Project Engineering Management

Bharat Heavy Electricals Limited

(A Govt. Of India Undertaking)

Ref. Enquiry No.: PE/PG/RTC/E-5966/2018 **Dated: 01.06.2018**

TENDER ENQUIRY THROUGH E-PROCUREMENT

DUE DATE
25.06.2018
BY 14:00PM

SUBJECT: TENDER ENQUIRY FOR RATE CONTRACT OF PLATE HEAT EXCHANGER AS PER TECHNICAL SPECIFICATION NO. PE-RC-999-179-N001 (REV 0)

OUR REF: TENDER ENQUIRY NO: PE/PG/RTC/E-5966/2018, DTD-01.06.2018

Dear Sir/ Ma'am,

We are pleased to invite your offer for subject package in two parts strictly as per Clause-2.0 of the enclosed **"Instructions to Bidders"**. Please upload your best quotation/ offer on https://bhel.abcprocure.com for the requirement strictly as per schedule of price format before above mentioned due date & time. The details of the tender enquiry is as mentioned below:

Sl. No	Description for which Rate Contract is desired	Tentative Quantity	Delivery required
1	**PLATE HEAT EXCHANGER** - Refer Technical specification no PE-RC-999-179-N001 for detailed description.	As per BOQ cum price schedule in Annexure-IA & IB) cumulative for the Prospective Projects as per Annexure-IV	For Main Supply- Six (06) months from drgs. /docs. Approval of primary drawing/docs (ref. clause 3 Sheet 2 of 2, Section IA of Technical Specification-PE-RC-999-179-N001 for list of primary drg.docs) in CAT-I issued by BHEL. Successful bidder to make 1st submission of drawing/docs as per list mentioned in clause 3 Sheet 2 of 2, Section IA of Technical Specification-PE-RC-999-179-N001, taking care of all the comments of BHEL. Any deficiency in documents submitted w.r.t. agreed specification/ comments from BHEL shall be treated as non-submission and no. of days delay in submission of complete documents during approval process, on account of this, would be reduced from the delivery. The vendor shall be responsible for getting approval from BHEL as early as possible and BHEL will support the process, in full, within above time frame and terms & conditions." For PG Test: Vendor to depute their representative to site for carrying out commissioning activities within two weeks of intimation by BHEL, subject to site readiness, failing which LD @ 0.5% per week or part thereof of total contract value for PG Test for that project shall be levied limited to 10% of PG Test value. For Mandatory Spares: Mandatory Spares to be delivered within 04 months from manufacturing clearance. Separate dispatch/ manufacturing clearance will be issued for Mandatory Spares.

Your best quotation/offer for the above requirement, in line with our terms and conditions, should be submitted online via e-procurement system. It shall be the responsibility of the bidder to ensure that the Tender is submitted on or before the due date by 2 p.m. Part-I bids shall be opened at 3 p.m. on the due date in the presence of authorized representatives of the bidders, who may like to be present.

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DY MANAGER/CMM
BHEL/PS-PEM
POWER PROJECT ENGINEERING INSTITUTE,
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Note:-

1. Please note that Part Supplies offered for tender BOQ shall disqualify the bidder's offer.

2. Documents and Credential as per Technical PQR, Techno Commercial Bids and Price Bids should be uploaded on the e-procurement portal.

Please refer GCC Rev-06 & Corrigenda to GCC Rev 06 which is available on www.bhelpem.com. You are requested to kindly download the same.

1. **Two Rate contracts (Group-A & Group-B) for 100 percent value on L1 bidder is proposed for one year from placement of Rate Contract PO with a provision for further extension after review on mutual consent.**

   Evaluation will be done on overall L1 for each group of projects BOQ (Total cost to BHEL excluding GST) basis with necessary loading as applicable.

   Suppliers to note that they can quote either for Group-A or Group-B or both. However, while quoting for a particular group, suppliers have to quote for all items mentioned in that particular group.

2. **Rate Contract will be finalized on total lump sum basis group wise. However, there is % allocation weightage against BOQ quantity of each item which shall be used for arriving at price break up and same will also ensure that item rates of L1 bidder will be lowest for each items compared with other bidders' rate.**

3. Bidders will be informed the following: -

   a) Rate contract shall be decided on the basis of grand **T**otal Ex works price & Freight Charges of Total BOQ of PHE as listed in Annexure-IA Group-A and Annexure-IB Group-B **separately (i.e. group wise).**
   b) Though evaluation is proposed on Ex Works + Freight, but there is % allocation weightage against BOQ quantity of each item which shall be used for arriving at price break up. Indigenous Bidders need to give only their total ex works price for given BOQ of Main Supply for respective groups BOQ at the specific cells that has been kept opened in the price schedule available in the e-procurement portal (i.e. sl. no. A.12 column no. 8 for Annexure IA Group-A and at sl. A.5 column no. 8 for Annexure-IB Group-B in separate price bids). Foreign bidders need to give only their total C&F price for given BOQ of Main Supply for respective groups BOQ at the specific cells that has been kept opened in the price schedule available in the e-procurement portal (i.e. at sl. no. A.12 column no. 15 for Annexure IA Group-A and at sl. A.5 column no. 15 for Annexure-IB Group-B in separate price bids).
   c) Indigenous Bidders also requires to mention applicable % GST for of taxes/ duties (against respective column for GST) applicable for each item of the BOQ.
   d) Indigenous bidder to give freight charges excluding GST as single percentage of Ex works value of Main Supply considering anywhere in India in the freight column
   e) Rest of the prices shall be derived by BHEL in line with % allocation fixed for each item.
   f) For better clarity to the bidders where value is to be filled is noted as "to be quoted" and for other columns it will be noted as "derived" which denotes shall be derived by BHEL as per % allocation fixed against each item
   g) Bidders to mention applicable GST rate on (total Ex. works + freight) in the specified cells of price schedule. **However, may please note that GST shall not be considered in evaluation.**

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h) **Indigenous bidders having CIF for raw material have to mention CIF% of total ex works in their bid and quote their prices considering discount on ex works price in lieu of availing CIF.**
i) Incomplete offer or offer for part of NIT BOM/BOQ shall be summarily rejected.
j) Bidders will be asked to fill applicable HSN code for all the BOQ items.

4. CIF benefit is available for this package and bidders are requested to quote considering the same. Incase for any project BHEL is not able to arrange CIF & vendor in RC have given quote with CIF then that project requirement may be considered for ordering through project purchase.

5. Quantity variation shall be applicable as plus 30 percent of the contract value

6. **Additional overhead charges shall be 5% instead of 30% as mentioned in clause no 26.2 of GCC Rev 06**

TERMS AND CONDITIONS

1. Procurement of the subject package shall be done through e-procurement
2. Enquiry No., due date etc. must be legibly super scribed on the offers as per clause no. 2.0 of "Instructions to Bidders".
3. Offers should be uploaded in two parts online at https://bheleps.buyjunction.in as follows:
   a) Part-I Bid :- Documents and Credential as per Technical PQR and Techno-Commercial offer (along with un-priced copy of un-priced bid and un-priced schedule of Technical-Commercial Deviation, Annexure I & II)
   b) Part II Bid :- Price Bid and Priced schedule of Technical-Commercial Deviation
4. Terms and conditions:-
   a) Part I bid will be opened on date & time mentioned in the NIT or subsequent corrigenda/amendments, if any.
   b) **Techno-commercial offer of only those bidders shall be evaluated who will meet the Technical pre-qualifying requirement of the tender.**
5. **Bidders shall submit their offers meeting the requirements of the following tender documents and other Terms and Conditions included in this Enquiry Letter:**
   - **ANNEXURE-I of GCC Rev. 06**: Letter to be furnished by the Bidders.
   - **ANNEXURE-II: DEVIATION SHEET (COST OF WITHDRAWL)** - To be furnished by the Bidders

   All the above Tender Documents shall automatically become a part of the Order/Contract after its finalisation.
6. Vendors shall quote in accordance with the requirements mentioned in the tender documents. In case of deviations (Technical/ Commercial), the same shall be highlighted separately giving Clause references along with the Cost of withdrawal of Deviations as per **Annexure-II to GCC Rev 06 of "DEVIATION SHEET (COST OF WITHDRAWL)"** along with reasons for taking such deviations

   Bidder to note all the points mentioned in "Notes" of Annexure-II to GCC Rev 06
7. ***Please note the following:***
   a. Price format is enclosed for compliance.
   b. SCC enclosed for compliance.

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c. GCC enclosed for compliance. GCC Rev-06 is available on www.bhelpem.com. You are requested to kindly download the same. GST related corrigenda to GCC Rev.06 is enclosed.

8. Tenders shall be submitted strictly in accordance with the requirements of the above tender documents.
9. Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
10. Validity of offer shall be as per **Clause No. 7.0, "Instructions to Bidders" of GCC Rev 06.**
11. Unsolicited fresh/revised Price Bids shall not be entertained.
12. Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any/all tender(s) in part or full without assigning any reason whatsoever.
13. Late tenders will be rejected.
14. Tenders and all correspondence thereof, shall be addressed to the undersigned by name & designation and sent at the following address:

Mr. I P SINGH, SR MGR, CMM **M/s Bharat Heavy Electricals Ltd.,** **Project Engineering Management,** Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 **Kind Attn: I P SINGH/ CMM** **E-MAIL: indra.pal.singh@bhel.in** **Ph. No. 0120-4218749 ,09818989654**	**Mr. SUMEET SAHAY, DY MGR, CMM** **M/s Bharat Heavy Electricals Ltd.,** **Project Engineering Management,** Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 **Kind Attn: SUMEET SAHAY/ CMM** **E-MAIL: sumeetsahay@bhel.in** **Ph. No. 0120-4213532 ,09999498202**

15. Definition of Terms is also enclosed. These definitions will apply to all the tender documents including this Enquiry Letter.
16. **PRE-QUALIFICATION REQUIREMENT: -**
    Bidders is requested to fill up the details in "TECHNICAL PRE-QUALIFYING REQUIREMENT" as per the conditions mentioned in the PQR and also to submit the credentials.
    Bids of only those bidders shall be evaluated who meet the Technical pre-qualifying requirements (if applicable).
17. Bidders to note that their bid shall be conditional subject to qualify PQR by registered vendors & non-registered vendors have to qualify PQR & get registered with PEM for the package.
    For registration in PEM "Bidders needs to apply & get registered for subject package with PEM before P-2 (price bid opening) & **hence you need to apply online for registration on PEM web portal & have to enclose acknowledgement with this effect with the bid documents else your bid will not be considered for evaluation"**
18. Bidder has to submit "NO DEVIATION CERTIFICATE FOR COMMERCIAL TERMS AND CONDITIONS AS PER GCC (06), SCC AND NIT". In case of deviations, bidder to clearly mention the same with their techno-commercial offer as per Point No-5 of NIT.
19. All the above Tender Documents shall automatically become a part of the Order/Contract after its finalization.
20. **The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL website www.bhel.com.**

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21. **"The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice."**
BHEL Fraud prevention policy is also uploaded in vendor's section on www.bhelpem.com.
22. **Bidders are requested to visit constantly our website to update them self for any technical or commercial change in the NIT.**
23. **All** corrigenda, addenda, amendments, time extensions, clarifications etc. to the tender will be hosted on BHEL websites only (www.bhelpem.com., www.bhel.com & https://bhel.abcprocure.com under subject tender reference. Bidders are requested to visit our websites from time to time to keep themselves updated. **Bidders may go through the Sellers' manual & Help documents provided on E-Procurement Portal website & obtain required Digital Signature Certificate for participating in the subject Tender.**
24. Bidders to submit their offers strictly in line with the enclosed price format.
25. Inspection shall be done by BHEL/ END CUSTOMER/Third party Agency (finalized by BHEL).
26. Any other taxes & duties applicable on the date of bid but not quoted by the bidders shall be to bidder account.
27. Delivery terms for dispatches shall be FOR Dispatch Station.
28. This enquiry is subject to Conditions/ limits if any imposed in PMD / Vendor registration.
29. Foreign & indigenous bidders participating through open/limited tender will necessarily have to but class III DSCs issued by the certifying authorities in India. Basic procedure/ checklist is uploaded on www.bhel.com.
30. Non- registered bidder to submit the credentials required for Registration in BHEL PEM: -
"Online Registration Portal is operational in BHEL. Non-registered Vendors, who wish to apply for registration with BHEL-PEM, have to apply through Online Registration Portal available at www.bhelpem.com - vendor section - Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and submit the application for registration. One set of hard copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted."
31. Purchaser reserves the right to split up the scope of the tender enquiry and place the orders for different scope/ items with different bidders and also increase or decrease the quantity.
32. BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.
Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. The envelope sealed price bid of successful L1 bidder in RA, if

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conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com)."

As a reminder to the bidders, system will flash following message (in RED Color) during the course of 'online sealed bid':

"Bidders to submit online sealed bid less than or equal to their envelope sealed bid already submitted to BHEL"

Detailed guidelines of reverse auction 2016 are available in "information section" of www. bhelpem.com, same are applicable for subject tender.

IMPORTANT INSTRUCTION TO BIDDERS IN CASE OF REVERSE AUCTION

Indigenous Bidders has to quote the Single Price (i.e. Total Cost to BHEL for Main Supply only excluding GST) in Reverse Auction i. e. Price mentioned in at sl. no. D column no. 8 + sl. no. D column no. 9 for Annexure IA Group-A and Annexure-IB Group-B separately with loading/de loading (if any).
Foreign Bidders has to quote the Single Price in INR (i.e. Total Cost to BHEL for Main Supply only excluding GST) arrived after loading their C&F price in Reverse Auction i. e. Price mentioned in at sl. no. D column no. 15 for Annexure IA Group-A and Annexure-IB Group-B separately with loading/de loading (if any).

33. If any bidder has mentioned the term Not Applicable / Not required / Not Quoted in BHEL price format. The bidder needs to substantiate the same. If the same item will be required in future for the system same will be supplied free of cost.
34. Foreign Suppliers & Indian agents of foreign suppliers: Please refer our website http://www.bhelpem.com/Tenders.aspx for details.
35. L1 bidder will have to submit Bank Guarantee for each POs (irrespective of value) which will be placed under the Rate Contract finalised through this tender considering RC as original contract as per format mentioned in **Annexure V** to NIT instead of format mentioned in GCC Rev 06
36. All other terms and conditions shall be as per GCC Rev 06 and Special Conditions of Rate Contract as per attached Annexure-III. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be NIT / corrigenda related to GCC Rev.06/ Rate contract SCC / GCC Rev. 06
37. Vendors shall have to enter into Integrity Pact (IP) with BHEL. The Integrity pact shall be returned by the bidder along with their Techno-commercial Bid, duly filled & signed by the authorized signatory and will form part of the order. Only those vendors/bidders who enter into Integrity Pact with BHEL, would be qualified to participate in the bidding Process. (Refer Annexure-IX, as per GCC Rev-06).
To oversee implementation of IP, Shri D R S Chaudhary, IAS (Retd), has been appointed as IEM (Independent External Monitor) by BHEL.
38. Foreign bidders will have to quote C & F (cost & freight) basis instead of FOB.

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For importing materials on C&F basis, bidders to note following:

a) In case of foreign bidders, the quoted C&F price shall be loaded by factors mentioned in GCC cl no-19.4, ITB, to arrive at total FOR Site price and evaluation will be done on FOR price in Indian currency.
b) As per Incoterms (CFR), risk transfers to buyer when the goods have been loaded on board the ship in the country of Export. Hence, shipped on board date mentioned on the clean Bill of Lading or Air way Bill, shall be treated as the date of Shipment/ Dispatch for all contractual purposes including calculation of LD.
c) Usance period (90 days) of the L/C shall start from the date of Bill of lading/Air Way Bill.
d) Bill of Lading shall be considered as equivalent document (refer clause 9.7.1 b OF GCC rev-06) for recognition of dispatch.
e) For claiming payment under clause 9.1.1 and 9.2.1 Bill of lading shall be considered instead of receipted LR (refer clause 9.7.2 b of GCC rev-06)
f) Freight is to be quoted as inclusive in basic price by vendor and is not to be quoted separately.
g) Insurance for evaluation purposes shall be @ 0.1 % of quoted C&F price.
h) There will be no change in MRC payment.

Note: Tenderer must submit UN-PRICED Price format duly filled mentioning the word "QUOTED" in place of actual price given in sealed price bid.

Thanking you,
Yours faithfully,
For and on behalf of BHEL

सुमीत सहाय / SUMIT SAHAYA
उप प्रबन्धक (सी. एम. एम.) / Dy. Manager (CMM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.
पावर सैक्टर-परियोजना इंजीनियरिंग प्रबंधन
Power Sector-Project Engineering Management
पीपीईआई भवन, एचआरडी एण्ड ईएसआई कॉम्पलेक्स,
PPEI Bldg, HRD & ESI Complex,
प्लॉट न. 25, सैक्टर 16 ए, नोएडा -201301
Plot No. 25, Sector 16 A, Noida -201301

1/6/18

(Signature of official with Name & Designation)

Enclosure:

1. Enquiry Terms & Conditions
2. Price Format (Prices should be quoted in this format only) – Annexure IA & Annexure I B
3. Techno-Commercial Deviation Sheet (Annexure-II to GCC Rev 06) – Annexure II
4. BOQ & Technical Specifications
5. Technical PQR
6. SCC – ANNEXURE III
7. Prospective Project List – Annexure IV
8. Corrigenda to GCC Rev 06
9. Annexure V - BG Format

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ANNEX-IV TO NIT REF NO- PE/PG/RTC/E-5966/2018, DTD-01.06.2018
TENTATIVE PROJECT LIST

GROUP A

SL NO.	PROSPECTIVE PROJECT LIST
1	3X800MW PVUNL Patratu TPP
2	5X800MW TSGENCO YADADRI TPS
3	1X660MW UPRVUNL Panki TPS
4	1X660MW Bhusawal TPS

GROUP B

SL NO.	PROSPECTIVE PROJECT LIST
1	2X800MW TANGENCO Uppur TPP
2	2X660MW Udangudi Supercritical STPP

Note-
Project list is indicative only, BHEL may ask for delivery anywhere in India for any of the project added in the prospective project/ existing projects during RC period.

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भारत हेवी इलेक्ट्रिकल्स लि
पावर सैक्टर-प
Power Sector-Proj
पीपीईआई भवन, एच
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(CMM)
Electricals Ltd.

BHEL / PEM / CMM
SPECIAL CONDITIONS OF RATE CONTRACT

ANNEXURE III TO NIT REF NO-PE/PG/RTC/E-5966/2018, DTD-01.06.2018

SPECIAL CONDITION OF RATE CONTRACT FOR PLATE HEAT EXCHANGERS

1. BHEL/PEM intends to enter into Rate Contract for supply of the tendered items for a period of one year. The Rate Contract shall come into force from the date of issue of Purchase order for Rate Contract. Validity for ordering shall be one year from the purchase order for Rate Contract.
2. Details of consignee and project site information for dispatch of material shall be intimated at the time of placement of PO for specific project after finalization of RC
3. Transit Insurance is in BHEL scope
4. The items will be required against respective projects. Exact quantities and Project information shall be intimated while placing order for a specific project based on the Rate Contract.
5. The prices shall remain firm during the RC period
6. Items have to be manufactured as per specification and supplied strictly in accordance with the approved BHEL / Customer's Drawings & Quality Plan. The items/ test certificate of items, which for any reason are not acceptable to BHEL / Customer, shall be required to be retested. No extra charge shall be payable on those account by BHEL
7. Inspection of materials shall be carried out by BHEL/CQA and or by Customer or by an authorized agency at manufacture's works before dispatch, if required. Dispatch of material to be done, only after receipt of BHEL/Customer MDCC. It is responsibility of vendor to for obtain Material Dispatch Clearance Certificate (MDCC) from BHEL or Customer as required before dispatch of material.
   Vendor shall give inspection call on BHEL-CQS web site to applicable inspection agency with a copy of inspection call to BHEL-PEM for arranging Customer participation (if applicable) in inspection / Joint inspection on the proposed date with an advance notice of 15 working days. Inspection charges shall be paid by BHEL-PEM.
   Items have to be manufactured as per specification and supplied strictly in accordance with the approved BHEL / Customer's Drawings & Quality Plan. The items/ test certificate of items, which for any reason are not acceptable to BHEL / Customer, shall be required to be retested. No extra charge shall be payable on those account by BHEL.
8. Mode of dispatch shall be by road through Schedule Bank/BHEL (PEM) approved transporters.
9. Other terms and conditions shall be as per Standard Technical specification, GCC Rev 06 & Corrigenda to GCC Rev 06, Enquiry letter.
10. This enquiry is subject to Conditions/ limits if any imposed in PMD/ Vendor registration.
11. Tentative quantity is given in enquiry.
12. Bidders to submit offer for RC of said items ONLINE via e-Procurement System only. Bidder to upload tender documents complete in all respects duly signed & stamped on each and every page by the authorized signatory of the bidder as a token of acceptance of all the terms and conditions of tender.
13. The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendor/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL web site http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud as soon as it comes to their notice.

सुमीत सहाय / S
उप प्रबन्धक (सी. एम. एम.)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड /
पावर सैक्टर–परियोजना
Power Sector-Project Eng
पीपीई भवन, एचआरडी
PPEI Bldg. HRD &
25 सैक्टर 16
No. 25, Sec. 16 A

M)
Bhicals Ltd.
ment

ANNEXURE- IA

RATE CONTRACT - NIT REF NO-PE/PG/RTC/E-5966/2018, DTD-01.06.2018

PRICE SCHEDULE FOR PLATE HEAT EXCHANGERS (GROUP A)

NAME OF VENDOR-

					INDIGENOUS VENDOR							FOREIGN VENDOR			
SL NO	ITEM DESCRIPTION	UOM	ORDERED QUANTITY	HSN CODE	UNIT EX-WORKS PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL EX WORKS PRICE OF PHEs GIVEN AT SL NO-A.12 OF COUMN 8	UNIT EX-WORKS PRICE (DULY PACKED) (INR)	TOTAL EX-WORKS PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL EX WORKS PRICE OF PHEs GIVEN AT SL NO-A.12 OF COUMN 8	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL F.O.R SITE PRICE (INR)	UNIT C & F PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.12 OF COUMN 15 INDIAN SEA PORT	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)	TOTAL C & F PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.12 OF COUMN 15 INDIAN SEA PORT	TOTAL C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)
1	2	3		4	5	6	7	8	9	10	11	12	13	14	15
A	PLATE HEAT EXCHANGER - MAIN SUPPLY														
A.1	TYPE I	NOS.	9	TO BE QUOTED	3.39844%	Derived	30.58594%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	3.39844%	Derived	30.58594%	Derived
A.2	TYPE II	NOS.	6		1.01563%	Derived	6.09375%	Derived			Derived	1.01563%	Derived	6.09375%	Derived
A.3	TYPE III	NOS.	15		1.83594%	Derived	27.53906%	Derived			Derived	1.83594%	Derived	27.53906%	Derived
A.4	TYPE IV	NOS.	10		0.74219%	Derived	7.42188%	Derived			Derived	0.74219%	Derived	7.42188%	Derived
A.5	TYPE V	NOS.	3		2.22656%	Derived	6.67969%	Derived			Derived	2.22656%	Derived	6.67969%	Derived
A.6	TYPE VI	NOS.	4		0.70313%	Derived	2.81250%	Derived			Derived	0.70313%	Derived	2.81250%	Derived
A.7	TYPE VII	NOS.	3		1.56250%	Derived	4.68750%	Derived			Derived	1.56250%	Derived	4.68750%	Derived
A.8	TYPE VIII	NOS.	2		0.70313%	Derived	1.40625%	Derived			Derived	0.70313%	Derived	1.40625%	Derived
A.9	TYPE IX	NOS.	3		2.22656%	Derived	6.67969%	Derived			Derived	2.22656%	Derived	6.67969%	Derived
A.10	TYPE X	NOS.	2		0.70313%	Derived	1.40625%	Derived			Derived	0.70313%	Derived	1.40625%	Derived
A.11	TYPE XI	NOS.	3		1.56250%	Derived	4.68750%	Derived			Derived	1.56250%	Derived	4.68750%	Derived
A.12	TOTAL (A.1 TO A.11)						100.00000%	TO BE QUOTED = Rs X	Derived	Derived	Derived			100.00000%	TO BE QUOTED = M
				HSN CODE	UNIT PRICE FOR PG TEST	UNIT PRICE FOR PG TEST (INR)	TOTAL EX-WORKS PRICE OF PG TEST IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.12 OF COUMN 8	TOTAL EX-WORKS PRICE FOR PG TEST (INR)		APPLICABLE GST RATE % QN PG TEST PRICE (INR)	TOTAL PRICE FOR PG TEST WITH GST (INR)	UNIT PRICE FOR PG TEST	UNIT PRICE FOR PG TEST (CURRENCY)	TOTAL PRICE OF PG TEST IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.12 OF COUMN 15 INDIAN SEA PORT	TOTAL PRICE FOR PG TEST (CURRENCY)
B	SERVICES AT SITE PG TEST AT SITE (NOTE: 1SET = PG TEST FOR ONE PHE.)														
B.1		SET	60	TO BE QUOTED	0.015633% OF PRICE AT A.12, COL 8	Derived	0.938% OF PRICE AT A.12, COL 8	Derived		% TO BE QUOTED	Derived	0.015633% OF PRICE AT A.12, COL 15	Derived	0.938% OF PRICE AT A.12, COL 15	Derived

					INDIGENOUS VENDOR							FOREIGN VENDOR			
B.2	TOTAL (B.1)							Derived			Derived				Derived
				HSN CODE	UNIT EX-WORKS PRICE (DULY PACKED)	UNIT EX-WORKS PRICE (DULY PACKED) (INR)	EXPECTED QUANTITY OF SPARES AS PER DATASHEET A OF SECTION IA	TOTAL EX- WORKS PRICE (DULY PACKED) (INR) (Col F * Col. G)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL F.O.R SITE PRICE (INR)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)		TOTAL C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)
C	MANDATORY SPARES EXPECTED SPARES FOR EACH PHE TYPE AS PER SPARE LIST INDICATED IN DATASHEET A AT SECTION IB OF SPECIFICATION.														
C.1	TYPE I	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7% OF PRICE AT A.1, COL 6	Derived	20	Derived			Derived	0.7% OF PRICE AT A.1, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.15%OF PRICE AT A.1, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.1, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.075%OF PRICE AT A.1, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.05%OF PRICE AT A.1, COL 13	Derived		Derived
C.2	TYPE II	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7% OF PRICE AT A.2, COL 6	Derived	20	Derived			Derived	0.7% OF PRICE AT A.2, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15% OF PRICE AT A.2, COL 6	Derived	30	Derived			Derived	0.15% OF PRICE AT A.2, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025% OF PRICE AT A.2, COL 6	Derived	1	Derived			Derived	0.025% OF PRICE AT A.2, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075% OF PRICE AT A.2, COL 6	Derived	10	Derived			Derived	0.075% OF PRICE AT A.2, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05% OF PRICE AT A.2, COL 6	Derived	10	Derived			Derived	0.05% OF PRICE AT A.2, COL 13	Derived		Derived
C.3	TYPE III	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7% OF PRICE AT A.3, COL 6	Derived	30	Derived			Derived	0.7% OF PRICE AT A.3, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.15%OF PRICE AT A.3, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.3, COL 6	Derived	2	Derived			Derived	0.025%OF PRICE AT A.3, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.075%OF PRICE AT A.3, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.05%OF PRICE AT A.3, COL 13	Derived		Derived
C.4	TYPE IV	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.4, COL 6	Derived	20	Derived			Derived	0.7%OF PRICE AT A.4, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.15%OF PRICE AT A.4, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.4, COL 6	Derived	2	Derived			Derived	0.025%OF PRICE AT A.4, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.075%OF PRICE AT A.4, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.05%OF PRICE AT A.4, COL 13	Derived		Derived

					INDIGENOUS VENDOR							FOREIGN VENDOR			
C.5	TYPE V	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.5, COL 6	Derived	30	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	0.7%OF PRICE AT A.5, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.5, COL 6	Derived	90	Derived			Derived	0.15%OF PRICE AT A.5, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.5, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.5, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.5, COL 6	Derived	30	Derived			Derived	0.075%OF PRICE AT A.5, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.5, COL 6	Derived	30	Derived			Derived	0.05%OF PRICE AT A.5, COL 13	Derived		Derived
C.6	TYPE VI	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.6, COL 6	Derived	40	Derived			Derived	0.7%OF PRICE AT A.6, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.6, COL 6	Derived	260	Derived			Derived	0.15%OF PRICE AT A.6, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.6, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.6, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.6, COL 6	Derived	20	Derived			Derived	0.075%OF PRICE AT A.6, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.6, COL 6	Derived	120	Derived			Derived	0.05%OF PRICE AT A.6, COL 13	Derived		Derived
C.7	TYPE VII	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.7, COL 6	Derived	30	Derived			Derived	0.7%OF PRICE AT A.7, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.7, COL 6	Derived	200	Derived			Derived	0.15%OF PRICE AT A.7, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.7, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.7, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.7, COL 6	Derived	1	Derived			Derived	0.075%OF PRICE AT A.7, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.7, COL 6	Derived	100	Derived			Derived	0.05%OF PRICE AT A.7, COL 13	Derived		Derived
C.8	TYPE VIII	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.8, COL 6	Derived	20	Derived			Derived	0.7%OF PRICE AT A.8, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.8, COL 6	Derived	200	Derived			Derived	0.15%OF PRICE AT A.8, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.8, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.8, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.8, COL 6	Derived	1	Derived			Derived	0.075%OF PRICE AT A.8, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.8, COL 6	Derived	100	Derived			Derived	0.05%OF PRICE AT A.8, COL 13	Derived		Derived
C.9	TYPE IX	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.9, COL 6	Derived	30	Derived			Derived	0.7%OF PRICE AT A.9, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.9, COL 6	Derived	90	Derived			Derived	0.15%OF PRICE AT A.9, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.9, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.9, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.9, COL 6	Derived	30	Derived			Derived	0.075%OF PRICE AT A.9, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.9, COL 6	Derived	30	Derived			Derived	0.05%OF PRICE AT A.9, COL 13	Derived		Derived
		Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.10, COL 6	Derived	20	Derived			Derived	0.7%OF PRICE AT A.10, COL 13	Derived		Derived

					INDIGENOUS VENDOR							FOREIGN VENDOR			
C.10	TYPE X	Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.10, COL 6	Derived	60	Derived			Derived	0.15%OF PRICE AT A.10, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.10, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.10, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.10, COL 6	Derived	20	Derived			Derived	0.075%OF PRICE AT A.10, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.10, COL 6	Derived	20	Derived			Derived	0.05%OF PRICE AT A.10, COL 13	Derived		Derived
C.11	TYPE XI	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.7%OF PRICE AT A.11, COL 6	Derived	30	Derived			Derived	0.7%OF PRICE AT A.11, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.15%OF PRICE AT A.11, COL 6	Derived	200	Derived			Derived	0.15%OF PRICE AT A.11, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.025%OF PRICE AT A.11, COL 6	Derived	1	Derived			Derived	0.025%OF PRICE AT A.11, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.075%OF PRICE AT A.11, COL 6	Derived	1	Derived			Derived	0.075%OF PRICE AT A.11, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.05%OF PRICE AT A.11, COL 6	Derived	100	Derived			Derived	0.05%OF PRICE AT A.11, COL 13	Derived		Derived
C.12	**TOTAL (C.1 TO C.11)**							**Derived**	**Derived**	**Derived**	**Derived**				**Derived**
D	**GRAND TOTAL (A.12+B.2+C.12)**							**Derived**	**Derived**	**Derived**	**Derived = Rs Y**				**Derived = N**
E	**Indigenous vendors having CIF are required to indicate CIF @ ___% of their total ex-works supply value and quote their prices considering discount on ex works price in lieu of availing CIF.**														

Note:-

1. Bidder to note that evaluation shall be on Grand Total Ex works price + Freight charges, however, Bidder to quote grand total Ex works/total C&F value of the PHEs mentioned at A.1 to A.11 (Rs X for Indigenous bidders/ M for foreign bidder) only as per the BOQ above. The item wise break up of Ex works prices (unit as well as total) for all the items in the BOQ shall be derived as per the formulae indicated above by BHEL. Indigenous bidder also need to indicate taxes percentage in the respective column and freight percentage of Ex works value considering delivery anywhere in India in the freight column.

2. Rate contract shall be decided on the basis of grand Total Ex works price + Freight charges of Total BOQ

3. Value is to be filled only where "to be quoted" is mentioned and for other columns where "derived" is mentioned same shall be derived by BHEL as per % allocation fixed against each item

4. Bidder to note that total price indicated above at D shall be considered for evaluation and hence should be complete in all respect for the full scope defined and considering all terms and conditions agreed.

5. The unit price quoted by bidder shall be binding for quantity variation which is at discretion of purchaser.

6. Prices shall remain firm during contract execution.

7. For any clarification please refer Technical Specification No-PE-RC-999-179-N001

8. Price of all accessories, commissioning spares, special Tools & tackle and other accessories not listed above shall be included in the price of PHE & shall be supplied with the PHE.

9. Indigenous vendors having CIF are required to indicate CIF @ ___% of their total ex-works supply value and quote their prices considering discount on ex works price in lieu of availing CIF.

10. Bidder shall furnish this price Schedule indicating "Quoted/Not-Quoted" along with technical offer and actual prices in his price offer.

11. Where ever the quantity is coming in fraction same shall be round off to next higher number.

12. Any item indicated as "Not Applicable" by bidder but actually found applicable for that PHE type, shall be supplied by bidder at cost based on cost percentage break-up for spares furnished along with NIT.

16/12
सुमीत सहाय / SUMIT SAHAY
उप प्रबन्धक (सी एम एम) / Dy Manager (CMM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.
पावर सेक्टर-परियोजना इंजीनियरिंग प्रबंधन
Power Sector-Project Engineering Management
पीपीईआई भवन, एचआरडी एण्ड ईएसआई कॉम्प्लेक्स
PPEI Bldg, HRD & ESI Complex
प्लाट न 25, सेक्टर 16 ए, नोएडा -201301
Plot No. 25, Sector 16 A, Noida -201301

ANNEXURE- IB

RATE CONTRACT - NIT REF NO-PE/PG/RTC/E-5966/2018, DTD-01.06.2018

PRICE SCHEDULE FOR PLATE HEAT EXCHANGERS (GROUP B)

NAME OF VENDOR-

					INDIGENOUS VENDOR							FOREIGN VENDOR			
SL NO	ITEM DESCRIPTION	UOM	ORDERED QUANTITY	HSN CODE	UNIT EX-WORKS PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL EX WORKS PRICE OF PHEs GIVEN AT SL NO-A.5 OF COUMN 8	UNIT EX-WORKS PRICE (DULY PACKED) (INR)	TOTAL EX-WORKS PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL EX WORKS PRICE OF PHEs GIVEN AT SL NO-A.5 OF COUMN 8	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL F.O.R SITE PRICE (INR)	UNIT C & F PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.5OF COUMN 15 INDIAN SEA PORT	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)	TOTAL C & F PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.5OF COUMN 15 INDIAN SEA PORT	TOTAL C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)
1	2	3		4	5	6	7	8	9	10	11	12	13	14	15
A	PLATE HEAT EXCHANGER - MAIN SUPPLY														
A.1	TYPE XII	NOS.	6	TO BE QUOTED	6.89076%	Derived	41.34454%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	6.89076%	Derived	41.34454%	Derived
A.2	TYPE XIII	NOS.	4		2.35294%	Derived	9.41176%	Derived			Derived	2.35294%	Derived	9.41176%	Derived
A.3	TYPE XIV	NOS.	6		6.80672%	Derived	40.84034%	Derived			Derived	6.80672%	Derived	40.84034%	Derived
A.4	TYPE XV	NOS.	4		2.10084%	Derived	8.40336%	Derived			Derived	2.10084%	Derived	8.40336%	Derived
A.5	TOTAL (A.1 TO A.4)						100.00000%	TO BE QUOTED = Rs X	Derived	Derived	Derived			100.00000%	TO BE QUOTED = M

				HSN CODE	UNIT PRICE FOR PG TEST	UNIT PRICE FOR PG TEST (INR)	TOTAL EX-WORKS PRICE OF PG TEST IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.5OF COUMN 8	TOTAL EX-WORKS PRICE FOR PG TEST (INR)		APPLICABLE GST RATE % ON PG TEST PRICE (INR)	TOTAL PRICE FOR PG TEST WITH GST (INR)	UNIT PRICE FOR PG TEST	UNIT PRICE FOR PG TEST (CURRENCY)	TOTAL PRICE OF PG TEST IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.5 OF COUMN 15 INDIAN SEA PORT	TOTAL PRICE FOR PG TEST (CURRENCY)
B	SERVICES AT SITE PG TEST AT SITE (NOTE: 1SET = PG TEST FOR ONE PHE.)														
B.1		SET	20	TO BE QUOTED	0.016800% OF PRICE AT A.5, COL 8	Derived	0.336% OF PRICE AT A.5, COL 8	Derived		% TO BE QUOTED	Derived	0.016800% OF PRICE AT A.5, COL 15	Derived	0.336% OF PRICE AT A.5, COL 15	Derived
B.2	TOTAL (B.1)							Derived		Derived	Derived				Derived

				HSN CODE	UNIT EX-WORKS PRICE (DULY PACKED)	UNIT EX-WORKS PRICE (DULY PACKED) (INR)	EXPECTED QUANTITY OF SPARES AS PER DATASHEET A OF SECTION IA	TOTAL EX- WORKS PRICE (DULY PACKED) (INR) (Col F * Col. G)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL F.O.R SITE PRICE (INR)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)		TOTAL C & F PRICE (DULY PACKED) INDIAN SEA PORT (CURRENCY)
C	MANDATORY SPARES EXPECTED SPARES FOR EACH PHE TYPE AS PER SPARE LIST INDICATED IN DATASHEET A AT SECTION IB OF SPECIFICATION.														
C.1	TYPE XII	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.8% OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.8% OF PRICE AT A.1, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.12% OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.12% OF PRICE AT A.1, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.015% OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.015% OF PRICE AT A.1, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.04% OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.04% OF PRICE AT A.1, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.025% OF PRICE AT A.1, COL 6	Derived	1	Derived			Derived	0.025% OF PRICE AT A.1, COL 13	Derived		Derived

					INDIGENOUS VENDOR							FOREIGN VENDOR			
C.2	TYPE XIII	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.8% OF PRICE AT A.2, COL 6	Derived	1	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.2, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.12% OF PRICE AT A.2, COL 6	Derived	1	Derived			Derived	0.12% OF PRICE AT A.2, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.015% OF PRICE AT A.2, COL 6	Derived	1	Derived			Derived	0.015% OF PRICE AT A.2, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.04% OF PRICE AT A.2, COL 6	Derived	1	Derived			Derived	0.04% OF PRICE AT A.2, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.025% OF PRICE AT A.2, COL 6	Derived	1	Derived			Derived	0.025% OF PRICE AT A.2, COL 13	Derived		Derived
C.3	TYPE XIV	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.8% OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.8% OF PRICE AT A.3, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.12% OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.12% OF PRICE AT A.3, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.015% OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.015% OF PRICE AT A.3, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.04% OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.04% OF PRICE AT A.3, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.025% OF PRICE AT A.3, COL 6	Derived	1	Derived			Derived	0.025% OF PRICE AT A.3, COL 13	Derived		Derived
C.4	TYPE XV	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	TO BE QUOTED	0.8% OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.8% OF PRICE AT A.4, COL 13	Derived		Derived
		Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	TO BE QUOTED	0.12% OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.12% OF PRICE AT A.4, COL 13	Derived		Derived
		Valves	NOS.	TO BE QUOTED	0.015% OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.015% OF PRICE AT A.4, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	TO BE QUOTED	0.04% OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.04% OF PRICE AT A.4, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	TO BE QUOTED	0.025% OF PRICE AT A.4, COL 6	Derived	1	Derived			Derived	0.025% OF PRICE AT A.4, COL 13	Derived		Derived
C.5	**TOTAL (C.1 TO C.11)**							**Derived**	**Derived**	**Derived**	**Derived**				**Derived**
D	**GRAND TOTAL (A.5+B.2+C.5)**							**Derived**	**Derived**	**Derived**	**Derived = Rs Y**				**Derived = N**
E	**Indigenous vendors having CIF are required to indicate CIF @ ___% of their total ex-works supply value and quote their prices considering discount on ex works price in lieu of availing CIF.**														

Note:-

1. Bidder to note that evaluation shall be on Grand Total Ex works price + Freight charges, however, Bidder to quote grand total Ex works/total C&F value of the PHEs mentioned at A.1 to A.4 (Rs X for Indigenous bidders/ M for foreign bidder) only as per the BOQ above. The item wise break up of Ex works prices (unit as well as total) for all the items in the BOQ shall be derived as per the formulae indicated above by BHEL. Indigenous bidder also need to indicate taxes percentage in the respective column and freight percentage of Ex works value considering delivery anywhere in India in the freight column.
2. Rate contract shall be decided on the basis of grand Total Ex works price + Freight charges of Total BOQ
3. Value is to be filled only where "to be quoted" is mentioned and for other columns where "derived" is mentioned same shall be derived by BHEL as per % allocation fixed against each item
4. Bidder to note that total price indicated above at D shall be considered for evaluation and hence should be complete in all respect for the full scope defined and considering all terms and conditions agreed.
5. The unit price quoted by bidder shall be binding for quantity variation which is at discretion of purchaser.
6. Prices shall remain firm during contract execution.
7. For any clarification please refer Technical Specification No-PE-RC-999-179-N001
8. Price of all accessories, commissioning spares, special Tools & tackle and other accessories not listed above shall be included in the price of PHE & shall be supplied with the PHE.
9. **Indigenous vendors having CIF are required to indicate CIF @ ___% of their total ex-works supply value and quote their prices considering discount on ex works price in lieu of availing CIF.**
10. Bidder shall furnish this price Schedule indicating "Quoted/Not-Quoted" along with technical offer and actual prices in his price offer.
11. Where ever the quantity is coming in fraction same shall be round off to next higher number.
12. Any item indicated as "Not Applicable" by bidder but actually found applicable for that PHE type, shall be supplied by bidder at cost based on cost percentage break-up for spares furnished along with NIT.

1/12/18

सुमीत सहाय / SUMIT SAHAYA
उप प्रबन्धक (सी एम एम) / Dy Manager (CMM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड Bharat Heavy Electricals Ltd
पावर सेक्टर ... इंजीनियरिंग प्रबंधन
Power Sector ... Engineering Management
पीपीई ... ... Complex,
... 201301

ANNEXURE-II: DEVIATION SHEET (COST OF WITHDRAWL)

PACKAGE:- PLATE HEAT EXCHANGER- RATE CONTRACT

TENDER ENQUIRY REF NO-RATE CONTRACT - NIT REF NO-PE/PG/RTC/E-5966/2018, DTD-01.06.2018

NAME OF VENDOR:-

SL NO	VOLUME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWL OF DEVIATION (POSITIVE/ NEGATIVE)	REASONS FOR QUOTING DEVIATION
TECHNICAL DEVIATIONS									
COMMERCIAL DEVIATIONS									

PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE

NAME	DESIGNATIONS	SIGN & DATE	

NOTES:

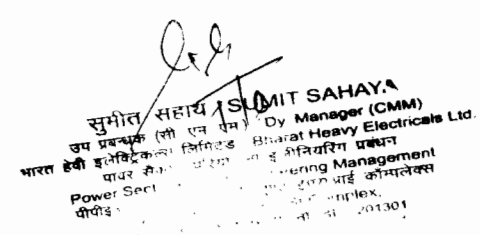
1. For self manufactured items of bidder, cost of withdrawl of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
2. For directly dispatchable items, cost of withdrawl of deviation will be applicable on the basic price including taxes, duties & freight.
3. All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.
4. Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.
5. Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawl of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable
6. Bidder shall furnish price copy of above format along with price bid.
7. The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.
8. Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered
9. For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawl of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawl of deviation shall be taken as NIL.
10. Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.
11. All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.
12. Cost of withdrawl is to be given seperately for each deviation. In no event bidder should club cost of withdrawl of more than one deviation else cost of withdrawl of such deviations which have been clubbed together shall be considered as NIL.
13. In case nature of cost of withdrawl (positive/negative) is not specified it shall be assumed as positive.
14. In case of descrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.

सुमीत सहाय / SUMIT SAHAY
उप प्रबंधक (सी एम एम) / Dy Manager (CMM)
भारत हेवी इलेक्ट्रिकल्स लि. / Bharat Heavy Electricals Ltd.
पावर सेक्टर प्रोजेक्ट इंजीनियरिंग प्रबंधन
Power Sector Project Engineering Management
पीपीईआई भवन, तृतीय एवं ईएसआई कॉम्प्लेक्स
PPEI Bldg. 3RD & ESI Complex,
प्लाट न 25, सेक्टर 16 ए, नोएडा –201301
Plot No. 25, Sector 16 A, Noida 201301

BOQ of SPARES (GROUP-A)

SL.NO.	Spares for each PHE type:	Unit of Measurement	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI	TYPE VII	TYPE VIII	TYPE IX	TYPE X	TYPE XI
1	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	20	20	30	20	30	40	30	20	30	20	30
2	Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	1	30	1	1	90	260	200	200	90	60	200
3	Valves	NOS.	1	1	2	2	1	1	1	1	1	1	1
4	Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	1	10	1	1	30	20	1	1	30	20	1
5	Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	1	10	1	1	30	120	100	100	30	20	100

	NOTE:
1	Bidder shall furnish this price Schedule indicating "Quoted/Not-Quoted" against each item along with technical offer and actual prices in his price offer.
2	Where ever the quantity is coming in fraction same shall be round off to next higher number.
3	Any item indicated as "Not Applicable" by bidder but actually found applicable for that PHE type, shall be supplied by bidder at cost based on cost percentage break-up for spares furnished along with NIT.



BOQ of SPARES (GROUP-B)

SL.NO.	Spares for each PHE type:	Unit of Measurement	TYPE XII	TYPE XIII	TYPE XIV	TYPE XV
1	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	1	1	1	1
2	Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	1	1	1	1
3	Valves	NOS.	1	1	1	1
4	Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	1	1	1	1
5	Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	1	1	1	1
	NOTE:					
1	Bidder shall furnish this price Schedule indicating "Quoted/Not-Quoted" against each item along with technical offer and actual prices in his price offer.					
2	Where ever the quantity is coming in fraction same shall be round off to next higher number.					
3	Any item indicated as "Not Applicable" by bidder but actually found applicable for that PHE type, shall be supplied by bidder at cost based on cost percentage break-up for spares furnished along with NIT.					

सुमीत सहाय/ SUMIT SAHAY
उप प्रबन्धक (सी एम एम)/ Dy Manager (CMM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड Bharat Heavy Electricals Ltd
पावर सैक्टर-परियोजना इंजीनियरिंग प्रबंधन
Power Sector Project Engineering Management
पीपीईएमजी
PEM
ESI Complex,
201301

ANNEXURE A

Cost of Spares in Percentage w.r.t Unit Ex-works price of One PHE

S. No	Spares for each PHE type:	Unit of Measurement	Cost in percentage of One PHE Cost of that type (as quoted by bidder) at Column 6/13 of Price schedule									
			TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI	TYPE VII	TYPE VIII	TYPE IX	TYPE X	TYPE XI
1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	0.700%	0.700%	0.700%	0.700%	0.700%	0.700%	0.700%	0.700%	0.700%	0.700%	0.700%
2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	0.150%	0.150%	0.150%	0.150%	0.150%	0.150%	0.150%	0.150%	0.150%	0.150%	0.150%
3	Valves	NOS.	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%
4	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%
5	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	0.050%	0.050%	0.050%	0.050%	0.050%	0.050%	0.050%	0.050%	0.050%	0.050%	0.050%
Note:													
1)	The percentage cost indiacted above is for 1 unit of measurement of each spare item. The qty. of spare are mentioned in BOQ of Spares for arriving at final percentage of each type of PHE in Sl. No. C of Price Schedule.												

TC

SUMIT SAHAY
उप प्रबंधक (सी एम एम) Dy Manager (CMM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड, Bharat Heavy Electricals Ltd
पावर सैक्टर–परियोजना इंजीनियरिंग प्रबंधन
Power Sector-Project Engineering Management
पीपीईआई भवन एचआरडी एण्ड ईएसआई कॉम्प्लेक्स
PPEI Bldg. HRD & ESI Complex,
प्लाट न 25, सेक्टर 16 ए नोएडा –201301
Plot No 25, Sec 16 A, Noida - 201301

ANNEXURE A (GROUP-B)

Cost of Spares in Percentage w.r.t Unit Ex-works price of One PHE

S. No	Spares for each PHE type:	Quantity	Cost in percentage of One PHE Cost of that type (as quoted by bidder) at Column 6/13 of Price schedule			
			TYPE XII	TYPE XIII	TYPE XIV	TYPE XV
1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	0.800%	0.800%	0.800%	0.800%
2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	0.120%	0.120%	0.120%	0.120%
3	Valves	NOS.	0.015%	0.015%	0.015%	0.015%
3	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	0.040%	0.040%	0.040%	0.040%
4	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	0.025%	0.025%	0.025%	0.025%
Note:						
1)	The percentage cost indiacted above is for 1 unit of measurement of each spare item. The qty. of spare are mentioned in BOQ of Spares for arriving at final percentage of each type of PHE in Sl. No. C of Price Schedule.					

सुमीत सहाय / SUMIT SAHAY
उप प्रबन्धक (सी एम एम) / Dy Manager (CMM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड, Bharat Heavy Electricals Ltd.
पावर सैक्टर-परियोजना इंजीनियरिंग प्रबंधन
Power Sector-Project Engineering Management
पीपीईआई भवन एचआरडी एण्ड ईएसआई कॉम्प्लेक्स
PPEI Bldg HRD & ESI Complex.
प्लाट न 25 सेक्टर 16 ए नोएडा -201301

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited [1] (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at _____ through its Unit at.....(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at_____[2] hereinafter referred to as the 'Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated .....[3] valued at Rs.....[4] (Rupees ----------)/FC.....(in words.....) for .....[5] (hereinafter called the 'Contract') and the Contractor having agreed to provide a Contract Performance Guarantee, equivalent to .....% (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we, ..., (hereinafter referred to as the Bank), having registered/Head office at ..... and inter alia a branch at ..... being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs ---------- (Rupees ----------) without any demur, immediately on a demand from the Employer, .
Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor/ Supplier in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the contractors/supplier shall have no claim against us for making such payment.

We the .....bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

We ..... BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor/Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Contractor/Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall remain in force upto and including..... [6] and shall be extended from time to time for such period as may be desired by Employer.
This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor/Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the .....[7]we shall be discharged from all liabilities under this guarantee thereafter.

We, ... BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed..... [8]
b) This Guarantee shall be valid up to .....[9]
c) Unless the Bank is served a written claim or demand on or before _____[10] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dated.....

Place of Issue.....

[1] *NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited*

[2] *NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.*

[3] *DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE*

[4] *PROJECT/SUPPLY DETAILS*

[5] *BG AMOUNT IN FIGURES AND WORDS*

[6] *VALIDITY DATE*

[7] *DATE OF EXPIRY OF CLAIM PERIOD*

[8] *BG AMOUNT IN FIGURES AND WORDS.*

[9] *VALIDITY DATE*

[10] *DATE OF EXPIRY OF CLAIM PERIOD*

Note:

1. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**
2. **In Case of Bank Guarantees submitted by Foreign Vendors-**
   - a. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
   - b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**

   b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

   b.2 **In case, Foreign Vendors intend to provide BG from** Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

   b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

   b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

GST related Corrigendum to GCC Rev 06

Clause Ref:	Existing Clause as:	Replaced/ New Clause as:
Clause No.4 of GCTC (General commercial terms and conditions)	**TAXES AND DUTIES** **4.1 EXCISE DUTY** 4.1.1 Seller/ Contractor is required to ensure that excise duty including cess, if any, is quoted as per the existing tariff on the date of the offer and all benefits as per existing rules have been considered. 4.1.2 Excise duty actually incurred by Seller/ Contractor on self-manufactured items alone shall be reimbursed against documentary evidence. Excise duty paid by Purchaser on inputs, bought out items, raw materials and components consigned directly to site from sources other than Seller/ Contractor's factory/ works shall be included by the bidder in the quoted basic price. 4.1.3 If excise duty is paid under protest or dispute, it shall not be reimbursed till the dispute is settled. If the Seller/ Contractor claims/ obtains any refund of the excise duty paid, the same shall be refunded to the Purchaser immediately 4.1.4 Invoice cum Excise duty gate pass (Excise Invoice) should contain the name of the ultimate consignee as per Order/ Contract/ Special Conditions of Contract. 4.1.5 If required by Purchaser, the Seller / Contractor will provide a certificate stating that CENVAT benefit has been availed of on the inputs and the same has been passed on to the Purchaser. 4.1.6 Excise duty shall be paid at actuals against documentary evidence but restricted to the amount and percentage indicated in the Order/ Contract. **4.2 SALES TAX / VALUE ADDED TAX (VAT)** 4.2.1 Central Sales Tax / Value Added Tax shall be reimbursed only if the same is paid by the Seller / Contractor to the respective Govt. authorities on direct sales by the Seller/ Contractor to the Purchaser, meeting all statutory requirements and availing all exemptions/ concessions under the respective Central Sales Tax / Value Added Tax Acts. The offer should clearly indicate CST/ VAT percentage and the total	**TAXES AND DUTIES** **4.1 CGST/SGST/UTGST/IGST** 4.1.1 Seller/ Contractor is required to ensure that CGST/SGST/UTGST/IGST (whichever is applicable) is quoted as per the existing tariff on the date of the offer and all benefits as per existing laws have been considered. 4.1.2 It is the responsibility of the seller/contractor to issue the Tax Invoice strictly as per the format prescribed under the relevant applicable GST law (CGST Act/SGST Act/UTGST Act/IGST Act). Vendor to indicate the proper GSTN Registration/ HSN code in their tax invoice. 4.1.3 The purchaser is registered in the State of Uttar Pradesh vide following GST registration number: **09AAACB4146P2ZC** 4.1.4 Seller/contractor is required to mention the above registration number in their tax invoice unless stated otherwise in NIT/SCC. 4.1.5 CGST/SGST/UTGST/IGST shall be paid at actuals against Tax Invoice but restricted to the amount and percentage in the order/contract

	amount along with concessional form(s), if any. 4.2.2 Purchaser is registered in NOIDA, U.P. vide following Registration Numbers: Central Sales Tax Registration No. : ND – 5341151 w.e.f. 01-07-2006 UP Trade Tax Registration No. : ND – 0345307 w.e.f. 01-07-2006 UP TIN No. : 09765702874 4.2.3 Central Sales Tax/ Value Added Tax shall be reimbursed, as per tariff applicable, but restricted to the percentage and amount shown in the Order/ Contract. If it is shown as included in the quoted price/ not applicable, it will not be reimbursed by the Purchaser. 4.2.4 Purchaser proposes to make sale-in-transit under section 6 (2) (b) of Central Sales Tax Act where goods movement is inter-state. Form-C shall be issued and exchanged against Form-E1/E2 based on quarterly transactions. Seller/Contractor is required to submit his request in the format enclosed at Annexure-VI within 30 days from end of the Quarter, giving State-wise invoice details. 4.2.5 VAT invoices, in format prescribed by the respective State Sales Tax Act, have to be submitted in the name of Nodal Agency specified in Special Conditions of Contract. **4.3 SERVICE TAX** 4.3.1 Service Tax paid by the Service Provider /contractor to the Government authorities directly shall only be reimbursed at actuals against documentary evidence, but restricted to the rate and amount mentioned in the order/contract. The offer should clearly indicate the percentage and the total amount of service tax. 4.3.2 Service provider/Contractor to ensure their registration for "Intended Service" to be provided, before claiming Service tax under the "intended category". Decision of BHEL shall be final w.r.t. the "Intended category" in which the service will be falling. 4.3.3 If required by the Purchaser, the Service Provider/Contractor will provide a certificate stating that "CENVAT Benefit has been availed of on the input and the	**4.2 OTHER TAXES & LEVIES** 4.2.1 All taxes/duties/Cess other than CGST/SGST/UTGST/IGST shall be deemed to be included in the Ex-Works prices unless specified otherwise by the bidder in the price bid. No variation in other taxes and duties shall be payable by Purchaser. **4.3 CUSTOMS DUTY**

	same has been passed on to the purchaser" or "CENVAT Benefit has not been availed of on the inputs". **4.4 OTHER TAXES & LEVIES** All taxes and duties other than Excise Duty, Sales Tax/ VAT, Service Tax shall be deemed to be included in the Ex-Works prices unless specified otherwise by the bidder in the price bid. No variation in other taxes and duties shall be payable by Purchaser. However, statutory variation in Octroi will be payable extra against documentary evidence. **4.5 CUSTOMS DUTY** 4.5.1 Customs Duty element for imported items as per Special Conditions of Contract shall be included in the Ex-Works prices. No variation in customs duty and exchange rate for imported items shall be payable by Purchaser. 4.5.2 Seller/ Contractor shall arrange for his own import license, if required, since Purchaser will not provide any import license. Therefore, Seller/ Contractor alone shall be responsible for any delay in getting import license or non-availability of the same or completion of other related formalities. Purchaser shall not be responsible for any financial liability, whatsoever, on this account. 4.5.3 Essentiality Certificate or Project Authority Certificate (PAC) as per Import Policy, if required to avail concessional customs duty, shall be clearly specified in the offer. Import content (CIF value in rupees) with list of items, quantity, foreign currency, country of origin etc., shall be submitted by the bidder as part of Price bid. **4.6 DIRECT TAX** 4.6.1 Purchaser shall not be liable towards income tax of whatever nature including variations thereof, arising out of this Order/ Contract, as well as tax liability of the Seller/ Contractor and his personnel.	4.3.1 Customs Duty/IGST/Goods and Services compensation cess under Goods and Services Tax (Compensation to States) Act, 2017 element for imported items as per Special Conditions of Contract shall be included in the Ex-Works prices. 4.3.2 Seller/ Contractor shall arrange for his own import license, if required, since Purchaser will not provide any import license. Therefore, Seller/ Contractor alone shall be responsible for any delay in getting import license or non-availability of the same or completion of other related formalities. Purchaser shall not be responsible for any financial liability, whatsoever, on this account. 4.3.3 Essentiality Certificate or Project Authority Certificate (PAC) as per Import Policy, if required to avail concessional customs duty, shall be clearly specified in the offer. Import content (CIF value in rupees) with list of items, quantity, foreign currency, Country of origin etc., shall be submitted by the bidder as part of Price bid. **4.4 DIRECT TAXES** 4.4.1 Purchaser shall not be liable towards income tax of whatever nature including variations thereof, arising out of this Order/ Contract, as well as tax liability of the Seller/ Contractor and his personnel. 4.4.2 Deductions of Tax at source at the prevailing rates shall be effected by the Purchaser before release of payment, as a statutory obligation, if applicable. TDS certificate will be issued by the Purchaser as per statutory provisions

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	4.6.2 Deductions of Tax at source at the prevailing rates shall be effected by the Purchaser before release of payment, as a statutory obligation, if applicable. TDS certificate will be issued by the Purchaser as per statutory provisions.	
	5.0 STATUTORY VARIATION 5.1 If the rates for taxes and duties in respect of the quoted materials and/ or services assumed by the Seller/ Contractor are less than the tariff prevailing at the time of tendering, Seller/ Contractor will be responsible for such under quotations. However, if the rates assumed are higher than the correct rates prevailing at the time of tendering, the difference will be to the credit of the Purchaser. 5.2 Statutory Variations in Excise Duty, Service Tax and Central Sales Tax/ Value Added Tax only on self-manufactured items/ services rendered by vendor himself on the rates prevailing at the time of delivery/ completion in comparison to the date of offer, will be to the account of the Purchaser. No other variations such as on customs duty, exchange rate, minimum wages, prices of controlled commodities, any other input etc. shall be payable by the Purchaser. 5.3 Notwithstanding the above, where the actual completion of the supply occurs beyond the period stipulated in the Order/ Contract or any extension thereof, variations referred to above, will be limited to the rates prevailing on the dates of such agreed completion periods only. For variations after the agreed completion periods, the Seller/ Contractor alone shall bear the impact for the upward revisions and for downward revisions; purchaser shall be given the benefit of reduction in taxes/ duties. This will be without prejudice to the levy of penalty for delay in delivery/ completion schedule. 5.4 Any new tax structure (like Goods & Services Tax) as and when implemented by the Government shall become applicable in addition to or in lieu of existing tax structure.	**5.0 STATUTORY VARIATION** 5.1 Statutory variation for CGST/SGST/UGST/IGST is available provided the actual completion of supply does not occur beyond the period stipulated in the order/contract or any extension (without levy of penalty). 5.2 For variation after the agreed completion periods, the seller/contractor alone shall bear the impact for the upwards revisions and adjust the price in their basic price in such a manner that total price with tax matches with the ex-works with taxes of Purchase Order/Contract. For downward revisions, purchaser shall be given the benefit of reduction in CGST/SGST/UGST/IGST. This will be without prejudice to the levy of penalty for delay in delivery/completion schedule. 5.4 No other variations such as on Custom Duty, exchange rate, minimum wages, prices of controlled commodities, any other input etc. shall be payable by the purchaser.

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Clause 8	**8.0 TRANSPORTATION & FREIGHT CHARGES** 8.1 All dispatches shall be through road carriers approved by Purchaser/ Bank, on freight pre-paid basis. 8.2 Road permit/ entry permit, if required as per law of the State, shall be arranged by Purchaser. 8.3 Freight charges (including Service Tax) shall be payable after delivery of the goods at the project site, on receipt of MRC or receipted LR on pro-rata basis.	8**.0 TRANSPORTATION & FREIGHT CHARGES** 8.1 All dispatches shall be through road carriers approved by Purchaser/ Bank, on freight pre-paid basis. 8.2 Road Permit/E-way bill, if required, will be arranged by Supplier.
	9.0 TERMS OF PAYMENT **9.1 SUPPLY PACKAGES** 9.1.1 Ninety percent (90%) of basic price of materials supplied, as per PO, along with 100% taxes and duties (as applicable), shall be paid against receipt of material at site on pro-rata basis. 9.1.2 Ten percent (10%) of basic price of materials supplied will be released on pro-rata basis after receipt of Material Receipt Certificate (MRC) from project site engineer of Owner/ Purchaser, on submission of all final documents for the packages as detailed below, duly certified by Engg. Deptt. of purchaser, and submission of Form E1/ E2 against Form-C, if applicable. List of packages with required final documents is as per Annexure-X. **9.2 SUPPLY PACKAGES WITH PERFORMANCE GUARANTEE / DEMONSTRATION** **TEST AT SITE IN VENDOR'S SCOPE** 9.2.1 Eighty Five percent (85%) of basic price of materials supplied, as per PO / approved billing schedule, along with 100% taxes and duties (as applicable), shall be paid against receipt of material at site on pro-rata basis. 9.2.2 Ten percent (10%) of basic price of materials supplied will be released on pro-rata basis after receipt of Material Receipt Certificate (MRC) from project site engineer of Owner/ Purchaser and submission of Form E1/ E2 against Form-C, if applicable. 9.2.3 Five percent (5%) of the total basic price of materials and PG/ Demonstration test charges shall be released after submission of all final documents as per Technical	**9.0 TERMS OF PAYMENT** **9.1 SUPPLY PACKAGES** Payment of basic price of materials supplied alongwith freight and taxes and duties (as applicable), shall be paid against receipt of material at site on pro-rata basis. 10% of basic price of materials supplied will be retained as security deposit which will be released on pro – rata basis after receipt of Material Receipt Certificate (MRC) from project site engineer of owner/purchaser on submission of all the final documents for the packages as detailed below, duly certified by engineering department of purchaser. List of packages with required final documents is as per Annexure-X. **9.2 Supply packages with performance guarantee/demonstration test at site in vendor's scope** Payment of basic price of materials supplied, as per PO/ as per approved billing schedule, along with freight and taxes and duties (as applicable), shall be paid against receipt of material at site on pro-rate basis. 15% of basic price of materials supplied will be retained as security deposit which will be released on pro – rata basis as details below: a) 10% will be released after receipt of Material Receipt Certificate (MRC) from project site engineer of owner/purchaser.

	Specifications and successful completion of the Performance Guarantee (PG)/ Demonstration Test at site. Note: If the Performance Guarantee/ Demonstration Test is not conducted up to 24 months from supply completion for reasons not attributable to the vendor, then last 5% payment will be released against Bank Guarantee of an equivalent amount, valid for 12 months. This bank guarantee will be in addition to Contract Performance Bank Guarantee for 10% of the contract value (excluding taxes, duties and freight). **9.3 SUPPLY PAYMENT FOR TURNKEY PACKAGES (E&C IN VENDOR'S SCOPE)** 9.3.1 Eighty Five percent (85%) of basic price of materials supplied, as per approved billing schedule, along with 100% taxes and duties (as applicable), shall be paid against receipt of material at site on pro-rata basis. OR i) Five percent (5%) lump sum payment of total basic price (excluding taxes, duties & freight) against approval of design documents and quality plan as certified by Engineering. Design documents and quality plan shall be as defined in the Technical Specifications. ii) Eighty percent (80%) of basic price of materials supplied, as per approved billing schedule, along with 100% taxes and duties (as applicable), shall be paid against receipt of material at site on pro-rata basis. 9.3.2 Five percent (5%) of basic price of materials supplied along with freight, if applicable, will be released on pro-rata basis after submission of Material Receipt Certificate (MRC) from project site engineer of Owner/ Purchaser and submission of Form E1/ E2 against Form-C, if applicable. Collection of Material Receipt Certificate from Site/ Owner and its submission for claiming the payment shall be the responsibility of the Seller/ Contractor. 9.3.3 Ten percent (10%) of the total basic price shall be released after i) submission of all final documents as per Technical Specifications and ii) successful completion of	b) 5% will be released after submission of final documents as per technical specification and successful completion of the performance guarantee (PG)/ Demonstration test at site. Note: If the Performance Guarantee/ Demonstration Test is not conducted up to 24 months from supply completion for reasons not attributable to the vendor, then 5% security deposit will be released against Bank Guarantee of an equivalent amount, valid for 12 months. This bank guarantee will be in addition to Contract Performance Bank Guarantee for 10% of the contract value (excluding taxes, duties and freight). **9.3 SUPPLY PAYMENT FOR TURNKEY PACKAGES (E&C IN VENDOR'S SCOPE)** 9.3.1 Payment of basic price of materials supplied, as per approved billing schedule, along with freight, taxes and duties (as applicable), shall be paid against receipt of material at site on pro-rata basis. 15% of basic price of materials supplied will be retained as security deposit which will be released on pro – rata basis as details below: a) 5% will be released on pro-rata basis after submission of Material Receipt Certificate (MRC) from project site engineer of owner/purchaser. Collection of Material Receipt Certificate from site/owner and its submission for claiming the payment shall be the responsibility of the Seller/Contractor. b) 10% will be released after i) submission of all final documents as per Technical Specifications and ii) successful completion of Performance Guarantee (PG)/ Demonstration Test and handing over of the system/ package, if applicable, as per Order/ Contract

	Performance Guarantee (PG)/ Demonstration Test and handing over of the system/ package, if applicable, as per Order/ Contract. **9.4 ERECTION & COMMISSIONING PAYMENT FOR TURNKEY PACKAGES** 9.4.1 Eighty percent (80%) payment on pro-rata basis for the work completed, as per approved billing schedule, shall be released by Site authorities/ Region on submission of protocols, duly signed by BHEL Site/ Owner. 9.4.2 Ten percent (10%) of the total value shall be released by Site authorities/ Region on successful commissioning of the complete system/ package. 9.4.3 Ten percent (10%) of the total value shall be released by Site authorities/ Region on successful completion of PG/ Demonstration test(s) and handing over system/ package to the Owner, as applicable. **9.5 PG TEST, INSTALLATION CHECK, SUPERVISION OF ERECTION /** **COMMISSIONING CHARGES** 100% payment shall be released after successful completion of the activity, on Site certification. **9.6 Vendors shall submit documents for payment directly to BHEL. Payment will** **be released within 60 days after receipt of complete documents as per order/** **contract (45 days for vendors qualified and registered as Micro or Small as per** **MSMED Act).** To be eligible for payment as Micro and Small category, vendors shall submit annual certification for validation from designated authority under MSMED Act or Chartered Accountant within first quarter of every financial year. . **Note:** 1) For indigenous suppliers, if the documents are routed through Bank, then all bank charges will be to vendor's account. 2) Foreign bidders can opt for payment (less agency commission, if applicable) through irrevocable and unconfirmed letter of credit. In that case for	**9.4 ERECTION & COMMISSIONING PAYMENT FOR TURNKEY PACKAGES** 9.4.1 Eighty percent (80%) payment on pro-rata basis for the work completed, as per approved billing schedule, shall be released by Site authorities/ Region on submission of protocols, duly signed by BHEL Site/ Owner. 9.4.2 Ten percent (10%) of the total value shall be released by Site authorities/ Region on successful commissioning of the complete system/ package. 9.4.3 Ten percent (10%) of the total value shall be released by Site authorities/ Region on successful completion of PG/ Demonstration test(s) and handing over system/ package to the Owner, as applicable. **9.5 PG TEST, INSTALLATION CHECK, SUPERVISION OF ERECTION / COMMISSIONING CHARGES** 100% payment shall be released after successful completion of the activity, on Site certification. **9.6 Vendors shall submit documents for payment directly to BHEL. Payment will be released within 60 days after receipt of complete documents as per order/ contract (45 days for vendors qualified and registered as Micro or Small as per MSMED Act).** **Note:** 1) Vendors are required to issue Tax Invoice inclusive of PVC value (if applicable) wherever indices are available. 2) For indigenous suppliers, if the documents are routed through Bank,

	evaluation purpose, prices of foreign bidders will be loaded on account of payment through LC, equal to loading specified against 'Payment through Bank' in Annexure-VIII. No loading will be done if foreign vendors agree for 90 days usance LC or submit the documents on collection basis for payment within 90 days of submission of complete documents. 3) LC opening/ negotiation/ confirmation charges will be to vendor's account. 4) Form C/ E1/E2 are not applicable for foreign bidders. 5) In extreme case of vendors not agreeing to link 10% payment with submission of Form E1/ E2 against Form-C as above, their prices will be loaded as per Annexure-VIII. 6) Any negative PVC, if not adjusted in earlier payments, will be adjusted at the time of MRC payment. **7)** Payment terms for mandatory spares shall be as per clause 9.1.	then all bank charges will be to vendor's account. 3) Foreign bidders can opt for payment (less agency commission, if applicable) through irrevocable and unconfirmed letter of credit. In that case for evaluation purpose, prices of foreign bidders will be loaded on account of payment through LC, equal to loading specified against 'Payment through Bank' in Annexure-VIII. No loading will be done if foreign vendors agree for 90 days usance LC or submit the documents on collection basis for payment within 90 days of submission of complete documents. 4) LC opening/ negotiation/ confirmation charges will be to vendor's account. **5)** Payment terms for mandatory spares shall be as per clause 9.1. 9.7 The applicable TDS under CGST/SGST/UGST/IGST/ Goods and Services (Compensation to States) Act will be deducted from the payments. **9.8 Other clauses** 1. Vendor/Supplier will intimate & upload the Tax invoice along with LR/RR(as applicable) on web portal & intimate BHEL immediately on removal of goods from vendor/supplier works. In case of Services, Vendor is required to upload the Tax invoice on Web Portal immediately after raising the invoice. BHEL will issue the delivery order/instruction to dispatch the material to the customer as indicated in SCC. 2. All payments against Tax Invoice to vendors/contractors shall be released only after:

		a) Vendor/contractor declaring such invoice in GSTR-1 within the prescribed timeline as per the relevant Act. b) The tax component charged by the vendor in the invoice should be matched with the details uploaded by vendor in GSTR-1. c) Confirmation of payment of GST thereon by vendor on GSTN portal 3. In case, any GST credit is delayed/denied to BHEL due to non/delayed receipt of goods and/or tax invoice or expiry to timeline prescribed in the relevant Act for availing such ITC, or any other reasons not attributable to BHEL, tax amount shall be recoverable from the vendor/contractor along with interest levied/leviable on BHEL. 4. Wherein GST liability arises on BHEL under reverse charge, any interest levied/leviable due to any reasons not attributable to BHEL shall be recovered from the vendor/contractor.
Clause 9	**9.7 DOCUMENTS TO BE SUBMITTED BY VENDOR** **9.7.1 For Recognition of Dispatch** Copy of the following documents by e-mail/ fax immediately on despatch: a. Invoice b. LR along with Delivery Order c. Packing List d. Insurance Intimation e. Dispatch Clearance 9.7.2 For Claiming Payments (under clause 9.1.1, 9.2.1, 9.3.1): a. Invoice – original+1 copy b. Receipted LR (signed & stamped)/ confirmation from site regarding receipt of packages/ Boxes original/ copy	9.7 All same a. to be replaced with “GST compliant invoice” in 9.7.1, 9.7.2, 9.7.3 Modification in the clause **Duty drawback documents** “As per applicable law” (original+1 copy.)

	c. Delivery order- 2 copies d. Packing List - clearly showing number of packages, gross weight and net weight. - original+1 copy e. MDCC from BHEL/ Customer – as per SCC – 2 copies f. Guarantee Certificate – Original + 1 copy g. Insurance Intimation - 2 copies CQIR / Inspection Reports – Original+1 copy i. PVC Calculation and copy of all applicable indices, if PVC applicable. – 2 copies j. Duty drawback documents (original excise invoice, original disclaimer certificate, original certificate from excise authority for payment of excise duty), if applicable. – original + 1copy 9.7.3 For Claiming Freight Payment a. Invoice – Original + 1 copy b. Receipted LR (signed & stamped)/ confirmation from site regarding receipt of packages/ Boxes original/ copy c. Transporter's document indicating the freight amount. Original money receipt to be submitted if required as per SCC. 9.7.4 For Claiming MRC Payment a. Invoice – Original + 1 copy b. Copy of MRC 9.7.5 For Claiming Payment for Services involving Service Tax a. Invoice as per rule 4A of Service Tax Act – Original + 1 copy b. Copy of Service Tax registration certificate c. Copy of challan for Service Tax payment	
Clause 3.0 Instruction to bidders	Total **erection & commissioning charges** including service tax should be minimum 20% (or as specified in NIT) of the total quoted package price (excluding mandatory spares but including all taxes and freight), failing which the break-up of prices shall be adjusted accordingly for ordering.	Total **erection & commissioning charges** including applicable tax but excluding freight along with GST should be minimum 20% (or as specified in NIT) of the total quoted package price (excluding mandatory spares but including all taxes and freight), failing which the break-up of prices shall be adjusted accordingly for ordering.

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Clause 16.0 Instruction to bidder	For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawl of deviation loading as per Annexure-VIII will apply.	For deviations w.r.t. Payment terms, Liquidated damages, Firm prices before claiming 10% payment, if a bidder chooses not to give any cost of withdrawl of deviation loading as per Annexure-VIII will apply.
Clause 16.0 of GCTC	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 of the total contract price per week or part thereof, subject to a maximum of ten (10) percent of the total contract price excluding elements of taxes, duties and freight, if the Seller/ Contractor fails to deliver any part of the ordered stores within the period stipulated in the Order/ Contract. For Turnkey packages (Supply and E&C in vendor's scope), Liquidated Damages shall be levied on the total contract value of both Supply and E&C orders (excluding taxes, duties and freight) if E&C completion of the package is delayed beyond the contractual completion date or extension thereof. Liquidated Damages will not be withheld from supply payment. LR/ GR/ RR date for indigenous supplies and AWB/ BL date for FOB contracts shall be treated as the date of dispatch for levying LD as per Clause 16. However, for indigenous supply if receipted LR date is beyond three months from the date of LR, such excess period shall also be considered for LD purpose. 2. In case of any amendment/ revision, LD shall be linked to the amended/ revised contract value and delivery date(s)	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 plus applicable GST of the total contract price per week or part thereof, subject to a maximum of ten (10) percent of the total contract price excluding elements of taxes, duties and freight, if the Seller/ Contractor fails to deliver any part of the ordered stores within the period stipulated in the Order/ Contract. For Turnkey packages (Supply and E&C in vendor's scope), Liquidated Damages shall be levied on the total contract value of both Supply and E&C orders (excluding taxes, duties and freight) if E&C completion of the package is delayed beyond the contractual completion date or extension thereof. Liquidated Damages will not be withheld from supply payment. LR/ GR/ RR/ eway bill date for indigenous supplies and AWB/ BL date for C&F contracts shall be treated as the date of dispatch for levying LD as per Clause 16. However, for indigenous supply if receipted LR/eway bill date is beyond three months from the date of LR/e-way bill, such excess period shall also be considered for LD purpose. 2. In case of any amendment/ revision, LD shall be linked to the amended/ revised contract value and delivery date(s)

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Deviation sheet- Cost of Withdrawal	Point no-9 For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawl of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawl of deviation shall be taken as NIL.	For deviations w.r.t. Payment terms, Liquidated damages, Firm prices before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.
Annexure-VI		Deleted
Annexure-VIII		Following changes in annexure-8, (remaining portion of annex-8 is same): C) LIQUIDATED DAMAGES If maximum limit asked for is 10% or 5% of Undelivered Portion – 10% value of the total quoted price including GST & freight. If maximum limit asked is less than 10 % of contract value loading shall be to the extent to which not agreed by bidder (at offered value) . ~~E) DEVIATION TO SUBMISSION OF FORM-E1/ E2 BEFORE CLAIMING 10% PAYMENT~~ ~~10% of Ex-Works supply value.~~

New clauses:

a) In case of discrepancy in CGST/SGST/UTGST/IGST rate corresponding to HSN ;code and quotes rates, the evaluation shall be done on quoted price and correct CGST/SGST/UTGST/IGST rate shall be considered for ordering (limited to quoted FOR Site Price)
b) The bidder should have been registered with the appropriate authority under relevant GST laws.
c) The bidder to specify in their offer (part 1 bid) the category of registration under GST i.e. registered dealer and composite dealer
d) No CGST/SGST/UTGST/IGST will be reimbursed to composite dealer. In the event of any GST quoted by composite dealer, the same shall be considered for evaluation purpose. However, the ordering will be done without considering the tax.
e) In the event of any change in the status of vendor from composite to regular dealer after the submission of the bid but before the supply, no reimbursement of CGST/SGST/UTGST/IGST will be made. However, the vendor has to raise the invoice strictly, as per the law, by adjusting their ex-works price.

FORM NO. PEM 6100-0

ENQUIRY NO.:

PROJECT: Rate Contract

PACKAGE: PLATE HEAT EXCHANGER (PHE)

1. The bidder should have designed, manufactured, tested, inspected & supplied the PHE with minimum heat load for GROUP-A / GROUP-B, 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, as under:

    a. PQR Minimum heat load for GROUP-A : **5100000 Kcal/Hr.**

    b. PQR Minimum heat load for GROUP-B : **3520260 Kcal/Hr.**

    NOTE: Bidder who meets above PQR for GROUP-B and does not meet PQR for GROUP-A, shall be eligible for GROUP-B only. However, if Bidder meet PQR for GROUP-A, Bidder shall be eligible for GROUP-A as well as for GROUP-B.

2. The Bidders shall furnish following support documents for assessment of Bidder 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 date of satisfactory performance feedback certificate should not be later than 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.

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 bidder.

3. 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.

4. 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.

5. 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.

TECHNICAL SPECIFICATION
FOR
RATE CONTRACT
OF
PLATE HEAT EXCHANGERS

Specification No. : PE-RC-999-179-N001 (REV 0)

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

CONTENTS

This Technical Specification consists of three Sections:

SECTION I

IA SPECIFIC TECHNICAL REQUIREMENTS

IB DATASHEET – A

1.0 GENERAL :

1.1 This specification is intended for finalization of rate contract between BHEL PEM and Bidder. Standard technical detail as indicated in the specification shall be agreed upon between BHEL PEM and Bidder. Project specific technical detail shall be made available to the bidder during the specific project ordering.

1.2 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 spares (as applicable), accessories, commissioning 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.

Note:

1. **This specification is being made with the intent of entering into rate contract for the supply of Plate Heat Exchangers (PHEs) of various type applicable for the various projects from time to time.**

2. **Type of PHEs have been bifurcated in to two groups viz. Group-A and Group-B, same has been detailed in Data Sheet-A, Section-1B. The bidder shall include complete supplies for a Group (A/B) in his scope. Part supplies offered for a Group (A/B) shall disqualify the bidder's offer for that Group (A/B). Evaluation shall be separate for each group and further details shall be indicated in NIT.**

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.

In the event of Contradictions between Section IA /Customer Specification (Appendix 1)/ Datasheet A (Section IB), the same shall prevail in the order as:
Customer Specification (Appendix 1), Section IA, Datasheet-A (Section IB).

1.3 The bids shall be evaluated as per NIT. Ordering shall be done separately as per NIT.

1.4 Bidder to quote for items as per price schedule attached in NIT. The quantity as mentioned in the BOQ is only for evaluation purpose. However actual ordered quantity may vary from project to project throughout the year.

2.0 SPECIFIC REQUIREMENTS:

2.1 **Project specific requirements for Flow &/ or Temp rise for PHE at primary side as well secondary side may vary slightly vis-à-vis those indicated in Datasheet A at section IB. However Flow variation shall be within +/- 20 % for primary side as well secondary side &/or Temp rise shall be within +/- 20 % for primary side as well as secondary side but Heat Load of PHE (Flow x Temp Rise) shall be within +/- 10 % vis-à-vis Flow x Temp Rise as per Datasheet A at section IB. Exact Parameters for specific project shall be**

informed during project specific order Bidder to meet the above requirement during project specific ordering, without any cost implication to BHEL.

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

3.0 Document submission schedule after the award of contract shall be as below:

PACKAGE	BHEL DRG NO	DRG TITLE	Drg Submission schedule
PLATE HEAT EXCHANGERS (PHE)	**Primary Documents** -		
	PE-V5-XXX-179-N001	Technical Data sheet of PHE	R-0 within 20 days from LOI/PO & subsequent revisions within 10 days of comments received from BHEL.
	PE-V5-XXX-179-N002	GA drawing of PHE	
	PE-V5-XXX-179-N003	Thermal sizing calculation of PHE	
	PE-V5-XXX-179-N005	QAP of PHE	
	Secondary Documents -		
	PE-V5-XXX-179-N004	Performance curves of PHE	R-0 within 20 days of Cat-I(or)II approval on TDS
	PE-V5-XXX-179-N006	O&M MANUAL for PHE	Within 30 days from MDCC
	PE-V5-XXX-179-N007	PG TEST PROCEDURE -PHE (If Applicable)	R-0 within 20 days of Cat-I(or)II approval on PHE document.

	TECHNICAL SPECIFICATION FOR RATE CONTRACT OF PLATE HEAT EXCHANGER			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
				Section	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE I**	**TYPE II**
1.0	**General**				
1.1	**Number of Plate Heat Exchanger**		Nos	Nine (9) nos	Six (6) nos
1.2	**Arrangement**			3X50% configuration per unit	2X100% configuration per unit
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	600	350
		(Secondary Side)	NB	600	350
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)	2.0 to 2.5 Kg/sq. cm(g)	2.0 to 2.5 Kg/sq. cm(g)
2.4	**Mechanical Design Temp.**		^oC	60	60
2.5	**Heat Transfer per Sq.Mtr. Of Heat Transfer Plate**		$Kcal/Hr./m^2$	6500 (Max.)	6500 (Max.)
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	2000	640
		(ACW Side)	M^3/hr	2000	640
3.2	**Inlet temperature**	(DMCW Side)	^oC	46.5	44.3
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	38	38
		(ACW Side)	^oC	44.5	42.3
3.4	*** Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow**	(DMCW Side)	MWC	7	7
		(ACW Side)	MWC	7	7
	*** 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.**				

	TECHNICAL SPECIFICATION FOR RATE CONTRACT OF PLATE HEAT EXCHANGER			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
				Section	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE I**	**TYPE II**
4.0	**Additional HT plates on Design Plates**		%	NIL	NIL
5.0	**Heat Transfer Coefficient/Margin**				
5.1	**Overall fouling resistance (minimun)**		Hr m2deg C/Kcal	0.00008	0.00008
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 Deg. shore hardness	Nitrile rubber, 65 ± 5 Deg. shore hardness
6.3	**Compression/Fixed/Frame/Movable Pressure plates**			Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted
6.4	**Guide Rails/ bar**			Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding
6.5	**Support Beam/ column**			Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, 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				

	TECHNICAL SPECIFICATION FOR RATE CONTRACT OF PLATE HEAT EXCHANGER		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
			Section	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-A	**GROUP-A**
	PHE DESCRIPTION		**TYPE I**	**TYPE II**
7.0	**Extra Carrying capacity to be provided on frame assembly.**	%	25	25
8.0	**Spares**	**Unit of Measurement**		
8.1	**Heat Transfer Plates**	1 Lot = 1% of plates in each PHE	20 LOTS	20 LOTS
8.2	**Gaskets (All types)**	1 Lot = 1% of gaskets of each type in each PHE	1 LOT	30 LOTS
8.3	**Valves**	NOS.	1	1
8.4	**Tie Rods**	1 Lot = 1% of tie-rod of each type in each PHE	1 LOT	10 LOTS
8.5	**Fasteners (Nuts & bolts etc.)**	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	1 LOT	10 LOTS
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	60	60
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.			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE III**	**TYPE IV**
1.0	**General**				
1.1	**Number of Plate Heat Exchanger**		Nos	Three (15) nos	Ten (10) nos
1.2	**Arrangement**			3X50% configuration per unit	2X100% configuration per unit
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	500	300
		(Secondary Side)	NB	500	300
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)	2.0 to 2.5 Kg/sq. cm(g)	2.0 to 2.5 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	1375	541
		(ACW Side)	M^3/hr	1375	541
3.2	**Inlet temperature**	(DMCW Side)	^oC	47	44.6
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	38	38
		(ACW Side)	^oC	45	42.6
3.4	*** Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow**	(DMCW Side)	MWC	8	8
		(ACW Side)	MWC	8	8
	*** 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**		%	NIL	NIL
5.0	**Heat Transfer Coefficient/Margin**				
5.1	**Overall fouling resistance (minimun)**		Hr m2deg C/Kcal	0.00008	0.00008

BHEL	**TECHNICAL SPECIFICATION FOR RATE**			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE III**	**TYPE IV**
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 Deg. shore hardness	Nitrile rubber, 65 ± 5 Deg. shore hardness
6.3	**Compression/Fixed/Frame/Movable Pressure plates**			Carbon Steel, ASTM A-283 Grade C, Epoxy painted	Carbon Steel, ASTM A-283 Grade C, Epoxy painted
6.4	**Guide Rails/ bar**			Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding
6.5	**Support Beam/ column**			Carbon Steel, ASTM A-283 Grade C, Epoxy painted	Carbon Steel, ASTM A-283 Grade C, 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**			SS-316	SS-316
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**		1 Lot = 1% of plates in each PHE	30 LOTS	20 LOTS

	TECHNICAL SPECIFICATION FOR RATE		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-A	**GROUP-A**
	PHE DESCRIPTION		**TYPE III**	**TYPE IV**
8.2	**Gaskets (All types)**	1 Lot = 1% of gaskets of each type in each PHE	1 LOT	1 LOT
8.3	**Valves**	NOS.	2	2
8.4	**Tie Rods**	1 Lot = 1% of tie-rod of each type in each PHE	1 LOT	1 LOT
8.5	**Fasteners (Nuts & bolts etc.)**	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	1 LOT	1 LOT
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	60	60
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.			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE V**	**TYPE VI**
1.0	**General**				
1.1	**Number of Plate Heat Exchanger**		Nos	Three (3) nos	Four (4) 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	350
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)	10.5	12.6
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)	2.0 to 2.5 Kg/sq. cm(g)	2.0 to 2.5 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	2815	615
		(ACW Side)	M^3/hr	2815	615
3.2	**Inlet temperature**	(DMCW Side)	^oC	43.5	43.5
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	38	38
		(ACW Side)	^oC	41.5	41.5
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	8	8
		(ACW Side)	MWC	8	8
	*** 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

BHEL	**TECHNICAL SPECIFICATION FOR RATE CONTRACT OF PLATE HEAT EXCHANGER DATASHEET - A FOR CLARIFIED WATER APPLICATION**			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
				Section	**IB**
				Rev	**0**
				Date	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE V**	**TYPE VI**
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, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted
6.4	**Guide Rails/ bar**			Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding
6.5	**Support Beam/ column**			Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, 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**		1 Lot = 1% of plates in each PHE	30 LOTS	40 LOTS

	TECHNICAL SPECIFICATION FOR RATE		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-A	**GROUP-A**
	PHE DESCRIPTION		**TYPE V**	**TYPE VI**
8.2	**Gaskets (All types)**	1 Lot = 1% of gaskets of each type in each PHE	90 LOTS	260 LOTS
8.3	**Valves**	NOS.	1	1
8.4	**Tie Rods**	1 Lot = 1% of tie-rod of each type in each PHE	30 LOTS	20 LOTS
8.5	**Fasteners (Nuts & bolts etc.)**	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	30 LOT	120 LOT
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	60	60
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.			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE VII**	**TYPE VIII**
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	500	300
		(Secondary Side)	NB	450	300
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)	2.0 to 2.5 Kg/sq. cm(g)	2.0 to 2.5 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	1175	500
		(ACW Side)	M^3/hr	1175	500
3.2	**Inlet temperature**	(DMCW Side)	^oC	46.6	44.4
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	38	38
		(ACW Side)	^oC	44.6	42.4
3.4	*** Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow**	(DMCW Side)	MWC	8	8
		(ACW Side)	MWC	8	8
	*** 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 FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE VII**	**TYPE VIII**
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, ASTM A-283 Gr.C, Epoxy painted	Carbon Steel, ASTM A-283 Gr.C, Epoxy painted
6.4	**Guide Rails/ bar**			Carbon Steel, ASTM A-283 Gr.C, Epoxy painted	Carbon Steel, ASTM A-283 Gr.C, Epoxy painted
6.5	**Support Beam/ column**			Carbon Steel, ASTM A-283 Gr.C, Epoxy painted	Carbon Steel, ASTM A-283 Gr.C, 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**			SAE 1045 EPOXY COATED	SAE 1045 EPOXY COATED
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**		1 Lot = 1% of plates in each PHE	30 LOTS	20 LOTS

	TECHNICAL SPECIFICATION FOR RATE		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-A	**GROUP-A**
	PHE DESCRIPTION		**TYPE VII**	**TYPE VIII**
8.2	**Gaskets (All types)**	1 Lot = 1% of gaskets of each type in each PHE	200 LOT	200 LOTS
8.3	**Valves**	NOS.	1	1
8.4	**Tie Rods**	1 Lot = 1% of tie-rod of each type in each PHE	1 LOT	1 LOT
8.5	**Fasteners (Nuts & bolts etc.)**	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	100 LOT	100 LOT
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	60	60
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.			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	**GROUP-A**
	PHE DESCRIPTION			**TYPE IX**	**TYPE X**
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	600	300
		(Secondary Side)	NB	600	300
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)	10.5	12.6
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)	2.0 to 2.5 Kg/sq. cm(g)	2.0 to 2.5 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	1610	460
		(ACW Side)	M^3/hr	1610	460
3.2	**Inlet temperature**	(DMCW Side)	^oC	47.61	45.4
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	38	38
		(ACW Side)	^oC	45.61	43.4
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	8	8
		(ACW Side)	MWC	8	8
	*** 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

BHEL	TECHNICAL SPECIFICATION FOR RATE			Technical specification no	PE-RC-999-179-N001 (Rev 0)
	CONTRACT OF PLATE HEAT EXCHANGER			Section	IB
	DATASHEET - A			Rev	0
	FOR CLARIFIED WATER APPLICATION			Date	16/04/2018
				GROUP-A	GROUP-A
	PHE DESCRIPTION			TYPE IX	TYPE X
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, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted
6.4	Guide Rails/ bar			Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding
6.5	Support Beam/ column			Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, 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		1 Lot = 1% of plates in each PHE	30 LOTS	20 LOTS

	TECHNICAL SPECIFICATION FOR RATE		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-A	**GROUP-A**
	PHE DESCRIPTION		**TYPE IX**	**TYPE X**
8.2	**Gaskets (All types)**	1 Lot = 1% of gaskets of each type in each PHE	90 LOTS	60 LOTS
8.3	**Valves**	NOS.	1	1
8.4	**Tie Rods**	1 Lot = 1% of tie-rod of each type in each PHE	30 LOTS	20 LOTS
8.5	**Fasteners (Nuts & bolts etc.)**	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	30 LOT	20 LOT
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	60	60
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.			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-A	
	PHE DESCRIPTION			**TYPE XI**	
1.0	**General**				
1.1	**Number of Plate Heat Exchanger**		Nos	Three (3) nos	
1.2	**Arrangement**			3X50% configuration	
1.3	**Location**			Indoor	
1.4	**Primary side (Hot) Fluid**			Passivated DM water (Refer enclosed water analysis)	
1.5	**Secondary side (Cold) fluid**			Clarified water (Refer enclosed water analysis)	
1.6	**Connecting Pipe size**	(Primary Side)	NB	600	
		(Secondary Side)	NB	600	
1.7	**Maximum permitted Length of the PHE**		mm	5000 mm (excluding reducer)	
2.0	**Design**				
2.1	**Design Code**			Latest IS/BS/DIN/ASTM Standards	
2.2	**Design Pressure**		Kg/cm^2 (g)	10	
2.3	**Operating Pressure**	(Primary Side)	Kg/cm^2 (g)	6.0 to 7.0 Kg/sq. cm(g)	
		(Secondary Side)	Kg/cm^2 (g)	2.0 to 2.5 Kg/sq. cm(g)	
2.4	**Mechanical Design Temp.**		^oC	60	
2.5	**Heat Transfer per Sq.Mtr. Of Heat Transfer Plate**		$Kcal/Hr./m^2$	To be decided by bidder	
2.6	**Specific Heat of Fluid**	**(Primary Side)**	Cal/gmDeg.C	1	
		(Secondary Side)	Cal/gmDeg.C	1	
2.7	**Density of Fluid**	**(Primary Side)**	gm/cc	1	
		(Secondary Side)	gm/cc	1	
3.0	**Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:**				
3.1	**Flow rate**	(DMCW Side)	M^3/hr	1835	
		(ACW Side)	M^3/hr	1835	
3.2	**Inlet temperature**	(DMCW Side)	^oC	43.5	
		(ACW Side)	^oC	36	
3.3	**Outlet temp**	(DMCW Side)	^oC	38	
		(ACW Side)	^oC	41.5	
3.4	*** Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow**	(DMCW Side)	MWC	8	
		(ACW Side)	MWC	8	
	*** 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%	
5.0	**Heat Transfer Coefficient/Margin**				
5.1	**Overall fouling resistance (minimun)**		Hr m2deg C/Kcal	0.00008	

BHEL	TECHNICAL SPECIFICATION FOR RATE CONTRACT OF PLATE HEAT EXCHANGER			Technical specification no	PE-RC-999-179-N001 (Rev 0)
				Section	IB
	DATASHEET - A			Rev	0
	FOR CLARIFIED WATER APPLICATION			Date	16/04/2018
				GROUP-A	
	PHE DESCRIPTION			TYPE XI	
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	
6.0	Material of Construction :				
6.1	Heat Transfer Plates (Minimum acceptable plate thickness 0.6 mm). Refer Note no. 3			SS-316	
6.2	Plate Gasket			Nitrile rubber, 65 ± 5 % shore hardness	
6.3	Compression/Fixed/Frame/Movable Pressure plates			Carbon Steel, ASTM A-283 Gr.C, Epoxy painted	
6.4	Guide Rails/ bar			Carbon Steel, ASTM A-283 Gr.C, Epoxy painted	
6.5	Support Beam/ column			Carbon Steel, ASTM A-283 Gr.C, Epoxy painted	
6.6	Nozzle (Reducer/Expander)			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	
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	
6.9	Tightening Bolts/Rods & Nuts			SAE 1045 EPOXY COATED	
6.10	Nozzle flange bolts / nuts			SA 193 B7/ SA 194 2H	
6.11	Nozzle flange gasket			3mm wire inserted Red Rubber	
6.12	Name Plate			AISI 316 18'-8' SS (3 mm thick)	
6.13	Wetted fasteners			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.	
	b.) Primer				
	c.) Final Paint				
7.0	Extra Carrying capacity to be provided on frame assembly.		%	25	
8.0	Spares		Unit of Measurement		
8.1	Heat Transfer Plates		1 Lot = 1% of plates in each PHE	30 LOTS	

	TECHNICAL SPECIFICATION FOR RATE		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR CLARIFIED WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-A	
	PHE DESCRIPTION		**TYPE XI**	
8.2	**Gaskets (All types)**	1 Lot = 1% of gaskets of each type in each PHE	200 LOT	
8.3	**Valves**	NOS.	1	
8.4	**Tie Rods**	1 Lot = 1% of tie-rod of each type in each PHE	1 LOT	
8.5	**Fasteners (Nuts & bolts etc.)**	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	100 LOT	
9.0	**Hydrotesting at Shop**			
9.1	**Hydrotesting Pressure**	Kg/cm2 (g)	1.5 times the design pressure	
9.2	**Duration of Hydrotesting**	Minutes	60	
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.			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR SEA WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-B	**GROUP-B**
	PHE Description			**TYPE XII**	**TYPE XIII**
1.0	**General**				
1.1	**Number of Plate Heat Exchanger**		Nos	Total Six (6) nos	Total Four (4) nos
1.2	**Arrangement**			3 x 50% per unit	2 x 100% per unit
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**			Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)
1.6	**Connecting Pipe size**	(Primary Side)	NB	500	300
		(Secondary Side)	NB	500	300
1.7	**Maximum permitted Length of the PHE**		mm	Length 5000 mm (excluding reducer)	Length 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)	2.0 to 2.5 Kg/sq. cm(g)	2.0 to 2.5 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	0.94	0.94
2.7	**Density of Fluid**	**(Primary Side)**	gm/cc	1	1
		(Secondary Side)	gm/cc	1.03	1.03
3.0	**Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:**				
3.1	**Flow rate**	(DMCW Side)	M^3/hr	1431	529
		(ACW Side)	M^3/hr	1478	546
3.2	**Inlet temperature**	(DMCW Side)	^oC	46.2	44.2
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	38	38
		(ACW Side)	^oC	44.2	42.2
3.4	*** Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow**	(DMCW Side)	MWC	7	7
		(ACW Side)	MWC	7	7

BHEL	**TECHNICAL SPECIFICATION FOR RATE**		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR SEA WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-B	**GROUP-B**
	PHE Description		**TYPE XII**	**TYPE XIII**
	*** 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**	%	NIL	NIL
5.0	**Heat Transfer Coefficient/Margin**			
5.1	**Overall fouling resistance (minimun)**	Hr m2deg C/Kcal	0.00008	0.00008
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**		Titanium	Titanium
6.2	**Plate Gasket**		Nitrile rubber, 65 ± 5 Deg. shore hardness	Nitrile rubber, 65 ± 5 Deg. shore hardness
6.3	**Compression/Fixed/Frame/Movable Pressure plates**		Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)
6.4	**Guide Rails/ bar**		Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding (CS to be epoxy painted)	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding (CS to be epoxy painted)
6.5	**Support Beam/ column**		Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted
6.6	**Nozzle (Reducer/Expander)**		**DMCW Side**: Carbon steel IS 2062, Gr. B, Epoxy Coated **ACW Side**: BHEL Scope.	**DMCW Side**: Carbon steel IS 2062, Gr. B, Epoxy Coated **ACW Side**: BHEL Scope.
6.7	**Nozzle flanges**		**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.	**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.
6.8	**Flange/ Counter flanges**		**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.	**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.
6.9	**Tightening Bolts/Rods & Nuts**		IS-1367 Gr.8.8 or equivalent	IS-1367 Gr.8.8 or equivalent
6.10	**Nozzle flange bolt and nut**		**DMCW Side:** SA 193 B7/ SA 194 2H **ACW Side:** SS 316L	**DMCW Side:** SA 193 B7/ SA 194 2H **ACW Side:** SS 316L

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	FOR SEA WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-B	**GROUP-B**
	PHE Description			**TYPE XII**	**TYPE XIII**
6.11	**Nozzle flange gasket**			3mm wire inserted Red Rubber	3mm wire inserted Red Rubber
6.12	**Name Plate**			SS 316L	SS 316L
6.13	**Wetted fasteners**			Duplex SS	Duplex SS
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 inside the (indoor installation) building, two coats of epoxy polymide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. 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 inside the (indoor installation) building, two coats of epoxy polymide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. 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**		1 Lot = 1% of plates in each PHE	1 LOT	1 LOT
8.2	**Gaskets (All types)**		1 Lot = 1% of gaskets of each type in each PHE	1 LOT	1 LOT
8.3	**Valves**		NOS.	1	1
8.4	**Tie Rods**		1 Lot = 1% of tie-rod of each type in each PHE	1 LOT	1 LOT
8.5	**Fasteners (Nuts & bolts etc.)**		1 Lot = 1% of Nuts & bolts of each type & size in each PHE	1 LOT	1 LOT
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	60	60
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%)				

	TECHNICAL SPECIFICATION FOR RATE		Technical specification no	PE-RC-999-179-N001 (Rev 0)
	CONTRACT OF PLATE HEAT EXCHANGER		Section	IB
	DATASHEET - A		Rev	0
	FOR SEA WATER APPLICATION		Date	16/04/2018
			GROUP-B	GROUP-B
	PHE Description		TYPE XII	TYPE XIII
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.			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
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	DATASHEET - A			**Rev**	**0**
	FOR SEA WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-B	**GROUP-B**
	PHE Description			**TYPE XIV**	**TYPE V**
1.0	**General**				
1.1	**Number of Plate Heat Exchanger**		Nos	Total Six (6) nos	Total Four (4) nos
1.2	**Arrangement**			3 x 50% per unit	2 x 100% per unit
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**			Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)
1.6	**Connecting Pipe size**	(Primary Side)	NB	500	250
		(Secondary Side)	NB	500	250
1.7	**Maximum permitted Length of the PHE**		mm	Length 5000 mm (excluding reducer)	Length 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)	2.0 to 2.5 Kg/sq. cm(g)	2.0 to 2.5 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	0.94	0.94
2.7	**Density of Fluid**	**(Primary Side)**	gm/cc	1	1
		(Secondary Side)	gm/cc	1.025	1.025
3.0	**Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:**				
3.1	**Flow rate**	(DMCW Side)	M^3/hr	1314	434
		(ACW Side)	M^3/hr	1500	450
3.2	**Inlet temperature**	(DMCW Side)	^oC	46.8	44.6
		(ACW Side)	^oC	36	36
3.3	**Outlet temp**	(DMCW Side)	^oC	38	38
		(ACW Side)	^oC	44	42.6
3.4	*** Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow**	(DMCW Side)	MWC	7	7
		(ACW Side)	MWC	7	7
	*** 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**		%	NIL	NIL

	TECHNICAL SPECIFICATION FOR RATE		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
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	FOR SEA WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-B	**GROUP-B**
	PHE Description		**TYPE XIV**	**TYPE V**
5.0	**Heat Transfer Coefficient/Margin**			
5.1	**Overall fouling resistance (minimun)**	Hr m2deg C/Kcal	0.00008	0.00008
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**		Titanium	Titanium
6.2	**Plate Gasket**		Nitrile rubber, 65 ± 5 Deg. shore hardness	Nitrile rubber, 65 ± 5 Deg. shore hardness
6.3	**Compression/Fixed/Frame/Movable Pressure plates**		Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)
6.4	**Guide Rails/ bar**		Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding (CS to be epoxy painted)	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding (CS to be epoxy painted)
6.5	**Support Beam/ column**		Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted
6.6	**Nozzle (Reducer/Expander)**		**DMCW Side**: Carbon steel IS 2062, Gr. B, Epoxy Coated **ACW Side**: BHEL Scope.	**DMCW Side**: Carbon steel IS 2062, Gr. B, Epoxy Coated **ACW Side**: BHEL Scope.
6.7	**Nozzle flanges**		**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.	**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.
6.8	**Flange/ Counter flanges**		**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.	**DMCW Side:** Carbon Steel, IS-2062, E-410, Gr.BR (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated. **ACW Side:** BHEL scope. However gaskets and connecting nuts/bolts are in bidder's scope.
6.9	**Tightening Bolts/Rods & Nuts**		IS-1367 Gr.8.8 or equivalent	IS-1367 Gr.8.8 or equivalent
6.10	**Nozzle flange bolt and nut**		**DMCW Side:** SA 193 B7/ SA 194 2H **ACW Side:** SS 316L	**DMCW Side:** SA 193 B7/ SA 194 2H **ACW Side:** SS 316L
6.11	**Nozzle flange gasket**		3mm wire inserted Red Rubber	3mm wire inserted Red Rubber
6.12	**Name Plate**		SS 316L	SS 316L
6.13	**Wetted fasteners**		Duplex SS	Duplex SS
6.14	**Painting**			
	External Surface			

	TECHNICAL SPECIFICATION FOR RATE			**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER			**Section**	**IB**
	DATASHEET - A			**Rev**	**0**
	FOR SEA WATER APPLICATION			**Date**	**16/04/2018**
				GROUP-B	**GROUP-B**
	PHE Description			**TYPE XIV**	**TYPE V**
	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.	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.
	b.) Primer			For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polymide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polymide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.
	c.) Final Paint				
7.0	**Extra Carrying capacity to be provided on frame assembly.**		%	10	10
8.0	**Spares**		**Unit of Measurement**		
8.1	**Heat Transfer Plates**		1 Lot = 1% of plates in each PHE	1 LOT	1 LOT
8.2	**Gaskets (All types)**		1 Lot = 1% of gaskets of each type in each PHE	1 LOT	1 LOT
8.3	**Valves**		NOS.	1	1
8.4	**Tie Rods**		1 Lot = 1% of tie-rod of each type in each PHE	1 LOT	1 LOT
8.5	**Fasteners (Nuts & bolts etc.)**		1 Lot = 1% of Nuts & bolts of each type & size in each PHE	1 LOT	1 LOT
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	60	60
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.				

	TECHNICAL SPECIFICATION FOR RATE		**Technical specification no**	**PE-RC-999-179-N001 (Rev 0)**
	CONTRACT OF PLATE HEAT EXCHANGER		**Section**	**IB**
	DATASHEET - A		**Rev**	**0**
	FOR SEA WATER APPLICATION		**Date**	**16/04/2018**
			GROUP-B	**GROUP-B**
	PHE Description		**TYPE XIV**	**TYPE V**
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.			

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

ANALYSIS OF RAW WATER

SR. NO.	PARAMETERS	UNITS	VALUES
1.0	pH		8.0 – 8.5
2.0	Temperature	^0C	22 - 30
3.0	Conductivity	µS/cm	1300
4.0	Colour	Hazen Units	Not Available
5.0	Odour		Not Available
6.0	Taste		Not Available
7.0	TDS	ppm	870
8.0	P-Alkalinity as $CaCO_3$	ppm	Nil
9.0	M-Alkalinity as $CaCO_3$	ppm	400
10.0	T – Alkalinity as $CaCO_3$	ppm	400
11.0	Organic Matter as $KMnO_4$	ppm	50
12.0	Iron (as Fe)	ppm	1
13.0	Turbidity (NTU)	ppm	100 during Non – Monsoon Up to 10,000 during Monsoon
14.0	**CATIONS**		
	(a) Ca as $CaCO_3$	ppm	295
	(b) Mg as $CaCO_3$	ppm	77
	(c) Na as $CaCO_3$	ppm	203

SR. NO.	PARAMETERS	UNITS	VALUES
	(d) K as $CaCO_3$	ppm	10
	Total Cation	ppm	**585**
15.0	**ANIONS**		
	(a) HCO_3 as $CaCO_3$	ppm	400
	(b) Chlorides	ppm	149
	(c) SO_4 as $CaCO_3$	ppm	33
	(d) Fluoride as $CaCO_3$	ppm	1
	(e) Nitrate as NO_3	ppm	2
	Total Anion	ppm	**585**
16.0	Ammonia	ppm	Absent - Traces
17.0	Silica Colloidal (as SiO_2)	ppm	< 1 (can be present in summer)
18.0	Silica Non - Colloidal (as SiO_2)	ppm	36
19.0	Free Chlorine	ppm	Nil
20.0	Total Suspended Solids	ppm	Not Available
21.0	Carbonates as $CaCO_3$	ppm	Not Available
22.0	Boron	ppm	Not Available
23.0	Oil & Grease	ppm	Not Available

CYCLE OF CONCENTRATION (C.O.C) = 5.0

Chemical analysis of Sea Water:

S.No.	Parameters	Value (ppm)
1.	Total Solids	35,000
2.	Dissolved solids	21,620
3.	Suspended Solids	580
4.	Ignited residue	17,500
5.	Volatiles Solids	4,700
6.	Acid Insolubles	112
7.	Chlorides (as Cl)	20,232
8.	Sulphates (as SO_4)	1,457
9.	Iron (as Fe)	70
10.	Total alkalinity (as $CaCO_3$)	525
11.	Alkalinity due to Normal Carbonates (as $CaCO_3$)	Nil
12.	Alkalinity due to bi-Carbonates (as $CaCO_3$)	525
13.	Total hardness (as $CaCO_3$)	8,155
14.	Permanent hardness (as $CaCO_3$)	6,200
15.	Temporary hardness (as $CaCO_3$)	1,955
16.	Calcium hardness (as $CaCO_3$)	1,255
17.	Magnesium hardness (as $CaCO_3$)	6,900
18.	P_H	8.2

CYCLE OF CONCENTRATION (C.O.C) = 1.3

SECTION II

IIA STANDARD TECHNICAL SPECIFICATION STANDARD QUALITY PLAN

SECTION - IIA
PLATE HEAT EXCHANGER
STANDARD TECHNICAL SPECIFICATION
DATA SHEET C

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.

BHEL	**STANDARD QUALITY PLAN** SHEET 1 OF 5	CUSTOMER: BIDDER/VENDOR: SYSTEM:	PROJECT TITLE: QUALITY PLAN NO.: ITEM: PHE	SPECIFICATION NO. : PE-TS-999-179-N001 SPECIFICATION TITLE : TECHNICAL SPEC. FOR PHE STD. QP NO.: PE-QP-999-179-N001 SECTION : IIA

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK 2/3	EXTENT OF CHECK 1	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY P	AGENCY W	AGENCY V	REMARKS
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.
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/He-at Batch	1/ Heat/He-at Batch	App. Drg / Data Sheet	Relevant material spec.	Mill TC Or Lab Test Report	√	2,3	-	1	If co-related mill TCS are not available then check testing carried out by reputed lab
		Chemical Properties	MA	Chemical Analysis	1/ Heat/He-at Batch	1/ Heat/He-at Batch	-do-	-do-	-do-	√	2,3	-	1	-do-
		Dimensions	MA	Measurement	100%	100%	Approved Drawings		Inspection Reports	√	2,3	-	1	
		Workmanship And Finish	MA	Visual	100%	100%	-do-	-do-	-do-		2,3	-	1	
		Lamination (Applicable For Frame And Pressure Plate Only)	CR	Ultrasonic Test	100%	100%	SA 435	SA 435	-do-	√	2,3	-	1	Applicable for plate thickness more than 25 mm only
1.2	Heat Transfer 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	√	2,3	-	1	Co-related mill TCS to be provided. **See Remark 1**
		Chemical Properties	MA	Chemical Analysis	1/ Heat	1/ Heat	-do-	-do-	-do-	√	2,3	-	1	-do-
		Dimensions	MA	Measurement	100%	Sample	Approved Drawings		Inspection Reports	√	2,3	-	1	
1.3	Gaskets	Dimensions	MA	Measurement	100%	Sample	Approved Drawings		Inspection Reports		2,3	-	1	Co-related mill TCS to be provided.
		Workmanship And Finish	MA	Visual	-do-	-do-	No damage, No Surface defects.		-do-		2,3	-	1	
		Contour	MA	Visual	-do-	-do-	Mfg. Drgs / specification		-do-		2,3	-	1	

MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER	**LEGEND:** * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** **1:** BHEL **1* SHALL BE CLEARED BY BHEL 2:** VENDOR, **3**: SUB VENDOR **P:** PERFORM **W**: WITNESS AND **V:** VERIFICATION. AS APPROPRIATE **CHP:** CUSTOMER SHALL IDENTIFY IN COLUM "N" AS ' W"	**Cust. Logo** **FOR CUST. USE**	**DOC. NO.:** **REV.** **CAT-.**	
SIGNATURE				**REVIEWED BY**	**APPROVED BY** / **APPROVAL SEAL**

BHEL	**STANDARD QUALITY PLAN** SHEET 2 OF 5	CUSTOMER:	PROJECT TITLE:	SPECIFICATION NO. : PE-TS-999-179-N001 SPECIFICATION TITLE : TECHNICAL SPEC. FOR PHE STD. QP NO.: PE-QP-999-179-N001 SECTION : IIA
		BIDDER/VENDOR:	QUALITY PLAN NO.:	
		SYSTEM:	ITEM: PHE	

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					2/3	1					P	W	V	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.
		Hardness	CR	Measurement	-do-	-do-	Approved Drawings		-do-	√	2,3	-	1	
1.4	Tightening Bolts & Nuts. (Tie Rod)	Physical Properties	MA	Physical Test	1/ Heat	1/ Heat	App. Drg / data sheet	Relevant Material Spec.	Mill Tc Or Lab Test Report	√	2,3	-	1	Manufacturer test certificate will be submitted for review.
		Chemical Properties	MA	Chemical Analysis	1/ Heat	1/ Heat	-do-	-do-	-do-	√	2,3	-	1	-do-
		Dimensions	MA	Measurement	100%	100%	Approved Drawings		IR	√	2,3	-	1	
		Workmanship and Finish	MA	Visual	100%	100%	-do-	-do-	-do-		2,3	-	1	
		Internal Soundness (For diameter >= 40 mm)	CR	UT	100%	100%	ASTM A 388	See Remark - 3	-do-	√	2,3	-	1	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	IR	√	2,3	1	-	**See Remark 2**
		Physical Properties	MA	Physical Test	1 Sample per Heat	1 Sample per Heat	Approved drawing/ data sheet	Relevant Material Spec.	Mill TC or Lab Test Report	√	2,3	-	1	Manufacturing test certificates will be submitted for review.
		Chemical Properties	MA	Chemical Analysis	1 Sample per Heat	1 Sample per Heat	Approved/ drawing/ data sheet	Relevant Material Spec.	Mill TC or Lab Test Report	√	2,3	-	1	Manufacturing test certificates will be submitted for review.
		Dimension	MA	Measurement	1 Sample per Heat	1 Sample per Heat	Approved drawing/ data sheet	Approved drawing/ data sheet	Inspection Report	√	2,3	-	1	

		LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** **1:** BHEL **1* SHALL BE CLEARED BY BHEL 2:** VENDOR, **3**: SUB VENDOR **P:** PERFORM **W**: WITNESS AND **V:** VERIFICATION. AS APPROPRIATE **CHP:** CUSTOMER SHALL IDENTIFY IN COLUM "N" AS ' W"	**Cust. Logo**	**DOC. NO.:** **REV.** **CAT-.**
MANUFACTURER/ SUB-SUPPLIER	**MAIN-SUPPLIER**		**FOR CUST. USE**	
SIGNATURE			**REVIEWED BY**	**APPROVED BY** / **APPROVAL SEAL**

BHEL	**STANDARD QUALITY PLAN** SHEET 3 OF 5	CUSTOMER:	PROJECT TITLE:	SPECIFICATION NO. : PE-TS-999-179-N001 SPECIFICATION TITLE : TECHNICAL SPEC. FOR PHE STD. QP NO.: PE-QP-999-179-N001 SECTION : IIA
		BIDDER/VENDOR:	QUALITY PLAN NO.:	
		SYSTEM:	ITEM: PHE	

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK 2/3	EXTENT OF CHECK 1	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY P	AGENCY W	AGENCY V	REMARKS
1.	2.	3.	4.	5.	6.		7.	8.	9.		** 10.			11.
		Workmanship And Finish	MA	Visual	100%	100%	Approved drawing/ data sheet	No scratches, cracks etc.	-do-		2,3	-	1	
		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	√	2,3	1	-	**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	√	2,3	1	-	**See Remark 3**
		PMI testing	CR	PMI test	100 %	1 Sample per Heat	Approved drawing/ data sheet		PMI Compliance report	√	2,3	-	1	**See Remark 5**
2.2	Welding Procedures Specification (WPS)	Correctness	MA	Verification	100%	100%	ASME SEC-IX.	ASME SEC-IX.	QW 482 ASME SEC-IX	√	2,3	-	1	Customer /BHEL/ TPI (NPCIL, EIL, LLYODS & BVIS) approved WPS shall be used for welding
2.3	Procedure Qualification Records (PQR)	Suitability	MA	Visual & Mechanical Test	100%	100%	-do-	-do-	QW 483 ASME SEC-IX.	√	2,3	-	1	
2.4	Welders Performance Qualification	Welder's Performance Soundness Of Welds	MA	Visual / RT & Mechanical	100%	100%	-do-	-do-	QW 484 ASME SEC-IX	√	2,3	-	1	Only customer / BHEL/ TPI (NPCIL, EIL, LLYODS & BVIS) approved welder shall be engaged for welding.

		LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** **1:** BHEL **1* SHALL BE CLEARED BY BHEL 2:** VENDOR, **3**: SUB VENDOR **P:** PERFORM **W**: WITNESS AND **V:** VERIFICATION. AS APPROPRIATE **CHP:** CUSTOMER SHALL IDENTIFY IN COLUM "N" AS ' W"	**Cust. Logo**	**DOC. NO.:**	**REV.** **CAT-.**
MANUFACTURER/ SUB-SUPPLIER	**MAIN-SUPPLIER**		**FOR CUST. USE**		
SIGNATURE			**REVIEWED BY**	**APPROVED BY**	**APPROVAL SEAL**

	STANDARD QUALITY PLAN SHEET 4 OF 5	CUSTOMER:	PROJECT TITLE:	SPECIFICATION NO. : PE-TS-999-179-N001 SPECIFICATION TITLE : TECHNICAL SPEC. FOR PHE STD. QP NO.: PE-QP-999-179-N001 SECTION : IIA
		BIDDER/VENDOR:	QUALITY PLAN NO.:	
		SYSTEM:	ITEM: PHE	

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK 2/3	EXTENT OF CHECK 1	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY P	AGENCY W	AGENCY V	REMARKS
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.
2.5	Weld joint of expander/reducer.	Welding Of Outer Flange To Reducer/Expander	MA	Visual	100%	100%	Approved Drawings		Inspection Report	√	2,3	-	1	
				DPT	100%	100%	Manufacturer's DP test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		DPT Report	√	2,3	1	-	
2.6	PHE Structure	Workmanship and finish	MA	Measurement & Visual	100%	100%	Approved Drawings		Inspection Report	√	-	2	1	
2.7	Plate Gaskets	Presence Of Gasket	MA	Visual	100%	100%	Mfg. Spec.	Mfg. Spec.	-do-	√	2	1	-	
2.8	Plate arrangement to flow diagram	Correctness	CR	Visual as per flow diagram	100%	100%	Approved Drawing		Inspection Report		2	-	1	
2.9	Assembly of tightening bolts and nuts	Squeezing of threads on T/B	MA	Visual	100%	100%	Approved Drawing / Data sheet		-do-		2	-	1	
2.10	Plate Pack	Length	MA	Dimension Measurement	100%	100%	Approved Drawing		-do-		2	-	1	
3.0	**FINAL INSPESTION**													
3.1	Complete Assembly	a. Conformance to GA drg.	MA	-do-	100%	100%	-do-	-do-	-do-		2	1	-	CHP
		B. Dimensions, No. of Heat Transfer Plates, Workmanship & finish	MA	-do-	100%	100%	-do-	-do-	-do-	√	2	1	-	CHP
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	√	2	1	-	CHP; Hydro test @ 1.5 times the design pressure with 60 minutes holding time.

MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER	LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** 1: BHEL 1* SHALL BE CLEARED BY BHEL 2: VENDOR, 3: SUB VENDOR P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE CHP: CUSTOMER SHALL IDENTIFY IN COLUM "N" AS ' W"	Cust. Logo	DOC. NO.:	REV.	CAT-.
SIGNATURE			FOR CUST. USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL

BHEL	**STANDARD QUALITY PLAN** SHEET 5 OF 5	CUSTOMER:	PROJECT TITLE:	SPECIFICATION NO. : PE-TS-999-179-N001
		BIDDER/VENDOR:	QUALITY PLAN NO.:	SPECIFICATION TITLE : TECHNICAL SPEC. FOR PHE
		SYSTEM:	ITEM: PHE	STD. QP NO.: PE-QP-999-179-N001 SECTION : IIA

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK 2/3	EXTENT OF CHECK 1	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY P	AGENCY W	AGENCY V	REMARKS
1.	2.	3.	4.	5.	6.		7.	8.	9.		** 10.			11.
3.3	Unbalanced hydrostatic pressure (Secondary Side)	Leakage / strength of structure	MA	Hyd. Test	100%	100%	-do-	-do-	√	2	1	-		CHP; Hydro test @ 1.5 times the design pressure with 60 minutes holding time.
3.4	Completeness of all previous tests	Completeness	MA	Verification of reports	100%	100%	Tech. Specs / App. Drawings	Completion Certificate	√	2	-	1		
3.5	Painting	Dry film thickness & shade	MA	Measurement & visual	100%	100%	Customer/BHEL Tech. Spec. / Approved Data sheets	-do-	√	2	-	1		
3.6	Packing	Completeness	MA	Measurement & visual	100%	100%	Customer/BHEL Tech. Spec. / Approved Data sheets	-do-	√	2	-	1		Packing procedure as per Annexure B.

REMARKS:-

1. Original Mill TC's to be furnished by vendor to BHEL representative during inspection stage. 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.
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 only 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 third party like TUV/Lloyd & certificate shall be submitted for review of BHEL. BHEL reserves the right to conduct random & independent PMI inspection on PHE's Heat Transfer plates to ascertain the plate material.

		LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** **1:** BHEL **1* SHALL BE CLEARED BY BHEL 2:** VENDOR, **3**: SUB VENDOR **P:** PERFORM **W**: WITNESS AND **V:** VERIFICATION. AS APPROPRIATE **CHP:** CUSTOMER SHALL IDENTIFY IN COLUM "N" AS ' W"	**Cust. Logo**	**DOC. NO.:**	**REV.** **CAT-.**
MANUFACTURER/ SUB-SUPPLIER	**MAIN-SUPPLIER**		**FOR CUST. USE**		
SIGNATURE				**REVIEWED BY**	**APPROVED BY** / **APPROVAL SEAL**

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

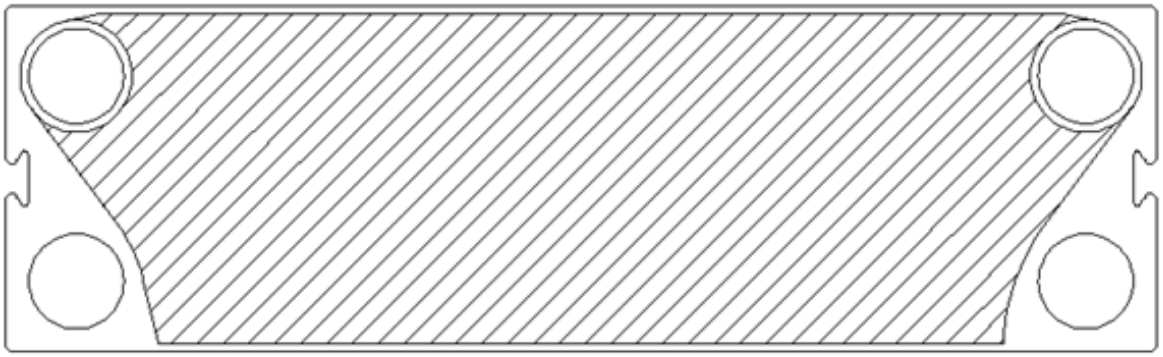

Fig. 1: Wetted Surface Area for Parallel Connection

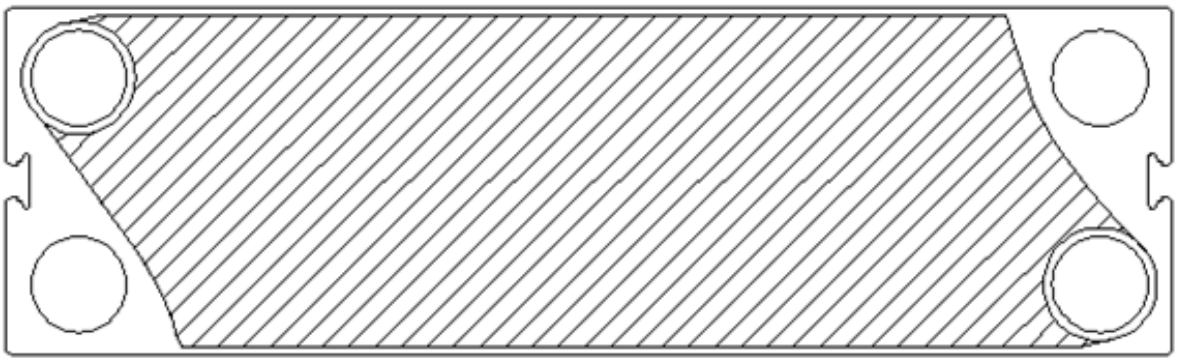

Fig. 2: Wetted Surface Area for Diagonal Connection

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 FOR RATE CONTRACT OF PLATE HEAT EXCHANGER		SPECIFICATION NO.	PE-RC-999-179-N001
			Section	IIIB
			Rev No.	0

SL. NO.	DESCRIPTION	UNIT	GUARANTEE VALUE
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-RC-999-179-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-RC-999-179-N001, 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	$M^2hr\,^oC/KCal$		

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INSTRUCTION TO BIDDER

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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	

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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**		

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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	

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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

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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

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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)		

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