

BOQ		Doc No:	PE-PF-415-553-A001				
		Rev No:	0				
		Date of issue	21.09.2019				
NAME OF PROJECT:		1X660 MW BHUSAWAL TPS					
NAME OF PACKAGE:		AIR CONDITIONING SYSTEM					
TECHNICAL SPECIFICATION No:		PE-TS-415-553-A001					
S. No.	DESCRIPTION	UNIT	QTY	HSN/SAC CODE			
1	Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for Supply part, Services part and Mandatory spares comprising of design (i.e. Preparation and submission of drawing /documents including “As Built” drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable), fill of lubricants & consumables including chemicals for softening plant till handing over, mandatory spares along with spares for erection, start-up and commissioning as required, forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation & storage at site, in-site transportation, assembly, erection & commissioning, final painting at site, minor civil work, trial run at site and carrying out Performance guarantee / Functional / Demonstration tests at site (As applicable), training of customer/client O&M staff, operation of the AC Plant(s) after commissioning till handing over and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order.	1 Lot					
2	MAJOR BREAK-UP OF PRICES GIVEN IN 1.0 ABOVE.						
2.1	Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for Supply part comprising of design (i.e. Preparation and submission of drawing /documents including “As Built” drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable), fill of lubricants & consumables including chemicals for softening plant till handing over along with spares for erection as required, start-up and commissioning spares as required, forwarding, proper packing, shipment and delivery at site for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order. (Break-up as per Annexure-I)	1 Lot		8415 82 90			
2.2	Total lumpsum firm prices inclusive of all prevailing taxes, duties and other levies for Services part comprising of service part for unloading, handling, transportation & storage at site, in-site transportation, assembly, erection & commissioning, final painting at site, minor civil work, trial run at site and carrying out Performance guarantee / Functional / Demonstration tests at site (As applicable), training of customer/client O&M staff, operation of the AC Plant(s) after commissioning till handing over and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order. (Break-up as per Annexure-I)	1 Lot		995463			
2.3	Total lumpsum firm price inclusive of all prevailing taxes, duties and other levies for Mandatory spares comprising of manufacture, fabrication, assembly, inspection / testing (as applicable) at vendor's & sub-vendor's works, painting, forwarding, proper packing, shipment, delivery at site & guarantee as per tender technical specification above, amendment & agreements till placement of order. (Price break up of mandatory spares is to be furnished as per Annexure- II)	1 Lot		8415 90 00			

BOQ ANNEXURE - I					Doc No:	PE-PF-415-553-A001
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SL NO	DESCRIPTION	UNIT	Qty	SUPPLY	ERECTION AND COMMISSIONING	
A	AC-Plant-1: CENTRAL CHILLED WATER SYSTEM FOR MAIN CR AREA					
1	Water cooled Chilling machine each of minimum 220 TR (actual) capacity consisting of (a) Screw refrigerant compressor complete with motors, control panel, multi drive set, controls and interlocks other accessories as specified; (b) Water cooled condenser adequately sized with suitable anti corrosive paint coating for tube and shell part coming in contact with soft water & other accessories and (c) Shell & tube type water chiller & other accessories, as specified.	2	NO			
2	Sheet metal cabinet type air handling units (double skin as per specification) consisting of chilled water cooling coil, centrifugal blower, TEFC sq cage induction motor, filters (pre filter), 3 way motorised mixing valve with thermostatic control and other accessories to meet the AC load of the main CR areas at 17.0 m . Fine Filters shall be included in discharge for individual AHUs.	4	NO			
3	Sheet metal cabinet type air handling units (double skin as per specification) consisting of chilled water cooling coil, centrifugal blower, TEFC sq cage induction motor, filters (pre filter), 3 way motorised mixing valve with thermostatic control and other accessories to meet the AC load of the main UPS room at 8.5 m . Fine Filters shall be included in discharge for individual AHUs.	2	NO			
4	Fibreglass reinforced plastic (FRP) construction cooling towers (common for AC plant 1 and AC Plant 2) complete with fan, motor, FRP basin, nozzles, make-up water & quick fill water connection, instruments, drains, piping, valves, strainers, ladder & structural support and all accessories as specified as per specification.	2	NO			
5	Centrifugal pump sets for condenser water recirculation (common for AC plant 1 and AC plant 2) complete with TEFC motor & all accessories as specified.	2	NO			
6	Centrifugal pump sets for chilled water recirculation complete with TEFC motor drive set & all accessories, as specified.	2	NO			
7	Soft water MS (with suitable rubber lining) /FRP Storage tank (common for AC plant 1 and AC Plant 2) to cooling towers with instruments, valves and all other accessories as required. Capacity of each tank min 8 m3 .	2	NO			
8	MS/HDPE Expansion Tank (spray galvanised from inside) for chilled water with insulation all accessories like instruments and valves as required, capacity min 1 m3.	1	NO			
9	Makeup water MS/FRP Storage tank (common for AC plant 1 and AC Plant 2) with instruments, valves and all other accessories as required. Capacity of tank min 2 m3 .	1	NO			
10	Skid mounted softening plant (2 x 100 %) (common for AC plant 1 and AC Plant 2) with associated piping, valves, instruments, soft water pumps & regeneration pumps & tanks as applicable with suitable rubber lining & as per tender requirement	1	LOT			
11*	HDPE Piping (3 ") complying to IS 4984, PN 10, PE80 carbon black, UV rating) along with valves for transferring softening plant reject water and cooling tower blow down water to collection pit at EL 0.0m near Control Tower	60	mtrs*			
12	Condenser water piping with suitable rubber lining & necessary fittings, strainers, valves including piping from soft water storage tank to pan humidifiers of AHU room of CCR, UPS and condenser water piping from C of ACP 1 to chiller of ACP 2 as specified.	1	LOT			
13	Insulated Chilled water piping within AC plant room, AHU rooms and from AC plant room to various AHU rooms, FCU units, complete with valves support fittings, strainers, insulation with finish as per specification.	1	LOT			
14	Monsoon reheating/ winter heating kit comprising strip heaters, safety controls, air-stat, contactors, frame work, thermostat & humidistat/ sensor etc.	1	LOT			
15	Pan type humidifier for each AHU room.	1	LOT			

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SL NO	DESCRIPTION	UNIT	Qty	SUPPLY	ERECTION AND COMMISSIONING		
16	Fresh air fan (axial flow type), complete with motor, inlet cone, air filters (pre and fine), dampers mounting frame, MS rain protection cowl, bird screen along with support structure and all other accessories etc. as per specification.	1	LOT				
17	Smoke exhaust fan complete with casing,TEFC sq. cage induction motor & mounting frame, damper, MS rain protection cowl, bird screen along with support structure and all other accessories	1	LOT				
B	AC-Plant-2: CENTRAL CHILLED WATER SYSTEM FOR SERVICE BUILDING						
1	Water cooled Chilling machine each of minimum 200 TR (actual) capacity consisting of (a) Screw refrigerant compressor complete with motors, control panel, multi drive set, controls and interlocks other accessories as specified; (b) Water cooled condenser adequately sized with suitable anti corrosive paint coating for tube and shell part coming in contact with soft water & other accessories and (c) Shell & tube type water chiller & other accessories, as specified.	2	NO				
2*	Sheet metal cabinet type air handling units (double skin as per specification) consisting of chilled water cooling coil, centrifugal blower, TEFC sq cage induction motor, filters (pre filter), 3 way motorised mixing valve with thermostatic control and other accessories to meet the AC load of the service building. Fine Filters shall be included in discharge for individual AHU.	8	NO*				
3	Centrifugal pump sets for chilled water recirculation complete with TEFC motor drive set & all accessories, as specified.	2	NO				
4	MS/HDPE Expansion Tank (spray galvanised from inside) for chilled water with insulation all accessories like instruments and valves as required, capacity min 1 m3.	1	NO				
5	Insulated Chilled water piping within AC plant room, AHU rooms and from AC plant room to various AHU rooms, FCU units, complete with valves support fittings, strainers, insulation with finish as per specification.	1	LOT				
6	Monsoon reheating/ winter heating kit comprising strip heaters, safety controls, air-stat, contactors, frame work, thermostat & humidistat/ sensor etc.	1	LOT				
7	Pan type humidifier for each AHU room.	1	LOT				
8	Fresh air fan (axial flow type), complete with motor, inlet cone, air filters (pre and fine), dampers mounting frame, MS rain protection cowl, bird screen along with support structure and all other accessories etc. as per specification.	1	LOT				
9	Smoke exhaust fan complete with casing,TEFC sq. cage induction motor & mounting frame, damper, MS rain protection cowl, bird screen along with support structure and all other accessories	1	LOT				
C	AC PLANT -3 (ESP CONTROL ROOM)						
1*	Water cooled Precision type Package air conditioning units of minimum 25 TR (Net) capacity complete with scroll compressors (suitable for R-410/407c refrigerant) and water cooled shell and tube condensers, interconnecting refrigerant piping (duly insulated) between condensers and PAC units, evaporator fans with highly efficient EC motors and their controls, filters as per specification, cooling coils with expansion valve, electrode type humidifiers with controls, electric strip heaters, casing as per specification, insulated SS drain pan, insulated drain piping, and built-in microprocessor based control panel as per specification. The cost shall include cooling water recirculation piping with valves and accessories from the terminal point.	4	NO*				
2*	Fresh air fan (axial flow type), complete with motor, inlet cone, air filters (pre and fine), dampers mounting frame, MS rain protection cowl, bird screen along with support structure and all other accessories etc. as per specification.	2	NO*				

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3*	Smoke exhaust fan complete with casing,TEFC sq. cage induction motor & mounting frame, damper, MS rain protection cowl, bird screen along with support structure and all other accessories	1	NO*				
4*	online Non chemical water treatment equipment with all accessories as required to meet the system requirement.	1	NO*				
D	ITEMS COMMON TO ALL AC PLANTS						
1*	Finished GSS (zinc coating 275 gms/sq.m) ducting for above area complete with dampers, grills(with VCD & without VCD), support structure (painted) and all accessories as specified.						
(a)*	18G.	550	SQM*				
(b)*	20G.	550	SQM*				
(c)*	22G.	1550	SQM*				
(d)*	24G.	2550	SQM*				
2*	Fire damper.						
(a)*	Fire damper with auto resetting, limit switches, indication lamps etc.	15	SQM*				
(b)*	Motorized actuator with single phase power supply for the above fire damper.	12	NO*				
3*	Supply air diffuser/ grill with VCD	45	SQM*				
4*	Return air diffuser / grill without VCD	60	SQM*				
5*	GI Volume control dampers for Duct	10	SQM*				
6	Acoustic insulation of first 6 m of ducting from centrifugal fan outlet of AHU and precision package AC.	1	Lot				
7*	Thermal insulation of supply air duct & return air duct with finish as per specification.	5350	SQM*				
8*	MS medium class drain piping upto nearest drain point with and without insulation						
a*	50mm with insulation	50	Rmt*				
b*	40mm with insulation	50	Rmt*				
9*	Fibre optic cable.	50	Rmt*				
10*	Fan Coil units						
a*	3 TR	16	NO*				
b*	2TR	12	NO*				
c*	1.5 TR	2	NO*				
E	AC System for Aux. building as required						
1*	Water cooled Precision type Package air conditionig units of minimum 7.5 (Net) capacity complete with scroll compressors (suitable for R-410/407c refrigerant) and water cooled shell and tube condensers, interconnecting refrigerant piping (duly insulated) between condensers and PAC units, evaporator fans with highly efficient EC motors and their controls, filters as per specification, cooling coils with expansion valve, electrode type humidifiers with controls, electric strip heaters, casing as per specification insulated SS drain pan, insulated drain piping, and built-in microprocessor based control panel as per specification. The cost shall include cooling water recirculation piping with valves and accessoried from the terminal point. Acoustic insulation of first 6 m of ducting from centrifugal fan outlet of precision package AC shall also be included.	1	NO*				
2*	Fresh air fan (axial flow type), complete with motor, inlet cone, air filters (pre and fine), dampers mounting frame, MS rain protection cowl, bird screen along with support structure and all other accessories etc. as per specification.	1	NO*				

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3*	online Non chemical water treatment equipment with all accessories as required to meet the system requirement.	1	NO*				
4*	Smoke exhaust fan complete with casing, TEFC sq. cage induction motor & mounting frame, damper, MS rain protection cowl, bird screen along with support structure and all other accessories	1	NO*				
5*	AIR COOLED SPLIT UNITS consisting of outdoor unit (having compressor condenser coils with fan and motor), indoor unit (having evaporator coil, filter, fan with motor), interconnecting refrigerant piping, drain piping as per site requirement & fittings with insulation, cordless remote, electrical power cord upto the nearest available point along with isolator / MCB, fixing frame for indoor and outdoor unit, Stabilizer, etc.						
(a)*	5.0 TR capacity (ductable type, 415 V, 3 phase with isolation switch).	2	NO*				
(b)*	2.0 TR capacity (non-ductable type, 240 V, 1 phase) with isolation switch, i.e MCB of suitable rating as specified, voltage stabilizer, cabling, all supporting structure and refrigerant piping as per actual site condition, drain piping upto nearest drain etc. (Split AC shall be of best rating as per latest BEE based on ISEER)	90	NO*				
(c)*	1.5 TR capacity (non-ductable type, 240 V, 1 phase) with isolation switch, i.e MCB of suitable rating as specified, voltage stabilizer, cabling, all supporting structure and refrigerant piping to suit actual site condition, drain piping upto nearest drain etc. (Split AC shall be of best rating as per latest BEE based on ISEER)	52	NO*				
6*	Handling arrangement						
a*	Manually operated, platform trolley of 1 Ton capacity with base area 2m x 1.5m	4	NO*				
b*	3 Ton capacity electric hoist with monorail	2	No*				
c*	1 Ton capacity chain pulley block with travelling trolley and monorail arrangement	1	No*				
d*	1 Ton capacity chain pulley block without travelling trolley	1	No*				
F	Cable tray, conduits, junction boxes, local control panel and Field instruments like pressure gauge, temperature gauge, pressure switch, pressure sensor, pressure transmitters, differential pressure switch, differential pressure transmitters flow switch, flow transmitter, flow meter, temperature sensors, etc, including necessary control panel form hook up with main DDCMIS as per specifications	1	LOT				
G	Total lumpsum price for special tools & tackles for maintenance inclusive of packing forwarding, transportation up to site, etc. (Bidder shall submit item-wise price break-up-As per Appendix A).	1	LOT		NA		
H	Total lumpsum price for commissioning spares inclusive of packing forwarding, transportation up to site, etc. (Bidder shall submit item-wise price break-up-As per Appendix B).	1	LOT		NA		
I*	Providing full support during FAT of DDCMIS, preparation of control scheme and commissioning of DDCMIS as per relevant specification.	21	mandays*	NA			
J	Any other item not indicated above, but required to make the system complete in all respects.	1	LOT				
NOTES							
1	The bidder shall furnish unit rates for variable item (marked *) for necessary adjustment (plus or minus) variation during detailed engg. stage. The unit rates quoted above shall be considered and no separate unit rates shall be quoted. Unit rates shall be valid throughout the contract.						
2	Bidder to note that above BOQ for this tender has to be read in conjunction with tender specification. Any item, if not mentioned in above BOQ but indicated in tender specification and required for completion of the system shall be deemed to be included in above price.						

BOQ APPENDIX - A Special tools & tackles for maintenance			Doc No:	PE-PF-415-553-A001
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TECHNICAL SPECIFICATION No:			PE-TS-415-553-A001	
SL NO	DESCRIPTION	UNIT	Qty	
1	FLAT D WRENCH - 6 MM TO 32 MM (12 Pcs)	SET	1	
2	BOX WRENCHES - 6 MM TO 22 MM (14 Pcs)	SET	1	
3	RING SPANNER - 6 MM TO 32 MM (12 Pcs)	SET	1	
4	ALLEN KEYS - 2 MM TO 10 MM	SET	1	
5	CRESCENT SCREW SPANNER	NO.	1	
6	SCREW DRIVER	NO.	1	
7	OFFSET SCREW DRIVER	NO.	1	
8	INSULATED PLIER	NO.	1	
9	TORCH LIGHT FOR 2 CELL	NO.	1	
10	HAMMER 1 LB	NO.	1	
11	OIL CAN	NO.	1	
12	POCKET THERMOMETER - 0 TO 50 DEG. C)	NO.	1	
13	INSULATION TAPE ROLL	NO.	1	
14	STEEL FOOT RULE - 12"	NO.	1	
15	FEELER GAUGE 9 BLADES	NO.	1	
16	PIPE WRENCH	NO.	1	
17	FLARE NUT (1/4")	NOS.	6	
18	FLARING TOOL	NO.	1	
19	TUBE CUTTER	NO.	1	
20	GAS CHARGING PIPE	NO.	1	
21	NITROGEN CHARGING ADAPTER	NO.	1	
22	FREON PRESSURE GAUGE (2 1/2" DIA DIAL)) 0 - 300 MM PSI	NO.	1	
23	FREON PRESSURE GAUGE (2 1/2" DIA DIAL)) 30 - 150 MM PSI	NO.	1	
24	PSYCHRO METER	NO.	1	
25	LOCK WITH KEY FOR TOOL BOX	NO.	1	
26	RATCHET 1/4"	NO.	1	
27	MS TOOL BOX	NO.	1	
28	ADJUSTABLE SPANNER	NO.	1	
29	WRENCH SPANNER	NO.	1	
30	GREASE GUN	NO.	1	
31	OIL GUN	NO.	1	
32	HAND LAMP	NO.	1	
33	LINE TESTER	NO.	1	
NOTE S				
1	ABOVE IS THE MINIMUM LIST. ANY OTHER TOOL / TACKEL REQUIRED FOR THE SYSTEM SHALL ALSO BE PROVIDED BY THE VENDOR WITHOUT ANY COST IMPLICATION.			

BOQ APPENDIX - B Commissioning spares				Doc No:	PE-PF-415-553-A001
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TECHNICAL SPECIFICATION No:				PE-TS-415-553-A001	
SL NO	DESCRIPTION	UNIT	Qty		
1	AHU FAN BELTS	SET	1		
2	PRESSURE GAUGE	NO.	1		
3	TEMPERATURE GAUGE	NO.	1		
4	FILTER	SET	1		
5	COMPRESSOR OIL	LOT	1		
6	REFRIGERANT	LOT	1		
NOTES					
1	ABOVE IS THE MINIMUM LIST. ANY OTHER COMMISSIONING SPARE REQUIRED FOR THE SYSTEM SHALL ALSO BE PROVIDED BY THE VENDOR WITHOUT ANY COST IMPLICATION.				

BOQ ANNEXURE-II LIST OF MANDATORY SPARES		Doc No:	PE-PF-415-553-A001
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NAME OF PACKAGE: AIR CONDITIONING SYSTEM			
TECHNICAL SPECIFICATION: PE-TS-415-553-A001			
S. No.	DESCRIPTION	Quantity	
I	MECHANICAL		
1	SCREW COMPRESSOR/ CHILLING		
1.1	HP STAGE OF COMPRESSOR		
(a)	HP element	One (1) Set	
(b)	Packing Set	Four (4) Sets	
(c)	Axial thrust Bearing	Two (2) Sets	
(d)	Labyrinth oil seal or radial seals	Four (4) Sets	
(e)	Bearing for male & female rotors (DE & NDE)	Lot (Two (2) sets)	
(f)	Timing Gears	One (1) set	
(g)	Suction & discharge valves	Lot (Two (2) sets)	
1.2	LP STAGE OF COMPRESSOR		
(a)	LP element	One (1) Set	
(b)	Graphitic ring shaft seals for compressor	Four (4) Sets	
(c)	Packing Set	Four (4) Sets	
(d)	Axial thrust Bearing	Two (2) Sets	
(e)	Bearing for male & female rotors (DE & NDE)	Lot (Two (2) Sets)	
(f)	Timing Gears	One (1) set	
(g)	Suction & discharge valves	Lot (Two (2) sets)	
1.3	Main Bearing	Lot (Two (2) sets)	
1.4	Set up gear/pinion	One (1) set	
1.5	Air intake filter element with gaskets	Eight (8) sets	
1.6	Oil filter element with gaskets & seals	Eight (8) sets	
1.7	Safety valve springs & gaskets	Four (4) sets	
1.8	inbuilt automatic drain valve	Four (4) sets	
1.9	Gearcase breather filterelement	One (1) set	
1.10	Drain valve kit	One (1) set	
1.11	Oil filter	Two (2) sets	
1.12	All types of Bearings	Two (2) sets	
1.13	Oil filter 'O' ring	Two (2) sets	
1.14	Oil seals for drive shafts	Four (4) sets	
1.15	Refrigerant filter	Two (2) sets	
1.16	All types of valves	Two (2) sets	
1.17	Refrigerant filter 'O' ring	Two (2) sets	
1.18	Timing Gear	One (1) set	
1.19	EXV valve	One (1) set	
1.20	All types of packing	Four (4) sets	
1.21	Differential pressure switch	One (1) set	
1.22	Solenoid valve 2 way	One (1) set	
1.23	Solenoid valve coil	One (1) set	
1.24	Solenoid valve 'O' ring	One (1) set	
1.25	Solenoid valve gasket	One (1) set	
1.26	Master solenoid valve	One (1) set	
1.27	Master solenoid valve coil	One (1) set	
1.28	Master solenoid gasket	One (1) set	
2	AIR HANDLING UNIT (for each model)		
2.1	Impeller/ blower with motor	One (1) set	
2.2	V-belts for AHU blower	Four (4) sets	
2.3	AHU blower bearing	Two (2) sets	
2.4	Blower motor bearing	Two (2) sets	
2.5	Filters at suction and discharge of AHU	Lot (50 % of installed population)	
3	FRESH AIR FAN		
3.1	Impeller	One (1) set.	
3.2	Bearings	Two (2) sets.	
4	CONTROLS (for each model)		

S. No.	DESCRIPTION	Quantity	
4.1	HP/LP cut out	One (1) se.	
4.2	Anti-freeze thermostat	Two (2) sets	
5	COOLING TOWER (for each model)		
5.1	Nozzles for cooling towers	Lot (Twenty (20) nos. or 10% of quantity installed whichever is higher)\	
5.2	Float valve assembly	One (1) set	
5.3	Fan bearings	Two (2) sets	
5.4	Motor bearings	Two (2) sets	
5.5	V-belt for cooling tower fan (if applicable)	Two (2) sets	
6	VALVES (for each type and size)		
		1 Lot (One (1) no. where total quantity of a particular type and size of valve is less than or equal to ten (10).)	
		1 Lot (Two (2) nos. where total quantity of a particular type and size of valve is less than 40 but more than 10.)	
		1 Lot (10% of the total quantity (to nearest whole no.) of a particular type and size where the total quantity of a particular type and size of valve is more than 40.)	
7	Humidity sensors	One (1) no. of each type size and rating	
8	Geyserstat	Two (2) nos. of each type size and rating	
9	Antifreeze thermostat	One (1) no. of each type size and rating	
10	Local humidity indicator	One (1) no. of each type size and rating	
11	PRECISION AIR CONDITIONERS		
11.1	V-belts for Evaporator fan	Lot(One set for each PAC unit)	
11.2	Vibration Isolators	Lot(One set for each rating of PAC unit (both for condenser & Indoor Unit)	
11.3	Filters	Lot (One set for each PAC unit)	
11.4	Bearings	Lot (One set for each of fan and motor for each rating of PAC unit)	
11.5	Condenser fan Impeller	Lot (One set for each rating of PAC unit)	
11.6	Expansion valve	Lot (One set for each rating of PAC unit)	
11.7	Any other spare parts recommended by the Manufacturer	Lot (As recommended by the Manufacturer)	
12	FRESH AIR SYSTEM		
12.1	Dry Panel type HDPE filter	Lot (One set with each Fresh air unit)	
12.2	Fan-motor bearing	Lot (One set with each Fresh air unit)	
12.3	Vibration Isolators	Lot (One set with each Fresh air unit)	
13	SPLIT AIR CONDITIONERS		
13.1	Fan –motor bearing for outdoor unit	Lot (One set for each rating of SAC unit)	
13.2	Vibration Isolators	Lot (One set each for outdoor unit & Indoor unit for each SAC unit)	
13.4	Filter	Lot (One set for each SAC unit)	
13.5	Expansion Valve	Lot (One set for each rating of SAC unit)	
13.6	Any other spare parts recommended by the Manufacturer	Lot (As recommended by the Manufacturer)	
14	WINDOW AIR CONDITIONERS (if applicable)		
14.1	Evaporator fan motor	Lot (One no. for each rating of WAC unit)	

S. No.	DESCRIPTION	Quantity	
14.2	Control unit	Lot (One set for each rating of WAC unit)	
14.3	filter	Lot (One set for each WAC unit)	
14.4	Any other spare parts recommended by the Manufacturer	Lot (As recommended by the Manufacturer)	
15	FAN-FILTER UNITS		
15.1	Filter	Lot (One set for each FFU)	
15.2	Fan-motor Bearing	Lot (One set for each rating of FFU)	
15.3	Vibration isolators	Lot (One set for each FFU)	
15.4	Back Draft Dampers	Lot (One no. of each size)	
15.5	Any other spare parts recommended by the Manufacturer	Lot (As recommended by the Manufacturer)	
16	WALL MOUNTED SUPPLY/ EXHAUST FAN		
16.1	Fan-motor Bearing	Lot (One set for each rating of fan)	
16.2	Vibration isolators	Lot (One set for each fan)	
16.3	Fan Motor	Lot (One no. for each rating of fan)	
17	CENTRIFUGAL FAN (if applicable)	Lot (For each type & rating)	
17.1	V-belts	Lot (Two sets for each fan)	
17.2	Fan Bearing	Lot (One set for each fan)	
17.3	Motor bearing	Lot (One set for each rating of fan)	
17.4	Vibration isolators	Lot (One set for each fan)	
17.5	Any other spare parts recommended by the Manufacturer	Lot (As recommended by the Manufacturer)	
18	Electric Hoists (for each type and rating)		
18.1	Brake linings	Two (2) sets of each type	
18.2	Rope guide and rope tighter	One (1) of each type	
18.3	Limit switch	Two (2) of each type and size	
18.4	Bearings for long travel wheels	Two (2) sets	
18.5	Bearings for gear boxes for each type of hoist	Two (2) sets	
18.6	Break liners for all the brakes	100% of total population of each type & size	
18.7	Oil seals	100% of total population of each type, size rating	
18.8	Brake springs for all brakes	100% of total population of each type, size rating	
18.9	Wire ropes for hooks	100% installed on each crane and hoist	
18.10	Solenoid coils for brakes	Two (2) sets	
18.11	Overload relay for motors	Two (2) nos.	
18.12	Limit switches for hoists and travel mechanisms	Two (2) sets	
18.13	Spare motors for hoists	Two (2) nos.	
18.14	Long travel machinery		
18.14.1	Gear wheel	One (1) set	
18.14.2	Internal clip	Two (2) nos.	
18.14.3	Pinion	One (1) no.	
19	Chain Pulley Blocks (for each type and rating)		
19.1	Load chain wheel	One (1) no.	
19.2	Load chain stripping fork	Five (5) nos.	
19.3	Hand chain wheel	Two (2) nos.	
19.4	Ratchet pawl	One (1) no.	
19.5	Locking ratchet wheel	Two (2) nos.	
19.6	Guide roller	Two (2) nos.	
19.7	Brake disc	Two (2) mos.	
II	ELECTRICAL		
1	415 V MOTORS		
a.	Terminal plates for motors upto 30kw for each rating	1 Lot (1 no. For each type & rating of Motor)	
b.	Terminal plates for motors above 30kw for each rating	1 Lot (1 no. For each type & rating of Motor)	

S. No.	DESCRIPTION	Quantity	
c.	Heaters	1 Lot (1 no. For each type & rating of Motor)	
d.	Greasing arrangements	1 Lot (1 no. For each type & rating of Motor)	
e.	Motor of each type and rating	1 Lot (10% of the installed quantity or minimum 1 number whichever is higher)	
f.	Bearings (DE and NDE)	1 Lot (1 set For each type & rating of Motor)	
g.	End shield cover driving & non driving end	1 Lot (1 set For each type & rating of Motor)	
h.	Cooling fan	1 Lot (1 set For each type & rating of Motor)	
i.	Motor terminal block	1 Lot (1 set For each type & rating of Motor)	
j.	Complete set of coupling	1 Lot (1 set For each type & rating of Motor)	
2	DC Motors of each type and rating		
a.	Carbon brushes of each type	10 sets	
b.	Brush assemblies of each type	2 sets	
c.	Terminal blocks of each type	2 sets	
d.	Heaters of each type	2 sets	
e.	Pulley of each type	2 sets	
f.	Motor of each type and rating	1 Lot (10% of the installed quantity or minimum 1 number whichever is higher)	
g.	Bearing (DE and NDE)	1 Lot (1 set For each type & rating of Motor)	
III	C&I		
1	MEASURING INSTRUMENTS		
1.1	ELECTRONIC TRANSMITTERS		
1.1.1	Transmitters of all types, ranges and model no. (for the measurement of Pressure, differential pressure flow, level etc.)	1 Lot (10% or 2 no. of each type and model, whichever is more)	
1.1.2	Electronic cards / PCB's for each type and model and model of transmitters	1 Lot (10% or 5 nos. of each type, whichever is more)	
1.2	TEMPERATURE ELEMENTS		
1.2.1	RTDs of each type & length	1 Lot (10% or 2 nos. whichever is more)	
1.2.2	Thermocouples of each type like K-type, R-type, metal etc and length	1 Lot (10% or 2 nos. whichever is more)	
1.2.3	Thermowell for T/C & RTDs	1 Lot (10% or 1 no. of each type, rating, length used in the system whichever is more)	
1.2.4	Process actuated switch devices Including all types of pressure, differential pressure, flow, temperature, differential temperature, level switch devices	1 Lot (10% or 1 no. of each type and model whichever is more)	
1.3	INDICATORS/RECORDERS		
1.3.1	Digital Indicators of each model, type & range (including relevant digital indicators of electrical system)	1 Lot (10% or 2 nos. min. whichever is more)	
1.3.2	Vertical Indicators of each type & model	1 Lot (5% or 1 no. of each model whichever is more)	
1.3.3	Recorders for each type and model	1 Lot (5% or 1 no. whichever is more.)	
1.3.4	Consumables for continuous recorders Charts Ink capsules	1 Lot (25 rolls per recorder/ 25 nos per recorder/ 20 nos. per recorder / Ink Pads /Pens.)	
1.3.5	Consumables for multi point recorders		
a.	Charts	1 Lot (5 nos. per recorder)	
b.	Ink pads	1 Lot (5 nos. per recorder)	
c.	Print mechanism/ print head assembly	1 Lot (10% or 5 nos. of each type whichever is more)	
1.3.6	Level transmitters (displacer type)		
a.	Electronic cards / PCB's of level transmitters	1 Lot (10% of total quantity used or 1 for each type/rating whichever is more)	

S. No.	DESCRIPTION	Quantity	
b.	Level transmitters	1 Lot (10% of total quantity used or 1 for each type/rating whichever is more)	
c.	Electronic water level indicator	1 Lot (10% or 2 nos. min. whichever is more)	
1.3.7	PD type flow transmitters	1 Lot (10% of total quantity used or 1 for each type/rating whichever is more)	
1.4	SWITCHES		
1.4.1	Switches (Pressure, DP, Level, Flow, Temperature etc)	1 Lot (10% of each type of total nos. used in the system or minimum 1 no. of each type, model & range whichever is more)	
1.5	Rotameter	1 Lot (10% of each type of total nos. used in the system or minimum 2 no. of each type, model & range whichever is more)	
1.6	SOLENOID VALVE	1 Lot (10% of each type of total nos. used in the system or minimum 2 no. of each type, model & range whichever is more)	
1.7	E/P Converter	1 Lot (10% of each type of total nos. used in the system or minimum 2 no. of each type, model & range whichever is more)	
1.8	SPECIAL INSTRUMENTS		
1.8.1	Nucleonic /non-nucleonic density meter, solid flow meter etc.	1 no. and spare parts as per manufacturer	
1.9	Electrical Transducers	1 Lot (10% of total quantity used or minimum 1 no. of each type and range whichever is more)	
2	PROCESS CONNECTION PIPING (for impulse piping /tubing, sampling piping/ tubing and air supply piping as applicable)		
2.1	Valves of all types and models	1 Lot (10% or 2 no. of each type, class, size and model whichever is more.)	
2.2	2 way, 3way, 5way valve manifolds	1 Lot (10% or 2 no. of each type, class, size and model whichever is more.)	
2.3	Fittings	1 Lot (10 nos. of each type)	
2.4	Purge meters	1 Lot (10 % of each model or 2 Nos. whichever is more)	
2.5	Filter regulators	1 Lot (10 % of each model or 2 Nos. whichever is more)	
2.6	Impulse pipe & tubing of all type	1 Lot (20 mtrs each type & size)	
2.7	Impulse line root valve	1 Lot (10% of total quantity used or 4 no. whichever is more for each type and rating of each size)	
2.8	SS tube	1 Lot (40 mtrs of each type/size)	
2.9	Fitting for SS tube	1 Lot (40 nos. of each type/size)	
3	INSTRUMENTATION CABLE, INTERNAL WIRING AND ELECTRICAL FIELD		
3.1	Pre fabricated cable of each type	1 Lot (10% of installed quantity)	
3.2	Pre fabricated cable connector	1 Lot (10% or 1no. of each type and model, whichever is more.)	
3.3	Other cables	1 Lot (10% of each type, pair and size of actual installed quantity)	
4	ELECTRICAL ACTUATORS		
4.1	Actuators	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.2	Power unit for modulating actuator	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.3	DC-DC unit/power pack units	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	

S. No.	DESCRIPTION	Quantity	
4.4	Electronic cards	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.5	Brake assembly	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.6	Brake coils	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.7	Position feed back transmitters	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.8	Control unit	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.9	Torque and limit switch assembly of each unit	1 Lot (10% or 1 no. of each type, model and rating, whichever is more.)	
4.10	O-ring	1 Lot (1 set of each size)	
4.11	Motor	1 Lot (1 no. of each type & rating)	
4.12	Auxiliary contact	1 Lot (10% of total quantity used or 2 nos. whichever is more for each type and rating of each size)	
4.13	Seal kit	1 Lot (1 set of each type & size)	
5	RADAR TYPE LEVEL TRANSMITTER		
5.1	Transmitter/Receiver	1 Lot (10% or 1 no. of each type transmitter/ receiver)	
5.2	Electronic card	1 Lot (10% or 1 no. of each type electronic card)	
6	CONTROL VALVE		
6.1	NON-CRITICAL CONTROL VALVE	(a) 1 Lot (One set of spare control valve stem packing for each control valve.)	
		(b) 1 Lot (Two moulded rubber diaphragms for each control valve.)	
		(c) 1 Lot (2 no. of gasket for each type/size.)	
		(d) 1 Lot (100% quantity of lubricants for gaskets for each control valve on one year consumption basis.)	
		(e) 1 Lot (2 set of limit switches for each control valve.)	
		(f) 1 Lot (One (1) set of valve trims (such as plug, stem, seat ring/cage, guide bushing, stem lock pin, packing retaining ring etc) for each control valve.)	
		(g) 1 Lot (One completes actuator of each type or min. 10% for each type and size whichever is more.)	
6.2	COMMON SPARES AND ACCESSORIES FOR ABOVE VALVE		
6.2.1	Feed back transmitter unit	1 Lot (10% of total quantity used or 2 nos. whichever is more for each type/rating)	
6.2.2	Electronic positioner	1 Lot (10% of total quantity used or 2 nos. whichever is more for each type/rating)	
6.2.3	Solenoid valve	1 Lot (10% of total quantity used or 2 nos. whichever is more for each type/rating)	
6.2.4	Air filter regulator	2 nos.	
6.2.5	Air lock relay	1 Lot (4 nos of each type)	
6.2.6	Complete actuator for each type and model	1 set	
6.2.7	Volume booster	1 Lot (2 no each type/size)	

S. No.	DESCRIPTION	Quantity	
7	CONTROL PANEL AND LOCAL/ REMOTE CONTROL DESK (AS APPLICABLE)		
7.1	Recorder	1 Lot (1(one) No. each type and model)	
7.2	Bar graph indicator	1 Lot (10% of total quantity used in the system or minimum 1(one) no. whichever is more for each type and model.)	
7.3	Digital indicator	1 Lot (10% of total quantity used in the system or minimum 1(one) no. whichever is more for each type and model.)	
7.4	Mosaic/Conventional Type Push button Station	1 Lot (10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.)	
7.5	Mosaic Type Push button Station with LED Indication	1 Lot (10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.)	
7.6	Mosaic Type LED Indication Station	1 Lot (10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.)	
7.7	Simaphore Indicator	1 Lot (2(two)Nos. each type)	
7.8	ANNUNCIATION SYSTEM (For offsite / Auxiliary Plants)		
7.8.1	Each type of PCB (for non-PLC driven system)	1 Lot (1(one) No. each)	
7.8.2	Lamp Box with Facia & Lamps (LED type)	1 Lot (10% with minimum 2 nos.)	
7.8.3	Hooter	1 (one) No.	
8	Micro PLC system (i.e. integrated CPU & I/O system, where above mentioned components are not applicable)	One complete set	
9	MANDATORY SPARES NOT COVERED ABOVE	Bidder to supply 10% electronic modules/ cards or any other electronic components required for system such as annunciation system for offsite/auxiliary plant, online condensate tube cleaning system, ambient air monitoring system, plant simulator.	

Notes:

- Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender specification apart from specified above, same shall be deemed to have been covered in bidders scope of supply.
- Wherever the requirement has been specified as a set, it will include the total requirement of the item for a unit, module or the station or as specified. Where it is not specified, a set would mean the requirement for the single equipment / system as the case may be. also, the set would include all components required to replace the item.
- All mandatory spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is "not applicable" for particular equipment, then suitable applicable alternate spare has been offered / shall be supplied by the bidder without any financial implication."
- Any item which is quoted as "not applicable" by the bidder in the above list and is found to be "applicable" at a later date shall be supplied by the bidder without any commercial and delivery implication.
- Any cell left blank in the unpriced schedule shall be treated as "Quoted" and is included in total price