

1X250 MW ROURKELA PP-II EXPANSION (NSPCL)

TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGERS

Specification No. : PE-TS-427-179-N001



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



TITLE :
**TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS**

SPECIFICATION NO. PE-TS-427-179-N001

SECTION

REV. NO. 0

DATE 01.03.2017

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 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
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-TS-427-179-N001

SECTION I

REV. NO. 0

DATE 01.03.17

SECTION I

IA SPECIFIC TECHNICAL REQUIREMENTS

IB DATASHEET – A



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-TS-427-179-N001

SECTION IA

REV. NO. 0 **DATE 01.03.2017**

SHEET 1 OF 3

1.0 GENERAL :

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

1X250 MW Rourkela PP-II Expansion

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).

2.0 SYSTEM DESCRIPTION :

- 2.1 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 (Clarified Water).
- 2.2 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.
- 2.3 The analysis of DM Water, Clarified Water (Auxiliary cooling water) to be handled by the Plate Heat Exchangers are given in Data Sheet-A.
- 2.4 A strainer of 2 mm size at ACW inlet lines of PHE is provided and backwashing of PHE's is not envisaged.

3.0 SCOPE OF SUPPLY :

- 3.1 The details of the Plate Heat Exchangers with the quantity, design parameters etc. to be supplied shall be as per Data Sheet-A enclosed herewith.
- 3.2 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 (Clarified Water) 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.



TITLE :
**TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS**

SPECIFICATION NO. PE-TS-427-179-N001

SECTION IA

REV. NO. 0 DATE 01.03.2017

SHEET 2 OF 3

- (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 as indicated in Data Sheet.
- (x) Mandatory spares as applicable as per data sheet A.

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

4.0 INSPECTION REQUIREMENTS

- 4.1 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.
- 4.2 Minimum requirement for quality Plan shall be as per quality plan attached in the Section D of the Vol. IIB. 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.
- 4.3 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.

5.0 PERFORMANCE GUARANTEE AND TESTING:

- 5.1 The PHE shall be guaranteed to meet the performance requirements specified in Section-II and also for trouble free operation after commissioning.
- 5.2 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.
- 5.3 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.



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SPECIFICATION NO. PE-TS-427-179-N001

SECTION IA

REV. NO. 0 DATE 01.03.2017

SHEET 3 OF 3

5.4 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.

6.0 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.

7.0 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-V5-427-179-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-V5-427-179-N002	GA drawing of PHE	
	PE-V5-427-179-N003	Thermal sizing calculation of PHE	
	PE-V5-427-179-N005	QAP of PHE	
	Secondary Documents		
	PE-V5-427-179-N004	Performance curves of PHE	R-0 within 20 days of Cat-I(or)II approval on TDS
	PE-V5-427-179-N006	O&M MANUAL for PHE	Within 30 days from MDCC
	PE-V5-427-179-N007	PG TEST PROCEDURE -PHE (If Applicable)	R-0 within 20 days of Cat-I(or)II approval on PHE document.

8.0 EXCLUSIONS :

The following are excluded from the bidder's scope:

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

		TECHNICAL SPECIFICATION FOR		Technical specification no.	PE-TS-427-179-N001
		PLATE HEAT EXCHANGER		Section	IB
		DATASHEET - A		Rev	0
				Date	01.03.2017
				Sheet	1 OF 2
	PROJECT NAME			1X250 MW Rourkela PP-II Expansion	
1.0	General			PLATE HEAT EXCHANGERS	
1.1	Number of Plate Heat Exchanger		Nos	2 (Two) Nos	
1.2	Arrangement			2X100% configuration	
1.3	Location			Indoor	
1.4	Primary side (Hot) Fluid			Passivated DM water (Refer enclosed water analysis)	
1.5	Secondary side (Cold) fluid			Clarified water (Refer enclosed water analysis)	
1.6	Connecting Pipe size	(Primary Side)	NB	600	
		(Secondary Side)	NB	600	
1.7	Maximum permitted Length of the PHE			4500 mm (excluding reducer)	
2.0	Design				
2.1	Design Code			Latest IS/BS/DIN/ASTM Standards	
2.2	Design Pressure		Kg/cm ² (g)	12	
2.3	Operating Pressure	(Primary Side)	Kg/cm ² (g)	About 5.5 Kg/sq. cm(g)	
		(Secondary Side)	Kg/cm ² (g)	About 3.6 Kg/sq. cm(g)	
2.4	Mechanical Design Temp.		°C	60	
2.5	Heat Transfer per Sq.Mtr. Of Heat Transfer Plate		Kcal/Hr./m ²	-	
2.6	Minimum Heat Transfer Area		Sq. M	1200.0	
2.7	Specific Heat of Fluid	(Primary Side)	Cal/gmDeg.C	1.0	
		(Secondary Side)	Cal/gmDeg.C	1.0	
2.8	Density of Fluid	(Primary Side)	gm/cc	1.0	
		(Secondary Side)	gm/cc	1.0	
3.0	Guaranteed Performance Requirements for each Heat Exchangers in fouled condition:				
3.1	Flow rate	(DMCW Side)	M ³ /hr	2110	
		(ACW Side)	M ³ /hr	2110	
3.2	Inlet temperature	(DMCW Side)	°C	43.42	
		(ACW Side)	°C	36	
3.3	Outlet temp	(DMCW Side)	°C	38	
		(ACW Side)	°C	41.42	
3.4	* Allowable pressure drop across heat exchanger from inlet to outlet in fouled conditions at the design flow	(DMCW Side)	MWC	7	
		(ACW Side)	MWC	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	
5.0	Heat Transfer Coefficient/Margin				
5.1	Overall fouling resistance (minimun)	Hr m ² deg C/Kcal		0.00008	
5.2	Minimum corrosion allowance on pressure parts,nozzles,sliding channel and frame (refer note 1)		mm	1.6	
6.0	Material of Construction :				
6.1	Heat Transfer Plates (Minimum acceptable plate thickness 0.6 mm). Refer Note no. 3			SS-AISI-316	
6.2	Plate Gasket			Nitrile rubber, 65 ± 5 Deg. shore hardness	
6.3	Compression/Fixed/Frame/Movable Pressure plates			Carbon Steel, IS-2062 Gr B, Epoxy painted	
6.4	Guide Rails/ bar			Carbon Steel, IS-2062 Gr B, with SS Cladding	

	TECHNICAL SPECIFICATION FOR		Technical specification no.	PE-TS-427-179-N001
	PLATE HEAT EXCHANGER		Section	IB
	DATASHEET - A		Rev	0
			Date	01.03.2017
			Sheet	1 OF 2
	PROJECT NAME		1X250 MW Rourkela PP-II Expansion	
6.5	Support Beam/ column		Carbon Steel, IS-2062 Gr B, Epoxy painted	
6.6	Nozzle		Carbon steel IS 2062 Gr. B	
6.7	Nozzle flanges		Carbon Steel IS 2062 (Confirming to ANSI B 16.5 class, Min.-150 lb)	
6.8	Flange/ Counter flanges		Carbon Steel as per IS 2062 Gr. B (Confirming to ANSI B 16.5 class, Min.-150 lb) Epoxy Coated	
6.9	Tightening Bolts/Rods & Nuts		IS 1367 or equivalent	
6.10	Nozzle flange bolt and nut		SA 193 Gr B7 / SA 194 Gr 2H	
6.11	Nozzle flange gasket		3 mm wire inserted red rubber	
6.12	Name Plate		AISI 316 18'-8' SS (3 mm thick)	
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.	
	b.) Primer			
	c.) Final Paint			
7.0	Extra Carrying capacity to be provided on frame assembly.	%	25	
8.0	Mandatory Spares			
8.1	Heat Transfer Plates	Nos	10% of total number of plates required for all PHEs	
	Plate Gaskets	Nos	1 set of total number of gaskets required for all PHEs	
	End plate gaskets	Nos	4 Nos.	
9.0	Available space (L x W x H)	mm	----- Bidder to indicate -----	
10.0	Weight of Assembly	Kg	----- Bidder to indicate -----	
11.0	Performance Testing		All supplied PHE's to be tested by vendor at Site to demonstrate gauranteed performance.	
12	Hydrotesting at Shop			
12.1	Hydrotesting Pressure	Kg/cm ² (g)	1.5 times the design pressure	
12.2	Duration of Hydrotesting	Minutes	30	
13	Performance curves and figures to be furnished during contact stage			
13.1	Primary side water outlet temperature vs. Secondary side water inlet temperature.			
13.2	Primary side water flow (80% to 115%) vs. Pressure drop and outlet temperature (Secondary side flow – 100%)			
13.3	Secondary side water flow (80% to 115%) vs. Secondary side pressure drop and primary side outlet temp (Primary side flow – 100%)			
13.4	Primary side water outlet temperature vs. Primary side inlet temp.			
13.5	Film heat transfer coefficient curve			
13.6	Correction Curves.			
14	Minimum Standard requirement of the PHE to be offered by the bidder.			
14.1	Minimum Corrosion allowance on thickness (as per ASME Sec. VIII Div. I)			
14.2	Metallurgy specified above is bare minimum . Equivalent or Superior materials suitable for fluid handled is also acceptable.			
14.3	Minimum plate thickness of 0.6 mm is without any negative tolerance. The plates shall be pressed from one single piece with the corrugation being smooth, uniform and identical for every plate.			
14.4	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.			
14.5	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.			
14.6	Each Plate shall be numbered in sequence with the number marked by indelible ink on each plate to permit easy reassembly.			
14.7	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. 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

Rourkela EPC Package (1x250 MW)

Water analysis report

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



TITLE :
TECHNICAL SPECIFICATION FOR
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-TS-427-179-N001

SECTION II

REV. NO. 0

DATE 01.03.2017

SECTION II

IIA STANDARD QUALITY PLAN

		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		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS	
					2/3	1						P	W	V	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.		11.	
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							
SIGNATURE				FOR CUST. USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL

बी एच ई एल BHEL		STANDARD QUALITY PLAN		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 DOCUMEN T	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		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					2/3	1					P	W	V	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.	11.	
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

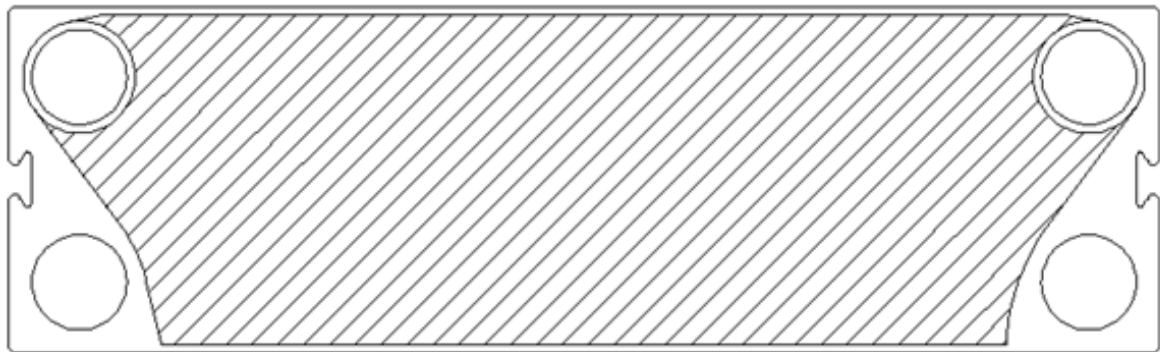


Fig. 1: Wetted Surface Area for Parallel Connection

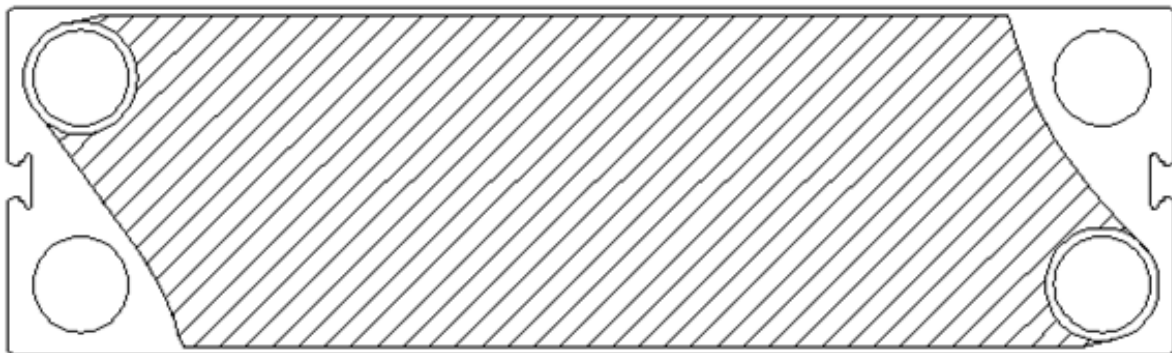


Fig. 2: Wetted Surface Area for Diagonal Connection



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

SECTION IIA

REV. NO. 1 **DATE 18.05.2016**

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
PLATE HEAT EXCHANGERS

SPECIFICATION NO. PE-TS-427-179-N001

SECTION III

REV. NO. 0

DATE 01.03.2017

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 : TECHNICAL SPECIFICATION FOR PLATE HEAT EXCHANGERS	SPECIFICATION NO. PE-TS-427-179-N001	
		SECTION IIIA	
		REV. NO. 0	DATE 01.03.2017

PROJECT : 1X250 MW ROURKELA PP-II
EXPANSION

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		SPECIFICATION NO.	PE-TS-427-179-N001
			Section	IIIB
	PLATE HEAT EXCHANGER		Rev No.	0
SL. NO.	DESCRIPTION	UNIT	GUARANTEE VALUE	
			1X250 MW ROURKELA PP-II EXPANSION	
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 PLATE HEAT EXCHANGER	SPECIFICATION NO. PE-TS-XXX-179-N001 SECTION IIIC SHEET 1 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	
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 Secondary Side (Hot Fluid) (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) a) For design flow b) For 110% design flow rate	bar		

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 2 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	
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 PLATE HEAT EXCHANGER	SPECIFICATION NO. PE-TS-XXX-179-N001 SECTION IIIC SHEET 3 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
5.0	Heat Transfer Plates		
5.1	Area of each plate	M ²	
5.2	Dimension (width x height)	mm x mm	
5.3	Thickness	mm	
5.4	Material & chemical composition		
5.5	Number of plates per heat exchanger	Nos.	
5.6	Maximum number of plates that can be accommodated in the heat exchanger frame	Nos.	
5.7	Type of corrugation		
5.8	Minimum plate pack length	mm	
	a) As per 5.5 above		
	b) As per 5.6 above		
	Maximum plate pack length	mm	
	a) As per 5.5 above		
	b) As per 5.6 above		
5.9	Average spacing between two plates	mm	
5.10	Hold up volume of each passage	M ³	
5.11	Port size (diameter)	mm	
6.0	Plate Gaskets		
6.1	Type		
6.2	Material and composition		
6.3	Thickness of gasket	mm	
6.4	Hardness of gasket		
6.5	Expected life of gasket		

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	Secondary Side
13.1	Size	mm	<u>(Hot Fluid)</u>	<u>(Cold Fluid)</u>
13.2	Rating			
13.3	Facing & drilling standard			
13.4	Flange material			
13.5	Are all nozzles counter-flanges, bolts, nuts, gaskets etc., are included in the 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	SPECIFICATION NO. PE-TS-XXX-179-N001
		PLATE HEAT EXCHANGER	SECTION IIIC
			SHEET 7 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
	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 :					