



Government of India
Bhabha Atomic Research Centre
Visakhapatnam

UC-1 Annex, BARC Main Campus
Gajuwaka-Yellamanchili Road
Maduturu Sub Post Office
Near Visakhapatnam-531011

Lr No: BARC (V)/CES/GOB/Corr-01/1575

Date: 12.05.2026

Name of Work: "Construction of General Office Building and other miscellaneous works at BARC Main campus, Atchutapuram, Near Visakhapatnam, A.P"

NIT NO. : BARC(V)/CES/GOB/215, Dated: 24.04.2026

Technical Specifications and Payment Schedules (as applicable) for Electrical, IT and Mechanical works are enclosed herewith. Bidders may note accordingly.

All other terms and conditions of the tender document remain unchanged.

Encl:

- 1) Technical Specifications and Payment Schedules for Electrical works
- 2) Technical Specifications and Payment Schedules for IT works
- 3) Technical Specifications for Mechanical works

Sd/-

Chief Engineer

Bhabha Atomic Research Centre
Visakhapatnam

TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORKS

Document No. : TS-E001		
Equipment		Lighting Fixtures
S. No.	Particulars	Specified by BARC
A	<u>Lighting fixture</u>	
1	Suggested Manufacturers	M/s Philips, M/s Wipro, M/s Havells or OEM
2	Type of lamp	LED
3	Luminous Efficacy	Min. 100 Lumens/ Watt
4	Mounting	Surface Mount/ Recess Mount/ Batten Type/Mirror light/Hanging type
5	Supply Voltage	Single Phase, 220-240 V AC, 50 Hz
6	CCT	6500 K
7	CRI	80%
8	THD	<10 %
9	IP rating	IP 20 or better
10	Surge protection	Inbuilt surge protection up to 2.5kV shall be available
11	Warranty	Lighting fixture shall be provided with 5 years warranty from the date of commissioning. During this 5 years, if any fixture becomes faulty, the same shall be replaced by contractor at no additional price. If faulty fixture is not replaced within 2 months from the date of notification to the contractor, then work order rate of the fixture including GST shall be recovered from the "LED lights 5 Years performance deposit". The remaining amount under "LED lights 5 Years performance deposit" will be released after 5 years from the date of completion of the work.
12	Reports to be produced along with datasheets	LM 79, LM 80, TM 21
B	Installation	
1	M.S. items like channels/ angles/ flats/ Supports, flexible conduit from ceiling to fixture as per site requirement), connecting wire through connectors, PVC Connectors etc required for installation of lighting fixtures.	Cost of these items to be included in the quoted rates of lighting fixture
C	Inspection & Testing	GTP/Routine Test Certificates or Sample of lighting fixture to be approved by the department before procurement.

Document No. : TS-E001		
Equipment		Lighting Fixtures
D	Note	Cutting of gypsum sheet/matrix false ceiling for fixing/adjustment of recessed mounted luminaries as per drawing and electrical connection to nearest ceiling rose to be included in the quoted rate. Cost of Drilling in slab, fixing screw/nails in slab/wall, metal wire for hanging of recess lighting fixture, copper lugs, crimping of lugs and copper wire for connecting of light fixtures, PVC connectors, cutting wall are included in quoted rate.

Document No. : TS-E002		
1200mm sweep Ceiling Fan		
S. No.	Parameters	Specified by BARC
1	General	
1.1.1	Suggested manufacturer	M/s Usha/Crompton/ Havells
2	Details of ceiling fan	
2.01	Type of fan	BLDC Fan
2.02	Supply suitability for operation of fan	230V AC, single phase, 50 Hz
2.03	Sweep of fan	1200 mm
2.04	Down rod length	Down rod as suitable at site. (Length may vary from 300 mm to 1000 mm)
2.05	Winding material	Copper
2.06	Mounting	Ceiling mounted using fan hook box.
2.07	Blades	To be provided
2.08	Canopy	To be provided
2.09	Terminal block	To be provided
2.10	Earthing terminals	Two nos of earthing terminals to be provided
2.11	Wiring	To be wired upto terminal block
2.12	Safety Wire	To be Provided.
2.13	Color	Ivory/White or any other color to be approved by the department.
3	Installation	
3.01	M.S. items like channels/angles/flats/fan hooke etc. as required for installation of ceiling fan. Also flexible PVC Conduits to be considered in the scope of installation.	Cost of these items to be included in the quoted rates of ceiling fan
3.02	Wiring, external power and control cables,data cable, cable trays, cable trenches, wall opening etc	Not to be included in the quoted rates of ceiling fan

Document No. : TS-E002		
1200mm sweep Ceiling Fan		
S. No.	Parameters	Specified by BARC
4	Sample Approval	GTP/Routine Test Certificates/Sample of Ceiling fan to be approved by the department before procurement.
5	Note	Adjustment and making holes in false ceiling for hanging of ceiling fan is included in scope of work along with metal wire for safety of hanging of fan. This has to be tied with fan base and fan hook box. Thickness about 2.5 sq mm, stranded steel wire. 2 wheeler brake wire to be used as safety wire

Document No. : TS-E002		
200mm sweep Exhaust Fan-PVC		
S. No.	Parameters	Specified by BARC
1	<u>General</u>	
1.1	Project Site	
1.1.1	Suggested manufacturer	M/s Crompton/Almonard/Usha
2	<u>Details of Exhaust fan</u>	
2.1	Type	Single phase, high efficiency
2.2	Supply suitability for operation of fan	230V AC, single phase, 50 Hz
2.3	Sweep of fan	200 mm dia
2.4	Winding material	Copper
2.5	Condenser	As per Manufacturer
2.6	Mounting	Window mounted
2.7	Blades	To be provided
2.8	Canopy & louvers	To be provided
2.9	Terminal block	To be provided
2.10	Wiring	To be wired up to socket with plug top. Plug Top to be Provided by the Bidder.
2.11	Construction of Material	Plastic Body
3	Installation	
3.1	M.S. items like channels/angles/flats etc required for installation of exhaust fan.	Cost of these items to be included in the quoted rates of Exhaust fan
3.2	wall opening and finishing the wall as per previous condition etc	To be included in the quoted rates of Exhaust fan
4	Sample Approval	GTP/Routine Test Certificates and Sample of exhaust fan to be approved by the department before procurement.

Document No. : TS-E002		
200mm sweep Exhaust Fan-PVC		
S. No.	Parameters	Specified by BARC
5	Note	Wire of 2.5 sq mm Phase, neutral, earth TRS wire of white color with plug top to be provided along with Exhaust fan. Fixing of fan in the aluminum frame of is in scope of work

Document No. : TS-E002		
Exhaust Fan-Metallic Body		
S. No.	Parameters	Specified by BARC
1	General	
1.1	Project Site	
1.1.1	Suggested manufacturer	M/s Crompton/Almonard/Usha
2	Details of Exhaust fan	
2.1	Type	Single phase, high efficiency
2.2	Supply suitability for operation of fan	230V AC, single phase, 50 Hz
2.3	Sweep of fan	300mm
2.4	Winding material	Copper
2.5	Condenser	As per Manufacturer
2.6	Mounting	Window mounted
2.7	Blades	To be provided
2.8	Canopy & louvers	To be provided
2.9	Terminal block	To be provided
2.10	Wiring	To be wired upto socket with plug top
2.11	Construction of Material	Metalic Body
3	Installation	
3.1	M.S. items like channels/angles/flats etc required for installation of exhaust fan.	Cost of these items to be included in the quoted rates of Exhaust fan
3.2	wall opening and finishing the wall as per previous condition etc	To be included in the quoted rates of Exhaust fan
4	Sample Approval	GTP/Routine Test Certificates and Sample of exhaust fan to be approved by the department before procurement.
5	Note	Minimum 1.5 meter of 2.5 sq mm Phase,neutral,earth TRS wire of white color with plug top to be provided along with Exhaust fan. Louvers should also be provided with exhaust fan

Document No. : TS-E002		
Wall Mounted Fan		
S. No.	Parameters	Specified by BARC
1	General	
1.1	Project Site	
1.1.1	Suggested manufacturer	M/s Crompton/Almonard/Usha
2	Details of Exhaust fan	
2.1	Type	Single phase, high efficiency
2.2	Supply suitability for operation of fan	230V AC, single phase, 50 Hz
2.3	Sweep of fan	400 mm sweep
2.4	Winding material	As per Manufacturer
2.5	Condenser	As per Manufacturer
2.6	Mounting	Wall mounted
2.7	Blades	To be provided
2.8	Protection guard	To be provided
2.9	Terminal block	To be provided
2.10	Wiring	To be wired upto socket with plug top
3	Installation	
3.1	M.S. items like channels/angles/flats etc required for installation of exhaust fan.	Cost of these items to be included in the quoted rates of Exhaust fan
3.2	wall opening and finishing the wall as per previous condition etc	To be included in the quoted rates of Exhaust fan
4	Sample Approval	GTP/Routine Test Certificates and Sample of exhaust fan to be approved by the department before procurement.
5	Note	The fan speed should have adjustable speed control of 3 levels, speed adjusted with strings, tilt and oscillation control,

Equipment : Insulating Mat		
S. No.	Particulars	Specified by BARC
A	<u>insulating Mat</u>	
1	Suggested Manufacturers	Electromat/Dozz or OEM.
2	Type	Class B- 11 KV Class
3	Thickness	2.5 mm+/- 10 %
4	Width	1 mtr
5	Properties	Shall be free from attacks from Acid/Alkali/Transformer Oil etc.
6	Fire Retardant Property	Shall have fire retardant properties.

Equipment : Insulating Mat		
S. No.	Particulars	Specified by BARC
7	Installation	The mat shall be fixed on the floor of sub-station. The cost of cutting the mat as per width of panel and fixing it at the floor (as directed by Engineer-in- Charge) is to be included in the cost of insulating mats.
8	Ref Standard	IS 15652:2006

DOCUMENT NO. : TS-E004		
Equipment : Power Panels		
S. No.	Particulars	Specified by BARC
A	Equipment specification	
1	<u>General Particulars</u>	
1.1	Suggested manufacturers	L&K, Siemens, Schneider Electric, ABB , Indo Asian or any panel builder approved by the department.
1.2	Type of LT Panel	Single door Metal Enclosed Switchgear
1.3	Rated voltage	415 V
1.4	Number of phases	Four Pole
1.5	Rated frequency	50 Hz
1.6	System Neutral earthing	Solidly earthed
1.7	Maximum system voltage	460 V
1.8	One minute power frequency voltage	
1.8.1	For power circuits	2.5kV
1.8.2	For control circuits	2kV
1.8.3	For circuits connected to CT secondary	2kV
1.8.4	Reference design ambient temp (Amb T)	45 degC
1.8.5	Reference standard	as per IEC 61439
1.9	Short circuit withstand for bus bars and droppers	
1.9.1	One second rating	16kA (RMS)
1.9.2	Dynamic rating	40kA (Peak)
1.9.3	Max. temp. at continuous current rating under (Amb T) for busbar, contacts, joints, cubicle etc..	as per IEC 61439
1.9.4	Door Interlock	The incomer MCCB shall trip in the event of opening of cable chamber.

1.10	Bus Bar	Electrolytic grade high conductivity Copper busbar for all phases and Earth Busbar. Calculation for BUS Bar Design for withstanding short circuit current, temperature rise to be approved by EIC.
Note:	The bus bar material is copper for all phases and all the panels and detailed calculation of bus bar sizing needs to be submitted and approved by the department. Panel Drawings submitted without bus bar sizing calculation shall not be accepted.	
2	<u>Constructional Particulars</u>	
2.1	Sheet metal	CRCA Sheet
2.2	Thickness of sheet	2 mm construction (1.6mm only for partition between compartments)
2.3	Treatment and Painting	7 tank process with epoxy powder coating paint as per IS 5
2.4	Colour finish shade	
2.4.1	Inside	Siemens grey (RAL 7032)
2.4.2	Outside	Siemens grey (RAL 7032)
2.5	Baseframe	MS ISMC
2.6	Earth bus bar material and size	Copper, 300 sq.mm (Minimum)
2.7	Clearance in air of live parts	
2.7.1	Phase to phase	25 mm
2.7.2	Phase to earth	19 mm
2.8	Cable entry	Top and Bottom Entry
2.9	Single front/double front	Single front
2.10	Degree of protection	IP 43
2.11	Forms of separation	3b or above
3	<u>Auxiliary Components.</u>	
3.1	<u>Panel Light</u>	
3.1.1	Type	LED type
3.1.2	Voltage	240V, single phase, 50 Hz
3.2	<u>Receptacle</u>	
3.2.1	Type	Industrial/Domestic
3.2.2	Rating	240V AC, single phase, 50 Hz, 5A, 3 pin
3.2.3	Switching	MCB
3.3	<u>Space heaters</u>	
3.3.1	Type	Strip type
3.3.2	Voltage	Single phase, 240V AC, 50 Hz
3.3.3	KW rating and quantity in numbers	As per manufacturer design
4	<u>Feeder Components .</u>	
4.1	<u>Terminations</u>	
4.1.1	<u>Suggested manufacturers of connectors (if specified)</u>	Phoenix, Elmex

4.1.2	Power connection to bus bar	
4.1.2.1	For feeders rated above 63A	Extended copper bar
4.1.2.2	For feeders rated 63A and below 63A	4 No, Single core flexible copper conductor cable
4.1.3	Power connection (External)	As per feeder type/ Spare type
4.1.4	Power terminal (External)	As per feeder type/ Spare type
4.1.5	Control connection	2.5sq.mm
4.1.6	Control terminal	Connector at cable chamber
4.2	<u>Moulded case circuit breaker (MCCB)</u>	
4.2.1	<u>Suggested manufacturers</u>	L&K, ABB, Siemens, Schneider, Legrand
4.2.2	Rated current inside cubicle at (Amb T)	As per feeder type/ Spare type
4.2.3	Voltage, frequency, No. of poles	415 V, 50 Hz, Four Pole
4.2.4	Utilization category	A
4.2.5	Rated breaking capacity	I (Ultimate)= I (Service)= 25kA/36kA (RMS)
4.2.6	Rated making current	65 kA/92 kA (peak)
4.2.7	Operating mechanism	Manual with extended rotary handle
4.2.8	Auxiliary contact for remote use	1(NO) + 1(NC)
4.2.9	Releases (with inbuilt CT)	
4.2.9.1	Type	As per feeder type/ Spare type
4.2.9.2	Trip contacts for remote use	1(NO) + 1(NC)
4.2.9.3	Standards	Shall conform to IS 3231, IS 60947 and qualified for the operating conditions
4.3	<u>Current transformer</u>	
4.3.1	<u>Suggested manufacturer</u>	AE/ Kappa/ Pragati/ Precision
4.3.2	Type	Cast resin
4.3.3	System voltage & frequency	415 V, 50 Hz
4.3.4	Power frequency withstand voltage	3 kV
4.3.5	Class of insulation	Class-F or better
4.3.6	Winding material	Copper
4.3.7	Rated primary current and ratio	As per feeder type/ Spare type
4.3.8	Short time current rating (1 Second)	16 kA (RMS)

4.3.9	Accuracy class & burden	
4.3.10	For metering	Class 1 , 15 VA
4.3.11	For protection	5P10, 10VA
4.4	<u>Multifunction digital meter (MDM)</u>	
4.4.1	<u>Suggested manufacturer</u>	AE, Siemens, Schneider
4.4.2	Accuracy class	Class 1
4.4.3	Voltage input	110V and 415V (selectable at site)
4.4.4	Current input	1A
4.4.5	Measurement	V, I, kW, kWh, kVA, kVAR, Pf, Hz
4.4.6	Display	LCD type Only. LED type is not acceptable.
4.4.7	Communication	RS485 port, IEC61850
4.4.8	Similar Model	M/s Siemens PAC 3200 or equivalent model among suggested makes
4.5	MCB	
4.5.1	<u>Suggested manufacturer</u>	Legrend, Siemens, Schnider, ABB, L&K
4.5.2	Rated breaking capacity	10 kA
4.5.3	Rated current inside cubicle at (Amb T)	As per requirement
4.6	RCCB	
4.6.1	<u>Suggested manufacturer</u>	Legrend, Siemens, Schnider, ABB
4.6.2	Number of poles	Double pole and Four Pole
4.6.3	Leakage sensitivity	30mA
4.6.4	Rated current inside cubicle at (Amb T)	As per requirement
4.7	<u>Indicating lamps</u>	LED type lamps, screw type replaceable for each indication
4.8	<u>Control circuit</u>	
4.8.1	Protected by	MCB
4.8.2	Rated current	As per manufacturer design
4.8.3	No. of poles of MCB	As per manufacturer design
4.8.4	Schematic drawing	As per feeder type/ Spare type
4.9	Space Heater	To be included with thermostat for auto start
5	<u>Feeder Types, their Components with quantity For PCC-01</u>	
5.1	Feeder type	MCCB--IN-630A, Four Pole
5.1.1	Quantity of feeders	1 Nos.
5.1.2	Terminations	
5.1.2.1	Power connection (External)	suitable for connecting 3.5C x 400 sq.mm. Al Cable.
5.1.2.2	Power terminal (External)	Extended copper strips
5.1.3	Moulded case circuit breaker (MCCB)	1No

5.1.3.1	Rated current inside cubicle at (Amb T)	630A
5.1.3.2	Release Type	TM based O/C, S/C, E/F, U/V with adjustable short circuit and Overload settings. ELR to be provided for incomer
5.1.4	Current transformer (excluding inbuilt CT of releases)	
5.1.4.1	Rated primary current and ratio	630/5A
5.1.4.2	Metering CT	One for each phase
5.1.5	Indicating lamps	6No (R,Y,B,On,OFF,Trip)
5.1.6	Control circuit	1 Set
5.1.7	Analogue current meter	1 Set
5.1.7.1	Range	0-630
5.1.8	Analogue voltage meter	1 Set
5.1.9	Multifunction digital meter (MDM)	1 Set
5.1.10	Control circuit	1 Set
5.1.11	Emergency Stop PB	To be Provided.
5.1.12	MDM	To be Provided.
5.2	Feeder type	MCCB-OG-200 A, Four Pole
5.2.1	Quantity of feeders	1 No.s
5.2.2	Terminations	
5.2.2.1	Power connection (External)	Suitable to 200A/4C X 25 sq.mm. Al cable
5.2.2.2	Power terminal (External)	Extended copper strips
5.2.3.1	Rated current inside cubicle at (Amb T)	200 A
5.2.3.2	Release Type	TM based O/C, S/C, E/F, U/V release
5.2.4	Indicating lamps	6No (On,OFF,Trip),(R,,Y,B)
5.3	Feeder type	MCCB-OG-150 A, Four Pole
5.3.1	Quantity of feeders	1 No.s
5.3.2	Terminations	
5.3.2.1	Power connection (External)	Suitable to 150A/4C X 25 sq.mm. Al cable
5.3.2.2	Power terminal (External)	Extended copper strips
5.3.3.1	Rated current inside cubicle at (Amb T)	150 A
5.3.3.2	Release Type	TM based O/C, S/C, E/F, U/V release
5.3.4	Indicating lamps	6No (On,OFF,Trip),(R,,Y,B)
5.4	Feeder type	MCCB-OG-100 A, Four Pole
5.4.1	Quantity of feeders	1 No.s
5.4.2	Terminations	
5.4.2.1	Power connection (External)	Suitable to 100A/4C X 25 sq.mm. Al cable

5.4.2.2	Power terminal (External)	Extended copper strips
5.4.3.1	Rated current inside cubicle at (Amb T)	100A
5.4.3.2	Release Type	TM based O/C, S/C, E/F, U/V release
5.4.4	Indicating lamps	6No (On,OFF,Trip),(R,,Y,B)
5.5	Feeder type	MCCB-OG-63 A, Four Pole
5.5.1	Quantity of feeders	7 No.s
5.5.2	Terminations	
5.5.2.1	Power connection (External)	Suitable to 63A/4C X 25 sq.mm. Al cable
5.5.2.2	Power terminal (External)	Extended copper strips
5.5.3.1	Rated current inside cubicle at (Amb T)	63A
5.5.3.2	Release Type	TM based O/C, S/C, E/F, U/V release
5.5.4	Indicating lamps	6No (On,OFF,Trip),(R,,Y,B)
6	Feeder Types, their Components with quantity For PCC-02	
6.1	Feeder type	MCCB-IN-630 A, Four Pole
6.1.0	Quantity of feeders	1 No.s
6.1.1	Terminations	
6.1.1.1	Power connection (External)	Suitable for connecting 3.5C x 400 sq.mm. Al Cable.
6.1.1.2	Power terminal (External)	Extended copper strips
6.1.2.1	Rated current inside cubicle at (Amb T)	630A
6.1.2.2	Release Type	TM based O/C, S/C, E/F, U/V with adjustable short circuit and Overload settings. ELR to be provided for incomer
6.1.3	Current transformer (excluding inbuilt CT of releases)	
6.1.3.1	Rated primary current and ratio	630/5A
6.1.3.2	Metering CT	One for each phase
6.1.4	Indicating lamps	6No (R,Y,B,On,OFF,Trip)
6.1.5	Control circuit	1 Set
6.1.6	Analogue current meter	1 Set
6.1.6.1	Range	0-400
6.1.7	Analogue voltage meter	1 Set
6.1.8	Multifunction digital meter (MDM)	1 Set
6.1.9	Control circuit	1 Set
6.1.10	Emergency Stop PB	To be Provided.
6.1.11	MDM	To be Provided.
6.2	Feeder type	MCCB-OG-100 A, Four Pole

6.2.0	Quantity of feeders	3 No.s
6.2.1	Terminations	
6.2.1.1	Power connection (External)	Suitable to 100A/4C X 25 sq.mm. Al cable
6.2.1.2	Power terminal (External)	Extended copper strips
6.2.2.1	Rated current inside cubicle at (Amb T)	100A
6.2.2.2	Release Type	TM based O/C, S/C, E/F, U/V
6.2.3	Indicating lamps	3No (On,OFF,Trip)
6.3	Feeder type	MCCB-OG-80A, Four Pole
6.3.0	Quantity of feeders	1 No.s
6.3.1	Terminations	
6.3.1.1	Power connection (External)	Suitable to 80A/4C X 25 sq.mm. Al cable
6.3.1.2	Power terminal (External)	Extended copper strips
6.3.2.1	Rated current inside cubicle at (Amb T)	80A
6.3.2.2	Release Type	TM based O/C, S/C, E/F, U/V
6.3.3	Indicating lamps	3No (On,OFF,Trip)
6.4	Feeder type	MCCB-OG-63A, Four Pole
6.4.0	Quantity of feeders	2 No.s
6.3.1	Terminations	
6.3.1.1	Power connection (External)	Suitable to 63A/4C X 25 sq.mm. Al cable
6.3.1.2	Power terminal (External)	Extended copper strips
6.3.2.1	Rated current inside cubicle at (Amb T)	63A
6.3.2.2	Release Type	TM based O/C, S/C, E/F, U/V
6.3.3	Indicating lamps	3No (On,OFF,Trip)
6.4	Feeder type	MCCB-OG-40A, Four Pole
6.4.0	Quantity of feeders	2 No.s
6.3.1	Terminations	
6.3.1.1	Power connection (External)	Suitable to 40A/4C X 25 sq.mm. Al cable
6.3.1.2	Power terminal (External)	Extended copper strips
6.3.2.1	Rated current inside cubicle at (Amb T)	40A
6.3.2.2	Release Type	TM based O/C, S/C, E/F, U/V
6.3.3	Indicating lamps	3No (On,OFF,Trip)
7	<u>Feeder Types, their Components with quantity For PCC-03(UPS Panel)</u>	
7.1	Feeder type	MCCB-IN-80 A, Four Pole
7.1.0	Quantity of feeders	3 No.s

7.1.1	Terminations	
7.1.1.1	Power connection (External)	3.5C x 70 sq.mm. Al Cable.
7.1.1.2	Power terminal (External)	Extended copper strips
7.1.2	Moulded case circuit breaker (MCCB)	3No
7.1.2.1	Rated current inside cubicle at (Amb T)	80A
7.1.2.2	Release Type	TM based O/C, S/C, E/F, U/V with adjustable short circuit and Overload settings. ELR to be provided for incomer
7.1.3	Current transformer (excluding inbuilt CT of releases)	
7.1.3.1	Rated primary current and ratio	100/5A
7.1.3.2	Metering CT	One for each phase
7.1.4	Indicating lamps	6No (R,Y,B,On,OFF,Trip)
7.1.5	Control circuit	1 Set
7.1.6	Analogue current meter	1 Set
7.1.6.1	Range	0-400
7.1.7	Analogue voltage meter	1 Set
7.1.8	Multifunction digital meter (MDM)	1 Set
7.1.9	Control circuit	1 Set
7.1.10	Emergency Stop PB	To be Provided.
7.1.11	MDM	To be Provided.
7.2	Feeder type	MCCB-OG-63 A
7.2.0	Quantity	1 No.s
7.2.1	Terminations	
7.2.1.1	Power connection (External)	Suitable to 63A/3.5C X 70 sq.mm. Al cable
7.2.1.2	Power terminal (External)	Extended copper strips
7.2.2.1	Rated current inside cubicle at (Amb T)	80A
7.2.2.2	Release Type	TM based O/C, S/C, E/F, U/V with adjustable Short Circuit and Over Load setting
7.2.3	Indicating lamps	3No (On,OFF,Trip)
7.3	Feeder type	MCCB-OG-32 A
7.3.0	Quantity of feeders	3 No.s
7.3.1	Terminations	
7.3.1.1	Power connection (External)	Suitable to 32A/4C X 25 sq.mm. Al cable
7.3.1.2	Power terminal (External)	Extended copper strips

7.3.2.1	Rated current inside cubicle at (Amb T)	32A
7.3.2.2	Release Type	TM based O/C, S/C, E/F, U/V
7.3.3	Indicating lamps	3No (On,OFF,Trip)
7.4	Feeder type	MCCB-OG-40A
7.4.0	Quantity of feeders	8 No.s
7.4.1	Terminations	
7.4.1.1	Power connection (External)	Suitable to 40A/4C X 25 sq.mm. Al cable
7.4.1.2	Power terminal (External)	Extended copper strips
7.4.2.1	Rated current inside cubicle at (Amb T)	40A
7.4.2.2	Release Type	TM based O/C, S/C, E/F, U/V
7.4.3	Indicating lamps	3No (On,OFF,Trip)
7.5	Feeder type	MCCB-OG-80 A
7.5.0	Quantity	1 No.s
7.5.1	Terminations	
7.5.1.1	Power connection (External)	Suitable to 80A/3.5C X 70 sq.mm. Al cable
7.5.1.2	Power terminal (External)	Extended copper strips
7.5.2.1	Rated current inside cubicle at (Amb T)	80A
7.5.2.2	Release Type	TM based O/C, S/C, E/F, U/V with adjustable Short Circuit and Over Load setting
7.5.3	Indicating lamps	3No (On,OFF,Trip)
8	<u>Feeder Types, their Components with quantity For Control Panel</u>	
8.1	Feeder Type	MCB-25A, 2 Pole
8.1.1	Quantity	4 Nos.
8.1.2	Type	C curve, 10kA
8.1.3	Indicating lamps	ON and OFF for all three feeders
8.1.4	Power contactor rating	25A,2P,240V AC
8.1.5	Power Contactor Quantity	4 Nos.
8.1.6	Timer switch	Minimum 2 output, minimum 2 channels, Astronomical function with minimum 56 (2x28) programmables
8.1.7	Timer Quantity	2 Nos.
8.2	Feeder Type	MCB-32A,2 Pole
8.1.1	Quantity	1 Nos.
B		
1	Included in scope of this item.	Cost of these items to be included in the quoted rates of this item.
1.1	Support	
1.1.1	Material	MS ISMC, ISMB, ISMA, Flat as per drawing.

1.1.2	Size	Size of supports shall be as per load and as approved by BARC
1.1.2	Fabrication	Cutting, welding, grinding, drilling, as required at site and and as approved by BARC
1.1.3	Painting	Two coat of anticorrosive paint followed by two coat of synthetic enamelled.
1.2	Fixing of support	Grouting/ Anchoring on RCC floor. Welding with ms structure of building.
1.3	Fixing of equipment	Bolted with supports, Grouting/ Anchoring on RCC floor with anchor fasteners.
1.4	Earth connection	
1.4.1	Material	2 nos, 25 mm X 3mm copper strip
1.4.2	Length/ route	2 Nos 25 X 3 mm copper strip to be extended from nearby earth pit and the cost of earth strip is to be included in the quoted rate of LT Panel.
1.4.3	End joints	Bolted at both ends.
2	Excluded from scope of this item.	These are covered in separate items of price schedule. Hence cost of these items shall not be included in the quoted rates of this item.
2.1	External power/ control/ Cat6 cable, end joints.	NA
2.2	Cable tray	NA
2.3	Panel Dimension	As per site requirement and as instructed by EIC
2.4	Panel Shipping	Panel to be shipped in sections and assembling/Commissioning shall be done at site due to space constraints in LT Panel room
C	Testing & commissioning of panels	As per department approved QAP. Tests shall be carried out at Manufacturer's premises as per approved QAP & Relevent IS.
Panel Details with Feeder Schedule		
S. No.	Parameters	Specified by BARC
1	Rated normal current of bus bar inside cubicle at (Amb T)	250A/150A/100A/63A as per specific requirement
2	Overall size	
3	Cable entry(For all Panles)	Suitable for Top and Bottom entry
4	Access to bus bar chamber(For all panels)	Front(Preferably) or as per Site Condition
5	Access to cable chamber(For all Panels)	Front(Preferably) or as per Site Condition

Feeder components specification of each Feeder Types is followed from Offered General specification Document no :-TS-E004		
Feeders schedule of PCC-01		
S. No.	Feeder No.	Feeder types
1	Feeder1(Incoming)	MCCB-630 A
2	Feeder2(Outgoing)	MCCB-200 A
3	Feeder3(Outgoing)	MCCB-150 A
4	Feeder4(Outgoing)	MCCB-100 A
5	Feeder5(Outgoing)	MCCB-63 A
6	Feeder6(Outgoing)	MCCB-63 A
7	Feeder7(Outgoing)	MCCB-63 A
8	Feeder8(Outgoing)	MCCB-63 A
9	Feeder9(Outgoing)	MCCB-63 A
10	Feeder10(Outgoing)	MCCB-63 A
11	Feeder11(Outgoing)	MCCB-63 A
Feeders schedule of PCC-02		
S. No.	Feeder No.	Feeder types
1	Feeder1(Incoming)	MCCB-630 A
2	Feeder2(Outgoing)	MCCB-100 A
3	Feeder3(Outgoing)	MCCB-100 A
4	Feeder4(Outgoing)	MCCB-100 A
5	Feeder5(Outgoing)	MCCB-80 A
6	Feeder6(Outgoing)	MCCB-40 A
7	Feeder6(Outgoing)	MCCB-40 A
8	Feeder7(Outgoing)	MCCB-63 A
9	Feeder8(Outgoing)	MCCB-63 A
Feeders schedule of PCC-03		
S. No.	Feeder No.	Feeder types
1	Feeder1a(Incoming)	MCCB-80 A
2	Feeder1(Incoming)	MCCB-80 A
3	Feeder2(Incoming)	MCCB-80 A
4	Feeder3(Outgoing)	MCCB-80 A
5	Feeder4(Outgoing)	MCCB-32 A
6	Feeder5(Outgoing)	MCCB-32 A
7	Feeder6(Outgoing)	MCCB-32 A
8	Feeder7(Outgoing)	MCCB-40 A
9	Feeder8(Outgoing)	MCCB-40 A
10	Feeder9(Outgoing)	MCCB-40 A
11	Feeder10(Outgoing)	MCCB-40 A
12	Feeder11(Outgoing)	MCCB-40 A

13	Feeder12(Outgoing)	MCCB-40 A
14	Feeder13(Outgoing)	MCCB-40 A
15	Feeder14(Outgoing)	MCCB-40 A
16	Feeder15(Outgoing)	MCCB-63 A
Note:	PCC-03 is an UPS Power panel. In PCC-03, Feeder-1 and Feeder-2 are connected by a common bus bar which is fed from Feeder-1a. Similarly Feeder-3 and Feeder-4 to Feeder-17 are connected by a common bus bar which are being fed from UPS supply. Feeder-1 and Feeder-3 should not be interconnected and there should be isolation between the busbars of Feeder-1 and Feeder-3.	
Feeders schedule of Control panel		
S. No.	Feeder No.	Feeder types
1	Feeder1(Incoming)	MCB-32 A,2P
2	Feeder2(Outgoing)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-1 switch
3	Feeder3(Incoming)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-1 switch
4	Feeder4(Outgoing)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-2 switch
5	Feeder5(Outgoing)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-2 switch
Note:	This control panel is required for timing of AC control to switch ON and OFF the AC's, controlled by a timer switch, where the timing for switching ON and Switching OFF the power contactors can be adjusted. Timer-1 controls Feeders-2 and Feeders-3, whereas Timer-2 Controls Feeder-4 and Feeder-5	

Document No : TS-E005		
Equipment		RCCB/MCB/DB
S. No.	Parameter	Specified by BARC
1	RCCB	
a	Type	Double Pole
b	Sensitivity	30 mA
c	Rating	16A/25A/40A/63A as per Schedule/Bill of Quantities
d	Suggested make	M/s Legrand/M/s Schnieder/M/s Siemens/ M/s Havells
2	MCBs	
a	Type	Single Pole/Four Pole
b	Char Curve	Type-B/Type-C, 10 KA
c	Rating	6-63 A as per Schedule/Bill of Quantities
d	Suggested make	M/s Legrand/M/s Schnieder/M/s Siemens/ M/s Havells
3	SPDs	
	Suggested make	M/s Legrand/M/s Siemens/M/s DEHN

Document No : TS-E005		
Equipment		RCCB/MCB/DB
S. No.	Parameter	Specified by BARC
a	Type	Four Pole 4 kV, 40 KA, Type-2 Surge Diverter
b	Qty	Qty as per Schedule-B.
c	Approvals or test certificates	Type test report as per EN 61643-11 shall be submitted along with Datasheet for approval before procurement
d	Place of installation	Inside DB
4	TPNDB	
a	Type	8 Way (8+24) with acrylic door
b	Mounting	Flush Mounting
c	Suggested make	M/s Legrand/M/s Schnieder/M/s Siemens/ M/s Havells
d	Number of Phases	TPN
e	Bus strip material	Electrolytic grade high conductivity copper
f	Rated normal current of bus bar inside cubicle at (Amb T)	as per requirement.
Note:		Each circuit breaker has to connected with copper lugs of suitable size. The cost of internal wiring inside the DB is included in cost of MCBs. Ferulling of all circuit and identification and naming of all circuits and DB with striker to be included in scope of work

Document No : TS-E006		
Equipment		Modular Devices
S. No.	Parameter	Specified by BARC
1	<u>Modular Devices</u>	
1.1	Suggested make	Suggested makes - M/s Legrand- Myrius White Mechanisms or M/s MK-Honeywell- Elements/ M/s Crabtree- Murano
1.2	Cover plate and Frame	2 Module/3 Module/4 Module/6 Module/8 Module/12 Module/16 Module, Quantity as mentioned in the Scheddule/Bill of Quantities
1.3	Colour of cover plate and control switches	White/Ivory or as any other color after approval by department
1.4	Control switch	
a	Type	
b	6 Amp, 1 Way Switch	Single pole modular plate type.
c	6 Amp, 2 Way Switch	Single pole modular plate type.
c	16A, 1 Way Switch with indication.	Single pole modular plate type.
d	25 A starter switch	Start and stop push buttons must be clearly shown

Document No : TS-E006		
Equipment		Modular Devices
S. No.	Parameter	Specified by BARC
c	25A, 1 Way Switch with indication.	Single pole modular plate type.
1.5	Power Sockets	
a	Type of sockets	
b	6/16 A	Two module 3 pin with shutters.
c	25 A	Two module Socket.
1.6	Fan Regulator	
a	Rating	120 W
b	Type	Electronic with step control in Two module
1.7	Ceiling Roses	
a	Material	Polycarbonate
b	Color	White/Ivory or as any other color after approval by department
c	Features	Self locking Arrangement
d	Suggested make	M/s Anchor/M/s Goldmedal/M/s Havells or OEM
2	Installation works of modular devices	
	Modular Cover plates along with necessary dummies is to be provided. Also minor civil works like chipping making it good etc. Also Ceiling cover plates (Round Plate)to be provided wherever necessary as per site requirement.	Cost of these items to be included in the quoted rates of respective wiring points.
3	Sample Approval	GTP/Routine Test Certificates/Sample of wiring devices to be approved by the department before procurement.

Document No : TS-E007		
S. No.	Parameter	Specified by BARC
1	Electrical Wiring	
1.1	General Details	
a	Size	1.5 Sq.mm/2.5 Sq. mm/4 Sq. mm (As per type of wiring)
b	Material	Copper
c	Type	FRLS PVC, 1100V grade, multistranded copper conductor wire
d	Suggested make of wire	Polycab/RR Kabel/Gloster/KEI

Document No : TS-E007		
S. No.	Parameter	Specified by BARC
e	Color coding of wire	Phase wires- Red/Yellow/Blue, Neutral wire -Black & Earth wire- Green
f	Laying of wires	Circuit wires to be installed in conduit & circuit wires of same phase can be laid in same conduit.
g	Termination	Terminating all wires at both ends with copper lugs with ferruling.
h	Feruling Details	To be submitted to the successful bidder. Feruling to be carried out.
i	Applicable Standard	IS 732
j	Testing & Commissioning	Continuity Test, IR Value, Functional Test
k	Switchboard Identification	To be carried out for all power point, AC Point and light/fan point
l	Light and Fan numbering	To be carried out.
m	DB Numbering	To be carried out
n	Stickering for DBs	Danger sticker to be put on top of all DBs.
2	Installation works of wiring	
	Suitable PVC ceiling Cover plates to be provided with smooth finishing etc. on junction box after wire pulling and also dummy plates to be provided on modular boxes as per site requirement. Also minor civil works like chipping making it good etc	Cost of these items to be included in the quoted rates of respective point wiring.

Document No. : TS-E008		
Equipment		Conduit
S.No.	Parameters	Specified by BARC
1	Conduiting	
1.1	Suggested Make	AKG/BEC/VIMCO
1.2	Applicable IS	IS9537
1.3	Material	PVC/MS as per BoQ
1.4	Type	High Mechanical Strength(HMS)
1.5	Size	25 mm OD
1.6	Accessories	Elbow, Tee, junction boxes, bends, coupler etc suitable for HMS conduit
1.2	Installation Details	

Document No. : TS-E008		
Equipment		Conduit
S.No.	Parameters	Specified by BARC
1.2.1	Installation of conduit	Concealed/ or outer surface as per site requirement and for outer surface , conduit is to be installed on Cable trays. Necessary clamping arrangement of conduit on cable tray shall be in the scope of this item.
1.2.2	Number of wires in conduit	Sum of cross sectional area of all wires inside conduit shall not exceed 50% of internal cross section of conduit
1.2.3	Laying of inspection Box	Inspection Box/Junction Box shall be provided as per site requirement to necessitate wiring and fault finding and shall be mounted on cable tray. Necessary binding of junction boxes shall be in the scope of this item.
1.3	Flexible PVC Conduit	Qty as per BoQ
a	Dia	25 mm
b	Suggested make	M/s Finolex/ M/s Precision or OEM
1.4	Casing Capping	Qty as per Schedule-B.
a	Width	25 mm
b	Depth	10 mm
c	Suggested make	OEM

Document No. : TS-E009		
Equipment		Power Cables
S. No.	Particulars	Specified by BARC
1	General	
1.1	Project Site	
1.1.1	Climatic condition	Near to sea coast. Climate is tropical with high humidity.
2	Suggested Manufacturer	Universal cables/RPG/RR kabel/KEI/Polycab
3	Type of cable	LT power cable
4	Voltage grade	1100 V AC (Effectively Earthed)
5	Core	
5.1	Core identification	Colouring (Red, Yellow, Blue, Black)or (Red, Yellow,Blue, Yellow& Green)
5.2	Nos. of cores	As per specific specification
6	Conductor	
6.1	Type of conductor	Stranded
6.2	Conductor size	As per specific specification
6.3	Conductor material	As per specific specification
6.4	Form of conductor	As per specific specification
6.5	Max. temp. of conductor	90 degC
6.6	Class of conductor	Class -2 as per IS-8130

Document No. : TS-E009		
Equipment		Power Cables
S. No.	Particulars	Specified by BARC
7	Insulation	
7.1	Type of Insulation	Cross linked polyethylene as per IS 7098 (Part-1)
7.2	Type of curing for cross linking	As per manufacturer
7.3	Nominal thickness of insulation	As per specific specification
8	Filler material(If required)	As per Manufacturer.
9	Inner sheath	
9.1	Type of material of inner sheath	PVC
9.2	Inner sheath type	Extruded
9.3	Thickness of inner sheath	As per specific specification
10	Armour	
10.1	Armour material	Low carbon galvanised steel wire as per IS 3975
10.2	Shape of armour conductor	Flat
10.3	Nos. of layers of armour wire	Single layer
10.4	Size of Armour conductor	As per specific specification
11	Outer Sheath	
11.1	Outer sheath material	FRLS PVC,Type ST2
11.2	Colour of outer sheath	Black
11.3	Thickness of outer sheath	As per specific specification
11.4	Embossed identification mark on outer sheath	As per specific specification
11.5	Printed mark on outer sheath	Sequential length in each metre
12	Installation	
12.1	M.S. items like channels/angles/flats/clamps/Nylon string etc required for installation of cables.Also minor civil works like chipping of floor etc	Cost of these items to be included in the quoted rates of LT power cables.
12.2	Cable trays, cable trenches, support for cable tray, wall opening, cable glands, cable lugs etc	Not to be included in the quoted rates of the LT power cables
12	Cable drum	
12.1	Material of construction of cable drum	wooden
12.2	Minimum barrel diameter of drum	12 times of dia. Of cable
13	Inspection and testing	GTP to be approved by the department before procurement of LT cable.Cables needs to be tested at manufacturers premises as per approved QAP before delivering at site

3.5 C X 400 Sq. mm Aluminium cable		
S. No.	Particulars	Specified by BARC
1	Core	
1.1	Nos. of cores	3.5 core
1.2	Core identification	Core identification(Red,Yellow,Blue,Black)
2	Conductor	
2.1	Conductor size	400 sq.mm
2.2	Conductor material	Aluminium
2.3	Form of conductor	As per manufacturer
3	Insulation	
3.1	Nominal thickness of insulation	As per table 3 of IS 7098 (part-1))
4	Inner sheath	
4.1	Thickness of inner sheath	As per table 5 of IS 7098 (Part-1)
5	Armour	
5.1	Size of Armour conductor	As per table 6 of IS 7098 (Part-1)
6	Outer Sheath	
6.1	Thickness of outer sheath	As per table 8 of IS 7098 (Part-1)
6.2	Embossed identification mark on outer sheath	FRLS 1100V, XLPE, 3.5 core, 400 sq.mm, Aluminium, Make and year of manufacturing
3.5 C X 70 Sq. mm Aluminium cable		
S. No.	Particulars	Specified by BARC
1	Core	
1.1	Nos. of cores	3.5 core
1.2	Core identification	Core identification(Red,Yellow,Blue,Black)
2	Conductor	
2.1	Conductor size	70 sq.mm
2.2	Conductor material	Aluminium
2.3	Form of conductor	As per manufacturer
3	Insulation	
3.1	Nominal thickness of insulation	As per table 3 of IS 7098 (part-1))
4	Inner sheath	
4.1	Thickness of inner sheath	As per table 5 of IS 7098 (Part-1)
5	Armour	
5.1	Size of Armour conductor	As per table 6 of IS 7098 (Part-1)
6	Outer Sheath	
6.1	Thickness of outer sheath	As per table 8 of IS 7098 (Part-1)
6.2	Embossed identification mark on outer sheath	FRLS 1100V, XLPE, 3.5 core, 70 sq.mm, Aluminium, Make and year of manufacturing
4 C X 25 Sq. mm Aluminium cable		
S. No.	Particulars	Specified by BARC
1	Core	
1.1	Nos. of cores	4 Core
1.2	Core identification	Core identification(Red,Yellow,Blue,Black)
2	Conductor	
2.1	Conductor size	25 sq.mm
2.2	Conductor material	Aluminium
2.3	Form of conductor	As per manufacturer

3	Insulation	
3.1	Nominal thickness of insulation	As per table 3 of IS 7098 (part-1))
4	Inner sheath	
4.1	Thickness of inner sheath	As per table 5 of IS 7098 (Part-1)
5	Armour	
5.1	Size of Armour conductor	As per table 6 of IS 7098 (Part-1)
6	Outer Sheath	
6.1	Thickness of outer sheath	As per table 8 of IS 7098 (Part-1)
6.2	Embossed identification mark on outer sheath	FRLS 1100V, XLPE,4 core, 25 sq.mm, Aluminium, Make and year of manufacturing

Cable End Termination		
S. No.	Parameter	Specified by BARC
1	General	
1.1	System voltage	415V, 3 phase, 50 Hz
2	Type of termination	End termination of cables at the Panel side/DBs/Control panel
3	Cable details	
3.1	Voltage grade of cable	1.1 kV, Power Cable,Aluminium
3.2	Size	3.5 C X 400 sq.mm/3.5 C X 70 sq.mm/4 C X 25 Sq. mm
4	Termination details	
4.1	Gland	
4.1.1	Type of gland	Double compression gland(for 400sq mm & 70 sqmm) and single compression gland for 25 sqmm cables
4.1.2	Material of gland	Brass
4.2	Lug	
4.2.1	Type & material of Lugs	Heavy duty long barrel crimping type Aluminium/copper (Bimetallic) lugs
5	Gland Earthing	
5.1	Material	Copper
5.2	Size	As per requirement
6	Installation	
6.1	Cable glands, copper lugs, bolts etc copper earthing strip/conductor as gland earthing.	Cost of this item to be included in the quoted rates of LT cable termination.

Document No. : TS-E010

TS FOR 20kVA, 3 phase ,415V, UPS

This specification covers the design, supply, delivery, installation, testing and commissioning of 20 kVA, 50Hz, 3 Phase Input, 3 Phase Output, True ON-LINE Uninterruptible Power Supply (UPS) including SMF battery Banks and with provision for bypass facility. 20kVA UPS must have a SMF Battery bank which can provide 30 min Backup at full load i.e., 20kVA at 0.8Power factor. 20kVA UPS system shall consist of the major components:1 Rectifier/ Charger,1 PWM Inverter,Output Isolation Transformer and Filter,No break static switch in the inverter line,No break static switch in bypass line,One maintenance bypass switch,One

main control and alarm panel complete with mimic diagram and LCD display,SMF-VRLA Battery Bank (12V, Battery Module). UPS should operate in any of the following modes: Online mode,battery mode,by-pass mode>manual bypass mode,power conditioner mode.

S. No.	Parameters	Tender Specification
1	General	
1.1	Project Site	
1.1.1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
1.1.2	Maximum ambient temp	45 degC
1.1.3	Humidity (RH)	95% at 45 degC
1.1.4	Altitude	Mean sea level
1.2	System Particulars	
1.2.1	System Grounding	Effectively earthed
1.2.2	Number of phases	415V, 3 phases, 4 wire
1.3	Type of UPS	True online double conversion UPS using PWM technology.
1.4	Suggested manufacturer	Emerson/ PCI/ Numeric/ Keltron/ Neo Watt/ Hirel Hitachi/ Schneider
1.5	Applicable standard	IEEE 446, IS 11260
2	Rating of UPS	20KVA (16 kW)
3	Input unit (Rectifier/Charger)	
3.1	Switching device	IGBT
3.2	Make of IGBT	Semikron/ Infineon
3.3	Technology and Control	PWM Technology with DSP Control.
3.4	Nominal Input voltage	415 V, (+15%. To -20%)
3.5	Input Frequency	50 Hz, +/- 5%
3.6	Harmonic content in input supply voltage	Maximum total harmonic distortion of the voltage <2%.
3.7	Input Power factor	0.98 or better at rated load and nominal voltage
3.8	Start up current limiting	Shall be with built in soft start feature to limit current suitable to the equipment
3.9	Start up 'walk in'	15 sec to 30 sec
3.1	Steady state current limiting	125% of rated current
3.11	Output voltage range	To suit inverter and battery charging
4	Inverter	
4.1	Switching device	IGBT
4.2	Make	Semikron/ Infineon
4.3	Technology and Control	PWM Technology with DSP Control.
4.4	Output voltage	415V AC, 3-phase and neutral 4 wire
4.5	Input DC voltage	To suit battery charging and suitable for inverter
4.6	output Frequency	50 Hz, +/- 0.05Hz
4.7	output voltage regulation	+/- 1%
4.8	Phase displacement	<1° for balance loads <2° for 100% unbalance loads

4.9	Line drop compensation	0 to 5% of nominal voltage (adjustable)
4.1	Transient voltage response	
4.10.1	For return or loss of AC	+/- 5%
4.10.2	For 100% load step	+/- 5%
4.10.3	For Pass or bypass	+/- 5%
4.11	Harmonic content of volatge	For non linear load- No single harmonic shall be more than 3% and total harmonic distortion shall not exceed 5%. For linear loads- total harmonic distortion shall not exceed 2%
4.12	Dynamic response	For 0 to 100% step load change, the output shall remain within +5% and recover to 98% within one cycle (IEC 62040-3, Class-I)
4.13	Waveform	Sinusoidal
4.14	Duty	Continuous
4.15	Slew rate	Max 0.1 Hz/sec
4.16	Overload capacity	
4.16.1	For 30 min	110%
4.16.2	For 10 min	125%
4.16.3	For 60 sec	150%
4.16.4	For 10 sec	200%
4.17	Crest factor	3:1
4.18	Power factor	0.8 lag to unity (inverter output filter shall be capable of providing required reactive KVAR of this p.f.)
4.19	Type of load	To cater Computers, network racks and lighting load
5	Bypass	
5.1	Voltage	415V AC
5.2	Input voltage variations	±10%
5.3	Frequency synchronization range	50Hz ± 1.5Hz
5.4	Transfer time	Sync. Mode-No break, Async mode <10msec.
5.5	Re-transfer time	Sync. Mode-No break, Async mode - Inhibited
5.6	Manual bypass	Make before break operation
6	DC link (Battery)	
6.1	Battery type	VRLA with 12V module battery
6.2	AH capacity and No. of cells	To suit for a min back up time of 30 minutes.
6.3	Float voltage	as per manufacturer design
6.4	Boost voltage	as per manufacturer design
6.5	Battery Bank	
6.5.1	Suggested Make	Amararaj/Exide/ Microtex
6.5.2	Application	Back up for UPS
6.5.3	Type of cells	High performance VRLA , 12V Module
6.5.4	EOD voltage	10.5 V/Module
6.5.5	DC voltage system	
6.5.6	Nominal voltage	12V/ Module

6.5.7	Expected no. of cells in battery bank	As per manufacturer
6.5.8	Cell voltages	
6.5.9	Float voltage	As per manufacturer
6.5.10	Maximum Boost voltage	As per manufacturer
6.5.11	DC ripple	3% without battery/ 1% with battery
6.5.12	Load Details	20 KVA UPS (16KW)
6.5.13	Time for back up	30 MINUTES
6.5.14	AH capacity of battery bank	To be calculated as per relevant IEEE standard considering the load on UPS, design factor (1.10), ageing factor (1.25) factor and temperature correction factor of 1.19.
	Documents to be submitted for approval	Design calculations of required AH capacity considered has to be submitted for approval.
6.5.15	Maximum time the battery can be recharged (in boost charge mode after a duty cycle so that it is again ready for a second duty cycle discharge)	8Hrs
6.5.16	battery stands	Steel stands painted with two coats of black acid resistant paint/FRP stand/ Wooden stand
6.5.17	Arrangement of battery cells in stands	Battery should be installed in a room. (Dimension of room will be provided at later stage) Cells shall be arranged in a direction such that the condition of all plates can be observed
6.5.18	Terminal connectors	Lead plated copper
7	Reliability	MTBF 200000 hrs
8	Controls	
8.1	Mains ON/OFF or Input circuit breaker (MCCB)	Required
8.2	Battery CB (MCCB)	Required
8.3	Fault reset push button	Required
8.4	Ammeter selector switch	Required
8.5	Voltmeter selector switch	Required
8.6	Inverter output switch/contactors (MCCB)	Required
8.7	Synchronous transfer to bypass switch (Transfer/ re-transfer switch)	Required
9	Metering	
9.1	Input voltages	Required
9.2	Input AC current	Required
9.3	Charger output /battery voltage	Required
9.4	Battery voltage	Required
9.5	DC link voltage	Required
9.6	Battery charging /discharging current	Required
9.7	Output voltage	Required

9.8	Output current	Required
9.9	Output frequency	Required
9.1	Output power in KVA , KW , P.F.	Required
9.11	Load manager with RS-485 communication port	To be provided
9.12	Heat sink temperature	To be provided
9.13	Indications	
9.13.1	Mains ON	Required
9.13.2	Rectifier trips/ fails	To be provided
9.13.3	DC overvoltage	Required
9.13.4	Low battery voltage	Required
9.13.5	Battery CB open	Required
9.13.6	Battery on load	Required
9.13.7	Mains failure	Required
9.13.8	Over temperature/fan failure	Required
9.13.9	Load on inverter	Required
9.13.10	Load on bypass	Required
9.13.11	Static bypass inhibit	Required
9.13.12	Manual bypass ON	Required
9.13.13	Inverter overload	Required
9.13.14	Static bypass ON/Manual bypass ON	Required
10	A mimic with following display shall be provided :	
10.1	Rectifier ON/ OFF	To be provided
10.2	Inverter ON/ OFF	To be provided
10.3	Bypass available	To be provided
10.4	Manual bypass ON	To be provided
10.5	Inverter switch ON	To be provided
10.6	Bypass switch ON	To be provided
10.7	Load ON	To be provided
10.8	Float charge	To be provided
10.9	Boost charge	To be provided
10.1	Battery low	To be provided
10.11	Battery charging/ discharging	To be provided
11	Protection	
11.1	Protections in Input circuit	
11.1.1	Semiconductor fuse at input circuit	To be provided
11.1.2	Phase loss on input side/Single phasing	To be provided
11.1.3	AC input overvoltage/undervoltage	To be provided
11.1.4	Rectifier overvoltage	To be provided
11.1.5	Rectifier over temperature	To be provided
11.1.6	Input line choke (filter)	To be provided
11.1.7	RF filter	To be provided
11.1.8	RC surge suppression at input	To be provided
11.1.9	dV/dt and dI/dt protection	To be provided

11.2	Protections in DC circuit	
11.2.1	filter capacitor protection	To be provided
11.2.2	Battery Overvoltage	To be provided
11.2.3	Battery low	To be provided
11.2.4	DC undervoltage	To be provided
11.2.5	Charger input current limit	To be provided
11.3	Protections in output circuit	
11.3.1	Semiconductor fuses at inverter input	To be provided
11.3.2	Semiconductor fuses at inverter output	To be provided
11.3.3	AC output overvoltage/undervoltage	To be provided
11.3.4	Overload	To be provided
11.3.5	Short circuit in output	To be provided
11.3.6	Inverter output voltage sag	To be provided
11.3.7	Inverter over temperature	To be provided
11.3.8	MCBs in control circuit	To be provided
11.4	Heat sink over-temperature protection	To be provided
11.5	Internal fault Protection	Required
12	Alarms	
12.1	Mains voltage failure	To be provided
12.2	Bus bar voltage failure	To be provided
12.3	Inverter heat sink overtemperature	To be provided
12.4	Battery voltage low	To be provided
12.5	Load on battery	To be provided
12.6	Low input voltage	To be provided
12.7	Output overload	To be provided
12.8	Internal fault	To be provided
13	Enclosure of UPS shall be designed for the immunity against the external EMI/ RFI noise	To be provided as per latest EN standard .
14	Acoustic Noise	Less than 65 dB at 1 mtr from surface (ISO-3746)
15	Efficiency	More than 90% at rated load and nominal voltage including the isolation transformer
16	Other requirements	
16.1	Static by pass switch	Suitably rated static bypass switch to be provided having changeover time less than 0.5 ms
16.2	Manual bypass switch	Suitably rated manual bypass switch shall be provided.
16.3	Isolation transformer	Suitably rated isolation dry type transformer to be provided at input and output
16.4	Computer interface	RS 485 connectivity with open protocol

17	Enclosure of UPS	Free standing and floor mounting with a base frame. Panel shall be fabricated out of 2 mm thick CRCA sheet. Framework shall be 3 mm thick. Panel shall be epoxy based powder coated after seven tank treatment. Panel shall be of min. IP 23 . Cabinet finish- RAL-7032. The minimum paint thickness shall be 50 micron.
18	Cooling of UPS	Natural air cooled unit shall be preferred. In case force cooled unit is offered then fan failure indication shall be included in alarm.
19	Cable termination	The UPS must have Provision for Cable entry from Bottom/ Top as per site requirement.. Double Compression Glanding of Brass material and Heavy-duty Long Barrel Copper Lugs for cables.
20	Electronics components	Shall be of good quality, reputed make, MIL grade(at least industrial grade) with sufficient PIV's and min design margin of 2.5 times for IGBT/MOSFET.
21	HMI	Touch screen HMI with SLD diagram and online monitoring of UPS with all the output and input data.
22	Internal wiring/ cabling	FRLS PVC insulated wires and cables of reputed make
23	Earth bus-bar of electrolytic grade copper	To be provided
24	Space heater with thermostat	To be provided
25	Potential free contacts (configurable)	To be provided
25.1	Rectifier trip	To be provided
25.2	Inverter trip	To be provided
25.3	Load on battery	To be provided
25.4	Battery low pre-alarm	To be provided
25.5	Load on static bypass	To be provided
26	Spares	One complete set of semiconductor fuses set for UPS
27	Warranty	2 years from Date of Commissioning.
28	M.S. items like channels/angles/flats etc required for installation of UPS. Also minor civil works like chipping of floor etc	Cost of these items not to be included in the quoted rates of UPS
29	Inspection and testing	
29.1	Tests at Manufacturer's works	
		1. Visual Inspection
		2. Bill of material checking
		3. Operational checks for mechanical parts
		4. IR after & before HV
		5. Performance parameter such as output voltage regulation w.r.t. input parameter at different voltage load condition, transient response, overload capacity, ripple content measurements, efficiency etc.

		6. Heat run test till temperature stabilized with mains available at rated load.
		7. All functional test
		8. AC input failure test
		9. AC input return test
		10. Transfer test from battery and mains
		11. Light load test
		12. UPS efficiency test
		13. Short circuit protection device test
		14. Restart test
		15. Audible noise
		16. Output over voltage test
		17. Harmonics component test
		18. Battery bank shall be tested for it's capacity at manufacturers work as per relevant standards
29.2	At site	
		1. Operational checks after installation
		2. Battery backup time checking
		3. Battery capacity test
		4. All functional test
25	Drawings	SLD, GA drawing, technical catalogue of UPS and capacity calculation of battery shall be furnished along with offer.
25.1	Documents to be submitted	BOM, detail drawing, Design Calculation of Isolation Transformer, Input and Output filter Components, Rectifier and Inverter Circuits and Switching Devices, Battery Bank – AH Capacity, Number of Battery Modules. Single Line Diagram,GA Drawings.Without those calculations EIC has the authority to reject to item.
26	Installation	Installation of UPS after proper positioning and levelling of floor including chipping if required. Supply and Termination of battery cable with suitable accessories for installation.
27	Commissioning	Commissioning of the complete system shall be carried out. System shall be installed at site including installation, connection from UPS to battery banks & commissioning of battery banks, and the other entire functional test shall be performed at site and submit a commissioning report along with O&M Manual with as built drawings.

Document No. : TS-E010A		
Equipment		AC
S. No.	Particulars	Specified by BARC
1	Tonnage	2 Tons
2	Energy rating	5 Star
3	Type	Split Ac, Inverter type
4	Suggested manufcaturers	Carrier/Hitachi/Daikin/O-General/Bluestar/Voltas
	Note	Provision for mounting Outdoor Units of AC along with PVC Piping for proper drain of water from AC should also be included in the scope of tender

Document No. : TS-E010B		
<u>Feeder Types, with quantity For Timer control switch for AC</u>		
1	Feeder Type	MCB-25A, 2 Pole
1.1.1	Quantity	4 Nos.
1.1.2	Type	C curve, 10kA
1.1.3	Indicating lamps	ON and OFF for all three feeders
1.1.4	Power contactor rating	25A,2P,240V AC
1.1.5	Power Contactor Quantity	4 Nos.
1.1.6	Timer switch	Minimum 2 output, minimum 2 channels, Astronomical function with minimum 56 (2x28) programmables
1.1.7	Timer Quantity	2 Nos.
1.2	Feeder Type	MCB-32A,2 Pole
1.1.1	Quantity	1 Nos.
1.3	Ref Standard	IS 15652:2006
Feeders schedule of Control panel		
S. No.	Feeder No.	Feeder types
1	Feeder1(Incoming)	MCB-32 A,2P
2	Feeder2(Outgoing)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-1 switch
3	Feeder3(Incoming)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-1 switch
4	Feeder4(Outgoing)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-2 switch
5	Feeder5(Outgoing)	MCCB-25A, 2P with Power contactor of 25A,2P,controlled by Timer-2 switch
Note: This control panel is required for timing of AC control to switch ON and OFF the AC's, controlled by a timer switch , where the timing for switching ON and Switching OFF the power contactors can be adjusted. Timer-1 controls Feeders-2 and Feeders-3, whereas Timer-2 Controls Feeder-4 and Feeder-5.		

Document No. :TS-E012
Equipment : Earthing Pits

S. No.	Particulars	Tender Specifications
A	System Particulars	
A1	Nominal System Voltage	415V AC
A2	Highest System Voltage	457V AC
A3	Frequency	50 Hz
A4	System Grounding	Effectively earthed
B	Electrode Particulars	
B1	Type	Plate
B2	Material	Tinned Copper
B3	Dimensions (LXWXt)	600mmX600mmX3mm
C	Accessories	
C1	Pipe	
C1a	Material	Galvinsed Iron
C1b	diameter	19mm
C1c	Length of the pipe	1500mm or more
C2	Earthing strip	
C2a	Material	Copper
C2b	Painting requirements	2 coats of bitumen paint
C2c	Dimensions	75mmX6mm
C2d	Length of the strip	1500mm or more
C3	Charcoal and Salt	Quantity shall be worked out as per the dimensions mentioned in drawing no. BARC(V)/ESS(V)/A4/STD-04
C4	Funnel	01 no. per pit of required size
D	Installation Instructions	
D1	Depth of copper plate	1500mm from top verticle edge of plate upto the finished ground level
D2	Connection between copper plate and copper strip	by brass bolt and nuts and washers as well as brazing to the surface alongside of the strip
D3	Inspection chamber	Shall be prepared with sand, bricks and cement as per Drawing no. BARC(V)/ESS(V)/A4/STD-04
D4	Reference drawing	Drawing no. BARC(V)/ESS(V)/A4/STD-04 shall be followed for connection/termination details,
D5	Display board	Display board made of GI/UV Based fibre glass to indicate data such as Earthing pit no., Tested date, Ohmic value, Due date.
D6	Excavation	Excavation of soil for installation of earthing plate is scope of this item.

E	Testing at Site	
E1	Earth pit resistance measurement	Pit resistance measurement shall be done using 3 point method.

Document No. : TS-E012

Equipment : 2 Mtr Air terminal with accessories

S. No.	Parameters	Specified by BARC
1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
2	Maximum ambient temp	45 deg C
3	Humidity (RH)	95% at 45 deg C
4	Altitude	Mean sea level
5	Suggested make	M/s Dehn or any other make subject to approval of department.
6	Air terminal	
6.1	Type	Rod type
6.2	Material	AlMgSi
6.3	Length of rod	Min. 2 mtr
6.4	Dia of rod (chamfered)	Min. 16/10mm
6.5	Confirming to	EN 62561-2.
7	Free stranding concrete base	Concrete base as per OEM for free standing arrangement suitable for wind speed of min 100Km/Hr
8	protection roofing sheet under concrete base	protection roofing sheets for concrete base shall be provided.
9	Clamp for termination of roof conductor to air terminal	Clamp made of Stainless steel for connection of roof conductor with Air terminal shall be provided. SS nuts and bolts are also part of this item.
8	Approval of Drawings/Datasheets	
8.1	Drawings/datasheets	01 set of hardcopy and softcopy shall be submitted for approval

Document No. : TS-E012

Equipment : Roof and Down conductor

S. No.	Parameters	Specified by BARC
1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
2	Maximum ambient temp	45 deg C
3	Humidity (RH)	95% at 45 deg C
4	Altitude	Mean sea level
5	Suggested make	M/s Dehn or any other make subject to approval of department.

6	Roof and down conductor	
6.1	Material of roof and down conductor	AlMgSi
6.2	Characterstics	Semi rigid
6.3	Diameter of conductor	8mm min.
6.4	Confirming to	EN 62561-2.
7	Approval of Drawings/Datasheets	
7.1	Drawings/datasheets	01 set of hardcopy and softcopy shall be submitted for approval

Document No. : TS-E012

Equipment : Roof conductor holder with concrete base

S. No.	Parameters	Specified by BARC
1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
2	Maximum ambient temp	45 deg C
3	Humidity (RH)	95% at 45 deg C
4	Altitude	Mean sea level
5	Suggested make	M/s Dehn or any other make subject to approval of department.
6	Conductor holders with concrete base	
6.1	Material of conductor holder	Plastic (black colour) suitable to hold 8mm conductor
6.2	Weight of concrete block	min. 1 Kg
6.3	Tentative dimensions	141mm X 86mm X70mm
7	Approval of Drawings/Datasheets	
7.1	Drawings/datasheets	01 set of hardcopy and softcopy shall be submitted for approval

Document No. : TS-E012

Equipment : Conductor holder

S. No.	Parameters	Specified by BARC
1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
2	Maximum ambient temp	45 deg C
3	Humidity (RH)	95% at 45 deg C
4	Altitude	Mean sea level
5	Suggested make	M/s Dehn or any other make subject to approval of department.
6	Conductor holders	
6.1	Material of conductor holder	stainless steel
6.2	Thread of conductor holder	M8

6.3	Conductor size for which holder required	8mm
7	Approval of Drawings/Datasheets	
7.1	Drawings/datasheets	01 set of hardcopy and softcopy shall be submitted for approval

Document No. : TS-E012

Equipment : Cross and T Connectors

S. No.	Parameters	Specified by BARC
1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
2	Maximum ambient temp	45 deg C
3	Humidity (RH)	95% at 45 deg C
4	Altitude	Mean sea level
5	Suggested make	M/s Dehn or any other make subject to approval of department.
6	Cross and T Connectors	
6.1	Material of connectors	Stainless steel
6.2	Material of screw & nut	Stainless steel
6.3	Clamping range	8-10mm
7	Approval of Drawings/Datasheets	
7.1	Drawings/datasheets	01 set of hardcopy and softcopy shall be submitted for approval

Document No. : TS-E012

Equipment : Test link box

S. No.	Parameters	Specified by BARC
1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
2	Maximum ambient temp	45 deg C
3	Humidity (RH)	95% at 45 deg C
4	Altitude	Mean sea level
5	Suggested make	M/s Dehn or any other make subject to approval of department.
6	Test link box	
6.1	Thickness of sheet steel	2mm
6.2	Size of box	250mm x150mm x 100mm(H)
6.3	Treatment	Seven tank treatment hot dip galvanized
6.4	Internal conductor	8mm AlMgSi rod with suitable insulating support or 25mmX6mm GI strip with Flat to Rod connectors and insulating support.
6.5	Cover	Openable
7	Fixing arrangement	Suitable for fixing on Wall.

8	Installation instructions	Installation of the box on wall/MS channel with all fixing material is the scope of installation.
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Document No. : TS-E010A		
Equipment		AC
S. No.	Particulars	Specified by BARC
1	Tonnage	2 Tons
2	Energy rating	5 Star
3	Type	Split Ac, Inverter type
4	Suggested manufcaturers	Carrier/Hitachi/Daikin/O-General/Bluestar/Voltas
	Note	Provision for mounting Outdoor Units of AC along with PVC Piping for proper drain of water from AC should also be included in the scope of tender
4	Width	1 mtr
5	Properties	Shall be free from attacks from Acid/Alkali/Transformer Oil etc.
6	Fire Retardant Property	Shall have fire retardant properties.
7	Installation	The mat shall be fixed on the floor of sub-station. The cost of cutting the mat as per width of panel and fixing it at the floor (as directed by Engineer-in- Charge) is to be included in the cost of insulating mats.
8	Ref Standard	IS 15652:2006

Document No. : TS-E013	
Equipment : False-Ceiling	
1	<p>Providing and Fixing in position Suspended false ceiling system using 600x600mm Aerated Calcium Silicate Ceiling tiles (plain/ cosmos/ spinton model) Tiles having 15mm Densified edges and 100% Humidity resistance, Incombustible as per BS476 part IV with Thermal conductivity of 0.043 w/m K and approved surface Design and with approved edge Profile placed in a suspended Grid of silhouette reveal grid system of Aerolite or equivalent with 15 mm wide flanges incorporating a 3mm central recess. The main runner and cross tees shall have mitered ends and birdsmouth notches to provide mitered cruciform junction. The main runners and cross tees shall be made of Hot-dipped G.I. steel sections having an exposed surface capping of Pre-finished baked polyester painted coil wherein the main tee of size 15mmx41mmx0.33mm (Min.) shall be suspended at 1200 mm centres securely fixed to the structural soffit by approved hangers at 1200 max. centres and not more than 150 mm from spliced joints. The last hanger at the end of each Runner should not be greater than 600 mm from adjacent wall. last along the length of ceiling with 4mm dia G.I. wire with necessary level adjusters and cross tees of size 15x41x0.33mmx1200mm shall be inserted in to slots between the main Tees at 600mm centres and thereafter in direction vertical to the longer TEEs, cross Tees of size 15x41x0.33mmx600mm shall be inserted to form a grid size of 600x600mm resting on the periphery walls on wall angles of size 22x22x3000x0.40mm thickness.</p> <p>Note: The rate shall include providing necessary openings for light fixtures, diffusers, Trap doors etc. to be made as per layout Drawings. The work shall be carried out as per directions of Engineer-in-charge. The main Tees to be suspended from the ceiling/ Soffit with the help of metal dash fasteners of 6mmx50mm, soffit cleats of 25mmx35mmx1.60mm and 4mm dia G.I. wire with galvanised spring steel levelling clips. the entire grid system shall be designed to bear a distributed load of minimum 15 Kgs/Sq.m etc. complete all as per drawings and specifications and as directed by Engineer-in-charge. (Only Calcium Silicate False Ceiling area will be Measured for the Purpose of Payment).</p>
2	<p>Providing and Fixing in position Suspended false ceiling system using 12mm thick Calcium Silicate Boards, 100% Humidity resistance, Incombustible as per BS476 part IV with Thermal conductivity of 0.043 w/m K placed in a suspended Grid of size of 600x 600mm made of Hot-dipped G.I steel sections wherein the Ceiling Sections of 0.55 mm thick shall be suspended at 1200 mm centres along the length of ceiling with 4mm dia G.I wires/ 1 mm thick Strip hangers made of G.I sheet sections with necessary level adjusters and Inter Channels of 0.90mm thick with connecting Clips and resting on the Periphery walls on wall angles of 0.55 mm thickness including providing necessary openings for light fixtures, diffusers, Trap doors etc to be made as per layout Drawings and as per directions of Engineer-in-charge. The rate quoted shall also include two coats of acrylic emulsion paint over a coat of primer.</p> <p>Note: The rate shall include providing necessary openings for light fixtures, diffusers, Trap doors etc. to be made as per layout Drawings. The work shall be carried out as per directions of Engineer-in-charge. The main Tees to be suspended from the ceiling/ Soffit with the help of metal dash fasteners of 6mmx50mm, soffit cleats of 25mmx35mmx1.60mm and 4mm dia G.I. wire with galvanised spring steel levelling clips/ GI strip hangers. The entire grid system shall be designed to bear a distributed load of minimum 15 Kgs/Sq.m etc. complete all as per drawings and specifications and as directed by Engineer-in-charge. (Only Calcium Silicate False Ceiling area will be Measured for the Purpose of Payment).</p>

Document No. : TS-E015		
Equipment		10 passenger Machine Room Less Elevator
S. No.	Particulars	Specified by BARC
1	Type of lift	Machine Room Less (MRL Type) Passenger lift
2	Capacity	10 passenger/ 680 kgs (Min)
3	Speed	1-1.5 m/sec
4	Drive	Ac VVVF variable voltage variable frequency with 30%-50% power saving
5	Control	Full Collective simplex control with Micro processor /PLC technology
6	Building data	
6.1	Floor Designation	GF+F1+F2+F3 (QtyAs per BOQ)
6.2	Stops	4 stops/ 4 landings with (all opening on the same side)(QtyAs Per BOQ)
6.3	Shaft Hoist Total Length	up to 15.6 mtrs
6.4	Shaft dimension	2200mm width *1875mm depth ,shaft height from the last landing 4.5 mtrs, shaft floor height GF:3150mm,F1&F2 :3150mm
6.5	Pit depth	1600mm from Last landing
7	Features:	
7.1	Hall buttons with position and direction arrows at all floors	
7.2	Car operating panel with Braille luminous buttons and attendant key	
7.3	LCD digital car position indicator in car(During Normal &ARD conditions)	
7.4	Battery operated alarm bell and emergency light and fan& communication	
7.5	Overload warning indicator in car	
7.6	Electronically controlled card access system in car operating panel. Provision to bypass this feature also shall be provided.	
7.7	Touch less floor selection , door open and close button, next landing announcement, arrival gong	
7.8	Bilingual door open, Floor announcement and music in car	
7.9	Infrared door detection system	
7.10	Intercom unit in car,at ground floor and machine room area	
7.11	In built stabilizer for controller	
7..12	Inbuilt ups for door control,ARD ,and Power failure conditions.	
7.13	Automatic Rescues Device to bring elevator to landing nearest at floor both in power & controller failure.	
7.14	Lift Door finish: SS Door with hairline finish	
7.15	Fireman's switch at main lobby. Fire safety regulations pertaining to lifts: Thetenderersshall also take into account local and State regulations as in vogue for the design and installation of lifts.	
7.16	Signages with serial number of lift and emergency customer care numbers to be provided in the	

	lift cabin. Standard DO's and DONT's list also to be provided inside CAR Cabin.
7.17	Automatic Self leveling
7.18	The Bidder shall be responsible for obtaining all necessary statutory licenses and fitness certificates for the lift from the relevant authorities, ensuring full compliance with applicable IS standards and local regulations.
8	General requirements
8.1	Fixtures Stainless steel fixtures (in car & at all landings), Glass door with SS Envelop
8.2	Car Door operation Automatic with Curtain of infrared door detector
8.3	Car Area Dimensions 1300mm width*1100mm depth*2400mm height
8.4	Car interior design Car body shall be made of Vandal/Scratch resistant Stainless steel of thickness 1.5mm min. Stainless steel car: provided with false ceiling with LED lighting, suitable No's of Duct fans, stainless steel car operating panel.
8.5	Car finish Rear panel=Teak & SS hairline finish /Cedar or as sample approved, Side panels =Teak & SS hairline finish /cedar or as sample approved, Front panels =Teak & SS hairline finish /cedar or as sample approved
8.6	Car operating panel Full height stainless steel panel with Braille luminous buttons. Touch less operation.
8.7	Car door Fully automatic power operated doors with SS envelop (Color sample as directed by EIC), centre opening. auto doors clear opening :800mm width*2000mm height
8.8	Car door protection Multiple beam full light curtain of infra red detectors
8.9	Flooring Anti skid heavy duty vinyl tiles /artificial granite - colour and makes as approved by client
8.1	Lighting Led lighting with decorative design false ceiling
8.11	Ventilation Duct fans in suitable no's to provide sufficient air circulation in lift car. Cross flow fan is preferred.
8.12	Hand rail Stainless steel mirror finish handrails SS bed guard on three sides of lift guard of dia 25-35mm at height clear of 1000mm from bottom
8.13	Emergency light, fan & alarm To be provided.
8.14	Automatic Rescue Device To be Provided.
8.15	Landing door and colour Fully Glass with SS envelop with golden color (preferably)

8.16	Shaft Lighting & Power (electrical conducting (PVC)/electrical items and wiring in shaft etc)	Scope of Bidder. To be provided with PVC/GI metal conduits along with GI/PVC accessories surface mounted GI/Powder coated /PVC modular box/Modular switches & Sockets as required as per specifications. Supply, Installation, termination (with lugs and glands), testing and commissioning of 4 core 16 sq copper stranded cable with armor of length of 40 meters (for each lift) is in scope of work. Installation of 4P 32 amps MCB (for each lift) and 4P RCCB, 32 A, 30 mA (for each lift) in Distribution Board is also included in scope of work. SITC of Earthing Copper Strip of 25 X 3 mm to be connected from lift to earthing pit. Continuity to be ensured and operation of RCCB to be demonstrated in case of current leak in lift car. Necessary Cable tray/trunking and support for cable tray- Installation of power cable also in the scope of bidder.
8.17	Power requirement	415V, +5%-10%, 3 phase, 50 Hz +/- 3% 3 Phase AC supply or 230V Single Phase AC supply
8.18	Commissioning test	a) Leveling test b) Safety gear test c) Speed d) Lift balance e) Car & landing door locks f) Controller g) Normal terminal stopping switches h) Final terminal stopping switches i) Insulation resistance j) Earthing k) Ropes l) Buffers m) Service temperature rise test
8.19	Types of wires & Cables	All wires and cables shall be FRLS /FRLSH type.
8.2	UPS & UPS power	To be provided by for door operation, ARD, breaking, soft start & Soft stop.
8.21	Running counter	Lift travel counter
8.22	Speed governor	Both Mechanical & Electrical
8.23	Call indicator	A visual and audible device in the car to indicate to the attendant the lift landings from which calls have been made.
8.24	Car frame steel structure/lift support frames /all steel structures/guide brackets	All parts constructed in sheet steel shall be either galvanised by hot dipping process /powder coated or shall be fabricated from hot dipped galvanised sheet steel in accordance with BS729 with minimum thickness of 85 micron .
8.25	BMS potential Free contacts	To be provided

8.26	Civil shaft	Brick shaft. Minor Civil modification required to accommodate the car/cabin is also in the scope of the bidder.
8.27	Traction media	Steel rope/flat coated steel belt / or as per manufacturers specification and as per standards
8.28	False ceiling type	Metallic with led light fixtures
8.29	Car door finish	Teak & SS hairline finish / Cedar or as sample approved
8.3	Landing doors finish	Teak & SS hairline finish / Cedar or as sample approved
8.31	Car & hoist way door type	Central opening (CO)Power doors
8.32	Floor Display LCD , call Booking buttons ,Car position indicator	Floor indicator LCD inside the car. Floor call bookings buttons with LCD display to be provided.
8.33	Standard features	Anti-nuisance car call protection,overload device,nudging,emergency,firemen's service, emergency car lightunit, infrared curtain door protection, doortime protection, emergency alarm button,extra door time of lobby & parking, dooropen/close button, manual rescueoperation, belt inspection drive, auto fancut off, soft start &Soft stop.
8.34	Power protection	Over current /earth fault/overload/emergency trip/short circuit/ earth leakage/single phasing/phase reversal/under voltage/over voltage/motor temperature etc as per standards to be provided
8.35	Safety Features	All standard safety features such as Emergency Stop, Automatic door leveling, Over travel limit switch, pit switch, Speed governor (Both Mech/Elect), pit buffer and all the mechanical safety/interlocks etc. to be provided.
8.36	Minor civil works/Load Buffer civil works /Load i beam /Load hooks/scaffolding	All minor civil works including chipping, drilling ,cutting ,plastering ,buffer foundation & finishing etc required for installation of the Lift shall be in the scope of theBidder. Supply installation of ibeam/Hooks in vendor scope only. Safety scaffolding in the scope of vendor.Packing of Terrace lift outer door with 2 sheets wooden sheet of 19mm or SS sheet with water proof wall paper is also scope of contract.
8.37	Defect Liability Period	One year from date of Handover of lift.
8.38	Finishes	Samples/sample images of Lift finishes to be submitted for approval.
8.39	Data sheet/ Drawings Approval	Lift Drawings/ data sheets/ QAP shall be approved before starting the manufacturing Process.
8.4	Pre-dispatch Inspection	Shall be carried out at Manufacturer's Premises as per approved QAP.
9	Applicable Standards:	

	Applicable Standard	Description
9.1	IS-14665 (Part 2) Sec-1 :2000	Code of Practice for installation, operation and maintenance of electric passenger & goods lifts
9.2	IS-14665 (Part 2) Sec-2 : 2000	Code of practice for installation, operation and maintenance of electric service lift
9.3	IS-14665 (Part 3) Sec-1 : 2000	Safety Rules Section-1 Passenger and Good lifts
9.4	IS-14665 (Part 3) Sec-2 : 2000	Safety Rules Section-2 – Service Lifts
9.5	IS-14665 (Part-1) : 2000	Outline dimension for electric lifts
9.6	IS-14665 (Part 5) : 1999	Inspection Manual for Electric Lifts
9.7	IS-14665 (Part 4) Sec-1 to 9 :2001IS 15330 :2003	Installation And Maintenance of Lifts For Handicapped Persons (Code of Practice)
9.8	IS-4289 (Par-1) : 1984 Reaffirmed 1991	Specification for lifts cables
9.9	IS-1173-1978 Reaffirmed 1987	Specification for hot rolled and slit steel tee bars
9.1	IS-7443-1974 Reaffirmed 1991	Method of loading rating of worm gear
9.11	IS-7403-1974 Reaffirmed 1991	Code of practice for selection of standard worn and helical gear box
9.12	IS-4218-(Part-II)1976 Reaffirmed 1996	Isometrics screw threads
9.15	IS-2147-1962	Degree of protection provided by enclosure for low voltage switchgear and control gear
9.16	IS-1271- 1985, Reaffirmed 1990.	Classification of insulating materials for electrical machinery and apparatus in relation to their thermal stability in service.
9.17	IS-3043	Code of practice for earthing
9.18	IS-1646-1997	Electrical installation Fire Safety of Building
9.19	IS-694-1990	PVC insulated electric cable for working voltage up to and including 1100 volts
9.2	IS-732-1989	Code of practice for electrical wiring and installation
9.21	IS-1554-1988 (Part-1)	PVC insulated (Heavy Duty) electric cables for working voltage up to and including 1100 volts
9.22	IS-3480-1966	Flexible steel conduits
9.23	IS-3837-1976	Accessories for rigid steel conduit for electrical wiring
9.24	IS-5133-1969 (Part 1)	Accessories for rigid steel conduit for electrical wiring
9.25	IS-5216- 1982 (Part-1)	Guide for safety procedures and practices in electrical work
9.26	IS-8130- 1984	Conductors for insulated electric cables and flexible cordes
9.27	IS-8828-1996	Miniature Circuit Breakers
9.28	IS-9537- 1981	Rigid steel conduits for electrical wiring (Second revisions)
9.29	IS-10810-1998	Methods of test for cables

9.3	IS-12640-1988	Earth Leakage Circuit Breakers
9.31	IS-13947-1993	Moulded Case Circuit Breakers
9.32	IS-13947-1993	General requirement for switchgear and control gear for voltage not exceeding 1000 volts
9.33	IS 7098	1100 volt grade XLPE insulated armoured cables
9.34	IS 7754-1975	Specifications for hoistway door-locks
9.35	IS 1735-1975	Rules for design, installation, testing and operation of lifts, escalators and moving parts
9.36	Applicable	The Indian Electricity Rules 1956
9.37	Applicable	The Indian Electricity Act 1910
10	Suggested Manufacturers	M/s OTIS, M/s Schindler, M/s Jhonson Lifts Private Limited, M/s Mitusbishi, M/s Kone,M/s Escon Elevators Pvt. Ltd.
11	Note:	
11.1	All the material/equipment to be supplied by the contractor shall be new one.	
11.2	Necessary documents in 6 sets along with completion documents, GTPs, As built drawings, Lift manual, work progress photos (Stage Wise) is to be submitted after Work Completion and this is to be included in the scope of the work.	
11.3	Necessary minor works required for completion the work is also in the scope of the contract	
11.4	Design of Supports, system design, integration etc as required at site pertaining to this work shall be in the scope of contractor in addition to Bill of quantities.	

PAYMENT SCHEDULE FOR ELECTRICAL WORKS

Item No	Description	Supply	Installation	Testing & Commissioning
1.01	Supply, installation, testing and commissioning of LED hanging type of dimension 1200mm, lighting fixture of minimum lumen output of minimum 3000 lumen of efficacy of minimum 100 lumen/watt, CCT 6500K as per TS-E001	70	20	10
1.02	Supply, installation, testing and commissioning of Mirror LED lighting fixture of lumen output of 500/600/700 lumen, , adjustable, wall mounted as per TS-E001	70	20	10
1.03	Supply, installation, testing and commissioning of LED lighting fixture of dayspace type of lumen output of minimum 3600 lumen of efficacy of minimum 100 lumen/watt, recess mounted, CCT 6500K, dimension of 600mm x 600mm, white/Red colour outline as per TS-E001	70	20	10
1.04	Supply, installation, testing and commissioning of LED lighting fixture with inbuilt PIR occupancy sensor, of lumen output minimum 2800 lumen of efficacy minimum 100 lumen/watt, recess mounted, CCT 6500K, dimension of 600mm x 600mm as per TS-E001	70	20	10
1.05	Supply, installation, testing and commissioning of LED lighting fixture of lumen output of minimum 1500 lumen of efficacy of minimum 100 lumen/watt recess mounted, CCT 6500K, dimension of circular shape as per TS-E001	70	20	10
1.06	Supply, installation, testing and commissioning of LED lighting fixture of lumen output of minimum 1000 lumen of efficacy of minimum 100 lumen/watt surface/recess mounted mounted, CCT 6500K, circular shape as per TS-E001	70	20	10
1.07	Supply, installation, testing and commissioning of LED batten type lighting fixture of dimension 1200mm of lumen output of minimum 2000 lumen of efficacy of minimum 100 lumen/watt, CCT 6500K as per TS-E001	70	20	10
2.01	Supply, installation, testing and commissioning of 1200 mm sweep 3 blade BLDC Fan with hanging rod of minimum 2-3 feet length and cap. Adjustment and making holes in false ceiling for hanging of ceiling fan is included in scope of work along with metal wire for safety of hanging of fan. This has to be tied with fan base and fan hook box. Thickness about 2.5 sq mm, stranded steel wire. 2 wheeler brake wire to be used as safety wire as per TS-E002	70	20	10
2.02	Supply, installation, testing and commissioning of plastic Exhaust fan of 200mm sweep dia , single phase, 32 watt, wire of 2.5 sq mm Phase,neutral,earth TRS wire of white color with plug top to be provided along with Exhaust fan. Fixng of fan in the aluminum frame is in	70	20	10

Item No	Description	Supply	Installation	Testing & Commissioning
	scope of work as per TS-E002			
2.03	Supply, installation, tesing and commissioing of metallic Exhaust fan of 300mm sweep , single phase of minimum 900 rpm, 50/60 watt. 1.5 meter of 2.5 sq mm Phase,neutral,earth TRS wire of white color with plug top to be provided along with Exhaust fan.Louvers should also be provided with exhaust fan as per TS-E002	70	20	10
2.04	Supply, installation, testing and commissioning of Wall mounted fan of 400mm sweep , adjustable speed control of 3 levels, speed adjusted with strings, tilt and oscillation control, with protection guard, plug top and power cord as per TS-E002	70	20	10
3.01	Suppy of nominal 2.5 mm +/- 10% thick and 1 m width insulated Mat conforming to IS15652: 2006 and meeting the requirement of IS 5216 (Part 1, 2 &3), Is 8437, IEC-479 Pub-1 & as per of IS: 15652 and suitable for class - B upto 11 kv, Make -Electromat or equivalent OEM aas per TS- E003	70	20	10
4.01	GI strip of 25mm X 3 mm.Strip.. Installation of GI strip includes along cable tray, on the wall. Connection of GI strip with cable tray with nut and bolts, distribution board is be done by nut and bolts. Installation along wall includes Insulator to be installed on wall at every 1 meter length of gap of strip. Bending of GI strip and taking out through hume pipe and connecting to earthing pit is included in the scope of work. Cost of Insulator and nut bolt, lugs is included in quotaed rate.	0	80	20
4.02	Copper strip of 25mm X 3 mm. Installation of copper strip includes along cable tray, on the wall. Connection of strip with cable tray, Panel is be done by nut and bolts. Installation along wall includes Insulator to be installed on wall at every 1 meter length of gap of strip. Bending of strip and taking out through hume pipe and connecting to earthing pit is included in the scope of work. Cost of Insulator and nut bolt, lugs is included in quotaed rate.	0	80	20
5.01	MS item includes various sizes of L angle, C chanel, metal sheet of various thickness. Fabrication including Cutting , welding , Red oxide painting and enemal paint, cost of weilding rod is included in quoted rate	0	100	0
6.01	Supply and installation of bolted rung Ladder type GI 450 mm width cable tray with flange width of 50mm. Cable tray to be modular and has to be assembled at site. Accessories like bends, Tees, cross, elbows, reducers etc required for installation of cables trays, minor civil works like chipping of floor is included in scope of work. The cost is included in quoted rate. Gap between 2 Rungs not to exceed 300 mm. Thickness of cable rungs and ladder to be 2.5mm	70	20	10

Item No	Description	Supply	Installation	Testing & Commissioning
7.01	Fabrication, Supply, Installation, testing and commissioning of Power Panel (PCC-01) as per TS - E004	70	20	10
7.02	Fabrication, Supply, Installation, testing and commissioning of Power Panel (PCC-02) as per TS - E004	70	20	10
7.03	Fabrication, Supply, Installation, testing and commissioning of UPS Power panel(PCC-03) as per TS - E004	70	20	10
7.04	Fabrication, Supply, Installation, testing and commissioning of Control Panel as per TS -E004	70	20	10
8.01	Supply, installation, testing and commissioning of TPN DB of 8way (8+24) with acrylic door as per TS-E005	70	20	10
8.02	Supply, installation, testing and commissioning of 6/10 A SP B/C type as per TS-E005	50	30	20
8.03	Supply, installation, testing and commissioning of 16 A SP C type as per TS-E005	50	30	20
8.04	Supply, installation, testing and commissioning of 25 A SP C type as per TS-E005	50	30	20
8.05	Supply, installation, testing and commissioning of 25 A 4P B/C type MCB as per TS-E005	50	30	20
8.06	Supply, installation, testing and commissioning of 32 A 4P C type MCB as per TS-E005	50	30	20
8.07	Supply, installation, testing and commissioning of 63 A 4P C type MCB as per TS-E005	50	30	20
8.08	Supply, installation, testing and commissioning of 25 A DP RCCB of 30mA sensitivity as per TS-E005	50	30	20
8.09	Supply, installation, testing and commissioning of 40 A DP RCCB of 30 mA sensitivity as per TS-E005	50	30	20
8.10	Supply, installation, testing and commissioning of 63 A DP RCCB of 30 mA sensitivity as per TS-E005	50	30	20
8.11	Supply, installation, testing and commissioning of 4kV,40kA Type-2 Surge diverter as per TS-E005	50	30	20
9.01	Supply, installation, testing and commissioning of 6/16 A universal socket with shutters as per TS-E006	50	30	20
9.02	Supply, installation, testing and commissioning of 16 A 1 modular Switch with indication light as per TS-E006	50	30	20
9.03	Supply, installation, testing and commissioning of 6 A 1 modular Switch as per TS-E006	50	30	20
9.04	Supply, installation, testing and commissioning of 6 A 1 modular 2 way switches as per TS-E006	50	30	20
9.05	Supply, installation, testing and commissioning of 25 A Motor starter 2 Module for controlling of AC points as per TS-E006	50	30	20
9.06	Supply, installation, testing and commissioning of 25 A 2 Module Socket as per TS-E006	50	30	20
9.07	Supply, installation, testing and commissioning of 1 module blanking cover Plates as per TS-E006	50	30	20
9.08	Supply, installation, testing and commissioning of 1/2 module cover plate with frame as per TS-E006	50	30	20

Item No	Description	Supply	Installation	Testing & Commissioning
9.09	Supply, installation, testing and commissioning of 3 module cover plate with frame as per TS-E006	50	30	20
9.10	Supply, installation, testing and commissioning of 4 module cover plate with frame as per TS-E006	50	30	20
9.11	Supply, installation, testing and commissioning of 6 module cover plate with frame as per TS-E006	50	30	20
9.12	Supply, installation, testing and commissioning of 8 module cover plate with frame as per TS-E006	50	30	20
9.13	Supply, installation, testing and commissioning of 16 module cover plate with frame as per TS-E006	50	30	20
9.14	Supply, installation, testing and commissioning of Fan step Regulator of 100 watt of 2 module as per TS-E006	50	30	20
9.15	Supply, installation of 2 module metal flush boxes as per TS-E006	50	30	20
9.16	Supply, installation of 3 module metal flush boxes as per TS-E006	50	30	20
9.17	Supply, installation of 4 module metal flush boxes as per TS-E006	50	30	20
9.18	Supply, installation of 6 module metal flush boxes as per TS-E006	50	30	20
9.19	Supply, installation of 8 module metal flush boxes as per TS-E006	50	30	20
9.20	Supply, installation of 16 module metal flush boxes as per TS-E006	50	30	20
9.21	Supply, installation of Fan hook boxes as per TS-E006	50	30	20
9.22	Supply, installation of PVC ceiling rose as per TS-E006	50	30	20
10.01	Supply, installation, testing and commissioning of Point wiring of 1.5 sq mm wire of average length 25 meter with plus minus 5 meter with phase wire, neutral wire and earth wire in each point wiring circuit. Wiring in same flush box is not considered to be separate wiring point as per TS-E007	0	80	20
10.02	Supply, installation, testing and commissioning of Point wiring of 1.5 sq mm wire of average length 10 meter with plus minus 2.5 meter with phase wire, neutral wire and earth wire in each point wiring circuit. Wiring in same flush box is not considered to be separate wiring point as per TS-E007	0	80	20
10.03	Supply, installation, testing and commissioning of Point wiring of 2.5 sq mm wire of average length 25 meter with plus minus 5 meter with phase wire, neutral wire and earth wire in each point wiring circuit. Wiring in same flush box is not considered to be separate wiring point as per TS-E007	0	80	20
10.04	Supply, installation, testing and commissioning of Point wiring of 2.5 sq mm wire of average length 15 meter with plus minus 2.5 meter with phase wire, neutral wire and earth wire in each point wiring circuit.	0	80	20

Item No	Description	Supply	Installation	Testing & Commissioning
	Wiring in same flush box is not considered to be separate wiring point as per TS-E007			
10.05	Supply, installation, testing and commissioning of Point wiring of 4 sq mm wire of average length 25 meter with plus minus 5 meter with phase wire, neutral wire and earth wire in each point wiring circuit. Wiring in same flush box is not considered to be separate wiring point as per TS-E007	0	80	20
10.06	Supply, installation, testing and commissioning of Point wiring of 4 sq mm wire of average length 15 meter with plus minus 2.5 meter with phase wire, neutral wire and earth wire in each point wiring circuit. Wiring in same flush box is not considered to be separate wiring point as per TS-E007	0	80	20
11.01	Supply, installation, testing and commissioning of High Mechanical strength (HMS) 25 mm OD PVC conduit, socket at one end including accessories like long L bend, T joint, Straight Joint/Coupler, etc as per TS-E008	0	80	20
11.02	Supply, installation, testing and commissioning of High Mechanical strength (HMS) PVC Junction box for interconnection of conduit of 25 mm OD as per TS-E008	0	80	20
11.03	Supply, installation, testing and commissioning of thickness 1.3 to 1.8 mm, 25 mm OD MS conduit, socket at one end including accessories like long L bend, T joint, Straight Joint/Coupler, etc as per TS-E008	0	80	20
11.04	Supply, installation, testing and commissioning MS Junction box for interconnection of conduit of 25 mm OD as per TS-E008	0	80	20
11.05	Supply, installation, testing and commissioning of Metallic flexible pipe of 25 mm OD along with rolling flexible PVC rolling tape . The metallic flexible pipe to be connection to metallic junction boxes with metallic clamp. The cost of clamp is included in this quoted rate as per TS-E008	0	80	20
11.06	Supply, installation, testing and commissioning of Casing and capping of 2 inch width with bends and joints as per TS-E008	0	80	20
11.07	Supply, installation, testing and commissioning of PVC Trunking with all the required accessories as per TS-E008	0	80	20
12.01	Supply, installation, testing and commissioning of 3.5 C x 400 sq mm , Aluminium Conductor 1.1 kv, xlpe extruded insulation, aluminium cable, with FRLS sheath, round/flat armoured. as per TS-E009	70	20	10
12.02	Supply, installation, testing and commissioning of 4C x 25 sq mm 1.1 kv, xlpe extruded insulation, Aluminium Conductor cable , with FRLS sheath, round armoured	70	20	10

Item No	Description	Supply	Installation	Testing & Commissioning
	as per TS-E009			
12.03	Supply, installation, testing and commissioning of 3.5C x 70 sq mm 1.1 kV, xlpe extruded insulation, Aluminium Conductor cable, with FRLS sheath, round armoured as per TS-E009	70	20	10
12.04	Supply, installation, testing and commissioning of Cable Gland for 3.5C x400 sq mm with double compression and connection of 4 nos of aluminium long barrel/bolted lugs as per TS-E009	0	80	20
12.05	Supply, installation, testing and commissioning of Cable Glanding and connection of 4 nos of Aluminum long barrel/bolted lugs for 4C x 25sq mm as per TS-E009	0	80	20
12.06	Supply, installation, testing and commissioning of Cable Gland for 3.5C x 70sq mm with double compression and connection of 4 nos of aluminium long barrel/bolted lugs as per TS-E009	0	80	20
12.07	Excavation of Hard soil for laying of cable and back filling after installation of cable	0	100	0
12.08	Laying of hume Pipe, NP3 class of 300 mm OD conforming to IS-458, length of 3 meter at depth of about 1 meter	0	100	0
12.09	Filling of sand for laying of cable including laying of brick from 3 side of underground laid cable	0	100	0
12.10	Route marker, Supply & Installation - RCC cable route markers, with custom label as per dimensions(300mm x 400 mm) and sketch - RCC grade M-30 - Base colour: Yellow, band colour: Firozi & Red - Marking: Engraving on Front with red colour - Installation: 18" inside/ above the earth with PCC base	70	20	10
12.11	Supply & Installation High Density Polyethylene Pipe of size 100mm to 110 mm diameter. Carbon content max 3 %. Thickness not less than 6mm.. The intrnal and external surface of pipe shall be smooth, clean and fre from grooving and other defects. Material density DHPE, dentity of 940 to 960 kg/m3. IS 4984-2016	70	20	10
12.12	Augering of soil of 150 mm dia 750 mm below the surface of grass	0	100	0
13.01	Supply, installation, testing and commissioning of 20 kVA UPS with external battery bank and feature of parallel redundancy as per TS-E010	70	20	10
13.02	Supply and Installation of 2 Tr. Split inverter AC as per TS-E010A	70	20	10
13.03	Supply, Installation, Testing and Commissioning of Timer control switch for AC as per TS- E010B	70	20	10
13.04	Supply, Installation, Testing and Commissioning of 75mm GI Pipe	70	20	10
14.01	Supply, installation, testing and commissioning of 2	70	20	10

Item No	Description	Supply	Installation	Testing & Commissioning
	mtr Air terminals as per TS-E012			
14.02	Supply, installation, testing and commissioning of 0.5 mtr Air terminals as per TS-E012	70	20	10
14.03	Supply and installation of roof & downconductor rod as per TS-E012	70	20	10
14.04	Supply and installation of roof conductor holder for flat roofs with concrete blocks as per TS-E012	70	20	10
14.05	Supply and installation of conductor holder as per TS-E012	70	20	10
14.06	Supply and installation of SS cross connectors and T connectors as per TS-E012	70	20	10
14.07	Supply and installation of Test link box as per TS-E012	70	20	10
14.08	Supply, installation, testing and commissioning of Earth pits as per TS-E012	0	80	20
15.01	Providing and Fixing in position Suspended false ceiling system using 600x600mm Aerated Calcium Silicate Ceiling tiles (plain/ cosmos/ spinton model) Tiles having 15mm Densified edges as per TS-E013	70	20	10
15.02	Providing and Fixing in position Suspended false ceiling system using 12mm thick Calcium Silicate Boards, 100% Humidity resistance, Incombustible as per BS476 part IV as per TS-E013	70	20	10
16.01	Supply, installation, testing and commissioning of 10(Ten) passenger capacity lift with 4 Stops/4 landing as per TS-E015	70	20	10

**Supply, Installation, testing and commissioning of Telephone, CCTV and Data Networking system at
General Office Building, BARC, Atchutapuram, near Visakhapatnam, Andhra Pradesh**

SCHEDULE OF PAYMENT

Sl. No.	Description	Payment Breakup	
		Supply	Installation, Testing and Commissioning
1.0	24 core Optical Fibre Cable (OFC): Supply, Installation, testing and commissioning of 24 Core, Single Mode, Multitube, Gelly filled,PVC insulated, Armoured, Optical Fibre Cable (OFC).	50%	50%
2.0	Light Interface Unit (LIU): Supply, Installation, testing and commissioning of 24 PORT,RACK MOUNT Light Interface Unit (LIU) with all accessories. Fully loaded includes adapters, OFC pigtailed and fiber tray.	50%	50%
3.0	Splicing of Optical Fiber: Splicing of Single mode Optical Fiber per core	0%	100%
4.0	Supply of Single mode, SC-LC/LC-LC, Optical Fiber patch cord of 3 meter length as per site requirement	70%	30%
5.0	Network Rack (Size: 15U): Supply and installation of 15U height wall mounted Network rack with accessories (a) hinged glass door (b)atleast 7 Nos. of horizontal and vertical cable manager (c) light (d) cooling fan (e) four outlet power distribution box	50%	50%
6.0	: Supply and installation of 42U height floor mounted Network rack (800 x800) with accessories (a) hinged glass door (b) atleast 20 Nos. of horizontal cable manager and atleast 02 Nos. of vertical cable manager (c) light (d) cooling fan (e) vertical power distribution units	50%	50%
7.0	CAT6 patch panel: Supply and installation of 24 port RJ-45, CAT6 loaded patch panel. Installation includes mounting in network rack, termination of Cat -6 UTP cable in all ports.	50%	50%
8.0	Cat-6 UTP cable: Supply, installation,testing and commissioning of Cat-6 UTP cable. Installation of cable shall be in PVC conduit and surface/ concealed conduit.	50%	50%

Sl. No.	Description	Payment Breakup	
		Supply	Installation, Testing and Commissioning
9.0	Supply, Installation of CAT 6 UTP patch cords,Length: 1 meter	70%	30%
10.0	Supply, Installation of CAT 6 UTP patch cords,Length: 3 meter	70%	30%
11.0	Supply and installation of bolted rung Ladder type GI 450 mm width cable tray with flange width of 50mm . Cable tray to be modular and has to be assembled at site. Accessories like bends, Tees, cross, elbows, reducers etc required for installation of cables trays, minor civil works like chipping of floor is included in scope of work. The cost is included in quoted rate. Gap between 2 Rungs not to exceed 300 mm. Thickness of cable rungs and ladder to be 2.5mm	50%	50%
12.0	MS item includes various sizes of L angle, C chanel, metal sheet of various thickness. Fabrication including Cutting , welding , Red oxide painting and enamel paint, cost of weilding rod is included in quotated rate	30%	70%
13.0	PVC conduit: Supply, Installation, testing and commissioning of 25 mm PVC Conduit - 1.8mm (MMS) thickness, including accessories such as 50mm Dia Junction box (1/2/3/4 way), Coupler, T Joints, bends, flexible conduit etc., as per site requirement.	50%	50%
14.0	DLP PVC TRUNKING (50x80) with Accessories, Supply & Installation - PLASTIC TRUNKING 80MMX50MM: 60 mtr - FLEXIBLE COVER 65MM WIDTH: 60 mtr - JOINT FOR 65MM WIDTH COVER: 30 no - BASE JOINT: 30 no - END CAP: 10 - INTERNAL ANGLES-ADJ FRM 80 DEG: 6 - EXTERNAL ANGLES-ADJ FRM 60 DEG: 6 - FLAT ANGLES: 2 - FLAT JUNCTIONS: 2	90%	10%
15.0	Supply Installation Testing and Commissioning of IP PBX with SIP support minimum 300 users capacity with hot standby configuration	50%	50%

Sl. No.	Description	Payment Breakup	
		Supply	Installation, Testing and Commissioning
16.0	RJ45 Computer Socket module: Supply and installation of RJ45 Cat 6 Computer socket single module suitable for installing in standard modular boxes.	50%	50%
17.0	Supply of Corded SIP based telephone instruments minimum one year warranty	100%	0%
18.0	Supply, Installation, Testing and Commissioning of flush mounted 3 modular boxes	50%	50%
19.0	Frame and support plate for modular boxes: Frame and support plate for 3 modular boxes as per site requirement.	50%	50%
20.0	48 Port Managable Gigbit Ethernet Switch with 4 SFP modules: Supply, Installation, testing and commissioning of 48 Port Gigbit Ethernet Switch with 4 SFP modules of 20 km populated. minimum one year warranty	50%	50%
21.0	24 Port PoE managable Ethernet Switch with 4 SFP modules: Supply, Installation, testing and commissioning of 24 Port PoE Gigbit Ethernet Switch with 4 SFP modules of 20 km populated. minimum one year warranty	50%	50%
22.0	48 Port PoE Managable Ethernet Switch with 4 SFP modules: Supply, Installation, testing and commissioning of 48 Port PoE Gigbit Ethernet Switch with 4 SFP modules of 20 km populated. minimum one year warranty	50%	50%
23.0	IP PoE Bullet Cameras: Supply, Installation, testing and commissioning of 4 MP, weather proof, PoE, IR, with 3.6/4.0 mm lense IP Bullet camera with support of H.265 or better compression. Minimum One year OEM warranty.	50%	50%
24.0	IP PoE Dome Cameras: Supply, Installation, testing and commissioning of 4 MP, PoE, IR, with 3.6/4.0 mm lense IP Dome camera with support of H.265 or better compression. Warranty: Minimum One year OEM warranty.	50%	50%

Sl. No.	Description	Payment Breakup	
		Supply	Installation, Testing and Commissioning
25.0	Network Video Recorder: Supply, Installation, testing and commissioning of Network Video Recorder (NVR) :32 Channel with support for H.265 or better Compression, Minimum support for 4 hard disk bay (each bay supporting upto minimum 8 TB), Video output Port: 1 x HDMI, Keyboard and mouse. NVR shall also support standard features of CCTV monitoring such as video recording, motion detection, video backup, RAID 5 etc. and all standard formats of video. Warranty: Minimum One year OEM warranty shall be applied.	50%	50%
26.0	Surveillance Hard disk: Supply, Installation, testing and commissioning of 6 TB Surveillance hard disk supporting above supplied NVR. Warranty: Minimum One year OEM warranty shall be applied.	50%	50%
27.0	43" LED Monitor: 43" LED, HD monitor suitable for above NVR with 1xHDMI, 1xVGA ports.	50%	50%
28.0	2KVA UPS with 30 min Battery backup, battery rack and necessary cables. Minimum One year OEM warranty shall be applied.	50%	50%
29.0	Excavation of soil and refilling by manual means upto a depth of 1.00 to 1.50 mtr.	0%	100%
30.0	Supply and laying of 50mm Dia HDPE pipe including couplers with ISI mark suitable for laying armoured Optical Fibre Cable.	50%	50%
31.0	Supply and Installation of Warning Tape	50%	50%
32.0	Supply and Installation of Route Markers	50%	50%

SPECIFICATION FOR TELEPHONE & DATA NETWORK

Item no	Specifications
1.0	24 core Optical Fibre Cable (OFC).
1.1	Type: Single mode, loose tube, Multitube, Gelly filled, PVC insulated, Armoured
1.2	No.of Cores: 24
1.3	Max. attenuation (dB/Km): <=0.4 @ 1310 nm , 0.25 @ 1550 nm
1.4	size: 9/125 µm; Cladding diameter: 125±1 µm
1.5	supporting IEC standard color coding
1.6	Installation: Installation includes laying of cable through HDPE conduit in cable tray, clamping on wall and termination on both ends. All accesories including clamps, glands, cable ties shall be in the scope of contractor.
1.7	Preferred makes: Legrand/ Belden/ Tyco - AMP/ CommScope
2.0	Light Interface Unit (LIU):
2.1	Enclosure: MS powder coated, rackmount
2.2	No. of Ports: 24 port SC
2.3	No. of pigtails to be supplied: 24 Nos.
2.4	Accessories: Fiber tray
2.5	Installation: LIU shall be rack mounted and fiber cable shall be entered in to LIU and tied. Proper dressing of fibers inside LIU shall be done
3.0	Splicing of Optical Fiber
3.1	Splicing shall be carried out as per industry standards and necessary equipment and tool shall be in the scope of contractor.
3.2	Testing and commissioning: Fiber continuity and dB losses shall be tested with the help of OTDR
4.0	Fiber Optic Patch Cord LC-LC & SC-LC, 3 meter
4.1	OS1 (UPC) single mode optical cords (9/125 µm),G652D,G657A,G657B
4.2	Maximum insertion losses : 0.3dB
4.3	Type : Single mode, LC-LC & SC-LC , 1310 nm
4.4	Connector Type LC-LC,Duplex & SC-LC Duplex
4.5	Length : 3 meter
4.6	Cable Type PVC & LSZH, 3.0mm x 6.2mm
4.7	Standard Compliant with TIA/EIA-568-C
4.8	Return loss: Greater than -55dB.
5.0	Network Rack (Size: 15U)
5.1	Size & Type: 15U & MS powder coated with hinge and glass door
5.2	Application: Installing Ethernet switches, RJ45 jack/ patch panels
5.3	Accessories: (a) hinged glass door (b)at least 7 Nos of cable manager (c) light (d) cooling fan (e) four outlet power distribution box
5.4	Cable entry: Provision in Top and bottom
5.5	Mounting: Wall mounting

Item no	Specifications
5.6	Installation: Rack shall be mounted on wall at appropriate height and location as instructed by Engineer-in-Charge.
6.0	Network Rack (Size: 42U)
6.1	Size : 42 U , 800 (w) x 1000(d) mm,
6.2	Conforms to DIN 41494 or equivalent standard
6.3	Front: Lockable Toughened Glass Door
6.4	Rear: Lockable Steel Door – Plain/ Vented/ Perforated
6.5	Anti-Corrosive Powder Coated
6.6	16 port PDU, 4 Fans, 20 horizontal cable manager, 2 Vertical cable manager, Mounting hardware,
6.7	Eye bolts for lifting the rack, Earth bolt
7.0	CAT6 patch panel:
7.1	Number of ports: 24 RJ45 (4x Six-port RJ45 modules)
7.2	Suitable for terminating 4 pairs, Cat-6 UTP cable
7.3	Universal labels color-coded for T568A and T568B wiring schemes
7.4	Suitable for Krone punch down tool or Tool less
7.5	Installation: Shall be mounted inside Network rack and UTP cable shall be terminated in all ports.
8.0	Cat-6 UTP cable:.
8.1	Type: Cat-6 UTP
8.2	No. of pairs: 4
8.3	Suitable for PoE equipment
8.4	Supporting EIA/TIA 568A/B standard color coding
8.5	Installation: Installation of cable shall be in PVC conduit and surface/ concealed conduit in wall / ceiling.
8.6	Testin& commissioning: Continuity test shall be carried out with the help of cable tester and proper terminal labeling shall be done on both ends of the cable.
8.7	Preferred makes: Legrand/ D-Link/ equivalent
9.0	CAT 6 UTP patch cords:1M
9.1	Type of cable: Cat-6 UTP
9.2	Length : 1 meter
9.3	Type of connector: RJ-45 (both ends shall be factory crimped)
9.4	Preferred makes: Legrand/ D-Link/ equivalent
10.0	CAT 6 UTP patch cords: 3M
10.1	Type of cable: Cat-6 UTP
10.2	Length : 3 meter
10.3	Type of connector: RJ-45 (both ends shall be factory crimped)
10.4	Preferred makes: Legrand/ D-Link/ equivalent

Item no	Specifications
11.0	Bolted rung Ladder type GI 450 mm width cable tray with flange width of 50mm
11.1	Ladder type GI Cable tray
11.2	Material: GI
11.3	450 mm(W), 100 mm (H)
11.4	Including tray joint & accessories as per site condition
11.5	Distance between two rung 200 mm
11.6	Thickness of tray material: 2 mm
11.7	Width of Rung: 50 mm
11.8	Shall be installed on MS angle, drilling & bolting
11.9	Minor civil works regarding installaiton of tray
11.10	Installation: Shall be bolted to the existing supporting structure at 1.5 mtr. Interval
11.11	All other accessories, fittings, materials etc. required for proper, complete, and reliable installation shall be deemed to be included in the scope of work
12.0	MS item includes various sizes of L angle, C chanel, metal sheet of various thickness. Fabrication including Cutting , welding , Red oxide painting and enemal paint, cost of weilding rod is included in quotated rate
13.0	PVC Conduit
13.1	Material :PVC
13.2	heavy duty round rigid conduits
13.3	25mm Dia,
13.4	1.8 mm wall thickness
13.5	Socket at one end
13.6	Accessories : 50mm Dia Junction box (1/2/3/4 way), Coupler, T Joints, bends, flexible conduit etc., as per site requirement.
13.7	All other accessories, fittings, materials etc. required for proper, complete, and reliable installation shall be deemed to be included in the scope of work
13.8	Confirming to IS:9537(Part-3)
14.0	DLP PVC TRUNKING (50x80) with Accessories
14.1	Size :PLASTIC TRUNKING 80MMX50MM
14.2	Accessories : Flexible cover,Joint for 65 mm width cover,Base Joint,End Cap,Internal Angels,Externeal Angels,Flat Angels,Flat Juntions etc
14.3	All other accessories, fittings, materials etc of DLP PVC Trunking required for proper, complete, and reliable installation, commissioning, and satisfactory operation of the system shall be deemed to be included in the scope of work
15.0	IP-BAX SIP Based
15.1	300 user lines
15.2	Concurrent calls (G.711): 450
15.3	Power Supply: 230 VAC
15.4	Analog Telephone FXS Ports: 4 or more

Item no	Specifications
15.5	PSTN Line FXO Ports: 4 or more
15.6	Network interface: Three or more Gigabit ports with PoE+
15.7	LED Indicators: Power, FXS, FXO, LAN, Heartbeat
15.8	Hotstandby configurable
15.9	Video Codecs: H.264 and more
15.10	QoS: Layer 2 & 3 QoS shall be available
15.11	rack mount accessories.
15.12	Support Video conferencing through SIP & computer application (Shall be supplied)
15.13	Call features: Call park, call forward, call transfer, call waiting, caller ID, call record, call history, ringtone, IVR, music on hold, call routes, DID, DOD, DND, DISA, ring group, time schedule, call queue, pickup group, paging/intercom, voicemail, c
15.14	Integration with PA system (conventional & IP based)
15.15	Warranty: 3 years onsite
16.0	RJ45 Computer Socket module
16.1	Cable support: Cat6 UTP
16.2	RJ45 (female) EIA/TIA 568A & B dual colour coded terminals supported
16.3	Shall support for Gigabit Ethernet and PoE
16.4	Shall be single modular size
16.5	Installation: shall be installed in existing modular boxes with frame and support plate. Shall be Terminated with Cat6 UTP cable
16.6	Testing & commissioning: End to end Contiuity test shall be done with cable tester. Necessary labling shall be done for identification of the port
16.7	Preffered Make: Legrand, AMP, D-link or equivalent
17.0	IP Phones SIP Based
17.1	PoE and DC powered
17.2	Power Adapter to be supplied
17.3	wall mount kit /accessories to be supplied
17.4	2 year OEM warranty
	Large display
18.0	Flush mounted 3 modular boxes
18.1	Flush mounted box suitable for concealed cabling,
18.2	Confirming to relevant Standards, IS 14772
19.0	Frame and support plate for moudlar boxes
19.1	Flush & surface mount
19.2	Material : Polycarbonate Hi-Grade Plastic
19.3	should be suitable to RJ45/RJ-11 module sockets
19.4	shall be installed for already existing flushed modular boxes
19.5	Shall be suitable for existing concealed modular boxes.
19.6	Preferred Make: Legrand, AMP, D-link or equivalent

Item no	Specifications
19.7	Note: Wherever Single module to be installed, faceplate shall be single outlet. Remaining all with dual outlet.
20.0	48 Port Managable Gigabit Ethernet Switch with 4 SFP modules
20.1	No. of Ports: 48 port 10/100/1000 Base-T
20.2	Uplink ports: 4 x 100/1000 Mbps Gigabit Ethernet/SFP combo ports
20.3	Switching capacity: 104 Gbps
20.4	MAC address table: 8K entries
20.5	4 x Gigabit Ethernet/SFP combo ports, Populated with duplex 4 SFP modules of 20Km
20.6	Auto MDI/MDIX adjustment for all twisted pair ports
20.7	Management interface: Web based GUI
20.8	LED: Status and Activity
20.9	Power supply: 230V AC, 50Hz
20.10	Installation: Shall be installed in Network rack and configured
20.11	Testing & commissioning: communication on all ports shall be tested and all the functionalities have to be tested.
20.12	Warranty: One Year onsite OEM warranty
20.13	Preferred make: D-link, Digisol, Cisco, Netgear or equivalent
21.0	24 Port PoE managable Ethernet Switch with 4 SFP modules
21.1	No. of PoE ports: 24 x 10/100/1000 Base-TX+PoE ports
21.2	Uplink ports: 2 x Gigabit Ethernet/SFP combo ports
21.3	4 x Gigabit Ethernet/SFP combo ports, Populated with duplex 4 SFP modules of 20Km
21.4	PoE Power budget : 190 watts or above
21.5	Switching capacity : 56 Gbps
21.6	LED: Power, Status and Activity
21.7	Power supply: 230V AC, 50Hz
21.8	Installation: Shall be installed in Network rack and configured for network connectivity
21.9	Testing & commissioning: communication on all ports shall be tested
21.10	Warranty: One Year onsite OEM warranty
21.11	Preferred make: D-link, Digisol, Cisco, Netgear or equivalent
22.0	48 Port PoE Managable Ethernet Switch with 4 SFP modules
22.1	Manageable Layer 2
22.2	48 x Gigabit (1000 Mbps) Ethernet ports
22.3	4 x Gigabit Ethernet/SFP combo ports, Populated with duplex 4 SFP modules of 20Km
22.4	MAC table: 16K entries or more
22.5	Switching capacity: 100 Gbps or more
22.6	Packet forwarding rate: 75 Mpps or more
22.7	Surge & Lightening protection for power supply & all ethernet ports shall be available

Item no	Specifications
22.8	Rack mount accessories
22.9	Minimum 1 year OEM onsite warranty
23.0	Supply & Installation
23.0	IP PoE Bullet Cameras:
23.1	STQC certification
23.2	Active pixels 4 MP or more
23.3	1/2.8" or larger sensor size
23.4	Lens: 2.8/ 3.6 / 4 mm as per site condition
23.5	PoE powered, Dual stream
23.6	H.265 compression,
23.7	Max. illumination distance up to 30 m
23.8	ONVIF Profile S, G & T
23.9	Wall mount & ceiling mount accessories to be supplied
23.10	120 db or more WDR
23.11	IP 67
23.12	UL/ BIS certification
23.13	OEM warranty: 1 year or more
24.0	IP PoE Dome Cameras:
24.1	STQC certification
24.2	Active pixels 4 MP or more
24.3	1/2.8" or larger sensor size
24.4	Lens: 2.8/ 3.6 / 4 mm as per site condition
24.5	PoE powered, Dual stream
24.6	H.265 compression,
24.7	Max. illumination distance up to 30 m
24.8	ONVIF Profile S, G & T
24.9	Wall mount & ceiling mount accessories to be supplied
24.10	120 db or more WDR
24.11	UL/ BIS certification
24.12	OEM warranty: 1 year or more
25.0	Network Video Recorder:
25.1	No. of channels: 32
25.2	Hard disk bay : supporting 4 x SATA HDD and each min. 8TB support
25.3	Video out: 1 x HDMI port
25.4	Feature support: H.265 Compression, RAID 1, 5, & 6, NVR shall also support standard features of CCTV monitoring such as video recording, motion detection, video backup etc., and all standard formats of video.
25.5	USB ports : 2 nos
25.6	Accessories: Keyboard and Mouse
25.7	RJ 45 Ethernet Port: 1x1000 Mbps
25.8	Power Supply: 230V AC, 50Hz

Item no	Specifications
25.9	Warranty: One Year on-site OEM warranty
26.0	Preferred makes: Dahua, CP Plus, Bosch, Axis, Honeywell, Pelco, DvTel, D Link, Samsung, Panasonic
26.0	Surveillance Hard disk:
26.1	Capacity : 6TB
26.2	Interface: SATA
26.3	Cache / buffer memory: 64 MB
26.4	Form Factor: 3.5"
26.5	HDD category: Surveillance HDD with high write capacity suitable for above NVR
26.6	Warranty: One Year on-site OEM warranty
26.7	Note: Hard disk shall be compatible with the supplied NVR against Item No.25
27.0	43" LED Monitor
27.1	Screen size: 43 Inches diagonal
27.2	Screen size: 43 Inches diagonal
27.3	Number of HDMI ports: 1 or more
27.4	Number of VGA ports : 1
27.5	Resolution: 1920 x 1080 Pixels
27.6	Aspect ratio: 16:9
27.7	Refresh rate: 60 Hz
27.8	Power supply support: 230V, 50Hz
27.9	Accessories: Power supply cord, HDMI cable, Mounting stand
27.10	Warranty : One year OEM warranty
27.11	Preferred make: Samsung/LG/ Dell/AOC/HP
28.0	2KVA UPS with 30 min Battery backup, battery rack and necessary cables. Minimum One year OEM warranty shall be applied.
28.1	Pure Online Double Conversion UPS, IGBT based, Single phase input and output,
28.2	External battery bank shall be provided with minimum 30 minutes backup time.
28.3	Battery racks and necessary cables shall be provided and included in the scope of the item
28.4	All other accessories, fittings, materials etc. required for proper, complete, and reliable installation shall be deemed to be included in the scope of work
29.0	Excavation & refill of soil by Manual means
29.1	Earth work excavation by manual labour only for a maximum depth of 1000 mm. Refilling of excavated soil shall be in the scope of the work. Work also include clearing Jungle, uprooting of vegetation, grass, etc. complete and as directed by the Engineer-in-charge
30.0	HDPE pipe - 50mm
30.1	Item description: High Density Polyethylene Pipe, IS:4984-2016,
30.2	Size: 50 mm OD \pm 0.4mm

Item no	Specifications
30.3	Surface Finish:The internal & external surface of the pipe shall be smooth, clean and free from grooving and other defects.
30.4	Wall Thickness:minimum 2.8mm
30.5	OVALITY:max 1.5 mm
30.6	Pressure rating:4.2 kg/cm ² , Shall show no signs of localized swelling, leakage or weeping, and shall not burst during test
30.7	CARBON BLACK CONTENT:2.0% - 3.0%
30.8	OXIDATION INDUCTION TIME:Shall be not less than 20 min
30.9	DENSITY:940.0-960.0 KG/M ³
30.10	YIELD STRENGTH:15 Mpa
30.11	Couplers for HDPE Joints:Included, approximately 50 Nos.
30.12	Water ingress protection for couplers:Weather proof /Leak proof
30.13	Titghtening mechanism for couplers:compression through Rotation, Thead tightening
30.14	Installation of hdpe includes installation in the ground, inside the hume pipes,across the wall or culvert, inside the trenches and on the cable trays:
31.0	Warning tape
31.1	Description:Printed Polythene warning tape, 50 micron, termite free
31.2	OFC to be printed on Warning tape
32.0	Cable route markers - RCC
32.1	Description:Supply and installation of RCC cable route markers, with custom label as per dimensions and sketch
32.2	Dimensions:Base: 400mm (h) x 300mm (W) x 120mm(W)
32.3	Stem (upper body): 450mm (h) x 300mm (W) x 120mm(W)
32.4	Material :RCC
32.5	Coulour:Yellow / Firozi
32.6	Marking:Engraving on top as directed by EIC
32.7	installation :The cable route markers shall be installed 1.5 feet below the ground and with a PCC base of Providing and laying in position cement concrete of 1:2:4 (1 cement, 2 coarse river sand, 4 graded stone aggregate of maximum size 40 mm). The scope also shall also include cost of digging/excavation of earth upto a depth of 1.5 feet below the ground.

TECHNICAL SPECIFICATIONS FOR CCTV SYSTEM AT GOB

Sl. No.	Description in brief	Unit	Qty.
1	6U Wall mount network Rack - SITC - Confirming to IS 9606-1980 - Front door: Toughened glass 4mm thick - Two cable manager & 1 power distribution board of minimum 4 power outlet. - One or more Fan - Rack consist of standardized multifolded, welded and powder coated sheet steel frame structure. Top and bottom cover along with side panel is screwed onto the front and rear frame which forms the basic structure for the wall mount.	No	3
2	48 port Cat-6 patch panel, Supply & Installation - Standards ISO/IEC 11801, ANSI/EIA/TIA 568 - Tool less, Metal Structure. - Shall support at-6 cable of all types: UTP, FTP, SFTP - Operating life for Jack 2000 insertion or more - Contact material of Jack Copper or copper base alloy - Jack Contact plating 0.8 μ or more Gold / Nickel plating - IDC connector life 200 or more re-termination cycle - DC resistance 20 m Ω , DC resistance imbalance 2 m Ω - Insulation Resistance 100 M Ω - Installation: Shall be mounted inside Network rack and UTP cable shall be terminated in all ports. - Rear cable support with cable guides - Identification / Tagging: Suitable permanent good quality easily readable tag / ferrule must be used at both ends of cable - The connectors shall be compatible as per IEEE 802.3af , IEEE 802.3at , IEEE 802.3bt : "Power over Ethernet"	Nos.	1
3	Cat-6 UTP Cable - SITC - 23 AWG solid bare Pure Copper conductor material, - Termination with weather proof long life tagging - FR-PVC Sheath - Insulation: HDPE - Mutual Capacitance: < 5.6nF/100m - Confirming to : ANSI/TIA 568 C.2	M	600
4	Cat -6 patch cords 1 mtr, Supply & Installation - Pure copper cable material - Gold plated contact of connectors - FRLS/ LSZH insulation	Nos.	32
5	LC-LC patch Cord - 30 Mtr - SITC - single-mode G652D,G657A,G657B- LC-LC, Duplex- Compliant with TIA/EIA-568-C- Return loss: Greater than -55dB- Insertion loss: <0.3dB maximum loss	Nos.	1
6	LC-LC patch Cord - 1 Mtr - single-mode G652D,G657A,G657B - LC-LC, Duplex - Compliant with TIA/EIA-568-C - Return loss: Greater than -55dB - Insertion loss: <0.3dB maximum loss	Nos.	2

Sl. No.	Description in brief	Unit	Qty.
7	24 Port Network Switch with PoE+ & 4 SFP modules of 20Km populated - SITC - Manageable Layer 2 - 24 x Gigabit (1000 Mbps) PoE+ Ethernet ports - 4 x Gigabit Ethernet/SFP ports, Populated with duplex 4 SFP modules of 20Km - PoE power budget: 280 watt or more - MAC table: 16K entries or more - Switching capacity: 45 Gbps or more - Packet forwarding rate: 35 Mpps or more - Surge & Lightening protection for power supply & all ethernet ports shall be available - Rack mount accessories - Comprehensive on-site warranty of Three Years or more	Nos.	1
8	8 Port PoE Network Switch with 2 SFP modules populated - SITC - Managed PoE - Total 10 Port Switch with 8 x 10/100/1000Mbps PoE ports and 2 Giga bit SFP Ports - PoE Budget: 80 Watt or more - Comprehensive on-site warranty of Three Years or more	Nos.	2
9	4MP IP PoE Motorised VariFocal Bullet camera - SITC- Image sensor: 1/2.7", 4 MP or better- Dual Light Night vision - Video Compression: H.265- ONVIF Profile T- Face detection, WDR 120dB, Built in Mic, 2.7mm to 12mm motorised zoom lens, - Resolution 2688(H) x1520 (V),- IR Range of 60 Mtr., Warm Light Range of 60 Mtr- memory slot with support of 256GB or more- Focus: Auto & Manual- IP67- Supply and installation of Suitable Box at camera base- AES 256-bit Encryption, IP/MAC filtering- Alarm IN & OUT- Comprehensive on-site warranty of Two Years or more- STQC	Nos.	4
10	4 MP PoE Bullet Camera - Image sensor: 1/2.8", 4 MP or better - Night vision - Video Compression: H.265 - ONVIF Profile T - DWDR, Built-in Mic - Resolution: 1920 (H) × 1080 (V) - IR Range of 30 Mtr. or more - Supply and installation of Suitable Box at camera base - IP67 - AES 256-bit Encryption, IP/MAC filtering - Alarm IN & OUT - Comprehensive on-site warranty of Two Years or more - STQC	Nos.	20
11	4 MP PoE Dome Cameras 2.8 mm Lens: - Image sensor: 1/2.8", 4 MP or better- Night vision - Video Compression: H.265- ONVIF Profile T- DWDR, Built-in Mic- Resolution: 1920 (H) × 1080 (V)- IR Range of 30 Mtr. or more- Supply and installation of Suitable Box at camera base- IP67- AES 256-bit Encryption, IP/MAC filtering- Alarm IN & OUT- Comprehensive on-site warranty of Two Years or more- STQC	Nos.	6

Sl. No.	Description in brief	Unit	Qty.
12	32 Ch Network Video Recorder with 6 TB x 4 HDDs: - RAID 1, 5, & 6 support, - No. of channels: 32 - features of CCTV monitoring such as video recording, motion detection, video backup etc., and all standard formats of video. - 4 number of 6 TB enterprise grade surveillance HDD shall be supplied along with NVR. - ONVIF profile T - Two or more network interface - Accessories: wireless Keyboard and Mouse of standard make - HDD Interface SATA, - BIS certification - Warranty Three Year OEM warranty - Supply & Installation	Nos.	1
13	43" LED Monitor, - Commercial grade for 24x7 operation, - Heavy duty Wall Mount Bracket with Tilt & 180° Swivel - Dolby Vision / HDR10 - Supply & Installation - OEM warranty: 3 years onsite	No.	1
14	2KVA UPS with 30 min Battery backup, battery rack and necessary cables. SITC of 2 KVA UPS with 60 mins back-up- Efficiency 88% or more- Topology: Double Conversion Online (IGBT-PWM)- Waveform: Pure Sine Wave- Input Voltage Range: 160- 280 V AC (Nominal 230V)- Output Voltage: 230 V AC \pm 5%- Input Frequency: 45 to 63 Hz- Transfer Time: zero (Instantaneous)- Back-up time: 60 mins or more at full load- Shall include batteries, Rack & Links- Two year onsite warranty	No.	1

Scope of this project shall also include following:

- As built Drawings with complete system connectivity.
- Installation, configuration & testing of all the system components.
- Pre-dispatch inspection of material for demonstration of vital specifications of system,
- Training for configuration, operation & maintenance of system with relevant documents.
- Operation & maintenance manuals.
- This also include necessary patch cables & connectors required for interconnection of system.
- Long term stable Ferruling of all the cable termination and Labelling of all active & passive items.
- Complete operation and maintenance instruction manuals. All aspects of system operation and maintenance shall be detailed, including wiring diagrams of all circuits, a written description of the system design, sequence of operation and drawing(s), illustrating control logic and equipment used in the system. Checklists and procedures for emergency situations, maintenance operations and procedures shall be included in the manual.
- Wiring shall be done using ferrules having indelible marking

Sl. No.	Description in brief	Unit	Qty.
<p>Important Conditions:</p> <ol style="list-style-type: none">1. All OEMs involved in this system contract must submit a declaration certificate regarding their genuinity, have their own manufacturing setups and IPR for the hardware & software. Shall not have third party manufacturing from any company blacklisted in India, due to proven backdoor access and data vulnerability.2. The quoted rates of individual items shall be realistic. Individual item rates shall not be abnormally high or abnormally low. The quantities may vary slightly during execution depending on site condition.3. There should be no separate license for life time which is required to perform above mentioned functionalities of each system component.4. Products having better than above mentioned specifications shall be accepted.5. The bidders are requested to read the specifications mentioned above very carefully.			

TECHNICAL SPECIFICATIONS FOR DESIGN, SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF EN-54 CERTIFIED ANALOG ADDRESSABLE FIRE ALARM SYSTEM FOR GOB

S.No	Description	UNIT	Qty.
1	<p>SITC of Analog addressable 2 Loop Fire Alarm Control Panel having 2 loops of 250 addresses, Software for monitorin status of fire alaram panel & devices remotely through network, With 2 pole MCB, 20 mtr Power cable 3 core 2.5 sq. mm, glanding</p> <ul style="list-style-type: none"> - EN-54 certified - Control panel shall be populated with redundant CPU. - Standby CPU shall take over the in case of primary CPU within few seconds, without any manual intervention. - Each loop shall have inherent redundant circuitary, which shall come in line without manual invervention within 1 minute. same shall be indicated. - Loop capability: 250 nos. of Multi criteria detectors or equivlant devices. - Loop Length: 1500 mtr cable length capability, using 1.5 sq.mm shielded twisted pair copper cable. - Ethernet communication with other panels, and with computer for operation & status monitoring with GUI. - Configuration & monitoring software which have license for total two times the panels & other devices being supplied i this scope. - One Relay output module having Eight or more freely programmable, bistable relays, contact rating of 2A or better rating shall be included. - Status indication of panel and all loop cards shall be available at front face - Auto dialing communicator having facility for fast communication withpre-defined number(s) in case of emergency - Dedicated battery backup for 48 hour (normal operation) & minimum 30 min under alarm condition. - Triplicate earthing terminals for safety, shield and signal grounding - Storing the logs of alarms, times and action taken report, min 30,000 logs - In-built buzzer - Large display on the panel shall be preferred - Suitable for Class-A type of wiring and work on positive sequence as per NFPA-72 - Normal power supply failure shall be annunciated audio-visually - MS enclosure for the FACP with front door fitted with acrylic sheet. - Two coat of anticorrosive paint followed by two coat of synthetic enamelled - Shall preferably have a USB memory stick or memory card slot for saving configuration parameters, loading software/ configuration and saving logs. - Seismic qualification - Three year OEM warranty (onsite) 	SET	1

S.No	Description	UNIT	Qty.
2	SITC of Addressable Repeater panel with annunciators from all panels in the network - EN-54 Certified - Active Type, shall be compatible to receive data from FACPs - Easily readable, bright display - MMI shall be the same as the main Controller - Audio & visual Alarms during fire - Display of Alarm & Fault similar to the Main Panel - User authentication - Single point failure in the cable shall not affect the performance and shall intimate the exact location of failure in all Panels - 24Hrs back up time for normal condition and minimum 30 min back-up time for fault/alarm condition, - Three year OEM warranty (onsite)	NOS	2
3	SITC of Intelligent Addressable multi-criteria detector (optical and thermal sensors) complete with standard base & cable gland- EN 54 certified- Intelligent, addressable, - Combination of Smoke detection and heat detection- Shall be able to identify the fires as per EN-54-29 & VDS- Thermal sensor shall be able to detect both maximum temperature Pre-defined (as per standards) and the rate of rise temperature- Inbuilt isolator, Drift compensation facility, - False alarm immunity and a superior signal to noise ratio, Automatic contamination compensation, Un-authorized detector removal detection, Adaptability with surrounding temperature fluctuations, built-in false alarm filtering provision as per EN54, - detection of both smouldering fires and open fires - EN-54-29: type of fires shall be detected- Operating conditions: 15 to +60oC, 10% to 95% RH (non- condensing)- Three year OEM warranty (onsite)	NOS	100
4	SITC of Intelligent addressable Class X type (Style 7), Manual Pull Station Single Action & cable glanding - EN 54 certified - Double action, re-usable, addressable, Loop powered - Shock and vibration resistant, polarity insensitive - LED status indication, in-built isolator, - Operating conditions: 15 to +50°C, 10% to 95% RH (non- condensing) - Three year OEM warranty (onsite)	NOS	6

S.No	Description	UNIT	Qty.
5	SITC of Intelligent addressable Class X type (Style 7), I/O Module with built in dual isolator, 2 inputs and 2 outputs with standard base & cable glanding, This can be substituted with multiple modules, collectively should have 2 input and 2 independent output modules - EN-54 certified - Intelligent, addressable, Class X type, built-in isolator, polarity insensitive - LED status indicator - Optocoupler isolation for input. - Loop powered and actuated by control panel - Contact output: Programmable, fail safe, Bi stable potential free change over contact: 1 set. contact rating 2A	NOS	1
6	SITC of Fire reponse indicators, with cable glanding - EN-54 certified - shall start flashing when the detector in that particular' area / zone has been activated - LED status indicator - Loop powered - Three year OEM warranty (onsite)	NOS	30
7	SITC of Addressable loop powered Sounder / Hooter along with Strobe/ Flasher, in-built isolator, & cable glanding- EN-54 certified- Addressable, loop powered sounder along with strobe- EN 54 certified- In-built isolator- SPL should be minimum 96 dB or more, adjustable SPL- Option of different tones for alarm detection in different floors- should draw minimum power from loop, at least 20 loop powered sounders in the same loop,- Sounder shall be combined with a Flasher - strobe shall be wall/ceiling mounted with 360 deg. Viewing angle- Three year OEM warranty (onsite)	NOS	8

S.No	Description	UNIT	Qty.
8	<p>Supply and Laying of 2 Core 1.5Sqmm FRLS Armoured Cable including all fixing accessories</p> <ul style="list-style-type: none"> - Conductor: 1.5 sq mm, Class-5 flexibility, Stranded (approx 0.25 mm dia strand) Tinned Copper conductor, AS PER BS EN 50288-1 - Insulation: Extruded-PVC TYPE D, FRLS Cable 500 V AS PER BS EN 50290-2-21, Thickness 0.45 mm ± 10%, contrast colour for each core of the pair. - Approx twist per meter: 10 - Shielding: Al Mylar Tape of minimum 0.05 mm thickness with minimum 25% overlap, - Drain wire: 0.5 sq mm, multi strand, Annealed Tinned Copper, - Inner sheath: 0.5 mm Extruded-PVC ST2 (Flexible), FRLS, - Outer Sheath: minimum 0.5 mm Extruded-PVC ST2 (Flexible), FRLS, Rodent repellent additives - Armour: GI round wires - Laying by wall clamping with saddle, max distance between clamps 500 mm. - Ferruling & Lugging (Copper) of each cable termination with documentation. 	mtrs	600
9	<p>SITC of 2 KVA UPS with 60 mins back-up</p> <ul style="list-style-type: none"> - Efficiency 88% or more - Topology: Double Conversion Online (IGBT-PWM) - Waveform: Pure Sine Wave - Input Voltage Range: 160- 280 V AC (Nominal 230V) - Output Voltage: 230 V AC ±5% - Input Frequency: 45 to 63 Hz - Transfer Time: zero (Instantaneous) - Back-up time: 60 mins or more at full load - Shall include batteries, Rack & Links - Two year onsite warranty 	SET	1

S.No	Description	UNIT	Qty.
	<p>Scope of this project shall also include following:</p> <ul style="list-style-type: none"> - As built Drawings with complete system connectivity. - Installation, configuration & testing of all the system components. - Pre-dispatch inspection of material for demonstration of vital specifications of system, - Training for configuration, operation & maintenance of system with relevant documents. - Operation & maintenance manuals. - This also include necessary patch cables & connectors required for interconnection of system. - Long term stable Ferruling of all the cable terminantion and Labeling of all active & passive items. - Complete operation and maintenance instruction manuals. All aspects of system operation and maintenance shall be detailed, including wiring diagrams of all circuits, a written description of the system design, sequence of operation and drawing(s), illustrating control logic and equipment used in the system. Checklists and procedures for emergency situations, maintenance operations and procedures shall be included in the manual. - Wiring shall be done using ferrules having indelible marking 		
	<p>Important Conditions:</p> <ol style="list-style-type: none"> 1. All OEMs involved in this system contract must submit a declaration certificate regarding their genuinity, have their own manufacturing setups and IPR for the hardware & software. Shall not have third party manufacturing from any company blacklisted in India, due to proven backdoor access and data vulnerability. 2. The quoted rates of individual items shall be realistic. Individual item rates shall not be abnormally high or abnormally low. The quantities may vary slightly during execution depending on site condition. 3. There should be no separate license for life time which is required to perform above mentioned functionalities of each system component. 4. Products having better than above mentioned specifications shall be accepted. 5. The bidders are requested to read the specifications mentioned above very carefully. 		

TECHNICAL SPECIFICATIONS FOR MECHANICAL WORKS**Item SI No 1: Seamless Pipe:**

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	Maharashtra Seamless/Jindal/Tata /Equivalent
2.00	Standard	ASTM A 53
3.00	Type	Seamless pipe
4.00	Material	M.S.
5.00	Class & Grade	Schedule 40, Grade A as per ASTM 53 A
6.00	Type of End connection	Beveled
7.00	Pipe Fittings (elbows, bends, reducers etc.) Note: The piping fittings shall be measured along the center line of pipe, and shall be paid at quoted rates of pipes in running meters.	Material as ASTM A 234 WPB, Dimension ANSI / ASME B 16.9, Thickness not less than thickness of pipe.
8.00	Product Marking	Manufacturers name
		Specification No.
		Size
		Grade (A)
		Type (S)
		Test Pressure
		Length
		Heat No.
		Lot No.
9.00	Inspection and Testing	As per approved QAP

Item SI No 2: Wrapping Coating

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	Iwl/STP Ltd/STP Ltd/Dr. Fixit/Equivalent
2.00	Coating Type	Self-adhesive multilayer polyethylene (PE) wrap with corrosion-resistant mastic layers as per IS-10221
3.00	Coating Thickness	2.5–3.5 mm (buried pipes), as per IS-10221
4.00	Service Temperature	–40 °C to +80 °C, as per IS-10221
5.00	Tape Width	As per manufacturer recommendation

Item SI No 3: NRV

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	Audco/Advance/Kirloskar/Equivalent
2.00	Type of end connection	Flanged type
3.00	Type of valve	Swing check type valve
4.00	Model No.	As per manufacturer
5.00	Size	As per manufacturer
6.00	Fluid handled	clear water

Sr. No.	Parameters	Specified by BARC
7.00	Class	PN 1.6 (Test pressure shall be equivalent to class PN 1.6 of gate valve)
8.00	Temperature of fluid	0 - 45 ⁰ C
9.00	Valve installation	Suitable for both horizontal and vertical position
10.00	Applicable Standard	ANSI B 16.34/IS 5312
11.00	Material of Construction	
11.01	Body, Door, Diaphragm	Cast iron, casting grade FG 260 as per IS-210
11.02	Face & seat ring	SS/Leaded tin Bronze, LTB 2 as per IS 318
11.03	Bearing Bushes	SS/Leaded tin Bronze, LTB 2 as per IS 318
11.04	Hinge Pin	SS/HT Brass HT 2, IS 320
12.00	Testing of Valves	Hydraulic test for body and seat as per PN 1.6 rating
13.00	Test certificate	Material test certificate shall be provided by the firm
14.00	Inspection and Testing	As per approved QAP

Item SI No 4: Gate Valve

Sr. No.	Parameters	Specified by BARC
1.00	Suggested make	Kirloskar/Audco/Hawa/Leader/Equivalent
2.00	Type of end connection	Flanged type
3.00	Size	As per manufacturer
4.00	Model No.	As per manufacturer
5.00	Fluid handled	clear water
6.00	Type of spindle	rising type, Outside Screw and Yoke
7.00	Application	service water, fire water
8.00	Applicable Standard	ANSI B 16.34/ IS:14846
9.00	Pressure class	PN 1.6
10.00	Temperature of fluid handled	0 - 45 ⁰ C
11.00	Maximum pressure drop across valve	As per manufacturer
12.00	Valve installation	Suitable for both horizontal and vertical position
13.00	Valve gate position indicator	Required
14.00	Material of Construction	
14.01	Body, Dome, Wedge, Hand wheel	Cast steel
14.02	Spindle	HT Brass Grade HT 2, IS 320

Sr. No.	Parameters	Specified by BARC
14.03	Body seat ring, wedge facing ring, bushes and stem nut	Leaded Tin bronze, LTB 2 as per IS 318
14.04	Testing of Valves at manufacturer works	Open end test - Hydraulic test for body and seat as per PN 16 rating
15.00	Test certificate	Material test certificate shall be provided by the firm
16.00	Inspection and Testing	As per approved QAP

Item SI No 5: Yard Hydrants

Sr. No.	Parameters	Specified by BARC
1	Suggested Make	Winco /Shahbhogilal / Sukan / Safex/ Equivalent
2	Size / Model	63 mm
3	Type	Single headed ,Oblique
4	Spring / washer	Phosphor wire-IS : 7608/ Rubber-IS : 937
5	Material of construction	Gun-metal -As Per IS : 318 GR. LTB2
6	Body	Gun-metal -As Per IS : 318 GR. LTB2
7	Stop vale	Gun-metal -As Per IS : 318 GR. LTB2
8	Instantaneous Female outlet	Gun-metal -As Per IS : 318 GR. LTB2
9	Blank Cap	Gun-metal -As Per IS : 318 GR. LTB2
10	Hand wheel	CI Confirming to IS : 210
11	Spindle	Brass Confirming to IS : 319
12	Seat tightness test	14 bar
13	Body test	21 bar
14	Flow test	900 lpm @ 7 bar
15	Testing / inspection Manufacturers test certificates/ Catalogues	To be attached
16	Referable Standard	IS :5290 Type A
17	Testing and Inspection	BY Client
18	Painting	IS : 5 shade no 536 . The paint shall confirm to IS : 2932
19	Inspection and Testing	As per approved QAP

Item SI No 6: Hose Cabinet (It comprises of Cabinet, Branch Pipe with Nozzle and Fire Hose with Coupling)

Sr. No.	Parameters	Specified by BARC
1.0	CABINET	
1.1	Suggested Make	Winco /Shahbhogilal / Sukan / Safex/Eversafe/Eqv
1.2	Standard	Manufacturers Standard
1.3	Material of Construction	M.S. Sheet of 16 SWG
1.4	Finish	Powder coated both inside & out side
1.5	Material of construction	
1.6	Glass thickness	4 mm
1.7	Size	As per the drawing
1.8	Color	As per IS 5 ,shade no 536
1.9	Marking	FIRE " letters of 80 mm size, on both doors
1.10	Locking arrangement	Built in lock (Glass break type)
1.11	Type	Wall mounted for internal and Stand mounted for External
1.12	GA Drawing	To be attached
2.0	BRANCH PIPE WITH NOZZLE	
2.1	Suggested Make	Winco /Shahbhogilal / Sukan / Safex/Eqv
2.2	Standard	IS 903
2.3	Branch pipe type	Short Branch pipe with male inst. Inlet connection
2.4	Nozzle	IS 903
2.5	Material of construction	
2.6	Branch pipe	Gun metal, IS 318 LTB 2
2.7	Nozzle	Gun metal, IS 318 LTB 2
2.8	Coupling	Gun metal, IS 318 LTB 2
2.9		
2.10	Branch pipe Size	63MM
2.11	Nozzle Size	19MM
2.12	Hydro test pressure	21 Kg / sq.cm
2.13	Flow	900LPM at 7 bar
3.0	FIRE HOSE WITH COUPLING	
3.1	Suggested Make	CRC / PADMINI / NIRMAL/Eqv
3.2	Type	RRL
3.3	Code	IS:636 Type A
3.4	Size & Length	63 mm dia.,30 meters each
3.5	Working pressure	14.6 bar max.
3.6	Test pressure	21.4 bar
3.7	Burst Pressure	Exceeds 35.7 bar. (Shall withstand working pressure of 8.5 bar without leakage)

Sr. No.	Parameters	Specified by BARC
3.8	Complete assembly test (Coupling with hose)	21 bar
3.9	Coil diameter for 30 m length	45cm dia.
3.10	Weight gm/m	425gm/mtr.
3.11	COUPLING	
3.11.1	Suggested Make	Winco /Shahbhogilal / Sukan / Safex/Eqv
3.11.2	General Construction	As per IS 903
3.11.3	End fittings (quick coupling end)	GM heavy quality spring lock type coupling as per IS:903
3.11.4	Material of Construction of Lug	IS :318
3.11.5	Coupling binding	IS : 7608
3.11.6	Quick coupling	Gun Metal
3.11.7	Testing and Inspection	As per approved QAP
3.11.8	Catalogues	To be attached

Item SI No 7: Air Release Valve

Sr. No.	Parameters	Specified by BARC
1	Suggested Make	Leader/Itap/Kirloskar/Bajaj/Eqv
2	Standard	IS 14845
3	Type	Double Function (D/F) Type
4	Pressure class	PN 1.6
5	Material of construction	
5.1	Body	Cast Iron IS:210
5.2	Float for LP chamber	AISI 304
5.3	Float for HP chamber	AISI 304
5.4	LP Seat Ring	Neoprene/EPDM
6	End	Screwed male end/Flanged end (PN 1.6) to suit site condition
7	Inspection and Testing	As per approved QAP

Item SI No 8: Scour Valve

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	Audco/Kirloskar/Leader/Eqv
2.00	Type of end connection	Flanged type
3.00	Size	As per manufacturer.
4.00	Model No.	As per manufacturer.
5.00	Fluid handled	Clear water
6.00	Type of spindle	Non rising type
7.00	Application	service water, fire water
8.00	Pressure class	PN 16
9.00	Temperature of fluid handled	0 - 45 ⁰ C

Sr. No.	Parameters	Specified by BARC
10.00	Maximum pressure drop across valve	As per manufacturer
12.00	Valve installation	Suitable for both horizontal and vertical position
13.00	Valve gate position indicator	Required
14.00	Material of Construction	
14.01	Body, Dome, Wedge, Hand wheel	Gate valves should confirm to ANSI B 16.34/ IS:14846 and of cast steel construction.
14.02	Spindle	HT Brass Grade HT 2, IS 320
14.03	Body seat ring, wedge facing ring, bushes and stem nut	Leaded Tin bronze, LTB 2 as per IS 318
15.00	Inspection and Testing	As per approved QAP

Item SI No 9 :Fire Department Connection

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	AAAG/Equivalent
2.00	Applicable standard	IS:904
3.00	Size	63mm x 2 Nos Inlets
4.00	Type	Collecting Head
5.00	Connection	Female Round Threads 750mm size
6.00	Material of construction	
6.01	Body	Gunmetal, IS:318, LTB
6.02	Male Inlets with NRV	Gunmetal, IS:318, LTB
6.03	FRT Swivel connector	Gunmetal, IS:318, LTB
6.04	Washer	Rubber, IS:937 Type B
7.00	Hydrostatic Test Pressure	21 kgf/cm ² for 2.5 minutes
8.00	Working pressure range	Up to 7 kgf/cm ²
9.00	Inspection and Testing	As per approved QAP

Item SI No 10 :Pressure Gauges

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	H Guru/Baumer/Forbes Marshall/equivalent
2.00	Type	Dial type
3.00	Dial size	Minimum 150 mm Dia.
4.00	Pressure range	0 – 20 Kg/cm ²
5.00	Material of construction – Siphon, cock and casing	SS 316
6.00	Accuracy	±0.5%
7.00	Accessories	
7.01	All fittings, gaskets etc.	To be provided
7.02	Cock valve	To be provided
8.00	Inspection and Testing	As per approved QAP

Sr. No.11: Pressure Sustaining / Relief valve

Sr. No.	Parameters	Specified by BARC
1	Suggested Make	Leader/Itap/Kirloskar/Bajaj/Eqv
2	Standard	As per any IS/ISO stad
3	Type	DI/MS material, D/F Diaphragm type
4	Pressure class	PN 1.6

Sr. No.19: GI Pipes

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	Maharashtra Seamless/Jindal/Tata /Equivalent
2.00	Standard	IS 1239
3.00	Type	Seamless pipe
4.00	Material	M.S.
5.00	Class & Grade	Class-C (Heavy Duty), IS 1239
6.00	Type of End connection	Beveled
7.00	Pipe Fittings (elbows, bends, reducers etc.) Note: The piping fittings shall be measured along the center line of pipe, and shall be paid at quoted rates of pipes in running meters.	Material as IS 1239 , Thickness not less than thickness of pipe.
8.00	Product Marking	Manufacturers name Specification No. Size Grade (A) Type (S) Test Pressure Length Heat No. Lot No.
9.00	Inspection and Testing	As per approved QAP

Sr. No.20: GM Gate Valves

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	Kirloskar/Audco/Hawa/Leader/Equivalent
2.00	Type of end connection	Flanged type
3.00	Size	As per manufacturer
4.00	Model No.	As per manufacturer
5.00	Fluid handled	clear water
6.00	Type of spindle	rising type, Outside Screw and Yoke
7.00	Application	service water, fire water
8.00	Applicable Standard	IS:318 Grade LTB2.
9.00	Pressure class	PN 1.6
10.00	Temperature of fluid handled	0 - 45 ⁰ C

Sr. No.	Parameters	Specified by BARC
11.00	Maximum pressure drop across valve	As per manufacturer
12.00	Valve installation	Suitable for both horizontal and vertical position
13.00	Valve gate position indicator	Required
14.00	Material of Construction	
14.01	Body, Dome, Wedge, Hand wheel	Gun Metal
14.02	Spindle	HT Brass Grade HT 2, IS 320
14.03	Body seat ring, wedge facing ring, bushes and stem nut	Leaded Tin bronze, LTB 2 as per IS 318
14.04	Testing of Valves at manufacturer works	Open end test - Hydraulic test for body and seat as per PN 16 rating
15.00	Test certificate	Material test certificate shall be provided by the firm
16.00	Inspection and Testing	As per approved QAP

Sr. No.21: Split AC

Sr. No.	Parameters	Specified by BARC
1.00	Suggested Make	Voltas/ Carriers/ BPL/ Godrej/ Hitachi/ Daikin/ BlueStar/Equivalent
2.00	Type of AC	Split AC, Inverter type, BLDC (Brushless DC) motors
3.00	Cooling Capacity	1.5 TR
4.00	Model No.	As per manufacturer
5.00	Refrigerant	R 32/ R410A/ R-134A/ R 290/ R 600 A
6.00	Coil material	Copper with protective blue fin anti-corrosion coating
7.00	Rated voltage	230 V, Single phase, 50 Hz
8.00	Rating as per ISEER	5 star
9.00	Casing and capping made of PVC:	Complete covering of pipe between ID & OD units with casing and capping made of PVC.
10.00	Inspection and Testing	As per approved QAP