipes shall be surface treated as per ASTM A380 both inside and outside. Pipe ends shall be machined as per PO and shall be secured with caps.

## 12.0 INSPECTION & CERTIFICATION

12.1 All pipes shall be inspected and test certificates shall be countersigned by BHEL/BHEL approved inspection agency.

Prepared by :

Vivekananda Yellu

Approved by:

Vedaprasad K  
Quality

K. Ganeshan  
OP&C and MPL

Venkataramani.G  
Engineering & Quality



12.2 Test Certificate shall include BHEL PO no., TDC no., Pipe size and quantity- melt wise, specification and grade with year of code, Heat no., Steel & Pipe making process, Product analysis, Heat treatment details with actual temperature and soaking time, Mechanical test results and hydrostatic test pressure and results.

**13.0 RECORDS OF REVISIONS**

**Rev 02** – New material specification (SA 790 UNS S32205) and Para 6.0 are included. Also minor corrections made for better clarity.

**Rev 03** – Para 8.0, 9.1, 10.0 & 11.0 are revised.

\*\*\*\*\*

Prepared by :		
Vivekananda Yellu		
Approved by:		
	Vedaprasad K Quality	K. Ganeshan OP&C and MPL
		Venkataramani.G Engineering & Quality



An ISO 9001  
Company

## Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

**TITLE**  
Seamless Stainless steel tubes

Phone: +91 431 2575730/ 7958

Fax : +91 431 252 0719

Email : [ghanabals@bhel.in](mailto:ghanabals@bhel.in)

Reference Number Enquiry	Enquiry Date:	Due date for submission of quotation
1502000038	26.11.2020	11.12.2020

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

**Tenders are invited by the MM / RM for Supply of 38.99 MT of above referred material.**

BHEL commercial terms & conditions and all annexure can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://eprocure.gov.in>

Yours faithfully,  
For **Bharat Heavy Electricals Limited**

SDGM/ PURCHASE/ RM

Ph: 0431- 2575730/7958, Fax: 0431- 2520719

Email: [ghanabals@bhel.in](mailto:ghanabals@bhel.in)

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