Corrigendum: Date: 28-11-2025

Domestic Tender: Supply, Installation, testing and commissioning of MNCF semi cleanroom HVAC

Tender date: 17th November 2025

Tender number: CeNSE/MNCF/2025/01

CORRIGENDUM- dated 28.11.2025.

Sl. No	Section	As existing in the tender	To be Read as
1	Section 2 - Eligibility Criteria	11. The bidder must have independently executed at least one turnkey project for a semiconductor facility in the last five (3) years, covering the design, supply, installation, testing, and commissioning of the following utilities: • Chiller plant • Air Handling Units (AHUs) • Process cooling water (PCW) lines • Compressed dry air (CDA) lines	11. The bidder must have independently executed at least one turnkey project for a semiconductor facility in the last three (3) years, covering the design, supply, installation, testing, and commissioning of the following utilities: • Chiller plant • Air Handling Units (AHUs) • Process cooling water (PCW) lines • Compressed dry air (CDA) lines
2	Section 2 - Eligibility Criteria	12. The bidder must have independently executed at least one Trunkey cleanroom project for Transmission Electron Microscope (TEM) facility in last five (3) years with temperature variation at 22±0.1 °C over the duration of 4 hours and RH 50±1% over the duration of 4 hours.	12. The bidder must have independently executed at least one Trunkey cleanroom project for Transmission Electron Microscope (TEM) facility in last three (3) years with temperature variation at 22±0.1 °C over the duration of 4 hours and RH 50±1% over the duration of 4 hours..
3	Section 5 – Technical Specifications	2 Chiller Unit-Supplying, installing, testing and commissioning of AHRI Certified Air Cooled SCROLL WATER CHILLING UNITS of 40 TR capacity(actual) complete	**2 Chiller Unit-**Supplying, installing, testing and commissioning of AHRI Certified Air Cooled SCROLL WATER CHILLING UNITS of 40 TR capacity(actual) complete with twin screw design compressor with star- delta, squirrel

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		with twin screw design compressor with star- delta, squirrel cage induction motor, starter panel machine mounted, water cooled condenser, insulated chiller, flow switch at chiller and condenser, neoprene pads, integral refrigerant piping and wiring, BMS interface unit Mod bus, counter flanges along with flanged connection for condenser and cooler water in/out connections, complete charge of refrigerant and oil, accessories as required and called for, automatic and safety controls mounted in central micro- processor based console panel and all mounted on a steel frame complete as per specifications. Motor shall be suitable for 415±10% 50 cycles. 3phase AC supply and motor cable terminal box shall be suitable to connect copper Cabling. Refrigerant used shall be Ozone friendly HFC 134a/R410a as detailed in specifications. First chiller shall be factory tested at design conditions at 100%, 75%, 50% and 25% load.	cage induction motor, starter panel machine mounted, water cooled condenser, insulated chiller, flow switch at chiller and condenser, neoprene pads, integral refrigerant piping and wiring, BMS interface unit Mod bus, counter flanges along with flanged connection for condenser and cooler water in/out connections, complete charge of refrigerant and oil, accessories as required and called for, automatic and safety controls mounted in central micro-processor based console panel and all mounted on a steel frame complete as per specifications. Motor shall be suitable for 415±10% 50 cycles. 3phase AC supply and motor cable terminal box shall be suitable to connect copper Cabling. Refrigerant used shall be Ozone friendly HFC 134a/R410a as detailed in specifications. First chiller shall be factory tested at design conditions at 100%, 75%, 50% and 25% load. he chiller unit price should also include ne cost of the platform below. **latform** he work includes the design, fabrication, upply, installation, and commissioning of hot-dip galvanized structural steel latform for hosting air-cooled/water-ooled chillers, pumps, and associated quipment. The platform shall be designed s per IS 800, IS 875, IS 1893, and relevant BC guidelines to safely support all static, ynamic, and wind loads with a minimum eck load capacity of 500 kg/m^2 and eflection not exceeding L/300. The tructure shall consist of ISMB/ISMC/box-ection members with adequate bracing, –8 mm anti-skid chequered plate decking, andrails with toe guards, and ladder ccess as per IS standards. All joints shall ollow IS 816/IS 9595 welding standards nd IS 1367 high-tensile bolting equirements. The platform shall ncorporate neoprene or spring anti-

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			ibration mounts with ≥90% isolation fficiency for chillers. Complete ocumentation including structural design alculations vetted by a chartered tructural engineer, fabrication drawings, naterial test certificates, vibration solation details, and as-built drawings hall be submitted. The installation must nclude leveling, anchoring to RCC oundation with approved anchor bolts, afety signage, and load-capacity marking, ollowed by inspection and load testing. A ninimum 1-year warranty on structural ntegrity and galvanization is required.
4	Section 5 – Technical Specifications	4. Chilled water pipeline Unit: Lot	4. Changed from lot to required BOQ. Please find the updated BOQ below
5.	Section 5 – Technical Specifications	10. Electrical Cabling and Accessories (Cables, wire, conduit, Earthing, Switch boards, Switches/Sockets etc) Cables	10. Electrical Cabling and Accessories (Cables, wire, conduit, Earthing, Switch boards, Switches/Sockets etc) Cables: BOQ Added Please see below
5.	Section 5 – Technical Specifications	**G.** i. Scaffolding Charges for duct erection Nos 1 ii Duct Supporting system Kgs 300 iii Wall Openings for Duct entry Lot 1 iv Engineering, Design and drawings L ot 1 v Documentation Lot 1 vi Commissioning and validation Lot 1 vii Packing forwarding and Transportation Lot 1 viii Housekeeping Lot 1	**G.** i. Scaffolding Charges for duct erection Nos 1 ii. Duct Supporting system Kgs 300 iii. Wall Openings for Duct entry Lot 1 iv. Engineering, Design and drawings Lot 1 v. Documentation Lot 1 vi. Commissioning and validation Lot 1 vii. Packing forwarding and Transportation Lot 1 viii. Housekeeping Lot 1 ix. Dismantling and refixing the false ceiling x. Dismantling of the existing duct xi. Dismantling and shifting of current AHU xii. Dismantling and shifting of one existing chiller

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4. Chilled water pipeline (Revised)

Sl.No.	Description	Unit	BOQ
	Pipe		
1	DN 100, SS304,Seamless SCH 10 Pipe	Rmt	174
2	DN 80 , SS304,Seamless SCH 10 Pipe	Rmt	36
3	DN 50, SS304,Seamless SCH 10 Pipe	Rmt	36
Fittings			
	Elbows		
1	DN 100, SS304,Seamless SCH 10 Bend	Nos.	34
2	DN 80, SS304,Seamless SCH 10 Bend	Nos.	15
3	DN 50, SS304,Seamless SCH 10 Bend	Nos.	12
Tee - Connections			
2	DN 100, SS304,Seamless Sch 10 Equal Tee	Nos.	6
3	DN 80, SS304,Seamless Sch 10 Equal Tee	Nos.	5
5	DN 100-DN80, SS304,Seamless Sch 10 Un-Equal Tee	Nos.	5
6	DN 80-DN50, SS304,Seamless Sch 10 Un-Equal Tee	Nos.	2
7	DN 100-DN50, SS304,Seamless Sch 10 Un-Equal Tee		1
Reducers			
1	DN 40 to DN 100, SS304,Seamless Sch 10 Reducer	Nos.	3
2	DN 65 to DN 100, SS304,Seamless Sch 10 Reducer	Nos.	8
3	DN 80 to DN 50, SS304,Seamless Sch 10 Reducer	Nos.	3
4	DN 80 to DN 100, SS304,Seamless Sch 10 Reducer	Nos.	3
	Collar		
1	DN 80, SS304,Seamless Sch 10 Collar	Nos.	1
2	DN 50, SS304,Seamless Sch 10 Collar	Nos.	1
Flanges			
1	SS304 DN 100 Slipon flanges PN 16	Nos.	75
2	SS304 DN 80 Slipon flanges PN 16	Nos.	30
3	SS304 DN 65 Slipon flanges PN16	Nos.	8
4	SS304 DN 40 Slipon flanges PN16	Nos.	3
5	SS304 DN 50 Slipon flanges PN16	Nos.	22
6	SS304 DN 100 Slipon Blind flanges PN 16 Rated	Nos.	5
7	SS304 DN 80 Slipon Blind flanges PN 16 Rated	Nos.	1
8	SS304 DN 50 Slipon Blind flanges PN 16 Rated	Nos.	1
Valves			
1	SS304, DN 100 Butterfly valves PN 16 Rated, Lever type	Nos.	**14**

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2	SS304, DN 80 Butterfly valves PN 16 Rated, Lever type	Nos.	10
3	SS304, DN 100 Balancing valves PN 16 Rated, Rotaating Wheel type	Nos.	3
4	SS304, DN 50 Butterfly valves PN 16 Rated, Lever type	Nos.	6
5	SS304 DN 100 SS304 Flexible	Nos.	10
6	SS304 DN 100 Dual Plate check valve	Nos.	3
7	SS304 DN 100 Y-Type Strainers with flanged ends on both sides PN 10rated for pumps and chillers	Nos.	5
8	SS304 DN 100 3 Way Modulating Valve	Nos.	3
9	SS304 DN 100 2 Way Pressure relief By pass valve	Nos.	3
Misc valves and Fittings			
1	Pressure Gauge(0-6 Bar)	Nos	14
	Temperature guage (0-50°C)	Nos	14
2	Temp gauge(0-50°C),probe length 150mm with Thermowell	Nos	22
3	SS304, 1/2" Siphon Tube for Pressure Gauge	Nos	14
4	SS304, 1/2" Brass Valves for drain and Pressure gauge	Nos	30
5	1/2" SS304 Auto Air Vent valves	Nos	5
6	SS304, 1/2" Coupling	Nos	54
7	DN 80 Asbestos gasket	Nos	22
8	DN 65 Asbestos gasket	Nos	8
9	DN 50 Asbestos gasket	Nos	10
10	DN 40 Asbestos gasket	Nos	3
11	DN100 Asbestos gasket	Nos	100
12	SS304 1/2"Thermowell NIPPLE 300 mm length	Nos	27
13	Temperature Sensor	Nos	9
14	Pressure Transducer	Nos	8
15	Auto drain valve	Nos	3

10. Electrical Cabling and Accessories (Cables, wire, conduit, Earthing, Switch boards, Switches/Sockets etc)

Cables (Added)

1	Single Core XLPE Copper Armoured cable 120 Sqmm Cable	Rmt	540
2	5 Core XLPE Copper Armoured cable 35 Sqmm Cable Chillers	Rmt	132
3	5 Core XLPE Copper Armoured cable 35 Sqmm Cable AHU 1 Heater	Rmt	30
4	5 Core XLPE Copper Armoured cable 25 Sqmm Cable AHU 2 Heater	Rmt	54
5	5 Core XLPE Copper Armoured cable 10 Sqmm Cable AHU 1 Blower(2 Blowers)	Rmt	60
6	5 Core XLPE Copper Armoured cable 6 Sqmm Cable AHU 1 Blower(1 Blowers)	Rmt	54
7	5 Core XLPE Copper Armoured cable 6 Sqmm Cable AHU 1 Humidifier	Rmt	30
8	5 Core XLPE Copper Armoured cable 6 Sqmm Cable AHU 2 Humidifier	Rmt	54

9	3 Core XLPE sheilded Cable 1.5 mm2 for Modulating Valve, Temp Sensor,Pressure Transducer, Flow Switch , Temp & RH sensor,	Rmt	1800

11. Approved makes.

Sr. No.	Description	Makes
1	Air handling unit (AHU)	VTS/ /System air
2	Motors for AHU	Crompton/ Greaves/ ABB/ Siemens/ Schnider
3	Chillers	Daikin, Trane, Carrier.
4	Starter	Siemens/ ABB/ L&T/ Schneider
5	Fire dampers	Air Master/ Caryaire/ Ajanta/ System Air/ Cosmos
6	Pan type humidifier	Rapid cool/ nordamann/ walter meier/ appidi
7	Ducting – GI Sheets	SAIL/TATA/Jindal
8	Duct insulation	Armaflex/k flex/supreme/aeroflex/ trocellene
9	Butterfly & ball valves	Regin/Siemens/ L&T/GEC/BDK/ZOLOTO
10	3-way,mixing valve	Honeywell/Siemens/Johnson/Belimo/Regin
11	Balancing valve	L&T/Advance/Bell & Gossett/Tour & Anderson
12	Y-Strainer	Sant /DS Engg/Lehry/ASIAN/ZOLOTO
13	Pumps	Johnson/ Grundfos /Armstrong/ wilo ,Blue Star
14	Pipe SS	TATA/Jindal
15	Pressure and Temperature gauges	WIKA/FORBE MARSHALL/HGURU/WAREE/BAUMER
16	BMS PLC and controls	Regin controls

Updated Technical specification for compliance statement

	Technical Specifications		
Sl.NO	**Description**	**Unit**	**Qty**
A	**HVAC**		
1.0	**Air Handling Unit**	**Nos**	**2**
	AIR HANDLING UNIT (AHU) (Quantity–2No.s) Scope of work included design, supply, installation and commissioning of dedicated AHU's for Micro and Nano Characterization facility with below specifications, TEMPERATURE: - 22±2℃ RELATIVE HUMIDITY: - 50±5% Noise levels in room: 55±2 dB		
1.1	1) AHU1 a. Total Supply air=8.796M3/sec b. Return air=7.677m3/sec c. Fresh air=1.119m3/sec d. Total fan Static=150mmWG e. 8 Row Cooling Coil Capacity=30Tr f. Heater capacity=76.10Kw g. Number of blowers: 2	Nos.	1

1.2	1) AHU2 a. Total Supply air=5.349M3/sec b. Return air=4.394m3/sec c. Fresh air=0.955m3/sec d. Total fan Static=150mmWG e. 8 Row Cooling Coil Capacity=20Tr f. Heater capacity=46.28Kw g. Number of blowers: 2	Nos.	1
	AHU CASING 1) AHU shall be of modular construction and of draw through type comprising of pre filter section, fine filter section, cooling coil section and fan section. The framework shall be of extruded Al sections joined by molded high tensile reinforced plastic and shall be assembled to provide a sturdy, strong and self-supporting framework for various sections. Each section shall be complete with its own independent base and mounted on 14G galvanised sheet steel and aluminum die cast channels. Zinc deposition on the GI sheets shall be minimum 120gsm. 2) AHU shall be of double skin, with 45+5 mm thick PUF insulation sand-witched panel, 0.8 mm thick percolated GSS outer skin and 0.8 mm thick plain GSS sheet inside. The density of PUF insulation shall be minimum 38±1Kg/m3. 3) The framework for each section shall be joined together with soft rubber gasket in between to make joints airtight. 4) Suitable air tight access doors with Aluminum die cast heavy duty hinges and locks shall be provided for various sections. The casing shall incorporate thermal break profile and all other necessary design Features to ensure that condensation does not occur during all seasons. 5) The AHUs shall be having Sound attenuators at Suction and delivery of AHUs to reduce the sound to 50±2dB at point of Use		
	CIRCULATION FAN 1) Fan Type: Direct driven, Plug type high efficiency centrifugal fan 2) Desired noise level should be reduced to 70±5 dB or less by suitable sound attenuators on supply and return air path. 3) Required Total static pressure: 200±2mmWG. 4) Fan should have backward curved blades to improve efficiency. 5) Fan blades should be made of Aluminium alloy for stability. 6) Motor and fan assembly should be floor mounted and to be placed on extruded aluminium sections and on the vibration isolators to reduce amplitude to less than 25-50 microns. 7) Motor Requirement: Adequately sized, TEFC Squirrel cage induction motor with VFD drive and suitable for415V ± 10%, 3 phase, 50 Hz± 5% AC power supply. 8) The motor should be of high efficiency IE3 class as per IS12615–2011-NonFLP. 9) Motor should be compatible for VFD operation. 10) Flexible connection should be fabricated of neoprene coated flame proof fabric attached by screws or bolts at 6” interval should be provided. Flexible connection should be provided with the sufficient material width to prevent interference with the free operation of the fan vibration system. 11) Fan should be factory statically and dynamically balanced as required to achieve field balance levels. 12) Epoxy based coating shall be provided on all the surfaces of ferrous fan housing. 13) Vibration measurement should be made in three orthogonal areas at each bearing location. Where equipment configuration precludes measurement at bearing; measurement should bemade on adjacent routine structure. 14) Peak to peak displacement at the rotational frequency should be measured. Governing displacement should be at the rotational frequency of fan. Controlling displacements at frequencies other that the rotational frequencies are not in compliance with the balance requirements.		

	COOLING COILS 1) Cooling medium requirement :Chilled water at a temperature of 8±1 Deg C 2) The velocity across the cooling coils should not exceed 2.25 m/s. accordingly, cooling coil area should be selected. 3) Coils should be of seamless copper tubes with Al fins, 8 rows deep, with 12-13 fins/inch, with copper header, flange connection and SS 304 enclosure. 4) Copper tubes should be 25±5% SWG and hydrostatically tested for 21kgpersq.cm. 5) Cooling coil condensate tray should be of 14±5% SWG SS304 material. 6) Vertically stacked Cooling coils should have SS 304 drip trays between the SS pipe drain connection left at the drain tray and finally should be connected to drain point with suitable trap to check ingress of outside air. 7) Fouling factor requirement:0.0002hr.m2DegC/Kcal. 8) Accessories requirement: Frame, support, inlet and outlet header, vent connection and drain connection with valves, pressure gauges with valves at inlet and outlet and their associated fittings.		
	HEATERS The AHUs should have Electrical heaters section to maintain the cleanroom temperature in the winter season. 1) Strip/Tubular heaters of sufficient capacity should be selected in each AHU to maintain the area temperature. 2) The heaters should be complete with mounting frame, Thermostat, humidistat, air stat in redundant arrangement along with all control devices which will be controlled by thyristors.		
	FILTERS There should be 3 stages of filtration in the AHU .Specifications: • Filters face velocity should not exceed2.25m/sec. • Filter mounting frame should be made out of extruded aluminum material. The frame should be strong enough to withstand the weight of two persons for climbing the frame during the filters replacement. • Between filter sections, minimum spacing of 600 mm should be maintained. • Filters should have a quick release mechanism and sealing gasket. • All the filters should have Al frame(flange type)with a module size of 600mm x 600mm (preferably): 1) 1st Stage Pre-filters should be of G4 grade as per EN 779, non-woven synthetic material sandwiched between HDPE mesh on both sides with minimum thickness of 150 mm flange type with an initial pressure drop of 5 mm WG or less, suitable for cleaning with dry air or water jet. 2) 2nd stage bag filters should be of F7 grade as per EN779, non-woven synthetic material sandwiched between HDPE mesh on both sides and suitable for minimum thickness of 300mm initial pressure drop of 6-8 mm WG or less, suitable for cleaning with dry air or water jet. 3) 3rd HEPA Filters should be of H14 grade, suitable for AHU capacity. Filter media should be of micro fiber glass, Efficiency required: 99.995%down to 0.3 micron. The filters should have Anodized Al frame with a module size of 600mm x 600mm (preferably). The filter media should be epoxy/PU bonded to the filter casing, Pressure drop<15mmofWG.Accessories Requirement: Frame ,supports, sealing gasket (Neoprene gasket		

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	Platform The work includes the design, fabrication, supply, installation, and commissioning of a hot-dip galvanized structural steel platform for hosting AHU, The platform shall be designed as per IS 800, IS 875, IS 1893, and relevant NBC guidelines to safely support all static, dynamic, and wind loads with a minimum deck load capacity of 500 kg/m^2 and deflection not exceeding L/300. The structure shall consist of ISMB/ISMC/box-section members with adequate bracing, 6–8 mm anti-skid chequered plate decking, handrails with toe guards, and ladder access as per IS standards. All joints shall follow IS 816/IS 9595 welding standards and IS 1367 high-tensile bolting requirements. The platform shall incorporate neoprene or spring anti-vibration mounts with ≥90% isolation efficiency for chillers. Complete documentation including structural design calculations vetted by a chartered structural engineer, fabrication drawings, material test certificates, vibration isolation details, and as-built drawings shall be submitted. The installation must include leveling, anchoring to RCC foundation with approved anchor bolts, safety signage, and load-capacity marking, followed by inspection and load testing. A minimum 1-year warranty on structural integrity and galvanizing is required.		
	Humidifier: Pan Type Humidifier Construction : Tank made from 1.2mm or 2mm thick Stainless Steel 304 grade sheet, In welded construction with steam Inlet / Outlet / Drain / Overflow Nozzle, Top Cover Open able with S.S Bolts Heating Element : Electrical Resistance Immersion Type, S.S tube Nickel plated Rating : 4KW x 3 Nos = 12KWWith 0.5 KW Additional Heater with Thermostat To maintain 75°C Temperature inside tank ElectricalPanel:Madefrom18GaugeCRCSheet(Epoxy Painted), Main Incomer of suitable capacity (L&T make) Outgoing Contactor (L&T / ABB / Schneider make), Fault Indicating & R.Y.B phase Indicating lights (Esbee make),On / Off switch with light (Esbee make) Duly Factory wired. Controls: Level Switch – RC-61L for Low Level Cut out (with Nylon Ball)Float valve with S.S Ball at Inlet connection. Thermostat for additional heater (Range = 5 Deg C to 75 Deg C) Master Thermostat for total load (Range = 50 Deg C to 120 Deg C) Sight Glass provided to check water, Overflow valve. Insulation: 25mm thick fiber glass wool and cladded with 22Gauge G.I sheet.		
1.3	Humidifier5.5Kg/Hr	Nos.	1
1.4	Humidifier2.1Kg/Hr	Nos.	1
2.0	Chiller Unit		
2.1	Supplying, installing, testing and commissioning of AHRI Certified Air Cooled SCROLL WATER CHILLING UNITS of 40 TR capacity(actual) complete with twin screw design compressor with star-delta, squirrel cage induction motor, starter panel machine mounted, water cooled condenser, insulated chiller, flow switch at chiller and condenser, neoprene pads, integral refrigerant piping and wiring, BMS interface unit Mod bus, counter flanges along with flanged connection for condenser and cooler water in/out connections, complete charge of refrigerant and oil, accessories as required and called for, automatic and safety controls mounted in central micro-processor based console panel and all mounted on a steel frame complete as per specifications. Motor shall be suitable for 415±10% 50 cycles. 3phase AC supply and motor cable terminal box shall be suitable to connect copper Cabling. Refrigerant used shall be Ozone friendly HFC 134a/R410a as detailed in specifications. First chiller shall be factory tested at design conditions at 100%, 75%, 50% and 25% load.	Nos.	2

2.2	Platform The work includes the design, fabrication, supply, installation, and commissioning of a hot-dip galvanized structural steel platform for hosting air-cooled/water-cooled chillers, pumps, and associated equipment. The platform shall be designed as per IS 800, IS 875, IS 1893, and relevant NBC guidelines to safely support all static, dynamic, and wind loads with a minimum deck load capacity of 500 kg/m^2 and deflection not exceeding L/300. The structure shall consist of ISMB/ISMC/box-section members with adequate bracing, 6–8 mm anti-skid chequered plate decking, handrails with toe guards, and ladder access as per IS standards. All joints shall follow IS 816/IS 9595 welding standards and IS 1367 high-tensile bolting requirements. The platform shall incorporate neoprene or spring anti-vibration mounts with ≥90% isolation efficiency for chillers. Complete documentation including structural design calculations vetted by a chartered structural engineer, fabrication drawings, material test certificates, vibration isolation details, and as-built drawings shall be submitted. The installation must include leveling, anchoring to RCC foundation with approved anchor bolts, safety signage, and load-capacity marking, followed by inspection and load testing. A minimum 1-year warranty on structural integrity and galvanizing is required.	Nos.	2
3	Chilled water circulation Pumps		
3.1	Chiller Water Pumps 1) Quantity–2Nos.(1W+1S) 2) Pump flow rate:600LPM@3Kg/cm2 3) Pump type: Horizontal centrifugal pumps. 4) Heavy duty for continuous operation 5) MOC: SS304 6) Impellor: SS304 7) Motor: Adequately sized TEFC, squirrel cage induction motor having high efficiency ratingIE3 Class and suitable for 415V + 10%, 3 Phase, 50 Hz + 5%. 8) Pump shall be horizontal, closed coupled, single stage, centrifugal, end suction with back pull-out design. Hence, the rotating unit can be removed and serviced without disconnecting the suction and discharge pipe. 9) The noise level shall not exceed 75dbA at 1m from the source. 10) Accessories: Pressure gauges at suction and discharge, isolating butterfly valves at suction and discharge, check valve, strainer, integral piping, base frame, foundation bolts, nuts, vibration isolator/rubber pads etc. Pumps should be Horizontal end suction Type.	Nos.	2
4	Chilled water pipeline		

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	Piping 1) All the pipes shall be SS304 SCH10, PN10rated, all pipelines should be joined with TIG welded. 2) Square cut plain ends should be welded for pipes up to and including100MMDia. 3) All pipes 100MM Dia. Or larger should be beveled by 35DEG.before welding. Pipe Supports/hangers 1) Pipe supports should be provided and installed for all piping wherever indicated, required or otherwise specified. Wherever necessary, additional hangers and supports shall be provided to prevent vibration or excessive deflection of piping and tubing. 2) All vertical pipe support should be made of 12mm M.S. rods and the horizontal support should be of M.S. angles of 50x50x4 mm thick. 3) Pipe supports should be adjustable for height and prime coated with rust preventive paint & finish coated with black paint using approved grade of paint. Joining 1) All pipe lines should be joined with TIG welded. 2) All pipes 125 MM Dia. or larger should be beveled by 35 DEG. before welding. 1) The body of the check valves should be made from SS304 PN16 rated, single piece casting in cylindrical shape 2) There should be two plates, which should be hinged in the centre of the circle. 3) Both plates should have springs attached to them for assisting in closing action of the valve. 4) There should be properly/designed metal to metal seal between the plates and the outer body, to ensure non leaking sealing. 5) The valve design should confirm to API 594 or equivalent specifications. Strainers 1) Strainers should either be pot type or 'Y' type SS304 body PN 16 rated, tested up to pressure applicable for the valves as per design. 2) The strainers should have a perforated bronze sheet screen with 3 mm perforation and with a permanent magnet, to catch iron fillings. Al Cladding Insulation All the chilled water lines shall be Chilled water line shall be insulated with Puff 50mm thick insulation and cladded with Aluminum sheet.		
	TESTING 1) In general, tests should be applied to piping before connection of equipment and appliances. In no case should the piping, equipment or appliances be subjected to pressures exceeding their test ratings 2) The tests should be completed and approved before any insulation is applied. Testing of segments of pipe work should be permitted, provided all open ends are first closed, by blank offs or flanges. 3) After tests have been completed the system should be drained and flushed 3 to 4 times and cleaned of all dust and foreign matter. All strainers, valves and fittings should be cleaned of all dirt, fillings and debris. 4) All piping should be tested to hydraulic test pressure of at least one and half times the maximum operating pressure but not less than10kg/cm2 for a period of not less than12hours.All leaks and defects in the joints revealed during the testing should be rectified to the satisfaction.		
4.1	DN 100, SS304,Seamless SCH 10 Pipe	Rmt	174
4.2	DN 80 , SS304,Seamless SCH 10 Pipe	Rmt	36
4.3	DN 50, SS304,Seamless SCH 10 Pipe	Rmt	36
4.4	DN 100, SS304,Seamless SCH 10 Bend	Nos.	34
4.5	DN 80, SS304,Seamless SCH 10 Bend	Nos.	15
4.6	DN 50, SS304,Seamless SCH 10 Bend	Nos.	12
4.7	DN 100, SS304,Seamless Sch 10 Equal Tee	Nos.	6

4.8	DN 80, SS304,Seamless Sch 10 Equal Tee	Nos.	5
4.9	DN 100-DN80, SS304,Seamless Sch 10 Un-Equal Tee	Nos.	5
4.10	DN 80-DN50, SS304,Seamless Sch 10 Un-Equal Tee	Nos.	2
4.11	DN 100-DN50, SS304,Seamless Sch 10 Un-Equal Tee	Nos.	1
4.12	DN 40 to DN 100, SS304,Seamless Sch 10 Reducer	Nos.	3
4.13	DN 65 to DN 100, SS304,Seamless Sch 10 Reducer	Nos.	8
4.14	DN 80 to DN 50, SS304,Seamless Sch 10 Reducer	Nos.	3
4.15	DN 80 to DN 100, SS304,Seamless Sch 10 Reducer	Nos.	3
4.16	DN 80, SS304,Seamless Sch 10 Collar	Nos.	1
4.17	DN 50, SS304,Seamless Sch 10 Collar	Nos.	1
4.18	SS304 DN 100 Slipon flanges PN 16	Nos.	75
4.19	SS304 DN 80 Slipon flanges PN 16	Nos.	30
4.20	SS304 DN 65 Slipon flanges PN16	Nos.	8
4.21	SS304 DN 40 Slipon flanges PN16	Nos.	3
4.22	SS304 DN 50 Slipon flanges PN16	Nos.	22
4.23	SS304 DN 100 Slipon Blind flanges PN 16 Rated	Nos.	5
4.24	SS304 DN 80 Slipon Blind flanges PN 16 Rated	Nos.	1
4.25	SS304 DN 50 Slipon Blind flanges PN 16 Rated	Nos.	1
4.26	SS304, DN 100 Butterfly valves PN 16 Rated, Lever type	Nos.	14
4.27	SS304, DN 80 Butterfly valves PN 16 Rated, Lever type	Nos.	10
4.28	SS304, DN 100 Balancing valves PN 16 Rated, Rotaating Wheel type	Nos.	3
4.29	SS304, DN 50 Butterfly valves PN 16 Rated, Lever type	Nos.	6
4.30	SS304 DN 100 SS304 Flexible	Nos.	10
4.31	SS304 DN 100 Dual Plate check valve	Nos.	3
4.32	SS304 DN 100 Y-Type Strainers with flanged ends on both sides PN 10rated for pumps and chillers	Nos.	5
4.33	SS304 DN 100 3 Way Modulating Valve	Nos.	3
4.34	SS304 DN 100 2 Way Pressure relief By pass valve	Nos.	3
4.35	Pressure Gauge(0-6 Bar)	Nos	14
4.36	Temperature guage (0-50°C)	Nos	14
4.37	Temp gauge(0-50°C),probe length 150mm with Thermowell	Nos	22
4.38	SS304, 1/2" Siphon Tube for Pressure Gauge	Nos	14
4.39	SS304, 1/2" Brass Valves for drain and Pressure gauge	Nos	30
4.40	1/2" SS304 Auto Air Vent valves	Nos	5
4.41	SS304, 1/2" Coupling	Nos	54
4.42	DN 80 Asbestos gasket	Nos	22
4.43	DN 65 Asbestos gasket	Nos	8
4.44	DN 50 Asbestos gasket	Nos	10
4.45	DN 40 Asbestos gasket	Nos	3
4.46	DN100 Asbestos gasket	Nos	100
4.47	SS304 1/2"Thermowell NIPPLE 300 mm length	Nos	27
4.48	Temperature Sensor	Nos	9

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4.49	Pressure Transducer	Nos	8
4.50	Auto drain valve	Nos	3
5.0	**Instrumentation & Control**		
	1. Three-way flow control valve, complete with all the accessories and with a manual bypass line with an isolation valve.	Nos.	2
	2.All three areas/partitions shall have temperature sensors with accuracy of ±0.2 deg C or better and humidity RH sensors with accuracy of ±1% or better.	Nos.	3
	3. The cooling coil water-inlet and water-outlet shall have temperature sensors cum transmitters.	Nos.	2
	4. Pressure gauges with isolation ball valves at inlet and outlet of the coils. In order to ensure a protection, a Temperature gauge shall come with a thermo well.	Nos.	4
	5.Pressure gauges with isolation ball valves at inlet and outlet of all the pumps	Nos.	4
	6. Differential pressure sensor across pre filters and fine filters.	Nos.	6
	7.VFDs for AHU fans.HMI control panel for monitoring Temperature, T and humidity, RH of all Partitions/rooms.AHU supply air volume shall be varied based on the room exhaust flow rates. The temperature control with SCR, and auto manul operation of VFD.	Nos.	1
6.0	AIR DISTRIBUTION SYSTEM:DUCTS, GRILLS & DIFFUSERS DUCTS AND INSULATION		
	HVAC Ducting Distribution		
	Duct Specifications: Complete supply air ducting including the flexible ducting connecting the solid duct work with filters collar and return air ducting is covered under scope of work. • DustsshallbemadefromGIsheetoflockformingqualityhavingZincCoatingasperASTMA-525G90. • The ducts shall be constructed as per SMACNA standard. • Theductsshallbedesignedfor100mmofWCpressure. • The ducts will be used for clean room class 100 environments. To meet this requirement, the GI sheet for manufacturing the ducts shall be totally oil free. • Velocity for Supply Air shall not exceed 1500 fpm and return air shall not exceed 1000 fpm, ducting shall be complete with dampers, vanes, anchor fasteners, supports, access doors, neoprene rubber gaskets etc. • All the ducts shall be supported with the building structure with GI threaded rods of 10mm dia and spring isolators of GI or coated suitable for clean rooms. • Ducting shall include dampers, supports, Isolators etc. • All duct supports, re-enforcement shall be galvanized. • All the dampers shall be Al anodized. • The duct sections shall be joined with Angle iron flange joints. • All the edges with min or leaks should be sealed with silicon sealant. • Duct inspection window to be provided in the main ducts and plenum boxes. The inspection windows shall be leak proof, easy to open/close. • The ducts fabrication work shall be carried out in dust free environment. Sheet Specifications: All duct work, sheet metal thickness and fabrication unless otherwise directed, shall strictly meet requirements, as described in IS: 655-1963 with amendment-I (1971 edition).		
6.1	22G Ducting	Sqm	1500

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	Flexible Duct Work • Insulated, flexible duct work shall be installed from Al supply duct work to each HEPA filter ceiling module. • The flexible duct work shall be sealed and secured at each filter module and sheet metal collar utilizing stainless steel flexible duct bands and duct band locks. • The diameter of flexible duct shall be12"(approx.) matching with the air inlet collar size. • Flexible ducting shall be heavy duty suitable for +2500 Pa of air pressure and 30m/s air velocity. • Material of duct: Multiple layers of Al-polyester laminated with spring steel wire helix.		
6.2	Flexible duct dia 250mm	Rmt	120
	Volume Control Damper		
6.3	• At the junction of each branch duct with main duct and split of main duct, volume dampers must be provided. Dampers shall be two gauges heavier than the gauge of the large duct and shall be rigid in construction. • The volume dampers shall be of an approved type, lever operated and completed with locking devices which will permit the dampers to be adjusted and locked in any position and clearly indicating the damper position. • The dampers shall be of splitter, butterfly or louver type. The damper blade shall not be less than 1.25 MM (18) Gauge, reinforced with 25MM angles 3MM thick along any unsupported side longer than 250MM. Angles shall not interfere with the operation of dampers, nor cause any turbulence.	Nos.	55
6.4	Fire Dampers • Automatic fire dampers to be provided wherever required as per the safety standards. The damper shall be multi blade louver type. The blades should remain in the air stream in open position and shall be constructed with minimum 1.8 mm thick galvanized sheets. The frame shall be of 1.6 mm thickness. Other materials shall include locking device, motorized actuator, control panel to trip AHU motor etc. • The fire dampers shall be capable of operating automatically on receiving signal from a fire alarm panel. All control wiring shall be provided between fire damper and electric panel. • A hinged and gasket access panel measuring at least 450mmx450 mm shall be provided on duct work Before each reheat coil and at each control device that may be located inside the ductwork.	Nos.	4
7	Thermal Insulation`		
	Duct Insulation Supply & Return Air Duct Thermal Insulation with Aluminum foil faced self-adhesive, Closed cell, Nitrile Rubber Insulation with proper sealing of joints filled with silicon sealant. Insulation of duct exposed to atmospheric/ambient conditions using Aluminum faced Closed cell Nitrile rubber, Class 'O 'fire rating, density not less than 50 Kg/m3 all the joints shall be sealed with 75mm thick Al tape. Supply Air Duct: 19mm thick Return Air Duct:19 mm thick Al-Cladding: HVAC ducts exposed UV light shall be cladded with Aluminum Sheets of suitable gauge.		
7.1	19mm thick for Supply air ducting	Sqm	900
7.2	19mm thick for Return air ducting	Sqm	900
8	Supply and Return Air Grills with Plenum Boxes		
	Standard Grills • The supply and return air grills shall be fabricated from extruded aluminum sections. The supply air grills shall have single/double louvers. The front horizontal louvers shall be of extruded section, fixed/adjustable type. There is a vertical louver where required shall of aluminum extruded sections and adjustable type. The return air grill shall have single horizontal extruded section fixed louvers. The grills may or may not be with an outer frame. • The damper blades shall also be of extruded aluminum sections. The grill flange shall be fabricated out of the aluminum extruded section. Grills longer than 450 mm shall have intermediate support for the horizontal louvers.		

8.1	Supply Air grill The linear diffusers/grilles shall be fabricated from Aluminum extruded sections. The diffusion blades shall be extruded, flush mounted type with single or double direction air flow. The frame shall be of aluminum extruded section and shall hold the louvers tightly in fixed position. The dampers as described under grilles shall be provided wherever specified. Includes GI Plenum Box	Nos.	55
8.2	Return Air Grill The linear diffusers/grilles shall be fabricated from Aluminum extruded sections. The diffusion blades shall be extruded, flush mounted type with single or double direction air flow. The frame shall be of aluminum extruded section and shall hold the louvers tightly in fixed position. The dampers as described under grilles shall be provided wherever specified.	Nos.	55
9	Electrical		
	HVAC Electrical Panels outdoor panel		
9.1	1) HVAC Electrical Panel : General Design Consideration a) System configuration i. Voltage Supply: 415V± 10% ii.Frequency:50Hz±5%iii.NoofPhaseandgrounding:3Phase&Solidlygroundearthiv.PowerDistribution: A.C., 3 Phase 4 wire for 3 Phase system, 1 Phase 3 wire system b) Code & Standards All electrical equipment and accessories to be furnished, installed and commissioned shall be designed, manufactured, tested and installed in accordance with relevant Indian Standard Specifications (ISS), Indian electricity rules and any other applicable regulations. 2) Cabling for electrical supply from wall mounted electrical panel to respective AHUs/Chillers/Pumps/Humidifier shall be armored copper cables. 3) Copper lugs should be used for cable termination. 4) Bus bar for incoming should be of Copper. 5)Cabling for all the equipment shall be laid through GI ladder or conduit . 6) AHU blower should operate on VFDs 7) Heaters control should be through Thyristors 8)Star-delta starter for chilled water pumps 9) Electrical Panel with bypass arrangement DOL/SD type electrical control panel and provision Microprocessor controller with display for Temperature, RH controlling, monitoring with status (AHU) interlocking with 3 way modulating valve & Strip heater system and SCR for Heater controllers. Provision for : a) AHU (Heaters, Blower, Humidifier) b) Pumps c) Chillers d) Compressor e) Process Cooling Water system 10) AHU panel Interlocks a.FlowSwitch-1nos b.AHUDoorinterlock-1nosc. Smoke and Fireinterlock-1nosd.ThermalInterlock-1nose.AccesscontrolEmergencyinterlock-1nos.		
9.2	HVAC Electrical DB: Supply, Installation, Testing and commissioning of Floor mounted type 14swg CRCA Powder coated out door electrical control panel with main incomer MCCB and provision for Microprocessor controller with HMI(refer the I/O points mentioned in the Technical Specifications ,PLC panel with HMI). HVAC electrical DB will have the following provisions	Nos	1
	1)AHUBlower-VFD-3Ph-4 nos.		
	2)Chillerunit-41Kw,3Ph-Contactor-2nos.		
	3)Heater-SSR-90,50Kw3Ph-2nos.		
	4)Pumps-7.5Kw,3Ph-ContactorwithStarDeltaStarter-2nos.-		
9.3	PLC Panel With HMI (out door) Dedicated HVAC BMS system with HMI panel shall be with the following I/O's.	Nos	1
	Interlocks		
	1)AirFlowSwitch-2nos		
	Room Air temp. and RH		
	Chiller interlocks(Provision only)		
	2)AHU Door interlock-2nos		

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	3)Chiller-PumpInterlock-2nos		
	4)Smoke and Fire-2nos		
	5)Thermal Interlock-2nos		
	6)Access control Emergency interlock-2nos.		
10.0	**Electrical Cabling and Accessories (Cables, wire, conduit, Earthing, Switch boards, Switches/Sockets etc)**		
	Cables The scope includes the Supply and installation of ISI marked PVC/XLPE insulated, Extruded PVC inner sheath, GI strip armored overall FRLS PVC outer sheathed, on wall/surface/existing cable tray as required as per thedetailedspecificationandquantityintheBOQ.ControlcablesshallbecopperconductorPVCinsulatedandpower cables shall be XLPE insulated. The necessary hardware for installation of cable like cable tie, clamps, tags etc. Will be in the scope of contractor. Make of power/control cable shall be Polycab/ Havells/ KEI/NICCO/CCI/National/gloster/Ecko. Instrumentation cables shall be conforming to BS 5308, type II, 300/500 Grade with stranded 0.75sq mm copper conductor, PVC insulated, color coded, twisted to form a pair/pairs, twisted to form a unit ,units laid up ,mylertaped binding, overall screened with aluminium mylertap with tinned copper drain wire, extruded inner sheathed, galvanised steel roundwire/strip armoured,overall FRLS PVC sheathed.		
	Wire The scope includes the Supply and installation of stranded Copper conductor wire, 1100-volt grade, FR PVC insulated single core conforming to IS 694 as per the detailed specification, quantity in the BOQ. Conduit: The scope includes the Supply and installation of ISI make rigid steel, hot dip galvanized conduits of different size, quantity & Specification as per BOQ. The conduit shall be installed on wall/surface/ metal truss/existing cable tray, as required. Flexible conduit shall be made with bright cold rolled annealed and electro-galvanized mild steel. Installation of conduits shall include all necessary hardware, metal strip, welding,Clamps etc.		
10.1	Single Core XLPE Copper Armoured cable 120 Sqmm Cable	Rmt	540
10.2	5 Core XLPE Copper Armoured cable 35 Sqmm Cable Chillers	Rmt	132
10.3	5 Core XLPE Copper Armoured cable 35 Sqmm Cable AHU 1 Heater	Rmt	30
10.4	5 Core XLPE Copper Armoured cable 25 Sqmm Cable AHU 2 Heater	Rmt	54
10.5	5 Core XLPE Copper Armoured cable 10 Sqmm Cable AHU 1 Blower(2 Blowers)	Rmt	60
10.6	5 Core XLPE Copper Armoured cable 6 Sqmm Cable AHU 1 Blower(1 Blowers)	Rmt	54
10.7	5 Core XLPE Copper Armoured cable 6 Sqmm Cable AHU 1 Humidifier	Rmt	30
10.8	5 Core XLPE Copper Armoured cable 6 Sqmm Cable AHU 2 Humidifier	Rmt	54
10.9	3 Core XLPE sheilded Cable 1.5 mm2 for Modulating Valve, Temp Sensor,Pressure Transducer, Flow Switch , Temp & RH sensor,	Rmt	1800
11.00	**Misc**		
11.1	Scaffolding Charges for duct erection	Nos	1
11.2	Duct Supporting system	Kgs	300
11.3	Wall Openings for Duct entry	Lot	1
11.4	Engineering, Design and drawings	Lot	1
11.5	Documentation	Lot	1
11.6	Commissioning and validation	Lot	1
11.7	Packing forwarding and Transportation	Lot	1
11.8	Dismantling and refixing the false ceiling	Lot	1

11.9	Dismantling of the existing duct	Lot	1
11.10	Dismantling and shifting of current AHU	Lot	1
11.11	Dismantling and shifting of one existing chiller	Lot	1
11.12	Housekeeping	Lot	1
11.13	Delivery- Supply, Installation, testing and commissioning of the works listed should be completed within 45 days from the date of PO.		
12	**Room conditions, TEMPERATURE: - 22±2℃ RELATIVE HUMIDITY: - 50±5%** **Noise levels in room: 55±2 dB**		
	Optional items, but mandatary to submit the technical and commercial bid		
Sl.No.	**Description**	**Units**	**Qty**
A	SITC of Process colling water lines		
i	2" SS 304 SH,10 seamless pipes	Rmt	180
ii	1" Tap off points for POU with SS304 PRV (0-10 Bar), Filter (0.5 micron), ball valve and flow meter (o-20 LPM)	Nos	20
B	SITC of Compressed dry air lines		
i	1" aluminium pipelines rated 20bar capacity with necessary fitting	Rmt	154
ii	1" Tap off points for POU with PRV (0-10 bar) and moisture filter	Nos	20

Note: The relevant clauses in the tender document referring to the above stands modified accordingly.

Purchase committee.

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