PHE –FOR SG AUX.

GeM Tender Enquiry for Heat Exchangers (plate type- for SG Aux) for 1x 660 MW Panki Project

Index of Annexures

Sl. No.	Description	Annexures
1.	Additional terms and conditions	Annexure I
2.	Delivery Schedule	Annexure II
3.	Instruction to Packing List	Annexure III
4.	Certificate for local Content	Annexure IV
5.	CIF Content Annexure	Annexure A
6.	NTPC Sub vendor Questionnaire	-
7.	BOQ	-
8.	PQR	-
9.	Technical Specification	-

ANNEXURE –I (PHE for SG Aux)

Additional Terms and Conditions for subject Tender Enquiry to be complied by Bidders for Consideration in this tender:

1. **Dispatch Markings: -**

   Each box shall be marked with Capital Letters in "Red" indicating the PEM supply (Main Supply/ Commissioning spare/ Mandatory Spare) for 1X660 MW UPRVUNL Panki Thermal Power Station Project. Each package delivered under the Contract shall be marked by Supplier and such marking must be distinct and in English Language (all previous irrelevant markings being carefully obliterated). Such marking shall show the description and quantity of contents, the name and address of consignee, the Gross weight and Net weight of the package, the name of the Supplier, PEM P.O. reference number, with a distinctive number of mark sufficient for purposes of identification. Besides above necessary, packing shall bear a special marking `TOP', `BOTTOM', 'DO NOT TURN OVER", "KEEP DRY", "HANDLE WITH CARE", etc.

   IMPORTANT

   - Two copies of respective standard manufacturer's erection instruction/operation instruction manual shall be kept in each package / container for immediate reference by BHEL site and same shall be reflected in packing slip also
   - The Packing list details for the consignment must be put inside the Box/Boxes.

   Commissioning Spares: - The commissioning spares shall be properly packed separately in separate box and each spare shall be properly tagged giving details i.e. dispatch (to match the description given in the packing slip) to facilitate their proper identification. One Copy of Packing list must be put inside the Box.

   Mandatory Spares: - The Mandatory spares shall be properly packed separately in separate box painted in Red, indicating Mandatory Spares in bold letters and each spare shall be properly tagged giving details i.e. item number of the equipment in line with the CUSTOMER approved BBU for Mandatory spares & Number per item (to match the description given in the packing slip) to facilitate their proper identification by ultimate customer UPRVUNL. One Copy of Packing list must be put inside the Box along with Manufacturing drawing no. reference, Catalogue reference etc.

   Note :- MDCC for mandatory Spares shall be issued only after receipt of detailed list of mandatory spares & photographs before final packing clearly showing mandatory spares with due tagging as per packing list (to be sent over mail/CD). Separate dispatch clearance will be issued for the mandatory spares in line with availability of customer's stores at site.

2. **Liquidated Damages: -**

   a) **Main Supply:-** Purchaser reserves the right to recover from the Seller/ Contractor, as agreed liquidated damages and not by way of penalty, a sum equivalent to half (½) percent and applicable GST thereon, of the total main supply & commissioning spares contract price excluding GST per week or part thereof, subject to a maximum of ten(10) percent of the total main supply & commissioning Spares contract price excluding GST, if the Seller/ Contractor fails to deliver any part of the ordered goods/stores within the period stipulated in the Order/ Contract.

b) **LD on mandatory spares portion:** - LD shall be applicable @ ½ percent and applicable GST thereon, of the total mandatory spares portion contract value excluding GST per week or part thereof, limiting to 10% of total contract value of mandatory spares excluding GST.

c) **LD on PG Test** - LD shall be applicable @ ½ percent and applicable GST thereon, of the total **PG Test** portion contract value excluding GST per week or part thereof, limiting to 10% of total contract value of **PG Test** excluding GST.

NOTE:

i. LR/RR date for indigenous supplies (Bill of Lading/AWB for Foreign supplies) shall be treated as the date of dispatch for levying LD. However, if receipted LR date for indigenous supply is beyond 30 days for FTL/ 45 days for PTL from the date of LR (PTL to be clearly mentioned in LR), such excess period shall be considered for LD purpose irrespective of dispatch date. Import General Manifest (IGM)/Bill of entry date (whichever is earlier), for foreign supplies, is beyond 90 days from the date of Bill of Lading/AWB, such excess period shall be considered for LD purpose irrespective of dispatch date.

ii. In case of any amendment/ revision, LD shall be linked to the amended/ revised contract value and delivery date(s).

iii. If Order/ Contract involves two or more Units/ Sets/ Lots/ Stages, then Liquidated Damages shall be levied on order/ contract value excluding GST of the delayed Unit/ Set/ Lot/ Stage, provided delivery stipulated in the Order/ Contract is Unit/ Set/ Lot/Stage wise, however total LD amount shall be limited to 10% of total order/ amended order value excluding GST of delayed Unit/ Set/ Lot/Stage. Any subsequent lot released (not envisaged in original contract) due to increase in quantity within permissible quantity variation shall be treated as separate lot for the purpose of LD.

iv. The sum specified above is not a penalty but a genuine pre-estimate of the loss/ damage which will be suffered by purchaser on account of delay on the part of the Contractor/Seller and the said amount will be deductible without proof of actual loss or damage caused by such delay.

3. Risk & Cost Purchase

BHEL reserves the right to terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' by BHEL in any of the following cases:

i) If the Seller/Contractor fails to deliver the goods or materials or any instalment thereof within the period(s) fixed for such delivery or the Seller's poor progress of the supply/ services vis-à-vis delivery/execution timeline as stipulated in the Contract, backlog attributable to seller including unexecuted portion of supply does not appear to be executable within balance available period;

ii) Delivers goods or materials not of the contracted quality and failing to adhere to the contract specifications;

iii) Withdrawal from or repudiation/ abandonment of the supply/ services by Seller before completion as per contract or if the Seller refuses or is unable to supply goods or materials covered by the Order/Contract either in whole or in part or otherwise fails to perform the Order/Contract;

iv) Non-supply by the Seller within scheduled completion/delivery period as per Contract or as extended from time to time, for the reasons attributable to the Seller;

v) Termination of Contract on account of any other reason (s) attributable to Seller.

vi) Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

vii) If the Seller be an individual or a sole proprietorship Firm, in the event of the death or insanity of the Seller;

viii) If the Seller/Contractor being an individual or if a firm on a partnership thereof, shall at any time, be adjudged insolvent or shall have a receiving order for administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the Order/Contract or enter into any arrangement or composition with his creditors or suspend payment or if the firm dissolved under the Partnership Act;

ix) If the Seller/Contractor being a company is wound up voluntarily or by order of a Court or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances shall have arisen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager;

x) Non-compliance to any contractual condition or any other default attributable to Seller.

Such defaulting vendor/Seller shall not be eligible to participate in re-tendering conducted on account of risk purchase made due to fault of such vendor/Seller.

3.1 **Risk & Cost Amount against Balance Work:**

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,

A= Value of Balance scope of Work (*) as per rates of new contract

B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

3.2 *** Balance scope of work (in case of termination of contract):**

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

ANNEXURE –I (PHE for SG Aux)

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose.

Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: In case portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract

quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

3.3 **LD against delay in executed work in case of Termination of Contract:**

LD against delay in executed work shall be calculated in line with above LD clause, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of LD against delay in executed work in case of termination of contract" is given below.

i. Let the time period from scheduled date of start of work till termination of contract excluding the period of

Hold (if any) not attributable to contractor = T1

ii. Let the value of executed work till the time of termination of contract = X

iii. Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were

planned for execution till termination of contract = Y

iv. Delay in executed work attributable to contractor i.e. T2 = [1-(X/Y)] x T1

v. LD shall be calculated in line with LD clause (clause 16) of the Contract for the delay attributable to

contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

3.4 Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor

Without prejudice to the other means of recovery of such dues from the Seller recoveries from the Seller on whom risk & cost has been invoked shall be made from the following:

a) Dues available in the form of Bills payable to seller, SD, BGs against the same contract.

b) Dues payable to seller against other contracts in the same Region/Unit/ Division of BHEL.

c) Dues payable to seller against other contracts in the different Region/Unit/ division of BHEL.

In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

4. For recognition of dispatch, vendor to submit following documents to BHEL by e-mail/ fax immediately on dispatch: - GST compliant invoice, LR for Indian Vendors (indicating Invoice No., no. of boxes, PTL (if applicable) etc.) / Bill of Lading or AWB for foreign vendor, Packing List (Must be indicating No. of boxes, Packing size, Gross weight and net weight of each package, Contents of the package with cross reference to BoM item code no. or item serial no. and Quantity of each item separately), Insurance Intimation to underwriter through email/fax, Dispatch Clearance.

B. Following ATC available in GEM shall also be made part of NIT: -

i. Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

ii. Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

iii. Data Sheet of the product(s) offered in the bid, are to be uploaded along with the bid documents. Buyers can match and verify the Data Sheet with the product specifications offered. In case of any unexplained mismatch of technical parameters, the bid is liable for rejection.

iv. The bidder is required to upload, along with the bid, all relevant certificates such as BIS license, type test certificate, approval certificates and other certificates as prescribed in the Product Specification given in the bid document.

v. While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

ANNEXURE –I (PHE for SG Aux)

Additional Terms and Conditions for subject Tender Enquiry to be complied by bidders for consideration in this tender:

A. Bidders to ensure that Third party/Customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name & designation of Issuing Authority and its organization contact number and E-mail Id. In case the same is found not available, BHEL has the right to reject such document from evaluation.

B. "This item /package/system falls under the list of items defined in para 3 of ministry of finance guideline date 20.09.16 (procurement of items related to public safety, health, critical security operations and Equipment's etc.) & hence criteria of prior experience /turnover shall be same for all bidders including start up /MSME".

C. **Guarantee & Warrantee** shall be as per Cl. No. 10 of GTC on GeM for the bid. However, Guarantee & Warrantee time period shall be 18 months from the date of last supply in the contract for Main Supply & Mandatory Spares respectively.

D. Evaluation shall be on the basis of total all inclusive, landed price at consignee destination (Refer cl. No. 6 of GTC on GEM).

E. **Terms of Delivery** shall be as per Cl. No. 13 of GTC on GeM (i.e. Free Delivery at site basis including loading/unloading). However, unloading of items (at delivery point) shall be in the scope of buyer. Insurance shall be in seller scope. Bidder to quote prices accordingly.

F. Further, w.r.t. Transit Insurance supplier has to inform the details of dispatches (such as Policy No., Consignee Name, Consignment Packing details, Project Name, Purchase Order No., LR No. & date, Invoice No. & date, dispatch Origin & destination details etc.) to policy underwriter.

G. PQR criteria uploaded with Buyer uploaded Bid Specific document shall prevail value of Experience criteria and Past performance parameter mentioned in GeM bid.

H. "Due to COVID-19 pandemic condition prevailing in the country BHEL/PEM may go for Remote Inspection of Offered items if required. Vendors are requested to be equipped with the facilities/gadgets as indicated in the guidelines available at : https://pem.bhel.com/Documents/VendorSection/Vendor/Guidelines.pdf to take up the inspection remotely.

I. **Inspection call to be raised by bidder on BHEL CQIR portal** (details shall be shared at the of execution of order) and Inspection agency shall attend at the inspection within seven (07) days of the date on which the material is notified as being ready. In case of delay in witnessing of inspection beyond stipulated time (i.e. 7 days from the date on which the material is notified as being ready), by BHEL arising due to reasons not attributable to vendor, BHEL will extend the delivery period for such delay in carrying out inspection. If BHEL is not able to witness inspection up to 15 days then in addition to delay beyond stipulated period, extension in delivery time of 07 days for arranging fresh inspection will be given.

When the tests have been satisfactorily completed at Seller/ Contractor's works, the Inspection Agency shall issue an inspection report that effect within seven (07) days after completion of the tests, but if the tests were not witnessed by the Inspection Agency or his representative, the material acceptance report would be issued within seven (07) days after receipt of the test certificates by the Purchaser.

Purchaser will issue MDCC to the Seller/ Contractor within 7 days based on inspection report/ test certificates/Certificate of Conformance as applicable. In case of delay in issuance of MDCC beyond 7

days stipulated time (i.e. from the date of successful inspection report), by BHEL arising due to reasons not attributable to vendor, BHEL will extend the delivery period for such delay in issuing MDCC. If BHEL is not able to issue MDCC up to 15 days then in addition to delay beyond stipulated period, 7 days' additional time shall be given to vendor to facilitate the vendor for arranging logistics arrangements.

J. All Bidders shall be required to submit applicable Freight % & GST % included in their prices during clarification stage of Tender.

K. Performance Bank Guarantee: shall be as per Cl. No. 7 of GTC of GeM. Performance Security amount shall be @5% of the value of contract value. Further, in case any benefit with respect to BG reduction is applicable at later stage for Panki project, then similar benefit shall be passed onto the bidders for subject tender as well.

L. **Payment Terms:** For Supply Portion incl. Mandatory Spares: - As per clause no. 12 (i) of GTC on GeM. Supplier has to provide original+1 copy of Tax invoice, Packing List, LR/RR or AWB, CRAC, Insurance intimation, Guarantee Certificate, E-way bill (as applicable) for payment. However, 5% payment of main supply shall be released after successful completion of PG test. In case, PG test is not conducted upto 36 months from the supply completion for reason not attributable to the vendor, then last 5% payment shall be released on submission of all final documents (O &M Manual, final drgs. and Inspection documents) for the package duly certified by Engineering department of the purchaser. However, PBG for contract shall be released only after completion of contractual obligation.

Offline payment mode shall be selected. Payment will be released within 60 days after submission of complete documents (45 days for vendors qualified and registered as Micro or Small as per MSMED Act).

For Services (PG test):- As per clause no. 12 (i) of GTC on GeM. Supplier has to provide Tax invoice, CRAC for payment.

M. **Bid reserved for Make in India products: -** Procurement under this bid is reserved for purchase from Class 1 local suppliers as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a class 1 local supplier is denoted in the bid document as 50%. All bidders must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which the bid is liable to be rejected.

Regarding verification of local content, the local supplier at the time of tender, bidding or solicitation shall be required to provide certification (as per enclosed annexure-IV) as per para 9 of PP-MII order revision dated 16.09.2020.

N. **This is conditional tender enquiry. Financial bid opening (Part-II) of a bidder shall be subjected to following: -**

(i) Approval of vendor by end customer i.e. M/s UPRVUNL/NTPC

(ii) Techno-Commercial evaluation/recommendation by BHEL.

(iii) Qualification of Technical PQR

(iv) Offered item should mandatorily conform to PP-MII order provisions.

O. **Consignee Details** (for PRC - Provisional Receipt Certificate & CRAC - Consignee's Receipt cum Acceptance Certificate, as applicable) shall be as per Project Site official details.

ANNEXURE –I (PHE for SG Aux)

P. The Bidder has to 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. In case, the bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/guidelines.

Q. Bidders to ensure the following: -

• Ensure compliance to Ministry of Power (MoP) Order No. 11/05/2018-Coord. dt. 28/07/2020, if applicable.

• Ensure compliance of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020.

• to submit "Model Certificate for Tenders" as per Annexure-III of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020. Bidder to submit the following undertaking on their letter head duly signed from the highest competent authority at your end (i.e Owner, partner, CMD, Director etc.)

R. Delivery Period: As per attached Annexure-II. Delivery Days mentioned in GeM bid is indicative only. Delivery shall be refixed as per terms & conditions of Annexure-II.

S. For registration in BHEL PEM- Online registration portal is operational, Non-registered Vendors who wish to apply for registration in BHEL-PEM can apply through Online Registration Portal available at www.pem.bhel.com - vendor section - Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration can be uploaded on the website and submit the application for registration. However, registration of suppliers is not mandatory in case of open tender.

T. Instructions to Packing List (annexure –III) and Certification reg. Local content (annexure –IV) to be complied by bidders.

U. All other terms & conditions shall be as per selected Additional Terms & Conditions for subject bid from GeM library and GTC version (1.21) available on GeM Portal on enquiry floating date shall be applicable.

V. Quantity Variation clause of +5% of GeM ATC shall be utilized.

W. CIF is applicable for subject tender, bidder to quote the CIF content in % only as per enclosed CIF content annexure – A.

X. Bidder who are not approved with end customer needs to submit the credentials as per NTPC sub vendor questionnaire (enclosed).

Y. Technical specification enclosed with subject tender is applicable for both type of (PHE's) heat exchangers – plate type for TG Aux. and SG Aux., however as such subject tender enquiry is only for heat exchangers – plate type for SG Aux, bidders to note the same.

Project:- 1x 660 MW Panki TPS
Pacakge:- Heat Exchanger (Plate Type for SG Aux.)
Annexure II to NIT- Delivery Schedule

Sl. No.	Package Code	BHEL Drawing No	Drawing Title	Primary/Secondary	Drg Sch for Vendors	Delivery Terms for Supply Portion and Mandatory Spares	Delivery terms for PG Test
1	179-11000-A	PE-V5-426-179-N001	TDS -PHE	Primary	R-0 within 21 days from PO & subsequent revisions incorporating all the BHEL comments within 10 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.	Within Four (04) months from date of CAT-1 approval of Primary drawing/documents, subjected to drawing/document submission/re-submission schedule as stipulated, in case of any delay in submission/re-submission of Primary drawing/ documents, then same shall be reduced from the given delivery period. Delay in BHEL's comments/approval beyond 18 days shall also be considered for delay analysis. **Mandatory Spares**: Within four (04) months from the date of BHEL manufacturing clearance. Separate dispatch/ manufacturing clearance will be issued for mandatory spares	**PG Test** Vendor to depute its service engineer for PG Test within 15 days from BHEL's intimation (for deputing service engineer) for such site activity. For delay in deputing service engineer, LD on PG test portion shall be applicable @ ½% of the total PG test portion (excluding element of taxes) per week or part thereof, with applicable GST. However, total LD (supply + PG Test portion) shall be limited to 10% of cumulative total contract value excluding taxes and freight (supply + PG Test portion).
2		PE-V5-426-179-N002	GENERAL ARRANGEMENT OF PHE	Primary			
3		PE-V5-426-179-N003	SIZING CALCULATION OF PHE's	Primary			
4		PE-V5-426-179-N005	QP-PHE	Primary			
5		PE-V5-426-179-N004	PERFORMANCE CURVES OF PHE's	Secondary	R-0 within 20 days of approval on TDS & subsequent revisions incorporating all the BHEL comments within 10 days of comments received from BHEL.BHEL shall furnish comments / approval on each submission within 18 days from receipt.		
6		PE-V5-426-179-N006	O&M MANUAL-PHE	Secondary	within 30 days of issuance of MDCC.		
7		PE-V5-426-179-N007	PG Test Procedure	Secondary	within 30 days of issuance of MDCC.		

Notes:-

(i) The end period specified is for completion of the deliveries. Deliveries to start progressively so as to meet the completion schedule.

(ii) The delivery conditions specified are for contractual LD purposes, however BHEL may ask for early deliveries without any compensation thereof.

(iii) Non-applicable drawings shall be decided during bid evaluation.

(iv) Wherever schedule of drawings/documents submission / re-submission is stipulated in the Technical Specifications, same shall be superseded by delivery specified in NIT.

PROJECT: 1x 660 MW PANKI TPS
PACAKGE: - Heat Exchangers - Plate Type for SG Aux.
ANNEXURE -III (TO) INSTRUCTIONS TO PACKING LIST

For faster verification of bills, successful bidder to submit detailed Bill of Material (BOM) at the time of drawings/ documents submission after placement of PO. Each item of the BOM to be uniquely identified with item code no. or item Sl. No. Supplier to ensure that all items which will find separate mention in the packing list are covered in this detailed BOM.

Supplier to also give the following undertaking in the BOM:
"The BOM provided herewith completes the scope (in content and intent) of material supply under PO No. ……. Dated …… Any additional material which may become necessary for the intended application of the supplied items/package will be supplied free of cost in most reasonable time.

Packing List must indicate:

a) Packing size
b) Gross weight and net weight of each package
c) Contents of the package with cross reference to BOM item code no. / Sl. No.
d) Quantity of each items separately.

The packing list must cover all the BOM items.

Supplier to give following undertaking in the packing list:

The Packing list provided herewith is as per BOM approved under PO No. -----

ANNEXURE IV
1x 660 MW PANKI TPS
HEAT EXCHANGERS –PLATE TYPE (FOR SG Aux.)

Letter head of Company

Ref……. Date……..

To,
Bharat Heavy Electricals Limited
PEM, PPEI Building, Plot No 25,
Sector -16A, Noida (U.P) -201301

Subject: - Certification regarding local content

Reference: Tender Enquiry No-……

Name of Package: ……

Dear Sir,

We hereby certify that items offered by us of Heat Exchangers- Plate Type (for SG Aux.) for 1x 660 MW Panki Project …….. meets the requirement of minimum local content in line with applicable GeM clause of Make In India and the Public Procurement (Preference to Make in India), Order 2017 dated-15.06.2017, 28.05.2018 & 29.05.2019, 04.06.20 & 16.09.20

We further confirm that details of location at which the local value addition is made will be our registered works at ……(address of the works)

Yours very truly

…….. (authorized signatory of company)

…… (firm name)

authorized signatory
of company

PROJECT: 1x 660 MW PANKI TPS
PACAKGE: - PHE (HEAT EXCHANGER- PLATE TYPE) - SG Aux.
ANNEXURE - A TO CIF CONTENT

Sl No.	DESCRIPTION	CURRENCY	RATE OF CUSTOM DUTY	SOURCE OF SUPPLY	TOTAL CIF CONTENT (IN % ONLY)
1.0	List of CIF content (if any)				

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

i.	***Item/Scope of Sub-contracting***			
ii.	***Address of the registered office***	***Details of Contact Person (Name, Designation, Mobile, Email)***		
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured***	***Details of Contact Person: (Name, Designation, Mobile, Email)***		
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting***			
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting***			
vi.	***Details of proposed works***			
1.	***Year of establishment of present works***			
2.	***Year of commencement of manufacturing at above works***			
3.	***Details of change in Works address in past (if any)***			
4.	***Total Area***			
	Covered Area			
5.	***Factory Registration Certificate***	***Details attached at Annexure – F2.1***		
6.	***Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)***	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)***		
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)***	***Details attached at Annexure – F2.3***		
8.	***After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)***	***Applicable / Not applicable Details attached at Annexure – F2.4***		
9.	***Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any***	***Details attached at Annexure – F2.5***		
10.	***Sources of Raw Material/Major Bought Out Item***	***Details attached at Annexure – F2.6***		
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing***	***Details attached at Annexure – F2.7***		

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

12.	***Manufacturing facilities*** ***(List of machines, special process facilities, material handling etc.)***	***Details attached at Annexure – F2.8***
13.	***Testing facilities*** ***(List of testing equipment)***	***Details attached at Annexure – F2.9***
14.	***If manufacturing process involves fabrication then-***	***Applicable / Not applicable***
	List of qualified Welders	***Details attached at Annexure – F2.10***
	List of qualified NDT personnel with area of specialization	***(if applicable)***
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses***	***Applicable / Not applicable*** ***Details attached at Annexure. –F2.11*** ***(if applicable)***
16.	***Supply reference list including recent supplies***	***Details attached at Annexure – F2.12*** ***(as per format given below)***

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback***	***Attached at annexure - F2.13***
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)*** ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.14*** ***(if applicable)***
19.	***Statutory / mandatory certification for the proposed product***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.15*** ***(if applicable)***
20.	***Copy of ISO 9001 certificate*** ***(if available)***	***Attached at Annexure – F2.16***
21.	***Product technical catalogues for proposed item (if available)***	***Details attached at Annexure – F2.17***

Name:		***Desig:***		***Sign:***		***Date:***	

Company's Seal/Stamp:-

	1x660 MW Panki TPS			
	BOQ FOR PLATE HEAT EXCHANGER PACKAGE (PHE FOR SG AUX'S)			
	DESCRIPTIONS OF WORKS OR EQUIPMENT	**HSN CODE**	UOM	TOTAL QTY.
1	**2**		**3**	**4**
A	Total Price for Design, manufacture, assembly, inspection and testing, at manufacturer's and / or his sub contractor's works, properly packed and painted for transportation and delivery of Plate Heat Exchangers for SG Aux's along with mandatory spares complete with all accessories, special tools & tackles (if any), commissioning spares (if any), counter flanges with nuts, bolts, gaskets and coatings (wherever necessary) as specified in the Technical specification No. PE-TS-426-179-N001 (Rev 02) .			
	Break up of 'A' above			
A.1	**PHEs for DMCW-SG Aux's**		NOS.	2
A.2	**Lumpsum price for following Mandatory spares (also specified in Data Sheet-A) Break-up as under:**			
A.2.1	**Mandatory Spares for PHEs for DMCW-SG Aux's**			
A.2.1.1	**Gaskets**		LOT	30% of total requirement of eacht type & size.
A.2.1.2	**HT Plates**		LOT	10% of each type & size
A.2.1.3	**Fasteners**		LOT	10% of each type & size
	Total (A.1+A.2)			
B	**Lumpsum Site Performance Testing of all PHE for SG Aux's.**	**SAC CODE**	UOM	TOTAL QTY.
			SET	2
C	**Grand Total (A+B)**			

NOTES :

1) Bidder to note that total price indicated above at C shall be considered complete in all respect for the full scope defined and considering all terms and conditio
2) Quantities indicated above shall be known as Order Quantities. The variation in Quantity shall be as per NIT.
3) Unit prices quoted by bidder, as above, shall be binding for any quantity variation.
4) Price of commissioning & erection spares, special tools & tackles and other accessories not listed above shall be included in the price of PHE & shall be supplied
5) Price break up for items not asked are deemed to be included in Sl.no '**A'** of this price schedule.
6) Delivery shall be as per NIT
7) Wherever quantity has been specified as percentage (%), it shall mean percentage (%) of the total population of the PHE for the project, unless specified otherwi
8) Wherever the quantities have been indicated for each type, size etc., these shall cover all the items to be supplied and installed.

691391/2022/PS-PEM-MSE

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) - PLATE HEAT EXCHANGERS (PHE)	DOCUMENT NO: PE-TS-426-179-N001, Rev-02 REVISION NO: 03 DATE: 03/08/2021 SHEET: **1** of **3**

FORM NO. PEM 6100-0

ENQUIRY NO.:

PROJECT: 1x660 MW Panki TPS (UPRVUNL)

PACKAGE: PLATE HEAT EXCHANGER (PHE) for SG Aux's

1. The bidder should have designed, manufactured, tested, inspected & supplied the PHE with minimum heat load of 1100000 Kcal/hr which have been successfully in use for at least 1 year in thermal power plant or similar industry/ application and bidder is in business of PHE on continuous basis.

2. Offers of the JV companies/ Joint Bidders/ bidders having collaboration / licensing agreement/ MOU/ Indian subsidiaries meeting the PQR at sl. no. 1 above shall be evaluated as follows:

   a. If bidder happens to be an Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR.

   b. If bidder happens to be the Joint Venture Company, then the credentials of any of JV partners can be also considered for meeting PQR.

   c. If bidder happens to bid jointly with their partner, then credentials of both the partners will be considered for meeting PQR as per distribution of the work. In all such cases, lead bidder as specified in bid documents shall be responsible for overall execution of the contract and all guarantee/ warranty

   d. If bidder happens to be the having valid collaboration agreement/ MOU/ licensing agreement with some other company, then the credentials of collaborator/ MOU partner/ licensing company can also be considered for meeting PQR.

Notes:

i) Bidder quoting on above route(s) should be manufacturer of PHE and qualifying on the basis of credentials of his principal/ JV partner/ Collaborator/ MOU partner/joint bidder/licensing Company etc., then the principal/ JV partner/ Collaborator/ MOU partner/ joint bidder/ licensing Company shall be responsible for overall design vetting and warranty/ guarantee of the package. The scope matrix clearly defining their respective roles including design vetting, manufacturing of critical component, E&C etc. and warranty/ guarantee shall be submitted along with the offer.

ii) Bidder to note that the arrangement of bidding (joint bid partners/ collaborator/ MOU partner/ licensing company etc.) once offered to BHEL as a part of bidding documents cannot be changed till the execution of the project.

3. The Bidders shall furnish following support documents for assessment of Bidder

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) - PLATE HEAT EXCHANGERS (PHE)	DOCUMENT NO: PE-TS-426-179-N001, Rev-02 REVISION NO: 03 DATE: 03/08/2021 SHEET: **2** of **3**

w.r.t. PQR as indicated at Sl. No. 1 above:

A. Bidder's Experience list of PHE for last 5 years (as on the enquiry/NIT date) for assessment of bidder for supplying the PHE on regular basis for establishing business continuity in the enclosed format- Annexure-1.

Bidder shall furnish the PO copy of at least one executed Contract as indicated in the experience list.

B. Bidder shall furnish any one from below in support of successful performance of PHE for one year:

i. Satisfactory Performance feedback certificates from End Customer (Owner) (in English) for at least one successfully executed contract which has been in use for at least one year indicating salient features like year of commissioning of PHE, rating of project, flow & heat load of PHE, project name etc., date of issue of certificate and name/ designation of the certificate issuer for power plant/similar application industry. The time duration of satisfactory performance completion should be before the date of subject enquiry/NIT.

OR

ii. The bidder has been awarded one repeat contract for PHE from End Customer (Owner) / Purchaser (in English) for power plant/similar application industry. Repeat contract shall be considered when the second contract is given by the same purchaser/ owner after lapse of minimum 1 year from execution (viz. supply) of first contract. Supporting documents for execution of the first contract like dispatch[N2] details or commissioning report or PG test report along with the PO Copy to be furnished, if bidder intends to submit the documents for Repeat Contracts. The date of repeat contract order should not be later than the date of subject enquiry/NIT.

Notes:-

N1 - Purchase order copy, supporting drgs/technical data sheets etc. are to be submitted along with the bid for which the bidder intends to furnish the performance feedbacks / repeat contracts for reference purpose only.

N2 - Dispatch details shall include any one of the following documents:
a. Tax Invoice.
b. Site receipt/Receipted LR.
c. Customer's material dispatch clearance certificate.

N3 – Purchase order for spare items shall not be considered as repeat order qualifying criteria.

Any additional document required in support of above documents to establish the co-relation between the above documents and the supplied item shall be provided by the

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) - PLATE HEAT EXCHANGERS (PHE)	DOCUMENT NO: PE-TS-426-179-N001, Rev-02 REVISION NO: 03 DATE: 03/08/2021 SHEET: **3** of **3**

	bidder.
	4. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
	5. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
	6. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.
	7. Consideration of offer shall be subject to customer's approval of bidders, if applicable.

EXPERIENCE LIST

ANNEXURE-1

EXPERIENCE LIST

PROJECT NAME	END CUSTOMER	PHE PARAMETERS			HEAT TRANSFER AREA (sq.m.)	PHE MODEL NUMBER	No. OF PHE's SUPPLIED	TYPE OF FLUID	PLATE MATERIAL	YEAR OF SUPPLY	PERFORMANE FEEDBACK CERTIFICATE ENCLOSED (Y/N)
		FLOW (Cu M/Hr.)	TEMP RISE (Deg. Cel.)	HEAT LOAD							

UPRVUNL

1 X 660 MW PANKI TPS EXTENSION

TECHNICAL SPECIFICATION

PLATE HEAT EXCHANGERS

Specification No.: PE-TS-426-179-N001 (REV 02)

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA-201301

CONTENTS

This Technical Specification consists of three Sections:

Notes:

1) For detailed list of documents to be submitted by bidder in their technical offer, please refer cl. no. 10.00.00 of Section-IIA.

2) For detailed list of documents to be submitted by vendor after award of contract, please refer Datasheet-C of Section-IIA.

3) In case there is conflict in different clauses of specification, most stringent clause (as decided by BHEL / end customer) shall be followed, if no specific deviation is taken by bidder and accepted by BHEL during tender stage in that regard.

SECTION I

IA SPECIFIC TECHNICAL REQUIREMENTS

IB DATASHEET – A

1.0 GENERAL:

1.1 This enquiry covers the design, manufacture, assembly, inspection and testing at manufacturer's and/ or his sub-contractors works, painting, proper packing & delivery of the item namely PLATE HEAT EXCHANGERS complete with all mandatory spares (as applicable), accessories, commissioning & erection spares (if any), counter flanges with nuts, bolts, gaskets and coatings (wherever necessary), including special tools & tackles (if any), including site PG test (as applicable) as mentioned in this specification for 1x660 MW Panki TPS Extension.

The Plate Heat Exchangers complete with all accessories including special tools and tackles (if any) shall conform to the Data Sheet-A (Section IB) and other requirements of section IIA. In addition, the requirements of this Section IA including Customer Specification attached at Appendix 1 (as applicable) shall also be complied with.

1.2 The bids shall be evaluated as per NIT. Ordering shall be done as per NIT.

1.3 Bidder to quote for items as per price schedule attached in NIT.

1.4 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship, and shall be capable of performing the required duties in a manner acceptable to Engineer / Owner, who will interpret the meaning of drawing and specifications and shall be entitled to reject any component, work or material, which in his opinion is not in conformity with the duty requirements.

Note: Type of PHEs have been detailed in Data Sheet-A, Section-1B. The bidder shall include complete supplies for one type of PHE in his scope. Part supplies for the type of offered PHE shall disqualify the bidder's offer. Evaluation shall be done separately for DMCW- TG and DMCW SG PHEs and further details shall be indicated in NIT.

2.0 SPECIFIC REQUIREMENTS:

2.1 Design heat load of plate type heat exchangers and Inlet & Outlet temperatures of the Plate type heat exchangers on the primary and secondary side to be demonstrated at site.

Pressure drop across the Plate type heat exchanger on the primary & secondary water circuit to be demonstrated at site.

PG test at site (if applicable) be conducted as per clause 8.02.00 of Section-IIA. Bidder to quote Unit Rate for PG test accordingly.

2.2 The Heat transfer plate area measurement procedure and packing procedure indicated at Section-IIA are only for reference. Project specific procedures shall be submitted by the bidder during detailed engineering for approval.

2.3 Following to be complied by the bidder:

a) Supplier to submit detailed 'Bill of Material' (BoM) at the time of drawing/document submission after placement of PO. Each item of the BoM to be uniquely identified with item code no. or item serial no.

b) Supplier to ensure that all items which will find separate mention in the packing list are covered in this detailed BoM.

c) Supplier to give following undertaking in the BoM:

"The BoM provided herewith completes the scope (in content and intent) of material supply under PO no.----------, dated ----------.
Any additional material which may become necessary for the intended application of the supplied items(s)/package will be supplied free of cost in most reasonable time."

2.4 Velocity in the PHE plates shall be so chosen such that sufficient turbulence should be maintained so as to prevent any deposition on the plate surface.

2.5 All nozzles shall be ' built-in type' and shall have a raised face.

3.0 The drawing / document submission schedule shall be as per NIT. MDL shall be as follows:

PACKAGE	BHEL DRG NO	DRG TITLE
PLATE HEAT EXCHANGERS (PHE)	PE-V5-426-179-N001	Technical Data sheet of PHE
	PE-V5-426-179-N002	GA drawing of PHE
	PE-V5-426-179-N003	Thermal sizing calculation of PHE
	PE-V5-426-179-N005	QAP of PHE
	PE-V5-426-179-N004	Performance curves of PHE
	PE-V5-426-179-N006	O&M MANUAL for PHE
	PE-V5-426-179-N007	PG TEST PROCEDURE -PHE (If Applicable)

Drawings submitted shall be complete in all respects with revised drawing submitted incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

Appendix 1

(Customer Specification)

Section M4 : Equipment Cooling Water System

	TEST / CHECKS ITEM / COMPONENTS	Material Test	WPS/PQR/Welder Qualification	DPT/MPI	Assembly Fit Up	Visual & Dimensional Check	UT	RT	Hydraulic / Water Fill	Balancing	Type Test	Performance Test	Other Test
A	**PLATE TYPE HEAT EXCHANGER**		Y	Y[3]	Y	Y			Y				
A.1	Heat Transfer Plates	Y[1]		Y[2]		Y	Y[5a]						Y 7
A.2	Gaskets	Y				Y							
A.3	Cover Plates (Front & Rear)	Y[1]				Y	Y[5a]						
A.4	Tie Rods	Y[1]		Y[4]			Y[5b]						
B	**HORIZONTAL / VERTICAL CENTRIFUGAL PUMP**				Y	Y						Y 10	
B.1	Casing	Y[1]		Y[4]		Y			Y				
B.2	Impeller	Y[1]		Y[4]		Y				Y 9			
B.3	Shaft	Y[1]		Y		Y	Y[5b]			Y 9			
B.4	Fabricated Components	Y[1]	Y	Y[3]	Y	Y	Y[5a]	Y 6	Y 8				

Notes:	
1.	One per heat / HT batch
2.	DP Test shall be conducted for 10% of the lot of HT plates. However, in case of any defect, entire lot shall be tested and only defect free plates shall be accepted
3.	100% DP Test shall be conducted on butt welds and 10% DPT on fillet weld after final run
4.	100% DPT shall be carried out on machined surfaces
5a.	UT shall be done on plates with thickness 25 mm or above
5b.	UT shall be done on shaft / tie rod with diameter 50 mm or above
6.	RT shall be conducted on butt joints having plate thickness above 10 mm. Quantum of RT shall be based on pressure rating
7.	Each Plate after pressing shall be subject to either of the following tests, as per Manufacturer Practice a) Light Box Test b) Vacuum Test c) Air Chamber Test
8.	All pressure retaining parts shall be hydrostatically tested at 200% of pump rated head or 150% of shut – off head, whichever is higher, for at least 30 minutes. No leakage is allowed

	TECHNICAL SPECIFICATION			**Technical specification no**	**PE-TS-426-179-N001 (Rev 01)**
	PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**02**
	1X660 MW PANKI TPS			**Date**	**24-01-2022**
	PHE DESCRIPTION			**DMCW-TG PHE**	**DMCW-SG PHE**
1.0	**General**				
1.1	**Number of Plate Heat Exchanger**		Nos	Three (3) nos	Two (2) nos
1.2	**Arrangement**			3X50% configuration	2X100% configuration
1.3	**Location**			Indoor	Indoor
1.4	**Primary side (Hot) Fluid**			Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)
1.5	**Secondary side (Cold) fluid**			Clarified water (Refer enclosed water analysis)	Clarified water (Refer enclosed water analysis)
1.6	**Connecting Pipe size**	(Primary Side)	NB	700	350
		(Secondary Side)	NB	700	400
1.7	**Maximum permitted Length of the PHE**		mm	5000 mm (excluding reducer)	5000 mm (excluding reducer)
2.0	**Design**				
2.1	**Design Code**			Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards
2.2	**Design Pressure**		Kg/cm^2 (g)	10	12
2.3	**Operating Pressure**	(Primary Side)	Kg/cm^2 (g)	6.0 to 7.0 Kg/sq. cm(g)	8.0 to 9.0 Kg/sq. cm(g)
		(Secondary Side)	Kg/cm^2 (g)	2.5 to 3.5 Kg/sq. cm(g)	2.5 to 3.5 Kg/sq. cm(g)
2.4	**Mechanical Design Temp.**		^oC	60	60
2.5	**Heat Transfer per Sq.Mtr. Of Heat Transfer Plate**		$Kcal/Hr./m^2$	To be decided by bidder	To be decided by bidder
2.6	**Specific Heat of Fluid**	**(Primary Side)**	Cal/gmDeg.C	1	1
		(Secondary Side)	Cal/gmDeg.C	1	1
2.7	**Density of Fluid**	**(Primary Side)**	gm/cc	1	1
		(Secondary Side)	gm/cc	1	1
3.0	**Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:**				
3.1	**Flow rate**	(DMCW Side)	M^3/hr	2225	665
		(ACW Side)	M^3/hr	2450	735
3.2	**Inlet temperature**	(DMCW Side)	^oC	44.4	44.5
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	39	39
		(ACW Side)	^oC	41	41
3.4	*** Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at 1.1 times of design flow**	(DMCW Side)	MWC	10	10
		(ACW Side)	MWC	10	10
	*** High pressure drop than the specified figure will not be accepted, no credit shall be, however, given for lower pressure drop in bid evaluation. Pressure drop mentioned shall be calculated against flow mentioned at S. No 3.1. Each heat exchanger shall be capable of passing a flow of at least 1.1 times the design flow rate on both primary and secondary water sides. Bidder shall indicate maximum pressure drop through the heat exchanger under this condition.**				
4.0	**Additional HT plates on Design Plates**		%	5%	5%
5.0	**Heat Transfer Coefficient/Margin**				
5.1	**Overall fouling resistance (minimun)**		Hr m2deg C/Kcal	0.00008	0.00008

	TECHNICAL SPECIFICATION		**Technical specification no**	**PE-TS-426-179-N001 (Rev 01)**
	PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**02**
	1X660 MW PANKI TPS		**Date**	**24-01-2022**
	PHE DESCRIPTION		**DMCW-TG PHE**	**DMCW-SG PHE**
5.2	**Minimum corrosion allowance on heat exchanger parts of carbon steel (e.g. pressure parts,nozzles,sliding channel and frame) (refer note 1)**	mm	1.6	1.6
6.0	**Material of Construction :**			
6.1	**Heat Transfer Plates (Minimum acceptable plate thickness 0.6 mm). Refer Note no. 3**		SS-316	SS-316
6.2	**Plate Gasket**		Nitrile rubber, 65 ± 5 % shore hardness	Nitrile rubber, 65 ± 5 % shore hardness
6.3	**Compression/Fixed/Frame/Movable Pressure plates**		Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.4	**Guide Rails/ bar**		Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding
6.5	**Support Beam/ column**		Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.6	**Nozzle (Reducer/Expander)**		Carbon steel IS 2062, Gr. B, Epoxy Coated	Carbon steel IS 2062, Gr. B, Epoxy Coated
6.7	**Nozzle flanges**		Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated	Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated
6.8	**Flange/ Counter flanges**		Carbon Steel as per IS 2062 Gr. B (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated	Carbon Steel as per IS 2062 Gr. B (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated
6.9	**Tightening Bolts/Rods & Nuts**		IS-1367 Gr.8.8 or equivalent	IS-1367 Gr.8.8 or equivalent
6.10	**Nozzle flange bolts / nuts**		SA 193 B7/ SA 194 2H	SA 193 B7/ SA 194 2H
6.11	**Nozzle flange gasket**		3mm wire inserted Red Rubber	3mm wire inserted Red Rubber
6.12	**Name Plate**		AISI 316 18'-8' SS (3 mm thick)	AISI 316 18'-8' SS (3 mm thick)
6.13	**Wetted fasteners**		SS-316	SS-316
6.14	**Painting**			
	External Surface			
	a.) Surface Preparation		All surface other than stainless steels shall be painted. The steel surface to be applied with painting shall be thoroughly cleaned before applying painting by shotblasting (SA 2.5) etc shall be subjected to BHEL/Customer approval. For all the steel surfaces, a coat of epoxy resin based zinc phosphate primer of min thickness of 50 microns followed up with undercoat of epoxy resin based paint pigmented with Titanium dioxide with min thickness of 50 microns shall be applied. The top coat shall consist of two coats each of min 50 microns thickness of epoxy paint. Thus total thickness shall be minimum 200 microns.	All surface other than stainless steels shall be painted. The steel surface to be applied with painting shall be thoroughly cleaned before applying painting by shotblasting (SA 2.5) etc shall be subjected to BHEL/Customer approval. For all the steel surfaces, a coat of epoxy resin based zinc phosphate primer of min thickness of 50 microns followed up with undercoat of epoxy resin based paint pigmented with Titanium dioxide with min thickness of 50 microns shall be applied. The top coat shall consist of two coats each of min 50 microns thickness of epoxy paint. Thus total thickness shall be minimum 200 microns.
	b.) Primer			
	c.) Final Paint			
7.0	**Extra Carrying capacity to be provided on frame assembly.**	%	25	25
8.0	**Spares**	**Unit of Measurement**		
8.1	**Heat Transfer Plates**	Lot	10% of each type & size	10% of each type & size
8.2	**Gaskets (All types)**	Lot	30% of total requirement of eacht type & size.	30% of total requirement of eacht type & size.

	TECHNICAL SPECIFICATION		**Technical specification no**	**PE-TS-426-179-N001 (Rev 01)**
	PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**02**
	1X660 MW PANKI TPS		**Date**	**24-01-2022**
	PHE DESCRIPTION		**DMCW-TG PHE**	**DMCW-SG PHE**
8.3	**Fasteners**	Lot	10% of each type & size	10% of each type & size
9.0	**Hydrotesting at Shop**			
9.1	**Hydrotesting Pressure**	Kg/cm2 (g)	1.5 times the design pressure	1.5 times the design pressure
9.2	**Duration of Hydrotesting**	Minutes	30	30
10.0	**Performance curves and figures to be furnished during contact stage**			
10.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.			
10.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)			
10.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)			
10.4	Primary side water outlet temperature vs. Primary side inlet temp.			
10.5	Film heat transfer coefficient curve			
10.6	Correction Curves.			
11.0	**Minimum Standard requirement of the PHE to be offered by the bidder.**			
11.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)			
11.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.			
11.3	Plate thickness should be adequate to withstand all operating conditions but with Minimum plate thickness of 0.6 mm (No negative tolerance allowed in thickness specified). The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.			
11.4	The plate Heat exchangers shall be single pass type. Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.			
11.5	Double sealing arrangement shall be provided at outer edge and around ports with the inter space between the seals vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.			
11.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.			
11.7	Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.			
11.8	Painting as specified at Sl. No. 6.14 above shall be subject to customer/BHEL approval during detailed engineering. No Price implication shall be admissible on account of this.			

DM WATER ANALYSIS

Applicable for ALL Projects (PHE - Primary Side)

ANNEXURE - A-9

CLAUSE NO.	PROJECT INFORMATION NTPC

ANALYSIS OF DM WATER TO BE USED

AS

PRIMARY FLUID FOR PHEs OF ALL THE PROJECTS

S.No.	Characteristics		Value
i)	Silica (Max.)	-	0.02 ppm as SiO2
ii)	Iron as Fe	-	Nil
iii)	Total hardness	-	Nil
iv)	pH value	-	CORRECTED TO 8.5-9.5
v)	Conductivity excludingthe effects of free CO_2	-	Not more than. 0.1

ANNEXURE-I: CLARIFIED WATER ANALYSIS

S. No.	Description	Unit	Parameter
1	Physical characteristics		
	pH at 25^0C	-	7.59
	Turbidity	NTU	<15
	Conductivity	µs /cm	590
	Total Dissolved solids	ppm	285
	Total Suspended Solids	ppm	<15
2	Cations		
	Calcium Hardness	ppm as CaCO3	113.86
	Magnesium Hardness	ppm as CaCO3	40
	Sodium + Potassium	ppm as CaCO3	37.2
	Iron	ppm as CaCO3	0.3
	Total Cations	ppm as CaCO3	191.36
3	Anions		
	Bicarbonate	ppm as CaCO3	97
	Carbonate	ppm as CaCO3	0.34
	Hydroxyl	ppm as CaCO3	0.02
	Chlorides	ppm as CaCO3	27.1
	Sulphate	ppm as CaCO3	66.4
	Nitrate	ppm as CaCO3	0.5
	Total Anions	ppm as CaCO3	191.36
4	Carbon Di-oxide as CO_2	ppm	5.54
5	Dissolved Silica	ppm as SiO2	10.0
6	Colloidal Silica	ppm as SiO2	0.5

SECTION II

IIA STANDARD TECHNICAL SPECIFICATION STANDARD QUALITY PLAN

1.00.00 **GENERAL**

This specification covers the Design, Performance requirements, Constructional Features, Materials requirements, manufacture, assembly, Inspection and Testing at Manufacturer's and/ or his sub-contractor's works and Painting requirements for delivery of Plate Heat Exchanger complete with all accessories as specified herein-after.

1.01.00 **SYSTEM DESCRIPTION**:

1.01.01 The Plate Heat Exchanger are intended to be used in closed circuit DM cooling water circuit for Cooling Hot passivated DM Water by Auxiliary Cooling Water (Clarified / Sea Water).

1.01.02 Passivated DM Water is circulated through various auxiliary coolers of TG/SG/Station Aux., in closed loop by means of pumps. This DM water picks up heat from different cooling equipment's. Heat from DM water is transferred to auxiliary cooling water (Secondary side) thru' the Plate Heat Exchangers covered under this specification.

1.01.03 The analysis of DM Water, Clarified /Sea Water (Auxiliary cooling water) to be handled by the Plate Heat Exchangers are attached as Annexure to Data Sheet-A.

1.01.04 A strainer of 2 mm size at ACW inlet lines of PHE is provided and backwashing of PHE's is not envisaged.

2.00.00 **CODES AND STANDARDS :**

2.01.00 The design manufacture and testing of the plate heat exchanger complete with all accessories, shall generally conform to the latest editions of the following appropriate standards.

2.01.01 IS/BS/DIN/US Standards regarding pressure vessels, pressure piping, pipes, valves, flanges and other as necessary.

2.01.02 IS/ BS/ DIN/ ASTM for material specification and testing procedures.

2.02.00 In case of any conflict between the above codes/ standards and this

specification, the latter shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the Engineer shall be final and binding.

3.00.00 **SCOPE OF SUPPLY**:

3.01.00 The details of the Plate Heat Exchangers with the quantity, design parameters etc. to be supplied shall be as per Data Sheet-A enclosed at Section IB.

3.02.00 Each Plate Heat Exchanger (quantity and other details specified in Data Sheet-A) shall be complete with the following accessories and auxiliaries.

(i) Suitable drain and vent connections for both primary (DMCW) and Secondary Water (Raw Water/ Sea Water as applicable) streams complete with isolation valves.

(ii) Supporting arrangement complete with foundation plate channels, anchor bolts, nuts, sleeves, inserts etc.

(iii) Lifting arrangement i.e., lifting lugs, eye bolts etc.

(iv) Matching counter flanges with necessary bolts, nuts, and gaskets for all flanged terminal points, including for DMCW and ACW inlet/outlet nozzles & reducers/ expanders.

(v) Inspection ports at the End plates of the PHE.

(vi) Other accessories as required to make PHE's complete in all respects.

(vii) Commissioning spares, if any.

(viii) One Ratchet spanner for each type of PHE is included in bidder's scope of supply.

(ix) Matching piece (Reducer/Expander), with coatings (as required), to match the PHE nozzle connection with connecting pipe size at DMCW side/ ACW side as indicated in Data Sheet. In case of sea Water, Matching piece on ACW Side (Secondary) shall be flanged with coatings (as required for sea water application).

(x) Spares as applicable as per data sheet A at Section IB.

3.03.00 Finish paints for touch up painting of equipment after erection at Site in sealed containers.

3.04.00 Items though not specifically mentioned in the specification but needed to complete the equipment to meet the intent of specification, shall also be deemed to be included unless otherwise specifically mentioned in exclusions.

4.00.00 **EXCLUSIONS :**

The following are excluded from the bidder's scope:

4.01.00 Civil foundation works required for installation of the heat exchangers.

4.02.00 Piping, valves etc., on the external circuit of both primary and secondary water streams.

4.03.00 Erection & Commissioning of equipment at site.

5.00.00 **DESIGN AND CONSTRUCTION:**

5.01.00 **General Requirements:**

5.01.01 Unless otherwise necessary manufacturer's standard and proven models of the plate heat exchanger shall be supplied.

5.01.02 The equipment shall be capable of safe, proper and continuous operation at all heat loads and water from up to those corresponding to the operating conditions mentioned in Data Sheet-A. Vibration, noise, mechanical and thermal stresses shall be kept within allowable limits specified by relevant codes/ standards in design. Due attention shall be given to ease of maintenance, repair and cleaning.

5.01.03 Suitable corrosion allowance shall be provided wherever necessary. The corrosion allowance for the heat exchanger parts such as pressure plates (support plates), nozzles, sliding channels and frame shall be 1.6 mm (minimum).

5.01.04 Each heat exchanger shall be capable of passing a flow of at least 1.1. times the design flow rate on both primary and secondary water sides. Bidder shall indicate maximum pressure drop through the heat exchanger under this condition.

5.01.05 For the purpose of calculating dirty overall heat transfer coefficient a total fouling factor as given in Data Sheet-A shall be assumed. It is expected that the cleaning frequency shall be once in a year with the above fouling factor.

5.01.06 No back wash for the heat exchangers is envisaged.

5.02.00 **Performance Requirements:**

5.02.01 The pressure drop across plate heat exchanger from inlet to outlet in fouled conditions for primary and secondary sides, shall not be more than those

specified in Data Sheet-A, for the specified flow rates.

5.02.02 For the specified flow rate and inlet temperature, the primary side (hot fluid) outlet temperature shall not be more than that specified in Data Sheet-A.

5.02.03 In the event of failure to meet the above stipulated performance requirements, the equipment will be outrightly rejected.

5.03.00 **Construction of Heat Exchanger:**

5.03.01 Heat transfer plates shall be packed in a frame consisting of fixed frame plate and movable pressure plate and aligned at top and bottom on carrying bars. Design shall be such that cleaning is possible without dismantling the piping.

5.03.02 Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.

Double sealing arrangement shall be provided at outer edge and around ports. The interspace between the seals shall be vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.

The gasket arrangement shall be such that it receives continuous support to ensure a long gasket life. The gasket should be able to retain their properties and shape over a life period of 10 years.

5.03.03 Heat transfer plates shall be provided with sufficient thickness in order to impart sufficient rigidity to the plates particularly from handling considerations. Plates shall have contact points in order to provide inter-plate supports. The recesses on the plates are suitably strengthened by a reinforcement plate.

Plate thickness shall be adequate to withstand all operating conditions as specified in Datasheet-A. Flanges shall be as per ANSI B 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sec. VIII Div. 1. 25% extra capacity for additional plates shall be provided in frame.

Each plate shall be numbered in sequence. The number shall be marked by indelible ink on the plate to permit easy reassembly. The plates shall be pressed from one piece. They shall be pressed in single / progressive manner.

The corrugation shall be smooth, uniform and identical for every plate. The PHE

bottom frame plate and support should have fixing lugs and cleats to keep provision for enabling to fit trough with outlet nozzle fitted underneath to collect and drain out water in the event of leakages.

5.03.04 Frame for each heat exchanger shall have extra capacity to accommodate the additional plates if required in future because of any reason whatsoever. The extra capacity to be provided is indicated in Data Sheet-A.

The upper carrying bar and lower guide bar shall be rigid in construction without any risk or sagging or buckling, and shall facilitate easy guiding of the plates.

5.03.05 All inlet, outlet and other nozzles shall be flanged type and shall be as specified in Data Sheet-A. Counter flanges complete with gaskets, bolts, nuts and coatings (wherever necessary) shall be supplied for all the nozzle connections. The nozzle sizes of primary / secondary streams of PHEs shall be of adequate size within acceptable range of velocity. The size selection shall be subject to approval in the event of order.

5.03.06 If necessary, relief valves shall be provided on both the streams.

5.04.00 **Materials of construction :**

Material of the heat transfer plates and gaskets shall be consistent with the fluid handled. However, material specification for various parts shall be equal or superior to those specified in Data Sheet - A.

5.05.00 **Foundation And Lifting Arrangements:**

5.05.01 Plate heat exchanger shall be supplied with necessary foundation plates, anchor bolts, sleeves, nuts, inserts etc.

5.05.02 Plate heat exchanger shall be equipped with suitable lifting lugs/ eye-bolts to facilitate handling during erection and maintenance.

6.00.00 **PAINTING:**

6.01.00 The surface preparation of all exterior and interior surfaces of plate heat exchanger shall include the following:

a) Removal of oil, grease, dirt and swarf etc.,

b) Removal of rust and scale etc.,

c) Sand blasting/ shot blasing.

6.02.00 All exterior surfaces of PHEs shall be sand / shot blasted, painted with primer and finish coated with coal tar based epoxy coating of min. 250 microns thickness. Colour shade etc. shall be subject to BHEL / customer approval.

7.00.00 **SHOP INSPECTION AND TESTS:**

7.01.00 **General:**

7.01.01 Manufacturer shall conduct all tests and stage inspections as per the approved quality plan to ensure that the plate heat exchanger shall conform to the requirements of this specification and of the applicable codes/ standards.

7.01.02 All materails used for manufacture/ fabrication of the plate heat exchanger components shall be of tested quality. Relevant test certificates for chemical analysis, mechanical tests and heat treatment shall be made available before the final shop inspection. In case the relevant test certificates are not available, the manufacturer shall arrange to carry out the necessary tests required as per approved quality plan and applicable codes at his cost, for which samples shall be identified by BHEL's representative.

7.01.03 All shop tests shall be conducted in the presence of BHEL's representative and test certificates for the same shall be furnished to BHEL for approval.

7.01.04 Qualification of welding procedures and welders shall be as per ASME B&PV Code, Section-IX/applicable code.

7.02.00 **Heat Transfer Plates:**

7.02.01 Plate material used for pressing shall be furnished with mill test report showing chemical and physical properties and heat treatment records. Suitable correlating mark shall be available, so that BHEL's inspector can identify the material with test certificates before pressing the plates.

7.02.02 After pressing visual and dimensional checks on the plates shall be made in the presence of BHEL's inspector, on sampling basis.

7.02.03 The heat transfer plates from each lot of the plates shall be tested by liquid / dye penetrant test in order to check for cracks and other surface defects in presence of BHEL / customer's representative / third party (Llyods, TUV or equivalent). If any defect is detected in any of these plates, the whole lot shall be tested and plates without defects only shall be accepted. Plates cleaning agent, liquid penetrant and developer shall not contain any halogen. Procedure for DP test shall be subjected to purchaser's approval. Quantum of check shall be subject to customer's/purchaser's approval in the event of order.

7.02.04 The heat transfer plates shall be tested by light box test in order to check for cracks and other surface defects in presence of BHEL / customer's representative / third party (Llyods, TUV or equivalent). The plates without defects only shall be accepted. Procedure for Light box test shall be subjected to purchaser's approval. Quantum of check shall be subject to customer's/purchaser's approval in the event of order.

7.02.05 **Inspection Requirements**

(i) Inspection for "Pressing of plates to form whole corrugation of the heat transfer plate" shall be from third party like TUV/Lloyd and certificate shall be submitted for review of BHEL.

(ii) Minimum requirement for quality Plan shall be as per quality plan attached in the Section IIA of the specification. Manufacturing Quality Plan for PHE shall be subject to approval during detail engineering. No price implication shall be admissible to QP approval by BHEL/Customer.

(iii) Heat transfer area for the PHE shall be measured by White light scanning / similar method during contract stage to ascertain the correctness of heat transfer area.

Bidder to note that Heat Transfer Area measured by White Light Scanning should not have negative tolerance more than 3% w.r.t to the heat transfer area indicated by bidder. However in the case of negative tolerance (limited to maximum 3 percent) , bidder has to provide additional plates proportionately, as free issue, assembled into all the applicable PHE's before the Final inspection and "As built Certificate" shall be issued by the bidder accordingly. Bidder to note that negative tolerance beyond three percent shall not be accepted, however no credit shall be given to the bidder for positive tolerance of the plate area measurement.

7.03.00 **Gaskets :**

7.03.01 Certificate on Chemical composition of the gasket material shall be furnished to prove the quality. Sample testing in presence of BHEL's inspector shall also be conducted if desired.

7.03.02 Shore hardness test shall be conducted on the gasket and certificate shall be furnished. Sample tests shall also be done in presence of BHEL's inspector.

7.03.03 Visual and dimensional check on a sampling basis shall be done. Plates and gaskets assembled together, will be inspected for proper assembly.

7.04.00 **Frame Assembly:**

7.04.01 All materials for various components of frame assembly viz frame plate, pressure plate, carrying bar, guide bar, tightening/ clamping bolts and nuts etc., shall be of tested quality and test certificates for chemical composition and physical properties shall be furnished.

7.04.02 If the thickness of the plates used for frame and pressure plates is 40 mm or more the same shall be checked ultrasonically to demonstrate the absence of lamination and lack of fusion etc.

7.05.00 All weld joints used for fabrication of heat exchangers shall be subjected to suitable non-destructive examination. This shall include 100% magnetic particle examination or other suitable NDT of all welds.

7.06.00 **Nozzle and Flanged Connections:**

All materails for various nozzles, flanges, gaskets, nuts, bolts etc., shall be of tested quality and correlating test certificates for chemical and mechanical properties shall be furnished. These shall be checked for the edge preparation, fit up, orientation and satisfactory working with matching parts.

7.07.00 **Dimensional Checks**:

Dimensional checks of various components of plate heat exchanger, plate pack length etc., shall be carried out as per assembly drawings approved by BHEL.

7.08.00 **Hydrostatic Test :**

Plate heat exchanger shall by hydrostatically tested at a pressure of 1.5 times the design pressure. Pressure shall be applied first to both the sides of the plate at the same time, then only to one side and finally only to other side. Pressure shall be maintained for a minimum period of 30 Minutes for each of the three cases above and for such additional time as may be necessary to conduct the examination, for leakage. The examination shall be performed on all joints, connections and regions of high stress. Fluorescent dye shall be used during the test for ease of leak detection. There shall be no structural damage deformation of the plates.

8.00.00 **PERFORMANCE GUARANTEE AND TESTING AT SITE:**

8.01.00 **Performance Guarantee**

8.01.01 After completion of erection at site, performance test will be conducted to ensure that the plate heat exchanger operation meets the specified requirements. Rectification of all defects shall have to be done by the supplier at no extra cost to the purchaser. However the purchaser reserves the right to reject the equipment/ parts not meeting the requirement if the deficiency still persists.

8.01.02 The Plate Heat Exchanger shall be guaranteed to meet the performance requirements as given in Data Sheet-A of Section-IB and also for trouble free operation after commissioning.

8.02.00 **PG Testing at Site**

8.02.01 The guaranteed performance figures of the plat heat exchangers shall be proved by the supplier during the performance testing at site (as applicable). If the results of these tests show the non-performance of the heat exchanger to meet the guaranteed values, the supplier shall modify the heat exchanger as required to enable it to meet the guarantees.

Even If PG test is not envisaged for any project, in the event of performance shortfall at site or if insisted by customer, performance parameters (Flow, Temperature rise & Pressure drop) are to be demonstrated at site by bidder without any cost implication to BHEL.

8.02.02 All duly calibrated instruments required for PG testing including for flow

measurements shall be arranged by the bidder and taken back after the Test. The computation of flow by characteristics curve of Pumps for PG Testing of PHE's shall not be permitted.

8.02.03 It is clarified that pressure gauges and temperature gauges are provided at each PHE inlet / outlet on both primary / secondary sides and bidder can install their calibrated instruments on these locations. It is further clarified that due to layout constraints flow measuring instruments installation on pipe is not feasible. Bidder shall arrange the Ultra-sonic flow meter / similar type of instrument for PG testing.

8.02.04 At the time of performance testing, cleaning of the plates (if required) and instruments like pressure gauges, temp. Gauges, flow measuring instruments etc. shall be arranged by the bidder and no instruments shall be provided by BHEL for performance testing.

9.00.00 **QUALITY ASSURANCE & QUALITY PLAN:**

9.01.00 The Plate Heat Exchanger to be supplied shall have assured quality and workmanship.

9.02.00 Typical quality plan is enclosed in section-IIB for guidance. The bidder shall comply with these minimum requirements and shall furnish his own quality plan for approval. The quality plan shall be subjected to customer's / purchaser's approval in the event of order without any cost implication.

10.00.00 **DRAWINGS, DATA & INFORMATION TO BE SUBMITTED ALONG WITH THE OFFER:**

10.01.00 Compliance certificate (duly signed and stamped).

10.02.00 Guarantee Schedule (duly signed and stamped).

10.03.00 Thermal sizing calculations (only for reference and shall be reviewed during detailed engineering).

10.04.00 GA Drg. of PHE indicating all-important details for Layout purpose, withdrawal space required for plates, weight of assembly, nozzle & matching piece details etc. (only for reference and shall be reviewed during detailed engineering).

10.05.00 Deviation Schedule (as per NIT format; in case of nil Deviation, mention "No Deviation" in the schedule and submit).

11.00.00 **DRAWINGS, DATA & INFORMATION TO BE SUBMITTED AFTER THE AWARD OF CONTRACT:**

The drawings, data and other documents as required in Data Sheet-C shall be furnished after the award of contract.

12.00.00 **In the event of Contradictions between Section I and Section-II of the Specification, the requirements of Section-I shall prevail over the Section-II.**

1.00.00 **DRAWINGS, DATA AND INFORMATION TO BE SUBMITTED AFTER THE AWARD OF CONTRACT**

After the award of contract, the following drawings, data and information is to be submitted for review/ approval of BHEL as per the distribution schedule given in the enquiry.

1.01.00 Within 2 (two) weeks of the date of LOI, the following shall be submitted.

1.01.01 Data Sheet-B duly revised conforming to accepted bid.

1.01.02 Final versions of the following drawings to enable BHEL to design foundations and structures and to finalise the layout.

a) General Arrangement/ Installation drawings indicating principal dimensions, and heights of equipment being supplied, size and location of various nozzles, connections, supporting arrangement, withdrawal space, bill of quantities and materials of construction and scope of supply etc.

b) Foundation arrangement drawings showing load data on support, size and location of anchor bolts etc.

1.01.03 Sizing and calculations related to PHE/plates.

1.01.04 Performance curve and figures as indicated in Data Sheet-A (for both clean and fouled conditions).

1.01.05 Quality Plan for PHE.

1.01.06 PG Test procedure (as applicable).

1.02.00 Within the stipulated time period the following drawing/ document shall be submitted:

1.02.01 Drawings of components and details as deemed necessary.

1.02.02 Material Test Certificates.

1.02.03 Shop Tests Reports and Certificates.

1.02.04 Write-up and Instruction Manuals for Erection, Operation and Maintenance.

1.02.05 Storage Instruction.

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
	CUSTOMER :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
	PROJECT:		PO NO.:	DATE:
	ITEM: PLATE HEAT EXCHANGER	SYSTEM: DMCW/ACW	SECTION:	SHEET 1 of 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					M	C	N	
1.0	RAW MATERIAL INSPESTION													
1.1	Frame Plates & Pressure Plates, Counter Flanges, Connection Lining Material, Top And Bottom Carrying Bar.	Physical Properties	MA	Physical Test	1/ Heat	1/ Heat	App. Drg / Data Sheet	Relevant material Std.	Mill TC Or Lab Test Report	√	P,V	V	V	If co-related mill TCS are not available then check testing carried out by NABL lab
		Chemical Properties	MA	Chemical Analysis	1/ Heat	1/ Heat	App. Drg / Data Sheet	Relevant material Std.	Mill TC Or Lab Test Report	√	P,V	V	V	If co-related mill TCS are not available then check testing carried out by NABL lab
		Dimensions	MA	Measurement	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	√	P,V	V	V	
		Workmanship And Finish	MA	Visual	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	√	P,V	V	V	
		Lamination (Applicable For Frame And Pressure Plate Only)	CR	Ultrasonic Test	100%	100%	SA 435	SA 435	Inspection Reports	√	P,V	V	V	Applicable for plate thickness more than 25 mm only
1.2	Heat Transfer (HT) Plates/Coils	Physical Properties	MA	Physical Test	1/ Heat	1/ Heat	App. Drg. / Data Sheet	App. Drg. / Data Sheet	Mill TC Or Lab Test Report	√	P,V	V	V	**See Remark 1**
		Chemical Properties	MA	Chemical Analysis	1/ Heat	1/ Heat	App. Drg. / Data Sheet	App. Drg. / Data Sheet	Mill TC Or Lab Test Report	√	P,V	V	V	**See Remark 1**
		Dimensions	MA	Measurement	100%	Sample	Approved Drawings	Approved Drawings	Inspection Reports	√	P,V	V	V	

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	19/2/20	NIKHIL DUBEY	Checked by:	19.02.20	MOHIT KUMAR		
Reviewed by:	19/2/2020	VISHAL KR. YADAV	Reviewed by:	19/2/2020	RITESH KR. JAISWAL		

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
	CUSTOMER :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
	PROJECT:		PO NO.:	DATE:
	ITEM: PLATE HEAT EXCHANGER	SYSTEM: DMCW/ACW	SECTION:	SHEET 2 of 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					M	C	N	
1.3	Gaskets	Dimensions	MA	Measurement	100%	Sample	Approved Drawings	Approved Drawings	Inspection Reports	√	P,V	V	V	Co-related mill TCS to be provided.
		Workmanship And Finish	MA	Visual	100%	Sample	No damage, No Surface defects.	No damage, No Surface defects.	Inspection Reports	√	P,V	V	V	
		Contour	MA	Visual	100%	Sample	Mfg. Drgs / specification	Mfg. Drgs / specification	Inspection Reports	√	P,V	V	V	
		Hardness	CR	Measurement	100%	Sample	Approved Drawings	Approved Drawings	Inspection Reports	√	P,V	V	V	
1.4	Tightening Bolts & Nuts. (Tie Rod)	Physical Properties	MA	Physical Test	1/ Heat	1/ Heat	App. Drg / data sheet	Relevant Material Std.	Mill Tc Or Lab Test Report	√	P,V	V	V	
		Chemical Properties	MA	Chemical Analysis	1/ Heat	1/ Heat	App. Drg / data sheet	Relevant Material Std.	Mill Tc Or Lab Test Report	√	P,V	V	V	
		Dimensions	MA	Measurement	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	√	P,V	V	V	
		Workmanship and Finish	MA	Visual	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	√	P,V	V	V	
		Internal Soundness (For diameter >= 40 mm)	CR	UT	100%	100%	ASTM A 388	See Remark - 4	Inspection Reports	√	P,V	V	V	UT will be carried on raw material stage.
2.0	IN PROCESS INSPECTION													
2.1	HT PLATES	Area Measurement	NA	White Light Scanning	1 per Type	1 per Type	Approved drawing/ data sheet	Approved drawing/ data sheet	Inspection Reports	√	P,V	W	V	See Remark 2

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	19/2/20	NIKHIL DUBEY	Checked by:	19.02.20	MOHIT KUMAR
Reviewed by:	19/2/2020	VISHAL KR. YADAV	Reviewed by:	19/2/2020	RITESH KR. JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
	CUSTOMER :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
	PROJECT:		PO NO.:	DATE:
	ITEM: PLATE HEAT EXCHANGER	SYSTEM: DMCW/ACW	SECTION:	SHEET 3 of 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					M	C	N	
		Physical Properties	MA	Physical Test	1 Sample per Heat	1 Sample per Heat	Approved drawing/ data sheet	Relevant Material Std.	Mill TC or Lab Test Report	√	P,V	V	V	
		Chemical Properties	MA	Chemical Analysis	1 Sample per Heat	1 Sample per Heat	Approved/ drawing/ data sheet	Relevant Material Std.	Mill TC or Lab Test Report	√	P,V	V	V	
		Dimension	MA	Measurement	1 Sample per Heat	1 Sample per Heat	Approved drawing/ data sheet	Approved drawing/ data sheet	Inspection Report	√	P,V	V	V	
		Workmanship And Finish	MA	Visual	100%	100%	Approved drawing/ data sheet	No scratches, cracks etc.	Inspection Report	√	P,V	V	V	
		Surface Defects And Cracks	CR	DP test	10%	2 % or min. 100 nos. whichever is higher	Manufacturer's DP test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		DPT Report	√	P,V	W	V	See Remark 3
				Light Box Test/ Vacuum chamber test	100%	10%	Manufacturer's Light Box/Vacuum test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		Vacuum Test Report	√	P,V	W	V	See Remark 3
		PMI testing	CR	PMI test	100 %	1 Sample per Heat	Approved drawing/ data sheet	Approved drawing/ data sheet	PMI Compliance report	√	P,V	V	V	See Remark 5

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	19/2/20	NIKHIL DUBEY	Checked by:	19.02.20	MOHIT KUMAR		
Reviewed by:	19/2/2020	VISHAL KR. YADAV	Reviewed by:	19/2/2020	RITESH KR. JAISWAL		

FOR CUSTOMER REVIEW & APPROVAL			
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Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
	CUSTOMER :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
	PROJECT:		PO NO.:	DATE:
	ITEM: PLATE HEAT EXCHANGER	SYSTEM: DMCW/ACW	SECTION:	SHEET 4 of 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	C/ N				D	M	C	N	
2.2	Welding Procedures Specification (WPS)	Correctness	MA	Verification	100%	100%	ASME SEC-IX.	ASME SEC-IX.	QW 482 ASME SEC-IX	√	P,V	V	V	Customer /BHEL/ BHEL TPI / NPCIL, EIL, LLYODS) approved WPS shall be used for welding.
2.3	Procedure Qualification Records (PQR)	Suitability	MA	Visual & Mechanical Test	100%	100%	ASME SEC-IX.	ASME SEC-IX.	QW 483 ASME SEC-IX.	√	P,V	V	V	
2.4	Welders Performance Qualification	Welder's Performance Soundness Of Welds	MA	Visual / RT & Mechanical	100%	100%	ASME SEC-IX.	ASME SEC-IX.	QW 484 ASME SEC-IX	√	P,V	V	V	Customer /BHEL/ BHEL TPI / NPCIL, EIL, LLYODS) approved WPS shall be used for welding.
2.5	Weld joint of expander/reducer.	Welding Of Outer Flange To Reducer/Expander	MA	Visual	100%	100%	Approved Drawings	Approved Drawings	Inspection Report	√	P,V	V	V	
			CR	DPT	100%	100%	Manufacturer's DP test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		DPT Report	√	P,V	W	V	
2.6	PHE Structure	Workmanship and finish	MA	Measurement & Visual	100%	100%	Approved Drawings	Approved Drawings	Inspection Report	√	P,V	V	V	
2.7	Plate Gaskets	Presence Of Gasket	MA	Visual	100%	100%	Mfg. Spec.	Mfg. Spec.	Inspection Report	√	P,V	W	V	
2.8	Plate arrangement to flow diagram	Correctness	CR	Visual as per flow diagram	100%	100%	Approved Drawing	Approved Drawings	Inspection Report	√	P,V	V	-	
2.9	Assembly of tightening bolts and nuts	Squeezing of threads on T/B	MA	Visual	100%	100%	Approved Drawing / Data sheet	Approved Drawing / Data sheet	Inspection Report	√	P,V	V	-	
2.10	Plate Pack	Length	MA	Dimension Measurement	100%	100%	Approved Drawing	Approved Drawing	Inspection Report	√	P,V	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	19/2/20	NIKHIL DUBEY	Checked by:	19.02.20	MOHIT KUMAR			Reviewed by:			
Reviewed by:	19/2/2020	VISHAL KR. YADAV	Reviewed by:	19/2/2020	RITESH KR. JAISWAL			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
	CUSTOMER :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
	PROJECT:		PO NO.:	DATE:
	ITEM: PLATE HEAT EXCHANGER	SYSTEM: DMCW/ACW	SECTION:	SHEET 5 of 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	C/ N				D	M	C	N	
3.0	FINAL INSPESTION													
3.1	Complete Assembly	a. Conformance to GA drg.	MA	Dimension Measurement	100%	100%	Approved Drawing	Approved Drawing	Inspection Report	√	P,V	W	W	
		B. Dimensions, No. of Heat Transfer Plates, Workmanship & finish	MA	Dimension Measurement	100%	100%	Approved Drawing	Approved Drawing	Inspection Report	√	P,V	W	W	
3.2	Unbalanced hydrostatic pressure (Primary Side)	Leakage / strength of structure	MA	Hyd. Test	100%	100%	Manufacturer's Hydro test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		Hydro Test Report	√	P,V	W	W	Hydro test @ 1.5 times the design pressure with 30 minutes holding time.
3.3	Unbalanced hydrostatic pressure (Secondary Side)	Leakage / strength of structure	MA	Hyd. Test	100%	100%	Manufacturer's Hydro test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		Hydro Test Report	√	P,V	W	W	Hydro test @ 1.5 times the design pressure with 30 minutes holding time.
3.4	Surface Preparation for Painting	Cleanliness (dust, dirt free, oil, grease free surface), surface profile	MA	Measurement & visual	100%	100%	Tech. Specs / App. Drawings	Tech. Specs / App. Drawings	Test Report	√	P,V	V	-	Surface profile as per SA 2.5
3.5	Painting	Dry film thickness & shade	MA	Measurement & visual	100%	100%	Customer/BHEL Tech. Spec. / Approved Data sheets		Test Report	√	P,V	V	V	
3.6	Packing	Completeness	MA	Measurement & visual	100%	100%	Customer/BHEL Tech. Spec. / Approved Data sheets		Test Report	√	P,V	V	V	Packing procedure as per Annexure B. **See Remarks 7**
REMARKS:-														

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	19/2/20	NIKHIL DUBEY	Checked by:	19.02.20	MOHIT KUMAR			Reviewed by:			
Reviewed by:	19/2/2020	VISHAL KR. YADAV	Reviewed by:	19/2/2020	RITESH KR. JAISWAL			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
	CUSTOMER :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
	PROJECT:		PO NO.:	DATE:
	ITEM: PLATE HEAT EXCHANGER	SYSTEM: DMCW/ACW	SECTION:	SHEET 6 of 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	C/ N				D	M	C	N	

1	Co-related Mill TC's to be furnished by vendor to BHEL representative during inspection stage for review. BHEL to verify physical correlation of Mill TC's with material.
2	Inspection of Heat Transfer Plate Area Measurement shall be by White Light Scanning Method from BHEL (Refer Annexure –A). In case, inspection of plate area measurement by white light scanning method of specific PHE model has been witnessed by BHEL in past project then Type test certificates are acceptable to BHEL for same. The type test certificate shall not be more than 5 years old from date of inspection.
3.	Reg. Dye Penetrant Test & Light Box Test: There shall be random witness by BHEL/ Customer at Bidder's works, in case any defect is found in any of selected % of plates, the whole lot shell be tested in presence of BHEL & Customer. H.T. Plates without defect only shall be accepted.
4.	Ultrasonic test of tie rods shall be carried out using 10 mm / 20 mm size Normal Beam Probe of frequency 2 MHz. Using this probe, the back wall echo in the sound area of bar shall be adjusted to 100% of full Screen Height (FSH). The whole bar shall be scanned under this sensitivity setting. In this sensitivity setting any defect echo indication having height greater than 20% of FSH is not acceptable.
5.	100% PMI Inspection for material grade of PHE Heat Transfer plates shall be from BHEL/ BHEL TPI. BHEL reserves the right to conduct random & independent PMI inspection on PHE's Heat Transfer plates to ascertain the plate material.
6.	BHEL reserves the right for conducting repeat test, if required.
7.	Photographs of packed material to be verified by BHEL before issuing MDCC.
8.	Project specific QP to be developed based on customer requirement.

LEGENDS:
*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N**: CUSTOMER, **D**: DOCUMENTATION
P: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR, **CR**: CRITICAL

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	19/2/20	NIKHIL DUBEY	Checked by:	19.02.20	MOHIT KUMAR		
Reviewed by:	19/2/2020	VISHAL KR. YADAV	Reviewed by:	19/2/2020	RITESH KR. JAISWAL		

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

Annexure-A to Standard Quality Plan

PROCEDURE FOR MEASUREMENT OF HEAT TRANSFER SURFACE AREA OF THE PHE PLATES

Definition of Heat transfer area:-

The Heat transfer area of the PHE plate is the area of the plate participating in the heat transfer process viz. the wetted surface area inside the gasketed groove of the plate as shown in the **Annexure 1**.

Steps to Measure the Heat transfer Area:

1) The surface area of the plate shall be cleaned thoroughly.
2) Apply the developer (as used in Dye Penetrant test) over the entire surface area of the plate.
3) Fix the reference stickers at several appropriate locations on the plate.
4) White light (CFL) is projected on the plate.
5) The entire surface area including all the geometrical features of the plate (corrugations) is captured by the 3D camera.
6) The 3D image of the plate is then converted into CAD format.
7) The surface area can be measured from the 3D· CAD drawing.

ANNEXURE-1

Heat transfer area to be measured-Shown in Hatched portion below

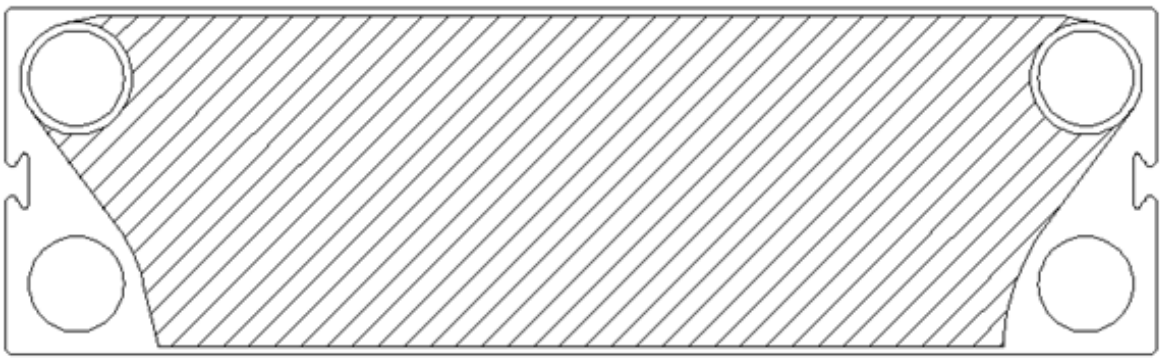

Fig. 1: Wetted Surface Area for Parallel Connection

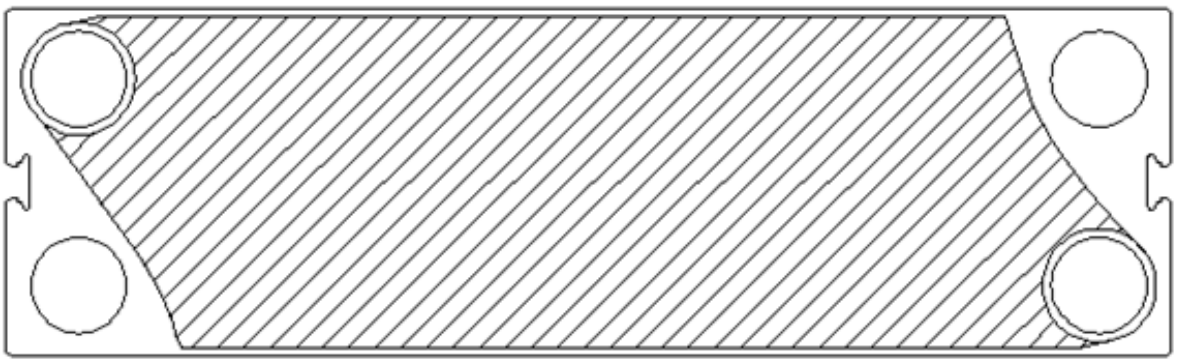

Fig. 2: Wetted Surface Area for Diagonal Connection

Annexure-B to Standard Quality Plan

PHE packing procedure before dispatch

1. Purpose:

The purpose of this procedure is to outline the requirements and procedures for protecting the equipment's during shipment and preserving during the storage.

2. Preparation for Packing:

- After hydro testing, operation, all fluids e.g. water etc., shall be completely drained from all PHE's, and the equipment blown dry.
- All material shall be cleaned internally and externally to remove, scale, rust fillings and any other foreign material.
- The PHE shall be placed on a strong wooden base & bolted to the wooden base using the foundation holes for further transportation upto site.

3. Protection of parts:

- Plate Heat Exchangers shall be packed in proper sizes of wooden cases. High grade woods like Rubber woods, jungle wood, hard wood, mango wood, pine wood, etc. is used for packing.
- All finished (or) machined (External C.S. Surfaces shall be protected against corrosion with corrosion resisting coating, which is easily removable (Compound shall be such that it will remain on the surface at temperature normally encountered during shipping & storage).
- All machined surfaces shall be protected from mechanical damage. All external unfinished carbon steel surfaces shall be sand blasted & shall be coated with rust preventive primer.
- Flanged opening if any shall be covered with blank flanges sealed with blank gasket of natural rubber or equivalent. Butt welded opening shall be closed with temporary closing covers. Internal threads shall be protected with metal plug sealed with Teflon tape (if applicable). External thread shall be protected with PVC sleeve.
- Wooden cases shall be covered with HDPE cloth from inside wooden box and the top. All the opening in plate heat exchanger shall be closed properly by suitably covering to prevent foreign material entering in plate heat exchanger.
- Loose material, primary and secondary a shall be packed in corrugated box and plastic bags with proper tagging.
- All fabricated wooden cases & crates conform to the requirement as per table given below:

Gross Weight [Kgs.]	Board Thickness	Batton / Rafter Thickness
2000 to 9000	Min. 30 mm	Min. 35 mm

9000 to 18000	Min. 50 mm	Min. 35 mm

- All the equipment shall be protected for entire period of dispatch, storage and erection against corrosion, incidental damage due to vermin, sunlight, rain, high temperature, humid atmosphere, rough handling in transit and storage. All MS parts which are not painted shall be provided with coating of grease.
- Clay Desiccant or such other moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.

4. Special tools and Spare parts:

Special tools and tackles and spares shall be packed separately with adequate identification. Such packages shall be identified as Tools/Commissioning/Operational spares.

5. Preservation

The equipment's shall be stored under closed/open space in packed condition until installation. The packages containing loose plates and gaskets are to be protected from extreme climatic conditions.

SECTION III

IIIA COMPLIANCE CERTIFICATE (TO BE SUBMITTED BY BIDDER DURING TENDER STAGE).

IIIB GUARANTEE SCHDULE (TO BE SUBMITTED BY BIDDER DURING TENDER STAGE).

IIIC DATASHEET –B FORMAT (TO BE SUBMITTED BY SUCESSFUL BIDDER AFTER AWARD OF CONTRACT).

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate and furnishing same with the offer

a.) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions/ deviations with regard to same.

b.) QP/ test procedures shall be submitted in the event of order based on the guidelines given in the specification & QP enclosed therein.
QP will be subject to BHEL/Customer approval in the event of order & customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc.
The charges for 3rd party inspection (Lloyds, TUV or equivalent) for imported components shall be included in the base price of the equipment by the bidder.

c.) All drawings/data – sheets etc. to be submitted during contract shall be subject to BHEL/Customer review/ approval.
GA drawings, as submitted with offer at tender stage are for reference purpose only and shall be subject to approval during contract stage.

d.) There are no other deviations with respect to specification other than those furnished in the 'Schedule of Deviations'

e.) The offered materials shall be either equivalent or superior to those specified. Also for components where material is not specified it shall be suitable for intended duty, materials shall be subject to approval in the event of order.

f.) The commissioning spares (if any) are supplied on 'As Required Basis' & prices for same included in the base price (If bidders reply to this is "No commissioning spares are required" and if some spares are actually required during commissioning same shall be supplied by bidder without any cost to BHEL).

g.) All sub vendors shall be subject to BHEL/CUSTOMER approval.

h.) Any special tools & tackles, if required, shall be in bidder's scope.

i.) Performance Guarantees for PHE's shall stand valid as per commercial terms and conditions.

j.) Regarding bidder's association with their respective Principals (Plate & Gasket supplier) bidder confirms the following:

i. Plate supplier shall vet the thermal design of PHE at tender and contract stage and certify the adequacy of design and number of plates.
ii. Guarantee schedule duly vetted by Principal shall be submitted during contract stage.
iii. Bidders have back to back arrangement with their principal for technical guarantees.

	SCHEDULE OF PERFORMANCE GUARANTEES		SPECIFICATION NO.	PE-TS-426-179-N001
			Section	IIIB
	PLATE HEAT EXCHANGER		Rev No.	02
SL. NO.	**DESCRIPTION**	**UNIT**	**GUARANTEE VALUE**	
			DMCW-TG PHE	**DMCW-SG PHE**
1.0	**PRIMARY SIDE (HOT WATER SIDE)**			
	CLEAN CONDITION			
a)	Flow rate	M^3/Hr.		
b)	DMCW inlet temperature	^oC		
c)	DMCW outlet temperature	^oC		
d)	Pressure drop	MWC		
2.0	**SECONDARY SIDE (COLD WATER SIDE)**			
	CLEAN CONDITION			
a)	Flow rate	M^3/Hr.		
b)	ACW inlet temperature	^oC		
c)	ACW outlet temperature	^oC		
d)	Pressure drop	MWC		
3.0	**PRIMARY SIDE (HOT WATER SIDE)**			
	FOULED CONDITION			
a)	Flow rate	M^3/Hr.		
b)	DMCW inlet temperature	^oC		
c)	DMCW outlet temperature	^oC		
d)	Pressure drop	MWC		
4.0	**SECONDARY SIDE (COLD WATER SIDE)**			
	FOULED CONDITION			
a)	Flow rate	M^3/Hr.		
b)	ACW inlet temperature	^oC		
c)	ACW outlet temperature	^oC		
d)	Pressure drop	MWC		

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

NAME

SIGNATURE

DATE

	Title **DATA SHEET - B**	**SPECIFICATION NO.** PE-TS-426-179-N001
BHEL	**PLATE HEAT EXCHANGER**	VOLUME **III** SECTION **B**
		SHEET 1 OF 7

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-TS-426-179-N001, Rev-01, Section – IA & IB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS	
1.0	**General**			
1.1	Number of plate heat exchangers being supplied.	Nos.		
1.2	Manufacturer			
1.3	Model Number/ Type			
1.4	Whether single or double pass			
1.5	Flow Pattern			
2.0	**Design**			
2.1	Design Pressure	bar (g)		
2.2	Design Temperature	^oC		
2.3	Heat Load(without LMTD correction)	KW		
2.4	Heat Load(with LMTD correction)	KW		
2.5	LMTD (Corrected)	^oC		
3.0	**Guaranteed Performance for Each Heat Exchanger (in fouled condition)**		**Primary Side (Hot Fluid)**	**Secondary Side (Cold Fluid)**
3.1	Flow rate	M^3/hr		
3.2	Inlet temperature	^oC		
3.3	Outlet temperature	^oC		
3.4	Total pressure drop across heat exchanger from inlet to outlet(including inlet & outlet nozzles) a) For design flow b) For 110% design flow rate	bar		
4.0	**Heat Transfer & Fluid flow data**		**Primary Side (Hot Fluid)**	**Secondary Side (Cold Fluid)**
4.1	Film heat transfer co-efficient	$KCal/hrM^2\,^oC$		
4.2	Fouling factor	$M^2hr\,^oC/KCal$		

Name of Bidder/ Vendor					
Revision Number	**0**	**1**	**2**	**3**	**4**
Signature of Bidder/ Vendor Authorised Representative					
Date :					

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-TS-426-179-N001, Rev-01, Section – IA & IB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS
4.3	Overall fouling	M^2 hr^{o}C/KCal	
4.4	Overall heat transfer coefficient	KCal/hrM^2 ^{o}C	
	a) In clean conditions		
	b) In fouled conditions		
4.5	Total effective heat transfer area per heat exchanger	M^2	
4.6	Average velocity	m/s	
	a) Through ports		
	b) Through Plate Channels		
4.7	Pressure drop in ports	bar	
4.8	Pressure drop in channels	bar	
4.9	Maximum differential pressure between hot and cold fluids in plate channels (operating)	bar (g)	
5.0	**Heat Transfer Plates**		
5.1	Area of each plate	M^2	
5.2	Dimension (width x height)	mm x mm	
5.3	Thickness	mm	
5.4	Material & chemical composition		
5.5	Number of plates per heat exchanger	Nos.	
5.6	Maximum number of plates that can be accommodated in the heat exchanger frame	Nos.	
5.7	Type of corrugation		
5.8	Minimum plate pack length	mm	

Name of Bidder/ Vendor					
Revision Number	**0**	**1**	**2**	**3**	**4**
Signature of Bidder/ Vendor Authorised Representative					
Date :					

INSTRUCTION TO BIDDER

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2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS
	a) As per 5.5 above b) As per 5.6 above		
		mm	
	Maximum plate pack length a) As per 5.5 above b) As per 5.6 above		
5.9	Average spacing between two plates	mm	
5.10	Hold up volume of each passage	M^3	
5.11	Port size (diameter)	mm	
6.0	**Plate Gaskets**		
6.1	Type		
6.2	Material and composition		
6.3	Thickness of gasket	mm	
6.4	Hardness of gasket		
6.5	Expected life of gasket		
7.0	**Carrying Bar**		
7.1	Type of construction		
7.2	Number per heat exchanger		
7.3	Size		
7.4	Material		
8.0	**Guide Bar**		
8.1	Type of construction		
8.2	Number per heat exchanger		
8.3	Size		
8.4	Material		
9.0	**Frame Plate**		

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-TS-426-179-N001, Rev-01, Section – IA & IB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS	
9.1	Type of Construction			
9.2	Material			
10.0	**Pressure Plate**			
10.1	Type of construction			
10.2	Material			
11.0	**Supporting Columns**			
11.1	Type of Construction			
11.2	Material			
12.0	**Clamping/Gasket Compression Arrangement**			
12.1	Type of arrangement			
12.2	Tie Rod size & material (Length to take care 25% extra plates)			
12.3	Tie Rod Nuts size & material			
12.4	Nozzle flange stud size & material			
12.5	Nozzle flange Nut size & material			
13.0	**Inlet & outlet Connection Nozzles**		**Primary Side (Hot Fluid)**	**Secondary Side (Cold Fluid)**
13.1	Size	mm		
13.2	Rating			
13.3	Facing & drilling standard			
13.4	Flange material			
13.5	Are all nozzles counter-flanges, bolts, nuts, gaskets etc., are included in the		YES/NO	

Name of Bidder/ Vendor					
Revision Number	**0**	**1**	**2**	**3**	**4**
Signature of Bidder/ Vendor Authorised Representative					
Date :					

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-TS-426-179-N001, Rev-01, Section – IA & IB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS
	offer?		
14.0	Recommended Cleaning frequency of the heat exchanger for assumed fouling factor	Months	
15.0	Is backwash necessary		YES/NO
16.0	Are all auxiliaries and accessories included in the offer		YES/NO
17.0	Are all counter-flanges with nuts, bolts and gaskets for all terminal points included in the offer?		YES/ NO
18.0	Are all heat exchangers supplied with necessary foundation plates, anchor, bolts, sleeves, inserts, lifting lugs etc., as specified.		YES/ NO
19.0	**Shop Tests & Inspection**		
19.1	Whether all the tests and inspections as detailed in the specification/ quality plan are carried out		YES/ NO
19.2	Hydrostatic Test :		
	a) Test Pressure	bar (g)	
	b) Test duration	min.	
19.3	Are all plates checked for cracks and other defects by the penetration method?		YES/NO

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-TS-426-179-N001, Rev-01, Section – IA & IB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS
	If not, what percentage is checked?		
19.4	Is hardness test conducted for plate gaskets?		YES/NO
20.0	**Details of Painting**		
20.1	***Exterior surface*** a) Surface preparation b) Primer c) Finish Preparation		
20.2	***Interior Surface*** a) Surface preparation b) Primer c) Finish Preparation		
21.0	Weight of each heat exchanger a) Empty b) Flooded Flooded Weight of heat exchanger with Max. Plates	kg.	
22.0	Overall dimensions - (Length x Breadth x Height)	mm x mm x mm	
23.0	withdrawal space		
24.0	Recommended Maintenance tools and tackles furnished		Yes/No

Name of Bidder/ Vendor					
Revision Number	**0**	**1**	**2**	**3**	**4**
Signature of Bidder/ Vendor Authorised Representative					
Date :					

INSTRUCTION TO BIDDER

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2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS
25.0	Mesh Size of recommended Strainer	mm	
26.0	Foundation nuts and bolts supplied		Yes/No
27.0	Other information (if any)		

Name of Bidder/ Vendor					
Revision Number	**0**	**1**	**2**	**3**	**4**
Signature of Bidder/ Vendor Authorised Representative					
Date :					