

**BHARAT HEAVY ELECTRICAL LIMITED****UNIT'S ADDRESS: PIPLANI, BHOPAL (M.P.)**

Contact Person's Name/Design./Phone No./E-Mail (From Purchase Deptt.)

Enquiry No.:

Due Date:

Supplier Qtn. No.:

Spec. No.: BCM / A/C SYSTEM 01, Dt.: 18/02/2010

Rev.: 02

Date:

Specification Cum Compliance Certificate of Air Conditioning System for (Winding Hall)BCM div. Block-3, Bay-2 BHEL, Bhopal**Note:-**

- Vendor must submit complete information against clause no. 24 (Qualifying Condition). The offer meeting this clause would only be processed.
- The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance. Additional information due to space constraints can be provided in separate annexure, duly signed. Subsequent cross-reference must be provided in this original certificate.
- The offer and all documents enclosed with offer should be in English language only.

Name & Address of the Supplier:

Name & Address of the Indian Agent:

Telephone Nos.:

Telephone Nos.:

Fax Nos.:

Fax Nos.:

E-Mail Address:

E-Mail Address:

Scope: Engineering, Design, Supply, Erection & Commissioning of AC-system for BCM div. located inside Block-3/ Bay-2, which must comply with the Specifications as given below:

Sl. No.	Description for BHEL Requirement	Specified / To be Confirmed By Bidder	Offered	Deviations	Remarks
1.00	General				
1.01	Bharat Heavy Electricals Limited, Bhopal is in the process of air-conditioning the existing BCM div. Hall located at Block-3, Bay-2. Vendor have to give suitable offer for air-cooled refrigerant condensing, energy-efficient system.	Vendor to Confirm			
1.02	The basic purpose of this AC system is to have clean-room environment by maintaining +ve pressure, so that no outside air must infiltrate from the leakages in the hall. Sufficient quantity of outside air mixed with inside recirculated air for proper IAQ & to maintain the inside temperature & humidity as per desired parameters. Also, consideration is to be taken to exhaust-out hot & dirty air generated over the heated-rollers of the machines installed inside the hall.	Vendor to Confirm			
1.03	Bidder have to give basis of design explicitly with BOQ, detail spec. & makes in their 'Technical Bid' for technical scrutiny in addition to confirming/ deviating with the following technical specification.	Vendor to Specify			

Sl. No.	Description for BHEL Requirement	Specified / To be Confirmed By Bidder	Offered	Deviations	Remarks
2.00	Scope of Work				
2.01	The Scope of Work shall include engineering, designing, supplying, installing, testing, commissioning, and proving of air conditioning system as described in the Technical Specifications. The contractor shall carry out and complete in every respect all work under this contract in conformity with the contract documents and to the entire satisfaction of the Owner & hand-over the AC system to BHEL, Bhopal with required inside condition, as given in clause no. 3.	Vendor to Specify			
2.02	All items of work shall be executed strictly to fulfill the requirements laid down under the Basis of Design. The type of equipment, material specifications, method of installation and testing and type of controls shall be in accordance with the approved shop drawings and the relevant Indian Standards.	Vendor to Specify			
2.03	The Scope of Work shall include all materials, labour, equipment, appliances and incidental work, whether specifically mentioned or not, but are necessary and customary to make a complete installation. It shall include all fittings, accessories, hardware, foundation bolts, terminal lugs, cable glands, junction boxes and other items, whether specifically mentioned or not, but are useful and necessary for proper and efficient working of the equipment.	Vendor to Specify			
2.04	Bidder have to visit the site to physically check the location for installation of Chiller, AHU's, Pumps, Pipelines, SA & RA Ducts, Grills, Diffusers etc.	Vendor to Confirm			
2.05	Bidder have to submit detail bill of material with detail specification & alternative makes, proposed system configuration, etc. in their technical bid for technical scrutiny.	Vendor to Specify			
2.06	Eligible bidder/ supplier have to supply reputed brand of AC System with individual items makes as specified in respective items below.				
2.07	The complete work of the above AC system must be carried-out by the bidder on TURNKEY BASIS. Complete Erection & Commissioning of the system at BHEL site will be in supplier's scope. All the responsibility of the above work will be at single point of the bidder/ supplier.	Vendor to Confirm			
3.00	Basis of Design				
3.01	Dimension of Hall to be air-conditioned: 47 mtr. x 17 mtr. x 8 mtr. height For layout of the Hall, glass-surface area, orientation, etc. bidders are requested to visit the site.	Vendor to Specify			
3.02	Outside conditions during:	Vendor to Confirm			
3.02.01	Summer:				
3.02.02	Winter:				
3.02.03	Monsoon:				

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3.03	Inside conditions required in all the individual enclosed Rooms & Hall:		Vendor to Confirm			
3.03.01	Temperature:	28°C \pm 2°C or better				
3.03.02	Relative Humidity:	55 % \pm 5 %				
3.04	Air-change to be designed: Based on + 3 mm WC inside Hall w.r.t. Ambient		-do-			
3.05	Maximum Heat Load generated Inside: 147 KW		-do-			
3.06	Maximum Number of Persons Occupying: 20 people at a time		-do-			
3.07	Lighting load:	@ 1 Watt/ Ft. ²	-do-			
3.08	Effective False-ceiling height: 25'		-do-			
3.09	Refrigerant Gas: Eco-friendly, Energy-efficient, Non-CFC, preferably R-404A or equivalent.		Vendor to Specify			
4.00	Air Conditioning System					
4.01.01	The air conditioning system must consist of suitable capacity Water Chiller, re-circulating Inline Pumps, AHUs, etc. with energy-efficient Heat-Recovery units installed in heat-exhaust system. Reputed make extremely reliable VSD driven Air-cooled Chiller system that offers industry leading efficiency at real world operating conditions, Screw-type Semi-hermetically-sealed Compressors with valve-less loading/unloading, excellent capacity control, high power factor and soft start is to be offered.		Vendor to Specify			
4.01.02	Bidder will have to provide basis of design, Chiller efficiency in COP & KW/TR at Test-bed condition, Pump & AHU efficiency in Operating-condition, etc.		-do-			
4.01.03	Bidder will have to specifically provide total efficiency in KW/TR of the complete AC system with the methodology & detail calculation.		-do-			
4.02.01	Air-cooled Water Chiller: It must be of Blue Star/ Voltas / Carrier/ Trane/ York/ Mcquay makes . It must fulfill following features:					
4.02.02	The water chilling unit shall be suitable for outdoor installation and designed for maximum corrosion protection with all panels being of heavy gauge galvanized steel construction.		Vendor to Confirm			
4.02.03	It shall be Air-cooled condensing type with Screw Compressor driven by Integrated Variable Speed Drive . The nominal cooling capacity of the Chiller shall be minimum 154TR.		Vendor to Specify			

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4.02.04	Chiller must be used for continuous operation, with reliable suction gas cooled, high efficiency, accessible hermetic compressor motor, full suction gas flow through 0.006" maximum mesh screen, with inherent internal thermal overload protection and external current overload on all three phases. Suction gas screen and serviceable, 0.5 micron full flow oil filter within the compressor housing.	Vendor to Confirm			
4.02.05	Chiller shall be compact, lightweight design completely factory assembled and tested under load conditions before dispatch and shipped with full operating charge of refrigerant and oil.	Vendor to Confirm			
4.02.06	Each independent refrigerant circuit per compressor must be connected using formed copper refrigerant pipe, resulting in a highly reliable and leak resistant system. Liquid line must include: liquid line shut-off valve with charging port, low side pressure relief device, high adsorption removable core filter-drier, sight glass with moisture-indicator, and electronic expansion valve. Discharge line must be provided with manual compressor shutoff service valve. Suction line equipped with closed-cell insulation. Insulated external oil separators with no moving parts, 450 PSIG (31 bar) design working pressure, and UL listing. Refrigerant system differential pressure provides oil flow through service replaceable, 0.5 micron, full flow, cartridge type oil filter internal to compressor. Oil cooling provided by dedicated air-cooled finned tube type heat exchanger located in the condenser section of the machine. A flash tank shall located in each refrigerant circuit to increase the system efficiency. The design working pressure is 450 PSIG (31 bar). Suction lines, oil separators and flash tanks are covered with closed-cell insulation.	Vendor to Confirm			
4.02.07	The compressor shall be direct-driven by a two-pole motor semi-hermetic rotary twin-screw type. The motor rating shall exceed break horsepower by at least 10%. It shall be suitable for reduced inrush current starting. The compressor shall have a suction check valve, suction filter, suction service valve, discharge check valve muffler, temperature actuated 'off-cycle' heater, rain-tight (IP55) terminal box, and precision machined cast iron housing mounted on neoprene isolators. Cast iron compressor housing precisely machined for optimal clearances and superb efficiency. Entire compressor, from suction to discharge has a Design Working Pressure of 350 PSIG (24 bar) or higher. Short Circuit Withstand Rating of the chiller electrical enclosure must be more than 30,000 Amps for standard terminal block connection. Ratings IAW (in accordance with) UL508.	Vendor to Confirm			
4.02.08	The lubrication system shall include an integral oil separation system, oil sump and oil filter. The temperature shall be controlled during operation to maintain proper oil temperatures throughout the lubrication system. An electric oil heater shall be supplied with each compressor to maintain oil temperature above 24°C during shutdown period.	Vendor to Confirm			

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4.02.09	The step-less control system shall modulate compressor capacity automatically by using microprocessor-controlled VSD to achieve valve-less, smooth capacity control from 100% down to 10% of chiller capacity within each compressor housing. Capacity-control must not be through slide valve and associated unloading components, with no moving parts.	Vendor to Confirm			
4.02.10	The condenser coil shall be constructed of copper tubes and die formed aluminum fins having self-spacing collars. Fins are to be mechanically bonded to the tubes. Refrigerant sub-cooling shall be incorporated into the coil. Baffles shall separate each condenser fan.	Vendor to Confirm			
4.02.11	The condenser shall have direct driven, heavy duty, dynamically and statically balanced glass fiber reinforced composite blades molded fans. The fan motors shall be 6 pole, slow speed type with internal overloads and shall be permanently lubricated. Guards of heavy gauge, PVC (polyvinyl chloride) coated must be provided.	Vendor to Confirm			
4.02.12	The cooler shall be of shell and tube type with seamless carbon steel shell, carbon steel dished ends and integrally finned copper tubes. Design working pressure of the shell waterside is 150 PSIG (10.3 bar), and 235 PSIG (16 bar) for the refrigerant side. The shell shall be rolled from 8 mm thick tested quality carbon steel plates as per IS 2062. It shall have galvanised steel baffles to provide zigzag passage over bank of tubes for efficient heat transfer. The evaporator shell must covered with 3/4" (19mm), flexible, closed-cell insulation, thermal conductivity of 0.26k (BTU/HR-Ft2-°F/in.) maximum. Water nozzles have grooves for mechanical (ANSI/AWWA C-606) couplings, and shall be insulated by Contractor after pipe installation.	Vendor to Confirm			
4.02.13	The refrigerant lines shall be of copper/ seamless carbon steel pipes. The liquid refrigerant line shall include shut off valve with charging port, liquid sight glass with moisture indicator, solenoid valve, filter-drier, flash economizer and modulating refrigerant expansion devices.	Vendor to Confirm			
4.02.14	The refrigerant vapour from the flash economizer shall be fed back into an intermediate compressor stage, thereby reducing the enthalpy of the refrigerant, increasing the net refrigeration effect of the evaporator and maximizing energy efficiency.	Vendor to Confirm			

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4.03.01	Chiller shall be complete with microprocessor based control panel containing all necessary operating and safety controls, indicating lights, starter, internal wiring, etc. as described below.	Vendor to Confirm			
4.03.02	The microprocessor based control panel shall be user friendly and display message in simple English language and must provide automatic control of Chiller operation including compressor start/stop and load/unload, anti-recycle timers, condenser fans, evaporator pump, evaporator heater, unit alarm contacts and run signal contacts. Chiller must automatically resets to normal operation after power failure. Unit operating software must be stored in non-volatile memory. Field programmed set points are to be retained in lithium battery backed regulated time clock (RTC) memory for minimum 5 years. Alarm contacts are to be provided for remote alert contacts for any unit or system safety fault. Display and Keypad: 80 character liquid crystal display that is both viewable in direct sunlight and has LED backlighting for night-time viewing. Display and keypad is accessible through display access door without opening main control/electrical cabinet doors. Display provides unit set-points, status, electrical data, temperature data, pressures, safety lockouts and diagnostics without the use of a coded display.	Vendor to Confirm			
4.03.03	The panel shall have interface for direct connectivity to a personal computer without any hardware in between or through a modem and ordinary telephone lines so that the water chilling unit operation can be monitored from any remote place.	Vendor to Confirm			
4.03.04	<p>Following operating controls shall be provided:</p> <p>a) Leaving chilled water temperature controller based on rate of change of return chilled water temperature.</p> <p>b) Auto lead-lag functions that constantly even out running hours and machine start automatically. If this function is not provided then cycle counter and hour meter shall be provided for each machine to facilitate manual changing of lead-lag on machines and evening out of machine starts and running hours.</p>	Vendor to Specify			

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4.03.05	<p>The panel shall be capable of displaying at least the following:-</p> <ul style="list-style-type: none"> a) Incorrect pass word message b) Day, date and time c) Daily start and stop time d) Holiday status e) Cooler inlet and outlet water temperatures f) Suction, discharge and oil pressures g) Compressor motor current h) Suction pressure cut-out setting i) Antifreeze temperature cut-out setting j) No cooling load condition k) Anti-recycle timer status for each compressor l) Compressor run status m) Automatic/ manual lead/ lag control n) Compressor starts and total run time o) Fault shutdown conditions 	Vendor to Specify			
4.04.01	<p>The Power & Control Panel includes main power connection(s), VSD, fan motor contactors, current overloads, etc. of the Chiller shall be pre-assembled, factory-wired and cushion mounted on the unit for utmost reliability and long life. It shall be NEMA 3R (IP55) rating, powder painted steel cabinet with hinged, latched, gasket-sealed, and lockable outer doors equipped with wind struts for safer servicing. The lockable operating handle extends through the power panel door so that power may be disconnected without opening any panel doors. It shall have separate compartments for electrical power control and refrigeration control. VSD section of power panel includes a dedicated inrush current starter and MCCB. The power panel shall contain reduced inrush current starter and MCCB for compressor – motor, factory wired with terminal block power connection, primary and secondary fused control power transformer. The control panel shall include high and low pressure cut-outs, suction, discharge and oil pressure gauges, oil safety control, antifreeze protection, indicating lights to locate cause of shutdown, interlocks for inherent motor protection, marked terminal strip and interconnecting control wiring. It shall be possible to start or stop the water chilling unit manually or through an external signal. The equipment manufacturer shall provide all indicating instruments necessary for proper operational control of individual equipment. They shall be mounted on the equipment itself and shall not be measured separately.</p>	Vendor to Confirm			

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4.04.02	The water chilling unit shall be electrically interlocked with the chilled water pump.	-do-													
4.04.03	The electrical control panel shall be wired to permit fully automatic operation during initial start-up, normal operation, & shutdown conditions.	-do-													
4.05.01	Air handling unit shall be floor mounted horizontal draw through type of sectionalized 24G double-skin 25 mm thick PUF insulated panel construction. Basic assembly shall consist of mixing plenum, filter section, coil section, fan section and filter plenum. Suction air filtration must be through 10μ HDPE washable type. Approved make: Carryaire/ Edgetech/ Citizen/ Blue Star.	Vendor to Confirm													
4.06.01	Fresh-air must be inserted inside the air-conditioned hall through Desiccant-type Enthalpy Wheel of sufficient capacity & size, so that there is a saving of 20TR minimum.	Vendor to Confirm													
4.07.01	Proportional thermostat shall sense the return air temperature and actuate the three – way modulating valve of the air handling unit. It is shall have a range of 10°C – 30°C and a differential of 1°C & it shall be suitable for working on line voltage. Approved make: Danfoss/ Johnson Controls/Honeywell/Siemens.	Vendor to Confirm													
4.08.01	All rectangular ducts shall be fabricated out of bright galvanized steel sheets with no watermarks. The galvanized steel sheets shall conform to IS 277. The zinc coating shall not be less than 125 gm/ m ² of surface area. The duct fabrication & installation shall conform to IS 655 – 1963 and approved shop drawings. Approved make: Jindal/ Ispat/ Tata.	Vendor to Confirm													
4.08.02	<u>The thickness of sheets shall be as under:</u> <table><thead><tr><th>Duct longer side</th><th>Sheet thickness</th></tr></thead><tbody><tr><td>Up to 750 mm</td><td>0.63 mm (24 gauge)</td></tr><tr><td>751 mm to 1500 mm</td><td>0.80 mm (22 gauge)</td></tr><tr><td>1501 mm to 2250 mm</td><td>1.00 mm (20 gauge)</td></tr><tr><td>2251 mm and above</td><td>1.25 mm (18 gauge)</td></tr></tbody></table>	Duct longer side	Sheet thickness	Up to 750 mm	0.63 mm (24 gauge)	751 mm to 1500 mm	0.80 mm (22 gauge)	1501 mm to 2250 mm	1.00 mm (20 gauge)	2251 mm and above	1.25 mm (18 gauge)	Vendor to Confirm			
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1501 mm to 2250 mm	1.00 mm (20 gauge)														
2251 mm and above	1.25 mm (18 gauge)														
4.09.01	All grills shall be of powder coated aluminum construction in rectangular shape & shall have adjustable front louvers to give 0 – 30 ^o vertical deflection. All air supply grills shall be provided with volume control dampers operated from front face by removable keys.	Vendor to Confirm													

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4.10.01	Water Circulation Pumps shall be vertical in-line centrifugal type with 100% standby. It shall be direct driven by a highly efficient totally enclosed fan cooled motor. Pump efficiency must be more than 75%. Approved makes: Grundfoss/ Armstrong/ Wilo	Vendor to Confirm			
4.11.01	All pipes carrying cooling water shall be galvanized steel heavy 'C' class construction as per IS 1239. The fittings shall be galvanized steel heavy class. All pipes and fittings shall be suitable for working pressure of 10 kg/cm ² . Approved make: Jindal/ Tata	Vendor to Confirm			
4.12.01	The valves shall be butterfly, balancing, non-return, Y-strainer and 3-way mixing valve as per HVAC norms. They shall include necessary flanges, counter flanges and nuts, bolts and gaskets. Approved make: Audco/ Leader/ Sant	Vendor to Confirm			
4.13.01	Thermal Insulation of 25mm thickness for through-out the exposed sheet metal work, except in the AC hall with resin bonded rigid fibre glass with thermal conductivity not exceeding 0.029 kcal/h-cm-°K at 20° C mean temperature and for chilled water pipe work shall be rigid polyurethane foam with thermal conductivity not exceeding 0.023 kcal/h-cm-°K at 10° C mean temperature. Approved makes: UP Twiga/ Kimco/ Blue Star.	Vendor to Confirm			
4.14.01	Acoustic Insulation will be carried-out for the initial portion of 1 mtr. the duct connecting AHU with fibre reinforced tissue paper and finally clad with minimum 28 gauge perforated aluminium sheets having at least 10% perforations.	Vendor to Confirm			
4.15.01	Distribution Board shall be free floor standing enclosed cubicle type, fully compartmentalized construction, dust tight, vermin proof and having IP 52 degree of protection as per IS 2147. It shall have a three phase three wire MCCB and a four pole earth leakage circuit breaker as incomer, 1000 A copper bus bars, neutral bars, starters, independent MCB for pumps, blowers, chillers, etc. with indicating lamps, SPP, TDR, interlocking, etc. Approved makes: L&T/ Siemens/ Schneider/ Techniks/ Indo Asian/ Meco.	Vendor to Confirm			
4.16.01	Power Cabling and Wiring shall include cables, wires, cable trays, conduits, glands, sockets and other ancillary materials like lockable nylon cable ties, galvanized iron hardware, spacers and saddles, cable identification tags, end termination, etc. as may be necessary. All cables shall be XLPE insulated 1.1 kV grade armoured overall sheathed copper conductors conforming to IS 7098 (Part I) 1988. Approved makes: Lapp/ Polycab/ Gloster. All electrical cable from main control panel to distribution board, pumps and other auxiliaries are in the scope of vendor.	Vendor to Confirm			

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5.00	Temperature, RH and Differential pressure Recorder (TO BE QUOTED AS OPTIONAL ITEM)				
5.01	Bidder will have to give optional cost for an instrument suitable for display & recording of Temperature, RH and Differential Pressure of the air-conditioned AC hall. The instrument shall have a large size display of minimum 8 inch height and shall have sufficient memory for continuous recording of these parameters. The instrument must be supplied complete with necessary Sensors, Transmitters etc. All the hardware & software for data transfer to a standard PC in online/off-line mode shall also be included in the offer. The equipment shall be suitable for operation on 220V AC supply. (Bidder to enclose the technical literature/catalogue of the offered system)	Vendor to Specify			
6.00	Automatic Sliding Doors over the entrances of the AC Hall (TO BE QUOTED AS OPTIONAL ITEM)				
6.01	Double wing sliding doors consisting of a silver-anodized aluminum extrusion profile PUF insulated are required of size: 6.36 m x 3.04 m (approx.) – 1 no. & 6.36 m x 2.835 m (approx.) – 1 no. Hammer-proof front guard at a height of 5000 mm is required over the doors. Automatic operation of the doors must be by photo-sensors placed at both inside & outside ends with 220 V gear motor & self-lubricating, noise limiting nylon wheels, electro-conducting synthetic materials drive belts are required. (Bidder to enclose the technical literature/catalogue of the offered system)	Vendor to Specify			
7.00	Automatic Air Curtains over the entrances of the AC Hall (TO BE QUOTED AS OPTIONAL ITEM)				
7.01	Custom designed Air-curtains for door-openings of size 3.630 mtr. (width) x 3.020 mtr. (height) – 1 no. & 3.630 mtr. (width) x 2.835 mtr. (height) – 1 no. are required to install over the Doors of the Hall. These machines must use forward-curved blowers, both statically and dynamically balanced, to give it higher performance, and hence enhancing it to act as a barrier to outdoor temperature, humidity, dust and air borne contamination. The machines and parts must be built to last and produce uniform and powerful laminar curtains of air at a very low noise level of 63 decibels on 'A' Scale, measured 1 mtr. from the unit & it must have highest standards of machine performance, consisting of blower-drum, motor, bearings, etc.	Vendor to Specify			
7.02	Auto-operation of the air-curtain machines are to be incorporated, so that the moment any moving person(s), equipment, etc. approaches in the range of 0.2 mtr. from the door, the same gets started. Also, it must be switched-off the moment, the item(s) moved-out away from the door. (Bidder to enclose the technical literature/catalogue of the offered system)	Vendor to Confirm			

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8.00	Erection & Commissioning				
8.01	The complete job is to be done on TURNKEY BASIS. All tools-tackles, consumables, welding m/c, brazing sets, etc. required for erection are to be arranged by the supplier.	Vendor to Confirm			
8.02	Supplier have to take full responsibility for carrying out the erection, start up, testing of AC Equipments, it's control system & all types of other supplied equipment. Service requirement like power, air & water shall be provided by BHEL at only one point, which needs to be indicated by supplier in their 'Technical Bid'. Other requirements like crane, sling, chain-pulley block, transporting facility, etc. can be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to Specify			
8.03	Complete anchoring system including roof-fasteners, anchoring materials, fixtures, clamps, brackets/ hangers(for supporting items like ducting, chilled water pipe grill etc.) foundation bolts, leveling shoes, vibration-insulators, etc should be supplied by the vendor.	Vendor to Confirm			
8.04	All tools & tackles & any special tools and equipment required for erection must be brought by the vendor after duly registered in CISC Gate no. 9 (BHEL Material Gate) for taking them after carrying out the work. However, vendor must supply all necessary tools like Torque Wrench, Spanners, Keys, etc. required compulsory for future operation and maintenance of the AC system. List of such tools should be indicated in the 'Technical Bid' & must be covered in lump-sum cost.	Vendor to Confirm			
8.05	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis. This is in order to permit the vendor to take back those spares which are not needed after commissioning.	-do-			
8.06	Vendor have to bring all measuring instruments like Anemometer, Laser Thermometer, Humidity-meter, U-tube Manometer-gauges, Sound-meter, Multi-meter, Energy-meter, etc. for test witnessing as required in mutually agreed commissioning test procedure. However, this needs to be explicitly defined in the 'Technical Bid'.	Vendor to Specify			
9.00	Inspection of Equipment at Manufacturer's Test Bed				
9.01	Bidder have to present the air-cooled water-chilling packages for inspection at Manufacturer's Works and testing of the same is to be carried-out as per ARI Standard 550/ 590-1998, which prescribe the method of testing using the vapor compression cycle to verify capacity and power requirements at a specific set of conditions.	Vendor to Confirm			

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9.02	Testing of Chillers to measure net cooling capacity (in TR) and energy requirements, at a specific set of conditions. It must include a measurement of the net heat removed from the water as it passes through the evaporator by determination of the following: a. Water flow rate b. Temperature difference between entering and leaving water	Vendor to Confirm			
9.03	Bidder have to make arrangements for witnessing performance test of all the bought-out items like AHUs, Pumps, VFDs, Electrical Panel, etc.	-do-			
10.00 10.01	<u>Site Visit Before Bidding</u> The bidder shall visit site to study the site conditions and availability of resources at site before submitting the bid.	Vendor to Specify			
11.00 11.01	<u>Performance Guarantee</u> The contractor will have to prove the performance of the system for achieving desired inside conditions during peak summer and monsoon. Each performance test shall be for 8hrs duration on six consecutive days in each season. All tests shall be carried out in presence of BHEL representatives.	Vendor to Specify			
12.00 12.01	<u>Vibration Isolation and Sound Attenuation</u> The equipment shall operate under all conditions of load without any objectionable vibration and noise. The contractor shall take the necessary precautions for vibration isolation and sound attenuation.	Vendor to Specify			
12.02	Outdoor equipment must not generate noise more than 65 dBA in external open areas at a distance of 5 m from building line.	-do-			
13.00 13.01 13.01.01 13.01.02 13.01.03 13.01.04 13.01.05 13.01.06	<u>Shop Drawings Before Installation and As-Built Drawings After Installation</u> The vendor shall prepare and submit for approval his shop drawings based on actual measurement at site. The shop drawings shall broadly cover the following drawings: Equipment Layout giving complete details of all equipment. Duct fabrication, installation and support details. Fixing of VCD, Grills & Diffusers. Chilled Water Pipe Layout showing all sizes and support details. Electrical drawings showing schematic control and power wiring diagrams, cable sizes, switch details, fuse sizes, control components and wiring details. Civil foundation details for all equipment.	Vendor to Specify			
14.00 14.01	<u>Test Reports</u> The results of the performance tests during summer and monsoon shall be submitted for scrutiny and approval. The test reports shall include record of all safety and automatic control settings for the entire installation.	Vendor to Confirm			
14.02	The contractor shall also submit along with the test reports, the manufacturers' certified performance data/ curves for all equipment highlighting the operational parameters for the project.	Vendor to Confirm			

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15.00	<u>Operation and Maintenance Manuals</u>				
15.01	Supplier shall submit 4 sets of ring-bound documents (in hard copies) in English language of operation and maintenance manual. The manual shall include following:	Vendor to Specify			
15.01.01	A list of all equipment giving full details such as model numbers, part numbers, serial numbers, names and addresses of the manufacturers, etc.				
15.01.02	Price list of all the consumable items & regular replacement parts, mentioning maximum period of operation of the same.				
15.01.03	Start up operation and maintenance instructions for the entire installation including that of AC equipment & Automatic Control system.	Vendor to Specify			
15.01.04	Detailed Maintenance manual of AC equipment with GA & layout drawing of Water/ Refrigerant Pipeline, Indoor/ Outdoor Units, detail drawing of all assemblies/ sub-assemblies/ parts including Electrical/ Pneumatic/ Electronic, etc. with Part/ Item number/ list.				
15.01.05	Maintenance, interface & commissioning manuals.				
15.01.06	Step-by-step routine, periodical and breakdown maintenance procedure for all equipment.				
15.01.07	Exploded view of all equipment detailing spare parts.				
15.01.08	Schematic layout of Electrical Power Cable & Control Wiring with necessary Ferrule numbers.				
15.01.09	Catalogues, O&M manuals of all brought-out items including drawings, wherever applicable.				
16.00	<u>Availability of Spares and Services During the Life of the Machines</u>	Vendor to Specify			
16.01	The contractor shall furnish an undertaking that he shall make available all spares, consumables and services required for proper operation and maintenance of the air conditioning systems for a minimum period of 10 years.				
17.00	<u>Training Requirement of BHEL's Personnel</u>	Vendor to Confirm			
17.01	On completion of the work but before handing over the air conditioning systems to the Owner, the contractor shall train the BHEL's operation and maintenance staff to operate, adjust and maintain all equipment installed.				
18.00	<u>Completion Period</u>	Vendor to Specify			
18.01	The entire work covered under this contract shall be completed within four months from the date of the Letter of Award. If the work is delayed due to any cause over which the contractor has no control, then the Owner may, at the request of the contractor can extend the completion period by a reasonable time.				

Sl. No.	Description for BHEL Requirement	Specified / To be Confirmed By Bidder	Offered	Deviations	Remarks
19.00 19.01	<u>Guaranty</u> The air conditioning system shall carry a guarantee for the successful operation of the equipment for a period of 12 months from the date of successful commissioning at BHEL works & handing them over to the Owner against any defective materials, unsuitable product design and bad workmanship. Any shortcomings found during this guaranty period shall be made good and defective materials shall be repaired/ replaced at site free of cost. Equipment/ sub-assemblies/ components found defective due to deficiency in design, material or workmanship shall be replaced by new ones and such replacements shall carry the successful operation for further period of 12 months from the date of replacements.	Vendor to Confirm			
20.00 20.01	<u>Maintenance During Defects Liability Period</u> The contractor shall receive service calls for any and all problems experienced in the operation of the air conditioning system during defects liability period, which shall extend to twelve months from the date of handing over the installation to the Owner.	Vendor to Confirm			
20.02	The contractor shall attend to these calls within 24 hours of receiving the complaints and take immediate steps to correct any deficiencies that may exist. All equipment requiring repairs shall be immediately serviced and repaired. The contractor shall supply all replacement parts and labour at his cost.	Vendor to Confirm			
21.00 21.01	<u>Price</u> The rates quoted shall remain firm and shall not be subjected to escalation.	Vendor to Confirm			
21.05	For price evaluation, total supply and labour value of the complete project, on TURNKEY basis will be considered.	Vendor to Specify			
22.00 22.01	<u>BHEL Scope of Supply</u> The BHEL shall only provide adequate 3 phase, $50 \pm 3\%$ Hz, 415 \pm 10% V, 3 wire electric supply at one point. No neutral point will be provided.	Vendor to Confirm			
23.00 23.01	<u>Provisions to be given by BHEL</u> Bidder have to give preliminary civil drawing for civil work to be carried out by BHEL within 2 weeks of LOI/ WO.	Vendor to Specify			
23.03	Bidder have to give total requirement of electrical power, water, air, etc. at one point. Subsequently, the same will be provided at a single point.	-do-			
23.04	Bidder have to clearly indicate any other requirement from BHEL in the technical offer, otherwise it will be assumed that any future requirement to complete the work on TURNKEY basis will be in the scope of the contractor.	Vendor to Specify			

Sl. No.	Description for BHEL Requirement	Specified / To be Confirmed By Bidder	Offered	Deviations	Remarks
24.00	PRE-QUALIFICATION REQUIREMENTS				
24.01	The following conditions have to be satisfied by the Bidder. Documentary proofs are to be enclosed with techno-commercial bid. In case the tenderer fails to enclose the same the tender will be rejected.	Vendor to Specify			
24.01.01	Bidder must be a reputed OEM (Original Equipment Manufacturer) or authorized AC System Integrator of any OEM. Such system integrator will have to submit a authorization letter in this regards from their OEM of Chiller manufacturer.	-do-			
24.01.02	Only those vendors will be entertained, who have supplied & commissioned at-least 2 nos. of air-cooled screw chillers system of same capacity or higher rating for industrial or similar application and the system should be working satisfactorily on the date of tender opening for one year or six months, if supplied in BHEL from the date of commissioning. Installation and commissioning certificates of such systems supplied by them will have to be enclosed along-with the offer.	Vendor to Specify			
25.00	REFERENCE LIST				
25.01	The following information is to be submitted by the vendor about the companies where similar AC Equipments have been supplied. This is required from all the vendors for qualification of their offer.	Vendor to Specify			
25.02	Name of the customer / company where similar AC Equipment are installed.	-do-			
25.03	Complete postal address of the customer.	-do-			
25.04	Year of commissioning.	-do-			
25.05	Application for which the AC Equipment is supplied with details of performance achieved on the job.	-do-			
25.06	Name and designation of the contact person of the customer.	-do-			
25.07	Phone, FAX no. and email address of the contact person of the customer.	-do-			