

Specification No.	SP/MISC./7809 Rev 01		
Item No.	SP/MISC./1/7/7809		
Location	BAY-9		
Quantity	03 Numbers		

DESIGN, SUPPLY, INSTALLATION & COMMISSIONING OF AIR COOLED WATER CHILLER, CAPACITY - 20 TR @ 15 °C FOR VAPOUR PHASE

NOTE :

- VENDOR must submit complete information against Clause No 11.0 (Qualifying Conditions). The offer meeting this clause will only be processed.**
- The "offered" Column and where applicable, the "Deviations" Column of this format shall be filled in by the Vendor and submitted along with the offer.
- The offer and all documents enclosed with offer should be in English language only.

NAME & ADDRESS OF THE SUPPLIER :

CONTACT PERSON'S NAME

TELEPHONE NOS.:

E-MAIL ADDRESS :

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF AIR COOLED WATER CHILLER (CAPACITY:20 TR @ 15 °C)

S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS
1.0 REQUIREMENT				
	Air cooled Water Chilling Plant (CAPACITY: 20 TR @ 15 °C) is required for cooling of vapour condensers & water jacket cooling of Vacuum Pumping System of Vacuum Drying Plant & Vapour Phase Drying Plant. Qty-03 nos.	Vendor to Confirm		
2.0 SCOPE				
	Design, Supply, Installation and Commissioning of 3 nos each of 20 TR @ 15 °C air cooled water chiller for vapor phase plant no. ME-1/7/2117, 2118 & Vacuum Drying Plant 2293 in bay-9. i. Installation & commissioning of water chilling units (Inlet & Outlet line connection with process plant line network). ii. Initial gas charging of chillers. iii. Operator's training for operation & control of air cooled water chillers.	Vendor to Confirm		
3.0 SPECIFICATION				
3.0.1	Cooling Capacity: 20TR@15°C	Vendor to Confirm		
3.0.2	Min/Max Operating Temp: +5°C/+25°C	Vendor to Confirm		
3.0.3	Min/Max Ambient Temp.:+5°C/+45°C	Vendor to Confirm		
3.0.4	Media to Cool: Clean Water	Vendor to Confirm		
3.1 Main Refrigeration Components:				
3.1.1	The package type chilled water unit must have two independent circuits with individual hermetically sealed compressors with inbuilt internal thermal protector & internal pressure relief valve. The crankcase heater must be operated as required by chiller PLC controller.	Vendor to Confirm		
3.1.2	The PLC should automatically switch on & off an individual compressor to work at part load to ensure energy efficiency of chilling unit and during any breakdown, give fault diagnosis & alarm indication by hooter & blinking light at the top of the chiller. This PLC should also calculate & ensure equal running time for all compressors. All the local PLCs of the Chillers must be integrated with the Main PLC of the VPD Plant.	Vendor to Confirm		
3.1.2.1	1. The offered PLC must support communication for sending and receiving data to and from the master PLC /HMI of VPD plant. (through Profibus/modbus/canbus etc.) 2. The acceptable makes of PLC: Siemens /ABB/Allen-bradley/Schneider only.	Vendor to Confirm		
3.1.3	The chilling plant shall consist of Hermetically-sealed Compressors, Air-cooled Condensers, Automatic Independent PLC based Control, Primary Chilled Water Pumps of suitable capacity to cater for the need of complete VPD plant.	Vendor to Confirm		
3.1.4	A direct expansion valve of Danfoss/ Sporlon/ Alco make should be provided to efficiently monitor expansion of refrigerant gas in liquid chiller of shell & tube type. The refrigerant lines must be of hard copper tubes with all refrigeration accessories like hand shut-off valves with charging port, hygroscopic sight glass, solenoid valve, antifreeze, thermostat & heater (operating during winter), moisture indicator, filter-drier, etc.	Vendor to Confirm		

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S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS
3.1.5	The shell of the cooler must be rolled from steel plate & tested at 600psi. A number of baffles must be provided on the shell side for zig-zag flow of secondary fluid (water) for better efficient heat transfer. Internally grooved high quality seamless copper tubes, individually replaceable & are expanded into the tube sheets for leak-proof joints must be used. The hydraulic water circuit with suction & discharge pipe outlet from the cooler must be interlocked with antifreeze thermostat. The chiller with pipes within the package unit must be insulated with 50 mm thick expandable PUF/ nitrile foam. This whole unit must be mounted on shaped, strong, rigid galvanized steel chassis and painted with epoxy polyurethane paint.	Vendor to Confirm		
3.1.6	The condenser must be of an air-cooled type & use ambient air to condense the refrigerant. The condenser coils must be made of seamless copper tubes, internally grooved type, arranged in staggered rows & mechanically expanded into hydrophilic super slit aluminium fins to give superior heat transfer efficiency. Dynamically & statically balanced helicoids fans of GE/ EBM Nadi/ Kanbo make, direct drive must be installed at the top of the unit. The fan-motor for condenser must be in water-tight enclosure with mechanical protection IP-54. The fan guards & coil guards should be made of heavy gauge steel which are electro-galvanized & epoxy painted.	Vendor to Confirm		
3.1.7	Condenser: Fan Type, Air-Cooled Condenser	Vendor to Confirm		
3.1.8	Condenser Make: Kelvion/GEA/Alpha Laval	Vendor to Confirm		
3.1.9	Compressor Make: Emerson/Danfoss only	Vendor to Confirm		
3.1.10	Compressor Type: Hermetically Sealed Scroll Compressor	Vendor to Confirm		
3.1.11	Evaporator Type: CBE (Brazed Heat Exchanger),	Vendor to Confirm		
3.1.12	Evaporator Make: GEA/ Swep/ Kaori/ Alphasval.	Vendor to Confirm		
3.1.13	Refrigeration Circuits: 02	Vendor to Confirm		
3.1.14	Refrigerant: R134A/R407C	Vendor to Specify		
3.2	Refrigeration Control Circuit with Accessories			
3.2.1	Chilled water pipeline MS 'C' class of Tata/ Jindal/SAIL make.	Vendor to Confirm		
3.2.2	All the valves, NRV, filter, etc. of Audco/ Advance make.	Vendor to Confirm		
3.3	Externally Mounted Pump: (on Tank Skid)			
3.3.1	Make: Grundfoss/Kirloskar/Crompton only	Vendor to Confirm		
3.3.2	Type: Centrifugal, Multistage	Vendor to Specify		
3.3.3	Construction: SS304 Impeller/CI Housing	Vendor to Confirm		
3.3.4	Process Flow Rate & Pressure: 200 L/Min @ 4Bar	Vendor to Confirm		
3.5	Water Reservoir:			
3.5.1	Water storage tank must be of SS-304 of sufficient capacity, which should rely on the buoyancy of warmer return chilled water, which is lighter than colder chilled water, to separate these chilled water during charging & discharging. Diffusers must be used to lower entering & leaving water velocity to prevent mixing. In the stratified tank, colder stored chilled water should be charged from the bottom diffusers arranged concentrically. It should also be discharged from the same bottom diffusers. The warmer return chilled water should be introduced to & withdrawn from the tank through the top lateral diffusers.	Vendor to Confirm		
3.5.2	The external surface of the storage tank should be insulated with TF quality 50 mm thick thermocole sheet with wire-mesh & sand-cement plaster.	Vendor to Confirm		
3.5.3	The storage tank must have automatic air vent (if required), water filling hole with automatic valve & draining hole at the bottom level with valve to periodically drain water completely.	Vendor to Confirm		
3.5.4	Volume: Minimum 500 Liters (with a provision for water level monitoring)	Vendor to Confirm		
3.5.5	Nitrile rubber insulation	Vendor to Confirm		

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3.6	Hydraulic Specs:			
3.6.1	Piping: Non-Corrosive	Vendor to Confirm		
3.6.2	Inlet/Outlet End Connections: 1-1/2" BSP	Vendor to Confirm		
3.7	Electrical:			
3.7.1	The control center of the package chiller must be complete from the stand-point of major operating & safety controls in double door constructed control panel as per IP-65. The gauges of Febieq/ Fluidyne/ Pressto make with valves & PLC controller mounted on the inside door must be clearly visible through a glass window on the front door panel. The control panel must be pre-assembled, factory-wired & cushion-mounted on the unit for utmost reliability & long life. The steel control center with locked door must contain the MCCB of Siemens make, 3-position (on-off-pump down) selector switch of AE/ Beemet make, high & low pressure cut-outs, oil safety switch of Danfoss/ Alco make, Single Phase Preventer (SPP) of Minilec make, interlock Contactors & Over Load Protector (OLP) of Siemens/ Schnieder/ Crouzet make for protection of all the motors, Voltmeter & Ammeter of AE make. For electrical connections glands & lugs should be used and all wires should be provided with numbering ferrules, as per prior approved control wiring drawings by BHEL.	Vendor to Confirm		
3.7.2	MPCB for Compressor, Pump, Fan etc.: Schneider/ABB/L&T/Siemens	Vendor to Confirm		
3.7.3	Contactors for Compressor, Pump, Fan etc.: Schneider/ABB/L&T/Siemens	Vendor to Confirm		
3.7.4	Main switch on/off: Schneider/ABB/L&T/Siemens only	Vendor to Confirm		
3.7.5	Single Phase Preventer: Schneider/ABB/L&T/Siemens only	Vendor to Confirm		
3.7.6	Microprocessor based controller	Vendor to Confirm		
3.7.7	Antifreeze switch	Vendor to Confirm		
3.7.8	All wires & cables should be of reputed make with ISI mark. Bidders must furnish the makes in their technical bid, for prior approval of BHEL.	Vendor to Confirm & Specify		
3.8	Power Supply:			
	Electric supply 3 PH, 415 V, 50Hz, AC will be provided by BHEL at one place only.	Vendor to Confirm		
3.9	Safety Devices:			
3.9.1	Hand shut off Valve: Both Suction & Discharge side of the Compressor for servicing purpose.	Vendor to Confirm		
3.9.2	Digital Temperature Controller.	Vendor to Confirm		
3.10	Control Accessories:			
3.10.1	High Pressure Trip	Vendor to Confirm		
3.10.2	Low Refrigerant Trip	Vendor to Confirm		
3.10.3	Phase Reversal Trip	Vendor to Confirm		
3.10.4	Water Level Low Trip	Vendor to Confirm		
3.10.5	Overload Relay Trip	Vendor to Confirm		
3.10.6	High/Low Temperature Alarm	Vendor to Confirm		
3.10.7	Antifreeze Trip	Vendor to Confirm		

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4.0	Erection & Commissioning			
4.1	Erection & Commissioning shall be done by supplier at BHEL works.	Vendor to Confirm		
4.2	Supplier to bring all the tools & tackles required for installation & commissioning.	Vendor to Confirm		
4.3	Initial charge of Refrigerant till successful commissioning of chillers shall be provided by supplier.	Vendor to Confirm		
4.4	If any special tool required for O&M it should be supplied by supplier along with chiller on Free of Cost basis.	Vendor to Confirm		
4.5	First fill up of oil, greese & gas will be in the scope of supplier till commissioning.	Vendor to Confirm		
4.6	Successful proving of all function at site as per specification by the supplier shall be considered as part of commissioning.	Vendor to Confirm		
5.0	Guarantee			
5.1	Guarantee for equipment shall be for 24 months from the date of commissioning.	Vendor to Confirm		
6.0	Packing:			
6.1	All components shall be suitably packed so that the material reaches BHEL without any damage/loss in transit.	Vendor to Confirm		
7.0	INSPECTION			
7.1	Pre-dispatch inspection will be carried out by the representative of BHEL as per specification at supplier's works.	Vendor to Confirm		
7.2	Minimum 15 days advance notice to be given by supplier for Inspection at supplier's works.	Vendor to Confirm		
8.0	Miscellaneous :			
8.1	Notwithstanding the details in this specification, if any thing else is required for its functioning the same shall be specifically brought out and included in the offer.	Vendor to Confirm		
8.2	AIR COOLED WATER CHILLER, 3 Nos, (each of CAPACITY-20 TR @ 15 °C) should be in ready to use condition with all required accessories for its functioning.	Vendor to Confirm		
9.0	PROVE-OUT OF BHEL COMPONENTS :			
9.1	Complete prove-out shall be done by VENDOR at BHEL works. VENDOR shall be fully responsible for prove out of components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL.	Vendor to Confirm		
9.5	Training of BHEL operators in operation of complete equipment & accessories etc by the supplier's experts / engineers during their stay at BHEL works.	Vendor to Confirm		
10.0	Documentation :			
10.1	Leaflet, catalog, drawing and B.O.M. indicating quantity, make & model of component in offered chiller to be submitted along with offer.	Vendor to Submit		
10.2	Water chiller shall be supplied with 3 sets of manual. The manual shall contain the details of - a. Refrigeration circuit diagram b. Complete wiring diagram with ferrule no. c. Spare parts details and d. Operation manual with maintenance details.	Vendor to Confirm		
10.3	GA & PI diagram with detail for refrigeration system shall be provided by supplier.	Vendor to Confirm		
10.4	Lay out diagram	Vendor to Confirm		
10.5	Foot print area	Vendor to Specify		
10.6	Total electrical load	Vendor to Specify		

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S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS
11.0	Qualifying condition			
11.1	To qualify for this tender, vendors shall submit the following detail and documents: (The documents in the name of OEM or their Authorized representatives shall be acceptable). i. The supplier should be the manufacturer (OEM) or authorized representative of the manufacturer. Authorization/OEM certificate must be submitted with offer. ii. Only those vendors/bidders, who have supplied and commissioned at least THREE numbers of water chiller of capacity 20 TR (or) more in the last 10 years (as on date of tender opening) for industrial use should quote. Copy of unpriced POs should be furnished for above. iii. Vendor/bidder should submit following:- a) Performance Certificate from their customers for the satisfactory performance (of atleast one no.) of water chiller (capacity 20 TR or more supplied vide any of above submitted purchase order) for a minimum period of one year (as on original date of tender opening). OR b) Commissioning certificate from their customers for atleast 3 nos water chillers (capacity 20 TR or more supplied with copy of purchase orders). The date of commissioning should be atleast one year before from the original date of tender opening. Party to furnish addresses, contact numbers, email IDs of their above users. BHEL reserves its right and may verify Performance directly from the user of the equipment if required. iv. The address and contact number of contact persons where such system are installed and working should be provided.	Vendor to submit		
12.0	BHEL reserves the right to verify any or all information submitted by the Vendors. In case any of the information is found to be false/ incorrect, the offer shall be rejected.	Vendor to Confirm		

(Rajeev Chaturvedi)

(Vivek Kumar Gupta)
07.07.2020

(PAWAN KUMAR)

(RAANU VERMA)
8/7/20