

PROJECT: CONSTRUCTION OF CGHS WELLNESS CENTRE AND ADMIN.BLDG. AT SECTOR-13, R.K.PURAM, NEW DELHI
BOQ FOR HVAC WORKS

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
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| | | | | | <i>In Figures</i> | <i>In Words</i> | <i>In Figures</i> | <i>In Words</i> |
| | | HVAC Work Bill of Quantities and estimated cost : | | | | | | |
| | | SCREW COMPRESSOR TYPE WATER COOLED CHILLING MACHINES : | | | | | | |
| 1 | NDSR | Supply,installation,testing and commissioning of water cooled Screw Chilling Machines of 190 TR actual Cooling capacity complete with semi-hermatically sealed compressors with stepless control, flooded shell and tube condenser, microprocessor based control panel ,including oil seperators pressure relief devices ,filter drier moisture indicators,refrigerant economisers and complete operating charge of both CFC free refrigerant 134a & compressor oil,control safeties and diagnostics display,refrigerant piping,mounting baseframe etc. complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| | | Operation Parametres : | | | | | | |
| | | Chiller : | | | | | | |
| | | Water Temperature IN - 54 degree F | | | | | | |
| | | Water Temperature OUT - 44 degree F | | | | | | |
| | | Fouling Factor - 0.0005 FPS | | | | | | |
| | | Condenser : | | | | | | |
| | | Water Temperature IN - 90 degree F | | | | | | |
| | | Water Temperature OUT - 97.5 degree F | | | | | | |
| | | Fouling Factor - 0.001 FPS | | | | | | |
| | | The cost of BMS compatible card shall be included in each chiller) | 2 | Nos. | | | | |
| | | Chilling machine COP at shall be min 5.79 and IPLV of 8.27 (One working+one standby) | | | | | | |
| | | (All chillers shall have IBMS integration cards) | | | | | | |
| 2 | | Hotwater Generator | | | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| | | Supply, installation, testing and commissioning of electrical Hot water Generator equipped with sufficient no. of flanges and electric immersion heaters. The pressure Vessel shall be constructed as per ASME standards and insulated on all sides with 2 layers of 50 mm thick fiberglass with 28 gauge Aluminium cladding as per specifications. The hot water generator shall be equipped with all automatic and safety controls such as manual reset, high temperature water outlet, step controller and recycling relay, on/off switch type thermostat, pilot light, low water cut off and other controls as per manufacturers recommendations. All basic controls and terminals shall be located in an integral control cabinet factory wired and tested. The hot water generator shall be suitable for 415±10%volts/50 cycles, 3phase power supply. The entire hot water generator shall be factory assembled and tested requiring only connection to services of 100 KW capacity. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. (1 Working+ 1 Standby) | | | | | | |
| | | Water in - 110 Degree F | | | | | | |
| | | Water out - 120 Degree F | 2 | Nos. | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 3 | | Water Pumps : | | | | | | |

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| | | | | | <i>In Figures</i> | <i>In Words</i> | <i>In Figures</i> | <i>In Words</i> |
| | NDSR | Supply, installation, testing and commissioning of end suction top discharge type water pump sets factory mounted on a common base with electric motor for recirculation of water for the central air-conditioning system. All pumps shall be aligned. The pump motor shall be EFF 1 & suitable for 415_+10% V, 50 cycles, 3 phase power supply. The quoted rates shall be inclusive of insulation and cladding. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. Pump performance characteristics shall be as follows: | | | | | | |
| a) | NDSR | Chilled water Primary Pumps | | | | | | |
| | | Water flow Rate : 456 US GPM | | | | | | |
| | | Head : 12 m | | | | | | |
| | | (Including one standby) | 2 | Nos. | | | | |
| b) | NDSR | Chilled water secondary Pumps with control panel & VFDs | | | | | | |
| | | 1DPT and PLC with duly downloaded software | | | | | | |
| | | Water flow Rate : 456 US GPM | | | | | | |
| | | Head : 15 m | | | | | | |
| | | (Including one standby) | 2 | Nos. | | | | |
| c) | NDSR | Condenser water Pumps | | | | | | |
| | | Water flow Rate : 760 US GPM | | | | | | |
| | | Head : 24 m | | | | | | |
| | | (Including one standby) | 2 | Nos. | | | | |
| d) | NDSR | Hot water Pumps | | | | | | |
| | | Water flow Rate : 100 US GPM | | | | | | |
| | | Head : 24 m | | | | | | |
| | | (Including one standby) | 2 | Nos. | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| 4 | NDSR | Cooling Towers : | | | | | | |
| | | Supply, installation, testing and commissioning of FRP induced draft type cooling towers. Each cooling tower shall be complete with casing, distribution system, filling louvers, ladder, propeller fans, motors and shall be suitable for 415V/3Ph/50Hz power supply, Isolator panel with suitable MCB at each cooling tower. There shall be 2 Nos. of 1200mm dia fans & with two 7.5 HP EFF1 motors. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | 240 TR (One working +one standby) | 2 | Nos. | | | | |
| 5 | NDSR | Air Handling Units (Vertical Type): | | | | | | |
| | | Supply, installation, testing and commissioning of sheet metal sectionalised construction draw thru type in Double Skin construction. Each Air Handling Units shall be with filters section with prefilters and fine filters, chilled water cooling coils of Copper tube & Al. Fins construction, squirrel cage induction EFF1 type motor, backward curved centrifugal fans, mixing box, ultrasonic type humidifier for RH balance belt drive and vibration isolators. Coil size shall be selected for a max. face velocity of 500 FPM and static shall be 50 mm. Motor shall be suitable for 415V/3Ph/50Hz AC supply. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. Air moving capacities shall be as follows : | | | | | | |
| a) | NDSR | 14,500 cfm with 4 row cooling coil | 1 | No. | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| b) | NDSR | 11,500 cfm with 4 row cooling coil | 1 | No. | | | | |
| c) | NDSR | 10,000 cfm with 4 row cooling coil | 1 | No. | | | | |
| d) | NDSR | 9,500 cfm with 4 row cooling coil | 1 | No. | | | | |
| e) | NDSR | 8,000 cfm with 4 row cooling coil | 1 | No. | | | | |
| | | | | | | | | |
| | | (All these AHUs shall be with thermal break profile) | | | | | | |
| | | | | | | | | |
| | | Ceiling Suspended AHUs : | | | | | | |
| | | | | | | | | |
| 6 | NDSR | Supply, installation, testing and commissioning of sheet metal construction draw thru type AHUs in Double skin construction. Each Air Handling Units shall be with thermal break. Each Air Handling Units shall be with filter with prefilters, chilled water cooling coils of copper tube and Aluminium fins construction, squirrel cage induction motor (EFF1 type), backward curved, centrifugal fans, drives, and vibration isolation pads etc. coil, size shall be selected for a maximum face velocity of 500 FPM, and static shall be 40 mm Motor shall be suitable for 220V/3Ph/50Hz. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. Air moving capacities shall be as follows: | | | | | | |
| | | | | | | | | |
| a) | NDSR | 7,000 cfm with 4 row cooling coil | 1 | No. | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| b) | NDSR | 6,500 cfm with 4 row cooling coil | 1 | No. | | | | |
| c) | NDSR | 6,000 cfm with 4 row cooling coil | 1 | No. | | | | |
| d) | NDSR | 4,400 cfm with 4 row cooling coil | 1 | No. | | | | |
| e) | NDSR | 4,200 cfm with 4 row cooling coil | 1 | No. | | | | |
| f) | NDSR | 4,000 cfm with 4 row cooling coil | 1 | No. | | | | |
| g) | NDSR | 3,200 cfm with 4 row cooling coil | 1 | No. | | | | |
| h) | NDSR | 2,500 cfm with 4 row cooling coil | 1 | No. | | | | |
| i) | NDSR | 2,300 cfm with 4 row cooling coil | 1 | No. | | | | |
| | | | | | | | | |
| 7 | NDSR | HRV Units | | | | | | |
| | | | | | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| | | Supply,installation,testing and commissioning of Heat exchanger units(HRV) in double skin construction,constructed out of extruded Aluminium section frame with puf insulated panels,blowers,EFF1 Motor plate to plate type Aluminium heat exchanger and filters.The unit will have two separate passages one for supply of fresh air and the other for exhaust of cool air from the rooms after the recovery of energy. Efficiency of these heat exchangers shall be 60-65%.The plate to plate heat exchanger shall be rigid thermally bonded seamless Aluminium channels separated by extruded aluminium spacers of the following capacity.The unit shall be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | 1450 cfm | 1 | No. | | | | |
| b) | NDSR | 1150 cfm | 1 | No. | | | | |
| c) | NDSR | 1000 cfm | 1 | No. | | | | |
| d) | NDSR | 950 cfm | 1 | No. | | | | |
| e) | NDSR | 800 cfm | 1 | No. | | | | |
| f) | NDSR | 700 cfm | 1 | No. | | | | |
| g) | NDSR | 650 cfm | 1 | No. | | | | |
| h) | NDSR | 600 cfm | 1 | No. | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| i) | NDSR | 450 cfm | 1 | No. | | | | |
| j) | NDSR | 400 cfm | 2 | Nos. | | | | |
| k) | NDSR | 350 cfm | 1 | No. | | | | |
| l) | NDSR | 250 cfm | 2 | Nos. | | | | |
| | | | | | | | | |
| 8 | NDSR | Fan Coil Units : | | | | | | |
| | | Supply,installation,testing and commissioning of Horizontal powder coated hideaway type fan coil unit blow thru type complete with 3 row deep cooling coils,one or more centrifugal fans, fan motor, Aluminium/synthetic cleanable filters, insulated condensate drain pans,casing,pipe connections thru copper pipe,condensate drain connections, complete as per specifications and drawings of below capacities. | | | | | | |
| a) | NDSR | 1.5 TR (600 cfm) | 2 | Nos. | | | | |
| | | | | | | | | |
| 9 | NDSR | Basement Exhaust ventilation / Staircase /Lifts Pressurisation Centrifugal Fan sections : | | | | | | |
| | | | | | | | | |
| | | Supply,installation,testing and commissioning of Double skin DIDW (Double Inlet & Double Width) centrifugal fan section with EFF 1 (Efficiency-1) motor, Drive set,Pullies, mounting frame, filter section with prefilters of below capacities for Ventilation and staircase pressurisation. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |

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| | | | | | <i>In Figures</i> | <i>In Words</i> | <i>In Figures</i> | <i>In Words</i> |
| a) | NDSR | 23,000 cfm at 50 mm static (For Upper Basement Parking Exhaust) | 2 | Nos. | | | | |
| b) | NDSR | 18,000 cfm at 50 mm static (For Lower Basement Parking Exhaust) | 2 | Nos. | | | | |
| c) | NDSR | 15,000 cfm at 15 mm static (For Staircase) | 1 | No. | | | | |
| e) | NDSR | 2,000 cfm at 15 mm static (For Lift Well) | 2 | Nos. | | | | |
| | | | | | | | | |
| | | Axial Fan : | | | | | | |
| | | | | | | | | |
| 10 | NDSR | Supply,installation,testing and commissioning of Axial Type Exhaust Fans complete with motor with suitable Electric starter panels. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. Axial Fans are of the following capacities : | | | | | | |
| a) | NDSR | 34,500 cfm at 15 mm static | 2 | Nos. | | | | |
| b) | NDSR | 27,000 cfm at 15 mm static | 2 | Nos. | | | | |
| | | | | | | | | |
| 11 | NDSR | Ducted Inline Type fans : | | | | | | |
| | | | | | | | | |
| | | Supply,installation,testing and commissioning of ducted Inline exhaust fans complete with motor, fan ,exhaust Louvers. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| a) | NDSR | 450 CFM at 20 mm static | 4 | No. | | | | |
| b) | NDSR | 350 CFM at 20 mm static | 4 | No. | | | | |
| | | | | | | | | |
| 12 | NDSR | Propeller Type fans : | | | | | | |
| | | Supply,installation,testing and commissioning of Propeller type free discharge exhaust fans complete with motor, fan ,exhaust Louvers. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| | | | | | | | | |
| a) | NDSR | 450 mm dia | 2 | Nos. | | | | |
| b) | NDSR | 300 mm dia | 1 | No. | | | | |
| c) | NDSR | 225 mm dia | 5 | Nos. | | | | |
| | | | | | | | | |
| 13 | NDSR | Main A/C Panel | | | | | | |
| | | | | | | | | |
| | | Supply Installation,testing and commissioning of Main A/C Panel (MCC), cubicle compartment-alised floor mounted type made of 2 mm thick steel sheet duly painted complete as per the manufacturer's specifications & as directed by Engineer-in-charge and as detailed below : | | | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| | | 1 no. 800 Amps TPN ACB incomer with KW, KWH & KVARh meter, phase indicating lamps with control fuse & toggle switch, voltmeter with selector switch, ammeter with CTs and selector switch 1 set 1000 Amps triple pole with neutral Al. Bus Bars duly sleeved | | | | | | |
| | | 3 nos. outgoing feeders for 190 TR Chilling Machines Each with 400 A TPN MCCB (50KA) and on/off indication lamps (one spare) | | | | | | |
| | | 3 nos. 300 Amps TPN MCCB (50KA) with neutral link outgoing feeders for 100 KW Hot water Generator. The compartment shall contain CT operated ammeter of 0-300 Amps range with selector switch and indicating lamps with fuse and toggle switch for ON and Trip status of motor. (to run during winters) (one spare) | | | | | | |
| | | 3 Nos 100 Amps TPN MCCB (35KA) outgoing for Condenser water pumps with 18.5 KW /25HP Star delta Starter (one spare) | | | | | | |
| | | 3 Nos 100 Amps TPN MCCB (35KA) outgoing for chilled water Primary pumps with 5.5 KW /7.5HP DOL Starter (one spare) | | | | | | |
| | | 2 Nos 100 Amps TPN MCCB (35KA) outgoing for chilled water Secondary pumps with 7.5 KW /10HP Star Delta Starter (one spare) | | | | | | |
| | | 2 Nos 63 Amps TPN MCCB (35KA) outgoing for hot water pumps with 3.7 KW /5.0 HP DOL Starter (one spare) | | | | | | |
| | | 4 Nos. 100 Amps TPN MCCB (35KA) outgoing for the cooling Towers fan motors each 5.5 KW DOL Starter (two spare) | | | | | | |
| | | Space required in this panel to accommodate the VFDs of cooling towers | 1 | Set | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| 14 | NDSR | Control Panel in Air Handling Unit Rooms : | | | | | | |
| | | Supply,installation,testing and commissioning of the following cubicle type openable front ,sheet steel wall mounted control panels sleeve type Al. bus bar including anchoring into the wall. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge.The panel shall include the following accessories : | | | | | | |
| i) | | Terminal block for power distribution. | | | | | | |
| ii) | | Single Phase Preventor. | | | | | | |
| iii) | | Phase indicating lights and indicating lights for ON/TRIP status | | | | | | |
| iv) | | Digital type Ammeter and suitable size CT and selector switch. | | | | | | |
| v) | | Time delay relay for automatic restart of AHUs motors. | | | | | | |
| vi) | | Auto/Manual stop selector switch shall be provided in each AHU Panel.The same should provide potential free contact for position monitoring to BMS system. | | | | | | |
| vii) | | All starters shall have suitable potential free contacts | | | | | | |
| viii) | | Wiring for microswitch for stopping the fan when fire dampers closes. | | | | | | |
| ix) | | Space for bypass starter of AHUs VFDs in the panel | | | | | | |
| x) | | MCCB as per rating given below. | | | | | | |
| | | The number of AHU panel shall be as detailed below : | | | | | | |
| | | | | | | | | |
| a) | NDSR | 32 amps TPN MCCB with 1 No.1.0 to 3.0 HP (Horse Power) DOL Starter for AHU fan | 6 | Set | | | | |
| b) | NDSR | 63 amps TPN MCCB with 1 No.5.0 HP (Horse Power)DOL Starter for AHU fan | 5 | Set | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| c) | NDSR | 63 amps TPN MCCB with 1 No.7.5 HP (Horse Power)to 1 No. 10HP (Horse Power) Star Delta Starter for AHUs fan | 3 | Set | | | | |
| 15 | NDSR | Control Panel for Exhaust fans and pressurisation fans : | | | | | | |
| | | Supply,installation,testing and commissioning of the following cubicle type openable front ,sheet steel wall mounted control panels sleeve type Al. bus bar including anchoring into the wall.These panels shall be complete in all respects as per the drawings and the specifications. The panels shall include the following accessories : | | | | | | |
| i) | | Terminal block for power distribution. | | | | | | |
| ii) | | Single Phase Preventor. | | | | | | |
| iii) | | Phase indicating lights and indicating lights for ON/TRIP status | | | | | | |
| iv) | | Digital type Ammeter and suitable size CT and selector switch | | | | | | |
| v) | | Time delay relay for automatic restart of Fan motors. | | | | | | |
| vi) | | Auto/Manual stop selector switch shall be provided in each | | | | | | |
| vii) | | All starters shall have suitable potential free contacts | | | | | | |
| viii) | | MCCB as per rating given below. | | | | | | |
| | | The number of El. Panels shall be as detailed below : | | | | | | |
| a) | NDSR | 32 amps TPN MCCB with 1 No.1.0HP (Horse Power) DOL Starter | 2 | Set | | | | |
| b) | NDSR | 63 amps TPN MCCB with 1 No.7.5 HP (Horse Power)DOL Starter | 1 | Set | | | | |
| c) | NDSR | 63 amps TPN MCCB with 1 No. 12.5HP (Horse Power) Star Delta Starter | 4 | Set | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| 16 | NDSR | Control Panel for HRV Units : | | | | | | |
| | | Supply, installation, testing and commissioning of the following cubicle type openable front, sheet steel wall mounted control panels sleeve type Al. bus bar including anchoring into the wall. These panels shall be complete in all respects as per the drawings and the specifications. The panel shall include the following accessories : | | | | | | |
| i) | | Suitable MCCB | | | | | | |
| ii) | | Terminal block for power distribution. | | | | | | |
| iii) | | Single Phase Preventor and push buttons. | | | | | | |
| iv) | | Phase indicating lights and indicating lights for ON/TRIP | | | | | | |
| v) | | Status, auxiliary contact for IBMS | | | | | | |
| vi) | | Ammeter and suitable size CT and Voltmetre | | | | | | |
| vii) | | All starters shall have suitable potential free contacts | | | | | | |
| | | The number of HRV Units Panel shall be as detailed below : | | | | | | |
| a) | NDSR | 16 amps TP MCCB with 2 Nos. 0.75 HP (Horse Power) to 2 HP (Horse Power) DOL Starters | 14 | Set | | | | |
| 17 | NDSR | Condenser water piping : | | | | | | |
| | | Supply, installation, testing and commissioning of "C" class mild steel Condenser water piping with all necessary fittings like bends, tees, reducers, flanges, supports etc complete as per manufacturer's specifications & as directed by Engineer-in-charge. of below sizes : | | | | | | |
| a) | NDSR | 200 mm dia. | 170 | Rmt | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| b) | NDSR | 150 mm dia. | 40 | Rmt | | | | |
| c) | NDSR | 50 mm dia | 20 | Rmt | | | | |
| | | | | | | | | |
| 18 | NDSR | Condenser Circuit Valves : | | | | | | |
| | | | | | | | | |
| | | Supply, installation, testing and commissioning of following type of valves for the condenser water circuit complete with all fittings etc. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | Butterfly Valves (Cast Iron Body with Black Nitrile Rubber seat) | | | | | | |
| | NDSR | 200 mm dia | 15 | Nos. | | | | |
| | NDSR | 150 mm dia | 2 | Nos. | | | | |
| | NDSR | 50 mm dia. | 4 | Nos. | | | | |
| b) | NDSR | Balancing Valve (Cast Iron Body) | | | | | | |
| | NDSR | 200 mm dia | 2 | Nos. | | | | |
| c) | NDSR | Check Valve (Cast Iron Body) | | | | | | |
| | NDSR | 200 mm dia. | 2 | Nos. | | | | |

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| | | | | | In Figures | In Words | In Figures | In Words |
| d) | NDSR | Flexible Pipe Connection at pumps suction and discharge (Material of Construction-Neoprene Rubber) | | | | | | |
| | NDSR | 200 mm dia | 8 | Nos. | | | | |
| e) | NDSR | Water Flow Switch | 2 | Nos. | | | | |
| f) | NDSR | Dirt separator (Material of Construction- Mild Steel) | | | | | | |
| | NDSR | It will be on pump suction header line or a suitable location and 200 mm dia. The separator should be complete with anti rust coating, service valve, nrv, butterfly valve connection flange, connection for make up water inlet, flanges, drain valve etc. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 1 | No. | | | | |
| g) | NDSR | Motorised Butterfly valves Supply, installation, testing and commissioning of following Motorised Butterfly Valve with actuator/linkage/accessories etc. (2 -way on/off type with status feedback) as per the manufacturer's specifications & as directed by Engineer-in-charge. 200 mm dia. | 4 | Nos. | | | | |
| | | | | | | | | |
| 19 | NDSR | Supply, installation, testing and commissioning of following Thermometers and pressure gauge as per drawings and specifications for the condenser water circuit complete with syphon and fittings. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | Pressure gauge | 8 | Nos. | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| b) | NDSR | Thermometer | 4 | Nos. | | | | |
| 20 | NDSR | Chilled Water Piping : | | | | | | |
| | | Supply, installation, testing and commissioning of "C" class mild steel Chilled water piping with all necessary fittings like flanges supports, bends, tees, reducers, sockets & TF Quality expanded polystyrene (thermocole) insulation of 20 kg/cum density & 28 gauge Al. cladding as per the thickness and densities as mentioned in the drawings and as per specifications & as per directions of Engineer-in-charge. Pipe Dia. 10 - 40 mm 50-100 mm Above 100 mm Thickness of insulation 25 mm 50 mm 75 mm | | | | | | |
| a) | NDSR | 125 mm dia. | 140 | Rmt | | | | |
| b) | NDSR | 100 mm dia. | 100 | Rmt | | | | |
| c) | NDSR | 80 mm dia | 60 | Rmt | | | | |
| d) | NDSR | 65 mm dia. | 70 | Rmt | | | | |
| e) | NDSR | 50 mm dia. | 165 | Rmt | | | | |
| f) | NDSR | 40 mm dia. | 50 | Rmt | | | | |
| g) | NDSR | 32 mm dia. | 45 | Rmt | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| h) | NDSR | 25 mm dia. | 20 | Rmt | | | | |
| l) | NDSR | 20 mm dia. | 20 | Rmt | | | | |
| | | | | | | | | |
| 21 | NDSR | Chilled Water Circuit Valves : | | | | | | |
| | | Supply, installation, testing and commissioning of following type of valves for the chilled/hot water circuit with all fittings and EPS insulations and 28 gauge Al. cladding. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | | Butterfly Valves (Cast Iron Body with Black Nitrile Rubber seat) | | | | | | |
| | NDSR | 125 mm dia | 19 | Nos. | | | | |
| | NDSR | 100 mm dia | 2 | Nos. | | | | |
| | NDSR | 80 mm dia. | 12 | Nos. | | | | |
| | NDSR | 65 mm dia. | 6 | Nos. | | | | |
| | NDSR | 50 mm dia. | 12 | Nos. | | | | |
| | | Ball valve (Cast Iron Body with Black Nitrile Rubber seat) | | | | | | |
| | NDSR | 40 mm dia. | 4 | Nos. | | | | |
| | NDSR | 32 mm dia. | 4 | Nos. | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| b) | | 2 way Pressure Independent Balancing cum control Valve in a single body. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. (32mm dia - Brass Body, 40-150mm dia. - Grey Iron Body) | | | | | | |
| | NDSR | 125 mm dia | 3 | Nos. | | | | |
| | NDSR | 100 mm dia | 1 | Nos. | | | | |
| | NDSR | 80 mm dia. | 1 | Nos. | | | | |
| | NDSR | 65 mm dia. | 3 | Nos. | | | | |
| | NDSR | 50 mm dia. | 6 | Nos. | | | | |
| | NDSR | 40 mm dia. | 2 | Nos. | | | | |
| | NDSR | 32 mm dia. | 2 | Nos. | | | | |
| c) | | Check Valve (cast iron body) | | | | | | |
| | NDSR | 80 mm dia | 2 | Nos. | | | | |
| | NDSR | 125 mm dia. | 4 | Nos. | | | | |
| d) | | Y-Strainers (cast iron body) | | | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| | NDSR | 80 mm dia. | 1 | Nos. | | | | |
| | NDSR | 65 mm dia. | 3 | Nos. | | | | |
| | NDSR | 50 mm dia. | 6 | Nos. | | | | |
| | NDSR | 40 mm dia. | 2 | Nos. | | | | |
| | NDSR | 32 mm dia. | 2 | Nos. | | | | |
| e) | | Flexible pipe Connection to be used at pump suction /discharge and chilling machines (Material of construction-Neoprene Rubber) | | | | | | |
| | NDSR | 125 mm dia. | 12 | Nos. | | | | |
| | NDSR | 80 mm dia. | 6 | Nos. | | | | |
| | NDSR | 65 mm dia. | 6 | Nos. | | | | |
| | NDSR | 50 mm dia. | 12 | Nos. | | | | |
| | NDSR | 40 mm dia. | 4 | Nos. | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| | NDSR | 32 mm dia. | 4 | Nos. | | | | |
| f) | NDSR | Water Flow Switch | 2 | Nos. | | | | |
| g) | NDSR | Air & Dirt Separator (Material of Construction- Mild Steel) Supply,installation,testing and commissioning of combined air & Dirt separators on return chilled water line or at a suitable place at the pump suction and of 125 mm dia.size. Separator should be capable of removing all microbubbles and should have a steel tube and copper wire media to carry out its operation.It should be able to remove upto 10 microns of dirt particles. The separator should be complete with high capacity airvent,service valve,check valve,butterfly valve connections for make up water inlet flanges ,drain valve etc.It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 1 | No. | | | | |
| h) | NDSR | Vacuum Degasser (Material of Construction- Mild Steel) Supply,installation,testing and commissioning of vacuum Degasser to be connected as a bypass to the main chilled water pipeline in the chilled water system,the vacuum degasser should be automatic operation and fitted with a high efficiency multistage pumps.The degasser shall degass upto 1000 litres/hour depending upon the requirement as per system working pressure.The Vacuum degasser shall be BMS compatible. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 1 | No. | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| i) | NDSR | Motorised Butterfly valves Supply,installation,testing and commissioning of following Motorised Butterfly Valve with actuator/linkage/accessories etc. (2 -way on/off type with status feedback) as per the manufacturer's specifications & as directed by Engineer-in-charge. 125 mm dia. | 8 | Nos. | | | | |
| 22 | NDSR | Supply,installation,testing and commissioning of following Thermometers and pressure guage for the Chilled/hot water circuit complete with syphon and fittings.It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | Pressure guage | 44 | Nos. | | | | |
| b) | NDSR | Thermometer | 36 | Nos. | | | | |
| 23 | NDSR | Expansion Tank : | | | | | | |
| | | Supply,installation,testing and commissioning of 1000 litres capacity expansion tank fabricated from 3mm MS sheet and having 19 mm thick nitrile rubber foam insulation covered with 28 Ga Aluminium sheet with man hole cover, drain ,overflow,quick fill,water supply connections,valves and complete in all respects as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| | NDSR | 1000mm X 1000mm X 1000 mm | 2 | Nos. | | | | |
| 24 | NDSR | Drain Piping : | | | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| | | Supply,installation,testing and commissioning of "B" class GI drain piping complete with fitting etc & TF Quality expanded polystyrene(thermocol)insulation of 20 kg/cum density & 28 G Aluminium cladding.It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. It should be of following sizes: Pipe Dia. Thickness of insulation 10 - 40 mm 25 mm 50-100 mm 50 mm | | | | | | |
| a) | NDSR | 25 mm dia. | 20 | Rmt | | | | |
| b) | NDSR | 32 mm dia. | 10 | Rmt | | | | |
| c) | NDSR | 40 mm dia. | 130 | Rmt | | | | |
| d) | NDSR | 50 mm dia. | 35 | Rmt | | | | |
| | | | | | | | | |
| 25 | NDSR | Supply,installation,testing and commissioning of Air Vents of 15 mm dia.It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 17 | Nos. | | | | |
| | | | | | | | | |
| 26 | NDSR | Supply,installation,testing and commissioning of 1" dia Ball valves for drain with fittings etc. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 15 | Nos. | | | | |
| | | | | | | | | |
| 27 | NDSR | Pre-insulated Rectangular Ductboard : | | | | | | |
| | | | | | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| 28 | | Supply,installation,testing and commissioning of climaver plus-R pre insulated 25mm Duct Board with Both Side Factory laminated Aluminum Foil for air conditioning ductwork with density of 76 to 80 kg/m3 (approx. 150 kg/m3 at the edge) complete with supports, dampers/splitters/vanes/fasteners/nuts/washers and all ancilliary items. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. External Facing: Aluminium+ reinforced glass fiber mesh (tissue)+ Kraft Internal Facing: Aluminium + Kraft Duct Board Size: 1.19mtr (W) X 3mtr (L) | 1500 | Sqm | | | | |
| 29 | | Supply,installation,testing and commissioning of rectangular Galvanised sheet steel ductwork complete with supports,dampers,splitters,vanes,fatsners,nuts,washers and all ancilliary items as per the drawings and specifications and as directed by engineers in charge for ventilation ductwork. | | | | | | |
| a) | NDSR | 24 Gauge | 450 | Sqm | | | | |
| b) | NDSR | 22 Guage | 1150 | Sqm | | | | |
| c) | NDSR | 20 Guage | 30 | Sqm | | | | |
| | | | | | | | | |
| 30 | NDSR | Duct Accoustic Lining : | | | | | | |
| | | | | | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
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| | | | | | <i>In Figures</i> | <i>In Words</i> | <i>In Figures</i> | <i>In Words</i> |
| | NDSR | Supply,installation,testing and commissioning of 25 mm thick & 32 kg/m3 density fiberglass insulation boards fixed on GI frame & covered with 26 guage perforated Aluminium sheet with nuts,bolts for the accoustic lining of A/C ducts. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 200 | Sqm | | | | |
| | NDSR | Grilles/Diffusers/Louvers/VCDs/FDs : | | | | | | |
| | | | | | | | | |
| 31 | NDSR | Supply,installation,testing and commissioning of Supply air grilles with dampers in extruded Aluminium construction and powder coated finish. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 35 | Sqm | | | | |
| | | | | | | | | |
| 32 | NDSR | Supply,installation,testing and commissioning of Return air grilles without dampers in extruded Aluminium construction and powder coated finish. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 50 | Sqm | | | | |
| | | | | | | | | |
| 33 | NDSR | Supply,installation,testing and commissioning of Supply air Diffusers with dampers in extruded Aluminium construction and powder coated finish. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 5 | Sqm | | | | |
| | | | | | | | | |
| 34 | NDSR | Supply,installation,testing and commissioning of Return/Exht air Diffusers without dampers in extruded Aluminium construction and powder coated finish. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 5 | Sqm | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| 35 | NDSR | Supply,installation,testing and commissioning of MS powder coated grilles with dampers,louvers and filters for Fresh air intake. | 2 | Sqm | | | | |
| 36 | NDSR | Supply,installation,testing and commissioning of MS powder coated Exhaust Grilles/louvers without dampers but with wire mesh jali for exhaust. | 6 | Sqm | | | | |
| 37 | NDSR | Supply,installation,testing and commissioning of GI construction Volume control Dampers lever operated type as per specifications and drawings. | 6 | Sqm | | | | |
| 38 | NDSR | Supply,installation,testing and commissioning of motorised combined smoke and fire dampers complete with control panel interconnecting wiring at locations shown in the drawings and as per specifications. | 13 | Sqm | | | | |
| 39 | NDSR | AHU Room Accoustic Lining | | | | | | |
| | NDSR | Supply,installation,testing and commissioning of accoustic lining on all side walls of each AHU Rooms with fiberglass ,tissue paper and 24 guage perforated aluminium sheet. The Fibreglass insulation shall be 50 mm X 32Kg/m3 of board type and shall be fixed on GI Frame. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 150 | Sqm | | | | |
| 40 | NDSR | Supply,installation,testing and commissioning of of powder coated extruded aluminium air transfer grilles with rear side frame. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 3 | Sqm | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| 41 | NDSR | Supply,installation,testing and commissioning of flexible duct connections constructed of fire resistance flexible double canvas sleeve. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | 5 | Sqm | | | | |
| 42 | NDSR | VFD Supply,Installation,testing and commissioning of the following Variable Frequency Drives for the Air Handling Units and Cooling Towers with communication protocol Bacnet/Modbus for BMS integration as per the manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | 7.5 HP motors | 6 | Nos. | | | | |
| b) | NDSR | 10 HP Motors | 1 | No. | | | | |
| c) | NDSR | 5.0 HP motors | 5 | Nos. | | | | |
| d) | NDSR | 12.5 HP Motors (for Basement ventilation fans normal working) | 4 | Nos. | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| 43 | NDSR | VAV Box Supply,Installation,Testing and commissioning of Variable Air Volume Boxes. VAVs shall be pressure independent type & low velocity type, cooling only. VAV Boxes shall be slow reacting type capable of delivering variable air volume type by the action of opposed blade dampers.These shall be supplied with end flanges for attachment to flanged duct ends and shall have internal accoustic treatment shall be in double skin GSS construction and completely sealed, easily removable. The access shall be provided in the bottom side only. VAV shall be electronically controlled networkable controller type complete with Low leakage damper actuator,microprocessor unit,wall/ceiling mounted temperature sensor with on/off switch control transformer unit handler bracket. VAV Boxes shall also be able to reset any air flow between zero and the max. air quantity that the boxes can handle without changing orifices or other parts. Each VAV Shall be supplied with one operating switch in the related rooms, which shall change the temperature setpoint of VAV including cost of wall switch. | | | | | | |
| | | The quoted price shall be inclusive of the temperature sensor for each VAV unit & associated internal cable required for proper functioning of the VAV Boxes. The temperature sensor and the entire control mechanism shall be fully compatible with IBMS.Data like temperature,setpoint and damper position shall be monitored through IBMS system.The capacities of the units as per manufacturer's specifications & as directed by Engineer-in-charge are as follows | | | | | | |
| a) | NDSR | 0 - 800 CFM | 5 | Nos. | | | | |
| b) | NDSR | 801 - 1350 CFM | 1 | Nos. | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
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| | | | | | <i>In Figures</i> | <i>In Words</i> | <i>In Figures</i> | <i>In Words</i> |
| c) | NDSR | 1351 - 2100 CFM | 1 | Nos. | | | | |
| d) | NDSR | 2101 - 3200 CFM | 2 | Nos. | | | | |
| e) | NDSR | 3201 - 4000 CFM | 1 | Nos. | | | | |
| f) | NDSR | 4001 - 8000 CFM | 1 | Nos. | | | | |
| 44 | | Power Cabling | | | | | | |
| | | | | | | | | |
| | | Supply, installation, testing and commissioning of PVC insulated sheathed 1.1 KV grade armoured Al / Cu Power cables from various panels upto their respective equipment on MS painted perforated trays with appropriate clamps/fixing arrangements. It should be complete as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | 3.5 C X 240 Sqmm Aluminium Cable | 100 | Rmt | | | | |
| b) | NDSR | 3.5 C X 70 Sqmm Aluminium Cable | 100 | Rmt | | | | |
| c) | NDSR | 3 C X 25 Sqmm Aluminium Cable | 100 | Rmt | | | | |
| d) | NDSR | 3 C X 16 Sqmm Aluminium Cable | 100 | Rmt | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|---------------|---------------|-----------------|-----------------|
| | | | | | In Figures | In Words | In Figures | In Words |
| e) | NDSR | 3 C X 10 Sqmm Aluminium Cable | 200 | Rmt | | | | |
| f) | NDSR | 3 C X 6 Sqmm Copper Cable | 100 | Rmt | | | | |
| g) | NDSR | 3 C X 4 Sqmm Copper Cable | 100 | Rmt | | | | |
| | | | | | | | | |
| 45 | NDSR | Control Cabling : | | | | | | |
| | | | | | | | | |
| 1 | | Supply,installation,testing and commissioning of PVC insulated sheathed 1.1 KV grade armoured Copper control cables for various equipment through walls/ceilings with appropriate clamps / fixing arrangements and complete with termination as per manufacturer's specifications & as directed by Engineer-in-charge. | | | | | | |
| a) | NDSR | 2C X 1.5 sqmm | 200 | Rmt | | | | |
| | | | | | | | | |
| 2 | | Supply,installation,testing and commissioning of perforated prepainted MS cable trays with perforations not more than 17.5% in convenient sections joined with connectors, suspended from the ceiling with MS suspenders including bolts & nuts, painting suspenders etc.as required. | | | | | | |
| a) | 4.1.2 | 150 mm wide, 50 mm deep & 1.6 mm thick | 75 | Rmt | | | | |

| Sl. No. | DSR 2012 Item No. / NDSR | Description | Qty | Unit | Rate (In Rs.) | Rate (In Rs.) | Amount (In Rs.) | Amount (In Rs.) |
|---------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------------------|-----------------|-------------------|-----------------|
| | | | | | <i>In Figures</i> | <i>In Words</i> | <i>In Figures</i> | <i>In Words</i> |
| b) | 4.1.8 | 300 mm wide, 62.5 mm deep & 2 mm thick | 250 | Rmt | | | | |
| c) | 4.1.10 | 450mm wide, 62.5 mm deep & 2 mm thick | 200 | Rmt | | | | |
| 46 | | Earthing : | | | | | | |
| a) | 5.15 | Providing & Fixing 25 mm X 5 mm GI strip on surface or in recess for connections etc. as required. | 100 | Rmt | | | | |
| b) | 5.16 | Providing & fixing 6 SWG GI wire on surface or in recess for loop earthing as required | 250 | Rmt | | | | |
| | | Note: The HVAC contractor shall provide fire shunt relay contact in main HVAC panel and all AHU panels/DBs along with auto / manual mode selector switch in the outgoing feeder for AHU Fan, Ventilation & Pressurization fan etc. to take fire input signal (Potential Free Contact) to trip /switch off them. Cost shall be included in the panel price quoted by him. | | | | | | |
| Total HVAC Cost (In Rs.) | | | | | | | | |