

C. Control & Instrumentation (Spares to be considered for the items which are applicable for External CHP)

Sl. No.	Equipment/Package Name	Quantity Required per unit	Remarks	UNIT EX WORKS PRICE	TOTAL EX WORKS PRICE	REMARK
1	DCS /MMI Items					
1.1	Multifunction Processor Unit	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.2	Binary Input Module	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.3	Binary Input Module for SOE Inputs	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.4	Pulse Input Module	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.5	Analog Input Module (4 to 20mA input type)	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.6	Analog Input Module (Thermocouple input type)	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.7	Analog Input Module (RTD input type)	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.8	Analog Output Module (4 to 20mA output type)	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.9	Pulse Output Module	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.10.	Binary Output (contact) Module	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.11	Binary Output (Voltage) Module	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.12	Output Relay modules/ Relay Board & Auxiliary Relay	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.13	Power Supply Unit	10% of total nos. used in the system or minimum 4(four) nos. whichever is more				
1.14	MCB (Miniature case circuit breaker)	10% of total nos. used in the system or minimum 10(ten) nos. whichever is more				
1.15	Racks for housing I/O & Processor Modules	1(One) no. each type used in the system				
1.16	Network communication cable with end connectors	10% of total nos. used in the system or minimum 4(four) nos. whichever is more				
1.17	I/O Connector with prefab cable	10% of total nos. used in the system or minimum 4(four) nos. whichever is more				
1.18	Communication Processor / Card	10% of total nos. used in the system or minimum 4(four) nos. whichever is more				
1.19	Network Interface card	10% of total nos. used in the system or minimum 4(four) nos. whichever is more				
1.20	Any other system specific Module/Cards used in the system but	10% of total nos. used in the system or minimum 1(one) no. whichever is more for				
1.21	Signal Isolator Module/Card	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				

1.22	Network Items for DCS					
1.22.1	Network Switch	10% of total nos. used for each type and model in the system or minimum 1(one) no.				
1.22.2	LIU unit	10% of total nos. used for each type and model in the system or minimum 2(two) no.				
1.22.3	Transceiver (Optical to UTPconverter)	10% of total nos. used for each type and model in the system or minimum 2(two)				
1.22.4	Fibre-optic Patch Cords	10% of total nos. used for each type and model in the system or minimum 2(two)				
1.22.5	Other associated Hardware	10% of total nos. used for each type and model in the system or minimum 2(two)				
1.23	Networking Cable					
1.23.1	FO Cable	1(one)Km. of each type of Cables				
1.23.2	Other Cable (Viz. Co-axial Cable, UTP Cable etc.) as applicable	500mtrs. for each type & rating				
1.24	Dot Matrix Printer	2nos. Complete Unit				
1.25	Key Board	2nos.				
1.26	Mouse/ Trackball	2nos.				
1.27	Complete Set of Operators Work Station	2nos. complete set				
1.28	21" Colour TFT Monitor	2nos. complete set				
1.29	Hard Disk Drive for the work Station	2nos complete set				
1.30	Floppy Drive	2nos complete set				
1.31	Floppy Diskettes	10 (ten) packs				
1.32	Dot Matrix Printer's Cartridge	25 (twenty five) nos.				
1.33	Toner for colour Laser Printer	10 (ten) nos. each colour other than black & 20nos. black				
1.34	Memory Module/ EEPROM Chip	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
1.35	Battery for RAM Backup	2 (two) nos.				
1.36	Fuse: Card mounted type, PCB mounted type, Rack Power supply etc.	Each type of fuse, 25% of total nos. used in the system or minimum 25 nos. whichever				
1.37	Terminal Block	10% of total nos. used in the system for each type and rating.				
1.38	Read-Write CD/DVD	2 (two) no. complete set				
1.39	Blank CD/DVD	50 (fifty) nos.				
1.40	Interposing Relays	10% of total nos. used in the system or minimum 10(ten) nos. whichever is more.				
2	Large Video Screen					

2.1	Lamp for Large Video Screen Display (DLP type)	15 (fifteen) nos.				
2.2	Video Input Card	1No. each type and model				
2.3	Video output Card	1No. each type and model				
2.4	Interfacing Module/componets with DCS	1No. each type and model				
3	PLC System					
3.1	CPU Card	1No.				
3.2	Communication Processor Module	1No. for each type				
3.3	Binary Input Card	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
3.4	Pulse Input Card	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.				
3.5	Analog Input Card (4 to 20 mA type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.				
3.6	Analog Input Card (TC input type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.				
3.7	Analog Input Card (RTD input type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.				
3.8	Binary Output Card for contact	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
3.9	Binary Output Card for Voltage (24VDC)	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
3.10	Pulse output Card	1No.				
3.11	Analog Output Card (4 to 20 mA type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.				
3.12	Interposing Realy	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
3.13	Output Relay modules/ Relay Board & Auxiliary Relay	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.				
3.14	Communication Modules	1No. for each type				
3.15	Prefab-cable with connector for CPU, Communication Card and I/O racks	1No. for each type				
3.16	Networking Modules/Components/Switch	1No. for each type				
3.17	Power Supply Unit for CPU, Communication Card and I/O racks	10% of total nos. used in the system or minimum 2(two) nos. whichever is more for				
3.18	RAM Backup Battery	2 (two) nos.				
3.19	MCB	1No. for each type and rating				
3.20	Special Fuse for the Cards	Each type/rating of fuse, 25% of total nos. used in the system or minimum 25 nos.				
3.21	MMI Unit					
3.21.1	21" Monitor	1No.				
3.21.2	Key Board	1No.				

3.21.3	Mouse/ Trackball	1No.				
3.22	UPS for PLC system (applicable for	Refer Si. No. 11				
3.23	Network Items for PLC					
3.23.1	Network Switch	10% of total nos. used for each type and model in the system or minimum 1(one) no.				
3.23.2	LIU unit	10% of total nos. used for each type and model in the system or minimum 2(two) no.				
3.23.3	Transceiver (Optical to UTPconverter)	10% of total nos. used for each type and				
3.23.4	Fibre-optic Patch Cords	10% of total nos. used for each type and				
3.23.5	Other associated Hardware	10% of total nos. used for each type and				
3.23.6	Networking Cable					
3.23.6.1	FO Cable	1(one)Km. of each type of Cables				
3.23.6.2	Other Cable (Viz. Co-axial Cable,	500mtrs. for each type & rating				
3.24	Dot Matrix Printer	1nos. Complete Unit				
3.25	Complete Set of Operators Work	1nos. complete set				
3.26	Hard Disk Drive for the work Station	2nos complete set				
3.27	Floppy Drive	2nos complete set				
3.28	Dot Matrix Printer's Cartridge	25 (twenty five) nos.				
3.29	Toner for colour Laser Printer	10 (ten) nos. each colour other than black				
3.30	Memory Module/ EEPROM Chip	10% of total nos. used in the system or				
3.31	Battery for RAM Backup	2 (two) nos.				
3.32	Fuse: Card mounted type, PCB	Each type of fuse, 25% of total nos. used in				
3.33	Terminal Block	10% of total nos. used in the system for				
3.34	Read-Write CD/DVD	2 (two) no. complete set				
3.35	Blank CD/DVD	50 (fifty) nos.				
3.36	Micro PLC system (i.e. inegrated CPU	One Complete Set				
4	Field Instrument					
4.1	Electronic Transmitters (Pressure,	1(One) no. complete set for each type and				
4.2	Switch (Pressure, Differential Pressure,	1(One) no. of each type & model/range				
4.3	Thermocouple	10% of each type and length of the total				
4.4	RTD	10% of each type and length of the total				
4.5	Thermo-well for both TC and RTD	One no. for each type and rating/length				
4.6	Solenoid Valve					
4.6.1	Complete Solenoid Valve Assembly	2Nos. for each type and rating used in the				
4.6.2	Coil (single or double coil type)	10% of total nos. used in the system or				
4.7	Gauge (Pressure, Differential Pressure,	10% of total nos. used in the system or				
4.8	Air Filter Regulator complete set with	10Nos.				
4.9	Rotameter	10% of total nos. used in the system or				

4.10.	Gauge Glass	1No. for each type and size				
4.11	Erection Hardware					
4.11.1	Transmitter's Manifold	10% of total nos. used in the system or				
4.11.2	Impulse Line Root valve	10% of total nos. used in the system or				
4.11.3	Impulse Line fittings	Each type/size 25Nos.				
4.11.4	Impuse Pipe	Each type/size 50Mtrs.				
4.11.5	SS Tube	Each type/size 100Mtrs.				
4.11.6	Fittings for SS Tube	Each type/size 100Nos.				
4.12	Conductivity Type Level Switch					
4.12.1	Conductivity Ttype level Probes	10% of total nos. used in the system or				
4.12.2	Complete Electronics unit	1Set				
4.12.3	Isolating/Root Valve	2Nos.				
4.13	Cable					
4.13.1	Thermocouple Cable	2(two)Km. of each type, size & rating of				
4.13.2	Control & Instrumentation Cable	2(two)Km. of each type, size & rating of				
4.14	Current/Voltage Transducers	1(one) no. each type/rating used in the				
4.15	MWatt/MVAR Transducer	1(one) no. each type/rating used in the				
5	SWAS (Including Water Analyzers					
5.1	Conductivity					
5.1.1	Conductivity Sensor/cell for each type	20% of the total no. used in the system or				
5.1.2	Conductivity Transmitter Complete Set	20% of the total no. used in the system or				
5.2	pH					
5.2.1	pH Sensor	20% of the total no. used in the system or				
5.2.2	pH Transmitter Complete Set	20% of the total no. used in the system or				
5.2.3	Sensor recharger	20% of the total no. used in the system or				
5.3	Sodium Analyser					
5.3.1	Sodium Analyser Electrode	1(one) no.				
5.3.2	Critical Electronic spare part for	1(one) no. each type				
5.3.3	Reagent container	1 no.				
5.3.4	Refurbishment kit for sodium analyser	1 no.				
5.3.5	Consumable kit/ Chemical Reagent for	For maintaining the system for 1(one) Year				
5.4	Silica Analyser					
5.4.1	Critical Electronic spare part for Silica	1(one) no. each type				
5.4.2	Reagent container	1 no.				
5.4.3	Cuvette assy for silica	1 no.				
5.4.4	Pump motor for silica	1 no.				
5.4.5	Tube replacement kit	1 set				
5.4.6	Fuses of each type	2nos. each				

5.4.7	Consumable kit/ Chemical Reagent for	For maintaining the system for 1(one) Year				
5.5	Hydrazine Analyser					
5.5.1	Critical Electronic spare part for	1(one) no. each type				
5.5.2	Cell Recharge kit	1 no.				
5.5.3	Porus Disc	1 no.				
5.5.4	Seal rings	1 set				
5.5.5	Fuses of each type	2nos. each				
5.5.6	Consumable kit/ Chemical Reagent for	For maintaining the system for 1(one) Year				
5.6	Dissolve Oxygen					
5.6.1	Dissolve Oxygen Sensor Complete Set	1(one) no.				
5.6.2	Dissolve Oxygen Analyser Complete	1(one) no.				
5.7	Phosphate Analyser					
5.7.1	Electrode	1(one) no.				
5.7.2	Critical Electronic Spare Parts for	1(one) no. each MPC				
5.7.3	Consumable kit/Chemical Reagent for	For maintaining the system for 1(one) year				
5.8	Other Hardware					
5.8.1	Stainer each type	2(two) nos.				
5.8.2	Sample Cooler	2(two) nos.				
5.8.3	High Pressure Reducing Valve	5(five) nos.				
5.8.4	Cation column	5(five) nos.				
5.8.5	Pressure Gauge, Pressure Switch,	10% of total quantity of each item and				
5.8.6	Annunciation System					
5.8.6.1	Each type of PCB	1(one) No. each				
5.8.6.2	Lamp Box with Facia & Lamps (LED	5(five)Nos.				
5.8.6.3	Hooter	1(one) No.				
5.8.7	Auxiliary/Power Contactor, Push	10% of total quantity of each type of items				
5.9	Chiller Unit					
5.9.1	Auxiliary/Power Contactor, Push Button, Indicating Lamp, Fuse, thermal overload etc. for Chiller Unit	10% of total quantity of each type of items used in the system or minimum 1(one) nos. whichever is more.				
5.9.2	Pressure Switch, Temperature Switch, Isolating Valve, Solenoid Valve, Thermostat etc.	10% of total quantity of each type of items used in the system or minimum 1(one) nos. whichever is more.				
6	On Line Flue Gas Analysis					
6.1	Matter/ Dust Density Monitor					
6.1.1	IR source / Transmitter unit	1 (one) no.				
6.1.2	Sink/Receiver unit	1 (one) no.				
6.2	CO, NOX, SOX Analyser (Insitu Probe					
6.2.1	Filter element of Air dryer	1 no. each type				
6.2.2	IR Source unit	1 no.				

6.2.3	Reflector Unit	1 no.				
6.2.4	Gas difuser window unit	1 no.				
6.3	Oxygen Analyser					
6.3.1	Field Sensor	2(two) nos. complete unit				
6.3.2	Field Transmitter/complete Electronic	1(one) no. complete unit				
6.3.3	Power supply Card	1 no.				
6.3.4	Instrumentation Hardware (viz,	1 no. each items/type				
6.4	Co-Analyser					
6.4.1	Field sensor	2 (two) nos. complete unit				
6.4.2	Field Transmitter/Complete Electronic	1 (one) no. complete unit				
6.4.3	Power supply Card	1 no.				
6.4.4	Instrumentation Hardware	1 no each item/type				
7	Pneumatic Control Valve & Power					
7.1	Control Valve					
7.1.1	Pneumatic Diaphragm for Diaphragm	2(two) nos. for each type of Actuator				
7.1.2	Actuator Seal Kit for Pneumatic	2(two) nos. for each type of Actuator				
7.1.3	Gland Packing	1(one) set for each type of Control Valve				
7.1.4	Plug, Seat, Cage, Stem etc.	1(one) set for each type of Control Valve				
7.1.5	Retainer Ring, Seal Ring etc.	1(one) set for each type of Control Valve				
7.1.6	Gasket	2(two) Sets. for each type of Control Valve				
7.2	Power Cylinder					
7.2.1	Actuator Seal Kit	2(two) nos. for each type of Power				
7.2.2	Gasket	2(two) Sets. for each type of Power				
7.2.3	Complete Set of Power Cylinder	1(one) no. each type for all application				
7.3	Common Items for Control Valve &					
7.3.1	Position Transmitter complete set	10% of total quantity used in the system or				
7.3.2	Control Valve/Power Cylinder E/P	10% of total quantity used in the system or				
7.3.3	Complete Set of Solenoid Valve for	2Nos. for each type & ratings				
7.3.4	Solenoid Coil for Pneumatic type	5Nos. for each type & ratings				
7.3.5	Position Limit Switch for Pneumatic	10Nos. for each type & ratings				
7.3.6	Air Lock Relay	10Nos. for each type				
7.3.7	Signal Air Booster Unit	2Nos. for each type				
8	Turbine Supervisory Instruments &					
8.1	Probes with extension cable	10% of total quantity used in the system or				
8.2	Signal Converter/Proximitor for	10% of total quantity used in the system or				
8.3	Rack Mounted Monitors for Transducer	10% of total quantity used in the system or				
8.4	Rack Interface Modules	10% of total quantity used in the system or				

8.5	Configurable type Relay Output	10% of total quantity used in the system or				
8.6	Communication/Gateway Modules	10% of total quantity used in the system or				
8.7	Rack Mounted Power Supply Modules	10% of total quantity used in the system or				
9	Closed Circuit Television System					
9.1	Complete Camera Unit	Each type 1(one) no.				
9.2	PTZ Unit for the Camera	Each type 2(two) no.				
9.3	Driver/Receiver unit for Camera control	Each type 2(two) no.				
9.4	Video Streamer	10% of total quantity used in the system or				
9.5	Camera Mounting Housing	10% of total quantity used in the system or				
9.6	Monitor	1 no.				
10	Control Panel And Local/Remote					
10.1	Recorder	1(one) No. each type and model				
10.2	Bar graph indicator	10% of total quantity used in the system or				
10.3	Digital indicator	10% of total quantity used in the system or				
10.4	Mosaic/Conventional Type Push button	10% of total quantity used in the system or				
10.5	Mosaic Type Push button Station with	10% of total quantity used in the system or				
10.6	Mosaic Type LED Indication Station	10% of total quantity used in the system or				
10.7	Simaphore Indicator	2(two)Nos. each type				
10.8	Annunciation System (For					
10.8.1	Each type of PCB (for non-PLC driven	1(one) No. each				
10.8.2	Lamp Box with Facia & Lamps (LED	10% with minimum 2 nos.				
10.8.3	Hooter	1(one) No.				
10.9	Current/Voltage Transducers	1(one) no. each type/rating used in the				
11	UPS (For BOP systems) - For rating					
11.1	Fuse	3 (Three) times of total quantity of each				
11.2	SCR	10% of total quantity of each type used in				
11.3	Diode	10% of total quantity of each type used in				
11.4	IGBT	2 (two) nos.				
11.5	Electronic Module/ PCB					
11.5.1	Static Switch	1 (one) no. each type of Electronic				
11.5.2	Inverter	1 (one) no. each type of Electronic				
11.5.3	Static voltage Regulator	1 (one) no. each type of Electronic				
11.5.4	Charger	1 (one) no. each type of Electronic				
11.6	UPS Battery					
11.6.1	Battery Cell (Uncharged, Dry)	8 nos.				
11.6.2	Inter connecting cell strips	10 nos.				
11.6.3	Vent cap	10 nos.				
11.6.4	Hydrometer	1 no.				

11.6.5	Rubber gloves	1 pair				
11.6.6	Voltmeter for measuring cell voltage	1 no.				
11.6.7	Funnel	1 no.				
11.6.8	Jug	1 no.				
11.6.9	Apron & Goggles	1 set				
11.6.10	Cell lifting puller	1 no.				
11.6.11	Insulated socket spanner with handle	1 no.				
11.6.12	Terminal screw with bellaville washer	5% of total quantity used				
11.6.13	Plastic filling bottle	1 no.				
11.6.14	Thermometer	1 no.				
12	Control Panel/Desk Mounted Items					
12.1	Push Button					
12.1.1	Complete assembly	5Nos for each colour				
12.1.2	Contact Element (1NO + 1NC) Block	20Nos.				
12.2	Selector Switch	10Nos. for each type and rating				
12.3	Meter (Analog or Digital)					
12.3.1	Ammeter	1No. for each type and range				
12.3.2	Voltmeter	1No. for each type and range				
12.4	Indicating Lamps complete assembly	10Nos. for each Colour and type				
12.5	Mimic Lamps	10Nos. for each Colour and type				
12.6	MCB	2Nos. for each type and rating				
12.7	Door Limit Switch	2Nos.				
12.8	Annunciation system					
12.8.1	Lamp Box with Facia & Lamps (LED	25Nos.				
12.8.2	Hooter	1No.				
12.8.3	Each type of PCB (for non-PLC driven	1(one) no.				
13	Plant communication system					
13.1	Handset Complete with microphone,	5 Nos.				
13.2	Microphone on handset	10 Nos.				
13.3	Earpiece on handset	10 Nos.				
13.4	Amplifier volume control on handset	10 Nos.				
13.5	Press-to-page switch on handset station	10 Nos.				
13.6	Loudspeaker mute switch on handset	10 Nos.				
13.7	Function Switch on handset station	10 Nos.				
13.8	Electronic modules with all					
13.8.1	Pre-amplifier	10Nos.				
13.8.2	Power-amplifier.	10Nos.				
13.8.3	Power Supply	10Nos.				

13.9	Loudspeaker for the following speaker					
13.9.1	Re-entrant horn type	5 Nos.				
13.9.2	Cone type	2 Nos.				
13.10	Transmitter Capsule on Handset of:					
13.10.1	Push Button Operated Telephone Sets	20Nos.				
13.10.2	Rotary Type Telephone Sets Type "Z"	15Nos.				
13.10.3	Telephone sets for PA System	10Nos.				
13.11	Receiver Capsule on Handset of :					
13.11.1	Push Button Operated Telephone Sets	20 Nos.				
13.11.2	Rotary Type Telephone Sets Type "Z"	15Nos.				
13.11.3	Telephone sets for PA System	10Nos.				
14	GPS Master Clock system					
14.1	Electronic modules	10% of total quantity of each type used in				
15	Rotating System Machine Condition Monitoring System					
15.1	Vibration Transducers	10% of total quantity of each type used in				
15.2	Power supply module	02 Nos.				
15.3	Vibration Monitor cards	10% of total quantity of each type used in				
15.4	Other electronic cards	10% of total quantity of each type used in				