



**BHARAT HEAVY ELECTRICALS LTD.,**  
CORPORATE R&D DIVISION  
VIKAS NAGAR, HYDERABAD-500093 (INDIA)

Enquiry No. :

Date :

3/3/2010

**PURCHASE SECTION**

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SPEC.NO.

PS: HVE:09: PPS:01/01

**SPECIFICATION CUM COMPLIANCE CERTIFICATION FOR POSITIVE PRESSURE SYSTEM (PPS)**

**Important**

1. Vendor must submit complete information against clauses Nos 19.0 and 20.0. The offer meeting these clauses would only be processed.
2. The offer and all documents enclosed with offer should be in English language only.
3. BHEL reserves the right to verify the information submitted by the vendor. The offer with false/ incorrect/incomplete information may be rejected.
4. Vendor shall sign and stamp all sheets.
5. Offers submitted shall be valid for a period of minimum 6 (six) months from date of commercial bid.
6. Revised technical bid may be necessary should the specification require up gradation/ modification on technical scrutiny of offers.
7. Vendor must respond to all points in the specification.

ADDRESS OF THE SUPPLIER :	ADDRESS OF THE INDIAN AGENT :
TELEPHONE NOS.:	TELEPHONE NOS.:
FAX NOS.:	FAX NOS.:
CONTACT PERSON:	CONTACT PERSON:
E-MAIL ADDRESS :	E-MAIL ADDRESS :

SCOPE:	Design, manufacturing, pre-despatch testing, supply, installation at BHEL and commissioning of equipment and related accessories complying with following specifications and training of BHEL staff.
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Quantity:	System consisting of 11 AHUs, 2 Water Chilling plants and chilled/ return water circuit.
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Serial No.	DESCRIPTION OF REQUIREMENT	DESIRED ACTION	OFFERED BY THE VENDOR	DEVIATIONS (IF ANY, ELSE PRINT NONE)	REMARKS(Only on deviations)
1.0	<b>Purpose of PPS:</b> This system will be used to maintain a dust free and clean atmosphere at a specified temperature inside an assembly room.	Vendor to note			
1.1	<b>End use of the Area:</b> Active parts of gas insulated High Voltage equipment are proposed to be assembled in this room.	Vendor to note			
1.2	<b>Description of the assembly room:</b> The size of the room is 25 metres X 9 metres X 8 metres high. The skeleton is made up of metal columns, metal partitions, glass and enamelled concrete walls. A false metal roof is provided in the area. The floor is covered with vitrified tiles.	Vendor to note			
1.3	<b>Air Zones:</b> The space is divided into two zones. Zone- 1 (~ class 10,000 ) over a length of 10 metres and Zone -2 (~ class 1,00,000) covers remaining length. The main entrance for the area is through Zone-2. No windows are provided and all walls are sealed against air leakage. ( Refer drawing)	Vendor to note			
1.4	<b>Temperature inside the room :</b> A temperature of 28 °C+/-2 shall be maintained inside the room. Maximum ambient (outside) temperature expected is 45 °C.	Vendor to note as input parameter			
1.5	<b>Humidity requirement inside the room(non critical):</b> Less than or equal to 60 %	Vendor to note as input parameter			

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1.6	<b>Power supply available:</b> All the electrical equipment shall be wired to a 415 volts, 50 Hz, 3 Phase +1 Neutral system.	Vendor to Conform			
2.0	<b>Zone specifications:</b>				
2.1	<b>Volume: Zone- 1:</b> 720 Cubic metres (CM) <b>Zone 2:</b> 1080 cubic metres (Refer Drawing).	Vendor to note as input parameter			
2.2	<b>Expected Positive pressure:</b> Zone -1 >4.0 mm water gauge; Zone- 2 >2.0 mm water gauge	Vendor to note as input parameter			
2.3	<b>Fresh air requirement for positive pressure build up:</b> 10% fresh air inlet provision shall be available in the AHUs. The fresh air quantity shall be controllable and shall be processed through filters.	Vendor to note as input parameter			
3.0	<b>Requirement at the entrance of the room:</b> The entrance from outside to Zone-2 shall be provided with a set of air-showers covering a width of 3.0 metres. The air showers and its installation shall be included in the scope of supply.	Vendor to conform			
4.0	<b>Air Handling Units (AHU) :</b>				
4.1	<b>Type of AHU:</b> Modular type, individual units with provision for brackets supporting structure. The AHUs are proposed to be fixed between steel columns at an elevation.	Vendor to conform			
4.2	<b>Nominal capacity of individual air handling Units : Appx. 2500 CFM (Min.)</b>	Vendor to conform			
4.3	<b>Requirement:</b> . Each unit shall have air blowers, pre and fine particle filters , HEPA filters and chilled water heat exchanger. 30-35 LPM of chilled water shall be available at ~15 ° C for each AHU for cooling the room air. The heat exchanger shall be designed using this input.	Vendor to conform			

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4.4	<b>Preferred size mm:</b> width/ Depth/ Height : < 3000/< 650/ < 3600	Vendor to conform			
4.5	<b>Number of AHUs required: Six for Zone-1 ; Five for Zone-2.</b> The Layout of AHUs will be as per drawing enclosed. The AHUs shall be marked suitably for identification from each other.	Vendor to refer drawing			
4.6	<b>Maximum Noise acceptable for each AHUs :</b> Less than 65 dB	Vendor to conform			
4.7	<b>Casing and Cabinet construction:</b> Vertical modular AHUs with 60 microns GI powder coated (external) and plain GI (internal) walls of standard thickness shall be used for this purpose. A poly urethane insulation of 40mm thick shall be used in between the walls. The frame shall be made from anodised aluminum. Suitable seals and gaskets shall be used so that a perfect air tight system is made. Access door shall be opened outside. Each unit is mounted with the help of brackets on the column at a base elevation of min. 0.3 meters. Each unit should have an electrical control panel with on/ off contactor ( MCB), over current relay, single phasing preventer, temperature/speed controller and indicator, power indicators and other accessory which are necessary for the protection of the unit. However, the electrical connection to each AHU is not in the scope of supply.	Vendor to conform			
4.8	<b>FAN and MOTOR</b>				
4.8.1	<b>Type :</b> Centrifugal	Vendor to conform			
4.8.2	<b>Configuration:</b> Double width double inlet (DWDI)/ vendor specific	Vendor to conform			
4.8.3	Fan shall be dynamically and statically balanced to ISO 1940	Vendor to conform			
4.8.4	Belted motors, if used, shall be mounted with provision for belt tension adjustment.	Vendor to conform			
4.8.5	Motors shall be rated for 20% margin over continuous maximum rating (CMR).	Vendor to conform			
4.8.6	Bearings shall be L-50 type rated for life of 200,000 Hrs.	Vendor to conform			
4.8.7	Fan and motor assembly shall be mounted on suitable spring type vibration isolators.	Vendor to conform			
4.9	<b>COOLING Section</b>				
4.9.1	Coil shall be installed such that header and return bend are enclosed. Drain and vent connections (preferably, quick) shall be provided on the exterior of casing for ease of connection/ plumbing. Coil connections shall be sealed against air leakage and condensation. Coil shall be removable without disturbing other assemblies of AHU.	Vendor to conform			
4.9.2	Capacity, water pressure drop and selection shall be in accordance with standards (ARI 410 etc)	Vendor to conform			

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4.9.3	The heat exchanger fins shall be of aluminum and the fin pitch shall be preferably 12 FPI.	Vendor to conform			
4.9.4	Coil frame: 1.5mm GI	Vendor to conform			
4.9.5	Coil working pressure (indicative 0.4 - 0.6 bar)	Vendor to specify			
4.9.6	Water Connection MPT(Male pitch threaded) or Quick connection	Vendor to specify			
<b>4.10</b>	<b>FILTERS FOR ZONE- 1</b>				
4.10.1	Disposable and washable panel filters shall be provided in preferably 2" (50mm)frames	Vendor to conform			
4.10.2	All primary and secondary filters shall be installed in metallic sliding rails.	Vendor to conform			
4.10.3	Primary / Pre filter : 10 Micron	Vendor to conform			
4.10.4	Fine filter: 5 micron	Vendor to conform			
4.10.5	HEPA: 0.3 micron	Vendor to conform			
4.10.6	Fresh air filter: 20 micron	Vendor to conform			
4.10.7	Clogged filter (HEPA) Indication shall be availability on control panel	Vendor to conform			
<b>4.11</b>	<b>FILTERS FOR ZONE -2</b>				
4.11.1	Disposable and washable panel filters shall be provided in preferably 2" (50mm)frames	Vendor to conform			
4.11.2	All primary and secondary filters shall be installed in metallic sliding rails.	Vendor to conform			
4.11.3	Primary / Pre filter : 20 Micron	Vendor to conform			
4.11.4	Fine filter: 10 micron	Vendor to conform			
4.11.5	HEPA: 0.3 micron	Vendor to conform			
4.11.6	Fresh air filter: 20 micron	Vendor to conform			
4.11.7	Clogged filter (HEPA) Indication shall be availability on control panel	Vendor to conform			
4.12	<b>Other requirements:</b> Out put air quality of AHUs shall be checked for consistency with a particle counter. Vendor to indicate particle count at 5min from switching on in closed system for both variety of AHUs (parameter for acceptance)	Vendor to Specify			

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5.0	<b>Chilled Water Units:</b> Number of Units =Two(2). One of each side.	Vendor to conform			
5.1	<b>Requirement:</b> A self contained and totally enclosed unit shall be offered. Unit shall be based on direct expansion system, air /water cooled condenser, vapor / water heat exchanger, circulating pump, control panel shall be integral to the unit. The vapour compression system shall be a low noise, energy efficient and completely enclosed. The refrigerant circuit shall be integral (welded or brazed). The equipment shall be assembled on a steel frame (Skid) with vibration pads/mounts. The unit shall operate at full efficiency with ambient temperature of +45 <sup>0</sup> C. Noisy units (>75dB) shall be enclosed in a sound proof enclosure, if required.	Vendor to conform			
5.2	Cooling Capacity of each unit : ~ 15TR	Vendor to conform			
5.3	Chiller Inlet water temperature: 35 +/- 2 ° C	Vendor to conform			
5.4	Chiller Outlet water temperature: 13+/- 1 ° C	Vendor to conform			
5.5	Inbuilt Water Reservoir Capacity : >2000 liters	Vendor to conform			
5.6	Material of reservoir: Stainless steel	Vendor to conform			
5.7	Outlet pressure, ~2.0 bar	Vendor to conform			
5.8	Water flow at outlet pressure, > 200 LPM	Vendor to conform			
5.9	Circulation Pump rating, kW	Vendor to Specify			
5.10	<b>Water line Connection :</b> Flanged/ Quick	Vendor to conform			
5.11	Electrical Controls: Offered unit shall be stand alone, requiring minimum attendance for intended operations. Control sequence shall be automated with a provision for manual intervention during maintenance. Indication for choked flow/ pressure build-up and under voltage shall be available on front panel along with power ON/OFF and EMERGENCY tripping facility/ control.	Vendor to conform			
6.0	<b>Insulated Plumbing</b>				
6.1	<b>Supply Line:</b> Thermally insulated straight water line in MS(class-C) material (minimum 0.8mm wall thickness) shall be supplied for an approximate circuit length of 50 meters. The line shall be suitably tapped (ref drawing), using a welded T-connector and quick coupling (auto blocking). Valve outlet is acceptable alternately.	Vendor to conform			
6.2	<b>Return Line:</b> Un insulated straight water line in MS(class-C) material (minimum 0.8mm wall thickness) shall be supplied for an approximate circuit length of 50 meters. The line shall be suitably tapped (ref drawing), using a welded T-connector and quick coupling (auto blocking). Valve outlet is acceptable alternately.	Vendor to conform			
6.3	Vendor shall quote rates for additional requirement of line on per meter basis, to compensate for difference in actual quantity (if higher than specified) used.	Vendor to conform			

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<b>7.0</b>	<b>OPTIONAL ACCESSORIES:</b>				
7.1	<b>Hand Held Particle Counter : Qty:1</b>	Vendor to offer			
7.2	<b>Digital Temperature and Humidity Measurement instrument with Panels: Qty:2</b>	Vendor to offer			
7.3	The vendor shall submit equipment specific list of optional accessories with technical offer for intended application.	Vendor			
<b>8.0</b>	<b>PRE-DESPATCH INSPECTION (PDI)</b>				
8.1	All routine (relevant) tests shall be performed at supplier's works before dispatch in presence of BHEL representatives which include company's quality department. List of tests proposed should be furnished along with the technical offer so that indenter's quality engineer can verify the performance before the final acceptance.	Vendor to agree and clearly mention the relevant tests to be carry out during the final inspection at vendor's premises.			
<b>9.0</b>	<b>DOCUMENTATION:</b> Four sets of following documents (Hard Copies ) in English should be supplied along with the machine.				
9.1	Operating manuals	Vendor to conform			
9.2	Detailed maintenance manuals for AHUs, boosters, chilled water plant and other accessories	Vendor to conform			
9.3	List of all major parts	Vendor to conform			
9.3	Test and Guarantee certificates	Vendor to conform			
9.4	SOFT COPY of all above documentation on CD ROM, wherever applicable	Vendor to conform			
<b>10.0</b>	<b>TRAINING</b>				
10.1	BHEL staff to be trained for acquaintance on operation and maintenance of supplied equipment at the indenter's premises, persons shall be trained for mutually agreed period in area of use the equipment, operating instructions, warnings and precautions, location and functions of control instrumentation, interlocks, preventive and periodic maintenance, operating limitations, any unique or potentially hazardous condition which could affect safe operation, etc.	Vendor to conform			
10.2	Vendor should depute an expert conversant in English during commissioning and provide satisfactory guidance/effective training to BHEL staff.	Vendor to conform			

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<b>11.0</b>	<b>COMMISSIONING/ DEMONSTRATION</b>				
11.1	The system shall erected and commissioned by the vendor at the indenter's premises after clearance by the indenter. Required items for the commissioning of equipment within stipulated time shall be brought by vendor on the returnable basis.	Vendor to conform			
11.2	Installation and Commissioning charges can be mentioned separately, however included within the scope of supply.	Vendor to conform			
<b>12.0</b>	<b>SPARES AND SERVICE</b>				
	Vendor shall support availability of spares and maintenance workforce for 10 years from date of commissioning.	Vendor to conform			
<b>13.0</b>	<b>SAFETY ASPECTS:</b> The supplier must take care of all safety aspects regarding the equipment and operating personnel. The equipment should have adequate and reliable interlocks to avoid any system damage and ensure personnel safety.	Vendor to conform			
<b>14.0</b>	<b>PACKING :</b> Rigid packing for all items of complete equipment, all accessories and other supplied items to avoid any loss / damage in transit. When equipment is dispatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to conform			
<b>15.0</b>	<b>PERFORMANCE GUARANTEE :</b> 12 months from the date of commissioning and acceptance of equipment.	Vendor to conform			
<b>16.0</b>	<b>QUALITY:</b> All the components especially the filtering units must meet the relevant standards.	Vendor to mention the relevant standards and tests to meet them			
<b>17.0</b>	<b>GENERAL :</b> The vendor must supply the following information about the proposed equipment along with the offer :				
<b>18.0</b>	<b>Weight Indication:</b> Weight of major components/ Packing shall be furnished.	Vendor to specify			
<b>19.0</b>	Detailed catalogue, sketch / photographs of the Equipment, accessories and attachments offered shall be substantiated with technical offer including guaranteed parameters and meet all the classes mentioned in this NIT	<b>Vendor must supply</b>			
<b>20.0</b>	<b>Qualification Requirements:</b> Vender should have dealt with similar equipment for at least three years. The supplier should give a reference list . Further, the vendor must have service outlets / service personnel to support the equipment, as and when required, by BHEL. The designs offered must be a proven and should have been deployed for a minimum period of 2 years with trouble free operation.	<b>Vendor to conform</b>			





