



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
PROJECT ENGINEERING MANAGEMENT

Enq No.: PE/PG/RTC/E-5657/2017

Date: 20/06/2017

TENDER ENQUIRY

DUE DATE
July, 5, 2017
By 02:00 P.M. IST

SUBJECT: OPEN TENDER ENQUIRY FOR RATE CONTRACT OF PLATE HEAT EXCHANGERS AS PER TECHNICAL SPECIFICATION NO. PE-TS-RC-179-N001

OUR REF: TENDER ENQUIRY NO: PE/PG/RTC/E-5657/2017 dtd 20/06/2017

Dear Sir/ Ma'am,

We are pleased to invite your offer for subject package in two parts strictly as per Clause-2.0 of the enclosed "Instructions to Bidders" of the General Conditions of Contract (GCC) Rev-06 available at following link: - <http://www.bhelpem.com/Documents/GCC/GCC-Rev-06.pdf> Bidders are requested to submit their bids in quintuplicate (5 sets) in sealed covers. The details of the tender enquiry are as mentioned below:

Sl. No	Description for which Rate Contract is desired	Tentative Quantity	Delivery required
1	Plate Heat Exchangers - Refer Technical specification no. PE-TS-RC-179-N001 for detailed description.	As per BOQ cum price schedules in Annexure-I for Group A (with CIF) & Annexure-II for Group B (without CIF) cumulative for the Prospective Projects (Group-A & Group-B) as per Annexure-IV.	Supply: "Six (06) months from drgs. /docs. Approval in CAT-I issued by BHEL. Successful bidder to make 1st submission of drawing/docs as per list mentioned in clause 8 of Technical Specification-PE-TS-RC-179-N001, taking care of all the comments of BHEL. Any deficiency in documents submitted w.r.t. agreed specification/ comments from BHEL shall be treated as non-submission and no. of days delay in submission of complete documents during approval process, on account of this, would be reduced from the delivery. The vendor shall be responsible for getting approval from BHEL as early as possible and BHEL will support the process, in full, within above time frame and terms & conditions." For PG Test: Vendor to depute their representative to site for carrying out commissioning activities within two weeks of intimation by BHEL, subject to site readiness, failing which LD @ 0.5% per week or part thereof of total contract value for supervision for that project shall be levied limited to 10% of supervision value. For Mandatory Spares: Mandatory Spares to be delivered within 04 months from manufacturing clearance. Separate dispatch/ manufacturing clearance will be issued for Mandatory Spares.

Please reply to:
PEM -Power Sector
PPEI Building,
BHEL House
HRD & ESI Complex,
Plot-25, Sector-16-A NOIDA - 201301

Phone: 0120-4213591
Fax : 0120-4329026
e-mail: ncsharma@bhelpem.co.in

Regd. Office:

Siri Fort
New Delhi - 110049



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(i) Rate contract on firm price basis is proposed for 1 year from placement of Rate Contract PO.

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

BOQ is split in two groups i.e. One for projects listed in Group-A and other for projects listed in Group-B. Grouping of the projects has been done considering availability/non-availability of CIF allocation for the projects.

Considering above, two Rate contracts (Group-A & Group-B) for 100 percent value on L1 bidder is proposed for one years from placement of Rate Contract PO with a provision for further extension after review on mutual consent.

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

For this purpose, two price bids in separate sealed envelope clearly indicating that the Group for which **Price bid has been submitted [one for Annexure-I Group-A and other separately for Annexure-II Group-B]** shall be asked. Accordingly, 2 RAs shall be done.

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

(iii) Bidders will be informed the following:-

a) Rate contract shall be decided on the basis of grand Total FOR site price of Total BOQ of PHE as listed in Annexure-I Group-A and Annexure-II Group-B separately.

b) Though evaluation is proposed on Grand Total FOR site, but there is % allocation weightage against BOQ quantity of each item which shall be used for arriving at price break up. Indigenous Bidders need to give only their total ex works price for given BOQ at sl. no. A.9 column no. 8 for Annexure I Group-A and at sl. A.4 column no. 8 for Annexure-II Group-B in separate price bids. Foreign bidders need to give only their total ex works price for given BOQ at sl. no. A.9 column no. 17 for Annexure I Group-A and at sl. A.4 column no. 17 for Annexure-II Group-B in separate price bids.

c) Indigenous Bidders also requires to mention applicable % GST for of taxes/ duties (against respective column for GST) applicable for each item of the BOQ.

d) Indigenous bidder to give % of freight charges considering anywhere in India in the freight column

e) Rest of the prices shall be derived by BHEL in line with % allocation fixed for each item.

f) For better clarity to the bidders where value is to be filled is noted as "to be quoted" and for other columns it will be noted as "derived" which denotes shall be derived by BHEL as per % allocation fixed against each item

g) Indigenous bidders having CIF for raw material have to mention CIF% of total ex works in their bid and % discount on ex works price in lieu of availing CIF.

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(iv) Evaluation will be done on overall L1 (Total cost to BHEL) basis with necessary loading as applicable. Incomplete offer or offer for part of NIT BOM/BOQ shall be summarily rejected.

(v) Refer Annexure-I for Group A (with CIF) & Annexure-II for Group B (without CIF) for tentative Qty of Plate Heat Exchangers, required for prospective projects (Projects in Group A viz. 800 MW Vijaywada APGENCO, 800MW Krishnapstnam APPDCL, 525MW Tuticorin & 2X660MW Ennore for which CIF is available & Projects in Group B viz. 250 MW Rourkela, 800 MW North Chennai for which CIF is not available, refer Annex-IV). Indigenous bidders to quote single freight % considering delivery to any of the project in each group i.e. for Group A & Group-B.
Quantity variation shall be applicable as plus 10 percent of the contract value.

(vi) Drawings/ documents, equipment manufacture inspection & dispatch requirement will be as per Technical Specification no. PE-TS-RC-179-N001.

(vii) **Pre-Qualifying Requirements (PQR):** All the bidders (registered/ non-registered) will be asked to submit documents fulfilling PQR requirements (as per enclosed annex-V) with the bid & their further evaluation shall be done based on qualification in PQR.

(viii) Bidders to note that their bid shall be conditional subject to qualify PQR by registered vendors & non-registered vendors have to qualify PQR & get registered with PEM for the package.

For registration in PEM "Bidders needs to apply & get registered for subject package with PEM before P-2 (price bid opening) & **hence you need to apply online for registration on PEM web portal & have to enclose acknowledgement with this effect with the bid documents else your bid will not be considered for evaluation**"

Online Registration Portal is operational in BHEL. Non-registered Vendors, who wish to apply for registration with BHEL-PEM, have to apply through Online Registration Portal available at www.bhelpem.com → vendor section → Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and submit the application for registration. One set of hard copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted.

(ix) Bidder are required to submit offer strictly in accordance with the requirements of the above tender documents. Deviations (Technical as well as Commercial) from NIT are generally not acceptable, if any, Technical deviations and Commercial deviations shall be furnished in "**Cost of Withdrawal sheet**" (as per Annexure-II of GCC Rev. 06, copy enclosed) **only under the headings "TECHNICAL DEVIATIONS" and "COMMERCIAL DEVIATIONS"** respectively, along with reasons for taking such deviations. Deviations (Technical & Commercial) taken other than as mentioned on cost of withdrawal sheet shall not be considered.

(GCC Rev. 06 is available on <http://www.bhelpem.com/Documents/GCC/GCC-Rev-06.pdf> , you are requested to kindly download the same).

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Tender Enquiry Terms and Conditions: -

1. Offers should be submitted in hard as follows:

Part-I Bid: Documents and Credential as per Technical PQR and Techno-Commercial offer (along with un-priced copy of un-priced bid for each Group i.e. Group-A & Group-B mentioned separately, Annexure I & II).

Part-II Bid: Price Bids for each Group separately- i.e. one price bid for Annexure-I Group-A and one price bid for Annexure-II Group-B separately.

Your best quotation/offer for the above requirement, in line with our terms and conditions, should either be delivered in person or sent by COURIER/REGISTERED POST, to the following address only:

Tender Box, Tender Room, Ground Floor, PPEI Building
(behind Reception Desk)
C/O N C SHARMA/ SR. ENGINEER, CMM
I P SINGH/ SR. MANAGER, 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,U.P.,INDIA
E-mail:
ncsharma@bhelpem.co.in; INDRA@bhelpem.co.in;
Ph. No. +91-120-4213591, 9911170053, +91-120-4368749

- a. It shall be the responsibility of the bidder to ensure that the tender is delivered on or before the due date by 02:00 PM (IST). The offer has to be deposited in tender box only. Part-I bids shall be opened at 03:00 PM (IST) on the due date in the presence of authorized representatives of the bidders, who may like to be present.
- b. BHEL shall not accept any tender in torn condition and return the same with the Stamping "Returned to Sender-Package Damaged". Offers in damaged condition will not be considered and no request for extension on this account will be considered.
- c. Bidder's representative shall deposit the offer in tender box only.
- d. Bidders shall be allowed in the tender room in area identified for bidders and only one authorized representative from each bidder shall be allowed.
- e. Bidder shall not be allowed to carry mobile/camera/ laptop in the tender room. The same shall have to be deposited at security in advance and taken back after tender opening.
- f. Details of offers shall be read out to bidders and in no case the offers shall be handed over to any of the bidders for noting down.
- g. Please ensure tender submission before due date and time. Late tenders shall not be accepted.

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2. For detailed instructions, please see clause no. 2 of "Instructions to Bidders" of GCC, Rev. 06.
3. Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
4. Bidder to submit complete tender 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.
5. Unsolicited fresh/ revised price bids shall not be entertained.
6. Tender will be opened at **03.00 PM on 05/07/2017**.
7. 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.
8. 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.
9. **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.

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Indigenous Bidders has to quote the Single Price (i.e. Total Cost to BHEL) in Reverse Auction i. e. Price mentioned in at sl. no. D column no. 13 for Annexure I Group-A and at sl. D column no. 13 for Annexure-II Group-B separately with loading/de loading (if any).

Foreign Bidders has to quote the Single Price (i.e. Total Cost to BHEL) in Reverse Auction i. e. Price mentioned in at sl. no. D column no. 17 for Annexure I Group-A and at sl. D column no. 17 for Annexure-II Group-B separately with loading/de loading (if any).

Price are to be inclusive of Packing & Forwarding charges and freight charges, all the routine & type tests as per tender scope, taxes/duties, including loading (if any). De-loading (if any) shall be done in line with NIT terms.

Statutory variation shall be applicable. Any new tax structure (like Goods & Services Tax) as and when implemented by the Government shall become applicable in addition to or in lieu of existing tax structure.

Note: - Applicable taxes & duties shall be determined as per location of works of bidder.

10. Integrity Pact (IP) shall be applicable for subject tender:

IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. A Panel of Independent External Monitors (IEMs) has been appointed to oversee implementation of IP in BHEL.

The IP (Refer Annexure-IX, as per GCC Rev-06) is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

Details of IEM for this tender are furnished below:-

Name: - Sh. VVR Sastry, Ex-CMD/ BEL

Address: - 957, 9th Main 3 Stage, 3 Block, Basaveswaranagar, Bangalore- 560079

Email: - sastryvvr@gmail.com

No routine correspondence shall be addressed to the IEM (phone/post/email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department.

For all clarifications/ issues related to the tender, Please contact:

Mr. N.C Sharma, Sr.ENGR/MM e-mail : ncsharma@bhelpem.co.in Ph. No. 0120- 4213591	Mr. I P Singh, Sr. Mgr./ CMM e-mail: INDRA@bhelpem.co.in Ph. No. 0120-4368749
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However, for **Technical clarifications**, following persons may be contacted:

Mr. Prashant Agarwal, Sr. ENGR./MSE e-mail: prashantagarwal@bhelpem.co.in	Mr. Ajay Jain, SR. MGR/MSE e-mail : ajayjain@bhelpem.co.in
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Ph. No.0120-4368506	Ph. No.0120- 4368986
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11. Any taxes and duties applicable on the date of bid but not quoted by the bidders shall be to the bidder account.
12. Delivery terms for dispatches shall be FOR Dispatch Station.
13. CIF is available for this package for Annexure-I Group-A.
14. Bidders to submit their offers strictly in line with the enclosed Price Formats (Annexure-I Group-A & Annexure II Group-B separately).
15. Validity of offer shall be as per Clause No. 7.0, "Instructions to Bidders" of GCC Rev 06.
16. This enquiry is subject to Conditions/ limits if any imposed in PMD / Vendor registration.
17. All corrigenda, addenda, amendments, time extensions, clarifications etc. to the tender will be hosted on BHEL website (www.bhel.com), BHEL-PEM website (www.bhelpem.com) & CPP Portal. Bidders should regularly visit websites to keep themselves updated.
18. Foreign and indigenous bidders participating through open tender will necessarily have to buy class III DSCs issued by the certifying authorities in India for future tenders. Basic procedure /checklist has been uploaded on www.bhel.com for participating in tender enquires through e-procurement.
19. Bidder to note that all other terms and condition shall be strictly as per NIT, GCC Rev. 06 & SCC. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be NIT (this letter) / SCC / GCC Rev. 06.

NOTE: In case you are not making an offer against this enquiry, you are requested to send a regret letter so as to reach us on or before the due date.

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

N C Sharma
Sr.ENGR/ CMM

नरेश चन्द्र शर्मा / Naresh Chandra Sharma
वरिष्ठ अभियंता (एम.एम.) / Sr. Engineer (MM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd
पावर सेक्टर-परियोजना इंजीनियरिंग प्रबंधन
Power Sector-Project Engineering Management
प्लॉट नं.-25, सेक्टर-16ए, नोएडा-201 301
Plot No. 25, Sector-16A, Noida-201 301

Enclosures:

- a) NIT (this letter itself)
- b) Technical Specification No. PE-TS-RC-179-N001
- c) Annexure-I Group A: Price Format
- d) Annexure-I Group B: Price Format
- e) Annexure-III: Special Conditions of Rate Contract (SCC).
- f) Annexure-IV: List of prospective projects
- g) Annexure-V: PQR (Pre-qualifying Requirement)
- h) Cost of Withdrawal sheet (Annexure-II of GCC Rev. 06) & PBG Format
- i) Integrity Pact

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ANNEXURE- I (Group-A) (with CIF)														
RATE CONTRACT														
PRICE SCHEDULE FOR PLATE HEAT EXCHANGERS														
NAME OF VENDOR-														
				INDIGENOUS VENDOR							FOREIGN VENDOR			
SL NO	ITEM DESCRIPTION	UOM	ORDERED QUANTITY	UNIT EX-WORKS PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL EX WORKS PRICE OF PHEs GIVEN AT SL NO-A.9 OF COUNMN 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.9 OF COUNMN 8	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES (INCLUDING SERVICE TAX) @ % OF TOTAL EX WORKS (INR)	GST	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.9 OF COUNMN 17 INDIAN SEA PORT (MUMBAI)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI) (CURRENCY)	TOTAL C & F PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.9 OF COUNMN 17 INDIAN SEA PORT (MUMBAI)	TOTAL C & F PRICE (DULY PACKED) INDIAN SEA POR (MUMBAI) (CURRENCY)
1	2	3	4	5	6	7	8	12		13	14	15	16	17
A	PLATE HEAT EXCHANGER - MAIN SUPPLY													
A.1	TYPE I	NOS.	3	1.99333%	Derived	5.98000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	1.99333%	Derived	5.98000%	Derived
A.2	TYPE II	NOS.	2	0.86000%	Derived	1.72000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	0.86000%	Derived	1.72000%	Derived
A.3	TYPE III	NOS.	2	2.81000%	Derived	5.62000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	2.81000%	Derived	5.62000%	Derived
A.4	TYPE IV	NOS.	3	3.49000%	Derived	10.47000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	3.49000%	Derived	10.47000%	Derived
A.5	TYPE V	NOS.	2	2.67500%	Derived	5.35000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	2.67500%	Derived	5.35000%	Derived
A.6	TYPE VI	NOS.	6	6.97833%	Derived	41.87000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	6.97833%	Derived	41.87000%	Derived
A.7	TYPE VII	NOS.	4	2.35500%	Derived	9.42000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	2.35500%	Derived	9.42000%	Derived
A.8	TYPE VIII	NOS.	3	6.52333%	Derived	19.57000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	6.52333%	Derived	19.57000%	Derived
A.9	TOTAL (A.1 TO A.8)					100.00000%	TO BE QUOTED = Rs X	Derived	Derived	Derived			100.00000%	TO BE QUOTED = M
				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.9 OF COUNMN 8	TOTAL EX-WORKS PRICE FOR PG TEST (INR)		GST	TOTAL PRICE FOR PG TEST WITH SERVICE TAX (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.9 OF COUNMN 17 INDIAN SEA PORT (MUMBAI)	TOTAL PRICE FOR PG TEST (CURRENCY)
B	SERVICES AT SITE PG TEST AT SITE (NOTE: 1SET = PG TEST FOR ONE PHE.)													
B.1		SET	10	0.0181% OF PRICE AT A.9, COL 8	Derived	0.181% OF PRICE AT A.9, COL 8	Derived		% TO BE QUOTED	Derived	0.018100000%	Derived	0.181000000%	Derived
B.2	TOTAL (B.1)						Derived			Derived				Derived
				UNIT EX-WORKS PRICE (DULY PACKED)	UNIT EX-WORKS PRICE (DULY PACKED) (INR)	EXPECTED QUANTITY OF SPARES AS PER DATASHEET A OF SECTION IA	TOTAL EX- WORKS PRICE (DULY PACKED) (INR) (Col F * Col. G)	FREIGHT CHARGES (INCLUDING SERVICE TAX) @ % OF TOTAL EX WORKS (INR)	GST	TOTAL F.O.R SITE PRICE (INR)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI) (CURRENCY)		TOTAL C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI) (CURRENCY)
C	MANDATORY SPARES EXPECTED SPARES FOR EACH PHE TYPE AS PER SPARE LIST INDICATED IN DATASHEET A AT SECTION IB OF SPECIFICATION.													
C.1	TYPE I	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.700% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.700% OF PRICE AT A.1, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.150% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.150% OF PRICE AT A.1, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.055% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.055% OF PRICE AT A.1, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.050% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.050% OF PRICE AT A.1, COL 15	Derived		Derived
C.2	TYPE II	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.7% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.7% PRICE AT A.2, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% PRICE AT A.2, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.074% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.074% PRICE AT A.2, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.05% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.05% PRICE AT A.2, COL 15	Derived		Derived

				INDIGENOUS VENDOR							FOREIGN VENDOR			
C.3	TYPE III	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% OF PRICE AT A.3, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.3, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% OF PRICE AT A.3, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% OF PRICE AT A.3, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.023% OF PRICE AT A.3, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.023% OF PRICE AT A.3, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.030% OF PRICE AT A.3, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.030% OF PRICE AT A.3, COL 15	Derived		Derived
C.4	TYPE IV	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% OF PRICE AT A.4, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.4, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% OF PRICE AT A.4, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% OF PRICE AT A.4, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.021% OF PRICE AT A.4, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.021% OF PRICE AT A.4, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.030% OF PRICE AT A.4, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.030% OF PRICE AT A.4, COL 15	Derived		Derived
C.5	TYPE V	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% OF PRICE AT A.5, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.5, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% OF PRICE AT A.5, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% OF PRICE AT A.5, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.027% OF PRICE AT A.5, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.027% OF PRICE AT A.5, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.03% OF PRICE AT A.5, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.03% OF PRICE AT A.5, COL 15	Derived		Derived
C.6	TYPE VI	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% OF PRICE AT A.6, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.6, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% OF PRICE AT A.6, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% OF PRICE AT A.6, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.016% OF PRICE AT A.6, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.016% OF PRICE AT A.6, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.03% OF PRICE AT A.6, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.03% OF PRICE AT A.6, COL 15	Derived		Derived
C.7	TYPE VII	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% OF PRICE AT A.7, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.7, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% OF PRICE AT A.7, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% OF PRICE AT A.7, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.027% OF PRICE AT A.7, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.027% OF PRICE AT A.7, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.03% OF PRICE AT A.7, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.03% OF PRICE AT A.7, COL 15	Derived		Derived
C.8	TYPE VIII	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% OF PRICE AT A.8, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.8, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% OF PRICE AT A.8, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% OF PRICE AT A.8, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.017% OF PRICE AT A.8, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.017% OF PRICE AT A.8, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.03% OF PRICE AT A.8, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.03% OF PRICE AT A.8, COL 15	Derived		Derived
C.9	TOTAL (C.1 TO C.8)						Derived	Derived		Derived				Derived
D	GRAND TOTAL (A.9+B.2+C.9)						Derived	Derived		Derived = Rs Y				Derived = N

- Note:-
1. Bidder to note that evaluation shall be on Grand Total FOR site price to BHEL, however, Bidder to quote grand total Ex works/total C&F value of the PHEs mentioned at A.1 to A.8 (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 FOR site price of Total BOQ

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

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

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

6. Prices shall remain firm during contract execution.

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

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

9. In case of spares, 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.
10. Indigenous vendors having CIF are required to indicate CIF @ ____% of their total ex-works supply value and ____% Benefit carryforward on ex-works value in lieu of availing CIF.
11. Bidder shall furnish this price Schedule indicating "Quoted/Not-Quoted" along with technical offer and actual prices in his price offer.



RATE CONTRACT
PRICE SCHEDULE FOR PLATE HEAT EXCHANGERS

NAME OF VENDOR-

				INDIGENOUS VENDOR							FOREIGN VENDOR			
SL NO	ITEM DESCRIPTION	UOM	ORDERED QUANTITY	UNIT EX-WORKS PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL EX WORKS PRICE OF PHEs GIVEN AT SL NO-A.4 OF COUMN 8	UNIT EX-WORKS PRICE (DULY PACKED) (INR)	TOTAL EX-WORKS PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL EX WORKS PRICE OF PHEs GIVEN AT SL NO-A.4 OF COUMN 8	TOTAL EX-WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES (INCLUDING SERVICE TAX) @ % OF TOTAL EX WORKS (INR)	GST	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.4 OF COUMN 17 INDIAN SEA PORT (MUMBAI)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI) (CURRENCY)	TOTAL C & F PRICE (DULY PACKED) IN PERCENTAGE OF TOTAL PRICE OF PHEs GIVEN AT SL NO-A.4 OF COUMN 17 INDIAN SEA PORT (MUMBAI)	TOTAL C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI) (CURRENCY)
1	2	3	4	5	6	7	8	12		13	14	15	16	17
A	PLATE HEAT EXCHANGER - MAIN SUPPLY													
A.1	TYPE IX	NOS.	2	6.10000%	Derived	12.20000%	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	6.10000%	Derived	12.20000%	Derived
A.2	TYPE X	NOS.	2	7.29500%	Derived	14.59000%	Derived			Derived	7.29500%	Derived	14.59000%	Derived
A.3	TYPE XI	NOS.	3	24.40333%	Derived	73.21000%	Derived			Derived	24.40333%	Derived	73.21000%	Derived
A.4	TOTAL (A.1 TO A.3)					100.00000%	TO BE QUOTED = Rs X	Derived	Derived	Derived			100.00000%	TO BE QUOTED = M
				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.4 OF COUMN 8	TOTAL PRICE FOR PG TEST (INR)		GST	TOTAL PRICE FOR PG TEST WITH SERVICE TAX (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.4 OF COUMN 17 INDIAN SEA PORT (MUMBAI)	TOTAL PRICE FOR PG TEST (CURRENCY)
B	SERVICES AT SITE PG TEST AT SITE (NOTE: 1SET = PG TEST FOR ONE PHE.)													
B.1		SET	7	0.053% OF PRICE AT A.4, COL 8	Derived	0.371% OF PRICE AT A.4, COL 8	Derived		% TO BE QUOTED	Derived	0.053000000%	Derived	0.371000000%	Derived
B.2	TOTAL (B.1)						Derived			Derived				Derived
				UNIT EX-WORKS PRICE (DULY PACKED)	UNIT EX-WORKS PRICE (DULY PACKED) (INR)	EXPECTED QUANTITY OF SPARES AS PER DATASHEET A OF SECTION IA	TOTAL EX-WORKS PRICE (DULY PACKED) (INR) (Col F * Col. G)	FREIGHT CHARGES (INCLUDING SERVICE TAX) @ % OF TOTAL EX WORKS (INR)	GST	TOTAL F.O.R SITE PRICE (INR)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI)	UNIT C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI) (CURRENCY)		TOTAL C & F PRICE (DULY PACKED) INDIAN SEA PORT (MUMBAI) (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 IX	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	20	14% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	14% OF PRICE AT A.1, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	200	30% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	30% OF PRICE AT A.1, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	4	0.209% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.209% OF PRICE AT A.1, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.050% OF PRICE AT A.1, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.050% OF PRICE AT A.1, COL 15	Derived		Derived
C.2	TYPE X	HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% PRICE AT A.2, COL 15	Derived		Derived
		GASKETS (ALL TYPES)	1 LOT = 1% OF GASKETS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.15% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.15% PRICE AT A.2, COL 15	Derived		Derived
		END PLATE GASKETS	NOS.	Derived	Derived	1	0.025% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.025% PRICE AT A.2, COL 15	Derived		Derived
		FASTENERS INCLUDING TIE RODS	1 LOT = 1% OF FASTENERS OF EACH TYPE IN EACH PHE	Derived	Derived	1	0.03% PRICE AT A.2, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.03% PRICE AT A.2, COL 15	Derived		Derived
		HEAT TRANSFER PLATES	1 LOT = 1% OF PLATES IN EACH PHE	Derived	Derived	1	0.8% OF PRICE AT A.3, COL 6	% TO BE QUOTED	% TO BE QUOTED	Derived	0.8% OF PRICE AT A.3, COL 15	Derived		Derived

Annexure- III

Special Condition of Rate Contract for Plate Heat Exchangers

1. BHEL/PEM intends to enter into Rate Contract for the tendered various type/sizes for a period of one year. The Rate Contract shall come into force from the date of issue of Purchase order for Rate Contract.
2. Transit Insurance is in BHEL scope
3. 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.
4. In case of Indigenous bidders, the freight charges shall be payable, as calculated at percentage of ex-works prices quoted by the bidder or actual freight charges paid to transporter whichever is lower against production of documentary evidence. Vendor to quote freight charges as percentage (%) of ex-works price for destination anywhere in India.
5. Indigenous vendor to note that Excise Duty is payable on self-manufacturing item only as per clause no 4.1.2 of GCC Rev 06 & hence for their BOI may quote Excise Duty is inclusive or Nil.
6. The prices shall remain firm during the period of one year of RC.
7. **In case of Indigenous bidders:** Inspection of materials shall be carried out by BHEL/CQA and or by Customer or by an authorized agency at manufacture's works before dispatch, if required. Dispatch of material to be done, only after receipt of BHEL/Customer MDCC. It is responsibility of vendor to for obtain Material Dispatch Clearance Certificate (MDCC) from BHEL or Customer as required before dispatch of material.

Vendor shall give inspection call on BHEL-CQS web site to applicable inspection agency with a copy of inspection call to BHEL-PEM for arranging Customer participation (if applicable) in inspection / Joint inspection on the proposed date with an advance notice of 15 working days. Inspection charges shall be paid by BHEL-PEM.

Items have to be manufactured as per specification and supplied strictly in accordance with the approved BHEL / Customer's Drawings & Quality Plan. The items/ test certificate of items, which for any reason are not acceptable to BHEL / Customer, shall be required to be retested. No extra charge shall be payable on those account by BHEL.

8. **In case of Foreign Bidders:**

In case of Imported Supplies, advance notice of 30 days for participation in inspection (if applicable, in line with approved QAP/ Customer Hold Points) shall be given by vendor. Third party inspection agency shall be informed to vendor by BHEL-PEM.

Test Certificates / Inspection reports (as applicable) duly accepted by the Inspection agency in line with approved QAP/ Customer Hold Points shall be submitted to BHEL/PEM, NOIDA. The above Inspection reports / Test certificates shall be reviewed by PEM-Engineering in line with the Technical Specifications & Approved Data sheets and then sent to Customer for their clearance. The dispatch clearance (MDCC) by Customer shall be given to the foreign supplier (or their representative in India) through BHEL/PEM after acceptance of above test certificates by Customer.

Inspection charges shall be borne by the vendor and the same shall be included in his offer to 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.

9. Mode dispatch for indigenous vendors shall be by road through Schedule Bank/BHEL (PEM) approved transporters.
10. Other terms and conditions shall be as per Standard Technical specification no. PE-TS-RC-179-N001 & GCC Rev 06, Enquiry letter.
11. This enquiry is subject to Conditions/ limits if any imposed in PMD/ Vendor registration.
12. Tentative quantity is given in enquiry.
13. The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendor/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL web site <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud as soon as it comes to their notice.

ANNEX-IV

Sl no.	Prospective Project List	
1	1X800 MW VIJAYWADA APGENCO	GROUP-A
2	1X800 MW KRISHNAPSTNAM APPDCL	
3	1X525 MW TUTICORIN TPS	
4	2X660 MW ENNORE SEZ STPP	
1	250MW NSPCL ROURKELA TPS	GROUP-B
2	1X800 MW TANGEDCO NORTH CHENNAI TPP	



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ANNEXURE– IX

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at “BHEL House”, Siri Fort, New Delhi – 110049 (India) hereinafter referred to as “The Principal”, which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as “The Bidder/ Contractor” which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

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1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or

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document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process & exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors". framed by the Principal.

Section 4 – Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

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5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders / Contractors / Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 –Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

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8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins and shall be binding on and from the submission of bid(s) by

	PROJECT ENGINEERING MANAGEMENT	GENERAL CONDITIONS OF CONTRACT (GCC) Revision No. 06	ANNEXURES (wef from 01-03-2014)
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bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal
(Office Seal)

For & On behalf of the Bidder/ Contractor
(Office Seal)

Place-----

Date-----

Witness: _____
(Name & Address) _____

Witness: _____
(Name & Address) _____

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited ¹ (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at _____ through its Unit at.....(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at _____ ² hereinafter referred to as the 'Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated³ valued at Rs.....⁴ (Rupees -----)/FC.....(in words.....) for⁵ (hereinafter called the 'Contract') and the Contractor having agreed to provide a Contract Performance Guarantee, equivalent to% (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we,, (hereinafter referred to as the Bank), having registered/Head office at and inter alia a branch at being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs ----- (Rupees -----) without any demur, immediately on a demand from the Employer, .

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____.

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

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

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

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

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

This Guarantee shall remain in force upto and including.....⁶ and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor/Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the⁷we shall be discharged from all liabilities under this guarantee thereafter.

We, BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁸
- b) This Guarantee shall be valid up to⁹
- c) Unless the Bank is served a written claim or demand on or before¹⁰ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

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

For and on behalf of
(Name of the Bank)

Dated.....

Place of Issue.....

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

² NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

³ DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

⁴ PROJECT/SUPPLY DETAILS

⁵ BG AMOUNT IN FIGURES AND WORDS

⁶ VALIDITY DATE

⁷ DATE OF EXPIRY OF CLAIM PERIOD

⁸ BG AMOUNT IN FIGURES AND WORDS.

⁹ VALIDITY DATE

¹⁰ DATE OF EXPIRY OF CLAIM PERIOD

Note:

1. Units are advised that expiry of claim period may be kept 2/3 months after validity date.
2. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
 - b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**
 - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
 - b.2 **In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank** (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.
 - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.
 - b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

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

Specification No. : PE-TS-RC-179-N001 (REV 01)



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



TITLE :
TECHNICAL SPECIFICATION FOR RATE
CONTRACT OF
PLATE HEAT EXCHANGERS

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

SECTION

REV. NO. 01

DATE 17.06.17

CONTENTS

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. 7 OF SECTION- IA (TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT).



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

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

SECTION I

REV. NO. 01

DATE 17.06.17

SECTION I

IA SPECIFIC TECHNICAL REQUIREMENTS

IB DATASHEET – A



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

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

SECTION IA

REV. NO. 01 DATE 17.06.17

SHEET 1 OF 4

1.0 GENERAL :

- 1.1 This specification is intended for finalization of rate contract between BHEL PEM and Bidder. Standard technical detail as indicated in the specification shall be agreed upon between BHEL PEM and Bidder. Project specific technical detail shall be made available to the bidder during the specific project ordering.
- 1.2 This enquiry covers the design, manufacture, assembly, inspection and testing at manufacturer's and/ or his sub-contractors works, painting, proper packing & delivery of the item namely PLATE HEAT EXCHANGERS complete with all spares (as applicable), accessories, commissioning spares (if any), counter flanges with nuts, bolts, gaskets and coatings (wherever necessary), including special tools & tackles (if any), including site PG test (as applicable) as mentioned in this specification.

Note:

1. This specification is being made with the intent of entering into rate contract for the supply of Plate Heat Exchangers (PHEs) of various type applicable for the various projects from time to time.
2. Type of PHEs have been bifurcated in to two group viz. Group-A and Group-B, same has been detailed in Data Sheet-A, Section-1D. Evaluation shall be separate for each group and further details shall be indicated in NIT.

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

Customer Specification (Appendix 1), Section IA, Datasheet-A (Section IB).

- 1.3 The bids shall be evaluated as per NIT. Ordering shall be done separately as per NIT.
- 1.4 Bidder to quote for items as per price schedule attached in NIT. The quantity as mentioned in the BOQ is only for evaluation purpose. However actual ordered quantity may vary from project to project throughout the year.

2.0 SPECIFIC REQUIREMENTS:

- 2.1 Project specific requirements for Flow &/ or Temp rise for PHE at primary side as well secondary side may vary slightly vis-à-vis those indicated in Datasheet A at section IB. However Flow variation shall be within +/- 10 % for primary side as well secondary side &/or Temp rise shall be within +/- 10 % for primary side as well as secondary side but Heat Load of PHE (Flow x Temp Rise) shall be within +/- 10 % vis-à-vis Flow x Temp Rise as per Datasheet A at section IB. Exact Parameters for specific project shall be informed during project specific order Bidder to meet the above requirement during project specific ordering, without any cost implication to BHEL.
- 2.2 PG test at site (if applicable) as per Project specific requirement shall have to be conducted



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TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
PLATE HEAT EXCHANGERS

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SHEET 2 OF 4

as per clause 6.0 below. Bidder to quote Unit Rate for PG test accordingly.

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

3.0 SYSTEM DESCRIPTION :

- 3.1 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 (Sea Water).
- 3.2 Passivated DM Water is circulated through various auxiliary coolers of TG/SG, 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.
- 3.3 The analysis of DM Water, Sea Water (Auxiliary cooling water) to be handled by the Plate Heat Exchangers are attached as Annexure to Data Sheet-A.
- 3.4 A strainer of 2 mm size at ACW inlet lines of PHE is provided and backwashing of PHE's is not envisaged.

4.0 SCOPE OF SUPPLY:

- 4.1 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.
- 4.2 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.
- 4.3 Finish paints for touch up painting of equipment after erection at Site in sealed containers.



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5.0 INSPECTION REQUIREMENTS

- 5.1 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.
- 5.2 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.
- 5.3 Heat transfer area for the PHE as offered by bidder with technical offer shall be measured by White light scanning method during contract stage to ascertain the correctness of heat transfer area as offered by bidder.

Bidder to note that Heat Transfer Area measured by White Light Scanning during contract stage should not have negative tolerance more than 3% w.r.t to the heat transfer area indicated by bidder against the offered model of PHE. 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.

6.0 PERFORMANCE GUARANTEE AND TESTING:

- 6.1 The PHE shall be guaranteed to meet the performance requirements specified in Section-II and also for trouble free operation after commissioning.
- 6.2 PG test requirements are specified in Datasheet-A. In case of any deficiency, the vendor shall rectify the same at site with no additional cost to BHEL. All duly calibrated instruments required for PG testing including for flow measurements shall be arranged by the bidder and taken back after the Test. The computation of flow by characteristics curve of Pumps for PG Testing of PHE's shall not be permitted.
- 6.3 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.
- 6.4 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.



TITLE :
**TECHNICAL SPECIFICATION FOR
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SHEET 4 OF 4

7.0 Documents to be submitted along with the offer :

- a) Compliance certificate.
- b) Guarantee Schedule.
- c) Thermal sizing calculations.
- d) GA Drg. of PHE indicating all-important details for Layout purpose, withdrawal space required for plates, weight of assembly, nozzle & matching piece details etc.

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

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

9.0 EXCLUSIONS :

The following are excluded from the bidder's scope:

- 9.1 Civil foundation works required for installation of the heat exchangers.
- 9.2 Piping, valves etc., on the external circuit of both primary and secondary water streams.
- 9.3 Erection & Commissioning of equipment at site.

	TECHNICAL SPECIFICATION FOR RATE CONTRACT OF PLATE HEAT EXCHANGER			Technical specification no PE-TS-RC-179-N001 (Rev 01)							
				Section	IB						
	DATASHEET - A			Rev	0						
	GROUP-A			Date	17.06.17						
	PHE DESCRIPTION			TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI	TYPE VII	TYPE VIII
1.0	General										
1.1	Number of Plate Heat Exchanger		Nos	Three (3) nos	Two (2) nos	Two (2) nos	Three (3) nos	Two (2) nos	Six (6) nos	Four (4) nos	Three (3) nos
1.2	Arrangement			3X50% configuration	2X100% configuration	2 x 100% per unit	3 x 50% per unit	2 x 100% per unit	3 x 50% per unit	2 x 100% per unit	3 x 50% per unit
1.3	Location			Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor
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)	Passivated DM water (Refer enclosed water analysis)	Passivated DM water (Refer enclosed water analysis)	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			Clarified water (Refer enclosed water analysis)	Clarified water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)
1.6	Connecting Pipe size	(Primary Side)	NB	450	300	300	400	300	500	250	450
		(Secondary Side)	NB	600	400	400	400	350	500	250	500
1.7	Maximum permitted Length of the PHE		mm	5000 mm (excluding reducer)	5000 mm (excluding reducer)	Length 5000 mm (excluding reducer)	Length 4500 mm (excluding reducer)	Length 4500 mm (excluding reducer)	Length 5500 mm (excluding reducer)	Length 5500 mm (excluding reducer)	Length 5000 mm (excluding reducer)
2.0	Design										
2.1	Design Code			Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards
2.2	Design Pressure		Kg/cm ² (g)	10	12	12	10	12	10	12	10
2.3	Operating Pressure	(Primary Side)	Kg/cm ² (g)	6.0 to 7.0 Kg/sq. cm(g)	8.0 to 9.0 Kg/sq. cm(g)	8.0 to 9.0 Kg/sq. cm(g)	6.0 to 7.0 Kg/sq. cm(g)	8.0 to 9.0 Kg/sq. cm(g)	About 6.0 to 7.0 Kg/sq. cm(g)	8.0 to 9.0 Kg/sq. cm(g)	6..0-7.0 Kg/sq. cm(g)
		(Secondary Side)	Kg/cm ² (g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)
2.4	Mechanical Design Temp.		°C	60	60	60	60	60	60	60	60
2.5	Heat Transfer per Sq.Mtr. Of Heat Transfer Plate		Kcal/Hr./m ²	8500 (Max.)	8500 (Max.)	8500 (Max.)	11000 (Max.)	11000 (Max.)	8500 (Max.)	8500 (Max.)	8500 (Max.)
2.6	Minimum Heat Transfer Area		Sq. M.	-	-	-	-	-	-	-	-
2.7	Specific Heat of Fluid	(Primary Side)	Cal/gmDeg.C	1	1	1	1	1	1	1	1
		(Secondary Side)	Cal/gmDeg.C	1	1	0.94	0.94	0.94	0.94	0.94	0.94
2.8	Density of Fluid	(Primary Side)	gm/cc	1	1	1	1	1	1	1	1
		(Secondary Side)	gm/cc	1	1	1.025	1.025	1.025	1.025	1.025	1.025
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:										
3.1	Flow rate	(DMCW Side)	M ³ /hr	1450	700	700	950	630	1500	480	1450
		(ACW Side)	M ³ /hr	1450	700	700	1040	785	1625	500	1450
3.2	Inlet temperature	(DMCW Side)	°C	45.5	43.5	43.4	44.3	45.2	45.3	44.2	45
		(ACW Side)	°C	36	36	36	36	36	35	35	36
3.3	Outlet temp	(DMCW Side)	°C	38	38	38	38	38	38	38	38
		(ACW Side)	°C	43.5	41.5	41.6	42	42	42	41.2	43.2
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow	(DMCW Side)	MWC	7	7	7	7	7	7	7	7
		(ACW Side)	MWC	7	7	7	7	7	7	7	7
* High pressure drop than the specified figure will not be accepted, no credit shall be, however, given for lower pressure drop in bid evaluation. Pressure drop mentioned shall be calculated against flow mentioned at S. No 3.1. Each heat exchanger shall be capable of passing a flow of at least 1.1 times the design flow rate on both primary and secondary water sides. Bidder shall indicate maximum pressure drop through the heat exchanger under this condition.											
4.0	Additional HT plates on Design Plates		%	NIL	NIL	NIL	NIL	NIL	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	0.00004	0.00004	0.00008	0.00008	0.00008
5.2	Minimum corrosion allowance on pressure parts,nozzles,sliding channel and frame (refer note 1)			mm	1.6	1.6	1.6	1.6	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	Titanium	Titanium	Titanium	Titanium	Titanium	Titanium
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	Nitrile rubber, 65 ± 5 Deg. shore hardness	Nitrile rubber, 65 ± 5 Deg. shore hardness	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, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)

										
	TECHNICAL SPECIFICATION FOR RATE		Technical specification no	PE-TS-RC-179-N001 (Rev 01)						
	CONTRACT OF PLATE HEAT EXCHANGER		Section	IB						
	DATASHEET - A		Rev	0						
	GROUP-A		Date	17.06.17						
	PHE DESCRIPTION		TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI	TYPE VII	TYPE VIII
6.4	Guide Rails/ bar		Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding
6.5	Support Beam/ column		Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted
6.6	Nozzle (Reducer/Expander)		Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated	Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.
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 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	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
6.8	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	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	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	IS-1367 Gr.8.8 or equivalent	IS-1367 Gr.8.8 or equivalent	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 bolt and nut		SA 193 B7/ SA 194 2H	SA 193 B7/ SA 194 2H	SA 193 B7/ SA 194 2H	SA 193 B7/ SA 194 2H	SA 193 B7/ SA 194 2H	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	3mm wire inserted Red Rubber	3mm wire inserted Red Rubber	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)	SS 316L	SS 316L	SS 316L	SS 316L	SS 316L	SS 316L
6.13	Painting									
	External Surface									
	a.) Surface Preparation		All surface other than stainless steels shall be painted.	All surface other than stainless steels shall be painted.	All surface other than stainless steels shall be painted.	All surface other than stainless steels shall be painted.	All surface other than stainless steels shall be painted.	All surface other than stainless steels shall be painted.	All surface other than stainless steels shall be painted.	All surface other than stainless steels shall be painted.
	b.) Primer		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.	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.	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.	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.	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.	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.	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.	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.
	c.) Final Paint		For all the steel surfaces inside the (indoor installation) building, a coat of red oxide primer of min thickness of 50 microns followed up with undercoat of synthetic enamel paint of min thickness of 50 microns shall be applied. The top coat shall consist of two coats each of min 50 microns thickness of synthetic enamel paint. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, a coat of red oxide primer of min thickness of 50 microns followed up with undercoat of synthetic enamel paint of min thickness of 50 microns shall be applied. The top coat shall consist of two coats each of min 50 microns thickness of synthetic enamel paint. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyamide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyamide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyamide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyamide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyamide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.	For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyamide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	25	25	25	25	25	25	25
8.0	Spares	Unit of Measurement								
8.1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot
8.2	Gaskets (All types)	1 Lot = 1% of gaskets of each type in each PHE	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot
8.3	End plate gaskets	Nos.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.
8.4	Fasteners including Tie Rods	1 Lot = 1% of fasteners of each type in each PHE	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot
9.0	Available space (L x W x H)	mm	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----
10.0	Weight of Assembly	Kg	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----	-----Bidder to indicate -----
11.0	Hydrotesting at Shop									
11.1	Hydrotesting Pressure	Kg/cm2 (g)	1.5 times the design pressure	1.5 times the design pressure	1.5 times the design pressure	1.5 times the design pressure	1.5 times the design pressure	1.5 times the design pressure	1.5 times the design pressure	1.5 times the design pressure
11.2	Duration of Hydrotesting	Minutes	60	60	60	60	60	60	60	60

	TECHNICAL SPECIFICATION FOR RATE CONTRACT OF PLATE HEAT EXCHANGER		Technical specification no	PE-TS-RC-179-N001 (Rev 01)						
	DATASHEET - A		Section	IB						
	GROUP-A		Rev	0						
			Date	17.06.17						
	PHE DESCRIPTION		TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI	TYPE VII	TYPE VIII
12.0	Performance curves and figures to be furnished during contact stage									
12.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.									
12.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)									
12.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)									
12.4	Primary side water outlet temperature vs. Primary side inlet temp.									
12.5	Film heat transfer coefficient curve									
12.6	Correction Curves.									
13.0	Minimum Standard requirement of the PHE to be offered by the bidder.									
13.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)									
13.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.									
13.3	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.									
13.4	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.									
13.5	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.									
13.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.									
13.7	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.									
13.8	25% extra capacity for additional plates shall be provided in frame.									

			Technical specification no		PE-TS-RC-179-N001 (Rev 01)	
	TECHNICAL SPECIFICATION FOR RATE		Section		IB	
	CONTRACT OF PLATE HEAT EXCHANGER		Rev		0	
	DATASHEET - A		Date		17.06.17	
	GROUP-B					
	PHE Description			TYPE IX	TYPE X	TYPE XI
1.0	General					
1.1	Number of Plate Heat Exchanger		Nos	Two (2) Nos	Two (2) nos	Three (3) nos
1.1	Arrangement			2X100% configuration	2 x 100% per unit	3 x 50% per unit
1.2	Location			Indoor	Indoor	Indoor
1.3	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)
1.4	Secondary side (Cold) fluid			Clarified water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)	Sea Water (Refer enclosed water analysis)
1.5	Connecting Pipe size	(Primary Side)	NB	600	300	500
		(Secondary Side)	NB	600	300	600
1.6	Maximum permitted Length of the PHE		mm	4500 mm (excluding reducer)	Length 5000 mm (excluding reducer)	Length 5000 mm (excluding reducer)
2.0	Design					
2.1	Design Code			Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards	Latest IS/BS/DIN/ASTM Standards
2.2	Design Pressure		Kg/cm ² (g)	12	12	10
2.3	Operating Pressure	(Primary Side)	Kg/cm ² (g)	5.5 to 6.0 Kg/sq. cm(g)	8.0 to 9.0 Kg/sq. cm(g)	6.0 to 7.0 Kg/sq. cm(g)
		(Secondary Side)	Kg/cm ² (g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 Kg/sq. cm(g)	3.5 to 4.0 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	-	8500 (Max.)	8500 (Max.)
2.6	Minimum Heat Transfer Area		Sq. M.	1200	-	-
2.7	Specific Heat of Fluid	(Primary Side)	Cal/gmDeg.C	1	1	1
		(Secondary Side)	Cal/gmDeg.C	1	0.94	0.94
2.8	Density of Fluid	(Primary Side)	gm/cc	1	1	1
		(Secondary Side)	gm/cc	1	1.025	1.025
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:					
3.1	Flow rate	(DMCW Side)	M ³ /hr	2100	525	1470
		(ACW Side)	M ³ /hr	2100	550	1625
3.2	Inlet temperature	(DMCW Side)	°C	43.5	44.1	47.1
		(ACW Side)	°C	36	36	36
3.3	Outlet temp	(DMCW Side)	°C	38	38	38
		(ACW Side)	°C	41.5	42.1	44.5
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at design flow	(DMCW Side)	MWC	7	7	7
		(ACW Side)	MWC	7	7	7
	* High pressure drop than the specified figure will not be accepted, no credit shall be, however, given for lower pressure drop in bid evaluation. Pressure drop mentioned shall be calculated against flow mentioned at S. No 3.1. Each heat exchanger shall be capable of passing a flow of at least 1.1 times the design flow rate on both primary and secondary water sides. Bidder shall indicate maximum pressure drop through the heat exchanger under this condition.					
4.0	Additional HT plates on Design Plates		%	NIL	NIL	NIL
5.0	Heat Transfer Coefficient/Margin					
5.1	Overall fouling resistance (minimun)		Hr m2deg C/Kcal	0.00008	0.00008	0.00008

			Technical specification no	PE-TS-RC-179-N001 (Rev 01)	
	TECHNICAL SPECIFICATION FOR RATE		Section	IB	
	CONTRACT OF PLATE HEAT EXCHANGER		Rev	0	
	DATASHEET - A		Date	17.06.17	
	GROUP-B				
	PHE Description		TYPE IX	TYPE X	TYPE XI
5.2	Minimum corrosion allowance on 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	Titanium	Titanium
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, FE-410, Gr.B, Epoxy painted	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)	Carbon steel to IS-2062 E-410, Gr B Epoxy Coated (Wth Titanium Cladding on Ports on ACW Side)
6.4	Guide Rails/ bar		Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding	Carbon Steel, IS-2062, E-410, Gr.B, with SS Cladding
6.5	Support Beam/ column		Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted	Carbon Steel, IS-2062, E-410, Gr.B, Epoxy painted
6.6	Nozzle (Reducer/Expander)		Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.	DMCW Side: Carbon steel IS 2062, E-410, Gr. B, Epoxy Coated ACW Side: Carbon steel IS 2062, E-410, Gr. B, with min. 2 mm DFT PU Coating internally as per AWWA C222.
6.7	Nozzle flanges		Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb)	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
6.8	Flange/ Counter flanges		Carbon Steel IS 2062 (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 bolt and nut		SA 193 Gr B7 / SA 194 Gr 2H	SA 193 B7/ SA 194 2H	SA 193 B7/ SA 194 2H
6.11	Nozzle flange gasket		3 mm 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)	SS 316L	SS 316L
6.13	Painting				
	External Surface				
	a.) Surface Preparation		All surface other than stainless steels shall be painted. The steel surface to be applied with painting shall be thoroughly cleaned before applying painting by shotblasting (SA 2.5) etc shall be subjected to BHEL/Customer approval. For all the steel surfaces inside the (indoor installation) building, a coat of red oxide primer of min thickness of 50 microns followed up with undercoat of synthetic enamel paint of min thickness of 50 microns shall be applied. The top coat shall consist of two coats each of min 50 microns thickness of synthetic enamel paint. Thus total thickness shall be minimum 200 microns.	All surface other than stainless steels shall be painted. The steel surface to be applied with painting shall be thoroughly cleaned before applying painting by shotblasting (SA 2.5) etc shall be subjected to BHEL/Customer approval. For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyimide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.	All surface other than stainless steels shall be painted. The steel surface to be applied with painting shall be thoroughly cleaned before applying painting by shotblasting (SA 2.5) etc shall be subjected to BHEL/Customer approval. For all the steel surfaces inside the (indoor installation) building, two coats of epoxy polyimide resin based red oxide-zinc phosphate (primer) of minimum thickness of 30 microns/coat followed up with one coat of epoxy resin based paint with MIO/coal tar based epoxy paint of minimum thickness of 80 microns shall be applied. The top coat shall consist of two coats of epoxy polyamide enamel suitably pigmented of minimum thickness of 30 microns/coat. Thus total thickness shall be minimum 200 microns.
	b.) Primer				
	c.) Final Paint				
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	25	25
8.0	Spares	Unit of Measurement			
8.1	Heat Transfer Plates	1 Lot = 1% of plates in each PHE	20 Lots	1 Lot	1 Lot
8.2	Plate Gaskets	1 Lot = 1% of gaskets of each type in each PHE	200 Lots	1 Lot	1 Lot

			Technical specification no	PE-TS-RC-179-N001 (Rev 01)	
	TECHNICAL SPECIFICATION FOR RATE		Section	IB	
	CONTRACT OF PLATE HEAT EXCHANGER		Rev	0	
	DATASHEET - A		Date	17.06.17	
	GROUP-B				
	PHE Description		TYPE IX	TYPE X	TYPE XI
8.3	End plate gaskets	Nos.	4 Nos	1 No.	1 No.
8.4	Fasteners including Tie Rods	1 Lot = 1% of fasteners of each type in each PHE	1 Lot	1 Lot	1 Lot
9.0	Available space (L x W x H)	mm	----- Bidder to indicate -----	----- Bidder to indicate -----	----- Bidder to indicate -----
10.0	Weight of Assembly	Kg	----- Bidder to indicate -----	----- Bidder to indicate -----	----- Bidder to indicate -----
11.0	Hydrotesting at Shop				
11.1	Hydrotesting Pressure	Kg/cm2 (g)	1.5 times the design pressure	1.5 times the design pressure	1.5 times the design pressure
11.2	Duration of Hydrotesting	Minutes	60	60	60
12.0	Performance curves and figures to be furnished during contact stage				
12.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.				
12.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)				
12.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)				
12.4	Primary side water outlet temperature vs. Primary side inlet temp.				
12.5	Film heat transfer coefficient curve				
12.6	Correction Curves.				
13.0	Minimum Standard requirement of the PHE to be offered by the bidder.				
13.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)				
13.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.				
13.3	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.				
13.4	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.				
13.5	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.				
13.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.				
13.7	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.				
13.8	25% extra capacity for additional plates shall be provided in frame.				

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

S. No.	Parameter	Circulating water analysis considering COC 5
1	PH	7.5 – 8.0 (max.)
2	K (as such)	800 ppm
3	Turbidity (NTU)	50 NTU
4	Sio2 (as such)	105 ppm
5	P-alk	NT
6	M alk (as such)	340 ppm
7	TH (as CaCO3)	470 ppm
7.1	CO3 (as such)	10.40 ppm
7.2	HCO3 (as such)	826.15 ppm
8	CaH (as CaCO3)	300 ppm
9	MgH (as CaCO3)	170 ppm
10	EMA (as CaCO3)	170 ppm
11	CL- (as CaCO3)	150 ppm
12	SO4 (as CaCO3)	20 ppm
13	Fe (as such)	0.5 ppm
14	KMnO4	--
15	RCI2	TR
16	TDS	1924.2 ppm

SEA WATER ANALYSIS

Sl. No	PARAMETERS	UNIT	RESULT
1.	pH	-	7.9
2.	Conductivity	μ mhos/cm	53700
3.	Temperature	$^{\circ}$ C	33
4.	Turbidity	NTU	14.8
5.	Salinity		35.4
6.	Total Suspended Solids	mg/l	8
7.	Total Organic Carbon	mg/l	Less than 5
8.	Calcium as Ca	mg/l	400
9.	Magnesium as Mg	mg/l	1270
10.	Sodium as Na	mg/l	12500
11.	Potassium as K	mg/l	376
12.	Ammonia as NH ₃	mg/l	BDL (DL: 0.01)
13.	Strontium as Sr	mg/l	1.76
14.	Barium as Ba	mg/l	BDL (DL: 0.41)
15.	Total Aluminium as Al	mg/l	BDL (DL: 0.03)
16.	Dissolved Aluminium as Al	mg/l	BDL (DL: 0.03)
17.	Total Manganese as Mn	mg/l	BDL (DL: 0.02)
18.	Dissolved Manganese as Mn	mg/l	BDL (DL: 0.02)
19.	Total iron as Fe	mg/l	0.33
20.	Dissolved iron as Fe	mg/l	0.17
21.	Chloride as Cl	mg/l	20987
22.	Sulfate as SO ₄	mg/l	3000
23.	Nitrate as NO ₃	mg/l	1.21
24.	Nitrate as NO ₂	mg/l	0.008
25.	Bicarbonate as HCO ₃	mg/l	137
26.	Carbonates as CO ₃	-	Nil
27.	Fluoride as F	mg/l	1.2
28.	Boron as B	mg/l	1.36
29.	Phosphate as PO ₄	mg/l	0.08
30.	Sulfide as H ₂ S	mg/l	BDL (DL: 0.01)
31.	Total silica s SiO ₂	mg/l	0.4
32.	Dissolved Silica as SiO ₂	mg/l	0.2
33.	Dissolved Oxygen	mg/l	5.4
34.	BOD @ 27°C for 3 days	mg/l	9
35.	Phenols	mg/l	BDL (DL: 0.001)
36.	COD	mg/l	53
37.	Oil & Grease	mg/l	Less than 1
38.	Zinc as Zn	mg/l	0.1
39.	Copper as Cu	mg/l	BDL (DL: 0.006)
40.	Nickel as Ni	mg/l	BDL (DL: 0.008)
41.	Cadmium as Cd	mg/l	BDL (DL: 0.003)
42.	Lead as Pb	mg/l	BDL (DL: 0.01)
43.	Mercury as Hg	mg/l	BDL (DL: 0.001)



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

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

SECTION II

REV. NO. 01

DATE 17.06.17

SECTION II

IIA STANDARD TECHNICAL SPECIFICATION
IIB STANDARD QUALITY PLAN

	TITLE :	SPECIFICATION NO. PE-TS-XXX-179-N001
	TECHNICAL SPECIFICATION	
	FOR PLATE HEAT EXCHANGERS	SECTION: IIA
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SECTION: IIA

PLATE HEAT EXCHANGER

STANDARD TECHNICAL SPECIFICATION

	TITLE :	SPECIFICATION NO. PE-TS-XXX-179-N001
	TECHNICAL SPECIFICATION	
	FOR PLATE HEAT EXCHANGERS	SECTION: IIA
		REV. NO. 0
		SHEET Page 2 of 8

1.00.01 GENERAL

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

2.00.00 CODES AND STANDARDS:

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

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

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

2.02.00 In case of any conflict between the above codes/ standards and this specification, the latter shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the Engineer shall be final and binding

3.00.00 DESIGN AND CONSTRUCTION:

3.01.00 General Requirements:

3.01.01 Unless otherwise necessary, manufacture's standard and proven models of the plate heat exchanger shall be supplied.

3.01.02 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 furnished a/w project enquiry. Vibration, noise, mechanical and thermal stresses shall be kept

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within allowable units specified by relevant codes/ standards in design.
Due attention shall be given to *case of maintenance, repair and cleaning*.

3.01.03 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).

3.01.04 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.

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

3.01.06 No back wash for the heat exchangers is envisaged.

3.02.00 Performance Requirements:

3.02.01 The pressure drop across plate heat exchanger from inlet to outlet in fouled conditions for primary and secondary sides, shall not be more than those specified in Data Sheet-A furnished a/w project enquiry, for the specified flow rates.

3.02.02 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 furnished a/w project enquiry.

3.02.03 In the event of failure to meet the above stipulated performance requirements, the equipment will be out rightly rejected.

3.03.00 Construction of Heat Exchanger:

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

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- 3.03.02 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 inter space 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.

- 3.03.03 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 data sheet A furnished a/w project enquiry.. Flanges shall be as per ANSI 16.5 or equivalent. Thickness of pressure and frame plates shall be as per ASME Sect. VIII div.1.25% extra capacity for additional plates shall be provided in frame.

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

The corrugation shall be smooth, uniform and identical for every plate. The PHE bottom frame plate and support should have fixing lugs and cleats to keep provision for enabling to fit trough with outlet nozzle fitted underneath to collect and drain out water in the event of leakages.

- 3.03.04 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 furnished a/w project enquiry.

The upper carrying bar and lower guide bar shall be rigid in construction

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	FOR PLATE HEAT EXCHANGERS	SECTION: IIA
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without any risk of sagging or buckling, and shall facilitate easy guiding of the plates.

3.03.05 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 the nozzle connections. The nozzle sizes of primary/ secondary streams of PHE's shall be of adequate size within acceptable range of velocity. The size selection shall be subject to approval in the event of order.

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

3.04.00 **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 furnished a/w project enquiry.

4.00.00 **FOUNDATION AND LIFTING ARRANGEMENTS:**

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

4.02.00 Plate heat exchanger shall be equipped with suitable lifting lugs/ eyebolts to facilitate handling during erection and maintenance.

5.00.00 **PAINTING:**

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

- a) Removal of oil, grease, dirt and swarf etc
- b) Removal of rust and scale etc.,
- c) Sand blasting/ shot blasting.

5.02.00 All exterior surfaces of PHE's shall be sand/ shot blasted, painted with

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primer and finish coated with coal tar based epoxy coating of min. 250 microns thickness. Color shade etc. shall be subject to BHEL/ Customer approval.

6.00.00 SHOP INSPECTION AND TESTS:

6.01.00 General:

6.01.01 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.

6.01.02 All materials 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.

6.01.03 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.

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

6.02.00 Heat Transfer Plates:

6.02.01 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.

6.02.02 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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- 6.02.03 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. Plate cleaning agent, liquid penetrant and developer shall not contain any halogen .Procedure for light box test and DP test shall be submitted to purchaser's approval. For Quantum of check , Refer Section C.
- 6.02.04 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 (Lloyds', TUV or equivalent). The plates without defects only shall be accepted. For Quantum of check , Refer Section C.
- 6.03.00 **Gaskets:**
- 6.03.01 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.
- 6.03.02 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.
- 6.03.03 Visual and dimensional check on a sampling basis shall be done. Plates and gaskets assembled together will be inspected for proper assembly.
- 6.04.00 **Frame Assembly:**
- 6.04.01 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.
- 6.04.02 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.
- 6.05.00 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.

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7.00.00 **Document submission:**

7.01.00 The tenderer shall submit during contract stage a curve showing expected DM Water (Primary side) temperature at heat exchanger outlet for each one degree centigrade variation in ACW (Secondary side) temperature, all other parameters remaining unchanged. Similar curve for expected DM Water outlet temperature for variation of ACW flow rate with ACW inlet temperature remaining unaltered shall also be furnished. The bidder shall also furnish various curves to enable, apply corrections during site PG testing in the event of any data variation from the stipulated design parameters.

7.02.00 Bidder shall also furnish thermal design calculations at contract stage to justify the no. of plates offered.

DMS (BHEL-PEM)
6169430-2013/07/04

		STANDARD QUALITY PLAN SHEET 1 OF 5		CUSTOMER:		PROJECT TITLE:		SPECIFICATION NO. : PE-TS-XXX-179-N001							
				BIDDER/VENDOR:		QUALITY PLAN NO.:		SPECIFICATION TITLE : TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGERS SECTION : IIA							
				SYSTEM:		ITEM: PHE									
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK		REFERENC E DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS	
					2/3	1					P	W	V		
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.		11.	
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/He -at Batch	1/ Heat/He -at Batch	App. Drg / Data Sheet	Relevant material spec.	Mill TC Or Lab Test Report	√	2,3	-	1	If co-related mill TCS are not available then check testing carried out by reputed lab	
		Chemical Properties	MA	Chemical Analysis	1/ Heat/He -at Batch	1/ Heat/He -at Batch	-do-	-do-	-do-	√	2,3	-	1	-do-	
		Dimensions	MA	Measurement	100%	100%	Approved Drawings		Inspection Reports	√	2,3	-	1		
		Workmanship And Finish	MA	Visual	100%	100%	-do-	-do-	-do-		2,3	-	1		
		Lamination (Applicable For Frame And Pressure Plate Only)	CR	Ultrasonic Test	100%	100%	SA 435	SA 435	-do-	√	2,3	-	1	Applicable for plate thickness more than 25 mm only	
1.2	Heat Transfer Plates/Coils	Physical Properties	MA	Physical Test	1/ Heat	1/ Heat	App. Drg. / Data Sheet	App. Drg. / Data Sheet	Mill TC Or Lab Test Report	√	2,3	-	1	Co-related mill TCS to be provided. See Remark 1	
		Chemical Properties	MA	Chemical Analysis	1/ Heat	1/ Heat	-do-	-do-	-do-	√	2,3	-	1	-do-	
		Dimensions	MA	Measurement	100%	Sample	Approved Drawings		Inspection Reports	√	2,3	-	1		
1.3	Gaskets	Dimensions	MA	Measurement	100%	Sample	Approved Drawings		Inspection Reports		2,3	-	1	Co-related mill TCS to be provided.	
		Workmanship And Finish	MA	Visual	-do-	-do-	No damage, No Surface defects.		-do-		2,3	-	1		
		Contour	MA	Visual	-do-	-do-	Mfg. Drgs / specification		-do-		2,3	-	1		
		Hardness	CR	Measurement	-do-	-do-	Approved Drawings		-do-	√	2,3	-	1		
				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** 1: BHEL 1* SHALL BE CLEARED BY BHEL 2: VENDOR, 3: SUB VENDOR P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE CHP: CUSTOMER SHALL IDENTIFY IN COLUMN "N" AS 'W'						Cust. Logo	DOC. NO.:		REV.		CAT.
MANUFACTURER/ SUB-SUPPLIER		MAIN-SUPPLIER		FOR CUST. USE											
SIGNATURE										REVIEWED BY		APPROVED BY		APPROVAL SEAL	

		STANDARD QUALITY PLAN SHEET 2 OF 5		CUSTOMER:		PROJECT TITLE:		SPECIFICATION NO. : PE-TS-XXX-179-N001						
				BIDDER/VENDOR:		QUALITY PLAN NO.:		SPECIFICATION TITLE : TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGERS SECTION : IIA						
				SYSTEM:		ITEM: PHE								
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK		REFERENC E DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					2/3	1					P	W	V	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.	11.	
1.4	Tightening Bolts & Nuts. (Tie Rod)	Physical Properties	MA	Physical Test	1/ Heat	1/ Heat	App. Drg / data sheet	Relevant Material Spec.	Mill Tc Or Lab Test Report	√	2,3	-	1	Manufacturer test certificate will be submitted for review.
		Chemical Properties	MA	Chemical Analysis	1/ Heat	1/ Heat	-do-	-do-	-do-	√	2,3	-	1	-do-
		Dimensions	MA	Measurement	100%	100%	Approved Drawings		IR	√	2,3	-	1	
		Workmanship and Finish	MA	Visual	100%	100%	-do-	-do-	-do-		2,3	-	1	
		Internal Soundness (For diameter >= 40 mm)	CR	UT	100%	100%	ASTM A 388	See Remark - 3	-do-	√	2,3	-	1	UT will be carried on raw material stage.
2.0	IN PROCESS INSPECTION													
2.1	HT PLATES	Area Measurement	MA	White Light Scanning	1 per Type	1 per Type	Approved drawing/ data sheet	Approved drawing/ data sheet	IR	√	2,3	1	-	See Remark 2
		Physical Properties	MA	Physical Test	1 Sample per Heat	1 Sample per Heat	Approved drawing/ data sheet	Relevant Material Spec.	Mill TC or Lab Test Report	√	2,3	-	1	Manufacturing test certificates will be submitted for review.
		Chemical Properties	MA	Chemical Analysis	1 Sample per Heat	1 Sample per Heat	Approved drawing/ data sheet	Relevant Material Spec.	Mill TC or Lab Test Report	√	2,3	-	1	Manufacturing test certificates will be submitted for review.
		Dimension	MA	Measurement	1 Sample per Heat	1 Sample per Heat	Approved drawing/ data sheet	Approved drawing/ data sheet	Inspection Report	√	2,3	-	1	
		Workmanship And Finish	MA	Visual	100%	100%	Approved drawing/ data sheet	No scratches, cracks etc.	-do-		2,3	-	1	

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

बी एच ई एल BHEL		STANDARD QUALITY PLAN SHEET 3 OF 5		CUSTOMER:		PROJECT TITLE:		SPECIFICATION NO. : PE-TS-XXX-179-N001						
				BIDDER/VENDOR:		QUALITY PLAN NO.:		SPECIFICATION TITLE : TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGERS						
				SYSTEM:		ITEM: PHE		SECTION : IIA						
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK		REFERENC E DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					2/3	1					P	W	V	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.		11.
		Surface Defects And Cracks	CR	DP test	10%	2 % or min. 100 nos. whichever is higher	Manufacturer's DP test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		DPT Report	√	2,3	1	-	See Remark 3
				Light Box Test/ Vacuum chamber test	100%	10%	Manufacturer's Light Box/Vacuum test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		Vacuum Test Report	√	2,3	1	-	See Remark 3
		PMI testing	CR	PMI test	100 %	1 Sample per Heat	Approved drawing/ data sheet		PMI Compliance report	√	2,3	-	1	See Remark 5
2.2	Welding Procedures Specification (WPS)	Correctness	MA	Verification	100%	100%	ASME SEC-IX.	ASME SEC-IX.	QW 482 ASME SEC-IX	√	2,3	-	1	Customer /BHEL/ TPI (NPCIL, EIL, LLYODS & BVIS) approved WPS shall be used for welding
2.3	Procedure Qualification Records (PQR)	Suitability	MA	Visual & Mechanical Test	100%	100%	-do-	-do-	QW 483 ASME SEC-IX.	√	2,3	-	1	
2.4	Welders Performance Qualification	Welder's Performance Soundness Of Welds	MA	Visual / RT & Mechanical	100%	100%	-do-	-do-	QW 484 ASME SEC-IX	√	2,3	-	1	Only customer / BHEL/ TPI (NPCIL, EIL, LLYODS & BVIS) approved welder shall be engaged for welding.

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

		STANDARD QUALITY PLAN SHEET 4 OF 5		CUSTOMER:		PROJECT TITLE:		SPECIFICATION NO. : PE-TS-XXX-179-N001						
				BIDDER/VENDOR:		QUALITY PLAN NO.:		SPECIFICATION TITLE : TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGERS SECTION : IIA						
				SYSTEM:		ITEM: PHE								
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK		REFERENC E DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					2/3	1					P	W	V	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.		11.
2.5	Weld joint of expander/reducer.	Welding Of Outer Flange To Reducer/Expander	MA	Visual	100%	100%	Approved Drawings		Inspection Report	√	2,3	-	1	
				DPT	100%	100%	Manufacturer's DP test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		DPT Report	√	2,3	1	-	
2.6	PHE Structure	Workmanship and finish	MA	Measurement & Visual	100%	100%	Approved Drawings		Inspection Report	√	-	2	1	
2.7	Plate Gaskets	Presence Of Gasket	MA	Visual	100%	100%	Mfg. Spec.	Mfg. Spec.	-do-	√	2	1	-	
2.8	Plate arrangement to flow diagram	Correctness	CR	Visual as per flow diagram	100%	100%	Approved Drawing		Inspection Report		2	-	1	
2.9	Assembly of tightening bolts and nuts	Squeezing of threads on T/B	MA	Visual	100%	100%	Approved Drawing / Data sheet		-do-		2	-	1	
2.10	Plate Pack	Length	MA	Dimension Measurement	100%	100%	Approved Drawing		-do-		2	-	1	
3.0	FINAL INSPECTION													
3.1	Complete Assembly	a. Conformance to GA drg.	MA	-do-	100%	100%	-do-	-do-	-do-		2	1	-	CHP
		B. Dimensions, No. of Heat Transfer Plates, Workmanship & finish	MA	-do-	100%	100%	-do-	-do-	-do-	√	2	1	-	CHP
3.2	Unbalanced hydrostatic pressure (Primary Side)	Leakage / strength of structure	MA	Hyd. Test	100%	100%	Manufacturer's Hydro test procedure (to be reviewed and approved by BHEL/Customer during contract stage)		Hydro Test Report	√	2	1	-	CHP; Hydro test @ 1.5 times the design pressure with 60 minutes holding time.

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

		STANDARD QUALITY PLAN SHEET 5 OF 5		CUSTOMER:		PROJECT TITLE:		SPECIFICATION NO. : PE-TS-XXX-179-N001						
				BIDDER/VENDOR:		QUALITY PLAN NO.:		SPECIFICATION TITLE : TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGERS SECTION : IIA						
				SYSTEM:		ITEM: PHE								
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK		REFERENC E DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					2/3	1					P	W	V	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.	11.	
3.3	Unbalanced hydrostatic pressure (Secondary Side)	Leakage / strength of structure	MA	Hyd. Test	100%	100%	-do-	-do-	√	2	1	-	CHP; Hydro test @ 1.5 times the design pressure with 60 minutes holding time.	
3.4	Completeness of all previous tests	Completeness	MA	Verification of reports	100%	100%	Tech. Specs / App. Drawings	Completion Certificate	√	2	-	1		
3.5	Painting	Dry film thickness & shade	MA	Measurement & visual	100%	100%	Customer/BHEL Tech. Spec. / Approved Data sheets	-do-	√	2	-	1		
3.6	Packing	Completeness	MA	Measurement & visual	100%	100%	Customer/BHEL Tech. Spec. / Approved Data sheets	-do-	√	2	-	1	Packing procedure as per Annexure B.	
REMARKS:- 1. Original Mill TC's to be furnished by vendor to BHEL representative during inspection stage. BHEL to verify physical correlation of Mill TC's with material. 2. Inspection of Heat Transfer Plate Area Measurement shall be by White Light Scanning Method from BHEL(Refer Annexure –A). In case, inspection of plate area measurement by white light scanning method of specific PHE model has been witnessed by BHEL in past project then Type test certificates are acceptable to BHEL for same. 3. Reg. Dye Penetrant Test & Light Box Test: There shall be random witness by BHEL/ NTPC 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 only be accepted. 4. Ultrasonic test of tie rods shall be carried out using 10 mm / 20 mm size Normal Beam Probe of frequency 2 MHz. Using this probe the back wall echo in the sound area of bar shall be adjusted to 100% of full Screen Height (FSH). The whole bar shall be scanned under this sensitivity setting. In this sensitivity setting any defect echo indication having height greater than 20% of FSH is not acceptable. 5. 100% PMI Inspection for material grade of PHE Heat Transfer plates shall be from third party like TUV/Lloyd & certificate shall be submitted for review of BHEL. BHEL reserves the right to conduct random & independent PMI inspection on PHE's Heat Transfer plates to ascertain the plate material.														

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



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

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

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-TS-XXX-179-N001

SECTION IIA

REV. NO. 1

DATE 18.05.2016

SHEET 2 OF 2

ANNEXURE-1

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

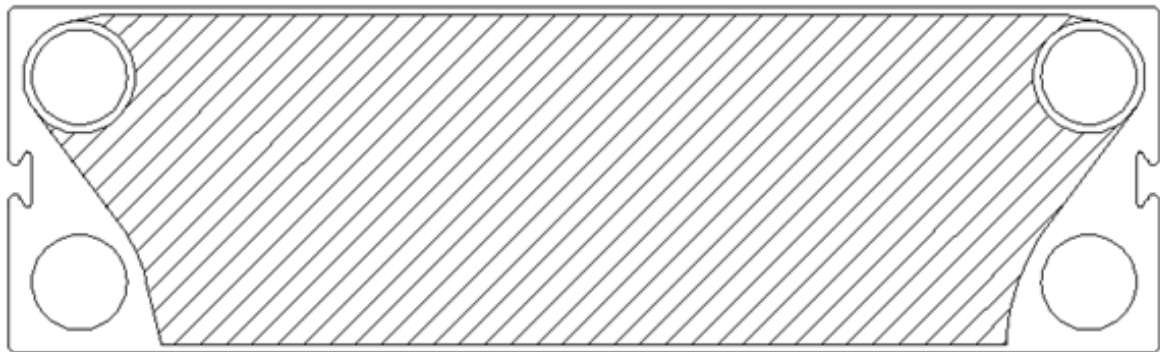


Fig. 1: Wetted Surface Area for Parallel Connection

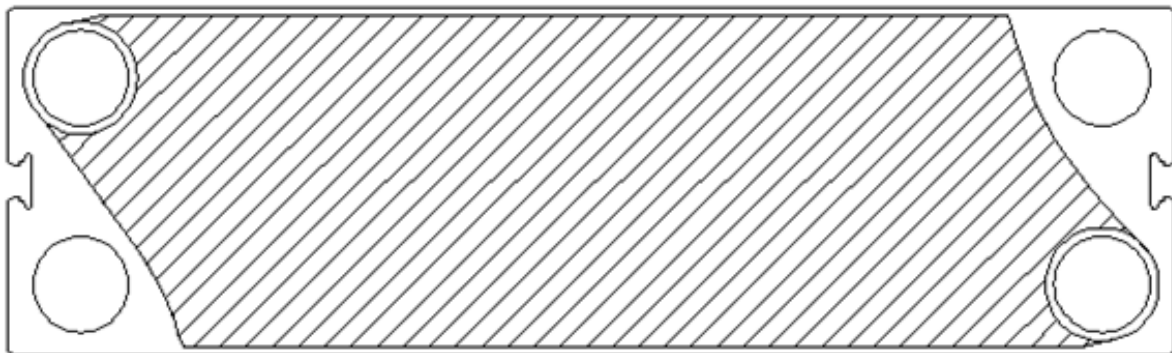


Fig. 2: Wetted Surface Area for Diagonal Connection



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

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

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

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

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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-TS-RC-179-N001

SECTION III

REV. NO. 01

DATE 17.06.17

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-TS-RC-179-N001	
	TECHNICAL SPECIFICATION FOR	SECTION IIIA	
	RATE CONTRACT OF	REV. NO. 01 DATE 17.06.17	
	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 no of plates.
 - ii. Guarantee schedule duly vetted by Principal shall be submitted during contract stage.
 - iii. Bidders have back to back arrangement with their principal for technical guarantees.

	SCHEDULE OF PERFORMANCE GUARANTEES FOR RATE CONTRACT OF PLATE HEAT EXCHANGER		SPECIFICATION NO.	PE-TS-RC-179-N001
			Section	IIIB
			Rev No.	1
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-TS-XXX-179-N001		
		PLATE HEAT EXCHANGER	SECTION IIIC		
			SHEET 1 OF 7		

INSTRUCTION TO BIDDER

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

SL.NO.	ITEM	UNIT	PARTICULARS	
1.0	General			
1.1	Number of plate heat exchangers being supplied.	Nos.		
1.2	Manufacturer			
1.3	Model Number/ Type			
1.4	Whether single or double pass			
1.5	Flow Pattern			
2.0	Design			
2.1	Design Pressure	bar (g)		
2.2	Design Temperature	°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		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		
	a) In fouled conditions			
	b) In clean conditions			
3.4	Total pressure drop across heat exchanger from inlet to outlet(including inlet & outlet nozzles)	bar		
	a) For design flow			
	b) For 110% design flow rate			

Name of

Bidder/ Vendor

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

	Title DATA SHEET - B PLATE HEAT EXCHANGER	SPECIFICATION NO. PE-TS-XXX-179-N001 SECTION IIIC SHEET 2 OF 7
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INSTRUCTION TO BIDDER

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

SL.NO.	ITEM	UNIT	PARTICULARS	
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		
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		
	a) In Clean Condition b) In fouled conditions			
4.8	Pressure drop in channels	bar		
	a) In Clean Condition b) In fouled conditions			
4.9	Maximum differential pressure between hot and cold fluids in plate channels (operating)	bar (g)		

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-TS-XXX-179-N001
		PLATE HEAT EXCHANGER	SECTION IIIC
			SHEET 3 OF 7

INSTRUCTION TO BIDDER

- This data sheet shall be read in conjunction with Specification No. PE-TS-XXX-179-N001 Section- IA & IB.
- Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT	PARTICULARS
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 a) As per 5.5 above b) As per 5.6 above	mm	
	Maximum plate pack length a) As per 5.5 above b) As per 5.6 above	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		

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-TS-XXX-179-N001
		PLATE HEAT EXCHANGER	SECTION IIIC
			SHEET 4 OF 7

INSTRUCTION TO BIDDER

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

SL.NO.	ITEM	UNIT	PARTICULARS
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		
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		

Name of

Bidder/ Vendor

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

	Title DATA SHEET - B PLATE HEAT EXCHANGER	SPECIFICATION NO. PE-TS-XXX-179-N001 SECTION IIIC SHEET 5 OF 7
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INSTRUCTION TO BIDDER

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

SL.NO.	ITEM	UNIT	PARTICULARS	
13.0	Inlet & outlet Connection Nozzles		Primary Side (Hot Fluid)	Secondary Side (Cold Fluid)
13.1	Size	mm		
13.2	Rating			
13.3	Facing & drilling standard			
13.4	Flange material			
13.5	Are all nozzles counter-flanges, bolts, nuts, gaskets etc., are included in the offer?			YES/NO
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

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-TS-XXX-179-N001
		PLATE HEAT EXCHANGER	SECTION IIIC
			SHEET 6 OF 7

INSTRUCTION TO BIDDER

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

SL.NO.	ITEM	UNIT	PARTICULARS
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? If not, what percentage is checked?		YES/NO
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	kg.	

Name of

Bidder/ Vendor

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

	Title DATA SHEET - B PLATE HEAT EXCHANGER	SPECIFICATION NO. PE-TS-XXX-179-N001 SECTION IIIC SHEET 7 OF 7
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INSTRUCTION TO BIDDER

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

SL.NO.	ITEM	UNIT	PARTICULARS
	a) Empty b) Flooded		
22.0	Flooded Weight of heat exchanger with Max. Plates 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
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 :					

	PRE - QUALIFYING REQUIREMENTS (TECHNICAL)	DOCUMENT NO.: PE-PQR-20-179-N001
		SPECIFICATION NO: PE-TS-RC-179-N001 (REV 01)
		REVISION NO: 0 DATE: 17.06.17
		SHEET: 1 of 1

ENQUIRY NO:

PROJECT: Rate Contract – PHE Package

PACKAGE: PLATE HEAT EXCHANGER (PHE)

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

a. PQR Minimum heat load for GROUP-A : **3412500 Kcal/Hr.**

b. PQR Minimum heat load for GROUP-B : **4143750 Kcal/Hr.**

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

Bidder to comply to general points of PQR available at <http://bhhelpem.com/vensection/PMD/PMD.aspx> . In case bidder is not OEM, the offer shall be evaluated as per point no 1 of general points of PQR

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 for assessment of bidder for supplying the PHE on regular basis in enclosed format- Annexure-1.

Bidder shall furnish the PO copy/approved documents/ Dispatch details 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 atleast 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.

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 of first contract. Supporting documents for execution of the Contract like dispatch details, MDCC, Inspection report etc. along with the PO Copy to be furnished, if bidder intends to submit the documents for Repeat Contracts.

OR

iii. In case, Bidder has executed contract(s) for BHEL-PEM, internal assessment by BHEL-PEM shall be followed for evaluation for satisfactory performance. For this, bidder to submit the request along-with relevant documents.

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