

Annexure

DECLARATION

(to be given by Bidder)

In pursuant to the Public Procurement Policy for MSEs Order, 2012, I/We declare(s) that My/Our firm is(are) falling under the following MSE category and I/we are submitting documentary evidence/ Govt. Certificate etc. along with UDYAM certificate in support of the same along with the techno-commercial offer.

Type under MSE	SC Owned	ST Owned	Women Owned	Others (excluding SC/ST & Women Owned)
Micro				
Small				

(√ Tick whichever is applicable)

Note: If the bidder does not furnish the above in the tender, offer shall be processed construing that the bidder is not falling under MSE category.

Signature of Authorized Signatory

Name:

Designation:

Stamp / Seal of Firm

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Conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations:

- 1) If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly.
- 2) The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating.
- 3) Procurement of goods directly from the manufacturers/ suppliers shall be preferred. However, if the OEM/ Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from the agent shall be ignored. However, this shall not debar more than one Authorised distributor (with/ or without the OEM). from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.
- 4) A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.

I/We declares that I/We have read and understood the above aspects, and confirms that such conflict of interest does not exist and undertakes that I/We will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s), in this regard. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, I am /We are, found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitable action shall be taken by BHEL as per extant policies/ guidelines.

Signature of Authorized Signatory

Name:

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BHARAT HEAVY ELECTRICALS LIMITED BHOPAL
(A Govt. of India Undertaking)
Ancillary & Subcontracting Division,
HRDC Building, Ground floor, BHEL Bhopal (M P)- 462022

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For Labour Basis Jobs (Machining) for 28/68 Buying group

Important Note : General terms & conditions are also applicable as per BP -200102 for indigenous vendor already available at B-2-B website of BHEL Bhopal internet webpage .

Techno commercial annexures for labour basis/Job work job/Mixed basis Section –A

1. Scope of Work:

- a. Scope of work shall include completion of all the works / operations as per BHEL drawings, inspection of the material and delivery of the goods to BHEL stores in accordance with the drawings specifications, technical scope, QA plan, annexure & other relevant documents etc.
- b. Technical scope is only for guidance and not exhaustive. Supplier has to take all necessary care and deliver the item to satisfy relevant quality standard applicable for such product.
- c. All required materials and / or components to be issued as free by BHEL under rule-55(1)-(B),(C) and (D) of central goods and service (CGST) rules 2017 against valid Bank Guarantee.
- d. Before start of manufacturing vendor to confirm latest revisions of Drawings, painting specification & QA plan (if any) in writing from Indenting deptt or Concerned Engineering deptt

2. Security against Material for labour basis/mixed basis jobs :

The raw material /components/sub-assemblies listed in enclosed free-issue material statement ("A" form) for the item(s) described in enquiry, shall be issued as Free Issue Material (FIM) by BHEL under rule-55(1)-(B),(C) and (D) of central goods and service (CGST) rules 2017 against valid **Security against FIM**, to be furnished covering cost of material proposed to be issued. Cost of any other inputs shall be borne by the supplier and are deemed to be included in the scope of supply/quotation. In case issuance of material gets delayed because of non-submission of **Security against FIM**, BHEL reserves the right to cancel the order. Pls. refer B2B site for full details. A declaration to be submitted for balance value of free issue items & solvency certificate to be submitted

In case of order, the vendor would be required to furnish **Security against FIM** as follows, if not stated otherwise in the main Enquiry.

a) Security against Free Issue Material to sub - contractor :-

The free issue materials are classified into 3 categories as follows for Security against FIM purposes:

Category A: Normal material of MS, SS, HSS, CRGO & CRNGO etc. for machining, fabrication and lamination purpose and copper sheets for welding to transformer tank

Category B: High value item e.g. Thermal blades, Turbine runner, Liners and Labyrinth for HVOF coating etc.

Category C: Very high value items like copper for moldings of conductors, silver for soldering etc.

b) Value of Security against Free Issue Material:

For category 'A' items as per above, Security against FIM to be taken for 10% of the highest balance of MWF value (taking into account both PMIV & SMIV held by vendors). Highest balance shall be reckoned as the MWF value appearing at the end of each month, starting from April of previous year to March of current year. (applicable from 01st June of current year). - **For PMD vendor**

Under Category "A" and "B", when enquires are issued simultaneously to new & established vendors, a uniform Security against FIM 10% value of free issue material shall be applicable.

c) Mode of Security against Free Issue Material: Security may be furnished in the following forms:

- (i) **Local cheques** of Scheduled Banks (subject to realization)/ **Pay Order/ Demand Draft/ Electronic Fund Transfer** in favour of BHEL.
- (ii) **Bank Guarantee** from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.
- (iii) **Fixed Deposit Receipt** issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act (FDR should be in the **name of the Contractor, a/c BHEL**).
- (iv) **Securities available from Indian Post offices** such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, **in favour of BHEL**).
- (v) **Insurance Surety Bond.**

(Note: Security deposit does not carry any Interest. BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)

(To be Signed and Sealed by Bidder in Acceptance of above points in Totality)

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In case of "Security against material" is in the form of Bank Guarantee or Insurance Surety Bond, the claim date shall extend beyond a minimum period of 3 months from validity date. The BG is to be furnished in prescribed Performa and from BHEL Consortium Banks only (available with ASC division & hosted in B2B website of BHEL, Bhopal).

d) Forfeiture of Security against Free Issue Material:

The Security against FIM will be forfeited and credited to BHEL's account in the event of a breach of contract by the supplier. The breach of contract may be due to non-returning, rejection of material etc.

The Security against FIM will be refunded to the contractor without interest, after he duly performs and completes the contract in all respects but not later than 60(sixty) days of completion of all such obligations including the warranty under the contract.

e) Undertaking for Free Issue Materials and Solvency certificate:

All vendors have to necessarily submit "Undertaking for Free Issue Materials", as per sample form no. BP205515 (annexure XV).

All vendors have to necessarily submit "form for solvency certificate" as per sample form no. BP205516 (annexure XVI)

Kindly refer B-2-B vendor portal website of BHEL Bhopal for further details of GTC, BG format and solvency certificate.

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3. Rates:

- a. Rates should be quoted in the unit mentioned in the enquiry, exclusive of taxes & duties but inclusive of desired/specified packing and to & fro transportation charges for delivering the completed job to BHEL Bhopal. Payment of all taxes if any for transportation of free issue material from Bhopal to the works of the supplier is to be borne by the supplier.
- b. All applicable Duties & Taxes, which BHEL is required to pay should be clearly declared.
- c. Rates shall remain firm basis and not subject to any variation / escalation during the period of contract on any account. The quoted rates should not be linked with quantity to facilitate part orders.
- d. Rates should be valid for ordering for 120 days from the date of tender opening. Offers received with validity period less than 120 days shall not be considered.

4. Scrap /Swarf clause: Scrap to be retained by vendor on chargeable basis. Scrap Cost and GST and other taxes (if any) on scrap shall be recovered from vendors bills. For this purpose, scrap selling rate shall be taken as mentioned in enq. office copy. The difference between the raw material weight (R/W) and finished weight (F/W) would be taken for determining the quantum of scrap generation.

5. GST as applicable on labour basis job.

6. Free-Issue-Material (FIM) will be issued by BHEL under rule-55(1) - (B), (C) and (D) of central goods and service (CGST) rules 2017 and the vendor will have to return the Duplicate/ Transporter/Green copy of excise challan to BHEL after value addition along with supplies along with supply/ the stipulated period as per GST rules. Failing which, the cost of material including GST paid by BHEL may be recovered from the vendor at the applicable rate. Moreover, overhead charges may also be deducted.

7. No rejection allowance is permissible

8. Supplier should indicate the supply capacity per month and delivery schedule, in No. of days/weeks/months (as the case may be) meeting enquiry requirement

9. Dimensional report TC, GC etc. as the case may be, to be furnished along with the supply. Machined items must be protected properly to avoid dent or damage during handling/transportation. TRP to be applied in each item.

10. Quotation should be valid for minimum 120 days from the date of opening of tender.

11. Purchase order can be issued for part quantity / item / item wise L1 basis, if not specified otherwise in the enquiry.

12. The vendor shall produce the free-issue-material supplied to them to BHEL officials visiting vendor's unit for verifications/ inspection purposes at any time. If vendor fails to produce or properly account for the material so issued, BHEL will take further action as deemed fit including the recovery of the value of material as per BHEL norms from vendor bills & BG.

13. **Splitting of order quantity:** BHEL reserves the right to split the ordering of tendered quantity. We need suppliers as mentioned in the Enquiry NIT for execution of this work.

The merit rank would be based on their standing position in RA or price bids. Above percentages are approximate figure. All quantities will be rounded off to nearest whole number. Other than L1 vendor shall be counter offered at L1 accepted rates and on acceptance of same by them, order shall be split as above. In case of non-acceptance of counter-offer by vendor as above, counter-offer process shall be repeated with other vendors in the order of their merit in the comparative statement of prices obtained through Part-II or RA. If we do not get sufficient vendors in final bidding of RA, then ranking of vendors will be picked from initial / dynamic bidding in order of their merit for counter offer purpose. Following are to be noted herein:

- a) No supplier must refuse the less quantity allocated.
- b) Additionally, BHEL also reserves the right to revise the tendered quantity downward with or without split ordering as above
- c) In case any of vendors L2 do not accept the counter offer of L1 rates, then the counter offer shall be made to other remaining vendors sequentially as per their comparative statement of prices obtained through Part-II (price bids) or ranking in RA followed by their ranking in sealed bids. At the end, however, if it is observed that less than the vendors required (excluding L1 vendor) has agreed to L1 rates, then the order shall be finalized with only those vendors who accepts L1 rates. The quantity distribution then shall be then proportionally revised as declared in enquiry details /enquiry remarks / enquiry main copy.
- d) In case, if less number of vendor accepts our counter offer then the quantity shall be redistributed as per split ratio shown above.

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- e) In case of capacity constraint /monthly capacity of vendors the additional quantity over & above of their shares will be distributed on other vendors suitably.

14. Basis of evaluation of quotations

- a) Only offers received before due date and time and meeting the terms and conditions of the enquiry will be considered.
- b) In case of Two bid system, all the bidders should read “instructions to bidders for submission of two bid system”. Whenever two bid system of enquiry is mentioned “BHEL reserves the right to go in for Reverse Auction instead of opening the submitted sealed bid, which will be decided after technical evaluation”. All the bidders should also read additional instructions to bidders for Reverse Auction (Ref. Annexure-IV).
- c) All the offers for each items shall be compared for landed cost to BHEL at BHEL stores.
- d) In cases where more than one offer is at L1 price, L1 will be decided :-
“In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.
In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss / draw of lots, in the presence of the respective L-1 bidder (s) or their representative(s).

Ranking will be done accordingly, BHEL's decision in such situation shall be final and binding”

- e) Offers received on any other basis other than the unit specified in tender shall be compared on the basis of design weight indicated in drawing.
- f) L-1 /lowest rank will be decided on basis of HESG cost/total landed cost to BHEL Bhopal.
- g) Offers having deviations to the terms and conditions will be suitably loaded as per standard/suitable loading factors of BHEL to derive total landed cost to BHEL at BHEL stores.
- h) GST as applicable on the date of enquiry shall be taken wherever it is not indicated in the offer for arriving the price to BHEL Bhopal.
- i) Decision of BHEL in this regard will be final and binding without any further correspondence with the supplier.
- j) During bid evaluation, No loading of price with regard to preferential payment of within 45 days will be made on vendor falling under MSMED ACT – OCT.06.

15. Acceptance & Rejection of bids

- a) In case of two bid system, firms whose bids have been evaluated but found not meeting the qualification criteria would be intimated and un-opened price bid shall be returned to them.
- b) Bids not in line with the terms and conditions of the tender enquiry, or unsatisfactory past performance, or not meeting the required delivery schedule/ long delivery or not conforming to normally accepted practices are likely to be rejected.
- c) Suppliers are requested to quote in two parts for 2 bid enquiries. However, for quotations submitted in single bid against our requirement of two bid will be considered only if the bid is techno-commercially accepted without seeking any clarifications from the vendor. Otherwise, the bid is liable to be rejected.
- d) If any new vendor to whom enquiry is issued & who is not registered in BHEL, their price bid shall be considered only after, they will get registered with BHEL.
- e) BHEL reserves the right in respect of acceptance & rejection of bids, which will be final and binding without any further correspondence.
- f) In case of any deviation submitted for vendors BHEL will preferably asked the vendors to withdraw their deviation as per BHEL NIT terms.

BHEL prefers : **As given in enquiry remarks** (item wise basis)

Delivery mentioned in the purchase order can be pre-poned / postponed as per the project schedule. Supplier will be required to meet the revised delivery schedule accordingly. In case of labour basis jobs / mixed basis jobs normally the vendors are expected to lift material in time without any reminders from BHEL and the delivery is computed as per the agreed manufacturing cycle

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mentioned in the enquiry / offer. However, at times, BHEL will remind the vendors through emails to lift material. In such cases, the delivery will be computed from the last date of issue of material.

16. Taxes & duties: -

- a) Applicable Duties & Taxes, which BHEL is required to pay, should be clearly declared considering the offer validity and quoted delivery period. Otherwise BHEL will not be responsible for payment of any kind of duties & taxes.
- b) Taxes and duties will be paid extra as applicable on the date/dates of contractual delivery or actual delivery whichever is lower.
- c) Parties shall declare: GSTIN details, GSTIN no. SAC code, Excise duty, sales Tax, IT PAN and SSI registration details and also communicate subsequent changes wherever not submitted earlier at the time of registration.
- d) All the formalities relating with existing taxes and duties as well as such taxes and duties which will be introduced in future, will be discharged by the vendor and there shall be nothing which will fall on BHEL.
- e) Form 88 – BHEL being Public Sector Undertaking of Gov. of India is exempted vide notification no. FA329/2004/1/V(54) DT 26/10/2005 by order of Addl. Secy. Gov. of M.P., in respect of goods sent from a place outside the state of Madhya Pradesh.
- f) Vendor to follow strictly adhere to the government E -way bill rules for transportation.

17. Payment –

- Indigenous: 100% payment in 90 days of receipt (45 days for Micro & Small and 60 days for Medium enterprises as registered in Udyam certificate as per relevant MSME act in force) and subject to acceptance of material and relevant documents at BHEL. In case of despatch of material to site directly, site certification for receipt of materials is required unless otherwise provided for in the PO. Any deviation from the above payment terms, if accepted (by BHEL), shall be loaded @ SBI base rate + 6% for the purpose of bid evaluation.

“MSE bidders as defined by the MSMED Act as amended from time to time can avail the intended benefits only if they submit along with the offer, attested copies of relevant document stipulated in the MSMED Act or its rules/ regulations as amended from time to time and /or by the buyer. Non submission of such documents as stipulated hereinbefore will lead to consideration of their bids at par with other bidders. No benefit shall be applicable for the concerned for the tender 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 may reject the bid or, as the case may be, cancel the order and take necessary steps for suspension of the business dealing against the bidder as per the extant guidelines for suspension of business dealings with suppliers/ contractors of BHEL. Note: MSME benefits shall not be given to traders, Dealers or authorised agents.”

18. Reverse Auction: (As per Guidelines as available on www.bhel.com)

19. BID SECURITY/ Earnest Money Deposit (EMD):

To safe guard against a bidder's withdrawing or altering its/ his bid during the bid validity period, Bid Security [also known as Earnest Money Deposit (EMD)] is to be submitted by the bidders along with their bids (except Micro and Small Enterprises (MSEs) or Start-ups as recognized by Department for Promotion of Industry and Internal Trade (DPIIT)). EMD shall not carry any interest. Amount of EMD shall be as mentioned in NIT document (if required).

Modes of deposit of EMD:

- a) The EMD may be accepted only in the following forms:
 - (i) Electronic Fund Transfer credited in BHEL account (before tender opening).
 - (ii) Banker's cheque/ Pay order/ Demand draft, in favour of BHEL (along with offer).
 - (iii) Fixed Deposit Receipt (FDR).
 - (iv) Bank Guarantee from any of the Scheduled Banks.
 - (v) Insurance Surety Bonds.

b) In case the EMD is more than Rupees Two lakh and in case of foreign bidders, it may be in the form of a bank guarantee (in equivalent Foreign Exchange amount, in case of foreign bidders) issued/ confirmed from any of the scheduled commercial bank in India in an acceptable form. The EMD shall remain valid for a period of 45 (forty-five) days beyond the final bid validity period.

Forfeiture of EMD

- i) A bidder's EMD will be forfeited if the bidder withdraws or amends its/his tender or impairs or derogates from the tender in any respect within the period of validity of the tender or if the successful bidder fails to furnish the required performance security within the specified period mentioned in the Tender.
- (ii) EMD by the tenderer to be withheld in case any action on the bidder is envisaged under the provisions of extant "Guidelines on Suspension of business dealings with suppliers/ contractors" and forfeited/ released based on the action as determined under these guidelines.

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Return of EMD

- (i) Bid securities of the unsuccessful bidders should be returned to them at the earliest after expiry of the final bid validity period and latest by the 30th day after the award of the contract. However, in case of two packet or two stage bidding, Bid securities of unsuccessful bidders during first stage i.e. technical evaluation etc. should be returned within 30 days of declaration of result of first stage i.e. technical evaluation etc.
- (ii) Bid security should be refunded to the successful bidder on conclusion of the order/ receipt of a performance security (if called in the tender).
- (iii) In case of expiry of offer validity period or any other circumstances, EMD can be released after the approval of Concerned Authority.

20. PERFORMANCE SECURITY

To ensure due performance of the contract, Performance Bank Guarantee (PBG) or Security Deposit (SD), hereafter referred as performance security is to be submitted by the successful bidder awarded the contract. The need for the Performance Security depends on the market conditions and commercial practice for the particular kind of goods. The total amount of Performance Security should not be less than five percent (5%) of the contract value. The Performance Security shall not carry any interest. The requirement of Performance Security or otherwise, as the case may be, shall be clearly specified in the tender conditions/NIT.

Performance Security is to be furnished by a specified date (generally 14(fourteen) days after notification of the award) and it should remain valid for a period of 60 (sixty) days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations.

Modes of deposit of Performance Security:

a) Performance security may be furnished in the following forms:

- (i) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL.
- (ii) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.
- (iii) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL).
- (iv) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL).
- (v) Insurance Surety Bond.

(Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)

b) In case of GTE tenders, the performance security should be in the same currency as the contract and must conform to Uniform Rules for Demand Guarantees (URDG 758) - an international convention regulating international securities.

Forfeiture of Performance Security:

The performance security will be forfeited and credited to BHEL's account in the event of a breach of contract by the supplier.

The performance security will be refunded to the contractor without interest, after he duly performs and completes the contract in all respects but not later than 60(sixty) days of completion of all such obligations including the warranty under the contract.

21. Breach of contract, Remedies and Termination

In case of breach of contract, wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is atleast 10% of the contract value, the same be encashed. In case the value of the security instruments available is less than 10% of the contract value, the balance amount be recovered from other financial remedies (i.e. available bills of the contractor, retention amount, etc. with BHEL) or legal remedies be pursued. The balance scope shall be got done independently without Risk & Cost of the failed supplier/ contractor.

Further, levy of liquidated damages, debarment, termination, de-scoping, short-closure, etc., shall be applied as per provisions of the contract.

22. Conflict of Interest among Bidders/ Agents

"A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

- a) they have controlling partner (s) in common; or
- b) they receive or have received any direct or indirect subsidy/ financial stake from any of them; or
- c) they have the same legal representative/agent for purposes of this bid; or
- d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder; or
- e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from one bidding manufacturer in more than one bid; or
- f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorise only one agent/dealer. There can be only one bid from the following:
 - 1. The principal manufacturer directly or through one Indian agent on his behalf and
 - 2. Indian/foreign agent on behalf of only one principal;

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- b) A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid; or
 - c) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business.
23. Confidentially agreement: Without prior permission of BHEL, NIT related documents shall not be used for any other purpose.

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Section –B (Additional terms for labour basis jobs)

1) ORDER EXECUTION:

Materials should be lifted immediately on receipt of intimation of readiness. Delivery period shall be reckoned after 2 days from the date of intimation. If any delay is due to non-lifting of material shall not be considered for delivery amendment. Stock Verification

24. BHEL reserves the right of verification of material lying with the subcontractor /supplier at any time.
25. BHEL material should be stocked at one place with identification with tags on them and should not be mixed with other materials.
26. Proper stock record of material held with them shall be maintained and the same shall be provided to BHEL on demand. If the Subcontractor fails to produce or properly account the materials so issued, BHEL will have the right to recovery of the value of the materials along with the respective administration charges and statutory levies from the running bills of the Subcontractor.
27. Any of the materials of BHEL under no circumstance be sold / hypothecated to any bank or to any lending institution or to any party whomsoever. It should not also be shown as the Subcontractor's assets in any of statements of the Subcontractor to any party.
28. Subcontractor should take all necessary precautions to ensure safety of BHEL material against damage or loss in any form.
29. Further subcontracting of work without prior written permission of BHEL is not permitted. Also, Shifting of items / materials issued by BHEL to any place other than the Subcontractor's works is prohibited.

2) Issue and accountal of free issue material from BHEL :

- a) Material /components will be issued free of cost under GST ACT 2017 only. Material accountal statement will be submitted by the supplier along with each bill. Free-Issue-material (FIM) will be issued by BHEL under GST rule For movement of inputs of partially processed goods under Rule 55(1)- (b), (c) & (d) of Central Goods & Service Tax (CGST) Rules, 2017 of Invoice GST rule from one factory to another factory for processing / operation and subsequent
- b) Material shall be issued in form of raw material & components as mentioned in the technical scope with adequate allowance as per prevailing engineering practice.
- c) It shall be the responsibility of Subcontractor to check the raw materials received by them for quality & quantity and ensure its correctness before removing it from BHEL premises.
- d) Any wrong material collected should be immediately communicated for remedy. Excess material collected should be immediately returned in the usable form.
- e) Any wrong material collected should be immediately informed to us for correction. Excess material collected should be immediately returned in the usable form against not for payment challan through SRV, & only cutbits/offcuts i.e end pieces shall be returned through SCRNL.
- f) Material issued for job work shall be taken back only in exceptional circumstances and upon written request of vendor with due justification.
- g) In cases wherever availability of material becomes critical for certain work order, BHEL has the right to either take back or transfer the balance, material available with the Subcontractor to other, with due material accountal, Free issue Material accountal shall be submitted by the vendor along with each supply. In case vendor fails to liquidate material accountal within stipulated period as per the GST rules from the date of issue of material, then BHEL may recover the cost of material.
- h) In case of rejection of BHEL issued material, vendor must repair and return/ replace, as the case may be, within 60 days from the date of rejection failing which such rejection shall be treated as "BHEL material damaged" and BHEL may recover the cost of material as per BHEL rules.

3) Q.A. Plan, Testing, Inspection, Quality certification & correlation

- a) Q.A. plan (if any) is to be strictly followed without any deviation and skilled worker will be employed as per job requirement & QA plan.
- b) Testing: -All types of testing & NDT would be in the scope of supplier and will be carried out through BHEL approved agencies unless specified otherwise in technical specification subject to review of NDT reports by BHEL. Testing of sample if done in BHEL TSD department will be on chargeable basis as per prevailing rates.
- c) Inspection and traceability of free issue Material
 1. All the material and components taken from BHEL should have got inspected and should be used only for the purpose for which it is issued by QC of BHEL otherwise job is likely to be rejected.
 2. It shall be the responsibility of subcontractors to check the raw materials received by them for quality & quantity as mentioned in the order.
 3. Subcontractors shall ensure transfer of materials identity and traceability at all stages and also maintains proper records.

4. Inspection of completed jobs

- a Inspection shall be done by customer, third party and/or BHEL's quality control department as mentioned in the QA plan /annexure.

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- b In case of inspection by customer or his authorized agency, intimation of readiness of job for calling the party should be given at least one week in advance.
- c After inspection at supplier's works the goods will be cleared for dispatch on provisional basis. Any defects noticed during assembly, testing or use is to be attended by the subcontractor, including replacement.
- d The cost of rework or rejection, and any cost of freight incidental to such work will be to the Subcontractor's account.
- e Subcontractors shall provide all reasonable facilities to BHEL personnel to have access to the records of the issued material and items under manufacture at all stages of processing and inspection.

5) CALIBRATION :

1. Subcontractor shall use only relevant measuring instruments, templates; gauges- calibrated at, either BHEL or at any Govt., approved labs – traceable to national standards or BHEL approved agencies for the purpose. 2. Relevant Test Certificates are to be produced to BHEL inspection staff for verification and demand.

- 6) **PENALTY / LD CALUSE:** In case of late delivery a penalty @0.5% of the total order value per week of delay or part thereof subject to a maximum of 10% of total order value would be levied.

a) **Order Cancellation:** BHEL shall have the right to cancel any order either wholly or in part on account due to cancellation of order or any curtailments or stoppage of BHEL's business or any other reason which justifies cancellation with recovery of full material cost.

b) In the event of delay in lifting the free issue material or/and delay in completion of work, BHEL shall be free to cancel the order in part or full and divert it to alternate subcontractor as per BHEL policy.

7) Confidentiality Agreement

- 1 All successful vendors are under obligation to maintain complete confidentiality of the documents, process etc . Acceptance of terms and conditions of the tender implies and binds the vendor to this agreement and no separate agreement need not be entered.
- 2 BHEL drawings shall not be used other than BHEL's requirements which after manufacture of items shall be returned along with delivery of materials.

8) Guarantee

The subcontractor shall warrant that the goods fully complies with the drawings and other technical conditions. If the finished goods are found defective owing to faulty workmanship / incomplete work within a period of 24 months from the date of dispatch the subcontractor shall make good of it / replace the same free of cost. Alternatively, the rework/replacement will be done by BHEL at the cost and risk of the subcontractor.

- 9) **Insurance- Submission of documents by the vendors :** Material issued to vendors are covered under BHEL corporate insurance policy. In case of any loss, to facilitate processing of claim, the vendor needs to furnish all required documents in time. The vendor is liable to pay the loss if the claim is not enforceable due to non-submission of documents by the vendors.

10) General

- a) Any change in the constitution of the subcontractor's unit during the operation of the contract will have to be made only after getting the specific written approval from BHEL. Non - compliance to this may entail cancellation of registration.
- b) The Subcontractor shall comply with all statutory obligations such as ESI. PF, labour laws, Factories Act. BHEL shall not be responsible for any of the penalties/ fines etc on this account.
- c) Further to the above, other instructions for packing, liquidated damages, arbitration & jurisdiction, indemnity, rejection etc., shall be as per the terms & conditions of indigenous enquiry BP -200102 and purchase order MM 5527 as issued by material management department. (copy of documents mentioned above are already available with the vendors & hosted in B2B site of BHEL Bhopal <http://www.bhelbpl.co.in/mm/>).

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- a. Progress report – Progress report will be required to be sent every week without fail by e-mail to skbaranawal@bhel.in indicating the status of each purchase order and hold up points. Please indicate your e-mail address in your offer without fail.
- b. In case of mismatch or any typographical mistake, computer generated enquiry copy shall be valid for enquiry.
- c. Pls visits B-2-B site for all information <http://www.bhelbpl.co.in/mm/>
- d. **Acceptance of all the above Enquiry terms & conditions & annexures are required in your offer. The same is to be signed by the vendors and submitted along with Part-1 offer. Offers/Bids/Quotations may be rejected without submission of same.**

11) **REGARDING TOOLS/Jigs , Fixtures , checking templates :**

“In cases where tools are issued **VENDORS ARE REQUESTED TO RETURN THE TOOLS IMMEDIATELY ON COMPLETION OF JOBS. IN CASE THE TOOLS ARE NOT RETURNED WITHIN 3 MONTHS OF ISSUE OF THE SAME, THE BILLS OF THE VENDORS MAY BE KEPT UNDER HOLD TILL RETURN OF THE TOOLS**”

12) **BHEL RESERVES RIGHT TO CANCEL**

- i. Our requirement part or full at any stage of the tender finalization (or) even after finalization of tender. PO can be short close or mutually extended at any point depending upon order BHEL book position and BHEL shop loading capacity etc.
- ii. Or forfeit the chance in tender, if any vendor(s) found to be “unsatisfactory” during our assessment processes/noncompliance of statutory requirements etc. as required for “vendor registration” during/after the processes of finalization of contract.
- iii. The order(s), if any vendor (s) found to be “unsatisfactory” during our periodical assessment processes / review of assessment processes/ noncompliance of statutory requirements etc. as required for “vendor registration” during the execution of order(s).
- iv. Divert order(s) allocation quantity, in case of non-submission/ delay in submission/delay in lifting the material/delay in completing the work/delay in supply or failure to meet order delivery schedule / in-sufficient amount of bank guarantee/non-execution of orders by vendor(s) as per BHEL rules/current practice .
- v. In case L-1 supplier or any supplier after finalization of rate contract is not maintaining supply within stipulated contractual delivery, the balance quantity will be distributed in order of merit.
- vi. The contract or forfeit the chance in tender, if any vendor (s) disposed off units/found to be sick/ running under unrest/ declared insolvency /nonrenewal lease deed during/ after finalization process/ during the validity of the contract without assigning any reasons thereafter.
- vii. The offers of the vendor who are in banned list and offers of those firm who engaged with the services of banned firm the offers shall be summarily rejected. If the vendor is found in banned list of BHEL at later stage the PO shall be cancelled. The list of all banned firm is available in BHEL internet site at www.bhel.com.
- viii. Any deviation to any points of this annexure or enquiry should be clearly mentioned in offer. Otherwise, it will be presumed that supplier agrees to these conditions.
Any deviation to BHEL NIT conditions and BHEL std practice will be suitably loaded as per BHEL current loading factors to arrive at total cost to BHEL to decide Total Landed cost to BHEL to arrive at L-1 status

- 14) Apart from the above, general terms & conditions of indigenous enquiry and purchase order issued by material management department vide BP -200102, MM 5527 respectively will also be applicable (already available with the suppliers and hosted in B-2-B site <http://www.bhelbpl.co.in/mm/>).

15) Acceptance of all the above Enquiry terms & conditions & annexures are required in your offer. The same is to be signed by the vendors and submitted along with Part-1 offer. Offers/Bids/Quotations may be rejected without submission of same. Deviation to be clearly mentioned in your offer else we assume that you have accepted all terms of BHEL. In case of e procurement enquiries as tender is submitted by verified DSC of vendor hence it will be presumed that all terms and conditions of tender and annexures are accepted in TOTO unless if any deviation is submitted or written in your online quotations .

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DECLARATION BY VENDOR

We declare that following family firms or sister concern affiliates/subsidiary firms are participating in tender No. E _____

1 M/s _____

2 M/s _____

3 M/s _____

I _____, hereby declare on behalf of M/s _____ and the family firms or sister concern affiliates /subsidiary firms listed above that we are not indulging in cartel information for Enquiry No. E.....

(_____)

For M/s... _____

(Sign & Seal)

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Annexure II

Instructions/Checklist for Vendors for BG :

- 1) Bank Guarantee / BG Extension shall be made strictly as per BHEL's Standard format as available on B2B site.
- 2) Validity date must be explicitly mentioned in the BG. There should be adequate gap, preferably minimum 3-6 months between Validity date and Claim date.
- 3) Claim Date must be mentioned in the BG.
- 4) **Confirmation:** As per Corporate and RBI guideline confirmation is required in respect of each BG. Confirmation may be provided by the same issuing branch by the officials higher in rank or from the office mentioned in the BG for confirmation. Thus Vendors must ensure that BG bears the Confirmation office address explicitly.
- 5) **Stamps:** Stamps must be purchased from registered stamp vendor. Stamp purchase date must be old than the date of the execution of the Bank Guarantee. E stamp is also allowed. Stamp must be purchased for BG purposes only. Place of execution of BG and purchase of stamp shall be in the same State.
- 6) Value of stamp must be as per Stamp act prevailing in the state where the BG is submitted or the state where the BG executed, whichever is higher.
- 7) **Bank Seal and sign of Bank Employee:** BG must be signed and sealed on every page of the BG. Employee Name and Code must be present in the BG at the end of the BGs text. Every BG having value more than 50,000/- must be signed by two authorized signatories of the bank.
- 8) Place of Invocation must mention on BG.
- 9) BGs should not be from the co-operative banks
- 10) BGs can be issued through consortium banks only.
- 11) Vendors must provide the BG from banks which are already SFMS Compliant. If vendors banks are not SFMS Compliant, a declaration from bank is required.
- 12) Email ID, phone no, Fax No of bank must mention on BG.
- 13) Extension/Amendment of BG is required on Rs. 1000/- Stamp Paper.
- 14) Bank Guarantee for Advance Payment – The BG shall be for 110% of the value of advance.
- 15) Cutting / overwriting on the BG shall be properly authenticated under signature and seal of the executing Bank.
- 16) Latest Solvency certificate: Latest Solvency Certificate in original, with Bank Seal and sign of Bank Employee, in BHEL's standard format shall be enclosed with Sub Contracting BG.
- 17) BG documents wherein corrections have been marked may also be enclosed with final corrected BG, where original BG document is being replaced.
- 18) Digital signed secured email confirmation required from BG issuing bank.

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Annexure III

UNDERTAKING FOR FREE ISSUE MATERIALS

M/s Bharat Heavy Electricals Limited
Piplani, Bhopal -462022 (M P)

Whereas M/s Bharat Heavy Electrical Limited (hereinafter referred to as 'The Customer' which expression shall unless repugnant to the context includes their legal representatives, successors and assigns having their office at Piplani, Bhopal 462 022, MP has entered in to a contract with M/s. _____ (hereinafter referred to as 'The Contractor' which expression shall unless repugnant to the context includes their legal representatives, successors and assigns for supply for free issue material on the terms and conditions as set out inter-alia, in the above said Purchase order/various purchase orders and various documents forming part there of hereinafter collectively referred to as the 'Said Contract' which expression shall include all amendments, modifications and / or variation thereto. This will also include other future fabrication and machining orders placed by BHEL during below mentioned period.

AND WHEREAS the customer has agreed to supply to the contractor major portion of raw materials / components etc. for the purpose of execution of the said contract by the contractor (the raw materials/ components etc.) to be supplied by the customer to the contractor hereinafter for the sake of brevity referred to as the "Said Materials" shall be under the custody and charge of the contractor and shall be kept, stored, altered, worked upon, machined/fabricated at the sole risk and expense of the Contractor.

Now Therefore in consideration of the pre-condition to the supply of the said materials by the Customer to the contractor, the Contractor hereby irrevocably and unconditionally undertake to compensate and keep compensated the customer from and against all loss, damage and destruction (inclusive but not limited) to any or all loss or damage and destruction to or of the said materials or any item or part thereof by theft, pilferage, fire, flood, storm, tempest, lightning, explosion storage, chemical or physical action or reaction, bending, warping, exposure, resting, faulty workmanship, fabrication or faulty method or technique of fabrication, strike, riot, civil connection or other act or omission or commission whatsoever within or beyond the control of the Contractor, misuse and misappropriation (Inclusive but not limit to misuse or misappropriation by the contractor and the contractor's servant and or agents) Whatsoever to or of in the said materials or any part of item thereof from the date that the same or relative part of item thereof was supplied to the Contractor up to until the date of return to the Purchaser of the said material or relative part of item thereof or completed construction works incorporating the said material and undertake to pay to the customer forthwith on demand in writing without protest or demur the value as specified by the Customer of the said material or item or part thereof lost , damaged, destroyed, misused and / or misappropriated, as the case may be , together with the Customers costs and expenses (inclusive of but not limited to handling, transportation, cartage, insurance freight, packing and inspection costs/ or expenses) upto and aggregate limit of Rs. _____/- (Rupees _____ only) and/or additional value of material, if supplied to contractor.

1. The Undertaking shall be a continuing/ Undertaking and shall remain valid and irrevocable for all claims of the purchaser arising hereunder upto and until the midnight of _____. However, if the Contract for which this Undertaking is given is not completed by this date Contractor hereby agrees to extend the Undertaking till such time as is required to fulfil the Contract.
2. This Undertaking shall not be determined on change of constitution or insolvency of the Contractor but shall be in all respects and for all purpose be binding and operative until payment of all moneys payable to the Customer in terms hereof.
3. The mere statement or allegation made by or on behalf of the customer in any notice or demand or other writing addressed to the contractor as to any of the said material or item or part thereof having been lost, damaged, destroyed, misused or misappropriated while in the custody of the contractor and / or prior to completion of the completed fabrication/ machining works and handing over the completed job thereof incorporating the said materials shall be conclusive of the factor of the said material or item or part thereof having been supplied to the Contractor and / or the loss, damage, destruction, misuse or misappropriation thereof, as the case may be , while in the custody of the Contractor and / or prior to the completion of the fabrication/ machining/processing works and handing over the completed job thereof incorporating the said materials without necessity on the part of the customer to produce any documentary proof or other evidence whatsoever in support of this.
4. The amount stated in any notice of demand addressed by the customer to the Contractor as to the value of such said materials lost, damage, destroyed, misused or misappropriated, inclusive relative to the costs and expenses incurred by the Customer in connection therewith shall be conclusive of the Value of such said materials and the said cost and expenses as also of the amount liable to be paid to the customer without producing any voucher, bill or other documentation or evidence whatsoever in support thereof.

The undersigned has full power to execute this undertaking on behalf of the Contractor under the capacity as Chairman & Managing Director/ owner/partner of the Company.

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Place : _____ For (Company Name): _____

Date : _____ Authorized Signature : _____

(Name, Sign & Seal of Company: _____)

Witnesses :-

1. Signarture : _____
Name : _____
Address : _____

2. Signarture : _____
Name : _____
Address : _____



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Sl.No.	Description
1	General:
1.1	<p>These General terms & conditions (GTC) shall apply to all enquiries, notice inviting tenders, request for quotations concerning the supply of goods and / or rendering of services to Bharat Heavy Electricals Ltd., Bhopal (hereinafter referred to as BHEL or the Purchaser) or its Projects / Customers. Special / supplementary enquiry conditions, if any, will override the conditions in this annexure. In case of placement of order these conditions will become part of Purchase Order (P.O) until unless the deviations are specifically agreed by BHEL.</p> <p>In case of any inconsistency, conflicts or contradiction among any of the contract documents, the interpretations will be based on the following order of precedence:</p> <ol style="list-style-type: none"> Amendments to Purchase Order/ Framework Agreement Purchase Order/ Framework Agreement Letter of intent (LOI)/ Letter of Award (LOA) Minutes of meeting or Clarifications agreed between Buyer and Seller as regards to the tender or the bidding conditions Corrigenda to NIT, with those of later date having precedence over those of earlier date Original NIT and annexures except documents listed in point no (vii) to (ix) below Technical specifications including their annexures Special Terms and condition of Enquiry (STC) General Terms of Enquiry (GTC)
2	General Instructions - Common for Indigenous & Foreign enquiries
2.1	<p>Through eProcurement</p> <ol style="list-style-type: none"> Interested bidders / suppliers shall submit their offer through e-procurement mode at https://eprocurebhel.co.in/nicgep/app Offers in any other mode will not be accepted. Procedure for submission of tender is available in the "Bidder Manual Kit" at e-tender portal https://eprocurebhel.co.in/. In case of any difficulty faced while registering on BHEL's e-Procurement portal developed by NIC, queries may be addressed to 0120-4001002, 0120-4001005 and 0120-4493395 email: support- eproc@nic.in. These details are also available on Contact Us page of the portal. Before uploading scanned documents if any, the bidders shall sign on all the statements, documents, certificates etc uploaded by him, owning responsibility for their correctness / authenticity. Disclaimer clause: Neither the Organization (Bharat Heavy Electricals Ltd.) nor the service provider is responsible for any failure of submission of bids due to failure of internet or other connectivity problems or reasons thereof.
2.2	Through tender room (Conventional tender)
2.2.1	<p>Sealed bids are invited for scope of Supply / Services as detailed in the enquiry.</p> <p>Bid should be free from correction, overwriting, using of corrective fluid etc. Any interlineation, cutting, overwriting shall be valid only if they are attested under full signature(s) of persons signing the bid else shall be liable for rejection.</p> <p>All overwriting/ cutting etc. will be numbered by bid opening officials and announced during bid opening.</p> <p>The bid should be submitted in English or Hindi language. Relevant enclosures, supporting documents, catalogue, samples, if any, as required as per Notice Inviting Tender (NIT) conditions shall be sent along with technical offer. Rate should be quoted in the units asked for in the enquiry.</p>
2.2.2	<p>Bids shall be submitted in a Sealed cover with Enquiry No., Due date and Bidder's name indicated on the cover.</p> <p>In case of Two Part Bid, technical bid containing technical offer, this GTC duly filled-in & signed; and un-priced copy of the Price Bid should be kept in one envelope. Price Bid containing only the price (as called for in the price format where required) should be kept in a separate envelope. Both envelopes indicating Part —I or Part-II as the case may be to be put in a bigger envelope, which should be addressed to in charge, Tender Room, Bharat Heavy Electricals Ltd. 2nd Floor, Jawahar Bhavan, Piplani, Bhopal 462022. Enquiry No., due date and bidder's name must be mentioned on all envelopes. Offer must reach tender room of BHEL Bhopal latest by 11.00 am IST on the enquiry due date.</p> <p>Bids submitted as single part bid against two – part bid, shall be rejected unless the offer is techno-commercially acceptable without seeking any clarification.</p>
2.2.3	<p>Offer received after 11.00 AM IST of the due date will be termed as "Late" and shall not be considered. However, late offer received against single tender enquiry may be considered.</p>
2.2.4	<p>Bidder can also submit offer through email id mmtender.bpl@bhel.in or if called for in the enquiry, at the designated /authorized email address indicated in the enquiry. Such email offers shall be sent only on designated email-id to reach before 11.00 am IST on the tender due date. BHEL will not be responsible for incomplete offers and the ones delivered late through e-mail. Bidder shall have no claim on e-mail offers sent to any other e-mail ID. In case of e-mail offers, the</p>



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	mail subject should contain Enquiry Number, Due date and Bidder name. Bidder address including contact details shall be mentioned in the content of the mail. Without these details, the offer is liable for rejection. All techno commercial terms & conditions mutually agreed prior to price bid opening shall prevail and supersede any terms and conditions specified otherwise in price bid.
2.3	Through tender room or EProcurement
2.3.1	Commercial Conditions quoted by the bidder in any place including as stated in bidder's 'General Terms and Conditions' if any, shall not be binding on the Purchaser and the conditions contained in this annexure, including special conditions, if any, for this enquiry shall only prevail.
2.3.2	Rate should be quoted in the units asked for in the enquiry. The rates should be quoted both in figures and words. In case of discrepancy in figures and words, the rates quoted in words shall be considered.
2.3.3	The goods offered shall conform to BHEL specifications and / or National/International standards as mentioned in the Enquiry and the bidder is required to confirm his unconditional acceptance to the same. Bidders, seeking deviations from the specifications and any other conditions, may indicate the same clearly on a separate sheet indicating Sl. No. of the item, with reasons for such deviations. BHEL reserves the right to reject the offer with deviations or load the deviations suitably for evaluation.
2.3.4	Offers shall be submitted directly by bidder or his authorized agent only. Unsolicited offers shall be summarily rejected.
2.3.5	Bid in single part or techno-commercial bid in two-part system (as the case may be) will be opened on the due date. In case of two part bid, price bids of techno-commercially accepted bidder(s) only shall be opened on the assigned date, for which separate intimation will be sent to the accepted bidders.
2.3.6	<p>Whenever specified /called in special /additional /tender specific remakes of tender the Bid Security/ Earnest Money Deposit (EMD)] is to be submitted by bidders along with their bids (except Micro and Small Enterprises (MSEs) or Startups as recognized by Department for Promotion of Industry and Internal Trade (DPIIT)).</p> <p><u>Modes of deposit</u></p> <p>a) The EMD may be accepted only in the following forms:</p> <p>(i) Electronic Fund Transfer credited in BHEL account (before tender opening).</p> <p>(ii) Banker's cheque/ Pay order/ Demand draft, in favour of BHEL (along with offer).</p> <p>(iii) Fixed Deposit Receipt (FDR).</p> <p>(iv) Bank Guarantee from any of the Scheduled Banks.</p> <p>(v) Insurance Surety Bonds.</p> <p>b) In case the EMD is more than Rupees Two lakh and in case of foreign bidders, it may be in the form of a bank guarantee (in equivalent Foreign Exchange amount, in case of foreign bidders) issued/ confirmed from any of the scheduled commercial bank in India in an acceptable form. The EMD shall remain valid for a period of 45 (forty-five) days beyond the final bid validity period.</p> <p><u>Forfeiture of EMD</u></p> <p>(i) A bidder's EMD will be forfeited if the bidder withdraws or amends its/ his tender or impairs or derogates from the tender in any respect within the period of validity of the tender or if the successful bidder fails to furnish the required performance security within the specified period mentioned in the Tender.</p> <p>(ii) EMD by the tenderer to be withheld in case any action on the bidder is envisaged under the provisions of extant "Guidelines on Suspension of business dealings with suppliers/ contractors" and forfeited/ released based on the action as determined under these guidelines.</p> <p><u>Others Instructions</u></p> <p>(i) Bid securities of the unsuccessful bidders should be returned to them at the earliest after expiry of the final bid validity period and latest by the 30th day after the award of the contract. However, in case of two packet or two stage bidding, Bid securities of unsuccessful bidders during first stage i.e. technical evaluation etc. will be returned within 30 days of declaration of result of first stage i.e. technical evaluation etc.</p> <p>(ii) Bid security will be refunded to the successful bidder on conclusion of the order/ receipt of a performance security (if called in the tender).</p> <p>(iii) EMD shall not carry any interest.</p>
2.3.7	<p>1.Any discount / revised offer submitted by a bidder on its own shall be considered, provided it is received on or before the due date and time of offer submission (Part-I). Conditional discounts shall not be considered for evaluation of tenders.</p> <p>2.Unsolicited discounts / revised offers given after Part-I bid opening shall not be accepted. No change in price will be permitted within the validity period of offer.</p> <p>3.In case of changes in scope and / or technical specification and / or commercial terms & conditions, having price implication, techno-commercially acceptable bidders shall be asked by BHEL to submit the impact of such changes on</p>



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	their price bids. In case a bidder opts to submit revised price bid instead of impact called for, then latest price bid shall prevail. However in both situations, original price bid will be necessarily opened.
2.3.8	The bidders will submit Integrity Pact, duly signed by its authorized signatory, where called for in the enquiry.
2.3.9	Unregistered suppliers, who are techno-commercially qualified against the open tender, are requested to register with BHEL-Bhopal as permanent supplier by submitting the Supplier Registration Form (SRF) in online supplier registration portal (https://supplier.bhel.in/). Un-registered vendors may be approved by BHEL, if found suitable, on the basis of data furnished by them in Supplier Registration Form (SRF) for Foreign Vendors or Indigenous Vendors (as applicable)
2.3.10	BHEL expects that the bidder responds to the enquiry. Regret letter, with valid reasons for not participating in the tender will be submitted where the bidder is unable to submit offer. Repeated lack of response on the part of bidder may lead to his deletion from BHEL's approved bidder list. Refer guidelines for suspension of Business Dealings with Suppliers/Contractors available on https://www.bhel.com/sites/default/files/suspension_guidelines_abridged.pdf
2.3.11	In case of open tenders (i.e. those published in website) all corrigenda, addenda, amendments, time extensions, clarifications etc. to the tender will be hosted on BHEL website. (https://bhel.com/tenders) and additional in https://eprocurebhel.co.in/nicgep/app for e-procurement tenders. Bidders responding to these tender should regularly visit website(s) to keep themselves updated.
2.3.12	In the course of evaluation, if more than one bidder happens to occupy L-1 status effective L-1 will be decided by soliciting discounts from the respective L-1 bidders in sealed envelope and will be open in tender room. In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/ draw of lots, in presence of the respective L-1 bidders or their representatives. Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.
2.3.13	The Purchaser can consider awarding tendered quantities among more than one bidder (after acceptance of L1 price by the other bidders) in the manner and proportion disclosed in the tender conditions. Purchaser can also consider awarding of part of the tendered quantity to other than L-1 bidder at L1 counter offered rates, if the quantity offered by the L-1 bidder is less than the quantity tendered for.
2.3.14	The bidder shall submit price bid strictly in the price format, wherever provided for, in the enquiry. Any attempt on the part of the bidder to alter the contents of the price bid format in any manner, which in the opinion of BHEL can vitiate the tendering process, will lead to rejection of the bid, <u>besides BHEL taking appropriate punitive action as deemed fit.</u> Refer Guidelines for suspension of Business Dealings with Suppliers/Contractors available on https://www.bhel.com/sites/default/files/suspension_guidelines_abridged.pdf
2.4	BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com). If tender specific conditions call for reverse auction, RA shall be conducted among the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking
2.5	BHEL reserves the right to negotiate with L1 vendor or re-float the tender for items. BHEL reserves the right to decrease the tender quantity in case where negotiation is being held.
3	Delivery Terms
3.1	Indigenous Purchase
3.1.1	Goods shall be delivered on 'FOR Destination' basis to the named destination unless otherwise called for in the enquiry.
3.2	Foreign Purchase — Imports
3.2.1	<ol style="list-style-type: none"> 1. Goods shall be despatched by Sea, unless stated otherwise in the enquiry or purchase order. 2. Terms of Delivery for Sea shipment shall be on CFR / CIF basis with 14 days' detention free period preferably at Nhava Sheva (JNPT-INNSA1) for FCL (Full Container Load) Cargo of GP & HC Containers. 3. For other cases - Other than GP & HC Containers, LCL Cargo shall be delivered at Nhava Sheva (JNPT- INNSA1) & Break-bulk Cargo at Mumbai (MPT - INBOM1). 4. For Air consignments, the terms of delivery shall be FCA at BHEL nominated Airport. In case of CIP, delivery shall be at Mumbai ACC (INBOM4). 5. Freight amount shall be indicated separately in the offer in case of CIP/CFR/CIF. 6. The number of detention free days and destination charges payable to shipping line must be mentioned in your offer and also on the Bill of Lading. 7. Offer received on FOB basis may be considered on an exceptional basis. BHEL will load freight, marine insurance & shipping line port handling charges etc. to work out landed cost at Sea Port. 8. Please visit BHEL Bhopal website https://bpl.bhel.com or refer special terms and conditions of tender enquiry for details of named Air ports and Sea ports. Name of the gateway port so chosen by the bidder shall be indicated by the Bidder in his offer.



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	<p>9a In case of CIP/CFR/CIF, the shipping line should be ready to move the containers to consignee's nominated CFS (Container Freight Station) yard and Indian agent of shipping line should issue Cargo Arrival Notice (CAN) 7 days in advance.</p> <p>9b In case of CFR contract, bidder to supply the material through a Certified Sea worthy vessel age not more than 15 years.</p> <p>9c The invoices being issued by shipping lines must be in the name of BHEL. Otherwise, BHEL will recover loss of Input Credit on GST from the vendor.</p> <p>9d While booking the shipment, bidder to also finalize destination charges and the same should appear over BL or agreed tariff to be provided to BHEL before arrival of shipment. If cargo is stuffed in container, then the same should be allowed to be moved to CFS of importer's choice without any additional charges.</p> <p>9e Load port charges shall be settled by the supplier and not be passed on to BHEL in any form of destination charges.</p> <p>10. For reasons of delay in receipt of documents from suppliers or due to the same being found to be incomplete, and or faulty, the suppliers shall be responsible to reimburse all penalties, detention and demurrages / wharfages, if any paid by BHEL (for stated reasons).</p>
3.2.2	<p>1. For delivery of FCL (Full Container Load) cargo, the Bidder shall provide minimum 14 days' detention free period from the date of delivery at Port of Discharge / Place of Delivery (in case of ICD). Wherever the detention free period offered is less than 14 days, the bids shall be loaded for the period short of 14 days' period.</p> <p>2. <u>Port Congestion charges or any additional charges claimed by the shipping line at Port of Discharge / Place of Delivery shall be to the Bidder's account.</u></p>
4	Bidder's particulars & logistics information (Bidder to give details against each of the provisions)
4.1	Name of the bidder's executive to deal with this tender / project
4.2	E-mail address of the contact person
4.3	Telephone no. of the contact person
4.4	Name of location from where the goods shall be offered for inspection and dispatch
5	Additional logistics information for Imports
5.1	Bid currency
5.2	Charges applicable at discharge port up to BHEL's CFS (Container Freight Station) to be indicated in your offer and on the B/L
5.3	Name of Airport in the country of dispatch for FCA delivery terms
5.4	Estimated number, type & size of containers for delivery of tendered quantity (applicable where the goods are to be sent in FCL)
5.5	No. of packages with cumulative gross weight and CBM volume (applicable for LCL & Break-bulk shipment)
5.6	Approx. distance in km. from Bidder's works to Port of Loading
6	Delivery Schedule & Completion date
6.1	<p>i. Instead of writing specific date against delivery offered, bidder shall commit delivery period in number of days / weeks/ months to suit the delivery period indicated in the enquiry.</p> <p>ii. Commencement of delivery period shall be reckoned from the date of PO / LOI or any other agreed milestone.</p> <p>iii. Bidder shall deliver the goods in the manner and schedule agreed under the Purchase order.</p> <p>iv. Goods shall be delivered within contractual period or any extension thereof, if any, granted by the Purchaser.</p> <p>v. If delivery is linked to approval of documents, time for submission of such documents to be indicated and delivery period to be indicated from approval of documents. This delivery schedule will be considered for processing delivery extension, wherever applicable.</p> <p>vi. BHEL reserves the right to cancel the order if material is not delivered within PO scheduled delivery.</p> <p>vii. Suitable action against defaulting vendor will be taken as per Guidelines for suspension of Business Dealings with Suppliers/Contractors available on https://bhel.com/guidelines-suspension-business-dealings-supplierscontractors</p>
6.2	<p>In case of foreign supplies, the date of Bill of Lading (B/L) or AWB shall be taken as actual date of delivery where freight until discharge port in India is in Seller's scope like CFR/CIF/CIP delivery terms.</p> <p>For Ex-works/FCA/FOB or any other delivery term where freight is in buyer's scope, date of material readiness /Test certificate/ Warehouse receipt/Freight forwarder receipt may be considered as actual date of delivery (mutually agreed).</p>



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6.3	In case of Indigenous bidders, the date of delivery at named destination in India shall be taken as contractual delivery completion date where delivery terms are FOR destination. In case of 'Ex-works' delivery terms, the date of LR / RR shall be the contractual delivery completion date.
7	Transit Insurance
7.1	Except where delivery terms are agreed on CIF basis for Imports & FOR destination basis for indigenous purchases, transit insurance will be covered by BHEL under its Open Marine Transit Insurance Policy. Bidder shall inform dispatch particulars with value of consignment to the Purchaser within 07 days of dispatch for BHEL to arrange insurance coverage in its policy. Failure on the part of bidder to inform dispatch particulars will make him liable to pay for any transit damages / losses suffered by the Purchaser.
8	Force Majeure
8.1	Notwithstanding anything contained in the contract, neither the Bidder nor the Purchaser shall be held responsible for total or partial non-execution of any of the contractual obligations, should the obligation become unreasonably onerous or impossible due to occurrence of a 'Force Majeure' which directly affects the obligations to be performed by the Purchaser or the Bidder; Such events include war, military operations of any nature, blockages, revolutions, insurrections, riots, civil commotions, insurgency, sabotage, acts of public enemy, fires, explosion, epidemics, quarantine restrictions, floods, earthquake, or acts of God, restrictions by Govt. authorities; over which the Bidder or the Purchaser has no control. The party claiming to be affected by force majeure shall notify the other party in writing without delay, within two weeks on the intervention and on the cessation of such circumstance. Extension of time sought by the Bidder along with supporting evidence and so granted by the Purchaser for the supply/ work affected, if any, shall not be construed as waiver in respect of remaining deliveries. Rescheduling of deliveries on account of force majeure conditions, if so agreed by the Purchaser, will not entail the Bidder to claim any increase in the price on whatsoever account. Notwithstanding above provisions, Purchaser shall reserve the right to cancel the order/ Contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements. If deemed necessary, Purchaser may takeover partly processed material at a mutually agreed price.
9	Penalty for Late Delivery
9.1.1	Unless covered under Force Majeure conditions aforesaid, Penalty for late delivery shall be 0.5% of the undelivered portion per week of delay or part thereof, subject to a maximum of 10% of the undelivered order value owing to delayed delivery . Total undelivered order value above shall be item wise, lot wise order value of PO . Any deviation from above, which is based on specific requirement/LD clause, shall be specified in particular tender /Special terms and condition(STC) /Additional terms and conditions(ATC) and same shall have overriding effect on anything mentioned in instant GTC. Imposition, recovery or settlement of this penalty shall not adversely affect BHEL's right to performance, compensation and termination of the order.
9.1.2	However, in case of Capital Machine / BOP (Balance of plant) where staggered deliveries may be applicable, the penalty will be levied on total order value. Any deviation based on specific requirement shall be specified separately in the NIT/STC/ATC. In case of Capital items /Balance of plant (BOP) item where services of installation /erecting & commissioning /supervision is desired with supply (Milestone delivery terms) , the LD clause will be separately mentioned in particular tender /Special terms and condition(STC) /Additional terms and conditions(ATC)
9.1.3	In case of any amendment / revision, the penalty shall be linked to the amended / revised PO.
9.1.4	Any loading on penalty clause shall be to the extent to which it is not agreed to by the bidder (at offered value)
9.2	In case the contractually agreed delivery date falls on a holiday in BHEL Bhopal, the next working day shall be taken as contractual delivery date for compliance and applicability of LD / penalty.
9.3	In case of any recovery for delayed performance, the applicable GST shall also be recoverable from bidders.
10	Indian Agents and Agency commission
10.1	BHEL prefers to deal directly with Foreign bidder, wherever required, for procurement of Goods. However if the Foreign Principal desires to avail services of an Indian Agent, then the Principal should ensure compliance to "regulatory guidelines" which will require submission of an agency agreement.
10.2	The CFR / CIF price quoted will be deemed to be inclusive of Indian Agency commission. Agency commission as disclosed by the bidder in his quoted CFR / CIF price will be paid in Indian Rupees on receipt & acceptance of Materials or it's installation at destination, as the case may be. The lower of the 'TT buying rate prevailing on the date of technical bid opening or price bid opening shall be considered for computation of Agency commission.



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10.3	In a tender either the Indian Agent on behalf of Principal / OEM or the Principal / OEM itself can bid, but both cannot bid simultaneously for same item / product in the same Tender. In case bids are received from both the Principal / OEM and the agent, bid received from the agent will be ignored.		
10.4	If an agent submits Bid on behalf of the Principal / OEM, the same agent shall not submit bid on behalf of another Principal / OEM in the Tender, for the same Item / Product.		
11	Documentation:		
11.1	Indigenous Purchase		
	<p>Bidder shall arrange to send to the consignee following documents immediately on despatch of the goods. Documents can also be uploaded at Incoming Material Document Management System (IMDMS) available at BHEL Bhopal B-2-B site of BHEL Bhopal internet page at https://bpl.bhel.com/mm/. Online submission of Invoices /e-invoices for payment can also be done in IMDMS system.</p> <ol style="list-style-type: none"> 1) Original Tax invoice in triplicate (Buyer's copy and duplicate for Transporter), 2) Consignee copy of LR & 2 sets each of Packing list, 3) Test certificate, Guarantee / Warranty certificate, 4) O & M manuals (where applicable) 5) In case of labour / mixed basis jobs, material is issued free of cost. Necessary material reconciliation is to be done and Free Issue Material Statement (FIMS) is to be submitted with each bill. 6) Pre-dispatch Inspection report /Third Party Inspection Certificates/MDCC certificate 7) Any other documents as specified in Enquiry /PO /STC/ATC of enquiry /annexure <p>The distribution of such documents will be specified in the Purchase order Terms and Conditions (BP 205315 for indigenous and BP205316 for Imported Purchases))</p>		
11.2	Foreign Purchase — Imports		
	<p>Seller shall send 1 set of following documents, in English, within 7 days of B/L date / 1 day of AWB date by courier to the Purchaser</p> <ol style="list-style-type: none"> 1. Express / Original 'Clean on board' Bill of Lading / AWB. 2. One set of Commercial Invoice, Packing list indicating container-wise Gross weight, Net weight, CBM volume, No. of packages with Dimensions of each package. 3. Original Certificate of Country of Origin (COO) issued by Chamber of Commerce. COO shall be as per requisite format where duty concession is available under Preferential Trade/Comprehensive Economic Partnership/Free Trade agreement. Customs tariff heading (CTH)/ Harmonized System of Nomenclature (HSN) code of material should be mentioned on invoice and COO in all such cases. 4. One set of Original Test Certificates and O&M Manual where called for. 5. Fumigation / Phyto-Sanitary Certificate wherever cargo is packed in wooden packing or packing of plant origin material is used. 6. Supplier should additionally forward 2 sets of original documents mentioned at point nos. 1 to 5 above along with Original Bill of Lading (OBL) or AWB through any international courier service/registered airmail within three (3) days of obtaining the same directly to the following: <table border="1"> <tr> <td> AGM (M.S) Regional Operations Division BHEL 14th Floor Centre-1 World Trade Centre, Cuffe Parade Mumbai 400 005 INDIA Email: msseabpl@bhel.in (In case of Sea freight) msair@bhel.in (In case of Air freight) </td> <td> DGM (FIN- FP) 4th Floor, Administrative Bldg. BHEL Bhopal - 462022 (India) E-mail : fin_fp.bpl@bhel.in </td> </tr> </table> <p>And confirm forwarding details to AGM (CMM- FE), BHEL Bhopal at mmfe.bpl@bhel.in</p> <ol style="list-style-type: none"> 7. In case the Seller decides to negotiate all 3 originals of B/L / AWB along with all original documents through negotiating Bank, non-negotiable documents (NNDs) consisting of copy of B/L / AWB & documents mentioned at Sl. no. 11- B2 to B5 will be sent by e-mail to the Purchaser at his e-mail address given in the PO with one copy to be mailed at mmfe.bpl@bhel.in as well as at msseabpl@bhel.in (for Sea shipment) or msair@bhel.in (for Air shipment). Other documents, as required, will be separately indicated in the Purchase Order. Additional expenditure, if any, incurred by the Purchaser by way of detention / demurrage, resulting out of delay attributable to the Seller in providing Negotiable documents, will be recovered from the Seller. <p>In case any discrepancy is raised by the Bankers / BHEL with respect to the documents submitted, vendor to facilitate clearance of goods through Delivery Order.</p> <p>Additionally, following requirements to be taken care of by the bidder during PO execution stage:</p> <ol style="list-style-type: none"> i) IEC (0588138690), GSTIN (23AAACB41461ZN) and email ID (mmfe.bpl@bhel.in) of BHEL Bhopal shall be clearly 	AGM (M.S) Regional Operations Division BHEL 14 th Floor Centre-1 World Trade Centre, Cuffe Parade Mumbai 400 005 INDIA Email: msseabpl@bhel.in (In case of Sea freight) msair@bhel.in (In case of Air freight)	DGM (FIN- FP) 4 th Floor, Administrative Bldg. BHEL Bhopal - 462022 (India) E-mail : fin_fp.bpl@bhel.in
AGM (M.S) Regional Operations Division BHEL 14 th Floor Centre-1 World Trade Centre, Cuffe Parade Mumbai 400 005 INDIA Email: msseabpl@bhel.in (In case of Sea freight) msair@bhel.in (In case of Air freight)	DGM (FIN- FP) 4 th Floor, Administrative Bldg. BHEL Bhopal - 462022 (India) E-mail : fin_fp.bpl@bhel.in		



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	<p>mentioned on B/L or AWB.</p> <p>ii) As per Uniform Customs Practice (UCP 600) for documentary credits (L/C), presentation period allowed is maximum 21 days after the date of shipment. However, for geographically closer ports where sea voyage time is less than 3-4 weeks, a shorter presentation period shall be agreed upon.</p> <p>iii) In case of CAD payment terms, Supplier shall send documents to BHEL's bank within 5 days of shipment. One set of original may be sent to any one of ROD, CMM-FE and MM, copy may be marked to the others.</p> <p>iv) For Air shipments through non-CONSOL (i.e., not through BHEL ROD's contract), Delivery Order (DO) should be given to BHEL without insisting for Bank Release Order (BRO). AWB to be drawn with BHEL Bhopal as consignee.</p> <p>v) It must be ensured that original shipping/commercial documents, if not provided to BHEL outside banking channel, should reach BHEL's bank at least 10 days prior to cargo arrival at port.</p> <p>vi) Part shipment and trans-shipment to be avoided to the extent possible especially where it is not possible to split shipping & commercial documents. Part shipment shall be strictly avoided for Airshipments.</p>
11.3	General
	<ol style="list-style-type: none"> For Hazardous chemicals, the materials safety data sheet (MSDS) is to be submitted. All certificates as called must be sent. BHEL may test any goods supplied and their decision is final irrespective of supplier's certificates. If test certificate and guarantee certificate are not received along with the document and stipulated in these specifications, BHEL reserves the right to get the material tested and recover the expenses from the supplier without awaiting supplier's confirmation Goods shall be properly packed to avoid transit damage. Suitable markings shall be provided to identify the goods with that of the PO No. and the consignee details. Goods shall be consigned to AGM (CRX), BHEL, Piplani, Bhopal - 462022, India, unless otherwise specified in the PO.
12	Pricing Terms
12.1	Prices once quoted shall remain firm within the validity or any extension thereof for placement of order, till complete execution of the order, without any escalation/increase for any reason, whatsoever, unless specifically provided for in the Enquiry & PO. In case of foreign bidders, the quoted price shall be taken as inclusive of Third Party Inspection and testing charges as called for in the NIT.
13	Price Validity :
13.1	Unless stated otherwise in the enquiry, offer shall be valid for a period of 90 days from the date of Techno- commercial (Part-I) bid opening date.
14	Taxes & Duties - Indigenous Purchase
14.1	Bidder to ensure timely remittance of SGST, CGST, IGST as applicable in time as per law.
14.2	Bidder to ensure compliance to filing of monthly GST sales return including BHELs supplies by 10 th of next calendar month in the online GST portal wherever applicable.
14.3	Bidders to declare filing of timely returns and GST remittance/likely remittance /ITC adjustment along with invoice.
14.4	Bidder to submit invoices compliant with GST invoice Rules
14.5	Bidders to comply with all statutory provisions as may be applicable at the time of despatch/sale. Any additional financial liability to BHEL on account of non-compliance by bidders shall be borne by them and shall be adjusted / recovered from the bidders. BHEL reserves the right to review the existing offers / contracts for any revision in terms, which may arise due to change in any statutory provisions to ensure that the benefit accrues to BHEL.
14.6	Bidder to ensure TAX INVOICE submission along with consignment
14.7	In respect of cases where the liability to discharge GST is on BHEL under reverse charge mechanism, bidders have to ensure timely submission of invoices and delivery of material / services to BHEL, so that there is no mismatch on both activities. In case there is any additional financial liability on BHEL on account of default on the part of the bidder on submission or delivery of material / services the same shall be passed on to them.
14.8	Vendors who fall under the E-Invoice regulations shall issue e-invoice in line with Rule 48(4) of CGST Rules read along with latest extant rules, failing which GST amount will not be reimbursed to the vendor.
14.9	In respect of free issue material by BHEL, bidders have to return the processed material within the time line as per the provisions of GST. In case of any additional tax liability on BHEL on account of non-compliance by the bidder, the additional financial implications on BHEL shall be passed on to the bidder
14.10	Bidders to provide the applicable HSN / SAC codes as called for in the enquiry
14.11	As per provisions of section 171 of the CGST Act 2017, bidders to pass on the anti-profiteering benefits accruing to them under GST regime to BHEL
14.12	With reference to section 51 of CGST act 2017 read with notification no 50/2018 – Central tax dated 13.09.2018; BHEL will be liable to deduct TDS under GST with effect from 01.10.2018. Deduction shall be made @ 2% (1% CGST + 1% SGST) or 2% IGST (as applicable) of the payment made or the amount credited. Bidder to generate & submit invoices as per above.



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	<p>The amount of TDS shall be deposited to the Government account and BHEL shall issue TDS certificate to deductees, TDS deposited in the Government account will be reflected in the electronic cash ledger of the deductee who will be able to use the same for payment of tax or any other amount.</p> <p>Deduction of TCS along with additional TDS will be as per prevailing Government guidelines.</p>
15.	Taxes & Duties - Foreign Purchase — Imports
15.1	The offered prices shall be inclusive of all the Taxes and duties as applicable in the country of bidder / country of dispatch for the quoted CFR / CIF price.
16	Payment Terms-
16.1	<p>Indigenous: 100% payment in 90 days of receipt (45 days for Micro & Small and 60 days for Medium enterprises as registered in Udyam certificate as per relevant MSME act in force) and subject to acceptance of material and relevant documents at BHEL. In case of despatch of material to site directly, site certification for receipt of materials is required unless otherwise provided for in the PO. Any deviation from the above payment terms, if accepted (by BHEL), shall be loaded @ SBI base rate + 6% for the purpose of bid evaluation.</p>
16.2	<p>Foreign: 100% against irrevocable, unconfirmed LC, payable within 90 days of the Bill of Lading (B/L) date or Payment terms of CAD payable on 90th day of B/L / AWB. In case BHEL considers any deviation in payment terms i.e. early payment based on bidder's request, then bids shall be evaluated with loading of State bank of India Base rate plus 6%, for the credit period short of 90 days. The LC shall be established 2 months prior to shipment date, valid for period of 90 days, unless agreed otherwise.</p> <p>Documents to be submitted as per UCP600 and should reach BHEL/ BHEL's bank at least 7 days prior to vessel arrival.</p>
16.3	Staggered Payment terms in case of Capital items /Balance of plant (BOP) item where services of installation /erecting & commissioning /supervision is desired with supply of items /goods will be separately mentioned in particular tender remarks /Special terms & condition /Additional terms and condition
16.4	<p>Foreign bidders to submit declaration of Permanent Establishment and Business Connection (PEBC) for remittances purpose. Declaration to be submitted in formats either in Annexure A or B whichever is applicable as per their transaction entered into with BHEL.</p> <p>In the absence of certificates from the bidder, withholding tax at applicable rates along with surcharge and cess will be recovered at the time of remittance to the bidder.</p>
16.5	Foreign bidders to submit Tax Residency Certificate (TRC) & Form 10F (for obtaining DTAA benefits) as per Annexure C in respect of services. The TRC (tax residency certificate) is to be issued by the authorities of the government of bidder's country. If the informative part of the format (other than residency) is not furnished by the authorities the same may be furnished by the bidder as a declaration.
16.6	BHEL Bhopal is registered with (TReDS) platform. MSME bidders are requested to get registered with (TReDS) platform to avail the facility as per the GOI guidelines.
17	Inspection of Goods
17.1	The Bidder shall give adequate notice, of 1 week or as mutually agreed period, in writing to the Purchaser (in case Customer inspection is involved) or BHEL appointed TPIA about the date and place at which the goods will be ready for inspection/ testing, as provided for in the contract.
17.2	<p>Purchaser or his authorized representative shall be entitled to carry out inspection of material and workmanship/Surveillance Audit at Bidder's premises or at his sub-contractor's premises at all reasonable times during execution of contract; Such inspection, examination and testing, if made, shall not absolve the Bidder from his obligations under the contract.</p> <p>Wherever required, BHEL may carry out testing at BHEL's testing Lab and in case of any rejection during such testing, replacement / rectification, as required, will have to be done by Supplier.</p> <p>If BHEL carries out any rectification of such rejected material, such cost will be recovered from Supplier's Bills.</p> <p>In case of Customer inspection as Supplier's Works, inspection clearance to be obtained from Customer and submitted to BHEL.</p>
17.3	BHEL's representative from unit or Corporate Quality (CQ) is authorised to carry out audits along with TPIA at bidder's works before clearing the items for despatch.
17.4	All costs related to inspections and re-inspections shall be borne by the Bidder. In case of inspection by BHEL and / or BHEL's customer, the cost of to & fro passage and Boarding & Lodging shall be borne by the Purchaser / Customer, unless otherwise specifically agreed. In case of foreign bidders, the cost of third party inspection, where called for, shall be deemed to be included in the quoted price. Bidder shall be responsible to provide assistance such as labour, materials, electricity, fuels, stores, apparatus, instruments at his cost, as may be required and as may be reasonably demanded to carry out such tests effectively.
17.5	<p>REJECTION:</p> <p>If any goods are rejected, BHEL shall be at liberty to take action as per following:</p>



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	<p>a) Allow the supplier, wherever mutually agreed, to rectify the rejected goods at BHEL's works within reasonable time as fixed by BHEL.</p> <p style="text-align: center;">Or</p> <p>b) Allow the supplier to make free replacement within a specified period. Rejected goods can be lifted by the supplier thereafter.</p> <p style="text-align: center;">Or</p> <p>c) In case payment has been done, allow supplier to refund equivalent value of rejected material by NEFT / RTGS or furnish Bank Guarantee for same amount before lifting the rejected goods. Fresh replacement shall be regulated as per terms and condition of the original Purchase Order. In case payment has not been done, at instructions from BHEL, supplier has to rectify the rejected goods at supplier's works within reasonable time as fixed by BHEL.</p> <p style="text-align: center;">Or</p> <p>d) Terminate the contract either in part or in whole at the discretion of BHEL and invoke Breach of Contract clause, if any, from the supplier.</p> <p style="text-align: center;">Or</p> <p>e) Any goods rejected by BHEL must be removed by the supplier after making payment through NEFT / RTGS within 30 days after receipt of the intimation of rejection. If bidder fails to lift or allow despatch of rejected material at his cost within 90 days from the intimation of rejection, his claim on rejected material shall cease.</p> <p style="text-align: center;">Or</p> <p>f) In exceptional cases, allow the supplier for one-time replacement of defective items (quantity) within reasonable time.</p>
18	Guarantee / Warranty and corresponding Repairs / Replacement of Goods
18.1	<p>Manufacturer's works test/inspection certificates shall be furnished along with the guarantee that material conforms strictly to the specification for general & special conditions as laid down in the purchase order. Goods shall comply with the specifications for material, workmanship and performance. The warranty shall be for a period of 12 months from the date of receipt. If the delivery is found non-compliant during the warranty period, leading to rejection, the Bidder shall arrange free replacement / repair of goods, within one month from the date of intimation or any mutually agreed period. The rejected goods shall be taken away by the Bidder at his cost and replaced on Delivered Duty Paid (DDP) (FOR - BHEL Stores/ designated destination basis) within such period. In the event of the Bidder's failure to comply, Purchaser may take action as appropriate, including Repair / Replenish rejected goods & disposal of rejections, at the risk & cost of the Bidder.</p> <p>In case the defects attributable to Bidder are detected during processing of the goods at purchaser's / his subcontractor's works, the Bidder shall be responsible for free replacement/ repair of the goods as required by the purchaser.</p>
19	<p>NOTE: Deviations (Commercial as well as Technical) from the tender specifications and conditions are generally not acceptable. However, deviation if any, shall be brought out clearly with proper justification in the offer. The deviation, if considered by BHEL shall be loaded for comparison, while evaluating the offer. If a bidder unconditionally withdraws any deviation before price bid opening, the same shall not be loaded. Loading criteria in respect of major commercial conditions where deviations if any are accepted shall be as per clause No.19.</p>
19.1	Evaluation and Loading Criteria:
19.1.1	<p>The evaluation currency for this tender shall be INR.</p> <p>Evaluation of the tender shall be on the basis of delivered cost, i.e. 'Total Cost to BHEL/Landed cost to BHEL' w.r.t the technical scope and commercial conditions finalized after techno-commercial clarifications (after considering, inter alia, Customs Duty and GST / Other taxes as applicable). Exchange rate (TT selling rate of State Bank of India) applicable on the date of Part-I bid opening shall be considered for evaluation of foreign bids. If the relevant day happens to be a bank holiday in India, then the FOREX rate as on the previous bank working day shall be taken for evaluation.</p> <p>Foreign suppliers shall ensure that the benefits as applicable under Comprehensive Economic Partnership Agreement (CEPA) with Government of India are disclosed in the bid & relevant documents such as Certificate of Country of Origin, issued by the appropriate authority in the country of Export, is provided by the bidder along with dispatch documents. Bids shall be evaluated with such applicable benefits. In the event of Bidder failing to provide appropriate documents for Purchaser to avail disclosed concessional duty benefits in India, financial loss, so incurred, will be to the Bidder's account.</p>
19.1.2	<p>Common Loading factors (in case of deviation quoted by bidders)</p> <p>INDIGENOUS</p> <ol style="list-style-type: none"> 1) Deviation quoted in delivery terms in EX works against FOR destination: In case BHEL accepts the EX-Works prices, such offers will be suitably loaded with actual freight charges as per BHEL freight rate contract. 2) Loading (if any) in case of deviation in delivery period in delivery non- sensitive contracts will be declared separately in STC/ATC of particular tenders.



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	IMPORTS 1) Offer received on FOB/FCA basis may be considered on an exceptional basis. BHEL will load freight, marine insurance & shipping line port handling charges etc. to work out landed cost at Sea Port. 2) Import duty, Taxes and duties as applicable on the date of Part-I bid opening. COMMON LOADING FOR IMPORTS & INDIGENOUS that will be added for arriving the "Total Cost to BHEL" A. Loading on Deviated Penalty clause (LD) as per clause 9.1.14 of GTC B. Loading for payment terms as per clause 16.1 of GTC
20	Variation of orders
20.1	No variation to the Purchase order is permitted unless authorised in writing and signed by or on behalf of purchase executive, BHEL Bhopal.
21	Sub-contract
21.1	BHEL's order or part there off, if further to be subcontracted in exceptional circumstances the details of subcontracting and to whom to be subcontracted shall be furnished to BHEL and written permission shall be obtained from BHEL. However, it shall not absolve the supplier of the responsibility of fulfilling BHEL order requirements.
22	Recovery / deductions of amount from supplier
22.1	a Any amount on account of recovery from consignor / supplier under any condition shall be liable to be adjusted against any amount payable to the consignor/supplier against bills. b For any deficiency in supplies where deduction is involved, an amount as decided by BHEL, shall be deducted from supplier's bills.
23	Safety clause for purchase orders
23.1	The bidders shall maintain and ensure sufficient safety measures as required for inspections and test like HV test. Pneumatic test, Hydraulic test Spring test, Bend test, Material handling and safe working environment etc. to enable Inspection Agency for performing inspection. The bidder shall ensure that all the safety precautions specified in factories Act 1948 chapter-IV Section-21 to 41 are complied with respect to equipment's to be inspected. If any test equipment is found not complying with proper safety requirement, then the inspection agency may withhold inspection, till such time the desired safety requirements are met.
24	Non-Disclosure Agreement
24.1	All Drawing and technical documents relating to the product or it's manufacture submitted by one party to the other, prior or subsequent to the formation of contract, shall remain property of the submitting party. Drawing, technical documents or other technical information received by one party, shall not without the consent of the other party, be used for any other purpose than that, for which they were provided. Such technical information shall not without the consent of the submitting party, otherwise be used or copied, reproduced, transmitted or communicated to a third party. Patterns supplied by BHEL will remain BHEL's property which shall be returned by the bidder on demand to BHEL. Bidder shall in no way share or use such intellectual property of BHEL to promote his own business with others. <u>BHEL reserves the right to claim damages from the bidder, or take appropriate penal action as deemed fit against the bidder, for any infringement of the provisions contained herein.</u>
	DRAWINGS, PATTERNS & TOOLS: All drawings, patterns & tools supplied by BHEL or made at BHEL's expense are BHEL's property. These cannot be used or referred to any other party and must only be used in the execution of BHEL's orders. These should be preserved at the supplier's cost for a period of not less than 5 years. Patterns & tools should be returned to BHEL within 90 days of issue of the same.
25	Settlement of Disputes & Arbitration
25.1	All questions/interpretations regarding subject matter of the Contract shall be decided by the Purchaser on the request of the Bidder and the decision of the Purchaser shall be final.
25.2	In case of dispute, steps shall be taken by the parties to the contract to settle the same through negotiations.
25.3	In case, dispute is not settled in negotiations, it shall be referred to Conciliator appointed by the competent authority of the Purchaser.
25.4	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 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. The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the Parties. 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 Bhopal.



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	<p>The cost of arbitration shall be borne as per award of the Arbitrator.</p> <p>Subject to the arbitration in terms of Clause above, the Courts at Bhopal shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract.</p> <p>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. Administrative Mechanism for Resolution of CPSEs Dispute as stated in https://dpe.gov.in/guidelines/guidelines/chapters/2673.</p> <p>In the event of any dispute or difference relating to the interpretation and application of the provisions of the commercial Contract between Central Public Sector Enterprises (CPSEs)/Port Trusts inter-se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning railways, Income Tax, Customs and Excise Departments), such dispute or difference shall be taken up by either party for resolution through Administrative Mechanism for Resolution of CPSEs Disputes (AMRCD) as mentioned in Department of Public Enterprises (DPE) Office Memorandum No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018 as amended from time to time."</p>
25.5	The Bidder shall continue to perform the contract, pending settlement of dispute(s).
26	Applicable Laws and Jurisdiction of Courts
26.1	Indian laws both substantive and procedural, for the time being in force, including modifications thereto, shall govern the Contract including Arbitration proceedings. The competent Courts at Bhopal in the State of Madhya Pradesh, India shall have sole jurisdiction.
27	RIGHT OF REJECTION /NON- PLACEMENT OF PO: BHEL reserves the right to accept the offers in part or in full, or cancel the Tender enquiry without assigning any reason.
28	Performance Bank Guarantee (PBG)/ Security Deposit (SD):
28.1	<p>Wherever Security Deposit (covering contract performance) is called for in the Tender /NIT , the Performance Bank Guarantee (PBG) or Security Deposit (SD), hereafter referred as performance security is to be submitted by the successful bidder awarded the contract.. Performance security is to be submitted by the date specified in the contract.</p> <p>Modes of deposit:</p> <p>a) Performance security may be furnished in the following forms:</p> <p>(i) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL.</p> <p>(ii) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.</p> <p>(iii) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL).</p> <p>(iv) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL).</p> <p>(v) Insurance Surety Bond.</p> <p>(Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)</p> <p>b) In case of GTE tenders, the performance security should be in the same currency as the contract and must conform to Uniform Rules for Demand Guarantees (URDG 758) - an international convention regulating international securities.</p> <p>a) Performance Security is to be furnished by a specified date (generally 14(fourteen) days after notification of the award) and it should remain valid for a period of 60 (sixty) days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations.</p> <p>Forfeiture of Performance Security:</p> <p>The performance security will be forfeited and credited to BHEL's account in the event of a breach of contract by the supplier.</p> <p>PS shall be refunded to the contractor without interest, after he duly performs and completes the contract in all respects but not later than 60 (sixty) days of completion of all such obligations including the warranty under the contract.</p> <p>The Performance Security shall not carry any interest.</p>
28.2	Composite 'Contract Performance Bank Guarantee' of matching value/ validity, where both Security Deposit and Performance Bank Guarantee are required, shall not be construed as deviation.
28.3	Wherever the contract is for supply of Goods processed on labor basis/mixed basis from BHEL supplied materials, the materials shall be issued against a suitable Bank guarantee as specified in the particular Enquiry/STC/ATC/Annexures.
28.4	Wherever PBG (covering equipment / system / work performance guarantee) is called for in the Notice Inviting Tender (NIT) deviation shall not be accepted



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28.5	Bank Guarantee wherever called for, shall be in the BHEL prescribed format. In case the order is to be placed in foreign currency, the BG must also be in Foreign currency, so specified by the Purchaser
28.6	Wherever Security Deposit (covering contract performance) is called for in the NIT, deviation shall not be accepted.
28.7	Bidder agrees to submit performance security required for execution of the contract within the time period mentioned. In case of delay in submission of performance security, enhanced performance security which would include interest (SBI rate + 6%) for the delayed period, shall be submitted by the bidder. Further, if performance security is not submitted till such time the first bill becomes due, the amount of performance security due shall be recovered as per terms defined in NIT / contract, from the bills along with due interest
29	<p>Benefits earmarked for Purchase from Micro & Small Enterprises (MSEs) –</p> <p>All benefits as per Government of India guidelines shall be given to eligible bidders.</p> <p>MSE bidders as defined by the MSMED Act as amended from time to time can avail the intended benefits only if they submit along with the offer, self-attested copies of relevant document, Udyam Registration as applicable stipulated in the MSMED Act or its rules/ regulations as amended from time to time and /or by the buyer. Non submission of such documents as stipulated hereinbefore will lead to consideration of their bids at par with other bidders. No benefit shall be applicable for the concerned for the tender 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. This provision for MSE will apply subject to the condition that the participating MSE meets the tender requirements.</p> <p>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 may reject the bid or, as the case may be, cancel the order and take necessary steps for suspension of the business dealing against the bidder as per the extant guidelines for suspension of business dealings with suppliers/ contractors of BHEL.</p> <p>Note: MSME benefits shall not be given to traders, Dealers or authorised agents.</p> <p>It may however be noted that MSE guidelines as on date (Date of Technical Bid Opening Part-1) shall prevail.</p> <p>As per the OM No. F. No. 1(2)(1)/2016-MA dtd. 09.02.2017 issued from the Office of Development Commissioner (Micro, Small & Medium Enterprises), "Traders and agents should not be allowed to avail the benefits extended under the PP Policy". In view of this, it is clarified that benefits of MSE (such as EMD Waiver, Tender fee exemption, Price preference, Payment preference etc.) will be given only to those MSE Vendors who are manufacturers of offered items against the NIT. No MSE benefits shall be provided to Agents / Stockists / Dealers / Traders etc. for the items offered but not manufactured by themselves.</p>
29.1	MSEs shall be given tender documents free of cost and shall be exempted from payment of EMD. Tender documents shall be issued free of cost & no EMD wherever called for will be insisted upon. MSE bidders shall submit along with bid relevant documents w.r.t. their respective MSE status as per extant norms. Date to be reckoned for determining the deemed validity will be the last date of Technical bid submission. Non- submission of such document will lead to consideration of their bid, at par with other bidders and MSE status of such bidders shall be shifted to Non- MSE supplier till the supplier submit these documents.
29.2	<p>In tender, participating MSEs quoting price within price band of L1+15% shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE and such MSE shall be allowed to supply up to at least 25% of total tendered value. In case of more than one such MSE, the supply shall be shared proportionately.</p> <p>A quantum of 6.25% (25% out of target of 25%), so earmarked, will be reserved for MSE's owned by SC / ST entrepreneurs who submit their bid with relevant documents provided that in event of failure of such MSE(s) to participate in tender process or meet tender requirements and L1 price, 6.25% sub-target for procurement earmarked for MSE(s) owned by SC or ST entrepreneurs shall be met from other MSE(s).</p> <p>A quantum of minimum of 3% reservation within the above mentioned 25% reservation, so earmarked, will be reserved for MSE's owned by women entrepreneurs who submit their bid with relevant documents provided that in event of failure of such MSE(s) to participate in tender process or meet tender requirements and L1 price, 3% sub-target for procurement earmarked for MSE(s) owned by women entrepreneurs shall be met from other MSE(s).</p> <p>In case of indivisible tender, the full quantity shall be awarded to L1.</p>
29.3	If an enterprise falling under MSE category as defined in the MSMED Act 2006, graduates to a higher category from its original category or beyond the purview of the Act, it shall continue to avail all non-tax benefits of its original category notified by the Ministry of Micro, Small and Medium Enterprise for a period of three years from the date of such graduation to the higher category.
29.4	MSE bidders as defined by the MSMED Act as amended from time to time can avail the intended benefits only if they submit, self-attested copies of Udyam Registration certificate, along with the offer. No benefits shall be applicable for the enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to



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	<p>be submitted through e-procurement portal, then the above required self-attested documents are to be uploaded on the portal.</p> <p>No benefits shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required self-attested documents are to be uploaded on the portal.</p> <p>The deemed validity will be assessed on the date of bid opening (Part 1 in case of two part bid). Non submission of such documents as stipulated hereinbefore will lead to consideration of their bids at par with other bidders. No benefit shall be applicable for the concerned for the tender enquiry, if any deficiency in the above required documents is not submitted before the price bid opening. This provision for MSE will apply subject to the condition that the participating MSE meets the tender requirements.</p> <p>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 may reject the bid or, as the case may be, cancel the order and take necessary steps for suspension of the business dealing against the bidder as per the extant guidelines for suspension of business dealings with suppliers/ contractors of BHEL.</p> <p>In case if all the items being procured under the enquiry fall under category of reserved items as defined in “Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012” and if any of the MSE bidder(s) is techno commercially qualified then the price bids of only MSE bidders shall be opened. If no MSE bidder is techno-commercially qualified, then price bids of all techno-commercially qualified bidders shall be opened.</p>																								
30	<p>Integrity Pact (IP) — Independent external monitors (IEM)</p> <p>For tenders in which integrity pact is applicable, following points stand valid :</p>																								
20.1	<p>IP is a tool to ensure that activities and transactions between the company and its bidders/contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL.</p> <p>The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno commercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this pact would be a preliminary qualification.</p> <div><div><p>Name: -----</p><p>Address: -----</p><p>E-mail : -----</p></div><div>}</div><div>As indicated in NIT / enquiry</div></div>																								
30.2	<p>Please refer section 8 of the IP for roles and responsibilities of IEMs. In case of any complaint arising out of tendering process, the matter may be referred to the IEM mentioned in the tender.</p> <p>NOTE: No routine correspondence shall be addressed to the IEM (phone / post/e-mail) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarifications/ issues shall be addressed directly to the tender issuing (procurement) department.</p> <p>For all clarifications/ issues related to the tender, please contact:</p> <table><tr><td></td><td>(1)</td><td>(2)</td></tr><tr><td>Name</td><td></td><td></td></tr><tr><td>Landline No.</td><td></td><td></td></tr><tr><td>Mobile No.</td><td></td><td></td></tr><tr><td>Email</td><td></td><td></td></tr><tr><td>Dept.</td><td></td><td></td></tr><tr><td>Address</td><td></td><td></td></tr><tr><td>Fax</td><td></td><td></td></tr></table>		(1)	(2)	Name			Landline No.			Mobile No.			Email			Dept.			Address			Fax		
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31	<p>Fraud Prevention Policy : The Bidder along with its associate/ collaborators/ sub-contractors/ sub-bidders/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website 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.</p>																								
32	<p>Integrity Commitment: The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL website www.bhel.com.</p> <p>Integrity commitment, performance of the contract and punitive action thereof :</p>																								
32.1	<p>Commitment by BHEL:</p> <p>BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all bidder(s) in a transparent and fair manner, and with equity.</p>																								
32.2	<p>Commitment by bidder / Supplier / Contractor :</p>																								



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32.2.1	<ul style="list-style-type: none"> - The bidder / supplier / contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal code, 1860 or any other law in force in India. - The bidder / supplier / contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by govt. of India / BHEL - The bidder / supplier / contractor will perform / execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business / money / reputation to BHEL.
32.2.2	<p>If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in mal-practices, cheating, bribery, fraud or / and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then action may be taken against such bidder / supplier / contractor as per the extant guidelines of the company available on www.bhel.com and / or under applicable legal provisions.</p>
32.2.3	<p>Preventive checks to eliminate suspected cartel formation between suppliers</p> <p>The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.</p> <p>In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines</p> <p>Declaration by Bidders</p> <p>We declare that the following family firms or sister concern affiliates/ subsidiary firms are participating in the tender No _____</p> <p>1.0 _____</p> <p>2.0 _____</p> <p>3.0 _____</p> <p>I _____ hereby declare on behalf of M/s _____ and family firms or sister concern affiliates/ subsidiary firms listed above that we are not indulging in cartel formation for Enquiry No _____.</p> <p style="text-align: right;">(_____) For M/s _____ Seal and Sign</p>
33	<p>Public Procurement (Preference to Make in India), Order 2017</p> <p>For this procurement, Public Procurement (Preference to Make in India), Order 2017 Dtd 15.06.2017 and 28.05.2018 and subsequent orders issued by both DPIIT and the respective nodal ministries shall be applicable</p> <p>For this procurement, the local content to categorise a supplier as a Class I local supplier/ Class II local Supplier / Non-Local supplier is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the 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> <p>Bidder to mention the percentage of local content and place of value addition to manufacture these items in the tender.</p>
34	<p>RESTRICTION UNDER RULE 144 (xi) OF THE GENERAL FINANCIAL RULES 2017: As per latest government guidelines</p>
34.1	<p>Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the competent authority.</p>
34.2	<p>"Bidder" (including the term 'tenderer', 'consultant' or service provider' in certain contexts means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies) every artificial juridical person not falling in any of the description of bidders stated hereinbefore, including any agency, branch or office controlled by such person, participating in procurement process.</p>
34.3	<p>Bidder from a country which shares a land border with India" for the purpose of this order means: -</p> <ol style="list-style-type: none"> An entity incorporated, established or registered in such a country; or A subsidiary of an entity incorporated, established or registered in such a country; or An entity substantially controlled through entities incorporated, established or registered in such a county; or An entity whose beneficial owner is situated in such a country; or



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	<p>e. An Indian (or other) agent of such an entity; or</p> <p>f. A natural person who is a citizen of such a country; or</p> <p>g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.</p>
34.4	<p>The beneficial owner for the purpose of (iii) above will be as under:</p> <p>1. In case of company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.</p> <p>Explanation –</p> <p>a. “Controlling ownership interest” means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company.</p> <p>b. “Control” shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholder’s agreements or voting agreements.</p> <p>2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;</p> <p>3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;</p> <p>4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;</p> <p>5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.</p>
34.5	An Agent is a person employed to do any act for another, or to represent another in dealings with third person.
34.6	<p>Model certificate for Tenders</p> <p><i>“I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the competent authority. I hereby certify that this bidder fulfills all requirements in this regards and is eligible to be considered. [Where applicable , evidence of valid registration by the Competent Authority shall be attached].”</i></p>
35	<p>Conflict of Interest:</p> <p>"A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if: a) they have controlling partner (s) in common; or</p> <p>b) they receive or have received any direct or indirect subsidy/ financial stake from any of them; or c) they have the same legal representative/agent for purposes of this bid; or</p> <p>d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder; or</p> <p>e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ subassembly/ Assemblies from. one bidding manufacturer in more than one bid; or</p> <p>f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorize only one agent/dealer.</p> <p>There can be only one bid from the following:</p> <p>1. The principal manufacturer directly or through one Indian agent on his behalf; and</p> <p>2. Indian/foreign agent on behalf of only one principal; or</p>



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GENERAL TERMS AND CONDITIONS OF ENQUIRY

	<p>g) A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid; or</p> <p>h) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies.</p> <p>Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business. "</p>
36	<p>Breach of contract, Remedies and Termination</p> <p>In case of breach of contract, wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is at least 10% of the contract value, the same be encashed. In case the value of the security instruments available is less than 10% of the contract value, the balance amount be recovered from other financial remedies (i.e. available bills of the contractor, retention amount, etc. with BHEL) or legal remedies be pursued. Further, levy of liquidated damages, debarment, termination, de-scoping, short-closure, etc., shall be applied as per provisions of the contract.</p>
37	<p>Option clause:</p> <p>The Purchaser reserves the right to decrease the quantity to be ordered at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.</p>

Note:

1.0 Tender Specific conditions shall override relevant provisions of this GTC

2.0 In the event of any change as notified by Govt. of India same will supersede the relevant GTC clause.

A-FORM



BHARAT HEAVY ELECTRICALS LIMITED - BHOPAL

MM DEPARTMENT

ESTIMATE SHEET FOR ISSUE OF MATERIAL/COMPONENTS FROM BHEL

CHECKLIST

FORM NO BP-0021

A-FORM NO : A211A87
REV NO : 0
A-FORM DATE : 23-DEC-25
PRINT DATE : 30-DEC-25
PAGE : 1 / 1

DEPARTMENT : 211 PROJECT : NPCIL GHAVP PO NO : A211A87 END PRODUCT : FINAL WELDING OVERLA
INDENT NO : 221150082 WORK ORDER NO : 18085W04801 PO DATE : DELY REQD : 25022026
INDENT DATE : 23122025 MATERIAL ISSUE DIV : 211 SUPP CODE : SUPP NAME :

DETAILS OF FINISHED GOODS

A-SLNO PO IT NO PI IT NO QUANTITY REQUIRED UNIT SHOP NO DEST CD COST CD HCELL
DESCRIPTION OF SUB-ASSEMBLY/ITEM & WEIGHT/VOLUME/AREA

FREE ISSUE MATERIAL PER UNIT OF FINISHED GOODS

MATL CODE	QTY PSL UNIT	PSL UNIT	RATE PSL UNIT	TOTAL MATL TO BE ISSUED	ISSUE PSL/ UNIT	SMIV/ WIP	MATERIAL VALUE	TARRIF HEAD	MATL ISSUE QTY
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DESCRIPTION OF FREE ISSUE MATERIAL AND WEIGHT /VOLUME/AREA

WELDING OVERLAY INCONEL 600 FOR BCL	1	0	1	2.000	NO	211	211	211	211
HE4180857022	1.0000	NO	776635.000	2.00	NO	WIP	1553270.000		1.0000
TUBE SHEET FORGING TO DRG NO. 31650340880 REV. 02. MATERIAL O/D 1165 X 260 THK EACH. R. WT. - 2250 KG EACH. F. WT. - 1756 KG EACH APPROX. WEIGHT OF CLAD MATERIAL AND FLUX ISSUED IS TO BE ADDED LATER IN R. WT.									
R/M WT (kg) PER UNIT: 2250	F/M WT (kg) PER UNIT: 1756	Scrap Rate (Rs/kg): 28							

WELDING OVERLAY INCONEL 600 FOR SDC	2	0	2	3.000	NO	211	211	211	211
HE4180857030	1.0000	NO	1239600.000	3.00	NO	WIP	3718800.000		1.0000
TUBE SHEET FORGING TO DRG NO. 31650340882 REV. 02. MATL O/D 1410X290 THK EACH. R. WT.- 3763 KG EACH F. WT. - 3787 KG EACH APPROX. WT. OF CLAD MTL & FLUX ISSUED TO BE ADDED LATER. DUE TO SYSTEM CONSTRAINT, NOTIONAL WT. OF CLAD MTL IS TAKEN AS 27 KGS.									

R/M WT (kg) PER UNIT: 3790 F/M WT (kg) PER UNIT: 3787 Scrap Rate (Rs/kg): 28
REMARKS A-FORM REVISED TO MAKE FIN. WT. BASED ON NON-DRILLED TUBE SHEET BY ADDING MTL WT. OF DRILLED HOLES
TO FIN. WT. OF DRG. DRILLING OF HOLES IN BHEL SCOPE
TOTAL NO OF CANCEL ITEM 0

1 MATERIAL TO BE ISSUED ON :-

2. TRANSPORT TO BE PROVIDED BY :-

3. EXCISE DUTY ON ISSUE MATL TO BE BORNE BY :-

4. SCRAP TO BE RETURNED :-

5 INVARIABLY ISSUE WT. TO BE RECORDED ON SMIV/PMIV

RPT-101

FREE ISSUE BASIS

SUPPLIER

SUPPLIER

NO

NO

HIMANSHU KANASKAR / Himanshu Kanaskar

वरि. प्रबंधक / SIGNATURE OF INDENTOR

एच. सी. एम. विभाग / NAME/Division

एच. सी. एम. विभाग / DESIGNATION

TELEPHONE

वरि. प्रबंधक / SIGNATURE OF ASC EXECUTIVE

एच. सी. एम. विभाग / H.C.M. Division NAME

एच. सी. एम. विभाग / B.H.E.L., BHOPAL DESIGNATION

TELEPHONE

Handwritten signature and date 30.12.25

FABRICATION DIVISION
ANNEXURE-1
PI No. - 221150082; Dated : 22.12.2025

Sl. No.	Sections	Sub-Sections / Clause Details
1	Supply Condition	Labour Basis
2	Scope of Work	<p>The Sub-Contractor's scope of work includes but not limited to Cladding, UT & DP, NPCIL Inspection of finished Job, receipt of ready to drill Tube Sheet at BHEL, Bhopal as per Drawings, QAP & Annexure-1, NPCIL Spec. PC-M-1109.</p> <p>Applicable QA Plan. No. QAX/TH/1483 REV. 02 for BCL & QAX/TH/1487 REV. 02 for SDC is attached with NIT. For BCL, Cl. 3.1.5 & for SDC, Cl. 3.1.4 of QAP is in BHEL Scope. For BCL, Cl. 3.1.4 of QAP related to review of WPS/PQR before cladding (qualification) of weld overlay shall have to be complied by Bidder. Similarly, for SDC, remarks of Cl. 3.1.5, "By qualified WPS/PQR" shall have to be complied by Bidder. NPCIL Spec. PC-M-1109 related to PQR for Cladding is also attached and is to be adhered to by bidder in totality.</p> <p>Tube-sheet, Machined prior to Cladding, shall be provided by BHEL. Cladding Material shall be INCONEL 600 [NPCIL Approved]. This shall be issued by BHEL to Bidder as Free Issue Item along with Flux in ratio of 1:1.</p> <p>Bidder has to quote rate on Rs./Tube-sheet basis, which would be inclusive of SR, Qualification required as per attached QAP & NPCIL Spec. along with applicable NDTs. Transportation of Tube Sheet from BHEL, Bhopal to Vendor Works and return to BHEL, Bhopal shall also be in Vendor Scope.</p>
3	Raw Materials (Labour Basis)	<p>[1] Tube Sheet machined prior to Cladding shall be provided by BHEL along with INCONEL 600 and Flux, as free issue material.</p> <p>[2] Further to it, complete Cladding, machining and NDT is in bidder's scope.</p> <p>[3] The total weight of the material issued along with Weight of Clad Material & Flux issued minus (-) the finish weight of the assemblies supplied to BHEL shall be treated as scrap and the same shall be charged from the sub-contractor. Expected scrap % is approximately 5% to 10%.</p> <p>[4] All material should be as per Bill of material & Drawing.</p>
4	Drawings	BHEL reserves the right to make modification in the design if necessitated by our customer. Bidder will work on the latest drawings supplied by BHEL through concern

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 वरिष्ठ प्रबंधक / Sr. Manager
 एच.सी.एम. विभाग / HCM Division
 बी.एच.ई.एल., भोपाल / B.H.E.L., BHOPAL
 02.01.2026
 Prepared by

हिमांशु कानकर / Himanshu Kanaskar
 वरिष्ठ प्रबंधक / Sr. Manager
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 बी.एच.ई.एल., भोपाल / B.H.E.L., BHOPAL
 02.01.2026
 Checked by

सुजित कुमार बिस्वास / Sujit Kumar Biswas
 अपर महाप्रबंधक / Addl. General Manager
 एच.सी.एम. विभाग / H.C.M. Division
 बी.एच.ई.एल., भोपाल / BHEL, BHOPAL
 02.01.2026
 Approved by

FABRICATION DIVISION**ANNEXURE-1****PI No. - 221150082; Dated : 22.12.2025**

		engineering. Before the start of job bidder should obtain the concurrence from BHEL.
5	Scrap %	(5-10)
6	Inspection Requirement	<p>Inspection is to be done as per drawing's Technical Requirement and QA Plan. No. QAX/TH/1483 REV. 02 for BCL & QAX/TH/1487 REV. 02 for SDC, as applicable.</p> <p>Records of all stages of QA Plan shall be generated during manufacturing and same is to be witness / reviewed as called in QA Plan from the Inspection Agency.</p>
7	Cladding	<p>7.1. All Tube-Sheets shall be Cladded to our drawing and notes thereon.</p> <p>7.2. The PQR for Cladding shall be submitted by the sub-contractor to BHEL HCM for approval. The manufacturing shall be started only after the approval of PQR. NPCIL Spec. PC-M-1109 related to same is also attached and is to be adhered to in totality.</p> <p>7.3 All inspection, testing & acceptance norms as stated in QA Plan / drgs. are to be complied with.</p> <p>7.4 Strict measure of quality control should be maintained throughout the work. The job should be free from spatters and under cuts. All dressing and cleaning shall have to be done to the satisfaction of BHEL Q.C.</p> <p>7.5 Wherever machining is called, supplier has to ensure the adequate availability of machining allowance clearly marked on the job.</p> <p>7.6 Any fixture, Tools etc required for above work are to be arranged by vendor.</p>
8	Stress Relieving	Stress Relieving of cladded Tube Sheet shall be done in compliance with Cl. 3.1.9 of BCL QAP / Cl. 3.1.8 of SDC QAP.
9	NDT	<p>9.1 Complete NDT will be in the scope of Subcontractor and NPCIL approved consumables are to be used. All NDT to be done with level -2 qualified personal and cost of the same will be in vendor scope only.</p> <p>9.2 N.D.T. shall be carried out by ISMT/ASME.</p> <p>9.3 BHEL will have full right to review / witness NDT at any point during the course of manufacture.</p>
10	Inspection Agency	Assemblies shall be inspected at various stages by BHEL - QIX/ Third party / Customer / Customer Appointed Third Party. During manufacturing all instruments for inspection shall be provided by the vendors. The Sub - contractor should maintain a separate file a history document containing all information and procedure pertaining to this order.

Handwritten Signature
Prepared by Manager
 एच. सी. एम. विभाग / HCM Division
 बी.एच.ई.एल., भोपाल / B.H.E.L., BHOPAL

Handwritten Signature
Checked by Himanshu Kanaskar
 एच. सी. एम. विभाग / HCM Division
 बी.एच.ई.एल., भोपाल / B.H.E.L., BHOPAL

Handwritten Signature
Approved by Division
 एच. सी. एम. विभाग / BHEL, BHOPAL

FABRICATION DIVISION**ANNEXURE-1****PI No. - 221150082; Dated : 22.12.2025**

		containing all information and procedure pertaining to this order.
11	Transportation	Complete transportation, i.e. Raw material lifting from BHEL and finish job supply to BHEL, is in scope of bidder.
12	Delivery Requirements	04 Weeks for each Tube Sheet from the date of issue of last free issue material for respective Tube Sheet.
13	Order Distribution	Order shall be distributed as per tender condition.
14	Quotation	<p>Bidder has to quote rate on Rs./Tube-sheet basis, which would be inclusive of SR, respective Cladding PQR Qualification, Transportation of Tube Sheet from BHEL, Bhopal to Bidder Works and return to BHEL, Bhopal, applicable NDTs. Etc. shall be in Bidder Scope. However, ordering can be in full / part.</p> <p>L-1 to be determined based on Landed Cost to BHEL. For loading for value for Cladding Material and Flux, PO of BHEL Trichy is obtained and rates are as detailed below. For arriving at Landed Cost to BHEL, requirement of Cladding material and Flux in Kgs. (in ratio of 1:1) is to be solicited from all Vendors in their respective Part-1 offers. This data shall be converted to cost based on quoted weight and rates as per below :</p> <p>(i.) 1 Kg. Cladding Material - 62 USD. Exchange Rate applicable as on a designated date (Part – 1 opening date / any other date) as per latest circular applicable for same.</p> <p>(ii.) 1 Kg. Flux - 3.47 USD. Exchange Rate applicable as on designated date (Part – 1 opening date / any other date) as per latest circular applicable for same.</p> <p>Designated Date of taking Exchange Rate shall be Due Date of Tender.</p>
15	Any other information	<p>1. Technical requirement of drawing to be strictly followed.</p> <p>2. Before starting the job, Bidder should confirm the latest drawing revision from BHEL.</p> <p>3. No tools, gauges, fixtures & template will be issued to vendor.</p> <p>4. For the aforementioned work, the approval of NPCIL needs to be obtained before part-2 opening of tender i. e. Price Bid. Hence, bidder to ensure sending all credentials related to NPCIL approval as well as PQR of this tender, along with their</p>

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02/01/2026

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Checked by
02/01/2026

सुजित कुमार बिस्वास / SUJIT KUMAR BISWAS
अपर प्रबंधक / Asst. General Manager
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बी.एच.ई.एल., भोपाल / BHEL, BHOPAL
Approved by
Page 3 of 4

FABRICATION DIVISION**ANNEXURE-1****PI No. - 221150082; Dated : 22.12.2025**

		<p>offer. These shall be evaluated during Technical Evaluation after part-1 opening.</p> <p>5. The availability of ample skilled man-power, qualified welders & machinery shall be established by contractor in his offer with documentary proofs.</p> <p>6. Bidder to also note that further to submission of credentials BHEL may ask further information and documents to pursue their approval from NPCIL. Bidder shall provide the same timely.</p> <p>Also, as per the requirement of customer/BHEL, there may be need to visit bidder's premises for evaluation of machinery etc. prior to their approval. In such case, bidder shall provide necessary access to their facilities and facilitate in all possible manner to make the assessment happen.</p>
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Himanshu Kanaskar
 हिमांशु कानस्कर / Himanshu Kanaskar
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 02.01.2026
 - On Leave -

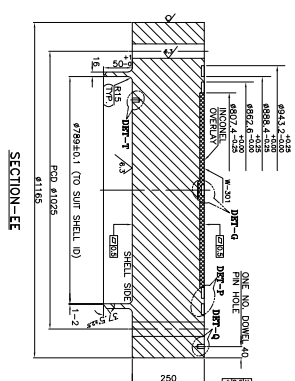
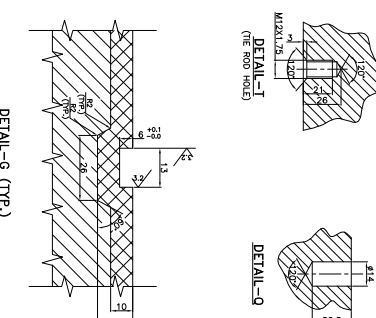
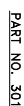
AGM/HCM

Sujit Kumar Biswas
 सुजित कुमार विश्वास / SUJIT KUMAR BISWAS
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 02.01.2026

Prepared by

Checked by

Approved by



DO NOT SCALE THE DRAWING.

ALL DIMENSIONS, OTHERWISE STATED :-
ALL DIMENSIONS ARE IN mm.
SURFACE FINISH TO BE $\frac{1}{8}$ " OR BETTER.
REMOVE ALL BURRS.
REMOVE ALL EXTERNAL SHARP CORNERS
AND EDGES BY CHAMFERING TO $0.15 \times 45^\circ$
ROUND ALL INTERNAL CORNER AND EDGES TO R 0.20
TOL. ON RADII & CHAMFER (IS:102)

REDI AND CHAMFERS	0.5-3	3-6	6-30
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ADDITIONAL INFORMATION
DRG. LIST : 4-16503-40
STATUS OF DRAWING
W/O. NO. : 18085/86-W-0
DISTRIBUTION OF PRINTS

[illegible][illegible][illegible]

17. CLADDING THICKNESS IS QUALIFIED THICKNESS.

14. AFTER REMOVAL OF TEMPORARY ATTACHMENTS AND BUTTERING, THESE AREAS SHALL BE
SUBMITTED TO NIT/PT.

15. AREAS TO BE BUTTERED/CLODED SHALL BE SUITABLY PREPARE AND SUBJECTED TO NIT/PT.

16. TUBE SHEET WELD OVERLAY SHALL BE UT EXAMINED AFTER 1ST LAYER FOR ANY DISCONTINUITIES
OR WELD REPAIR. THEREAFTER THE WELD OVERLAY WILL BE UT EXAMINED AFTER EACH LAYER.

GENERAL

10. OUTER TUBE DIM 01L=749.5
11. TUBE SHEET OVERLAY & TUBE SHEET MACHINING (INCLUDING DRILLING) SHALL BE DONE PER APPROVED PROCEDURE.
12. THE TUBE SHEET OVERLAY SHALL BE ULTRASONICALLY TESTED AND LIQUID PENETRANT INSPECTED BEFORE AND AFTER SURFACES RELIEFING.
13. ALL WELD EDGES AND MACHINED SURFACES SHALL BE SUBJECTED TO W/PT

5. EDGE PREPARATION AND MACHINED SURFACES SHALL BE PROTECTED PROPERLY TO AVOID DAMAGE DURING HANDLING OR OTHERWISE.
6. THREADING ACCORDING TO ISO ANSI B1.1.
7. BOLT HOLE DRILLING AS PER DRAWING REQUIREMENT.
8. TEMPORARY ATTACHMENTS IF REQUIRED MAY BE PROVIDED WITH PROPER BUTTERING.
9. DEBURR ALL SHARP EDGES AND ROUND OFF ALL SHARP CORNERS.


SOAKING TEMPERATURE (°C)	590-610
SOAKING PERIOD (min)	240
COOLING RATE (°C/hr)	35
UNLOADING TEMPERATURE (°C)	300

1. FOR GA AND NOTES REFER DRG. NO. 1-16503-40851.

2. TUBE SHEET SHALL BE STRESS RELIEVED AFTER OVERLAY AND BEFORE FINAL MACHINING AS PER APPROVED PROCEDURE.

LOADING TEMPERATURE (°C)	CLADDING TUBE SHEET
300	
HEATING RATE (°C/hr)	35

01	11	21
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	<h1>QUALITY ASSURANCE PLAN</h1>				QA PLAN NO.		QAX/TH/1483			
	<h2>ASSY. / ITEMS: BLEED COOLER FOR 700 MW GHAVP UNIT 1&2</h2> <h3>CUSTOMER: M/S NUCLEAR POWER CORPORATION</h3>				Date	15-02-2020				
					Rev.	02				
					Page No.	6 of 22				
Sr.No.	Component & Operation	Characteristic	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of Record	Inspection Agency P W R H	Remarks


3 FABRICATION												
3.1 Tube sheet												
	Material Identification of Tube sheet	QS clearance / Inspection Reports, SRs and identification markings	Major	TC Verification, Stamp verification, Visual check and Dimensional	100%	TPS & QAP, PC-E-1044	As per app. TPS, PC-E-1044 & QAP	Identification reports	2	1, 2	1	Separate QAP to be prepared
3.1.1	Machining of Tube sheet for Cladding	Dimension (OD, Thickness, Flatness)	Major	Measurement	100%	Approved Drawing	As per Approved Drawing	Inspection Report	2	2	1	
3.1.2	MT of machined surface before cladding	Surface Examination	Major	NDE	100%	Approved MT Procedure	As per approved MT Procedure	Inspection Report	2	1, 2	1	
3.1.3	Review of WPS/PQR before cladding (qualification) of weld overlay	Essential Variables and Parameters	Major	Verification	100%	NPCIL Spec. PC-M-1109, Approved procedure	As per Spec. PC-M-1109, Approved procedure	PQR	2	2	1	
3.1.4	Release of welding Consumables for Cladding	Conformance to Specification	Major	TC Verification	100%	Approved TPS	As per Approved TPS	Test Certificate	2	2	1	Verification of consumables material stock which was witnessed in batch qualification
3.1.5	Cladding of Tube sheet after successful procedure Qualification	Welding Parameters	Major	Measurement of thickness	100%	Approved procedure / PQR	As per Approved procedure/ PQR	Inspection Report	2	2	1	
3.1.6	Machine of cladded surface of tube sheet for NDE & verification of cladding thickness.	Dimension	Major	Measurement	Random Check	Approved Drawing	As per Approved Drawing	Inspection Report	2	2	1	
3.1.7	LPE and UTE of Cladding	Surface and Volumetric Examination	Major	NDE	100%	Approved LPE and UTE Procedure	As per approved LPE and UTE Procedure	Inspection Report	2	2	1	
3.1.8	Stress Relieving of cladded Tube Sheet	Control of Heating rate, Cooling rate, Soaking and Holding time	Major	HT Chart Review	100%	Approved Heat treatment Procedure	As per Approved Heat treatment Procedure	Inspection Report	2	1, 2	1	Calibrated Furnace shall be used. Loading of Tube Sheet in Furnace shall be witnessed by NPC QS
3.1.9	LPE and UTE of Cladding after Stress relieving	Surface and Volumetric Examination	Major	NDE	100%	Approved LPE and UTE Procedure	As per approved LPE and UTE Procedure	Inspection Report	2	1, 2	1	
3.1.10	Final machining of Tube sheet	Dimensions, Surface finish, parallelity, flatness	Major	Measurement	100%	Approved Drawing	As per Approved Drawing	Inspection Report	2	1, 2	1	
3.1.11	LPE Examination after final Machining of Tube sheet Cladding	Surface Examination	Major	NDE	100%	Approved LPE Procedure	As per approved LPE Procedure	Inspection Report	2	1, 2	1	

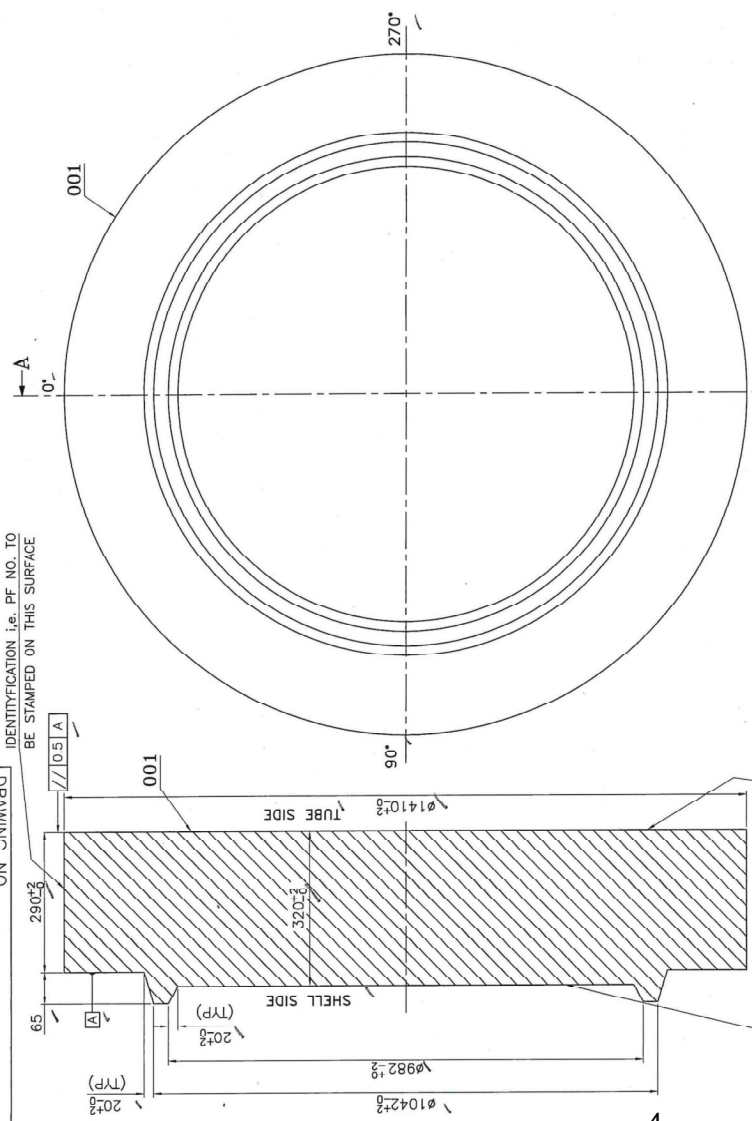


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NOTE-A

MOCKUP BLOCK REQUIRED FOR PROCESS QUALIFICATION AND PROCESS CONTROL SHALL BE OF SAME HEAT TREATMENT CONDITION AND MATERIAL OF TUBE SHEET FORGING. FOR QUANTITY AND SIZE FOR DIFFERENT MOCKUP BLOCKS REFER ENQUIRY/PC.

 <p>न्यूक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Limited</p>	<p>अनुमोदित / APPROVED</p> <p><input type="checkbox"/> विद्युत के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> संचरण के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> प्रोसेसिंग के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> अंतिम डिजाइन के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> SEND FINAL TRANSPARENCIES & PRINTS</p> <p><input type="checkbox"/> संचरण के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> REVISE & RESUBMIT FOR APPROVAL</p>	<p>अनुमोदित नहीं / NOT APPROVED BY</p> <p>संशोधन / REVISOR</p> <p>REVIEWED BY</p>	<p>15/12/19</p> <p>सिद्धान्ताधिकारी / सिद्धान्त अधिकारी</p> <p>15/12/19</p>
<p>अनुमोदित / APPROVED</p> <p><input type="checkbox"/> विद्युत के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> संचरण के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> प्रोसेसिंग के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> अंतिम डिजाइन के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> SEND FINAL TRANSPARENCIES & PRINTS</p> <p><input type="checkbox"/> संचरण के अनुपचार अनुमोदित / APPROVED AS NOTED</p> <p><input type="checkbox"/> REVISE & RESUBMIT FOR APPROVAL</p>	<p>अनुमोदित नहीं / NOT APPROVED BY</p> <p>संशोधन / REVISOR</p> <p>REVIEWED BY</p>	<p>15/12/19</p> <p>सिद्धान्ताधिकारी / सिद्धान्त अधिकारी</p> <p>15/12/19</p>	<p>15/12/19</p> <p>सिद्धान्ताधिकारी / सिद्धान्त अधिकारी</p> <p>15/12/19</p>



DO NOT SCALE THE DRAWING.

MACHINE ALL CHECK REMOVE ALL BURRS REMOVE ALL EXTERNAL SHARP CORNERS AND EDGES BY CHAMFERING TO 0.5 ± 0.08 ROUNDS ALL INTERNAL CORNERS AND EDGES TO R 0.5 ± 0.1 TOLERANCES ON RADI AND CHAMFERS (SEE 1:102)		PREDI AND CHAMFERS 105-3 3-5 (E-30) TOLERANCES 1:102 (E-30) 1:102 (E-30)
TOLERANCE IN LINEAR DIMENSIONS (5:2:100)		
DIMENSIONS TOL.	DIMENSIONS TOL.	DIMENSIONS TOL.
UP TO 6 0.1 30 120	0.1 0.1 0.1 0.1	0.1 0.1 0.1 0.1
1000-2000 0.12 0.15 0.20	0.12 0.15 0.20 0.25	0.12 0.15 0.20 0.25
TOLERANCE ON ANGULAR DIMS 1:0-0.5		

ADDITIONAL INFORMATION

TECHNICAL REQUIREMENTS (TR):-

1. SUPPLY CONDITION : HEAT TREATED AND PROOF MACHINED ALL OVER.
2. ALL TECHNICAL AND TESTING REQUIREMENTS SHALL BE AS PER NPCL APPROVED SPECIFICATION NO. BHCL/NPCL/30599/CS-FORGINGS/CDE- 9-3411.
3. NO REPAIRING/WELDING SHALL BE DONE WITHOUT PRIOR APPROVAL OF NPCL.
4. THE TUBES SHALL BE SUPPLIED WITH THE FOLLOWING DIMENSIONS PER SPECIFICATION NO. BHCL/NPCL/30599/CS-FORGINGS/CDE- 19-3411.
5. IDENTIFICATION TO BE STAMPED AT LOCATION SHOWN WITH FOLLOWING INFORMATION:
 - a). PURCHASE FORGING NUMBER
 - b). HEAT NUMBER
 - c). BHEL PO NUMBER
 - d). MATERIAL DESIGNATION
 - e). TEMPORARY OIL BASED RUST PREVENTO TO BE APPLIED AFTER MACHINING THE TUBE SHEET ON ALL SURFACES.
 - f). THE TUBE SHEET SHALL BE FORGED IN SUCH A WAY THAT FACE CORRESPONDING TO DIMENSIONS INDICATED HERE SHALL CORRESPOND TO THE BOTTOM OF INDENT.
 - g). DIMENSIONS INDICATED HERE SHALL CORRESPOND TO LINEAR AND ANGULAR DIMENSIONS SHALL BE IN ACCORDANCE TO IS2102.
 - h). THE SURFACE FINISH OF FORGINGS SHALL BE 3.2 CR BETTER.

ADDITIONAL INFORMATION

DRG. LIST : 4-16503-40359
STATUS OF DRAWING

W/C. NO. : 18085/86-W-0480
DISTRIBUTION OF PRINTS

CD \bar{E} - 1 HCM - 4 FWM - 4

REV.	02	DATE	03/05/19	ALTERED 03/05/19 CHECKED 03/05/19 APPROVED 03/05/19	03/05/19 03/05/19 03/05/19 03/05/19	03/05/19 03/05/19 03/05/19 03/05/19	03/05/19 03/05/19 03/05/19 03/05/19
ZONE	DRAWING REVISED TO INCORPORATE NPCIL COMMENTS DTD. 03/04/2019.						
REV.	01	DATE	20/03/19	ALTERED 20/03/19 CHECKED 20/03/19 APPROVED 20/03/19	20/03/19 20/03/19 20/03/19 20/03/19	20/03/19 20/03/19 20/03/19 20/03/19	20/03/19 20/03/19 20/03/19 20/03/19
ZONE	DRAWING REVISED BASED ON NPCIL COMMENTS DTD. 15/03/2019. TOLERANCE TABLE ADDED. NOTE--A ADDED.						

[illegible]


— CARD TYPE-3	28 — CARD TYPE-1	28 — CARD TYPE-2
<p align="center">NUCLEAR POWER CORPORATION OF INDIA LIMITED— (A GOVERNMENT OF INDIA ENTERPRISE)</p>		

PROJECT : GORAKHPUR HARVANA ANU VIDYUTH PARIYOJANA 1&2 (700 MWE).-
NPCL PURCHASE ORDER NO. : OMW/FP/10-33-1-1149/e-PO/30599, DATED 25.01.2019
NPCL DRAWING NO : GHAYP-1&2/33411/2019/DD REV.00

EQUIPMENT NAME : - SHUT DOWN COOLER

TAG NO. : (3341-HX-1,2,3,4)


[illegible]

		QUALITY ASSURANCE PLAN										QA PLAN NO.		QAX/TH/1487	
		ASSY. / ITEMS: SHUTDOWN HEAT EXCHANGER ASSY. FOR 700 MW GHAVP UNIT 1&2 CUSTOMER: M/S NUCLEAR POWER CORPORATION										Date		01-02-2020	
												Rev.		02	
												Page No.		4 of 19	
Sr.No.	Component & Operation	Characteristic	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of Record	Inspection Agency			Remarks			
									P	W	R	H			


2.3	Procedure qualification for all applicable configuration, Welding operator qualification procedure, Weld repair procedure qualification	Welding parameters Mech & Chem Properties, Weld Soundness, Position	Major	Verification & Approval	100%	Approved WPS (Welding Procedure Specification) ASME sec-IX	As per approved specification. ASME sec-IX	PQR and BHEL record	2	1	-	1	
3	FABRICATION												
3.1	Tube sheet												
3.1.1	Material Identification of Tube sheet	QS clearance/ inspection Reports, SRs and identification markings	Major	TC Verification, Stamp verification, Visual check and Dimensions	100%	TPS & QAP, PC-E-1044	As per app. TPS & QAP	Identification reports	2	2	-	1	Separate QAP shall be prepared
3.1.2	Machining of Tube sheet for Cladding	Dimension (OD, Thickness, Flatness)	Major	Measurement	100%	Approved Drawing/ Procedure	As per Approved Drawing / Procedure	Inspection Report	2	2	1	-	
3.1.3	MT of machined surface before cladding	Surface Examination	Major	NDE	100%	Approved MT Examination Procedure	As per approved MT Examination Procedure	Inspection Report	2	1	-	1	
3.1.4	Release of welding Consumables for Cladding	Conformance to Specification	Major	TC Verification	100%	Approved TPS	As per Approved TPS	Test Certificate	2	2	1	1	Verification of consumable material stock, witnessed in batch qualification.
3.1.5	Cladding of Tube sheet	Welding Parameters	Major	Measurement of thickness	100%	Approved WPS and PQR	As per Approved WPS and PQR	Inspection Report	2	2	1	-	By qualified WPS/PQR
3.1.6	Surface Preparation and Machining of cladded surface of tube sheet for NDE & verification of cladding thickness.	Dimension	Major	Measurement	Random Check	Approved Drawing/ Procedure	As per Approved Drawing / Procedure	Inspection Report	2	2	1	-	
3.1.7	LPE and UTE of Cladding	Surface and Volumetric Examination	Major	NDE	100%	Approved LPE and UTE Examination Procedure	As per LPE and UTE Examination Procedure	Inspection Report	2	1	-	1	
3.1.8	Stress Relieving of cladded Tube Sheet	Control of Heating rate, Cooling rate, Soaking and Holding time	Major	HT Chart Review	100%	Approved Heat treatment Procedure	As per Approved Heat treatment Procedure	Inspection Report	2	1	-	1	Calibrated Furnace shall be used. Loading of Tube Sheet in Furnace shall be witnessed by NPC QS
3.1.9	LPE and UTE of Cladding after Stress relieving	Surface and Volumetric Examination	Major	NDE	100%	Approved LPE and UTE Examination Procedure	As per LPE and UTE Examination Procedure	Inspection Report	2	1	-	1	


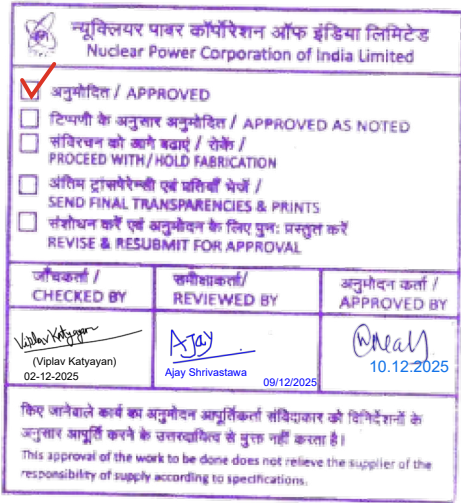
NPCIL


BHEL

		QUALITY ASSURANCE PLAN					QA PLAN NO.		QAX/TH/1487	
		ASSY. / ITEMS: SHUTDOWN HEAT EXCHANGER ASSY. FOR 700 MW GHAVP UNIT 1&2 CUSTOMER: M/S NUCLEAR POWER CORPORATION					Date		01-02-2020	
							Rev.		02	
							Page No.		5 of 19	
Sr.No.	Component & Operation	Characteristic	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of Record	Inspection Agency P W R H	Remarks



3.1.10	Final machining of Tube sheet	Dimensions, surface finish, Parallelity & flatness	Major	Measurement	100%	Approved Drawing	As per Approved Drawing	Inspection Report	2	1, 2	-	-	
3.1.11	LPE Examination after final Machining of Tube sheet Cladding	Surface Defect Examination	Major	NDE	100%	Approved Procedure	As per LPE Examination Procedure	Inspection Report	2	1, 2	-	1	
3.1.12	Drilling Qualification	Hole Dia., Drift, Surface finish, Positional Accuracy, Ligament verification	Major	Measurement	100%	Approved Drawings / Approved drilling procedure	As per Approved Drawings / Approved drilling procedure	Inspection Report	2	1, 2	-	1	NPC QS Shall verify the Drilling results on DQB and subsequently allow Tube Sheet Drilling
3.1.13	Tube sheet drilling	Hole Dia., Drift, Surface finish, Positional Accuracy, Ligament check	Major	Measurement	100%	Approved Drawings / Approved drilling procedure	As per Approved Drawings / Approved drilling procedure	Inspection Report	2	1, 2	-	1	NPC QS shall verify holes drilled on mock up block & 10% holes on Tube Sheet randomly
3.1.14	Secondary side Tie rod Hole drilling after set up verification	Axis matching, Location of Tie Rod Holes	Major	Visual & Dimensional	100%	Approved Drawings / Drilling procedure	As per Approved Drawing / Drilling Procedure	Inspection Report	2	2	1	-	
3.1.15	Tapping and Thread verification of tie rod hole on tube sheet	Threads & depth, Dimension (Dia. & Position)	Major	Gauge check	100%	Approved Drawings	As per Approved Drawing	Inspection Report	2	1, 2	-	-	Random check by NPCIL
3.1.16	Radius machining of Secondary side Tube holes and LPE	Radius of WEP, LPE	Major	Gauge check, LPE	100%	Approved Drawings, Approved LPE Procedure	As per Approved Drawing & LPE Procedure	Inspection Report	2	2	1	-	
3.1.17	Marking and drilling of PCD holes for Main Studs	Dimension, PCD, Location of Holes	Major	Visual & Dimensional	100%	Approved Drawings	As per Approved Drawing	Inspection Report	2	2	1	1	Ensure the coordinates of bolt hole prior to start of drilling.
3.1.18	Machining of gasket groove of tube sheet and LPE	Dimension & LPE Examination	Major	Visual, Dimensional and LPE	100%	Approved Drawings, Procedure, LPE Procedure	Approved Drawings, Procedure, LPE Procedure	Inspection Report	2	2	1	1	
3.1.19	Marking and drilling of hole for dowel pin	Dimension, Location of Holes	Major	Visual & Dimensional	100%	Approved Drawings	As per Approved Drawing	Inspection Report	2	2	1	-	
3.1.20	Plate Material Identification of wrapper plate for tube sheet.	Identification, Chemical & mech. Properties	Major	Review of test certificates	100%	As per approved TPS and approved drawing	As per approved TPS	Inspection reports	2	2	1	-	
3.1.21	Setup of wrapper plate with tubesheet	Dimensions	Major	Measurement	Random	Approved Drawing	As per Approved Drawing	Inspection Report	2	1, 2	-	-	





Name of Main supplier :	 BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL (Govt of India undertaking)			
Name of sub Vender :	NA			
Sub. Vendor PO Number :	NA			
NPCIL PO Number :	CMM/FTP/10-33-1-1149/e-PO/30599 Dated : 25-01-2019			
QA reference Number :	Main vendor : 2190190	Sub Vendor : NA		
Customer:	 NUCLEAR POWER CARPORATION OF INDIA LIMITED (Govt of India Enterprise)			
PROJECT :	2 x 700 MW GORAKHPUR HARIYANA ANUVIDYUT PARIYAOJANA - 1&2			
Equipment :	D2O Heat Exchangers			
Document Number :	BHEL/NPCIL/30599/D2O HX/NDE/MT/01			
Document Title :	Procedure for Magnetic Particle Examination			
Main vendor :				
02	15.11.2025	2+14 = 16	 Manish Kumar Dewangan NDT Level II (MT)	 CHAVVA HARINATHA REDDY ASNT NDT Level-III RT, UT, MT & PT CER. No. 240612
Rev No	Date	Pages	Prepared by	Checked & Approved by

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Magnetic Particle Examination	BHEL/NPCIL/30599/D2O HX/NDE/MT/01

REVISION CONTROL SHEET

Rev. No.	Date	Description of Revision	
00	09.11.2019	Initial submission	
01	26.02.2020	Incorporating NPCIL comment on Rev. 00	
02	15.11.2025	[1]	Clause 1.1 is added in order to address the detail about technique sheet attached at Annexure - II
		[2]	Report format attached at Annexure – I is revised
Prepared By		Checked & Approved By	
<div> Manish Kumar Dewangan NDT Level II (MT)</div>		<div> CHAVVA HARINATHA REDDY ASNT NDT Level-III RT, UT, MT & PT CER. No. 240612</div>	

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Magnetic Particle Examination	BHEL/NPCIL/30599/D2O HX/NDE/MT/01

1.0 SCOPE :

This procedure covers the magnetic particle examination & its acceptance standard applicable for ferromagnetic materials/welds as per the requirement of ASME BPVC Sec III. The extent of testing will be as required by the applicable specification, approved drawing/QAP & NDE Plan Document No. BHEL/NPCIL/30599/D2O HX/IARS/NDE Plan/01, BHEL/NPCIL/30599/D2OHX/FMRC/NDEPlan/01, BHEL/NPCIL/30599/D2O HX/BCL/NDEPlan/01, BHEL/NPCIL/30599/D2OHX/SDC/NDEPlan/01, BHEL/NPCIL/30599/D2O HX/RGCL/NDE Plan/01 .

- 1.1 Technique Sheet for performing Magnetic Particle Examination of Tube Sheets of all types of D2O Heat Exchanger is attached at Annexure – II.

2.0 REFERENCE DOCUMENTS :


- [A] ASME BPVC Sec V Article 7, Edition 2017
[B] ASME BPVC Sec III, Edition 2017
[C] NPCIL Tender Specification : PC-E-1044 Rev. 01
[D] ASTM E-709

3.0 QUALIFICATION OF TESTING PERSONNEL :

All the personnel performing magnetic particle examination shall be qualified in accordance with recommended guideline of SNT-TC-1A of ASNT/IS-13805/ISO 9712.

4.0 SURFACE PREPARATION :

- Examination can be performed in as-welded, as-rolled, as-cast, or as forged conditions. However, surface preparation by grinding or machining may be necessary where surface irregularities could mask indications due to discontinuities.
- The surface to be examined and all adjacent areas within at least 1 in. (25 mm) shall be dry and free of all dirt, grease, lint, scale, welding flux and spatter, oil, or other extraneous matter that could interfere with the examination.
- Cleaning may be accomplished using detergents, organic solvents, descaling solutions, paint removers, vapour degreasing, sand or grit blasting, or ultrasonic cleaning methods.
- Nonmagnetic surface contrasts may be applied by the examiner to uncoated surfaces, only in amounts sufficient to enhance particle contrast. When nonmagnetic surface contrast enhancement is used, it shall be demonstrated that indications can be detected through the enhancement. Thickness measurement of this nonmagnetic surface contrast enhancement is not required.

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5.0 **TECHNIQUES :**

One or more of the following five magnetization techniques shall be used:

- (A) prod technique
- (B) longitudinal magnetization technique
- (C) circular magnetization technique
- (D) yoke technique
- (E) multidirectional magnetization technique

5.1 **Prod Technique :**

5.1.1 **Magnetizing Procedure :**

For the prod technique, magnetization is accomplished by portable prod type electrical contacts pressed against the surface in the area to be examined. To avoid arcing, a remote control switch, which may be built into the prod handles, shall be provided to permit the current to be applied after the prods have been properly positioned.

The prod tips shall be kept clean and dressed. If the open circuit voltage of the magnetizing current source is greater than 25 V, lead, steel, or aluminum (rather than copper) tipped prods are recommended to avoid copper deposits on the part being examined.

5.1.2 **Magnetizing Current :**


Direct or rectified magnetizing current shall be used. The current shall be 100 amp/in. (4 amp/mm) to 150 amp/in. (5 amp/mm) of prod spacing for sections 3/4 in. (19 mm) thick or greater. For sections less than 3/4 in. (19 mm) thick, the current shall be 90 amp/in. (3.6 amp/mm) to 110 amp/in. (4.4 amp/mm) of prod spacing.

5.1.3 **Prod Spacing :**

Prod spacing shall not exceed 8 in. (200 mm). Shorter spacing may be used to accommodate the geometric limitations of the area being examined or to increase the sensitivity, but prod spacings of less than 3 in. (75 mm) are usually not practical due to banding of the particles around the prods.

5.2 **Longitudinal Magnetization Technique :**

Longitudinal part magnetization is produced by passing a current through a multi-turn coil encircling the part, or section of the part to be examined. A magnetic field is produced parallel to the axis of the coil. The unit of measurement is ampere turns (NI) (the actual amperage multiplied by the number of turns in the encircling coil or cable). The effective is variable and is a function of the fill factor and field extends on either

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side of the coil. The effective distance can easily be determined by use of a Gauss (Tesla) meter to identify where the flux lines are leaving to complete their return loop. Long parts should be examined in sections that do not exceed this length. There are four empirical longitudinal magnetization formulas employed for using encircling coils, the formula to be used depending on the fill factor. The formulas are included for historical continuity only. If used its use should be limited to simple shaped parts. It would be quicker and more accurate to use a Gauss (Tesla) meter, lay its probe on the part and measure the field rather than to calculate using the formulas.

5.2.1 Low Fill-Factor Coils :

In this case, the cross-sectional area of the fixed encircling coil greatly exceeds the cross-sectional area of the part (less than 10 % coil inside diameter). For proper part magnetization, such parts should be placed well within the coils and close to the inside wall of the coil. With this low fill-factor, adequate field strength for eccentrically positioned parts with a length-over diameter ratio (L/D) between 3 and 15 is calculated from the following equations:

5.2.1.1 Parts with Low Fill-Factor Positioned Close to Inside Wall of Coil:

$$NI = K/(L/D) (\pm 10 \%) \quad [\text{Eq.} - 1]$$

Where :


- N = number of turns in the coil,
- I = coil current to be used, amperes (A),
- K = 45000 (empirically derived constant),
- L = part, length, in., (see Note),
- D = part diameter, in.; for hollow parts, see 5.2.4, and
- NI = ampere turns.

5.2.1.2 Parts with Low Fill-Factor Positioned in the Center of the Coil :

$$NI = KR/\{(6 L/D) - 5\} (\pm 10 \%) \quad [\text{Eq.} - 2]$$

Where :

- N = number of turns in the coil,
- I = coil current to be used, amperes (A),
- K = 43000 (empirically derived constant),
- R = coil radius, in.,
- L = part, length, in., (see Note),
- D = part diameter, in.; for hollow parts, see 5.2.4, and
- NI = ampere turns.

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5.2.2 Intermediate Fill-Factor Coils :

When the cross section of the coil is greater than twice and less than ten times the cross section of the part being examined:

$$NI = (NI)_{hf} (10 - Y) + (NI)_{lf} (Y - 2) / 8 \quad [\text{Eq. - 3}]$$

Where :

(NI)_{hf} = value of NI calculated for high fill-factor coils using Eq. - ~~3~~ 3

(NI)_{lf} = value of NI calculated for low fill-factor coils using Eq. - 1 or Eq. - 2, and

Y = ratio of the cross-sectional area of the coil to the cross section of the part.

5.2.3 High Fill-Factor Coils :

In this case, when fixed coils or cable wraps are used and the cross-sectional area of the coil is less than twice the cross sectional area (including hollow portions) of the part, the coil has a high fill-factor.

5.2.3.1 For Parts Within a High Fill-Factor Positioned Coil and for Parts with an L/D ratio equal to or greater than 3:

$$NI = K / \{ (L/D) + 2 \} (\pm 10 \%) \quad [\text{Eq. - 4}]$$

Where :

N = number of turns in the coil or cable wrap,

I = coil current, amperes (A),

K = 35000 (empirically derived constant),

L = part, length, in.,


D = part diameter, in., and

NI = ampere turns.

Note : For *L/D* ratios less than 3, a pole piece (ferromagnetic material approximately the same diameter as part) should be used to effectively increase the *L/D* ratio or utilize an alternative magnetization method such as induced current. For *L/D* ratios greater than 15, a maximum *L/D* value of 15 should be used for all formulas cited above.

5.2.4 L/D ratio for a Hollow Piece :

When calculating the *L/D* ratio for a hollow piece, D should be replaced with an effective diameter D (eff.) calculated using :

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$$D_{eff} = [(OD)^2 - (ID)^2]^{1/2}$$

Where :

OD = outside diameter of the cylinder, and

ID = inside diameter of the cylinder.

5.3 Circular Magnetization Technique :

5.3.1 Direct Contact Technique :

5.3.1.1 Magnetizing Procedure :

For this technique, magnetization is accomplished by passing current through the part to be examined. This produces a circular magnetic field that is approximately perpendicular to the direction of current flow in the part.

5.3.1.2 Magnetizing Current :

Direct or rectified (half-wave rectified or full-wave rectified) magnetizing current shall be used.


1. The current shall be 300 amp/in. (12 A/mm) to 800 amp/in. (32 A/mm) of outer diameter.
2. For parts with geometric shapes other than round, the greatest cross-sectional diagonal in a plane at right angles to the current flow shall be used in lieu of the outer diameter in (1) above.
3. If the current levels required for (1) cannot be obtained, the maximum current obtainable shall be used and the field adequacy shall be demonstrated

5.3.2 Central Conductor Technique :

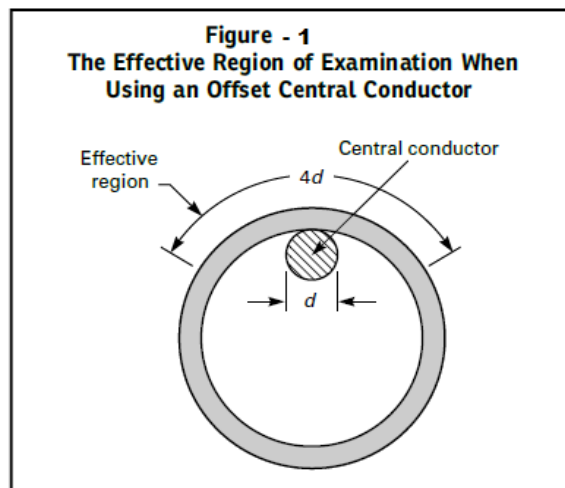
5.3.2.1 Magnetizing Procedure :

For this technique, a central conductor is used to examine the internal surfaces of cylindrically or ring-shaped parts. The central conductor technique may also be used for examining the outside surfaces of these shapes. Where large diameter cylinders are to be examined, the conductor shall be positioned close to the internal surface of the cylinder. When the conductor is not centered, the circumference of the cylinder shall be examined in increments. Field strength measurements in accordance with clause 6.4 shall be used, to determine the extent of the arc that may be examined for each conductor position. Bars or cables, passed through the bore of a cylinder, may be used to induce circular magnetization.

When the conductor passing through the inside of the part is placed against an inside wall of the part, the current levels, as given in clause 5.3.1.2 (1) shall apply, except that the diameter used for current calculations shall be the sum of the diameter of the central

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conductor and twice the wall thickness. The distance along the part circumference (exterior) that is effectively magnetized shall be taken as four times the diameter of the central conductor, as illustrated in Figure 1. The entire circumference shall be inspected by rotating the part on the conductor, allowing for approximately a 10% magnetic field overlap.



5.3.2.2 Magnetizing Current :

The field strength required shall be equal to that determined in clause 5.3.1.2 for a single-turn central conductor. The magnetic field will increase in proportion to the number of times the central conductor cable passes through a hollow part. When the central conductor technique is used, magnetic field adequacy shall be verified using a magnetic particle field indicator in accordance with clause 6.4


5.4 Yoke Technique :

For this technique, alternating or direct current electromagnetic yokes, or permanent magnet yokes, shall be used.

5.5 Multidirectional Magnetization Technique :

5.5.1 Magnetizing Procedure :

For this technique, magnetization is accomplished by high amperage power packs operating as many as three circuits that are energized one at a time in rapid succession. The effect of these rapidly alternating magnetizing currents is to produce an overall magnetization of the part in multiple directions. Circular or longitudinal magnetic fields may be generated in any combination using the various techniques described in clause 5.2 and 5.3.

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5.5.2 Magnetic Field Strength :

Only three phase, full-wave rectified current shall be used to magnetize the part. The initial magnetizing current requirements for each circuit shall be established using the previously described guidelines (see clause 5.2 and 5.3). The adequacy of the magnetic field shall be demonstrated using artificial flaw shims or a pie-shaped magnetic particle field indicator in accordance with clause 6.4. A Hall-Effect probe gaussmeter shall not be used to measure field adequacy for the multidirectional magnetization technique. An adequate field shall be obtained in at least two nearly perpendicular directions, and the field intensities shall be balanced so that a strong field in one direction does not overwhelm the field in the other direction. For areas where adequate field strengths cannot be demonstrated, additional magnetic particle techniques shall be used to obtain the required two-directional coverage.

6.0 CALIBRATION :

6.1 Frequency of Calibration :

6.1.1 Magnetizing Equipment :

Magnetizing equipment with an ammeter shall be calibrated at least once a year, or whenever the equipment has been subjected to major electric repair, periodic overhaul, or damage. If equipment has not been in use for a year or more, calibration shall be done prior to first use.

6.1.2 Light Meters :

Light meters shall be calibrated at least once a year or whenever a meter has been repaired. If meters have not been in use for one year or more, calibration shall be done before being used.


6.2 Lifting Powers of Yoke :

The magnetizing power of yokes shall be verified prior to use each day the yoke is used. The magnetizing power of yokes shall be verified whenever the yoke has been damaged or repaired.

Each alternating current electromagnetic yoke shall have a lifting power of at least 4.5 kg at the maximum pole spacing that will be used.

Each direct current or permanent magnetic yoke shall have a lifting power of at least 18 kg at the maximum pole spacing that will be used.

Leg spacing should be between 75 mm & 200 mm.

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6.3 Gaussmeters :

Hall-Effect probe gaussmeters used to verify magnetizing field strength shall be calibrated at least once a year or whenever the equipment has been subjected to a major repair, periodic overhaul, or damage. If equipment has not been in use for a year or more, calibration shall be done prior to first use.

6.4 Magnetic Field Adequacy And Direction :


The use of magnetic field indicators, artificial shims, or Hall-Effect tangential-field probes are only permitted when specifically referenced by the following magnetizing techniques:

- (a) Longitudinal
- (b) Circular
- (c) Multidirectional

The applied magnetic field shall have sufficient strength to produce satisfactory indications, but shall not be so strong that it causes masking of relevant indications by nonrelevant accumulations of magnetic particles.

The adequacy of magnetic field strength can be verified by using one or more of the following three methods :

- (a) **Pie-Shaped Magnetic Particle Field Indicator :** The indicator, shall be positioned on the surface to be examined, such that the copper plated side is away from the inspected surface. A suitable field strength is indicated when a clearly defined line (or lines) of magnetic particles form(s) across the copper face of the indicator when the magnetic particles are applied simultaneously with the magnetizing force. When a clearly defined line of particles is not formed, the magnetizing technique shall be changed as needed. Pie-type indicators are best used with dry particle procedures.
- (b) **Artificial Flaw Shims :** One of the shims whose orientation is such that it can have a component perpendicular to the applied magnetic field shall be used. Shims with linear notches shall be oriented so that at least one notch is perpendicular to the applied magnetic field. Shims with only circular notches may be used in any orientation. Shims shall be attached to the surface to be examined, such that the artificial flaw side of the shim is toward the inspected surface. A suitable field strength is indicated when a clearly defined line (or lines) of magnetic particles, representing the 30% depth flaw, appear (s) on the shim face when magnetic particles are applied simultaneously with the magnetizing force. When a clearly defined line of particles is not formed, the magnetizing technique shall be changed as needed. Shim-type indicators are best used with wet particle procedures.
- (c) **Hall-Effect Tangential-Field Probe :** A gaussmeter and Hall-Effect tangential-field probe shall be used for measuring the peak value of a tangential field. The

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probe shall be positioned on the surface to be examined, such that the maximum field strength is determined. A suitable field strength is indicated when the measured field is within the range of 30 G to 60 G while the magnetizing force is being applied.

6.5 Wet Particle Concentration & Settling Volume :

Bath concentration is determined by measuring its settling volume. This is accomplished through the use of a pear-shaped centrifuge tube with a 1-mL stem (0.05-mL divisions) for fluorescent particle suspensions or a 1.5-mL stem (0.1-mL divisions) for nonfluorescent suspensions. Before sampling, the suspension should be run through the recirculating system for at least 30 min to ensure thorough mixing of all particles which could have settled on the sump screen and along the sides or bottom of the tank.

After that, taking a 100-mL portion of the suspension from the hose or nozzle and allow it to settle for approximately 60 min with petroleum distillate suspensions or 30 min with water-based suspensions before reading. The volume settling out at the bottom of the tube is indicative of the particle concentration in the bath.

For fluorescent particles, the required settling volume is from 0.1 mL to 0.4 mL in a 100-mL bath sample and from 1.2 mL to 2.4 mL per 100 mL of vehicle for nonfluorescent particles unless otherwise specified by the particle manufacturer. Concentration checks shall be made at least every eight hours.

6.6 System Performance Of Horizontal Units :


The Ketos (Betz) ring specimen shall be used in evaluating and comparing the overall performance and sensitivity of both dry and wet, fluorescent and nonfluorescent magnetic particle techniques using a central conductor magnetization technique.

The test ring is circularly magnetized with full-wave rectified AC passing through a central conductor with a 1 in. to 1 1/4 in. (25 mm to 32 mm) diameter hole located in the ring center. The conductor should have a length greater than 16 in. (400 mm). The currents used shall be 1400 A, 2500 A, and 3400 A. The minimum number of holes shown shall be three, five, and six, respectively. The ring edge should be examined with either black light or visible light, depending on the type of particles involved. This test shall be run at the three amperages if the unit will be used at these or higher amperages. The amperage values stated shall not be exceeded in the test. If the test does not reveal the required number of holes, the equipment shall be taken out of service and the cause of the loss of sensitivity determined and corrected. This test shall be run at least once per week.

7.0 EXAMINATION :

examinations shall be conducted with sufficient field overlap to ensure 100% coverage at the required sensitivity.

At least two separate examinations shall be performed on each area. During the second examination, the lines of magnetic flux shall be approximately perpendicular to those

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used during the first examination. A different technique for magnetization may be used for the second examination.

7.1 **Method of Examination :**

The ferromagnetic particles used in an examination medium can be either wet or dry, and may be either fluorescent or nonfluorescent. Examination(s) shall be done by the continuous method.

7.1.1 **Dry Particles :**

The magnetizing current shall remain on while the examination medium is being applied and while any excess of the examination medium is removed.

7.1.2 **Wet Particles :**

The magnetizing current shall be turned on after the particles have been applied. Flow of particles shall stop with the application of current. Wet particles applied from aerosol spray cans or pump sprayers may be applied before and/or during magnetizing current application. Wet particles may be applied during the application of magnetizing current if they are not applied directly to the examination area and are allowed to flow over the examination area or are applied directly to the examination area with low velocities insufficient to remove accumulated particles.

8.0 **LIGHTING & ASSOCIATED REQUIREMENT :**


8.1 **For Visible (Color Contrast) Magnetic Particles :**

Natural or supplemental white light source can be used. The minimum light intensity shall be **100 fc (1076 lx)** at the examination surface. The light intensity shall be measured with a white light meter prior to the evaluation of indications

8.2 **For Fluorescent Magnetic Particles With Black Light :**

Ultraviolet light also called as black light will be used during examination. The examination shall be performed as follows :

- It shall be performed in darkened area
- Examiners shall be in a darkened area for at least **5 min** prior to performing examinations to enable their eyes to adapt to dark viewing. Glasses or lenses worn by examiners shall not be photochromic or exhibit any fluorescence.
- Black lights shall achieve a minimum of **1000 $\mu\text{W}/\text{cm}^2$** on the surface of the part being examined throughout the examination.

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- (d) Reflectors, filters, glasses, and lenses should be checked and, if necessary, cleaned prior to use. Cracked or broken reflectors, filters, glasses, or lenses shall be replaced immediately.
- (e) The black light intensity shall be measured with a black light meter prior to use, whenever the light's power source is interrupted or changed, and at the completion of the examination or series of examinations.

9.0 **DEMAGNETISATION :**

Demagnetisation following examination shall be carried out where residual magnetism can interfere with subsequent process or usage. Residual magnetism shall not exceed 3 gauss. Unless specifically required Demagnetisation for prod and yoke technique need not be done.

10.0 **POST EXAMINATION CLEANING:**

Surface examined shall be cleaned after evaluation with dry or wet cotton rag.


11.0 **EVALUATION OF INDICATION :**

- (a) Mechanical discontinuities at the surface are revealed by the retention of the examination medium. All indications are not necessarily defects, however, since certain metallurgical discontinuities and magnetic permeability variations may produce similar indications which are not relevant.
- (b) Any indication that is believed to be nonrelevant shall be reexamined by the same or other nondestructive examination methods to verify whether or not actual defects are present. Surface conditioning may precede the reexamination. After an indication has been verified to be nonrelevant, it is not necessary to reinvestigate repetitive nonrelevant indications of the same type. Nonrelevant indications that would mask defects are unacceptable.
- (c) Relevant indications are indications which result from imperfections. Linear indications are indications in which the length is more than three times the width. Rounded indications are indications which are circular or elliptical with the length equal to or less than three times the width.

12.0 **ACCEPTANCE STANDARD :**

12.1 **For Plates, Forgings, Bars, Castings, Tubular products, Fittings & its repaired areas :**

- (a) Only imperfections producing indications with major dimensions greater than 1/16 in. (1.5 mm) are required to be evaluated for acceptance.
- (b) Imperfections producing the following indications are unacceptable:
 - (1) Any inear indications greater than 1.5 mm long for material less than 16 mm thick, greater than 3 mm long for material from 16 mm thick to under 50 mm thick, and 5 mm long for material 50 mm thick and greater.

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- (2) Rounded indications with dimensions greater than 3 mm for thicknesses less than 16 mm and greater than 5 mm for thicknesses 16 mm and greater.
- (3) Four or more relevant indications in a line separated by 1/16 in. (1.5 mm) or less edge to edge;
- (4) Ten or more relevant indications in any 4000 square mm of area whose major dimension is no more than 150 mm with the dimensions taken in the most unfavourable location relative to the indications being evaluated.

12.2 For Bolts, Studs, and Nuts :

- (1) Linear nonaxial indications are unacceptable.
- (2) Linear axial indications greater than 25 mm long are unacceptable.

12.3 For Weld Edge Preparation Surfaces :


- (a) Laminar type imperfections are acceptable without repair if they do not exceed 25 mm in length.
- (b) Indications of non-laminar imperfections of (1) through (3) below are unacceptable :
 - (1) Any Linear indications greater than 5 mm long
 - (2) Rounded indications with dimensions greater than 5 mm
 - (3) Four or more indications, in a line separated by 1.5 mm or less, edge to edge

12.4 For Weld Joints & Weld Metal Cladding :

- (a) Only imperfections producing indications with major dimensions greater than 1/16 in. (1.5 mm) are required to be evaluated for acceptance.
- (b) Imperfections producing the following indications are unacceptable:
 - (1) Any crack and linear indications with dimensions greater than 1.5 mm
 - (2) Rounded indications with dimensions greater than 5 mm
 - (3) Four or more rounded indications in a line separated by 1.5 mm or less edge to edge
 - (4) Ten or more rounded indications in any 4000 square mm of surface with major dimension of this area not to exceed 150 mm with the area taken in most unfavourable location relative to the indications being evaluated.

13.0 REPORTING :

The reporting of test results shall be made on the test proforma as given in **Annexure - I**.

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Annexure – I**BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL****Non-Destructive Testing Division****Magnetic Particle Examination Report****Part - 1 : Test Requisition (From : To :**

Ref. No. :		Date :
Component :		Qty. :
Component Id :		
Drg. No. :	Rev. :	Drg. Item No. :
Welder Name :		Weld Joint Length :
Weld Joint No. :		Surface Condition :
W.O. No./P.O.No. :		
QAP No. :		QAP Cl. No. :
Test Specification/ Procedure No. :		
Area of Test :		
Material Grade & Thickness :		
Project :		

Part - 2 : Test Report (From : To :


Report No. :	Date :
Test Procedure No. :	
Test Technique :	
Magnetizing Current/Lifting Power :	
Testing Medium :	
Lighting Equipment & Light Intensity :	
Magnetic Field Adequacy & Direction :	
Weld Length Tested :	

Demagnetization required : Yes/ No, If yes final demagnetization value:-

Observation (including map or record of indication) :

Final Result :

Performed By	Evaluated By	Revised/Witnessed By

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Annexure – II

Technique Sheet for Magnetic Particle Examination of Tube Sheets of D2O HX

Part to be inspected	Tube Sheet of all type of D2O Heat Exchanger
Procedure Reference	NPCIL approved BHEL's Procedure No. BHEL/NPCIL/30599/D2O HX/NDE/MT/01
Examination personnel	Personal performing Magnetic Particle Examination shall be qualified as Level – I or Level – II Evaluation of test results shall be done by Level - II or Level – III qualified personnel.
Surface condition	The surface to be examined and all adjacent areas within at least 25 mm shall be dry and free of all dirt, grease, lint, scale, oil or other extraneous matter that could interfere with the examination.
Test technique	Electromagnetic Yoke Technique using alternating current
Lifting Power	Having lifting power of more than 4.5 kg in alternation current mode
Magnetic Particle & its suspension medium	Water suspendible black magnetic powder shall be used
Settling Volume	1.2 ml to 2.4 ml per 100 ml
Magnetic field adequacy check	Pie shaped field indicator shall be used to check magnetic field adequacy
Examination coverage	Each area is to be examined at least twice, with the lines of flux during one examination being approximately perpendicular to the lines of flux during the other.
Environment condition	Illumination (Natural or Supplemental white light) of the examination surface is required for the evaluation of indication. The minimum light intensity shall be 1076 lux on test surface during examination.
Interpretation & Evaluation	As per clause 11 of the above mentioned procedure
Acceptance criteria	As per clause 12.1 of the above mentioned procedure
Post examination cleaning	Surfaces examined shall be cleaned thoroughly after evaluation of the test with dry cotton cloth with or without solvent.

Prepared by





Manish Kumar Dewangan
NDT Level II (MT)




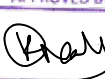
Approved by





CHAVVA HARINATHA REDDY
ASNT NDT Level-III
RT, UT, MT & PT
CER. No. 240612


Name of Main supplier :		BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL (Govt of India undertaking)
Name of sub Vender :	NA	
Sub. Vendor PO Number :	NA	
NPCIL PO Number :	CMM/FTP/10-33-1-1149/e-PO/30599 Dated : 25-01-2019	
QA reference Number :	Main vendor : 2190190	Sub Vendor : NA
Customer:		NUCLEAR POWER CORPORATION OF INDIA LIMITED (Govt of India Enterprise)
PROJECT :	2 x 700 MW GORAKHPUR HARIYANA ANUVIDYUT PARIYOJANA - 1&2	
Equipment :	D2O Heat Exchangers	
Document Number :	BHEL/NPCIL/30599/D2O HX/NDE/UT/02	
Document Title :	Specification for Ultrasonic Examination of weld metal overlay cladding	

Main vendor :



 न्यूक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Limited		
<input checked="" type="checkbox"/> अनुमोदित / APPROVED <input type="checkbox"/> टिप्पणी के अनुसार अनुमोदित / APPROVED AS NOTED <input type="checkbox"/> संशोधन को आगे बढ़ाएं / सेट करें / PROCEED WITH / HOLD FABRICATION <input type="checkbox"/> अंतिम ट्रांसपेरेंसी एवं प्रिंटिंग भेजें / SEND FINAL TRANSPARENCIES & PRINTS <input type="checkbox"/> संशोधन करें एवं अनुमोदन के लिए पुनः प्रस्तुत करें / REVISE & RESUBMIT FOR APPROVAL		
जांचकर्ता / CHECKED BY  23-12-2025 (Viplav Katayayan)	समीक्षकर्ता / REVIEWED BY  24-12-2025 Asim Israr	अनुमोदन कर्ता / APPROVED BY 
किए जानेवाले कार्य का अनुमोदन आपूर्तिकर्ता संशोधन के निर्देशनों के अनुसार आपूर्ति करने के उत्तरदायित्व से मुक्त नहीं करता है। This approval of the work to be done does not relieve the supplier of the responsibility of supply according to specifications.		

02	22.12.2025	2+9 = 11	 Manish Kumar NDT Level II (UT)	 Manish Kumar Dewangan NDT Level II (UT)
Rev No	Date	Pages	Prepared by	Checked & Approved by


*Previous revision of this procedure was reviewed by Sh.V.K Pandey and Sh. P. Puri.

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REVISION CONTROL SHEET

Rev. No.	Date	Description of Revision	
00	04.11.2019	Initial submission	
01	15.02.2020	Incorporating NPCIL comment on Rev. 00	
02	22.12.2025	[1]	Clause 1.4 is added in order to address the detail about technique sheet attached at Annexure - 1
		[2]	Clause 2.0 is revised- NPCIL specification No. PC-P-978 is added
		[3]	Clause 5.0 revised- Equipment shall be calibrated for screen height linearity and amplitude control linearity.
		[4]	Clause 6.0 is revised- Probe detail is specified.
		[5]	Clause 9.0 is revised- DAC method is specified
		[6]	Clause 10.5 is revised- Scanning direction is elaborated
		[7]	Clause 14.0 is revised- Report Format attached as Annexure-II
Prepared By		Checked & Approved By	
<div> Manish Kumar NDT Level II (UT)</div>		<div> Manish Kumar Dewangan NDT Level II (UT)</div>	

Simran

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1.0 SCOPE :

- 1.1 This Specification covers the procedure & acceptance standard for ultrasonic examination of weld metal overlay cladding as required by the applicable specification, approved drawing/QAP or Code & NDE Plan Document No. BHEL/NPCIL/D2O HX/BCL/NDE Plan, BHEL/NPCIL/D2O HX/IARS/NDE Plan, BHEL/NPCIL/D2O HX/FMRC/NDE Plan, BHEL/NPCIL/D2O HX/RGCL/NDE Plan, BHEL/NPCIL/D2O HX/SDC/NDE Plan.
- 1.2 This specification provides the technical requirements for the straight beam and angle beam ultrasonic examination of weld deposited cladding.
- 1.3 This specification is intended to detect defects parallel to the surface and also perpendicular to the surface.
- 1.4 Technique Sheet for performing Ultrasonic Examination is attached at Annexure – I.

2.0 REFERENCE DOCUMENT :

- ASME BPVC Sec. V Art. 4 Edition 2017
- NPCIL Tender Specification : PC-E-1044 Rev. 01
- NPCIL Specification : PC-P-978 rev. 00

3.0 EXAMINATION PERSONNEL :


All the personnel performing ultrasonic examination shall be qualified in accordance with recommended guideline of SNT-TC-1A of ASNT/IS-13805/ISO 9712.

4.0 SURFACE CONDITION :

The surface of the cladding shall be smooth, free of notches and machined to a finish to ensure acoustical contact of the search unit. Waviness of surface shall be such that distance between surface and probe does not exceed 0.5mm.

5.0 EQUIPMENT :

A pulse-echo-type of ultrasonic instrument shall be used. The instrument shall be capable of operation at frequencies over the range of at least 1 MHz to 5 MHz and shall be equipped with a stepped gain control in units of 2.0 dB or less. Equipment shall be calibrated for screen height linearity and amplitude control linearity atleast ones in a year.

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6.0 SEARCH UNITS :

6.1 **For Straight Beam Examination :**

M/s EEC make TRM-4L (Dual crystal, 4 MHz frequency, Longitudinal wave) or equivalent

6.2 **For Angle Beam Examination :**


M/s Applus NDT make FS-40 & FS-18 (Dual crystal, 2 MHz frequency, Longitudinal wave having 70 degree refracted angle)


7.0 COUPLANT :

Oil, grease, Glycerin & Water or cellulose paste shall be used as Couplant. The Couplant including additives shall not be detrimental to the material being examined. Couplant used for testing shall be the same as used for calibration. The Couplant shall not have halogens & sulfur exceeding 25 ppm each.

8.0 CALIBRATION BLOCKS :

- 8.1 The material used for making calibration blocks shall be of the same material specification or equivalent P-Number grouping as one of the materials being examined.
- 8.2 Deposition of clad shall be by the same method as used to clad the component to be examined.
- 8.3 The Calibration block shall receive the same type of heat treatment as the material specification.
- 8.4 The surface finish on the scanning surface of the block shall be representative of the scanning surface finishes on the component to be examined.
- 8.5 The calibration block configuration and reflectors shall be as shown in **fig. 1**. A side drilled hole of 1.5 mm by 25 mm minimum depth shall be drilled into the block at the clad interface for straight beam examination. For Angle beam scanning 2 mm Flat bottom hole shall be used. The thickness of the weld metal overlay cladding shall be at least as thick as that to be examined. The thickness of the base material shall be at least twice the thickness of the weld metal overlay cladding.
- 8.6 The temperature differential between the calibration block and examination surfaces shall be within 14°C.



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9.0 CALIBRATION :

9.1 For Straight Beam Examination :

9.1.1 Calibration reflector type & size :

Side drilled hole (SDH) of 1.5 mm diameter as shown in fig. 2

9.1.2 Calibration Procedure :

Calibration shall be performed utilizing the calibration block as shown in fig. 3. The probe shall be placed over the cladded surface and directed towards the holes drilled at different depths one at a time. The probe shall be positioned for the maximum response from the calibration reflectors (holes). Identify the hole which gives highest amplitude. The gain control shall be such that the highest amplitude response shall be set as 80% of full screen height. Note down the dB level of that response. This shall be the reference level. Now mark the maximum amplitude response points from other holes and join the same to get a DAC curve.


9.2 For Angle Beam Examination :

9.2.1 Calibration reflector type & size :

Flat bottom hole (FBH) of 2.0 mm diameter drilled from the side face of the calibration block as shown in fig. 2

9.2.2 Calibration Procedure :

Calibration shall be performed utilizing the calibration blocks as shown in fig. 4. The probe shall be placed over the cladded surface and directed towards the flat bottom face of the holes drilled at different depths one at a time. The probe shall be positioned for the maximum response from the calibration reflectors (holes). Identify the hole which gives highest amplitude. The gain control shall be such that the highest amplitude response shall be set as 80% of full screen height. Note down the dB level of that response. This shall be the reference level. Now mark the maximum amplitude response points from other holes and join the same to get a DAC curve.

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10.0 EXAMINATION :

- 10.1 Contact technique with manual scanning using longitudinal wave beam will be employed.
- 10.2 The Examination shall be performed from the weld metal overlay surface with overlap of minimum 10% of effective probe dimension
- 10.3 The rate of probe movement (scanning speed) shall not exceed 150 mm/s unless calibration is verified at that scanning speed.
- 10.4 Scanning on component surface shall be done at plus 6 dB from reference level but evaluation for presence of any discontinuity shall be done at reference level.
- 10.5 For angle beam examination, scanning is to be done in two mutually perpendicular directions all over the surface of cladding as shown in fig. 1.

11.0 RECORDING & ACCEPTANCE CRITERIA :

- 11.1 All indications having an amplitude equal to greater than 50% of the reference level shall be recorded. If the signal to noise ratio is less than 6dB, this is to be recorded and further activities have to be agreed upon.
- 11.2 All indications with a signal amplitude equal to or greater than the reference level are unacceptable.
- 11.3 For straight beam scanning ,30 recordable indications with a maximum continuous length of 10 mm subject to a total length of 250 mm /meter length of the scanned area are acceptable.
- 11.4 Whenever the indications are interpreted as cracks/lack of fusion, they are unacceptable.

12.0 EXAMINATION OF REPAIRED AREAS :

Repaired area shall be subjected to same type of examination procedure and technique used for the original detection of defects. Record of all repaired area shall be noted as well as the results of the re-examination of the repaired areas. Such reports will be designated as R1, R2.....etc.

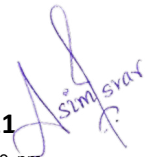
13.0 FINAL CLEANING :

After the examination is over, the Couplant shall be thoroughly cleaned and removed from the surface.

14.0 REPORTING :

Final Report describing the details of the technique adopted together with the analysis of results shall be prepared & submitted to the Purchaser.

A report of the examination shall be made complying all the essential requirements has to be present in the report format -**Annexure-II**




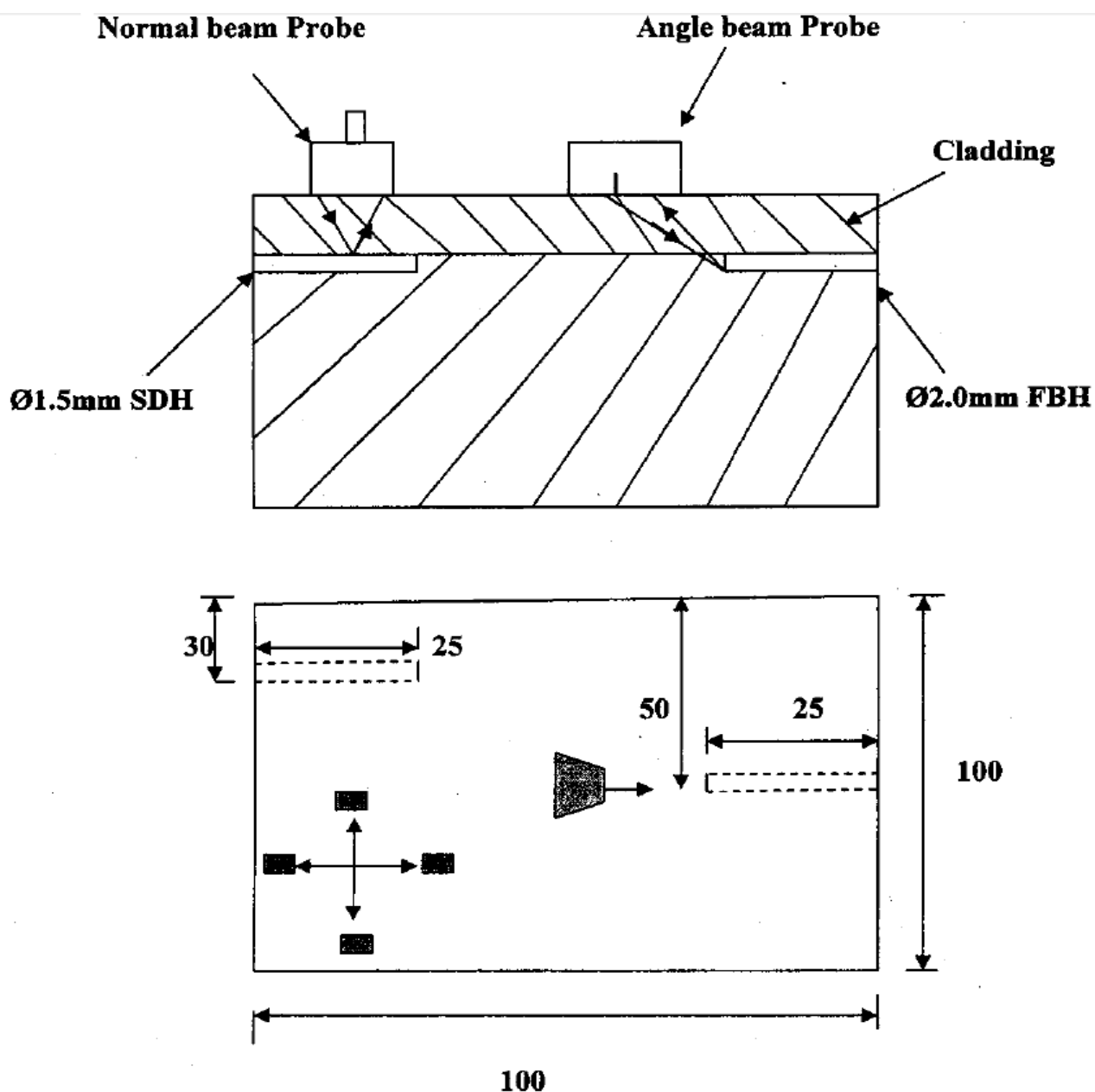
	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Specification for Ultrasonic Examination of weld metal overlay cladding	BHEL/NPCIL/30599/D2O HX/NDE/UT/02

Fig. – 1**Sketch of Calibration Block**


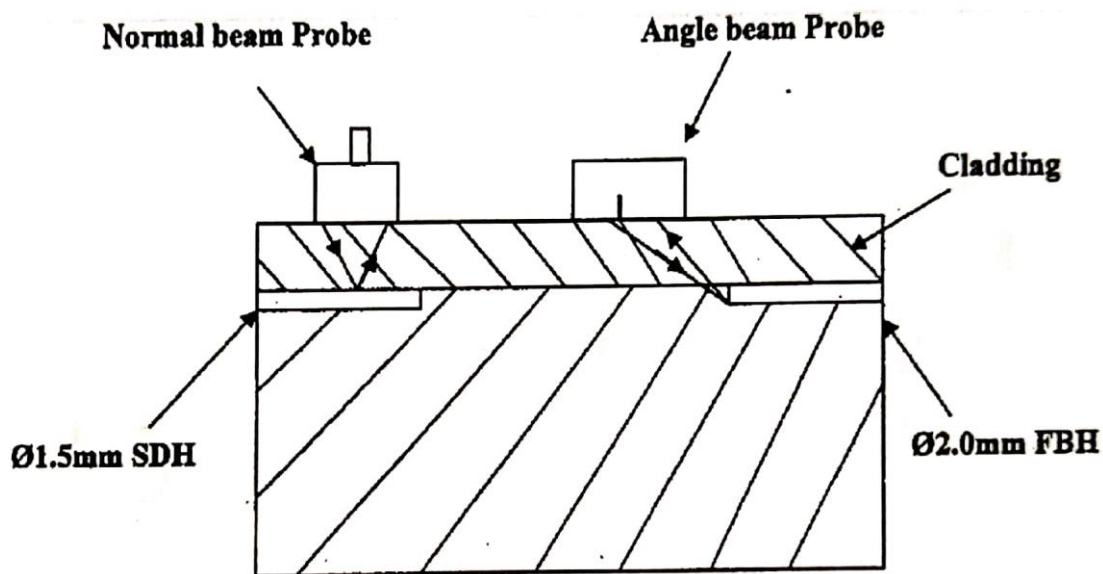
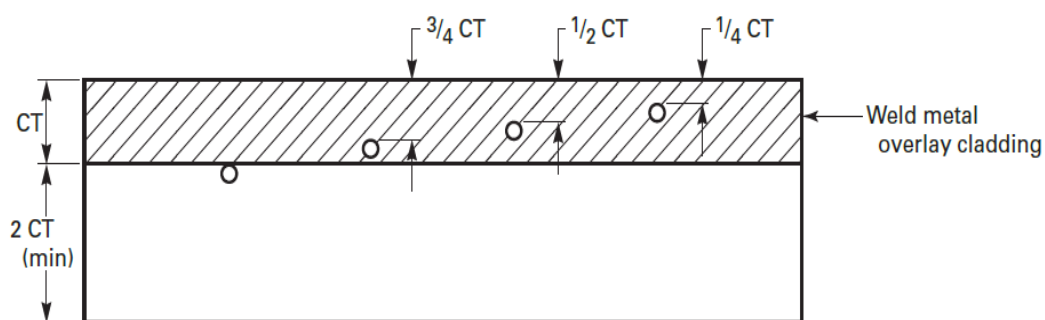
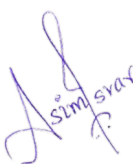

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Fig. – 2**Fig. – 3**

Calibration block ID : UT-D2O-01




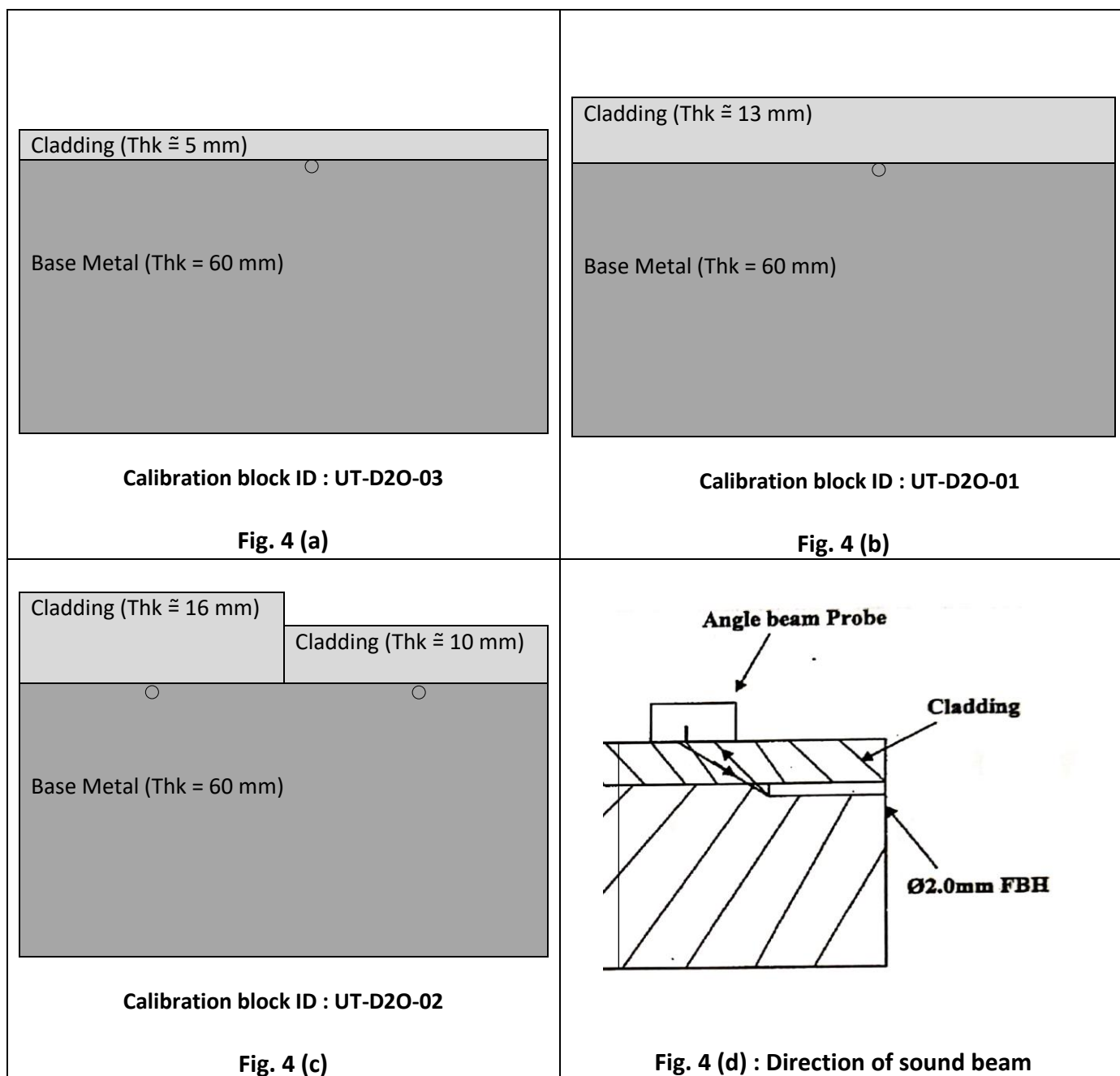

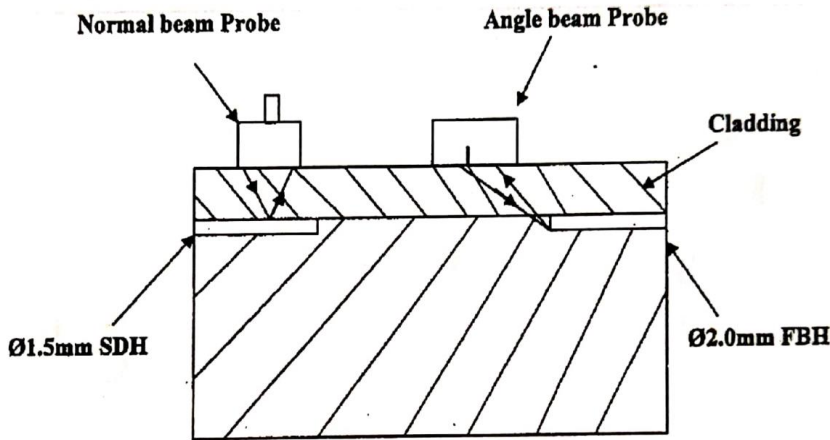
	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Specification for Ultrasonic Examination of weld metal overlay cladding	BHEL/NPCIL/30599/D2O HX/NDE/UT/02

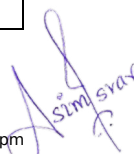
Fig. – 4


	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Specification for Ultrasonic Examination of weld metal overlay cladding	BHEL/NPCIL/30599/D2O HX/NDE/UT/02

Annexure – I

Technique Sheet for Ultrasonic Examination of Inconel Cladding overlay on tube sheet of all type of D2O HX

Part/weld to be inspected	Inconel cladding overlay on tube sheet of all type of D2O HX
Procedure Reference	NPCIL approved BHEL's Procedure No. BHEL/NPCIL/30599/D2O HX/NDE/UT/02
Material	[1] Base Material : Steel forging (SA 350 Gr LF2 Class – 1) [2] Cladding Material : Inconel material
Equipment	M/s GE/Krautkramer make USM 36 or equivalent
Probe	[1] M/s EEC make TRM-4L or equivalent for straight beam examination [2] M/s Applus NDT make FS-40 & FS-18 for angle beam examination
Couplant	Oil or glycerin shall be used as Couplant
Calibration block sketch showing direction of detection of defect	
Calibration	As per clause 9.0 of above mentioned procedure
Scanning direction for angle beam examination	Scanning is to be done in two mutually perpendicular directions all over the surface of cladding.
Recording & Acceptance criteria	As per clause 11.0 of above mentioned procedure
Post examination cleaning	After the examination is over, the Couplant shall be thoroughly cleaned and removed from the surface.
Test Report Format	As per Annexure - II



	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Specification for Ultrasonic Examination of weld metal overlay cladding	BHEL/NPCIL/30599/D2O HX/NDE/UT/02

Annexure - II**BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL****Non-Destructive Testing Division****Ultrasonic Examination Report**
Part - 1 : Test Requisition (From : To :

Ref. No. :		Date :
Component :		Qty. :
Component Id :		
Drg. No. :	Rev. :	Drg. Item No. :
Welder Name :		Weld Joint Length :
Weld Joint No. :		Surface Condition :
W.O. No./P.O.No. :		
QAP No. :		QAP Cl. No. :
Test Specification/ Procedure No. :		
Area of Test :		
Material Grade & Thickness :		
Project :		

Part - 2 : Test Report (From : To :

Report No. :		Date :
Test Procedure No. :		
Test Technique :		
Scanning :		Weld Length Tested :
Equipment Used :		

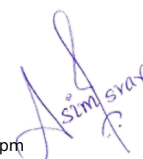
Probe Used :



Sr. No.	Identification	Freq. (MHz)	Size (mm)	Crystal (S/D)	Angle (deg.)
1					
2					
3					


Couplant Used :

Observation of Examination :
Final Result :



Tested By	Evaluated/Approved By	Witnessed/Reviewed By




Name of Main supplier :	 BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL (Govt of India undertaking)			
Name of sub Vender :	NA			
Sub. Vendor PO Number :	NA			
NPCIL PO Number :	CMM/FTP/10-33-1-1149/e-PO/30599 Dated : 25-01-2019			
QA reference Number :	Main vendor : 2190190	Sub Vendor : NA		
Customer:	 NUCLEAR POWER CORPORATION OF INDIA LIMITED (Govt of India Enterprise)			
PROJECT :	 2 x 700 MW GORAKHPUR HARIYANA ANUVIDYUT PARIYAOJANA - 1&2			
Equipment :	D2O Heat Exchangers			
Document Number :	BHEL/NPCIL/30599/D2O HX/NDE/PT/01			
Document Title :	Procedure for Liquid Penetrant Examination			
Main vendor :				
02	02.12.2025	2+12=14	 Manish Kumar NDT Level II (PT)	 Manish Kumar Dewangan NDT Level III (PT)
Rev No	Date	Pages	Prepared by	Checked & Approved by

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D20 HX/NDE/PT/01

REVISION CONTROL SHEET

Rev. No.	Date	Description of Revision	
00	04.11.2019	Initial submission	
01	29.01.2020	Incorporating NPCIL comment on Rev. 00	
02	02.12.2025	[1]	Clause 1.1 is added in order to address the detail about technique sheet attached at Annexure – II to V
		[2]	Report format attached at Annexure – I is revised
Prepared By		Checked & Approved By	
 Manish Kumar NDT Level II (PT)		 Manish Kumar Dewangan NDT Level III (PT)	

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D2O HX/NDE/PT/01

1.0 SCOPE :

This procedure describes the technique for liquid penetrant examination by the color contrast solvent removable method for the purpose of detecting discontinuities which are open to the surface on non-porous metals and other materials and welds of any shape or size to the extent as required by the applicable specification, approved drawing/QAP or Code & NDE Plan Document No. BHEL/NPCIL/D2O HX/BCL/NDE Plan, BHEL/NPCIL/D2O HX/IARS/NDE Plan, BHEL/NPCIL/D2O HX/FMRC/NDE Plan, BHEL/NPCIL/D2O HX/RGCL/NDE Plan, BHEL/NPCIL/D2O HX/SDC/NDE Plan.

Typical discontinuities detectable by this method are cracks, seams, laps, cold shuts, laminations, porosity etc.

- 1.1 Technique Sheet for performing Liquid Penetrant Examination of all types of D2O Heat Exchanger is attached at Annexure – II to V.

2.0 REFERENCE DOCUMENTS :

- [A] ASME BPVC Sec V Article 6, Edition 2017
 [B] ASME BPVC Sec III, Edition 2017
 [C] NPCIL Tender Specification : PC-E-1044 Rev. 01

3.0 QUALIFICATION OF TESTING PERSONNEL :


All the personnel performing Liquid Penetrant examination shall be qualified in accordance with recommended guideline of SNT-TC-1A of ASNT/IS-13805/ISO 9712.

4.0 PROCEDURE REVISION & RE-QUALIFICATION

This examination procedure shall be revised if there is any change in the essential or non-essential variables as given in Table-1 (based on Table T-621.1 of ASME Section V). A change in any essential variable shall require re-qualification of this written procedure by demonstration.

5.0 PENETRANT MATERIALS :

- 5.1 Penetrant Material consist of Penetrant, Cleaner & Developer.
- 5.2 Selection of liquid penetrant materials shall be from the same family (brand). Intermixing of penetrant materials from different families and different manufacturers is prohibited.
- 5.3 For examining nickle based alloys, The sulfur content in penetrant material shall not exceed 0.1% by weight. For Examining austenitic or duplex stainless steeland titanium,

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	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D2O HX/NDE/PT/01

The total chlorine and fluorine content in penetrant material shall not exceed 0.1% by weight.

Only NPC approved penetrant material shall be used for testing.

- 5.4** The certification of contaminant content for all liquid penetrant materials shall be obtained from the manufacturer. These certifications shall include the penetrant manufacturer's batch numbers and test results.

6.0 LIGHTING REQUIREMENT :


Adequate illumination is required to ensure no loss of the sensitivity in the examination. Examination shall be done under natural or suitable light. Illumination level shall be minimum 1076 LUX (100 fc) on the surface being tested. Light meter shall be calibrated at least once a year or whenever the meter has been repaired prior to use.

7.0 SURFACE PREPARATION :

- 7.1** Surface preparation by grinding, machining or other suitable method may be employed where surface irregularities may mask indications.
- 7.2** The surface to be examined and all adjacent areas within at least 25 mm 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.
- 7.3** 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. Cleaning method employed is an important part of the examination procedure. Cleaning solvents shall meet the requirement of Clause 5.3.

8.0 PRE CLEANING & DRYING :

Surface to be examined shall be cleaned thoroughly by solvent before application of penetrant. Drying shall be accomplished by normal evaporation or with forced hot air, as appropriate. The minimum time required for the Cleaner to dry from the surface shall be 1 minutes.

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	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D2O HX/NDE/PT/01

9.0 TEMPERATURE LIMITS DURING EXAMINATION :

The temperature of the penetrant and the surface of the part to be examined shall neither below 05 deg C nor above 52 deg C throughout the examination period. Local heating or Cooling is permitted provided the temperatures remain in the range of 05 deg C and 52 deg C during the examination. Where it is not practical to comply with these temperature limitations, other temperatures and times shall be used provided the procedures are qualified.

10.0 PENETRANT APPLICATION:

The penetrant may be applied by any suitable means, such as dipping, brushing, or spraying.

If the penetrant is applied by spraying using compressed air type apparatus, filters shall be placed at the air inlet to preclude contamination of the penetrant by oil, water, dirt or sediment that may have collected in the lines.

11.0 PENETRATION (DWELL) TIME :

The penetrant dwell time shall be 10 minutes minimum and in no case shall be more than 30 minutes.


During the penetrant dwell time, the penetrant shall not be allowed to dry. If for any reason the penetrant does dry, the examination procedure shall be repeated, beginning with a cleaning of the examination surface.

12.0 EXCESS PENETRANT REMOVAL :

12.1 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.

12.2 Excess penetrant shall be removed by wiping with a lint free cloth or absorbent paper. Repeat the operation until most traces of penetrant have been removed. The remaining traces shall be removed by wiping the surface lightly with cloth or absorbent paper moisturized with solvent.

Care shall be taken to avoid use of excess solvent as this may remove penetrant from discontinuities. Flushing the surface with solvent, following the application of the penetrant and prior to developing, is prohibited.

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
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13.0 DRYING AFTER EXCESS PENETRANT REMOVAL :

Surface shall be dried before the application of developer. For this method, the surface may be dried by normal evaporation, blotting, wiping or forced air.

14.0 DEVELOPER APPLICATION :

14.1 The wet non- aqueous developer shall be applied as soon as possible after excess penetrant removal. The maximum time allowed for the application of developer after the excess penetrant removal shall be 15 minutes.

14.2 Wet non-aqueous developer shall be applied by spraying in thin and uniform layer. Prior to applying the developer to the surface, the developer shall be thoroughly agitated to ensure that the particles in suspension are well dispersed. The drying of the developer shall be done by natural evaporation.


15.0 EVALUATION :

15.1 Observe the surface during the application of the developer to detect nature of any indications which tend to bleed out profusely. Final examination shall be done between 10 minutes at the earliest and 30 minutes at the latest after application of the developer. The nature of discontinuities corresponding to the indications shall be defined depending upon the method of setting, appearance, direction, shape and dimensions of the same. If the bleed out does not alter the examination results, longer periods are permitted. If the surface to be examined is large enough to preclude complete examination within the prescribed time, the surface shall be examined in increments.

15.2 With colour contrast penetrant, the developer forms a reasonably uniform coating. Surface discontinuities are indicated by bleeding out of the penetrant which is normally of a deep red colour. Indication with a light pink colour may indicate excessive cleaning. Inadequate cleaning may leave an excessive background making interpretation difficult.

15.3 As the developer dries to a smooth, even white coating, indications will appear at the locations of discontinuities. Depth of surface discontinuities may be correlated with the richness of colour and speed of bleeding out. However, localized surface imperfections such as from machining marks or surface conditions may produce similar indications which are non-relevant.

15.4 Usually, a crack or similar opening will show a line and light cracks or partially welded lap will show a broken line. Gross porosity may produce large indications covering an entire area. Very fine porosity is indicated by random dots.

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- 15.5** Any non-relevant indication shall be regarded as a defect until the indication is either eliminated by surface conditioning or it is proved non-relevant by other NDT methods.
- 15.6** Relevant indications are indications which result from imperfections and having major dimensions greater than 1.5 mm.
- 15.7** Linear indications are those indications in which the length is more than three times the width. Rounded indications are indications which are circular or elliptical with the length equal to or less than three times the width.
- 15.8** All indications shall be evaluated as per the acceptance criteria of this procedure.

16.0 ACCEPTANCE STANDARD :

16.1 For Plates, Forgings, Bars, Castings, Tubular products, Fittings & its repaired areas :

Imperfections producing the following relevant indications are un-acceptable :


- (1) Any linear indications greater than 1.5 mm long for material less than 16 mm thick, greater than 3 mm long for material from 16 mm thick to under 50 mm thick, and 5 mm long for material 50 mm thick and greater
- (2) Rounded indications with dimensions greater than 3 mm for thicknesses less than 16 mm and greater than 5 mm for thicknesses 16 mm and greater.
- (3) Four or more relevant indications in a line separated by 1.5 mm or less edge to edge
- (4) Ten or more relevant indications in any 4000 square mm of area whose major dimension is no more than 150 mm with the dimensions taken in the most unfavourable location relative to the indications being evaluated.

16.2 For Bolts, Studs, and Nuts :

- (1) Linear nonaxial indications are unacceptable.
- (2) Linear axial indications greater than 25 mm long are unacceptable.

16.3 For Weld Edge Preparation Surfaces :

- (a) Laminar type imperfections are acceptable without repair if they do not exceed 25 mm in length.

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(b) Indications of nonlaminar imperfections of (1) through (3) below are unacceptable :

- (1) Any Linear indications greater than 5 mm long
- (2) Rounded indications with dimensions greater than 5 mm
- (3) Four or more indications, in a line separated by 1.5 mm or less, edge to edge

16.4 For Weld joints & Weld Metal Cladding :

Imperfections producing the following relevant indications are un-acceptable :

- (1) Linear indications with dimensions greater than 1.5 mm
- (2) Rounded indications with dimensions greater than 5 mm
- (3) Four or more rounded indications in a line separated by 1.5 mm or less edge to edge
- (4) Ten or more rounded indications in any 4000 sq. mm of surface with major dimension of this area not to exceed 150 mm with the area taken in most unfavourable location relative to the indications being evaluated.

17.0 POST EXAMINATION CLEANING :

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

18.0 RECORD OF EXAMINATION (FORMAT OF REPORT):

Record for each examination shall be prepared in a format, attached with this procedure as Annexure-I. The type of indications (linear or rounded), location and extent (length or diameter or aligned) shall be recorded. Cello tapes, sketches or photographs can be used for recording the indications.

Report shall be signed by at least level-II qualified personnel.



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Table – 1

(Ref. : Table T-621.1 of ASME Sec V Article 6)

Requirements of a Liquid Penetrant Examination Procedure		
Requirement	Essential Variable	Nonessential Variable
Identification of and any change in type or family group of penetrant materials including developers, emulsifiers, etc.	X	..
Surface preparation (finishing and cleaning, including type of cleaning solvent)	X	..
Method of applying penetrant	X	..
Method of removing excess surface penetrant	X	..
Hydrophilic or lipophilic emulsifier concentration and dwell time in dip tanks and agitation time for hydrophilic emulsifiers	X	..
Hydrophilic emulsifier concentration in spray applications	X	..
Method of applying developer	X	..
Minimum and maximum time periods between steps and drying aids	X	..
Decrease in penetrant dwell time	X	..
Increase in developer dwell time (Interpretation Time)	X	..
Minimum light intensity	X	..
Surface temperature outside 40°F to 125°F (5°C to 52°C) or as previously qualified	X	..
Performance demonstration, when required	X	..
Personnel qualification requirements	..	X
Materials, shapes, or sizes to be examined and the extent of examination	..	X
Post-examination cleaning technique	..	X

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	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D20 HX/NDE/PT/01

Annexure – I

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
Non-Destructive Testing Division

Liquid Penetrant Examination Report

Part - 1 : Test Requisition (From : To : QND)

Ref. No. :		Date :
Component :		Qty. :
Component Id :		
Drg. No. :	Rev. :	Drg. Item No. :
Welder Name :		Weld Joint Length :
Weld Joint No. :		Surface Condition :
W.O. No./P.O.No. :		
QAP No. :		QAP Cl. No. :
Test Specification/ Procedure No. :		
Area of Test :		
Material Grade & Thickness :		
Project :		


Part - 2 : Test Report (From : QND To :

Report No. :		Date :
Test Procedure No. :		
Test Technique :		
Lighting Equipment & Light Intensity :		
Weld Length Tested :		
Test Chemicals Used :		
	Identification	Batch No.
Penetrant		
Cleaner		
Developer		

Penetrant time: Dwell time:
 Observation (including map or record of indication) :

Final Result :

Performed By	Evaluated By	Witnessed/Reviewed By

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D2O HX/NDE/PT/01

Annexure – II

Technique Sheet for Liquid Penetrant Examination of Plates, Forgings, Bars, Castings, Tubular products, Fittings & its repaired areas of D2O HX

Part to be inspected	Plates, Forgings, Bars, Castings, Tubular products, Fittings & its repaired areas
Procedure Reference	NPCIL approved BHEL's Procedure No. BHEL/NPCIL/30599/D2O HX/NDE/PT/01
Test technique	Color contrast solvent removable type
Examination personnel	Personal performing Liquid Penetrant Examination shall be qualified as Level – I or Level – II Evaluation of test results shall be done by Level - II or Level – III qualified personnel.
Surface condition	The surface to be examined and all adjacent areas within at least 25 mm shall be dry and free of all dirt, grease, lint, scale, oil or other extraneous matter that could interfere with the examination.
Pre-cleaning and Drying	Surface shall be cleaned thoroughly by solvent before application of penetrant. Drying shall be accomplished by normal evaporation or with forced hot air, as appropriate.
Equipment	NPCIL approved Dye penetration test kit
Environment condition	Illumination (Natural or Supplemental white light) of the examination surface is required for the evaluation of indication. The minimum light intensity shall be 1076 lux on test surface during examination.
Penetrant application details	Penetrant shall be applied by dipping, spraying or brushing.
Removal of excess penetrant	Excess penetrant shall be removed, first, by using a clean lint-free cloth and, subsequently, by cleaning with a clean lint-free cloth lightly moistened with solvent
Type of developer/ Application process	Non-Aqueous Developer / Spraying
Interpretation & Evaluation	As per clause 15 of the above mentioned procedure
Acceptance criteria	As per clause 16.1 of the above mentioned procedure
Post examination cleaning	Surfaces examined shall be cleaned thoroughly after evaluation of the test with dry cotton cloth with or without solvent.
Test Report Format	As per Annexure - I

Prepared by




Manish Kumar
NDT Level II (PT)

Approved by



Manish Kumar Dewangan
NDT Level III (PT)

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D2O HX/NDE/PT/01

Annexure – III

Technique Sheet for Liquid Penetrant Examination of Bolts, Studs, and Nuts of D2O HX

Part to be inspected	Bolts, Studs, and Nuts
Procedure Reference	NPCIL approved BHEL's Procedure No. BHEL/NPCIL/30599/D2O HX/NDE/PT/01
Test technique	Color contrast solvent removable type
Examination personnel	Personal performing Liquid Penetrant Examination shall be qualified as Level – I or Level – II Evaluation of test results shall be done by Level - II or Level – III qualified personnel.
Surface condition	The surface to be examined and all adjacent areas within at least 25 mm shall be dry and free of all dirt, grease, lint, scale, oil or other extraneous matter that could interfere with the examination.
Pre-cleaning and Drying	Surface shall be cleaned thoroughly by solvent before application of penetrant. Drying shall be accomplished by normal evaporation or with forced hot air, as appropriate.
Equipment	NPCIL approved Dye penetration test kit
Environment condition	Illumination (Natural or Supplemental white light) of the examination surface is required for the evaluation of indication. The minimum light intensity shall be 1076 lux on test surface during examination.
Penetrant application details	Penetrant shall be applied by dipping, spraying or brushing.
Removal of excess penetrant	Excess penetrant shall be removed, first, by using a clean lint-free cloth and, subsequently, by cleaning with a clean lint-free cloth lightly moistened with solvent
Type of developer/ Application process	Non-Aqueous Developer / Spraying
Interpretation & Evaluation	As per clause 15 of the above mentioned procedure
Acceptance criteria	As per clause 16.2 of the above mentioned procedure
Post examination cleaning	Surfaces examined shall be cleaned thoroughly after evaluation of the test with dry cotton cloth with or without solvent.
Test Report Format	As per Annexure - I

Prepared by




Manish Kumar
NDT Level II (PT)

Approved by



Manish Kumar Dewangan
NDT Level III (PT)

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D2O HX/NDE/PT/01

Annexure – IV

Technique Sheet for Liquid Penetrant Examination of Weld Edge Preparation Surfaces of D2O HX

Part to be inspected	Weld Edge Preparation Surfaces
Procedure Reference	NPCIL approved BHEL's Procedure No. BHEL/NPCIL/30599/D2O HX/NDE/PT/01
Test technique	Color contrast solvent removable type
Examination personnel	<p>Personnel performing Liquid Penetrant Examination shall be qualified as Level – I or Level – II</p> <p>Evaluation of test results shall be done by Level - II or Level – III qualified personnel.</p>
Surface condition	The surface to be examined and all adjacent areas within at least 25 mm shall be dry and free of all dirt, grease, lint, scale, oil or other extraneous matter that could interfere with the examination.
Pre-cleaning and Drying	Surface shall be cleaned thoroughly by solvent before application of penetrant. Drying shall be accomplished by normal evaporation or with forced hot air, as appropriate.
Equipment	NPCIL approved Dye penetration test kit
Environment condition	Illumination (Natural or Supplemental white light) of the examination surface is required for the evaluation of indication. The minimum light intensity shall be 1076 lux on test surface during examination.
Penetrant application details	Penetrant shall be applied by dipping, spraying or brushing.
Removal of excess penetrant	Excess penetrant shall be removed, first, by using a clean lint-free cloth and, subsequently, by cleaning with a clean lint-free cloth lightly moistened with solvent
Type of developer/ Application process	Non-Aqueous Developer / Spraying
Interpretation & Evaluation	As per clause 15 of the above mentioned procedure
Acceptance criteria	As per clause 16.3 of the above mentioned procedure
Post examination cleaning	Surfaces examined shall be cleaned thoroughly after evaluation of the test with dry cotton cloth with or without solvent.
Test Report Format	As per Annexure - I

Prepared by



Manish Kumar
NDT Level II (PT)

Approved by



Manish Kumar Dewangan
NDT Level III (PT)

	Non-Destructive Testing Division BHEL BHOPAL	BHEL Document No.
	Procedure for Liquid Penetrant Examination	BHEL/NPCIL/30599/D2O HX/NDE/PT/01

Annexure – V

Technique Sheet for Liquid Penetrant Examination of Weld joints & Weld Metal Cladding of D2O HX

Part to be inspected	Weld joints & Weld Metal Cladding
Procedure Reference	NPCIL approved BHEL's Procedure No. BHEL/NPCIL/30599/D2O HX/NDE/PT/01
Test technique	Color contrast solvent removable type
Examination personnel	Personal performing Liquid Penetrant Examination shall be qualified as Level – I or Level – II Evaluation of test results shall be done by Level - II or Level – III qualified personnel.
Surface condition	The surface to be examined and all adjacent areas within at least 25 mm shall be dry and free of all dirt, grease, lint, scale, oil or other extraneous matter that could interfere with the examination.
Pre-cleaning and Drying	Surface shall be cleaned thoroughly by solvent before application of penetrant. Drying shall be accomplished by normal evaporation or with forced hot air, as appropriate.
Equipment	NPCIL approved Dye penetration test kit
Environment condition	Illumination (Natural or Supplemental white light) of the examination surface is required for the evaluation of indication. The minimum light intensity shall be 1076 lux on test surface during examination.
Penetrant application details	Penetrant shall be applied by dipping, spraying or brushing.
Removal of excess penetrant	Excess penetrant shall be removed, first, by using a clean lint-free cloth and, subsequently, by cleaning with a clean lint-free cloth lightly moistened with solvent
Type of developer/ Application process	Non-Aqueous Developer / Spraying
Interpretation & Evaluation	As per clause 15 of the above mentioned procedure
Acceptance criteria	As per clause 16.4 of the above mentioned procedure
Post examination cleaning	Surfaces examined shall be cleaned thoroughly after evaluation of the test with dry cotton cloth with or without solvent.
Test Report Format	As per Annexure - I

Prepared by



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TITLE : **INCONEL WELDING CONSUMABLES AND
OVERLAY CLADDING FOR PHT SYSTEM HEAT
EXCHANGERS.**

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1.0 SCOPE


This specification defines the technical requirements for Inconel welding consumables and for the Inconel Overlay cladding process on the components for PHT system Heat Exchangers, such as Standby Coolers, Bleed Coolers, Bleed Condenser, Regenerative Heat Exchanger, F/M Recirculation Cooler , F/M Return Cooler, IARS HX etc. or for any other heat exchanger which refers to this Specification. In addition to this Specification, the Inconel welding consumables and Overlay cladding shall also comply with any other requirements specified in the particular heat exchanger equipment specification.

The Inconel welding consumables include :

- 1) Coated manual welding electrodes for Shielded Metal Arc Welding (SMAW).
- 2) Bare wires / rods for inert Gas Tungsten Arc Welding (GTAW).
- 3) Bare wires, rods and strips for Submerged Arc Welding (SAW).

These consumables shall be suitable for depositing Corrosion Resistant Inconel Overlay Cladding on Carbon steel (such as SA-350-LF2) and low alloy Quenched and Tempered Ferritic steel (20 Mn Mo Ni 55/ SA 508 Grade 3 Class 1) base metals. In addition, the deposited cladding shall be sound, ductile and free from micro-cracks, lack of bond and underbead cracks.

The Inconel Overlay cladding on the production component shall be done using qualified heat/lot/batch of welding consumable in accordance with qualified Overlay cladding procedures by qualified welders / welding operators. The deposited overlay cladding shall be of the specified chemical composition and shall be sound, ductile and free from micro-cracks, lack of bond, underbead /underclad cracks and shall possess resistance to hot cracking when further welding is done on the overlay cladding.

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2.0 CONTENTS

The requirements of this Specification are presented under the following section headings.

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3.0 APPLICABLE SPECIFICATIONS, CODES AND STANDARDS

All documents listed below, of the issue in effect on the date of the pertinent Tendering Documents, shall apply as specified herein. In the event of any conflict between the requirements of this Specification and the documents listed below, this Specification shall govern.

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ASME	Boiler and Pressure Vessel Code Section-II – Material Specifications – Part C – Welding Rods, Electrodes and Filler Metals Section-III – Division I – Nuclear Power Plant Components – NB – Class 1 Components Section V – Non-destructive Examination. Section IX – Welding and Brazing Qualifications.
ASTM	Appropriate Publications
VdTUV-1753/ KTA 1408.1 to 1408.3	Quality Assurance of Filler Material and Auxiliary Materials

4.0 INCONEL WELDING CONSUMABLES

4.1 GENERAL REQUIREMENTS

4.1.1. Chemical Composition


The overlay cladding thickness required on the job base metal is 6 mm minimum after final machining. The chemical composition of the deposited weld metal upto 2 mm depth from the top of machined cladding surface shall be as given in Table-1.

4.1.2. Heat/Lot/Batch Quantities

The complete quantity of electrodes, bare wires/rods/strips ordered against an item of a given size shall be from a single heat/lot/batch. If the quantity required against such an item is beyond the heat/lot/batch manufacturing capacity of the Supplier, only then that item shall be supplied in minimum number of such heats/lots/batches. The objective is to minimize the number of overlay cladding batch tests to be carried out to establish the suitability of each heat/lot/batch for overlay cladding on the job base metal.

4.2 TESTING FOR INCONEL WELDING CONSUMABLES

4.2.1 Coated Manual Welding Electrodes for SMAW

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4.2.1.1 The deposited weld metal shall be subjected to the following tests, all in compliance with SFA-5.11 of ASME Section II – Part C, except as noted below :

- (a) All weld metal tension tests
- (b) Transverse side bend tests
- (c) Transverse face bend tests
- (d) Surfacing weld bend tests

However, the surfacing weld bend tests shall show “No fissures”.

The ISO-V impact tests shall be done and the values attained shall be reported

4.2.1.2 The electrodes shall pass the test for resistance to Hot cracking conducted as per “D. Thomas and A.I. Schaeffler test”. (See Annexure-1 for test details).

4.2.2 Bare Wires, Rods or Strips for SMAW,GTAW or SAW

4.2.2.1 The deposited weld metal shall be subjected to the following tests, all in compliance with SFA-5.14 of ASME Section II – Part C, except as noted below :


- (a) All weld metal tension tests
- (b) Transverse side bend tests
- (c) Transverse face bend tests
- (d) Surfacing weld bend tests

However, the surfacing weld bend tests shall show “No Fissures”.

The ISO-V impact tests shall be done and the values attained shall be reported.

4.2.2.2 The bare wires/rods shall pass the test for resistance to Hot cracking conducted as per “D. Thomas and A.I. Schaeffler test”. (See Annexure- I for test details).

4.2.2.3 The weld metal deposited by SAW process shall be tested for resistance to Hot cracking by the crossed-bead welding test, as described in the Annexure-II. The welding processes to be adopted will be indicated by the Purchaser.

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4.3 QUALITY ASSURANCE AND PRODUCTION CONTROL

The welding consumable manufacturer shall have a well laid out quality assurance and production control programme as called for in ASME Section III or an equivalent such as VdTUV-1753/ KTA 1408.1 to 1408.3. While bidding information on quality assurance and production control programme shall be furnished.

For all the tests the base material shall be carbon steel (such as SA-350-LF2) or low alloy quenched and tempered ferritic steel (20 Mn Mo, Ni 55/ SA 508 Grade 3 Class 1), as specified. The chemical composition of these base materials are shown in Table-II.


4.4 BATCH TESTING AND GUARANTEE

4.4.1 Batch Testing

The Manufacturer /supplier shall indicate whether he is having facilities to conduct Batch testing of Inconel welding consumables for overlay cladding as per Section 5.0 of this Specification.

4.4.2 Guarantee

The Purchaser would be conducting special additional tests on the overlay cladding to ensure achievement of required quality of overlay cladding on carbon steel (such as SA-350-LF2) and low alloy quenched and tempered ferritic steel (20 Mn Mo, Ni 55/ SA 508 Grade 3 Class 1) components, which would experience appropriate post weld heat treatment cycles. The carbon steel components will be subjected to PWHT cycles (a few hours at temperature upto $600^{\circ} \pm 10^{\circ}\text{C}$) in accordance with ASME Section III-NB. The low alloy quenched and tempered ferritic steel (20 Mn Mo, Ni 55/ SA 508 Grade 3 Class 1) components will be subjected to a heat treatment cycle consisting of about 40 hours at $550 \pm 10^{\circ}\text{C}$ and 3 cycles for 8 hours each at $600^{\circ} \pm 10^{\circ}\text{C}$ with intermediate heating and cooling above 450°C at the rate of 30°C/hr as shown in Annexure-III. The minimum machined thickness of cladding would be 6 mm. The supplier of welding consumables shall guarantee that his product will give a sound, ductile and corrosion resistance cladding free from lack of bond, micro-fissuring, under bead / underclad cracking and other defects after such heat treatment cycles.

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4.5 REPORTS/CERTIFICATES

The chemical composition and all the tests conducted shall be reported in certified test certificates and 6 copies (with scanned PDF version on CD) of the same are to be sent to the purchaser. Two hard copies (Original+ one copie) of all test certificates and examinations shall be submitted to the purchaser. An additional copy shall accompany the welding consumables in their package for shipment.

4.6 MARKING

The welding consumables and their packages shall be legibly marked as per the requirements of SFA-5.11 (for coated electrodes) and SFA-5.14 (for bare wires / rods, strips) or equivalent.

4.7 PACKAGING


The welding consumables shall be properly packed to prevent any possible deterioration, contamination, and pick up of humidity during prolonged shipment and storage under tropical conditions.

4.8 INFORMATION TO BE SUPPLIED IN THE BID

At the time of bidding the welding consumable supplier shall furnish all the relevant technical information regarding his product which shall include the recommended welding parameters and also instructions such as electrode baking, shelf life etc.

4.9 QUALIFICATION OF WELDING CONSUMABLE SUPPLIER

The Bidder shall also furnish details regarding qualification and acceptance of his products by authorities like TUV, ASME and others for the required type of overlay cladding on the base metals mentioned herein. Bidder shall also furnish evidence for having been a recognized supplier qualified by the same authorities.

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4.10 DEVIATIONS

The Bidder shall clearly state, if there are any deviations to the requirements of this Specification. He shall ensure that all information requested for in this Specification and details pertaining to his product are furnished in his bid for proper evaluation by the Purchaser.


4.11 QUALITY SURVEILLANCE

The welding consumables will be subjected to Quality Surveillance by the Purchaser or his authorized representative and NPCIL or his authorized representative during the manufacture and testing at the Suppliers works. The products shall only be shipped after clearance and issue of shipping release by the Purchaser/NPCIL authorized representative.

5.0 BATCH TESTING FOR OVERLAY CLADDING

5.1 GENERAL REQUIREMENTS

Inconel welding consumables are procured generally as per the prevailing applicable welding consumable standards with additional requirements, if any, imposed by the Purchaser. The weld depositing process, parameters and other conditions adopted by the consumable supplier and the tests for acceptance conducted by him, often on the groove weld test coupon, may not truly represent those corresponding to the required overlay cladding on the production component. Hence batch testing is necessary to demonstrate that the overlay cladding of required quality could be produced on the specified base metal in accordance with the overlay cladding procedure to be used on the production component. Every heat/lot/batch of welding consumables shall undergo batch testing and only those welding consumables qualified by batch testing and approved by Purchaser shall be employed for overlay cladding on production component. All welding and testing conditions for batch testing shall be identical with those for overlay cladding procedure qualification test in principle. However, the extent of tests and examinations for batch testing may not be the same as that for procedure qualification. Batches used in procedure qualification tests may be accepted without separate batch testing provided all the batch tests given below are covered in procedure qualification tests. Similarly the batches of bare

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wires/rods and coated electrodes, which have been tested and certified for resistance to Hot cracking (in accordance with 5.6.1 below) by their Supplier, need not be again subjected to the same test during batch testing.

Unless otherwise specified, all tests and acceptance examinations shall be conducted on the batch test coupon which has been subjected to the simulated heat treatment corresponding to the production component.

5.2 EXAMINATIONS

The entire surface of overlay cladding shall be subjected to liquid penetrant examinations at the following stages : (a) In as deposited condition (b) After simulated heat treatment and (c) After the cladding is machined to the specified minimum thickness.


The entire surface of overlay cladding shall be free from any discontinuity indications at all of the above stages.

5.3 CHEMICAL COMPOSITION

The overlay cladding shall be machined to the specified minimum cladding thickness of 6 mm. The chemical composition of the cladding shall be analyzed for each 1 mm deep step upto 2 mm depth from the machined surface of the cladding. The chemical composition shall comply with the applicable composition indicated in Table-I.

5.4 METALLOGRAPHIC EXAMINATION

After simulated heat treatment of the test coupon, a section over the entire width of the test coupon shall be made transverse to the direction of cladding. Metallographic sections for microscopic examinations at suitable magnifications (X 100 or higher) shall be prepared for each of the welding processes used and their transitions in between. The examinations shall cover all typical locations in the cladding such as overlap zones of beads and layers, inter-layer zones, transition zones, HAZ of the base metal etc. The specimen section shall be free from cracks. Systematic defects are not acceptable.

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5.5 BEND TESTS

- 5.5.1 Four side bend test specimens, two each in transverse and longitudinal directions of cladding, 10 mm wide x 30 mm thick x 200 mm long shall be prepared from the test coupon after simulated heat treatment. They shall be bent 180° around a mandrel of diameter (40 mm) equal to 4 times the specimen width (10 mm) and inspected for any cracks.

Cracks which propagate into base metal and cracks in the cladding which do not extend to the fusion line are not acceptable. Occasional cracks in the cladding which form at an angle to and start from the fusion line are allowed provided they are less than 1.6 mm in length.

- 5.5.2 Further, two transverse face bend test specimen, 30 mm x 30 mm x 300 mm long shall be bent 180° around a mandrel of 120 mm diameter with cladding on the tension side of the bent specimen and inspected for any cracks. The bent specimen shall show “No cracks”.

5.6 RESISTANCE TO HOT CRACKING

- 5.6.1 Bare wires/rods and coated electrodes shall be subjected to “D. Thomas and A.I. Schaeffler test” for resistance to Hot cracking and shall pass the test. (See Annexure for test details).
- 5.6.2 The overlay cladding deposited by SAW process shall be tested for resistance to Hot cracking by the crossed-bead welding test as specified in the Annexure-II.

6.0 OVERLAY CLADDING FOR PROCEDURE QUALIFICATION AND PRODUCTION


6.1 GENERAL REQUIREMENTS

- 6.1.1 The Inconel overlay cladding procedure to be used on the production component shall be qualified before its application on the production component. The overlay cladding procedure / performance shall be in accordance with ASME Section III-NB, Section IX, this specification and the corresponding heat exchanger equipment specification. The

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overlay cladding for procedure qualification and production shall be identical in all respects, viz. surface preparation, cleanliness, welding processes / parameters, weld layers, PWHT, examination, etc.

The preparation of procedures for Purchasers approval, recording/reporting of results, documentation etc., as specified in the heat exchanger equipment specification shall be complied with. The following shall be complied with by overlay cladding for procedure qualification and production, as applicable.

- 6.1.2 All processes of overlay cladding and types of repairs on the cladding shall be covered in the qualification tests. Special attention shall be paid, during testing and examinations of cladding for procedure qualification or production, to the typical locations in the cladding such as bead and layer overlaps, clad-base metal interface, HAZ of base metal, transitions between welding processes etc., and these areas shall be adequately tested and examined. The objective shall be to achieve sound, ductile, corrosion resistant overlay cladding free from micro-fissuring, and underbead / underclad cracks.
- 6.1.3 Underclad cracks are difficult to detect and hence all possible precautions shall be taken to avoid them. The welding parameters shall be carefully optimized and the following recommendations shall be considered and adopted.

Preheat temperature - 150°C min.	} Applicable to all layers of cladding.
Interpass temp. - 200°C max.	
Post heat soaking temp. - 280°C x 6 hrs. min.	
Post weld heat treatment at - 600 ± 10°C	

The post heat soaking temperature shall be reached directly from interpass temperature and shall be held for about 6 hrs. before cooling down to ambient temperature, either due to completion of cladding or due to any interruptions. This post heat soaking need not be done if the job is taken directly to PWHT temperature from interpass temperature without cooling down.

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6.2 OTHER REQUIREMENTS FOR CLADDED QUALIFICATION TEST PLATE AND PRODUCTION COMPONENT

6.2.1 Overlay Cladding Thickness and Composition

The minimum thickness of cladding, in the final machined condition, shall be 6 mm as measured from the original surface without considering the depth of fusion. The chemical composition versus depth shall be determined step by step for each 1 mm depth at a time starting from the final machined cladding surface. The chemical composition for the top 2 mm depth shall be as given in the Table-I, as applicable to the type of consumable used.

6.2.2 Overlay Cladding Quality


The overlay cladding shall be free from all types of harmful defects such as cracks, pores, inclusions, lack of bond and shall pass the stage and final non-destructive examinations specified for the production component.

6.2.3 Base Metal

The base metal for test plate shall be identical with that for the production component and shall comply with all the requirements of the specification for such component (such as PC-M-1108 Carbon Steel Forgings for Heat Exchangers) in all respects. The test plate from the same heat/melt as that for the production component is desired. The test plate shall be of the same thickness as the production component but it need not be thicker than 150 mm when the production component exceeds 150 mm. The test plate shall be adequately sized to provide for all the required test specimens and also for simulated repairs and their qualification before undertaking repairs on the production component. Cladding shall be deposited on fresh and clean machined surface which has passed magnetic particle examination.

6.2.4 Post Weld Heat Treatment

The cladded test plate/production component shall be subjected to the same heat treatment cycle before subjecting them to the acceptant tests and examination, as applicable.

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6.2.5 Surface Condition of Cladding

The cladding shall be machined to a smooth surface with a finish of 6.3 microns or better after PWHT. The surface shall be suitable for carrying out ultrasonic and liquid penetrant examinations.

6.2.6 Cleanliness


Thorough cleanliness is very important to achieve a sound overlay cladding. Cleaning agents used shall be free from halogens, sulphur and other contaminants. The halogens and sulphur contents shall not exceed 25 ppm each. The cleaning procedure shall include cleaning before cladding in between passes/layers, after completion of cladding and final cleaning after machining.

6.2.7 Liquid Penetrant and Ultrasonic Examinations

The entire cladding on test plate and production component shall be liquid penetrant examined as described in 5.2 and also ultrasonically examined. For further details the relevant heat exchanger specification shall be referred to. Underclad cracks are not acceptable.

6.2.8 Metallographic Examination and Hardness Survey

After simulated heat treatment of the test coupon, a macro-section over the entire width of the test coupon shall be made transverse to the direction of cladding. This section shall be prepared and recorded photographically. Further, metallographic sections for microscopic examinations shall be prepared and examined as described in 5.4. The photo micrographs of typical locations (at suitable magnifications of X 100 or higher) shall be taken for documentation and those typical locations shall be identified on an overall photo or a sketch. The hardness measurements (HV 1.0) over the thickness of cladding, including the transition zone and HAZ of base metal, shall be made on one of the prepared metallographic sections and the results shall be represented graphically.

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6.2.9 Bend Tests

The bend tests as below shall be performed as separate sets of specimens from manual cladding, machine cladding and their transition is between.

- a) Four side bend tests (2 each in transverse and longitudinal directions of cladding) shall be conducted as per 5.5.1, with the first layer bend overlap (from base metal) at the maximum tension zone. However, for two layer and multi layer cladding (excepting cladding by SMAW) two further side bend tests shall be conducted with second layer bead overlap at the maximum tension zone. The side bend test evaluation for acceptance shall be as in 5.5.1.
- b) Two face bend tests (transverse to cladding direction) shall be conducted and evaluated for acceptance as in 5.5.2.

6.2.10 Test Opening

After simulated heat treatment, liquid penetrant and ultrasonic examinations of the test coupon, a test opening (atleast 100 X 150mm) in the overlay cladding shall be made by mechanical means (machining/grinding) to check for the absence of underclad cracks. The location for opening shall be selected by the Purchaser. For further details the heat exchanger equipment specification shall be referred to.

6.2.11 Test for Resistance to Hot Cracking

The overlay cladding deposited by SAW process shall be tested for resistance to hot cracking by the crossed-bend welding test as specified in the Annexure.II


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TABLE-I**INCONEL OVERLAY CLADDING**

Chemical Composition of deposited Inconel weld metal

Elements	Deposited from coated electrodes (SMAW) (Note-1)	Deposited from Bare wires / rods, strips by GTAW, GMAW and SAW (Note-2)
C	0.04 max.	0.04 max.
Cr	13.0 - 17.0	18.0 - 22.0
Ni	67.0 min	67.0 min
Mn	5.0 - 10.0	2.5 - 3.5
Si	0.5 max	0.5 max
P	0.02 max	0.02 max
S	0.015 max	0.015 max
Ta	0.2 max	0.2 max
Ti	1.00 max	0.75 max
Cu	0.50 max	0.50 max
Fe	2.0 - 9.0	3.0 max
Co	0.03 max	0.03 max
Nb	2.0 - 2.5	2.0 - 2.5
Nb/Si	4 min	4 min
Total incidental limits	0.5 max	0.5 max

Note-1 : The specified chemical composition is a modification / restriction on SFA-5.11 (ENi Cr Fe 3)

Note-2 : The specified chemical composition is a modification / restriction on SFA-5.14 (ERNi Cr Fe 3)



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TABLE-II

BASE METALS

Chemical Composition

Elements	Carbon Steels	Low alloy quenched and tempered steel
	SA-350 LF2	20 Mn Mo Ni 55/ SA 508 Grade 3 Class 1
C	0.30 max	0.17 - 0.21
Si	0.15 - 0.30	0.15 - 0.30
Mn	1.35 max	1.15 - 1.50
P	0.035 max	0.012 max
S	0.040 max	0.015 max
Cr	-	0.20 max
Mo	-	0.45 - 0.60
Ni	-	0.40 - 0.70
Al	-	0.05 max
Cu	-	0.10 max
V	-	0.03 max

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ANNEXURE- I

I. TEST FOR RESISTANCE TO HOT CRACKING (D. Thomas and A.L. Schaeffler test)

1. Scope

The following test is applicable for austenitic coated manual welding electrodes with diameter greater than or equal to 3.25 mm and bare wires/rods with dia greater than or equal to 1.2 mm.

2. Specimen

Base material shall be austenitic stainless steel - SS-347 or material no. 1.4550 (DIN-17440).

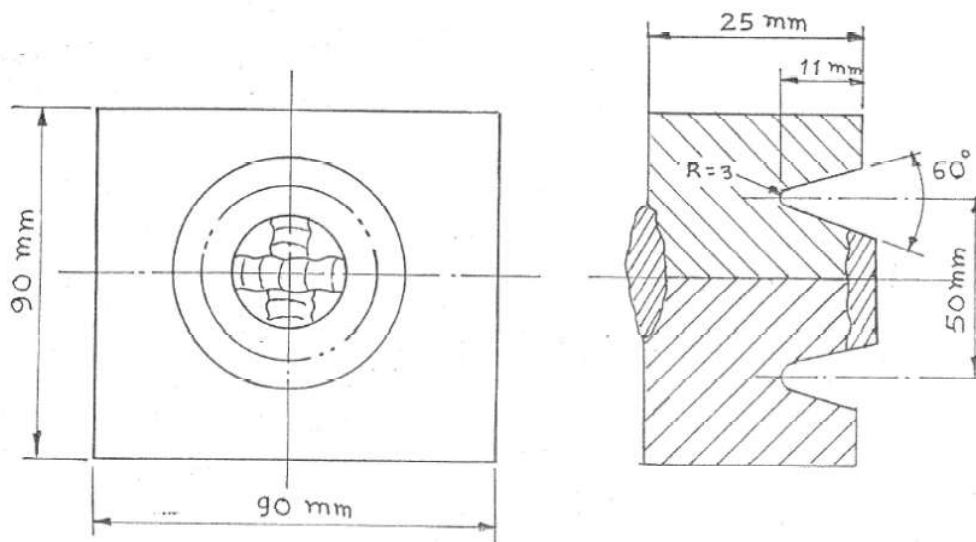



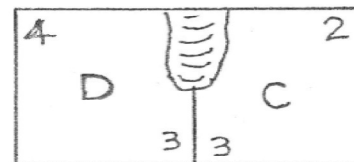
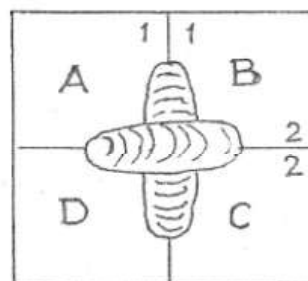
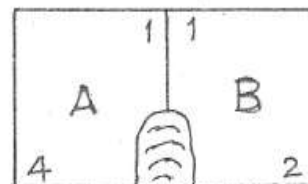
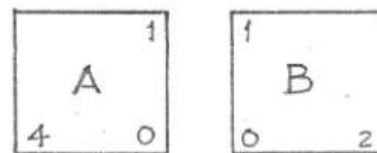
FIG.- 1.


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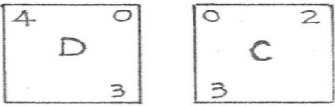
3. Test procedure

Four equal quadrant parts of 25 mm thick and 45 mm square length have to be taken as shown in fig. 2. The rolling surface can be maintained.

PREPARATION OF TEST SPECIMEN :	
1.	Surface 1-0 of part A & B and Surface 3-0 of part C & D shall be ground.
2.	Part A & B and part C & D shall be clamped together.
3.	Part A & B and part C & D shall be joined by tack welding both sides (25 mm long).
4.	Surface 4-0-2 of tack welded parts A-B and C-D shall be ground.
5.	Tack welded parts A-B and C-D shall be clamped together.
6.	Tack welded parts A-B and C-D shall be joined by tack welding both sides (50 mm long).



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7.	In the specimen, turn a groove as shown in Fig. 1.	 Fig-2
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4. Method of welding

Welding consumable	: As indicated in the scope, para-1.
Weld data	: Welding current / polarity as recommended by electrode manufacturer
Welding position	: Horizontal 1G

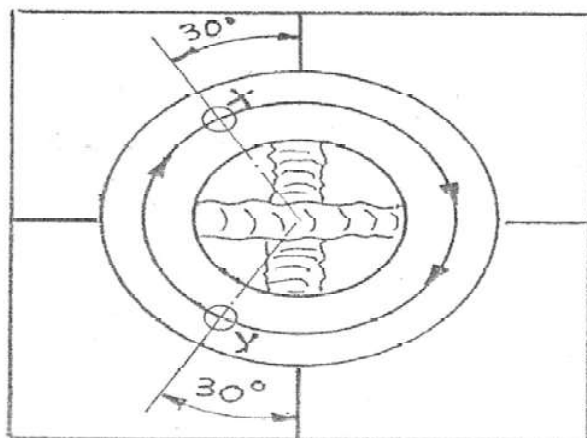



FIG-3.


From point X (Fig. 3) to point Y has to be welded without any oscillation and interruption. The speed of welding shall be around 150 mm/minute which corresponds that the welding time shall be about 42 seconds. After cooling the test specimen and cleaning (removing of weld slag and spattered metal) of the bead surface and groove, the point Y to X shall be welded as before in the clockwise

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direction without any oscillation and interruption in about 21 seconds. The welding speed of 150 mm per minute is indicated for electrode whose diameter is 4 mm.

5. Examination

The examination of the surface shall be done by liquid penetrant method and it shall not reveal any cracks. However, crater cracks are not considered for rejection.

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ANNEXURE- II

II TEST FOR RESISTANCE TO HOT CRACKING OF OVERLAY CLADDING DEPOSITED BY SAW PROCESS

1. Preparation of SAW Cladded test plate

The test plate, overlay cladded by SAW process, shall be subjected to simulated heat treatment, followed by machining of the cladding to the required minimum thickness and liquid penetrant examination.

2. Crossed weld bead deposition


Crossed weld beads SB1 to SB8 as shown in the sketch below, shall be welded as stringer beads to the prepared surface of the cladding, using (a) GTAW torch (without adding filler metal), (b) Coated manual welding electrodes (SMAW) of diameters 3.25, 4.00 and 5.0 mm. Unless otherwise specified, the following welding parameters shall be used.

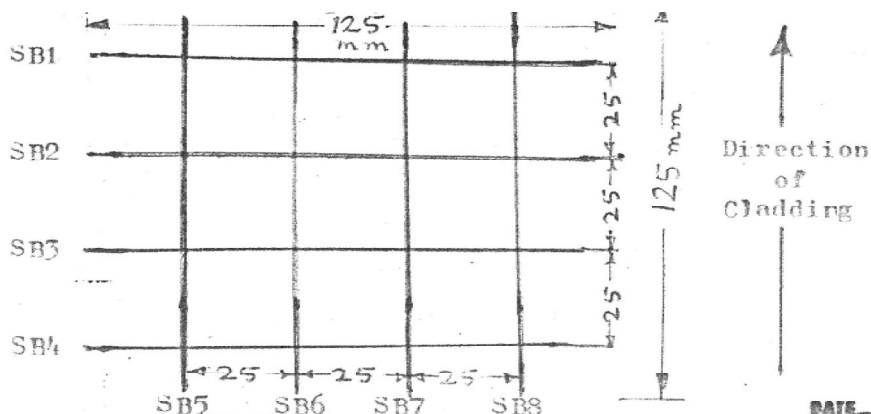
Sequence of beads	Welding process	Welding position	Electrode diameter mm	Current <u>Amps</u> Voltage volts	Preheat temp.
1 and 5	GTAW	1 G	---	Approx. 100 22 – 26	RT
2 and 6	SMAW	1 G	3.25	90 – 110 22 – 25	RT
3 and 7	SMAW	1 G	4.00	120 – 140 22 -- 25	RT
4 and 8	SMAW	1 G	5.00	150 – 170 22 – 25	RT

GTAW – Gas Tungsten Arc Welding

SMAW – Shielded Metal Arc Welding with Covered Electrodes

RT- Room Temperature

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SB= Sequence of bead to be followed

FIG-4

3. Examination


The specimen, welded as above, shall be subjected to liquid penetrant examinations as follows :

- In as welded condition.
- After grinding the weld head reinforcements down to the surface of the cladding.
- After grinding the entire area down, in steps of 0.5 mm, below the surface of the cladding till the HAZ of stringer beads within the underlying cladding is traversed.
- Further, a search for hot cracks shall be made in an overlapping zone between the surface layer and the underlying layer by progressive parallel sectioning.

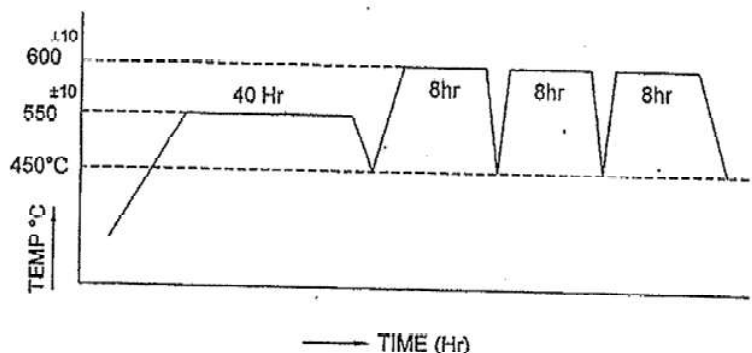
4. Evaluation

Special attention shall be paid to ascertain absence of cracks in HAZ, overlapping Zones within the cladding.

The specimen shall be free from indications due to cracks and any other types of defects.

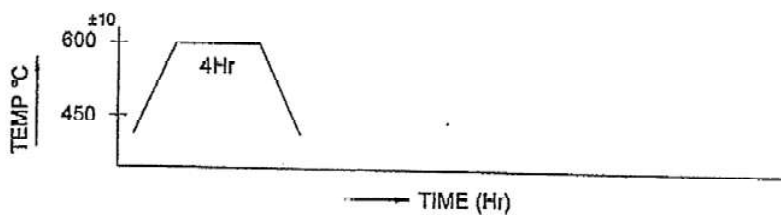
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ANNEXURE- III



SIMULATED HEAT TREATMENT

FIG - 1



HEAT TREATMENT OF WELDER PERFORMANCE QUALIFICATION TEST COUPON

FIG - 2

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Ancillary & Subcontracting Division, HRDC Building, Ground floor, BHEL Bhopal

Part 1/Cover 1 : Techno-Commercial Bid

(To be filled by supplier and submit with offer)

BHEL BHOPAL Tender No : E2853048 Item: WELDING OVERLAY OF INCONEL 600 FOR BCL AS PER DRG.NO. 11650340899 REV.04, ASSOCIATED MACHINING AND SR OPERATION AS PER QAP - QAX/TH/1483REV.02 & TECH ANNEX-A TUBE PLATEFORGINGS DRG NO.31650340880 REV.02 .

NIT Remarks:

1. Inspection clause for NIT: important note:
Loading factor for third party inspection charges done by BHEL: Stage and final inspection is in BHEL scope hence a loading factor @ Inspection Charges (0.242% - loading on basic rate) for local inspection and for outside Bhopal inspection @ 0.173% - loading on basis rate will be done to arrive at landed cost to BHEL hence pls. take cognizance of loading factor for Inspection Charges while submitting your quotation.
2. RA shall not be done for this enquiry
3. Bank guarantee, solvency and undertaking is required against issue of free issue items from BHEL as detailed in special term and condition of enquiry attached.
4. Evaluation shall be done on over all L1 basis
5. Relaxation in PQR provided under verified MSME or Start up as recognized by DPIIT-NO

SINo.	Elements	Standards	To be offered/confirmed by supplier
1	BHEL BHOPAL Supplier Code	As per supplier	
2	Supplier Name	As per supplier	
3	GSTIN NUMBER	As per supplier	
4	PAN NUMBER	As per supplier	
5	Quotation Reference and Date	As per supplier	Ref No..... Dt.....
6	HSN/SAC Code	As per supplier	
7	(CGST % & SGST %) or IGST%	As per supplier	(CGST % & SGST %) or IGST %
8	Supply from address/Work address (City Name, State / UT)	As per supplier	
9	Delivery Point.	As per supplier	BHEL BHOPAL
10	E-Mail	As per supplier	
11	Phone/Mobile	As per supplier	
12	Contact Person & Designation	As per supplier	
13	Office Address	As per supplier	
14	Minimum delivery period to be quoted in no of weeks/days from the date of free issue material from BHEL Bhopal.	1) Accepted as per NIT or 2) Not accepted then supplier to mention the delivery conditions in lot wise basis in weeks	



Bharat Heavy Electricals Limited, Bhopal (India)

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15	Prices shall be firm till delivery (Price to be furnished on FOR DESTINATION basis inclusive of transportation and transit insurance to and fro, P&F charges up to Destination , duly insured inclusive of all other charges)	Yes													
16	L-1 to be determined based on Landed Cost to BHEL. For arriving at Landed Cost to BHEL, requirement of Cladding material and Flux in Kgs. (in ratio of 1:1) is to be solicited. This data shall be converted to cost based on quoted weight and rates as per Annexure A point 14	You need to mention amount of cladding and flux material required in KG/No for each item.	<table> <tr> <th>Sl</th><th>Item disc</th><th>qty of Cladding Material in kg per no</th><th>Qty of Flux material in kg per no</th></tr> <tr> <td>1</td><td>WELDING OVERLAY OF INCONEL 600 FOR BCL AS PER DRG.NO. 11650340899 REV.04, ASSOCIATED MACHINING AND SR OPERATION AS PER QAP - QAX/TH/1483REV.02 & TECH ANNEX-A TUBE PLATEFORGINGS DRG NO.31650340880 REV.02</td><td></td><td></td></tr> <tr> <td>2</td><td>WELDING OVERLAY OF INCONEL 600 FOR SDC AS PER DRG .NO. 31650340883 REV.03, ASSOCIATED MACHINING AND SR OPERATION ASPER QAP - QAX/TH/1487 REV.02 & TECH ANNEX-A TUBE PLATE FORGINGS DRG NO.31650340882 REV.02</td><td></td><td></td></tr> </table>	Sl	Item disc	qty of Cladding Material in kg per no	Qty of Flux material in kg per no	1	WELDING OVERLAY OF INCONEL 600 FOR BCL AS PER DRG.NO. 11650340899 REV.04, ASSOCIATED MACHINING AND SR OPERATION AS PER QAP - QAX/TH/1483REV.02 & TECH ANNEX-A TUBE PLATEFORGINGS DRG NO.31650340880 REV.02			2	WELDING OVERLAY OF INCONEL 600 FOR SDC AS PER DRG .NO. 31650340883 REV.03, ASSOCIATED MACHINING AND SR OPERATION ASPER QAP - QAX/TH/1487 REV.02 & TECH ANNEX-A TUBE PLATE FORGINGS DRG NO.31650340882 REV.02		
Sl	Item disc	qty of Cladding Material in kg per no	Qty of Flux material in kg per no												
1	WELDING OVERLAY OF INCONEL 600 FOR BCL AS PER DRG.NO. 11650340899 REV.04, ASSOCIATED MACHINING AND SR OPERATION AS PER QAP - QAX/TH/1483REV.02 & TECH ANNEX-A TUBE PLATEFORGINGS DRG NO.31650340880 REV.02														
2	WELDING OVERLAY OF INCONEL 600 FOR SDC AS PER DRG .NO. 31650340883 REV.03, ASSOCIATED MACHINING AND SR OPERATION ASPER QAP - QAX/TH/1487 REV.02 & TECH ANNEX-A TUBE PLATE FORGINGS DRG NO.31650340882 REV.02														
17	Acceptance of INSPECTION as per NIT	Yes													
18	Quoted for all the items of tender enquiry	Yes / No. (If "No" please mention item number of regretted items)													
19	Technical Annexure A /QAP /conditions/scope of work/PQR (If Any).	Accepted as per enquiry / Accepted with deviation (If select Accepted with deviation, please mention the deviation)													
20	TC, GC and All Inspection report as per tender enquiry and specification as applicable will be submitted along with each consignment.	Yes (In case of "No" your offer may be rejected).													
21	Quotation Validity will be 120 days from the date of techno-commercial bid opening.	Yes													
22	Are you registered under MSMED ACT 2006 as Small or Micro.	Yes / No (If select Yes, please enclosed valid UDYAM registration certificate)													
23	Confirm whether bidder is Manufacturer or Trader or Dealer or Agent of items under enquiry.	As per supplier													



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24	Acceptance of Payment terms as per given in STC	90 days(for non – MSE or Trader/Dealer/Agent) / 45 Days (for Micro and Small Manufacturer) and 60 Days for Medium cat Manufacturer)	
25	Acceptance of all annexures of Enquiry	Yes	
26	Transit Insurance and transportation charges to and fro will be in supplier scope.	Yes	
27	Penalty: - LD shall be 0.5% of the total order value per week of delay or part thereof, subject a maximum of 10% of clause 9 the total order value (Please refer of GCC - BP200102).	Yes / No (In case of "No", your offer will be loaded suitably)	
28	Acceptance of General Terms and Conditions of enquiry (Form No. BP-200102B) & BHEL P.O. Terms & Conditions (Indigenous) MM5527 (available at B2B site of BHEL Bhopal).	Yes (In case of "No" your offer may be rejected).	
29	We confirm that other family firms or sister concern affiliates / subsidiary firms are not participating in the same tender, so as to eliminate the possibility of cartel formation.	Write Yes/ no) If NO than, Kindly submit signed and sealed Annexure-IX (declaration by vendor) (given with STC) with your offer.	
30	Acceptance of Security against Material clause as detailed in special terms and condition attached (for the purpose of BG/security amount, value of total free issue material (raw material cladding material and flux) shall be considered)	Yes (In case of "No" your offer may be rejected).	
31	Acceptance of special term and condition of labour basis enquiry and all annexures, BHEL Enquiry Office Copy , as attached	Accepted as per enquiry / Accepted with deviation (If select Accepted with deviation, please mention the deviation)	
32	By filling "Yes" in adjacent Box, I hereby declare & confirm that the details furnished above are true and correct to the best of my knowledge and belief and I undertake to inform you of any changes therein	As per supplier	



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	immediately. In case any of the above information is found to be false or untrue or misleading or misrepresenting, I am aware that I may be held liable for it.		
--	-----------------------------------------------------------------------------------------------------------------------------------------------------------------	--	--

- 1) Deviation in any commercial condition shall be suitably loaded in the offered price.
- 2) In case of any conflict, confirmation by vendor provided here will supersede.
- 3) In case bidder is not making an offer against this enquiry, we request the bidder to post the regret letter

Name of Supplier :

Seal & Sign of supplier