

Ref. Enquiry No.: PE/PG/RTC/E-6434/2020

Dated: 05.05.2020

**TENDER ENQUIRY THROUGH E-PROCUREMENT
(Conditional Enquiry)**

DUE DATE
16.05.2020
BY 14:00 PM

SUBJECT: TENDER ENQUIRY FOR RATE CONTRACT OF PLATE HEAT EXCHANGERS AS PER TECHNICAL SPECIFICATION NO. PE-RC-999-179-N003 (REV 0)

OUR REF: TENDER ENQUIRY NO: PE/PG/RTC/E-6434/2020, Dtd.05.05.2020

Dear Sir/ Ma'am,

We are pleased to invite your offer for subject package in two parts strictly as per Clause-2.0 of "Instructions to Bidders" of GCC (Rev07). Please upload your best quotation/ offer on <https://bhel.abcpurchase.com> for the requirement strictly as per schedule of price form available at e-procurement portal before mentioned due date & time. The details of the tender enquiry are as mentioned below:

Sl. No	Description for which Rate Contract is desired	Tentative Quantity	Delivery required
1	<u>PLATE HEAT EXCHANGERS</u> - Refer Technical Specification no. PE-RC-999-179-N003 (REV 0), for detailed description.	As per BOQ cum price schedule (price form available at e-procurement portal) cumulative for the Prospective Projects as per Annexure-III.	Delivery : Within Four (04) months from date of CAT-1 approval of Primary drawing/documents, subjected to drawing/document submission/re-submission schedule as stipulated above, in case of any delay in submission/re-submission of Primary drawing/ documents, then same shall be reduced from the given delivery period. Delay in BHEL's comments/approval beyond 18 days shall also be considered for delay analysis. For PG Test: Vendor to depute its service engineer for PG Test within 15 days from BHEL's intimation (for deputing service engineer) for such site activity. For 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.

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.**
- 3. Bidders to ensure that Third party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name &**

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designation of Issuing Authority and its organisation contact number and email Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.

4. "This item/Package/System falls under the list of items defined in Para 3 of Ministry of Finance guideline dated 20-09-2016 (procurement of items related to public safety, health, critical security operations and equipment's, etc.) & hence criteria of prior experience/turnover shall be same for all the bidders including start up/MSME".

Please refer GCC Rev-07 which is available on www.bhelpem.com. You are requested to kindly download the same.

1. **Rate contract, on firm price basis, shall be done for 2 years from placement of Rate Contract PO date with a provision for further extension after review on mutual consent.**
Rate contract will be done for 100 percent value on L1 vendor for this package. However ordering for any project on rate contract basis shall be subject to customer approval.
2. **Rate Contract will be finalized on total lump sum basis instead of item wise evaluation so that the complete requirement against one project is not split amongst various vendors to minimize operational difficulty.**
3. In line with cl. no. 3 (c) of make in India Circular ref: No. P-45021/2/2017-PP (BE-II) dtd 29/05/19 issued by Ministry of Commerce and Industry, Govt. of India, If L 1 bid is not from a local supplier, the lowest bidder among the local suppliers, will be invited to match the L 1 price subject to the local supplier's quoted price falling within the margin of purchase preference, and contract shall be awarded to such local supplier subject to matching the L 1 price. In case such lowest eligible local supplier fails to match the L 1 price, the local supplier with the next higher bid within the margin of purchase preference shall be invited to match the L 1 price and so on, and contract shall be awarded accordingly. In case none of the local suppliers within the margin of purchase preference matched the L1 price, then the contract may be awarded to the L 1 bidder.
4. As per circular ref: No. P-45021/2/2017-PP (BE-II) dtd 29/05/2019, the Margin of Purchase Preference shall be 20%.
5. For PHE package, the Local content shall be 34%.
6. Following shall be made part of NIT regarding preference to "Make in India" circular from Corporate office
For this procurement, Public Procurement (preference to make in India), order 2017, Dt:- 15.06.17, 28.05.18 & 29.05.19 and subsequent orders issued by the respective nodal ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/PO/WO against this NIT. In the event of any nodal ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable. Vendors are requested to go through the above mentioned orders and confirm the following: -
The local supplier at the time of tender, bidding, solicitation, shall be required to provide self-certification that the item offered meets the minimum local content as per above mentioned orders and shall give details of location(s) at which the local value addition is made.
Subject package is not divisible in nature and purchase preference shall be 20%.
7. **Bidders are requested to please note the following: -**
 - i. **Evaluation will be done on Ex Works + Freight basis for 75 numbers of PHEs. Item wise unit ex works and total ex works price will be derived from the percentage allocation formula mentioned in the price schedule. Vendor to quote only total ex works prices of 75 nos. of PHEs.**

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- ii. **Prices of PG Test and Mandatory Spares will also be derived as per the formula mentioned in Annexure I, Annexure I A and Annexure I B. Price derived for PG Test charges and Mandatory Spares will not be considered for evaluation, however, shall be considered for ordering.**
- iii. In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.
In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss / draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s). Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.
- iv. Bidder to give single % of freight charges considering anywhere in India in the freight column. Bidders have to give same % of freight for each line item.
- v. 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.
- vi. Though evaluation is 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. Bidders need to give only their total ex works price for given BOQ at the specific cells that has been kept opened in the price schedule available in the e-procurement portal (Grand Total ex works price). **Price mentioned anywhere else in BOQ or price uploaded anywhere else in the e-procurement portal shall not be taken in cognizance.**
- vii. Rest of the prices shall be derived by BHEL in line with allocation fixed for each item. There is formula applied in price schedule form available in e-procurement portal. As soon as bidder fills the cells for Total Ex works, freight percentage and GST percentage, rest values for e.g. unit ex works – item wise, total ex works – item wise, FOR site price – item wise will filled automatically. Bidders can also validate and cross check the same by using Check Formula button.
- viii. HSN Code mentioned in BOQ Schedule shall be considered by vendor while quoting.
- ix. Incomplete offer shall be summarily rejected.
- x. Pre-Qualifying Requirements (PQR): All the bidders (registered/ non-registered) will be asked to submit documents fulfilling PQR (technical) requirements along with the bid & their further evaluation shall be done accordingly. Bidders to ensure that Third party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name & designation of Issuing Authority and its organisation contact number and email Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.
- xi. Bidders to note that their bid shall be conditional, subject to qualify PQR (technical) & registration in PEM for subject package.
- xii. CIF allocation is not applicable for this tender. Bidder to quote accordingly.
- xiii. Quantity variation shall be +30%. 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. No minimum quantity is guaranteed by BHEL.
- xiv. PVC is not applicable for this package. Prices shall be remain from throughout the contract period.
- xv. Tenderers must enclose the Quality Plan in the prescribed format, for approval. Equipment will be dispatched only after Purchaser's / Owner's inspection of the hold points specified in the approved Quality Plan and issue of Material Dispatch Clearance Certificate (MDCC).
- xvi. In case of joint bidding, bidders to furnish scope matrix which should be clearly defined between them along with the offer for the complete scope.

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- xvii. In case of RA, if bidder fail to submit the price break up within prescribed time limit then the prices submitted by bidder in his hard bid shall be reduced proportionately for ordering purpose.

TERMS AND CONDITIONS

- Procurement of the subject package shall be done through e-procurement.
 - Enquiry No., due date etc. must be legibly super scribed on the offers as per clause no. 2.0 of "Instructions to Bidders" of GCC (Rev07).
 - Offers should be uploaded in two parts online at <https://bhel.abcprocure.com> in as follows:
 - Part-I Bid: - Documents and Credential as per Technical PQR and Techno-Commercial offer (along with un-priced copy of priced bid and un-priced schedule of Technical-Commercial Deviation, In e-form available at e-procurement portal)
 - Part II Bid: - Price Bid and Priced schedule of Technical-Commercial Deviation
 - Terms and conditions: -
 - Part I bid will be opened on date & time mentioned in the NIT or subsequent corrigenda/amendments, if any.
 - Techno-commercial offer of only those bidders shall be evaluated who will meet the Technical pre-qualifying requirement of the tender.**

All the above Tender Documents shall automatically become a part of the Order/Contract after its finalisation.
 - 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 in e-procurement portal, along with reasons for taking such deviations.
- Bidder to note all the points mentioned in "Notes" of cost of withdrawal sheet in e-procurement portal.***
- Please note the following:***
 - Compliance to price form available at e-procurement portal.***
 - SCC enclosed for compliance.***

GCC enclosed for compliance. GCC Rev-07 is available on www.bhelpem.com. You are requested to kindly download the same. Bidders are requested for furnishing compliance of these documents.
 - Tenders shall be submitted strictly in accordance with the requirements of the above tender documents.
 - Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
 - Validity of offer shall be as per cl.no.7 (instruction to bidders) of **GCC Rev 07**.
 - Unsolicited fresh/revised Price Bids shall not be entertained.
 - 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.
 - Late tenders will be rejected.
 - Tenders and all correspondence thereof, shall be addressed to the undersigned by name & designation and sent at the following address:

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Mr. I P SINGH, DGM, 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
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14. Definition of Terms is also enclosed. These definitions will apply to all the tender documents including this Enquiry Letter.
15. **Delivery Schedule:**

Drawing Title	Primary/Secondary	BHEL Inputs	Drg Sch for Vendors
PE-V5-XXX-179-N001	TDS -PHE	Primary	R-0 within 21 days from PO & subsequent revisions incorporating all the BHEL comments within 10 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.
PE-V5-XXX-179-N002	GENERAL ARRANGEMENT OF PHE	Primary	
PE-V5-XXX-179-N003	SIZING CALCULATION OF PHE's	Primary	
PE-V5-XXX-179-N005	QP-PHE	Primary	
PE-V5-XXX-179-N004	PERFORMANCE CURVES OF PHE's	Secondary	R-0 within 20 days of approval on TDS & subsequent revisions incorporating all the BHEL comments within 10 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.
PE-V5-XXX-179-N006	O&M MANUAL-PHE	Secondary	within 30 days of issuance of MDCC.

**** Also refer Data Sheet C, section IIA, SPECIFICATION NO. PE-TS-999-179-N001**

Within Four (04) months from date of CAT-1 approval of Primary drawing/documents, subjected to drawing/document submission/re-submission schedule as stipulated above, in case of any delay in submission/re-submission of Primary drawing/ documents, then same shall be reduced from the given delivery period. Delay in BHEL's comments/approval beyond 18 days shall also be considered for delay analysis.

For PG Test: Vendor to depute its service engineer for PG Test within 15 days from BHEL's intimation (for deputing service engineer) for such site activity.

For Mandatory Spares: Mandatory Spares to be delivered within 04 months from manufacturing clearance. Separate dispatch/ manufacturing clearance will be issued for Mandatory Spares.

16. PRE-QUALIFICATION REQUIREMENT: -

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Bidders is requested to fill up the details in "TECHNICAL PRE-QUALIFYING REQUIREMENT" as per the conditions mentioned in the PQR (technical) and also to submit the credentials.

Bids of only those bidders shall be evaluated who meet the Technical pre-qualifying requirements (if applicable). Bidders to ensure that Third party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name & designation of Issuing Authority and its organisation contact number and email Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.

"This item/Package/System falls under the list of items defined in Para 3 of Ministry of Finance guideline datedt.20-09-2016 (procurement of items related to public safety, health, critical security operations and equipments, etc) & hence criteria of prior experience/turnover shall be same for all the bidders including startup/MSME".

17. All other terms and conditions shall be as per GCC Rev 07 and Special Conditions of Rate Contract as per attached Annexure-IV. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be as mentioned in clause no 36 of GCTC of GCC (Rev.07).

18. Considering all the above open tender enquiry is floated in two parts (Part-I: Techno-Commercial Bid, Part-II: Price Bid) through e-procurement for entering into rate contract for the subject package, all the bids shall be treated conditional, subject to qualify PQR (technical) , & registration in PEM for subject 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 may not be considered for evaluation"

19. All the above Tender Documents shall automatically become a part of the Order/Contract after its finalization.

20. 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.abcpurchase.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.**

21. Bidders to submit their offers strictly in line with the form available at e-procurement portal.

22. Inspection shall be done by BHEL/ END CUSTOMER/Third party Agency (finalized by BHEL).

23. This enquiry is subject to Conditions/ limits if any imposed in PMD / Vendor registration.

24. 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.

25. 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

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copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted."

26. 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.
27. In case of RA, revised RA guidelines AA:SSP:RA:03 issued on 26.09.2016 (uploaded on http://www.bhel.com/vender_registration/pdf/Guidelines%20for%20Reverse%20Auction-2016.pdf) shall be applicable.

28. 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 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

"The Bidders has to quote the Single Price (i.e. Total Cost to BHEL) in Reverse Auction. Price are to be inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, Freight as applicable, including loading (if any). De-loading (if any) shall be done in line with NIT terms.

In case of RA, if bidder fail to submit the price break up within prescribed time limit then the prices submitted by bidder in his hard bid shall be reduced proportionately for ordering purpose.

29. Various Conditions, arrived after Reverse Auction, shall be treated as follows:

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Case-I (Taxes & duties and freight are identical in Reverse Auction & Conventional Price Bid)

Resolution: - Ordering shall be done on lower of the two bids (RA closing price & Conventional Price Bid). After successful completion of reverse auction L1 bidder shall be asked to submit break up in line with taxes & duties, freight quoted in their Conventional Price Bid.

30. If any bidder has mentioned the term Not Applicable / Not required / Not Quoted in bidding form. 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.
31. 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 in GCC Rev 07.
32. Refer attached Annexure-III to NIT for prospective project list. Project list is indicative only, BHEL may ask for delivery anywhere in India for any of the projects added in the prospective project/existing project during RC period.
33. All other terms and conditions shall be as per GCC Rev 07 and Special Conditions of Rate Contract as per attached Annexure-IV. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be as per GCC (Rev07).

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

Sd/-

Sumeet Sahay
Dy Mgr/CMM
(Signature of official with Name & Designation)

Enclosure:

1. Enquiry Terms & Conditions.
2. Technical Specifications.
3. Technical PQR
4. SCC – Annexure-III to NIT.
5. Prospective Project List – Annexure-IV to NIT
6. Format for self-certification regarding local content – Annexure- V to NIT
7. Price Schedule - Annexure-I to NIT(to be filled in e-procurement portal only)
8. Cost of withdrawal sheet -Annexure-II to NIT(to be filled in e-procurement portal only)

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बी एच ई एल ANNEXURE- I TO NIT REF NO-PE/PG/RTC/E-6434/2020, DTD-05.05.2020															
RATE CONTRACT															
PRICE SCHEDULE FOR PLATE HEAT EXCHANGERS															
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.18 OF COUNM 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.18 OF COUNM 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.18 OF COUNM 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.18 OF COUNM 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-1	NOS.	4	8419	1.54321%	Derived	6.17284%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	1.54321%	Derived	6.17284%	Derived
A.2	TYPE-2	NOS.	7		0.78875%	Derived	5.52126%	Derived			Derived	0.78875%	Derived	5.52126%	Derived
A.3	TYPE-3	NOS.	5		1.02881%	Derived	5.14403%	Derived			Derived	1.02881%	Derived	5.14403%	Derived
A.4	TYPE-4	NOS.	3		1.11454%	Derived	3.34362%	Derived			Derived	1.11454%	Derived	3.34362%	Derived
A.5	TYPE-5	NOS.	8		1.88615%	Derived	15.08916%	Derived			Derived	1.88615%	Derived	15.08916%	Derived
A.6	TYPE-6	NOS.	4		2.57202%	Derived	10.28807%	Derived			Derived	2.57202%	Derived	10.28807%	Derived
A.7	TYPE-7	NOS.	7		1.28601%	Derived	9.00206%	Derived			Derived	1.28601%	Derived	9.00206%	Derived
A.8	TYPE-8	NOS.	5		0.68587%	Derived	3.42936%	Derived			Derived	0.68587%	Derived	3.42936%	Derived
A.9	TYPE-9	NOS.	3		0.68587%	Derived	2.05761%	Derived			Derived	0.68587%	Derived	2.05761%	Derived
A.10	TYPE-10	NOS.	3		0.85734%	Derived	2.57202%	Derived			Derived	0.85734%	Derived	2.57202%	Derived
A.11	TYPE-11	NOS.	3		1.45748%	Derived	4.37243%	Derived			Derived	1.45748%	Derived	4.37243%	Derived
A.12	TYPE-12	NOS.	3		1.02881%	Derived	3.08642%	Derived			Derived	1.02881%	Derived	3.08642%	Derived
A.13	TYPE-13	NOS.	3		1.54321%	Derived	4.62963%	Derived			Derived	1.54321%	Derived	4.62963%	Derived
A.14	TYPE-14	NOS.	8		1.20027%	Derived	9.60219%	Derived			Derived	1.20027%	Derived	9.60219%	Derived
A.15	TYPE-15	NOS.	3		1.37174%	Derived	4.11523%	Derived			Derived	1.37174%	Derived	4.11523%	Derived
A.16	TYPE-16	NOS.	3		2.14335%	Derived	6.43004%	Derived			Derived	2.14335%	Derived	6.43004%	Derived
A.17	TYPE-17	NOS.	3		1.71468%	Derived	5.14403%	Derived			Derived	1.71468%	Derived	5.14403%	Derived
A.18	TOTAL (A.1 TO A.17)						100.00000%	TO BE QUOTED = Rs X	Derived	Derived	Derived			100.00000%	TO BE QUOTED = M
								TO BE QUOTED (in words) = Rs X							TO BE QUOTED (in words) = Rs X
				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.18 OF COUNM 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.18 OF COUNM 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	75	9983	0.08573333% OF PRICE AT A.18, COL 8	Derived	6.43% OF PRICE AT A.18, COL 8	Derived		% TO BE QUOTED	Derived	0.08573333% OF PRICE AT A.18, COL 15	Derived	6.43% OF PRICE AT A.18, COL 15	Derived
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 6 * Col. 7)	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-1	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	8419	0.7% OF PRICE AT A.1, COL 6	Derived	80	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)	8419	0.15% OF PRICE AT A.1, COL 6	Derived	120	Derived			Derived	0.15% OF PRICE AT A.1, COL 13	Derived		Derived
		Valves	NOS.	8419	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)	8419	0.075% OF PRICE AT A.1, COL 6	Derived	40	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)	8419	0.05% OF PRICE AT A.1, COL 6	Derived	40	Derived			Derived	0.05% OF PRICE AT A.1, COL 13	Derived		Derived
C.2	TYPE-2	Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	8419	0.7%OF PRICE AT A.2, COL 6	Derived	140	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)	8419	0.15%OF PRICE AT A.2, COL 6	Derived	210	Derived			Derived	0.15% OF PRICE AT A.2, COL 13	Derived		Derived
		Valves	NOS.	8419	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)	8419	0.075%OF PRICE AT A.2, COL 6	Derived	70	Derived			Derived	0.075% OF PRICE AT A.2 COL 13	Derived		Derived

[illegible]

INDIGENOUS VENDOR										FOREIGN VENDOR					
C.17	TYPE-17	Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	8419	0.15% OF PRICE AT A.17, COL 6	Derived	90	Derived			Derived	0.15% OF PRICE AT A.17, COL 13	Derived		Derived
		Valves	NOS.	8419	0.025% OF PRICE AT A.17, COL 6	Derived	1	Derived			Derived	0.025% OF PRICE AT A.17, COL 13	Derived		Derived
		Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	8419	0.075% OF PRICE AT A.17, COL 6	Derived	30	Derived			Derived	0.075% OF PRICE AT A.17, COL 13	Derived		Derived
		Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	8419	0.05% OF PRICE AT A.17, COL 6	Derived	30	Derived			Derived	0.05% OF PRICE AT A.17, COL 13	Derived		Derived
C.18	TOTAL (C.1 TO C.17)							Derived	Derived	Derived					Derived
D	GRAND TOTAL (A.6+B.2+C.6)							Derived	Derived	Derived	Derived = Rs Y				Derived = N
Note:-															
VENDORS TO QUOTE TOTAL EX WORKS PRICE FOR 75 NUMBERS OF PHEs ALONG WITH FREIGHT CHARGES IN PERCENTAGE AND GST RATE. ITEM WISE PRICE WILL BE CALCULATED AS PER PERCENTAGE DISTRIBUTION FORMULA MENTIONED ABOVE. PRICES OF PG TEST AND MANDATORY SPARES WILL BE CALCULATED AS PER FORMULA MENTIONED AT ANNEXURE I A AND ANNEXURE I B.															
1. Bidder to note that evaluation shall be on Grand Total Ex works price + Freight charges of total 75 numbers of PHEs. Bidder to quote grand total Ex works/total C&F value of the PHEs mentioned at A.1 to A.17 (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 75 numbers of PHEs. Price for PG Test and Mandatory Spares will not be considered for evaluation however shall be considered for ordering.															
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 A.18 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-N003 (REV 0)															
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. Bidder shall furnish this price Schedule indicating "Quoted/Not-Quoted" along with technical offer and actual prices in his price offer.															
10. . Quantity variation shall be +30%.															

ANNEXURE- I A TO NIT REF NO-PE/PG/RTC/E-6434/2020, DTD-05.05.2020

BOQ of SPARES																		
Spares for each PHE type:	Unit of Measurement	TYPE-1	TYPE-2	TYPE-3	TYPE-4	TYPE-5	TYPE-6	TYPE-7	TYPE-8	TYPE-9	TYPE-10	TYPE-11	TYPE-12	TYPE-13	TYPE-14	TYPE-15	TYPE-16	TYPE-17
Heat Transfer Plates	LOTS (1 Lot = 1% of plates in each PHE)	80	140	100	60	160	80	140	100	60	60	60	60	60	160	60	60	60
Gaskets (All types)	LOTS (1 Lot = 1% of gaskets of each type in each PHE)	120	210	150	90	240	120	210	150	90	90	90	90	90	240	90	90	90
Valves	NOS.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tie Rods	LOTS (1 Lot = 1% of tie-rod of each type in each PHE)	40	70	50	30	80	40	70	50	30	30	30	30	30	80	30	30	30
Fasteners (Nuts & bolts etc.)	LOTS (1 Lot = 1% of Nuts & bolts of each type & size in each PHE)	40	70	50	30	80	40	70	50	30	30	30	30	30	80	30	30	30

NOTE:

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

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

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.

 ANNEXURE-II: DEVIATION SHEET (COST OF WITHDRAWAL)									
PACKAGE:- PLATE HEAT EXCHANGER- RATE CONTRACT									
TENDER ENQUIRY REF NO-PE/PG/RTC/E-6434/2020, DTD-05.05.2020									
NAME OF VENDOR:-									
SL NO	VOLUME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASONS FOR QUOTING DEVIATION
TECHNICAL DEVIATIONS									
COMMERCIAL DEVIATIONS									
PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE									
NAME				DESIGNATIONS		SIGN & DATE			
NOTES:									
1. Cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.									
2. All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.									
3. Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.									
4. Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable. In the absence of same, such deviation(s) shall not be considered and offer shall be considered in total compliance to NIT.									
5. Bidder shall furnish price copy of above format along with price bid.									
6. The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.									
7. Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.									
8. For deviations w.r.t. Credit Period, Liquidated damages, Firm prices if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VII, 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.									
9. Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be considered.									
10. 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.									
11. Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.									
12. In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.									
13. In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.									

ANNEXURE III TO NIT REF NO-PE/PG/RTC/E-6434/2020, DTD-05.05.2020
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 two years. The Rate Contract shall come into force from the date of issue of Purchase order for Rate Contract. Validity for ordering shall be two years 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 period of two years with a provision for further extension after review on mutual consent.
6. 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.

7. Other terms and conditions shall be as per Standard Technical specification no, GCC Rev 07 & Enquiry letter.
8. This enquiry is subject to Conditions/ limits if any imposed in PMD/ Vendor registration.
9. Tentative quantity is given in enquiry.
10. 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.
11. 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.

ANNEX-III TO NIT REF NO-PE/PG/RTC/E-6434/2020, DTD-05.05.2020
TENTATIVE PROJECT LIST
RATE CONTRACT - PLATE HEAT EXCHANGERS

SL NO.	PROSPECTIVE PROJECT LIST
1	3X660MW Nabinagar FGD
2	3X200MW+3X500MW Ramagundam FGD
3	4X250MW Nabinagar FGD
4	2X250MW Bhilai FGD
5	3X200MW+3X500MW+1X500MW Korba FGD
6	3X660MW Nabinagar FGD

ANNEXURE V TO NIT REF NO-PE/PG/RTC/E-6434/2020, DTD-05.05.2020

Letter head of Company (<Rs. 10 Cr value)

Ref.....

Date.....

To,

Bharat Heavy Electricals Limited

PEM, PPEI Building, Plot No 25,

Sector -16A, Noida (U.P)-201301

Subject: - Certification regarding local content

Reference: Tender Enquiry No-.....

Name of Package:

Dear Sir,

We hereby certify that items offered by us of(package name).....for.....(Project Name/Rate contract)..... meets the requirement of minimum local content in line with Cl. No..... of NIT No..... dated..... and the Public Procurement (Preference to Make in India), Order 2017 dated-15.06.2017, 28.05.2018 & 29.05.2019.

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

Yours very truly

..... (authorized signatory of company)

..... (firm name)

authorized signatory
of company

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) - PLATE HEAT EXCHANGERS (PHE)	DOCUMENT NO: PE-RC-999-179-N003
		REVISION NO: 00 DATE: 27/02/2020
		SHEET: 1 of 2

FORM NO. PEM 6100-0	ENQUIRY NO.:
	PROJECT:
	PACKAGE: PLATE HEAT EXCHANGER (PHE)
	1. The bidder should have designed, manufactured, tested, inspected & supplied the PHE with minimum heat load of 1130000 Kcal/Hr, which have been successfully in use for at least 1 year in thermal power plant or similar industry/ application and bidder is in business of PHE on continuous basis.
	2. 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 time duration of satisfactory performance completion should be before the date of subject enquiry/NIT. OR ii. The bidder has been awarded one repeat contract for PHE from End Customer (Owner) / Purchaser (in English) for power plant/similar application industry. Repeat contract shall be considered when the second contract is given by the same purchaser/ owner after lapse of minimum 1 year from execution (viz. supply) of first contract. Supporting documents for execution of the first contract like dispatch^{N2} details or commissioning report or PG test report along with the PO Copy to be furnished, if bidder intends to submit the documents for Repeat Contracts. The date of repeat contract order should not be later than the date of subject enquiry/NIT. Notes:- N1 - Purchase order copy, supporting drgs/technical data sheets etc. are to be submitted along with the bid for which the bidder intends to furnish the performance

PREPARED BY:	REVIEWED BY:	APPROVED BY:
NAME:	NAME:	NAME:
DESIGNATION / DEPT.:	DESIGNATION / DEPT.:	DESIGNATION / DEPT.:

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) - PLATE HEAT EXCHANGERS (PHE)	DOCUMENT NO: PE-RC-999-179-N003
		REVISION NO: 00 DATE: 27/02/2020
		SHEET: 2 of 2

	feedbacks / repeat contracts for reference purpose only. N2 - Dispatch details shall include any one of the following documents: - Tax Invoice. - Site receipt/Receipted LR. - Customer's material dispatch clearance certificate. N3 – Purchase order for spare items shall not be considered as repeat order qualifying criteria. Any additional document required in support of above documents to establish the correlation 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.

PREPARED BY:	REVIEWED BY:	APPROVED BY:
NAME:	NAME:	NAME:
DESIGNATION / DEPT.:	DESIGNATION / DEPT.:	DESIGNATION / DEPT.:

EXPERIENCE LIST

ANNEXURE-1

EXPERIENCE LIST

[illegible]

**TECHNICAL SPECIFICATION
FOR
RATE CONTRACT
OF
PLATE HEAT EXCHANGERS**

Specification No. : PE-RC-999-179-N003 (REV 0)



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



TITLE :
**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS**

SPECIFICATION NO. PE-RC-999-179-N003

SECTION

REV. NO. 0

DATE 22/2/2020

INDEX

This Technical Specification consists of three Sections:

SECTION TITLE

SECTION I SPECIFIC TECHNICAL REQUIREMENTS

IA SPECIFIC TECHNICAL REQUIREMENTS.

IB DATA SHEET – A.

SECTION II STANDARD TECHNICAL REQUIREMENTS

IIA STANDARD TECHNICAL SPECIFICATION.

IIB STANDARD QUALITY PLAN.

SECTION III DOCUMENTS TO BE SUBMITTED BY BIDDER

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

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

IIIC DATASHEET –B & BALANCE DOCUMENTS AS PER CL. NO. 8 OF SECTION- IA (TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT).

Notes:

- 1) For detailed list of documents to be submitted by bidder in their technical offer, please refer cl. no. 10.00.00 of Section-IIA.
- 2) For detailed list of documents to be submitted by vendor after award of contract, please refer Datasheet-C of Section-IIA.
- 3) In case there is conflict in different clauses of specification, most stringent clause (as decided by BHEL / end customer) shall be followed, if no specific deviation is taken by bidder and accepted by BHEL during tender stage in that regard.



TITLE :
**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS**

SPECIFICATION NO. PE-RC-999-179-N003

SECTION I

REV. NO. 0

DATE 22/2/2020

SECTION I

IA SPECIFIC TECHNICAL REQUIREMENTS

IB DATASHEET – A



TITLE :
TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-RC-999-179-N003

SECTION IA

REV. NO. 0 DATE 22/2/2020

SHEET 1 OF 2

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 detailed in Data Sheet-A, Section-1B. The bidder shall include complete supplies in his scope. Part supplies offered shall disqualify the bidder's offer. Evaluation shall be combined 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.

- 1.3 The bids shall be evaluated as per NIT. Ordering shall be done 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 variation shall be within +/- 20 % for primary side as well as secondary side but Heat Load of PHE (Flow x Temp Rise) variation shall be within 0 to +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 Design heat load of plate type heat exchangers and Inlet & Outlet temperatures of the Plate



TITLE :
TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-RC-999-179-N003

SECTION IA

REV. NO. 0 **DATE 22/2/2020**

SHEET 2 OF 2

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

PG test at site (if applicable) 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 The drawing / document submission schedule and delivery shall be as per NIT.

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

5.0 Following to be complied by the bidder:

- a. Supplier to submit detailed 'Bill of Material' (BoM) at the time of drawing/document submission after placement of PO. Each item of the BoM to be uniquely identified with item code no. or item serial no.
- b. Supplier to ensure that all items which will find separate mention in the packing list are covered in this detailed BoM.
- c. Supplier to give following undertaking in the BoM"
"The BoM provided herewith completes the scope (in content and intent) of material supply under PO no.-----, dated -----.
Any additional material which may become necessary for the intended application of the supplied items(s)/package will be supplied free of cost in most reasonable time."



TITLE :
**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS**

SPECIFICATION NO. PE-RC-999-179-N003

SECTION IA- Appendix 1

REV. NO. 0

DATE 22/02/2020

Appendix 1

CUSTOMER SPECIFICATION

CLAUSE NO.		QUALITY ASSURANCE												एनटीपीसी NTPC	
EQUIPMENT COOLING WATER SYSTEM															
	TEST / CHECKS		Material Test	WPS/PQR/Welder Qualification	DPT/MPI	Assembly Fit Up	Visual & Dimensional Check	UT	RT	Hydraulic / Water Fill	Balancing	Type Test	Performance Test	Other Test	
	ITEM / COMPONENTS														
A	PLATE TYPE HEAT EXCHANGER			Y	Y ³	Y	Y			Y					
A.1	Heat Transfer Plates	Y ¹			Y ²		Y							Y ⁷	
A.2	Gaskets	Y					Y								
A.3	Cover Plates (Front & Rear)	Y ¹					Y	Y ⁵							
A.4	Tie Rods	Y ¹			Y ⁴			Y ⁶							
B	HORIZONTAL CENTRIFUGAL PUMP					Y	Y						Y ¹⁰		
B.1	Casing	Y¹			Y⁴		Y			Y⁸					
B.2	Impeller	Y¹			Y⁴		Y				Y⁹				
B.3	Shaft	Y¹			Y		Y	Y⁶			Y⁹				

NOTES

1 One per heat / HT batch

2 DP Test shall be conducted for 10% of the lot of HT plates. However, in case of any defect, entire lot shall be tested and only defect free plates shall be accepted.

3 100% DP Test shall be conducted on butt welds and 10% DPT on fillet weld after final run.

4 100% DPT shall be carried out on machined surfaces.

5 UT shall be done on plates with thickness 25 mm or above.

6 UT shall be done on shaft / tie rod with diameter above 40 mm.

7 After pressing each HT plate shall be subjected to either of the following tests, as per Manufacturer Practice
a) Light Box Test b) Vacuum Test c) Air Chamber Test

8 All pressure retaining parts shall be hydrostatically tested at 200% of pump rated head or 150% of shut – off head, whichever is higher, for at least 30 minutes. No leakage is allowed.

~~9 Static and Dynamic Balancing shall be carried out on complete rotor assembly.~~

~~10 All pumps shall be tested at rated speed, for head, flow capacity, efficiency and power consumption for the entire operating range i.e. from shut off head to maximum flow. A minimum of 7 readings shall be taken to plot the curve, with one reading at design flow. Testing standard shall be HIS (Hydraulic Institute Standard) of USA.~~

~~Performance test shall be carried out with contract motor, wherever Liquidated Damages are to be ascertained based on performance test at shop.~~

~~11 For Pipes, Valves and RE Joints refer LP Piping System requirements.~~

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1 of 1

		TECHNICAL SPECIFICATION FOR		Technical specification no		PE-RC-999-179-N003 (Rev 0)	
		PLATE HEAT EXCHANGER		Section		IB	
		DATASHEET - A		Rev		0	
		FOR RATE CONTRACT		Date		25-02-2020	

	TECHNICAL SPECIFICATION FOR		Technical specification no	PE-RC-999-179-N003 (Rev 0)	
	PLATE HEAT EXCHANGER		Section	IB	
	DATASHEET - A		Rev	0	
	FOR RATE CONTRACT		Date	25-02-2020	
	PHE DESCRIPTION		PHE TYPE-1	PHE TYPE-2	PHE TYPE-3
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	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	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	SA 193 B7/ SA 194 2H
6.11	Nozzle flange gasket		3mm wire inserted Red Rubber	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)	AISI 316 18'-8' SS (3 mm thick)
6.13	Wetted fasteners		SS-316	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.	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, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.
	c.) Final Paint				
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	25	25
8.0	Spares	Unit of Measurement			
8.1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	80 LOTS	140 LOTS	100 LOTS
8.2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	120 LOTS	210 LOTS	150 LOTS
8.3	Valves	NOS.	1 NO.	1 NO.	1 NO.
8.4	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	40 LOTS	70 LOTS	50 LOTS
8.5	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	40 LOTS	70 LOTS	50 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	1.5 times the design pressure
9.2	Duration of Hydrotesting	Minutes	30	30	30
10.0	Performance curves and figures to be furnished during contact stage				
10.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.				
10.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)				
10.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)				
10.4	Primary side water outlet temperature vs. Primary side inlet temp.				
10.5	Film heat transfer coefficient curve				
10.6	Correction Curves.				
11.0	Minimum Standard requirement of the PHE to be offered by the bidder.				
11.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)				
11.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.				
11.3	Plate thickness should be adequate to withstand all operating conditions but with Minimum plate thickness of 0.6 mm (No negative tolerance allowed in thickness specified). The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.				
11.4	The plate Heat exchangers shall be single pass type. Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.				
11.5	Double sealing arrangement shall be provided at outer edge and around ports with the inter space between the seals vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.				
11.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.				
11.7	Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.				
11.8	Painting as specified at Sl. No. 6.14 above shall be subject to customer/BHEL approval during detailed engineering.				

		TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGER		Technical specification no	PE-RC-999-179-N003 (Rev 0)	
DATASHEET - A		Section		IB		
FOR RATE CONTRACT		Rev		0		
		Date		25-02-2020		
PHE DESCRIPTION		PHE TYPE-4		PHE TYPE-5	PHE TYPE-6	
1.0	General					
1.1	Number of Plate Heat Exchanger	Nos	Three (3) nos	Eight (8) nos	Four (4) nos	
1.2	Arrangement		As per System Requirement	As per System Requirement	As per System Requirement	
1.3	Location		Outdoor	Outdoor	Outdoor	
1.4	Primary side (Hot) Fluid		Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)	
1.5	Secondary side (Cold) fluid		CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)	
1.6	Connecting Pipe size	(Primary Side) (Secondary Side)	NB NB	100 100	150 150	125 150
1.7	Maximum permitted Length of the PHE	mm	2000 mm (excluding reducer)	2000 mm (excluding reducer)	2000 mm (excluding reducer)	
2.0	Design					
2.1	Design Code		Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards	
2.2	Design Pressure	Kg/cm ² (g)	10	10	10	
2.3	Operating Pressure	(Primary Side) (Secondary Side)	Kg/cm ² (g) Kg/cm ² (g)	5.5 to 7.0 Kg/sq. cm(g) 2.5 to 4.0 Kg/sq. cm(g)	6.5 to 8.5 Kg/sq. cm(g) 4.0 to 6.0 Kg/sq. cm(g)	6.5 to 8.5 Kg/sq. cm(g) 3.5 to 5.5 Kg/sq. cm(g)
2.4	Mechanical Design Temp.	°C	60	60	60	
2.5	Heat Transfer per Sq.Mtr. Of Heat Transfer Plate	Kcal/Hr./m ²	6500 (Max.)	6500 (Max.)	6500 (Max.)	
2.6	Specific Heat of Fluid	(Primary Side) (Secondary Side)	Cal/gmDeg.C Cal/gmDeg.C	1 1	1 1	1 1
2.7	Density of Fluid	(Primary Side) (Secondary Side)	gm/cc gm/cc	1 1	1 1	1 1
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:					
3.1	Flow rate	(DMCW Side) (ACW Side)	M ³ /hr M ³ /hr	40 62	80 95	113 159
3.2	Inlet temperature	(DMCW Side) (ACW Side)	°C °C	48 36	48 36	48 36
3.3	Outlet temp	(DMCW Side) (ACW Side)	°C °C	38 42.5	38 44.4	38 43.1
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow	(DMCW Side) (ACW Side)	MWC MWC	5 5	5 5	5 5
* 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	NIL	
5.0	Heat Transfer Coefficient/Margin					
5.1	Overall fouling resistance (minimum)	Hr m2deg C/Kcal	0.00008	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	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	SS-316	
6.2	Plate Gasket		Nitrile rubber, 65 ± 5 Deg. shore hardness	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, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	
6.4	Guide Rails/ bar		Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding	
6.5	Support Beam/ column		Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	
6.6	Nozzle (Reducer/Expander)		Carbon steel IS 2062, Gr. B, Epoxy Coated	Carbon steel IS 2062, Gr. B, Epoxy Coated	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	Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated	

	TECHNICAL SPECIFICATION FOR			Technical specification no	PE-RC-999-179-N003 (Rev 0)	
	PLATE HEAT EXCHANGER			Section	IB	
	DATASHEET - A			Rev	0	
	FOR RATE CONTRACT			Date	25-02-2020	
	PHE DESCRIPTION		PHE TYPE-4	PHE TYPE-5	PHE TYPE-6	
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	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	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	SA 193 B7/ SA 194 2H	
6.11	Nozzle flange gasket		3mm wire inserted Red Rubber	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)	AISI 316 18'-8' SS (3 mm thick)	
6.13	Wetted fasteners		SS-316	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.	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, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	
	c.) Final Paint					
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	25	25	
8.0	Spares	Unit of Measurement				
8.1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	60 LOTS	160 LOTS	80 LOTS	
8.2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	90 LOTS	240 LOTS	120 LOTS	
8.3	Valves	NOS.	1 NO.	1 NO.	1 NO.	
8.4	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	30 LOTS	80 LOTS	40 LOTS	
8.5	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	30 LOTS	80 LOTS	40 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	1.5 times the design pressure	
9.2	Duration of Hydrotesting	Minutes	30	30	30	
10.0	Performance curves and figures to be furnished during contact stage					
10.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.					
10.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)					
10.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)					
10.4	Primary side water outlet temperature vs. Primary side inlet temp.					
10.5	Film heat transfer coefficient curve					
10.6	Correction Curves.					
11.0	Minimum Standard requirement of the PHE to be offered by the bidder.					
11.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)					
11.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.					
11.3	Plate thickness should be adequate to withstand all operating conditions but with Minimum plate thickness of 0.6 mm (No negative tolerance allowed in thickness specified). The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.					
11.4	The plate Heat exchangers shall be single pass type. Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.					
11.5	Double sealing arrangement shall be provided at outer edge and around ports with the inter passage between the seals vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.					
11.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.					
11.7	Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.					
11.8	Painting as specified at Sl. No. 6.14 above shall be subject to customer/BHEL approval during detailed engineering.					

				
TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGER		Technical specification no	PE-RC-999-179-N003 (Rev 0)	
DATASHEET - A		Section	IB	
FOR RATE CONTRACT		Rev	0	
		Date	25-02-2020	
PHE DESCRIPTION		PHE TYPE-7	PHE TYPE-8	PHE TYPE-9
1.0	General			
1.1	Number of Plate Heat Exchanger	Nos	Seven (7) nos	Five (5) nos
1.2	Arrangement		As per System Requirement	As per System Requirement
1.3	Location		Outdoor	Outdoor
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		CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)
1.6	Connecting Pipe size	(Primary Side) (Secondary Side)	NB 100 125	80 100
1.7	Maximum permitted Length of the PHE	mm	2000 mm (excluding reducer)	2000 mm (excluding reducer)
2.0	Design			
2.1	Design Code		Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards
2.2	Design Pressure	Kg/cm ² (g)	10	12
2.3	Operating Pressure	(Primary Side) (Secondary Side)	Kg/cm ² (g) 6.5 to 8.5 Kg/sq. cm(g) 3.5 to 5.5 Kg/sq. cm(g)	7.0 to 9.0 Kg/sq. cm(g) 5.0 to 7.0 Kg/sq. cm(g)
2.4	Mechanical Design Temp.	°C	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) (Secondary Side)	Cal/gmDeg.C 1 1	1 1
2.7	Density of Fluid	(Primary Side) (Secondary Side)	gm/cc 1 1	1 1
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:			
3.1	Flow rate	(DMCW Side) (ACW Side)	M ³ /hr 48 88	36 63
3.2	Inlet temperature	(DMCW Side) (ACW Side)	°C 48 36	43.6 36
3.3	Outlet temp	(DMCW Side) (ACW Side)	°C 38 41.5	38 39.2
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow	(DMCW Side) (ACW Side)	MWC 5 5	5 5
* 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 (minimum)	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, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.4	Guide Rails/ bar		Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding
6.5	Support Beam/ column		Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.6	Nozzle (Reducer/Expander)		Carbon steel IS 2062, Gr. B, Epoxy Coated	Carbon steel IS 2062, Gr. B, Epoxy Coated
6.7	Nozzle flanges		Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated	Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated

	TECHNICAL SPECIFICATION FOR			Technical specification no	PE-RC-999-179-N003 (Rev 0)	
	PLATE HEAT EXCHANGER			Section	IB	
	DATASHEET - A			Rev	0	
	FOR RATE CONTRACT			Date	25-02-2020	
	PHE DESCRIPTION		PHE TYPE-7	PHE TYPE-8	PHE TYPE-9	
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	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	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	SA 193 B7/ SA 194 2H	
6.11	Nozzle flange gasket		3mm wire inserted Red Rubber	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)	AISI 316 18'-8' SS (3 mm thick)	
6.13	Wetted fasteners		SS-316	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.	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, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	
	c.) Final Paint					
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	25	25	
8.0	Spares	Unit of Measurement				
8.1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	140 LOTS	100 LOTS	60 LOTS	
8.2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	210 LOTS	150 LOTS	90 LOTS	
8.3	Valves	NOS.	1 NO.	1 NO.	1 NO.	
8.4	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	70 LOTS	50 LOTS	30 LOTS	
8.5	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	70 LOTS	50 LOTS	30 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	1.5 times the design pressure	
9.2	Duration of Hydrotesting	Minutes	30	30	30	
10.0	Performance curves and figures to be furnished during contact stage					
10.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.					
10.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)					
10.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)					
10.4	Primary side water outlet temperature vs. Primary side inlet temp.					
10.5	Film heat transfer coefficient curve					
10.6	Correction Curves.					
11.0	Minimum Standard requirement of the PHE to be offered by the bidder.					
11.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)					
11.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.					
11.3	Plate thickness should be adequate to withstand all operating conditions but with Minimum plate thickness of 0.6 mm (No negative tolerance allowed in thickness specified). The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.					
11.4	The plate Heat exchangers shall be single pass type. Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.					
11.5	Double sealing arrangement shall be provided at outer edge and around ports with the inter passage between the seals vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.					
11.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.					
11.7	Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.					
11.8	Painting as specified at Sl. No. 6.14 above shall be subject to customer/BHEL approval during detailed engineering.					

	TECHNICAL SPECIFICATION FOR			Technical specification no	PE-RC-999-179-N003 (Rev 0)	
	PLATE HEAT EXCHANGER			Section	IB	
	DATASHEET - A			Rev	0	
	FOR RATE CONTRACT			Date	25-02-2020	
	PHE DESCRIPTION			PHE TYPE-10	PHE TYPE-11	PHE TYPE-12
1.0	General					
1.1	Number of Plate Heat Exchanger	Nos		Three (3) nos	Three (3) nos	Three (3) nos
1.2	Arrangement			As per System Requirement	As per System Requirement	As per System Requirement
1.3	Location			Outdoor	Outdoor	Outdoor
1.4	Primary side (Hot) Fluid			Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)
1.5	Secondary side (Cold) fluid			CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)
1.6	Connecting Pipe size	(Primary Side) (Secondary Side)	NB NB	100 150	100 150	150 150
1.7	Maximum permitted Length of the PHE	mm		2000 mm (excluding reducer)	2000 mm (excluding reducer)	2000 mm (excluding reducer)
2.0	Design					
2.1	Design Code			Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards
2.2	Design Pressure		Kg/cm ² (g)	10	10	10
2.3	Operating Pressure	(Primary Side) (Secondary Side)	Kg/cm ² (g) Kg/cm ² (g)	6.5 to 8.5 Kg/sq. cm(g) 3.5 to 5.5 Kg/sq. cm(g)	6.5 to 8.5 Kg/sq. cm(g) 3.5 to 5.5 Kg/sq. cm(g)	6.5 to 8.5 Kg/sq. cm(g) 3.5 to 5.5 Kg/sq. cm(g)
2.4	Mechanical Design Temp.		°C	60	60	60
2.5	Heat Transfer per Sq.Mtr. Of Heat Transfer Plate		Kcal/Hr./m ²	6500 (Max.)	6500 (Max.)	6500 (Max.)
2.6	Specific Heat of Fluid	(Primary Side) (Secondary Side)	Cal/gmDeg.C Cal/gmDeg.C	1 1	1 1	1 1
2.7	Density of Fluid	(Primary Side) (Secondary Side)	gm/cc gm/cc	1 1	1 1	1 1
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:					
3.1	Flow rate	(DMCW Side) (ACW Side)	M ³ /hr M ³ /hr	55 70	55 70	65 80
3.2	Inlet temperature	(DMCW Side) (ACW Side)	°C °C	43.6 36	48 36	43.6 36
3.3	Outlet temp	(DMCW Side) (ACW Side)	°C °C	38 40.4	38 43.9	38 40.6
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow	(DMCW Side) (ACW Side)	MWC MWC	5 5	5 5	5 5
	* 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	NIL
5.0	Heat Transfer Coefficient/Margin					
5.1	Overall fouling resistance (minimum)	Hr m2deg C/Kcal		0.00008	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	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	SS-316
6.2	Plate Gasket			Nitrile rubber, 65 ± 5 Deg. shore hardness	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, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.4	Guide Rails/ bar			Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding
6.5	Support Beam/ column			Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.6	Nozzle (Reducer/Expander)			Carbon steel IS 2062, Gr. B, Epoxy Coated	Carbon steel IS 2062, Gr. B, Epoxy Coated	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	Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated

	TECHNICAL SPECIFICATION FOR			Technical specification no	PE-RC-999-179-N003 (Rev 0)
	PLATE HEAT EXCHANGER			Section	IB
	DATASHEET - A			Rev	0
	FOR RATE CONTRACT			Date	25-02-2020
	PHE DESCRIPTION		PHE TYPE-10	PHE TYPE-11	PHE TYPE-12
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	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	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	SA 193 B7/ SA 194 2H
6.11	Nozzle flange gasket		3mm wire inserted Red Rubber	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)	AISI 316 18'-8' SS (3 mm thick)
6.13	Wetted fasteners		SS-316	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.	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, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.
	c.) Final Paint				
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	25	25
8.0	Spares	Unit of Measurement			
8.1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	60 LOTS	60 LOTS	60 LOTS
8.2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	90 LOTS	90 LOTS	90 LOTS
8.3	Valves	NOS.	1 NO.	1 NO.	1 NO.
8.4	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	30 LOTS	30 LOTS	30 LOTS
8.5	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	30 LOTS	30 LOTS	30 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	1.5 times the design pressure
9.2	Duration of Hydrotesting	Minutes	30	30	30
10.0	Performance curves and figures to be furnished during contact stage				
10.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.				
10.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)				
10.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)				
10.4	Primary side water outlet temperature vs. Primary side inlet temp.				
10.5	Film heat transfer coefficient curve				
10.6	Correction Curves.				
11.0	Minimum Standard requirement of the PHE to be offered by the bidder.				
11.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)				
11.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.				
11.3	Plate thickness should be adequate to withstand all operating conditions but with Minimum plate thickness of 0.6 mm (No negative tolerance allowed in thickness specified). The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.				
11.4	The plate Heat exchangers shall be single pass type. Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.				
11.5	Double sealing arrangement shall be provided at outer edge and around ports with the inter passage between the seals vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.				
11.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.				
11.7	Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.				
11.8	Painting as specified at Sl. No. 6.14 above shall be subject to customer/BHEL approval during detailed engineering.				

	TECHNICAL SPECIFICATION FOR			Technical specification no	PE-RC-999-179-N003 (Rev 0)	
	PLATE HEAT EXCHANGER			Section	IB	
	DATASHEET - A			Rev	0	
	FOR RATE CONTRACT			Date	25-02-2020	
PHE DESCRIPTION			PHE TYPE-13	PHE TYPE-14	PHE TYPE-15	
1.0	General					
1.1	Number of Plate Heat Exchanger		Nos	Three (3) nos	Eight (8) nos	Three (3) nos
1.2	Arrangement			As per System Requirement	As per System Requirement	As per System Requirement
1.3	Location			Outdoor	Outdoor	Outdoor
1.4	Primary side (Hot) Fluid			Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)
1.5	Secondary side (Cold) fluid			CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)
1.6	Connecting Pipe size	(Primary Side)	NB	150	150	150
		(Secondary Side)	NB	150	150	200
1.7	Maximum permitted Length of the PHE		mm	2000 mm (excluding reducer)	2000 mm (excluding reducer)	2000 mm (excluding reducer)
2.0	Design					
2.1	Design Code			Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards
2.2	Design Pressure		Kg/cm ² (g)	10	10	10
		(Primary Side)	Kg/cm ² (g)	6.5 to 8.5 Kg/sq. cm(g)	6.5 to 8.5 Kg/sq. cm(g)	6.5 to 8.5 Kg/sq. cm(g)
2.3	Operating Pressure	(Secondary Side)	Kg/cm ² (g)	3.5 to 5.5 Kg/sq. cm(g)	4.0 to 6.0 Kg/sq. cm(g)	3.5 to 5.5 Kg/sq. cm(g)
			°C	60	60	60
2.4	Mechanical Design Temp.					
2.5	Heat Transfer per Sq.Mtr. Of Heat Transfer Plate		Kcal/Hr./m ²	6500 (Max.)	6500 (Max.)	6500 (Max.)
2.6	Specific Heat of Fluid	(Primary Side)	Cal/gmDeg.C	1	1	1
		(Secondary Side)	Cal/gmDeg.C	1	1	1
2.7	Density of Fluid	(Primary Side)	gm/cc	1	1	1
		(Secondary Side)	gm/cc	1	1	1
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:					
3.1	Flow rate	(DMCW Side)	M ³ /hr	65	80	95
		(ACW Side)	M ³ /hr	80	95	115
3.2	Inlet temperature	(DMCW Side)	°C	48	43.6	43.6
		(ACW Side)	°C	36	36	36
3.3	Outlet temp	(DMCW Side)	°C	38	38	38
		(ACW Side)	°C	44.1	40.7	40.6
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow	(DMCW Side)	MWC	5	5	5
		(ACW Side)	MWC	5	5	5
	* 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	NIL
5.0	Heat Transfer Coefficient/Margin					
5.1	Overall fouling resistance (minimun)		Hr m2deg C/Kcal	0.00008	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	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	SS-316
6.2	Plate Gasket			Nitrile rubber, 65 ± 5 Deg. shore hardness	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, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.4	Guide Rails/ bar			Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding
6.5	Support Beam/ column			Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.6	Nozzle (Reducer/Expander)			Carbon steel IS 2062, Gr. B, Epoxy Coated	Carbon steel IS 2062, Gr. B, Epoxy Coated	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	Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated

	TECHNICAL SPECIFICATION FOR			Technical specification no	PE-RC-999-179-N003 (Rev 0)	
	PLATE HEAT EXCHANGER			Section	IB	
	DATASHEET - A			Rev	0	
	FOR RATE CONTRACT			Date	25-02-2020	
	PHE DESCRIPTION		PHE TYPE-13	PHE TYPE-14	PHE TYPE-15	
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	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	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	SA 193 B7/ SA 194 2H	
6.11	Nozzle flange gasket		3mm wire inserted Red Rubber	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)	AISI 316 18'-8' SS (3 mm thick)	
6.13	Wetted fasteners		SS-316	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.	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, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	
	c.) Final Paint					
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	25	25	
8.0	Spares	Unit of Measurement				
8.1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	60 LOTS	160 LOTS	60 LOTS	
8.2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	90 LOTS	240 LOTS	90 LOTS	
8.3	Valves	NOS.	1 NO.	1 NO.	1 NO.	
8.4	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	30 LOTS	80 LOTS	30 LOTS	
8.5	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	30 LOTS	80 LOTS	30 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	1.5 times the design pressure	
9.2	Duration of Hydrotesting	Minutes	30	30	30	
10.0	Performance curves and figures to be furnished during contact stage					
10.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.					
10.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)					
10.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)					
10.4	Primary side water outlet temperature vs. Primary side inlet temp.					
10.5	Film heat transfer coefficient curve					
10.6	Correction Curves.					
11.0	Minimum Standard requirement of the PHE to be offered by the bidder.					
11.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)					
11.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.					
11.3	Plate thickness should be adequate to withstand all operating conditions but with Minimum plate thickness of 0.6 mm (No negative tolerance allowed in thickness specified). The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.					
11.4	The plate Heat exchangers shall be single pass type. Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.					
11.5	Double sealing arrangement shall be provided at outer edge and around ports with the inter space between the seals vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.					
11.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.					
11.7	Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.					
11.8	Painting as specified at Sl. No. 6.14 above shall be subject to customer/BHEL approval during detailed engineering.					

				
TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGER		Technical specification no	PE-RC-999-179-N003 (Rev 0)	
DATASHEET - A		Section	IB	
FOR RATE CONTRACT		Rev	0	
		Date	25-02-2020	
PHE DESCRIPTION		PHE TYPE-16	PHE TYPE-17	
1.0	General			
1.1	Number of Plate Heat Exchanger	Nos	Three (3) nos	Three (3) nos
1.2	Arrangement		As per System Requirement	As per System Requirement
1.3	Location		Outdoor	Outdoor
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		CW Blowdown water (Refer enclosed water analysis)	CW Blowdown water (Refer enclosed water analysis)
1.6	Connecting Pipe size	(Primary Side) (Secondary Side)	NB NB	150 200
1.7	Maximum permitted Length of the PHE	mm	2000 mm (excluding reducer)	2000 mm (excluding reducer)
2.0	Design			
2.1	Design Code		Latest IS/BS/DIN/ASTM/ASME Standards	Latest IS/BS/DIN/ASTM/ASME Standards
2.2	Design Pressure	Kg/cm ² (g)	10	10
2.3	Operating Pressure	(Primary Side) (Secondary Side)	Kg/cm ² (g) Kg/cm ² (g)	6.5 to 8.5 Kg/sq. cm(g) 3.5 to 5.5 Kg/sq. cm(g)
2.4	Mechanical Design Temp.	°C	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) (Secondary Side)	Cal/gmDeg.C Cal/gmDeg.C	1 1
2.7	Density of Fluid	(Primary Side) (Secondary Side)	gm/cc gm/cc	1 1
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:			
3.1	Flow rate	(DMCW Side) (ACW Side)	M ³ /hr M ³ /hr	95 115
3.2	Inlet temperature	(DMCW Side) (ACW Side)	°C °C	48 36
3.3	Outlet temp	(DMCW Side) (ACW Side)	°C °C	38 44.3
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow	(DMCW Side) (ACW Side)	MWC MWC	5 5
* 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 (minimum)	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, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.4	Guide Rails/ bar		Carbon Steel, IS-2062, Gr.B, with SS Cladding	Carbon Steel, IS-2062, Gr.B, with SS Cladding
6.5	Support Beam/ column		Carbon Steel, IS-2062, Gr.B, Epoxy painted	Carbon Steel, IS-2062, Gr.B, Epoxy painted
6.6	Nozzle (Reducer/Expander)		Carbon steel IS 2062, Gr. B, Epoxy Coated	Carbon steel IS 2062, Gr. B, Epoxy Coated
6.7	Nozzle flanges		Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated	Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated

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	PLATE HEAT EXCHANGER		Section	IB	
	DATASHEET - A		Rev	0	
	FOR RATE CONTRACT		Date	25-02-2020	
	PHE DESCRIPTION		PHE TYPE-16	PHE TYPE-17	
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.	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, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	For all the steel surfaces, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50 microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and color with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns.	
	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	60 LOTS	60 LOTS	
8.2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	90 LOTS	90 LOTS	
8.3	Valves	NOS.	1 NO.	1 NO.	
8.4	Tie Rods	1 Lot = 1% of tie-rod of each type in each PHE	30 LOTS	30 LOTS	
8.5	Fasteners (Nuts & bolts etc.)	1 Lot = 1% of Nuts & bolts of each type & size in each PHE	30 LOTS	30 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	30	30	
10.0	Performance curves and figures to be furnished during contact stage				
10.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.				
10.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)				
10.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)				
10.4	Primary side water outlet temperature vs. Primary side inlet temp.				
10.5	Film heat transfer coefficient curve				
10.6	Correction Curves.				
11.0	Minimum Standard requirement of the PHE to be offered by the bidder.				
11.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)				
11.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.				
11.3	Plate thickness should be adequate to withstand all operating conditions but with Minimum plate thickness of 0.6 mm (No negative tolerance allowed in thickness specified). The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.				
11.4	The plate Heat exchangers shall be single pass type. Heat transfer plates shall be sealed at their outer edges and around the ports by gaskets in order to prevent leakage and inter-mixing of fluids.				
11.5	Double sealing arrangement shall be provided at outer edge and around ports with the inter space between the seals vented to atmosphere in order to avoid inter-mixing of liquids in case of gaskets failure.				
11.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.				
11.7	Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.				
11.8	Painting as specified at Sl. No. 6.14 above shall be subject to customer/BHEL approval during detailed engineering.				

DM WATER ANALYSIS

Applicable for ALL Projects (PHE-Primary Side)

ANNEXURE - A-9

CLAUSE NO.	PROJECT INFORMATION		
	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 SiO ₂
	ii)	Iron as Fe	Nil
	iii)	Total hardness	Nil
	iv)	pH value	CORRECTED TO 8.5-9.5
	v)	Conductivity excluding the effects of free CO ₂	Not more than 0.1
APPLICABLE FOR ALL PROJECTS		TECHNICAL SPECIFICATIONS SECTION-VI PART-A	PROJECT SYNOPSIS
			PAGE 1 OF 1

CLARIFIED WATER ANALYSIS

Sl. No.	Constituent	as	mg/Litre
A) COOLING WATER ANALYSIS /CW BLOW DOWN WATER ANALYSIS			
1.	Calcium	CaCO ₃	316
2.	Magnesium	CaCO ₃	292
3.	Sodium	CaCO ₃	260
4.	Potassium	CaCO ₃	24
5.	Total Cations	CaCO ₃	892
6.	M-Alkalinity	CaCO ₃	120
7.	P-Alkalinity	CaCO ₃	0
8.	Nitrate CaCO ₃	CaCO ₃	8.8
9.	Chloride	CaCO ₃	252
10.	Sulphate	CaCO ₃	160
11.	Total Anions	CaCO ₃	892
12.	Silica	SiO ₂	60
13.	Iron	Fe	0.48
14.	pH Value	-	6.5-6.9
15.	Turbidity	NTU	6
16.	Total Dissolved solids	CaCO ₃	980
17.	Organic matter (Oxygen absorbed from Acid Permanganate In 4 Hrs.)	mg/l	0.1

Note : In some cases calcium may go up to 721 mg/litre.



TITLE :
**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS**

SPECIFICATION NO. PE-RC-999-179-N003

SECTION II

REV. NO. 0

DATE 22/02/2020

SECTION II

**IIA STANDARD TECHNICAL SPECIFICATION
STANDARD QUALITY PLAN**



TITLE :
STANDARD TECHNICAL SPECIFICATION
FOR
PLATE HEAT EXCHANGER

SPECIFICATION NO. PE-TS-999-179-N001

VOLUME :

SECTION : IIA

REV. NO. 01

DATE : 2/5/2018

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

	TITLE : STANDARD TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGER	SPECIFICATION NO. PE-TS-999-179-N001	
		VOLUME :	
		SECTION : IIA	
		REV. NO. 01	DATE : 2/5/18
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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

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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.

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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

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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

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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.,

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	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.		

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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.		

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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.

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7.08.00 Hydrostatic Test :

Plate heat exchanger shall be 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 plate 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

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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).



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STANDARD TECHNICAL SPECIFICATION
FOR
PLATE HEAT EXCHANGER

SPECIFICATION NO. PE-TS-999-179-N001

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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.

	TITLE : DATA SHEET - C PLATE HEAT EXCHANGER	SPECIFICATION NO. PE-TS-999-179-N001	
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1.00.00 DRAWINGS, DATA AND INFORMATION TO BE SUBMITTED AFTER THE AWARD OF CONTRACT

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

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

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

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

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

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

1.01.03 Sizing and calculations related to PHE/plates.

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

1.01.05 Quality Plan for PHE.

1.01.06 PG Test procedure (as applicable).

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

1.02.01 Drawings of components and details as deemed necessary.

1.02.02 Material Test Certificates.

1.02.03 Shop Tests Reports and Certificates.

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

1.02.05 Storage Instruction.



MANUFACTURER/ BIDDER/		STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
SUPPLIER NAME & ADDRESS		CUSTOMER :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
		PROJECT:		PO NO.:	DATE:
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SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
	2	3	4	5	6		7	8	9	*	**			
1					M	C/ N				D	M	C	N	

1.0	RAW MATERIAL INSPECTION													
1.1	Frame Plates & Pressure Plates, Counter Flanges, Connection Lining Material, Top And Bottom Carrying Bar.	Physical Properties	MA	Physical Test	1/Heat	1/Heat	App. Drg / Data Sheet	Relevant material Std.	Mill TC Or Lab Test Report	✓	P.V	V	V	If co-related mill TCS are not available then check testing carried out by NABL lab
		Chemical Properties	MA	Chemical Analysis	1/Heat	1/Heat	App. Drg / Data Sheet	Relevant material Std.	Mill TC Or Lab Test Report	✓	P.V	V	V	
		Dimensions	MA	Measurement	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	✓	P.V	V	V	
		Workmanship And Finish	MA	Visual	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	✓	P.V	V	V	
		Lamination (Applicable For Frame And Pressure Plate Only)	CR	Ultrasonic Test	100%	100%	SA 435	SA 435	Inspection Reports	✓	P.V	V	V	Applicable for plate thickness more than 25 mm only
1.2	Heat Transfer (HT) Plates/Coils	Physical Properties	MA	Physical Test	1/Heat	1/Heat	App. Drg. / Data Sheet	App. Drg. / Data Sheet	Mill TC Or Lab Test Report	✓	P.V	V	V	See Remark 1
		Chemical Properties	MA	Chemical Analysis	1/Heat	1/Heat	App. Drg. / Data Sheet	App. Drg. / Data Sheet	Mill TC Or Lab Test Report	✓	P.V	V	V	
		Dimensions	MA	Measurement	100%	Sample	Approved Drawings	Approved Drawings	Inspection Reports	✓	P.V	V	V	

ENGINEERING				QUALITY				BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
	Sign & Date	Name	Checked	Sign & Date	Name	Seal		Sign & Date		Doc No:	Sign & Date	Name	Seal
Prepared by:		NIKHIL DUBEY			MOHIT KUMAR								
Reviewed by:		VISHAL K.R. YADAV			RITESH K.R. JAISWAL								

19/2/2020



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

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	10			
					M	C/ N				D	M	C	N
		Dimensions	MA	Measurement	100%	Sample	Approved Drawings	Approved Drawings	Inspection Reports	✓	P.V	V	V
		Workmanship And Finish	MA	Visual	100%	Sample	No damage, No Surface defects.	No damage, No Surface defects.	Inspection Reports	✓	P.V	V	V
		Contour	MA	Visual	100%	Sample	Mfg. Drgs / specification	Mfg. Drgs / specification	Inspection Reports	✓	P.V	V	V
1.3	Gaskets	Hardness	CR	Measurement	100%	Sample	Approved Drawings	Approved Drawings	Inspection Reports	✓	P.V	V	V
		Physical Properties	MA	Physical Test	1/1/Heat	1/1/Heat	App. Drg / data sheet	Relevant Material Std.	Mill Tc Or Lab Test Report	✓	P.V	V	V
		Chemical Properties	MA	Chemical Analysis	1/1/Heat	1/1/Heat	App. Drg / data sheet	Relevant Material Std.	Mill Tc Or Lab Test Report	✓	P.V	V	V
		Dimensions	MA	Measurement	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	✓	P.V	V	V
		Workmanship and Finish	MA	Visual	100%	100%	Approved Drawings	Approved Drawings	Inspection Reports	✓	P.V	V	V
		Internal Soundness (For diameter >= 40 mm)	CR	UT	100%	100%	ASTM A 388	See Remark - 4	Inspection Reports	✓	P.V	V	V
2.0	IN PROCESS INSPECTION												
2.1	HT PLATES	Area Measurement	NA	White Light Scanning	1 per Type	1 per Type	Approved drawing/ data sheet	Approved drawing/ data sheet	Inspection Reports	✓	P.V	W	V
													See Remark 2
1.4	Tightening Bolts & Nuts. (Tie Rod)												UT will be carried on raw material stage.

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

19/2/2020



MANUFACTURER/
SUPPLIER NAME & ADDRESS

STANDARD QUALITY PLAN

SPEC. NO : PE-TS-999-179-N001, R01

DATE: 02/05/18

CUSTOMER :

QP NO.: PE-QP-999-179-N004

DATE: 15/02/2020

PROJECT:

PO NO.:

DATE:

ITEM: PLATE HEAT EXCHANGER

SYSTEM: DMCW/ACW

SECTION:

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

BHEL

BIDDER/SUPPLIER

FOR CUSTOMER REVIEW & APPROVAL

ENGINEERING		QUALITY	
Sign & Date	Name	Sign & Date	Name
Prepared by: <i>[Signature]</i>	NIKHIL DUBEY	Checked by: <i>[Signature]</i>	MOHIT KUMAR
Reviewed by: <i>[Signature]</i>	VISHAL KR. YADAV	Reviewed by: <i>[Signature]</i>	RITESH KR. JAISWAL

Sign & Date	Seal

Doc No.:	Sign & Date	Name	Seal
Reviewed by: <i>[Signature]</i>			
Approved by: <i>[Signature]</i>			

19/12/2020

19/02/2020



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

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

BHEL				BIDDER/SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Doc No:		Sign & Date		Seal	
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name	Seal		
Reviewed by:	19/04/2018	NIKHIL DUBEY	19/02/2018	MOHIT KUMAR		Approved by:					
	19/2/2020	VISHAL KR. YADAV	19/02/2018	RITESH KR. JAISWAL							



MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-179-N001, R01	DATE: 02/05/18
CUSTOMER :		PROJECT :		QP NO.: PE-QP-999-179-N004	DATE: 15/02/2020
ITEM: PLATE HEAT EXCHANGER		SYSTEM: DMCW/ACW		PO NO.:	DATE:
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1	2	3	4	5	6	7	8	9	*	
					M C/ N				D M C N	
1	Co-related Mill TC's to be furnished by vendor to BHEL representative during inspection stage for review. BHEL to verify physical correlation of Mill TC's with material.									
2	Inspection of Heat Transfer Plate Area Measurement shall be by White Light Scanning Method from BHEL (Refer Annexure -A). In case, inspection of plate area measurement by white light scanning method of specific PHE model has been witnessed by BHEL in past project then Type test certificates are acceptable to BHEL for same. The type test certificate shall not be more than 5 years old from date of inspection.									
3.	Reg. Dye Penetrant Test & Light Box Test: There shall be random witness by BHEL/ Customer at Bidder's works, in case any defect is found in any of selected % of plates, the whole lot shall be tested in presence of BHEL & Customer. H.T. Plates without defect only shall be accepted.									
4.	Ultrasonic test of the rods shall be carried out using 10 mm / 20 mm size Normal Beam Probe of frequency 2 MHz. Using this probe, the back wall echo in the sound area of bar shall be adjusted to 100% of full Screen Height (FSH). The whole bar shall be scanned under this sensitivity setting. In this sensitivity setting any defect echo indication having height greater than 20% of FSH is not acceptable.									
5.	100% PMI Inspection for material grade of PHE Heat Transfer plates shall be from BHEL/ BHEL TPI. BHEL reserves the right to conduct random & independent PMI inspection on PHE's Heat Transfer plates to ascertain the plate material.									
6.	BHEL reserves the right for conducting repeat test, if required.									
7.	Photographs of packed material to be verified by BHEL before issuing MDCC.									
8.	Project specific QP to be developed based on customer requirement.									

LEGENDS:

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

BHEL				BIDDER/SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Doc No:		Sign & Date		Name	
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:	Sign & Date	Reviewed by:	Sign & Date	Name	Seal
by:	19/09/2020	NIKHIL DUBEY	by:	19.02.20	MOHIT KUMAR	by:		by:			
Reviewed by:	inlet	VISHAL KR. YADAV	Reviewed by:	19/02/2020	RITESH KR. JAISWAL	Approved by:		Approved by:			



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-RC-999-179-N003

SECTION IIA

REV. NO. 1

DATE 18.05.2016

SHEET 1 OF 2

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.



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-RC-999-179-N003

SECTION IIA

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ANNEXURE-1

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

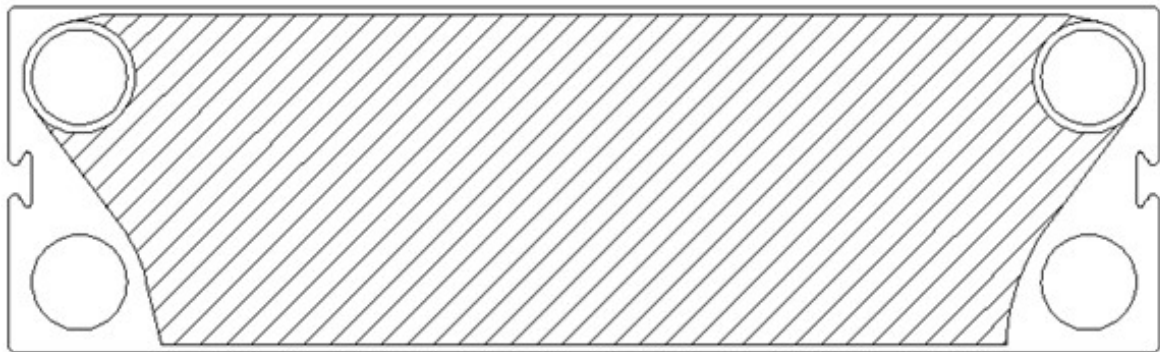


Fig. 1: Wetted Surface Area for Parallel Connection

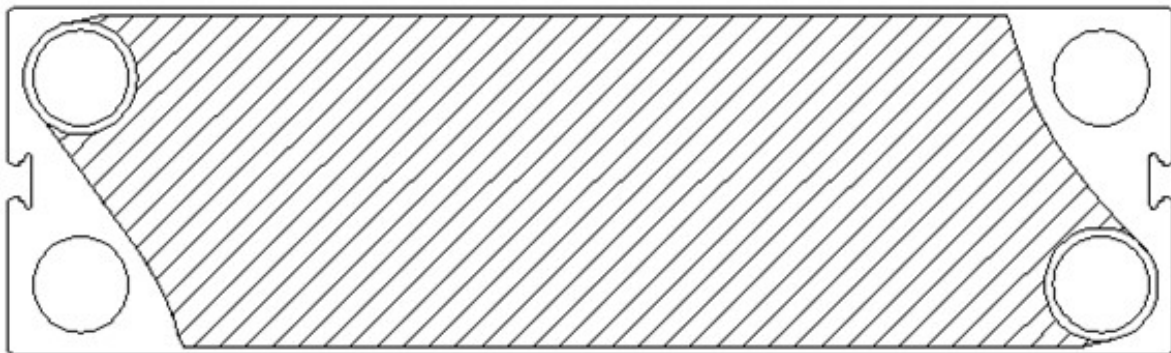


Fig. 2: Wetted Surface Area for Diagonal Connection



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-RC-999-179-N003

SECTION IIA

REV. NO. 1

DATE 18.05.2016

SHEET 1 OF 2

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



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

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SHEET 2 OF 2

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.





TITLE :
**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS**

SPECIFICATION NO. PE-RC-999-179-N003

SECTION III

REV. NO. 0

DATE 22/02/2020

SECTION III

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

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

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

	TITLE :	SPECIFICATION NO. PE-RC-999-179-N003	
	TECHNICAL SPECIFICATION FOR	SECTION IIIA	
	RATE CONTRACT OF	REV. NO. 0	DATE 22/02/2020
	PLATE HEAT EXCHANGERS		

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
PLATE HEAT EXCHANGER

SPECIFICATION NO.

PE-RC-999-179-N003

Section

IIIB

Rev No.

0

SL. NO.	DESCRIPTION	UNIT	GUARANTEE VALUE
	(To be Filled separately for each type of PHE)		
1.0	PRIMARY SIDE (HOT WATER SIDE)		
	CLEAN CONDITION		
a)	Flow rate	M ³ /Hr.	
b)	DMCW inlet temperature	°C	
c)	DMCW outlet temperature	°C	
d)	Pressure drop	MWC	
2.0	SECONDARY SIDE (COLD WATER SIDE)		
	CLEAN CONDITION		
a)	Flow rate	M ³ /Hr.	
b)	ACW inlet temperature	°C	
c)	ACW outlet temperature	°C	
d)	Pressure drop	MWC	
3.0	PRIMARY SIDE (HOT WATER SIDE)		
	FOULED CONDITION		
a)	Flow rate	M ³ /Hr.	
b)	DMCW inlet temperature	°C	
c)	DMCW outlet temperature	°C	
d)	Pressure drop	MWC	
4.0	SECONDARY SIDE (COLD WATER SIDE)		
	FOULED CONDITION		
a)	Flow rate	M ³ /Hr.	
b)	ACW inlet temperature	°C	
c)	ACW outlet temperature	°C	
d)	Pressure drop	MWC	

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

NAME

SIGNATURE

DATE

	Title DATA SHEET - B		SPECIFICATION NO. PE-RC-999-179-N003			
	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-N003, 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	°C		
2.3	Heat Load(without LMTD correction)	KW		
2.4	Heat Load(with LMTD correction)	KW		
2.5	LMTD (Corrected)	°C		
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	°C		
3.3	Outlet temperature	°C		
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 °C		
4.2	Fouling factor	M ² hr °C/KCal		

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

	Title	DATA SHEET - B	SPECIFICATION NO. PE-RC-999-179-N003		
		PLATE HEAT EXCHANGER	VOLUME	III	SECTION B
			SHEET	2	OF 7

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-RC-999-179-N003, Section – IA & IB.
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SL.NO.	ITEM	UNIT	PARTICULARS
4.3	Overall fouling	M ² hr°C/KCal	
4.4	Overall heat transfer coefficient	KCal/hrM ² °C	
	a) In clean conditions		
	b) In fouled conditions		
4.5	Total effective heat transfer area per heat exchanger	M ²	
4.6	Average velocity	m/s	
	a) Through ports		
	b) Through Plate Channels		
4.7	Pressure drop in ports	bar	
4.8	Pressure drop in channels	bar	
4.9	Maximum differential pressure between hot and cold fluids in plate channels (operating)	bar (g)	
5.0	Heat Transfer Plates		
5.1	Area of each plate	M ²	
5.2	Dimension (width x height)	mm x mm	
5.3	Thickness	mm	
5.4	Material & chemical composition		
5.5	Number of plates per heat exchanger	Nos.	
5.6	Maximum number of plates that can be accommodated in the heat exchanger frame	Nos.	
5.7	Type of corrugation		
5.8	Minimum plate pack length	mm	

Name of

Bidder/ Vendor

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

	Title	DATA SHEET - B	SPECIFICATION NO. PE-RC-999-179-N003		
		PLATE HEAT EXCHANGER	VOLUME	III	SECTION B
			SHEET	3	OF 7

INSTRUCTION TO BIDDER

- This data sheet shall be read in conjunction with Specification No. PE-RC-999-179-N003, Section – IA & IB.
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SL.NO.	ITEM	UNIT	PARTICULARS
	a) As per 5.5 above b) As per 5.6 above Maximum plate pack length a) As per 5.5 above b) As per 5.6 above	mm	
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		

Name of

Bidder/ Vendor

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

	Title	DATA SHEET - B	SPECIFICATION NO. PE-RC-999-179-N003			
		PLATE HEAT EXCHANGER	VOLUME	III	SECTION	B
			SHEET	4	OF	7

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-RC-999-179-N003, Section – IA & IB.
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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	Secondary Side
13.1	Size	mm	<u>(Hot Fluid)</u>	<u>(Cold Fluid)</u>
13.2	Rating			
13.3	Facing & drilling standard			
13.4	Flange material			
13.5	Are all nozzles counter-flanges, bolts, nuts, gaskets etc., are included in the		YES/NO	

Name of

Bidder/ Vendor

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

	Title	DATA SHEET - B	SPECIFICATION NO. PE-RC-999-179-N003		
		PLATE HEAT EXCHANGER	VOLUME	III	SECTION B
			SHEET	5	OF 7

INSTRUCTION TO BIDDER

- This data sheet shall be read in conjunction with Specification No. PE-RC-999-179-N003, Section – IA & IB.
- Items which deviate from Specification shall be marked with an asterisk (*)

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

Name of

Bidder/ Vendor

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

	Title	DATA SHEET - B	SPECIFICATION NO. PE-RC-999-179-N003		
		PLATE HEAT EXCHANGER	VOLUME	III	SECTION B
			SHEET	6	OF 7

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-RC-999-179-N003, Section – IA & IB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

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

Name of

Bidder/ Vendor

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

	Title	DATA SHEET - B	SPECIFICATION NO. PE-RC-999-179-N003		
		PLATE HEAT EXCHANGER	VOLUME	III	SECTION B
			SHEET	7	OF 7

INSTRUCTION TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PE-RC-999-179-N003, Section – IA & IB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

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

Name of
Bidder/ Vendor

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