

TD-106-1 Rev No. 5 Form No.	 HYDERABAD	PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, HYDERABAD –32.			Doc. No. PY51678						
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TECHNICAL SPECIFICATION FOR AIR CONDITIONING SYSTEM <table border="1" style="margin: 20px auto; width: 80%;"> <tr> <td style="width: 20%;">PROJECT :</td> <td>REVAMPING AND UPGRADATION OF 4 NOS OF ESPs SYSTEM FOR TPP BOILERS</td> </tr> <tr> <td>CUSTOMER :</td> <td>RASHTRIYA ISPAT NIGAM LIMITED, VISAKHAPATNAM STEEL PLANT</td> </tr> <tr> <td>PRINCIPAL CONSULTANT:</td> <td>M.N.DASTUR & COMPANY (P) LTD. CONSULTING ENGINEERS, KOLKATA</td> </tr> </table>						PROJECT :	REVAMPING AND UPGRADATION OF 4 NOS OF ESPs SYSTEM FOR TPP BOILERS	CUSTOMER :	RASHTRIYA ISPAT NIGAM LIMITED, VISAKHAPATNAM STEEL PLANT	PRINCIPAL CONSULTANT:	M.N.DASTUR & COMPANY (P) LTD. CONSULTING ENGINEERS, KOLKATA
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		1.0.0. INTENT OF SPECIFICATION: 1.1.0. The intent of this document is to establish the minimum requirement of design, engineering, selection, manufacture, assembly, inspection, shop testing, shop painting, delivery FOR site properly packed for transportation suitably protected from weather including transit insurance of all equipment, unloading at site, transportation to stores, safe storage at site, insurance against pilferage, transportation from stores to site, final painting, erection, testing, commissioning and performance testing, final handling over as mentioned hereinafter for the air conditioning system, which form part of project. 1.2.0. It is not the intent to completely specify all details of design, manufacture and construction. Nevertheless the equipment and installation shall conform to high standard of engineering and shall be capable of performing in continuous commercial operation in a manner acceptable to the Purchaser and end customer. 2.0.0 SPECIAL NOTES TO BIDDERS 2.1.0 This specification shall be read in conjunction with all its enclosures. In case of any discrepancy arising between this job specification & its enclosures, the most stringent of all (as determined by purchaser) shall be followed. Further, if a requirement in this specification or any of the enclosures, calls for a decision from the Purchaser, it shall be bidder's sole responsibility to clearly bring out/highlight the same distinctively in his pre-bid queries, so as to enable purchaser to furnish their decision/clarification. If such issues/requirements are not duly addressed by bidder during the pre-bid stage and if such issues/requirements have been observed later during order execution stage, it shall be binding on the bidder to comply with the final decision made by the purchaser subsequently, without any cost, delivery, or any other commercial implications. 2.2.0 Any additional equipment, material, services etc., which are not specifically mentioned in this specification, but required to make the Ventilation system complete in all respects, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be covered under the scope of this specification. 2.3.0 Any specific hardware/software/item/ etc. required as indicated in 2.2.0 above but not listed elsewhere in this specification or its enclosures, shall be deemed to be included in the basic price quoted by the bidder. Also, all mounting hardware/ accessories/fittings/conduits/etc. required for E&C of the above Ventilation System shall be deemed to be included in the basic price quoted by the bidder even if such items are not explicitly mentioned in this specification. 2.4.0 The Bidder shall accept full responsibility for the completeness and for the faultless working of all the equipment and the Ventilation plant as a whole. 2.5.0 Bidder to note that the Purchase Order for the complete Ventilation system for the subjected enquiry shall be placed on UNIT RATE basis as per tender specification requirements.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		2.6.0 Bidder offer shall be strictly as per these specification requirements. Unsolicited or Alternate offers from the bidders will not be entertained. 2.7.0 In case bidder feels that it is necessary to exclude some components of scope of supply or some of the features of specification requirements due to any technical constraints, bidder shall bring the same to the notice of purchaser during pre-bid stage and take their prior approval before submission of their bid. Format for pre-bid queries is attached as annexure-2 of this specifications. 2.8.0 All such clarifications required by the bidder shall be intimated to BHEL together as a single notice within a week of receipt of enquiry by bidder. In case no such clarifications are sought during pre-bid stage, it will be assumed that bidder has no comments or observations on BHEL's specification and no deviations to the specifications will be taken by the bidder. 2.9.0 Bidder to quote strictly as per BHEL's price format. Failure to do shall make their offer liable for rejection. Any tampering/modification/change of the BHEL's price format is not allowed and is liable for rejection of bidders offer. 2.10.0 Incase Bidder is unable to offer due to any specific requirement of specification, Bidder may bring out the same in their regret letter. Otherwise it will be considered that non participation by the bidder is attributable to reasons other than any specification requirements. 2.11.0 The design information, specifications and drawings indicate the "Minimum" requirements and are intended to enable Bidders to ascertain the extent of the work involved. Bidders are expected to supplement the information included in this specification as required and submit a comprehensive bid. 2.12.0 Bidder to refer to the Special Conditions of the contract (SCC) & General Conditions of the Contract (GCC) of tender specifications 3.0.0 PROJECT DESCRIPTION Visakhapatnam Steel Plant (VSP) owned by Rashtriya Ispat Nigam Limited (RINL) is located in Visakhapatnam district in Andhra Pradesh state and is having its own captive thermal power plant. The thermal power plant station is having 6 Units of 330 TPH boilers each with a total installed capacity of 1980 TPH. Out of the six (6) nos. of Boilers, five (5) nos. of Boilers are installed in Stage-I, during 3.0 MTPA stage and one(I) no. of Boiler is installed in Stage-II , i.e. 6.3 MTPA stage. The stage-I (5x330 TPH) units were commissioned in the year 1984-85. The stage-I Units #1 to 5 have completed 31 years of service. The ESPs installed in these units were originally designed and supplied by BHEL. The boilers and ESPs installed in Stage-I were designed for 100% coal firing and 50% coal + 50% Blast furnace gas combination fuel firing. The existing ESP type is 2xFAA-7x36-2x57125-2 (300mm pitch) design and the design emission value is 150 mg/Nm3. Over the period, due to ageing of boilers, due to deterioration in the coal quality & other parameters and change in the operating condition of the boilers, the present emission level in these five units is more than the specified norms indicated by the		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		Pollution Control Board. Presently, RINL intends to take up the Revamping & upgradation of existing four (4) nos. of ESPs to bring down the ESP outlet emission level to 50 mg/Nm3. Project Details:- <table border="0"> <tr> <td>Customer</td> <td>: -</td> <td>M/s Rashtriya Ispat Nigam Ltd, Visakhapatnam</td> </tr> <tr> <td>Project</td> <td>: -</td> <td>RINL - Revamping and Upgradation of 4 nos. of ESPs</td> </tr> <tr> <td>Plant/Project Location</td> <td>: -</td> <td>Visakhapatnam Steel Plant, Andhra</td> </tr> <tr> <td>Consultant</td> <td>: -</td> <td>M N Dastur & Company Private Limited, Kolkata</td> </tr> </table> 4.0.0 GENERAL PLANT REQUIREMENT 4.1.0 Air Conditioning system shall be designed to operate 24 hours per day and 365 days in a year. 4.2.0 The life span to be considered in the design , equipment and component selection shall be minimum of 20 years 4.3.0 For the design of the plant, it is necessary not only to consider the requirements of operation, but also (by suitably planning the layout), the convenience of inspection, cleaning, maintenance and repair. 4.4.0 Equipment design and engineering shall incorporate adequate safety features (as per applicable specifications of respective equipment as well as Health, Safety and Environment Codes & Standards applicable for the subject project) to provide protection to operating personnel, equipment and environment. 4.5.0 In order to achieve the reliability, high efficiency and safe operation of the plant, it is also necessary to consider various precautions to safeguard the operating and maintenance personnel. 4.6.0 The design of the plant shall ensure that the plant can, in the state of normal operation, adapt itself variation within the allowable range of design. 4.7.0 Equipments installed outdoors shall be able to operate in all-weather conditions and to withstand the work site environment. For equipment in operation or in standby that may be influenced by direct sunshine, shelter or cover shall be provided. 4.8.0 The facilities shall be completed in a manner so as to require minimum time for hook up of the same with other systems 4.9.0 If during the execution of works, it is found that there is interference with other facilities/structures, the Bidder shall revise his design/detailed drawings to clear the interference and shall provide all necessary measures for the safety of structures under construction. No claim in terms of cost or relaxation in time shall be entertained for any redesign, rework and for the safety measures provided. If at any stage of work, any dismantling or modification or relocation of any facilities is required to be done to complete the work in bidder's scope and which has been agreed by the Owner, the same shall be done by the bidder at no extra cost or			Customer	: -	M/s Rashtriya Ispat Nigam Ltd, Visakhapatnam	Project	: -	RINL - Revamping and Upgradation of 4 nos. of ESPs	Plant/Project Location	: -	Visakhapatnam Steel Plant, Andhra	Consultant	: -	M N Dastur & Company Private Limited, Kolkata
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time implication to the Owner. All such changes will be executed only after the proposed drawings and work plan are approved by the purchaser.

4.10.0 The Bidder shall take all necessary precautions to protect all the existing equipment, structures, facilities and buildings etc. from damage. In case any damage occurs due to the activities of the Bidder on account of negligence, ignorance, accidental or any other reason whatsoever, the damage shall be immediately made good by the Bidder at his own cost to the satisfaction of the Owner. The Bidder shall also take all necessary safety measures at his own cost, to avoid any harm or injury to his workers and staff from the equipment and facilities of the power station.

5.0.0 BIDDER'S SCOPE OF SUPPLY AND ERECTION-COMMISSIONING

5.1.0 AREA WISE AIR CONDITIONING SYSTEM REQUIREMENTS ARE AS FOLLOWS:

The following ESP Control room (ECR) areas shall be provided with air-conditioning system as per contract document:

S. No.	Building	Type of System
A	ECR for Unit 1-2	
1	Control Room @ EL. 9.5M Including: - ECP Room - ACP Room - Office Room	- Package Unit AC with Air Cooled Condenser. 16 TR (min) Cooling capacity X 3 Nos (2W+1S). - Please refer Annexure-17 for Heat Load Calculation.
2	Switchgear Room @ EL. 0.0M	- Package Unit AC with Air Cooled Condenser. 11 TR (min) Cooling capacity X 3 Nos (2W+1S). - Please refer Annexure-17 for Heat Load Calculation.

S. No.	Building	Type of System
B	ECR for Unit 3-4	
1	Control Room @ EL. 9.5M Including: - ECP Room - ACP Room - Office Room	- Package Unit AC with Air Cooled Condenser. 16 TR (min) Cooling capacity X 3 Nos (2W+1S). - Please refer Annexure-17 for Heat Load Calculation.

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company . <table border="1" style="width: 100%;"> <tr> <td style="width: 5%;">2</td> <td style="width: 45%;">Switchgear Room @ EL. 0.0M</td> <td style="width: 50%;"> • Package Unit AC with Air Cooled Condenser. • 11 TR (min) Cooling capacity X 3 Nos (2W+1S). • Please refer Annexure-17 for Heat Load Calculation. </td> </tr> <tr> <td>C</td> <td>ECR for Unit 5</td> <td></td> </tr> <tr> <td>1</td> <td> Control Room @ EL. 9.5M Including: • ECP Room • ACP Room • Office Room </td> <td> • Package Unit AC with Air Cooled Condenser. • 16 TR (min) Cooling capacity X 3 Nos (2W+1S). • Please refer Annexure-17 for Heat Load Calculation. </td> </tr> <tr> <td>2</td> <td>Switchgear Room @ EL. 0.0M</td> <td> • Package Unit AC with Air Cooled Condenser. • 11 TR (min) Cooling capacity X 3 Nos (2W+1S). • Please refer Annexure-17 for Heat Load Calculation. </td> </tr> </table> Notes: <i>Bidder to note that this is the actual cooling capacity required. The rating of the Package AC being offered shall be decided by the bidder considering the actual cooling requirement indicated above and Ambient conditions.</i> <i>Bidder to note that the cooling capacity indicated above is the minimum capacity. Bidder can offer machine with higher cooling capacity. Bidder to note that any such higher capacity machine shall be treated at par with the 11.0/16.0 TR Capacity machine. The configuration of the system, in any case, shall be as indicated above in clause 5.1.0.</i> <i>Heat Load Calculation summary has been provided in Annexure-17. Minimum capacity of equipment/machines are indicated therein. Detailed Heat load calculation shall be performed by bidder and equipment selection shall be as per approved heat load calculation. However, in any case, capacity/sizing of equipment shall not be less than that indicated in Annexure-17.</i> 5.2.0 — MANDATORY SPARES: The prices of mandatory spares indicated by the Bidder in the Price Bid Format (Annexure-1) shall be used for bid evaluation purposes. Wherever quantity is specified as both a percentage and a value, the Bidder has to supply the higher quantity until unless specified otherwise.					2	Switchgear Room @ EL. 0.0M	• Package Unit AC with Air Cooled Condenser. • 11 TR (min) Cooling capacity X 3 Nos (2W+1S). • Please refer Annexure-17 for Heat Load Calculation.	C	ECR for Unit 5		1	Control Room @ EL. 9.5M Including: • ECP Room • ACP Room • Office Room	• Package Unit AC with Air Cooled Condenser. • 16 TR (min) Cooling capacity X 3 Nos (2W+1S). • Please refer Annexure-17 for Heat Load Calculation.	2	Switchgear Room @ EL. 0.0M	• Package Unit AC with Air Cooled Condenser. • 11 TR (min) Cooling capacity X 3 Nos (2W+1S). • Please refer Annexure-17 for Heat Load Calculation.
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f) Price of all the above items shall be construed to be included in the main package price. No separate price for the same shall be offered.

5.5.0 SPECIAL TOOLS AND TACKLES:

a) All special tools and tackles, which are necessary for erection and commissioning and regular maintenance of the AC System, shall be supplied at site by bidder.

b) Price of these items shall be construed to be included in the main package price. No separate price for the same shall be offered.

c) All the special tools and tackles shall be shipped in separate steel tool boxes.

d) Bidder to note that if at a later stage the requirement of any other special tool & tackles is required for the Package, same has to be supplied by bidder without any delivery or commercial implication. Decision of the Purchaser regarding the requirement of any additional tools and tackles will be final and binding on the Purchaser.

e) All special tools and tackles shall be handed over to end customer warehouse / place informed by the Purchaser, prior to the issuance of the provisional acceptance certificate.

f) Following items, as a minimum but not limited to, shall be supplied by bidder. However, detailed list shall be furnished by bidder after award of contract for purchaser's review:

S.NO	DESCRIPTION	QTY.
1	Box Spanners(6 Pcs)	One Set
2	3/8 " (10mm) & 5/16" (8mm) Size valve Stem Socket Wrench (2 Pcs)	One Set
3	Flaring tools up to 3/4" (19 mm) Size	One Set
4	6" Size Inside Caliper, outside caliper and Divider (3 Pcs)	One Set
5	12" size Depth Gauge	One
6	Allen Keys (7 Pcs)	One Set
7	Instrument tube cutter up to 5/8" (16mm) size tube	One
8	1.5 Lbs .Hammer	One
9	Gas Charging manifold with Cylinder Adopter	One Set
10	Halide leak Detector	One
11	Assorted sizes of Half Union, Flared Tees Adopters, connectors, Flare Nuts etc. as reqd.	Ten
12	Grease gun	One
13	Center Punch	One
14	Torch with dry cells	One
15	Electric Tester	One
16	9- Blade feeler Gauge	One
17	12" long steel foot rule	One
18	Roll of insulation tape 3/4"	One
19	Oil can	One

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20	Temperature probe	One
21	Digital tachometer	One
22	Pitot tube	One
23	Digital anemometer	One
24	Tool box for the above	One

5.6.0 RECOMMENDED SPARES:

- a) BIDDER shall furnish a list of recommended spare parts which the BIDDER considers necessary for the Air-conditioning system for two (2) years trouble free operation. The recommended spares that already appearing in list of mandatory spares SHALL NOT be included in recommended spares list. The list of recommended spares shall include such spares which are to be stored to achieve the plant availability level indicated by the BIDDER.
- b) **The recommended spares are not part of main offer and shall not be considered for bid evaluation. The unit price of each recommended spares shall be indicated separately and shall not be included in the main price.**
- c) **These shall be ordered as per the requirement of end customer. The bidder shall provide the price validity for recommended spares for a period of two years from the date of purchase order.**
- d) The PURCHASER reserves the right to buy any of the recommended spare parts as considered necessary by him. The prices of recommended spares shall be consistent with those of start-up and essential spares.
- e) Purchase of these spare parts will be covered by a separate order or an amendment to the contract. The recommended spares will be normally ordered only after the receipt of the complete information such as instruction manuals/general arrangement and spares identification drawings etc. for the equipment from the VENDOR to enable the PURCHASER to finalize the exact requirements. Subsequent to placement of order for recommended spares, VENDOR shall furnish details/ dimensional drawings for all such spares.

~~5.7.0 ANY CHANGE REQUIRED OUT OF HAZOP SYTUDY OF THE PLANT:~~

~~HAZOP (Hazard & Operability study) will be carried out by others on all the final updated piping and Instrumentation Diagrams (P&IDs) during detail engineering stage.~~

~~Purchaser /PMC/End customer will participate in the HAZOP study. All changes recommended out of the Hazop study report shall be incorporated by the bidder without any commercial or delivery implications to the purchaser.~~

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		6.0.0 BIDDER'S SCOPE OF SERVICES 6.1.0 LIST OF MAJOR SERVICES INCLUDED IN BIDDER'S SCOPE: I. Detailed Engineering II. Submission and obtaining approval of all engineering documents III. Engineering for procurement IV. Ordering of all equipments and materials V. Preparation of Documentation and obtaining owner/consultant approvals for the same VI. Overall Project Management and progress reporting to owner/consultant VII. Expediting suppliers and sub vendors VIII. Procurement IX. Manufacture, fabrication and assembly at works and site X. Inspection and testing including third party Inspection XI. Painting at works , painting at site including touch up paint XII. Dispatch and transportation of equipments, consumables, construction aids and other material to site. XIII. Establishment of site office complete with all facilities and communication network, as required XIV. Storage, loading, unloading, security and handling at site XV. Construction at site including fabrication, erection and installation of the complete Air Conditioning system. XVI. Insulation with cladding and painting XVII. Engineering for interfacing all inputs and outputs - XVIII. Hooking up of all services with battery limit Interfaces. XIX. Site clearing and cleaning XX. Mechanical Completion XXI. Supply of consumables and spares during start up, pre-commissioning and commissioning. XXII. Liaisoning with other contractors in the plant - XXIII. Preparation of start up and operating manuals XXIV. Pre-commissioning activities and rectification XXV. Commissioning and reliability run XXVI. Running of the AC plant as per Purchaser / PMC/ End customer's requirements till final handing over. - XXVII. Handing over the plant to the owner - XXVIII. Successful Performance guarantee testing XXIX. Recommended list of 2- years spares XXX. Supply of all test reports /certificates XXXI. Providing as built drawings - XXXII. Training of the Clients Engineering and Operating Personnel Notes: 6. Bidder to note that the above list is not exhaustive and any other service required as per the intent of this specification / project requirements /good engineering practice shall be deemed to be included in bidder's scope without any commercial implication to the purchaser.		
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6.2.0 After award of work, before finalizing his layout especially the layout/levels of equipments cable/pipe routes and other services, the bidder shall carry out a site survey to identify the location & details of existing facilities that may interfere with his proposed facilities. He shall suitably modify his layout/levels to prevent dislocation of existing facilities without any commercial implication to the purchaser.

6.3.0 Arrange for services of manufacturer's installation / commissioning engineer at site during mechanical completion / pre-commissioning & commissioning of all the major equipment and systems All the cost including that towards boarding, lodging , servicing , Insurance , Local Travel , Service charges etc for arranging all the above visits shall be deemed to be included in the bidder's quoted price. Bidder shall not be eligible to raise any extra claim in this regard.

6.4.0 Bidder is also required to provide on the job training to Purchaser /End Customer's operation personnel by associating them in all the day to day pre-commissioning, commissioning and maintenance activities and process operations, however, responsibility for adequate manning the system shall be that of bidder. The cost of all such training shall be deemed to be included in the price quoted by the bidder. Bidder shall not be eligible to raise any extra claim in this regard.

7.0.0 CLARITY OF SCOPE IN OTHER AREAS (SCOPE MATRIX):

7.1.0 MECHANICAL

MECHANICAL			
Item	By BHEL	By Vendor	Remarks
Supply & Installation of all Support structure like structural steel, anchor bolts, brackets etc for AC Equipments, Fans, piping, cabling, Split units, manual hoist etc	No	Yes	
Supply & Installation of Insert plates for support of intake air louvers / filters, back draft dampers / pressure relief dampers, fire dampers, wall mounted control panel etc.	No	Yes	-

7.2.0 ELECTRICAL, CONTROL & INSTRUMENTATION SYSTEMS

SI No.	Item	Engineering		Supply		ENC	
		By BHEL	By AC Vendor	By BHEL	By AC Vendor	By BHEL	By AC Vendor
1.	AC system MCC Panel	Yes	-	Yes	-	Yes	-
2.	Cable Trays, Structural steel for Cable trays one end equipment is in BHEL Scope	Yes	-	Yes	-	Yes	-
3.	Cable Trays, Structural steel for Cable trays both end equipment	-	Yes		Yes	-	Yes

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				By BHEL	By AC Vendor	By BHEL	By AC Vendor	By BHEL	By AC Vendor
			are in Vendor Scope						
		4.	Local Control Panel for Centralised AC system (Common for Heater, Humidifier, Fire Damper, Fresh Air Fan, DPS etc.)	-	Yes	-	Yes	-	Yes
		5.	Power, Control & Signal Cables, one end equipment are in BHEL Scope	Yes	-	Yes	-	Yes	-
		6.	Power, Control and signal Cables both end equipment are in Vendor Scope	-	Yes		Yes	-	Yes
		7.	Cable Termination at equipment supplied by Non AC package Equipment supplier end	Yes	-	Yes	-	Yes	-
			Cable Termination at AC package Vendor supplied Equipment end	-	Yes	-	Yes	-	Yes
		8.	Interconnecting Cabling between Fire alarm panel and AC system Fire Damper Panel	Yes	-		Yes		Yes
			Interconnecting Cabling between Fire damper panel to fire Dampers	-	Yes	-	Yes	-	Yes
		9.	All the instruments & Control panels required for the operation the system	-	Yes	-	Yes	-	Yes
		10.	Cable glands and lugs for BHEL supplied equipment end	Yes	-	Yes	-	Yes	-
			Cable glands and lugs for vendor supplied equipment end	-	Yes	-	Yes	-	Yes
		11.	Earthing strips with bolts and nuts for various electrical equipment supplied by bidder.	Yes	-	Yes	-	Yes	-
		12.	Earthing connection between earthing strips of equipment to the plant Earthing network located inside the plant room / vicinity of the equipment.						
		13.	Voltage Stabilizers for Split AC & Cabling between Voltage stabiliser and Split ACs	-	Yes	-	Yes	-	Yes
14.	MCB, Socket for Split ACs	Yes	-	Yes	-	Yes	-		
15.	1-Phase Power receptacle near control room entry for Air Curtin's	Yes	-	Yes	-	Yes	-		

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SI No.	Item	Engineering		Supply		ENC	
		By BHEL	By AC Vendor	By BHEL	By AC Vendor	By BHEL	By AC Vendor
16.	Cable Tray Layout from BHEL equipment to AC vendor supplied equipment	Yes	-	Yes	-	Yes	-
17.	Cable Tray Layout from between AC vendor supplied equipment	-	-Yes	-	-	-	Yes

7.3.0 CIVIL

CIVIL				
S No.	Item	By BHEL	By Bidder	Remarks
1.	All civil buildings	Yes	No	
2.	Making openings in walls for ducts/pipes/cables/equipment etc., and making them good after installation for the purpose of installing bidder's supplied items	No	Yes	
3.	Foundation blocks for AC machine ,Humidifier, Panel etc	Yes	No	
4.	Grouting/fixing of all equipment including supply of grouting material, insert angle/plain frames in the walls, support structures, foundations bolts, anchor bolts etc	No	Yes	
5.	Supply and fixing of framework for ducts , supply air grilles / diffusers, intake / exhaust air arrangement	No	Yes	
6.	Supply of vibration isolators / fixing hardware to be embedded / mounted on foundations	No	Yes	
7.	Designing and providing civil foundations/pedestals for Centrifugal fans, Making of various rooms.	Yes	No	Bidder to provide all the required inputs for designing the foundation etc. by BHEL.
8.	All false ceiling work, illumination except providing frames for grills / diffusers.	Yes	No	Suitable support for the grills / diffuser shall be by bidder.
9.	Condensate drain from plant rooms AHU/PAC rooms to the BHEL storm water drain. Condensate line shall have water seal arrangement and fully insulated.	No	Yes	
10	All the under deck insulation for the area	Yes	No	

CIVIL				
S No.	Item	By BHEL	By Bidder	Remarks
	exposed to sun			
11	Temporary scaffolding related to erection, testing & commissioning.	No	Yes	

7.4.0 TERMINAL POINTS

S No.	Item	By BHEL	By Bidder	Parameters at Terminal Point:
1.	Make Up Water Humidifier	Yes	No	Make Up water shall be made available at ambient condition at one point in Toilet/Wash area (first floor) in each ECR. Further connection shall be in bidder's scope. MOC : MS As per IS 1239 Heavy Grade.

Notes:

7. Flanges and Counter flanges at all the terminal points is included in bidder's scope.
8. Isolation Valve at all terminal points is in bidder's scope.
9. All necessary supports cross over, approach ladder required for the proper erection and operation of all equipment supplied by bidder shall be included in bidder's scope.
10. Bidder to furnish utility list with the offer indicating the requirements of the above services.

8.0.0 APPLICABLE CODES & STANDARDS (Pls refer Annexure-10)

8.1.0 Following codes and standards (latest editions) including their latest addenda shall be followed unless otherwise specified:

1.	IS:659	Safety code for Air conditioning.
2.	ISHRAE	INDIAN SOCIETY OF Heating Ventilation & Air-conditioning Enggs.
3.	IS:660	Safety code for Mechanical Refrigeration.
4.	IS:655	Metal Air ducts
5.	IS:2494	V-Belts for Industrial Purposes
6.	IS:3142	V-Grooved Pulley
7.	IS: 2379.	Color Code for Identification of Pipe Lines
8.	IS: 1239	(Part 1) Mild Steel Tubes.
9.	IS:277	Galvanised Steel Sheets (Plain and Corrugated)
10	IS:2062	Steel for General Structural Purposes.
11	IS:3103	Code of Practice for Industrial Ventilation
12	IS:4894	Test Code for Centrifugal Fans.
13	IS:8148	Packaged Air Conditioners.
14	IS 8183	Bonded mineral wool
15	IS-101	Methods of test for ready mixed paints and enamels.
16	IS-2379	Indian Standard for Pipe line identification-colour code.
17	IS – 5	Colors for ready mixed paints and enamels
18	IS – 325	Three phase induction motors.

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		8.2.0 The motors shall also conform to the provisions of Indian Electricity rules and other statutory regulations currently in force in the country. 8.3.0 In case Indian Standards are not available, standards issued by IEC/BSI VDE/ IEEE/ NEMA or equivalent agency shall be applicable. 8.4.0 In case of any conflict between this specification and above codes, standards and guidelines requirements, the most stringent requirement of these shall govern and the decision of purchaser in the resolution of the any such conflict shall be final. It shall be bidder's sole responsibility to clearly bring out/highlight the same distinctively in his pre-bid queries, so as to enable purchaser to furnish their decision/clarification. If such issues/requirements are not duly addressed by bidder during the pre-bid stage and if such issues/requirements are observed later during order execution stage, it shall be binding on the bidder to comply with the final decision made by the purchaser subsequently, without any cost, delivery, or any other commercial implications. 8.5.0 Other international standards may also be acceptable subject to their being equivalent or superior to those listed above, with prior approval of purchaser. 8.6.0 For provisions not covered by any of the codes & standards, applicable good engineering practices and norms shall govern. 8.7.0 Latest edition of applicable codes/Standards/Statutory Regulations referred to in the Bid Document shall correspond to the edition as on the date of issue of bid. 8.8.0 All addenda including the latest addenda to all the above codes and standards (latest editions) shall be followed by the bidder. 8.9.0 Any special approvals that may be applicable for certain items, like for explosion-proof items from CMERI-Dhanbad, etc., shall be have to be duly considered and ensured. 8.10.0The bidder shall arrange, at his own cost, to keep a set of latest edition of above standards and codes at his office. 8.11.0 STATUTORY REQUIREMENTS Requirements of the following local statutory authorities (as applicable) shall be taken into account for compliance: - Factories Act - Indian Petroleum Rules - Indian Boiler Regulation Act (IBR) - Indian Electricity Rules - Central Electrical Authority (CEA) - Director General, Factory Advice Service and Labour Institute, Bombay - Central Mines Research Institute (CMRI), Dhanbad - Requirement of Petroleum & Explosives Safety Organization (PESO), Nagpur, India.		
Ref.	Doc			

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i. Standards prescribed by Oil Industry Safety Directorate (OISD), Ministry of Petroleum and Natural Gas, Govt. of India.

j. Ministry of surface transport.

k. Department of Water Resources, Gujarat.

l. Stipulations stated in Environmental clearance granted by Ministry of Environment and Forest, Govt. of India.

m. Liquid Effluent Discharge as per Minimal National Standards for Liquid effluents and air emissions confirming to Pollution Control Board Standards

n. Pollution Control Board.

o. Public Works Department (PWD).

9.0.0 SYSTEM DESCRIPTION & DETAILED SCOPE OF WORK

9.1.0 DESIGN GUIDELINES

9.1.1 Outdoor Design Condition

The design ambient temperature considered for calculation the heat load are as follow:

Description	Unit	Summer	Monsoon	Winter
Dry bulb Temp	°C	38	31	16
Relative Humidity (RH)	%	70	85	70

Note:

11. Outdoor design condition mentioned above shall be considered for AC heat load calculation purpose only.

12. Design temperature for sizing of air-cooled exchangers/condenser shall be 45°C (peak ambient temperature).

9.1.2 Indoor Design Condition

The Air conditioning system shall be sized to meet the following inside design conditions as

S. No.	Area	DBT (°C)	RH %	Remarks
1	Control Room Floor (Second Floor of ECR)	25±2 °C	55 ± 5 %	
3	LT Switchgear Room Floor (Ground Floor of ECR)	28 °C Max	55 ± 5 %	

9.1.3 Available Power Supply – Please refer attached Annexure-9.

9.1.4 Other design parameters as considered are as follows:

Sl No	Description	Value
1.	Lighting load	1.5 Watt/Sq.ft.

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		9.2.5 The quantity of supplied air is at least 10% more than the returned air. This shall ensure that the Air conditioned space remains under positive pressure and infiltration of outside air into the conditioned space is minimum. 9.2.6 For Control room (EL. 9.5M), return air shall be routed back through return air grilles into the space above false ceiling which shall act as a return air plenum and further to the respective AC plant room. For Switchgear room, return air shall be routed back through return air duct to respective AC plant room. 9.2.7 A Fresh Air system comprising of fan-filter unit located in plant room shall provide fresh air from outside. Required amount of fresh air as per ISHRAE guidelines is added here. 9.2.8 Volume control dampers shall be provided in all branches of main ducts from PAC to throttle the air volume. 9.2.9 A pan type humidifier shall be located in the plant room and shall serve the humidity control requirement. Whenever the relative humidity of the conditioned space reaches the minimum allowable percentage of humidity, the humidifier shall be energized to restore the relative humidity by supplying steam to supply air on receiving signal from humidistat. The humidifier shall be such controlled that it shall not exceed the maximum allowable limit of relative humidity in the conditioned space. The humidifier shall be sized and designed accordingly. Make up water connection for Pan Humidifier shall be connected from nearest water line to suit-at-site condition. 9.2.10A strip heater shall be located in the supply air duct to take care of the reheat control. 9.2.11 Fusible link type fire dampers shall be installed in supply air and return air path. Fire dampers shall be provided where ducts penetrate walls or floors forming fire barriers. The fire rating of each damper shall be 1.5 hours. The fusible link shall melt at a temperature of 65-74 deg. C. 9.2.12 Refrigerant shall be R-407a/ R-407c/ R-410a/ R-134a or equivalent, NON-CFC and NON-ODP environmental friendly. 9.2.13 Based on the heat load calculation, the Package Unit AC capacity is selected. Refer Annexure -1 & 2 for Heat Load Calculation details. 9.2.14 Noise level of any equipment shall not exceed 85 dB(A) at a distance of one (1) meter from source of noise. However, inside the conditioned area, it shall be 55 dB(A). 9.3.0 MAJOR EQUIPMENT INCLUDED IN BIDDER'S SCOPE Following Major equipment (but not limited to) shall be included in bidder's scope of supply and Erection–Commissioning for centralized Air conditioning of both Control Room and Switchgear Room:						
Ref. Doc	<table border="1"> <thead> <tr> <th data-bbox="245 1973 352 1995">S. No.</th> <th data-bbox="352 1973 839 1995">Item Description</th> <th data-bbox="839 1973 1219 1995">Configuration / Quantity</th> <th data-bbox="1219 1973 1501 1995">Location</th> </tr> </thead> </table>				S. No.	Item Description	Configuration / Quantity	Location
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.										
								Control Room at EL + 9.5 M	Switchgear Floor at EL + 0.0 M	
						1	Skid Mounted Air cooled Package AC with first fill of lubricants, Refrigerant, Vibration Isolators, etc. as specified elsewhere -Min. 16TR cooling Capacity Each	3 Nos (2W+1S)	3 Nos (2W+1S)	Inside AC Plant room of respective Floor
						2	Fire Retardant Flexible connection (canvass type) suitable for mounting at discharge of PAC	3 Nos	3 Nos	Outlet of Each PAC
						4	Make-up connection line for Pan type Humidifier	1 Lot	1 Lot	Inside AC Plant room of respective Floor
						5	All other piping (Including drain water piping, make up water piping etc.) required for the completion of AC system in AC plant room.	1 Lot	1 Lot	Inside AC Plant room of respective Floor
						6	Non-return Isolation dampers (dampers at outlet duct of each PAC of suitable size)	3 Nos	3 Nos	Outlet of Each PAC
						7	Suitable duct mounted heating units for entire air conditioning system with necessary instruments like Thermostat and Humidistat.	1 Lot	1 Lot	As per Approved Layout
						8	Suitable Pan humidifier units for entire air conditioning system with Humidistat.	1 Lot	1 Lot	Inside AC Plant room of respective Floor
						9	Fine Filter for mounting in Plenum as per BHEL Spec	1 Lot	1 Lot	Inside AC Plant room of respective Floor
						10	Differential Pressure Switch across fine filter	1 Lot	1 Lot	Inside AC Plant room of respective Floor
						11	Fresh air system complete with Fan Filter Unit	1 Lot	1 Lot	Inside AC Plant room of respective Floor
						12	Air distribution system –Ducting, dampers, and grilles/diffusers.	1 Lot	1 Lot	Located as per layout considerations
						14	Fire dampers along with actuators and Volume control dampers for Switchgear floor	--	1 Lot	Located as per layout considerations
						15	Thermal insulation for supply, return air ducting (if applicable) with all fixing hardware as per BHEL Spec.	1 Lot	1 Lot	Located as per layout considerations
						16	Acoustic Insulation (Up to 6 M from PAC outlet)	1 Lot	1 Lot	Located as per layout considerations
						17	Local Control Panel for Centralised Ac system (Common for Heater, Humidifier, Fire Damper, Fresh Air Fan, DPS etc.)	1 Lot	1 Lot	Inside AC Plant room of respective Building
						18	Air Curtains with fan and motor suitable for door mounting arrangement	1 Lot	1 Lot	Located as per layout considerations
						19	Power Cable	1 Lot	1 Lot	Located as per layout considerations
20	Control & Signal Cable	1 Lot	1 Lot	Located as per layout						

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company . <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 45%;"></th> <th style="width: 10%;"></th> <th style="width: 10%;"></th> <th style="width: 30%;">considerations</th> </tr> </thead> <tbody> <tr> <td>21</td> <td>Earthing cables and strips (GI/Cu) between the bidder supplied equipment and the Purchaser Earthing grid.</td> <td>1 Lot</td> <td>1 Lot</td> <td>Located as per layout considerations</td> </tr> <tr> <td>22</td> <td>Instruments for AC System (Humidistat, temp Gauge, Thermostat, RH Gauge, Incline tube manometer, Air flow switch, Press Gauge, Press switch, Level Gauge, , DPG, DPT, Pressure relief valve etc. (as per Approved P&ID and Layout)</td> <td>1 Lot</td> <td>1 Lot</td> <td>As per Approved P&ID and Layout.</td> </tr> <tr> <td>23</td> <td>Special tools and tackles</td> <td>1 Lot</td> <td>1 Lot</td> <td></td> </tr> <tr> <td>24</td> <td>Interconnecting Fire alarm cable from data gathering fire alarm panel (DGFAP)* to the fire damper.</td> <td>1 Lot</td> <td>1 Lot</td> <td>As per Approved Layout.</td> </tr> <tr> <td>25</td> <td>Foundation / fixing nuts & bolts for all the equipments</td> <td>1 Lot</td> <td>1 Lot</td> <td>As per requirement</td> </tr> <tr> <td>26</td> <td>Structural steel as required for equipment support & base frame of equipment</td> <td>1 Lot</td> <td>1 Lot</td> <td>As per requirement</td> </tr> <tr> <td>27</td> <td>Paints along with primers and all other accessories</td> <td>1 Lot</td> <td>1 Lot</td> <td>As per requirement</td> </tr> </tbody> </table> Note: 13. Bidder to note that the location of the various equipment are preliminary and may change during detail engineering. Bidder, however to note that they shall not be eligible to raise any extra claim on account of any such change during detail engineering stage. 14. Exact location of the DGFAP shall be informed during detail engineering stage. 15. The location of indoor and outdoor units of split ACs shall be finalized during detail engineering stage. 16. Bidder to however note that the requirements of all the variable items like copper tubing, cabling wiring etc. on the basis of finalized location of the split ACs shall be included in bidder's scope without any additional commercial implication to the purchaser. 17. Bidder to note that the power sockets for the Split ACs and flexible connection from the power socket to the Split AC unit shall be included in bidder's scope. 10.0.0 TECHNICAL DETAILS & CONSTRUCTIONAL FEATURES 10.1.0 Air Cooled Package Unit AC 10.1.1 Air cooled type Package AC Units shall comprise of scroll/screw compressors with motor, drive package with guard, Air cooled condenser with condenser fans, interconnected insulated refrigerant piping complete with necessary fittings, DX evaporator coil, control and line accessories, Panel, first charge of refrigerant and oil.									considerations	21	Earthing cables and strips (GI/Cu) between the bidder supplied equipment and the Purchaser Earthing grid.	1 Lot	1 Lot	Located as per layout considerations	22	Instruments for AC System (Humidistat, temp Gauge, Thermostat, RH Gauge, Incline tube manometer, Air flow switch, Press Gauge, Press switch, Level Gauge, , DPG, DPT, Pressure relief valve etc. (as per Approved P&ID and Layout)	1 Lot	1 Lot	As per Approved P&ID and Layout.	23	Special tools and tackles	1 Lot	1 Lot		24	Interconnecting Fire alarm cable from data gathering fire alarm panel (DGFAP)* to the fire damper.	1 Lot	1 Lot	As per Approved Layout.	25	Foundation / fixing nuts & bolts for all the equipments	1 Lot	1 Lot	As per requirement	26	Structural steel as required for equipment support & base frame of equipment	1 Lot	1 Lot	As per requirement	27	Paints along with primers and all other accessories	1 Lot	1 Lot	As per requirement
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company . 10.1.2 The Evaporator coil shall be of direct expansion type and constructed with copper tube and aluminium rippled type fins mechanically bonded for maximum heat transfer. 10.1.3 The compressor shall be scroll type suitably mounted on vibration isolator to minimize vibration transmitted to the AC unit as per manufacturer standard. 10.1.4 Safety devices for high inlet and low outlet pressure and other standard accessories shall be provided as per manufacturer standard. 10.1.5 The heat exchangers shall be designed for a minimum design test pressure of 21.0 Kg/m² on the refrigerant side and shall conform to the latest ASME CODE for unfired pressure vessels Section - VIII. 10.1.6 Chemical coating shall be done on heat exchange coils (condenser and evaporator coils) to avoid deterioration from saline/corrosive atmosphere. 10.1.7 Tube supports of adequate strength shall be provided to prevent the tubes from sagging and vibrating. The supports shall be as per TEMA Standard. 10.1.8 Drain line shall be connected to the nearest surface drain. 10.1.9 Refrigerant for shall be R-407a/ R-407c/ R-410a/ R-134a or equivalent, NON-CFC and NON-ODP environmental friendly. 10.2.0 Fresh Air Fan-Filter System 10.2.1 A Fresh Air system comprising of fan-filter unit located in plant room shall provide fresh air from outside. 10.2.2 Air filter shall be of 3-ply HDPE with one layer of Aluminium support mesh arranged in pleated form with GI/Al frame of preferable module size 610 x 610 x 50 thk. The pleats shall be suitably supported with Aluminum spacers. The filter shall be housed in a frame with GI intake louvre. 10.2.3 The efficiency of filters shall be 90% down to 10 micron dust. 10.2.4 The face velocity of filters and louvres shall be within 1.5 – 2 m/sec. 10.3.0 Ductwork 10.3.1 All duct work inclusive of accessories such as damper, vanes, access doors, etc. shall be manufactured form hot-dip galvanized sheet metal, complying with IS-277 Gr. 120 of zinc coating. Duct shall be designed and fabricated as per IS-655. 10.3.2 Following air velocities shall be considered for air conditioning: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Louvers for Air Inlet</td> <td>2m/s max.</td> </tr> <tr> <td>Main Ducts</td> <td>8-9 m/s (max.)</td> </tr> <tr> <td>Branch Duct</td> <td>5-6 m/s (max.)</td> </tr> <tr> <td>Supply Grills/Diffusers</td> <td>2-3 m/s (max.)</td> </tr> </table>					Louvers for Air Inlet	2m/s max.	Main Ducts	8-9 m/s (max.)	Branch Duct	5-6 m/s (max.)	Supply Grills/Diffusers	2-3 m/s (max.)
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		- Duct velocity may be increased at certain sections to meet layout constraints. However, the overall efficiency and noise level shall be maintained within acceptable limits. - Return air velocity shall be 20% lower compared to supply air velocity. Neck velocity through supply and return air grilles/diffusers will be 2.5-3.5 m/s. 10.3.3 Duct work shall be suitably supported by duct hangers and anchor fasteners in roof. 6mm thick neoprene gasket shall be provided between all flange joints. All joints shall be made air tight with sealant. Leak test shall be conducted on duct before installation. 10.3.4 Duct work shall be provided with following accessories (as applicable): ➤ Turning guide vanes ➤ Volume control damper (opposed blade type with 16G 150mm wide blades and 14G casing of GSS. ➤ Rubber impregnated fire resistant canvass connection between duct and PAC outlet. ➤ Access door for Heaters, Fire Dampers, filters. 10.3.5 Where a branch duct is taken from main duct, a volume control damper shall be installed to regulate the required flow. 10.3.6 Duct acoustic insulation shall be provided on the inner surface of ducting for a minimum distance of 5 M from Package AC unit Outlet. The acoustic insulation shall be resin bonded glass/mineral wool with density not below 48 kg/m3 & thickness of the same shall be 12 mm. Cladding to be provided over insulation using Al sheet 30 G. 10.3.7 Supply and return air conditioning duct shall be insulated up to tail end. The insulation material shall be closed cell nitrile rubber/polyurethane Foam with density of 60±2 kg/m3 and having thickness of 13 mm in conditioned space, 25 mm thickness in unconditioned space. The thermal insulation material may also be provided Al foil faced resin bonded glass wool having density of 48 kg/m3 and thickness of 25 mm in conditioned space, 50 mm thickness in unconditioned space. The insulated duct shall be covered with 24 SWG Aluminium sheet.		
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		10.5.0 Supply and Exhaust Air Grilles / Diffusers																													
		10.5.1 Each supply air diffusers shall be fitted with opposed blade damper, built-in vanes and louvers arranged as per manufacturer's standard design.																													
		10.5.2 All return air grill/diffusers shall be without volume control damper.																													
10.5.3 All grilles / diffusers shall be fitted with suitable gasket to prevent air leakage																															
10.5.4 Grills/ Diffusers shall be supported from false ceiling for Control room at EL. 9.5M. Same shall be installed in Supply/Return Air ducts in Switchgear room (EL 0.0M)																															
10.6.0 HEATING UNIT																															
10.6.1 Heating shall be preheating and/or reheating as per psychometric process requirement.																															
10.6.2 Heating shall be electric/hot water/steam as specified in Job Specification/Data Sheet.																															
10.6.3 Electric strip heaters, if provided, shall be complete with- heating thermostats/humidistat, safety thermostats and contactors. Hot water/steam coils- shall be complete -with control valve, humidistat/thermostat etc.																															
10.6.4 Reheating of air shall be provided to correct Relative Humidity in monsoon/winter heating. Heating shall be electric type. Electric heaters shall be provided inside the duct/plenum in properly distributed number of banks.																															
10.7.0 HUMIDIFIER UNIT																															
10.7.1 Humidifier shall be steam pan type or water spray type as per Job Specification/Data Sheet.																															
10.7.2 Pan humidifier shall be complete with immersion type electric heaters actuated by humidistat, water float valve, stop valve in water make up line, level switch interlocked with heaters. Pan shall be fabricated with 3 mm carbon steel sheets and 25x25x3 nun angle on edges with class C socket end connection. The outer surface shall be- thermally insulated.																															
10.7.3 Water spray type humidifier shall comprise of spray header, nozzles, arms etc; fractional h.p. pump set, humidistat, solenoid valve etc. Make up tank, water collecting trough complete with																															
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	drain, quick fill, overflow, strainer, make up connection with ball & float valve and isolating valves shall be provided.																										
	10.7.4 Drain pan/water collecting trough of water spray humidifier shall be of stainless steel construction and thermally insulated.																										
10.7.5 The humidifier shall be sized to deliver 110% of capacity required.																											
10.7.6 Pan type humidifier of stainless steel construction shall be provided to meet specified humidity requirement in winter season.																											
10.8.0 Material of Construction (MOC) of Major Items:																											
<table border="1"> <thead> <tr> <th>Sl No</th> <th>Item</th> <th>MOC</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Refrigerant piping</td> <td>As per OEM Standard</td> </tr> <tr> <td>2.</td> <td>Duct Thermal Insulation</td> <td>As Indicated above.</td> </tr> <tr> <td>3.</td> <td>Duct Acoustic Insulation</td> <td>As Indicated above.</td> </tr> <tr> <td>4.</td> <td>Pan Humidifier</td> <td>SS Construction</td> </tr> <tr> <td>5.</td> <td>Duct</td> <td>Galvanized Steel sheet: Grade 120 as per IS 277. Design and fabrication as per IS 655</td> </tr> <tr> <td>6.</td> <td>Hangers and support</td> <td> For size < 2250mm: - Angle 35X35X5mm. - Rod- 10mm dia. For Larger size > 2250mm: - Angle 50X50X5mm. - Rod- 15mm dia. </td> </tr> <tr> <td>7.</td> <td>Supply & Return diffusers grilles</td> <td>Powder coated MS or anodised Aluminum or PVC.</td> </tr> </tbody> </table>				Sl No	Item	MOC	1.	Refrigerant piping	As per OEM Standard	2.	Duct Thermal Insulation	As Indicated above.	3.	Duct Acoustic Insulation	As Indicated above.	4.	Pan Humidifier	SS Construction	5.	Duct	Galvanized Steel sheet: Grade 120 as per IS 277. Design and fabrication as per IS 655	6.	Hangers and support	For size < 2250mm: - Angle 35X35X5mm. - Rod- 10mm dia. For Larger size > 2250mm: - Angle 50X50X5mm. - Rod- 15mm dia.	7.	Supply & Return diffusers grilles	Powder coated MS or anodised Aluminum or PVC.
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10.9.0 GRILLES / DIFFUSERS																											
i. Supply air diffusers or grilles, as required, shall be provided and shall be fitted with sponge foam tape. Volume control damper shall be provided with each supply air diffuser/grille. Volume control damper shall be key operated from the front of diffuser/grille. Supply air grilles shall be provided with vertical & horizontal adjustable louvers.																											
ii. All return air diffusers/grilles, if required, shall be without volume control damper.																											
10.10.0 Fire Damper Please refer Annexure-10 for detailed description.																											
10.11.0 INSULATION Please refer Annexure-10 & 15 for detailed description.																											
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		10.12.0 Piping Material Specification Not Applicable 10.13.0 CABLE SIZE FOR 415 V MOTORS: Please refer attached Annexure-9. 10.14.0 MEDIUM VOLTAGE INDUCTION MOTORS Please refer attached Annexure-9. 10.15.0 CONTROL & INSTRUMENTATION 10.15.1 Control philosophy: i. The Operation & Control of the Package AC shall be done from Machine mounted control panel on each package unit ACs as per manufacturer standard. ii. A Local Control Panel shall be located inside AC plant room. Operation and monitoring of the following centralized AC system equipments shall be done from the Local control panel located in the AC plant room: <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> • Fresh Air Fan (1 Set) • Heaters (1 Lot) and - Panel. • Pan Humidifier (1 Lot) </td> <td style="vertical-align: top;"> - Manual operation & Monitoring - Auto operation through Thermostat Humidistat & Monitoring in Local - Auto operation through Humidistat & Monitoring in Local Panel. </td> </tr> </table> iii. Air-conditioning system shall be interlocked with existing Fire alarm panel, so that in case of fire, AC system shall be tripped. Potential free contacts shall be provided in the Local control panel for tripping of AC system on receipt of fire signal from the Fire Alarm Panel. Interconnecting cabling between Fire Alarm Panel (existing) and LCP shall be in the scope of bidder. iv. Following Annunciation shall be made available in Plant DCS/PLS: • ON & TRIP Annunciation of all Package AC Units • ON and TRIP Annunciation of Fresh Air Fan Bidder to make suitable provision for above. 10.15.2 Temperature & Humidity Control in the Air Conditioned Space: • Room temperature control shall be done with the help of cooling thermostats provided in the Package ACs during the cooling cycle where-as the thermostats in the return air path will control operation of the strip heaters during winter periods.			• Fresh Air Fan (1 Set) • Heaters (1 Lot) and - Panel. • Pan Humidifier (1 Lot)	- Manual operation & Monitoring - Auto operation through Thermostat Humidistat & Monitoring in Local - Auto operation through Humidistat & Monitoring in Local Panel.
• Fresh Air Fan (1 Set) • Heaters (1 Lot) and - Panel. • Pan Humidifier (1 Lot)	- Manual operation & Monitoring - Auto operation through Thermostat Humidistat & Monitoring in Local - Auto operation through Humidistat & Monitoring in Local Panel.					
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		- Room RH control shall be done with the help of humidifiers & duct mounted re-heaters getting sense from the RH Sensors placed in the return air paths. 10.15.3 Interlocks: The system components are provided with interlocked with one another in the following manner: - The duct mounted electric strip heater shall not be energized unless the respective air flow switches provide the required air flow healthy signal to the heater control circuits. - On-Off-trip indications for all the drives, electric heaters & humidifiers have been provided at the LCS located in the AC plant room. Motors of fire dampers provided in the supply & return air circuits shall remain energized in normal condition to ensure that the fire dampers remain open during the normal periods. In the event of a fire, the actuators of fire dampers will be de-energized and the damper will close on account of its inherent spring return action. 11.0.0 PAINTING SPECIFICATION Please refer attached Annexure-11. 12.0.0 ERECTION GUIDELINES 12.1.0 Erection & commissioning of all the items / equipments supplied by bidder is included in bidder's scope. 12.2.0 Bidder to note that the fronts for erection & commissioning activity of the Air-Conditioning system shall be made available to the bidder, as & when available and ready at site. Bidder shall plan his E&C activities accordingly. 12.3.0 Bidder to take cognizance of the fact that the E&C activities of Air Conditioning system, being dependent on the progress of the erection of other agencies at site, may get delayed due non availability of fronts etc. due to reasons beyond purchaser's control. Bidder to note that will not be entitled to raise any extra claim on account of these delays. All the cost of any eventual delay in the E&C of the Air conditioning system shall be deemed to be included in the price quoted by the bidder. 12.4.0 COMMISSIONING & PRE-COMMISSIONING ACTIVITIES: 12.4.1 The bidder shall be responsible to carry out pre-commissioning, commissioning and performance test run of Air conditioning system with Purchasers, PMC and End Customer's operating personnel.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		12.4.2 A procedure for detailed mechanical completion, pre-commissioning, start-up and performance test shall be developed by the bidder based on the guideline furnished elsewhere and this shall be approved by Purchaser, PMC and end customer. 12.4.3 Bidder shall also submit operation manual. 12.4.4 Bidder shall submit the pre-commissioning and commissioning schedule in the form of network detailing therein the sequence of all the pre-commissioning and commissioning activities and time taken by each individual activity to be carried out in each equipment / sub-system of the units. This shall be submitted to Purchaser prior to start of pre-commissioning activities. 12.4.5 Bidder shall submit weekly progress report and the status of pre-commissioning and commissioning activities, likely slippage and action being taken by the bidder to contain this slippage. 12.5.0 MECHANICAL COMPLETION 12.5.1 Bidder shall declare mechanical completion after all installation works of the system have been completed and hydro tested in accordance with approved construction drawings, approved specification, applicable code as defined in the document, accepted international good engineering practices and all the activities have been completed in a comprehensive manner by the bidder. 12.5.2 After Mechanical Completion of systems bidder shall check the system/sub-system so that system/unit/system/sub-system meets the process requirement and is constructed as per the approved drawings. 12.5.3 After liquidating the checklist bidder shall submit certificate as per FORMAT-I (attached in Annexure-xx) stating system/sub-system, which is mechanically completed. 12.5.4 Checklist generated by bidder and test certificates connected with the system/sub-system will form a part of the FORMAT-I. Certificates of various statutory bodies for relevant portion of the work completed shall be made available by the bidder as part of mechanical completion. 12.5.5 Purchase PMC / End customer representative shall check the system along with LSTK bidder's representative and shall issue FORMAT-II (as per format given in Annexure-xx) which includes deficiencies / modifications required for the portion of the work that is declared by the bidder as mechanically complete. 12.6.0 PRE –COMMISSIONING ACTIVITIES 12.6.1 Bidder shall raise FORMAT – III (as per format given in Annexure-xx) which certifies that all checklist points are liquidated and the system/unit /system/sub-system is ready for pre-commissioning.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		12.6.2 Bidder will start pre-commissioning activities after acceptance of FORMAT-III by Purchaser /PMC/End customer. This shall include but shall not be limited to activities such as system checking 12.7.0 READY FOR COMMISSIONING 12.7.1 The system/unit shall be considered 'Ready for Commissioning' when all the facilities have completed along with their auxiliaries and support facilities in every respect including charging of lubes, chemicals, preparation of solution, any last minute modifications, if any, as recommended by the purchaser/PMC/ End customer. 12.7.2 All temporary structures, scaffolding etc. used for carrying out the pre-commissioning works shall be removed, all the blinds shall be put into position as required by P&IDs 12.7.3 All systems as recommended shall be purged and pressurized. 12.7.4 All pre-commissioning and other documents shall be handed over to the Purchaser. 12.7.5 Bidder shall issue a certificate of ready for commissioning of system/unit for acceptance by the Purchaser /PMC / end customer in standard format, FORMAT-IV with all exceptions resolved. 12.7.6 After the process unit has been declared as 'Ready for Commissioning', bidder shall not carry out any hot work in the system/unit without prior written permission of the Purchaser. 12.8.0 COMMISSIONING 12.8.1 It shall be the responsibility of the bidder to commission the Air Conditioning System 12.8.2 Commissioning will be carried out under necessary guidance and overseeing of representatives of Purchaser /PMC/End Customer after mechanical completion is over successfully, all pre-commissioning activities are carried out and certificate of "Ready for commissioning" is accepted by Purchaser /PMC/End Customer. 12.8.3 Bidder shall provide necessary co-ordination during start up and technical clarification will be furnished by them. 12.8.4 The Air conditioning system shall be considered to be commissioned successfully when the system/unit, with instrumentation / control systems, process, utilities and support systems have been on uninterrupted stable operation for not less than 72 hours. 12.8.5 Whether the 72 hours operation has been successful or not, shall be decided by the Purchaser /PMC/End Customer based on observations recorded during 72 hours. 12.8.6 The countdown for 72 hours operation shall start only after unit has been on stable operation with all controls and safety system in normal operation for a period of not less than 48 hours. 12.8.7 Bidder is also required to provide on the job training to Purchaser /End Customer's operation personnel by associating them in all the day to day pre-commissioning, commissioning and maintenance activities and process operations, however, responsibility for adequate manning the system shall be that of bidder. 12.8.8 After successful commissioning of the system/unit as above the same shall be handed over to the OWNER for operation. 12.8.9 In case of any constraint in achieving the above process parameters in the plant, the same shall be communicated by the bidder to the Purchaser in writing. This will be reviewed jointly by Purchaser /PMC/End Customer to arrive at a decision on whether the constraint is on account of reasons attribute to the bidder or not. In case the constraints are found due to reasons attributable to the bidder, bidder shall take all remedial actions as per the decision of		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		the purchaser. Bidder, however, shall not be eligible for any commercial claim on account of this. 12.8.10 Bidder in some cases may be required to do part commissioning of the mechanically completed sections of the system/unit as per directives from the Purchaser /PMC/End Customer. 12.8.11 Upon successful commissioning of the units the same shall be taken over by the OWNER for day to day operation and maintenance only. Final takeover shall be subject to compliance to all the contractual obligations by the bidder. 12.8.12 Once the system/unit is successfully commissioned bidder will issue FORMAT-V (as per format given in Annexure-90) to Purchaser /PMC/End Customer for takeover of the unit from bidder. 12.9.0 PERFORMANCE TEST RUN 12.9.1 After the units have been completed, put into operation and steady state operation is established, performance test of units shall be conducted. 12.9.2 Before carrying out of the performance test of units, bidder shall develop a procedure/protocol and schedule in consultation with the OWNER / PMC/ VENDORS and submit to Purchaser /PMC/End Customer for their approval. 12.9.3 The performance test is to be carried out as soon as practicable after the commissioning. 12.9.4 Among the other things the procedure shall broadly include the following. • Test conditions • Log sheet for recording operating data • Sampling methods • Analytical methods • Methods of calculations • Pre-test run period, if any • Methodology for interpretation and measurement of tests • Methodology for taking operating data and its frequency • Methodology for evaluating the performance of the unit, feed/utilities/energy consumption, yields etc 12.9.5 The bidder shall provide the services of his commissioning engineer who was associated with the commissioning of the process units at site during this performance test run period. 12.9.6 Bidder shall be held responsible for any defects noted during performance test run and attributable to him and shall be dealt as per the relevant provision of the contract. 12.9.7 The performance test shall be carried out by operating the units for a minimum period as specified for the unit continuously for guarantee test. 12.9.8 The results obtained during that period will form the basis of comparison between the actual performance and bidder's process guarantees. 12.9.9 Measuring methods, tolerances, instructions for analysis and calculations shall be as per accepted practices and shall be mutually agreed upon before the start of performance test. 12.9.10 Any interruption in the running of the units for less than five minutes during performance test shall be ignored.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		12.9.11 If a performance test of units has been carried out successfully for a period as specified and bidders's guarantees are met, then the performance test shall be deemed to have been successfully completed. 12.9.12 Until bidders' guarantees have been met additional performance tests shall be conducted, in the same manner as the first performance test. 12.9.13 After completion of a performance test, all relevant operating and production figures shall be recorded in a protocol to be signed by authorized representatives from bidder, Purchaser /PMC/End Customer 12.9.14 Bidder shall prepare test report and submit to OWNER/PMC within 15 (fifteen) days after the completion of each performance test. 12.9.15 In case the performance test fails to meet guarantees, the authorised representative of both bidder and OWNER/PM Purchaser /PMC/End Customer C shall mutually discuss and determine the causes of failure of the test. Necessary modifications required will be suggested by bidder in writing and if the cause of failure is attributable to bidder , cost of these modifications shall be borne by bidder. 12.10.0 MANUFACTURER'S REPRESENTATIVE 12.10.1 It shall be bidder's responsibility to arrange for services of manufacturer's installation / commissioning engineer at site during mechanical completion / pre-commissioning & commissioning of all the major equipment and systems listed as under: • Package ACs. • All critical pumps and blowers. • Any other critical/proprietary equipment, for which it is felt necessary to call Vendor's representative for proper commissioning 12.10.2 Bidder shall plan all such visits in advance, so that there is no hold and subsequent delay at site. 12.10.3 In emergency circumstances, bidder shall immediately arrange for the visit of manufacturer's expert. 12.10.4 All the cost including that towards boarding, lodging , servicing , Insurance , Local Travel , Service charges etc for arranging all the above visits shall be deemed to be included in the bidder's quoted price. Bidder shall not be eligible to raise any extra claim in this regard. 13.0.0 INSPECTION AND TESTING (PLEASE REFER ANNEXURE-12) 13.1.0 Bidder shall maintain an effective Quality Assurance System, to ensure that all equipment and material supplied as a part of the Ventilation System package meet required Quality standards and specifications. 13.2.0 Bidder, to ensure that the equipment and material supplied, meet all the specifications laid down in the contract 13.3.0 In case bidder find any deviation or non- conformity with respect to the agreed specifications, during manufacturing of the item and where corrective action is not feasible, the bidder shall report the same to Purchaser and / or PMC in the designated "Waiver /		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		Deviation Request” format and seek prior approval from Purchaser /PMC before proceeding with the job. 13.4.0 Bidder shall notify in writing to the Purchase, at least two weeks (Ten working days) in advance of the date and the place at which the items will be ready for witnessing of inspection / testing by Purchaser and / or PMC In case any postponement becomes necessary, the CONTRACTOR shall provide written notification at least 48 hours prior to the original scheduled date. 13.5.0 Bidder after satisfying that all inspection requirements as per approved ITP and applicable specifications / documents have been taken care by TPIA, shall submit copy of the Inspection Certificate and all Quality control records to Purchaser in requisite copies along with Statutory Certificates if any, such as IBR, CCE etc. duly endorsed by their Quality Control Manager. 13.6.0 Purchaser and / or PMC – End customer reserve the right to carry out surprise checks on all material either at manufacturer’s works or at site. In case of any rejection at site, the whole lot will be rejected and bidder shall get the entire lot replaced without any time or delivery implication to the purchaser. 13.7.0 TPIA shall check the calibration status and traceability of all instruments used by the supplier, for testing. In case, TPIA uses their own instruments for testing purposes, similar certification shall be ensured. 13.8.0 Dimensional check up to a minimum of 10% should be done for all pipes and fittings at supplier’s shop and witnessed by TPIA. Additionally 1% dimensional check will be carried out at site by the bidder and witnessed by Purchaser /PMC. 13.9.0 In case any non-conformity is noticed, 100% of the lot shall be checked by TPIA and all non-conforming material shall be replaced by the bidder. 13.10.0 Inspection Certificate i. Bidder shall submit, copy of each Inspection Certificate (IC) / Inspection Release Note (IRN) issued by TPIA, along with all attachments mentioned therein. The IC / IRN shall include the following as minimum: ➤ Job No. / Project Title / PO. No. / Purchase Specification No., Date of inspection and ➤ Status of the visit - Initial / Intermediate / Final. ➤ Item Tag No. / Name / Total quantity ordered / released / offered for inspection and accepted during the visit. ➤ Manufacturer’s Name ➤ Date & Place of Inspection, name of Inspection Agency and Inspection Authority. ➤ Reference of Documents with Revision status.(It shall be clearly indicated in the inspection certificate that “inspection has been carried out based on code 1 drawings and approved ITP”.) ➤ Verification of calibration documents. ➤ Details of Inspection carried out. ➤ Works Certificate with details of acceptance tests witnessed and Certificate of statutory approvals if applicable, for electrical items ➤ Works Certificate with details of calibration, and Certificates of statutory approvals if applicable, for instruments. ➤ Works Certificate accompanied with details of basis for acceptance, for all other items ➤ Results of Inspection.		
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15.6.0. Scope Demarcation for Site Facilities :					
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			BHEL	Bidder	
	1.0	ESTABLISHMENT		YES	
	2.0	FOR CONSTRUCTION PURPOSE:			
	a	OFFICE SPACE	YES		On Chargeable Basis. Land for office construction shall be provided by BHEL/RINL on chargeable basis. Rates for the same shall be informed after award of contract.
	b	Open space for storage (as per availability)	YES		On Chargeable Basis. Land for Storage yard shall be provided by BHEL/RINL on chargeable basis. Rates for the same shall be informed after award of contract.
	c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
	d	Bidder's all office equipments, office / store / canteen consumables		Yes	
	e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
	f	Firefighting equipment like buckets, extinguishers etc		Yes	
	g	Fencing of storage area, office, canteen etc of the bidder		Yes	
	3.0	FOR LIVING PURPOSES OF THE BIDDER			
	a	Open space for labor colony (as per availability)		Yes	
	b	Labor Colony with internal roads, sanitation, complying with statutory requirements		Yes	
	4.0	ELECTRICITY			
	4.1	Electricity for construction purposes 3 Phase 415/440 V			On Chargeable Basis. Rates for the same shall be informed after award of contract.
	a	Single point source (within a distance of 500 metres of site)	YES		
	b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		b) Bidder shall ensure that all drawings and documents shall be PDF for official submission. However AutoCAD version of drawings shall be submitted alongwith official submission for our records. c) BHEL shall consider the submission of soft copy as the submission date for the drawing. Submission of soft copy shall be followed by submission of two sets of Hard copies for review and return. d) Approved documentation/ As built documentation shall be submitted in 10 sets of hard copies and three compact Discs/ DVDs. e) Bidder shall ensure submission of all documentation as per approved Master Document List. 16.2.0. DRAWING APPROVAL / REVIEW CATEGORY: a) Following classes of review shall be followed for all the documents engineered by the bidder • APPROVAL (A) Approval is mandatory and bidder cannot proceed without obtaining Purchaser's approval (eg. Layouts, schemes etc.) • INFORMATION / RECORDS (I) This type of documents shall be submitted to Purchaser for his information (eg. data sheets, GA drawings etc.) Type of Code used as per BHEL for approval/commnets of Documents: Code-1 : No comments Code-2 : Comments as marked cleared for manufacturing Code-3 : Comments as marked but not cleared for manufacturing Code-4 : Reatnied for information 16.3.0. DRAWINGS REVIEW AND APPROVALS PROCEDURE a) Bidder to understand that efficient handling of drawings and documents to be prepared by him under the contract is the key to the timely completion of the system. By accepting the contract the bidder undertakes to ensure that all drawings and documents to be submitted by him to the Purchaser/ End Customer shall be of professional quality and conforming to the contractual requirements. b) Each drawing submitted by the bidder shall be clearly marked with the name of the Owner, the unit designation, the specifications, title, the specification number and the name of the Project with revision No. and date. If standards, catalogue pages are submitted the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawings shall be in English.		
Ref. Doc				

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		d) Review of drawings and documents issued by bidder shall be carried out by Purchaser /End customer.																																		
		f) The first submission of drawings shall start within 15 days from the date of Purchase order. All the first submission shall be completed within 45 days from the date of Purchase order.																																		
		g) All the engineering documentation including revised submission shall be completed within 90 days from the date of purchase order. In other words, the system engineering shall be completed within 3 months from the date of purchase order.																																		
		h) All revised drawings after incorporating the comments shall be furnished within 15 days. BHEL shall furnish comments (if any)/approval on the documents within 15 days after the receipt of same.																																		
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Ref.	Doc.			

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		iii. GA drawing and catalogue of all equipments iv. Quality plan v. Test certificates vi. Installation procedure. 17.0.0. SUB VENDOR LIST 17.1.0. All the equipment shall be sourced from recommended Bidders only as specified in this specification (Refer Annexure-7). 17.2.0. All the equipment shall be sourced from recommended Bidders only as specified in this specification (Refer Annexure-7). 17.3.0. Sub vendor shall be ISO certified company. 17.4.0. Supply items for which no definite “make/brand” is indicated, shall be procured only from makes & models having proven track records and requires purchaser approval. 17.5.0. Bidder may propose additional sub vendors for items that have three vendors or less in the vendor list given in annexure-7. These proposed vendors shall have proven track record (validated with credentials) for the above items and subjected to BHEL / customer approval during post ordering of the package. 17.6.0. Bidder to comply with sub-vendor list enclosed with the specification. If any item is left over other than indicated in the sub-vendor list, sub-vendor name shall be furnished to BHEL/ customer approval. Non-acceptance of any sub-vendor by BHEL / customer shall not have any commercial & delivery implication. While submitting sub-vendors for approval of BHEL, bidder shall furnish following documents : i. ISO certificate of Sub-vendors ii. Proven track record for makes and models supplied earlier. 18.0.0. PRICE BID FORMAT (Annexure-1) 18.1.0. Air conditioning system as envisaged in this bid document shall be executed by the bidder on Lump Sum Turnkey (LSTK) basis. 18.2.0. All the items included in the price bid format shall be quoted as per tender specification and subsequent tender stage correspondences, if any. Responsibility of ensuring correctness & completeness of scope of supply as per spec. requirement solely lies with bidder. 18.3.0. Prices quoted by the bidder shall remain firm till the successful handing over of the Air conditioning plant to end customer. Any request for upward revision of price during any intermediate stage before handing over the plant to end customer will be summarily rejected by BHEL.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		18.4.0. Bidder to refer to GCC & SCC for the applicable taxes and duties. Bidder to quote only base rates for all the items. Applicable taxes and duties shall be indicated separately. 18.5.0. The equipment supplied shall be complete in all respects. The bidder shall not be eligible for any extra payment in respect of such mountings, fittings, fixtures and accessories if required for the safe and reliable operation of the equipment. Any additional equipment, material, etc., which are not specifically mentioned here, but are required to make the supplied equipment complete in all respect, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be in bidder scope only. It will be the bidders sole responsibility to specifically highlight any of the missing equipments / items required for the proper & intended use of the Air Conditioning System as a part of their offer. In case nothing is highlighted by the bidder, it will be assumed that all the major items are included in the bidder's scope of supply for the desired operation of the AC system. 18.6.0. All hardware/software/item/ etc. required as per tender specification or subsequent tender correspondences or for desired satisfactory operation of package or due to good-engineering practice or as prescribed by relevant/applicable code/standard, but not listed exclusively in this specification, shall be deemed to be included in the basic price quoted by the bidder. Also, all mounting hardware / accessories /fittings/conduits/etc. required for above the package shall be included in the basic price of respective item. Bidder, at no point of time, shall be eligible to raise any extra claim in this regard. 18.7.0. Drawings attached with this specification are preliminary & are not exhaustive in nature. These drawings may get revised during detail engineering. All other inputs required for engineering of the Air conditioning system will be furnished to the bidder during detail engineering stage, as and when the same is available with BHEL. Bidder to note that they shall not be eligible to raise any extra claim on account of revision of input drawings or any other input drawings during detail engineering stage. 18.8.0. Only main items shall be considered for price bid evaluation. Optional items (RO – rate only)shall not be considered for price bid evaluation 18.9.0. Bidder shall confirm that he has quoted all items by marking “Quoted” in the price bid and enclose the same in their technical offer. Price shall not be specified in the technical offer. 19.0.0. BILLING BREAKUP METHODOLOGY 19.1.0. Billing break-up (BBU) shall be submitted to BHEL in following methodology 19.2.0. The BBU shall be prepared only for the pro-rata billing purpose.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		19.3.0. BBU will contain complete list of items required for the completion of the project as per specification and shall be dispatched by bidder irrespective of the items/quantities are indicated in the document or not. 19.4.0. Any additional requirement of the item already indicated in the document will be updated in the subsequent revision of this document. All such item will be dispatched as “free item” term to BHEL. 19.5.0. Inspection & Testing of all items shall be as per approved quality plan. The entire item shall be dispatched to site only after the completion of Inspection and testing requirement as per approved quality plan. Non-inclusion of any item does not absolve the vendor from meeting the requirement. 19.6.0. Vendor shall obtain prior permission from BHEL after submitting all the documents before ensuring dispatch of all main items applicable for project. 19.7.0. Inspection & quality: All the items applicable for this project shall be inspected as per approved quality plan. It may be noted that any item shall be dispatched to site only after complying with the Inspection requirements as per approved quality plan. 19.8.0. As separate document indicating the details of all the items having SHELF LIFE shall be furnished. Prior permission from BHEL shall be taken before dispatch of any of the item having shelf life. 19.9.0. Applicable taxes & duties shall be extra. 19.10.0. BBU shall be a comprehensive document having details of all the items applicable for this project. There should not be any Non-Billable item to be supplied at site. 19.11.0. Wherever Lot items are indicated, same shall be quantified in details in a separate annexure. Similarly all Accessories/ Instruments/ items are to be defined with comprehensive details. 19.12.0. In case requirement of any such item / additional item is detected at any stage of the contract execution, BBU will be revised to reflect the same. However all the additional items will be supplied as a ‘Zero Value Item’, without any commercial implication to BHEL. All the contractual requirements shall be valid for these additional items also. 20.0.0. DEVIATIONS TO SPECIFICATIONS: 20.1.0. Bidders are advised to quote strictly as per BHEL’s specification requirements. In case bidder excludes some components of scope of supply or some features of specification requirements, the bidder will be required to include the same in the scope during offer evaluation stage /contract execution stage without any additional commercial and price implications on account of the same. Bidder to note that they won’t be entitled for any price impact on account of withdrawal of deviation taken from BHEL spec during technical scrutiny		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		stage. Price impact will be allowed by BHEL only to the extent of change of specification during tender evaluation stage, if any, from BHEL end. 20.2.0. In case bidder feels that it is necessary to exclude some components of scope of supply & some features of specification requirements, due to genuine constraints if any, bidder has to clearly bring out the same to the notice of BHEL and take their prior approval before submission of bid. Bidders are requested to bring out only those deviations which are impractical to meet (or) not technically advisable as per the experience of bidder, for BHEL's review before the submission of bid. All such clarifications required by the bidder shall be intimated to BHEL together as a single notice within a week of receipt of enquiry by bidder. 20.3.0. All such deviation or variation from the scope, requirement and/or intent of this specification shall be clearly defined under relevant attachment of the Bid forms irrespective of the fact that such deviations/ variations may be standard practice or a possible interpretation of the specification by the Bidder. Except for those deviations/ variations covered as a part of pre bid clarification, it will be the responsibility of the bidder to fully meet the intent and the requirements of the specification within the quoted price. No other deviation whatsoever from this specification, except for the those that have been specifically agreed by purchaser as a part of pre-bid clarification shall be considered. 20.4.0. Bidder to note that all such applicable deviations /clarification shall be listed separately in the format attached with this specification (Annexure -102) and submitted to BHEL as a part of pre-bid query. All such applicable deviations /clarification shall have cross reference to page number /section / clause /para etc. of this specification or its annexure with proper reasons for the deviations for purchaser's consideration. Any such applicable deviations /clarification not listed under the above section, even if reflected in any other portion of the bidder's proposal shall not be considered applicable. 20.5.0. In case the vendor considers requirement of additional instrumentation, controls, safety devices and any other accessories/auxiliaries essential for safe and satisfactory operation of the equipment, he shall recommend the same along with reasons in a separate section along with his proposal and include the same in his scope of supply. 21.0.0. DEFINITIONS 21.1.0. BIDDER/VENDOR: Bidder means the party supplying Air Conditioning system for this project. 21.2.0. SUB VENDOR : Sub vendor means any party on whom bidder suborders materials and items (like tubes, forgings etc) 21.3.0. QUALITY ASSURANCE PLAN (QAP) / INSPECTION AND TEST PLAN (ITP) : It is a document generated by the supplier with complete listing of various inspection stages, tests, material certification requirements and parties involved with their respective roles in inspection; indicating the requirements of Hold (H), Witness (W) Inspection, and Review (R) of Quality control documents / records for an item. QAP and ITP are considered synonymous.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company .		21.4.0. HOLD POINT : A Hold Point is a stage designated in the ITP/QAP, which requires Witness Inspection by TPIA and / or PMC/OWNER before supplier can proceed with further processing, except where prior written permission for further processing or waiver of Witness Inspection by PMC / OWNER is obtained. 21.5.0. WITNESS POINT A Witness point is a stage designated in the ITP/QAP, which requires witness inspection by TPIA, PMC and / or Owner. EPCC/LSTK CONTRACTOR / Supplier shall perform the activity after proper notification has been given to TPIA / PMC and OWNER for witnessing the activity. The CONTRACTOR/ Supplier is not obliged to hold further processing, if TPIA / PMC and / or OWNER are not available to witness the activity or does not provide the comments before the date notified with proper notification period. 21.6.0. REVIEW POINT A review point is a stage designated in the ITP/QAP which requires the concerned agencies i.e. CONTRACTOR / TPIA / PMC/OWNER, to verify the documents for their correctness and to confirm that the said documents meet the requirements laid down. 21.7.0. THIRD PARTY INSPECTION AGENCY (TPIA) Third Party Inspection Agency means an inspection agency appointed by the EPCC/LSTK CONTRACTOR for carrying out Inspection and witness of tests of equipment and material being procured by the CONTRACTOR for the Project. 21.8.0. INSPECTION CATEGORY Inspection category determines the scope of Inspection for the Supplier, TPIA, PMC / OWNER for various equipment and material depending upon their use, serviceability, safety criteria and complexity. 21.9.0. MECHANICAL COMPLETION :Mechanical Completion of systems shall mean that all installation works of the system have been completed and hydro tested in accordance with approved construction drawings, approved specification, applicable code as defined in the document, accepted international good engineering practices and all the activities have been completed in a comprehensive manner by the bidder. 21.10.0. PRE-COMMISSIONING Activities : Pre commissioning activities (as detailed in Annexure-90) are defined as those activities, which are required to be performed after completion/ installation, inspection, hydro testing etc. of an equipment/ system to make it ready for commissioning		
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22.00.0 ANNEXURES:

Following input documents and specifications are enclosed to facilitate the bidder to furnish the offer:

Annexure	Document/ Drawing Title	Doc. no.
1.	Price-Bid Format	--
2.	Pre-Bid Queries Format	--
3.	Master Document List	--
4.	Guidelines for QA QC plan	--
5.	Manufacturer quality Plan	--
6.	FORMAT for NO Deviation Certificate	--
7.	Sub-Vendor List	--
8.	BHEL Standard for Domestic Packing	AA0490010
9.	Technial Specification FOR Electrical	VSP-TPP-ESP-RU-UTL-001
10.	General Specification for HVAC	VSP-6.3/GS-M-04/R1
11.	Painting Specification	VSP-6.3/GS-P-01/R1
12.	Inspection & Testing	VSP-TPP-ESP-RU-UTL-001
13.	Layout of ECR	--
14.	Plant Area Layout for ESP System	28882-000-000-ltl-0001
15.	General Specification for Thermal Insulation	VSP-6.3/GS-M-06/R1
16.	Proposed Duct Routing for AC system	--
17.	Heat Load Calc Summary	--

Notes:

Incase if bidder found any document/annexure no. listed in the technical specification and is missing from the attachment, it is bidder's responsibility to highlight the missing attachment.

Ref.
Doc

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